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# Alternatives to ITQs in equity–efficiency–effectiveness trade-offs: How the lay-up system spread effort in the BC halibut fishery

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ABSTRACT

Individual Transferable Quotas (ITQs), also called "catch shares", have been broadly adopted in the last two decades, at the same time that concerns about their equity and effectiveness in delivering the predicted outcomes have increased. This paper documents how an alternative fishermen-designed and operated system of spreading fishing effort to avoid the race for fish—called the lay-up system—worked effectively and equitably for four decades in the British Columbia halibut fishery before ITQs were introduced in this fishery. Why the lay-up system was allowed to collapse and its history ignored illustrates important roles played by conflicting ideologies, bureaucratic rationality, and the inability to imagine an alternative way of solving fisheries management problems. Trade-offs between the efficiency, equity, and effectiveness of halibut and other management systems are considered.



## 1. Introduction

Individual Transferable Quotas (ITQs) are permits allowing the holder of the ITQ to catch or transfer a share of the total allowable catch annually. Various studies have documented inequities and other problems in fisheries where access privileges have been converted to ITQs. Many defenders of ITQ programs dismiss such concerns by suggesting that equity is properly addressed in the political arena rather than in the design of management tools. This position is challenged here by documenting the lay-up system for regulating access in the British Columbia halibut fishery. In this system, the problems which ITQs are intended to address were handled without sacrificing equity: no racing, effective controls on landings, and an even flow of product into markets. There need be no drastic trade-off between efficiency and equity.

The lay-up system met economic and management objectives by spreading fishing effort over 100–250 days of fishing, at no cost to government. It could be considered a system of co-management of fishing effort through cooperative rule-making, monitoring, and enforcement by diverse fishermen's organizations in the US and Canada. Because this system was used for four decades, it is important to know why it was disregarded and a far less equitable system adopted. In analyzing the lay-up system as an alternative, it is argued that the ITQ system did not perform well in either effectiveness or equity and that government regulation and input controls are needed to supplement either a lay-up type system or an ITQ system.

This discussion will: (1) identify key inequity problems in ITQ fisheries worldwide, (2) briefly review key failures of the BC halibut ITQ system to achieve equitable and effective outcomes, (3) describe how the lay-up system functioned in the BC halibut fishery to spread fishing effort equitably and effectively, (4) describe how the lay-up system was discontinued and the halibut fishery eventually ITQed, (5) analyze what caused the lay-up system to be discontinued, and (6) consider what trade-offs and combinations of bottom–up and top–down regulations are needed to achieve a balance of equity, effectiveness, and efficiency in halibut, with lessons for many other fisheries.

## 2. Theory and methods

The history of the lay-up and ITQ regimes in Pacific halibut are instructive because, unlike many histories of gradual over-exploitation caused by lack of adequate regulation—and/or fishermen having no power to design regulations that are appropriate—the story of halibut regulation since the 1930s has been one of successful regulation. Regulation was done at one level by the International Pacific Halibut Commission (stock assessment, setting of Total Allowable Catch and fishing seasons, gear regulation), and at another level by many fishermen's organizations working together to control the timing and extent of fishing effort. While some economists and biologists documented and celebrated this fishermen-designed lay-up system, this success story has been remarkably unrecognized and ignored by

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ITQ advocates. It is argued that when a history is ignored, and replaced by a different construction of the issues, there are two possible explanations. Either the history is being deliberately suppressed, or the paradigm of self-management is poorly understood and therefore ignored. The theoretical lens used here draws from narrative inquiry in history [1,2], the social construction of reality in sociology [3], and constructivism in anthropology [4]. All these theoretical traditions consider that dueling visions of reality, including different ways of constructing history, are used to justify current arrangements and differing ideologies about what values should drive management decisions and policy. This discussion also draws from common property theory, co-management theory, and from sociological theories about the behavior of organizations and bureaucracies, as discussed below.

Literature reviewed included two contrasting sets: (1) accounts of the lay-up system in halibut by economists who valued it [5], reports by biologists in and to the International Pacific Halibut Commission [6–8] also valuing it, a graduate student thesis describing it [9], and (2) reports by economists that are favorable to halibut ITQs but which ignored the lay-up system [10–12]. The minutes of the meetings of the fishermen's organizations which developed the lay-up rules annually (housed in Special Collections in the University of British Columbia library) were reviewed and more than 20 halibut fishermen, processors, and former government managers were interviewed over a period of seven years about their experience of the lay-up system. These different data sources provided validation and corroboration of each others' accuracy [13].

## 3. Key inequity problems in ITQ fisheries worldwide

Economists [14] and epidemiologists [15] have identified the negative consequences of inequity in society in general, showing that the more unequal the society, the greater the occurrence of economic and social disorders such as lower capital flow, mental illness, imprisonment, obesity and poor health, low educational performance, and teenage pregnancy. The most recent report of the United Nations Development Programme [16] echoes the long-established finding that equity is a necessary and inseparable component of successful development. Common property theorists have likewise noted that equity is one of the necessary components of sustainable use of common pool resources, and that local institutions can help allocate resources equitably, over long time periods, with minimal efficiency losses [17]. Geographer McDermott [18] even claims that equity should be understood as the very foundation of sustainability, rather than one of three legs of the triple bottom line of economic, ecological and social sustainability.

Some fisheries economists [19–23] have noted the key role of equity and the necessity of considering broader economic impacts than those on fishermen license owners for a particular species [24]. Fisheries ecologists have considered the ethical responsibilities of both fishermen and governments to equitably share the ecological costs of fishing, and that neither distributional equity nor ecological sustainability are reducible to efficient allocation [25]: ethical fisheries are found to be sustainable fisheries [26].

Maritime anthropologists have considered the impacts of ITQs on equity, both in access to fish and in the distribution of benefits from fishing [27–29]. Olson [30] summarizes much of the literature on this topic and concludes that not only is there significant worldwide loss of access (particularly by small vessels), loss of employment (fewer vessels and less crew on each), loss of the percent of crew share, and loss of new entry opportunity, but also a loss of cultural values supporting equity—a finding also prominent in Maurstad [31] and Lowe and Carothers [32]. This latter loss in fishing communities damages the social fabric at both the household and community scale. Carothers [33] documents the perceived negative impact of halibut ITQs in Alaska: inequitable access by small boats, rural fishermen, crew; creation of a privileged class of fishermen; consolidation and job loss. Recent reviews of the longest-established ITQ fisheries in New Zealand [34] and Iceland [35] show significant inequity features which are remarkably similar to those in BC halibut ITQs.

Clay et al. [36] develop performance measures of ITQ fisheries compared to non-ITQ fisheries for federal fisheries managers in the US, and suggest that there are significant equity problems. They use the categories (a) financial viability, (b) distributional outcomes, (c) governance—including costs to government and fishermen, transparency, and legitimacy, (d) well-being, and (e) stewardship to develop performance measures. The first four categories are the main focus for the following discussion of ITQs compared to the lay-up system.

## 4. Key equity problems in the BC halibut ITQ system

It is useful to evaluate the lay-up system (discussed in the next section) in the context of the performance of the ITQ system which followed it (discussed in this section), using Clay et al.'s performance measures identified above. To these could be added the more specific criteria of economist and ITQ advocate Arnason [37]. He argues that efficiency is the chief performance criterion, and that it can be measured by "(i) reduced fishing effort, (ii) reduced fishing capital, (iii) larger fish stocks, (iv) higher quality of landed catch and (v) better co-ordination between supply of landings and market demand." These criteria could be assumed to correspond roughly to Clay et al.'s "financial viability" and "stewardship". Because stewardship and stock condition are complex questions beyond the scope of this paper, the focus here will be on the other four measures. It is argued below that the lay-up system performed reasonably well by these four Arnason measures, almost as well as the ITQ system. However, it will be shown below that when Clay et al.'s second measure (distributional outcomes) is entertained, the lay-up system performs far better than ITQs, and also does significantly better in governance and well-being.

As noted above, economic analyses identifying the benefits of ITQs have, like Arnason's, focused on efficiency gains, and generally assumed that equity was not as strong a public value as efficiency, or that a sacrifice in equity was necessary to obtain efficiency. It is important to note different stances even among such analyses, however. In one case, an ITQ advocate who became informed of the extent of the inequities of the BC halibut ITQ system (which did not function as he had predicted) reflected that economists should pay more attention to distributional issues "or suffer the consequences" [38]. Similarly, in response to the recent debate about whether ITQs are effective in meeting management objectives, Clark et al. [39] noted that there are "pessimists" about market rule who hold that there are "definite limits to socially desirable privatization", that "there is a nontrivial number of resources that cannot be safely entrusted to complete private control and management", and that in these cases the ultimate management power "must rest with the public sector." Presumably it is the "optimists" about market rule that anthropologist Ho [40] found on Wall Street even after the economic collapse: those who believed that greed and selfishness are "good for the system", and that people who "lose out" are assumed to be inefficient, unproductive and undeserving of consideration. For these neo-liberal economists and financiers, the logic of market rule makes equity irrelevant.

It is critical to consider how inequity can have a direct impact on effectiveness. Pinkerton and Edwards [41] demonstrated that efficiency in BC halibut ITQs is gained not only at the expense of equity, but also at the expense of the overall effectiveness of the regime in achieving its stated objectives of "stability and viability of the existing fleet" [42]. The first generation of fishermen whose license privileges were converted to ITQs were greatly advantaged by their possession of considerable quota. They were in a strong position to lease or buy additional quota at higher prices than fishermen who owned no quota, a pattern also noted in the Alaska halibut fishery [22]. Often leasing through processors or brokers who bid up the price of quota leases in an effort to secure enough to fill their markets, the original recipients of quota benefited significantly, but new entrants who had to lease quota from them were disadvantaged and took on significant debt. By 2006, about one third of the BC halibut fleet had to lease 70% or more of the quota it fished and its economic viability was questionable because of the high lease price of halibut quota. The lease price rose from about 50% of the landed value of the catch in 1993 to 78% by 2008, so that outside investors with access to capital were attracted to the high returns from leasing out quota while younger fishermen without access to capital could not get established as viable fishermen [41]. Thus two kinds of inequity (initial allocation and lease prices beyond the means of a substantial portion of the fleet) made the program ineffective at achieving its stated goals of "stability and viability of the existing fleet".

Other factors exacerbate the inequitable effects of initial allocation and market-driven transfers of quota. DFO's recent re-allocation of 3% of the Total Allowable Catch (TAC) to the sport fishery without compensation to the commercial fishery demonstrates that ITQs are a privilege rather than a right, a conclusion also reached by economists in the US [43]. Therefore, the second generation of quota owners who purchase them at great cost risk devaluation either by changes in government policy on ITQs, price competition from farmed halibut [44], or by landed value price reductions through varied timing of Alaskan halibut fisheries, such as occurred in fall 2012. Thus a new entrant who may pay $1 million to acquire quota from a fisherman who was gifted this quota is likely undertaking substantial debt and risk at the same time.

Another form of inequity is a substantial reduction in the distribution of benefits to rental skippers and crew. Driven especially by ownership of quota by outside investors and retired fishermen, this pattern is widely documented in ITQ regimes [45,46,34,30]. Crew shares have dropped from a 20% share to 1–5% wage [47]. This practice has now entered even the portion of the fleet operated by the original quota holders who still fish. It has become customary for quota-owning skippers to deduct the cost of leasing quota from the catch value before crew are paid (even when leasing their own quota to themselves), leaving crew with a far smaller share of the benefits and lower overall benefits, even when an operation is far more profitable than it was under the previous share system [20,41]. Changing accounting practices might be considered part of the loss of cultural values about equity noted by Olson [30]. In addition, in the case of pre-treaty halibut quota allocated to BC aboriginal bodies which have lost traditional access, there is a temptation for aboriginal managers to lease quota to the highest bidder for the sake of simplicity and maximizing income rather than allocating it to community members. Thus the commodification of fishing privileges can overpower cultural understanding of the value of keeping community members fishing.

In summary, the BC halibut ITQ system does not perform well as measured by Clay et al.'s performance measures of distributional outcomes, and even financial viability for a significant portion of the fleet and most of the crew in the entire fleet. Thus it is not effective at achieving the stated management objectives of financial viability and stability. It is against this backdrop that the lay-up system is examined.

## 5. How the lay-up system in the BC halibut fishery spread effort and created equity

A major problem identified by many economists and fisheries managers is the "race for fish" which increases the cost of fishing and thus dissipates rent. Many economists believe that the race inevitably occurs without privatization of fishing access privileges which guarantee access to a specific quantity of fish per season to individual fishermen: ITQs. This construction of inevitability ignores the many situations in which fishermen's communities or organizations have made their own rules to prevent the race for fish by allocating fishing opportunity in time, space, and/or by specific gear [48–57]. The lay-up system in Pacific halibut is an example of how fishermen's organizations prevented the race for fish by rule-making about time and gear.

The system was extraordinary in its simplicity, consisting of rules requiring fishermen to stop fishing (or "lay up") for 6 to 10 days (depending on the year) following catch delivery, initially taking turns in who went first to stagger deliveries [9]. They eventually learned that deliveries became naturally staggered because of different lengths of individuals' fishing trips. The purpose of the rules was to extend the fishing season, create an orderly distribution of landings—thus obtaining higher prices, allow for in-season rest and repair, and avoid fishing on weekends, holidays, and special events such as children's birthdays. A rather similar lay-up system was used historically in the New Hampshire groundfish industry, but it included an additional limit on fishing days [58]. The Pacific halibut experience suggests that such "trip limits" may be unnecessary for successfully spreading effort in some fisheries.

The rules were designed and revised annually by local organization meetings and a regional conference or two of all the organizations 1933–1941 and 1957–1976. The rules were simple enough to print on both sides of one sheet of $8.5 \times 11$ in. paper, which was folded into a pamphlet and distributed to every fisherman. Each participating vessel had a crew delegate who was responsible for reporting its arrivals and departures from port. Reports were made to the "union office or other enforcement officer of the Layup Program", which kept track of compliance with the rules [5]. Rules in the 1950 s and later required that (with the exception of camps and smaller vessels delivering less than 3000 pounds) halibut be delivered to ports which "have shore-based cold storage and a regular fish exchange where trips are listed and bid for" [5]. A "Halibut Exchange" operating in the major ports of Prince Rupert, Vancouver, and Seattle was a public auction at which buyers bid for specific amounts of halibut at a particular price, while cold storage facilities sold ice to fishermen, thus relieving them of the standard industry practice of having to deliver at a lower price to processors who supplied ice and credit in advance and often gave the skipper a confidential bonus which was not shared with the crew [59]. Even though small vessels reportedly delivered more than permitted by the lay-up rules to some processors, the Halibut Exchange auction prices exerted upward pressure on all prices, so that halibut prices in any major port remained fairly competitive within that port and among ports [60]. Interviewees claimed that the Halibut Exchange was also important in maintaining a more accurate record of landings and landed value than processors' records alone, as a crew member of each vessel was required to observe the weighing, and this was an additional incentive for fishermen to deliver to

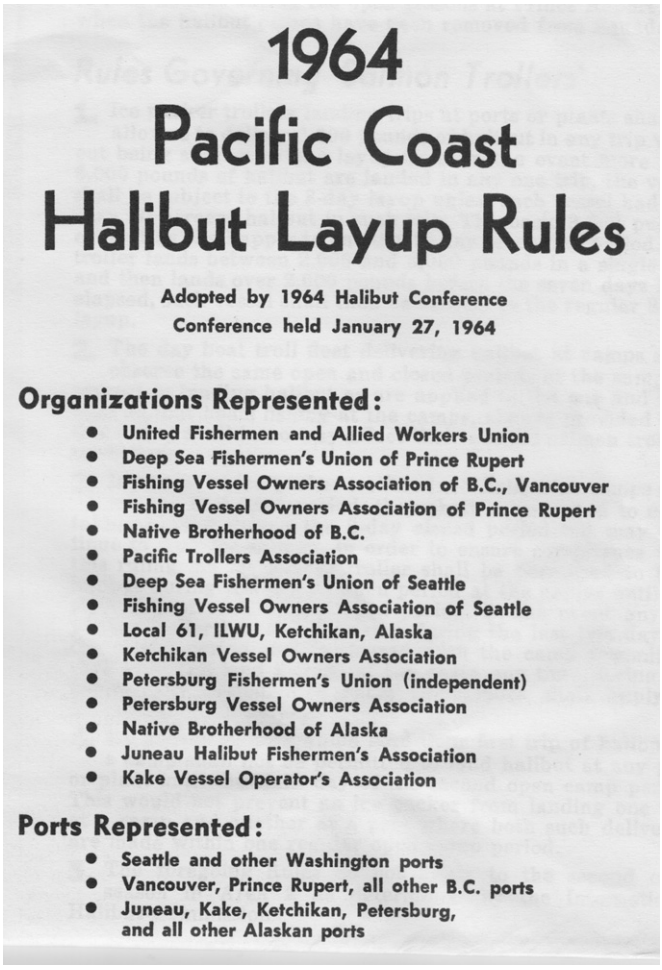
the Halibut Exchange.[1] Some interviewees reported cases of systematic under-reporting of catch or price by processors. Thus by requiring fish deliveries through the exchange, the lay-up system contributed to both price competition and more accurate catch and price monitoring.

The United Fishermen and Allied Workers Union of British Columbia and the Deep Sea Fishermen's Union in the US and Canada, played an important role in enforcing the lay-up rules because fish processor workers, Halibut Exchange workers, and many crew were unionized and would refuse to deliver or accept halibut from non-compliant vessels. They were also constantly monitoring and reporting on vessels at sea. Even DFO officers were informally part of the action of monitoring and enforcing the lay-up rules. The rules required vessels to remain in port during their lay-up time, so that any vessel observed traveling would be contacted by radio and asked for an explanation. Bell [8] estimated that compliance was good, with non-compliance of 5–8% in the mid to late 1960s occurring mostly in southeast Alaska. Given the tensions between the United Fishermen and Allied Workers Union and the Prince Rupert Fishermen's Cooperative Association (which delivered to its own plant, not the exchange), along with the Deep Sea Fishermen's Union of Prince Rupert which organized shoreworkers and crew for the latter organization during most of the lay-up period [61], it is remarkable that these diverse organizations were able to collaborate as effectively as they did.

Meetings of the fishermen's organizations which made the lay-up rules annually were coordinated with those of the International Pacific Halibut Commission (IPHC) so that the fishermen's rules were presented to the IPHC and approved annually, with considerable interaction between scientists and fishermen. Fishermen recommended and got changes such as where area boundaries should be drawn for ease of monitoring [9].

The system was also extraordinary in its complexity, since the rules were made by 15–18 fishermen's organizations (see Fig. 1) from Alaska, British Columbia, and Washington State. These organizations operated at different scales from single community to province/state-wide, and represented diverse constituencies (vessels owners and crew, small and large vessels) in a geographic area over 2000 miles long. The system was initiated by the Seattle Vessel Owners Association in 1933 as an attempt to delay the start of fishing in order to prevent a drop in price at the start of the season when there was a carry-over of frozen halibut in storage. In a relatively short time it was endorsed by 18 organizations in the U.S. and Canada and its operation clearly buoyed halibut prices [9].

The system thus exemplified comprehensive self-organization by a wide range of fishermen's organizations to deal with *who* can fish and *when* they can fish. The goal was not only to get higher prices for fish, but also to prevent crowding on the grounds and the race for fish by extending the season for more days and spreading out fishing effort. The rules were *de facto* harvest management rules (openings and closings) as effective as any other government-designed system at addressing key problems, at no expense to government, since each organization levied a fee from and enforced the rules on its own members, and those of the other organizations. Most halibut fishermen paid $0.30–$0.50 per 1000 lbs of halibut landed to the Halibut Curtailment Fund, which supported the costs of meetings, and enforcement. Senior governments attempted to imitate these fishermen's rules when the lay-up system collapsed, but were not as effective [5]. The operation


1964
Pacific Coast
Halibut Layup Rules

Adopted by 1964 Halibut Conference
Conference held January 27, 1964

Organizations Represented:

- United Fishermen and Allied Workers Union
- Deep Sea Fishermen's Union of Prince Rupert
- Fishing Vessel Owners Association of B.C., Vancouver
- Fishing Vessel Owners Association of Prince Rupert
- Native Brotherhood of B.C.
- Pacific Trollers Association
- Deep Sea Fishermen's Union of Seattle
- Fishing Vessel Owners Association of Seattle
- Local 61, ILWU, Ketchikan, Alaska
- Ketchikan Vessel Owners Association
- Petersburg Fishermen's Union (independent)
- Petersburg Vessel Owners Association
- Native Brotherhood of Alaska
- Juneau Halibut Fishermen's Association
- Kake Vessel Operator's Association

Ports Represented:

- Seattle and other Washington ports
- Vancouver, Prince Rupert, all other B.C. ports
- Juneau, Kake, Ketchikan, Petersburg, and all other Alaskan ports

**Fig. 1.** The organizations which made the halibut lay-up rules. .
*Source*: front of pamphlet distributed to halibut fishermen in 1964

of the system illustrates the value of simplicity and legitimacy. All the organizations recognized the value of such rule-making and were able to negotiate equitable agreements despite their diversity. The number of day fishing 1933–1976 in BC and Alaska during lay-up and non-lay-up times permitted by these rules is shown in Fig. 2.

The lay-up system was discontinued as a safety measure when Japan entered World War II in 1941 and did not restart until 1957 because of debates which ensued during the interim. The IPHC argued that reintroducing the lay-up system would spread effort to underutilized stocks, but the US and Canada would not allow this. The IPHC then attempted to address the problem by creating sub-areas. While this helped somewhat, it was not considered sufficient, so the lay-up system was finally reinstated. The success of the lay-up program is evidenced by the gradual increase in the length of the season during the late 1950s and 1960s. Interviewees suggested that more fishing days were planned when the TAC was lower, giving fishermen more time to find the fish.

The lay-up system was valued highly by economists, regulators, and fishermen during its operation, for different reasons [5]. Economists liked the longer season, which allowed the supply chain to absorb the product more easily and more predictably, reducing the overloading of port facilities and marketing costs/risks of inventory holders. A higher percentage of the catch could be sold fresh, creating upward pressure on prices, an outcome supported by the findings of Thomson [9]. Overcapacity was reduced because occasional halibut fishing by non-specialists was discouraged. Arnason's criteria for efficiency (reduced fishing

[1] Fishermen interviewees reported that processors had incentives to under-report deliveries and catch value in order to lower taxes, and some boasted to friends that they had successfully done so.

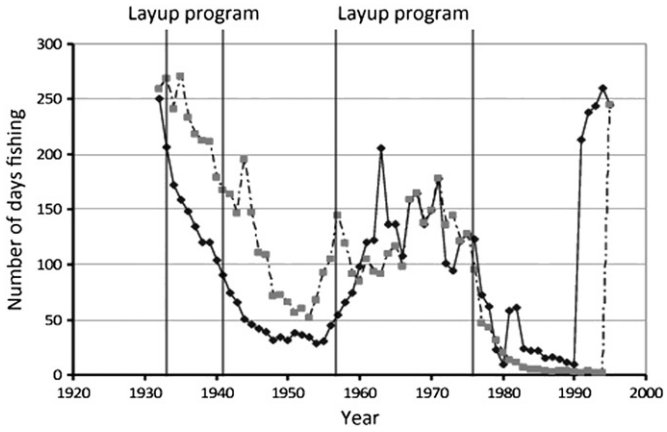



**Fig. 2.** Number of days open to commercial fishing in Pacific halibut management area 2B (BC) (black triangles) and 3A (Alaska) (gray squares)1932–1995, noting periods during which Layup program operated. .
*Sources*: Herrmann and Criddle 2006, International Pacific Halibut Commission

effort, reduced fishing capital, higher quality of landed catch, better co-ordination between supply of landings and market demand) were well met. Because the race for fish was reduced significantly, there was less incentive to overcapitalize by building bigger boats to get to the fish faster. The ITQ system which began in 1990, although it had more days open to fishing than the lay-up system, was arguably not much more efficient (in the sense of least effort to catch the fish) because halibut boats typically only made two or three halibut fishing trips a year of 7–8 days each under ITQs. A few smaller boats fishing multiple species, including halibut, fished a maximum of 130 days a year. Even they did not need more days to take their quota than the lay-up system had allowed.

Government regulators liked the way the lay-up system distributed effort to early, late, and underexploited stocks. They valued the slowed season, which made it easier to track the catch. They appreciated the balance among different sectors of the fleet: small and large, full-time and part-time. This *de facto* allocation by fishermen's organizations spared them the necessity of making difficult allocative political decisions. They also valued the fact that the rules were enforced by fishermen's organizations. Since these were virtually harvest management rules, they relieved government regulators of certain tasks. The IPHC, in arguing that the lay-up system should be made mandatory by the US and Canada, declared that "Without this [lay-up] program, it is likely that the Commission would have introduced a series of open and closed periods to extend the season, which during the early 1950s was less than 40 days in Area 2" [62]. Indeed, when the US and Canada would not make the lay-up system mandatory in 1977, the IPHC explained that it was doing the best it could to provide regulations which would have an effect similar to that of the lay-up system: "In adopting this plan, the Commission attempted to provide for a fishing season similar to 1976 [in] overall length and timing" [63]. Fig. 2 demonstrates that the IPHC was not successful in developing ways to spread fishing effort over more days during the late 1970s and the 1980s when the lay-up system was no longer in use.

Fishermen liked the lay-up system because through it they made rules that were more appropriate and legitimate than government regulations, and allowed them more control and flexibility in organizing the fishing season. They were able to arrange time in their home port during the season, time to make repairs (increasing safety and effectiveness), and experience less pressure to race to fishing grounds (which were less crowded).

While there may not be large differences between ITQs and lay-up systems in the disincentives they provide to overcapitalize vessels and gear in the race for fish, there are significant differences in capitalization of quota or licenses under the two systems. Whereas formerly in the "race for fish" during years when the lay-up system was not in use (e.g., 1977–1989), fishermen were said to overinvest, or overcapitalize their boats, this phenomenon now occurs with quotas under the ITQ system. An ITQ now costs far more than a license alone previously cost. Scholz et al. [64] documented this trend in all British Columbia ITQ fisheries: the combined capital investment in quota, license, and boat under an ITQ system is far greater than the combined capital investment in license and boat pre-ITQs, violating Arnason's condition of "reducing fishing capital". A rough calculation of halibut licenses and quota values shows that pre-ITQ license value was about $46.3 million (1988), or $52.5 million (1989).[2] In 2000, after 10 years of halibut ITQs, licenses and quota were valued at $311 million (in constant 2003 dollars) [65], an increase of nearly 600 percent. By 2011 halibut quota and license values were $357 million [66] or $305.3 million in constant 2003 dollars, so values were dropping but insignificantly compared to the overall increase. Vessel value of $43 million in 2000 and $54 million in 2011 [65,66] was c. $31 million less than the pre-ITQ period (by 2011) in constant 1989 dollars, but this reduction pales in comparison to the increase in capitalization of licenses and quotas. It is also worth noting that the number of vessels fishing after ITQs was less than half the number before ITQs, suggesting that capital investment in vessels at the individual level continued to increase.

In 2011 a "high degree of leasing activity" was reported, with the lease price averaging $5.15/lb [65], or 72% of the average landed value.[3] Although lower than the 2008 lease fee worth 78% of landed value, this figure suggests that the reduction in the economic viability of the second generation is permanent: new owners buy ITQs for $1 million and service a large debt while the third of the fleet which has to lease 70% or more of the quota it fishes faces unsustainably high fishing costs. The approximately half of the fleet which owns most of the quota it fishes has extremely efficient operations, as does the other half of the quota owners who do not fish but lease out their quota.[4] It is especially efficient to lease out one's quota and incur no fishing costs. But this efficiency occurs at the expense of active fishermen. Thus there are significant trade-offs being made between equity, efficiency and effectiveness in the ITQ system. In contrast, the lay-up system arguably achieved a reasonable degree of efficiency without trading off equity and effectiveness.

## 6. Why was the lay-up system discontinued?

In the 1970s, prices for Pacific salmon and herring were at unprecedented highs, drawing new entrants into these fisheries and the halibut fishery, including new Canadians. Limited entry licensing in halibut did not occur until 1979 in British Columbia,

[2] Pre-ITQ values for halibut licenses were estimated from surveys of average monthly advertised sale price in the trade magazine Westcoast Fisherman in 1988 and 1989 (7 advertisements from 1988 and 14 from 1989); OAL (overall allowable length) for all halibut licenses (DFO License List 1994—which would be nearly identical to 1988, given that licenses were limited); and Statistics Canada Consumer Price Index, 2004 (to correct for inflation) (pers. com. Danielle Edwards 2012).

[3] Interviews with processor, buyers, and fishermen suggested an average landed value of $7.15/lb. in 2011.

[4] Small quota holder interviewees reported that they leased because they could not afford the new fixed monitoring costs and could not bear to relinquish a lifetime of connection to the fishery.

meaning any fisherman could buy a halibut license, including those with salmon licenses. The number of halibut licensed vessels (5 net tons or more) in the US and Canada combined increased from 497 in 1975 to 1204 in 1977 [7], the year to lay-up system ended. Many new entrants in the 1970s did not join fishermen's organizations and ignored the lay-up rules, which were not easily or legally enforceable on non-members. Part of the reason appears to have been that many new halibut licenses were put on smaller salmon boats, which did not want to follow the lay-up rules requiring that during a lay-up, a fisherman was not allowed to participate in other fisheries if he had delivered more than 3000 lbs of halibut in a single trip [5]. More and more of the larger boats felt they could not compete and dropped out of the lay-up system. The lay-up system therefore functioned poorly for several years in the early 1970s, since it is difficult to enforce rules if a sizable number of people are not obeying them.

In this situation, the IPHC pleaded with the US and Canada to be given the authority to enforce the lay-up system rules. The US and Canada had a number of options if they had chosen to respond positively to this plea. They could have made membership in a participating fishermen's organization a condition of licensing. Or the rules made by the existing organizations could have been made mandatory for all halibut fishermen. Fishermen's organizations themselves could have been legally empowered to enforce the rules on all fishermen, as they had been doing to members of all participating organizations already when, for example, unionized plant workers refused to unload halibut vessels which were on the "unfair list" [5]. Non-cooperating vessels were reported to be forced to stop fishing for as much as 30 days.

Why were none of these solutions attempted? Skud [7] identifies the lack of [government] manpower or funds to adequately enforce the lay-up rules as the main barrier. There is no evidence that any government regulator considered legally empowering the fishermen's organizations to monitor rule-breaking or enforce the rules. Possibly a combination of anti-regulatory sentiment in the US, and economists advocating limited entry as the solution [67], persuaded government regulators in the US and Canada to try limited entry alone.

However, limited entry in halibut occurred after almost a decade of increase in fishing capacity in salmon and herring. There were no limits on powering up the halibut fleet during this time (investing in bigger boats, faster engines, more gear), and the disincentives to power up provided by the lay-up system were gone after it was discontinued in 1977. Fishermen who were aware that limited entry was coming responded as they had in salmon: they put halibut licenses on every vessel imaginable in preparation, so that the expectation of limited entry caused a swift expansion of the fleet. The ultimate failure of limited entry to contain fishing effort and the race for fish resulted in the number of days fishing being reduced mostly to about 10 days 1979–1990 after which ITQs were finally brought in to increase the number of days fishing and to reduce the fleet size.

## 7. Halibut history told differently according to different policy objectives

The brief summary of halibut fishery regulation in the previous section allows us to conceptualize four contending ideologies regarding the key tool or tools for managing the "race for fish" and the number of days allowed for fishing: lay-up rules, gear and vessel regulations, limited entry, and ITQs. Washington State-based economists favouring limited entry [5] wrote favorably about the history of the lay-up rules as a contribution to regulation, although they did not believe they were a sufficient contribution to contain the growth of fishing effort. However, they were skeptical of other state regulations constraining expansion, such as gear restrictions, because these could limit efficiency. Halibut regulation has historically limited gear *type*—requiring most fish to be taken on hook and line, permitting release of immature halibut with low mortality-but no gear or vessel amount or size. Alaska-based economists [44] began their discussion of issues in halibut regulation in the 1930s.

In contract, Canadian economists favorably evaluating ITQs in halibut tended to argue, at least until recently, that this tool made other tools unnecessary. They ignored the history of the lay-up system and begin their history of problems in the fishery (the race for fish) in 1980 when the fishing days were fewest. As Said [68], cited in Dale [69], notes, "the point at which a storyteller chooses to begin is the first step in the intentional construction of meaning." In this case, ignoring the lay-up history which was well documented in the economics literature can be seen as the avoidance of a different narrative in order to highlight one's own construction of meaning. As Carothers [70] puts it, the process of creating ITQs is portrayed as inevitable and alternatives are left unimagined. The failure of government in containing the race for fish (by having only about 10 days of fishing in 1980) is blamed on limited entry, and not the failure of government to constrain fleet development through regulation and especially to enforce the lay-up system which had an established record of spreading fishing effort. Probably at least two of these mechanisms (lay-up and earlier limited entry or vessel/gear regulations) were necessary in combination to prevent what had happened by 1980.

It is difficult to explain why the positive history of such an efficient, effective, and equitable regulatory tool as lay-up would be ignored in accounts of this history unless scholars either failed to understand how it functioned or were ideologically swayed by a type of neo-liberalism which considers that the market provides the best options. But a more important question is why the Canadian Department of Fisheries and Oceans (DFO) would embrace the advice of the economists advocating ITQs. Government departments are not without ideology, and DFO had already chosen economist Peter Pearse to conduct their 1982 Royal Commission on West Coast Fisheries, which advised them to adopt ITQs. However, government regulators are usually also driven by the sort of pragmatic necessities which organizational behavior sociologists call "bureaucratic rationality" [71]. In this case, ITQs offered government regulators a mechanism to achieve goals for their own internal operations which had nothing to do with more effective regulation of a fishery. One goal was the financial viability of the agency; the other was regulatory simplicity.

DFO was under increasing budgetary pressure and ITQs offered a way of downloading many regulatory costs onto fishermen. A DFO economist told me proudly that after ITQs were introduced in BC sablefish and halibut, these ITQ programs paid for the cost of the entire groundfish unit in DFO's Pacific region. While some economists have argued cogently that fishermen should pay a greater share of the full management and ecological costs of fishing [24], under ITQs these costs are not scaled to the ability of fleets to pay, as is the case in some jurisdictions [72] or to fishing capacity as argued by Lam [73]. Davidson's [74] account of his halibut fishing costs in 2008 provides insight into substantial new costs undertaken by fishermen operating under the ITQ system. Annual costs included: (a) $7,875 for at sea monitoring (cameras installed on his boat which photographed all fishing activity and relayed it to DFO), (b) $1,800 for offload monitoring (dockside monitors who had to be present when fish were unloaded from the boat), (c) $13,320 for license/co-management fees. The cumulative total paid to DFO and the body (Pacific Halibut

Management Association) which oversaw halibut management in 2008 was $1,332,000, compared to approximately $13,000 DFO would have recovered from fishermen before ITQs when a halibut license cost about $30/year. In 2009, DFO cut its own previous contribution to electronic monitoring, further increasing fishermen's costs. The new at-sea and offload monitoring paid for by fishermen were probably instituted in response to concerns expressed by a halibut ITQ evaluation team [75] about "the incentive and opportunity for illegal offloads and unreported halibut landings, especially at remote locations." Although these incentives existed before ITQs after the lay-up system had been discontinued (1977–1989), they were not changed by ITQs sufficiently for them to be disregarded, so action was deemed to be required, and by downloading much of the cost of added monitoring and enforcement onto fishermen, DFO was in a new position to enforce regulations. It is notable that enforcement by DFO is far more expensive than the enforcement by fishermen's organizations under the lay-up system.

This finding is also reflected in James' [76] account that ITQs may lead to higher monitoring and enforcement costs for fishermen but lower costs for government. Economist Tom Tietenberg [77] suggests that many government agencies grant a windfall of public wealth to the first generation of fishermen who transfer their license privilege into ITQs in exchange for the agreement of the first generation to take on these management costs and that it is "politically expedient to allocate a substantial part of the economic rent to existing users as the price of securing their support for moving to ITQs." This finding is consistent with accounts of how ITQs were introduced in the BC halibut fishery, over considerable opposition from fishermen [78].

Anthropologist Scott [79] suggests an additional reason that government agencies prefer privatization schemes such as ITQs: they simplify the job of regulation and make it more understandable, quantifiable, and "legible" to bureaucrats. This reduction of complexity in order to make local systems manageable is far easier for government regulators when the market becomes the method of exchange. Regulators tend to prefer quantitative market metrics to the complexity of managing people or trusting decisions made at fishermen's meetings. This type of simplification allows more control by government. Examining additional dimensions of this form of bureaucratic rationality, Pinkerton [80] found that government regulators tend to be more comfortable with "segmentalism" instead of "holism", and thus have difficulty sharing authority with would-be co-managers. Brewer [81] notes that ITQs in the US were regarded favorably because they disengaged the senior government regulator (NOAA) from allocation conflicts. Likewise, she finds that regulators in New England were uncomfortable with the complexity of Maine fishermen's requests for gear restrictions both because they were complex and because they made fisheries less efficient.

In summary, a reasonable hypothesis is that DFO's policy objectives in instituting halibut ITQs in 1990 were cost recovery and greater manageability as much as (or more than) their stated ones of providing stability and viability for the existing fleet. This would help explain why DFO is now working toward ITQing salmon, a migratory species notably unsuited to ITQs [82]. Therefore, DFO was willing to adopt this economic approach, along with the ITQ narrative which ignores the history of the lay-up system in the halibut fishery.

The implication of this for Clay et al.'s "governance" criteria (costs to government and fishermen, transparency, and legitimacy) are mixed and controversial. Halibut fishermen had voluntarily paid a fee to cover the cost of the annual meeting to negotiate the lay-up rules and to monitor and enforce them on their members. But when DFO dedicated 10% of the halibut TAC to pay for management under the ITQ system 2000–2006, this practice encountered significant opposition from fishermen, even though a substantial portion of this revenue was spent by the Pacific Halibut Management Association (PHMA), the halibut fishermen's organization which oversaw activities such as catch monitoring. The Larocque Court of Appeal's decision [83], although it applied to snow crab and not halibut, caused DFO to stop the practice of using 10% of the TAC to pay for management. Another court case [84] has been launched to recover the fees paid by halibut quota holders to buy back the 10% of the TAC taken from them during 2000–2006. Together with the court challenge to perceived inequity in the initial allocation of quota [78], the halibut ITQ record could not be considered to score well on Clay et al.'s "governance" criteria compared to the lay-up system.

## 8. Conclusion

The community, the state, and the market all have a role to play in making the regulation of a common pool resource equitable, effective, and efficient. As Salomon et al. [85] argue, trade-offs between multiple objectives in a finite world are necessary. It has been argued that the lay-up system offered a reasonable and beneficial balancing of equity, effectiveness, and efficiency in the management of the BC halibut fishery. It scored well on Clay et al.'s performance measures of (a) financial viability, (b) distributional outcomes, (c) governance, and (d) well-being. It clearly performed better than ITQs on the last three criteria, and it has been argued here that since ITQs in halibut are only efficient for quota owners—not quota lessees or crew who together constitute the majority of working fishermen—that the lay-up system also performed better than ITQs on financial viability. The lay-up system also performed well on Arnason's efficiency criteria of (i) reduced fishing effort, (ii) reduced fishing capital, (iii) higher quality of landed catch and (v) better coordination between supply of landings and market demand. Halibut ITQs were shown to perform poorly on reducing fishing capital compared to the lay-up system.

But what is perhaps the most important learning from this story is that it matters a great deal how fishermen perceive and value the equity–effectiveness–efficiency trade-offs. The lay-up system demonstrated that equity was a major driver in the way fishermen's organizations created rules for spreading fishing effort and avoiding the race for fish. It also demonstrated the positive effects of a balancing of equity and efficiency. Its wisdom was to allow fishermen to design their fishery in a way which optimized rest, repair, safety, and flexibility-all values the fishermen believed were as important as efficiency, and ones which Clay et al. might classify as "well-being". This balance was arguably the most effective way to achieve the "fleet stability and viability" which is the stated policy objective of DFO. This discussion thus challenges the claim that equity has to be sacrificed in order to achieve efficiency and effectiveness in fisheries management.

It has been argued that the lay-up system was discarded because governments did not have the imagination or confidence to extend the lay-up system by delegating some monitoring and enforcement authority to fishermen's organizations in a way which would have allowed them to enforce it on new entrants who ignored the rules. This is a particularly lamentable instance of government's inability to support or allow co-management, because there was already four decades of experience with the lay-up system. It would not have been a large step to make the voluntary system mandatory for all halibut fishermen, and it could have been seen as compatible with the neo-liberal ideology of delegating authority to local organizations. By discarding the lay-up system, a major contribution of the community to slowing down and spreading out the fishery equitably without creating economic or biological problems was ignored.

Finally, it has been argued that ITQs, which do not perform as well as the lay-up system on the stated objectives of government

(financial viability and stability of the whole halibut fleet), were adopted by government for cost recovery and regulatory simplicity as much as, or more than, for achieving their stated objectives. The ITQ system can be seen rather as creating significant debt and over-investment in quota instead of boats and gear by the second generation of owners and by the lessees who faced very high leasing costs. It would be wise to question whether the benefits often claimed to result from ITQs really result from that program, as suggested by Costello et al. [86], for example, or whether the choice to ITQ fisheries that are already well-managed (as in the case of halibut by the IPHC) and valuable species influences the comparisons between ITQed and non-ITQed fisheries. Likewise, the context in which a valuable system like the lay-up is discarded is often clouded by the complexity of simultaneous influences such as a downturn in halibut abundance, the advent of extended jurisdiction in 1976 (resulting in less fish being delivered to Canadian ports), precipitous price rises in many fisheries in the mid-1970s accompanied by expanded participation in the halibut fishery, especially from smaller vessels.

Furthermore, it is argued that neither the lay-up nor the ITQs systems should ever have been seen as capable of replacing key input controls such as gear regulation, limited entry, and extensive monitoring. Emery et al. [87] note that many ITQ fisheries also use input controls, and this discussion has documented the substantial increase in monitoring and enforcement deemed necessary under ITQs. Not only is there a need to balance the objectives of equity, effectiveness, and efficiency, but there is a need to recognize that community, market, and state solutions need to work in tandem, as the history of the lay-up and ITQ systems amply demonstrate. Rather than suppressing or ignoring that history, the history lessons should be informing BC halibut and other fisheries worldwide.

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