

# Escaping the Subsidies Trap: The Role of Cooperative Fisheries Management

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# Introduction

- Presentation originally began as one on fisheries subsidies, as a consequence of a kind invitation from WWF Mexico.
- The discussion on subsidies, however, provides me with an opportunity to return to and expand upon a theme that Colin Clark and I put forward at IIFET 2106 on the importance of cooperative fisheries management at the domestic level among fishers, but also between fishers and resource managers.
- We begin with fisheries subsidies, with much of what I will have to say coming from an important recent article.



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## Strategies and rationale for fishery subsidy reform

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## ABSTRACT

Subsidies can directly support unsustainable fishing practices that harm both ecosystems and long-term social and economic benefits. Global fishery subsidies are substantial, yet their impacts on fishing dynamics are specific to given regions or fisheries at local scales. Subsidies thus have markedly different effects when applied to artisanal versus industrial, or managed versus open-access conditions, as shown for Mexican fisheries. Subsidy reform strategies are critically assessed, drawing on a review of over 30 case studies worldwide to determine patterns in their usefulness and conditions for implementation. Strategies with best relative results are reorienting subsidies away from capacity-enhancement, and/or conditioning them on specific sustainable performance metrics. Decoupling subsidies from fishing (e.g. providing direct aid to fishers) has unpredictable and unclear results, whereas buyback programs tend to have poor outcomes. Eliminating subsidies is perhaps the simplest strategy, but is the most difficult to implement from a social and political perspective. Key factors for any policy to succeed are clear short- and long-term goals; creative design; transparent implementation; and strong socio-political will.

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## 1. Introduction

A fishery subsidy, according to the World Bank definition, is a “financial contribution from the public sector that grants private benefits to the fishery sector” [1]. Subsidies can thus be used to fund various programs and activities, such as management, research, regulation, infrastructure, tax exemptions, fuel, vessel purchases or direct supplements to income. Globally, an estimated US\$38 billion (2014 USD) in subsidies are granted to the fishery sector [2]. Of this total, around 60% are capacity-enhancing (“bad”), 30% beneficial (“good”) and 10% ambiguous (“ugly”) [3]. It is thus widely accepted that global subsidies mostly contribute to overfishing, resulting in an annual loss of US\$55 (2014 USD) billion in potential benefits if fisheries operated at economically-optimal levels [1].

The public sector has limited resources, so conferring subsidies to fisheries (or other private sectors) should form part of a plan toward final goals. Traditionally, there are two reasons for

introducing a subsidy [4]. The first is to provide incentives for a sector to take actions that may not otherwise have occurred in the same way. For example, when large-scale fishery subsidies were introduced in many developing countries during the 1970s, a main goal was to accelerate industry growth, which was undoubtedly achieved [5,6]. The second motivation for introducing a subsidy is to address distributional and social equity issues. In this case, the nation adopts subsidies that artificially increase income for workers in a sector to raise their living conditions to an ‘acceptable’ level. More recently, strategies aimed at environmental conservation are increasingly funded by governments (i.e. beneficial subsidies) at various scales, and funding from non-government organizations—though not subsidies in the strict definition—has become a crucial form of support [7].

Given that most global fisheries reached their ecological limits to production some years ago [5], it would seem that the only defensible reason, aside from purely political motivations, to continue capacity-enhancing fishery subsidies is poverty reduction. However, economic benefits from fishing—unlike, for example, the manufacturing sector—depend directly on ecosystem quality, and fishing, by definition, has (however slight) negative consequences on the ecosystem. Therefore, continuing to subsidize fishing effort on an already overexploited ecosystem will only damage it more, continually diminishing its long-term productivity (e.g., [4,8,9]). In this way, attempts to reduce current

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# World Fisheries Subsidies

- We as economists distinguish between “good” government fisheries subsidies, “bad” subsidies, and those in between.
  - “bad” subsidies potential threat to fish resource conservation and management, e.g. by increasing harvesting capacity.
- “Bad” subsidies affecting world capture fishery resources estimated to be not less than US\$23 billion per year.

# Unending Subsidies - Motivation

- Economists and others have gone on and on about the size of “bad” subsidies, and the damage that they do – with not much effect. Why so?
- Look to motivation behind government subsidies:
  1. foster fisheries development
  2. distributional concerns- support fisher incomes
- Argue that today, 2. is of overwhelming importance
  - no wonder politicians do not listen to us
- The subsidies trap: “bad” subsidies used to support destitute fishers, but the subsidies undermine fishery resources promising fisher poverty tomorrow- leading to yet more subsidies

# Escaping the Fisheries Subsidies Trap

- The first possible way to escape the “trap” is to follow the example of our colleagues in agriculture.
  - agricultural subsidies are very large; they do not lead to destruction of agricultural land, but they lead to overproduction and distortion of international trade. Prime political motivation is income maintenance.
- Proposed solution, going back to the 1990s, is “decoupling” – an agricultural subsidy is fully “decoupled”, if it has no impact on agricultural production and trade.
- Could the same thing be done in fisheries?

# “Decoupling”: A Second Best Solution

- “Decoupling” in fisheries actually being considered
  - example from Mexico – proposed that fuel subsidies be eliminated as replaced by outright grants to fishers.
- But opportunities for “decoupling” seem rather limited. Also it is not a First Best solution.
- First Best solution, not available in agriculture, is obvious upon being stated – improve fisheries management in such a way as to lead to an increase in fisher income. If successful, prime political motivation for subsidies eliminated.

# On First Best Solutions

- The statement that improved fisheries management provides an escape from the “trap” is not all that helpful. Just how do we get to that improved fisheries management?
- First, we will confine ourselves to domestic (intra-EEZ) fisheries -cannot do everything.
- The proposition, which we will put forward –repeat – is that a key lies in cooperation, both among fishers, **but also** between fishers and resource managers
  - cooperation among fishers, an old, old idea – think of Elinor Ostrom



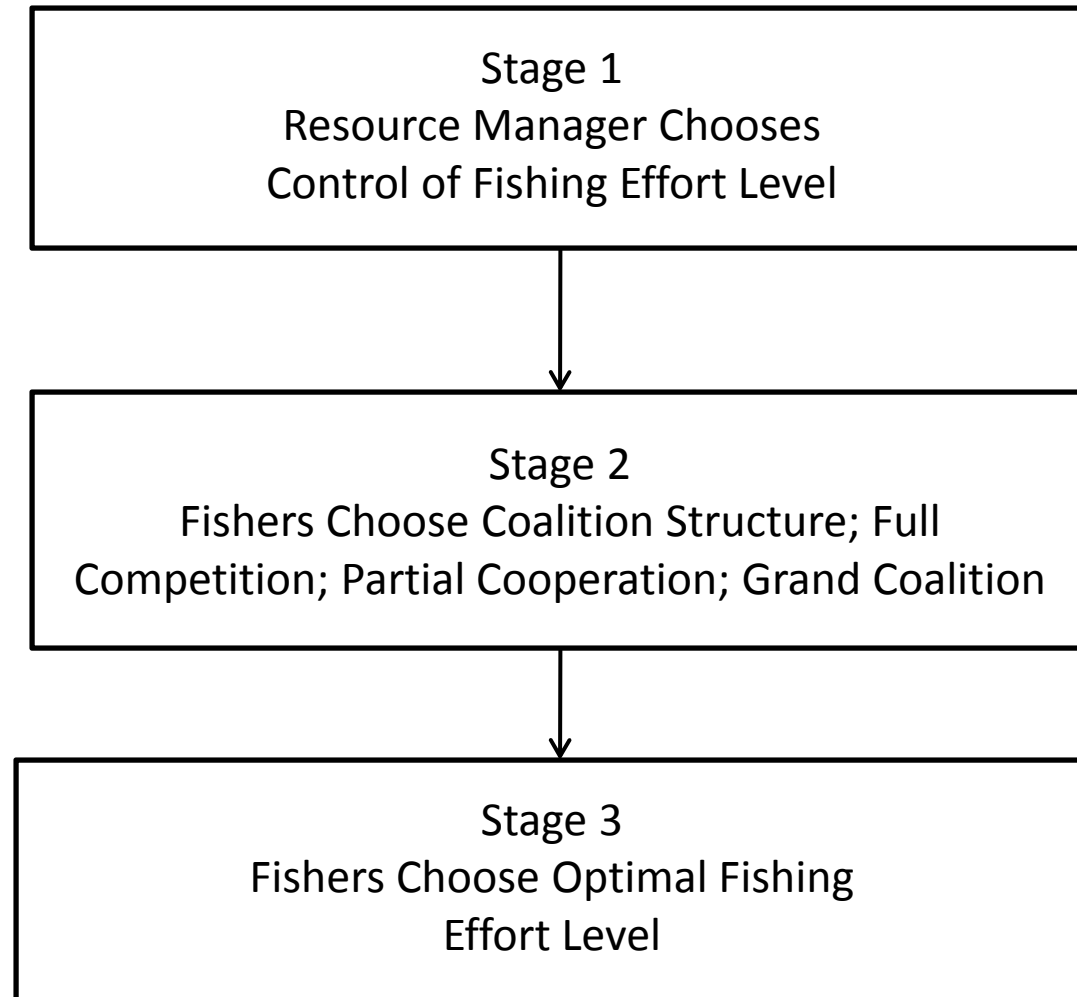
# Fisheries Management: A Framework

- If we are going to focus on cooperation, then, whether we like it or not, the theory of strategic interaction (game theory) is going to have to be brought to bear.
- Rejecting the zero management option – open access – out of hand, we assume that there is a resource manager to place limits on the access to the fishery
- We need a framework – I go back to the one that I have used many times before, the decade old model of Lone Kronbak and Marko Lindroos
  - importantly, they link the resource managers to the fishers *and* allow for cooperation among the fishers.

# Kronbak-Lindroos (K&L) Model

- The K&L model is a multi-stage game, with the resource manager playing a leader-follower game with the fishers. After the leader makes its move, the fishers choose a coalition structure: fully competitive; partially cooperative; Grand Coalition. Fishers then determine their optimal effort level.
- The model is static, and it is assumed that the resource manager has control over TAC and level of fishing effort only, and has perfect information. Consequently, the model is just a start and no more, but it is of value nonetheless.
- What more is being done? Just wait.

# The K&L Three Stage Game



Source: Kronbak and Lindroos, 2006.

# More on the K&L Model

- While the resource manager has perfect information, the resource manager is better off, the greater is the degree to which the fishers cooperate – no surprise here.
- K&L bring to bear so called partition function games, used extensively in analysis of international fisheries, to analyze the fisher game – looking for “stand alone stability” – in which there is no incentive for players to deviate and free ride.

# Fisher Cooperation and the Ostrom Option

- Suppose that the resource manager heeds the K&L advice and attempts to foster fisher cooperation
  - obvious way would be to set up some sort of harvesting rights scheme – TURFs, fisher cooperatives or ITQs.
- Elinor Ostrom and colleagues famous for arguing that non-governmental groups ,e.g. fishers, can effectively manage common pool resources without the benefit of ongoing government support. The cooperative groups, once established, are effectively self-enforcing.
  - Ostrom and colleagues, however, make surprisingly little use of the theory of cooperative games (let alone partition function games).

# Testing the Ostrom Option

- A decade ago, Stephen Polasky et al. put the Ostrom option to the test, using a fishery example, with a formal game theoretic model. It is not a partition function game, but has much the same flavor, assessing conditions under which “stand alone stability” will hold.
  - the fishers are not in a formal cooperative, or TURF, and so are much like an ITQed fishery.
- The Polasky et al. results are not all that encouraging, and give support to those who argue that the scope for effective cooperation among ITQ holders is very limited.

# Lessons from International Fisheries

- I return to an argument that I have made several times before (e.g. IIFET 2016), arising from experience with international fisheries. This is that International Fisheries Agreements (IFAs) are necessarily self-enforcing, because there is no third party to provide assistance in curbing free riding.
- In domestic fisheries, by way of contrast, there is an obvious *potential* third party in the form of the government. If that potential is realized, stable fisher cooperative games can emerge, even in ITQed fisheries with a substantial number of players.

# Support for an Assertion

- The previous statement was an assertion – can I support it with any evidence?
- I can, by expanding upon an example that Colin and I used at IIFET 2016. The example also allows me to illustrate the fact that improved management can eliminate any justification for government subsidies.
- The example is that of the B.C. groundfish trawl fishery, which by the way has its direct counterpart off Washington and Oregon.
  - I must, of course, try to argue that the experience of the fishery is not in some sense unique to B.C.



# Overview of B.C. Groundfish Trawl Fishery Introduced



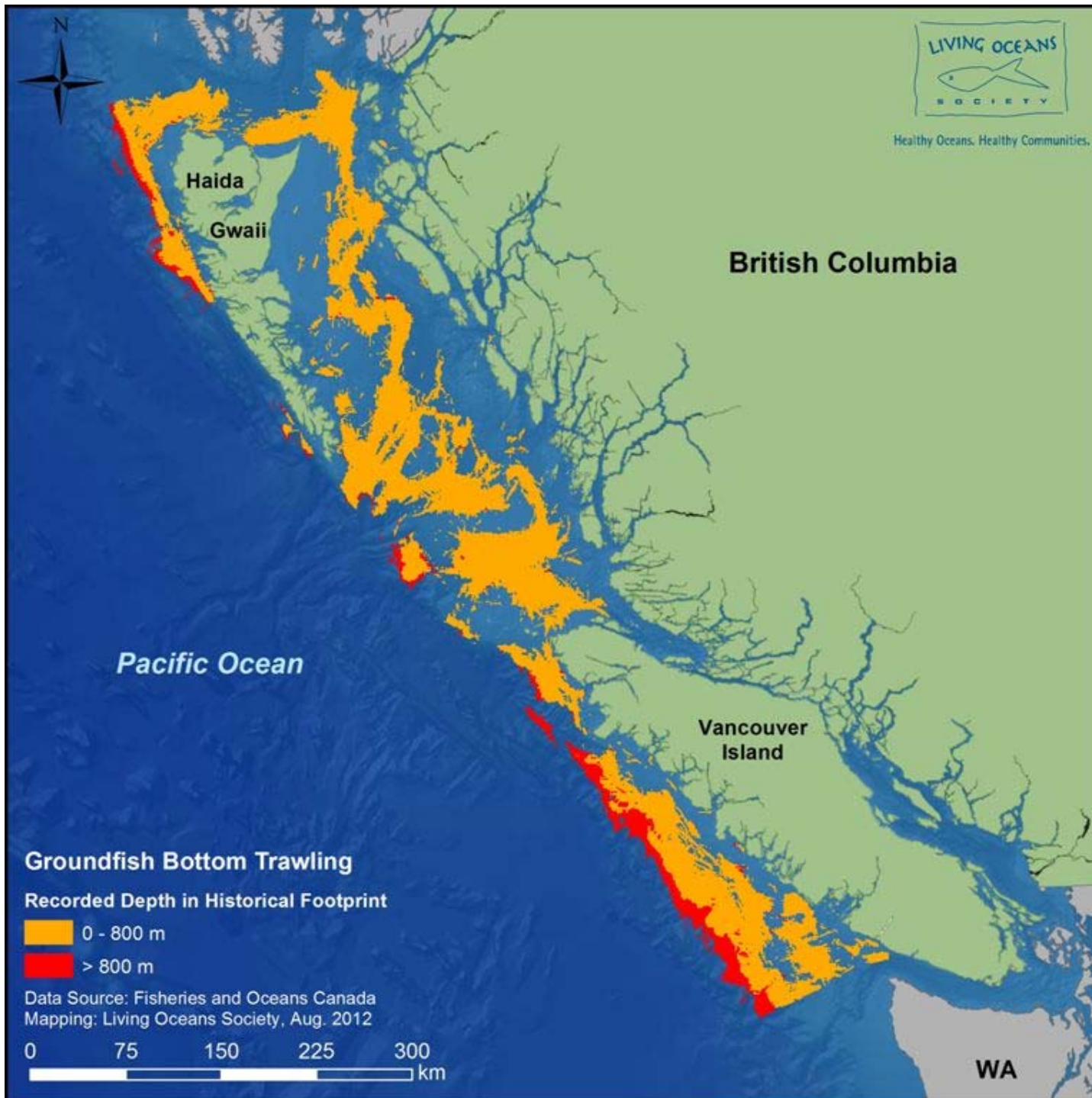
Photo credit: Brian Mose

- complex multi-species fishery – 60 stocks - operating along entire B.C. coast – bottom and mid-water trawls

- fishery put under management in late 1970's – standard limited entry with Olympics style TACs



- problems emerged, with which we economists are now so well acquainted.



Bottom area  
trawled  
between  
1997-2011

~41,000 km<sup>2</sup>

# The State of Affairs in 1995

- By 1995, the fishery was an economic and biological disaster.
  - fishers playing a highly competitive game among themselves, and, of course, a competitive game with the resource manager – federal Department of Fisheries and Oceans (DFO).
  - overcapitalization obvious to the naked eye – 135 active vessels.
  - evidence that the resource manager (DFO) was losing control of several of the resources, e.g. most valuable of rockfish species - Pacific Ocean Perch (POP). Reported POP catches were in some years exceeding the TACs by more than 100%.
    - true “overages” probably exceeded this by a considerable margin.
- In September of that year, DFO took the unprecedented step of shutting the fishery down – reasons for.

# Reform of the Fishery

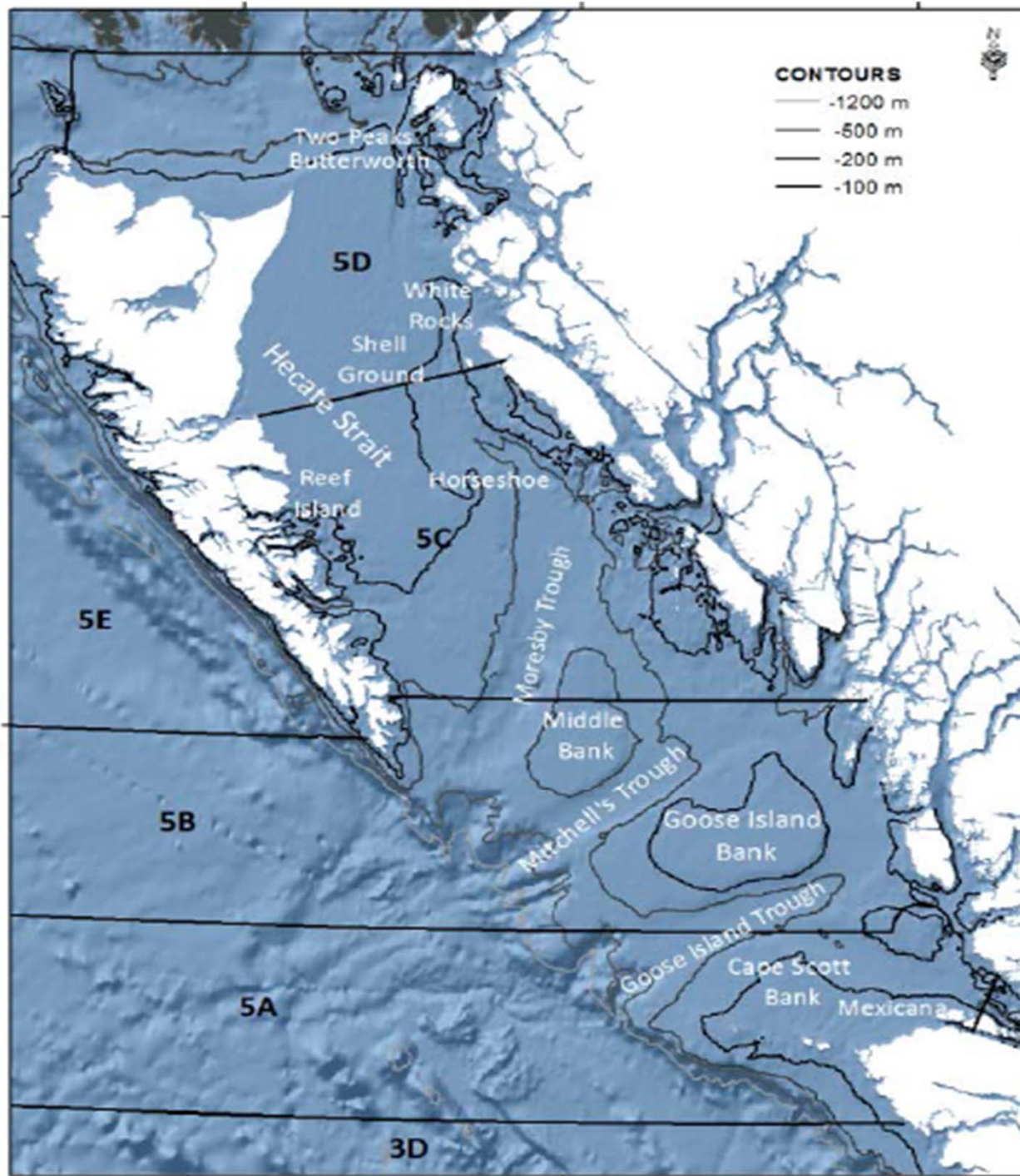
- DFO re-opened the fishery in stages in 1996-1997.
- Prior to the shutdown, there had been dockside monitoring, but little onboard monitoring. In 1996, full onboard observer coverage implemented, along with dockside monitoring - all at industry expense.
- In 1997, ITQ scheme implemented (forced upon the industry).
  - recall that in those days many pro-ITQ fisheries economists did not think that ITQs would work in a multi-species fishery.
- Overcapitalization – industry was informed that it would have to solve the problem on its own – ZERO buybacks subsidies.
  - may have been result of DFO experience with buybacks in Pacific salmon fishery.

# The New Fishery

- Several of us have argued that, if an ITQed fishery is to be fully effective, we must see the hitherto competitive fisher game evolve into a cooperative game. Would this happen in the B.C. groundfish trawl case?
  - ITQs not supposed to work in multi-species fisheries. Moreover scope for cooperation among ITQ holders believed to be limited – with “large” numbers, free riding an intractable problem. Vessel ownership in the fishery complex, but can maintain that the number of independent players (agents) not fewer than 30 – a “large” cooperative game.
- There is an industry association –Canadian Groundfish Research and Conservation Society (CGRCS) – but this is an association ONLY. No power over individual members.

# First Signs of Fisher Cooperation

- First clear sign of a fisher cooperative game emerging occurred in 2000/2001 – Pacific cod resource in Hecate Strait.
  - industry, concerned about state of resource pressured DFO to slash TAC over a period of several years –industry initiated fishery resource investment program.
- Next sign occurred about the same time–industry became dissatisfied with the extent of DFO stock assessment. Decided that there should be an industry financed research supplement. Through CGRCS, members agreed to impose upon themselves an annual research levy, but strictly voluntary.
  - currently stands at US\$550,000+ - per year.



# Another Industry Sponsored Conservationist Move

- A second example of industry pressuring DFO to reduce TACs – Hecate Strait Pacific Ocean Perch (POP)- 2006 -2013.
  - recall that in 1995, POP prime example of serious resource overexploitation, DFO powerless to prevent – TAC “overages” of 100%.
- Industry once again concerned about state of resource.
  - industry, drawing upon its research fund, put scientist under contract to work with DFO scientists over a period of several years on stock assessment –
  - cost to the industry over the seven years – estimated at: US\$350,000 (approx.)
- Outcome – as a consequence of industry pressure, and combined DFO and industry research, the TAC on Hecate Strait POP – over the period 2006 -2013- *was reduced by 40%*.



# B.C. Groundfish Trawl Habitat Conservation Collaboration Agreement

- The final example is the agreement between industry and a consortium of environmental NGOs – ENGOs ,e.g. WWF, to limit industry catches of sponge and coral – DFO support and acceptance critical, but the initiative came from industry.
  - recounted in detail in Clark and Munro, *MRE*, April 2017 –will not repeat.
- Will say that agreed upon annual sponge/coral quota for the industry is: **4,500 kg**. 2016/2017 season ended on February 20<sup>th</sup> , end of the 5<sup>th</sup> year of the Agreement – actual sponge/coral catch for the year – **330kg**. – a touch over 7% of quota.

# What Do We Make of All This?

- The first question is why has this fisher cooperative game achieved stability, with the “large” number of players? The short answer is that we do not know for certain – much more game theoretic research required.
- Conjecture – DFO as the critical “third” party. Recall our earlier discussion of domestic vs. international fisheries . Effective DFO mandated surveillance and control has curbed free riding.

# Followers as Leaders

- Go back to the K&L leader- follower game
  - resource manager the leader; the fishers as followers.
- What we had in in the cases of Pacific cod, POP and the Habitat Agreement, was a switch, in which the fishers were leaders; the resource manager the follower. The K&L model must be made dynamic.
- Furthermore, leader- follower games are inherently competitive. The resource manager-fisher game in 1995 was highly competitive -today that game, after the switches, is cooperative. We do not have a good explanation.

# Emerging Co-management

- Let us try to put this all together. The B.C. groundfish case is not one of fisher self-management – the crucial DFO surveillance and enforcement role.
- BUT the industry has had, and is having, an impact upon resource management – beneficial in terms of conservation.
- What is emerging is *de facto* co-management – it has not been planned
  - it is **not** co-management by equals –definite hierarchy. The final word on management rests with DFO.

# Subsidies and Overcapitalization

- Let us return to our original question of subsidies. While we do not have hard data on incomes, we note that there is no evidence of the industry enjoying “bad” subsidies, or ambiguous subsidies – buybacks – *au contraire*.
  - the industry has solved overcapitalization on its own. There exist 142 groundfish trawl licenses. In 1995, 135 of those were activated. In 2017, the number of activated licenses is about 55.
- Go back to the industry research levy. The levy benefits the industry, but it has positive externalities. The ultimate owners of the resources – the Canadian public - benefit. One can argue that the industry is, in fact, **subsidizing** the Canadian public (with a “good” subsidy).

# Relevance Outside of B.C.

- Of course, domestic fisheries outside of B.C. will be different from those in B.C. That said, the proposition that the B.C. experience has no relevance outside the Canadian province is unacceptable.
- The experience has obvious relevance to other ITQed fisheries, but it also has relevance to fisher cooperatives and TURFs. A key factor is fisher cooperation- TURFs and coops are cooperative games by definition.
- Finally, while it can be claimed that the Habitat Agreement is unique, the B.C. groundfish trawl fishery has no other claims to uniqueness. It is highly likely that there are similar cases out there, which have yet to be researched.

# A Few Conclusions

- We began our discussion on fisheries subsidies, arguing that the First Best way out of the subsidies “trap” is through improved fisheries management removing the prime motivation for subsidies.
  - we gave as an example the B.C. groundfish fishery. 20+ years ago fishery was a biological and economic disaster. Reformed, with industry receiving **zero** buyback subsidies. Now prosperous, and can be seen as a provider of (“good”) subsidies
- Key, we argued was the development of cooperation at two levels; (i) among fishers, and (ii) between fishers and resource managers – the coming of de facto co-management.
- We do not begin to fully understand the true nature of this de facto co-management – much more research required.

# A Few More Conclusions

- A part (but not all) of the additional research required will involve the application of the theory of strategic interaction (game theory).
- With that in mind, I am pleased to announce plans underway for a book – *Game Theory and Fisheries Management: Theory and Applications*– designed to cover game theory and fisheries at domestic, as well as international, level
  - two of the prospective authors are K & L, along with Pedro Pintassilgo
  - hoped for publication date -1919
  - do we all now have to become true game theorists? No, the rest of us have to learn how to collaborate with the true game theorists (cooperation, once again).
- All of this leads me to repeat what Colin and I said in Aberdeen: we can predict, with confidence, that the future for fisheries economists is one of full employment.



*Thank you for your  
attention*

