

CHAPTER 26

Incentives:

the key to solving fisheries problems

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This paper focuses on taking the lessons from some of the more successful fisheries in the world and trying to get those lessons more universally applied. The one word, and we have certainly heard it before (it is not my unique message), is that it is all about ‘incentives’.

Fishermen’s behaviour

After finishing my Ph.D. studies at the University of British Columbia I was employed as an ecologist with Fisheries and Environment Canada and worked on fishermen’s behaviour. My job was to look at ‘predators’ and determine what they did every day. I retrieved the daily records of every British Columbian purse seiner and gillnetter and ascertained where they had fished and what they had caught. What we found is that they behaved in a very predictable way by attempting to maximize their economic well-being. If one place became ‘hot’, then boats would move to that location until it was no longer ‘hot’. However, it wasn’t that the catches were uniform because, in some places, the cost of fishing was higher. At that time in the BC purse seine salmon fishery movement occurred between areas to “equalize” catch rates – subject to differential costs of fishing different areas. There was also an interesting unnatural experiment that took place in Barkley Sound with sockeye production, where it had gone from being a very minor fishery to a very significant fishery. However, it took one season before enough fishermen moved to Barkley Sound in the late 1970s and early 1980s so that, instead of the Barkley Sound fishermen making four or five times as much per day as they would have in other places in BC, enough boats fished in Barkley Sound to equalize the catch rates. Clearly then, fishermen maximize their well-being given the rules and opportunities presented to them.

Fishermen maximize their well-being

Steven Fretwell, an ecologist, had the idea of the “ideal free distribution”, which was that individuals in a population should distribute themselves so that their fitness, in all habitats, is the same. This idea is simple common sense or economics with respect to harvest opportunity. It applies to all aspects: boat building, illegal fishing etc. It means, look at the rules, see what would maximize well-being and then that is what the group will, in aggregate, be doing.

This has proven to be quite universal. It assumes perfect information and a few generalizations that obviously are not true all the time but it is common sense. Economists have been saying this for a long time and it is a powerful way of viewing the world; people will do what maximizes their well-being. If

you look at how fishermen allocate their effort, whether they build a new boat or whether they fish illegally, groups of people tend to make what would be very rational decisions based on the incentives that they are given.

Example: Abundance of lobsters in Tasmania

Some years ago we studied lobster catches in Tasmania and conducted stock assessments using catch per unit effort. The question we explored was, “What determines catch per unit of effort in Tasmania?” The state was divided into 50 different statistical areas and there were very clear differences between the areas. Figure 26.1 shows the total amount of catch, over about a five-year period, which emerged from different areas. There were very significant differences - some places had, effectively, no lobsters at all and some had enormous amounts of lobsters. Most of the big catches came from the west coast of Tasmania.

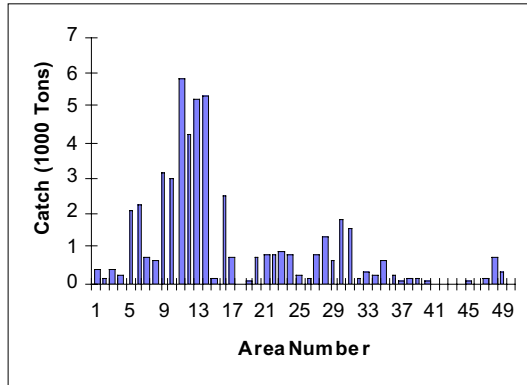


Figure 26.1. Total catch of lobsters in Tasmania by statistical area, over a 5-year period.

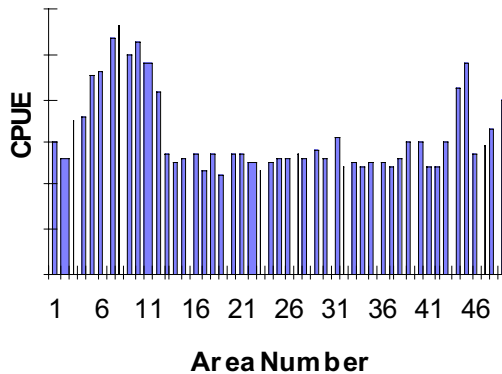


Figure 26.2. Catch per unit effort (CPUE) for lobsters in Tasmania by statistical area.

When we looked at the catch per effort, it was almost the same everywhere except on the west coast (Figure 26.2). Throughout the east coast and the north coast, in general, the catch per effort was almost constant, despite order of magnitude differences in abundance. This was surprising and people indicated that they had been conducting their stock assessments assuming catch per effort related to abundance. However, it is clear that catch per effort was related to alternative opportunities. The west coast has higher catch per effort because frequently the fishermen find the weather is so bad that they cannot fish and so, on days that they are fishing, they have to catch twice as many fish to make it worthwhile going there. Very simply, people are responding to the incentives in which they are placed and, in this case, how they are going to make money.

Managers act to maximize their well-being

Fishermen go to whatever area maximizes their well being - the same thing applies in agencies. Some time ago there was an organization called the International Pacific Salmon Fisheries Commission whose mandate was to split the catch between the US and Canada on an agreed upon sharing arrangement.. They knew their job was to get the right catch in the US and Canada and they did it with staggering precision. They knew their job and they could do it.

In contrast, at the Department of Fisheries and Oceans Canada managers did not know what their job was and they did not know if they were to achieve escapement goals, or to provide sufficient weeks for unemployment insurance for the fishermen in the region, or to minimize fishermen’s complaints. They had very ill-defined objectives and the fishery suffered as a result.

In British Columbia’s salmon fishery, going back as far as 20 years, it was very clear there were a lot of things going wrong. For example, early coded-wire tag analysis work revealed in excess of 80%

exploitation rates for coho salmon in Johnstone and Georgia Straits - and it was very clear that these were too high. There was also pressure to build hatcheries but there were no incentives, within the DFO system, to recognize the dangers posed. John Fraser referred to that earlier (Chapter 1); that is, the incentives, within the DFO system, are not on the performance of the fishery and instead have to do with many other things. There was one group however that was very successful, and that was the Salmon Enhancement Program. They knew what their job was, which was to keep the money coming and they did a good job of that.

If incentives are set, people will behave according to the incentives. For example, in Australia they decided that Individual Transferable Quotas (ITQs) were the way to go for fisheries and they actually authorized, within the civil service, bonuses for achieving certain deadlines for moving fisheries into ITQs; in the Southeast trawl fishery, located between Tasmania and the mainland, civil servants received their bonuses because they achieved the time-line for inclusion into the ITQ. It was so flawed, however, that it was in court for years and was never implemented. However, the incentives were there and the document was in by a certain date - the civil servants achieved the goal.

In December of 1984, Paul Starr, a scientist at the Pacific Biological Station in Nanaimo, BC, and I conducted an analysis on chinook harvest rates and, for the first time, had coded-wire tag data. It was clear from our data that there was a crisis and the harvest rates were much too high. We held a workshop on the impacts of these harvest rates and how the wild and hatchery fish interacted.

Let us think through incentives and what happens in other salmon agencies. Some of our more successful salmon fisheries include: Columbia River salmon, the Alaska troll fisheries, US and Canada chinook in the 1980s. However, habitat and salmon issues in BC, Washington, Oregon and California, are clearly disaster stories. If you devote five minutes to thinking about who is in charge and what incentives they have, the discovery is that there are complex management agencies with either ill-defined goals or, even worse, conflicting goals amongst powerful actors and, the reality is, no progress will be made. The incentives are completely wrong and the incentives themselves become the end result.

Managers act to maximize their well-being in just the same way that the fishermen act to maximize their well being. If the managers don't know what their objectives are, the results are just as unfavourable. If you have multiple actors in charge and multiple agencies, each with the power to do various things, you will not achieve the kinds of outcomes you are looking for.

Bristol Bay sockeye – a successful fishery

Many people will agree that, within Alaska, Bristol Bay sockeye is one of the most successful salmon fisheries. Bristol Bay is located in southwest Alaska (Figure 26.4) and almost all habitat is protected.

This fishery has a long history of sustainability, largely due, not necessarily to the great management of the Alaska Department of Fish and Game although it has done a good job, but to the fact that there has not been significant habitat loss and there are only about 3,000 people living in a very large area. There have been no hatcheries in the system and that is largely a credit to the good sense of the local residents and the people who fish there. Even more remarkable, it may be the only place in North America that has had no exotic species introductions. There is nothing there that has not been there since glaciation. Within Alaska's Department of Fish and Game, they have very clear objectives and they have a very straightforward decision-making structure. They work on escapement goals and the managers know that is their job and, if they do not succeed then there is a year-end review and they are held accountable. In fact, within the areas of Alaska in which I work, it is much more common to over-escape than under-escape and that is the culture of the agency. The other thing that is very different about Bristol Bay, and lots of other places, is that there is someone who is a designated manager and everyone knows their area

of responsibility and there is very clear line of responsibility. That is very different from other fisheries management agencies.

Figure 26.4 shows the trend in catch over the past 100 years or more including the record catches that have occurred due to regime shifts. Figure 26.5 shows the trend in escapement since the 1950s – the escapement trends have been upward rather than downward, which is a very positive counter trend. These represent what are in the current definition *over-escapement* and we will probably see lower escapements on average in the future.

However, there is a “dark side” to Bristol Bay and that is that no one is in charge of economic performance. There have been millions of dollars injected into Bristol Bay and it is an economic disaster. It is a biological success but an economic disaster caused by low prices due to competition with farmed salmon, low quality, the way the fish are caught, a very high over-capitalization, too many boats, overly expensive boats, and due to it primarily being a race to fish. The incentives for an individual fisherman are to build as big a boat as possible to compete with the other fishermen. In this area there are probably five times more boats than are needed and many of them are grossly over-powered. The result is, when there are periods of low economic returns, people lose money and face possible foreclosure and bankruptcy.

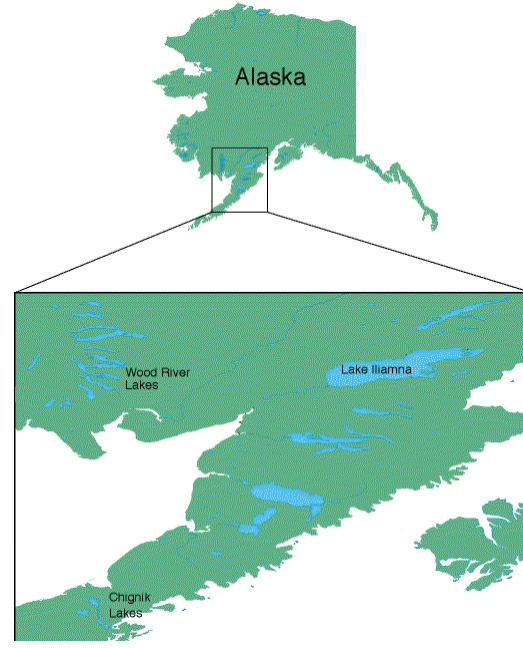


Figure 27.3. Bristol Bay.

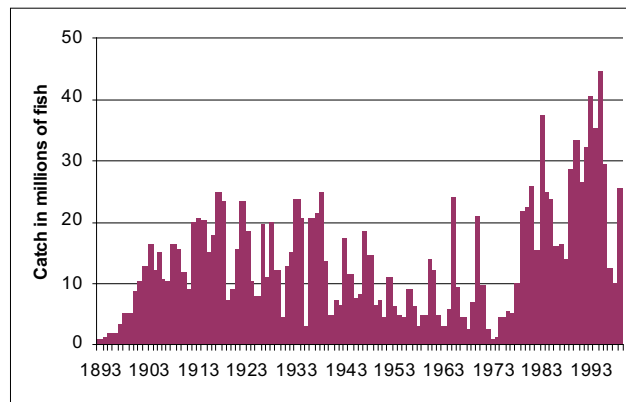


Figure 26.4. Trend in catch of Bristol Bay sockeye since 1893.

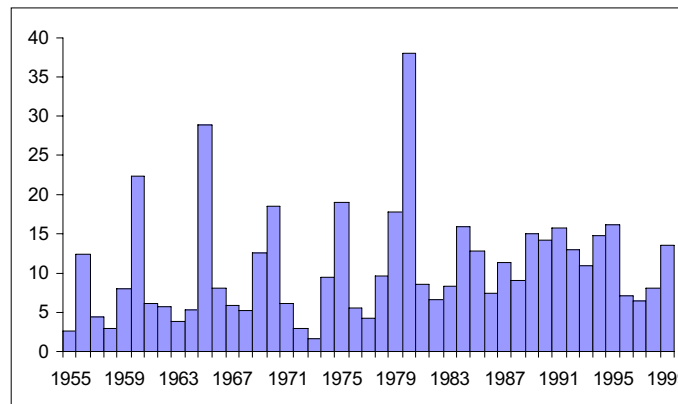


Figure 26.5. Trend in escapement of Bristol Bay sockeye since 1955.

Since there is not a specific mandated position to oversee regulations in order to make it economically efficient, it simply does not happen. There is a giant fishing fleet, although it has limited entry, having gone from 2,000 small boats to 2,000 large boats, and the cost of fishing is probably equal to the current landed value. This has gone from being a \$300 million landed value fishery to, in the last few years, probably a \$50 million landed fishery value. This is one-sixth of the value without the costs of fishing having changed very much, with the result that people are unable to meet their costs. In fact, one-third of the fishermen did not go out at all in 2002. The result is that there is a fishery that is on its knees for reasons that the economic incentives, in that fishery, are totally wrong. It is almost analogous to the Pacific halibut fishery before it went to the ITQ system, where there was a biological success story but a fishery that landed all of its fish in only 12 hours per year.

A comparison of the Canadian and US west coast groundfish fisheries

The Canadian west coast groundfish fishery has made enormous strides in its management strategy. It has gone to 100% observer coverage, which effectively eliminated discarding of economically valuable fish and resulted in complete reporting of the catch. It went to an ITQ system, which reduced effort dramatically and made vessels profitable. The way the ITQ system is structured means that they cannot go fishing for any of the quota species unless they still have quota. Also, the industry is now funding surveys and research to increase the science base. In contrast, the US west coast groundfish fishery is largely closed due to a combination of discarding and by-catch. This means that it runs on trip limits, so that if fishermen are out fishing and run out of their trip limit for a particular species, they legally have to throw it overboard. Current estimates show that 40% of the commercially valuable product is dumped over the side and the fishery is somewhere between near and total economic collapse resulting in a recently funded \$10 million bail-out, buy-back program. The biological status is not nearly as bad as the public perceive; four or five of the stocks are listed as overharvested but none of them are on the verge of extinction. They have recently revised the rebuilding rates from two centuries, to a ten-year or five year period for *bocaccio*. However, this is clearly a fisheries disaster story.

What is the difference between the management strategies of Canada and the US? It is the result of managerial incentives - in Canada, there was and is a manager whose job it is to ensure the success of the fishery. In contrast, in the US, there is no manager; instead there is a committee of seventeen members, the Pacific Fishery Management Council, and no one is in charge. In Canada, the manager knows that his or her job is to determine how to take this fishery from being one of discarding and trip-limits to one that is economically successful and to eliminate many of the problems. He/she does not have power nor is he/she a Minister or decision-maker; rather the job is to manipulate the system. In the US there is the acknowledgement that the trip limits have to be eliminated but nobody has determined how to solve the enforcement problems and nobody has the job to do that.

Moving to property rights (quota) fisheries

Many of the fisheries that I work within have moved to various forms of property rights. Some of the more innovative ones are co-operatives, such as the Chignik salmon fishery, and the New Zealand ITQ fisheries. One of the interesting features of these kinds of fisheries is the elimination of the race to fish. Fishermen think about making money by better product marketing and the value of their product rather than by competing with the other fishermen. In Australia and New Zealand, where they have 100% cost recovery of all management expenses from license holders, the costs of fishing include the cost of operating the boat plus the monies charged for the management system that conducts the research. In a number of these fisheries, the fishermen are beginning to evaluate harvest policies that have lower exploitation rates and also lower research requirements because they are not trying to squeeze out the last fish. Their approach is to draw back on the harvest rate and eliminate the need for conducting surveys every year. By setting the incentives in a positive manner, the outcome is more desirable and will result in a smoother run fishery, more predictability and more profitability. The current incentives in most fisheries

involve a race to fish, building as big and as fast a boat as possible, and pressure to extract the very last fish, and most of the errors are on the side of excess exploitation.

Restructuring incentives

Peter Larkin taught us repeatedly, in the 1970s, that fisheries management is about people management. Yet, if you look at how DFO and NOAA define the precautionary approach, it is almost exclusively in the form of reference points. That is strictly biological and this approach to fisheries says nothing about fishing fleets. The real precaution is in data monitoring, keeping fishing capacity down, and setting incentives in a positive manner. The precautionary approach, as implemented in both the US and Canada, essentially ignores human dynamics - it has taken the people out of the fishery.

We need to think about renewed approaches to the incentives, particularly with respect to salmon. The first thing is to eliminate the race to fish. The ways in which that has been done successfully, in a number of places, is by allocation. For salmon, the most interesting example that I have seen, is that of the Chignik with a co-operative. In the Chignik in 2002, 70 of the 99 fishermen joined the co-op; they fished five boats instead of 70 boats, and all members received a \$20,000 cheque. If you take the worth of that \$20,000 cheque, in terms of an investment, you would be hard pressed to earn a \$20,000 return on a \$300,000 investment. This means that possessing a Chignik license is the equivalent of a \$300,000 investment. The average value of a salmon license in Alaska has gone from being \$100,000 to \$300,000; in Bristol Bay it is currently \$10,000, and in Chignik, the licenses are on the market for \$150,000 to \$200,000. Many of the salmon licenses that have lost almost all their value could, by going to co-operatives, probably increase their value ten-fold. It would mean a dramatic drop in employment but it would also mean that almost all the people who fished would be the local people. In Alaska in the future we will see more and more fisheries converting to co-operatives.

If there is anything I have learned in fisheries management, it is that the smaller the scale and the fewer people that are involved, the better the outcome. The successful Alaska fisheries are small-scale or local fisheries - these are people who care about the resource, who live there and take care of it whether it is the fishermen or the managers. For harvest managers, the requirement for smaller scale is the same. This may mean foregoing fish quality to become more economically profitable and achieving sustainable fisheries.

Managers need to have clearly stated objectives and indices evaluation and be subject to a quantitative score card. This is particularly important when there are objectives with respect to hatchery and wild fish. Guidelines do not work – what is needed is a score-card to allow determination of results, which will be the incentive for managers to achieve positive results. For agency managers, clear quantitative wild fish policies and annual objectives are required as well as implementing and ensuring an annual evaluation. When it comes to habitat management, I am not at all optimistic – it is such a diffuse problem with so many people involved that I would not even attempt to provide a solution.

Conclusion

Bill Rees said, “we are self-interested utility maximizers” (Chapter 14). If we want to solve fisheries problems we need to recognize this and design systems so that what is in the interest of an individual is also in the interest of society. If we want to solve fisheries problems, we need to recognize that we are self-interested utility maximizers and we have to design systems to recognize that. We need to look at the systems that work and determine the key characteristics and then emulate the success stories.