

Driving to Central – A Fisheries Analogy

By Barry Darby

Is it an impossible job that DFO is tasked with in setting harvesting quotas? That's something I've claimed in arguing for a different system for managing ocean harvesting, but it's time to examine that assertion further. What exactly is it that's impossible?

The numbers in DFO's stock assessments for 2J3KL cod over recent years show a large variance. Spawning stock biomass (SSB) values in 2018 were listed between 304 and 418 kilotonnes (kts), and in 2019 between 306 and 518 kts. Other key factors such as natural predation, food supply and the stock's age composition lead to further variability in estimating what yield would be sustainable. Moreover, there is a broad range of opinion as to what percentage of SSB is the correct one for calculating a sustainable harvest.

Let's take a look at a simple example of the practical mathematics of variance in a non-fishery context. Suppose you have to travel from the Burin area to Central Newfoundland next week, a distance of 400-500 kilometres. You'll be travelling at 80 – 120 km/hour. How long will it take you to get there?

A little bit of math will show you that you might possibly make it in as little as 3 hours and 20 minutes, but it could take you as long as 6 hours and 15 minutes.

This analysis leads to three conclusions:

1. There is no exact answer to the problem.
2. There is a range of possible answers that can inform your planning.
3. There are many answers outside that range that you know are wrong: e.g., You can't do it in two hours, but it won't take you ten.

Now let's apply the same process to harvesting 2J3KL cod. Comparable cod fisheries in Iceland, Norway, and pre-moratorium Newfoundland and Labrador show that sustainable harvesting rates vary widely. A conservative estimate based on the known information would suggest that harvest rates of between 10 and 30% of SSB can be, and have been, sustainable.

We know we have an SSB of between 300 and 500 kts of Northern Cod in 2J3KL. A bit of math shows that an appropriate harvest from this stock could be as low as 30 kts (10% of the lower estimate) or as high as 150 kts (30% of the higher estimate.)

Again we can draw three conclusions:

1. There is no exact answer to the problem of how much to harvest.
2. There is a range of possible answers that can inform our planning.
3. There are many answers outside that range that we know are wrong: e.g., We shouldn't catch 200 kts, but 12 kts is way too low.

Quota-based management (QBM) fails and will continue to fail because it requires exact answers to the question of how much fish to harvest. No matter how complex the modeling, it is simply not possible to determine a correct Total Allowable Catch from which to allocate the resulting quotas. From the efforts to calculate the B_{msy} (Maximum Sustainable Yield) in the 1970s, and the use of $F_{0.1}$ in the '80s, to DFO's new "harvest decision rule" of 2020, no system will enable us to do the impossible.

Quota-based management will continue to disappoint, and worse. We will either overfish as we did in the 1960s, or underfish as we are doing now. With the current system, we are harvesting less than we sustainably could – and in fact should, to help keep stocks in balance with the carrying capacity of their habitats. DFO needs to stop trying to achieve the impossible and start implementing a better way.