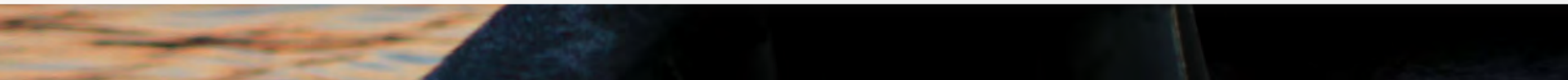
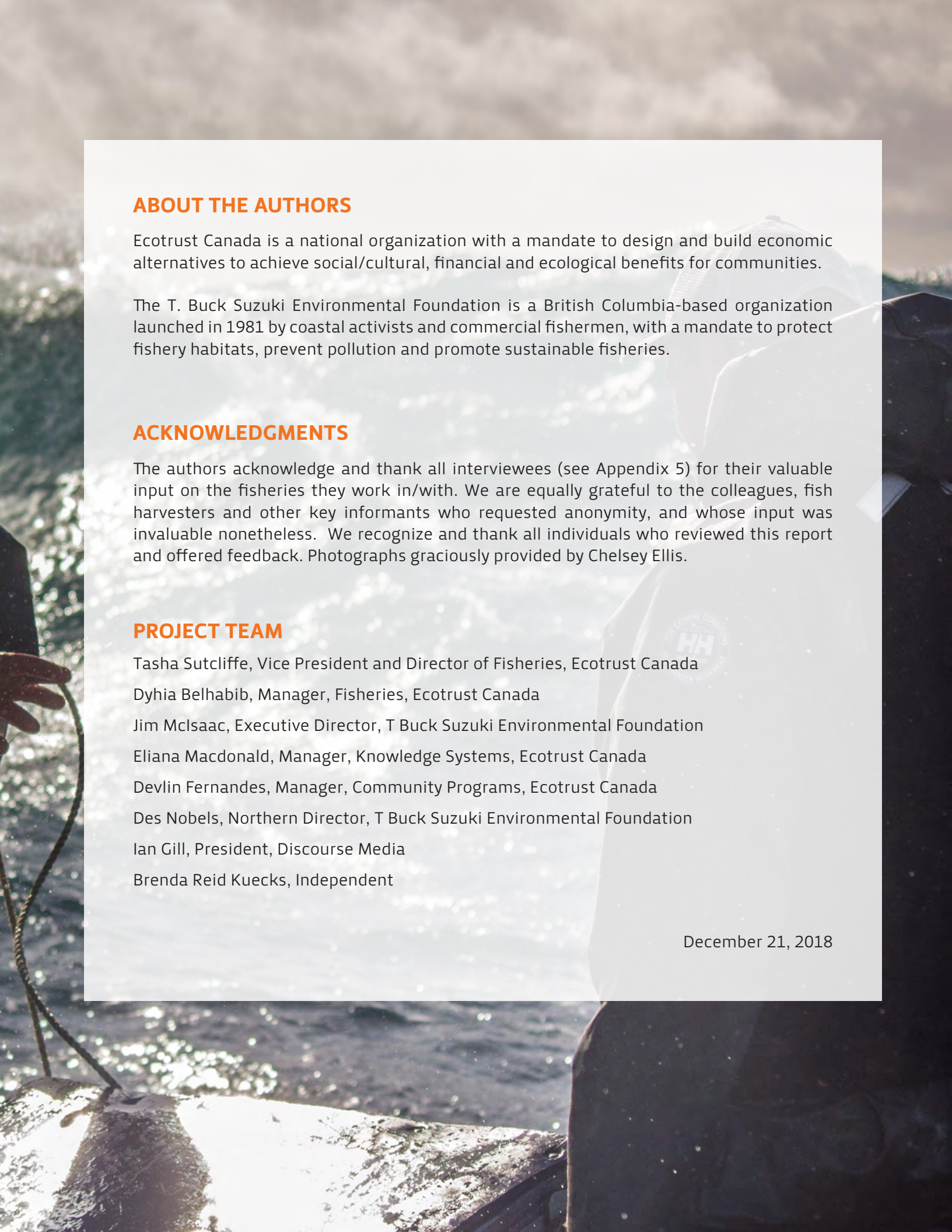
Ecotrust Canada
T. Buck Suzuki Environmental Foundation

Just Transactions Just Transitions

Towards Truly Sustainable Fisheries in British Columbia





ABOUT THE AUTHORS

Ecotrust Canada is a national organization with a mandate to design and build economic alternatives to achieve social/cultural, financial and ecological benefits for communities.

The T. Buck Suzuki Environmental Foundation is a British Columbia-based organization launched in 1981 by coastal activists and commercial fishermen, with a mandate to protect fishery habitats, prevent pollution and promote sustainable fisheries.

ACKNOWLEDGMENTS

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EXECUTIVE SUMMARY

In late 2016, beset by the toughest housing crisis ever faced by the city, Vancouver invited experts from around the world to what it called a Re:Address Summit focused on "global housing solutions." A summary published in 2017[1] included some wise advice for fishermen everywhere.

Sorry, what? Housing solutions? Fishermen?

Bear with us for a moment. Here's what was said about housing in Vancouver:

- "We need to rethink our **housing system** if we are to maintain options for the next generation of **households** and families and remain a competitive and prosperous city and region.
- We need to better understand the impact of the lack of affordable **housing** on our economy and the social fabric of our city.
- We have a renewed understanding of how across global cities, **housing systems** are a fundamental contributor and driver of the economy.
- We are failing the next generation by not providing affordability — the hyper-commodification of **housing** ownership is pricing out the next generation from the **housing** market and needs a stronger regulatory response from government.
- Generational equity is becoming a key focus for Vancouver's younger generations and we should find ways to support young people in the current **housing** market."

Now, substitute a few key words, and you get this:

- We need to rethink our **licencing system** if we are to maintain options for the next generation of **fish harvesters** and families and remain a competitive and prosperous **marine economy**.
- We need to better understand the impact of the lack of affordable **fishing access** on our economy and the social fabric of our **communities**.
- We have a renewed understanding of how across global **coastal communities**, **fisheries** systems are a fundamental contributor and driver of the economy.
- We are failing the next generation by not providing affordability — the hyper-commodification of **fishing access** is pricing out the next generation from the **fishing industry** and needs a stronger regulatory response from government.
- Generational equity is becoming a key focus for **British Columbia's** younger generations and we should find ways to support young people in the current **fishing industry**."

Crisis? What crisis? Well, far from the condo towers or suburban bungalows of the Lower Mainland, or the remodelled shorelines and riverscapes (where our commercial fisheries are mostly recalled on menus at fish and chip shops), there is a crisis every bit as severe for young fish harvesters and their communities on our coast as there is for first-time homebuyers in Vancouver.

Canada's national motto — *A Mari Usque Ad Mare*, or From Sea to Sea — evokes images of a country that thrives on the bounty of its oceans, a place of plenty, steeped in traditions dating back centuries on all three coastlines, and dotted with villages where communities prosper in harmony with natural cycles as reliable as the tides. With the longest coastline of any country, Canada should be a beacon for ocean governance and fisheries.

In fact, as detailed in this report, a hard look at Canada's fisheries — and British Columbia's commercial fisheries in particular — reveals a level of social dysfunction where our policy makers are ignoring available solutions that could make our fisheries among the best managed, most sustainable, and most socially and economically beneficial in the world. Indeed, fixing what's wrong with our fisheries could be a lot easier than fixing Vancouver's housing market. If we were just to listen to the experience of Canadian fish harvesters themselves, we would have a good solid understanding of the issues, and what is needed to solve them. Instead, and this will come as a surprise to many Canadians, many of our fisheries languish among some of the least successful when judged against four pillars of sustainability: ecosystem health, economic benefits, social benefits, and good governance.

For the authors of this report, sustainable fisheries assume a healthy coexistence of ecosystem function and human use. They must maintain ecological integrity while meeting the socio-economic needs of our society. Decisions about how to achieve this should include a central role for harvesters and their communities in managing and stewarding these natural assets. Ultimately, in addition to maintaining ecological integrity and the ability for future generations to meet their needs, sustainable fisheries should provide meaningful work and good livelihoods, contribute to local food security and a sustainable global food supply, and support vibrant cultures, resilient coastal/rural economies and communities.

As it stands, our fisheries not only fail this test of sustainability — they don't even meet our government's own limited objectives for healthy fisheries. In British Columbia, under the guise of "rationalizing" our fisheries to make them more efficient, a conscious policy choice to corporatize and consolidate fisheries through openly transferable[i] licences and quotas (ITQs), has concentrated economic gains in the hands of a few investors — at tremendous cost to many fish harvesters, First Nations, and struggling coastal communities. Since the implementation of a number of fisheries restructuring plans in BC, including the onset of unrestricted licence and quota leasing, there have been drastic declines in the numbers of working fish harvesters and small boats. One could argue that this was an intended objective of the current management system for the sake of economic efficiency, however, from 2000 to 2015 there were notable declines in fish harvesters' incomes — despite the fact that the number of fish harvesters had declined, and total volume of landed fish have remained steady.

Now, a generation of young people on the BC coast face insurmountable barriers to entering marine fisheries that once were at the centre of family and community life on the coast. Instead, with valuable licences and quota in the hands of a wealthy few, the future of our fisheries is a centralized corporate large boat fishing fleet that is the antithesis of the diversity and community engagement that used to be a hallmark of coastal small boat fisheries.

This report makes an unequivocal case that unrestricted ownership and open transferability of fishing licences and quota are negatively affecting the viability of many historically important values in BC's fishing industry. This is a highly predictable outcome given that the Canadian government, which is mandated to manage marine resources and fisheries on behalf of all Canadians, measures its success largely against two variables — conservation and economic growth. Such a limited scope ignores the richer aspects of Canada's fisheries and discredits their incredible value socially and culturally, and overlooks many of our fisheries' more nuanced economic benefits.

Our federal fisheries management — certainly when it comes to BC's coast — not only

i Any entity can buy and own a quota or licence to fish without any requirement to be the one fishing it.

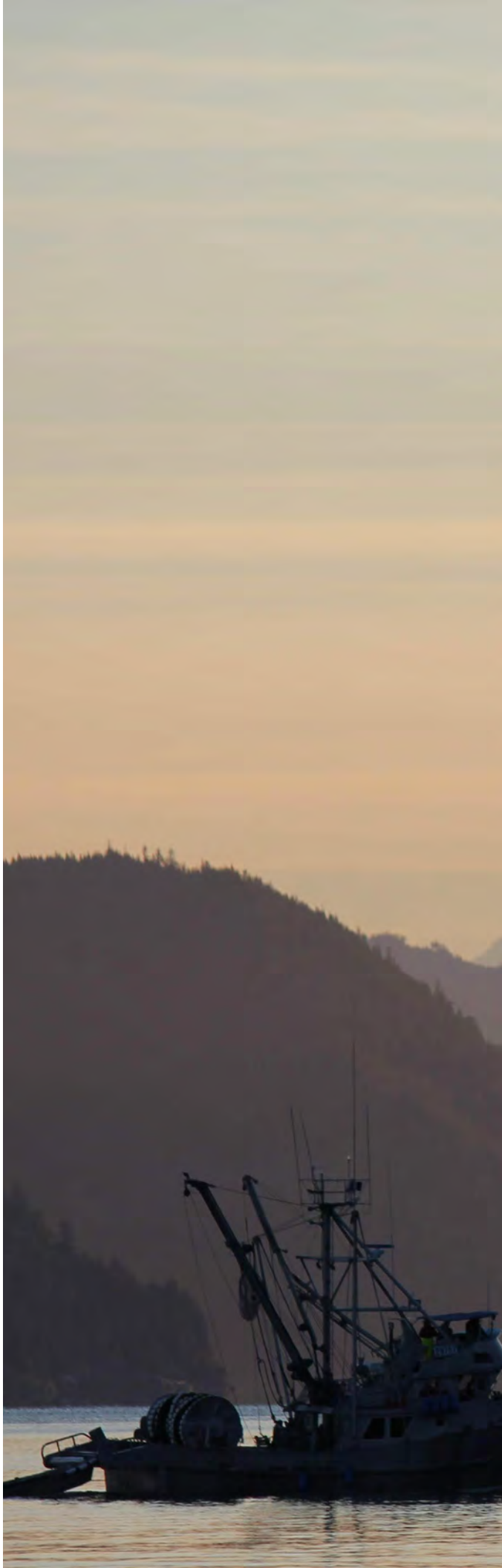
hastens the decline of our coastal communities, but it flies in the face of evidence from around the world that fisheries *can be and are* managed to be sustainable *and* provide diverse benefits that can favour community interests.

In this report, we assess fisheries from across the globe against a suite of economic, social, governance and environmental sustainability indicators. We find that the most successful fisheries — the top five — have several attributes in common, including:

- The owner/grantee of fishery access must be on the boat (owner-operator),
- Processors/non-fishing companies cannot own licences or quota,
- The fishery does not allow the lease, trade, or sale of quota,
- The fishery is managed by, or is jointly managed with, harvesters and their community,
- Membership in a cooperative or fish harvester organization is required,

Measured against these same sustainability indicators, the BC quota-managed fishery reviewed ranks among the lowest performing fisheries. We believe it is urgent that the current, flawed Canadian fisheries licencing management regime be redesigned to achieve greater social and economic equity, ecosystem health and — from a governance standpoint — far greater accessibility, transparency, accountability, and basic fairness. The good news is that, in drawing on the global examples examined in detail in the following pages, a transition to more sustainable and equitable fisheries is not just desirable but achievable. Though not all attributes of the top rated fisheries are appropriate or easily transferred to BC fisheries, many can provide a roadmap for solutions, and a suite of tools and experience that can be learned from, adapted for, and implemented in BC. This includes the consideration of policy provisions such as owner-operator and fleet separation which, if adapted to a *made-in-BC* solution that respects the diversity of fisheries' and fish harvester needs, can ensure a fair, sustainable, and prosperous fishery for both current and future generations.

This report provides many answers to questions about what ails Canadian fisheries and what can be done about it. The one question the report cannot answer — but is designed to provoke — is whether there is sufficient will across the industry and government to concern themselves with the broader benefits of fisheries and to act in the interests of all Canadians. We fervently hope there is.



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1. TIME IS OF THE ESSENCE

The Liberal government of Prime Minister Justin Trudeau is now more than halfway through its first term, a period that has been characterized by progressive reforms in a number of policy areas. Canada's Fisheries Act, one of our most powerful legal tools for protecting marine areas, was put under review — the first comprehensive review in thirty years. Then Fisheries Minister Dominic LeBlanc, in a July 2017 speech before the Canadian Independent Fish Harvesters Federation in Nova Scotia, stated that a goal of the Fisheries Act review was to "strengthen fish management provisions and create a legislative framework that affirms the ability of the Fisheries Minister to consider social and cultural objectives in administering the Act." Minister LeBlanc specifically referenced Atlantic policies that support small-scale owner-operator fleets, and he stated his intent to enshrine those policies into law. After consultations starting in October 2016, Minister LeBlanc proposed sweeping changes to the Fisheries Act and introduced new legislation to Parliament in early 2018. This provides an historic opportunity to right some serious wrongs in fisheries management not only in Atlantic Canada but in our Pacific region, and this report provides a clear and strong case for doing so.

The research and analysis presented here was begun by two Canadian charitable organizations that have collectively been active in the marine and fisheries sectors for more than sixty years. Our intent is to articulate a vision for fisheries that contribute to the social, ecological, and economic wellbeing of harvesters, fishing communities and the resource. While our focus is on BC, our findings have national implications since our marine fisheries fall under federal jurisdiction — the very jurisdiction that is now under review. Given the government's public commitment to diverse objectives in fisheries policy, the findings of this report are especially pertinent to the Fisheries Act review and any subsequent regulation and policy that might follow. The Fisheries Act review provides a unique and time sensitive opportunity to consider the consequences of the current policy framework and to inform fisheries policy on the west coast of Canada to ensure fair and affordable access to fisheries for First Nations, coastal communities, and independent fish harvesters. We believe our analysis provides important guidance to the Minister of Fisheries, Oceans, and the Canadian Coast Guard and his staff, and to Parliament, at a critical juncture in the evolution of Canadian fisheries policy.

While the review of the Fisheries Act is a welcome development for coastal communities, the evolution of fisheries polices in Canada hasn't always produced good results for either fish or people. Canadians have long recognized the multiple values that the sea has to offer — as a critical source of local healthy food, a key contributor to our economy, a provider of jobs, a connector to nature through which we can experience and learn about our oceans, and, for the many communities along our three coasts, a foundation of our very identity.

As one industry veteran told us,

> If we lose our fishing, we lose our identity.

Our varied and deeply rooted connection to the sea is the one constant in an industry that has had to adapt almost continuously throughout its history — to changing ecosystems, science, technologies, labour markets, consumer preferences, competition, climate conditions, government policies, and economic pressures. Our commercial fisheries policies have evolved in a piecemeal fashion over time — not necessarily for the better.

Canada, with the longest coastline of any country and the fourth largest marine estate on the planet, is constantly challenged to manage its ocean resources and habitat sustainably. Fisheries and Oceans Canada (still most commonly referred to as DFO, after the Department of Fisheries and Oceans of old) carries out this management responsibility with "absolute discretion," reflecting its origins in colonial rule. DFO staff are asked to protect and implement this authority as their duty. Fish harvesters and coastal communities struggle to have influence within this top down decision-making structure as do many First Nations despite the Federal government's stated commitments to reconciliation and United Nations Declaration on the Rights of Indigenous Peoples. Even with $2.5 billion of annual public investment in this institution and many attempts at industry reform,[2] DFO has struggled to initiate resource management policies that achieve the economic, environmental and social objectives as directed by our politicians.

To fulfill its mandate under the federal Fisheries Act, DFO's attempts at fisheries reform have focused on realizing "sustainable aquatic ecosystems" and "economically prosperous maritime sectors and fisheries."[3] What constitutes an "economically prosperous" fishery should answer, "economically prosperous for whom?" An "economically prosperous" fishery for export and gross domestic product (GDP) is not necessarily the same fishery that is "economically prosperous" for harvesters and communities. In British Columbia, DFO's response has been to focus on licence holders, placing little or no priority on securing livelihoods for harvesters or ensuring that remote communities that have historically relied on fisheries — in the case of First Nations for millennia — continue to have access to fish. The result: 85-90% of our fish are exported and increasingly harvesters and adjacent communities have minimal access to, or benefit from, this rich resource.

Instead, the federal government has opted to essentially support large scale privatization and consolidation of the Pacific ocean, incrementally increasing the ease with which licences and quota can be purchased, traded, and sold. A significant move in this direction was made over forty years ago when ITQs were first promoted as a tool for rationalizing fisheries (see Figure 1). This led to the creation of ocean "landlords" — or quotalords, in effect — individuals or corporations who, through quota and licence transfers, are now owners of large amounts of fishing quota, many of whom do not fish. It is to these licence and quota owners that DFO has increasingly passed on its fisheries management responsibilities, despite fisheries being a public resource. This has worked well for some, such as certain retiring harvesters who have been able to sell these future rights at high prices, often not to young harvesters or communities

HIGHLIGHTS IN THE HISTORY OF THE BC COMMERCIAL FISHERY

1868 **Fisheries Act** - Minister granted absolute discretion

1871 **British Columbia Terms of Union** - Canada to protect and encourage fisheries

1923 **International Pacific Halibut Commission** established

1954 **Great Law of Fishing** - tragedy of the commons

1960 **Sinclair Report** - fisheries licensing

1969 **Davis Plan** - effort controls

1973 **Report from the West Coast Salmon Fleet Development Committee** (Pearse)

1977 Canada establishes 200 nautical mile Economic Exclusion Zone (EEZ)

1978 **Economic Council of Canada** (Pearse) recommends eliminating subsidies, fleet reduction, and 'stinted landing rights'/quotas

1979 DFO Deputy Minister Needler argues for fleet reduction

1980 DFO **State of the Industry study** (Pearse & Doucet)

1981 **Review of the Davis Plan** (Hayward)

1982 Canadian Constitution repatriated: Section 35 enshrines Aboriginal title & rights + UN Convention on the Law of the Sea

1982 **Commission on Pacific Fisheries Policy** (Pearse Commisison) released - output controls

1989 **Vision 2000** - fleet and DFO reductions; ITQs and area licensing

1990 **Sparrow** decision - aboriginal priority access for Food, Social, and Ceremonial purposes

1991 **Cruickshank Report** - fishermen recommend owner-operator policies in the Pacific

1992 Aboriginal Fisheries Strategy (AFS)

1993 Halibut ITQs fully implemented

1994 Allocation Transfer Program (ATP) established to transfer commercial access to First Nations

1995 **Fraser Report** results in Industry Roundtable on fleet reform and reduction

1996 **Mifflin Plan** - area licensing, salmon fleets reduced

1997 **Oceans Act** + **Delgamuukw** decision (aboriginal title exists) + Fisheries Renewal BC

1998 **Anderson Plan** - salmon fleet reduced by two thirds

1999 **Marshall** decision - treaty right to fish to earn a moderate livelihood

2004 **Pearse/McRae Report** promotes ITQs for treaty settlement

2004 First Nations Fisheries Panel releases **Our Place at the Table** sets visionfor fisheries management and allocation

2005 Wild Salmon Policy - harvest rates reduced

2006 Commercial Groundfish Integration Pilot Program

2007 Pacific Integrated Commercial Fisheries Initiative (PICFI)

2010 **Cohen Commission of Inquiry into the Decline of Sockeye Salmon in the Fraser River**

2009 **Ahousaht** decision - Aboriginal right to sell fish

2014 **Tsilhqot'in** decision - first time Aboriginal title is proven

2017 Pacific North Coast Integrated Management Area plan endorses ecosystm-based management

Figure 1: A detailed summary of each event described in this timeline is provided in Appendix 1. A brief narrated overview of the history of Canadian fisheries is also provided in Appendix 2.

but to investors and processors, as they are the only ones who can afford the purchase. This consequence of current policy has left many communities and fish harvesters, especially the next generation, literally high and dry. This disenfranchisement is most evident in Canada's Pacific region where licences are openly transferable with no requirement for the owner to fish and where individual transferable quotas (ITQs) have been in place in key fisheries since the early 1990s.[4]

Our current government has inherited decades of policies with no stated social objectives. Our Prime Minister, in 2016, spoke to a vision of protecting access to our coast for future generations:

> "As a government, everything we do, and every action we take, is done with one goal in mind: we want to leave our kids and grandkids with a better place to live — whether we're creating good, well-paying jobs for the middle class; ensuring our communities are safe and protected; or taking the necessary action to safeguard our environment. And by working together with our partners along the coasts and across the country, I know we can preserve our coastlines for generations to come."[i]

The current review of the Fisheries Act will soon be added to BC's commercial fishery timeline. Whether it stands the test of time as a pathway to sustainable prosperity for our coastal communities, portends mere tinkering with the status quo, or worse, serves as a launch pad for more ill-considered policy-making — well, that's on future generations to decide.

i http://pm.gc.ca/eng/news/2016/11/07/prime-minister-canada-announces-national-oceans-protection-plan [Accessed on 16/06/2017]

ADRIFT IN A POLICY SOUP

In the Oceans Act, which the government describes as "An Act respecting the oceans of Canada," it is stated that:

> "Canada recognizes that the oceans and their resources offer significant opportunities for economic diversification and the generation of wealth for the benefit of all Canadians, and in particular for coastal communities."[i]

The Oceans Act is one of several pieces of legislation that guide the priorities and practices of Fisheries and Oceans Canada. Despite the words of the Prime Minister or the enshrined recognition in legislation of the opportunities for *all Canadians* to benefit from our oceans and coastal resources, there is ample evidence to suggest suggest that to date, on a number of fronts, the federal government is not doing as well as Canadians might hope in the management of our public marine resources. Granted, it is a very complex and diverse sector to manage.

Here, from DFO's website at the time of this report, is what the government *says* it is trying to do:

> *The core business of Fisheries and Oceans Canada and the Canadian Coast Guard, managing Canada's fisheries and safeguarding its waters, is central to who we are as a Department. Our work is part of the daily lives of Canadians.*
>
> *We:*
>
> - *ensure commercial vessels and recreational boaters can safely navigate our waters and are there to save lives and protect our environment when emergencies arise;*
> - *sustainably manage fisheries and aquaculture and work with fishers, coastal and Indigenous communities to enable their continued prosperity from fish and seafood; and*
> - *ensure that Canada's oceans and other aquatic ecosystems are protected from negative impacts.*
>
> *The Department's work is guided by* ***six key pieces of legislation****:*
>
> - *the* Oceans Act;
> - *the* Fisheries Act;
> - *the* Species at Risk Act;
> - *the* Coastal Fisheries Protection Act; *and*
> - *the* Canada Shipping Act, 2001 (Transport Canada*-led); and*
> - *the Fishing and Recreational Harbours Act*[ii]
>
> *The Department's Mission*
>
> *To ensure Canada's aquatic ecosystems and fisheries are sustainable and economically successful. We also keep Canadian waters safe and secure.*[iii]

i http://laws-lois.justice.gc.ca/eng/acts/O-2.4/FullText.html [accessed on 16/06/2017]
ii http://www.dfo-mpo.gc.ca/about-notre-sujet/org/mandate-mandat-eng.htm [accessed 11/12/2018]
iii http://www.dfo-mpo.gc.ca/about-notre-sujet/index-eng.htm [accessed 11/12/2018]

In DFO's interpretation of its vast and complex mandate, it has settled on two critical metrics of success: conservation and economic prosperity. True, in recent years the government has shown a willingness to commit to a broader set of objectives than DFO's current mission does, including Ecosystem-Based Management — as shown in their endorsement of the Pacific North Coast Integrated Management Area plan. And as per the quote above from the Oceans Act, Canada has acknowledged the importance of adjacency for economic benefit from our ocean estate.

In DFO's wide spectrum of policy development from region to region, some regions have fared better than others. For example, the policy framework "Preserving the Independence of the Inshore Fleet in Canada's Atlantic Fleet" (PIIFCAF) in Atlantic Canada, specifically the owner operator and fleet separation policies, have shown measurable success. Introduced in 1979, the fleet separation policy was created with goals aimed at explicitly *reducing or eliminating corporate concentration of fishing licences*, *ensuring wide distribution of harvesting incomes*, *and ensuring the long-term viability of rural communities*. In 1989, the owner operator policy was introduced to support the independent inshore fleet, with the wealth and value flowing from licences held and controlled by fish harvesters who remained in their communities.[5] In 2007, PIIFCAF was announced by DFO as the tool to address the negative impacts that trust agreements were having on the management of Atlantic fisheries and how those trust agreements exploited loopholes in various licensing policies thereby reducing the efficacy of the fleet separation and owner operator policies.

Despite occasional, positive efforts over the years to consider a broad range of outcomes for our fisheries, and despite some regional policies (as above) that do this, when measuring the impact and effectiveness of DFO's various management tools against their two objectives of "sustainable aquatic ecosystems" and "prosperous maritime sectors and fisheries," the government reports[2] regularly on only a few key indicators:

- the health of stocks for primary commercial species;
- the landed value of various species (what fish harvesters receive at the dock);
- the contribution of Canada's combined fisheries resource (including marine, freshwater, aquaculture) to the country's GDP; and
- the market value of processed fish.

Yet there is so much more to know if we are to have any confidence that the government's short list of performance indicators reflects progress towards a much longer list of expectations that the industry, and Canadians as a whole, deserve to see realized in the management of Canadian fisheries. What we cannot reliably discern from Canada's self-reporting on its management of our fisheries is whether DFO policies are contributing to overall community wellbeing and ecosystem health or having a negative effect? Are fishing enterprises viable or are they losing money year after year? Do coastal communities benefit from harvests in their adjacent waters? Are fishing policies supporting the processor over the harvester? Does Canada maximize the value of its fishery resource through jobs, incomes, value-added processing and new market development? Is there good or poor compliance with fishing regulations by the array of resource users? Is fish harvester and traditional knowledge appropriately involved in building

management plans? Are the Rights and Title of Indigenous peoples being addressed? How do our elected leaders respond to a BC fish harvester's comment below?

> Beyond financial help, we need attitude help in Ottawa. We need the whole thing rethought so they are thinking about … how we can actually spread the benefit of the industry. As government, your business isn't making a few people rich, your business is making the country rich.

This points to a core question for Canadians, rooted in widespread frustration on our west coast about the growing social inequity of ownership, large scale privatization, and consolidation in our Pacific coast fisheries — especially in light of the progressive and successful policy framework that *the same department* has pursued to such beneficial effects in Atlantic Canada. British Columbians, all Canadians have a right to ask,

> "How do we want our fisheries managed to maximize both their longevity and their benefits? Will consolidating the ownership and control of our fisheries resources in a few larger vessels, a few hands: a) conserve stocks; b) ensure good stewardship; c) maximize the value that we receive from the resource; d) reduce management costs and increase management effectiveness; e) spread the wealth along our coast; f) maximize the jobs along our coasts from the fishery; g) build wellbeing in our fishing communities?"

The answers to all these questions and to the desire for a fundamental attitude shift in Ottawa will not come until DFO is measuring a more complete set of indicators of what Canada's fisheries management is achieving. Until DFO embraces the concepts of true sustainability — and measures itself against a much higher standard than is currently the case — Canadians will be in the dark as to whether "every action it takes," will leave our kids and grandkids with a better place to live: good, well-paying jobs; safe and protected communities; a safeguarded environment. All that and more, for generations to come.

What should sustainable fisheries look like? What are the values that harvesters hold dear when it comes to our natural and local fisheries resources? What are the common threads that built and sustain the fabric of coastal communities, food systems, and cultures? A Canadian vision for commercial fisheries should be one that reflects core Canadian values, respects ecosystem connections, and which holds dear the fundamental objective of *sustaining* them.

Together with many fishing community leaders and individual harvesters, we have articulated below a widely held vision and core values for marine resource use. This is a foundation against which we believe Canadians can measure success in managing our fisheries.

We envision:

- **Sustainable fisheries**: Fish and marine resource use meets the immediate social and economic needs of society without compromising ecological integrity or the ability of future generations to meet their needs.

- **A stable, long-term balance between conservation and use**: Well-managed marine ecosystems require diverse knowledge systems and collaborative work to sustain thriving coasts, ecosystems, and communities for future generations.

- **The critical locus of resource use and stewardship in adjacent communities**: Resource users and their communities should be the primary beneficiaries of local fishery resources and habitat, and should play a lead role in managing and protecting those natural assets.

- **Continuing social and economic development**: Fisheries providing meaningful work and good livelihoods, contributing to local food security and a sustainable global food supply, and supporting vibrant cultures and resilient coastal economies.

Foundational to our vision are four realms of sustainability:

Ecosystem includes elements such as continued health and productivity of fish stocks; long-term protection of marine biodiversity; habitat and ecosystem integrity; local stewardship; and transparency and accessibility of data.

Social includes elements such as culture and humanities; safe and respected jobs; equitable opportunities for the next generation; a fostered connection to ecosystem; localized access; food security and safety; informed and engaged citizenry; inclusion of, and respect for, tradition and local knowledge; and community health and well-being.

Economic includes elements such as fair trade through the value chain; stability, viability and diversification in fishing opportunities; investment in local infrastructure and human capacity; maximization of value from catch; sustainable livelihoods; equitable distribution of benefits; and maximization regional economic benefits to communities.

Good governance includes elements such as accessible, transparent, and inclusive decision making, with collaborative governance structures; engagement of all governments with jurisdiction (Federal, Provincial, and First Nations); evolution of laws, policies, and regulations, including evolution that recognizes Indigenous Rights, Title, and authority; and effective and responsive evaluation frameworks that provide accountability.

In addition to the larger principles of sustainability outlined above, there are three aspects of fishing itself that are critical to realizing a sustainable and viable fishery for harvesters: fish harvester's knowledge and skills (how to fish and come home safely); their legal access (licences and quota) to enough fish to maintain viable enterprises; and their ability to have and maintain the appropriate technologies and tools — vessels, gear — to safely and effectively catch fish in their fishery.

We are not alone in having a vision for more sustainable fisheries in Canada. Consider the vision of the Canadian Fisheries Research Network:

> *"A healthy fishery respects the ecological integrity of the ocean and its resources; is ethical, responsibly governed, economically viable and technologically appropriate; supports fishermen and communities; draws on local culture, heritage and diverse knowledge system; and enhances health, wellbeing, and the public good."*

The following high-level overview of the current state of west coast fisheries reveals a management structure that is ill-equipped to manage our fisheries to even a minimum acceptable standard, let alone one that embodies the basic principles of sustainability that are essential to industry and community "health, wellbeing and public good." It is time something was done about it.

2. THE CURVE OF TIME*

At the outset of this report we promised a hard look at Canada's fisheries — and British Columbia's commercial fisheries in particular — to provide evidence of a level of management that sows social dysfunction in our coastal communities and fails the most basic tests of community sustainability. What follows is a critical assessment of how our fisheries are faring on the Pacific Coast, and how the current structure of our fisheries is largely to blame. Our report in no way suggests that our fisheries can't be made viable, quite the contrary. This is about management, and the fact that people who know the fisheries best are largely excluded from solving the problems outlined here. What they need is a chance to contribute their knowledge in ways that will lead to a return to real and lasting prosperity on our coast.

THE STATE WE'RE IN...

BC fisheries have been a cornerstone of the provincial economy since before the province's inception, indeed for thousands of years before Confederation. Emblematic of the so-called modern economy, at least until recently, is a portrait on the ceiling dome of the provincial legislature building that features four main resources: fisheries, forestry, mining, and agriculture. But for decades, by many measures, our fisheries have experienced a long decline.[4]

THE STATE OF EMPLOYMENT AND INCOME

Once a major employer in BC, and the predominant economy in many coastal communities, fisheries have suffered extensive job losses.[4] The effect this has had on coastal economies has been felt on many levels, including direct job loss in fishing but also the loss of ancillary services and infrastructure that supported a broad range of community needs. As community members and fish harvesters themselves describe, there has been an even greater impact on social and cultural wellbeing.[6]

Simple indicators, such as numbers of registered boats and harvesters (Figure 2), tell the story. The number of registered commercial fishing vessels in the Pacific region has shrunk from 6,700 in 1985 to 2,400 in 2015 — just 36 percent of what it used to be.[i]

i http://www.dfo-mpo.gc.ca/stats/commercial/licences-permis/pacific-pacifique/pacfleet-eng.htm [Accessed on 15/5/2018]

** With apologies to M. Wylie Blanchet*

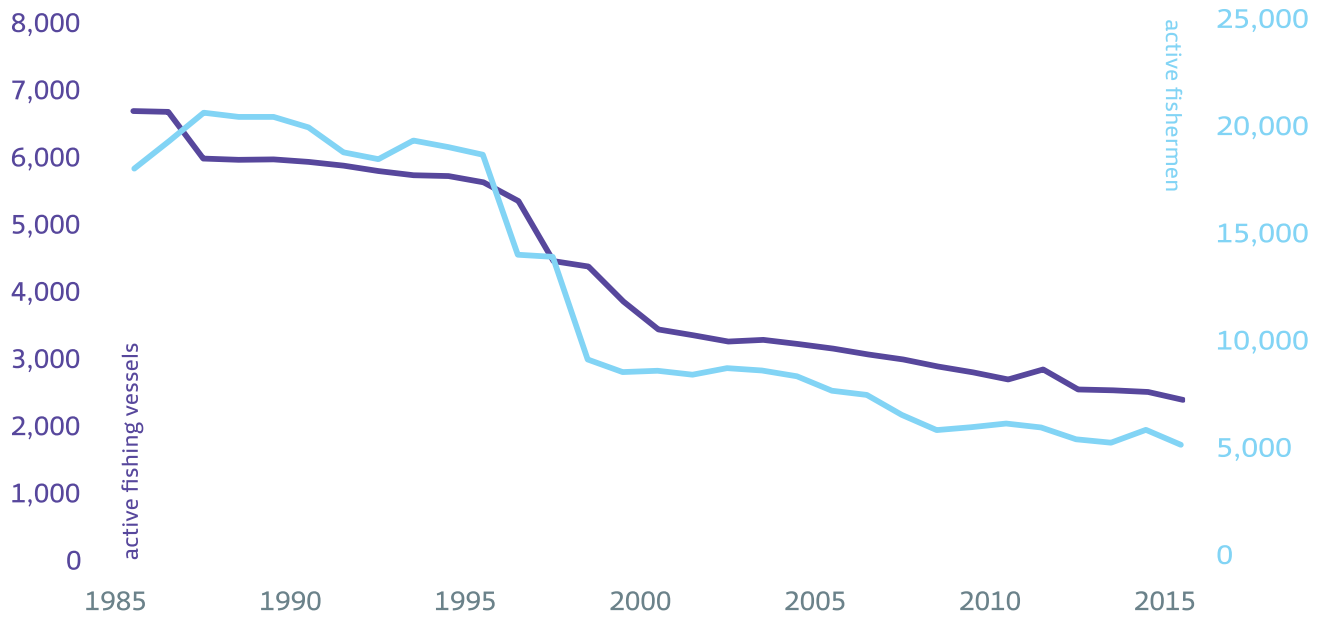


Figure 2. Number of registered commercial fishing vessels and personal commercial fishing licences, reflecting the number of fishing jobs in British Columbia, 1985-2015.

The decline in vessels is mirrored by a decline in harvesters. Everyone needs a licence to fish — so the number of personal commercial licences, or fisher registration cards (FRCs) issued is one indicator of how many people are active in the industry. By that measure, there has been a constant and dramatic decline. Today the number of fish harvesters is just thirty percent of what it was thirty years ago.[i]

Meanwhile, other very telling indicators are also faring poorly. Incomes have declined sixteen percent from 2000 to 2013, and the average age of harvesters has climbed from fifty-four in 2003 to sixty-two in 2015,[7] suggesting that the next generation isn't entering the industry.

THE STATE OF THE FLEET

The dramatic loss of vessels in the BC fishery has affected the large and small boat fleets differently. Though both size classes have had dramatic drops in numbers, the small boat fleet (<65') declined by 4,000 more vessels than the large boat fleet (>65') between 1985 and 2015.

The impacts of this loss in small boats is significant, given the higher number of jobs available within the small boat fleet. The impact has been disproportionately greater on this fleet, and it's also the fleet that provides the most direct benefit to remote coastal communities.

i http://www.dfo-mpo.gc.ca/stats/commercial/licences-permis/pacific-pacifique/pactype-eng.htm [Accessed on 15/5/2018]

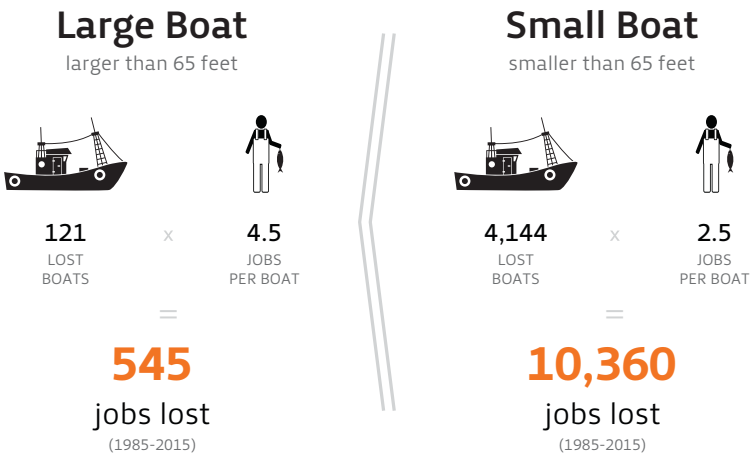


Figure 3. The number of boats and jobs lost for vessels smaller and larger than 65 feet, between 1985 and 2015.

UNSAFE STATE

For decades, in many competitive fisheries, openings were typically so short and infrequent that there was intense pressure to fish to survive — no matter what the conditions. At times, this had devastating results. Many a parent, spouse, sibling or child was lost at sea. During the 1975 herring season, due to a series of tight openings in bad and unpredictable weather, nineteen vessels were lost and fourteen fish harvesters drowned. During a halibut opening in 1987, the fleet was out in terrible weather, desperate not to miss an opening. Fourteen boats went down in one day, and nine fish harvesters died.

As fishery openings became fewer and shorter, the stakes of each opening got higher (including being able to make a living and support a family), dangerous fishing incidents grew, and fish harvesters became desperate for a solution. ITQs were lauded as the way to reduce hazards in fishing and ultimately, to reduce the risk of injury and death. To a certain extent this was true, however — like many other promises of ITQs — this benefit would prove short lived. Implementing ITQs may have eliminated the "race for fish," but as ITQ critics claim, as quota purchase prices soured it was replaced by a "race to pay your line of credit."

Market pressures still create scenarios where fish harvesters are forced to fish in unsafe conditions with underpaid, and often inexperienced crew, and vessels that are in less than optimum condition due to a lack of income to cover maintenance costs. Furthermore, harvesters must increase fishing effort to cover the ever-growing costs of operations and exorbitant lease fees paid pre-season. As a result, the incident of injury and fatality at sea has not declined and in many cases has gone up (see Figure 4). Says a BC fish harvester,

> "With quota, to some extent the pressures of weather and trying to get done on a certain date have been replaced by the pressures of carrying a big line of credit to cover quota lease costs. So, you are pressured to fish all the days you can fish in order to try and get ahead of that cost and actually make something for the boat and crew. What's the worst anxiety, you know — a thirty-knot westerly or a fifty-thousand-dollar lease accumulating daily interest? What's going to make a guy make more sensible decisions?

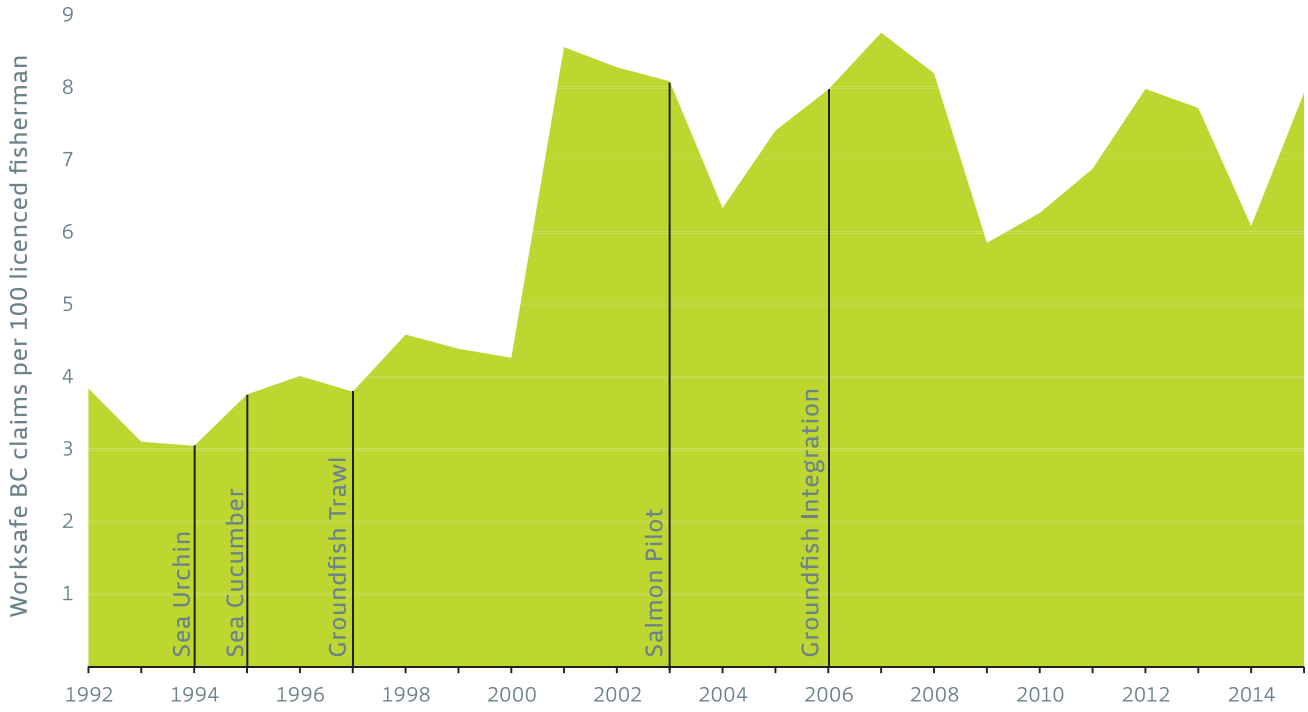


Figure 4. Trend in the number of claims to Worksafe BC in the fishing sector, 1992-2015. The incidents of fishing injuries and deaths has remained high, and in some cases, has increased, since the onset of ITQs. Black lines indicate dates of ITQ implementation.

We all want our family and community members to come home safe and sound, but overall the rate of claims per licensed fish harvester has increased since ITQs came in. Fishing families still have much to keep them up at night.

THE STATE OF CAPITAL

Apart from conservation, a key goal (and metric) for DFO is economic prosperity, but its management approach in the Pacific region has both lowered incomes (Figure 10) and dramatically affected affordability. The cost of quota, which directly affects the cost of fishery access, has quadrupled since 2004.[8] Fish harvesters' economic pressures can vary widely — from reasonable wages for boat, crew, and captain, to the need to pay the majority, if not all, of revenues earned to someone who doesn't even get on the boat. If we take the examples of two middle-sized boats, a 58 foot boat that fishes halibut, sablefish, dogfish, lingcod, and salmon, and a 35 foot boat that fishes lingcod, sea cucumber, and salmon, we see that not only are lease costs so high that they squeeze out the ability to pay for insurance, boat repairs, and other operating costs, but also that the boat may be losing money, despite diversified opportunities (Figure 5).

This scenario occurs often in ITQ fisheries, as many cannot afford to own their own quota because of an astronomical rise in purchase price per pound (Figure 6). For example, the cost of halibut quota has been steadily climbing for years. Harvesters who want to keep fishing are forced to lease or contract fish quota, often leaving no funds for maintenance and upkeep,

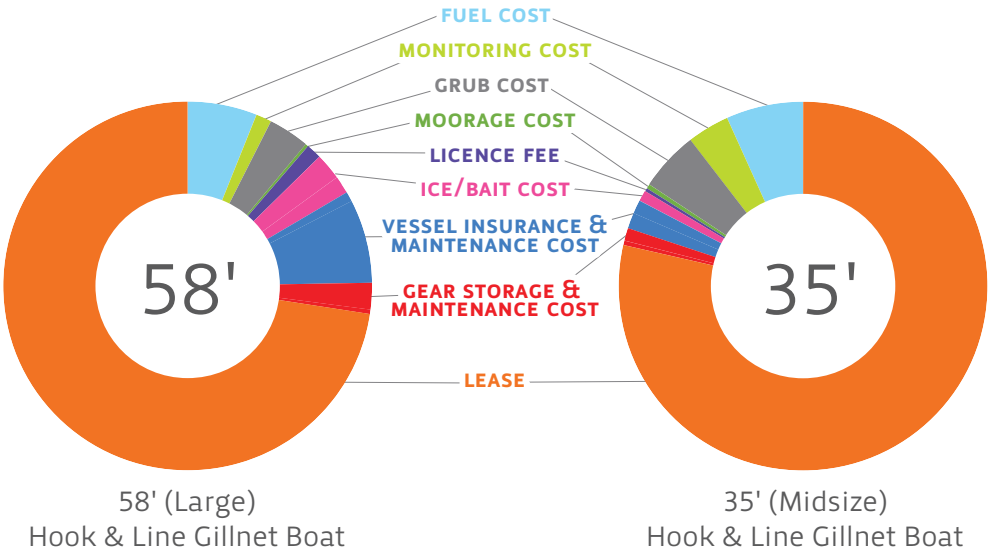


Figure 5. High lease and operating costs of two middle-sized boats[i]

and leaving people with little to take home to support themselves, their families, and their communities.

As a result of this huge price inflation, many fish harvesters who are forced to lease find themselves losing the majority of the revenue they would have earned prior to ITQs, to the owners of the quota. Conversely, the ITQ owners earn their revenue from leasing as opposed to fishing.[4]

STATE OF SUCCESSION

Any fish harvester in British Columbia will tell you that it is extremely hard to enter most Pacific fisheries. The fleet is aging — fish harvesters are growing older without being replaced by younger individuals beginning their careers. Not only that, but the average income from fishing in BC is declining, and in most cases commercial fishing offers insecure and uncompetitive incomes.[9 7] Says one older BC fish harvester,

> How stable is an industry that's confined to, or totally in the hands of older men who are now losing energy, and you've restricted younger guys from getting in? You know in five, six, seven years, what happens when I can't find my ... glasses, I can't find the keys to my boat or something, you know? I get a young crew man, he can work on the deck, sure, but can he make enough money on this boat to buy quota? ... I don't think so.

i Simulation realized using the Fisheries Diversification Model (FDM) © Ecotrust Canada. Data extracted from various sources (the FDM database for costs, DFO data for catch opportunity and ex-vessel prices, and interviews were conducted with members of the industry).

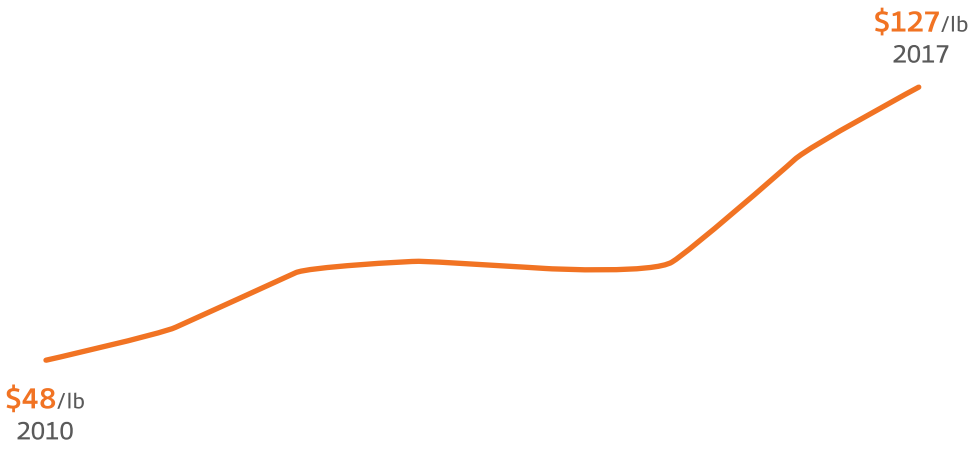


Figure 6. Halibut quota purchase price, 2010–2016, adapted from [4] and A. Davidson (BC fish harvester, pers. comm.). Prices adjusted to 2015 value.

To the cost of quota, add vessel financing, the cost of a licence, gear, insurance … and remember it is seasonal work with increasingly shorter seasons, which means fish harvesters need non-fisheries employment to make up a greater portion of their income every year.[9 7] On top of that, new entrants have to learn complex regulatory frameworks and become familiar with new ecosystems. They can be easily overwhelmed. Without the capital or capacity for young people to start small, independent fishing operations and with limited access to complementary employment opportunities, this is a very tough career choice to make. As a result, more and more people don't, so these licences end up in the hands of larger, sometimes offshore, corporations, fewer fish harvesters are employed every year, and the benefits to adjacent coastal communities decline. The question of who comprises the next generation of fish harvesters is now more than ever a critical one.

> "What we have neglected to address, is that these quotas are useless without people to catch the fish. They don't generate money on their own, you've got to have people out there to catch the fish and we're not training any new ones.

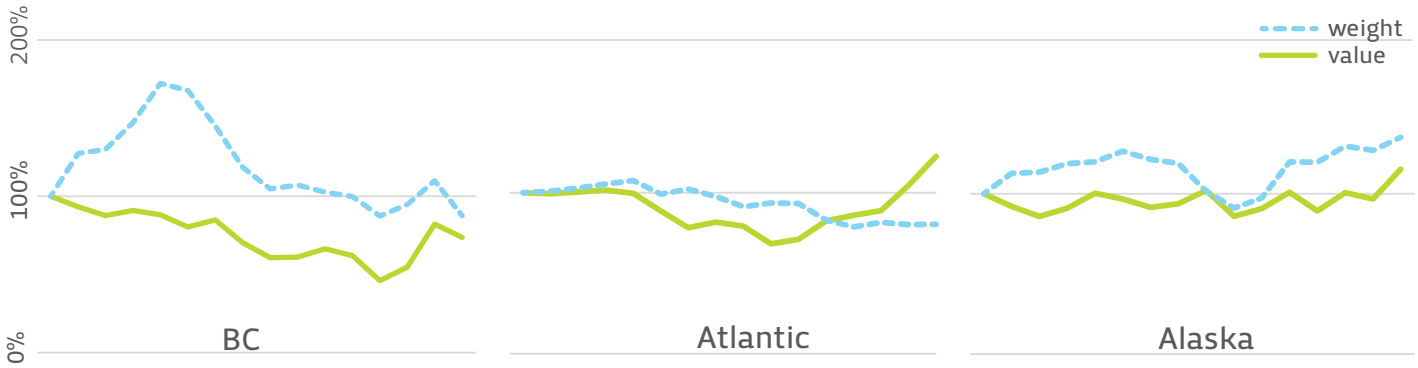
"So what?" You might ask. "They can find other employment somewhere else." But here is the thing: fisheries, particularly in these communities, are not only about employment, but also about the sense of identity, belonging, culture, and much more as our previous study found.[6] A fishing family is defined in its core by fishing, and the loss of that identity on the coast costs youth in many ways other than just a source of employment. For example, it is well documented throughout international literature, that losing access to fishing increases risks to wellbeing.[9-12] The decline of wellbeing in BC communities historically based on fishing is also well documented with increased unemployment and drug use, loss of infrastructure and youth retention, as well as increased youth deliquency and suicide.[13, 14]

STATE OF THE FISH

A review of the catch landed in BC over the past fifteen years shows a decline in value and a steady trend in volume. Conversely, the volume in Atlantic fisheries has declined but they have seen an increase in overall value. It is striking that this greater value realized for a declining catch is something BC has not managed to achieve. The same trend of increasing value to weight is also seen in Alaskan seafood. Species may vary from BC, to Atlantic Canada, to Alaska, but BC seafood is as high quality as Alaskan and Atlantic Canada seafood and is also capable of realizing increased value. The question becomes, why isn't it?

BC fisheries are lagging behind our neighbours to the north and compatriots on the east coast. Both Alaska and Atlantic Canada are capturing increasing value from fisheries resources compared to their state in 2000, while BC remains at or below our landed volumes and value (see Figure 7). There is an ever-increasing global demand for seafood, but we are literally missing the boat. The profound disappointment of the failure of our fisheries to provide their full value to fish harvesters and BC communities is not just around the huge loss of financial benefit, but the fact that the fishery has historically been, and can be again, not simply an economic driver but also an integral part of our food security, culture, and the social fabric of our province.

Figure 7. Evolution of landings (in tonnes) and landed value ($) in Canada's Atlantic, British Columbia, and Alaska, between 2000 and 2015, relative to 2000.



SOMETHING IS ROTTEN IN THE STATE OF BRITISH COLUMBIA

By almost every meaningful measure, BC's fisheries are in a perilous state.

As illustrated in Figure 8, from 2000 to 2015 our coast lost thirty percent of our commercial boats, about eighteen percent of our fishing jobs, and while the landed volume stayed steady (increased one percent) over the past fifteen years, the landed *value* dropped twenty-six percent. Further, the total income for all fish harvesters in BC has dropped forty-two percent over the same period.

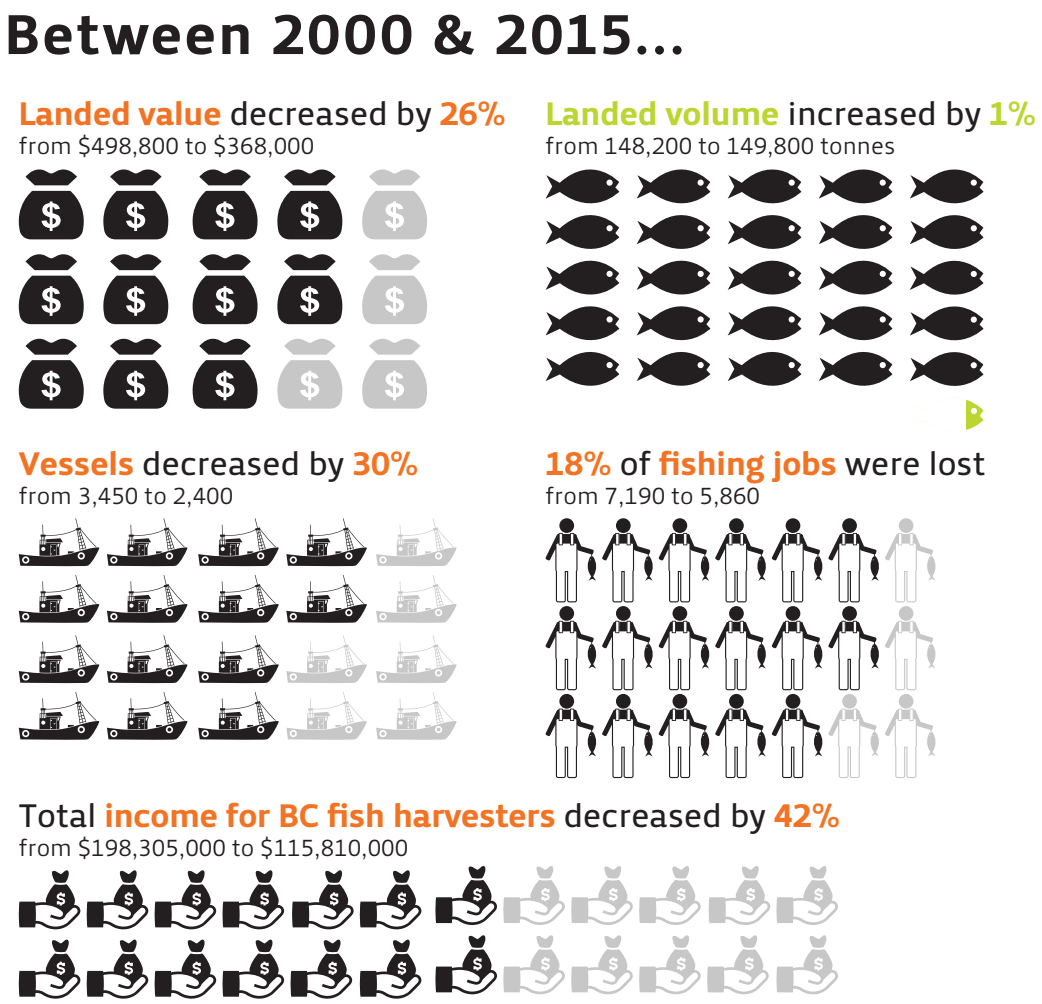


Figure 8. Change in the landed value and volume, number of vessels, fishing jobs, and fish harvester's income between 2000 and 2015. (DFO and Revenue Canada)

Despite the continued high volume of seafood caught off BC's coast, in 2015, the average fishing income of BC fish harvesters at $19,100 was under half of the average income of Atlantic Canada's fish harvesters at $42,795.[7] In BC, average income from fishing employment has dropped 29% in constant dollar terms over the fifteen year period from 2000 to 2015, whereas

Atlantic Provinces combined saw an increase of 45% (Figure 9).

It is important to note that the decline in fishing incomes in BC cannot be attributed to a decline in landed volumes. This is evidenced by the fact that landed volume has stayed steady while incomes have declined as shown in Figure 10. Further, it cannot be directly attributed to drop in value as the decline in harvester income was much greater.

These troubling trends tell the story of a broken system. Over the 2000 to 2015 period, BC landed a similar volume of fish, but lost value, and to an even greater extent, lost employment income.

In summary, in BC we have

- lost thousands of jobs in coastal communities where jobs are hard to find at the best of times,
- the same amount of fish is coming out of the water,
- a drop in value acquired per pound despite an increase in most other regions and an increasing global demand for seafood,
- a loss of viable livelihoods for fish harvesters and their families, and
- a decline of overall wellbeing across rural fishing communities.

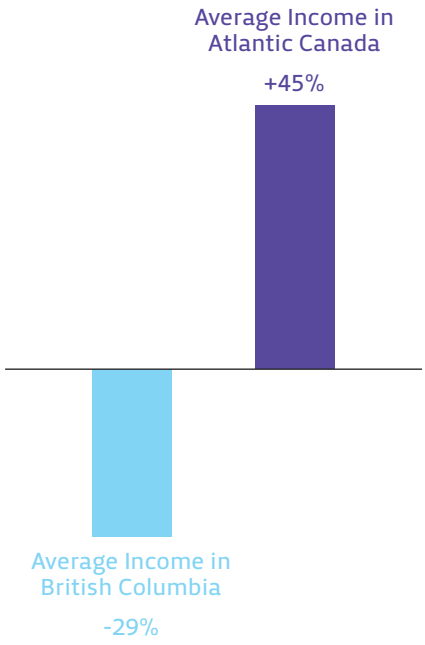


Figure 9. Contrasting fishing prosperity in Atlantic Canada and British Columbia, 2000-2015.

BC fish harvesters are catching the same amount of fish and making less.

What is galling to communities, and should galvanize outrage and demands for urgent and significant policy change, is that the declines outlined above have not come about through a

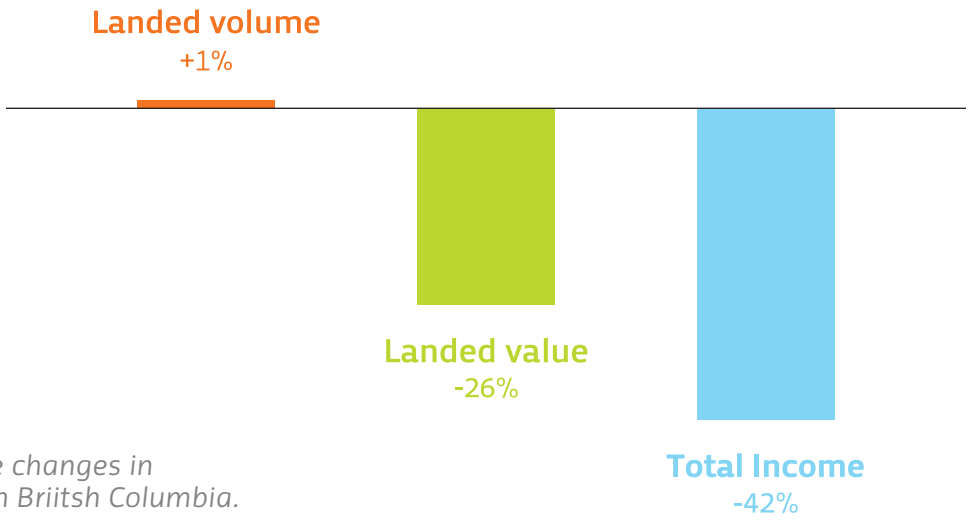


Figure 10: Disproportionate changes in harvests and profitability in Briitsh Columbia.

drop in catch due to some environmental catastrophe, through overfishing, or some massive and ungovernable natural phenomenon. There has been no drop in overall catch. Yes, we need to be ever vigilant about multiple development and environmental threats to habitat, and who knows what else climate change might yet portend for our oceans and our marine fisheries. But the biggest threat to our fishery is in plain sight, and it is man-made: a management structure that is antithetical to sustainability, and spells ruin for all but a lucky few in the casino economy of British Columbia.

Says a First Nations fish harvester from the north coast,

> “It’s killed a lot of communities. You go to Bella Bella, you go to Hartley Bay, you go to Alert Bay even, you look at their fleets and ever since area selection and quotas, you’re down to — let’s say they had five hundred boats, they’re down to ten, fifteen. That’s from the quota. You can actually go into a lot of these villages and you can see on the beach the boats that they can’t maintain. My brother’s boat sank right in the breakwater in Hartley Bay.

THE TROUBLE WITH UNRESTRICTED TRANSFERABILITY

“Who benefits from fish harvested in B.C.’s waters?” asks renowned maritime anthropologist Dr. Evelyn Pinkerton, of Simon Fraser University. “You’d be logical in thinking the answer is mostly people who make the BC coast their home and who fish for a living. And you’d be wrong.”

It is estimated that Pacific commercial fisheries land 182,983 tonnes of fish each year,[i] worth a gross landed value of $352 million.[ii] The number of boats and the number of fish harvesters has decreased dramatically, and although this has resulted in huge job losses, the “rationalization” or reduction of Pacific fleets was an intended outcome. The decline of harvester income was not, on the contrary, rationalization was lauded as a way to increase harvester incomes.

The increasing transferability — or in other words marketization — of licences and quota in BC fisheries has dramatically increased purchase prices of both licences and quotas. In most cases it has also resulted in a highly competitive market for leasing that has become cost prohibitive for fishermen. By way of example, the introduction of individual quotas (IQ) and individual transferable quotas (ITQs)[iii] translated into a radical restructuring of our Pacific fisheries with the federal government essentially introducing openly transferable quasi-private property

i 2016, http://www.dfo-mpo.gc.ca/stats/commercial/land-debarq/sea-maritimes/s2015pq-eng.htm [Accessed on 16/06/2017]

ii 2016, http://www.dfo-mpo.gc.ca/stats/commercial/land-debarq/sea-maritimes/s2015pv-eng.htm [Accessed on 16/06/2017]

iii ITQs refer to individual portions of a TAC — units of quota — which allow the holder to catch that portion of the TAC each season. The weight value of the ITQs change proportionately to changes in the TAC set for a species each season. ITQs are fully tradeable and can be sold or leased to other persons. http://www.afma.gov.au/resources/glossary/ [Accessed on 05/05/2017]

rights into the allocation and management of a public resource. Licence holders first received a predetermined catch allocation assigned for their exclusive benefit (IQ), and then achieved the right to openly sell or lease their allocation to others if they did not want to fish it themselves. This open ability to lease and sell became increasingly easy to do resulting in an unregulated market — the private buying and selling of access to Canada's previously publicly owned fisheries resources — and was a much-lauded policy invention,[15, 16] in some quarters at least.

Catch shares, in one form or another, are now used as the principle means of managing all or part of sixteen (out of twenty) commercial fisheries on the Pacific Coast, and individual transferable quotas (ITQs) are used in twelve of those (sixty percent). The cost to purchase quota for Pacific commercial fish species has skyrocketed over the past thirty years, even over the past ten years, currently totalling approximately one billion dollars.[i] The salmon fishery, culturally the most significant fishery on our coast, is facing mounting pressure from an increasingly consolidated and vertically integrated industry to move to an ITQ regime, with active ITQ pilots in the troll and seine fisheries in place.

ITQs, initially based on catch history, were introduced in Canada's Pacific region as a tool that would secure harvesters' access, yet the opposite has happened. There were no protections or provisions for active fish harvesters — the privilege to fish a percentage of the available catch each season can be purchased, held, leased, or sold without requirement to fish the quota or operate a vessel. In other words, anyone can own BC's ITQs and increasingly, this is not active fish harvesters. Recalls one fisherman,

> "Not everybody was consulted. We didn't really know about it until they just threw it right out there. I would've been voicing that there was no agreement of a lot of the fishermen.

By guaranteeing each quota holder a percentage of the available fish stocks, ITQs purport to end a destructive race to fish from "open access" fisheries. The underlying assumptions behind these new quasi-property rights were that:

- They will allow each vessel to pace their fishing activity to their own needs and to the market's requirements because they are guaranteed their share and do not have to "race" to catch it;
- By spreading fishing activity throughout the year (again, removing the race for fish), industry stability, including prices, safety and employment will improve;
- Harvesters will be more inclined to conserve stocks because of an increasing sense of personal ownership/responsibility; and
- Harvesting rights will remain in the hands of harvesters.

Unfortunately, largely due to the uncontrolled transferability of these quotas, there have been

i Calculated on the basis of the latest available value of quota purchase price for all quota species and the most recent data for total allowable catch including geoduck, groundfish trawl, halibut, sablefish, lingcod and dogfish.

many unintended consequences, as is often the case when there is an absence of clear objectives, few regulatory controls, and no accountability measures to monitor success over time. On the docks and boats, many have been voicing their concern for a lack of fair process and thoughtful planning for years, as well as the lack of controls and accountability framework to keep speculative investors out of the system.

THE DEBATE GOES ON

> The government actually had an agenda — 'How do we reduce the cost of managing this fishery?' That was the way they looked at it. 'We're not able to manage the impacts on the fish, we are spending a huge budget trying to do it and it's not successful, so we need a new way to do it. And our economists tell us that an ITQ is the way to do this.' Now the economist, I don't know how much halibut he caught over the years, but they had an idea and that's the idea they wanted to sell.

Since their introduction, ITQs have been the cause of much dispute within the industry. The argument mimics the centuries-old debate among economists: those who argue for the power and effectiveness of a free-wheeling market-based economy (ITQ proponents), versus those who assert that only carefully crafted markets can achieve a complex suite of deliberate outcomes (ITQ opponents).

ITQ proponents argue that the smaller-boat fisheries are seasonal, inefficient social operations. They hold that if a smaller number of participants manage to gradually buy up fishing privileges, the industry will become more stable and efficient, which will increase fishing business viability. They believe the marketplace should be left free to establish quota pricing — arguing that the forces of supply and demand will ultimately establish a fair and reasoned price point for quota (and therefore of access), and that the only way to fairly determine a distribution of benefits is through those with the means to pay the going price. Inevitably, there will be winners and losers. Simultaneously, ITQ proponents argue for an end to owner-operator and fleet-separation policies on the basis that these systems restrict the free flow of available capital into the industry, including the capital of corporations.

ITQ opponents, on the other hand, insist that ITQs have amounted to an unprecedented privatization of Canada's public fishery resource, resulting in only the largest and wealthiest parties gaining access, benefit, and authority. There is strong evidence of industry consolidation,[17] with licences and quotas moving from smaller owner-operator enterprises to larger corporate ones; that the system is reducing economic benefits of the fishery from the many to the few; that those most disadvantaged in the new system are from more remote parts of the coast, in already marginalized communities. These communities were historically reliant on fisheries, but are losing access as ownership, landing, and processing shifts to larger urban centers or offshore. Drawing on license ownership and quota allocation data obtained from Fisheries and Oceans Canada, researchers at Ecotrust Canada found that 50% of the quota value for Pacific

region fisheries is owned by 6% of quota holders, mostly large companies with no economic connections to these remote communities.

There are examples in Pacific region fisheries where the capital value of commercial fishing licences and quotas has risen beyond the reach of independent fish harvesters, and increasingly beyond the costs of active fishing. For an increasing number of fisheries, the price of quota purchase or lease, together with the costs of active fishing (vessel costs and crew), is no longer covered by the landed value of the fish — as a result, the viability of harvesters is seriously impeded. Figure 11 demonstrates this point.

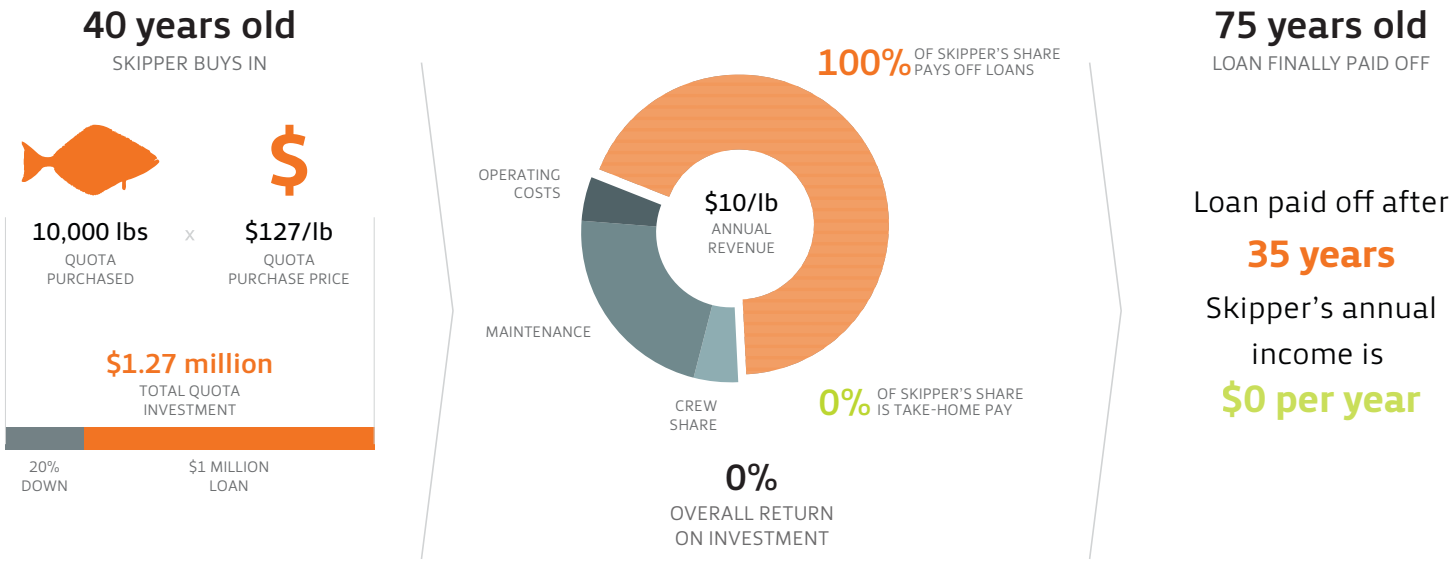


Figure 11. Return on investment scenario for Halibut fishery in 2016. Data on quota purchase price obtained from industry interviews.

To illuminate the intolerable business case for fish harvesters trying to get into the fishery, here we show a simple scenario of a young person, who is starting from a position of good fortune with assets to leverage, attempting to acquire 10,000 lbs of halibut quota to make a small fishery for themselves. Not only does this 40 year old harvester have cash of over $250,000 in hand for a 20% down payment, but they will need loan collateral. Some banks will allow the quota itself as collateral but likely only at 60% market value, leaving 40% of the value to be covered through some other asset the fish harvester will have to put up. To break even each year and not lose money, this skipper would take 35 years to pay off this loan. In addition the crew is making a very low wage. This also assumes the harvester being able to finance and refinance a loan over a 35 year period and a consistent interest rate of 5%, which no bank will consider. Further, this skipper in an actual fishing scenario would have multiple non-target species to lease which may add some small amount of revenue, or add more costs, depending on the leasing situation. Clearly there is no chance for this harvester to start their own operation and stay afloat.

ITQ proponents have also held that transferable quotas result in improved ability to manage fish stocks and meet conservation objectives. This is often credited to the idea that an increased level of monitoring enables regulators to better manage the fishery, reducing bycatch and keeping catches within allowable catch limits. Also, that ITQs end the "tragedy of the commons" as fish harvesters will become owners of the resource and as such, be motivated to be better stewards of it.[15]

ITQ opponents hold that these are false assumptions, given two important consequences of the system design:

- First, that DFO can no longer effectively enforce their management responsibility because the move from a system of annual licences to a system of perpetual ownership, as defined by the market, has created property rights which are outside their mandate.[i, ii, iii]

- Second, that this new ability for anyone — especially speculative investors — to amass and lease quota holdings has broken the important linkage between the right to fish and the requirement to fish responsibly.

Further, attributing conservation objectives achieved through monitoring to ITQs is noted by many harvesters as false attribution as effective monitoring systems can be, and are, employed in non ITQ fisheries, such as in the BC Area A crab fishery.

The growing practice of speculative investments and increasing consolidation in BC fisheries is not an academic issue for people who live in coastal communities and live with the real consequences of policies made far from where their effects are felt. Graphs and statistics are not in and of themselves able convey fully the devastating consequences and human costs of bad policy decisions and ill-designed restructuring of Pacific fisheries.

NO CO-OPERATION IN CO-VENTURE AGREEMENTS

Co-venture agreements have been used successfully for decades in fisheries, commonly between parties that bring different but relatively equal contributions to a venture. Usually, the intention is that the parties share the profit equally. However, interviews[iv] with a number of harvesters on our coast reveal that in co-venture agreements with large processing companies, the harvester:

- forfeits all equity if s/he terminates the agreement within the first five years;

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i https://www.hakaimagazine.com/article-long/last-trial-codfather [Accessed on 16/06/2017]

ii http://www.theecologist.org/News/news_analysis/2988759/ecologist_special_report_new_zealands_fisheries_fraud.html [Accessed on 16/06/2017]

iii http://www.radionz.co.nz/news/national/331055/fishing-companies-on-trial-for-under-reporting-catches [Accessed on 16/06/2017]

iv Note that interviewees requested anonymity because of well-founded fears of being blacklisted by the industry. We have respected their wish for anonymity, but assure readers that these are real accounts from real people.

- forfeits the first $100,000 of equity if death or incapacitating injury occurs within the first five years;
- must sell all fish to a processor for the processor's price, but the processor can refuse to purchase fish at any time;
- surrenders all security interests in the venture;
- waives all rights to receive any financial statements filed or received regarding the venture;
- acknowledges that if s/he default on any part of the agreement, the processor can seek not only monetary award but injunctive relief beyond monetary damages;
- agrees that the processor can assign contract without a fish harvester's consent but the fish harvester must have the processor's consent prior to discussing transfer to others;
- must keep the agreement strictly confidential, and is unable to share or discuss the contract with anyone but except legal advisors.

These draconian and burdensome strictures on individual fisherman also spill over into community based fishing enterprise agreements, in which licence contracts can require a fisherman to pay fifty percent of the landed value to the licence holder from all fish caught. This is a before-expenses payment, so fuel, grub, crew, monitoring, gear, vessel, and monitoring costs come out of the remaining fifty percent. Licence leasing fees — $35,000 a year for salmon — can be payable up front with no refund if there is no fishery opening.

It gets worse.

Fishermen who have to lease licences often lose access to fish when they need it because quota holders fix lease rates to market prices for fish and thus hold on to quota and speculate on the market price. For example, as one harvester recounted, in 2016 over seventy percent of the sablefish quota was unfished as fishermen entered the fall season and the worst weather, the result of quotalords holding onto fish quota for higher lease prices when market prices for fish were expected to go up.

Pinch species, or ones with limited total allowable catch, are ones that fishermen desperately need access to in order to be able to fish their target species. Knowing this, quota owners lease these species for prices higher than what anyone could hope to sell the fish for — often two or three times the landed value. Harvesters are trapped, because pinch species often move into areas where their target species are in abundance. To get back on the water harvesters are forced into paying extortionate lease rates for pinch species quota.

In another example of the servitude of fish harvesters leasing licences from companies, in some cases they are effectively being forced to work for zero income. When the fish harvested do not cover lease and expense costs, harvesters are forced to fish other licences until the debt is paid off. Imagine for example, a harvester leasing multiple herring gillnet licences working with harsh weather, poor fishing conditions, scattered fish because of other ecosystem changes (sea lions, humpback whales, warming seas), poor returns, and poor prices, and as a

result, despite backbreaking work, ends herring season in debt. The fish harvester is then given salmon licences with quota to fish until they have paid off the herring lease debt. Basically, fishing for nothing... twice.

The halibut market is particularly tricky. In Canada halibut lease fees are often paid prior to the season opening and are set as a portion of the current retail price per pound. Once the season opens this price shifts as supply increases. If the market price in the US is lower, where no lease fees are in play, their fish harvesters can dump into our local market. For example, in early 2017, BC halibut lease prices ranged from $7 to $8 per pound. In the United States, the retail price was lower so their fish harvesters sold into Canada, driving prices down. Canadian fish harvesters were then caught holding quota and fish worth less than the quota lease price they had to pay before going fishing. All of the risk is downloaded to and borne by the leaser, often the harvester, since the quota owner gets paid and profits no matter what.

In law, there is a concept known as "procedural fairness." It is the idea that when courts act with fairness, people are more likely to respect the law — even if a decision goes against them. It is not enough for courts to simply act impartially: they must be seen to be fair. If court proceedings are respectful, neutral, easy to understand, and give people involved a voice, they build trust in the law. If not, people flout the law.

It is not unreasonable to suggest that the same might hold for processes, policies and regulations that affect the lives and livelihoods of a whole class of people, who suffer from the failure of our government to meet even minimum criteria for the sustainable management of a public resource whose benefits are supposed to favour the many over the few. On the Pacific coast, whole communities of people feel they have been punished without trial, incarcerated by policies they never wanted by a government that has ignored evidence of the deep harm caused by its decisions.

There is mounting evidence, including that in this report, of an increasingly desperate situation facing harvesters and coastal communities. What is the recourse, where is the "policy fairness," that would restore trust in fisheries management on the Pacific coast? Is realizing a vision for truly sustainable BC fisheries a pipe dream? We think not — and we have proof that, beyond our shores, there are positive alternatives that offer real hope for reform here at home. The question is: will the government listen, and act?

3. IS THERE HOPE FOR POSITIVE CHANGE? A GLOBAL SCAN OF ALTERNATIVES

A global scan of fisheries reveals as many approaches to management as there are countries with fisheries to manage. Different regimes succeed or fail in varying degrees due to a multitude of complex internal and external factors that are unique to them. Assessing various approaches to fisheries management against economic, social, governance, and environmental indicators reveals which approaches become models for achieving sustainability, and it becomes obvious that, when compared to other fisheries across all four spectrums, BC fisheries are failing.

The good news is that many fisheries around the globe are succeeding, and we can learn from them. We don't even have to go overseas to find fisheries that are successfully managed for greater accrued benefits to communities and to harvesters — we just need to look at what's done differently on our Atlantic coast.

To this end, we sought to find out what works, and what doesn't, in fisheries management approaches around the globe. Also, given the focus of this paper on the vagaries of commodification and privatization of resources, we studied two non-fisheries markets — the Toronto taxi industry, and the Vancouver real estate market — to gain further insights into the effects on economies and society of speculative asset-driven *vs.* owner-operator management models.

The map in Figure 12 shows twenty-seven cases of fisheries management we investigated, plus the two non-fisheries markets. We highlight the diversity of mechanisms and tools employed by governments, communities, and industry to achieve management objectives in their fisheries. Some of these cases are aggregations of a single country's approach across a multiple strategy initiative (Appendix 3).

These twenty nine approaches ranged from IQ-based with complementary measures to community co-management initiatives, and from science-based to traditional or belief-based approaches. Many of the cases use more than one management method. For the purposes of this study, we have grouped each system by their dominant characteristics, what we refer to as the system's *primary approach*. A detailed summary of each of the cases is provided in Appendix 3. In developing these case studies, we performed a literature review to better understand the approaches and their implications, then conducted interviews with key experts and fish harvesters (Appendix 4) within the respective regions to either complete or ground-truth the information, or acquire information that the literature failed to address. The core indicators (see 10 categories below) were developed based on this process.

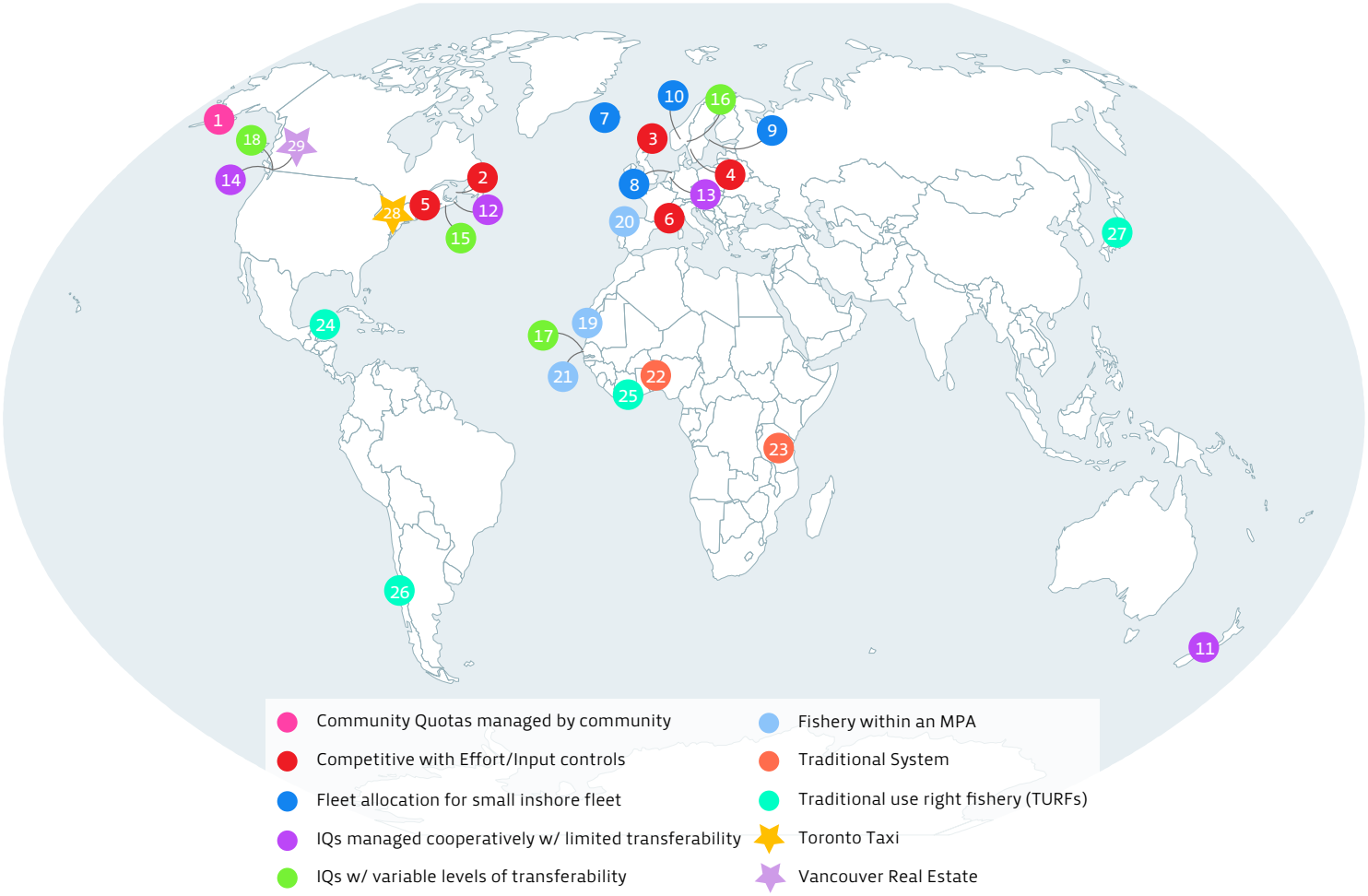


Figure 12. Map of global fisheries management alternatives investigated

The following section outlines and describes the types of, or approaches to, fisheries management utilized by each case studied, and the key mechanisms deployed to achieve local objectives.

FISHING INDUSTRY MANAGEMENT APPROACHES

PRIMARY APPROACH: QUOTAS MANAGED BY COMMUNITIES

Case study #1 – Bering Sea and Aleutian Islands: community development quotas (CDQs)

Operate like a quota bank but are based on communal allocation which is managed by the community for eligible members, rather than a group of individual or vessel allocations pooled and managed by a private enterprise or member organization.

PRIMARY APPROACH: COMPETITIVE WITH EFFORT/INPUT CONTROLS

Case Study #2 – Magdalen Islands: Lobster fishery managed collectively with effort control

Case Study #3 – Shetland Islands: Fishery managed by association

Case Study #4 – Sweden: Fishery managed by rotating fishing effort

Case Study #5 – Maine: Competitive lobster fishery managed by input controls and owner operator provisions

Case Study #6 – South of France: Traditional management groups

Fisheries managed locally/regionally by limiting the fishing effort (number of days, total number of traps, number of licences). Number of entries is limited in some cases and not in others. Management is inclusive, and access grants some fairness safeguards. Input controls are restrictions put on the intensity of use of gear that fishers use to catch fish. Most commonly these refer to restrictions on the number and size of fishing vessels (fishing capacity controls), the amount of time fishing vessels are allowed to fish (vessel usage controls) or the product of capacity and usage (fishing effort controls).

PRIMARY APPROACH: FLEET ALLOCATION FOR SMALL INSHORE FLEET

Case study #7 – Iceland: Fleet allocation by community, then divided up as IQs

Case study #8 – Netherlands: Community eel quota divided in the forms of IQs, not tradeable

Case study #9 – Sweden: Fleet allocation to passive gear (small) vessels, fished competitively

Case study #10 – Norway: Fleet allocation to smaller vessels, fished competitively

A portion of the total allowable catch is set aside for a subset of the fleet (smaller boats), based on a maximum vessel length and capacity. The total fleet-wide quota can then be divided by members within the community as a form of individual quotas, or fished competitively. Communities may play a role in managing the quota and distributing it to members.

PRIMARY APPROACH: INDIVIDUAL QUOTAS MANAGED COOPERATIVELY WITH LIMITED TRANSFERABILITY

Case study #11 – New Zealand: Company composed of quota shareholders of scallop

Case study #12 – Atlantic Canada: Crab fishery; small shares pooled together and fished as a company

Case study #13 – Netherlands: Producer Organizations pool quotas and offer lease advantages and lower prices to members

Case study #14 – British Columbia: Quota Bank where members pool quotas and enjoy lower lease prices

Individual quotas are pooled in a group in the form of a Producer Organization, or licence/quota bank, where members enjoy access to quotas and licences with lower cost, access to decision making process, and a fair market price of their product. The system is created as an adaptive tool to high quota and licence prices.

PRIMARY APPROACH: INDIVIDUAL QUOTAS WITH VARIABLE LEVELS OF TRANSFERABILITY

Case study #15 – Nova Scotia: snow crab fishery managed by licences with individual quota shares per licence and owner operator provisions

Case study #16 – Norway: ITQ fishery with owner operator provisions

Case study #17 – Senegal: Shrimp group quota for all shrimpers, limited membership

Case study #18 – British Columbia: Individual Quotas with unlimited tradability

A total allowable catch is divided into individual quotas, initially allocated to fish harvesters, then subject to varying levels of transferability. Quotas with no owner operator rules can be transferred to any individual/company within or outside the fishing sector, while owner operator safeguards may or may not include fish harvesters operating on boats, or those making their livelihoods from boats without operating on them.

PRIMARY APPROACH: FISHERY WITHIN A MARINE PROTECTED AREA (MPA)

Case study #19 – Mauritania: Small traditional sail boats only fish within the MPA

Case study #20 – Spain: Fishery operates in an MPA, limited by a TAC distributed to members as IQs, co-managed

Case study #21 – Senegal: small-scale fishery operates at various levels of MPA

Fishery operated in part within, and managed spatially in or immediately adjacent to, an MPA. A limited fishery type can operate within the MPA where fishing rights are reserved for traditional — limited impact — fishing fleet.

PRIMARY APPROACH: TRADITIONAL SYSTEM

Case study #22 – Benin: voodoo animist belief system

Case study #23 – Tanzania: religion driven system

Local fishery management systems based primarily on observed trends and beliefs associated with local cultures, indigenous communities, or traditional fishing communities.

PRIMARY APPROACH: TERRITORIAL USE RIGHT FISHERY (TURF)

Case study #24 – Mexico: TURFs with co-management of effort

Case study #25 – Cote d'Ivoire: Individual concessions within a traditional management system

Case study #26 – Chile: TURFs with co-management of effort

Case study #27 – Japan: TURFs with co-management of effort

Place-based, rights-based management scheme where privileges over some or all resources within a geographic area are allocated to one or more agents.[18]

INDUSTRY MANAGEMENT APPROACHES FROM SECTORS OTHER THAN FISHERIES

PRIMARY APPROACH: LIMITED LICENSING WITH OWNER OPERATOR PROVISIONS

Case study #28 – Toronto: Taxi limited licensing

Owner-operator rules with limited licensing.

PRIMARY APPROACH: URBAN OPEN HOUSING MARKET

Case study #29 – Vancouver: Real estate

Anyone can buy. Open market, no restrictions on leasing/renting.

INDICATORS OF PERFORMANCE

Setting limited objectives in a management system can be detrimental. For example, if a fishery is managed to ensure that economic output is maximized, that can come at the expense of other objectives such as optimizing the social contributions of fisheries, and the health of fish stocks. In our global scan, each fisheries management system's efficacy in meeting a wide range goals was measured against forty-four indicators within ten categories identified and described below. Many indicators are interrelated and can arguably be situated in more than one category (examples of this are indicated in *italics*). There are inevitably more indicators that could be explored, we only cover what we deduced from the research and the interviews to be important and assessable across a wide range of fisheries. The conclusions we reach are based on these indicators. This list could be extended upon in other studies.

The categories are:

FISHING EFFORT: This category is derived from two indicators:[19, 20] 1) the number of boats, and 2) fleet presence at sea. Number of boats may be both an indication of the reduction of fishing pressure (*fish stock health*), and an indication of a decline in fleet diversity to more powerful wealthy fleets (*social values*). Fleet presence at sea indicates the level of income certainty and/or the level at which harvesters could afford to buy or lease a quota for the species they target (*certainty and risk of economic activity*). A positive scoring indicates an increase in the participation of communities both in number of boats, and days at sea, with the underlying notion of stock health preserved.

FISHING COSTS: This category[21, 22, 23, i] includes five indicators related to fishing communities and boat operators: 1) fishing operating costs, 2) burden of quota cost, 3) inflation of cost to lease/buy access, 4) additional capital costs, and 5) costs of monitoring to fish harvesters/community. Positive scoring implies a reduction of fishing costs to both fish harvesters and communities.

ECONOMIC EFFICIENCY AND MARKET OPPORTUNITIES: This category relates to the output of fishing operations for skippers/captains, the crew and the community at large. Indicators in this category include: 1) landings,[24] 2) size of fish,[25] which is an indicator of the quality of a product that can fetch higher prices[26] and of *fish stock health*, 3) price of fish,[27] which is related to 4) ability to negotiate the price,[4] which is also an indicator of *fairness of market*, 5) crew and skipper's income,[28, 29] 6) catch per unit of effort[30] (*fish stock health*), and 7) community added value (*social values*). Indicators of this category were derived with respect to the underlying notion of fish stock health preserved. With this in mind, any increase in the above-mentioned indicators of this category scores positively.

FAIRNESS OF MARKET: This category includes indicators of fairness and distribution of wealth: 1) absence of control by non-harvester (presence scores negative), 2) absence of market speculation (presence of speculation scores negative), 3) fair lending practices (as opposed to predatory lending practices which score negatively), and 4) quota diluted (as opposed to concentration which scores negatively). These indicators were derived from a combination of literature sources,[19, 31, 32] and a ground-truthing exercise with harvesters and local experts (Appendix 4).

CERTAINTY AND RISK OF ECONOMIC ACTIVITY: This category includes three indicators: 1) predictability of catch,[24] and 2) predictability of quota price, which can both be captured by the recent history level of variation of the catch, and 3) feeling of certainty or security (as opposed to stress).[4] Higher predictability of catch and quota price and feeling of certainty and higher job satisfaction[33] score positively.

i Derived from cited sources along with discussions from local experts (Appendix 4).

SECURITY / SAFETY AT SEA: Safety at sea includes: 1) quality of boats (ability to operate properly as opposed to size), which is also related to capital cost and hence the category fishing costs,[25] 2) crew quality which reflects experience,[4] education and knowledge,[6,23] (*intangible values, certainty and risk of economic activity*), 3) fatalities and injuries at sea,[4] and 4) exposure to risk at sea.[4] Increased quality of boats (operating without need of major repairs) and increased crews with experience and knowledge score positively, while increased number of fatalities and injuries at sea, and increased operation within bad conditions, i.e. increased risk at sea, both score negatively.

SOCIAL VALUES: This category includes five indicators: 1) freedom as a business owner (independence to operate without corporate pressure), 2) relationships between fish harvesters, 3) fishery kept within the community, 4) easiness of succession or new entrants, and 5) stable or increasing employment (as opposed to loss of employment). These indicators were obtained through a combination of literature review[19, 25, 26] and a ground-truthing exercise with fish harvesters and local experts (Appendix 4). Increased freedom as a business owner, improved or incentives to improve relationships between fish harvesters, and control of fishery or its benefits by local communities to which they are adjacent score positively; unfair constraints to entering the fishery, limited by the notion of stock health, and unstable or declining employment score negatively.

GOVERNANCE VALUES: This category includes three main indicators, 1) trust in top-down programs, 2) existence of sustainable community programs,[25] which in turn relates to the nature of the relationship between fish harvesters (*social values*), and 3) respect of aboriginal rights and title.[34] Trust in top down programs is illustrated through an existing dispute between communities and the management structure (e.g. low trust), and/or refusal of compliance to existing rules created and implemented under a top-down scheme (e.g. low trust and hence scores negatively). Existence of sustainable community programs, co-management, and marine protected areas implemented by the community that benefits from them score positively, whenever they exist and are documented as effective. Respect of aboriginal rights and title implies the full control or participation in the management of the resources within a territory by the aboriginal people who are within that territory, that govern the territory, or that have historical ties to it. In this case, existence of disputes regarding opening or closing of fisheries, or territorial rights, score negatively.

INTANGIBLE COMMUNITY AND INDIVIDUAL VALUES: This category covers ten indicators:, including those investigated and listed by.[6] These are: 1) lifestyle (as a fishing community), 2) stewardship, 3) networks, 4) sense of pride, 5) intergenerational succession, 6) education, 7) culture and tradition, 8) spiritual values, 9) gifting and trading of seafood, and 10) absence of general anxiety. The score is positive for any of these indicators when the fishery management program contributes to increasing or improving them.

FISH STOCK HEALTH: This category derived from [25] includes 1) fish stock status and 2) addressing overfishing. Each of these indicators score positively if the fishery management program improves fish stock health, and/or addresses overfishing.

For each of the 29 cases assessed, we gathered information based on a combination of literature review as referenced in the Endnotes, and interviews with those local experts listed in Appendix 4. Case Study #18 is the current ITQ system in BC. In this section, Table 2 presents the effectiveness of each case studied, by assessing whether the impact is positive or negative for each of the 44 indicators. Each indicator was scored based on the method outlined in the matrix provided in Appendix 6.

HOW THEY MEASURE UP

By noting which management measure each fishery deploys, it is possible to see which measures (or combination of them) impact success. The following chart shows each case in order of overall performance against the full list of indicators, and identifies which management measures it deploys.

Table 1. Assessing alternative and complementary approaches to ITQs worldwide.

Positive Indicator
Negative Indicator
Neutral Indicator
No data
Not applicable

	Indicator	Comm'ty Quotas 1	2
Fishing effort	Number of boats	●	●
	Presence at sea	●	●
Fishing costs	Operating costs	●	○
	Quota cost lower burden?	●	●
	Lower inflation of quota cost?	●	●
	Capital costs maintained or lowered?	●	●
	Lower monitoring costs?	●	●
Economic Efficiency	Landings	●	●
	Size of fish	○	●
	Price of fish	●	●
	Ability to negotiate price	○	●
	Crew and skipper's income	○	●
	CPUE	●	●
	Community added value	●	●
Fairness of market	No control by armchair fishermen	●	●
	No market speculation	●	●
	Fair lending practices	●	●
	Non concentration of quota	●	●
Certainty and risk of economic activity	Predictability of catch	○	○
	Predictability of quota price		●
	Feeling certain and secure of business	○	●
Security & Safety at sea	Quality of boats	●	○
	Crew quality	○	○
	Fatalities and injuries at sea	○	○
	Exposure to risk at sea	●	○
Social values	Freedom as a business owner	●	●
	Relationships between fishermen	○	●
	Fishery kept within the community	●	●
	New entrants	●	●
	Stable or increasing employment	●	○
Governance values	Trust in top-down programs	○	●
	Sustainable community programs		●
Intangible values	Lifestyle	●	●
	Stewardship	●	●
	Networks	●	○
	Sense of pride	●	●
	Intergenerational succession	●	●
	Education	●	●
	Culture and tradition	●	●
	Spiritual values	●	
	Gifting and trading of seafood	●	○
	No general anxiety	●	●
Fish stock health	Fish stock status	●	●
	Addresses race to fish	●	○
	Confidence interval (%)	11	12

Scenario numbers and locations:

1. Bering Sea and Aleutian Islands, Alaska, USA
2. Magdalen Islands, Atlantic Canada
3. Shetland's crab fishery, Scotland
4. Gullmar Fjord shrimp fishery, Sweden
5. Maine's Lobster fisheries, USA
6. Prud'homie, South of France
7. Iceland's global quota
8. Eel fishery, The Netherlands
9. Sweden's community quotas
10. Norway's fleet allocation
11. Challenger Scallop Enhancement Company, New Zealand
12. Nova Scotia (Areas 23/24), Atlantic Canada
13. Netherlands Producer Organizations
14. BC Licence and Quota bank
15. Nova Scotia (Area 19), Atlantic Canada
16. Norway's limited tradability and owner operator rules
17. Senegal individual quotas
18. Groundfish ITQ fisheries in British Columbia
19. Banc d'Arguin National Park of the Imraguen, Mauritania
20. Galicia, Spain
21. Ngaparou, Senegal
22. Benin
23. Tanzania
24. Punta Allen, Mexico
25. Grand Lahou and Aby Lagoons, Cote d'Ivoire
26. Chile's Territorial Use Right Fisheries
27. Japan's Territorial Use Right Fisheries
28. Taxi cab industry in Toronto, Canada

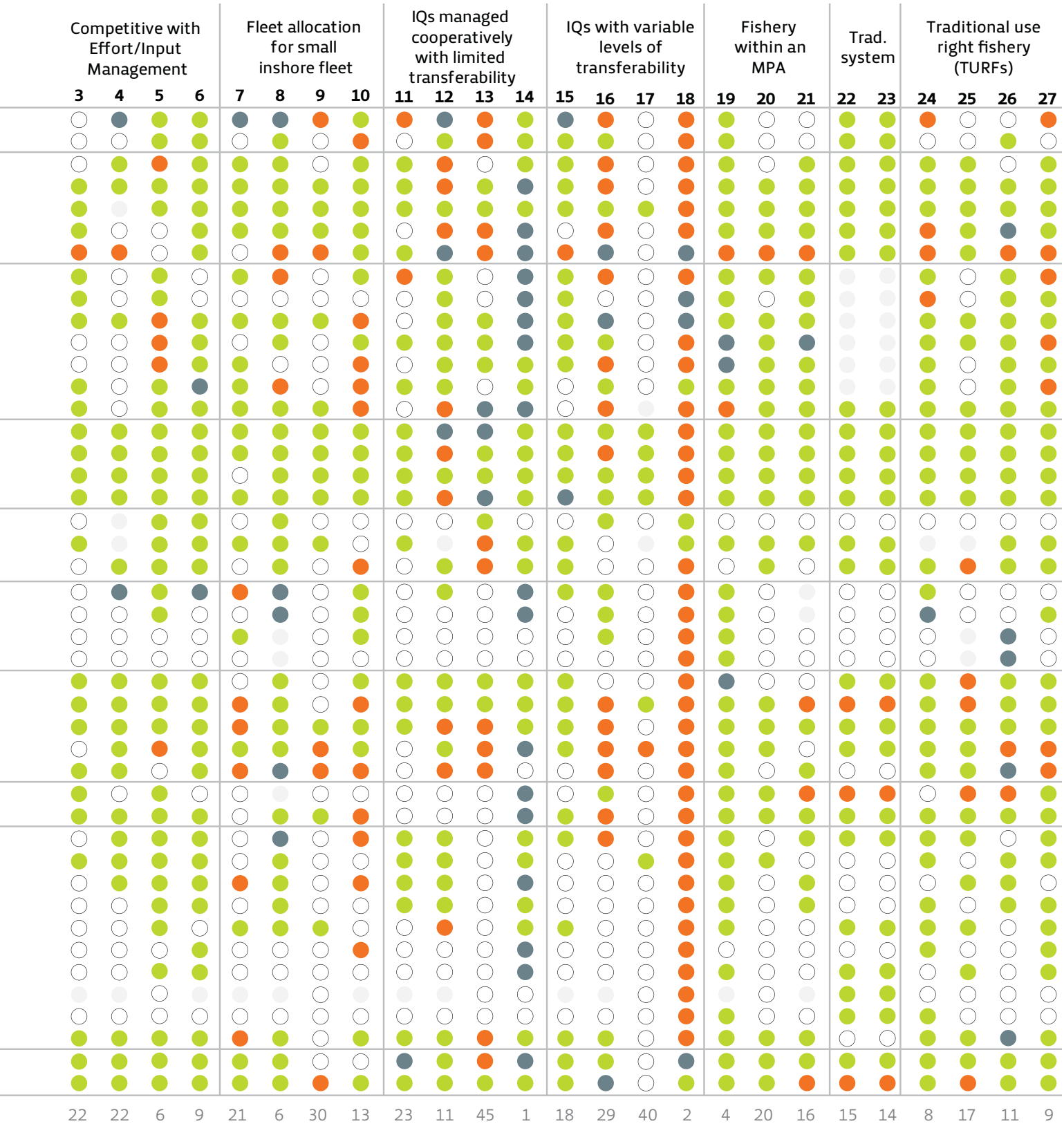
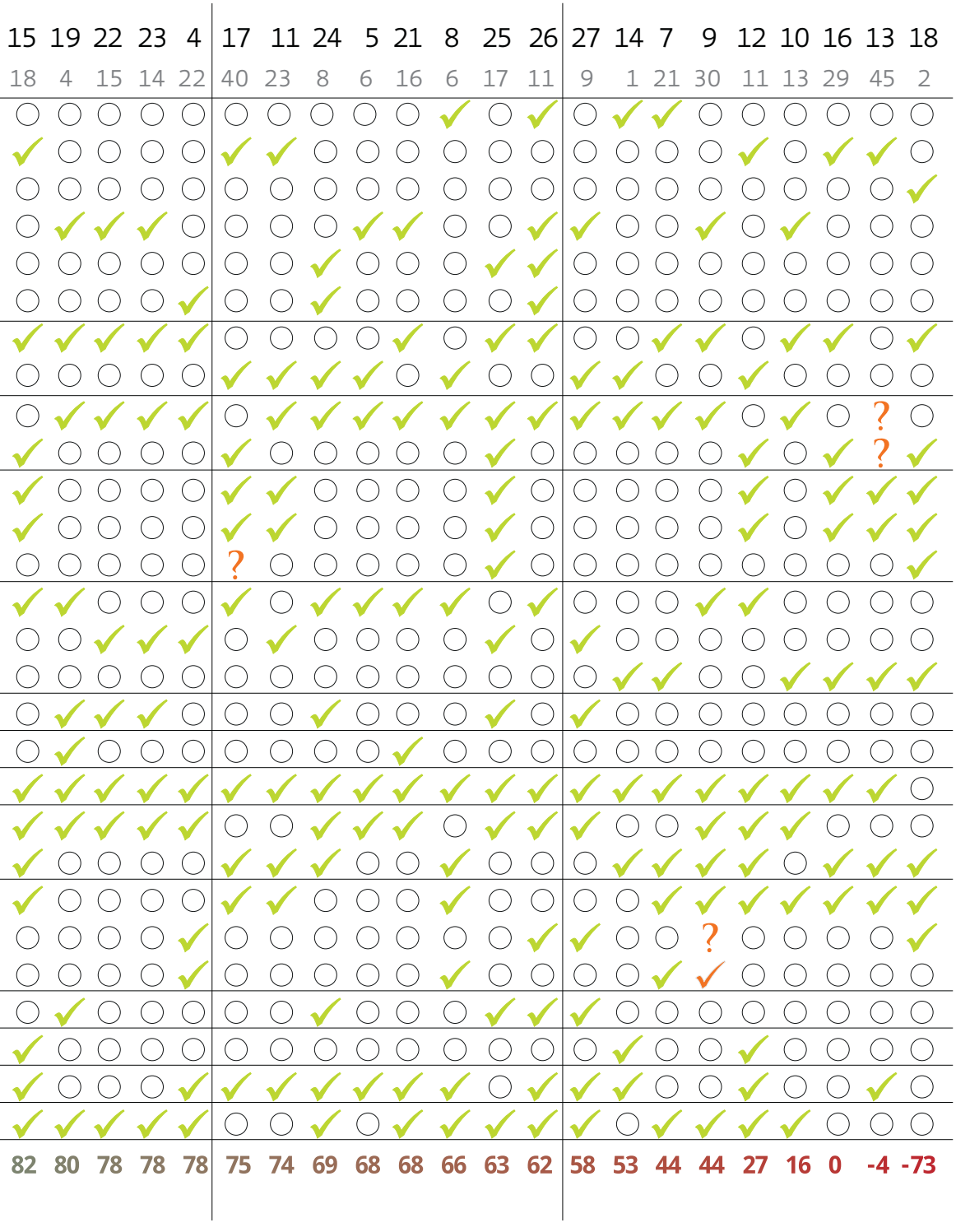

Competitive with Effort/Input Management
Fleet allocation for small inshore fleet
IQs managed cooperatively with limited transferability
IQs with variable levels of transferability
Fishery within an MPA
Trad. system
Traditional use right fishery (TURFs)
3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27
22 22 6 9 21 6 30 13 23 11 45 1 18 29 40 2 4 20 16 15 14 8 17 11 9

Table 2. Deconstruction of individual management cases by attribute, ordered from highest to lowest score.

✓ *The management system uses this attribute*
✓ *The management system partially uses this attribute*
○ *The management system does not use this attribute*
Not applicable to this management system
? *Information was not available to make assessment*

	2	6	3	1	20
Confidence interval (%)	12	9	22	11	20
Individual quotas - non transferrable	○	○	○	✓	✓
Indiviudal quota with limited transferability	○	○	○	○	○
Individual quota with full transferability	○	○	○	○	○
Competitive fishery - no quota	✓	✓	✓	○	○
Concession, or geographic area, allocated to individuals	○	○	○	○	○
Fishing days allocated to individuals	○	○	○	○	○
Open access entry to fishery	○	✓	○	✓	✓
Limited entry to fishery e.g. # of licences	✓	○	✓	○	○
Active Fisher on Board only	✓	✓	✓	✓	✓
Active Fisher on Board or managing Boat/charter	○	○	○	○	○
Can sell licence/quota	✓	○	○	○	○
Can trade licene/quota	✓	○	○	○	○
Can lease licence/quota	○	○	○	○	○
Fishery jointly managed	✓	○	○	✓	✓
Fishery managed from bottom up	○	✓	✓	○	○
Fishery managed from top down	○	○	○	○	○
Local knowledge helps manage the fishery	○	✓	○	○	✓
Fishery (or part of fishery) is in marine protected area	○	○	○	○	✓
Fleet separation - processors can not own licences/quota	✓	✓	✓	✓	✓
Fishery is managed with input (effort) measures	✓	✓	✓	○	✓
Fishery is managed with output (catch) measures	○	○	○	✓	✓
Quota allocated to a fleet	○	○	○	○	○
Quota allocated to a geographic area	○	○	○	○	✓
Quota allocated to a community	○	○	○	✓	○
Territorial use rights fishery	○	✓	○	○	○
Fishermen pool individual quota for collective use	○	○	○	○	○
Required membership to a cooperative or fisher organization	✓	✓	✓	✓	✓
Fishery limited to small scale/inshore	○	✓	○	○	✓
Score (%)	**97**	**91**	**88**	**85**	**85**


15 19 22 23 4 17 11 24 5 21 8 25 26 27 14 7 9 12 10 16 13 18
18 4 15 14 22 40 23 8 6 16 6 17 11 9 1 21 30 11 13 29 45 2
82 80 78 78 78 75 74 69 68 68 66 63 62 58 53 44 44 27 16 0 -4 -73

The top-ranking scenarios are those that have a positive score on the highest number of indicators across all categories. We calculated the total score for each management scenario as the sum of positive, negative, and neutral indicator scores, divided by the total number of assessed indicators. Where information for an indicator was not available or may not have been applicable to a scenario, we eliminated these indicators from the total score. This resulted in applying a certain level of uncertainty[i] for each scenario to account for the lack of information. (See Appendix 5 for uncertainty analysis.)

What is clear from the top five scoring fisheries management case studies is that, with few exceptions, they have several attributes in common:

- There is fleet separation between harvester and processor — processors cannot own licences or quota
- The fishery licenses the harvester to be on the boat (owner-operator) as a requirement
- The fishery requires harvesters to be part of an organized group (cooperative, association, etc.)
- The fishery is either managed by, or is jointly managed with, harvesters/community
- The fishery has non-transferable individual quotas or is competitive

When reviewing the top ten scoring fisheries, all or the large majority have the six attributes listed above, as well as the following:

- The fishery is managed primarily through input controls
- The fishery is open access[ii]
- The fishery does not use ITQs in any form (including those that are pooled, geographically distributed, allocated to the fleet, or too small allocations to communities)
- There are no individual specific area- and time-based allocations such as concessions or days

It is also apparent that BC fisheries that deploy management measures that highly commodify fishing access, such as individual quotas with no controls on transferability, rate significantly worse across most areas measured. In the words of Ian Kinsey, a Norwegian fish harvester:

> “Privatization is not the saviour of fisheries. Good management is the saviour of fisheries.

i We used a Monte Carlo approach to assess uncertainty, where each unscored indicator receives a random score value and then calculated the confidence interval ($p<0.05$)

ii In this report, we define open access as a set of conditions where any person can be granted entry without conditions. The fishery is still regulated through a set of measures such as gear restrictions, size limits, trip limits, seasonal and spatial closures, quotas, etc. We use a broader definition than the strict pure open access definition. Our definition includes a level of input controls such as a set number of licences which is however accessible to anyone wishing to enter the fishery, community quotas where the number of people fishing is not limited, and other types of restrictions such as marine protected areas, time limits, etc.

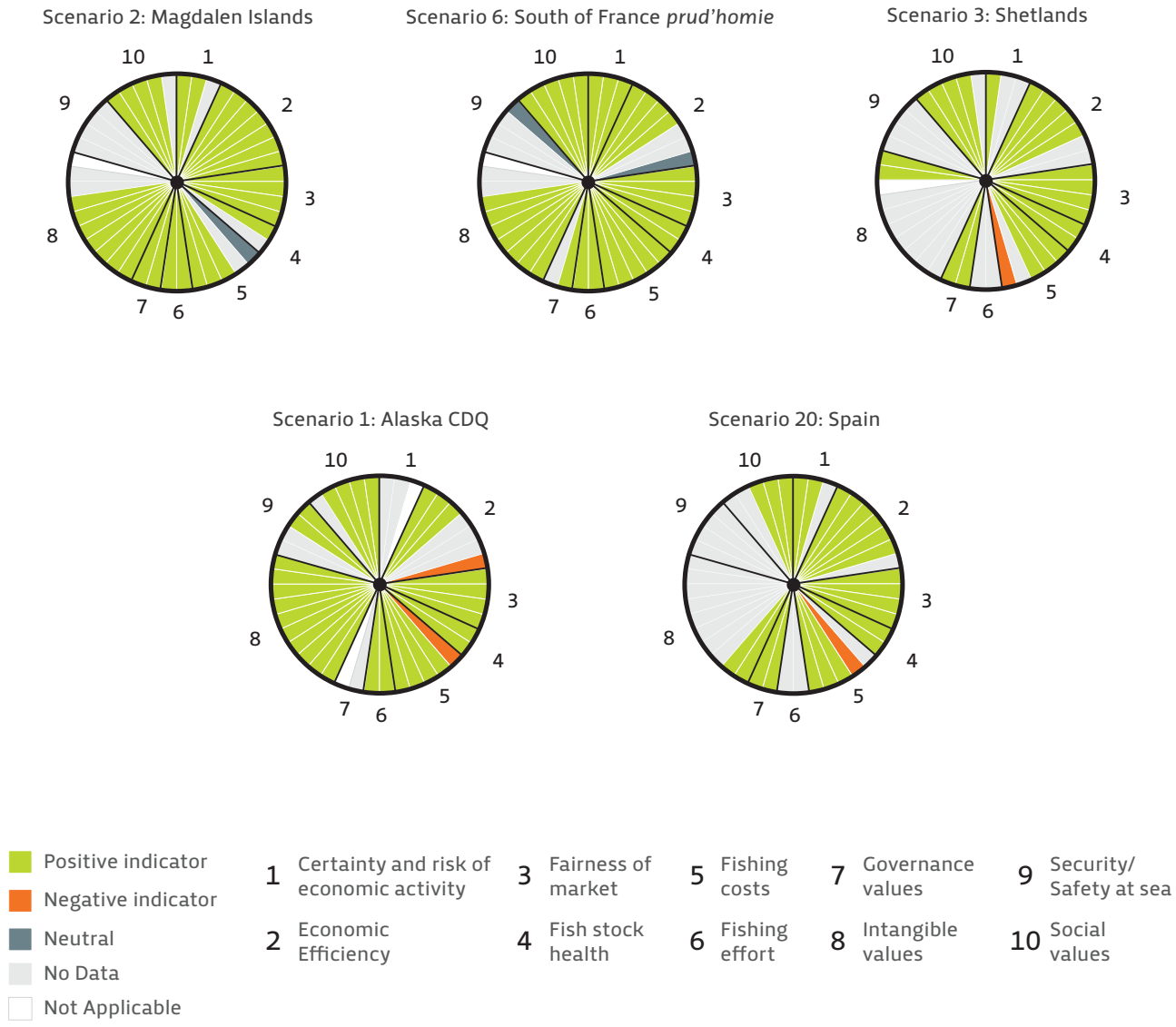


Figure 13. Individual scores per indicator for the top five ranking management cases.

The top 5 ranking case studies are:

- Canada's Magdalen Islands: Scenario (2)
- The South of France *prud'homie* system: Scenario (6)
- Shetlands, Scotland: Scenario (3)
- Alaska's Community Development Quotas (CDQ): Scenario (1)
- Spain: Scenario (20)

These highly ranked fisheries are notable as much for how different they are as for what they have in common. The first, Canada's **Magdalen Islands lobster trap fishery**, features a hands-on

committee that was responsible for the acquisition of a service centre for fishing vessels, implemented measures to increase spawning in female lobsters, measures to limit uncontrolled increase in fishing effort, instituted limits to and protection of fishing licences to allow new entrants in the industry, and increased education to promote entry of the new generation of fish harvesters. Management relies on fishing input controls, fishing season closures, size limits, trap limits and restrictions, and other gear limits. No quotas are in place, but rather a homogeneous effort quota is represented by a maximum of the number of traps per fisher, and a limited number of fishing hours. Despite constant pressure against owner-operator principles by corporations and processors, the fishery has delivered increased prices and landings, fosters a strong sense of ownership and stewardship and features the active participation of fish harvesters in decision making about the resource.

An ocean away, the **Prud'homies system in the Mediterranean** region of southern France has operated for more than 150 years. Prud'homies are groups of 3–5 fish harvesters elected by the community and given regulatory, jurisdictional, and disciplinary powers over their mixed-species fishery zones. They encourage fair distribution of profits and local employment. They prioritize low-impact artisanal fishing. Sometimes, fishing lots are drawn on a map to allow for less competition for fish harvesters using the same fishing gear. Prud'homies can intervene in cases where catches are too high. Social protection manifests itself through attentiveness to individual situations of each member of the community, including helping younger members, retired fish harvesters, and widows. The system is participative, provides certainty and security for fish harvesters, guarantees higher prices, preserves the ecosystem, maintains the cultural and historic fabric of the fisheries, and creates jobs.

Half a world away in the North Sea, a vacuum of management oversight of the **Shetland Islands crab fishery** led, in 2000, to the formation of the Shetland Crab Fishermen's Association, which has a legal right to manage crabs, other species including lobsters, scallops, queen scallops, whelks, oysters, mussels, cockles, clams, and razor shells. It developed a partnership with other organizations to ensure the sustainability of shellfish through a local licensing scheme to control fishing effort, restrict fishing gear and vessel sizes, set minimum landing sizes, and close seasons for some species. The management plan is backed with a data collection scheme and extensive consultation with stakeholders. As a result, employment in the industry became full-time and year-round, landings increased, there is an increased sense of community and stewardship, and the fisheries are more sustainable.

Coming in fourth is **Alaska's Community Development Quotas (CDQ) program** in the Bering Sea and Aleutian Islands region, where quotas for groundfish, prohibited species, halibut, and crab are made available to six CDQ groups that can lease out the quota or fish it with their own assets. Sixty-five native communities comprise the six groups, whose combined revenues now exceed $50 million annually. They have acquired $400 million in assets (vessels and shore-based infrastructure), and since 1992, over $120 million in wages, education, and training benefits have been generated for over 25,000 residents, and over $500 million in revenues have been generated. Notable gains are in greater access allocated to small-scale fishing communities, Indigenous participation in commercial fisheries, development of local and regional fishing economies to meet social and economic objective, and employment on land and at sea — along with revenues from resources flowing to communities and new infrastructure being built.

On the old continent, in **Spain** and more precisely the traditional fishing region Galicia, the fishery operated by some 3500 boats and 5000 female gleaners, has existed around a Marine Protected Area system and TURFs since 1992. The catch is limited by a TAC, distributed in the form of Individual Quotas to fish harvesters. The exploitation of sedentary species is granted to local cofradias (brotherhoods of fishermen) with legal standing with regards to the management of the MPA. The fisheries are small-scale in nature, and the system relies heavily on joint management, and voluntary measures. Management measures include controls on fishing mortality through for example, daily allowable catch limits. The expected total catch is based on historical catch data and information generated by on-site ecologists, and is not permitted to exceed the catch from the previous year by more than 10%. **Cofradías** may also implement a rotational harvest system by designating fishing zones within the TURF and rotating harvests through the season. Typically, anyone who lives in the area can join upon paying membership fees. Each Cofradia is responsible for managing the resources within its TURF. These fisheries have generated significant gains to the communities, with over 150 million euros in revenues a year, and ensured the rebuilding of e.g. barnacle stocks.

In addition to the five detailed above, another twenty-one fisheries around the world (detailed in Appendix 3) rate higher across these indicators than our global laggard on the Pacific coast of Canada. The world's five top fisheries, according to our sustainability measures, are geographically dispersed, species diverse, culturally unique and about as unlike each other as you could find — except they have management systems that privilege communities of owner-operators who live and breathe the resource, ahead of remote large scale corporations or investors. These five fisheries all require that fish harvesters granted access be actively fishing and on the vessel (owner-operator provisions), they all have fleet separation (no processor or business can own access to fish), they all are managed by or at the local level, and all but Alaska's CDQs are managed with input/effort controls such as gear, size of vessel or fishing time. Overall, the path to success in fisheries management is clearly defined by a set of attributes that exclude top-down management and full transferability of quotas. Lobster fish harvesters off Canada's east coast, French artisanal fish harvesters in the Mediterranean, shellfish harvesters in the Shetland Islands, native fish harvesters off the Alaska coast, or the Pescadores of Galicia … and a whole lot more, are a lot better managed than Canada's Pacific fisheries. We draw inspiration from examples both around the world and right here in Canada that suggest a transition to more community-controlled fisheries on the West Coast is not just desirable, but doable.

4. JUST TRANSACTIONS — JUST TRANSITIONS

Reviewing global best practices in fisheries management — including better practices right here in Canada — it is abundantly obvious that our Pacific fisheries are in drastic need of reform. The current structure is manifestly unjust for fish harvesters and coastal communities, especially those where there are few options for diversification away from the historic economic and cultural backbone of our fishing communities.

All markets are subject to disruption with changing circumstances. Governments routinely are called upon to use their regulatory powers to help industries transition. In fact, when industries are failing to meet community objectives, this should be government's primary responsibility. Such was the motivation a generation ago that led to the increasing large scale privatization and consolidation of Pacific fisheries in the first place. But like fisheries themselves, not all interventions are created equal. All have consequences, and not all of them turn out well, no matter how well intentioned.

In order to illustrate that many of the industry problems we have presented in this paper — and potential solutions to them — aren't unique to West Coast *fisheries*, we included in our scan of resource management practices two Canadian markets that have been radically transformed in recent years and where government policy interventions have had very different effects: the Vancouver real estate market, and the Toronto taxi licence market.

Using our sustainability criteria (and allowing for the fact that most Vancouver house owners aren't concerned with how many fishing days they get, and most Vancouver houses aren't inside a Marine Protected Area), the nature of private home ownership leads to the conclusion that the only resource management regime that performs worse for people in Canada than Pacific coast fisheries is the Vancouver real estate market.

By contrast — and again, acknowledging that most Toronto taxi drivers aren't concerned with the price of halibut — our sustainability criteria ranks reforms to the management of Toronto's taxi licence market ahead of even Magdalen Islands lobster fisheries. Controversially, in 2014 new owner-operator provisions were introduced into the entire Toronto taxi fleet by way of a new Toronto Taxicab Licence that required all existing forms of Toronto taxi licences convert to this new owner operator licence by 2024.[i,ii]

Today, taxi licence owners are increasingly also the drivers and all participants are accountable. New entrants can apply to be on the waiting list of drivers, then be issued a licence from the City, or

i https://www.theglobeandmail.com/news/toronto/torontos-taxi-overhaul-initiates-shift-to-owner-operated-cabs/article16991155/

ii https://www.toronto.ca/legdocs/bylaws/2014/law0503.pdf

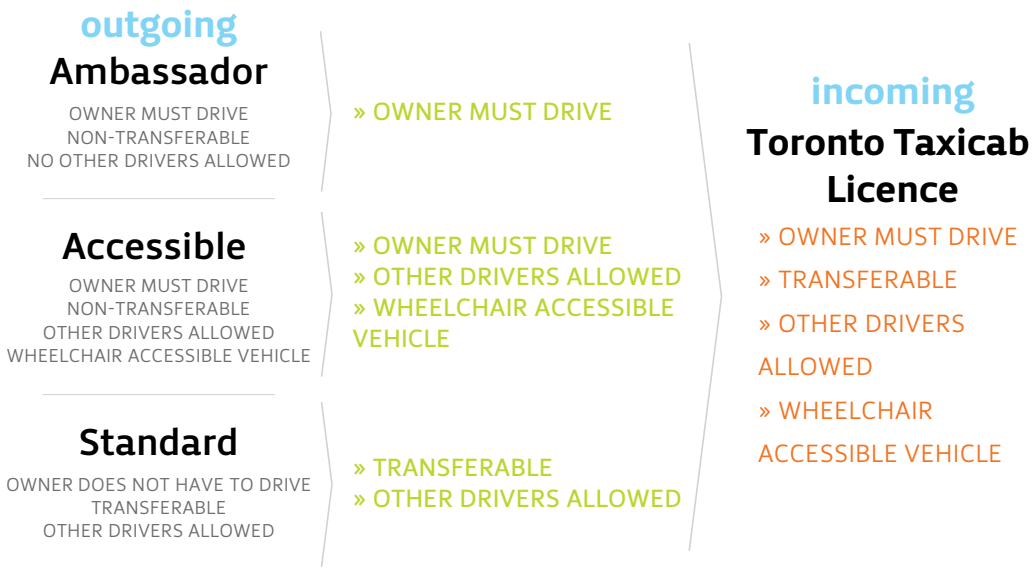


Figure 14. Toronto taxi cab licencing structures.[iii]

purchase an existing taxi.[i] Licences cannot be leased, but shift drivers are permitted under certain conditions — including that the shift drivers can't drive for more than 12 hours in a 24 hour period.[ii] Licences are transferable under certain conditions, but the industry experienced another upheaval with the introduction of the Vehicle for Hire bylaw in July 2016. Created to address Uber and other ridesharing programs, this changed the City's approach to transportation regulation and is under review in 2018. The revamped taxi system has made taxis more affordable, improved customer service, and enhanced working conditions and public safety — but it remains to be seen if these benefits will ride out ridesharing. However, if Toronto taxi drivers caught fish, theirs would be the best regulated and most sustainable fishery in the country.

There endeth the metaphor. The point is to illustrate that regulations matter and have consequences. Just like in the Toronto taxi licence market, diversifying market access away from corporate concentration to an owner-operated regime will be controversial. For a system of just transactions to be instituted in Pacific fisheries, care must be taken to transition justly as well. If Canada chooses to stop and indeed reverse the perverse outcomes of our increasingly commodified, privatized and marketized fisheries in BC, people who are currently benefiting, by choice or happenstance, from an unjust system are entitled to demand policy fairness when it comes to much needed policy reform that will affect their livelihoods. How can these transitions be made not only possible, but palatable for those entangled in the current system? Transparency and inclusivity, so lacking in the transition that led to the current system in the first place, will be key.

A critical first step is for objectives of transition planning to be defined and for the government to commit to them. This is the case for any good planning process and was a step clearly taken, by Canada, in the well-established process of Preserving the Independence of the Inshore Fleet in Canada's Atlantic Fisheries (PIIFCAF) in Atlantic Canada.

i https://www.toronto.ca/services-payments/permits-licences-bylaws/taxis/taxi-owners/
ii https://www.toronto.ca/legdocs/municode/toronto-code-546.pdf
iii https://www.toronto.ca/legdocs/mmis/2014/ls/bgrd/backgroundfile-66258.pdf

Examples of **objectives** could include:

- Maximizing viability of fish harvesters, and resilience of fishing communities
- Enabling new entrants and youth to be next generation of harvesters
- Enable the full and true value of seafood to be realized
- Ensuring fish stocks remain healthy for current and future generations
- Achieving reconciliation in fisheries with Indigenous peoples

Further, there need to be some established **principles** for transition planning, such as:

- Minimizing harm to existing active fish harvesters
- Maximizing buy-in and community/industry cohesion
- Making transition as easy and cost effective as possible for all parties

Further, these other fisheries management systems provide many examples of alternative management options that can be explored as solutions for BC fisheries. Not all will be applicable or appropriate for the unique conditions and wide variety of issues in the current day fisheries in BC, However, there are relevant and adaptable policy options that can be utilized in pursuit of realizing a made in BC solution to what ails our industry — a solution that respects the diverse fisheries and fish harvester needs that are unique to BC. Policy frameworks such as PIIFCAF deploy owner-operator and fleet separation provisions which take aim at improving the exact issues we have seen surface in BC fisheries. Canadian tried and tested options such as these deserve to be considered for our west coast. Custom designed solutions that are informed by those reliant on the resource are possible. Parity in how fisheries success is measured, as well as in how fish harvesters and fishing communities are valued across our country, is necessary.

On February 6, 2018, Former Fisheries Minister Dominic LeBlanc was on the West Coast to announce reforms to the Fisheries Act. His government is restoring fish habitat protections that were removed by the Harper Conservatives in 2012, and promises to recognize fishing as culturally and socially important to Canada's coastal communities. "The Liberals' changes also hope to protect the independent inshore commercial fishery. [Atlantic] Canada's owner-operator policy means individual fishermen are required to fish their licences personally and reap the rewards. The fleet-separation policy ensures corporations cannot both be harvester and processor... The newly announced proposals would enshrine 'the social, economic and cultural factors' of fishing and promote independent licence holders, said LeBlanc."[i]

On the face of it, LeBlanc's comments would seem to lay the groundwork for BC to pursue exactly the kind of reforms this paper argues for. Independent harvesters reaping the rewards of their labour... processor or other corporations restricted from owning production and instead reaping the rewards from marketing valued seafood products... enshrining social, economic and cultural factors ... all there for the doing, drawing on examples from around the globe, to the point that one day, maybe, the best performing fishery against sustainability indicators in the world is on Canada's west coast, as well as its east. But the work to make that happen has to start and end on the ground. It has to start at the heart of the industry itself, with harvesters, who must be engaged — armed in part with the information gathered here — in making the tough decisions, the *informed* decisions, that will put our fisheries back on a path to true sustainability, and our fish harvesters and communities back on a path to shared prosperity and wellbeing for both current and future generations.

i http://www.cbc.ca/news/politics/fisheries-act-overhaul-1.4522472 [Accessed May 2018]

APPENDICES

APPENDIX 1: HIGHLIGHTS IN THE HISTORY OF THE BC COMMERCIAL FISHERY

Dennis Brown (edited and updated)

1867 Confederation — Canada formed. Provinces agree that the federal government will get authority over fisheries, and the Minister of Fisheries is granted absolute discretion over the allocation of fishing licences.

1868 First Fisheries Act gets Royal Assent.

1871 British Columbia Terms of Union; BC joins Canada and authority over Pacific fisheries is given to the federal government.

1954 Great Law of Fishing is published by H. Scott Gordon, concluding that all open access fisheries attract more capital and labour than necessary.

1960 Dr. Sol Sinclair, an economist from Manitoba, is commissioned to study the West Coast Fishing Industry. He follows in Gordon's footsteps, concluding that all open access fisheries are uneconomic. The Sinclair Report forms foundation of fisheries licensing policy.

1969 The Government of Canada introduces the Davis Plan, the first limited entry licensing scheme in the Pacific salmon fishery. The fleet is reduced by 30 percent, ostensibly to "improve incomes of fishermen."

1973 DFO tasks the West Coast Development Committee, including Dr. Peter Pearse & Mike Hunter, with finding solutions to over-capitalization caused by limited licensing. The idea of individual quotas is raised for the first time in this report as a means of reducing capitalization. A minority report by two UFAWU members on the West Coast Development Committee opposes the introduction of quotas, and instead calls for the elimination of corporate licence ownership and the addition of an owner/operator clause.

1978 The Economic Council of Canada (ECC), and key author Dr. Peter Pearse, recommend reducing the commercial fishing fleet and eliminating subsidies to the industry. The notion of "stinted landing rights" for fish harvesters is introduced — an early name for what would later become known as IVQs or ITQs.

1979 DFO Deputy Minister A.H. Needler argues for major reductions in the commercial fishing fleet.

1980 DFO commissions Dr. Peter Pearse and Fernand Doucet to do a study of the fishing industry. Pearse and Doucet offer a series of economic proposals, but more importantly call for a Royal Commission, which Pearse later ends up heading.

1981 UBC researcher Brian Hayward publishes a review of the Davis Plan, noting that while it reduced the number of fish harvesters, it resulted in an increase in the catching power of the fleet and an enormous increase in capitalization.

1983 The Royal Commission on Pacific Fisheries (Pearse Commission) is released, with recommendations ranging from ITQs for common property fisheries, fleet reduction through stackable licensing provisions, time-bound ITQs, and ITQs as mechanism to transfer access to First Nations. Many of his recommendations end up in the 1996 Mifflin Plan.

1984 Then-Minister of Fisheries Pierre Debane accepts all of Pearse's recommendations for fleet rationalization, including ITQs, area licensing, and a licence retirement program, but does not accept his recommendation to make all quotas time-limited and subject to periodic renewal bidding. The Debane Plan was never implemented as the Liberal government lost the next election, but its recommendations were almost identical to those of the 1996 Mifflin Plan.

1985 Task Force under Prime Minister Brian Mulroney reviews Canadian fisheries, recommending major commercial fleet reduction as well as reduced government spending on DFO. ITQs are advanced as a desirable option.

1989 A leaked discussion paper by the Economic and Planning Branch of DFO titled Vision 2000 calls for major fleet reduction, ITQs, area licensing, and major reductions within DFO.

1990 DFO announces its intention to introduce an ITQ pilot program in the halibut fishery, very similar to what the Debane Plan had proposed in 1984. A number of fisheries once included under the "A" salmon licence are separated and put under limited entry restrictions based on fishermen's past landing records. The number of participants in the crab, prawn, and shrimp fisheries is dramatically reduced, as per the recommendations of Vision 2000.

1991 Dr. Scott Parsons, Deputy Minister for Science at DFO, publishes Management of Marine Fisheries in Canada. It catalogues the history and development of DFO policies as they relate to broader national politics and economics.

1991 The Commission of Inquiry into Licensing and Related Policies of the Department of Fisheries and Oceans (Cruickshank Report) initiated by the fishing industry in response to Vision 2000.

1993 Halibut ITQs are introduced. No conservation issue is identified.

1995 Fraser Report, investigating the "missing fish" problem of the 1994 Fraser River sockeye fishery, recommends that the West Coast salmon fleet be reduced substantially. DFO's response was to announce an Industry Roundtable on fleet reform and reduction.

1996 The Pacific Salmon Fleet Restructuring Program, or the Mifflin Plan, is announced. While citing conservation concerns, its prime focus is on economics. A major licence retirement plan is implemented, as well as stackable area licensing and single gear licensing. The salmon fleet drops by one third.

1997 Oceans Act -> integrated oceans management.

1997 Delgamuukw decision -> title exists & oral history is valid.

1997 Groundfish Development Authority formed; 10-20% groundfish TAC allocated for community economic development.

1997 Fisheries Renewal BC created, with mandate to fund programs to protect fish habitat, enhance fish stocks, and create new jobs in value-added and diversified fisheries.

1998 The Anderson Plan results in an additional round of licence retirement. Anderson announces severe harvest restrictions in all fisheries, ultimately paving the way for the Wild Salmon Policy of 2005. The salmon fleet is reduced by almost two-thirds under the Anderson Plan.

2004 The Pearse/McRae report on fisheries in the post-land claims era is released. Pearse and McRae recommend that significant portions of the TAC in all fisheries be transferred to Aboriginal fisheries. ITQs are recommended as one way to accomplish this goal. Pearse recommends that ITQs be introduced in the salmon fishery.

2005 The Wild Salmon Policy (WSP) is introduced. It creates an entirely new management regime, in which commercial salmon harvest rates drop from 70-80% of biomass to 20-30%.

2006 Commercial Groundfish Integration Pilot Program introduced, creating new management regime and extending IVQs and ITQs to additional fisheries to incorporate full accountability of catch under quotas.

2007 The $150 million Pacific Integrated Commercial Fisheries Initiative (PICFI) program is announced with the goal of expanding Aboriginal participation in commercial fisheries. PICFI money is used to fund an ongoing licence and quota transfer program to First Nations enterprises.

2010 Commission of Inquiry into the Decline of Sockeye Salmon in the Fraser River called, led by Justice Bruce Cohen. The Cohen Commission released final report in 2012.

2010 Dr. Carl Walters of UBC releases Where Have All the Sockeye Gone?, criticizing DFO's Wild Salmon Policy and suggesting that severe reductions in the commercial harvest rate of salmon have not resulted in improvements for most weak stocks of Fraser sockeye — in fact, they may have depressed productivity rates for stronger stocks. Walters estimates that between 1995 and 2009, at least 24 million Fraser sockeye might have been safely harvested without compromising conservation, but were not due to DFO policies.

2011 Dr. Pearse provides Management of the Pacific Fisheries: The Development of Fishing Rights and Fisheries Management on the Pacific Coast as expert testimony in the Supreme Court Ahousaht case. In this report, Pearse gives a detailed account of the history of Pacific Coast management licensing policy, and in particular ITQs. While Pearse cites conservation to some extent, it is abundantly clear that his lifetime pursuit was to economically rationalize the fishery.

APPENDIX 2: A BRIEF HISTORY OF CANADIAN FISHERIES

Brenda Reid Kuecks

This presentation of Canada's fishing history is not intended to be comprehensive. It would be impossible to include every turn in this complex historical tide — and the record has been narrated by too many different voices and opinions over time to make it true in the re-telling once again. What we want to do here is simply set the table with enough historical detail to create a foundation upon which to defend our argument that a new approach to fisheries management is needed in this country to secure our collective future.

At Canada's Confederation in 1867, the British Crown gave the federal government the authority and the responsibility to plan for, manage and maintain this country's publically-owned ocean and freshwater estates and their resource bounty. Stewarding the multiple needs and interests of the longest coastline in the world was no modest mandate. To oversee this important social, cultural, economic and environmental assignment, the Department of Marine and Fisheries was established, and a year later Canada enacted its Fisheries Act granting the minister "absolute discretion."

Canada's federal Fisheries Act of 1868 established resource conservation *and* prosperous maritime sectors *as its central management pillars and was intentional about authorizing the power necessary to balance fishing effort with resource abundance.*

The Fisheries Act established resource conservation (now referred to as 'sustainable aquatic ecosystems') as its central pillar, followed closely by economic benefits in the form of jobs and wealth (now called 'economically prosperous maritime sectors and fisheries'). At the time, economic benefit and community benefit were synonymous.

Above all else, the Act was intentional about authorizing the power necessary to balance fishing effort with resource abundance — thus the absolute discretion. It also provided regulations against pollution-generating activity and impacts to protect our environment and resources for future generations. In the 1871 BC Terms of Union, Canada commits to defray all charges for the "protection and encouragement of fisheries."

Since that landmark time, numerous scientific and economic studies have been commissioned, and a number of national commissions created[i] — each which has recommended a new program, or a new management regime aimed at the singular goal of maintaining and/or improving this balance between the Act's two key objectives — resource conservation and economic benefits. Too many cooks in the kitchen over too many decades has left Canadians with a stinky soup.

Always with an eye to conservation, the first significant wave of resource management followed World War I, when the demand of veterans for employment resulted in a decision to 'open' BC's salmon fishery rather than to restrict fishing licences. With this policy shift, purse-seine and troll fisheries grew rapidly to join an already substantial gillnet fleet.

i Examples include: Great Lakes Fishery Commission; Western and Central Pacific Fisheries Commission; Canadian Columbia River Inter-Tribal Fisheries Commission

Federal fisheries management then showed little vigour or innovation until the Second World War with only a few exceptions. In 1922 Quebec was granted the authority to manage its own fixed-gear fisheries; in 1928 following a court decision, it yielded control of processing plants to the Provinces; and in 1930 it allowed the Prairie Provinces to manage their own freshwater fisheries and separated the Dept. of Fisheries from the Dept. of Marine.

After World War II, once again fueled by the need to generate jobs, fishing fleets across the country began a period of rapid expansion — adopting new technologies, including hydraulically-powered gear; sounders and sonars; seine and gillnet drums; and other gear and vessel efficiencies. These increasingly powerful vessels were not only capable of finding and catching more fish, but also of transporting them over longer distances. Post war appetites and rising prosperity simultaneously gave rise to the phenomenon of household refrigeration, storage and transportation options that enabled a new frozen fish market to emerge, changing the economic proposition of groundfish fisheries dramatically.

After the Second World War, fishing fleets began a period of rapid expansion, adopting new technologies, including hydraulically-powered gear; GPS tracking systems; and gear and vessel efficiencies. These increasingly powerful vessels were suddenly capable of finding and catching more fish, as well as transporting them over longer distances.

The federal government actively supported industry expansion during this period by:

- providing grants and loans to build and equip new vessels;
- extending unemployment benefits to self-employed fishermen;
- establishing vessel insurance programs; and
- encouraging the exploitation of new commercial species.

This combination of federal policies and programs, introduced in less than a decade, created a fishing industry that was more lucrative and more attractive than ever before.

Unfortunately, the post-war unprecedented development push in the commercial fishing industry quickly (and not unexpectedly) resulted in too much fishing power on the water. The concept of 'overcapacity' entered our fishing vernacular — where the ability to catch fish, using whatever technology is available, results in harvesting more fish than that species can reasonably reproduce. On both coasts, this new reality, seen in the 1960's collapse of the BC herring reduction fishery, and more dramatically seen in the Atlantic cod collapse in 1992, began to show itself not only in serial stock depletions but in year over year financial instability by the mid 1960's — smaller catches = lower financial returns. A course correction was needed to bring the management metrics of conservation and economic outputs back into alignment.

BC enjoyed the short-term advantage during this period of growing a group of salmon scientists and managers who worked hard to keep salmon stocks fairly stable despite increasing pressure on the stocks from fishermen, coupled with the devastating effects to habitats caused by the deadly trio of urban expansion, industrial-scale logging and hydroelectric dams. The commercial fishing industry was actively managed through up-to-the-moment field reports

and day-to-day judgement calls that incorporated both fishermen's direct knowledge and scientific data. It worked well. BC fishermen's organizations such as United Fishermen and Allied Workers Union (UFAWU), Native Brotherhood, and processor organizations, recognizing the economic peril of serial stock depletion, were active participants in fisheries management and self-started many important stewardship initiatives. The UFAWU pushed hard for licence controls aimed at improving the prospects for both conservation and better incomes; vessel ownership by processors decreased; and the canning industry consolidated.

Since the 1950s economists and fishery experts had bemoaned the common-property nature of the fishing industry, with its tendency towards repeated cycles of overexpansion and crisis. Now the mantra that 'open' fisheries attracted more fishermen and fishing power than they could support became widely accepted by decision-makers.

For more than a decade, economists and fishery experts had bemoaned the common-property nature of the fishing industry, pointing to its tendency for repeated cycles of overexpansion and crisis. The mantra that 'open' fisheries attracted more fishermen and fishing power than they could ultimately support now became widely accepted by decision-makers. Comprehensive fisheries management, to move the dial back again to a balance between Canada's conservation and economic benefit objectives, first appeared on the scene in 1968. For the next 25 years, while experiencing several boom and bust cycles, all major fisheries on the east and west coast reacted, responded and then adapted to new management tools and approaches as they were introduced. Many of these tools are still being used:

- LIMITING LICENSING: Begun in '68 and encompassing all fisheries by the end of the '70s this mechanism restricted the number of licences that were available for each fishery. Licences were issued annually by the federal government to fishermen for an annual fee;
- AREA LICENSING: Area licensing established fishing 'zones' in the ocean and restricted each fishing licence to a specific fishing zone. For salmon this ending the ability for fishermen to 'follow' fish as they migrated along the coast;
- VESSEL SIZE RESTRICTIONS: These were introduced in an attempt to retain a small boat fleet and limit fishing capacity;
- LICENCE STACKING PROVISIONS: These provisions enabled fishermen to hold more than one licence on a single vessel;
- INDUSTRY-GOVERNMENT ADVISORY COMMITTEES: To encourage and support the active participation of commercial fishermen in both longer term and in-season fishing decisions, and to bring their knowledge into the room, advisory structures were established to inform every major commercial fishery;
- SALMON ENHANCEMENT: In 1977 the federal government introduced a multi-billion dollar program aimed at doubling salmon abundance through hatchery production. This program rested on the active engagement of provinces, fishermen and communities. Today, with both strong advocates, vocal opponents and far fewer federal resources (currently averaging $25 million/year), this program is but a tiny fraction of its former self.

By 1979, it was incredibly evident that the complexity of the vast responsibility for effective fisheries and marine management on three coastlines — from science, to enforcement, to the management of multi-party interests, was cumbersome, expensive and complex. In response, the federal government created the stand-alone Department of Fisheries and Oceans (DFO), and mandated it responsible for fisheries management and research, oceanography, hydrography and small craft harbours.

By the mid-1980's despite increasingly frequent conflicts among fishing interests and a growing rivalry with Aboriginal and recreational fisheries, Canada was the leader in world fish exports, and catches and values were setting all-time records, including the formation of many vertically integrated companies (combining fishing, processing, and marketing) which operated large processing and freezing plants, each of which could employ hundreds of people in reliable jobs, often year-round.

Unfortunately, stocks continued to report decline and it became widely accepted among fisheries managers that the various licence limitation schemes of the previous decades had not done enough to reduce the ability to harvest fish — in fact, fewer fishing vessels, thanks to the policies of licence stacking and the introduction of new technology (vessel stability, tracking and gear), could actually harvest more fish than ever before. With the inclusion of an Aboriginal Rights clause in the repatriated Constitution of 1982, a number of successful court cases initiated by Aboriginal communities now required the federal government to finally address historical inequities. These settlements required (and continue to require) DFO to introduce a number of new financial and rights-based programs including Food Social and Ceremonial Fisheries, and the reassignment of licences retired or purchased from the commercial fishery. A key-missing element to date is co-management (or joint management) at the governance level; "absolute discretion" is a significant barrier.

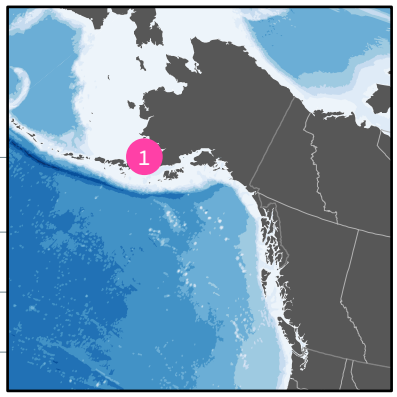
In response to the combined impact of growing conservation concerns, the need to reallocate fishing opportunities to Aboriginal communities, and the ever increasing costs and complexity of fisheries management, DFO was advised to introduce first the Individual Quota system (IQs) — allocating a defined portion of the annual allowable catch to every licenced vessel, and shortly thereafter the Individual Transferable Quota system (ITQs) — enabling quota allocations to be bought, traded or sold without a fishing requirement. In an industry that had always operated on the principle that Canada's marine resources were annually 'on loan' at the discretion of the federal government for the purpose of creating direct and indirect economic benefits, this new ability to purchase and sell (or essentially to own) access radically shifted perceptions and created a powerful new marketplace. It was unprecedented.

So where does this long story lead us in the end? *In 2017, Canada celebrated her 150th anniversary since Confederation — marking 150 years since the federal government was given the responsibility to manage our shared marine and fishery resources.* Whether we have succeeded or failed in this endeavor is still being hotly debated in some quarters, but if we strip away all positional interests, political rhetoric and social conditioning and return solely to the two key objectives upon which our national Fisheries Act was founded — the **conservation** of Canada's marine environment and resources; and the generation of **economic prosperity** in the form of jobs and wealth creation from her resources, the evidence as shown in many reports suggests that a major gap has emerged: the economic objectives no longer cover the social objectives and in fact, greatly impede meeting them.

APPENDIX 3: FISHERIES MANAGEMENT ALTERNATIVES WORLDWIDE

PRIMARY APPROACH	CASE STUDY
Community Quotas managed by community	1. Bering Sea and Aleutian Islands, Alaska, USA
Competitive with effort/ input controls	2. Magdalen Islands, Atlantic Canada 3. Shetland's crab fishery, Scotland 4. Gullmar Fjord shrimp fishery, Sweden 5. Maine's Lobster fisheries, USA 6. Prud'homie, South of France
Fleet allocation for small inshore fleet	7. Iceland's global quota 8. Eel fishery, The Netherlands 9. Sweden's community quotas 10. Norway's fleet allocation
Individual Quotas managed cooperatively with limited transferability	11. Challenger Scallop Enhancement Company, New Zealand 12. Nova Scotia (Areas 23/24), Atlantic Canada 13. Netherlands Producer Organizations 14. BC Licence and Quota bank
Individual Quotas with variable levels of transferability	15. Nova Scotia (Area 19), Atlantic Canada 16. Norway's limited tradability and owner operator rules 17. Senegal individual quotas 18. Groundfish ITQ fisheries in British Columbia
Fishery within MPA	19. Banc d'Arguin National Park of the Imraguen, Mauritania 20. Galicia, Spain 21. Ngaparou, Senegal
Traditional system	22. Benin 23. Tanzania
Territorial use right fishery (TURFs)	24. Punta Allen, Mexico 25. Grand Lahou and Aby Lagoons, Cote d'Ivoire 26. Chile's Territorial Use Right Fisheries 27. Japan's Territorial Use Right Fisheries
Limited licensing with owner operator provisions	28. Taxi cab industry in Toronto, Canada 29. Vancouver real estate market, Canada

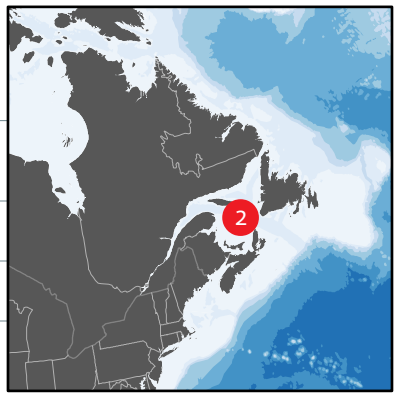
1. BERING SEA AND ALEUTIAN ISLANDS, ALASKA, USA



Example	Alaska's Community Development Quotas (CDQ) program
What method?	Community Quotas managed by community
Where?	Alaska, USA — Bering Sea & Aleutian Islands
What happens?	% of Bering Sea & Aleutian Islands quotas for groundfish, prohibited species, halibut, and crab are made available to 6 CDQ groups. These CDQ groups can lease out the quota or fish it with their own assets.
Who is impacted?	65 native communities (within 50 nautical miles of the Bering Sea coast) make up the 6 CDQ groups
For how long?	Since 1991, with amendments to the program since then.
Impact(s)	» CDQ royalties for the six groups now exceed $50 million annually » Have acquired $400 million in assets (vessels & shore-based infrastructure) » Since 1992, over $120 million in wages, education, and training benefits have been generated for over 25,000 residents, and over $500 million in revenues have been generated.
Values achieved	» Access allocated to small scale fishing communities » Indigenous participation in commercial fisheries » Development of local and regional fishing economies to meet social and economic objectives » Employment — on land & at sea » Revenues from resources flowing to communities — in $ and allowing infrastructure to be built up
Caveat(s)	Still market-based quota
References	Keith Criddle, Professor, University of Alaska Fairbanks https://www.apicda.com/about-apicda/cdq-program/

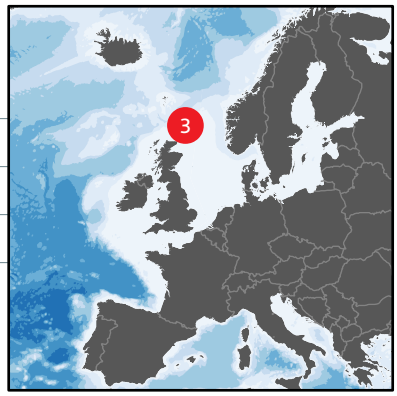
> This gave operators greater flexibility to choose when, where, and how to fish. Decisions could be based on maximizing profit per pound of CDQ instead of maximizing catch-per-day as they did in the regular fishery.
>
> *- anonymous fish harvester*

2. MAGDALEN ISLANDS, ATLANTIC CANADA



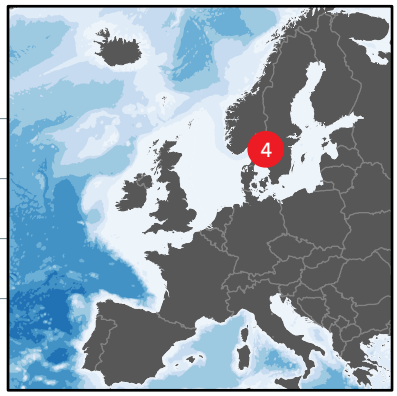
Example	Lobster fishery managed collectively with effort controls
What method?	Competitive with effort/input controls
Where?	Lobster Fishing Area 22, Magdalen Islands
What happens?	Lobster fisheries in Eastern Canada are divided into areas called Lobster Fishing Areas (LFA), which delimit jurisdiction and access for communities and fishermen. LFA 22, which is adjacent to the Magdalen Islands, has a management committee that targets the lobster trap fishery. The committee was responsible for the acquisition of the service centre for fishing vessels, implementation of management measures to increase spawning in female lobsters, implementation of measures limiting the uncontrolled increase in fishing effort, the limitation and protection of the fishing licences in the lobster fishery at 325 licences to allow new entrants in the industry, increased education to promote entry of the new generation of fishermen, and the establishment of a partnership with the MAPAQ. The number of traps is set at 273 per fisher. Management relies on fishing input controls, fishing season closures, size limits, trap limits and restrictions, and other gear limits. No quotas are in place, but rather a homogenous effort quota is represented by a maximum of the number of traps per fisher, and a limited number of fishing hours.
Who is impacted?	Fishery employs 10% of the population of the islands, with 850 fishers
For how long?	Integrated fishery management in place since 2010
Impact(s)	» The Fishery is MSC certified » Sales price increased from 60% to 85% » Landings increased to 2500 tonnes in 2016
Values achieved	» Strong sense of stewardship and ownership » Active participation of fishers to decision making
Caveat(s)	Constant pressure against owner-operator principle by corporations and processors
References	[35] Dyhia Belhabib, pers. observ.; Kevin Squires, Fish harvester, Nova Scotia; Gordon Beaton, snow crab fish harvester, Nova Scotia Area 19 http://www.pecheimpact.com/comite-consultatif-du-homard-des-iles-maintien-des-mesures-de-gestion-mais-report-de-la-date-de-mise-a-leau/ http://ici.radio-canada.ca/nouvelle/778979/gaspesie-iles-de-la-madeleine-homard-peche-misealeau-casiers-grande-entree

3. SHETLAND'S CRAB FISHERY, SCOTLAND



Example	Fishery managed by association
What method?	Competitive with effort/input controls
Where?	Shetland Islands, Scotland
What happens?	The Shetland Crab Fishermen's Association obtained a Regulated Fishery order which confers the legal right to manage a fishery and which is granted by the UK government. The Order also includes other species (lobsters, scallops, queen scallops, whelks, oysters, mussels, cockles, clams, and razorshells). The group formed a new organization "the Shetland Shellfish Management Organization" (SSMO) a partnership between Shetland Fishermen's Association, Shetland island Council, Shetland Association of Community Councils, Shetland Fish Processors Association and other organizations, to ensure the long-term sustainability of shellfish fisheries. SSMO has developed a local licensing scheme to control fishing effort, restrict fishing gear and vessel sizes, set minimum landing sizes, and close seasons for some species. The management plan is backed with a data collection scheme and extensive consultation with stakeholders. Regulations include: » A licensing scheme where licences are renewed annually by the SSMO and are not transferable » Maximum vessel length established at 17m » Gear and mechanical limitations » Size limitations » Closed seasons » Closed areas
Who is impacted?	The order covers a fishing area of 6,000 km². Fisheries feed 1/3 of the island's economy
For how long?	The order came into effect in 2000
Impact(s)	» Employment became full time » Fisheries became year round » Certified MSC since 2012 » Landings increased to over 600 tonnes, and the catch per unit of effort increased
Values achieved	» Stewardship and sense of community » Fisheries are more sustainable » Virtually absent management before this system came into place
Caveat(s)	*Not available*
References	https://www.ssmo.co.uk/about [Accessed May 2018] 29, 36 Beth Mouat, NAFC Marine Centre, Shetland, Scotland

4. GULLMAR FJORD SHRIMP FISHERY, SWEDEN

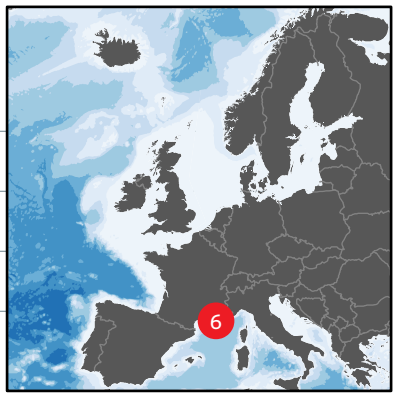


Example	Fishery managed by rotating fishing effort
What method?	Competitive with effort/input controls
Where?	Gullmar Fjord, Sweden
What happens?	Fishing rights are given to six small-scale shrimp trawlers (8–15 m). The fishery comprises only small-scale vessels with one fisherman onboard. The fishery is managed through a combination of tools including fishing permits granted by the Swedish National Board of Fisheries that secure access to the fishery to some small-scale fishers (licence renewed every five years — free of charge to enter a fishery). The effort is limited at 100 vessel days. Upon securing access to the fishery, fishermen engaged in co-management by adopting larger mesh sizes to avoid catching undersized shrimp, and dividing the number of days between vessel owners to avoid crowding on fishing grounds and premature closure. To avoid the early closure of the fishing, the fishery opens in April for 50 days, closes during July–August and then opens again for 50 days until December. No vessel can trawl the area one day a week. The Gullmar shrimp as set at a higher price.
Who is impacted?	6 fishing vessels with one fisherman associated with each
For how long?	The trawl fishery was re-opened in 1999 followed by the regulations and co-management plan.
Impact(s)	» These measures increased the fishery's cost efficiency and encouraged higher prices (the Gullmar Fjord shrimp fishery earns 75% higher prices than other Swedish shrimp fisheries)
Values achieved	» Increases stewardship » Fishermen feel the fishery is secure to them » Flexibility in negotiating prices
Caveat(s)	» Informal trade in the number of days started
References	[37, 38] Ida Wingren, Lund University

5. MAINE'S LOBSTER FISHERIES, USA

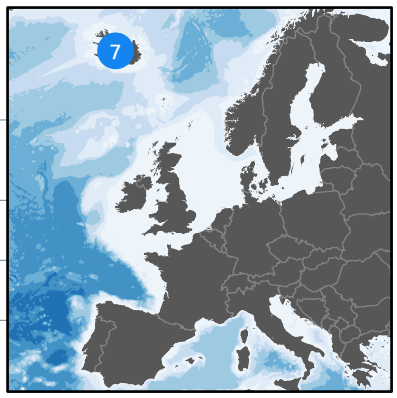
Example	Competitive lobster fishery managed by input controls and owner operator provisions
What method?	Competitive with effort/input controls
Where?	Maine, USA
What happens?	The fishery is divided into seven co-management zones managed by lobster management policy councils comprised of local lobstermen and their elected leaders. The councils decide on trap limits, maximum number of traps, fishers, and time and day of fishing. There is an apprenticeship program for new entrants, and a trap tag program. Rules are voted on. Each council includes several harbours. An association (Maine Lobstermen's Association) mediates in case of conflict, and assists with negotiations. Some rules include: » Females with eggs are to be v-notched » It is prohibited to fish on Sundays in the summer, additional time restrictions apply. » Also, limiting zone lines, sizes, traps. Ultimately management is shared between government and lobstermen.
Who is impacted?	Around 5,400 fishing businesses and over 35,000 people employed by the lobster fisheries of Maine
For how long?	Introduced in 1995 as a co-management law, and since 1997 for zoning.
Impact(s)	» The fishery was valued at $510.7 million US in 2015
Values achieved	» Fisher independence and freedom as business owners » Fishers contribute to decision making » Reduced income disparities due to a smoother distribution of traps amongst fishermen » Lobstermen more organized, confident in promoting their interests » Lobster fisheries considered a major engine for coastal communities
Caveat(s)	» Increase in lobster population levels may not be due to the effort controls but to environmental conditions (warming waters, lower predator populations) » Lobstermen become bolder in obstructing others » Open conflicts developed due to a strong sense of ownership » "State administration of voting enables aggregated licence holder preferences to supersede discussion that might have taken place at the local level."
References	39, 40, 41 Brett Tolley, Northwest Atlantic Marine Alliance (NAMA) http://www.pressherald.com/2016/03/04/maine-fish-seafood-hit-record-616-5-million-in-2015/ [Accessed May 2018]

6. PRUD'HOMIES, SOUTH OF FRANCE



Example	Traditional Management groups
What method?	Competitive with effort/input controls
Where?	South of France
What happens?	This management system targets multiple small-scale boat gear types and species (6–12 m boats, using longlines, nets, and traps). *Prud'homies* are groups of 3–5 fishermen with over thirty years of experience, elected by the community. *Prud'homies* have regulatory, jurisdictional, and disciplinary powers over their fishery zones. *Prud'homies* regulates access to fish over time and space and encourage fair distribution of profits and local employment. They prioritize low impact artisanal fishing. Regulations include listing of permitted and prohibited fishing gear, per-boat catch limits, minimum fish size, and fishing effort. Sometimes, fishing lots are drawn on a map to allow for less competition for fishermen using the same fishing gear. *Prud'homies* can intervene in cases where catches are too high. They can suspend fishing to regulate prices, and direct re-targeting of species. Social protection manifests itself through attentiveness to individual situations of each member of the community, including helping younger members, retired fishermen, and widows.
Who is impacted?	The 33 *Prud'homies* committees along the south of France represent 1,650 fishermen.
For how long?	The *Prud'homies* were officially recognized in 1859.
Impact(s)	» Increased value of the catch by 20% in the last 20 years » Fish stocks are stable » Stable average wage per fisherman
Values achieved	» Creates a participative approach » Provides a sense of certainty and security for fishermen » Provides a guarantee of higher prices — supply being controlled » Ecosystem is well preserved » Cultural and historic fabric of fisheries well maintained » Creation of jobs » The community works to maximize the returns to its members, and the less advantaged are prioritized
Caveat(s)	*Not available*
References	[30] Michèle Mesmain http://slowfood.com/slowfish/pagine/eng/blog/dettaglio.lasso?id_edit=661 http://www.l-encre-de-mer.fr/2013-10-04-les-prudhomies-de-peche-de-mediterranee/

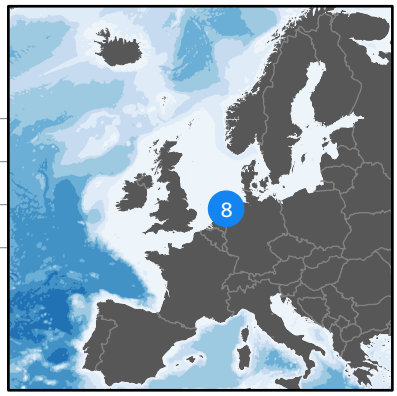
7. ICELAND'S GLOBAL QUOTA



Example	Fleet allocation by community, then divided up as IQs
What method?	Fleet allocation for small inshore fleet
Where?	The whole of Iceland
What happens?	ITQs are in effect for industrial fisheries, and a global quota is set aside for coastal and small scale fisheries (vessels under 12m or 6 Gross Registered Tonnes). The government adjusts the commercial TAC as needed to reallocate quota between commercial and coastal and small-scale fisheries. Small-scale operators do not have to buy quota, nor can they sell the quota acquired through the allocations.
Who is impacted?	The fishing sector employs 1,300 people onboard vessels and 7,000 people on land.
For how long?	Since 2009, the Fisheries Management Act was revised to reflect the interests of small communities
Impact(s)	» Total landed value estimated at $1.2 billion US » Total number of vessels maintained at 1,620
Values achieved	» Small-scale added value fisheries and communities are favored » No quota costs to small-scale fishermen » Communities manage their own quotas with added flexibility » Concentration outside the community is limited
Caveat(s)	Fishermen end up competing if not followed by co-management measures. Concentration of quota, and decline in land based employment occurred
References	Anna Karlsdottir, Iceland University 23, 42, 43

> Not all communities get community quota, the decision is made by the Minister each year based on regional reduction rates, preventing too damaging losses to communities. So locally where the community quota is allocated, this can rescue some jobs, but overall it does not increase manpower involved. The community quotas have been heavily contested for being a too small and insignificant Band-Aid to a system that favors consolidation as an effect of its transferability.
>
> *- Anna Karlsdottir, Iceland University*

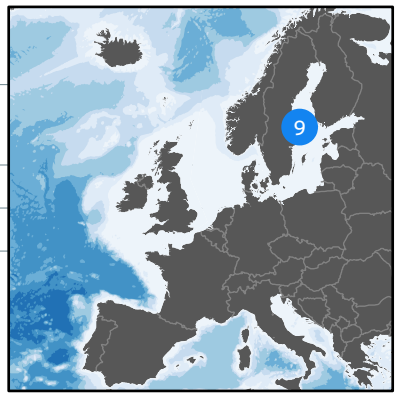
8. EEL FISHERY, THE NETHERLANDS



Example	Frisian eel fishery, The Netherlands
What method?	Fleet allocation for small inshore fleet
Where?	Netherlands inland waters
What happens?	Frisian eel fishers manage their fisheries and the Union is the keeper of the fishing rights/ quota. The cooperative union allocates access to fishing rights/quota to each of the fourteen participating vessels each year. If a fisher exits the fishery, the quota goes back to the group. The union will then decide whether the quota will go to another member or a new entry will be accepted, evaluated, then facilitated.
Who is impacted?	One community of 14 fishing vessels
For how long?	Since 2009
Impact(s)	» Number of boats kept stable over the years » Increased prices » Value added increased because of the community management aspect
Values achieved	» Access allocated to small scale fishing communities » No quota costs to new entrants » Inter-generational access warranted » Increased selectivity in the fishery » Revenues from resources flowing to communities » Sense of independence as a fisher
Caveat(s)	Catches declined since prior the quota implementation. Monitoring costs increased as communities follow their members' catches
References	Arjan Heiner, Marine biologist/Fisheries management advisor, Netherlands 44

> The number [of fishermen] is stable and people can make a living out of these fisheries.
>
> *- Arjan Heiner, Marine Biologist, Netherlands*

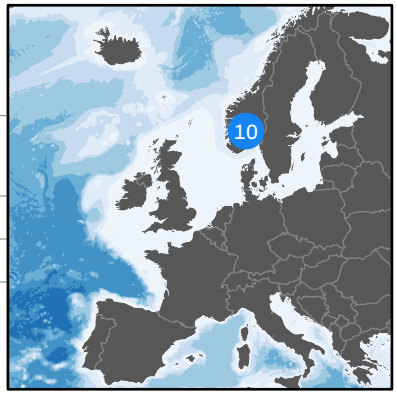
9. SWEDEN'S COMMUNITY QUOTAS



Example	Fleet allocation to passive gear (small) vessels, fished competitively
What method?	Fleet allocation for small inshore fleet
Where?	The Baltic sea communities, Sweden
What happens?	A fixed proportion of the TAC is provided to the smaller Baltic Sea vessels (under 12 m in length) using passive gear. Whenever needed, additional allocations to the small-scale sector are made at the expense of commercial quotas. In some cases, communities rationalize where each fisherman is allowed a fixed catch per week. There are rules associated with the pool of quota: » In the case of mackerel and cod, quotas are rationed to vessels every two weeks » Other species are managed by a national quota » Quotas cannot be transferred
Who is impacted?	Small scale fishing communities of the Baltic, and overall fishing communities holding over 1322 licences.
For how long?	Since 2009
Impact(s)	» Ex-vessel prices have increased » Debt decreased » Number of boats declined by 4% and was 1,105 in 2013
Values achieved	» New entrants are allowed in the small-scale system » No quota costs to small-scale fishermen
Caveat(s)	Major loss of employment as the community quotas are fairly small
References	[37, 45, 46] Ida Wingren, Lund University

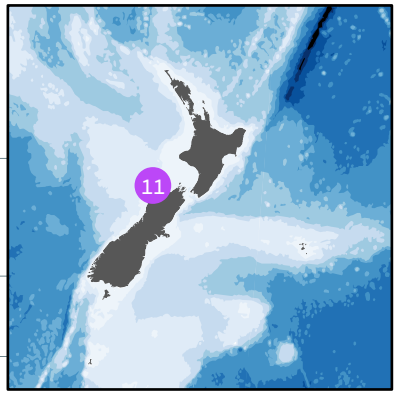
> There is a decline in vessels and it keeps on declining very fast and several municipalities are afraid of losing their fishery to bigger vessels from the West coast.
>
> *- Ida Wongren, Lund University*

10. NORWAY'S FLEET ALLOCATION



Example	Fleet allocation to smaller vessels, fished competitively
What method?	Fleet allocation for small inshore fleet
Where?	Norway
What hap pens?	Global quotas are granted to geographically separated communities. Quotas are allocated to vessels >11m in length while the coastal fleet (vessels <11m in length) operates competitively under the coastal global quota (TAC). Coastal vessels 11-28 meters in length fall under the "Structural Quota System" and a decommissioning scheme. There are four groups of vessel length under this category, where vessels can transfer 80% of their individual quota within the same length group and country (region), if the vessel stripped of its quota is scrapped. To promote Northern coastal fisheries, vessels in the northernmost part of Norway can buy vessels with quotas from the whole country. Quota portfolio allocations (i.e. number of species IVQs) limits and caps apply.
Who is impacted?	There are 907 vessels falling under this category, and 673 registered fishing harbors, and 265 processing plants in Norway.
For how long?	Since the early 2000s for various fisheries
Impact(s)	» Fish prices increased and so did market conditions » Catch per boat increased
Values achieved	» Opportunities of diversification of, and access to, fisheries for part timers
Caveat(s)	Increased competition as the number of fishermen operating under this component of the fleet is increasing
References	47, 48, 49 Ian Kinsey, Fish harvester, Norwaylan Kinsey, Fish harvester, Norway.

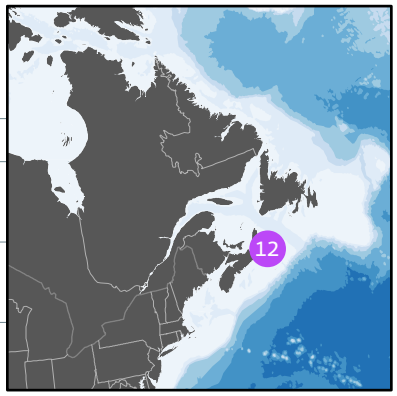
11. CHALLENGER SCALLOP ENHANCEMENT COMPANY, NEW ZEALAND



Example	Challenger Scallop Enhancement Co. Ltd.: Company composed of quota shareholders of Scallop
What method?	Individual quota managed cooperatively with limited transferability
Where?	North end of New Zealand's South Island, and covers 2,000 km² of harvestable area
What happens?	Challenger Scallop Enhancement Co. (CSEC) is a public company whose share ownership is restricted to New Zealand scallop quota holders. Each quota holder (an active fisher) owns shares in proportion to their quota ownership. The company provides services such as fishery management, vessel support, gear construction (ring-bag dredge), research and scientific advice, and resource monitoring. Shares in the company were limited by the total amount of quota available, and to the owners of Southern Scallop quota, where one share is equal to 100kg. Quotas are transferable to new shareholders (no market speculation), and are not pooled. If the transfer of shares is to an outsider, Challenger would extend an offer to the newly-qualifying prospective shareholder to accept a shareholding in the company. The previous shareholder would be removed. The company further manages the fishery by establishing (as a group of quota holders) management decisions: seasons, area closures, documenting and reporting requirements, limits on daily catches, area catches and scallop sizes. Annual endorsement by the Minister is not required. The company undertakes biomass surveys.
Who is impacted?	Between 11 and 30 vessels operate in this fishery
For how long?	Formed initially in 1993 (the Challenger Scallop Quota Holders Association), and became a limited liability public company in 1994
Impact(s)	» Number of vessels declined because of declining stocks and closures
Values achieved	» Creates community based stewardship » Reduces quota costs and quota speculative prices » Increased CPUE
Caveat(s)	*Not available*
References	45, 50

> Once the Board has approved the draft strategy, Challenger consults with commercial fishery participants, recreational scalloping representatives, customary Maori fishers, Government agencies, environmental organizations and the general public.
>
> *- Mincher, 2008*

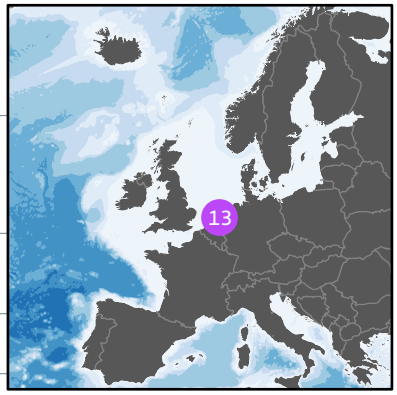
12. NOVA SCOTIA (AREAS 23/24), ATLANTIC CANADA



Example	Crab quota groups of Nova Scotia
What method?	Individual Quotas managed cooperatively with limited transferability
Where?	Atlantic Canada Snow Crab Fishing Areas 23/24, Canada
What happens?	Industry concern over TAC-setting method led to science-based approach, and the establishment of an ITQ fishery. The collapse of the cod fishery, increases in snow crab stocks, and the fact of increased sharing of snow crab in other areas (NL and the Gulf) led to expanded participation in SC Areas 23/24. Small snow crab allocations (roughly equivalent to 1/14th of a traditional licence) were made to individual fishermen, who then group and create companies or cooperatives and hire fishermen to fish for them. While only an active fisherman can qualify to receive a quota, the quota is so small that it requires several fisherman to form a group (company) to fish it in a profitable manner. They get together, and group their quotas to receive a licence from DFO. Upon receiving a licence, the allocations become attached to that group. All the quotas are transferable. These allocations are much more mobile than overall licences, and are easier to pick up.
Who is impacted?	430 Nova Scotia coastal fishermen (North Cape Breton to South of Halifax)
For how long?	Since 2000
Impact(s)	» The fishery compensated for the economic hole caused by the collapse of the cod fishery » Total landings reached 11,292 tonnes in 2015 » Number of fishermen declined from 580 to 430 since 2002 » The number of licences was maintained at 116 » The catch per unit of effort increased from 103 to 106 kg/trap hauled (2010-2015)
Values achieved	» Equal share of quota for each fishermen » Strengthens sense of cooperation between fishermen » Easiness of obtaining access to the fishery
Caveat(s)	» Quotas and licences can still be sold and moved around
References	[51] Kevin Squires, Fish harvester, Nova Scotia.

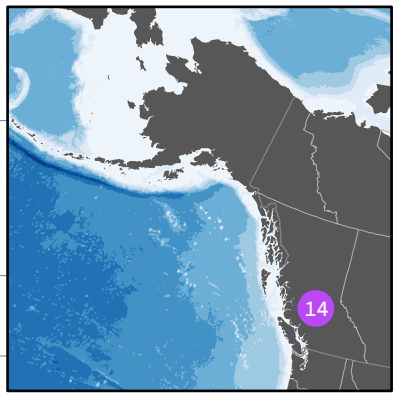
> The pressure caused by the collapse of the cod fishery and the economic hole was filled by the crab and shrimp fisheries.
>
> *- Kevin Squires, Fisherman, Nova Scotia*

13. NETHERLANDS PRODUCER ORGANIZATIONS



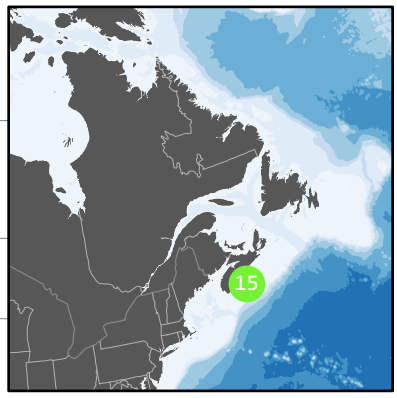
Example	Netherlands Producer organizations pool quotas and offer lease advantages and lower prices to members
What method?	Individual Quotas managed cooperatively with limited transferability
Where?	Netherlands
What happens?	This is a co-management system that encourages active participation of fishers in management, incentivizing self-organization. ITQs were introduced in the pelagic and demersal industrial fisheries, but are managed in-season as cooperative catch rights under Producer Organizations (POs). Individual fishers, not a member of the PO, can only rent out (part of his) quota through an agreement that has to be made before March of that year. Later in the year it is not possible. A PO can exchange quotas among its members the whole year round. A PO can also exchange quotas with other POs throughout the year. To be part of a PO, a fisher has to have a licence, and a vessel. The quotas are run by the POs who serve as clearinghouses for quotas, buying unused quotas and renting them out where they are needed. Individual fisherman become members by signing an agreement with the PO but they remain owners of their individual quota entitlements, yet during the year the quotas are managed as a pool and landings match the total of the group quota holdings. POs can take active roles in acquiring additional quotas by collectively buying quotas on the market; such quota becomes the property of the group. Over-fishing beyond ITQs by some vessels will be at the expense of other members of the group; indemnity is agreed upon between the group members.
Who is impacted?	Quota owners, 400 fishermen
For how long?	Since 1993
Impact(s)	» Decline in the number of boats, jobs, and harbors because of concentration
Values achieved	» Concentration under the ITQ system within a few hands is limited to the POs » Fishermen gain short term flexibility » Individual fisherman can fine-tune quota holdings and landings during the year by leasing out or acquiring additional quotas from the community » Quota prices are still very high but PO members enjoy a reduced price
Caveat(s)	» A new kind of concentration in the hands of the POs is established. » Initial allocation and durability of fishing rights, and high grading and discards do remain rather problematic. » Although fishers are not required to be part of a PO, acting alone makes it very expensive for them to have access to quota.
References	[52, 53] Arjan Heiner, Marine Biologist/Fisheries Management Advisor, Netherlands

14. BC LICENCE AND QUOTA BANK



Example	Pacific Coast Fishermen's Conservation Company (PCFCC): Quota Bank where members pool quotas and enjoy lower lease prices
What method?	Individual Quotas managed cooperatively with limited transferability
Where?	British Columbia's Western Vancouver Island
What happens?	Licence and quota bank that purchased groundfish (trawl and longline) licences and quota when prices were good, then leases them to member fishermen at fair market prices as fish are caught and quota needs confirmed. The business model is called a "bank" because it's ultimately about setting up a legal entity to securely hold licences and quota. Fishermen themselves own the bank in partnership with outside investors or community groups. Member fishermen lease quota and licences from the bank as their individual needs require. By pooling capital and operating according to principals of fairness and sustainability, the bank provides fishermen with access to licences and quota that they couldn't otherwise obtain. The system reduces gambling risks and removes the need to acquire quota in advance. Decisions for new purchases and leases are made collectively by the group.
Who is impacted?	The small boat fleet of Ucluelet
For how long?	Since 2006
Impact(s)	» The number of boats was kept constant » Reduced costs of and speculation around licences and quotas
Values achieved	» Sense of security as a business owner » Increased sense of pride as a fisherman » Allows easier intergenerational succession » The fishery is kept within the community
Caveat(s)	» Still has the burden of quota cost and total quota uncertainty
References	http://ecotrust.ca/project/pacific-coast-fish harvesterss-conservation-company/ [Accessed May 2018] The interviewee preferred to remain anonymous

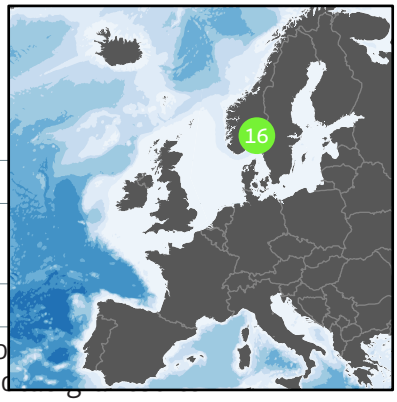
15. NOVA SCOTIA (AREA 19), ATLANTIC CANADA



Example	Snow crab fishery managed by licences with individual quota shares per licence and owner operator provisions
What method?	Individual quotas with variable levels of transferability
Where?	Scotia Fundy — Area 19, Nova Scotia, Canada
What happens?	This system is reserved for Area 19 snow crab fishermen. Licences are associated with shares of traps between 3 and 26 shares. Each share receives a catch quota associated with it (2000 lb/share to 5500lb/share). This management system limits the number of traps to 26. A licence is issued when a fisherman has access to at least 3 shares (traps). Fishermen may collaborate and share a boat and gear to achieve this number. Young fishermen can hence acquire a share towards entering the fishery. The TAC is divided by the number of traps, regardless of each individual's fishing history. The fishery starts at a set date, and is further regulated through a set of output controls (size of crabs).
Who is impacted?	Cape Breton communities, fishermen and fish processors
For how long?	Since 2002
Impact(s)	» Landings increased by 150% and reached 3,500 tonnes » The number of licences increased to 184 » The landed values reached $ 16 million » Operating costs declined by 40%
Values achieved	» Flexibility of fishing season, and freedom of going out at sea » Independence in landing and negotiation of price » Fishermen can acquire bigger boats without the competition with others
Caveat(s)	Not available
References	Gordon Beaton, snow crab fish harvester, Nova Scotia Area 19 54, 55

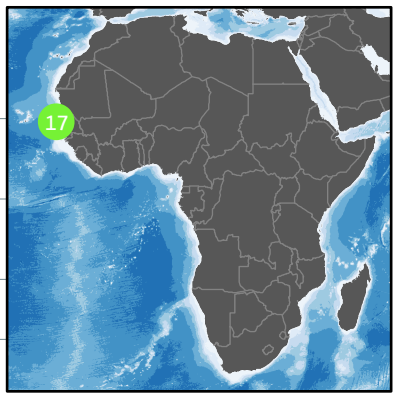
> It is a pretty good opportunity. You don't have to buy a big operation, you can get it with 2-3 crab shares. They [fishermen in this system] can join up with a couple of fishermen to a max [of] 25.
>
> *- Gordon Beaton, snow crab fish harvester, Nova Scotia Area 19*

16. NORWAY'S LIMITED TRADABILITY AND OWNER OPERATOR RULES



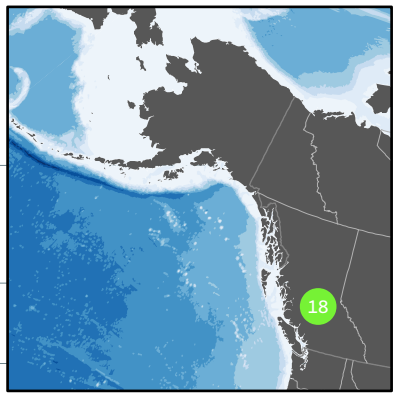
Example	ITQ fishery with owner operator provisions
What method?	Individual Quotas with variable levels of transferability
Where?	Norway
What happens?	Deep sea purse-seine and trawl fisheries are subject to [illegible] are granted to vessels not individuals, and to global qu[illegible] geographically separated communities. This is a whole system where the industrial fleet acts under the IVQ system, and the coastal fleet operates competitively under the coastal global quota (see case 11). The original allocation of quota to individual boats was determined though a formula linking a "base quota" to a boat's licensed cargo capacity, with each boat getting a share equal to the proportional share of its base quota. Base quota increased with the capacity of the boat but at diminishing rate so bigger boats are disadvantaged and ultimately get less. The IVQ system is governed by certain rules limiting tradability, and setting owner operator rules: » Initial quotas provided to people who fished during the 3 preceding years of the quota system introduction » The owner must be an active fisherman (fishing or involved in the vessel and quota running), and registered in the Register for Norwegian fishermen — having either operated before the system was implemented, or qualifies as class B fisherman (100% of livelihood dependent upon fishing, owns a seaworthy vessel, which under the IVQ system has to be 11–21m in length)
Who is impacted?	The whole fishing industry in Norway
For how long?	Since the early 2000s for various fisheries
Impact(s)	» Landings estimated at 1 million tonnes of fish » Fish prices increased and market conditions improved » Catch per boat increased » Landed value reached $3 billion CAD in 2010
Values achieved	» Consolidation is limited, and Northern communities are advantaged through lower losses in transfers (5% compared to 15% in southward transfers) » Helps provide quota for choke species
Caveat(s)	» Quotas are tradable and market speculation exists, which result in inflated quota (and boat) prices » Consolidation occurred, with a lower number of boats
References	47, 48, 49 Ian Kinsey, Fish harvester, Norway.

17. SENEGAL INDIVIDUAL QUOTAS



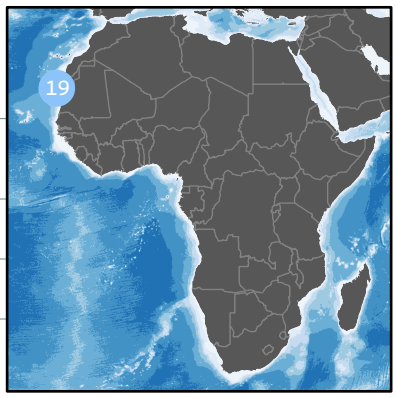
Example	Shrimp group quota for all shrimpers, limited membership
What method?	Individual quotas with variable levels of transferability
Where?	Senegal — Dakar cooperative
What happens?	Shrimp trawl fishermen qualify for a percentage of the overall TAC of shrimp, and are all members of the local management organization. Allocations are valid for a period of 15 years. After 5 years, however, the government charges an independent party with evaluating the use of the quota by the members. Members can either sell or transfer their individual quota within the organization. Concentration is prevented at two levels, first only active trawl fishermen can qualify, second, the Ministry of Fisheries sets licence fees to avoid inflation and buy-ups. The management organization keeps track of the transfers between its members. It is the management organization's responsibility to check that individual catches do not exceed individual quotas. Management fees constitute 5% of the revenue of the fishery.
Who is impacted?	Around 24 shrimp trawlers all flagged to Senegal
For how long?	Since 2015
Impact(s)	» Socio economic impacts not yet evaluated, however the fishery is believed to generate 111,800 kg of shrimp annually » The fishery is reserved for domestic operators only
Values achieved	» Increased sense of stewardship and inclusiveness » The fishery is closely monitored
Caveat(s)	» The fishery has high discards (23%) and by-catch which are not accounted for. » New entrants have to buy quota to access the cooperative » Domestic can be defined as foreign vessels with a Senegalese flag whose beneficial ownership is foreign
References	[56] Dyhia Belhabib, Pers. Obs. An interviewee preferred to remain anonymous.

18. GROUNDFISH ITQ FISHERIES IN BRITISH COLUMBIA



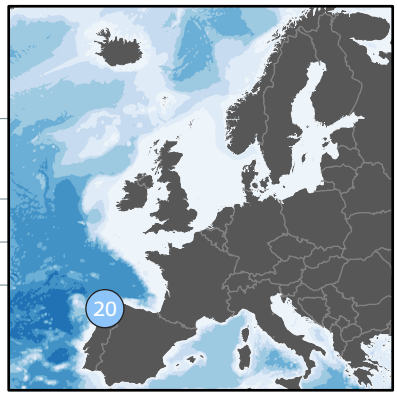
Example	Pacific integrated groundfish halibut fisheries: Individual Quotas with unlimited tradability
What method?	Individual Quotas with variable levels of transferability
Where?	British Columbia, Canada — Coastwide
What happens?	To operate, a vessel must hold a quota for the relevant species (halibut, hake, pacific cod, lingcod, dogfish, rockfish, and sablefish). First generation fishermen received quotas based on their catch history. These quotas can be leased, traded, and sold with any person, or company, in Canada, or from elsewhere. In addition to quota, fishermen must have a valid licence attached to the vessel. In the case of the halibut fishery, a halibut licence is entitled to fish for schedule II species (lingcod, dogfish). While the number of permanent quota transfers is declining, there is a high level of quota leasing. The fishery is regulated by output controls in addition to vessel length restrictions, catch size and seasonal closures. Bycatch restrictions apply.
Who is impacted?	There are over 340 halibut licences in British Columbia
For how long?	Halibut quota fully implemented in 1993
Impact(s)	» The fishery is worth around $70 million in landed value, and over $900 million in asset value (quota and licences)
Values achieved	» Consolidation of the fishing fleet » Increased catch per unit of effort » Higher predictability of the catch » Addresses the issue of the race to fish in the water » Continued (but slow) increase in halibut biomass
Caveat(s)	The absence of owner operator rules has resulted in corporations increasingly taking control over fishing access. DFO's no bycatch with no quota policy contradicts the Fisheries Act which prohibits discarding in Canadian waters.
References	4, 24, 26, 32, 57, 58, 59 An interviewee preferred to remain anonymous.

19. BANC D'ARGUIN NATIONAL PARK, MAURITANIA



Example	Small traditional sail boats only fish within the MPA
What method?	Fishery within MPA
Where?	Banc d'Arguin, Mauritania
What happens?	The *Imraguen* people, an ethnic group who primarily live in the National Park, have exclusive rights over the park's fisheries. They are small scale fishermen who operate sail boats and target mullets. New fishermen can enter the fishery if they become a member of the *Imraguen* community. The MPA is associated with a tremendous surveillance effort by the government of Mauritania. » It is completely prohibited to fish individually. » The *Imraguen* adopted traditional fishing concessions, or TURFs, accompanied by buffer zones. Conflicts with neighboring villages are minimized. » The fishing season is organized such as 6 days of no fishing are followed by 8 to 10 days of fishing. During southern migrations of mullet, *Imraguen* close the fishing season.
Who is impacted?	There are around 1,500 fishermen in the Park, and the fleet is not motorized.
For how long?	Since 1980
Impact(s)	Around 2,000 fishermen and their communities
Values achieved	» Traditional and cultural values are maintained » Mullet stocks have rebuilt » Fishermen have a strong sense of stewardship
Caveat(s)	Socio-economic issues continue to prevail despite the MPA being effective in providing livelihoods to people and rebuilding fish stocks.
References	[60] Dyhia Belhabib, pers. observ.

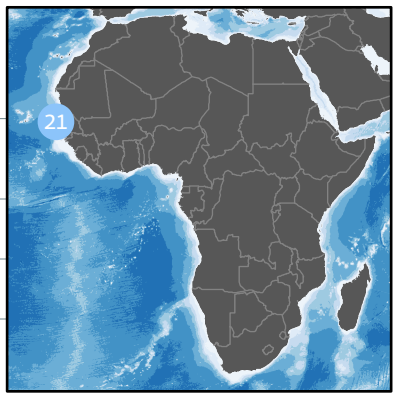
20. GALICIA, SPAIN



Example	Fishery operates in an MPA, limited by a TAC distributed to members as IQs, co-managed
What method?	Fishery within MPA
Where?	Galicia, Spain
What happens?	Exploitation of sedentary species is granted to local *cofradía* — organizations of fishermen's representatives with legal jurisdiction in an MPA. Fisheries are small scale and target sedentary species. The system is based on co-management and voluntary measures, and cofradías have to develop their management plan. These specify controls on fishing mortality, which include daily allowable catch limits for each fisherman and the expected total catch per year. The expected total catch is based on historical catch data and information generated by on-site ecologists, and is not permitted to exceed the catch from the previous year by more than 10%. Cofradías may also implement rotational harvests by designating fishing zones within the TURF and rotating harvests through the season. Typically, anyone who lives in the area can join upon paying membership fees. Each cofradía manages the resources within its TURF. Inclusion of on-site ecologists help technical and scientific monitoring.
Who is impacted?	3500 boat fishers and 5000 women gleaners (foot fishers) in Galicia
For how long?	The cooperative, the MPA, and the territorial rights were secured in 1992
Impact(s)	» Over 150 million euros in shellfish catches, and have increased since the early 1990s
Values achieved	» Benefits maintained to local communities » Localized fishing activity » Improved productivity of some fisheries » Improved compliance and reduced illegal fishing » Higher ability to negotiate prices on the market » Increase trust between fishermen and government, conflict resolution » Higher degree of organization and mutual commitment » Stock of goose barnacles improved
Caveat(s)	» Political challenges as the MPA is threatened each time there is an election year
References	61, 62, 63 Michèle Mesmain, Slow Fish

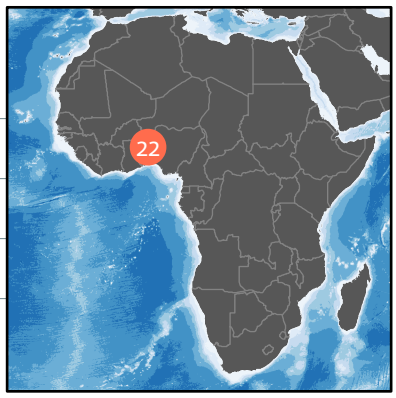
> The approach was based on key steps: first fishermen come up with management plans and options, then they take them to scientists who analyze them, and provide the best option, and then fishermen take the management plan to the government.
>
> *- Michèle Mesmain, Slow Fish*

21. NGAPAROU FISHING COMMUNITY IN SENEGAL



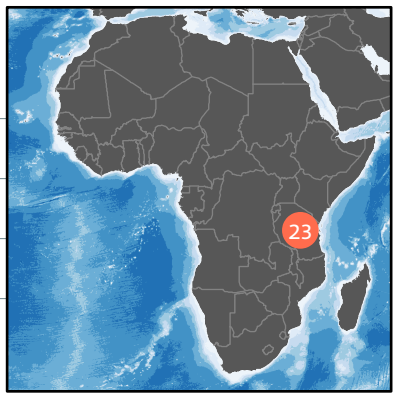
Example	Small-scale fishery operates at various levels within MPA
What method?	Fishery within MPA
Where?	Ngaparou, Thies, Senegal
What happens?	Small scale fishermen (multiple targets and gears) organized into a local fishing committee (CLP). Co-management initiatives are first identified at the CLP, then reviewed with local village councils, and finally validated by the local council of artisanal fisheries (CLPA), governing bodies created with the help of the World Bank. Protection zones (non-fishing), fishing zones, regulated zones, and recreational zones are delimited. The number of nets per boat is capped at 20. The community also monitors the area, and sanctions through confiscation of fishing gear until a fine is paid. This comes in addition to existing regulations on fish size, gear types, fishing areas and seasons, etc.
Who is impacted?	A fishing community of 6,000 people
For how long?	Since 2014
Impact(s)	» Size of the catch increased by 42% for rock lobsters in 5 years » CPUE increased by 133% » Increased in demersal species abundance and juvenile fish within the MPA » Community witnessed a return in fish schools
Values achieved	» Increased sense of pride and stewardship
Caveat(s)	» This system failed in all other provinces of Senegal because it did not take into account other local realities, such as existing traditional organizations. » Fishermen monitoring the fishery risk their lives daily, and their relationships with the community, and have no legal status.
References	[60] http://www.worldbank.org/en/news/feature/2014/09/15/in-senegal-fishermen-come-together-to-fish-smarter-and-more-sustainably [Accessed May 2018] Dyhia Belhabib, pers. observ.

22. BENIN TRADITIONAL MANAGEMENT SYSTEM



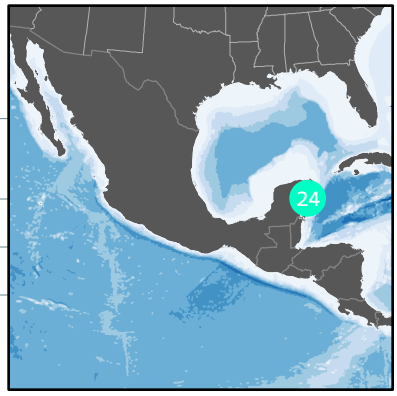
Example	Voodoo animist belief system
What method?	Traditional system
Where?	Benin
What happens?	The fisheries management system of small scale coastal fisheries (multi-gear, multi-species) built around animist beliefs ('Voodoo') and local fisheries knowledge. Violation of fisheries regulations set up by villages is considered a sacrilege. Voodoo sanctions range from fines and confiscation of fishing gear to public flagellation, and the destruction of the house of the offender replaced the death sentence. Measures to prevent overfishing, and to allow fish to reproduce, include prohibiting breastfeeding women and menstruating women from approaching the water and "quotas," traditionally defined by the customs of the two ethnic groups *Houedah* and the *Xwlâ*. Although they have no scientific basis, and are based exclusively on tradition, these quotas are believed to be efficient when combined with some of the remaining traditional management measures. Other management measures include fishing bans, release of bycatch, and a weekly fishing ban on the sea deities' feast day.
Who is impacted?	Around 6,000 fishermen in 34 villages
For how long?	Traditional and historic
Impact(s)	» High compliance with the system
Values achieved	» Respect and preservation of traditional knowledge » Access remains strongly within communities » Unsustainable fishery practices effectively banned » Intergenerational values preserved
Caveat(s)	» A new community committee modern system was implemented which divided management into two separate spheres
References	[64] Dyhia Belhabib, pers. observ.

23. TANZANIA TRADITIONAL MANAGEMENT



Example	Religion driven system
What method?	Traditional system
Where?	Tanzania
What happens?	Management of the small-scale fishery (multi-gear, multispecies). Tanzania relies on multiple cultural taboos, including restrictions on eating certain species of fish, fishing before bathing, fishing after having sex, allowing menstruating women (who are considered impure) to fish, and fishing during strong winds and heavy rains. Whenever a fisherman is lost at sea, all fishing activities stop until he is found. In some fishing communities, fishermen cancel fishing activities if one among them inadvertently mentions a name of a terrestrial animal. If a fisher is identified by others as having consumed alcohol, he is dropped off to avoid misfortune. It is prohibited to fish on Fridays, during wedding ceremonies, on election days, during neap tides, and to pursue dive fishing during the fasting month. Some fishers cancel fishing activities if, when going out to fish or check nets/traps, they meet with one person. This is believed as a bad omen on that day as nothing will be caught. It is considered a lucky sign to meet with two or more people when a fisher goes out fishing. If a fisherman receives payment for fish in advance, he may cancel the fishing activities on that day. There are many other taboos, and these have contributed for centuries to keep oversight and control of fisheries.
Who is impacted?	Around 80% of coastal village households rely on fishing, with on average 3,800 people per village.
For how long?	Traditional and historic
Impact(s)	*Unknown*
Values achieved	» Respect and preservation of traditional knowledge » Access remains strongly within communities » Unsustainable fishery practices effectively banned » Intergenerational values preserved
Caveat(s)	Lack of recognition of system by authorities
References	65, 66

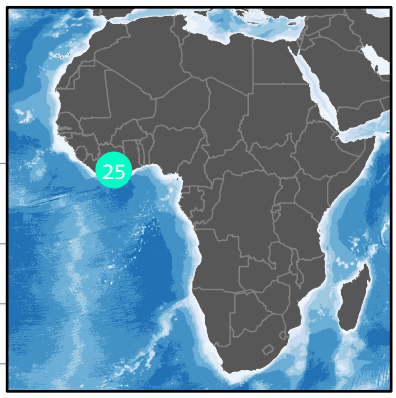
24. PUNTA ALLEN, MEXICO



Example	Vigia Chico Fishing Cooperative: TURFs with co-management of effort
What method?	Territorial Use Right Fishery (TURF)
Where?	Punta Allen, Mexico
What happens?	Fishermen from *Vigia Chico* Fishing Cooperative harvest lobster using artificial shelters or *casitas*. Each member is responsible for a plot or *campos* of 25 m with no-take buffer areas between each within the concession. The community regulates the number of *casitas*. Federal regulations include an annual four-month closure, restrictions on the type of fishing gear, a minimum size limit, and zero retention of female lobsters carrying eggs. Cooperative regulations include seasonal closures, minimum legal size, and prohibition of egg bearing females. Only Cooperative members are permitted to harvest spiny lobster in the TURF. Leasing is not allowed, though *campos* are transferable among Cooperative members on both a temporary and permanent basis.
Who is impacted?	Around 500 people in the community with 80 fishermen and 55 small fishing boats.
For how long?	Since 1968
Impact(s)	» Around 100,000 kg in annual catches
Values achieved	» Access stays with the community » Intergenerational values perpetuated as access is inheritable » Elders who exit the fishery put money aside for retirement, and hence no armchair fishermen » The fishery is MSC certified
Caveat(s)	*Not available*
References	[67] Andres Cisneros, NEREUS Project, University of British Columbia; Silvia Salas, Centre for Research and Advanced Studies of the National Polytechnic Institute, Mexico; Eloy Sosa, Research Associate, Department of Systematics and Aquatic Ecology, ECOSUR http://ecotippingpoints.org/our-stories/indepth/mexico-quintana-roo-vigia-chico.html [Accessed May 2018]

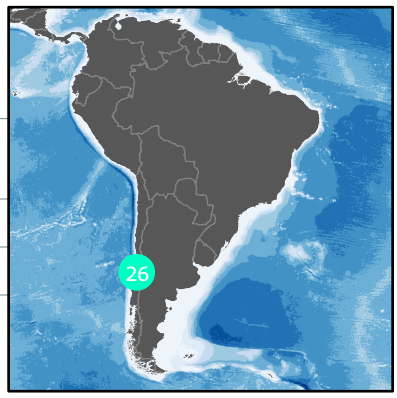
> It is not easy to be admitted in one fishing cooperative, moreover on those fishing for lobsters. There are a variable number of temporal workers (called “aspirantes”), they are not stable workers and mostly work only during the more productive months. Also, in any cooperative the number of boats is restricted, since almost two decades it is practically impossible to get a permission to introduce additional boats (only the old boats can be replaced for a new one).
>
> *- Eloy Sosa, Research Associate, Department of Systematics and Aquatic Ecology, ECOSUR*

25. GRAND LAHOU AND ABY LAGOONS, COTE D'IVOIRE



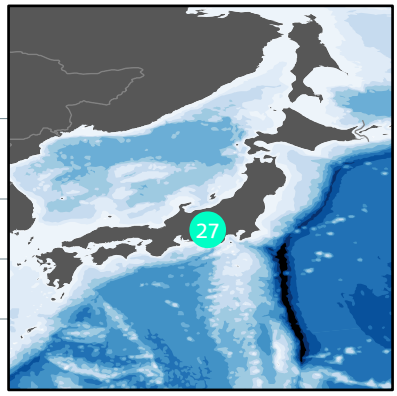
Example	Individual concessions within a traditional management system
What method?	Territorial Use Right Fishery (TURF)
Where?	Grand Lahou and Aby Lagoons
What happens?	System aimed at controlling and managing lagoon fisheries. Fishing access is controlled by village authorities where each fisherman pays fees to access the village resource. Fishing is prohibited one day a week, and some areas are closed. Almost all purse-seining is banned. Villages have management discretion. Rights are not transferable once distributed, which limits loopholes of outsider fishing. Management revolves around 1) control of access to the fisheries through concessions, 2) control of fishing effort and fishing techniques and gear, and 3) control over some processing and commercialization organizations. Some families traditionally passed TURFs through generations. All fishers have to pay 2/3 of their profits to the owner of the TURF (or the village).
Who is impacted?	Villages around Grand Lahou and Aby Lagoons (over 2,000 fishermen)
For how long?	Historic and traditional systems
Impact(s)	» No speculative quota prices » Higher ex-vessel prices » Added value captured by communities (villages)
Values achieved	» Reduced over-exploitation » Added value captured by villages » Local access to the resource is kept while the system guarantees that new entries for outsiders are strictly controlled by local authorities » Tradition and local knowledge well preserved
Caveat(s)	» Young generation contests rent distribution on villagers » Lack of proper definition of TURFs, generating conflicts of usage » Ill-defined quota sharing system
References	68, 69 Dyhia Belhabib, pers. observ.

26. CHILE'S TERRITORIAL USE RIGHT FISHERIES



Example	Chilean TURFs with co-management of catch
What method?	Territorial Use Right Fishery (TURF)
Where?	Chilean coast
What happens?	Exclusive harvest rights (tenure 2–4 years) over benthic resources over grounds immediately adjacent to those exploited historically by the "*Caletas*" were provided to the communities therein and their artisanal fishermen. Each TURF is divided into spatial units, managed locally but constrained by a TAC. A group of licenced artisanal fishermen has then access to the TURF. A vessel loses the licence when transferred to a person that is not a registered artisanal fisherman, and artisanal fisherman of the central and northern zones are entitled to priority access to the coastal zone. Access cannot be leased. Informal stock rebuilding activities take place such as protective closures, protection of nursery grounds, removal of predators and competitors, translocations and manipulation of species upon which the Chilean abalone (*Concholepas concholepas*) preys — key TURF species. Chilean TURFs were introduced after the failure of ITQs.
Who is impacted?	Program targets 17,000 artisanal fishermen managing 550 areas covering 100,000 ha. TURFs range in size from 25 to 900 fishermen, for 66 species. System builds on historically important harvester communities.
For how long?	Program implemented since 1991
Impact(s)	» No cost to acquire quota » Concentration outside communities inexistent » Increased landings by 5-fold in 10 years » Added value captured by the community » Increased ex-vessel price, increased catch per boat, and reduced debt » Target species maintained at biologically sustainable limits
Values achieved	» Strong sense of ownership » Increased flexibility of fishing operations and price for fishermen » Increased access to adjacent resources for artisanal fishermen
Caveat(s)	» Governance system and implementation not well functioning and allocations are disputed » Newcomers have to work without pay for 6 months to become eligible » Encourages self-empowerment and self-governance to solve fisheries problems
References	28, 70, 71, 72 Michèle Mesmain, Slow Fish. http://fisherysolutionscenter.edf.org/design-stories/chilean-national-benthic-resources-territorial-use-rights-fishing-program [Accessed May 2018]

27. JAPAN'S TERRITORIAL USE RIGHT FISHERIES



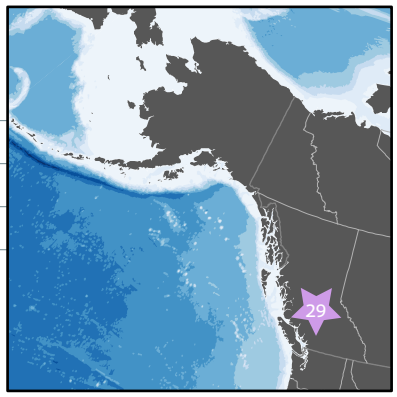
Example	Japanese TURFs with co-management of effort
What method?	TURFs with strong history and tradition
Where?	Japan
What happens?	Exclusive access rights are granted to well-defined groups of fishermen (various gears and target species) associated with local fishermen's cooperatives. Fishermen self-manage the fishery by implementing various strategies generally guided by overarching federal-level constraints and targets. Each TURF has a number of Fishery Management Organizations (FMO), each of which has developed its own practices that fit local conditions, the make-up of the group of users, and historical pre-conditions. TURFs are hence managed locally but constrained by a total allowable catch (TAC). Rotation rules among fishermen exist. Income pooling systems apply. Migratory species are managed through TURFs. Fishing rights cannot be sold, swapped, borrowed, or leased.
Who is impacted?	Fishermen grouped in 1,738 FMOs throughout coastal Japan
For how long?	Historic (legislated in 1901)
Impact(s)	» Community revenue increases range from 61% to 567% reaching $70 million US in one TURF (Hokkaido). » Price per tonne of fish increases range between 155% and 724% since the mid-1990s
Values achieved	» Consolidation outside community is inexistent » Strong sense of stewardship with over 1,000 MPAs created by members
Caveat(s)	» Pollution results in declining jobs, landings, and boats » Entry is difficult for new members
References	33, 73, 74 Shio Segi, NEREUS Program, University of British Columbia "Who Owns the Sea" Masayuki Komatsu, 2016

28. TAXI CAB INDUSTRY IN TORONTO, CANADA

Example	Toronto's taxi cab limited licensing
What method?	Limited licensing with owner operator provisions
Where?	Toronto
What happens?	In Toronto, licence owners are directly involved in business; without intermediates, all participants are accountable. Licence transferability is not permitted. New entrants must wait for the city to issue or re-issue a licence. Owner-operated licences have a minimum number of operating hours. Licences cannot be leased, but shift drivers are permitted. Licences are transferable under certain conditions (24 cumulative months of exemption/reduction from owner minimum driving hours, 24-hour operation, wheelchair accessible vehicles, and affiliation with a brokerage).
Who is impacted?	A population of over 4,800 taxicabs, and 10,400 drivers
For how long?	Partially since 2003
Impact(s)	» The Taxicab industry generates $1.6 million daily
Values achieved	» Operating stages are minimized » System creates affordable fares » System improves customer service » Drivers' working conditions and public safety are enhanced
Caveat(s)	» Owner operator provisions introduced to entire Toronto taxi fleet in 2013, with a lot of controversy » The Vehicle-for-Hire bylaw, which came into effect in July 2016, changed the City's approach to regulation within the ground transportation industry and is currently under review
References	https://www.toronto.ca/services-payments/permits-licenses-bylaws/taxis/taxi-owners/ [Accessed May 2018]

> We need to rethink our housing system if we are to maintain options for the next generation of households and families and remain a competitive and prosperous city and region.
>
> *- City of Vancouver*

29. VANCOUVER REAL ESTATE MARKET, CANADA



Example	Vancouver real estate market
What method?	Urban open housing market
Where?	Vancouver
What happens?	Government policy intervention, at different scales, to achieve social and economic objectives. LIMITING FOREIGN OWNERSHIP *By the City of Vancouver* » Canada's first empty home tax (1%) *By the Province of BC* » A 15% property transfer tax on foreign national home buyers was implemented in August 2016 — Those arriving under the immigration Canada's nominee program are exempt (Province of BC regulation) NEW ENTRANTS *By the Province of BC* » Subsidy to new home buyers » Full or partial exemption on the amount of property transfer tax for first time home buyers » Interest free loan for first time buyers matching the amount the buyer has saved up to $37,500 AFFORDABILITY *By the City of Vancouver* » Developed framework for lease negotiations » Vancouver's first "community Land Trust" » Developed Rental Standards database » Creation and authorization of new developments » Mayoral Task Force on Housing Affordability » New regulations on Airbnb to offer more long term renting supply
Who is impacted?	Foreign buyers (overwhelmingly from China) purchased 5% of the home sold around Vancouver, spending $400,000 more than a typical Canadian. This rate ranges between 3% in Victoria to 14% in Richmond.
For how long?	Not available — no hard line
Impact(s)	» Vancouver home prices dropped after July 2016
Caveat(s)	» Houses being built are exempt from the foreign ownership tax
References	http://www.theglobeandmail.com/real-estate/the-market/has-vancouver-home-affordability-actually-improved/article34796026/ http://globalnews.ca/news/3201112/bc-foreign-buyers-tax-vancouver-home-prices/ http://vancouver.ca/home-property-development/empty-homes-tax.aspx http://www2.gov.bc.ca/gov/content/taxes/property-taxes/property-transfer-tax/understand/first-time-home-buyers http://www.theglobeandmail.com/news/bc-government-releases-preliminary-data-on-foreign-home-purchases/article30790277/ http://council.vancouver.ca/20170328/documents/rr1.pdf [Accessed May 2018]

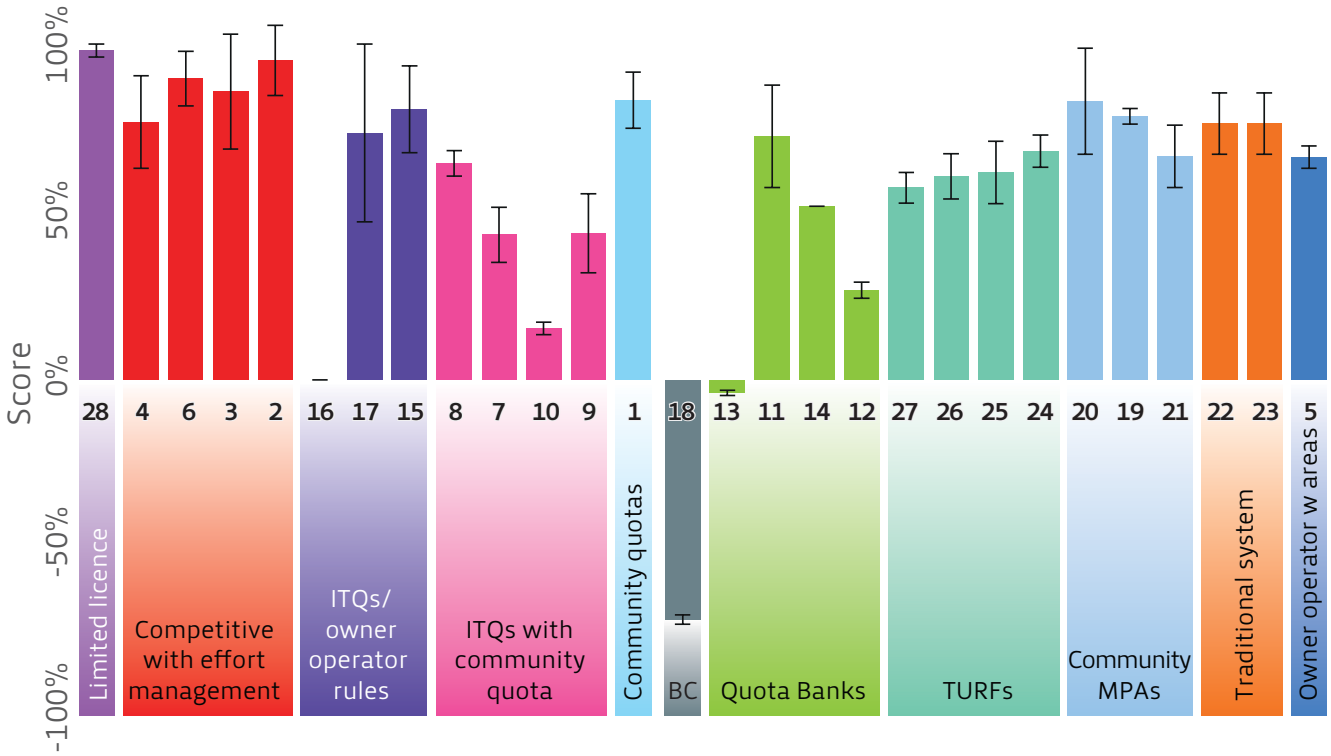
APPENDIX 4: LIST OF INTERVIEWEES

COUNTRY	FISHERY	INTERVIEWEE	POSITION
Netherlands	Small scale eel fisheries	Arjan Heiner	Marine biologist, Small Scale Fisheries Federation
Japan	Nationwide TURFs	Yoshi Ota	Policy Director, NEREUS Project, University of British Columbia
Japan	Nationwide TURFs	Shio Segi	Post-Doctoral Fellow, NEREUS project, University of British Columbia
Iceland	Quota fisheries	Anna Karlsdottir	Iceland University
Norway	Community quotas	Ian Kinsey	Fish Harvester
Senegal	Small scale lobster fisheries	Dyhia Belhabib, local knowledge	Program Manager, Fisheries, Ecotrust Canada
Benin	Traditional management system	Dyhia Belhabib, local knowledge	Program Manager, Fisheries, Ecotrust Canada
Mauritania	Imraguen fishery	Dyhia Belhabib, local knowledge	Program Manager, Fisheries, Ecotrust Canada
Côte d'Ivoire	Coastal management system	Dyhia Belhabib, local knowledge	Program Manager, Fisheries, Ecotrust Canada
Sweden	Small fleet concessions	Ida Wingren	Department of Service Management and Service Studies, Lund University
Mexico	Punta Allan lobster concessions	Andres Cisneros	Research Associate, NEREUS Project University of British Columbia
Mexico	Punta Allan lobster concessions	Silvia Salas	Professor, Center for Research and Advanced Studies of the National Polytechnic Institute, Mexico
Mexico	Punta Allan lobster concessions	Eloy Sosa	Research Associate, Department of Systematics and Aquatic Ecology, ECOSUR
France	Prud'homies	Michèle Mesmain	SlowFish
Scotland	Shetland crab fisheries	Beth Mouat	Joint Head of Marine Science & Technology, NAFC Marine Centre, Shetland, Scotland
Canada	Atlantic Canada crab and lobster fisheries	Kevin Squires	Fish Harvester, Nova Scotia
Canada	Atlantic Canada snow Crab fishery (area 19)	Gordon Beaton	Fish Harvester, Nova Scotia area 19
United States	Alaska CDQ fisheries	Keith Criddle	Professor, College of Fisheries and Ocean Sciences, University of Alaska Fairbanks
United States	Maine fisheries	Brett Tolley	Northwest Atlantic Marine Alliance (NAMA)

APPENDIX 5: UNCERTAINTY ANALYSIS OF SCORING METHODS

We used 44 indicators to assess the performance of each fisheries management case. We first conducted a literature review to populate information for each indicator, then discussed the results with local experts and fish harvesters. These discussions provided a ground-truthing element for the analysis, and filled in some gaps, notably on the intangible values, history, and governance aspects. However, information was not available for all indicators, hence, it became necessary to assess the uncertainty related to the unassessed indicators. We counted the number of "black boxes", i.e. indicators for which no information was available under each management case as "x", we then calculated the maximum score that "+x" could add, and the minimum score "-x" could reduce. We used a Monte Carlo approach to randomize the result, where each unscored indicator receives a random score value and then calculated the confidence interval ($p<0.05$). This exercise reveals that high-ranking management cases, when significant information on indicators is not available, are bound with higher uncertainty. Hence, as we conduct the analysis, we stress that top ranking scenarios must have a high score and a low uncertainty associated with that score (Appendix 5 Figure 1).

Appendix 5 Figure 1. Scoring and uncertainty analysis of management scenarios.



APPENDIX 6: SCORING DETAILS PER INDICATOR

MEASURE[iii]	POSITIVE	NEGATIVE
Fishing Effort		
Number of vessels	Number of small-scale vessels increased and large-scale vessles decreased[i]	Number of industrial vessels increased while small-scale vessels declined[ii]
Fleet presence at sea	Increased participation of active fleets and/or number of days at sea[i]	Decreased participation of active fleets and/or number of days at sea[ii]
Fishing costs		
Operating costs	Decrease in operating costs	Increase in operating costs
Burden of quota cost	Decreased pressure on fishermen and crews to pay off quota costs	Increased pressure on fishermen and crews to pay off quota costs
Inflation of cost to lease/buy access	Cost of access remains controlled or declined	Cost of access increased beyond reasonable limits
Additional capital costs	Capital costs decreased	Capital costs increased
Costs of monitoring to fish harvesters/ community	Cost of monitoring decreased	Cost of monitoring increased
Economic efficiency and market opportunities		
Landings	Landings have increased[i]	Landings have decreased[i]
Size of fish	Size of the fish increased	Size of the fish decreased
Price of fish	Ex-vessel price increased	Ex-vessel price decreased
Ability to negotiatie price	Fish harvester's share of the price increased - and/or dependence upon one single buyer decreased	Fish harvester's share of the price increased - and/or dependence upon one single buyer increased
Crew and skipper's income	Crew and skipper's income increased	Crew and skipper's income decreased
Catch per Unit of Effort (CPUE)	CPUE increased	CPUE decreased
Community added value	Community added value increased (e.g. processing activities)	Community added value decreased

i Within the limits of stock sustainability
ii But not because of fish stock pressure
iii Neutral score means that the management system did not result in a change in the indicator, and unknown means that we could not retrace a change due to the management system for that indicator

Fairness of market		
Absence of control by armchair fish harvesters	No control by armchair fish harvesters	Existance of control by armchair fish harvesters
Abscence of market speculation	No or low market speculation on access costs	Existance or increased market speculation on access costs
Fair lending practices	Lending practices are fair	Lending practices are predatory
Quota diluted	Dilution of quota - fair distribution of quota	Concentration of quota within the wealthiest
Certainty and risk of economic activity		
Predictability of catch	Catch is predictable and does not vary extensively over time	Catch is not predictable and varies exensively over time
Predictability of quota price	Quota price is predictable	Quota price is not predictable and incresed disproportionately
Feeling of certainty or security	Fish harvesters feel secure in their fishing venture after they pay access cost	Fish harvesters feel stressed, constrained to go fishing because of excessive access costs they have to cover
Security /safety at sea		
Quality of boats	Maintained or improved ability of boats to operate safely	Ability of boats to operate safely is reduced as other fishing costs increase
Crew quality	Experience, education, and knowledge of crew maintained or improved	Experience, education, and knowledge of crew reduced
Fatalities and injuries at sea	Fatalities and injuries at sea decreased	Fatalities and injuries at sea increased
Exposure to risk at sea	Fishing operations in safe conditions	Fishing operations in risky conditions as fish harvesters fee constrained to go fishing
Social values		
Freedom as a business owner	Freedom to operate without (corporate) pressure	Fish harvesters constrained in their businesses by corporate interests
Relationship between fish harvesters	Relationship between fish harvesters improved or incentivized	Relationship between fish harvesters reduced or negatively affected
Fishery kept within the community	Community access to the fishery and its value maintained or increased	Community access to the fishery and its value reduced
Easiness of succession or new entrants	Increased fair and easy access to new entrants[i]	Increased unfair barriars to entry
Employment	Stable or increasing employment	Decreasing employment

Governance values		
Trust in top-down programs	Maintained or increased trust in top-down programs and/or increased cooperation with government	Decreased trust in top-down programs and/or increased cooperation with government
Existance of sustainable community programs	Effective community programs exist, increased, and/or favoured	Community programs do not exist, undermined, and/or disincentivized
Intangible values		
Lifestyle	Lifestyle related to fishing maintained or improved	Lifestyle related to fishing reduced
Stewardship	Participation in sustainability increased	Participation in sustainability decreased, and/or sense of stewardship lost
Networks	Network between fish harvesters and community improved	Network between fish harvesters and community declined
Sense of pride	Sense of pride as a fish harvester increased	Sense of pride as a fish harvester decreased
Intergenerational succession	Intergenerational succession easy and fair	Intergenerational succession made difficult, and/or lost
Education	Value increased	Value decreased
Culture and tradition	Sense of culture and tradition maintained or increased	Sense of culture and tradition decreased
Spiritual values	Spiritual values maintained	Spiritual values decreased
Gifting and trading of seafood	Gifting and trading of seafood maintained or increased	Gifting and trading of seafood decreased
General anxiety	General anxiety reduced	General anxiety over access to fisheries increased
Fish stock health		
Fish stock status	Fish stocks are rebuilding or maintained at sustainable levels	Fish stocks are over-exploited, and/or maintained at low levels
Addressing overfishing	Overfishing is addressed	Overfishing continues

APPENDIX 7: MORE ON THE AUTHORS AND THIS STUDY

Both Ecotrust Canada and TBuck Suzuki grew out of a period of environmental activism in Canada and share a strong social justice orientation, choosing to focus our efforts on initiatives that will achieve a more equitable distribution of benefits in the political, economic, and social realms of Canadian society.

Over the past 15 years, Ecotrust Canada and TBuck have been bringing our collective wisdom and experience together to analyse critical issues affecting the marine and fisheries sectors. In 2004, Ecotrust Canada published Catch-22: Conservation, Communities and the Privatization of BC Fisheries. This report investigated the economic, social, and ecological impacts of federal fisheries licensing policy, particularly the use of individual transferable quotas (ITQs). In 2009, Ecotrust Canada released A Cautionary Tale, describing eight lessons to be learned from BC's experience with ITQ fisheries. Both reports raised questions and cautions about how ITQs are designed, managed, and implemented.

Meanwhile, with offshore fisheries intercepting valuable BC salmon, BC fishermen supported the development of the UN Convention on the Law of the Sea to protect access for adjacent communities and fishermen. TBuck further supported Canada's 1997 Oceans Act and 2005 Oceans Strategy, and endorsed integrated (ecosystem-based) management in a variety of forums including: the West Coast Aquatic Management Board (2012), the Marine Planning Partnership (2015), and the Pacific North Coast Integrated Management Area initiative (2017).

In 2013, Ecotrust Canada and TBuck jointly published the report Understanding Values in Canada's North Pacific, identifying the full spectrum of tangible and intangible values that fisheries contribute to the survival and well-being of BC's smaller communities, including First Nations whose territories are situated on the coast or up river. The report highlighted the need to incorporate a broader suite of values in fisheries management policies and approaches to address the challenges facing the fishing industry and the communities that depend on it. In 2015, we co-published Caught up in Catch Shares, which updated quantitative and qualitative evidence on the impacts that catch share policies and practices have had on west coast fisheries, fishermen, and fishing communities. With each of these publications, our objective has been two-fold:

- To demonstrate how current fisheries management policies in BC are effectively undermining the incredible social-economic opportunities which our fisheries resource can (and once did) provide; and
- To provide evidence that the sea's bounty can be managed sustainably in a manner that enables it to be a source of healthy local food, a key contributor to our economy, a cultural foundation, a provider of rewarding employment, and a critical link with our shared natural environment.

This latest report continues in pursuit of these objectives by offering new analysis on alternative fisheries systems around the world today (including BC's ITQ system), and by examining what they have to teach us. This research has been structured around a comprehensive review of 28 cases of fishery management regimes, assessed against 44 indicators for success. Our intention is that by learning from these time-tested fisheries, and deploying those lessons across Canada, and specifically in BC, there are tangible and practical changes that can be made to realize sustainable fisheries — fisheries that can better achieve the mandate of the Canadian Government and improve social, economic, and environmental outcomes for fish harvesters, fishing communities, and Canadians at large. As with our previous reports, we are hopeful that this work will inspire new thinking, innovation, and action by both industry and governments to realize the true value of our marine resources and protect their sustainability for future generations.

REFERENCES

1. City of Vancouver. *Housing reset engagement summary.* 119 (City of Vancouver, Housing Vancouver, 2017).
2. Fisheries and Oceans Canada. *2017-2018 Departmental Plan.* 69 (2018).
3. Government of Canada. *Fisheries Act: R.S.C., 1985, c. F-14.* 69 (Government of Canada, 1985).
4. Robertson, A. et al. *Caught up in catch shares.* 61 (Ecotrust Canada and T. Buck Suzuki Foundation, 2015).
5. Fisheries and Oceans Canada. *Preserving the Independence of the Inshore Fleet in Canada's Atlantic Fisheries (PIIFCAF).* (Department of Fisheries and Oceans Canada, 2014).
6. O'Donnell, K. *et al. Understanding values in Canada's North Pacific: Capturing values from commercial fisheries.* 102 (Ecotrust Canada and T. Buck Suzuki Foundation, 2013).
7. Williams, R. *Fisheries Seasonality and the Allocation of Labour and Skills Labour Market Information Study.* (Canadian Council of Professional Fish Harvesters, In Press).
8. Ecotrust Canada. *Catch-22: Conservation, communities and the privatization of B.C. fisheries, and economic, social and ecological impact study.* 47 (Ecotrust Canada, 2004).
9. Brashares, J. S. et al. Wildlife decline and social conflict. *Science* 345, 376–378 (2014).
10. Short, J. F. Poverty, Ethnicity, and Crime: Change and Continuity in U.S. Cities. *J. Res. Crime Delinquency* 28, 501–518 (1991).
11. Sanchez, A. *U.S. Southcom vs. Caribbean Narco-pirates.* (Center for International Maritime Security, 2015).
12. Utas, M. *African conflicts and Informal Power: Big Men and Networks.* (Nordiska Afrikainstitutet; Zed Books, 2012).
13. BC Coroners Service. *Suicide Deaths in BC 2006-2016.* 9 (BC Coroners Service, 2016).
14. Robinson Consulting and Associates Ltd. *Socio-economic Cultural Overview and Assessment Report for the Pacific North Coast Integrated Management Area.* 230 (Robinson Consulting and Associates, 2012).
15. Birkenbach, A. M., Kaczan, D. J. & Smith, M. D. Catch shares slow the race to fish. *Nature* 544, 223–226 (2017).
16. Costello, C., Gaines, S. D. & Lynham, J. Can Catch Shares Prevent Fisheries Collapse? *Science* 321, 1678–1681 (2008).
17. Haas, A., Edwards, D.N. and Sumaila, U.R. Corporate concentration and processor control: Insights from the salmon and herring fisheries in British Columbia. *Marine Policy* 68, 83–90 (2016).
18. Wilen, J.E., Cancino, J., Uchida, H. The economics of Territorial Use Rights Fisheries, or TURFs. *Review of Environmental Economics and Policy* 6(2):237-257 (2012).
19. Sumaila, R., U. A Cautionary Note on Individual Transferable Quotas. *Ecol. Soc.* 15, 36 (2010).
20. van Hoof, L. Design or pragmatic evolution: applying ITQs in EU fisheries management. *ICES J. Mar. Sci.* 70, 462–470 (2013).

21. Belhabib, D., Sumaila, U. R. & Pauly, D. Feeding the poor: Contribution of West African fisheries to employment and food security. *Ocean Coast. Manag.* 111, 72–81 (2015).

22. McCay, B. J. Social and ecological implciations of ITQs: an overview. *Ocean Coast. Manag.* 28, 3–22 (1995).

23. Olson, J. Understanding and contextualizing social impacts from the privatization of fisheries: An overview. *Ocean Coast. Manag.* 54, 353–363 (2011).

24. Essington, T. E. Ecological indicators display reduced variation in North American catch share fisheries. *PNAS* 107, 754–759 (2010).

25. Worm, B. et al. Rebuilding Global Fisheries. *Science* 325, 578–585 (2009).

26. GS Gislason & Associates Ltd. *Employment impacts of ITQ fisheries in Pacific Canada*. (2008).

27. Yandle, T. Whatever happened to the wreckfish fishery? An evaluation of the oldest finfish ITQ program in the United States. *Mar. Resour. Econ.* 30, 193 (2015).

28. Cancino, J. P., Uchida, H. & Wilen, J. E. TURFs and ITQs: Collective vs. Individual Decision Making. *Mar. Resour. Econ.* 22, 391–406 (2007).

29. Napier, I. R. *Development and management of cab fisheries in Shetland, Scotland. in Crab2001, crabs in cold water regions: biology, management, and economics*. 705–716 (Lowell Wakefield Fisheries Symposium Series, 2002).

30. Ceccaldi, H. J. *et al. Marine Productivity: Perturbations and Resilience of Socio-ecosystems: Proceedings of the 15th French-Japanese Oceanography Symposium*. (Springer, 2015).

31. Orensanz, J. M. L. What are the key elements for the sustainability of S-fisheries? Insights from South America. *Bull. Mar. Sci.* 76, 527–556 (2005).

32. Soliman, A. Using individual transferable quotas (ITQs) to acheive social policy objectives: a proposed intervention. *Mar. Policy* 45, 76–81 (2014).

33. Sweke, E. A., Kobayashi, Y., Makino, M. & Sakurai, Y. Comparative job satisfaction of fishers in northeast Hokkaido, Japan for coastal fisheries management and aquaculture development. *Ocean Coast. Manag.* 120, 170–179 (2016).

34. De Alessi, M. The Political Economy of Fishing Rights and Claims: The Maori Experience in New Zealand. *J. Agrar. Change* 12, 390–412 (2012).

35. Thériault, G., Hanlon, J. & Creed, L. *Report of the Maritime Lobster Panel*. 106 (Maritime Lobster Panel, 2013).

36. SeaFish. *Edible crab in Shetland inshore waters*. 10 (2017).

37. Brady, M. & Waldo, S. Fixing problems in fisheries — integrating ITQs, CBM and MPAs in management. *Mar. Policy* 33, 258–263 (2009).

38. Eggert, H. & Ulmestrand, M. *Tenure Rights and Stewardship of Marine Resources: A co-managed Swedish shrimp fishery in a marine reserve*. (University of Gothenburg, Department of Economics, 2007).

39. Brewer, J. Revisiting Maine's lobster commons: rescaling political subjects. *Int. J. Commons* 6. doi:10.18352/ijc.336 (2012).

40. Coombs, M. Lobstering and Common Pool Resource Management in Maine. *Grassroots Econ. Organ. GEO Newsl.* 2, 1–2 (2011).

41. Henry, A.M., Johnson, T.R. Understanding Social Resilience in the Maine Lobster Industry. *Mar. Coast. Fish.* 7, 33–43. (2015).

42. Kokorsch, M., Karlsdóttir, A., Benediktsson, K. Improving or overturning the ITQ system? Views of stakeholders in Icelandic fisheries. *Marit. Stud.* 14, 2–22 (2015).

43. Marchal, P., Andersen, J.L., Aranda, M., Fitzpatrick, M., Goti, L., Guyader, O., Haraldsson, G., Hatcher, A., Hegland, T.J., Le Floc'h, P., Macher, C., Malvarosa, L., Maravelias, C.D., Mardle, S., Murillas, A., Nielsen, J.R., Sabatella, R., Smith, A.D.M., Stokes, K., Thoegersen, T., Ulrich, C. A comparative review of fisheries management experiences in the European Union and in other countries worldwide: Iceland, Australia, and New Zealand. *Fish Fish.* 17, 803–824. (2016).

44. Quist, C. *Nurturing the eel: Inland fishers in The Netherlands participate in managing inland eel fisheries.* (International Collective in Support of Fishworkers, 2016).

45. Wingard, J. Community Transferable Quotas: Internalizing Externalities and Minimizing Social Impacts of Fisheries Management. *Hum. Organ.* 59, 48–57 (2000).

46. Waldo, S. et al. Swedish coastal herring fisheries in the wake of an ITQ system. *Mar. Policy* 38, 321–324 (2013).

47. Hannesson, R. Norway's experience with ITQs. *Soc. Cult. Impacts Mar. Fish.* 37, 264–269 (2013).

48. Nielsen, M., Flaaten, O. & Waldo, S. Management of and Economic Returns from Selected Fisheries in the Nordic Countries. *Mar. Resour. Econ.* 27, 65–88 (2012).

49. Hentiksen, E. *Norweigian coastal fisheries: An overview of the coastal fishing fleet of less than 21 meters.* 55 (NOFIMA, 2014).

50. Mincher, R. *New Zealand's Challenger Scallop Enhancement Company: from reseeding to self-governance.* 16 (Marine Resource Stakeholder Solutions, 2008).

51. DFO. R*eview of scotian Shelf snow crab assessment results for 2015.* 30 (Department of Fisheries and Oceans, 2016).

52. Risinger, B. *Effekterna av systemet med överlåtbara fiskerättigheter inom pelagiskt fiske. Rapport från ett regeringsuppdrag.* 32 (Havs- och vattenmyndigheten, 2014).

53. Venema, N. An overview of the Netherlands open sea and coastal fisheries: State of the art. *Fish. Cent. Res. Rep.* 9, 141–161 (2001).

54. DFO. *Area 19 snow crab Integrated Fisheries Management Plan 2005-2013.* 27 (Fisheries and Oceans Canada, 2005).

55. Loucks, L. *The evolution of the area 19 snow crab co-management agreement: understanding the inter-relationship between transaction costs, credible commitment and collective action.* 289 (Simon Fraser University, 2005).

56. DPM. *Plan d'aménagement de la pêcherie de crevettes profondes.* 56 (Direction des Pêches Maritimes, 2015).

57. Chu, C. Thirty years later: the global growth of ITQs and their influence on stock status in marine fisheries. *Fish and Fisheries.* 10, 217–230 (2009).

58. Dewees, C., M. Effects of individual quota systems on New Zealand and British Columbia fisheries. *Ecol. Appl.* 8, S133–S138 (1998).

59. Pinkerton, E. W. Local Fisheries Co-management: A Review of International Experiences and Their Implications for Salmon Management in British Columbia. *Can. J. Fish. Aquat. Sci.* 51, 2363–2378 (1994).

60. Bernardon, M. & Ould Mohamed Vall, M. *Le mulet en Mauritanie: biologie, écologie, pêche et aménagement*. 56 (Foundation International du Banc d'Arguin, 2013).

61. Frangoudes, K., Marugan-Pintos, B. & Pascual-Fernandez, J. J. From open access to co-governance and conservation: the case of women shellfish collectors in Galicia (Spain). *Mar. Policy* 32, 223–232 (2008).

62. Macho, G., Naya, I., Freire, J., Villasante, S. & Molares, J. The Key Role of the 'Barefoot Fisheries Advisors' in the Co-managed TURF System of Galicia (NW Spain). *Ambio* 42, 1057–1069 (2013).

63. Morales, J. & Freire, J. Development and perspectives for community-based management of the goose barnacle (Pollicipes pollicipes) fisheries in Galicia (NW Spain). *Fish. Res.* 65, 485–492 (2003).

64. Briones Alonso, E., Houssa, R. & Verpoorten, M. *Voodoo versus fishing committees: The role of traditional and contemporary institutions in fisheries management*. 73 (LICOS Centre for Institutions and Economic Performance, 2015).

65. East African Centre of Excellence. T*aboos, customs hold key to managing Tanzania reefs*. 4 (East African Centre of Excellence, University of Dar es Salaam Institute of Marine Sciences, 2009).

66. Katikiro, R., Macusi, E. & Deepananda, K. H. M. A. Changes in fisheries and social dynamics in Tanzanian coastal fishing communities. *West. Indian Ocean J. Mar. Sci.* 12, 95–110 (2013).

67. Cunningham, E. *Catch Shares in Action: Mexican Vigía Chico Cooperative Spiny Lobster Territorial Use Rights for Fishing Program*. 10 (Environmental Defense Fund, 2013).

68. Anoh, K. P. Stratégies comparées de l'exploitation des plans d'eau lagunaire de Côte-d'Ivoire. *Cah. D'Outre-Mer Rev. Géographie Bordx*. 63, 347–363 (2010).

69. Weigel, J. Y. *L'amenagement traditionnel de quelques lagunes du Golfe de Guinee (Cote d'Ivoire, Ghana, Togo, Benin)*. 34 (Food and Agriculture Organization of the United Nations, 1989).

70. Castilla, J. C. & Gelcich, S. Management of the loco (Concholepas concholepas) as a driver for self-governance of smallscale benthic fisheries in Chile. in *Case Studies in fisheries self-governance* 504, 441–451 (Food and Agriculture Organization of the United Nations, 2008).

71. Criddle, K. R., Pan, M. & Davidson, K. *A summary of the Pacific islands region catch share workshop, Honolulu, Hawaii March 9-12, 2010*. 35 (Pacific Islands Fisheries Science Center, 2011).

72. van Leuvan, T. *Catch shares in action: Chilean benthic resources territorial use rights for fishing program*. 10 (Environmental Defense Fund, 2013).

73. Anon. *Fisheries in Japan*. 76 (European Parliament, 2013).

74. Sakai, Y., Matsui, T. & Yagi, N. Econometric analysis of the factors contributing to the fish price increase in coastal TURFs in Japan: the case of income-pooling fishery for coastal shrimp '"Sakuraebi Sergia lucens"'. *Fish. Sci.* 711–718 (2010).

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