

March 14, 2017

Hon. Louise Stutes, Chair  
House Special Committee on Fisheries  
Alaska State Legislature

Re: HB128

Dear Representative Stutes:

Wild fisheries resources go up or down, depending on environmental conditions. Sometimes these down periods last years, or even decades. During these down periods, the fishing fleet and coastal communities may experience significant economic hardships. However, given pristine habitats such as we have in Alaska, environmental cycles swing back the other way, and the fish stocks recover. But, during the down period there is inevitably a call to “fix” the depressed stock with a hatchery. In addition to its mariculture provisions, HB128 provides a mechanism for creating enhancement hatcheries (shellfish only) in these situations, which will occur with all of our fisheries resources at some point.

What is wrong with the vision of an Alaskan coastline dotted with facilities releasing millions of juvenile crab, sea cucumbers, shrimp, and in the future possibly also sablefish, halibut, Pacific cod, yelloweye rockfish, starry flounder, etc.? Some might have aesthetic objections to such wholesale changes to the marine environment, but the economic benefit of an enhancement program could be large.

Or, it might not be. If environmental conditions are currently against the species being enhanced, producing more juveniles will often be ineffective at increasing the number of adults, as their survival after release might be quite low. More pernicious is the inevitable shift in environmental conditions back to a favorable state where the fishery resource would be quite productive on its own. Unfortunately, with a large enhancement program in place it will be difficult determining whether the high abundance is due to natural conditions or to the latest tweak to hatchery practices. Once started, there is a high risk of wastefully continuing an unnecessary enhancement program, the cost of which is borne by the fishermen in perpetuity.

However, I’m concerned that the most serious costs will be borne by our fisheries resources. Enhancement is not risk-free. There are three pathways by which enhancement programs can damage our wild stocks:

1. Replacement.- One possibility is that hatchery-reared individuals will simply displace wild-born ones. When environmental conditions are poor, there may be factors that limit the size of the population after the age at which enhanced individuals would be released. Flooding the ocean with animals produced in a hatchery might not increase the population very much, but simply convert much of the population to artificially-produced individuals.

2. Genetic risks.- The presumption that a hatchery-produced animal is equivalent to a wild animal is a critical and dangerous assumption. Our marine environment varies greatly across the state, with a diversity of habitats and oceanographic features, and populations are potentially adapted to their local conditions. Genetic studies often miss significant local adaptations, as they are based on selectively neutral characters. Local adaptation aside, wild populations also have high genetic diversity which, although not currently adaptive, would allow the population to maintain productivity were the environment to change due to global warming, ocean acidification, etc. Enhancement activities can degrade both locally adaptive genetic traits and genetic diversity overall.

Outplanting large numbers of hatchery reared individuals can lower genetic diversity by increasing the level of inbreeding, homogenizing differences in neutral genetic characters, and swamping locally-adapted traits. Domestication, or adaptation to the hatchery environment, may gradually reduce the fitness of hatchery-reared animals for the wild environment. In the hatchery, selection for characteristics such as breeding behavior, egg incubation, foraging, larval reactions to environmental cues, settlement, and predator avoidance will differ greatly from that experienced by animals in the wild, and critical adaptive behaviors may be lost in culture. Using locally-sourced broodstock, continually replenishing broodstock from the wild, and using good breeding practices in the hatchery reduces but does not eliminate these risks.

3. Mixed-stock harvests.- Wild stocks have low productivity, and can sustain only very low harvest rates; otherwise, enhancement would not be necessary. A successful outplanting program will produce many more adults than were used in the brood stock, and thus the enhanced population can sustain a much higher harvest rate. When hatchery and wild components are mixed on the fishing grounds, even if fishing is managed so that total abundance remains high, the wild-born component will be overharvested and will decline. Mixed-stock fisheries accelerate both the replacement of wild fish with hatchery-origin animals and the loss of genetic diversity.

Conservation-minded consumers are well aware of the risks of enhancement to wild stocks. Consequently, a poorly-implemented enhancement program has the potential to jeopardize the sustainability certification of a fishery, which can have a significant financial impact. The large-scale enhancement of salmon in Prince William Sound has led to concerns about damage to the wild stocks that has caused difficulties in certifying those salmon fisheries as sustainable.

So, what about our salmon hatcheries? These produce enormous benefits to our fishing industry, and might seem to be a model for enhancing our other fishery resources. Unfortunately, this is not a great example. Salmon have one feature that allows our salmon hatchery programs to minimize (but not completely eliminate) the risks I've outlined above; salmon return to where they were released.

Because salmon return to where they were released, we can release them in remote locations where they can be targeted for harvest without overharvesting our wild stocks. This remote release strategy minimizes the genetic effects on wild stocks by limiting the interbreeding of wild- and hatchery-produced fish. Most other fishery resources we would enhance would not return to their release site, so

an enhancement program will result in a mixture of wild- and hatchery-origin animals on the breeding grounds and in the fishery, a much riskier situation than with salmon.

In sum, although there is an understandable desire to help economically distressed fishermen and communities during stock downturns by artificially producing fish, this can result in significant risks to the wild populations. Alaska should proceed very gingerly in creating new fisheries enhancement programs. Our fisheries and our markets are based on our sustainable and productive wild stocks, and we should be cautious in tinkering with them.

Recommendation: Although there is language in the HB128 that conveys the desire to protect wild stocks (e.g., Sec. 16.12.010(e)), this language should be made more specific. I would recommend amending the language to read, “The commissioner may not issue a permit under this section unless the commissioner determines that strong proof exists that the action would result in substantial public benefits and would not jeopardize natural stocks”. This change would emphasize the intent of the legislature that protection of wild stocks is the highest priority and that the standard of proof that enhancement operations are safe and beneficial should be quite high.

Respectfully,

Milo Adkison, Professor of Fisheries  
College of Fisheries and Ocean Sciences  
University of Alaska Fairbanks  
(907) 796-5452  
milo.adkison@alaska.edu