

Alaska Fisheries Work in the Last Frontier

The Importance of Salmon and Ensuring Fish Passage and Habitat Connectivity – Part 2

Katrina Mueller/USFWS: Last week we heard from a commercial fisherman operating in Bristol Bay about the economic and cultural importance of healthy, sustainable wild fish populations, and also from our region's Fisheries Program coordinator, Rod Simmons, about how important it is for fish to have free access between key habitats. Fish also need options: species that aren't forced to put all their eggs in one basket tend to do well over time, even if certain populations experience periodic downturns. Daniel Schindler, a professor in the School of Aquatic and Fishery Sciences at the University of Washington, highlighted this in a talk he gave during the Southwest Salmon Science Symposium titled "*The value of intact landscapes for sustaining salmon and their fisheries*"

Daniel Schindler/University of Washington:

Why are salmon fisheries in Bristol so productive and so sustainable over such a long time period? The metaphor that we've started using that I think is useful for thinking about how you wrap your brain around all these processes going on. And the metaphor here is a portfolio, just like an investment portfolio that some of you may be putting your money into. And the way to think about this is you have a hierarchy of very coarse-scale dynamics at the scale of Bristol Bay—this is where the commercial fishery operates—and it's capturing fish that are returning to their home streams in nine major rivers. And each of those major rivers has dozens, if not hundreds of genetically distinct individual populations that occupy individual pieces of that habitat mosaic. And this whole system is being pounded by water and wind and temperature etc., and just like a stock portfolio, where you have stocks that maybe aggregated up into mutual funds that are then aggregated up into your retirement portfolio, the aggregate is much more productive and much more reliable than any of the individual stocks that contribute to that overall portfolio. And the reason you get stability at the big level is because all of the populations don't boom and bust in same years: they compensate for each other through time.

So the argument is that diversity in the landscape—diversity in the habitat—produces diversity in the biology and this spreads risks to variation in the environment and stabilizes the fishery and therefore the people that rely on it.

Mueller/USFWS: Our activities on land, or in the water, can prevent or hinder fish from accessing critically important habitats during key stages of their life cycle, or make those habitats unsuitable for spawning, egg incubation, and rearing. I'm here with Bill Rice, who's our fish passage engineer for the state of Alaska: Bill, What's a common type of man-made barrier that hinders or prevents fish passage in Alaska that many people may not even be aware of?

Bill Rice/State of Alaska: Culverts are everywhere there is a road or trail. Most people don't think of them as barriers because they are on small streams away from the rivers people fish. In the past, culverts were typically undersized and designed only to pass water; resulting in jump, velocity or water depth barriers for fish. There is better data and more controls now with new installations, but it is still a challenge to size them correctly. The best data we have suggest

around 5,000 to 10,000 culverts in fish bearing streams in the state and around 70% of them potentially some kind of barrier.

I would say the other most common barriers that people may not be aware of are fences and water extraction areas. People don't realize that the wire on a fence can be a barrier and also collects debris, they just want their farm animal to not go downstream. It is also fairly common in the more rural areas to extract water from the creek for home needs and a simple way to do that is erect a small barrier of wood or rock to create a pond for the pump and a fish barrier is created.

Mueller/USFWS: So what are some of the key things that need to be considered when designing a "fish friendly" road crossing?

Rice/State of Alaska: For our program, it is all about mimicking the stream being crossed. In other words we ideally want the fish to be able to swim under the road or trail without even really knowing they've gone through a crossing. We embed the culvert in the streambed so it's there's a natural bed of material through the crossing, and simulate the stream's dimensions through the road to maximize the ability for fish and other aquatics to move upstream or downstream. In general this entails selecting a reference reach—so a natural upstream or downstream section of the stream that isn't impacted by the road or trail—and assessing key morphological features such as slope, width, and depth. These are used to correctly size and place the culvert to pass fish, including juvenile salmonids or species that aren't strong swimmers like grayling. Substrate information from the reference reach is used in the design of the streambed through the crossing and sometimes the streambanks. It is important to have roughness—like when you look at a riffle and see different sized rocks that fish can hide behind and get out of the current for a moment—so this roughness essentially creates a diversity of velocities fish can use in navigating through the crossing, just like in the natural environment. It's important to keep in mind fish are moving all the time, trying to maximize their food intake, be successful at spawning, and not get eaten by predators, etc.

Mueller/USFWS: And finally, what's the most innovative fish passage project you've been involved with in Alaska so far?

Rice/State of Alaska: I would say the most innovative was a culvert to bridge project recently constructed where we had to use a combination of bridge construction and stream re-alignment. Basically the original crossing was too small, and it was located where the road curved. We wanted to put a bigger crossing that would pass fish—a bridge—and so we had to move the stream channel slightly to better accommodate the bridge. In this case, putting the bridge in was the preferred option to maximize fish passage and accommodate a 100 year flood event. Through extensive survey of the creek we were able to recreate an entire meander bend with essentially all the same slope, width and depths as the original, with a series of pools and riffles to reference conditions through the new crossing.

Mueller/USFWS: I asked Jon Gerken, a Fisheries Biologist based out of the Anchorage Fish and Wildlife Field Office, to give me an example of how the Fisheries Program is helping

prioritize local fish passage restoration efforts by studying the movement and distribution of salmon.

Jon Gerken/USFWS: Katrina, currently we have a project located about an hour—45 minutes to an hour—north of Anchorage to the Big Lake area, and the idea is to tag juvenile coho salmon with “PIT” tags—Passive Integrated Transponders—about the size of a grain of rice. We implant them in their abdominal cavity and set up a bunch of fixed arrays throughout the system to monitor the migration of these fish year round...and [we] also use a lot of other mobile tracking to catch these fish throughout the season. And the idea is to eventually to figure out where these fish are going, what habitats their using, to make more informed decisions on which culverts or which areas are problematic for fish migration. And the idea is to make an optimization model so we can better use our money for fish passage projects as the final result.

Mueller/USFWS: I'm here with Cecil Rich, our National Fish Habitat Action Plan, or "NFHAP", coordinator. Cecil, in the context of conserving fish habitat in Alaska, can you talk a little bit about Fish Habitat Partnerships in AK, why they came about, and give a brief example of how a partnership has brought people together to improve fish passage?

Cecil Rich/USFWS: Alaska has three Alaska-based Fish Habitat Partnerships that have formed over the past few years in the Matanuska-Susitna Basin, Southwest Alaska and the Kenai Peninsula. These partnerships consist of variety of players including state, local and federal agencies, and tribal entities and non-profits that each bring their unique resources and abilities to collaborate on high priority fish habitat protection and restoration needs with the goal of keeping Alaska's fish populations healthy and abundant.

The Matanuska-Susitna Basin Fish Habitat Partnership came together to identify some of the threats to healthy fisheries. Road culverts not designed with fish passage in mind were one of the primary threats. Over the past several years the Partnership has improved fish passage at almost 50 road crossings. Two of these were on Eska Creek, which flows into the Matanuska River. This system supports coho and Chinook salmon resources that are very significant to the Chickaloon Tribe and other local residents. The Chickaloon Village's Environmental Stewardship Program took the lead in a collaborative project involving the USFWS Fish Passage Program, local contractors, the Alaska Fish and Game and Department of Transportation in repairing these significant barriers to fish passage. This resulted in increased access for salmon to their historic habitats as well as important movements of resident fish.

Mueller/USFWS: If you're interested in learning more about how the Fisheries Program in Alaska is contributing to the conservation of fisheries and fish habitat in Alaska, visit Alaska.fws.gov/fisheries/ and click on fisheries. From there, you can browse the Kenai, Fairbanks, Anchorage, and Juneau Fish and Wildlife Field Offices and also like our facebook page to get timely updates about what the Service and partners are doing to conserve fish and their habitat in Alaska!