

University of New Hampshire

## University of New Hampshire Scholars' Repository

---

Faculty Publications

---

2000

### Fisheries Dependence and Social Change in the Northern Atlantic

Lawrence C. Hamilton

*University of New Hampshire*, [lawrence.hamilton@unh.edu](mailto:lawrence.hamilton@unh.edu)

Cynthia M. Duncan

*University of New Hampshire*

Follow this and additional works at: [https://scholars.unh.edu/faculty\\_pubs](https://scholars.unh.edu/faculty_pubs)

---

#### Recommended Citation

Hamilton, L.C. & C.M. Duncan. 2000. "Fisheries dependence and social change in the northern Atlantic," pp. 95–105 in D. Symes (ed.) *Fisheries Dependent Regions*. Oxford: Fishing News Books.

This Book Chapter is brought to you for free and open access by University of New Hampshire Scholars' Repository. It has been accepted for inclusion in Faculty Publications by an authorized administrator of University of New Hampshire Scholars' Repository. For more information, please contact [nicole.hentz@unh.edu](mailto:nicole.hentz@unh.edu).

## **FISHERIES DEPENDENCE AND SOCIAL CHANGE IN THE NORTHERN ATLANTIC**

Lawrence C. Hamilton, University of New Hampshire  
Cynthia M. Duncan, University of New Hampshire

### **Authors' draft. Citation:**

Hamilton, L.C. & C.M. Duncan. 2000. "Fisheries dependence and social change in the northern Atlantic," pp. 95–105 in D. Symes (ed.) *Fisheries Dependent Regions*. Oxford: Fishing News Books.

### **INTRODUCTION**

Fisheries-dependent regions of the northern Atlantic have experienced rapid social changes in recent decades, driven partly by globalization and other large socioeconomic forces, and partly also by shifts in ocean ecology. Among the most notable social changes has been a widespread substitution of technology for labor, so that fisheries-related work tends now to support fewer people. Beset by a shrinking demand for labor, and by variations in ocean production, the population of many small fishing communities has declined and grown older. Many fishing communities have also become less fisheries dependent, and developed more diverse economies—commonly based on expansions of tourism, service and public-sector jobs. Families connected to fishing communities have diversified too, in their fishing and non-fishing activities.

This chapter looks at the changing face of fisheries dependency in the northern Atlantic. We draw on database work and individual interviews done for a broad comparative study of fishing communities across the northern Atlantic—from Norway to Iceland, Greenland, Newfoundland and Maine (Hamilton, Duncan and Flanders 1998a, 1998b). Despite many differences, these places share a 20th-century history of fisheries dependence, particularly on cod. Over the past decade, all of them experienced crises related to declines in cod and other economically important fish populations. As they struggle to cope with these crises, governments face the challenge of encouraging more sustainable development, within constraints imposed by rocky, cold-ocean landscapes. Individuals and families face challenges too, and strive to adapt through changes in their own choices and behavior.

We begin by examining the distribution of "fisheries dependence" itself, and how this varies across hundreds of North Atlantic communities. Next, we describe the general relationship between fisheries dependence and population decline. Finally, focusing on case-study material from several Northwest Atlantic communities, we conclude with a look at adaptation and social change from the perspectives of individual families.

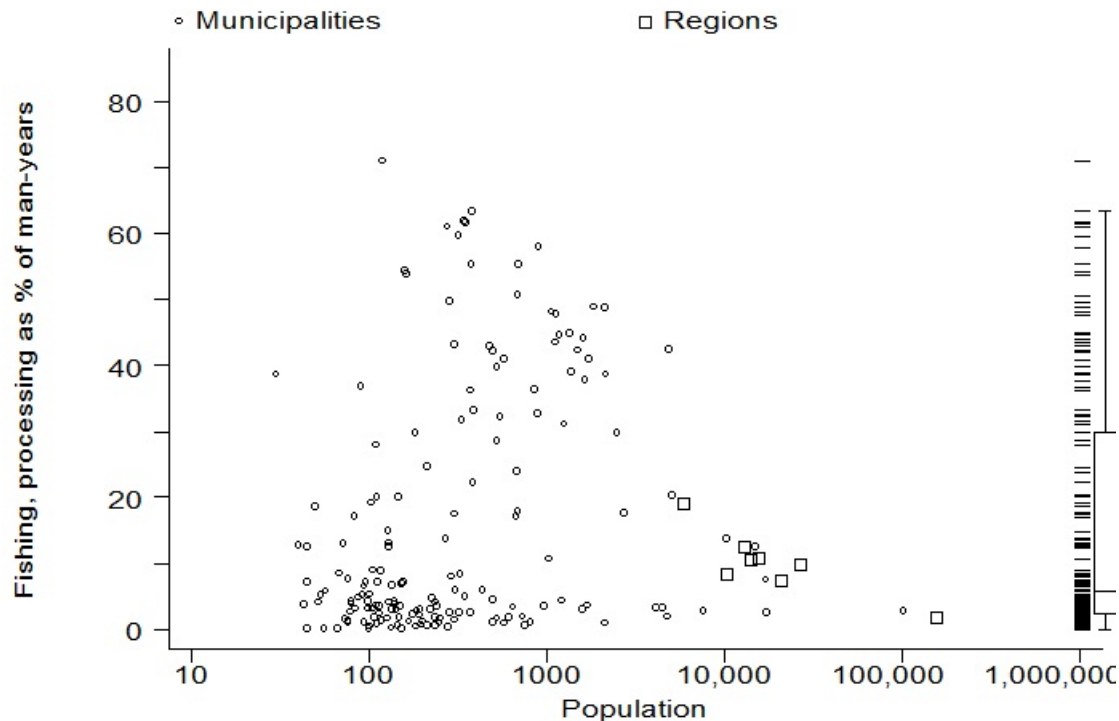
### **SIMPLE MEASURES OF FISHERIES DEPENDENCE**

The total economic impact of fisheries can sometimes be estimated from national-level data, as done for example in Arnason's (1995) book on Iceland. At the level of individual communities,

however, limited data and more permeable boundaries make the total economic impact difficult to define. Employment-based statistics, such as the percentage of fishing-related jobs, offer a simpler alternative for measuring fisheries dependence at the community level. Relative employment corresponds reasonably well to the popular understanding of what “fisheries dependence” means.

To compare fisheries employment across many communities, we must rely on national statistical agencies. Such agencies differ from one country to the next, however, in their variable definitions, units of analysis, timing and accuracy. Community-level cross-national analysis therefore risks comparing apples with oranges. A graphical, exploratory analytical approach helps us to see the similarities across countries, despite differences in their data.

**Figure 1** graphs the joint distribution of fisheries dependence and community size in Iceland. Two levels of analysis are shown: small circles represent 169 individual municipalities, while squares denote the country’s 8 larger geographical regions. The vertical axis shows fishing plus fish processing, as a percentage of the total man-years of work reported for that municipality or region in 1994. The horizontal axis, population, employs a logarithmic scale. Icelandic municipalities range in size from 30 to about 100,000 people, and in fisheries dependence from 0 to 71 percent. Icelandic regions range from 6000 to 150,000 people, and from 2 to 19 percent fishing. The distribution of fisheries dependence across municipalities is shown in a one-way scatterplot and boxplot at the right margin of Figure 1.

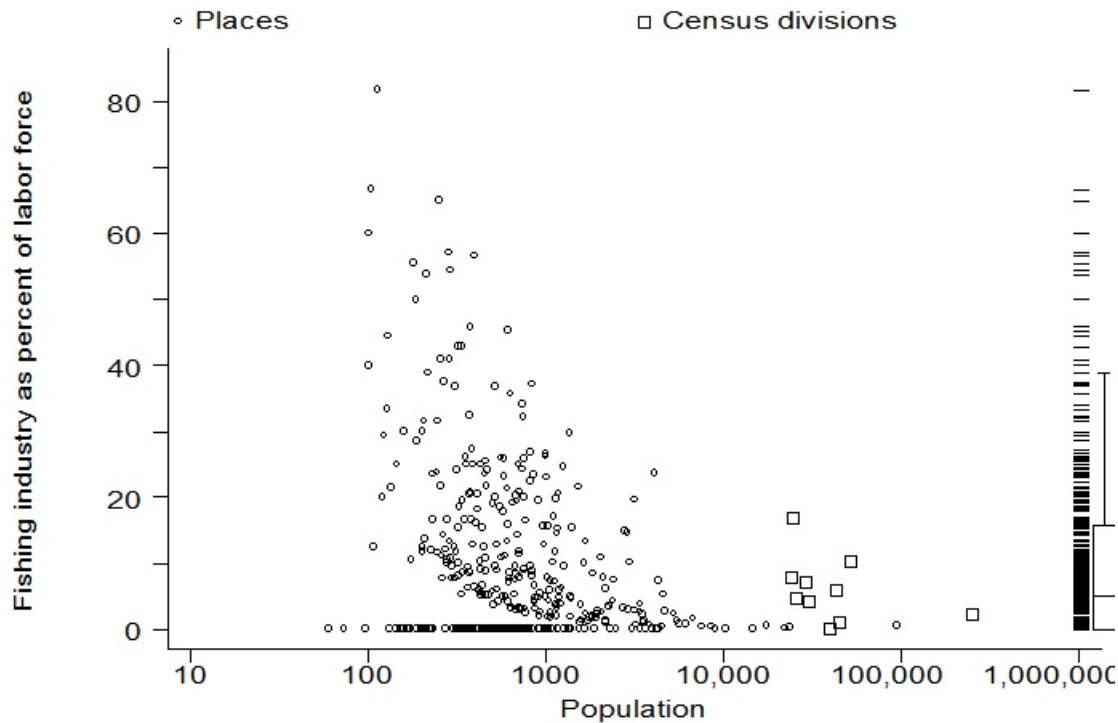


**Figure 1:** Fisheries dependence (percentage of man-years) vs. population of 169 municipalities and 8 regions in Iceland, 1994.

Figure 1 reveals no natural distinction between “fisheries dependent” and “other” communities. Insofar as any fishing exists at all, fisheries dependence is a continuous dimension. That is, it should be realistically understood as a matter of degree, rather than defining a distinctive type or category of community. The boxplot emphasizes this variable’s positive skew: most municipalities possess low values, and the median equals 6%; but there are no gaps as the distribution thins out towards much higher values. We have no reason to expect that other possible measures of fisheries dependence, based upon income for example, would lead to a substantively different result.

Figure 1 also reveals something about scale. Many Icelandic municipalities are small, and exhibit correspondingly wide variation—the gain or loss of a few workers affects their percentages. Icelandic geographical regions, on the other hand, are comparatively large, and show a narrower range of fisheries dependence. Some regions are nevertheless distinctly more fisheries-dependent than others. Among the regions, but not among municipalities, we see a strong negative correlation ( $r = -.86$ ) between fisheries dependence and log population. In these data, scale matters: fisheries dependence has a different distribution, and also different correlations with other variables, depending on which level we use. Figure 1 shows only two levels, municipality and region, but others such as county or nation could be considered as well. Because social-science theory often does not specify scale, and sub-national units are defined differently in different countries anyway, researchers should check routinely whether their findings hold true across different scales or levels.

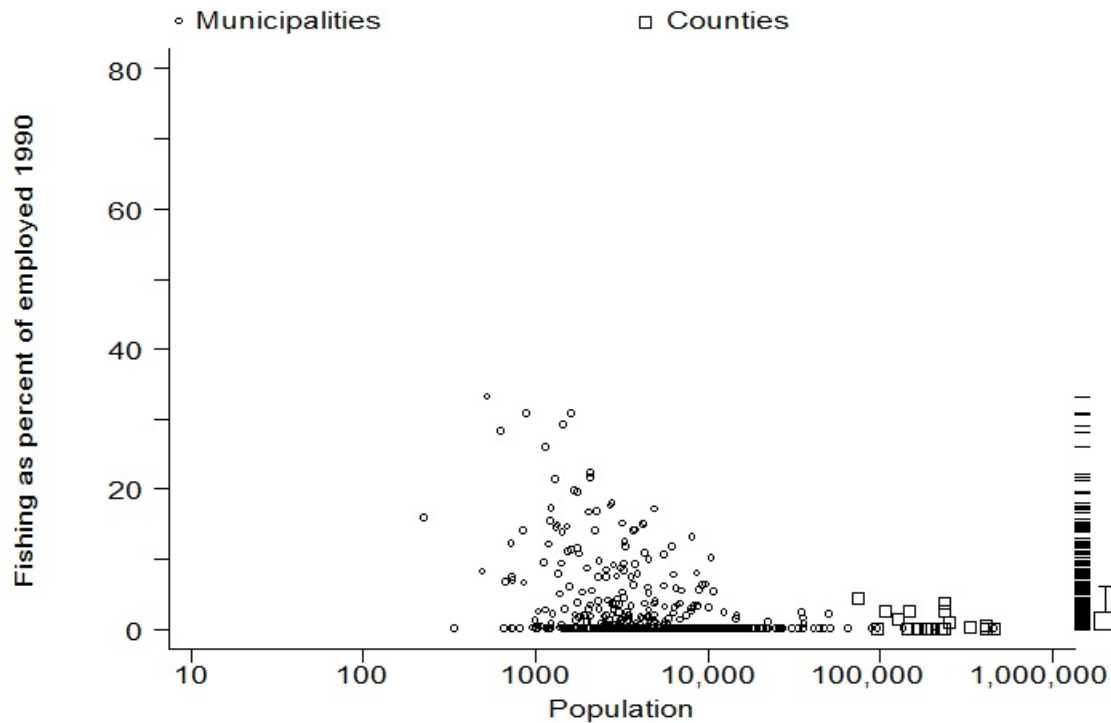
Cross-national comparisons provide another avenue for replication. **Figure 2** employs data on the Canadian province of Newfoundland. This scatterplot’s format resembles the Iceland graph in Figure 1, but many of the details are different. Following Canadian Census conventions, we here measure fisheries dependence as the percentage of the labor force in the fishing industry. Census “places” (CMA or CA), the smaller units of analysis, are shown as circles. The squares in Figure 2 stand for Newfoundland’s ten Census divisions (CD). The peculiar bifurcation among points at lower left in Figure 2 is an artifact, resulting from Statistics Canada’s practice of rounding off the values it reports from low-population places.



**Figure 2:** Fisheries dependence (percentage of labor force) vs. population of 384 Census places and 10 Census divisions in Newfoundland, 1991.

Figure 2 supports some of the same general conclusions drawn from Figure 1. Fisheries dependence varies more widely among small places than among large ones; and among both it follows a continuous, positively skewed distribution with no natural cut-points. We see a mild negative correlation between dependence and log population at both the smaller and larger scales ( $r$  equals  $-.32$  and  $-.39$ , respectively).

A similar graph based on 454 Norwegian municipalities, and 19 counties, appears in **Figure 3**. Norway, with almost 4.4 million people, is an order of magnitude larger than Newfoundland (563,000) or Iceland (270,000). Norwegian municipalities tend to be correspondingly larger than their Newfoundland or Iceland counterparts, and they exhibit a narrower range of fisheries dependence—from 0 to 33% of the total number of employed persons. Figure 3, like Figures 1 and 2, depicts fisheries dependence as a continuous dimension. It correlates negatively with log population, whether we choose municipalities ( $r = -.37$ ) or counties ( $r = -.43$ ) as units of analysis.



**Figure 3:** Fisheries dependence (percentage of employed persons) vs. population of 454 municipalities and 19 counties in Norway, 1990.

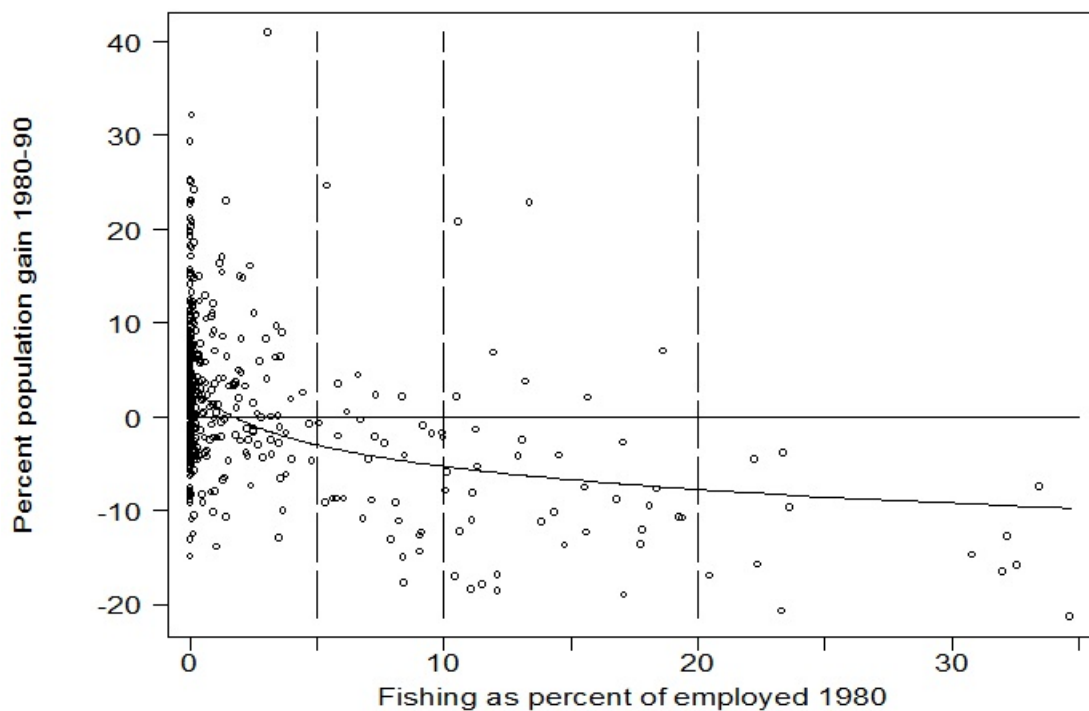
The boxplot at right in Figure 3 shows greater skew among Norwegian municipalities than we saw among their counterparts in Iceland or Newfoundland. Proportionately more Norwegian municipalities have zero or very low fisheries dependence. Our dependence measures show increasing skew as we look from Iceland to Newfoundland to Norway. This could be a systematic effect of scale: within-country analyses have established that both the mean and the variance of fisheries dependence decline with community size. If the same principle holds true between countries, then we should expect Norway's larger municipalities to have lower levels of fisheries dependence, and less variation. On the other hand, Norway has a more diverse economy than Iceland, and as a nation it depends less upon fishing. Historical, political, economic and geographic factors—including North Sea oil—could explain differences in fisheries dependence. Moreover, the differences might be methodological as much as substantive. We have different definitions of fisheries dependence, differently-defined analytical units, and different degrees of accuracy, in each of the three graphs.

Explaining the differences we find between countries tends to be problematic. Because countries differ in so many ways besides whatever is of most interest to the researcher, there tend to be many alternative explanations. When similar findings begin to emerge from community-level analyses in different countries, on the other hand, this provides increasingly persuasive evidence for generalization. The next section examines one area of similarity among many fisheries-dependent communities.

## POPULATION CHANGE

Over the past decade, while their countries grew, many fisheries-dependent regions of the northern Atlantic have been shrinking. Outside of the capital region around Reykjavík, and a few other population centers such as Akureyri, Iceland's fisheries-dependent rural communities have tended to lose population in the 1990s. In Newfoundland, populations of the most fisheries-dependent regions leveled off and began declining during the 1980s. Even Newfoundland's capital region has lost population since the 1992 codfish moratorium, making Newfoundland the only Canadian province with negative growth. Net outmigration caused the Faroe Islands population to fall nine percent between 1989 and 1995. In South Greenland, several former cod-fishing municipalities have experienced low or negative growth since the collapse of the cod fishery around 1992, while other parts of Greenland grew rapidly (Hamilton and Haedrich 1998).

Most of these population declines occurred following ecological changes: the decline of key finfish species that were subjected to postwar overfishing. In the Northwest Atlantic, for example, establishment of 200-mile economic exclusion zones around Canada, Greenland and the U.S. in the late 1970s inspired an era of government-subsidized local fisheries expansion, followed by stagnation and then crises by the late 1980s/early 1990s, as the targeted groundfish populations collapsed. In the Northeast Atlantic, Norwegian herring catches peaked in the 1950s, then suffered collapses in 1956–63 and 1968–72. Subsequent crises affected Norwegian capelin and cod stocks in the late 1980s. Figure 4 plots the relative change in population of Norwegian municipalities, 1980–90, against their degree of 1980 fisheries dependence. As a regression curve shows, the greater the fisheries dependence, the greater the mean population decline.



**Figure 4:** Population gain or loss vs. fisheries dependence of 454 municipalities in Norway.

Like Figures 1–3, Figure 4 treats fisheries dependence as a continuous dimension. But the observation that fisheries-dependent communities have tended to lose population would still emerge clearly if we had used instead some categorical definition of fisheries dependence, whether based on a 5%, 10% or 20% cut-point (indicated by dashed lines). Similar negative relationships between fisheries dependence and population change can be observed elsewhere, at both smaller and larger sub-national scales.

Outmigration, particularly by young adults, is the obvious immediate cause of population declines. Indeed, a steady flow of outmigration was stemmed temporarily in Newfoundland when the Canadian government promoted fishing as a rural development strategy (Schrank 1995). But a less obvious dynamic has also been at work. Until recently, fisheries-dependent regions tended to have relatively high birth rates that more than compensated for a continual stream of outmigration. During the modern fisheries crises, outmigration has increased, but at the same time birth rates have tended to fall. Birth rates in fisheries-dependent communities are now closer to national levels, so they no longer buffer the effects of outmigration. One result is that many fisheries-dependent communities have changed, over a short period of time, from “young” places to “old” ones (Hamilton and Otterstad 1998).

While the demographic composition of fishing communities has changed, the lives of their residents have been changing too. In the following sections we turn to material from case studies conducted in Newfoundland and Maine. Interviews with residents in two small “traditional” fishing communities illustrate some of the social transformations now taking place.



## NEWFOUNDLAND'S GREAT NORTHERN PENINSULA

Outports (fishing villages) along the Great Northern Peninsula in northwest Newfoundland have undergone dramatic changes in recent decades (Sinclair 1985; Felt and Sinclair 1995; Palmer and Sinclair 1997). As recently as the 1960s both fishing and everyday life were traditional. People lived off the sea and land following seasonal patterns, relied on family members for social support, and were virtually cut off from the outside world when ice covered the bays during winter months. Only about 10 percent of homes had indoor plumbing with hot and cold water. Children attended one-room schools organized by religious affiliation. Many dropped out before completing high school, and the majority of people were illiterate.

World War II and confederation with Canada in 1949 began pulling rural Newfoundland out of its isolation. New public assistance—primarily family allowances for each child, and unemployment insurance—brought greater economic security and introduced cash to the economy. Although they brought improvements in education and health, the new social support programs also helped to maintain many of the seasonal patterns associated with the old subsistence way of life, instead of launching a new modern era. Fishermen still pieced together a living from season to season. They hunted seals and caught lobsters in the spring, then fished for cod and herring in the summer and early fall. After confederation, they could draw unemployment benefits in the winter, instead of cutting trees for a regional paper mill. But they also continued to mend traps and nets, hunt and cut wood on the Crown lands for family needs as they always had. Sinclair (1985:48) describes a world where fishermen and their families, relying on cod, salmon, herring and lobster, were “resigned to a life of unchanging toil....”

The big changes in outport life came during the 1960s, beginning with the new road in 1961 that connected outports along the Peninsula and the introduction of electricity. As a forty-five year old recalls:

“All of a sudden, things just completely changed, I mean there was actually an unbelievable change in the area here over a 10-12 year period. The area just went from a real old world place—isolated—to not so isolated.... Coastal boats used to come in once a month or something, and that was it, right? So then the road came through and then we got electricity. That was in the later part of sixties.... I can remember studying at my parents’ on a lamp, wondering if it would last to finish some paper.”

Even people born in the 1950s and 1960s have personally experienced a traditional way of life in their communities. They grew up fairly isolated, with little money and few conveniences. This baby-boomer (postwar) cohort of fishermen on the Great Northern Peninsula can remember when the first car arrived, and who had the first television or generator. Fertility has changed, as we noted earlier. Whereas their parents grew up in families of ten and twelve children, these younger fishermen grew up in families of four or five and now often have just two children of their own. Human capital has changed dramatically as well. Their parents dropped out of school in grade six or seven, having barely gained minimal reading and writing skills, but most of the younger adults

we have interviewed not only finished grade twelve but attended college or had some additional post-secondary training in a trade. In just one generation, fishermen and their families have “modernized” in many respects.

But these fishermen have also seen a dramatic transformation of their fishery. Sinclair and Palmer conducted richly detailed research, tracking the transformation of the Peninsula’s fleet from a small open-boat fishery to a more diverse fleet including mid-sized gillnetters and longer draggers. In 1962, three of the open-boat fishermen rented a Nova Scotia longliner. In 1963 four men in our study outport built the first of the new, larger boats on the Peninsula. By 1968 there were fifty on the coast (Sinclair 1985:61). During the 1970s, these skippers converted their gear from gillnets to trawlers. With government assistance, fishermen upgraded their gear, bought bigger boats, and many began to go after shrimp. Within a few years they began to trawl for cod as well, and expanded their range and their time fishing. During what Palmer and Sinclair (1997) refer to as “the glory years” (1982–87), the fleet and catch grew phenomenally.

Although the first dragger skippers began to think of themselves as “businessmen,” many of them also fished hard, beyond what they knew the resource could support. In many cases, they fished their legal catch and then also an unreported or “under-the-table” catch of equal size. They fished nonstop.

“You know, he would come in with a boat load of fish, part of the 100 thousand or 50 thousand or whatever. He’d write it down on the receipt [as] 20 thousand. The rest of it went under the table. Paid cash for it. I mean, there was no way in catching the quotas, right? If the government put out a quota of 10 million pound, I’d say there could have been 30, caught. That’s what happened to the fishery.... You come in, you go home for the hour, have a wash or something to eat and, I couldn’t say you lied down.... Back aboard the boat and gone again.”

When new regulations to reduce effort were introduced in the 1980s, fishermen resisted by lining their nets with smaller-size mesh (Palmer and Sinclair 1997). They also discarded tremendous bycatch. Every man who fished on a dragger during this period recounts seeing baby redfish and cod cover the sea when they dragged for shrimp. Introduction of the Nordmar grate in the early 1990s helped reduce this waste, but in addition attitudes began to change, especially among the younger men.

“If my generation were the skippers, if we were to get into the fishery, you know, and this developed the fishery now, we wouldn’t do what, what they done.... This was the older generation.... They were used to working and they didn’t know no better. I mean they weren’t educated people by any means. They didn’t really know anything, only fishing.... They couldn’t—they wouldn’t stop and go for a holiday or anything. Or, just stay home. And—they didn’t realize, I think, what they were doing, either.”

Newer generations of fishermen have finished grade 12 and perhaps attended college. They have not only the forestry, carpentry and engine-tinkering experience of their fathers and grandfathers,

but also technological know-how. This human capital gives them better prospects of finding good jobs elsewhere than their fathers might have had.

The Sewell family has lived in their Newfoundland outport for several generations (all names have been changed to protect privacy). Bob Sewell, now in his sixties, was one of the first to get a longliner and then a dragger. Bob's father was a fisherman and his parents had eleven children. Bob had dropped out of school in grade six and gone right into the woods to work for the big lumber company with other young boys in the fall and winter. By spring he was sealing and then lobstering, and in the summer he fished out of a dory using hook and line to get cod. After twelve years he upgraded to an open boat with a motor, still using hook and line. In 1949, when he was nearly twenty, Newfoundland joined Canada, and many of the Canadian social welfare benefits became available to the Sewells and their neighbors. They saw cash for the first time, and could get "child allowances" for each of their children—an incentive for maintaining patterns of high fertility in these remote communities where living was hard.

But Bob and his wife Mary had only four children, and when those children were still toddlers, Bob invested in one of the outport's first larger boats. He switched to using gill nets. Within a few years, Bob moved up to an even larger boat and was one of the first to adopt the otter trawler dragging gear in the late 1960s. Several year later he bought an even larger boat—the one he fishes now. During the "glory days" he made a lot of money, and the family lives in a beautiful house he built himself. Bob and Mary's oldest son, Jeffrey, fished alongside his father as he went through secondary school, and later graduated from college with a degree in political science. Their younger son also went to college, and is now a pharmacist in Labrador. Both daughters finished college. One married a fisherman, and now is a teacher in the outport. The other married and moved away, and works as a legal secretary in Nova Scotia. Jeffrey expects to inherit Bob's boat and permits in a few years, although currently he both fishes with him as a shareman and has his own small open boat from which he works lobsters and some new experimental fisheries.

Today Jeffrey and his wife Susan have two children, a son who loves to go out with his father or grandfather, and a daughter who lives in her books. Susan, also a college graduate, does bookkeeping for local businesses. Jeffrey takes a leadership role in the union that represents fishers using all gears and boat sizes, and also the workers in the fish processing plant. He supports policies that would buy out the more traditional part-timers and leave "core" fishermen like himself fishing year-round, as their chosen profession. Susan is active in the school and on the historical commission, and Jeffrey plays "gentlemen's hockey" with other men at night out at the rink. They both contribute to the social capital in their outport community as volunteers. Jeffrey represents a new generation of fishermen, business and even "career minded," valuing his independence, but recognizing the role regulators need to play. He has chosen to stay home and fish when he had other options.

## DOWNEAST MAINE

Compared with Newfoundland outports, the coastal communities of Downeast (northeast coastal) Maine offer more options for non-fisheries employment. Still, alternative economic opportunities are scarce. Many working residents in the Maine communities we have studied either depend directly on fishing, or on the tourism and retirement population drawn by the sea and attractions of fishing ports. Here too, ecological changes involving fish stocks have coincided with social changes that are transforming everyday life, including the human capital of the fishermen and the social capital of the communities.

Even the most rural parts of Maine have changed dramatically over the last several decades. Our research site, Washington County, is still the poorest and least densely settled, but after four decades of population loss, population grew by 2.7 percent between 1980 and 1990. The proportion of residents with high school degrees increased from 33 percent in 1952 to 73 percent in 1990. Poverty declined from 40 percent in 1960 to 19 percent in 1990. In the county as a whole, over 30 percent worked in manufacturing in the 1950s and 1970s, but this sector had shrunk to 17 percent by 1990. The proportion in fishing, agriculture and forestry stayed about the same over these decades—around 8 percent. The decline in manufacturing jobs was made up largely by growth in the service sector, as has happened across the rural U.S. These changes, which have implications for fisheries, are reflected in the life histories and decisions about work and community of long-time residents.

Frank Powell, now in his late twenties, grew up in a small fishing community. He is the grandson of fishermen and the son of a welder and homemaker. When he finished high school in the late 1980s, he went away to college in Portland, where his four siblings were in school or working, to study to be a high school teacher. But he was restless in the city and unhappy with his teaching apprenticeship. As a boy, he had loved fishing, and would beg the fishermen to take him out. In 1990, when he was in his early twenties, he dropped out of college and returned home, encouraged and mentored by an older cousin for whom he had fished. He bought an old boat and got into dragging for scallops, quahogs and urchins. Within two years he upgraded to a newer, longer fiberglass boat, raising his investment from about \$20,000 to about \$70,000.

He now fishes year-round, going after quahogs in the summer when the market is good, and for scallops and sea urchins in the winter. He is active in fishing politics, looking out for the interests of fishermen in the region, and is involved in shaping policies that affect the species he fishes and the gear he uses. He has chosen fishing as a profession, and he recognizes that he needs a sustainable resource to continue:

“I am hoping we can get a sustainable fishery.... That’s why I got involved in the fisheries management, to keep it so we will have something there. Bigger ring sizes for scallops, bigger mesh on the drags, to let the smaller ones through it. And to try to get rid of some of the pirates on the ocean and try to sustain an urchin fishery....”

Frank respects the experience of the older fishermen—he can name several who have been an inspiration to him. But he also recognizes that they do not have the patience, or tolerance, for regulations the way the younger fishermen do. He is also prepared to diversify, to meet opportunities to fish new species when they arise. He would like to see all species have a permit and license system that lets younger guys get in. Frank and his young wife, also a well-educated native who chose to stay, are close to family and active in community affairs. In many respects, Frank, like young Jeffrey Sewell, represents a new cohort of fishermen—business-minded, community-minded, and prepared to comply with regulations they help develop, that will maintain a sustainable fishery in which they can make a decent year-round living.

## CONCLUSION

When we make comparisons across regions or communities, fisheries dependence appears as a matter of degree, rather than denoting a distinct category or type of place. The level of fisheries dependence, defined in terms of relative employment, tends to be lower among larger communities or regions. Smaller places, in contrast, range from zero to quite high levels of fisheries dependence. The dependency of most places has declined in recent decades, as fisheries become less labor-intensive and less reliable, and also as rural economies become more diverse. The most fisheries-dependent places tend to be losing population, particularly young adults.

These findings reflect a modernizing fishing industry, in which new technology means that fewer people are needed to “man” a boat and catch large amounts of fish. They furthermore reflect adaptations to the hard times brought by ecological crises, which occurred after too many fishermen overfished with the new technology. But the demographic changes also represent a more general modernization that includes declining fertility, closer ties with global markets and trends, and increased educational attainment among fishing-community residents. Our interviews found even the nominally traditional small-community sector changing. Some of those who remain in this sector represent a new generation of more business-oriented and technologically-skilled fishermen. Among this group we also heard more expressions of ecological awareness, and of the need for sound management policies to protect the resource.

Times are hard in many fisheries-dependent communities because key stocks have been overexploited, leading now to lower quotas, closures and access restrictions. The inherent uncertainties in depending on a natural resource are compounded by uncertainties from the global economy, and often, by unpredictable fisheries management policies. Many people have left rural villages, and some of those who stay now rely on government assistance for much of their income. Nonetheless, a good living can still be made by others. In our study communities, we find younger entrepreneurs choosing fishing as a profession. They are adopting new technology, watching global markets, trying new species and engaging in management debates and policy formulation.

Analysts and policy debates sometimes contrast small-scale, community-based “traditional” fisheries with more industrial, trawler-based fisheries that range far offshore. Smaller-scale fisheries are widely viewed as essential to small-community survival, and perhaps the key to sustainable resource use. Industrial fisheries, on the other hand, appear simpler to regulate. They are valued for their ability to provide industrial-level year-round wages, and to generate regional or national export earnings. Recent changes in small fishing communities have complicated this picture, however. Elements of small-community fisheries have become less traditional, more professional, and at the same time more technologically capable of rapidly affecting resources. Small communities now contain both an older, more traditional inshore group and the newer, more professional fishermen who have invested in boats that can fish some distance offshore. Those in the more professional group are usually kin or neighbors of the others, so their disagreements might be muted in public to avoid dividing the community. They are nevertheless competing with each other, and with the larger corporate fleets as well. No one wants to return to the old subsistence days of relentless toil in a truly traditional fishery; nor does it seem desirable to abandon hundreds of fishing communities as casualties of modernization. Perhaps the range of social changes now occurring can be harnessed by policies that support a new generation of core fishermen—educated, engaged in their industry and community, and choosing to stay and fish rather than migrate.

## REFERENCES

Arnason, R. 1995. *The Icelandic Fisheries: Evolution and Management of a Fishing Industry*. Oxford: Fishing News Books.

Felt, L.F. and P. R. Sinclair (eds.). 1995. *Living on the Edge: The Great Northern Peninsula of Newfoundland*. St. John's, Newfoundland: ISER

Hamilton, L. C., C. M. Duncan and N. E. Flanders. 1998a. "Management, adaptation and large-scale environmental change." Pp. 17–33 in D. Symes (ed.) *Property Rights and Regulatory Systems in Fisheries*. Oxford: Fishing News Books.

Hamilton, L. C., C. M. Duncan and N. E. Flanders. 1998b. "Northern Atlantic fishing communities in an era of ecological change." *Nor'easter*.

Hamilton, L. C. and R. L. Haedrich. 1998. "Climate, ecology and social change in fishing communities of the North Atlantic Arc." Paper presented at the International Symposium on Polar Aspects of Global Change, Tromsø, August 24–27.

Hamilton, L. C. and O. Otterstad. 1998. "Demographic change and fisheries dependence in the northern Atlantic." *Human Ecology Review* 5(1):24–30.

Palmer, C. T, and P. R. Sinclair. 1997. *When the Fish Are Gone: Ecological Disaster and Fishers in Northwest Newfoundland*. Halifax, NS: Fernwood Publishing.

Schrank, W. E. 1995. "Extended fisheries jurisdiction: Origins of the current crisis in Atlantic Canada's fisheries." *Marine Policy* 19(4):285–299.

Sinclair, P.R. 1985. *From Traps to Draggers: Domestic Commodity Production in Northwest Newfoundland, 1850-1982*. St. John's, Newfoundland: ISER.

## ACKNOWLEDGMENTS

This research has been supported by a grant from the Arctic System Science program of the U.S. National Science foundation (OPP-9515380), and by a National Research Initiative grant from the Cooperative State Research, Education, and Extension Service of the U.S. Department of Agriculture (95-37401-2019). Oddmund Otterstad provided the Norway data shown in Figures 3 and 4.