

FROM POLICY INSTRUMENTS TO ACTION ARENAS: THE RIGHT TO SELF-GOVERN UNDER CONDITIONS OF SOCIAL-ECOLOGICAL CHANGE IN THE NOVA SCOTIAN LOBSTER FISHERIES

Barnett, Allain J.¹

April 29, 2013

ABSTRACT

To govern the commons, states often focus on structures or instruments, such as delegated co-management or tradable quotas. This research argues that this emphasis often presents a trade-off with making investments into socially just action arenas. I revisit the case of the Port Lameron groundfish and lobster fishery in Southwest Nova Scotia, Canada, originally explored by Elinor Ostrom in *Governing the Commons* (1990) based on research by Davis (1984). In the spring and summer of 2012, I conducted ethnographic field research consisting of participant observation, face-to-face surveys, and semi-structured interviews. I pay particular attention to how Ostrom's design principles have interacted and changed over time, using primary literature from Maine as a counter-example. The results of this research illustrate the fragilities of this system, and provide a dynamic application of Ostrom's design principles. In particular, I show that how the combination of a lack of recognition of customary institutions and weak collective-choice arrangements have led to rules that are not congruent with local conditions. These interactions are mutually reinforcing, as incongruent rules are a disincentive for harvesters to participate in decision-making, which reinforces the need for strong top-down governance. The erosion of trust among harvesters, associations, and the state has led to a governance system that is rich in rules and monitoring, but lacking effective procedures to develop harvesting strategies that meet the sustainability goals of the state and livelihood goals of fish harvesters. Recent attempts by harvesters to form new associations to "take back the industry" highlight the attempt to re-center the commons around socially just action arenas rather than policy instruments.

Keywords: common pool resources, collective action, justice, social-ecological systems, fisheries, Atlantic Canada,

The authors agree to allow the Digital Library of the Commons to add this paper to its archives for IASC conferences.

¹ Arizona State University
Center for the Study of Institutional Diversity
School of Evolution and Social Change

INTRODUCTION

More than 20 years after its publication, the insights from *Governing the Commons* (Ostrom 1990), have stood the test of time. While much of this work has been updated with new understandings from a variety of fields in the natural and social sciences (e.g., Agrawal 2001; Ostrom 2007; Cox, Arnold, and Villamayor-Tomas 2010; Anderies, Janssen, and Ostrom 2004), commons researchers have convincingly argued for a third way beyond state or property-based methods of governing the commons. This third way involves the consideration of the social norms, and formal and informal rules developed and monitored by resource users. While Ostrom's Design Principles have endured in the academic commons, what has happened to the cases originally discussed in *Governing the Commons*?

This study re-evaluates one case study from Ostrom (1990) providing a dynamic dimension to the design principles as they are re-scaled, reconstituted, and respond to pressures and stressors over time. While cases are continually added to lists of self-governed or co-managed common pool resources (CPRs), few studies have revisited these cases. In a similar study, Brewer (2012b) revisited Acheson (1988) Lobster Gangs of Maine and demonstrates the utility of this type of analysis in two ways. First, the study demonstrates that tradeoffs are inherent in policies designed to support the livelihoods and self-governance of communities harvesting a CPR. Brewer (2012b) shows how state policies designed to support local self-governed lobster fishing communities re-scaled the decision arena in which lobster harvesters operate and reconfigured captains as political subjects seeking to advance their personal interests. Thus, Brewer (2012b) demonstrates an inherent tradeoff in the decision-arena between the recognition of locally derived institutions and the endurance of the communitarian basis on which these institutions were originally conceived.

Second, CPR case study revisits can expand on previous understandings by viewing the original case through a different theoretical lens. Brewer (2012b) applies insights from political ecology and post-structuralism to Acheson (1988), showing the importance of the politics of scale, social differentiation among resource users, and subjectivities that emerge from political decisions. Given the call for "strong interdisciplinary science of complex multilevel systems" to diagnose social-ecological systems (Ostrom 2007, 15182), studies such as this are highly beneficial for furthering this goal.

The case of Port Lameron in Nova Scotia, Canada was first discussed by Davis (1975) in a master's thesis, and subsequently described in greater detail in Davis' (1984a) doctoral thesis. Citing a summary of this work (Davis 1984a), Ostrom (1990) describes the case of Port Lameron as fragile in the "institutional failures and fragilities" chapter of the book. Interestingly, the description of this lesser known fragile system provides a basis for comparison with the case of Maine, often described as successful in self-governing the lobster commons. Based on data from participant observation, field interviews, and primary and secondary sources, this study revisits the case of Port Lameron. Similar to Brewer (2012b), I broaden the analysis of this case by comparison of present conditions to past,

and by comparison of Maine trajectories to Port Lameron trajectory. The analysis that follows will consider these trajectories as they apply to Ostrom's design principles, with particular attention to formal and informal institutions, difference among harvesters, and the politics of scale.

DATA AND METHODS

Study Site

I conducted fieldwork in Barrington Municipal District (hereafter referred to as Barrington), in Southwest Nova Scotia, Canada. This municipality, also known as the "lobster capital of Canada" consists of a large number of interlinked communities. Davis (1984a) and Davis (1975) conducted his research in Port Lameron, Brazil, and Pagesville, pseudonyms for Port La Tour, Baccaro, and Smithville. I will use Port Lameron to refer to these three communities.

In 1977, the Port Lameron Fishery consisted of 99 fishers, including 74 men and 42 inshore boats, and 25 men and 10 offshore fishing boats. Offshore fishing vessels were more capital intensive, larger, had larger crews, and more sophisticated technologies. The majority of harvesters used multiple types of fishing gear to catch cod, halibut, herring, mackerel, and lobster. Based on an average of 1.28 crewmembers per vessel, and a count of 40 licensed vessels, I estimate that Port Lameron currently consists of 40 captains, and 51 crewmembers, for a total of 91 harvesters. Technology, mobility, and decreased inshore productivity have blurred the distinction between offshore and inshore harvester. However, it is clear that fishing vessels now have more advanced technologies and increased mobility.

After significant declines in groundfish (e.g. cod, haddock, pollock, hake) and important food web linking species (e.g., mackerel and herring), lobstering has increasingly become the backbone of the communities of SWNS. The vast majority of harvesters in Barrington fish with 40' to 50' vessels, which allow flexibility for fishing various species. On average, 82% of a harvester's income and 72% of a fishing household's income comes from lobster fishing, though this varied from 13% to 100% among households.

With such a high dependence on lobster, harvesters are increasingly vulnerable to changing economic conditions, related to economic growth in the United States, worldwide lobster landings, and the US/Canadian dollar exchange rate (DFO Statistical Services 2007). Slow economic growth in the US combined with a strong Canadian dollar has resulted in lower wharf prices for harvesters. Since the 1970s, lobster landings have tripled, with recent catches of around 55,000 metric tons (DFO 2011).

Methods

Fieldwork consisted of participant observation, semi-structured interviews, and face-to-face surveying. In this study, I focus on data from field notes, informal and semi-structured interviews, and general survey information. Here I focus on general survey information regarding the relationships among harvesters, associations, and government.

I supplement field data with a literature review of fisheries policy, and the condition of fisheries in SWNS. In some cases, I supplement survey information with secondary sources from news agencies for triangulating harvester's claims. Literature review and survey and interview data presented here emphasizes the changes that have occurred in Port Lameron and SWNS since original information from (Davis 1984a,b 1975; Ostrom 1990).

DESIGN PRINCIPLES IN PORT LAMERON AND SOUTHWEST NOVA SCOTIA

The pathways of change of design principles in the Port Lameron and Maine Lobster fisheries are compared in Table 1. In the following sections, I will discuss these pathways in detail for Port Lameron, and for Maine where applicable.

Rescaling and fixing boundaries

The definition of boundaries is considered a first step in organizing for collective action, instilling certainty in a resource user that their efforts to maintain a resource will not be reaped by "outsiders" who have not contributed to collective efforts (Ostrom 1990). Cox, Arnold, and Villamayor-Tomas (2010) separate this principle into two sub-principles: clear boundaries defining the resource system, and clear social boundaries defining membership as a resource user.

User Boundaries

In Davis (1984a), the boundaries of Port Lameron were subdivided in congruence with spatial and temporal heterogeneity of a variety of species, and the suitability of technologies. Membership was based on social relationships and a long-standing history of kinship ties to the fishing grounds. These boundaries were not fixed and impermeable. Instead, the degree to which harvesters would delineate and enforce their boundary lines was contingent on scarcity of the resource (Davis 1984a; Ostrom 1990). This sense of territoriality associated with membership in a community is similar to that described in Acheson (1988).

In Maine, entry was gradual and negotiated by harbor groups, and outsiders are excluded from information and exchange networks (Acheson 1988; Brewer 2012a). In the past, the boundaries of these socially negotiated fishing regions were fluid, but as boundaries were defined by the state and industry, they have become clarified and rigidified (Brewer 2012b). Along with the creation of fishing zones, license-holders further consolidated their power within fishing zones by seeking further limitations on entry. To date, only one lobster fishing zone in Maine has no state-defined limitations on entry (Brewer 2012a).

Table 1. A comparison of the pathways of change of design principles for the cases of Port Lameron, and Maine.

Principles	Description	Port Lameron	Maine
1A	<i>User Boundaries</i>	From local to market determination	From community to captain determination
1B	<i>Resource Boundaries</i>	Re-scaled beyond local boundaries	Re-scaled beyond local boundaries
2A	<i>Congruence with local conditions</i>	Weakened	Same
2B	<i>Congruence between appropriation and provisioning</i>	Weakened	Same
3	<i>Collective-choice arrangements</i>	No	Yes
4A	<i>Monitoring users and resource</i>	Yes	Yes
4B	<i>Monitors are accountable</i>	No	Yes
5	<i>Graduated sanctions</i>	Yes	Yes
6	<i>Conflict-resolution mechanisms</i>	Yes	Yes
7	<i>Minimal recognition of rights to organize</i>	Still weak	Strong
8	<i>Nested enterprises</i>	Vertical links made but no horizontal links	Vertical links but no horizontal links

In Port Lameron and SWNS, present day user boundaries are enforced by the DFO through a limited licensing system, but its introduction was not exclusively top-down. The Minister of Fisheries implemented a limited licensing system in response to letters and proposals from harvesters and fishermen’s associations that sought restrictions on “moonlighters” (i.e., part-time fishermen with alternative employment) (Bodiguel 2002). But as Davis (1984a) notes in Port

Lameron, the DFO's method of forming and implementing a limited entry system was unsatisfactory for harvesters. The problem with the DFO's implementation was that it limited a harvester's flexibility to use the technologies and catch the species according to variations in the economy and ecology of the region.

Since the inception of limited entry, the DFO and fishing communities have struggled with the institutions surrounding licensing. Questions center on whether access to a fishery is a privilege or a right, to whom these rights or privileges should be extended, and what is the value of a license. These questions remain clear in writing, but unclear in practice. While the DFO considers access to fisheries as a privilege given by government, harvesters consider it their right of first use (usufruct right) based on a history of use (Davis 1984a). With the intention of keeping the port market competitive and the fishing fleets independent, the DFO has added criteria to licensing in attempts to limit access to only bona fide fishermen and to restrict access from processing companies and moonlighters. But while licenses are not formally transferable, a provision allowing an exiting harvester to appoint a new entrant has opened the door for a stealth market in licenses. Furthermore, legal decisions and extra-legal contractual arrangements have further opened the door to transferability, giving non-bona fide harvesters the ability to own and lease out licenses (Bodiguel 2002). While the access to fish remains limited to those who meet eligibility requirements, the benefits from fishing can now be exploited by non-harvesters. Therefore, in practice, license ownership is a transferable property right requiring access to credit or financing from a company.

Resource Boundaries

Limited entry and clear impermeable resource boundaries in SWNS predate Maine boundaries considerably. The DFO introduced license limitation and trap limits in 1968 and lobster fishing areas or districts (LFAs) by 1972 (Miller and Breen 2010). The introduction of these rules has set up the conditions for conflict between customary and state-defined membership and territoriality. This conflict is pronounced in Port Lameron because it is located next to the LFA 34-33 line. The line that separates LFA 34 and LFA 33 runs southeast outward from Baccaro point, separating Port Lameron harvesters from a portion of their ancestral fishing grounds. As harvesters fishing to the southwest of the line expanded outwards, they began to enforce this line more rigorously by reporting line violations to enforcement. As officers increasingly charged Port Lameron harvesters for fishing over the line, Port Lameron harvesters formed a group that lobbied government to move the Baccaro line to the southwest. In Barrington, this was a highly contested process, and the location of the Baccaro line remains unchanged.

Additionally, the lines on the map drawn up by the DFO give a harvester a legal claim to any fishing ground within their district. With increasing mobility and storage capacity, many vessels venture further from port to chase lobsters where catches are high, a practice locally referred to as "chasing yarns". Some Port Lameron harvesters expressed frustrations about the presence of harvesters coming from the northeast to fish the southern grounds of LFA 33, and about

their inability to claim the right of first use of grounds off their own shores. This evolution of boundaries and membership has effectively removed harvesters from the governance process. Those living close to lobstering lines encounter a rigid impermeable barrier to historical fishing areas, while locally defined territorial boundaries are less defensible. Additionally, membership was largely based on a variant of usufruct rights, whereby ports had social and culturally determined rights of first use of adjacent lobstering grounds.

Separating Rules from Local Context

According to Cox, Arnold, and Villamayor-Tomas (2010), congruent rules includes those that are congruent with local biophysical and socio-cultural conditions (2A), and those that ensure benefits from participation in management will exceed the costs of participating in the governance system (2B). In her classification Ostrom (1990), Port Lameron matches these criteria, but processes were set in motion to destabilize this congruency even before *Governing the Commons* was completed.

Congruence between rules and local conditions

The Maine lobster fishery has been heralded as one of the most successful fisheries in the world (Acheson and Knight 2000). Much of its success has been attributed to informal rules developed by harvesters, which were later formalized by the state (Acheson and Gardner 2011). Most notably, many harvesters and Maine put V-notches in the tails of egg-bearing females as a conservation measure, and the state enforces laws prohibiting the sale of V-notched lobsters. In addition, harvesters are allowed to land lobsters above a minimum size requirement of 3.25 inches, and below a maximum size requirement of 5 inches. These practices are still in place today, with some areas adopting limits on the number of traps a harvester can use.

All lobster fisheries in Atlantic Canada have also adopted similar measures, but with different emphases. Similar to Maine, minimum size requirements, and a prohibition on selling egg-bearing females has been in place since the 1870s (Miller and Breen 2010), but beyond these measures, there are significant differences. First, the V-notching program, often considered the key to the success of the Maine fishery, has been tried and abandoned by many harvesters (Fisheries Resource Conservation Council 2007), and I found very weak support for this practice (Field Interviews 2012) in Port Lameron.

Second, while trap limits are still a source of contestation in Maine, trap limitations were introduced in 1968 federally, ranging from 250 (in Port Lameron) to 400 (in LFA 34 in the spring). Before the introduction of trap limits, the number of traps a harvester used was a function of socialized local ecological knowledge and experience of a heterogeneous lobstering grounds from which harvesters seek to maintain a stable livelihood (Davis and Kasdan 1984). The DFO introduced trap limits based on bioeconomic assumptions of profit maximization through reducing effort (DeWolf 1974). Yet despite this policy instrument combined with reductions in licenses in the 1970s due to limited entry licensing, the actual number of traps used increased (Kearney 1989) because harvesters

perceived this limit to be a target for fishing effort while enforcement remained inadequate Davis and Kasdan (1984). This increase in trap usage after trap limits was also observed in Maine (Brewer 2012b).

The efficiency or suitability of a given trap number used depends on a plethora of biophysical, economic, and social conditions, including trap design, bait quantity and quality, soak time, behavioral characteristics of lobsters, water temperature, wharf price of lobsters, characteristics and heterogeneity of local lobstering grounds, staking out lobstering grounds, the costs of labor, fuel, bait, and the harvester's personal preferences (Miller 1990; Brewer 2012a; Acheson 2003, 1998). Thus, while decisions of trap usage were congruent with local conditions at a fine scale, varying within and among ports, new regulations homogenized trap usage among all harvesters in vast fishing zones. Additionally, given that capital and labor investments of harvesters are contingent on a variety of fluctuating and changing conditions, most notably changing economic conditions since the economic crisis and gradually changing abundance and temporal and spatial heterogeneity of lobsters due to climate change, harvesters under uniform trap limits are less flexible to respond to these stressors. While there are practical reasons for trap limits, such as limiting particularly greedy harvesters, or decreasing the occurrence of tangles due to closely placed and poorly tended traps (Brewer 2012b), the DFO's implementation of trap limits did not fit well with the variety of local conditions.

Acheson (1998) shows that trap limits have been developed by harbor-gangs to solve distributional battles. To devise these rules, harbor gangs first needed to delineate the boundaries of the resource territory, and limit membership to the harbor gang. Additionally, Acheson (1998) noted that trap limits were highly susceptible to powerful coalitions of defectors that cannot be effectively sanctioned. This dilemma is a reflection of the heterogeneity of power and influence of harvesters in a region. In SWNS, this dilemma may have also existed, but DFO policy was enacted in an effort to rationalize the fishery, and not to resolve distributional conflicts.

Congruence between appropriation and provision rules

Due to the incongruence between the rules and local conditions, many do not see the benefits to contributing to rule development, or to complying with rules. Instead, many harvesters resist further rule changes. While 52.4% of harvesters did not want to see any changes to lobster fishing regulations, 12.4% suggested effort controls such as lower pot limits, stopping overnight hauling of traps, and restricting hauling of traps on Sundays. In the fall of 2012, as the November fishing season approached, the LFA 34 management board had harvesters vote on temporary methods of effort reduction to lessen the fall glut and increase wharf price. This measure, which would see trap limits reduced from 375 to 300 in the fall, was voted down by 60.6% of harvesters in LFA 34. There are four often stated reasons harvesters are reluctant to modify the current rules. First, if a rule is put in place and it does not have anticipated or desirable effects it will remain in place despite calls from harvesters to remove them. Second, some harvesters believe that despite their historical drawbacks, current rules are

working as they are now. Given stable and increasing lobster stocks, it seems clear that harvesters are catching at a rate that does not exceed their rate of growth (at current environmental and trophic conditions). Third, harvesters believe that any rule change will benefit one group of harvesters more than others. Harvesters are heterogeneous in regards to vessel size, fishing location (offshore or inshore), level of debt or leasing arrangements, and age. Finally, some harvesters believe that any rules coming from the DFO will only cause further damage to their livelihoods (Field Interviews 2012). While it is likely that an overhaul of the rule structure would benefit harvesters, monitors, and the DFO, the current state of cynicism makes changing the rules unlikely.

Participatory Collective-Choice Arrangement

Congruent provisioning and appropriation rules are often the product of collective-choice arrangements, wherein “most individuals affected by the operational rules can participate in modifying the operational rules” (Ostrom 1990, p.93). Under these conditions, harvesters can develop congruent rules if the transaction costs of changing and designing rules is relatively low. Cox, Arnold, and Villamayor-Tomas (2010) found moderate support for this principle, and suggests that attention should be paid to situations where decision-making processes have been co-opted or weakened by external agents or local elites (see Cleaver 1999; Skolsvold 2008).

In Maine, Brewer (2012b) suggests that the collective choice arrangements are indeed being co-opted by captains. In this case, captains have invoked their legal identities and access to larger-scale decision arenas to further their interests, and excluded other non-legal individuals, such as crewmembers and potential new entrants. This process of exclusion has been facilitated by an individualistic mail-in secret ballot voting system, which allows license-holders to make decisions without recourse from customary considerations of kin, class, gender, or age. Thus, an individualized process negotiated at larger scales has replaced the local processes by which rules are negotiated and contested among the wider community, the majority of whom are affected by these decisions. This runs contrary to the criteria that “most” individuals can participate in modifying operational rules”.

A comparison of the collective-choice trajectory in Maine to that of SWNS illustrates the tradeoff inherent in institutional design of collective choice arrangements. Ostrom (1990) characterized the collective choice arrangements of Port Lameron as “weak”. In Port Lameron, harvesters contributed to a system of rules constraining the use of technology in subdivided zones, and the sanctions to be expected from infractions were the product of local cultural knowledge acquired as a member of fishing ports reinforced by folklore, and frequent inter- actions between harvesters at sea, on band radios, and on land Davis (1984a). These local rules, however, were in direct competition with rules devised by the DFO, which “have different origins, reflect different principles and are motivated by different objectives” (Davis 1984a, p. 140). Though local rules may be somewhat fixed by appeals to tradition and the influence of reputed community members, the channels by which harvesters can modify local rules

are arguably more accessible than those made by the DFO at this time, especially under conditions where harvesters have no formal organization to negotiate with government. The weakness of formal organization in this region remains a challenge to the industry to this day.

The beginning of a shift in policy from top-down control to a rudimentary form of co-management came shortly after the “Pubnico affair” (Davis and Kasdan, 1984; Kearney, 1989, see), which centered on the dispute over trap limits. Though passed in 1968, enforcement officials began a new effort to crack down on harvesters fishing with traps lacking government-issued tags after giving two weeks notice in the spring of 1982 (Kearney 1989). Enforcement officers began visually checking traps and confiscated those that were untagged. This led to tensions and protests among harvesters, culminating in May 1983 in the Pubnico affair, in which about 100 harvesters burned and sunk two DFO patrol vessels (see Davis and Kasdan 1984; Kearney 1989, for a more detailed account).

As Kearney (1989) notes, the first meetings of lobster harvesting Working Groups were held in June 1983. This led to a vote regarding trap limits in which LFA 34 decided to limit effort to 375 traps in the fall, and 400 in the spring, a limit that is too low for some, but too high for others (Kearney, 1989). These working groups have led to the LFA management boards, and LFA advisory committees, organizations still in place today. But while Kearney (1989) argued for organization based on “internal momentum” building on existing solidarities among harvesters, the emphases of these organizations have been placed on co-management as a structure of advisory processes and voting procedures. Additionally, similar collective-choice situations in the groundfishing industry, largely composed of lobster harvesters, lacked this emphasis on cohesion and internal momentum. Calls for cohesion during the process by which Individual Transferable Quotas were introduced in the groundfishery were undermined as those harvesters with high historical catches recognized the windfall gains they could make by acting individually (Field Interviews 2012).

Survey results illustrate the low legitimacy of the organizations and advisory committee meetings that developed in 1983. When asked what changes they would like to see to the decision-making process, 54.5% of harvesters wanted a consultation process wherein harvesters give their input, and their local knowledge is incorporated. Another 12.1% called for a democratic process by which harvesters make decisions, while 23.2% did not want to see the decision-making process changed at all. Other notable responses with frequencies lower than 5% included making the regulations easier to understand, make the system fair, make decisions more responsive to harvester’s needs, rules should be made by some- one who understands fishermen, and making decisions publicly rather than behind closed doors. While 71.7% of harvesters paid dues to fisheries organizations, 61.1% never or seldom attended these meetings. The motivations for attendance were varied but included getting information and knowing what’s coming (55.7%), for the future of the fishery (13.6%), having a say in decisions that affect them (10.2%), making a good living (8%), and because fishermen need to be organized (4.5%). Sources of discouragement varied even more, but

included a lack of say in the decision-making process (20.6%), arguing and fighting among harvesters (19.6%), a lack of positive change (16.8%), too much “doom and gloom” (7.5%), poor leadership or organization (8.4%), or a lack of available time to attend (8.4%). A commonly reported sentiment is that there is no sense in going to many of these meetings because it doesn’t change anything. Others stated that their presence at government meetings merely legitimizes the decisions the “bureaucrats” were going to make anyways (Field Interviews 2012).

Nevertheless the LFA management boards do have a process in place. Each wharf elects a port rep to represent that port’s interests, and port reps meet at LFA management boards and advisory committee meetings. The management board also has an elected chair or spokesperson. Being elected port rep, however, is a daunting and thankless job, as harvesters from port vent their frustrations on port reps for the lack of positive change, while port reps try to explain the slow process by which policies can be modified. As a result, port reps quit their positions frequently and there is a high rate of turnover in this position (Field Interviews 2012). As a result of the perceived lack of influence of the management boards and advisory committees, some harvesters view them as “yes men” for the government rather than representation for the industry. This has led to the formation of more radical associations that have vowed to “take back the industry” as a voice that will stand up to the DFO.

The state of collective-choice arrangements in SWNS is further complicated by cultural and political-economic structure. According to (Apostle and Barrett, 1992, p. 301), “the industry and much of rural Nova Scotia value individualism, believe unshakably in free enterprise, and intensely dislike big government and big companies.” These views are particularly strong among conservative Protestants (Baptists, Pentecostals and Lutherans). Additionally, Apostle and Barrett (1992) list three structural causes of fragmentation of the industry. First, fishing villages are diverse in scale of fishing operations and geography, leading to a variety of market conditions and products, and different mental models of the problems the industry faces. Second, lobster buyers and fish processors vary significantly in scale and influence with government. Small companies with little economic and political influence fear that any efforts to organize will be punished by government or the big companies. Third, small companies must compete vigorously for access to fish and vessels to buy from, leading to disputes among buyers. It is likely that this competition among smaller companies remains strong after two decades of quota cuts, particularly in the groundfishing industry. These cultural and structural factors lead harvesters and buyers to favor individualist response to threats, and collective action only when common threats are identified.

Monitoring

Ostrom's fourth principle requires not only that resource users be monitored actively, but that monitors are "accountable to the appropriators or are the appropriators" (1990, p. 94). Cox, Arnold, and Villamayor-Tomas (2010) found strong support for accountability of monitors, and moderate support for their presence in successful CPRs, and suggested the additional importance of monitoring not only the resource users, but the condition of the resource system as well (see Pinkerton and Weinstein 1995; Cinner and McClanahan 2006).

Presence of monitors that audit appropriator behavior and CPR conditions

Technological change has rarely been mentioned in relation to monitoring and sanctioning, and it bears mentioning for both harvesters and enforcers. Enforcing capabilities has increased significantly with the development of faster vessels and satellite technologies. Technological advancement, however, has improved the ability of harvesters to hide illegal activity from enforcement officers as well. While the Cape Islander vessels of SWNS are still quite slow and less agile than enforcement vessels, the need to mark traps with buoys has decreased due to the advancement of global positioning system (GPS) technology and software, and the most common practice of using trawls of lobster traps rather than single buoyed traps. Now a harvester can set a string of 10-20 unmarked lobster traps, mark their location on a GPS, and then later send a dragging device to the seafloor, and drag a perpendicular line to the location of the traps. This enables a harvester to retrieve their traps, but keeps their location unknown to would be enforcers. It is important to note here that many harvesters do not endorse this practice.

Another lesser-mentioned complication to monitoring is the increasing scale of lobstering operations. While Davis (1984a) reported that lobster fishing occurred predominately within 25 miles from shore, harvesters now fish all the way to the 50-mile boundaries of the LFA, a process mirrored in the Maine fisheries (Brewer 2012b). This creates a larger gradient in enforcement efficacy and increases enforcement costs. Visibility in the inshore is much higher because inshore grounds are more intensely exploited. Enforcement officers and resource users are more likely to encounter infractions on the inshore, and these areas are easier to monitor than the offshore grounds where buoys are more distantly spaced. Though inshore lobster harvesters more often state it, many believe that illegal activity is most prominent on offshore grounds (Field Interviews 2012).

Regardless of above complications, many harvesters today believe that enforcement has been more effective due to improved technology, stricter penalties, and cooperation from harvesters (Field Interviews 2012). But just as many have been satisfied with current monitoring efficacy, many fear a new era in unrestrained fishing due to recent changes in the fishery. In the current context of post-economic crisis austerity politics, the potential for effective enforcement has been threatened by budget cuts and government divestment from fisheries management.

Monitors are accountable to appropriators

The ability to monitor resource users, in the case of Port Lameron specifically, and in open sea fisheries in general, rests on the cooperation of the resource users themselves. Under geographical conditions where it is virtually impossible for enforcers to see and prosecute all but a small percentage of the infractions occurring, fisheries officers must depend on tips from harvesters.

Overall, monitors are accountable to the DFO, and the DFO is accountable to the fishermen through the aforementioned insufficient consultation process. The sense of dissatisfaction with the rules, rule-making process, and monitoring process has led to frequent disputes with monitors. In a study by McMullan, Perrier, and Okihiro (1993), enforcement officers describe the effects of this governance regime on their personal lives. Officers ranked the effects their occupation had on their personal lives, and reported to be the subject of gossip (45%), to have received abusive or threatening phone calls (41.5%), to have received threats on their property (18.9%) and on their family (7.9%), and to have had their children harassed (5.1%).

Graduated Sanctions

For a resource user to follow a set of rules, there has to be a high likelihood that they will be sanctioned, such that the cost of violating the rules is high. Additionally, sanctions should reflect an ideal of fairness, whereby sanctions are proportional to the seriousness and context of the violation (Ostrom 1990). Alternatively, as Cox, Arnold, and Villamayor-Tomas (2010) found in his review (citing Cleaver 2000), a high degree of social cohesiveness may obviate the need for sanctioning, and implementing a system of sanctioning should not replace this cohesiveness.

Infractions occurring in the lobster fishery fall into two categories, illegal fishing, or illegal activity when fishing legally. Illegal fishers, or poachers, have not bought into the licensing system, and therefore do not have the same level of overhead as entrants. They also often sell their catch in cash to black markets valued at up to \$200 million in 2002 (Cox 2002). Harvester representatives have sought stiffer penalties for poaching, such as the complete forfeiture of fishing vessel and gear. Some harvesters suggest that poaching has decreased because of stiffer penalties and better monitoring (Field Interviews 2012).

Harvesters often spoke differently of the sanctions imposed on legal harvesters. Some complained that a harvester caught with a few untagged traps might be sanctioned too severely, for example, by being prohibited from fishing during the start of the season when harvesters make the majority of their annual income. In a social context of weak ties between the state and harvesters, however, illegal fishing practices and poaching often becomes a “routine form of everyday resistance” (Scott 1986, p.18), whereby rules are tested and negotiated at sea (McMullan, Perrier, and Okihiro 1993).

Conflict resolution

Ostrom's sixth principle calls for low-cost conflict resolution mechanisms. While conflicts between harvesters are still settled locally and at sea, conflicts regarding property rights and contractual agreements, and conflicts between enforcers and harvesters are often settled in regional courts. While enforcement officers complain of an unwillingness of local judges to prosecute harvesters (McMullan, Perrier, and Okihiro 1993), some harvesters complain of the costs of going to court (Field Interviews 2012).

Recognition of Harvester's Rights to Organize

Ostrom (1990) suggests that Port Lameron's rule system is fragile mainly because it was not recognized by the DFO. This sets up the conditions for scalar conflicts between rule systems, whereby local harvesters attempt to circumvent local traditions by appealing to federal rules, and customary rule systems diminish over time Ostrom (1990). Cox, Arnold, and Villamayor-Tomas (2010) found moderate support for this principle.

The DFO's lack of recognition of local customary rights has played out similarly to Ostrom's description. First, there are clear signs that the rule system described by Davis (1984a) has diminished over time. The influence of customary territoriality and gentlemen's agreements regarding trap placement have declined. Furthermore, a lack of social cohesion creates conditions where harvesters may call in infractions made by a local harvester rather than those made by outsiders. Thus, the state apparatus has become a tool used by harvesters to compete amongst one another (Field Interviews 2012).

Another important customary rule that has diminished over time regards gentlemen's agreements to set pots at sufficient distance to avoid "snarls" and competition for lobsters. Resource users engaging in these practices would likely be punished with shaming, and possible damage to their gear (Davis 1984a,b). Now with harvesters often encountering other vessels from different ports, especially on offshore grounds, combined with an increasing "business-oriented" perspective of harvesters, many harvesters express frustration with those that do not respect these agreements. For instance, if one resource user is pulling up traps with significantly high catches, and this is either observed or overheard by another user, a business-oriented user is likely to shift his pots close to, or in some cases, on top of them.

In SWNS, and including Port Lameron, the relationship between resource users and the state is very different from that described in Maine. While in Maine, locally legitimated rules and property relations based on customary governance regimes have been recognized by the state, the rule-making process in Atlantic Canada is the product of uneven decision-making power among the state as sole provider of fishing privileges and property relations, and local customs that emphasize a right of access as a product of communally determined property relations McMullan, Perrier, and Okihiro (1993). Thus while Brewer (2012b)

highlights the dangers of re-scaling customary institutions, the current trajectory of Atlantic Lobster fisheries highlight the dangers of misrecognition of customary institutions.

Nested enterprises

This principle applies to complex systems, where multiple interacting layers of organization are necessary to address multi-scalar problems (Ostrom 1990). Cox, Arnold, and Villamayor-Tomas (2010) clarifies this principle by stating that it refers to both vertical linkages, such as those between jurisdictional levels, and horizontal linkages between neighboring communities. These linkages were absent at the time of Ostrom's writing.

There is some evidence for a strengthening in nested enterprises in Port Lameron and SWNS. For instance, vertical linkages connect harvesters to port representatives, the LFA management board, and to the DFO through advisory committees. Similar vertical linking structures exist for the other fisheries in the region. Increasing scalar arrangements may improve the delineation and enforcement of rules on a gradient spanning from port to LFA, to the Atlantic region. For example, ports may be able to develop locally relevant rules that complement and fit general requirements of sustainability and equity at larger scales.

Horizontal linkages among fisheries LFAs remain weak. Horizontal linkages can benefit the governance system in a few ways. First, horizontal linkages can help organize harvesting strategies over multiple species, or can be used to negotiate when there are disputes between technology types. Second, horizontal linkages between LFAs can be used to identify similar problems, and to address these problems as a united voice to the DFO.

DISCUSSION

Figure 1 summarizes the evolution of the Port Lameron and SWNS lobster fisheries with two snapshots of social-ecological systems (SESs). The original case as described by Davis (1984b) suggested a strong connection between resource users and community-based decision-making processes. Rules were reinforced at sea, and monitored by harvesters who interacted with each other frequently. These rules were a reflection of heterogeneity of resource uses and technologies, allowing harvesters to alter their strategies to changing conditions. Ostrom (1990) described these collective-choice arrangements as weak because there was no formalized process by which harvesters would discuss and make modifications to rules and monitoring processes. Given that these fishing practices had endured for decades before (Davis 1984b), it is likely that strong collective choice-arrangements were not necessary for inshore small-scale harvesters. From the perspective of harvester communities, things were working well just the way they were.

Davis (1984b) and Ostrom (1990) described the early conditions that set the Port Lameron SES on a path to its current state (Figure 1b). This path arguably started with the 1977 declaration of a 200-mile limit under the sole jurisdiction of the government of Canada (Rogers 1998). As the DFO claimed ownership of offshore and inshore fisheries, the policies they implemented sought to avoid an impending tragedy of the commons (Matthews 1988). These policies and decision-making processes did not recognize the local informal institutions already in place in Port Lameron and other wharfs in Atlantic Canada. While policies were, in part, a response to the grievances of these harvesters, they were decided on without sufficient negotiation and had negative implications for the flexibility of fishing livelihoods. Thus, rules were made to be increasingly incongruent with local conditions. The boundaries of fishing areas were rescaled, from the port-scale to the scale of the LFA, and the dominant rule-making procedures jumped from the port level to the federal level under the Minister of Fisheries. As this SES has been re-scaled and jumped jurisdictional levels, the strong connections that link resource users to rules, and rules to locally experienced conditions have been weakened.

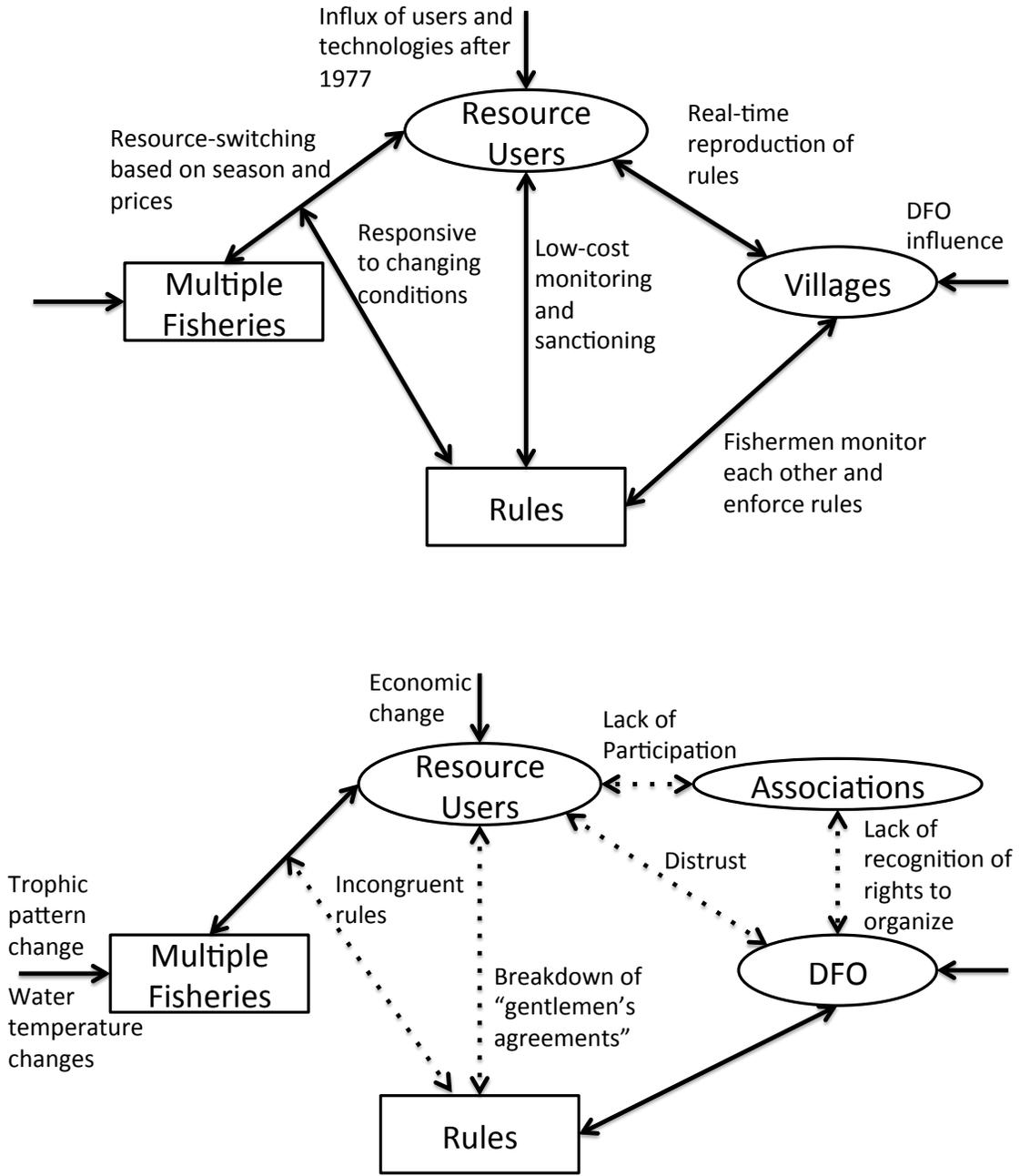


Figure 1. The characterization of the Port Lameron and SWNS social-ecological system (SES) according to Anderies, Janssen, and Ostrom (2004) A) at the time of *Governing the Commons* and B) currently.

The clash between local customary and federal formalized rules has created a predictable pattern in the Maritimes as described by Davis and Kasdan (1984): increasing frustrations from harvesters due to a lack of influence in the decision-

making process eventually reaches a point of boiling over, at which point harvesters will engage in violent or non-violent forms of direct action. With the 2012 strike recent in the minds of many harvesters, it is important to note that these events are often traumatic, causing hard feelings among communities, kin, and friends, buyers and harvesters, fist fights, damage to trucks and other personal property, and threatening phone calls to families. Enforcement officers recount similar traumatic experiences.

This case study demonstrates how weak collective-choice arrangements and government's lack of recognition of local institutions are mutually reinforcing processes. Whether imagined or real, the government implements a set of rules based on the assumption that fishing communities cannot avoid a tragedy of the commons. Harvesters believe that participation in consultations will not influence decision-making, and thus, do not see any benefit in participating. Government implemented policies, in-turn, continue to lack participation from harvesters and do not reflect local-level conditions. Thus, current conditions in SWNS can be described as resilient, though not desirable for the parties involved.

According to Acheson (2006), analysts have focused their attention on cases of successful resource management rather than institutional failures, and as a result, literature on institutional failure remains poorly developed. The case of Port Lameron and SWNS is in a special position. The stock remains stable, and despite increasing effort, catches continue to increase proportionally. Nevertheless, some harvesters are concerned about the sustainability of fishing effort (Weston 2009). The current sustainability of these lobster fisheries depends on the resilience of the stocks, and not the robustness of the institutional design. This leads the social-ecological system towards a potential full-scale institutional failure. I argue that this fishery remains fragile, and the fragility of the system has increased since Ostrom (1990). There are a number of reasons for this characterization. First, the decline of groundfish, herring, mackerel and other species leave harvesters increasingly dependent on lobster as a source of income. Whereas before, harvesters could alter their fishing practices to economic and ecological conditions, many have no alternatives to turn to. Second, the decision-making process has rigidified to a state where harvesters will likely resist changing the rules, even when ecological and economic conditions threaten the livelihoods of many. Third, given that current rules are not well supported by communities, further cutbacks in monitoring and enforcement may lead to decreased compliance. Finally, as the lack of recognition of local institutions continue, local institutional arrangements will continue to decline without a push for rejuvenation. This will reduce the institutional diversity in the region.

The case of the collapse of the Atlantic cod fishery highlights the threat of institutional failure in the region. Acheson (2006) argues that this case exemplifies Scott's (1999) criteria for "Seeing Like a State". These criteria are; 1) the attempt to make complex social-ecological processes legible and controllable, 2) "high modernism", or an uncritical belief in science and technological progress and a disdain for uncertainty and complexity, 3) a

centralized state power that pushes for legibility and high modernism, and 4) a civil society that lacks the capacity to resist government intervention. While the government's promotion of high modernist trawlers and large-scale processing plants has dwindled, DFO science continues without sufficient input and cooperation from harvesters. Some progress has been made, however, as some science for lobster stocks is based on a partnership between scientists and harvesters. Also, the government has moved increasingly towards decentralizing power to smaller scales through consultation processes mentioned above. However the weakness of collective-action arenas among harvesters may provide the basis for future government restructuring and rationalization programs.

To avoid the vicious cycle between weak decision arenas and a lack of recognition of local scales, many marine social researchers have called for increased emphasis on procedural elements of fisheries management rather than management instruments themselves. Pinkerton and John (2008) draws attention to legitimacy of local authority in multiple dimensions to reduce the costs of monitoring. Additionally, Raajkaer Nielsen and Mathiesen (2003) linked compliance in fisheries to the perceived legitimacy of procedures and their outcomes. Another procedural process linked to legitimacy is social and procedural justice. Outside fisheries literature, scholars have developed notions of environmental justice, composed of principles such as the recognition of social groups as members of society, expanding capabilities and functioning of individuals or groups, participation of individuals and groups in decision-making processes, and the distribution of benefits and burdens among society (Schlosberg, 2009; Nussbaum 2001; Honneth 1996; Young 1990). These principles apply at multiple scales to the relationships among harvesters, buyers, processors, plant-workers, spouses and community members, monitors and managers.

In response to Ostrom's (1990) argument for clear boundaries, (Brewer 2012a, p.386) asks, "For whom do we manage resources?" To avoid the vicious cycle described above, attention must be paid to a wide variety of social, cultural, economic, and political factors, and processes that develop rules must strive towards social and procedural justice in the decisions surrounding the harvesting, processing, and marketing of marine resources. Through fairer decision-making and action arenas, rules can be made more flexible, socially and ecologically appropriate, and with stronger focus on benefitting fishing communities and livelihoods that depend on marine resources.

REFERENCES

- Acheson, J. (1988). *The lobster gangs of Maine*. University Press of New England, Lebanon, NH.
- Acheson, J. (2003). *Capturing the commons: devising institutions to manage the Maine lobster industry*. University Press of New England, Lebanon, NH.
- Acheson, J. M. (1998). Lobster trap limits: A solution to a communal action problem. *Human Organization*, 57(1):43–52.
- Acheson, J. M. (2006). Institutional failure in resource management. *Annual Review of Anthropology*, 35(1):117–134.
- Acheson, J. M. and Gardner, R. (2011). The evolution of the Maine lobster v-notch practice: Cooperation in a prisoner's dilemma game. *Ecology and Society*, 16(1):41.
- Acheson, J. M. and Knight, J. (2000). Distribution fights, coordination games, and lobster management. *Comparative Studies in Society and History*, 42(01):209–238.
- Anderies, J. M., Janssen, M. A., and Ostrom, E. (2004). A framework to analyze the robustness of social-ecological systems from an institutional perspective. *Ecology and Society*, 9(1):18.
- Apostle, R. and Barrett, G. (1992). Populism and alienation. In Apostle, R. and Barrett, G., editors., *Emptying their nets: small capital and rural industrialization in the Nova Scotia fishing industry*, chapter 14, pages 300–313. University of Toronto Press, Toronto, Canada.
- Bodiguel, C. (2002). Fishermen facing the commercial lobster fishery licensing policy in the Canadian maritime provinces: origins of illegal strategies, 1960–2000. *Marine Policy*, 26(4):271–281.
- Brewer, J. F. (2012a). Don't fence me in: Boundaries, policy, and deliberation in Maine's lobster commons. *Annals of the Association of American Geographers*, 102(2):383–402.
- Brewer, J. F. (2012b). Revisiting Maine's lobster commons: rescaling political subjects. *International Journal of the Commons*, 6(2):319–343.
- Cinner, J. and McClanahan, T. (2006). Socioeconomic factors that lead to overfishing in small-scale coral reef fisheries of Papua New Guinea. *Environmental Conservation*, 33(1):73–80.
- Cleaver, F. (1999). Paradoxes of participation: questioning participatory approaches to development. *Journal of international development*, 11(4):597–612.
- Cleaver, F. (2000). Moral ecological rationality, institutions and the management of common property resources. *Development and change*, 31(2):361–383.

- Cox, K. (January 10, 2002). Halifax lobster black market valued at up to \$200-million. *The Globe and Mail*, page A4.
- Cox, M., Arnold, G., and Villamayor-Tomas, S. (2010). A review of design principles for community-based natural resource management. *Ecology and Society*, 15(4):38.
- Davis, A. (1975). The organization of production and market relations in a Nova Scotian inshore fishing community. PhD thesis, Dept. of Anthropology, University of Manitoba.
- Davis, A. (1984a). Property rights and access management in the small boat fishery: A case study from southwest Nova Scotia. In Lamson, C. and Hanson, A., editors, *Atlantic Fisheries and Coastal Communities: Fisheries Decision-Making Case Studies*, pages 133– 164. Dalhousie Ocean Studies Programme, Halifax, Canada.
- Davis, A. (1984b). “You’re your own boss”: an economic anthropology of small boat fishing in Port Lameron harbour, southwest Nova Scotia. PhD thesis, York University, Toronto, Canada.
- Davis, A. and Kasdan, L. (1984). Bankrupt government policies and belligerent fishermen responses: Dependency and conflict in the southwest Nova Scotia small boat fisheries. *Journal of Canadian Studies*, 19(1):108–124.
- Department of Fisheries and Oceans (2010). Policy for preserving the independence of the inshore fleet in Canada’s Atlantic fisheries. <http://www.dfo-mpo.gc.ca/fm-gp/initiatives/piifcaf-pifpcca/piifcaf-policy-politique-pifpcca-eng.htm>. Date Accessed: November 5, 2010.
- DeWolf, A. G. (1974). The lobster fishery of the Maritime Provinces: economic effects of regulations. Department of the Environment, Fisheries and Marine Service.
- Fisheries and Oceans Statistical Services (2007). Economic outlook for Canada’s Atlantic commercial fisheries 2012. <http://www.dfo-mpo.gc.ca/stats/commercial/eo/2012/eo12-eng.htm>. Date Accessed: April 23, 2013.
- Fisheries Resource Conservation Council (2007). Sustainability framework for atlantic lobster. Report to the Minister of Fisheries and Oceans R1, Fisheries Resource Conservation Council.
- Department of Fisheries and Oceans, Canada. (2011). Fisheries sustainability - lobster. <http://www.dfo-mpo.gc.ca/fm-gp/sustainable-durable/fisheries-peches/lobster-homard-eng.htm>. Date Accessed: April 23, 2013.
- Honneth, A. (1996). The struggle for recognition: the moral grammar of social conflicts. The MIT Press, Cambridge, MA.
- Kearney, J. F. (1989). Co-management or co-optation? the ambiguities of lobster fishery management in southwest nova scotia. In Pinkerton, E., editor, *Cooperative management of local fisheries: New directions for improved*

- management and community development*. chapter 5, pages 85–102. University of British Columbia Press.
- Matthews, R. (1988). Federal licensing policies for the Atlantic inshore fishery and their implementation in Newfoundland, 1973—1981. *Acadiensis: Journal of the History of the Atlantic Region*, 17:83–108.
- McMullan, J., Perrier, D., and Okihiro, N. (1993). Regulation, illegality and social conflict in the Nova Scotia lobster fishery. *Journal of Legal Pluralism & Unofficial Law*, 33:121.
- Miller, R. J. (1990). Effectiveness of crab and lobster traps. *Canadian Journal of Fisheries and Aquatic Sciences*, 47(6):1228–1251.
- Miller, R. J. and Breen, P. A. (2010). Are lobster fisheries being managed effectively? examples from New Zealand and Nova Scotia. *Fisheries Management and Ecology*, 17(5):394–403.
- Nussbaum, M. (2001). *Women and human development: The capabilities approach*. Cambridge University Press, Cambridge, MA.
- Ostrom, E. (1990). *Governing the commons: The evolution of institutions for collective action*. Cambridge University Press, Cambridge, MA.
- Ostrom, E. (2007). A diagnostic approach for going beyond panaceas. *Proceedings of the National Academy of Sciences*, 104(39):15181.
- Pinkerton, E. and John, L. (2008). Creating local management legitimacy. *Marine Policy*, 32(4):680–691.
- Pinkerton, E. and Weinstein, M. (1995). Fisheries that work. sustainability through community-based management. The David Suzuki Foundation, Vancouver. British Columbia.
- Raakjaer Nielsen, J., and Mathiesen, C. (2003). An analytical framework for studying: compliance and legitimacy in fisheries management. *Marine Policy*, 27(5):425–432.
- Rogers, R. (1998). The Atlantic fishery. In Keil, R., Bell, D., and Fawcett, L., editors, *Political ecology: global and local*, pages 99–116. Routledge, New York, NY.
- Schlosberg, D. (2009). *Defining Environmental Justice: Theories, Movements, and Nature*. Oxford University Press, New York, NY.
- Scott, J. (1986). Everyday forms of peasant resistance. *Journal of Peasant Studies*, 13(2):5– 35.
- Scott, J. (1999). *Seeing like a state: How certain schemes to improve the human condition have failed*. Yale University Press.
- Skolsvold, T. (2008). The institutional reality of common pool resources. PhD thesis, Norwegian University of Science and Technology, Trondheim, Norway.

- Steinberg, C. (1984). Structure and price determination in Maritimes port markets: a study of fishermen/buyer relations. Canadian Industry Report of Fisheries and Aquatic Sciences 149, Department of Fisheries and Oceans.
- Weston, R. (2009). The Canadian lobster fishery: trapped in a perfect storm. Report of the standing committee on fisheries and oceans, Department of Fisheries and Oceans.
- Young, I. (1990). *Justice and the Politics of Difference*. Princeton University Press, Princeton, NJ.