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February 20, 2019

Alaska Board of Fisheries
Alaska Department of Fish & Game
Boards Support Section
P.O. Box 115526
Juneau, AK 99811-5526
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Sent Via Electronic Mail

Dear Board of Fisheries Members:

We, the Afognak Alutiiq people, have inhabited our traditional lands of the Kodiak Island Archipelago for over 7,500 years. Afognak Native Corporation ("Afognak" or "the Corporation") represents over 1,100 Native Shareholders, who are descended specifically from the Village of Afognak, on Afognak Island, in the northern part of the Archipelago. On March 27, 1964, one of the largest natural disasters in U.S. history, the "Good Friday" earthquake and tsunami, destroyed our traditional home on Afognak Island. Following the destruction of our village, many chose to relocate and build a new village on Kodiak Island. Our new village was named Port Lions after the philanthropic "Lions Club," that helped rebuild our community along with other organizations. Others moved to the city of Kodiak, or other locations in Alaska, and the lower 48. Afognak Native Corporation was organized in 1977 through the merger of two ANCSA village corporations: Port Lions Native Corporation and Natives of Afognak, Inc. Shareholder status is determined by cultural ties, and shares cannot be bought, sold, or traded. All nine Board Members are Alaska Native Shareholders elected by their fellow Shareholders and serve three-year terms.

Many of our Shareholders rely on fishing as their family's primary source of income. Annual subsistence fishing is impacted by the productivity of salmon hatcheries that contribute to improved salmon returns throughout our region. As such, we are submitting these comments to the Alaska Board of Fisheries to support the continued benefits provided by salmon hatcheries throughout the Kodiak Island Archipelago and our Alutiiq Community. Specifically, we are in support of sustainable salmon fisheries and strong hatchery production in Alaska and the convening of the Salmon Hatcheries Committee Meeting and Joint Protocol on Salmon Enhancement. We also support the intent of the Joint Protocol to highlight statewide perspectives on issues associated with hatchery production of salmon, to provide a forum for open discussion on hatchery topics, and to improve dialogue and transparency between the Board of Fisheries, ADF&G, fisheries stakeholders, and the public.

To support our position, we provide the following data on the critical contributions of hatcheries to our region's fisheries. The Kodiak Regional Aquaculture Association (KRAA), our region's hatchery association, currently operates two hatcheries. One of them is the Kitoi Bay Hatchery (KBH), which is located on Afognak Island on the west side of Izhut Bay approximately 30 miles north of the City of



Kodiak. It is situated on an 11.75-acre site that is owned by the Afognak Native Corporation and leased by the State of Alaska. The lease is due to expire in November 2031. The hatchery was initially designed as a sockeye salmon research facility. The present goal of the facility is to provide enhanced common property salmon fishing opportunities for Kodiak Management Area (KMA) fishermen by increasing returns of pink, chum, coho, and sockeye salmon through broodstock development, egg takes, incubation, hatching, rearing, and releasing juvenile salmon, primarily to the Kitoi Bay area.

The hatchery's primary contribution is to Kodiak area commercial fisheries, but also provides valuable opportunities for subsistence and recreational fishermen on the north end of Kodiak. Specifically, KBH rears four different species of finfish that are implanted into 18 lake and river systems throughout the Kodiak Island Archipelago. They include sockeye, king, and chum salmon, along with rainbow trout. The following table is taken from KRAA's website and shows the origin of the donor stock, the permitted level of egg take, and the release site for each of the four species of hatchery raised fish:

Species	Permitted Level	Donor Stock	Egg-Take Goal	Release Site
Sockeye Salmon	20,000,000	Afognak Lake	Varies	Hidden Lake
		Afognak Lake	Varies	Little Waterfall Lake
		Afognak Lake	Varies	Big Waterfall Lake
		Afognak Lake	Varies	Crescent Lake
		Saltery Lake	Varies	Spiridon Lake
		Saltery Lake	Varies	Telrod Cove
		Saltery Lake	Varies	Ruth Lake
		Saltery Lake	Varies	Upper Jennifer Lake
		Saltery Lake	Varies	Lower Jennifer Lake
Coho Salmon	500,000	Pillar Creek	110,000	Pillar Creek
			110,000	Monashka Creek
			30,000	Island Lake
			20,000	Mission Lake
King Salmon	450,000	Monashka Creek	60,000	Monashka Creek
			60,000	Olds River
			60,000	American River
			60,000	Salonie Creek
Rainbow Trout	200,000	Swanson River	N/A	Varies

The stream and lake systems where these fish are implanted produce fish returns that benefit all user groups around the Island. For example, the Crescent Lake release site is located inside the southern boundary of the City of Port Lions. It provides nearly all the annual subsistence sockeye harvest for the 175 residents of Port Lions who do not have a grocery store. The Hidden Lake, Little Waterfall Lake, and the Big Waterfall Lake systems also provide benefit to our Shareholders by increasing the levels of traveling fish near the north end of Kodiak Island.

In addition to the essential subsistence value, these hatcheries contribute significant local use, economic, and sport fishing benefits. For instance, the Pillar Creek Hatchery releases fish in Pillar Creek, Monashka Creek, Island Lake, Mission Lake, the Olds River, the American River, and Salonie Creek. These



releases provide great value to the local community as these sites are all located on the City of Kodiak road system and they increase harvest opportunity for all user groups. Further, there is additional benefit in that the timing of hatchery returns is staggered throughout the harvest season, which provides fishermen the ability to target all species at various locations.

According to KRAA, the average commercial value of hatchery production was estimated at \$7 million between 2012 and 2017 alone, and over \$3 million on an annual average between 2003 and present. KRAA produced 3.2 million pink salmon (53%) of a total return of 6 million to the Kodiak Management Area in 2018, and the preliminary ex-vessel value of the Kodiak hatchery pink salmon in 2018 was estimated to be approximately \$4.7 million. Preliminary ex-vessel values indicate chum, sockeye, and coho salmon produced by KRAA were estimated to contribute an additional estimated \$2 million to the commercial fishery of Kodiak in 2018. The economic contributions of KRAA to the Kodiak management region resulted in 43 jobs, \$1.8 million in labor income, and almost \$1 million in total economic output in 2017. Across the state, hatchery-origin salmon accounts for 17 percent of sport coho harvests, 13 percent of sport sockeye harvests, and eight percent of sport Chinook harvests. In sum, hatcheries contribute to greater local subsistence harvests, to stronger economic returns for the commercial harvesting fleet, and to higher rates of success for sports fishermen.

In addition to these economic contributions, hatcheries are largely self-sustaining and scientifically sound. Consider that Alaska's salmon hatchery program is non-profit and self-funded through cost recovery and enhancement taxes on the resource and is a model partnership between private and public entities. This sustainability is fueled by the best science. Alaska's salmon hatchery program employs strong scientific methodology and is built upon precautionary principles and sustainable fisheries policies to protect wild salmon populations. In fact, Alaska salmon fisheries, including the hatchery program, continue to be certified as sustainable by two separate programs, Responsible Fisheries Management (RFM) and Marine Stewardship Council (MSC).

Given the important subsistence, economic, and sportfishing contributions hatcheries provide, we request the State of Alaska continue to support all of Alaska's hatcheries and the work they do to provide improvements to habitat and salmon returns throughout Alaska. We specifically request that the State support the convening of the Salmon Hatcheries Committee Meeting and Joint Protocol on Salmon Enhancement. This Joint Protocol is particularly essential as it provides a forum for open discussion on hatchery topics to improve dialogue and transparency between the Board of Fisheries, ADF&G, fisheries stakeholders, and the public to generate statewide perspectives on issues associated with hatchery production of salmon.

Quyanaa (Thank you) for the opportunity to provide these comments. We appreciate the Alaska Department of Fish & Game's dedicated work on behalf of Kodiak and other fishing families and communities. Please do not hesitate to contact us if you have any questions or concerns regarding these comments.

Sincerely,

Alisha Drabek, PhD
Executive Vice President

Submitted By
Alan Kapp
Submitted On
2/19/2019 2:56:15 PM
Affiliation

Honorable Board of Fish,

I write this letter in strong support of salmon hatcheries in the State of Alaska.

I have been a salmon purse seine fisherman in Prince William Sound since 1975. I remember salmon fishing prior to the advent of the hatcheries. I have witnessed salmon fishing since then too. The salmon hatcheries stopped the heavy rains in the fall from scouring the salmon eggs out of the streams by placing the salmon eggs in incubation trays inside a hatchery. As a result, salmon hatcheries in Prince William Sound have given us much more reliable salmon returns. This has been a good thing for fishermen, salmon processors, and the Alaskan State economy.

I urge the Board of Fish to study the facts of this issue. Listen to ADF&G staff reports. Study the science. Then look at the economic benefits to the State that the salmon hatcheries bring. Salmon hatcheries shouldn't be a controversial issue.



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February 19, 2019

Alaska Board of Fisheries
Reed Morisky, Chair
Via email: dfg.bof.comments@alaska.gov

RE: On-time comments for March 8 2019 Hatchery Committee

Chairman Morisky and Board Members:

Alaska General Seafoods ("AGS") AGS is a socially responsible seafood processing company that purchases fresh seafood from independent fishermen, who harvest their wild catch from sustainable fisheries in a responsible manner from the cold pristine waters of Alaska. AGS produces canned, fresh and frozen seafood and sells to wholesale customers around the world. Our seafood products are manufactured in processing facilities which are certified at the highest levels, by both state and federal regulators and independent food inspection agencies, to ensure our seafood products are wholesome and of high quality.

The company has a total of 3 locations in Alaska: two processing plants (one in Naknek and the second in Ketchikan, Alaska) and a Fish Camp in Egegik, Alaska. Our Ketchikan, Alaska plant is located in Southeast Alaska (or the Panhandle) and processes salmon from June to September. SE Alaska has been known for its abundance of pink and chum salmon. After the huge 2013 SE pink salmon run and harvest, wild pink salmon abundance has been on the decline. Our fishermen, employees, and AGS depend on chum hatchery fish to keep themselves financially viable, especially in southeast when pinks have been in short supply.

Alaska's unique salmon enhancement program is critical to the stability of the fishery-dependent communities in these regions, as well as the livelihoods of thousands of Alaskans. Alaska's salmon hatcheries contribute nearly a quarter of the value of our state's salmon harvests and generate \$600 million in economic output, with impacts throughout the economy.

AGS supports the convening of the Salmon Hatcheries Committee Meeting and Joint Protocol on Salmon Enhancement. The Alaska salmon hatchery program provides economic and ecological stability to our salmon returns, which fluctuate year to year. Salmon hatchery production supports our local economies, communities, and all user groups.

Thank you for considering our comments.

Sincerely,



Brad Wilkins

AGS General Manager

Submitted By
Anthony
Submitted On
2/20/2019 8:18:48 PM
Affiliation
Fisherman

Please understand how important hatchery enhancement is to southeast Alaskans. Without these programs hundreds of jobs would be in jeopardy and many fishermen would go bankrupt. Let's keep these enhancement programs permitted and operating at their full capacity. Thank you. Anthony Taiber. Southeast Gillnet.

Submitted By
Ben Van Alen
Submitted On
2/20/2019 2:08:04 PM
Affiliation

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Comments in opposition to Alaska's salmon hatchery program.

We all know that to have healthy salmon runs we need to maintain the environment and maintain the spawners. Unfortunately, many are unaware of the harm that industrial scale hatchery releases are having on the environment and spawners. We are apparently using hatcheries to rebuild and enhance wild runs until they are gone. An unintended consequence of spending millions and millions of dollars trying to get something for nothing. In Nature, there is no free lunch. You can't just release a bunch of little fish and expect an increased return of big fish. The production of all fish (and all critters) is always limited by the carrying capacity of the environment. Releasing millions of little fish reduces the carrying capacity. Millions of wild salmon spawning and dying in thousands of natal streams enhances the carrying capacity. There is no question that hatchery salmon are unnatural competitors for food and mates with wild salmon. After 40+ years working on the assessment and management of salmon stocks and fisheries in Alaska I find neither an ecological nor economic niche for hatchery salmon. This Alaska Board of Fisheries Hatchery Committee must recognize the risks that industrial hatchery releases have on our salmon stocks and take immediate actions to minimize these risks.

I will comment on the "Hatchery Stock Straying", "Regional Planning Teams", and "Enhancement Related Research" agenda items before sharing the comments I submitted to the Board of Fisheries in October 2018 in opposition to hatcheries.

Regarding Agenda Item 5, "Hatchery Stock Straying", I ask WHY? Why allow millions of hatchery salmon to stray? Why knowingly release millions of salmon where they have no place to go? Why do something so different that what happens naturally? Where do millions of wild salmon originate where they have no place to go? Why rely on mop-up/terminal area fisheries to keep hatchery salmon from straying and spawning when it has always been impossible to do so? Why rely on the obvious imprinting and homing ability of hatchery fish then assume high "natural" rates of straying? Why accept the broad dispersion of hatchery strays hybridizing with wild spawners? Why accept the broad scale conversion from wild salmon to hatchery hybrids? Why think that hatchery hybrids are now as fit as the wild stocks they've replaced? Why assume in Southeast Alaska and Prince William Sound that you still have "wild" stock baselines in the multi-million-dollar hatchery vs. wild genetic fitness study? "Wild" stocks have been actively hybridized by hatchery strays each year since hatcheries began. My "recommendations on long-range mitigation strategies" is to close hatcheries and manage for quality habitat and escapements.

Regarding Agenda Item 6, "Regional Planning Teams", I know that 1) an independent scientific review process is needed, and 2) RPT's must follow and comply with wild stock priorities in Alaska's constitution, regulations, and policies. Knowing that wild and hatchery fish swim together, and are in direct competition for space and food to grow and survive in the marine environment, I ask why, why do RPT's assume hatchery returns are "hatchery production" and not "wild reduction"? The latter assumption is ecologically robust. Where do we have industrial scale hatchery releases and not declining or depressed wild runs of eulachon, herring, Chinook, Sockeye, Coho, Pink, and Chum Salmon? Why are RPT's so focused on enabling hatcheries to use whatever rearing and release techniques they can afford to provide their releases with survival advantages over wild fish?" Late-large "and supersized smolts is not a wild stock priority.

Regarding Agenda Item 7, "Enhancement Related Research", I recommend looking at the ecologic and economic data we already have. How have our assumptions worked out since the State began multi-million-dollar hatchery investments in the 1970's? We will likely conclude that overfishing and over-releasing are the principal reasons for declines in eulachon, herring, and salmon stocks. Most importantly, we will likely conclude that the sustaining and rebuilding of wild runs is impossible in the face of continued hatchery releases.

To better understand my hatchery concerns, here are my (slightly edited) comments to the Board of Fisheries from October 2018:

It is time for our experiment with the ocean ranching of hatchery salmon to end. There is no ecological, nor economic, niche for hatchery salmon. Hatchery fish increase competition, decrease growth, increase predation, decrease survivals, increase straying, decrease fitness, increase harvest pressure, and decrease management precision on wild fish. Hatchery releases put wild and hatchery fish in direct competition for declining resources. We observe declining or depressed runs of eulachon, herring, and wild and hatchery salmon wherever we have industrial scale hatchery releases. How can a hatchery fish help a wild one?

To have healthy salmon runs we must maintain the environment, maintain the wild spawners, and close hatcheries – to protect the environment and protect the spawners. The abundance of salmon (and all biota) is always ultimately limited by the environment's carrying capacity - not by the numbers of babies. The carrying capacity can be filled with wild fish, or hatchery fish, but it is the nutrient cycling of wild fish that maintains the carrying capacity. Wild fish are dying for more. It is best to manage for naturally distributed spawners within a range that returns are not obviously limited by too few, or too many, spawners. Our industrial-scale "ocean ranching" hatchery releases push carrying capacity thresholds and contribute to highly variable survivals and returns of both wild and hatchery salmon. Poor survivals of wild salmon results in low returns and low escapements and years of fishery restrictions to rebuilt escapements and returns. It takes fish to

make fish. The sustaining and rebuilding of wild runs is impossible in the face of continued hatchery releases. Where are there industrial-scale hatchery releases and not declining runs of eulachon, herring, and salmon?



Production of salmon (and all plants and animals) is always ultimately limited by the environment's carrying capacity – not by the numbers of babies. You can't just release more fish and get more fish just like you can't just plant more corn to get more corn. The productivity of the ocean is limited just like the productivity of a field is limited. The natural fertilizing by millions of salmon in thousands of natal lakes, streams, and rivers is needed to maintain the environment's productivity just like the farmer must fertilize to maintain the productivity of his/her field. In fact, the farmer also knows the importance of tilling the soil before planting and the importance of seed quality. The farmer knows if she/he wants more corn then they need a bigger field. Our industrial-scale ocean-ranching hatchery program disregards natural ecological processes and all that we have learned about agriculture and farming since 700 BC. The Mighty Pacific is Nature where carrying capacity and natural selection rules. There is only one Mighty Pacific. We can't do better than what happens naturally. We must use Nature as our guide and minimize differences from what happens naturally. There is nothing natural or sustainable about hatchery propagation regardless of the millions of dollars we spend to build and operate hatcheries and the millions of dollars and hours we spend to manage for and around hatchery fish. Ironically, about the same proportion of wild runs are allowed to spawn as the proportion of hatchery runs that are harvested for brood stock and cost recovery? Again, the production of salmon is limited by the carrying capacity and the carrying capacity is limited by our habitat protections, the number we harvest, and the number we release from hatcheries. To sustain healthy stocks and fisheries we must maintain natural habitat conditions as much as possible, actively manage salmon harvests to maintain naturally distributed and abundant spawners, and close hatcheries. It's the numbers that die, not the poor egg-to-fry. Human nature is not mother nature. We can't do better than what happens naturally. Realize that what happens naturally is the positive result of millions, billions, and gazillions of experiments in the competition and cooperation of the biota in the biosphere (fish in the sea).

Hatchery salmon swim with wild fish, they eat what wild fish eat, they eat wild fish, they stray and spawn and reduce the fitness of wild fish, they reduce survivals of wild fish, and, they do not make more fish - they make fewer. Wild and hatchery fish fill the carrying capacity but only wild fish help to sustain it. It is the natural nutrient cycling of millions of wild salmon spawning and dying in thousands of natal streams that helps maintain the productive capacity of our watersheds, estuaries, bays, straits, and ocean. It is the millions of wild salmon that return to spawn where and when their parents did that maintains the genetic and biodiversity fitness needed to have healthy stocks and fisheries. We've allowed billions of hatchery fish to elbow their way into the ecosystem potluck without bringing a dish. We've allowed millions of hatchery fish to stray, spawn, and unnaturally hybridize with, and reduce survivals of, wild fish. The "nutrient mining" inherent with ocean ranching is lowering the productivity for all biota. The 1.6+ billion "nutrient miners" now released from Alaskan hatcheries each year are in direct competition for space and food with wild fish.

How can a hatchery fish help a wild fish? Every place we look we find hatchery releases up and wild (and now hatchery) fish down. Cutting hatchery fish by 100% is needed to sustain healthy eulachon, herring, and salmon stocks and essential now that we have declining and depressed runs of wild eulachon, herring, and salmon in Southeast Alaska, Prince William Sound, Cook Inlet, and Kodiak. It is not thanks to hatcheries that we still have fisheries - it is because of hatcheries that we are losing our fisheries. From fishers to hatchery harvesters. Hatcheries have become one of the biggest "user group" in the State. Simply put, low salmon runs are a consequence of over-fishing and over-releasing. We have nearly 100% control over the former and should close hatcheries to have 100% control of the latter.

The Board of Fisheries should take actions immediately to: 1) discontinue hatchery releases of Chinook, Coho, and Sockeye Salmon; and 2) allow only volitional releases of less than 20 million unfed Pink and Chum Salmon fry from hatchery sites until a complete independent scientific review of factors limiting the production of wild and hatchery fish is done.

In summary, it is impossible to maintain healthy salmon stocks and fisheries in the face of industrial-scale hatchery releases. There is only one ocean and the production of salmon from the ocean is ultimately limited by its carrying capacity. Wild fish can fill this carrying capacity and only wild fish help to sustain it. It is the natural spawning and dying of millions of salmon in thousands of natal streams that helps maintain the productive capacity of our watersheds, estuaries, bays, straits, and ocean. Hatchery fish are elbowing their way into the ecosystem potluck without bringing a dish. The "nutrient mining" inherent with ocean ranching is lowering the productivity for all biota. The 1.6+ billion "nutrient miners" now released from Alaskan hatcheries each year are in direct competition for space and food with wild fish. We observe declining and depressed runs of eulachon, herring, Chinook, Sockeye, Coho, Pink, and Chum Salmon wherever we have industrial scale hatchery programs. Why do we continue to think that the ocean is limitless and that we will have more salmon if we just release more salmon? Why allow hatcheries to employ whatever rearing and release strategies they can "afford" to provide their releases with a survival advantage over wild fish? Why allow hatchery strays? Why spend millions of dollars to supplant wild fish with hatchery fish? Instead of joining Japan and Russia as world leaders in ocean ranching nutrient mining we must stand tall and go wild for healthy runs and healthy fisheries. We all know the key to abundant salmon is to maintain the habitat and maintain the spawners. Minimizing hatchery releases is critical to maintaining the habitat and maintaining the spawners – and completely under our control. How can a hatchery fish help a wild one?

It is time to accept and embrace Alaska's wild stock priority. Alaska Salmon: Wild, Natural, Sustainable...or Hatchery? Stand Tall, Go Wild.

Submitted By
Blake Bousley
Submitted On
2/20/2019 10:58:41 PM
Affiliation
F/V Prime-Time

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Dear Board of Fisheries,

I am a commercial salmon gillnet fishermen born and raised in Ketchikan, Alaska. I am in full support of the current salmon hatchery enhancement programs in Alaska. The salmon hatchery enhancement program contributes a great deal to the commercial salmon fleet as well as taking away a lot of commercial fishing pressure off of wild stocks of salmon. Being able to commercially fish in designated terminal harvest areas away from the routes of wild stocks of salmon is a huge benefit to the fishermen and also the wild stocks of salmon. Decreasing hatchery production will only force commercial fishermen to fish in common property areas that will put more pressure on the wild stocks of salmon.

-Blake Bousley

F/V Prime-Time

Submitted By
Brad Scudder
Submitted On
2/19/2019 10:53:42 AM
Affiliation

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Board of Fish

Mr.Chairman and Board Members,

Thank you for the opportunity to comment on the Joint Protacol on Salmon Enhancement.

Salmon hatcheries are integral to the economic vitality of coastal Alaska communities.

The investment in boats, gear, harbors, and processing would not be happening in Alaska at the current rate if not for salmon hatcheries.

I know I could not have made the investments I have without them.

My history with salmon in Alaska started as a crewman on the Sea Foam in 1977 with Captain Henry Llanos.

In 1978 Henry volunteered to catch some chum salmon in Carroll Inlett for brood stock to start the first hatchery in Alaska. We distributed the extra fish to the community of Ketchikan with extra emphasis to the senior center.

In 1989 I was grateful to have a job harvesting cost recovery fish at the Kitoi Bay hatchery in Kodiak during the Exxon Valdez oil spill.

That was the only salmon fishing available to the fleet that year.

As a board member of NSRAA I experienced first hand the benefit to Southeast coastal communities.

Sport fishing interests enjoy a particular benefit as they access enhanced salmon with out the cost.

In 2010 I had the opportunity to transition to Prince William Sound.

In the brief period of time I have been fishing there, the area has experienced three all time world record salmon returns thanks to hatcheries and exceptional management of wild stocks by ADFG.

As an interested and affected stake holder I hope the Board will carefully consider my comments.

Respectfully submitted,

Brad Scudder

F/V Andy Sea

Submitted By
Brant Widness
Submitted On
2/19/2019 2:28:26 PM
Affiliation
Permit Holder/SSRAA Board Member

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February 18, 2019

Dear members of the Board of Fisheries,

I write today to give my endorsement for continued hatchery support throughout the state of Alaska. Salmon enhancement programs offer fishermen around the state the ability to capitalize on one of our numerous renewable resources. Communities all over the world benefit from the production of Alaska's hatchery programs by making our fish a product that is not only accessible on a domestic, but international market.

As a commercial power troller in Southeast Alaska, I know firsthand the economic benefits and impacts of our local hatchery programs. Many of my fellow fleet members report that over 50% of their gross earnings are from targeting hatchery produced salmon. This is not an exception among the other gear groups, as well. Around Ketchikan we have release programs, propagated by the Southern Southeast Regional Aquaculture Association (SSRAA), that are vital to the economic survival for a multitude of individuals and businesses. With over 70% of SSRAA's returning fish going into common property fisheries, they are successfully making large contributions to the communities of Southeast Alaska. A 2017 study by the MCDowell group study shows that SSRAA has an economic impact of creating 680 regional jobs in all sectors of the salmon fishing industry. The loss of any of these employment opportunities would have a detrimental ripple effect throughout our communities.

If support for Alaska's hatcheries is curtailed by the Alaska Board of Fisheries, Alaska Department of Fish Game, or the public; I fear that many of our commercial fishermen will be unable to sustain their businesses and/or livelihoods.

Thank you,

Brant Widness
F/V Alyeska
Ketchikan, AK

Submitted By
Brian lee
Submitted On
2/19/2019 2:13:02 PM
Affiliation
Self

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Attention BOF

My name is Brian Lee. I am a commercial fishermen in PWS. I have gillnetted since 1985 and purse seined since 2008. The hatcheries in PWS are an extremely important part of my annual business. I am very concerned about any future cuts to hatchery production. I have watched the wild stock pink salmon return at very healthy levels in the the last 6 years during the odd year returns. I personally have not witnessed any one thing of concern that can be directly attributed to hatchery pink salmon. I strongly encourage you to allow the hatcheries to maintain their current level of production. Thank you Brian lee

Submitted By
Brian Warmuth
Submitted On
2/20/2019 8:02:42 AM
Affiliation

I would like to make a few comments for the how tree committee to consider. The first item I would like to cover is the issue of straying salmon. The straying of salmon isn't anything new, it's been happening since the dawn of time. In fact I firmly believe that some movement of fish from stream to stream is a good thing and is nature's way to add to diversity of the species. But, I do understand that too much of a good thing would be a very bad thing, as is the case with many things in life. So I would strongly recommend that the state needs to monitor what is going on in the field and note if there are any dramatic shifts in the amount of straying salmon over time.

One other topic that I wanted to cover is the R.P.T. Process the State has in place. I have gone to a few of these meetings here in Ketchikan. These meetings have been ever informative and useful in learning how the state's hatchery planning process works. It was also interesting to watch how much public input there was. I went to a 2017 meeting when one of the issues was a proposed hatchery at Baranof Warm Springs. These hatcheries had been an item that the R.P.T. had been dealing with for years. There was a great deal of comment from the different state agencies and the general public. I walked away from that meeting with a great deal of confidence that the R.P.T. was a very good way to deal with hatchery proposals. The only change that I would recommend is to have their meetings better advertised so we could have even more public input. Thank you for reading and considering my comments on these issues.

Submitted By
Brian Zwick
Submitted On
2/9/2019 8:44:25 PM
Affiliation
Alaska resident Gillnet

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As a resident Alaska Gillnet fisherman I rely on hatchery raised salmon to support my family. Without the hatcheries I as well as many others wouldn't be able to continue to operate, and the community would suffer.. Another thing our hatcheries do is take pressure off of our wild salmon stocks, without the hatchery fish, commercial, sport and subsistence salmon fishermen would deplete the wild stocks. The bottom line is without our hatcheries Alaska our fishermen, communities and wild salmon would suffer greatly.

Truly. Brian Zwick

Submitted By
Charles McCullough
Submitted On
2/20/2019 3:16:41 PM
Affiliation
Purse seiner

CharlieThaAs a lifelong commercial fisherman in Southeast Alaska the importance of the hatchery program has become increasing apparent to myself and the fleet as a whole. All three of the salmon fisheries in southeast are very dependent on the hatchery programs for making the bottom line of their expenses on any poor wild run return and even on most moderate wild return years. The overhead costs of running our business' is ever increasing and yet the price of salmon has not significantly increases. This means we need to be able to put in some pounds be able to continue making a living in this industry. The ever increasing pressure to preserve some of the stocks of concern has greatly affected our opportunity to fish on other stocks that are healthy but might have a similar run time and migration path as a less vibrant run. Sometimes there terminal harvest areas are the only places we have to fish. Ocean carrying capacity is a tricky subject but evidence points to to the fact that the amount of hat very fish being released into the oceans should have a negligible effect on the available food sources in the ocean. I urge the department to continue its track record of using the best available science to make its decisions on these sort of policies.

Thank you,

Charlie McCullough

Submitted By
Chris Guggenbickler
Submitted On
2/20/2019 6:25:17 AM
Affiliation
SSRAA, USAG, Wrangell F&G AC

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Wrangell, Alaska 99929

Dear Chair Morisky and members of the Board of Fisheries

As a board member of Southern Southeast Regional Aquaculture Association and an associated gillnet representative on the Southern Southeast Regional Planning Team as well as voting member of the Joint Regional Planning Team in Southeast I would offer my experiences in the RPT process. Firstly I would like to state that I feel it has been an open public meeting process and well advertised. I have never experienced debate limited or interested parties not be allowed to fairly speak their mind. All interested persons are able to sign up for associated emails. I have witnessed fully vetted hatchery applications approved and denied support according to a well laid out process in the Comprehensive Salmon Enhanced Plan for Southeast Alaska: Phase III. I have witnessed individuals and department representatives speak of their concerns on various release sites and species. Some times these permit recommendations come with future straying studies attached. Most often new release sites come with test fisheries in proposed terminal harvest areas, I have seen permits approved and others denied based on incidental wild stock harvest in these areas. Other times there has been harvest requirements attached to reduce the potential of straying. More often than not these new permit applications are denied based on strict criteria. The RPT process and criteria for recommendations of permit applications is based on the best available science.

As I reflect on the spring 2018 Board of Fisheries meeting in Sitka and the sheer number of paper associated with staff comments, public comments and rc's. It seems an insurmountable task to properly digest all the input and due public process. The thought of the BOF overseeing the whole RPT process through the state seems to me would even add more and take away from this daunting task.

Furthermore I would like to add that as the chair of the Wrangell Advisory Committee I witnessed an overwhelming support for the hatchery programs in Southeast Alaska. This is the first time I recall the majority of the AC's have come together, jointly in support of something as important as this.

Thank you for this opportunity to comment

Chris Guggenbickler

Submitted By
Chris Ystad
Submitted On
2/20/2019 8:58:39 AM
Affiliation
SE seiner

Phone
907 738-1560

Email
fathom99835@yahoo.com

Address
104 Chirikov Dr
Sitka, Alaska 99835

I am writing to you in support of Alaska's salmon hatchery programs. Alaska's hatcheries are a vital piece to Alaska's economy, and the Pacific Northwest's economy as a whole. These hatcheries are not only important to commercial fisherman like myself, but also to charter fisherman, and personal use fisherman. Lots of money is pumped into Alaska's economy in preparing, chasing, and catching these hatchery fish. From buying licenses, renewing permits, buying fishing gear, fuel, food, sales tax, etc, all of which puts money into different areas of our economy. Alaska's hatchery fish are a big part of many Alaskan's livelihood, putting food on their tables and roofs over their heads. Last year over two thirds of my salmon catch was hatchery salmon. Without these hatchery salmon my season would not have been profitable. This statement can go for many of SE seiners last season, in fact many are calling NSRAA's new Crawfish program a season saver. But since my season was profitable I was able to make my loan payments, make my mortgage payments, buy food at the store, make equipment and gear upgrades, hire hard working Alaskans to make boat upgrades, and not to mention the money I pay my Alaskan crew who pay rent, buy goods and services and help bolster our economy. I could keep going on about the many different ways hatchery fish contribute to Alaska's economy (processors, plant workers, tenderman, etc.) but I will try to keep this short. Limiting Alaska's hatcheries is in essence limiting Alaska's economy, and with Alaska's current financial state that doesn't seem like a financially responsible thing to do. Our governor's new budget proposes massive cuts that will directly hurt many Alaskan's across the state, but its not just the direct financial hardships but also the indirect hardships felt by those down the business commerce line. I think anything that can be done to help bolster Alaska's economy and its financial situation is a good thing to do, and supporting Alaska's hatcheries would be one of those things. When I say support I don't just mean let the hatcheries maintain there current level of production but let them grow. You never know when and how many business's/families an Alaska salmon hatchery will save next.



Alaska Department of Fish and Game
Boards Support Section
P.O. Box 115526
Juneau, AK 99811-5526

RE: March 2019 Salmon Hatcheries Forum Discussion

February 20, 2019

To Whom It May Concern,

Chugach Alaska Corporation (Chugach) is an Alaska Native Regional Corporation established pursuant to the Alaska Native Claims Settlement Act of 1971. As an Alaska Native corporation, we serve the interests of the Alaska Native people of the Chugach region and represent more than 2,500 shareholders. The Chugach region includes the communities of Cordova, Seward, Valdez, Whittier, Port Graham, Chenega, Eyak, Nanwalek and Tatitlek and over 5,000 miles of coastline along the southern tip of the Kenai Peninsula, through the Kenai Fjords, Prince William Sound and Gulf of Alaska.

Alaska's salmon hatchery program is an example of sustainable economic development that directly benefits subsistence fisherman, seafood processors, as well as state and local governments, which receive raw fish tax dollars. The hatchery program has proven to be significant and vital to Alaska's seafood and sportfish industries and the state of Alaska by creating employment and economic opportunities throughout the state, particularly in rural coastal communities.

Chugach Alaska Corporation supports Alaska's salmon hatchery programs and the efforts of the Prince William Sound Aquaculture Corporation. We are ready to engage where needed. If you have any questions please feel free to contact me at 907-563-8866.

Sincerely,

Sheri Buretta
Chairman of the Board
Chugach Alaska Corporation

To: Board of Fisheries (BoF) members
From: Chum Trollers Association (CTA)
RE: Regional Planning Team (RPT) suggestions to address recurring gear-group allocation imbalances

Respected Board Members:

Allow us to introduce ourselves: Linda Danner is Chair of the Chum Trollers Association, and David Richey is a CTA board member. We are speaking on behalf of CTA's 110 members and Southeast trollers generally with respect to RPT hatchery issues and concerns.

First off, hatcheries, in the opinion of the vast majority of trollers, are an unqualified success at raising fish in the Southeast region. NSRAA, SSRAA, DIPAC -- and several smaller hatcheries -- add tremendous value to both the commercial and sport interests in our region. And, vitally: Salmon hatcheries are self-sustaining, being paid for by fishermen, managed by fishermen and harvested by fishermen. This is a beautiful thing.

But here's the problem:

In Southeast Alaska, it's sharing of the abundant resource that is problematic. The 1994 Southeast Alaska Enhanced Salmon Allocation Plan unanimously agreed to hatchery allocation sharing percentages as follows:

1994 Enhanced Salmon Allocation Ranges:

Trollers: 27-32%
Gillnetters: 24-29%
Seiners: 44-49%

Significant allocation imbalances still exist. For a multitude of reasons that change over the decades. So what's to be done?

CTA suggests RPTs be mandated by the BoF to pursue the following:

1. Use the already existing regulations in the 1994 Southeast Alaska Enhanced Salmon Allocation Plan (5AAC 33.364) to impactfully address allocation adjustment measures when imbalance occurs. Use the explicit direction of the regulation to adjust THA access so that all gear groups derive the benefits they pay for.
2. The Joint Regional Planning Team (JRPT) is made responsible for enforcing compliance when long-term allocation imbalance occurs.
3. The JRPT reports to the BoF, and the JRPT is accountable to the BoF.
4. If allocation imbalance persists after a six-year period of time despite the recommendations of the (J)RPT boards' efforts, the gear group that is lowest in their targeted allocation range submits prioritized proposals to the BoF to rectify the imbalance.
5. BoF mandates change.

But here's the rub:

Each hatchery board in Southeast Alaska votes on gear-group access to the THAs. Some boards are better at sharing than others. Why?

Recurring boardroom problems CTA has observed over the last 15 years:

1. Undue outside influence.
 - a. Pacific Salmon Treaty issues are leveraged when chum THA access is being negotiated.
 - b. Local processor influence. Processors put tremendous pressure on local civic leaders, hatchery managers and gear-group representatives.
2. Board personalities. There's no denying that some people are overpowered by others, not by the merits of the argument but the forcefulness of the personalities.
3. Voting.
 - a. Self-interest and simple math typically conspire against the gear group lowest in allocation: We describe this as the "two wolves and a sheep voting on what's for dinner" syndrome.
 - b. Non-permit boardroom seats have undue influence on voting outcomes.
4. Insistence on waiting for new production rather than sharing existing production.
 - a. Unsustainable.
 - b. This approach is contrary to Guiding Principle 13 of BoF Findings 94-148, which prioritizes adjusting management of existing THAs/SHAs ahead of new production.
 - c. The gear group farthest behind must wait for new production.
 - d. The new production is then fought over at the hatchery boardroom level.
 - e. Imbalance continues as new production is harvested by gear groups within their allocation, causing further imbalance.
5. Persistent proposals threatening to alter the 1994 Plan rather than utilizing the existing plan with the corrective guidelines within it, causing strife in boardrooms across Southeast Alaska and before the BoF.

The beauty of the JRPT being responsible for addressing allocation imbalances is:

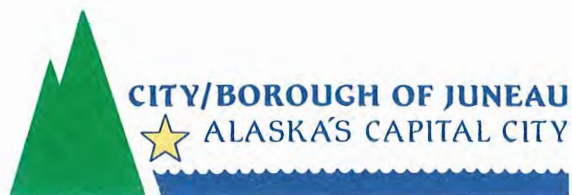
1. It's fair and equitable to *all* gear groups. The gear group lowest in allocation will get equal consideration no matter which gear group that is.
2. Less gear-group squabbling in boardrooms and at the BoF.
3. A solution to allocation imbalances already exists. We need only use it.

Utilizing the JRPT would be easier and more affordable for stakeholders and the state rather than reinventing the wheel: Simply use and enforce existing regulation directives to achieve the mandated objectives laid down in 1994. With the JRPT responsible for compliance when imbalance occurs, this mandate could be accomplished.

Thank you for your time and consideration of our suggestions.

Sincerely,

Linda Danner, CTA Chair
David Richey, CTA boardmember



CITY & BOROUGH OF JUNEAU

City Manager's Office
155 S. Seward St., Juneau, AK 99801
Phone: (907) 586-5240 Fax: (907) 586-5385
rorie.watt@juneau.org

February 19, 2019

Board of Fisheries
State of Alaska, Department of Fish & Game

Submitted via email: dfg.bof.comments@alaska.gov

Dear Board of Fisheries,

The City and Borough of Juneau (CBJ) has greatly benefited from the State of Alaska's Salmon Hatchery Program which, for 45 years, has supplemented wild salmon harvests throughout the state. Alaska's salmon hatchery program is an example of sustainable economic development that directly benefits subsistence fishermen, personal use fishermen, sport fishermen, charter fishermen, commercial fishermen, seafood processors, as well as state and local governments, which receive raw fish tax dollars.

CBJ supports ongoing dialogue between the Board of Fisheries, ADF&G, fisheries stakeholders, and the public. It is important to highlight statewide perspectives regarding issues associated with hatchery production of salmon and to provide a forum for open discussion on hatchery topics to improve communication and transparency. Specifically, we support the convening of the Salmon Hatcheries Committee Meeting and Joint Protocol on Salmon Enhancement. Annual management plans are crucial to the long term viability of salmon stock.

Alaska's salmon hatcheries account for the annual equivalent of 4,700 jobs and \$216 million in total labor income, including all direct, indirect, and induced economic impacts. A total of \$600 million in annual economic output is connected to Alaska salmon hatchery production. The number of people who earn some income from the harvest of hatchery-produced salmon is several times the annual average. In Southeast Alaska, hatcheries account for 2,000 jobs (annualized), \$90 million in labor income, and \$237 million in total annual output, including all multiplier effects. Clearly this is a vital industry for our region.



The CBJ affirms its support for Alaska's salmon hatchery programs, and supports scientific methods to assess the interaction of Alaska's salmon hatchery programs with natural salmon stocks, such as the Alaska Hatchery-Wild Salmon Interaction Study which began in 2011 and is scheduled to conclude in 2023. Further, the CBJ requests the Alaska Board of Fisheries to work with the hatchery community, the Alaska Department of Fish and Game and industry leaders to further its understanding of the importance of the Alaska salmon hatchery program to all Alaskans.

Thank you for your service to the state and your consideration of our comments,

Sincerely

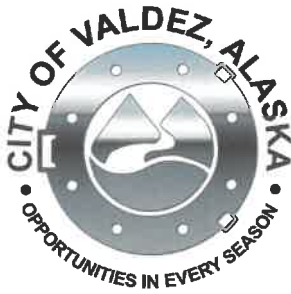
A handwritten signature in black ink, appearing to read "Duncan R. Watt".

Duncan R. Watt
City Manager

Submitted By
Tim O'Connor
Submitted On
2/16/2019 9:11:46 AM
Affiliation
City of Craig Ak.{ Mayor}

Phone
541-601-5941
Email
Mayor@craigak.com
Address
PO box725
Craig, Alaska 99921-725

In The city of Craig fishing is one of our Key Industries. We have a large commercial fishing fleet as well as a large charter fleet. There is also tribal subsistence need and rual needs to address. These are very dependent upon our Prince of Whales hatcherys. The city helps fund and support these as they are critical to our way of life in S.E. Alaska. We have assisted with expanding Hatcherys and release sites to help benefit our local fishermen and subsistence needs. The city views this as a investment nessesary to the servival of our area. It means millions of dollars to our economy. Thank you for your time. Mayor Tim O'Connor, Craig Alaska



February 19, 2019

Alaska Department of Fish and Game
Boards Support Section
P.O. Box 115526
Juneau, AK 99811-5526

<mailto:dfg.bof.comments@alaska.gov>

Dear Board of Fisheries:

As an entity relying on sustainable salmon fisheries and strong hatchery production, the City of Valdez benefits greatly from the State of Alaska Hatchery Program.

Alaska's salmon hatchery program is an example of sustainable economic development that directly benefits subsistence fishermen, personal use fishermen, sport fishermen, charter fishermen, commercial fishermen, seafood processors, as well as state and local governments such as Valdez, which receive raw fish tax dollars.

Alaska's salmon hatchery program is vital to Alaska's seafood and sportfish industries by creating employment and economic opportunities throughout the state and in particular coastal communities such as Valdez.

Prince William Sound Aquaculture Corporation headquartered in Cordova contributes significantly to the economy by providing 1,405 jobs, 68 million in labor income, and \$192 million in total economic output in 2017 and Valdez Fisheries Development Association, Inc. headquartered in Valdez contributes significantly to the economy of Prince William Sound by providing 824 jobs, \$21.5 million in labor income, and \$80.1 million in total economic output between 2008 and 2012.

The City of Valdez encourages the Alaska Board of Fisheries to work with Alaska's salmon hatcheries, by supporting the Joint-Protocol on Salmon Enhancement, and the continuance of regular Salmon Hatchery Committee meetings to increase transparency and dialogue at the Board of Fisheries level.

We thank you for this opportunity to submit our comments and look forward to your continued support of Alaska's Salmon Hatchery program.

Sincerely,

Elke Doom

City Manager
City of Valdez, Alaska

Coal Point Trading Company
4306 Homer Spit
Homer, Alaska 99603

It is acknowledged,

that private nonprofit hatcheries produce a commodity.

that wild salmon are placed at risk from this commodity.

that artificial production far exceeded the purpose of "contributing to the rehabilitation of the states depleted and depressed salmon fisheries."

that the decreed position of the ADFG is adherence to the precautionary principle.

The precautionary Principle to protect wild fish requires cooperation and coordination without present delay, denial, red herrings or half-truths.

Therefore, this BOF Hatchery Committee under its authority and #2002-FB-215 the Joint Protocol on Salmon Enhancement, has the responsibility to invite other state and federal agencies, professional societies, scientists, or industry spokespersons to investigate critical unanswered questions from the original intent that created the PNP Hatchery Act.

1. Has this hatchery commodity achieved the State of Alaska intent, that private nonprofit hatchery programs: **"shall be operated without adversely affecting natural stocks of fish in the state"?** (food web)
2. Has this hatchery commodity been accomplished "efficiently" abiding by Comprehensive Plans and ***policy of management which allows reasonable segregation of returning hatchery-reared salmon from naturally occurring stocks?"***¹ (straying)

¹ ***Section 1. INTENT. It is the intent of this Act to authorize the private ownership of salmon hatcheries by qualified nonprofit corporations for the purpose of contributing, by artificial means, to the rehabilitation of the state's depleted and depressed salmon fishery.***

The program shall be operated without adversely affecting natural stocks of fish in the state and under a policy of management which allows reasonable segregation of returning hatchery-reared salmon from naturally occurring stocks."

Unfortunately the opposite to the original intent is true:

Artificial hatchery production continues to be “operated **with little to no consideration** of adversely affecting of wild fish in the state” through straying, competition, food webs, and increased predator fields. and

Artificial hatchery production ignores reasonable segregation with the documentation of vast unreasonable integration condoned and promoted into naturally occurring stocks, the most recent being 98% artificial hatchery production in Crawfish Inlet September 2018.

Now how to gather all the information reorganize the Regional Planning Teams and begin to systematically repair the damage we are causing to wild stocks.

Hatchery Stock straying - Additional study subjects

- a. **Determine the extent of hatchery straying in the State of Alaska**
- b. the hatchery straying problem has been obscured from public view for 45 years,
- c. the BOF Hatchery Committee and the public must have a centralized register of transparent access of all memos, reports, relating to straying to comprehend the full extent of the hatchery straying over time in the State of Alaska
- d. **Please clarify terms in 39.222 to remove any doubt or confusion to differentiate biological wild spawning natural stocks from hatchery stocks**
 - The hatchery section of ADFG, the RPT’s, the hatchery associations and the public seem confused on the distinctions.
 - Alaskan laws differentiate wild naturally spawning stocks of fish as distinct from an artificial propagated commodity. ^{2 3}
 - Biologically delineate “wild spawning salmon” distinctions by removing all marketing connotations that have crept into biological definitions confusing and obscuring Alaskan wild fish priority from the hatchery commodity.
 - Identify, Accumulate and evaluate **all**, past and ongoing Hatchery/remote release straying studies.

² AS.05.730(a) **shall** be managed consistent with sustained yield of wild stocks **may** be managed with enhanced stocks

³ PNP Hatchery Act – Without adversely affecting natural stocks of fish

- Investigate the PWS Hatchery study design protocol. Questions have been raised as to this design and these questions must be answered not hidden.
- Accumulate and evaluate all Management reporting either written or verbal

How are hatcheries in compliance with the Genetics Policy with their CSP's as compared to straying outcomes. Where is compliance failing?

- "A conservative management approach dictates avoiding release sites where large numbers of hatchery strays can be expected to interact This approach can be achieved by spatial or temporal isolation of the hatchery and wild stock.
- The magnitude of straying relative to the size of the wild run is the most important criterion, a massive spawning by hatchery strays may jeopardize a wild population by displacement on spawning habitat and superimposition of redds, as well as genetic influx.

Regional Planning teams and Comprehensive Plans

- Are the Comprehensive Salmon Plans Comprehensive to protect wild stocks
- Are the Regional Planning Teams we balanced with scientific knowledge to protect wild fish priority?
- There needs to be a professional independent oversight over the RPTs to protect wild stocks
- The Hatchery section must be removed as a voting member from RPT because they sign the permits



February 18, 2019

Alaska Department of Fish & Game
Alaska Board of Fisheries
PO Box 115526
1255 W. 8th Street
Juneau, AK 99811-5526

via email: dfg.bof.comments@alaska.gov

Re: Hatchery Committee Meeting – March 8, 2019

Chairman Morisky, Members of the Alaska Board of Fisheries:

Cook Inlet Aquaculture Association (CIAA) offers these comments and suggestions regarding the agenda for the ADF&G Board of Fisheries (BOF) Hatchery Committee Meeting.

CIAA fully supports restarting the Joint Protocol on Salmon Enhancement #2202-FB-215. This is an important tool to convey critical information to the public.

Hatchery stock straying

Although there is much we do not understand about straying or its impacts, significant research is being conducted to address these concerns. We are only now beginning to receive the necessary data to answer these questions and develop a complete understanding of hatchery/wild interactions and this research is years from completion.

Science, not public opinion, must lead policy development on this topic. In determining an acceptable level of straying of hatchery stocks, rates of straying must be considered for each individual species based on genetics, environmental conditions, spawning habitat and geographical population structure.

All salmon—natural and hatchery-produced—stray to some extent for many reasons including genetics, environmental factors (i.e., wind, currents, storms), and unstable spawning habitat. Straying has allowed salmon to develop genetic resiliency and demographic stability. The mere presence of hatchery strays should not be expressed as harmful until a scientific determination of the effect of hatchery strays on natural salmon populations is known.

Salmon enhancement today means better salmon fishing tomorrow.

Regional Planning Teams (RPT)

The RPT process currently works and accomplishes its intended purpose. Meetings are open and public, follow established agenda and regulatory processes, and are noticed sufficiently. A greater emphasis on disseminating information can be developed to ensure that information is displayed to the public and increasing the commitment to improve the public process. The dissemination of RPT actions would greatly improve public awareness with meeting minutes provided for BOF regional cycle meetings.

Merits of including the Board's hatchery authorities as part of the Board's call for proposals

The public has opportunity to provide proposals for consideration by the BOF for allocative matters within the standard three-year cycle. We believe strongly that if the BOF commits to convening an annual hatchery forum, and the department continues to review RPT decisions and provide updates on hatchery operations, all involved will gain a better understanding and be provided opportunity to voice concerns.

The board's focus on allocative matters of hatchery stocks provides production stability to the users of the resource and the enhancement community. This has been an effective method of managing hatchery programs, using a sound application of scientific and precautionary principle.

The Alaska salmon hatchery program provides economic and ecological stability to our salmon returns, which fluctuate year-to-year. Salmon hatchery production supports our local economies, communities, and all user groups.

Thank you for the opportunity to advance suggestions for the agenda topics scheduled for the hatchery committee meeting. We look forward to working with the Board of Fisheries and Alaska Department of Fish and Game to improve public understanding of these important fishery enhancement programs.

Sincerely,



Dean Day
Executive Director

Salmon enhancement today means better salmon fishing tomorrow.

**Effects of Hatchery-Origin Pink Salmon
On Ecosystems and Other Pacific Salmon:**

An Annotated Bibliography

Prepared by

CM Hersh

**Consulting Aquatic Biologist
Portland, OR
waterhersh@gmail.com**

For

Cook Inletkeeper

**Homer, AK
www.inletkeeper.org**

July 2018



Agler, B.A., G.T. Ruggerone, L.I. Wilson, and F.J. Mueter. 2013. Historical growth of Bristol Bay and Yukon River, Alaska chum salmon (*Oncorhynchus keta*) in relation to climate and inter-and intraspecific competition. *Deep-Sea Res II* 94, 165-177.

This study of Bristol Bay and Yukon River adult chum salmon scales from 1965 through 2006 showed that increased growth was associated with higher regional ocean temperatures but slower growth associated with wind mixing and ice cover. Lower third-year growth was associated with high abundance of Asian chum and warmer sea surface temperatures (SST) in the Gulf of Alaska. High abundances of Russian pink salmon was also associated with lower third-year growth but the effects were smaller than those shown for high abundance of Asian chum and warmer GOA SST.

Amoroso, R. O., M. D. Tillotson, and R. Hilborn. 2017. Measuring the net biological impact of fisheries enhancement: Pink Salmon hatcheries can increase yield, but with apparent costs to wild populations. *Canadian Journal of Fisheries and Aquatic Sciences* 74:1233–1242.

This research estimated the net effect of the largest hatchery program in North America, the Prince William Sound pink salmon. Using other Alaska regions as reference sites (Kodiak, SE Alaska, and southern Alaska Peninsula), the authors used catch data from before establishment of hatchery programs (1960-1976) and after (1988-2011). The reference sites all had smaller programs than PWS (with no southern Alaska Peninsula pink hatchery program). Post late-1970s climate regime shift, all regions had higher catches, with PWS having the greatest increase. Changes in wild salmon abundance were estimated for each region. Hatchery releases did not appear to decrease year-to-year variability in catches. No net positive effects (that is, taking into account the cost of the hatchery programs and reduced wild abundance) from the hatchery programs were detected for in Kodiak or SEAK. In PWS, the net effect was an increase in catch by 28%, lower than that estimated by other studies. This does not take into account other negative effects (e.g., other ecosystem effects, smaller size of returning fish), so any increases in hatchery programs should be done with a full accounting of risks and benefits.

Armstrong, J.L., Myers, K.W., Beauchamp, D.A., Davis, N.D., Walker, R.V., Boldt, J.L., Piccolo, J.J., Haldorson, L.J. and J.H. Moss. 2008. Interannual and spatial feeding patterns of hatchery and wild juvenile pink salmon in the Gulf of Alaska in years of low and high survival. *Transactions of the American Fisheries Society*, 137(5), pp.1299-1316.

This research compared hatchery and wild pinks in PWS and the northern coastal Gulf of Alaska (CGOA) with regard to their summer diets and feeding patterns (e.g., prey composition) in 1999-2004 (encompassing both high- and low-survival years). Hatchery and wild pink salmon had similar diets both during their residence in PWS and after they initially migrate to the CGOA. This lack in difference means that PWS hatchery pink can compete with wild fish for the available prey. Also, it appears that faster-growing fish can migrate from PWS earlier in summer and take advantage of better feeding opportunities in the CGOA.



Atcheson, M. E., K. W. Myers, N. D. Davis, and N. J. Mantua. 2012. (abs) Potential trophodynamic and environmental drivers of steelhead (*Oncorhynchus mykiss*) productivity in the North Pacific Ocean. *Fisheries Oceanography* 21:321–335.

“Information on prey availability, diets, and trophic levels of fish predators and their prey provides a link between physical and biological changes in the ecosystem and subsequent productivity (growth and survival) of fish populations. In this study two long-term data sets on summer diets of steelhead (*Oncorhynchus mykiss*) in international waters of the central North Pacific Ocean (CNP; 1991–2009) and Gulf of Alaska (GOA; 1993–2002) were evaluated to identify potential drivers of steelhead productivity in the North Pacific. Stable isotopes of steelhead muscle tissue were assessed to corroborate the results of stomach content analysis. We found the composition of steelhead diets varied by ocean age group, region, and year. In both the GOA and CNP, gonatid squid (*Berryteuthis anonychus*) were the most influential component of steelhead diets, leading to higher prey energy densities and stomach fullness. Stomach contents during an exceptionally warm year in the GOA and CNP (1997) were characterized by high diversity of prey with low energy density, few squid, and a large amount of potentially toxic debris (e.g., plastic). Indicators of good diets (high proportions of squid and high prey energy density) were negatively correlated with abundance of wild populations of eastern Kamchatka pink salmon (*O. gorbuscha*) in the CNP. In conclusion, interannual variations in climate, abundance of squid, and density-dependent interactions with highly-abundant stocks of pink salmon were identified as potential key drivers of steelhead productivity in these ecosystems. Additional research in genetic stock identification is needed to link these potential drivers of productivity to individual populations.”

Azumaya, T., and Y. Ishida. 2000. Density interactions between Pink Salmon (*Oncorhynchus gorbuscha*) and Chum Salmon (*O. keta*) and their possible effects on distribution and growth in the North Pacific Ocean and Bering Sea. *North Pacific Anadromous Fish Commission Bulletin* 2:165–174.

Data from Japanese salmon research vessels from 1972-1998 were analyzed to evaluate the long-term spatial and temporal distribution of chum and pink salmon. Chum salmon distribution varied out-of-phase with the odd-even differences in pink salmon abundance (pinks having higher abundance in odd years). Chum salmon growth was not directly affected by pink salmon abundance but was affected by chum salmon abundance (higher abundance = slower growth), indicating that intra-species competition was more important than inter-species competition. Dietary (stomach content) research would shed more light onto the importance of inter-specific competition.

Batten, S. D., G. T. Ruggerone, and I. Ortiz. In press. Pink Salmon induce a trophic cascade in plankton populations in the southern Bering Sea and around the Aleutian Islands. *Fisheries Oceanography*. DOI: 10.1111/fog.12276.

This study examined time series (2000-2014) of phytoplankton and copepod abundances around the Aleutian Islands and the southern Bering Sea and compared those numbers with



pink salmon abundances, which were eight times higher in odd years than in even (2000-2012). In 2013 (odd year), the abundance was 73% lower than previous odd years and the next year, pink abundance was relatively high (although lower than the average odd year abundance). There are opposing biennial patterns in abundances of large phytoplankters and copepods relative to pink salmon abundances: in odd years, pink salmon abundance and large diatom abundance is high, while copepod (prey of pink salmon and grazer of diatoms) abundance is low. These associations were stronger than comparisons to “stanzas”, the 4-6 year cycle of warm or cold temperatures found in the Bering Sea.

Beamish, R. J., R.M. Sweeting, T.D. Beacham, K.L. Lange, and C.M. Neville. 2010. A late ocean entry life history strategy improves the marine survival of Chinook salmon in the Strait of Georgia. NPAFC Doc. 1282. 14 pp. (Available at www.npafc.org).

One aggregated population of Georgia Strait Chinook salmon (South Thompson drainage of the Fraser River) has increased in recent years while most other Georgia Strait Chinook populations have declined. The South Thompson Chinook juveniles are not abundant in Georgia Strait in July but are by September, and by November are moving to sea, probably through the Strait of Juan de Fuca. Harrison River sockeye salmon are also a “late-entry” juvenile and doing better than others. It is theorized that high populations of pink and chum salmon present in Georgia Strait at the same time as earlier-entry populations of Chinook and sockeye are the reason why these populations of Chinook and sockeye are not doing as well as late-entry populations. Focused research is needed.

Brenner, R. E., S. D. Moffitt, and W. S. Grant. 2012. Straying of hatchery salmon in Prince William Sound, Alaska. *Environmental Biology of Fishes* 94:179–195.

The authors (all ADFG employees) sampled streams in PWS to determine stray rates using data gathered in two time periods, 1997-1999 and 2008-2010. Percentages of hatchery pink salmon in spawning areas varied from 0 to 98%. Most (77%) of spawning locations had pink salmon from three or more hatcheries, and the escapement at 51% of locations consisted of more than 10% hatchery pink salmon during at least one year surveyed. Application of an exponential decay model indicates that many streams would have over 10% hatchery pinks, even if distant from a hatchery. Besides the implication of genetic effects on wild populations, the authors express concern that estimates of wild escapement may be inflated by the assumption that all fish seen in weirs or in aerial surveys are assumed to be wild.

Debertin, D. J., J. R. Irvine, C. A. Holt, G. Oka, and M. Trudel. 2017. Marine growth patterns of southern British Columbia Chum Salmon explained by interactions between density-dependent competition and changing climate. *Canadian Journal of Fisheries and Aquatic Sciences* 74:1077–1087.

The authors report the results of a study of 39 years of scale growth measurements of chum salmon from Big Qualicum River (BC) in regard to climate variation and competition with other North American salmon (chum, sockeye, and pink). When the North Pacific Gyre Oscillation



was positive, growth increased (attributed to higher primary production). Growth at all ages was negative when the combined biomass of NA salmon was high. Competition effects increased when the NPGO was more positive and the Pacific Decadal Oscillation was more negative. The authors recommend the use of biomass estimates over abundance estimates to take into account inter-species variations and the observed trend of smaller returning salmon. The authors believe this study is the first to use a longitudinal model to examine growth versus the interactions of climate and density dependent competition. If their results are typical of wild salmon populations, reductions in hatchery releases should be considered.

Grant, W.S., 2012. Understanding the adaptive consequences of hatchery-wild interactions in Alaska salmon. *Environmental Biology of Fishes*, 94(1), pp.325-342.

This is a review of hatchery-wild interactions with an emphasis on genetic effects to wild populations. While the author acknowledges that some may argue that studies conducted elsewhere may not be applicable to Alaskan salmon populations for a variety of reasons, the near-universal result that introgression between hatchery fish and wild fish leads to reduced fitness in wild populations is a fact that must be considered when evaluating hatchery programs. The adaptive potential of wild populations must be preserved as a buffer against climate change and diseases.

Gritsenko A.V. and E.N. Kharenko. 2015 (abs). Relation between biological parameters of Pacific salmon of the genus *Oncorhynchus* and their population dynamics off the northeastern Kamchatka Peninsula. *J Ichthyol* 55:430–441.

“Results are provided of a 7-year study of biological parameters in females of three Pacific salmon of the genus *Oncorhynchus* (pink salmon *O. gorbuscha*, chum salmon *O. keta*, and sockeye salmon *O. nerka*) in the Olyutorsky and Karaginsky gulfs, Bering Sea. Abundance of the pink salmon is identified as the main determining factor of the interannual dynamics of maturity index in female Pacific salmon in coastal waters. Maturity index rises at high levels of abundance as a result of differently directed changes in two parameters: decreasing body weight and increasing ovary weight. In female chum salmon, maturity index depends on the age structure of the population and body weight dynamics of different age groups, factors influenced by high abundance of some pink salmon generations, and does not depend on the abundance of spawning chum salmon. The revealed association between pink salmon and sockeye salmon in dynamics of their biological parameters may result from the similarity of their diets; during the last year of fattening in the sea, the sockeye salmon is affected by the pink salmon, the most abundant of the three species. The interannual variation of biological parameters in pink salmon and chum salmon is more pronounced in Olyutorsky Gulf than in Karaginsky Gulf.”

Heard, W.R., 2012. Overview of salmon stock enhancement in southeast Alaska and compatibility with maintenance of hatchery and wild stocks. *Environmental Biology of Fishes*, 94(1), 273-283.



This review of the hatchery programs of SEAK, as well as some relevant studies of wild-hatchery interactions, acknowledges that some interactions between hatchery salmon and of wild salmon are unavoidable, but concludes that “obvious adverse impacts from the current levels of hatchery releases and population trends in Alaska’s wild salmon populations are not readily evident.” The author believes that SEAK hatchery chum programs have been successful in increasing numbers for fisheries, but says that additional increases (which have been requested) should be limited to “gradual incremental steps” given concern over straying in some streams, until better information is generated on the possible impacts of hatchery programs on wild populations.

Hilborn, R. and D. Eggers. 2000. A review of the hatchery programs for pink salmon in Prince William Sound and Kodiak Island, Alaska. *Transactions of the American Fisheries Society* 129:333-350.

Wertheimer, A. C., W. W. Smoker, T. L. Joyce, and W. R. Heard. 2001. Comment: A review of the hatchery programs for pink salmon in Prince William Sound and Kodiak Island, Alaska. *Transactions of the American Fisheries Society* 130:712–720.

Hilborn, R. and D. Eggers, 2001. A review of the hatchery programs for pink salmon in Prince William Sound and Kodiak Island, Alaska: Response to Comment. *Transactions of the American Fisheries Society* 130:720–724.

Hilborn and Eggers used ADF&G catch data from four Alaska regions. The initial paper concluded that while the PWS hatchery program was successful in producing fish to be harvested, the overall increase in harvest wasn’t necessarily due to the PWS pink salmon hatchery programs, because other AK regions (with no, or geographically separated hatchery programs) experienced an increase in wild pink production. In fact, increases in pink salmon harvest in PWS occurred before large-scale hatchery programs there. Therefore, the hatchery-produced pink salmon replaced rather than augmented the wild fish. A decline in wild production in PWS was attributed to lower wild escapements and hatchery releases (the authors claim no evidence has been produced to show that the Exxon Valdez oil spill was detrimental to long-term pink salmon production).

Wertheimer et al. (2001) commented that Hilborn and Eggers vastly over-estimated wild pink production and therefore underestimated the proportion of the PWS pink harvest that could be attributed to hatchery production. They also used a longer time-series of catch data, along with other approaches to the data. Hilborn and Eggers (2001), in a response, stand by their conclusions and point out that in this case a longer time-series is not appropriate (positive changes in pink salmon habitat after the 1964 earthquake). They maintain that an increase in PWS pink production was evident before large-scale hatchery releases took place, and that hatchery releases replaced rather than augmented wild production.



Holt, C.A., Rutherford, M.B, and R.M. Peterman. 2008 (abs). International cooperation among nation-states of the North Pacific Ocean on the problem of competition among salmon for a common pool of prey resources. *Marine Policy* 32, 607–617.

“A common-pool problem in the North Pacific Ocean that remains largely ignored in international policy is competition for prey resources among salmon populations (*Oncorhynchus* spp.) from different countries. Hatcheries release large abundances of juvenile salmon into the North Pacific and the resulting decrease in mean body size of adult wild and hatchery salmon may lead to reductions in benefits. We examine incentives and disincentives for cooperation among nation-states on this issue. We recommend that either a new international organization be created or that amendments be made to the mandate and powers of an existing organization. The resulting organization could encourage collective action to reduce competition among salmon from different nations by using side-payments to change the incentive structure, by establishing a multi-national scientific assessment team to create a common frame of reference for the problem, and by implementing policy prescriptions.”

Irvine, J. R., and M. Fukuwaka. 2011. Pacific salmon abundance trends and climate change. *ICES Journal of Marine Science* 68:1122–1130.

This study compared abundance of five species of salmon (represented by commercial catch data) in both Asia and North America with five climate regimes (1925-1946, 1946-1976, 1977-1988, 1989-1998, and 1999-2009). Higher catches in the western north Pacific are attributed to hatchery programs (both releases and better hatchery technology resulting in healthier fry). The results confirm earlier studies indicating regime “shifts” in 1947, 1977, and 1989. Higher catches of pink and chum since 1990 in all regions have occurred and can be attributed to hatchery releases in only the northwestern Pacific region because only Russia has significantly increased hatchery releases.

Jeffrey, K. M., I. M. Coté, J. R. Irvine, and J. D. Reynolds. 2016. Changes in body size of Canadian Pacific salmon over six decades. *Canadian Journal of Fisheries and Aquatic Sciences* 74:191–201.

Commercial catch data for five salmonid species from 1951-2012 were analyzed along with climatic variables (four Pacific Ocean indices), latitude of catch, and total salmonid biomass to determine if size of caught fish has changed, and if so, what variables are associated with the changes. Catch data from the least-selective method were used to minimize any size-selective gear bias. Analyses from the earlier part of the catch dataset agree with the results of previous research. The results from this study indicate changes in body size over time from oceanic changes as well as density-dependent effects. Pink salmon size declined initially but has changed relatively little over the last 20 years. Body size of Chinook, chum, and coho was most influenced by the total biomass of sockeye, chum, and pink salmon in the Gulf of Alaska. Inclusion of Asian chum salmon did not improve model performance. Pink salmon size was reduced as total biomass increased, with odd-years (higher abundances of pinks) showing a more pronounced effect. Chinook and coho body size increased with total salmon biomass,



possibly reflecting better overall environmental conditions, given the lack of overlap in diet preferences between Chinook and coho vs. the other three species.

Jenkins, E.S., Trudel, M., Dower, J.F., El-Sabaawi, R.W. and A. Mazumder. 2013. Density-dependent trophic interactions between juvenile pink (*Oncorhynchus gorbuscha*) and chum salmon (*O. keta*) in coastal marine ecosystems of British Columbia and Southeast Alaska. North Pacific Anadromous Fish Commission Technical Report 9:136-138.

This study employed stable isotopes to determine the degree of dietary overlap between juvenile chum and juvenile pink salmon (the southern end of SEAK to the northern end of Vancouver Island), and how that is affected by temperature, abundance (juvenile salmon), and prey availability. Juveniles were collected 2000-1 and 2004-5. The niches of pink and chum overlapped more when abundance was high and prey availability was low. The size difference between the species was not significantly correlated with overlap. It appears that when competition was greater (fewer prey items) both species became less selective and therefore they overlapped more. Hatchery releases resulting in greater numbers of juveniles may thus increase competition.

Kaev, A. M. 2012 (abs). Wild and hatchery reproduction of Pink and Chum salmon and their catches in the Sakhalin-Kuril region, Russia. Environmental Biology of Fishes 94:207–218.

“In the Sakhalin-Kuril region hatchery culture of pink and chum salmon is of great importance compared to other regions of the Russian Far East. During the last 30 years the number of hatcheries increased two-fold, and significant advances were made in hatchery technologies. As a result, chum salmon capture in regions where hatcheries operate (southwestern and eastern Sakhalin coasts, and Iturup Island) was 9 times as high during 2006–2010 than during 1986–1990, whereas wild chum salmon harvest markedly declined. Recent dynamics in pink salmon catch appear to track trends in natural spawning in monitored index rivers, suggesting natural-origin pink salmon play a dominant role in supporting the commercial fishery. It remains uncertain as to whether hatcheries have substantially supplemented commercial catch of pink salmon in this region, and I recommend continued research (including implementing mass marking and recovery programs) before decisions are made regarding increasing pink salmon hatchery production. Location of hatcheries in spawning river basins poses problems for structuring a management system that treats hatchery and wild populations separately. Debate continues regarding the existence and importance of density-dependent processes operating in the ocean environment and the role hatcheries play in these processes. Loss of critical spawning habitat for chum salmon in the Sakhalin-Kuril region has led to significant declines in their abundance. I conclude by recommending increases in releases of hatchery chum salmon numbers in the region to help recover depressed wild populations and provide greater commercial fishing benefits in the region.”

Kaev, A. M., and J. R. Irvine. 2016. Population dynamics of Pink Salmon in the Sakhalin-Kuril region, Russia. North Pacific Anadromous Fish Commission Bulletin 6:297–305.



Run size (catch plus escapement) data and numbers of hatchery and wild fry were estimated for eight areas around Sakhalin Island and the southern Kuril islands over the 1975-2015 period. Marine survival was also indexed by dividing run size by the number of fry for each area. Odd-year runs are greater than even-year runs, with the difference increasing over time. The recent increase in pink salmon catch does not appear to be the result of hatchery releases (greater numbers of fry) but instead is the result of environmental conditions in early life stages. Increasing size of adults is attributed to conditions in the common area where pinks (from a number of investigated areas) mingle later in life.

Kaga T., Sato S., Azumaya T., Davis N.D., and M-a. Fukuwaka. 2013. (abs) Lipid content of chum salmon *Oncorhynchus keta* affected by pink salmon *O. gorbuscha* abundance in the central Bering Sea. *Mar Ecol Prog Ser* 478:211–221.

“To assess effects of intra- and inter-specific interactions on chum salmon in the central Bering Sea, chum salmon lipid content was analyzed as a proxy for body condition. We measured the lipid contents of 466 immature individuals collected during summer from 2002 to 2007. Individual variation in log-transformed lipid content was tested using multiple regression analysis with biological and environmental variables. A regression model that included chum salmon fork length and pink salmon CPUE (number of fish caught per 1500 m of gillnet) was the most effective in describing variation in lipid content. Path analysis showed that the negative effect of pink salmon CPUE was stronger than the effect of chum salmon CPUE on chum salmon lipid content. Stomach content analysis of 283 chum salmon indicated non-crustacean zooplankton (appendicularian, chaetognath, cnidarian, ctenophore, polychaete, and pteropod) was higher under conditions of high pink salmon CPUE. Increased consumption of non-crustacean zooplankton containing a low lipid level could lower the lipid content of chum salmon. Thus, chum salmon lipid content could be affected directly by their shift in prey items and indirectly by interspecific competition with pink salmon.”

Mallick, M.J. and S.P. Cox. 2016. Regional-scale declines in productivity of pink and chum salmon stocks in western North America. *PLoS one*, 11(1), p.e0146009.

Historical population data from 99 wild chum and pink stocks in WA, BC, and AK were assessed, and trends in productivity noted. While productivity of some pink stocks in Alaska declined over time, others increased. The authors believe that the productivity of pink and chum stocks in western North America is driven by common processes “operating at the regional or multi-regional spatial scales.” The effects are not constant but can change over time. While some environmental factors operating at the regional scale (and thus, are potential drivers of productivity) were identified, they were not investigated. “Mechanisms that operate over these spatial scales may include freshwater or marine processes such as disease or pathogens, changes in stream flow and stream temperature, competition with abundant hatchery salmon, or shifts in oceanographic condition such as the timing of the spring phytoplankton bloom or sea surface temperature.” They found that most chum and some pink salmon stocks declined, in contrast to Stachura et al. (2014) and other reports.



Malick, M.J. 2017. Multi-scale environmental forcing of Pacific salmon population dynamics. PhD thesis, Simon Fraser University, School of Resource and Environmental Management, Burnaby, BC.

http://summit.sfu.ca/system/files/iritems1/17425/etd10171_MMalick.pdf

This researcher considered variable environmental factors (e.g., phytoplankton phenology, horizontal and vertical transport patterns) and their influence on salmon productivity (see Malick and Cox 2016). The thesis also contains a section on policy analysis where the author outlines the problems that arise from management of migratory anadromous fish species, e.g., multiple national and sub-national polities, the fact that management decisions of one entity can impact the resources of another, and incomplete use of real-time data to make management decisions. The author believes that an “international ecosystem synthesis group” could integrate information from various managers and provide “strategic management advice” based on their synthesis of the various information they receive. Because of the complexity of managing Pacific salmon, a multi-faceted approach is warranted.

Manhard, C.V., Joyce, J.E., Smoker, W.W. and A.J. Gharrett. 2017. Ecological factors influencing lifetime productivity of pink salmon (*Oncorhynchus gorbuscha*) in an Alaskan stream. Can. J. Fish. Aquatic Sci. 74(9), 1325-1336.

A study of the pink salmon populations (both even- and odd-years) of a short (323 m) lake-outlet stream indicated that early marine survival was the primary determinant of overall productivity. An overall downward trend in productivity was associated with an observed decline in freshwater spawning habitat quality. A nearby hatchery released large numbers of pink fry 1988-2002 but no difference in marine survival was noted between that time period and afterwards (with no hatchery releases). “[W]hile commercial harvest and hatchery straying do occur, the effects of these processes on adult recruitment are more likely to be stochastic than deterministic.”

Morita, K. 2014. Japanese wild salmon research: toward a reconciliation between hatchery and wild salmon management. North Pacific Anadromous Fish Commission Newsletter 35:4–14.

This English-language article summarizes some Japanese-language literature on wild and hatchery salmon management in Japan. The author believes that wild salmon productivity is higher and more important than many people believe. Most large rivers in Japan have hatchery programs, and protecting wild populations is a way to guarantee continued success of the hatchery programs (e.g., genetic reserve, source of broodstock in integrated programs). Integrated hatchery programs are probably the best management option in highly-developed, hatchery-dominated Japanese watersheds.

Morita, K., S. H. Morita, and M. Fukuwaka. 2006. (abs) Population dynamics of Japanese Pink Salmon (*Oncorhynchus gorbuscha*): are recent increases explained by hatchery



programs or climatic variations? *Canadian Journal of Fisheries and Aquatic Sciences* 63:55–62.

“Hatchery programs involving the mass release of artificially propagated fishes have been implemented worldwide. However, few studies have assessed whether hatchery programs actually increase the net population growth of the target species after accounting for the effects of density dependence and climatic variation. We examined the combined effects of density dependence, climatic variation, and hatchery release on the population dynamics of Japanese pink salmon (*Oncorhynchus gorbuscha*) from 1969 to 2003. The population trends were more closely linked to climatic factors than to the intensity of the hatchery programs. The estimated contributions of hatchery-released fry to catches during the past decade are small. We concluded that the recent catch increases of Japanese pink salmon could be largely explained by climate change, with increased hatchery releases having little effect.”

Moss, J.H., Beauchamp, D.A., Cross, A.D., Myers, K.W., Farley Jr, E.V., Murphy, J.M. and Helle, J.H., 2005. Evidence for size-selective mortality after the first summer of ocean growth by pink salmon. *Transactions of the American Fisheries Society* 134(5)1313-1322.

Juvenile pink salmon originating from PWS hatcheries were sampled in PWS and the Gulf of Alaska in 2001 to identify the hatchery of origin and determine if larger, faster-growing pink salmon had higher survival rates. Adult pink salmon were also sampled in PWS (at cost-recovery fishing sites) in 2002 for scale analysis to determine if size-selective mortality was occurring after the juvenile sampling (through scale analyses). Both juveniles and adults showed high growth rates in June but lower in July. In July 2001, far fewer juveniles were caught in the Gulf of Alaska than in PWS, although catch rates were similar in August and September, a time when elevated growth rates were also seen. This indicates a bottleneck in growth for PWS pink salmon in July and possible density-dependent effects. The results also indicate that juveniles must attain a critical size in order to survive over the winter and bottlenecks in growth could prevent juveniles from attaining that size.

Myers, K.W., R.V. Walker, N.D. Davis, and J.L. Armstrong. 2004. Diet overlap and potential feeding competition between Yukon River chum salmon and hatchery salmon in the Gulf of Alaska in summer. Final Report to the Yukon River Drainage Fisheries Association. SAFS-UW-0407. School of Aquatic and Fisheries Sciences, University of Washington, Seattle. 63 p.

The overlap in diets and the potential for feeding competition distribution between Yukon River chum salmon and hatchery chum, pink, and sockeye from Asia and Alaska were investigated in summers in the Gulf of Alaska from 1993 through 2003 by examining almost 5000 salmon stomach contents. Inter-specific overlap in salmon diets was low to moderate, however the quality of chum salmon diets was lower than the diets of all sizes of pink salmon and large-sized sockeye salmon. There was a higher potential for competition between Yukon River chum and Alaska hatchery pink salmon in the northeast region of the GOA than in the southeast region.



Stomach contents analyses were consistent with previous studies that showed that chum salmon switch their diets to lower-calorie prey when pink salmon abundance is high. The results lead to hypotheses that competition with hatchery salmon in the GOA may reduce the growth of immature Yukon River chum, especially when adverse ocean and climate conditions limit prey abundance, and that the reduction in growth may reduce survival by various mechanisms such as increased predation, decreased lipid storage, and increases in disease and parasites.

Ohnuki, T., K. Morita, H. Tokuda, Y. Oksutaka, and K. Ohkuma. 2015. (abs) Numerical and economic contributions of wild and hatchery Pink Salmon to commercial catches in Japan estimated from mass otolith markings. *North American Journal of Fisheries Management* 35:598–604.

“Evaluating the contribution of wild and hatchery fish to a fishery is essential to understand economic feasibility as well as the impact of hatchery fish on the ecosystem. However, a precise estimate of this contribution is often difficult to obtain, particularly when hatchery and wild fish are mixed in the catch. In this study, we quantified the contribution of hatchery and wild Pink Salmon *Oncorhynchus gorbuscha* to the mixed- stock commercial fishery in Japan by identifying the ratio of otolith- marked hatchery fish to unmarked and presumably wild fish. The contribution of hatchery fish to the total coastal catch of Pink Salmon in Japan was estimated to be 16.6% and 26.4% in 2011 and 2012, respectively. Thus, the majority of the commercial salmon catch originated from naturally spawned wild fish. Economic yield per release by Japanese hatcheries was 2.2 yen (¥2.2) (≈US\$0.022) and ¥1.5 in 2011 and 2012.”

Pearson, W.H., Deriso, R.B., Elston, R.A., Hook, S.E., Parker, K.R. and J.W. Anderson. 2012. Hypotheses concerning the decline and poor recovery of Pacific herring in Prince William Sound, Alaska. *Reviews in Fish Biology and Fisheries* 22(1), pp.95-135.

In 1993, the Pacific herring stock of Prince William Sound dramatically declined: the stock was about 20% of the predicted record-breaking biomass. The authors examine a number of studies advancing a number of different hypotheses on the reason(s) for the observed decline, and could find no evidence that any of the following have led to either the decline or the poor recovery of PWS herring: oil exposure from the *Exxon Valdez* oil spill; harvest effects; spawning habitat loss; the spawn-on-kelp fishery; disease. Instead, the authors attribute the decline to poor nutrition that began in the mid-1980s and reached a low in 1993. Disease was a secondary response. The fact that the recovery of PWS Pacific herring has been poor despite fishery restrictions is attributed to oceanic conditions outside of PWS and juvenile pink salmon releases (pink salmon predation on age-0 herring and food competition between pink salmon and age-1 herring). Multi-species or ecosystem-based management, rather than single-species management is recommended.

Peterman, R. M., C. A. Holt, and M. R. Rutherford. 2012. The need for international cooperation to reduce competition among salmon for a common pool of prey resources in the North Pacific Ocean. *North Pacific Anadromous Fish Commission Technical Report* 8:99–101.



These researchers accept that density-dependent competition is occurring in the north Pacific and is caused by hatchery programs. Increasing hatchery releases may result in a diminishing return on the costs of hatchery programs, but if competition increases sufficiently wild populations will also be affected as well. The situation is that the “common-pool” resource that is the north Pacific is subject to the classic “Tragedy of the Commons”. The North Pacific Anadromous Fish Commission, after amendments to its mandate, is the body best equipped to deal with the situation. The NPAFC should “identify and implement collective actions to prevent further increases in competition among salmon from different nations or even reduce it” as “[a]ction on this problem of multinational grazing of salmon food is long overdue.” Action needs to be taken before a crisis occurs, such as climatic changes that may limit overall salmon productivity, and will likely lead to a knee-jerk call for more (ultimately counter-productive) hatchery releases.

Prince William Sound Science Center studies on hatchery-wild interaction:

Gorman, K., McMahon, J., Rand, P., Knudsen, E., and D.R. Bernard. 2018. Interactions of wild and hatchery pink salmon and chum salmon in Prince William Sound and Southeast Alaska. Final report for 2017. Prince William Sound Science Center, Cordova, AK.

Gorman, K., McMahon, J., Rand, P., Knudsen, E., and D.R. Bernard. 2016. Interactions of wild and hatchery pink salmon and chum salmon in Prince William Sound and Southeast Alaska. Progress Report for 2016. Prince William Sound Science Center, Cordova, AK.

Knudsen, E., Buckhorn, M., Gorman, K., Rand, P., Roberts, M., Adams, B., O’Connell, V. and D.R. Bernard. 2015. Interactions of wild and hatchery pink salmon and chum salmon in Prince William Sound and Southeast Alaska. Final Progress Report for 2014. Prince William Sound Science Center, Cordova, AK; Sitka Sound Science Center, Sitka, AK.

Knudsen, E., Buckhorn, M., Gorman, K., Crowther, D., Froning, K., Roberts, M., Marcello, L., Adams, B., O’Connell, V. and D.R. Bernard. 2015. Interactions of wild and hatchery pink salmon and chum salmon in Prince William Sound and Southeast Alaska. Final Progress Report for 2013. Prince William Sound Science Center, Cordova, AK; Sitka Sound Science Center, Sitka, AK.

Knudsen, E., Rand, P., Gorman, K., McMahon, J., Adams, B., O’Connell, V. and D.R. Bernard. 2016. Interactions of wild and hatchery pink salmon and chum salmon in Prince William Sound and Southeast Alaska. Progress Report for 2015. Volume 1. Prince William Sound Science Center, Cordova, AK; Sitka Sound Science Center, Sitka, AK.

Prince William Sound Science Center. 2013. Interactions of Wild and Hatchery Pink and Chum Salmon in Prince William Sound and Southeast Alaska. Annual Report 2012. For Alaska Department of Fish and Game Contract IHP-13-013



These reports were generated as part of a research effort sponsored by ADF&G. The purposes are to: “1) further document the degree to which hatchery pink and chum salmon straying is occurring; 2) assess the range of interannual variability in the straying rates; and, 3) determine the effects of hatchery fish spawning with wild populations on the fitness of wild populations.” Ocean sampling was conducted in 2013-2015 in nine locations near the entrances to PWS to determine wild or hatchery origins of pink and chum in PWS (via examination of otoliths). Stream studies were also conducted to determine the proportion of hatchery-origin fish on the spawning grounds and an investigation into the relative survival of the offspring of naturally spawned fish (wild and hatchery-origin). These reports have reported basic data with no advanced statistical or biological analyses. Proportions of hatchery-origin pink salmon on spawning grounds range from zero to over 80% in some PWS streams.

Riddell, B., M. Bradford, R. Carmichael, D. Hankin, R. Peterman, and A. Wertheimer. 2013. Assessment of Status and Factors for Decline of Southern BC Chinook Salmon: Independent Panel’s Report. Prepared with the assistance of D.R. Marmorek and A.W. Hall, ESSA Technologies Ltd., Vancouver, B.C. for Fisheries and Oceans Canada (Vancouver, BC) and Fraser River Aboriginal Fisheries Secretariat (Merritt, BC). xxix + 165 pp. + Appendices. Available at www.psc.org/publications/workshop-reports/southern-bc-chinook-expert-panel-workshop. Accessed June 5, 2018

Evidence presented at a workshop discussing the decline of southern BC chinook did not support the hypothesis that pink salmon abundance had a role in the decline of southern BC Chinook. There was no apparent odd- and even-year pattern in Chinook survival (which would thought to be present if pinks were having an effect), although some recent literature (referenced in this report) indicated that there may be an effect.

Ruggerone, G.T., and J.R. Irvine. 2018. Number and biomass of natural- and hatchery-origin pink, chum, and sockeye salmon in the North Pacific Ocean, 1925-2015. *Mar Coast Fish* 10:152-168.

Abundance and biomass data are presented for pink, chum, and sockeye for the time period 1925-2015; this is the most comprehensive tally to date. These species are at an all-time high, as the late 1970s regime shift benefited these species. If immature salmon are included, the north Pacific contains 5×10^6 metric tons of these species. Pink salmon were the most abundant adult fish of the three (67%) and were 48% of the total biomass (chum 20% and 35%; sockeye 13% and 17%, respectively). Alaska produced 39% of the pink salmon with Japan and Russia producing most of the remainder. Hatcheries accounted for 15% of the pink salmon production (Alaska produced 68% of hatchery pink salmon) although hatchery fish dominated in some regions, such as PWS and SEAK. In the period 1990-2015, hatchery fish composed 40% of the total biomass in the north Pacific, which may be at its carrying capacity. Density-dependent effects are occurring although hatchery-wild interaction effects are difficult to quantify. Management agencies should mark hatchery fish and estimate hatchery- and natural-origin fish in their catch and escapement data to aid focused research efforts.



Ruggerone, G.T., Agler, B.A., Connors, B.M., Farley Jr., E.V., Irvine, J.R., Wilson, L.I. and E.M. Yasumiishi. 2016. Pink and sockeye salmon interactions at sea and their influence on forecast error of Bristol Bay sockeye salmon. *North Pacific Anadromous Fish Commission Bulletin* 6:349–361. doi:10.23849/npafcb6/349.361 (Available at <http://www.npafc.org>).

Ruggerone et al. (2010) showed that abundance of sockeye salmon in western and central Alaska tended to be positively correlated with pink salmon abundance, in contrast to more southern regions where sockeye abundance was negatively correlated with pink salmon abundance. Ocean conditions may be an overriding factor, so this research was focused on evaluation of the evidence of competition between Bristol Bay sockeye and pink salmon from Russia and central Alaska. Sockeye scales from 1965 through 2009 were evaluated for growth patterns; abundance of adult pink salmon was available in previously published literature. Growth patterns from all five BB sockeye stocks indicated a strong alternating-year growth pattern, consistent with the hypothesis that sockeye and pinks compete for food on the high seas. Sockeye growth at sea during odd-years was low; other referenced research indicated that pink and sockeye have a high diet overlap. Also, in odd-years sockeye stomach fullness was reduced. Examination of the ADF&G's sockeye salmon abundance forecasts from 1968-2010 indicated errors in an alternating-year pattern; a tendency for a too-high forecast in even-years, and too low in odd-years, consistent with a hypothesis that competition at sea between sockeye and pink (in the year previous to the sockeye return year) was indeed a factor but was not considered in the forecasts.

Ruggerone, G.T. and B.M. Connors. 2015. Productivity and life history of sockeye salmon in relation to competition with pink and sockeye salmon in the North Pacific Ocean. *Can. J. Fish. Aquat. Sci.* 72, 818–833.

The Fraser River (BC) sockeye salmon return in 2009 was the lowest in over 60 years, capping a decline that had started in the 1980s. Scientists indicated that declining productivity at sea was responsible rather than factors like spawner abundance or freshwater factors. Pink salmon abundance was identified as a possible factor due to overlapping spatial distribution in the north Pacific and diets. This research uses stock-recruitment dynamics and data from 36 sockeye salmon populations ranging from Washington State north to SEAK (18 were Fraser River drainage populations). Sea-surface temperature (SST) and farmed salmon were also considered as possible confounding factors. Results indicated that 1) during odd-years (high pink abundance), sockeye survival rates and length-at-age of returning sockeye were lower, as well as a higher proportion showing delayed maturation; 2) for all but one population (with a unique “ocean-type” life history) sockeye growth in the second year was negatively correlated with pink salmon abundance and led to lower sockeye productivity; 3) inclusion of environmental factors did not improve performance; and 4) there did not seem to be evidence that returning pink salmon preyed on out-migrating sockeye salmon. The 1970s regime shift saw an actual increase in pink salmon abundance from 200 million to 400 million; a model of pink salmon abundance and Fraser River sockeye returns predicted a reduction in Fraser River sockeye returns of approximately 5.5 million.



Ruggerone, G. T., B. A. Agler, and J. L. Nielsen. 2012. Evidence for competition at sea between Norton Sound chum salmon and Asian hatchery chum salmon. *Environmental Biology of Fishes* 94:149–163.

An important chum salmon population in Norton Sound, Alaska (Kwiniuk chum) has experienced reduced adult length-at-age, age-at-maturation, productivity, and abundance, corresponding with increased hatchery Asian chum salmon abundance. Analyses of the relevant data indeed show that hatchery Asian chum salmon abundance is negatively correlated with the size and age parameters, productivity, and abundance of the Kwiniuk chum. Inclusion of Asian and western Alaska wild chum salmon abundance did not improve the model. Lower productivity of Kwiniuk chum was correlated with high abundance of wild eastern Kamchatka Island pink salmon during odd-years; the effect was less than that of hatchery chum. This evidence for density-dependent effects points out the need for international cooperation on hatchery releases.

Ruggerone, G.T., Peterman, R.M., Dorner, B. and K.W. Myers. 2010. Magnitude and trends in abundance of hatchery and wild pink, chum, and sockeye salmon in the North Pacific Ocean. *Mar Coast Fish* 2, 306–328.

Total abundance numbers for both Asia and North America populations of chum, pink, and sockeye salmon were reconstructed from catch and spawner abundance data from 1952–2005. Pink salmon were the most abundant (70%), followed by sockeye (17%) and chum (13%). After the mid-1970s regime shift, pink and sockeye became more abundant while chum numbers decreased. Asian salmon numbers did not increase until the 1990s. Hatchery releases increased during the 1990s and early 2000s, reaching 4.5×10^9 juveniles/yr. Hatcheries were responsible large numbers of adult fish returning: 62% of the chum, 13% of the pink, and 4% of the sockeye in 1990-2005. Combined, wild and hatchery salmon in the same time period averaged 634 million fish, twice as many as during 1952-1975. Better data gathering and management are needed, as well as international cooperation to better manage the common waters, especially in light of possible increases in hatchery releases in the face of evidence of changing climate and density-dependent effects.

Ruggerone, G.T. and J.L. Nielsen. 2004. Evidence for competitive dominance of pink salmon (*Oncorhynchus gorbuscha*) over other salmonids in the North Pacific Ocean. *Rev Fish Bio Fish* 14, 371–390.

The alternating yearly cycle of pink salmon abundance lends itself to studies of competition with other Pacific salmon. This review article examined studies to date indicating that competition between pink salmon and other salmon is an important process negatively influencing other salmon species because pink salmon are efficient predators of the (common) prey. The authors are not aware of any studies of pink salmon being negatively affected by other Pacific salmon. Their abundance (pink salmon are the most common Pacific salmon), rapid growth, high feeding rates, and early entry combine to make pink salmon a dominant competitor. It also appears that



pink salmon have been the dominant competitor in the north Pacific across multiple climate regimes.

Ruggerone, G.T., Zimmermann, M., Myers, K.W., Nielsen, J.L. and D.E. Rogers. 2003. Competition between Asian pink salmon (*Oncorhynchus gorbuscha*) and Alaskan sockeye salmon (*O. nerka*) in the North Pacific Ocean. *Fish Oceanogr* 12, 209–219.

The researchers hypothesized that competition between Bristol Bay sockeye and Asian pink salmon would be greater in odd-years when pink salmon abundance was generally greater. BB sockeye scale samples from 1955 to the 1990s (from variously aged fish) and fish length (from adult returns in each river system) from 1958-2000 were used to determine growth estimates. Scale growth estimates showed a distinctive alternating-year pattern as growth was typically below average in odd-years and above average in even-years for both ocean age-2 and age-3 sockeye. Lengths of adult BB sockeye were inversely related to Asian pink salmon abundance (of the previous year) for years other than the year of homeward migration. Sockeye survival also was negatively influenced by pink salmon abundance. In the years after the mid-1970's, when pink salmon abundance greatly increased, BB sockeye returns averaged a 22% reduction in the alternating years the when higher pink salmon abundance would exert greater influence. The alternating-years phenomenon is due to Asian, primarily the eastern Kamchatka pink salmon population. In the (smolt) years 1977 to 1997, the researchers estimate 59 million fewer sockeye salmon returned to BB due to the high Asian pink salmon abundance in alternating years.

Saito, T., Hirabayashi, Y., Suzuki, K., Watanabe, K. and H. Saito. 2016. Recent decline of pink salmon (*Oncorhynchus gorbuscha*) abundance in Japan. *North Pacific Anadromous Fish Commission Bulletin*, 6:279-296.

In-river catch data from twenty-two pink stocks from the coast of the Sea of Okhotsk were analyzed (separated into five regional groups) along with sea surface temperatures (SST). The long-term decline in pink salmon abundance is related to higher coastal SSTs which can cause decreased juvenile survival, preliminary adult mortality, and increased straying. The higher coastal SSTs can also cause a shift in migration timing, although pink salmon hatchery programs have been consciously selecting for earlier migration. No data were available to determine the proportion of wild fish in the escapement.

Schindler, D., C. Krueger, P. Bisson, M. Bradford, B. Clark, J. Conitz, K. Howard, M. Jones, J. Murphy, K. Myers, M. Scheuerell, E. Volk, and J. Winton. 2013. Arctic-Yukon-Kuskokwim Chinook salmon research action plan: Evidence of decline of Chinook salmon populations and recommendations for future research. Prepared for the AYK Sustainable Salmon Initiative (Anchorage, AK). v + 70 pp. Available at www.aykssi.org/wp-content/uploads/AYK-SSI-Chinook-Salmon-Action-Plan-83013.pdf. Accessed June 5, 2018



The decline in AYK Chinook populations since the 1990s is discussed. All evidence (for and against) various hypotheses is summarized and research recommendations are made. The authors are careful not to be conclusive in their summary, instead stating that the hypotheses are not “statement of facts” but instead represent how the “salmon system” “may work”. One hypothesis, on anthropogenic changes to ocean conditions, includes a discussion of the evidence that hatchery releases of chum, pink, and sockeye are affecting (or not) the survival of AYK Chinook.

Shiomoto, A., Tadokoro, K., Nagasawa, K., and Y. Ishida. 1997. Trophic relations in the subarctic North Pacific ecosystem: possible feeding effect from pink salmon. *Marine Ecology Progress Series*, 150, 75-85.

Biomass of phytoplankton and macrozooplankton were sampled from 1985 to 1994 in the north Pacific Ocean and year-to-year variations noted. After comparing these data to pink salmon abundance data, the researchers noted that years in which the biomass of macrozooplankton was low corresponded with years when pink salmon were more abundant and phytoplankton biomass was higher. In years when pink salmon were less abundant, macrozooplankton biomass was higher and phytoplankton biomass was lower. Temperatures and surface nutrient concentrations did not show any year-to-year variation, ruling out phytoplankton blooms; also, phytoplankton productivity was higher in even-years than in odd-years. This indicates that the variation in phytoplankton biomass was not regulated by the chemical or physical environment, nor by the productivity of the phytoplankton. Similarly, the macrozooplankton biomass variation did not seem to be influenced by their own productivity. Instead (post-1989), the variations were regulated by predation by pink salmon.

Shaul, L.D. and H.J. Geiger. 2016. Effects of climate and competition for offshore prey on growth, survival, and reproductive potential of coho salmon in Southeast Alaska. *North Pacific Anadromous Fish Commission Bulletin* 6:329–347.
doi:10.23849/npafcb6/329.347. (Available at <http://www.npafc.org>).

The relationship between Gulf of Alaska and their prey can be described as a “trophic triangle” where both pink and sockeye salmon prey upon minimal armhook squid and also compete with the squid for zooplankton prey. The squid is also the primary prey of coho; this research explored relationships between adult coho weight, environmental conditions, and top-down control on squid by pink and sockeye salmon, using data from 1970-2014 (for some variables, 1990-2014). Most of the variation in the size of coho salmon was equally explained by pink salmon biomass, and a PDO index corresponding with squid emergence and development. The late-marine period may be crucial for coho survival. Pink salmon is a keystone predator that controls the trophic structure of salmon food and directs energy flow in the offshore GOA. Sea ranching of chum salmon may offer an alternative to pinks as a way to lessen effects on higher trophic level species.



Springer, A., van Vliet, G.B., Bool, N., Crowley, M., Fullagar, P., Lea, M.A., Monash, R., Price, C., Vertigan, C., and E.J. Woehler. 2018. Transhemispheric ecosystem disservices of pink salmon in a Pacific Ocean macrosystem, PNAS 2018 115 (22) 5038-5045.

Short-tailed shearwaters make annual 30,000 km, non-stop round-trip migrations from their breeding grounds in southeastern Australia, the Bass Strait, and Tasmania to the north Pacific Ocean and Bering Sea (NP/BS). Other research has noted dietary overlap between pink salmon and shearwaters in the NP/BS and greater numbers of shearwaters (more than an order-of-magnitude greater) dying in the Pribilof Islands in odd years (high pink salmon abundance) than even years. This research used proxies to estimate shearwater abundance at their breeding grounds and compared those data to pink salmon abundance data (catch plus escapement). There are strong correlations between low bird abundance and high pink abundance in all five examined time intervals. In recent odd-years, there have been increasing numbers of “wrecks”: massive bird mortality upon reaching their breeding grounds due to malnutrition during their time in NP/BS (the non-stop migration means that the birds rely on their reserves established in the NP/BS). Greater numbers of birds nest in even years than in odd years. Reduced numbers of shearwaters on the breeding grounds are thought to be responsible for changes in local (breeding ground) ecology, and forced reductions in commercial harvest of shearwaters by Aboriginal residents. These results suggest that pink salmon--and the hatchery releases of pink salmon--are “altering the distribution of wealth stored in this macrosystem.”

Springer, A.M. and G.B. van Vliet. 2014. Climate change, pink salmon, and the nexus between bottom-up and top-down control in the subarctic Pacific Ocean and Bering Sea. PNAS 2014 111 (18) E1880-E1888.

Monitoring data from four major seabird colonies (four islands) in the southern Bering Sea and Aleutian Islands were examined and indexed, such as “mean hatch date” and any anomalies noted (e.g., days before [“early”] or after [“late”] the mean). Thirteen of twenty omnivorous species/island samples had later hatch dates in even years, and this result was seen on all four islands. Clutch size was smaller in odd-years than in even-years for one bird species on all three islands where that species is found. Other significant effects were found for some species for parameters such as laying success, hatching success, fledgling success, and productivity, consistent with a hypothesis that in odd-years (high pink abundance) bird reproductive success was reduced. Some species build nests and in all cases where sufficient nests were counted to make comparisons, more nests were built in even-years than in odd-years. Many of these same nesting parameters were negatively correlated with a more specific parameter, the run size of eastern Kamchatka pink salmon. There were no consistent geographic patterns in the strength of the relationships (i.e, no island showed significantly more or fewer significant differences). As might be expected given these results, planktivorous seabirds showed an opposite response (or there was no relationship). The abundance of pink salmon in the northern Pacific and the results here that indicate top-down forcing call for a re-examination of fishing and hatchery practices and an ecosystem-based management.



Stachura, M. M., Mantua N. J., and M.D. Scheuerell. 2014. Oceanographic influences on patterns in North Pacific salmon abundance. *Can. J. Fish. Aquatic Sci.* 71(2), 226-235.

Authors took the 34 time series of regional salmon (wild North American and Asian, pink, chum, and sockeye) abundance used by Ruggerone et al. (2010) and applied three separate ordination techniques to identify patterns of abundance (as represented by the salmon abundance time-series) vs atmospheric and oceanographic variability (data from 10 environmental indices/datasets previously identified in the literature). Three dominant patterns were identified, accounting for 47% of the variability seen. Asian and North American populations had opposite trends for on pattern, indicating that large-scale climatic events may have different regional effects (e.g., NW Pacific vs. NE Pacific), or that density-dependent relationships become more important during these particular climatic events. Other factors “[f]or example, changes in harvest, hatchery practices, or freshwater habitat may contribute to abundance trends unrelated to climate and ocean variability” but were not investigated.

Sturdevant, M.V., R. Brenner, E.A. Fergusson, J.A. Orsi, and W.R. Heard. 2013. Does predation by returning adult pink salmon regulate pink salmon or herring abundance? *North Pacific Anadromous Fish Commission Technical Report 9*: 153–164. (Available at www.npafc.org).

This study investigated predation by returning adult pink salmon on 1) juvenile pink salmon (cannibalism) and 2) Pacific herring in SEAK and PWS through 1) diet comparisons, 2) contrasting adult pinks with more piscivorous but less abundant coho and immature Chinook, and 3) examining climate mechanisms’ influence on predator-prey relationships. In the SEAK straits, herring and salmon were uncommon in adult pink salmon diets, unlike coho salmon diets; Chinook consumed herring but not salmon. In alongshore areas, pinks consumed greater numbers of fish. In PWS alongshore areas, pink diets varied monthly and between years. Pink salmon cannibalism was uncommon in either PWS or SEAK. No evidence was found to support that pink salmon cannibalism was a factor in the alternating-year nature of pink returns, although some results indicate that retuning pinks may locally affect herring in PWS. Environmental factors such as annual temperature variations can affect adult return timing as well as out-migration by juveniles and migration routes, and therefore shift temporal and spatial overlaps of prey and predators.

Sydeman, W.J., Thompson, S.A., Piatt, J.F., Garcia-Reyes, M., Zador, S., Williams, J.C., Romano, M. and H.M. Renner. 2017. Regionalizing indicators for marine ecosystems: Bering Sea - Aleutian Island seabirds, climate, and competitors. *Ecological Indicators* 78, 458-469.

Marine predators occupying upper-trophic levels, like birds, mammals, and piscivorous fish, are more affected by ocean climate variability than ones in mid-trophic levels. Seabirds are secondary and tertiary consumers and multivariate seabird indicators can be used as indicators of marine ecosystem health. This study used data from 1989 to 2012 on birds’ breeding and diet (collected in the Alaska Maritime National Wildlife Refuge), pink salmon abundance, and



environmental factors to investigate food webs and developed multivariate indices (principal components or PCs). Besides significant correlations between some PCs representing breeding success with some environmental PCs, there was a strong negative correlation for one breeding PC with pink salmon abundance. This is interpreted as regional kittiwake breeding success is negatively related to pink salmon abundance. Regional murre breeding success is unrelated to pink salmon abundance. The authors recommend keeping bird data separated by genera when developing PCs. Negative and positive relationships between environmental factors and breeding success show the importance of “early season” conditions and how those conditions affect food webs. For kittiwakes, the abundance of pink salmon is another such factor.

Toge, K., R. Yamashita, K. Kazama, M. Fukuwaka, O. Yamamura, and Y. Watanuki. 2011. The relationship between Pink Salmon biomass and the body condition of short-tailed shearwaters in the Bering Sea: can fish compete with seabirds? *Proceedings of the Royal Society B: Biological Sciences* 278:2584–2590.

From October to March, short-tailed shearwaters (*Puffinus tenuirostris*) breed mainly in Tasmania but spend May to September in the North Pacific Ocean. About 16 million can be found in the Bering Sea in summer, feeding on upper water-column krill, fishes, and small squid; thus they possibly compete with pink salmon for prey. Birds were sampled 2002-2008 for stomach contents and various condition factors, along with pink salmon to estimate pink salmon biomass. Body mass and liver mass were similar among the birds sampled in the central Bering Sea and the birds sampled in the northern Pacific Ocean, suggesting that the birds had in fact recovered their body condition after migration. Bird body mass and bird liver mass were found to be negatively influenced by pink salmon biomass (as represented by pink salmon catch per unit-effort or CPUE). Pink salmon CPUE was higher in odd-years. No significant relationship between stomach contents and pink salmon biomass was found, possibly because of the daytime feeding habits of the birds did not lend itself well to the nighttime sampling of birds.

Ward, E. J., M. Adkison, J. Couture, S. C. Dressel, M. A. Litzow, S. Moffitt, T. Hoem-Neher, J. T. Trochta, and R. Brenner. 2017. Evaluating signals of oil spill impacts, climate, and species interactions in Pacific Herring and Pacific salmon populations in Prince William Sound and Copper River, Alaska. *PLoS ONE* [online serial] 12(3): e0172898.

Pre- and post-oil spill (the 1989 *Exxon Valdez* oil spill, or EVOS) were used to determine what has driven changes in productivity of Pacific salmon (wild PWS pink, two PWS-lake sockeye populations, as well as Copper River Chinook and Copper River sockeye) and PWS Pacific herring. Five possible drivers were evaluated: 1) intraspecific density dependence; 2) EVOS, 3) changing environmental conditions, 4) interspecific competition, and 5) competition with and predation by adult fish (for salmon)/predation by humpback whales (for herring). Support was found for the first hypothesis for all evaluated fish stocks except wild PWS pink salmon. No support was found that the EVOS event negatively affected long-term productivity. The strongest environmental factor was that freshwater discharge negatively affected herring productivity. Little support was found for effects of juvenile-juvenile competition. A negative relationship was found between adult pink salmon hatchery returns and sockeye salmon



(Copper River and both PWS stocks) productivity but was not shared with herring, Chinook, or PWS wild pink salmon. The lack of support seen in this study for so many of the drivers suggests that other factors may be important and operating on these fish stocks (e.g., disease).

Wertheimer, A. and E.V. Farley Jr. 2012. Do Asian Pink Salmon Affect the Survival of Bristol Bay Sockeye Salmon? North Pacific Anadromous Fish Commission Technical Report No. 8: 102-107.

Ruggerone, G.T., Myers, K.W., Agler, B.A. and J.L. Nielsen. 2012. Evidence for bottom-up effects on pink and chum salmon abundance and the consequences for other salmon species. North Pacific Anadromous Fish Commission Technical Report No. 8: 94-98.

Using the data analyzed by Ruggerone et al. (2003), Wertheimer and Farley conclude there is no evident effect on Asian pink salmon numbers on Bristol Bay sockeye. Using correlation analyses, they found no consistent response in the three BB sockeye stocks with pink numbers (separated into odd-even years). They reject the contentions of Ruggerone et al. (2012) that correlation analyses are not sufficiently robust to detect effects and stand by their conclusion that Asian pinks did not have a detrimental effect on BB sockeye.

Ruggerone et al. stand by the conclusions in Ruggerone et al. (2003) and later manuscripts (linking declines in Bristol Bay sockeye growth and survival to increased Asian pink salmon abundance), thus offering a rebuttal to Wertheimer and Farley (2012). They list a number of reasons why the use of correlation analyses by Wertheimer and Farley (2012) is incorrect, while acknowledging that use of correlation would lead to a conclusion that there is not a significant relationship between Asian pink abundance and BB sockeye survival. Ruggerone et al. also review a number of other papers offered as evidence of density-dependent relationships (while respecting changes in oceanographic conditions).

Wertheimer, A.C., Heard, W.R., Maselko, J.M. and W.W. Smoker. 2004. Relationship of size at return with environmental variation, hatchery production, and productivity of wild pink salmon in Prince William Sound, Alaska: does size matter? *Reviews in Fish Biology and Fisheries*, 14(3), pp.321-334.

Historically high returns of PWS pink salmon has been accompanied by decreasing body size. This research considered body size at return of PWS pink salmon against ten biophysical factors including hatchery inputs. Body size was also evaluated against wild pink salmon productivity. Two measures of temperature conditions were positively correlated to body size while three measures of pink salmon abundance (hatchery releases, hatchery returns, and overall GOA catch) were negatively correlated with body size. This is evidence that the growth of salmon in the ocean is density dependent and is also affected by environmental factors operating on the basin- and regional-scale. Body size significantly affected wild stock productivity, although marine environmental conditions explained most of the variability. Productivity of PWS pink salmon was affected more by regional environmental indices (e.g., GOA SST) than by basin-scale conditions (e.g., PDO) during their first year in ocean. Overall,



density-independent factors affect wild pink salmon productivity more than do than density-dependent ones. While wild stocks may be affected by hatchery programs, the overall net benefit of hatcheries is much greater than the reduction in wild production. Continued evaluation of the efficacy of the hatchery programs is essential to give managers and policy-makers the data they need for informed decision-making.

Wertheimer, A.C., Heard, W.R. and W.W. Smoker. 2004. Effects of hatchery releases and environmental variation on wild-stock productivity: consequences for sea ranching of pink salmon in Prince William Sound, Alaska. Pages 307-326 in: K.M. Leber, S. Kitada, H. L. Blankenship, and T. Svasand, eds. *Stock Enhancement and Sea Ranching: Developments, Pitfalls and Opportunities*, Blackwell Publishing, Oxford, UK.

This study is a follow-up to the Wertheimer et al. (2001) comment on the Hilborn and Eggers (2000) study. Wertheimer et al. (2001) believed that the Hilborn and Eggers population model over-estimated wild production and did not consider other factors. Here, the researchers evaluate wild stocks (returns per spawner) against a number of parameters, including hatchery releases. Wild stock data (derived from ADFG harvest data and spawner surveys) from 1960-1998 were used. Environmental variables included winter air temperature; spring air temperature; spring zooplankton abundance; herring biomass; Gulf of Alaska (GOA) summer sea surface temperature (SST); GOA summer wind stress; Pacific decadal oscillation (PDO); PDO-1 (variable using the annual winter PDO index in pink brood year $y - 1$; evaluates conditions during the adult ocean life-history phase of pinks); GOA pink salmon abundance; marine survival index (MSI); and hatchery releases. Three separate time series were used (1980-1998; 1975-1998; and 1960-1998) because data on all the variables were available only in 1960-1998. For all three time series, indices/variables of environmental conditions better explained variability in wild stock productivity than did hatchery releases. In the 1975-1998 time period, while hatchery releases were significant, MSI explained more variability. The authors believe that the assertions made in Wertheimer et al. (2001) are validated and that wild stocks in PWS have only been marginally negatively affected by hatchery releases, and that the net benefits of pink salmon hatchery programs are substantially greater (an increase in total runs 3x to 6x).

Yasumiishi, E.M., Criddle, K.R., Helle, J.H., Hillgruber, N. and F.J. Mueter. 2016. Effect of population abundance and climate on the growth of 2 populations of chum salmon (*Oncorhynchus keta*) in the eastern North Pacific Ocean. *Fishery Bulletin*, 114(2).

The seasonal and annual marine growth of chum salmon from an Alaskan creek and a Washington river were compared to abundances of pink and chum salmon and climate indices. Data from the early 1970s through 2004 were used. Pink salmon abundance negatively affected immature growth of chum salmon, except in the case of the first immature year of WA river chum. The exception may be due to the marine distribution of WA river chum; they were not as far west or as far north as the AK creek chum and thus did not overlap with pinks to be affected. Growth of both populations (except mature growth) was positively related to surface sea temperatures after accounting for density-dependent effects.



Zador, S., Hunt Jr., G.L., TenBrink, T., and K. Aydin. 2013. Combined seabird indices show lagged relationships between environmental conditions and breeding activity. *Mar Ecol Prog Ser* (485), 245-258.

Seventeen data sets related to the reproductive effort of five predacious seabirds were integrated into two indices using principal components analysis and then compared to environmental variables in the eastern Bering Sea. The two principal components (PC1 and PC2) accounted for 65% of the variability. Pink salmon abundance was not one of the environmental variables evaluated, but a “sawtooth” pattern in PC2 values was noted that corresponds to the odd/even year pattern in pink salmon abundance, reflecting lower kittiwake reproductive success in the odd-years (high pink abundance). The authors hypothesize that increased competition for prey between kittiwakes and pink salmon lead to lower kittiwake reproductive success in odd-years.

Zavolokin, A. V., V. V. Kulik, and L. O. Zavarina. 2014. The food supply of the Pacific salmon of the genus *Oncorhynchus* in the Northwestern Pacific Ocean 2: comparative characterization and general state. *Russian Journal of Marine Biology* 40:199–207.

The intent of the study was to determine how diet, growth, and survival interacted at various levels of salmon abundance and food abundance for salmon species in the northwestern Pacific, based on a hypothesis that salmon consume only a small portion of the prey available to them, even in periods of high salmon abundance. Periods of low food supply were identified for the western Bering Sea, the southern Sea of Okhotsk, and the northwestern Pacific Ocean, and most of these periods coincided with strong shoreward salmon migration. This evidence for a density-dependent effect included a shift in the diet composition and the feeding patterns of salmon. Because there was no reduction in growth or survival of salmon, the effect is thought to be small. The increase in salmon abundance in the 2000s was sufficiently supported by the available food.



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Alaska Department of Fish & Game
Board Support Section
P.O. Box 115526
Juneau, AK 99811-5526

Dear Board Members:

Hatchery programs across the state play a huge role in the success of Alaska's salmon fisheries for all user groups. It is because of this important role that Copper River Seafoods supports everything the hatcheries are doing.

The economic value that these hatcheries bring our state is vital to the diversification of revenue needed in a state such as Alaska. Without the stability that the hatcheries offer, the fishery would see additional fluctuations in catch and therefore more fluctuations of the economic wellbeing of the industry. Stability means we can meet the demand of the market as well as ensure the success of fishers, processors and Alaskan community members alike.

There is no scientific evidence that the hatchery fish are competing with wild stocks in any negative way or that straying of hatchery fish is causing a distress to wild stocks. The research being done in these areas needs time to complete their studies so that decisions are made based on science. Please consider this while deliberating on the future of the hatcheries.

Thank you for your consideration,

Martin Weiser
Chief Development Officer

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February 20, 2019

Reed Morisky, Chairman
Glenn Haight, Executive Director
Alaska Board of Fisheries
Alaska Department of Fish and Game, Boards Support Section
P.O. Box 115526
Juneau, AK 99811

RE: Hatchery Committee Meeting

Dear Chairman Morisky and members of the Board of Fisheries,

Cordova District Fishermen United is a non-profit membership organization representing over 900 commercial fishing families who participate in commercial fisheries in Alaska's Area E, which includes Prince William Sound, the Copper River region and the northern-central Gulf. It is our mission to preserve, promote and perpetuate the commercial fishing industry in Area E and to further promote safety at sea, legislation, conservation, management and general welfare for the mutual benefit of all our members.

CDFU continues to support Alaska's salmon enhancement programs, and our organization has been a longstanding advocate for the economic benefits of hatchery production in Alaska. Recently, there has been a great deal of public inquiry regarding Alaska's hatcheries and the science behind them, as well as the process that governs their management.

As you are aware, hatchery production is thoroughly vetted through Regional Planning Teams, which include representatives from Alaska Department of Fish and Game and whose meetings are open to the public. These meetings also include scientific reports and presentations from the department on the most current research available. Members of the Regional Planning Teams have a strong background in the science behind hatchery production and a thorough



understanding of local ecology and regional fisheries. Regional Planning Teams operate within the parameters laid out in 5 AAC 40.300-370, and public input is encouraged at all stages of regional comprehensive salmon plan development through this process (5 AAC 40.360). CDFU continues to support this framework for statewide hatchery production planning, as it is an open public process and heavily reliant on input from the scientific community, including representatives from ADFG, USFS, and regional aquaculture associations, as well as members of the public.

As a strong supporter of Alaska's hatchery programs, CDFU recommends that further topics of research, as they relate to hatchery stock straying, include studies on rates of wild pink salmon straying for comparison of data. Without a thorough understanding of wild salmon stray rates, it is difficult to quantify or compare an acceptable range for hatchery-origin fish. Future topics of research should also include investigating the effect of different harvest and fisheries management strategies that may minimize straying impacts. Data from the Alaska Hatchery Research Project (AHRP) should be cross-referenced with commercial fishing harvest data from the study years, to determine the extent to which effective harvest reduces rates of straying. Future research could also be focused on understanding run timing and its effect on both straying and reproductive fitness, and how differences in wild and hatchery-run pink salmon may impact variability in fitness levels.

Thank you for your time and consideration on this very important issue. We believe it is valuable for the Board of Fisheries to continue to be informed on hatchery production, and we continue to recommend that the Department of Fish and Game regularly provide the Board of Fisheries with reports and updates regarding hatchery production.

Sincerely,

Chelsea Haisman
Executive Director

Submitted By
Dan Leathers
Submitted On
2/19/2019 2:05:16 PM
Affiliation
Ketchikan Charter Boats

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Ketchikan , Alaska 99901

SSRAA raised salmon have been an incredibly valuable resource for the nonresident sportsfishing charter fleet. This source of fish has greatly enhanced what is possible for our clients to take. Were it not for these fish our early season fishing would be very unproductive. The fleet contributes to State and local coffers in the form of KSS and licenses as well as Burrough sales tax and that is for cruise ship passengers. Those flying in and doing multi day Charters add even more. My fervent hope would be that this resource could be perpetually enhanced and if possible to an even greater degrees

Submitted By
Dave Beam
Submitted On
2/20/2019 9:24:30 PM
Affiliation

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Dear Board of Fish Members,

I am writing this letter in support of our state wide salmon hatcheries and to oppose Proposals: 169, 170, and 171.

I have been a commercial fisherman since 1979 and make my full time home in Girdwood, AK. I started crewing on seine boats in 1980 in Lower Cook Inlet and then moved to Prince William Sound in 1983. In 1986, I bought into the gillnet fishery in Area E and worked there until I started seining in PWS in 2009 on my own seine boat. Without hatchery pinks, the Prince William Sound seine fishery would not be financially feasible. I fully support the ongoing science surrounding PWS hatchery and wild stock pinks. With three of the largest ever wild stock pink returns in the last ten years, there does not seem to be a problem with the hatchery production interfering with wild stock returns. The hatcheries are a huge asset to the State of Alaska.

Thank you,

Dave Beam



Submitted By
David Martin
Submitted On
2/15/2019 6:56:29 PM
Affiliation

The State had the foresight to increase and stabilize salmon production by pioneering the hatchery program in the 1970s under management of the FRED division. This program was successful but had many learning curves but the State learn well. The State started fazing out of the State run hatchery program by turning their facilities and programs over to non-profit Aquaculture Associations. The State helped in many ways, including financially, to assure success of the Aquaculture Associations hatchery programs. These Aquaculture Associations were, and are, created, funded and managed predominantly by the commercial fishermen. The hatchery production benefits all user groups. In many areas of the State the recreational fishery catches mostly hatchery released salmon. Without the Aquaculture Associations producing these hatchery salmon there would be little to no recreational fishery in these areas. The same can also be said with the commercial fisheries in many areas. Many agencies, including ADF&G, are responsible for oversight of the hatchery programs by implementing strict protocol for permitting in all functions of the hatchery programs. These strict protocol criteria are based on science, biology, genetics and other scientific criteria. The goal is to not negatively effect the wild stocks but to be able to produce salmon for the greater economic and food value to all user groups. This hatchery program has been extremely successful and has been recognized world wide for these successes. The bulk of this success can be contributed to the fact that science, not politics, dictates hatchery programs and management. The sustainable and reliable economic benefits has greatly benefited fishermen from all users groups, plus local, Borough and State economies. Thousands of jobs have been created. The Aquaculture Associations helps the State in salmon management and production by collecting data, operating adult and smolt weirs, flow control structures, moving salmon through beaver dams and other barriers, rehabilitation programs, habitat issues, managing and eradicating invasive species, etc. The BOF is **not** predominately made up of scientist or biologist and has become a Board that is increasingly forming their regulatory decisions more on a political or on an allocative basis than on using scientific and economic facts. The Board has even publically stated that their main function is allocation. For the Aquaculture Associations to remain finacially sound and continue, the salmon production that benefits everyone, plus the activities they preform to help ADF&G, then they cannot be shackled with regulations that jeopardize their production and finacial stability. The BOF has enough to do already and should not get more involved in the successful and well regulated Aquaculture hatchery programs. Failure of the Aquaculture Associations would be devastating to the State, its citizens and communities! Thank you for your time and consideration.

Submitted By
David C Thynes
Submitted On
2/19/2019 10:17:56 AM
Affiliation
1967

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Petersburg, Alaska 99833

Dear Alaska Board of Fisheries Hatchery Committee members,

I am a 51 year old, life long Alaska fisherman that has participated in Southeast Alaska Driftnet fisheries since my childhood. My parents were driftnetters based in Petersburg with whom I secured my first "crew" position at the age of 5. My wife and both sons have also enjoyed the opportunity to participate in our family business, Southeast driftnetting.

There have been many changes in our driftnet fishery since I started operating my own driftnetter in 1991. One of the most striking changes has been the shift of our driftnet fleet's effort from targeting and relying on wild salmon returns, to focusing on hatchery enhanced salmon, especially opportunities in hatchery THA's/SHA's. This shift has been magnified by both the increase in chum value (\$0.17/lb in 1996 to \$0.94/lb in 2011)¹, and the continued decline or low abundance of certain historic natural salmon returns throughout Southeast Alaska.

In terms of individual commercial fishing boats, the opportunities Alaska's hatchery salmon present us are absolutely crucial to our businesses. **I would approximate that 75% - 80% of my commercial salmon income is now derived from hatchery enhanced salmon.** I fish Southeast Alaska from District 1 to District 15 and rely on the THA/SHA opportunities at Nakat Inlet, Neets Bay, Anita Bay, Speel River, Deep Inlet, & Boat Harbor as well as the common property interceptions of hatchery bound salmon that occur in the corridors leading to these hatchery sites. There are many other commercial salmon fishers that follow this same nomadic fishing template in Southeast Alaska.

Beyond the opportunities hatchery salmon provide fishers like me directly, there are countless benefits to our fishing communities state-wide in the form of reliable local employment for crewmembers & processing facility workers, work related to infrastructure support, not to mention the raw fish tax revenue for commercial salmon landings to help fund our municipality school systems and harbors, etc.

Our sport fishing industries and personal use fishing also benefit from added hatchery enhanced fishing opportunities, continuing the trickle-down to our local communities in the form of commerce, tax revenue and visitor exposure.

I fully support Alaska's Salmon Hatchery programs and I urge this committee to carefully consider my testimony as evidence of the positive impacts our hatchery programs have proliferated throughout Alaska.

Our families, our communities, and our fleets thank you for continuing to keep our salmon resources secure and our businesses healthy and viable.

Sincerely,

David Thynes

F/V Nocona

¹http://www.adfg.alaska.gov/index.cfm?adfg=commercialbyfisherysalmon.salmoncatch_exvessel



Submitted By
Deborah
Submitted On
2/20/2019 8:58:52 PM
Affiliation
commercial fisherman

Chairman Morisky and members of the BOF

Thank you for wrestling with the contentious issue of hatchery production of salmon. I am a fisherman and my family has be supported by the salmon industry for 38 years. During this time the hatchery production of salmon has leveled out our harvest on weak wild stock years. This enables us to support our family with commercial fishing given it's inherent wild stock inconsistencies. My sons are of age to join in the fisheries and I would like to envision a future where they could support their families by carrying on this family tradition. I live in a town and a state that depends on the economics of the fishery and its many support industries. I would caution against making a decision that would undermine one of Alaska's thriving industries.

Thank you

Deborah Eckley



Date: 15 February 2019

To: Board of Fisheries

From: Dennis Nickerson

Re: Comment- *Joint Protocol on Salmon Enhancement*

Greetings,

I'm providing a written comment regarding the Alaska Department of Fish & Game, Board of Fisheries- *Joint Protocol on Salmon Enhancement*.

I'm a lifelong resident of Klawock, site of Alaska's First Salmon Cannery in 1878. I am a full blood Tlingit. I continue a customary & traditional lifestyle. Our family continues our Ancestral right to harvest our natural resources. Salmon, specifically sockeye is our number one resource.

Sockeye and Coho helps our community. At one time in our Tlingit History, 70% of our diet was seafood. My family relies on the salmon that return to the Klawock River and outline systems. We catch and process our salmon, strengthening our family bond. This also increases our physical activity and promotes a healthy diet. We still eat salmon during our potlucks or other ceremonies- as well as for trade and barter.

Salmon Enhancement is needed in our community, so we can continue our annual harvest. The community bond continues in Klawock, as families work together to feed our community. Our school's lunch program utilizes Coho while "in season".

Our commercial fishermen rely on salmon enhancement to sustain an industry that competes in a world market. It is estimated that hatcheries in Southeast Alaska account for 2,00 jobs (annualized), \$ 90 million in labor income, and \$ 237 million in total annual output.

More than 16,000 fishermen, processing employees, and hatchery workers can attribute some portion of their income to Alaska's salmon hatchery production. Sport fishing provides good seasonal employment and increases local economy on Prince of Wales Island. Non-resident fishing has increased dramatically on the Klawock River's Coho return.

Our resident sport/personal use/customary & traditional ("subsistence") harvest of salmon have economic impacts as well as very significant social and cultural impacts throughout Alaska.



I am urging the Board of Fisheries to either continue or increase efforts on salmon enhancement for Alaska. We rely on salmon in many ways. Our effect on the world's seafood market is huge, when it comes to processed salmon.

Oil cannot return. Mineral exploration's resources cannot come back. Salmon have that opportunity to return to Alaska. We must continue sustaining all stocks of salmon, so Alaskan's can enjoy some of the healthiest food.

I am grateful for our state's efforts, and hope that future generations will enjoy the livelihood of Alaskans that separate us from the rest of the United States.

Thank you for allowing me to provide a comment.

Respectfully,

Dennis Nickerson

Klawock, Alaska 99925

20-Feb-19
Date



Douglas Island Pink and Chum, Inc.

2697 Channel Drive • Juneau, Alaska 99801

(907) 463-5114 • www.dipac.net

February 20th, 2019

To: Mr. Reed Morisky, Chair and Board of Fish Members
Alaska Board of Fisheries

Subject: Commentary on the regulatory process for Alaska salmon enhancement operations.

The goal of Alaska's salmon enhancement hatcheries is to bolster state fisheries without adversely affecting wild salmon stocks. The permitting process for Alaska state salmon enhancement programs is extensive and thorough, supported by statutes and regulations dictating program implementation and operation.

Douglas Island Pink and Chum, Inc. (DIPAC) operates as a Private Nonprofit (PNP) hatchery and strives to operate above and beyond statute to the benefit all salmon user groups while also taking care to avoid harm to wild stocks. We firmly believe in the philosophy and responsibility of "The program shall be operated without adversely affecting natural stocks of fish in the state and under a policy of management which allows reasonable segregation of returning hatchery-reared salmon from naturally occurring stocks" (McGee 2004). Several key requirements for hatcheries were established to safeguard wild stocks, which include: hatcheries located away from significant wild stocks, use of local brood sources, management priority focused on wild stock protection, tagging/marking of hatchery fish, and special studies on hatchery/wild interactions (McGee 2004).

The permitting process for a PNP typically takes 2 years to complete, following the procedures described in 5 AAC 40.110 – 5 AAC 40.240. An overview of these policies and permitting processes are in the Comprehensive Salmon Enhancement Plan for Southeast: Phase III (AS 16.10.375) and the Sustainable Salmon Policy (5 AAC 39.222). In general these describe the need for the development of enhanced stocks to assuage pressure on wild stocks using a precautionary and conservative management approach for the conservation of wild salmon stocks. The PNP process for applications are described by McGee 1995 and detail the numerous levels of review and public input opportunities before a hatchery becomes operational or is even approved for construction. Additionally, the regulatory process includes annual reviews, public hearings, and state genetic and pathology review of hatchery operations. The ADF&G commissioner has direct authority to alter hatchery permits if in the best interest of the public or wild stock health (AS 16.10.430; 5 AAC 41.040), and can further amend hatchery permit terms relating to fish and egg harvesting (AS 16.10.440(b)).



The primary organizational tool for enhancement programs are Regional Plan Teams (RPT) (AS 16.10.380; 5 AAC 40.300-370), the RPTs include stakeholders such as, salmon fishing gear groups, subsistence fishers, federal agencies, and ADF&G. The primary roles of an RPT is to "...initiate and continue an orderly process that examines the full potential of the region's enhanced salmon production capacity" (Comprehensive Salmon Enhancement Plan for Southeast: Phase III). An important aspect of the RPT is in recognizing that it will be "responsive to new knowledge and changing conditions". The RPT ensures that hatcheries are operating in the best interest of the state's salmon resources and are aligned with fisheries management policies such as, the Policy for the Management of Mixed Stock Fisheries for sustained yield of wild fish stocks, and sustainable salmon fisheries (5 AAC 39.220; AAC 39.222; and AS 16.05.730).

An essential part of a PNP is cost recovery fishing in special harvest areas and DIPAC has four locations outlined in Article 2, 5 AAC 40.032; which, additionally aids management in the fair allocation of gear group harvest levels in Article 3, 5 AAC 33.364, thereby helping each region achieve targeted harvest goals. Each PNP must complete annual assessments of hatchery activities, submitted to ADF&G, which include the Annual Management Plans 5 AAC 40.840 and Annual Report 16.10.470. A segment of those reports details the sale of salmon/roe and how those proceeds are distributed, which identifies that remaining funds shall go to regional associations for fisheries activities (16.10.450). Distribution of those funds gives money directly back to fisherman by offsetting the need for a PNP to conduct cost recovery fishing, in so doing allows for additional access in common property harvests.

A unique characteristic of all salmon is straying from their natal streams, an evolutionary adaptation allowing them to persist despite environmental/habitat disturbances. As research technologies and innovations have progressed so has the ability to monitor the status of hatchery and wild fish dynamics. The Alaska Hatchery Research Project, commenced in 2012 and is planned to conclude in 2023, is a comprehensive salmon study researching hatchery stray rates, proportion of hatchery fish in wild streams, and impacts on genetic fitness of wild stocks. The results of this study will help to inform and develop best management practices for hatchery stock production and targeted fisheries, and minimize harm to wild stocks. DIPAC has advocated for this research from the start and has donated funds and in kind lab support throughout.

The DIPAC hatcheries have been producing chum, sockeye, king, and coho salmon in Southeast since 1976, generating an average of \$78 million in economic output per year. We continue to be supportive of the state's efforts to ensure responsible and effective management for wild salmon stocks while balancing the provisions of salmon enhancement programs. Thank you for taking the time to consider these issues and we look forward to continuing our affable relationship with the public and the Board of Fisheries.



Respectfully,

Adam Zaleski – Research Manager

Eric P Prestegard – Executive Director

McGee, S.G. (2004). Salmon Hatcheries in Alaska - Plans, Permits, and Policies Designed to Provide Protection for Wild Stocks. American Fisheries Society Symposium 44:317 - 331.

McGee A. (1995). The hatchery program and protection of wild salmon in Alaska: policies and regulations. ADF&G, Commercial Fisheries Management and Development Division. January.

Submitted By
Donald Klepser
Submitted On
2/10/2019 9:20:33 AM
Affiliation

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I am opposed to any change to the hatchery regulations. Or to any reduction in their output.

Simply put. Southeast Alaska commercial fleets can not survive without hatchery production, And any reductions will adversely affect an industry that is struggling to survive already.

I know that without hatchery operations at there current levels I can not continue to be a commercial fisherman, I was born and raised in Ketchikan and only recently moved.

I can't stress enough that this will devastate all the Southeast Alaska commercial fleets. And state wide this wil put thousands of people out of work.

Alaska's commercial salmon fleets bring millions of dollars of revenue to state in the form of raw fish taxes. The state will suffer too. This is clearly a bad idea on so many levels

Sitka, Petersburg, Juneau, Wrangell, and Ketchikan's local economies recieve great economic benefit as well from hatchery operations.. So not only will this hurt fishing families but the local economies directly.

These hatcheries have been permitted by the state of alaska and should be able to continue to operate under the current conditions that the state allowed.

As a fisherman i produce food for people to eat, if this proposal to limit production is allowed it is going to take an excellent source of protien out of the nations food supply.

I am opposed

Donald Klepser

Submitted By
Dustin B.C. Connor
Submitted On
2/18/2019 12:09:26 PM
Affiliation

Greetings, I have been seining South East Alaska nearly my entire life, from the age of 8 back in '94 when the only real money we made for a two and half month season came from the hatchery at Hidden Falls. This past season of 2018 was almost a total flop, if not for the remote release hatchery site at Crawfish, which saved many a fisherman's season. The extended fishing time these hatchery sites provide local fishermen is paramount to the economies of the coastal communities that rely on them. Any reduction to hatcheries would not only harm the fishermen, but the support services that keep the rest of a town thriving. It is not hard to see the trickle down effect of cutting off the much needed revenue these hatcheries provide to coastal communities and the state at large. As a parting word, reduction on hatcheries production would also have a negative effect on the roughly 54 million dollars generated by raw fish tax in 2018 that boosts the state coffers each year, half of which also goes back to help the coastal communities that bring in this revenue, many of which have large populations of indigenous tribes. Sincerely, Dustin Connor

Submitted By
ED TAGABAN
Submitted On
2/19/2019 11:42:43 AM
Affiliation
SE DRIFT GILLNETTER

I am in favor of hatcheries. I have gillnetted in southeast alaska on my own in the past 36 seasons and 12 years before that with my father as a child. I have enjoyed the experience of havesting wild stock salmon throughout southeast alaska before chum hatcheries became a necessary part of our harvest. Now in Southeast Alaska we have seen declines wild stocks of Sockeye, Silver and Chinook. The Chum hatcheries have replaced the void of the wild stocks and new markets have turned our harvests viable for our future. These hatcheries are a necessity that provide for our families, communities and markets worldwide feeding people. I myself look forward to the the success of the Thomas Bay, Southeast Cove and Crawfish Bay release sites to help sustain the markets and decrease fishing pressure in the existing release sites from the different gear groups. This success is only attainable as long as there is a fair access for all gear groups, using best science without the influence of outside interests for their own personal gain. We have a great program that is run many good people doing good work. Thank you for your time.

Submitted By
Eric Bezenek
Submitted On
2/18/2019 10:07:19 PM
Affiliation

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ketchikan, Alaska 99901

Enhanced fish are the means to a sustainable livelihood. For the past eight years my personal salmon drift gillnet operation in Southeast has been driven financially by the harvest of these enhanced fish. In 2011 I started this career with help from the state's division of economic development knowing that the successful management of hatcheries across the state would provide sustainable fish to harvest for as long as my career would last. I have nothing but respect for the managers, workers, and all those involved in the hatchery industry. Their presence in our state's fisheries success is often overlooked, but their importance should never be overlooked or overstated. For all this fishery has given to me, I hope this letter to the board can give just as much support back to the hatchery system in our state.

Submitted By
Ezekiel Kinyon Brown
Submitted On
2/20/2019 9:19:43 PM
Affiliation

Dear Chairman Morisky and Members of the Board of Fisheries,

My name is Ezekiel Brown. I am a lifelong resident of Cordova, AK where I sport, subsistence and Commercial Fish. I am a first generation commercial fisherman and hold PWS salmon seine and gillnet permits.

The Hatcheries in Prince William Sound are an amazing achievement that all of Alaska should be proud of. Personally there is no way I could have worked my way from a crew member to a owner of both a gillnet and seine boat and permit without the consistency in runs created by the hatchery program. Since I started fishing Prince William Sound and the Copper River has enjoyed some very large returns of wild salmon but without the hatchery fish to harvest on the inevitable small wild returns it would be very difficult to make a living in this fishery.

I believe the current RPT process has been very effective and open. I think that the record returns of wild and hatchery salmon in Prince William Sound since the implementation of the hatchery program speak for themselves. The Hatchery program is a success and needs to be expanded and duplicated. Research should be done on expanding Alaska's king salmon hatcheries to help meet the growing demand by subsistence, sport, personal use, and commercial fishermen.

Thank you for your time

Submitted By
GALE K. VICK
Submitted On
2/20/2019 11:27:58 PM
Affiliation

WRITTEN TESTIMONY TO BOF HATCHERY COMMITTEE

February 20, 2019

My name is Gale Vick. I am 72, a 51-year resident of Alaska and have been involved in fisheries issues – policy, science, regulations, practices - around the state for over 40 years. I was a salmon drift net fisherman in Prince William Sound for 20 years and a family member was on the PSWAC board. I was on both the Prince William Sound Science Center board and the North Pacific Research Board AP for nine years, as well as involved extensively with the NPFMC and the Board of Fish. I have fished commercially, sports, personal use and subsistence. I am a researcher but not a scientist. I say this to state some of my qualifications for my subsequent remarks related to the newly reconstituted Alaska Board of Fisheries Hatchery Committee.

I fully support this committee and encourage it to tackle the thorny problems regarding hatcheries that we have largely been ignoring since the beginning. This is a complex issue and my remarks are necessarily general. What are the questions we *should* be asking?

There are three primary issues I am concerned with:

1. Biology – What are the biological impacts of hatcheries on wild salmon and our marine/riverine ecosystems?
2. Economics - How much are hatcheries actually costing Alaska in terms of subsidies, loan forgiveness, permitting, oversight, research, genetic sampling, reporting, etc. How much of these funds are diverted from wild stock management? How might cost recovery be driving increased production? What cost/benefit analyses are available?
3. Governance - Where are the strengths and weaknesses? How integrated is the system? How might a detailed infographic help understand this?

While working on a NOAA/MAFAC aquaculture subcommittee in 2016, I had an epiphany - largely driven by the insistence of hatchery operators and managers around the country that Alaska's finfish hatchery system was no different than other West Coast hatcheries and that hatchery salmon are fundamentally different than wild salmon. For most of my adult life I have contested this. I then realized that I had been operating under false assumptions all these years. Now, after an extensive literature search of books and scientific papers for Washington, Oregon, British Columbia and Alaska, I have come to understand how hatcheries have contributed to the loss of wild stock and that, yes, hatchery fish are different than wild fish, no matter what their original genetics. While much belated research is still being conducted for Alaska, the findings of extensive (and on-going) research on the West Coast are likely to be repeated here.

Why should we pay such close attention to this? "Wild salmon have sustained humanity since before recorded time. Salmon are anadromous species that must navigate complex passages of up to thousands of miles, and the fact that they have survived modern man at all is a testimony to their strength and resilience. But we have threatened that resiliency so much that the billions of salmon that have fed ecosystems around the world for millennia are now a trickle, the threat of losing whole runs is the reality rather than incidental. Even more, we have lost the genetic stock that produced massive sizes of salmon. *In less than one hundred years we have damaged our wild salmon stocks in such significant ways that we have likely permanently altered patterns and genetics.*"^[1]

So what does this have to do with hatcheries?

Alaska finfish hatcheries are strictly a commercial operation but with quiding principles. Despite stated hatchery policies, it is discouraging to read all the recent public relations reports that promote Alaska's finfish hatcheries as being economic engines of their respective regions *without any mention of biology or wild stock impacts whatsoever*. It is equally discouraging, but understandable, to hear fishermen so entrenched in their systems that they feel threatened by the least mention of oversight.

I know because I was one of them. When I fished PWS, we made every effort to improve the quality of our harvest by following marketing guidelines created by local area fishermen and we certainly obeyed all the ADF&G regulations, as all fishermen must. We fished a mixed stock fishery (except in the SHA) but we could often tell which of our sockeye and chum came from the few wild streams. We noticed a lot of things but we did not ask questions about what hatchery straying or competition for forage food might be doing to our wild stocks. Having lived through the Exxon Valdez Oil Spill, we were far more concerned about residual spill impacts. We got mightily involved in local fish politics, usually siding with the hatchery on issues, without questioning for a minute that our local hatchery system may have been lacking in sufficient oversight. We never really questioned why hatcheries existed in the first place, considering them an important part of the economic scenery.

But here are some things we should have considered:

1. "In contrast to hatchery programs in other areas, Alaska's salmon fishery enhancement program was not built to mitigate habitat losses associated with human projects. Alaska has healthy^[2] well-managed wild stocks and a robust and healthy hatchery program that was designed to minimize wild stock interactions and enhance fisheries. Our hatchery programs for commercial fisheries are *stakeholder driven and overseen by fishermen* who strongly support Alaska's mandate to protect wild stocks while enjoying the

(2) Examples: (increased since these dates)

- a. Hatchery contributions of adult salmon to commercial fisheries have been as much as 77 million fish, accounting for 48% of the total salmon harvested in common property commercial fisheries in 2010[4]
- b. In 2012, 37.2 million hatchery- produced salmon were harvested statewide in the commercial common property fisheries or 31% of the total commercial fisheries harvest [5]
- c. In 2012, hatchery production accounted for 80% of the commercial fisheries harvest in PWS and 27% in SEAK. [6]

Hatchery production has increased since these citations. If hatchery production is so incredibly high, what is the correlation in wild stock production? Having worked on Chinook issues the last five years, I know what everyone else knows – our wild Chinook stocks are in a dangerous decline and so may be our sockeye and chum stocks. While there are multiple drivers for these declines, (most of them out of our control or knowledge), we are currently asking questions about all potential human-caused impacts on the ecosystem, including from hatcheries.

This leads to the most fundamental question Alaskans must ask ourselves – *do we really value our wild salmon stocks and do we hold sacred the laws and regulations intended to protect them?*

“State of Alaska law (Policy for management of sustainable salmon fisheries – 5 AAC 39.222) mandates that hatcheries shall operate without adversely affecting natural stocks of fish. The policy states that the effects and interactions of introduced or enhanced salmon stocks on wild salmon stocks should be assessed, and that wild salmon stocks and fisheries on those stocks should be protected from adverse impacts from artificial propagation and enhancement efforts.” [7]

The next question then is, what can we *really* do to identify and mitigate negative hatchery impacts? This is the real charge of the Alaska Board of Fisheries.

It is disingenuous to say that hatcheries are “under attack.” They are rightfully “under scrutiny.” Hatcheries should have been under independent scrutiny all along. The Hatchery Committee of the Board of Fish did not organize the first time until 2001-2002 *and then they never operated again until they re- organized in October 2018. ADF&G evaluations of hatcheries did not begin until 2011, 35 years after implementation of the hatchery program. [8]* And this was only as a reaction to MSC certification requirements. That’s a very long time for a system to operate without sufficient review.

Alaska has been the home to finfish hatcheries since the 1800’s (using some terrible practices) operated by the federal government, but it was not until 1974 that the State of Alaska passed the *Alaska Hatchery Act* that instituted the PNP hatchery system. We did so without benefit of any real biological studies at all and we *still* have less information than we should. With the incredibly increased production of hatcheries since that time, it raises questions about where we put our efforts. Finfish hatcheries are largely confined to the Gulf of Alaska but I would like to know if the State of Alaska (ADF&G, DEC, CFEC, CCED, DNR, Labor) puts a disproportionate amount of time, money and energy into hatchery production than in wild stock management for the GOA.

Anyone remotely involved in fisheries research or management in Alaska understands full well that we do not have all the resources we need to sufficiently manage wild stock salmon even now. Despite all the efforts of some really terrific agency people, there is a lot of data we do not collect, a lot of basic information we do not have. Alaska is so vast that some anadromous streams are not yet catalogued and *most* of them are not enumerated. For anyone to say that there is sufficient oversight and management of wild stock is ludicrous and yet I hear it all the time. If we do not have the resources to adequately monitor and manage our wild stock, we definitely do not have the same for hatchery stock.

Alaskan wild salmon, especially Chinook, are the icons of the world. We are the last best place for wild runs. “In a state that constitutionally values its wild resources, *wild stock salmon should always come first* in any practice. We absolutely must manage salmon, in fact all our fisheries, in terms of whole physical and economic ecosystems. From the very local levels to our highest management levels, Alaska’s salmon deserve a seamless integration of shared knowledge, data and decision making.”[9]

Alaskans should not be pitted against each other on this. I suspect that most of the hatchery fleet is just as concerned about wild stocks as I am. We need to figure out ways to get to the essentials of all of our concerns, separate fact from fiction. But, we need to fully recognize that hatcheries are an economic engine that should always, always, always defer to wild stock considerations. Otherwise, we will be no better than the rest of the world who has destroyed their wild runs.

Recommended reading:

(1) *Salmon Without Rivers: A History of the Pacific Salmon Crises*, Jim Lichatowich

(2) 2018 *Policy Analysis: Alaska Salmon Hatcheries* Jessica Eller, Graduate School University of Montana



[1] *We Are Each Stewards: Salmon Management is a Shared Responsibility*, Vick, Gale, "Salmon Shadows" April 2018

[2] At the time this was written, a situation considerably changed

[3] <https://www.adfg.alaska.gov/index.cfm?adfg=fishingHatcheries.main>

[4] https://www.adfg.alaska.gov/static/fishing/PDFs/hatcheries/2013_ak_hatcheries.pdf

[5] https://www.adfg.alaska.gov/static/fishing/PDFs/hatcheries/2013_ak_hatcheries.pdf

[6] https://www.adfg.alaska.gov/static/fishing/PDFs/hatcheries/2013_ak_hatcheries.pdf

[7] Kevin Delany, *Anchorage Daily News*, October 3, 2018

[8] <http://www.adfg.alaska.gov/index.cfm?adfg=fishingHatcheriesOtherInfo.reports>

[9] *We Are Each Stewards: Salmon Management is a Shared Responsibility*, Vick, Gale, "Salmon Shadows" April 2018

Submitted By
Gregg Bigsby
Submitted On
2/20/2019 9:46:54 PM
Affiliation

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The Southeast Alaska Hatchery Program was initiated by the State's ADFG in the mid-1970's, creating "fisherman Financed" regional hatchery Associations. The idea was to have fish to catch and market in times of low abundance of natural stocks, which happens naturally.

Our natural stock fish are under major pressure from all directions, and our hatcheries in Southeast Alaska are a blessing to our commercial fishing industry.

Submitted By
Gunnar Noreen
Submitted On
2/20/2019 9:07:26 AM
Affiliation
DIPAC Board member

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PO Box 240367
Douglas, Alaska 99824

Greetings fellow Alaskan's,

I have lived in S.E. Alaska since before Statehood (1956) . I started my fishing career fishing on the Chilcat River in Haines set-netting with my family when I was 5. My uncle's Karl and Christian Tagg were in Haines fishing before we were, late 40's and early 50's. I hope you understand the continuous fabric this has been in my family's life as it continues with my adult children who now also fish (Gillnet S.E.).

I have been on the DIPAC board of Directors since 2006 and am still very active in that regard. I continue to Gillnet here in Southeast and have seen first hand the positive impact the DIPAC hatchery has had on my income. In the early 80's i was lucky to gross \$30,000 and this was consistent yearly. I now gross up to 3 times as much. This pays bills for college kids, repairs needed on my boat, medical needs and I think you get the boost, in income, also translates into more local store purchases for needed supplies and such.

We as shareholders and concerned Alaskans need to pull together and address the warming trends and global climate issues. Really! This squabbling over "Dammit the Kings aren't coming back because of hatcheries" is really self depreciating and devious. The Norwegians and other farm fish producers are real happy to step in and cover the proposed decrease in hatchery production.

We're not going to get natural stock increases in our life time unless we look at the issues causing them. Habitat and spawning channels up the Taku River are filling in. There are up to 500 seals and sea lions waiting at the sand bar that all spawning Taku River salmon need to cross. Don't forget about our Canadian fishermen up river sending in tags months late or underreporting catch rates. When the rivers low their catch rates go up, go figure.

Hatcheries are the only thing keeping me in this business. It would be a death blow to the salmon industry. Ask a Seiner how they look at this. I really can't believe we need to have this discussion it comes down to "got money in your wallet"?

Please use your brain on this when deciding my family's future income.

Best wishes, Gunnar K. Noreen F/V Mayo- F/V Ida Maria 1980- F/V Raw Fish 1986- F/V Ritz 1988 present

Submitted By

Hein Kruithof

Submitted On

2/18/2019 8:40:25 PM

Affiliation

I hope the importance of maintaining our hatcheries in Prince William Sound is kept in mind throughout the meeting. I am an Alaska resident, commercial fisherman, and my family heavily relies on our hatchery system to live. We need them managed fairly and managed well. Hatcheries provide income for fishing families like ours, which in turn gets spent in the state of Alaska and benefits the Alaskan economy. Commercial fishing is such a huge part of Alaska and will always be here. It is a way of life that a massive amount of Alaskans make an honest living out of.



February 20th, 2019

Chairman Reed Morisky
Alaska Board of Fisheries
dfg.bof.comments@alaska.gov
ATTN: BOF COMMENTS

RE: COMMENTS ON AGENDA FOR MARCH 8TH SALMON HATCHERY COMMITTEE MEETING

Chairman Morisky and members of the Alaska Board of Fisheries,

Icicle Seafoods is one of the largest and most diversified seafood companies in North America. Our operations are located throughout the State of Alaska including Southeast, Prince William Sound, Cook Inlet, Kodiak, Dutch Harbor, and Bristol Bay. Our processing facilities and our fishermen depend on regulatory stability and sustainable management of fisheries resources. We appreciate the opportunity to comment on the first salmon hatchery committee meeting.

Regardless of the outcome of this hatchery committee meeting, we urge the BOF to consider returning to a consistent yearly process for dealing with hatchery-related issues and to hold that meeting in October concurrent with the BOF Worksession. Dealing with repetitive hatchery proposals out of cycle is time consuming and incredibly expensive for participants who are now forced to attend multiple BOF meetings per year.

The hatchery committee open forum is limited in the topics that may be discussed, however the majority of the topics were already commented on extensively during the October 2018 BOF hatchery workshop. As was the case then, we continue to support the Alaska Hatchery Research Project (AHRP) which will provide comprehensive science-based information. As that project comes to completion, we assume that additional research topics will be identified. We also express full support of considering science-based information in the open forum at the hatchery committee meeting, as opposed to unverified research papers and self-proclaimed biologists. Alaska's reputation for sustainable, science-based fisheries management is well deserved and should not be overshadowed by a recent uptick in attempts to manage fisheries by the court of public opinion.

As was the case with past public comments on hatchery issues, it appears that there is a general lack of understanding regarding salmon production and abundance throughout the North Pacific, and Alaska's contribution to overall salmon numbers (both hatchery production and wild stock). As the BOF moves forward with identifying research priorities of hatchery salmon, it would be beneficial if the public has a better understanding of overall salmon abundance and hatchery production in the entire North Pacific.

As for the Regional Plan Team (RPT) process, overall the structure works and is behaving as designed. Hatchery production requests are evaluated and frequently get denied. Meetings are open to the public and promoted to the public. They follow an agenda and process. It's easy and convenient to claim that a process is broken and non-transparent, however as members of the BOF are aware, sometimes perception doesn't match with reality. Although there are small additional efforts that can be made to attempt to engage the public in the RPT process such as making teleconference lines available, one of the best ways to engage and inform the public is by the BOF re-engaging a yearly hatchery meeting, the Joint Protocol on Salmon Enhancement.

Icicle Seafoods extends an open invitation to any member of the board to observe salmon or other fisheries and processing operations. Thank you for the opportunity to comment, please reach out if you have any questions.

Sincerely,



Julianne Curry
Public Affairs Manager
Icicle Seafoods
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Submitted By
Ivan Stonorov
Submitted On
2/20/2019 7:22:19 AM
Affiliation

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- Salmon hatchery's benefit Alaskans in many ways. Many Alaskan communities depend on the fish that hatcheries produce, it is a big part of there economy, jobs, fish tax etc. Hatcheries boost both sportfishing and commercial fishing, more opportunity is created to catch fish.
- Hatcheries have been producing fish in Alaska for more than 30 years. For species like pink salmon that is 30 generations of fish. If hatcheries are damaging the ecosystem, the damage has already been done. We are seeing robust returns of wild and hatchery fish after 30 years of hatchery production. On years when hatchery fish do you well, wild fish also do well, it seems when there is enough feed in the ocean all fish thrive. As was said at the last meeting, "Leave hatcheries alone!"
-

Submitted By
James P R Honkola
Submitted On
2/20/2019 11:04:00 PM
Affiliation
Mr.

Dear Chairman Morisky and members of the Board of Fisheries, Hatcheries have been a part of commercial fishing in Alaska for 45 years. During this time they have proven to be instrumental in keeping the commercial fishing industry sustainable, while at the same time coexisting with wild runs. I am a third generation commercial fisherman. I was raised both gillnetting and seining out of Cordova, on the Copper River and in Prince William Sound. This means I have fished for both wild and hatchery salmon in both areas. I can say, from personal experience and ADF&G historical commercial harvest data that there have been large wild salmon returns during many of the years hatcheries have been operated. Clearly these numbers, provided by ADF&G, show a different reality than what is being portrayed by the emergency petition from last year. The Copper River, located just outside the entrance to PWS, has seen robust wild king salmon and silver salmon returns in the last 3 years, as well as record wild red salmon returns in the last 8 years. This year, the wild red salmon return was lower than forecasted on the Copper River which resulted in a closed commercial fishery and restrictions on personal use and sport fisheries upriver. At the same time, the system experienced a high king salmon return. Fortunately, the Gulkana red salmon hatchery stocks returned to the Copper River, allowing the mixed stock fishery to be executed in a conservative manner. This hatchery-produced harvest not only provided a limited opportunity for commercial fishing, but also made it possible for multiple user groups to utilize the resource. Without this vital Gulkana Hatchery run, subsistence, personal use, and sport users would not have had the same opportunity and bounty that they enjoyed this season. In years with lower wild returns and limited commercial fishing opportunity, hatchery salmon in Prince William Sound provide much needed resource for fishermen. With the Copper River district closed to commercial fishing for the majority of the 2018 red salmon season, the commercial fleet was able to concentrate fishing efforts on the hatchery runs in PWS. Each of these Alaskan small business owners depends on having the opportunity to fish for these crucial hatchery supported salmon runs. Proper scientific method and evaluation is needed to fully explore the complex relationship that hatchery salmon have with their environment. The current RPT process for determining hatchery production is rooted in science, working data, and experience, and therefore is a more effective system to determine hatchery policy. The multi-agency scientific study currently underway is a step in the right direction for answering more questions and furthering our understanding of how hatcheries effect and interact with wild salmon populations. Thank you for your time

Submitted By
Jeffrey Golden
Submitted On
2/20/2019 11:51:01 AM
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Fisherman

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AK Board of Fish, The hatchery program in SE AK has been and is of great importance to the viability of the fishery, since I started seining in 1976. This last season, 2018 illustrated clearly that importance. Without the hatcheries there would have been little or no fishing time for the fleet. With the hatchery program it turned out to be a good year. Sincerely, Jeffrey Golden F/V Challenger



Thank-you for opening the hatchery process into a public forum of the BOF. This is a serious threat to wild populations of all fish species.

Hatchery salmon are not wild salmon. This is of utmost importance. Please clearly define in regulation hatchery fish from the wild diverse genetics and epigenetics (**biological mechanisms that will switch genes on and off**) of wild populations. They are not the same. Millions of years of diversity not the same.

The ignore, condone, and deny tactic used by ADFG and hatchery proponents will never lead to solution to the huge percentages of hatchery fish straying into wild salmon rivers and the competing with wild fish populations for food.

Please do not be deterred from keeping this open process in the BOF cycles to allow somewhere for the public to openly see what is going on with hatcheries from a statewide perspective. This process must be in regulation.

The piecemeal approach of managing hatchery production has not and does not work. Fisherman and fish are being adversely affected from different regions causing the wild fisherman to lose millions of dollars through poundage loss of wild fish and markets being swamped with hatchery product. This hatchery process can aid better understanding and consideration of the complexity of this hatchery ideology that is overtaking the wild fish priority.

The public, legislature, and ADFG itself is in the dark about the hatchery culture. **The Annual Enhancement Reports** must also list all straying, scientific rebuttals to hatcheries and problems such as hatchery stocks outcompeting the natural wild fish for available biomass for food, not just look how many fish we are producing.

- **The Regional Planning Teams** need independent ADFG scientists not just hatchery proponents and those who have prior hatchery production employment and hatchery commercial fishing prospects which have taken ADFG and RPT positions.
- **Comprehensive Salmon Plans** need to be comprehensive and linked with wild systems as the priority not just hatchery.
- **Acceptable levels of straying is 2% unless complete documentation through science**

False statements have become the norm with no backup of evidence or inquiry in science. including denials and ignoring policies and statutes. The onus is on the Aquaculture Associations to prove no harm. Hatcheries have been hidden from view for over 40 years with outdated legislation originally designed to contribute to rehabilitation not replace and overwhelm wild populations.

The word "enhancement" needs to be looked at the "artificial production" the much of hatcheries have become today.

Forming this BOF hatchery committee will begin the crucial steps needed to educate the State of Alaska people, the legislature and the ADFG and BOF themselves as to the entire story and process process that unwittingly has led to the over production of hatchery fish that while yes, serves a very small limited number of fisherman, but at the same time primarily serves nonresident corporations while affecting the abundance and rehabilitation of our often over harvested natural wild stocks.

The consequences the scale of what was conceived as rehabilitation has grown into a business plan with no money to monitor it, assess it, or even have a handle on it by the ADFG. The state of Alaska has lost control. Hatchery proponents are attempting to make the fish fit a business plan tat replaces natural wild fish with inferior hatchery product.

Without the publics knowledge, reports and eco certifications use empty words based on lack diversion from mandated priorities.

Guessing is not good enough.

Hatchery fish compete with food in the ocean. It is becoming known that one of the reasons for smaller wild fish is this competition between the huge numbers of introduced fish with wild fish. The fisherman must begin to comprehend the loss of poundage and money being stolen from their wild fish to artificially introduced hatchery fish from food competition in the ocean.

It is rare that the fisherman within regions attend their association board meetings. Regional Planning Team meetings are rarely attended by the public. It is left up to 6 people in the RPT, four of which do not



have the health of wild fisheries or fish as the priority. The decision to allow an employee from the hatchery section to be a voting member seriously compromised the already beleaguered ADFG members of the team. Decisions are being made by a very limited number of people oftentimes with limited knowledge of the problems production of this size creates and/or receive financial gain from within the hatchery sector

HATCHERY STOCK STRAYING

The Comprehensive plans and genetics policy state a 2% straying percentage. Straying beyond this 2% is in an area of uncertainty. This area of uncertainty should not be exceeded. Until we absolutely understand all aspects of what straying means the precautionary principle must come into play. Just saying we use the precautionary principle is not good enough. This must be followed up with evidence of how this principle is protecting fish from adverse affects. For instance why is straying at almost 100% being allowed to continue using the excuse that a study is ongoing? This is the opposite of precautionary. This is thumbing your nose at a very serious situation that must cease.

Yet just this past fall straying at 98% hatchery fish in large wild river systems was seen in Crawfish Inlet. 93% in Lower Cook Inlet from fish from PWS hatchery fish hundreds of miles away. How can this be legal and ADFG to condone this? This isn't even being talked about? How can this possibly be good for wild fish? Why is ADFG allowing this to continue. Are they under a gag order? Is ADFG not allowed to perform their duties to prioritize wild fish? Has ADFG been taken over by Hatchery Constituents?

A scientific Committee of independent thinkers must be consulted outside of ADFG and Hatchery Production to bring the BOF the latest scientific knowledge. To continue to use outdated information or biased information for fear of retribution without addressing the many indicators and concerns of scientists around the world will only lead to damage to our natural wild fish and fisheries.

Submitted By
Jeffrey McKean
Submitted On
2/12/2019 2:27:21 PM
Affiliation

Alaska Board of Fish Members:

I support the current hatchery production in Alaska. Not a surprising statement from a SE gill-netter, whose income is dependent on the hatchery production. In return I support the hatcheries with 3% of my salmon revenue. Very simple.

Where I find a surprise, is that the recreation industry being against hatchery production in Alaska, all the while their friends fishing in Washington, Oregon, and Idaho are only allowed to take hatchery produced fish home. If it were not for the State and Tribal hatcheries in Washington, Oregon, and Idaho the sport fisheries there would cease.

Some thing so simple is complicated?

Thank you, Jeffrey McKean

Submitted By
John Liddicoat
Submitted On
2/20/2019 7:03:24 PM
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SE Alaska seiners

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As a purse seiner I would just like to say how much the hatcheries have benefited our fishery. Without them last year would have been a total disaster. My four crew and myself wouldn't have made any money. Please do not allow the hatcheries to be shut down as they help us through the lean years which always happen in our fishery thanks John Liddicoat F/V Endurance

Submitted By

John Renner

Submitted On

2/20/2019 6:26:07 PM

Affiliation

Members of the Board, My name is John Renner and I live in Cordova Alaska. I am concerned with the hatchery committee meeting and agenda. It appears the Chairman is asking the public for recomedations that would be better addressed by the scientific community and the Alaska Department of Fish and Game.

Prince William Sound Hatchery System is a suces story. The wild pink salmon run in 2015 was an all time record. The sockeye runs on the Copper River have also seen record runs in the last decade. The long term studies on straying and genetic diviserty are just beginning to bring results. It appears hatchery fish do not reproduce as effectively as wild fish. Genetic diversity has not been degraded. This is great news. The State, coastal Alaska and the fishing industry have made a significant investment in the hatcheries and related infrastructure. Please don't unesscessarily regulate or otherwise mess up a good thing. Thank you.

Alaska Board of Fisheries
HATCHERY COMMITTEE MEETING
March 8, 2019
Sheraton Hotel, Anchorage

Comments

John Sund
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Craig, Alaska

Regional Planning Teams (RPTs)

I am representing myself and directing my comments to the discussion regarding Regional Planning Teams. I believe I can bring a historical perspective to the creation of the RPT's and supply a context to assist in the review and discussion.

At the time of the drafting of the legislation creating and setting up the legal framework for the Private Non-Profit Regional Aquaculture Associations (PNP); 1976 – 1980, I worked on the legislation and regulations as staff to the legislature. Bill Hall from Cordova working for Senator Kertulla, and myself from Ketchikan working for Representative Gardiner were the primary staff.

The 1970's produced some of the smallest salmon returns in the history of the state. Recall in 1976 the total harvest of all salmon in the state was 26 million. The state set up a commission to find a way to rebuild the "Missing 100 Million Salmon". The report recommended a multi prong effort to rebuild and recover the historical salmon harvests. The effort included management, conservation and enhancement. The result was enactment of limited entry, a \$100 million bond issue to finance state operated hatcheries and enhancement projects and legislation authorizing the creation of Private Non-Profit Aquaculture Associations. The fishermen were encouraged to conserve and invest in the rebuilding of salmon runs. When the fish returned in the they would be protected from a growth in new fishermen entering the fishery.

Enhancement was a multi part effort. The state, through FRED (Fisheries Rehabilitation and Enhancement Division) of Fish and Game set out on a program to build hatcheries. The private sector participated through the creation Private Non-Profit corporations. Both the "ma and pa' and the Regional Associations. The PNP program provided the means and methods for the fishermen to pay for the enhancement projects. Both through assessments on gross stock and recovery of salmon in designated cost recovery areas. The fishermen have "skin in the game".

There were no models to follow and more questions and unknowns on how to provide the answers to build a powerful economic generator utilizing the marine resources. The function of that generator, who guides it, who builds and operates it, how it is funded, and how it pays its own way were not known. Even the notion of creating such a system was untried. So, there were social, economic and technological experiments to put in place. It needed legislation, programs, institutions, funding mechanisms, technology and monitoring systems to evaluate the effectiveness of the efforts.

The Regional Planning Teams were an integral part of the planning process for the Recovery and Enhancement Program. They were established in the initial legislation. The RPT provides a platform for

regular, integrated comprehensive planning. The purpose was to coordinate the overall salmon program in a given area and provide advice to the Commissioner. The ultimate decision on any action is made by the Commissioner of Fish and Game.

The initial legislation setting up the RPT's is in AS16.10.375.

“The commissioner shall designate regions of the state for the purpose of salmon production and have developed and amend as necessary a comprehensive salmon plan for each region, including provisions for both public and private non-profit hatchery systems. Subject to plan approval by the commissioner, comprehensive salmon plans shall be developed by **regional planning teams** consisting of department personnel and representative of the appropriate qualified regional associations formed under AS 16.10.380.”

The RPT are representative of the primary stakeholders. The Regional Associations are mandated by statute to include representatives of other user groups within the region. User groups are defined as sport fishermen, processors, commercial fishermen, subsistence fishermen and representatives of local communities.

From this group the Board appoints its members to the RPT. The RPT meeting process is open to the public. The meetings are noticed in the newspaper and other public media. Agenda's are published and notes of the meetings are kept. The process is intended to be open and transparent.

The first RPT meeting took place in 1975 in Prince William Sound between the Department and PWSAC. At that meeting there were six members. Later the membership of the RPT was set at six by regulation adopted by the department. The RPT's meet and make a report to the Commissioner. The Commissioner makes the decision.

The RPT process is an important venue to bring valuable information to the planning process in an organized manner. The reports are advisory. The process is public and transparent. The information is useful to the Board of Fisheries in its deliberations and decision-making process. As stated in both the statute and the Joint Protocol on Salmon Enhancement #2002-FB-215 the Board regulates the harvest of salmon in the common property fishery and cost recovery areas.

From my perspective and view point the reason and rationale for the creation of the Regional Planning Team's in the 1970's is still valid today. It is a time-tested process. The environment continues to change. The salmon runs continue to fluctuate. New information is produced every year. The public perception of the use of the resource continues to change and evolve over time. The RPT process provides valuable advice to the Commissioner and to the Board. The process has worked for over 40 years. It is my recommendation the RPT process continue to operate in its current form.

Submitted By

John A Yeager

Submitted On

2/20/2019 7:18:00 PM

Affiliation

SSRAA Subsistence seat, SE RAC representative, Charter fishing guide, sportsfisherman, subsistence harvester

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I am writing this letter in support of the SE Alaska hatchery program. The benefits that come from both SSRAA and NSRAA hatchery programs are felt region wide and by many different user groups. Primarily designed to benefit the commercial fishing industry, I have experienced the benefits of hatchery raised salmon first hand. There is a significant number of salmon that are intercepted by the guided charter fleet as well as the sport angler whether resident or non resident passing through. Hatchery caught fish provide both a financial avenue to the fisherman as well as an economic boost to local communities. Although not a "traditional" harvested species, hatchery raised salmon do play a part in the subsistence lifestyle that so many Alaskans customarily partake in. When natural runs of salmon are in low abundance, having a hatchery return to access provides opportunity to put up much needed salmon.

I support the science-based decision making that goes into the SE hatchery programs and the dedicated and highly trained staff that carryout those programs. I also feel that the RPT process is proven and brings on the ground data and experience to the BOF process. Hatchery production in SE Alaska has had positive impacts with very little negative.

In closing, hatchery programs have become an important factor in keeping commercial fishing moving in a positive direction while inadvertently providing opportunities for the sports fisherman and subsistence harvester. The benefits of healthy managed hatchery programs are felt state wide.

Thank you for the opportunity.

John A Yeager.

STATEWIDE IMPACTS

- Alaska's salmon hatcheries account for the annual equivalent of 4,700 jobs and \$218 million in total labor income, including all direct, indirect, and induced economic impacts. A total of \$600 million in annual economic output is connected to Alaska salmon hatchery production.
- The employment impact of 4,700 jobs is an annualized estimate.
- The number of people who earn some income from the harvest of hatchery-produced salmon is several times the annual average.
- More than 16,000 fishermen, processing employees, and hatchery workers can attribute some portion of their income to Alaska's salmon hatchery production. Thousands of additional support sector workers earn wages connected to Alaska hatchery production.
- The economic footprint of Alaska's hatcheries includes \$95 million in labor income associated with commercial fishing, \$82 million in labor income associated with processing, and \$25 million connected to hatchery operations.
- Non-resident sport harvest of hatchery salmon accounts for \$16 million in annual labor income created directly or indirectly by Alaska's hatcheries. This number is limited to impacts resulting from non-resident sport harvest of hatchery salmon and should be considered conservative.
- Clearly, resident sport/personal use/subsistence harvests of hatchery salmon have additional economic impacts as well as very significant social and cultural impacts in Alaska. McDowell Group. "Economic Impact of Alaska's Salmon Hatcheries - Executive Summary. October 2018.
- Southeast Alaska hatcheries account for 2,000 jobs (annualized), \$90 million in labor income, and \$237 million in total annual output, including all multiplier effects.
- Prince William Sound hatcheries account for 2,200 jobs, \$100 million in labor income, and \$315 million in total annual output, including all direct, indirect, and induced effects. McDowell Group. "Economic Impact of Alaska's Salmon Hatcheries - Executive Summary. October 2018. ECONOMIC VALUE OF HATCHERIES
- Over a six year period, commercial fishermen harvested an annual average of 222 million pounds of hatchery-produced salmon worth \$120 million in ex-vessel value.

- Chum and pink salmon are the most important species – responsible for 39 and 38 percent of ex-vessel value, respectively – followed by sockeye (16 percent), coho (4 percent), and Chinook (2 percent).

- More than half of hatchery salmon ex-vessel value went to seiners (57 percent). Gillnetters pulled in 38 percent, while trollers caught 5 percent of hatchery ex-vessel value over the study period.

- Regionally, Prince William Sound (PWS) harvests of hatchery salmon generated \$69 million in ex-vessel value annually. Southeast harvests earned fishermen \$44 million on average, followed by Kodiak (\$7 million) and Cook Inlet (\$0.5 million) harvests.

- It should be noted that Cook Inlet Aquaculture Association (CIAA) is currently building up their pink production and the full impact of these additional investments will not be seen for several more years. In addition, CIAA maintains several flow control structures and a fish ladder – efforts that lead to additional (though unquantifiable) salmon production.

- As a percentage of statewide harvest value, hatchery-derived salmon represents 22 percent of total salmon ex-vessel value over the study period. This percentage ranged from a high of 28 percent in 2013 to a low of 15 percent in 2016.

McDowell Group. "Economic Impact of Alaska's Salmon Hatcheries - Executive Summary. October 2018.

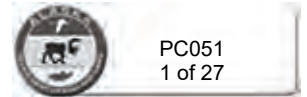


Kachemak Bay Conservation Society

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To:
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Although hatcheries were authorized in 1974 under the provision that they “shall be operated without adversely affecting natural stocks of fish in the state,”¹ ADF&G (the department) has only just begun to conduct limited research on straying and genetic impacts to wild stocks; it has done no research whatsoever on competition, predation and trophic-level impacts.

1)The Board of Fisheries (the board) must consider the impacts of straying, loss of genetic diversity, competition, predation and trophic-level cascades to assess (a) whether the current scale of hatchery releases is consistent with the protection of wild stocks,² and (b) to what extent it is appropriate to set apart fish reserve areas, refuges, and sanctuaries for wild stocks.^{3 4} However, the because of their lack of research, the department cannot be considered an expert on many of the

¹ Act *Authorizing the Operation of Private Nonprofit Salmon Hatcheries*

² The Board of Fisheries may adopt regulations it considers advisable...for...investigating and determining the extent and effect of disease, predation, and competition among fish in the state, exercising control measures considered necessary to the resources of the state (Regulations of the Board of Fisheries, AS 16.05.251).

³ The Board of Fisheries may adopt regulations it considers advisable...for...setting apart fish reserve areas, refuges, and sanctuaries in the waters of the state over which it has jurisdiction, subject to the approval of the legislature (Regulations of the Board of Fisheries, AS 16.05.251).

⁴ This approach was recommended in ADF&G's 2018 “Salmon Hatcheries in Alaska – A Review of the Implementation of Plans, Permits, and Policies Designed to Provide Protection for Wild Stocks” by Danielle F. Evenson Christopher Habicht Mark Stopha Andrew R. Munro Theodore R. Meyers and William D. Templin.



above matters, and certainly cannot be the only source of information appraised by the Hatchery Committee in its deliberations.⁵

Our conversations with ADF&G research- and management biologists around the state make it clear that *they are not free to speak about hatchery issues without fear of losing their jobs*. This is a grave matter, and a challenge that the board must face squarely vis a vie information decimated by the department. The board, pursuant to its own mandates under AS 16.05.251, must seek information on straying, genetic impacts, competition, predation, and trophic-level impacts from scientists whose work has been published, peer-reviewed, and is free of all conflicts of interest.⁶

The formation of an independent Hatchery Impacts Science Advisory Group made up of such ocean ecologists and biologists is necessary if the Hatchery Committee is get the information it needs to do its job, and if the people of the State of Alaska are to get the evidence-based regulation, transparency, and rule of law that they deserve. A list of well-respected researchers in the field is included at the end of this letter, and we strongly urge the Board invite them to become members of a Hatchery Impacts Science Advisory Group and to use the information they are able to provide.

In his presentation to the board, Mr. Templin's summary dismissal of peer-reviewed work by biologists from institutions such as the Fisheries and Oceans Canada, the Alaska Department of

⁵ Special Publication No. 09-10 "Alaska Department of Fish and Game Internal Review of Prince William Sound Aquaculture Corporation" by ADF&G in August 2009 gives some insight into the resistance within the department to assess stray rates: "The department has also documented large scale pink salmon straying Joyce and Evans (unpublished data), Joyce and Evans (1999), and Joyce et al. (unpublished data). The studies found that

The proportion of hatchery salmon in stream escapements was greatest in the streams located adjacent to hatcheries in all years often reaching 100% by the final sampling event. Proportions of hatchery pink salmon were also high in southwestern streams distant from production hatcheries; proportions in the final sampling event ranged from 31% in Snug Harbor to 91% in Loomis Creek in 1997, and from 14% in Snug Harbor to 83% in Loomis Creek in 1998. No further studies were conducted to evaluate straying rates in other areas or even years.

The department has largely ignored the results of this study. It is unclear why the authors, one of whom was the PWS Area Management Biologist, did not follow up on the results of this study. The authors write

We have reported very high percentages of hatchery salmon in streams, especially in the southwestern region of Prince William Sound, and have commented briefly on the effects they may have on wild populations. We might ask how the hatchery permitting agencies of the State of Alaska allowed the current situation to arise.

This internal review questions how the authors allowed the problem continue without comment for the next decade."

⁶ As appropriate, the board and department may agree to invite other state officials and federal agencies, professional societies, scientists, or industry spokespersons to attend and contribute information on particular topics... (*Joint Protocol on Salmon Enhancement #2002-FB-215*).



Fish and Game, the University of Alaska, The Marine Biological Association, The Prince William Sound Science Center, and NOAA Fisheries should be approached with skepticism. Dismissing the work of researchers from the above institutions as merely correlative, Mr. Templin failed to mention broad-based and decades-long research establishing that pink salmon travel together, compete directly with, and share the diets of chinook, sockeye, and silver salmon. This problem is particularly pressing, for example, in explaining the finding that the weight of food found in king salmon stomachs in odd years is less than half the weight of the contents in even years (Davis 2003). Mr. Templin also failed to clarify in what concrete ways he or the Department used the precautionary principal when interpreting the data he rejected.⁷ It is unclear that the precautionary approach is being used at all. Furthermore, Mr. Templin failed to comment on why the department is doing no research of its own on these pressing questions. In his dismissal, Mr. Templin did not indicate what other factor(s) could explain the even/odd year patterns observed in copepods, diatoms, zooplankton, orcas, kittiwakes, tufted puffins, and Ancient murrelets.

Biologists within the Department of Fish and Game have indicated significant concern regarding the above issues on other occasions. An April 19, 2010 memo from the Division of Commercial Fisheries and Division of Sport Fish Regarding Prince William Sound Division of Commercial Fisheries Permit Alteration Requests advises against the permitting of increased hatchery releases in the Prince William Sound, citing:

A growing body of evidence suggesting hatchery salmon production could come at a substantial cost to other fisheries and wild salmon stocks. Many studies have concluded there is inter and intra-specific competition for pink and chum salmon food resources in North Pacific Ocean nearshore and offshore waters. This competition has been linked to a substantial decrease in productivity and body size of PWS pink salmon wild stocks.

We share these concerns. We remind the board that they are born out of consideration of research conducted by the scientists both inside and outside the department whose work was dismissed by Mr. Templin and whose names are included at the end of the letter. It behooves the board to uphold the integrity of the department, to maintain its respectability in the eyes of the public, to uphold the regulations that require precaution⁸ and prioritize protecting wild stocks over hatchery

⁷ ...in the face of uncertainty, salmon stocks, fisheries, artificial propagation, and essential habitats shall be managed conservatively as follows: (A) a precautionary approach, involving the application of prudent foresight that takes into account the uncertainties in salmon fisheries and habitat management, the biological, social, cultural, and economic risks, and the need to take action with incomplete knowledge, should be applied to the regulation and control of harvest and other human-induced sources of salmon mortality... (Policy for the management of sustainable salmon fisheries 5 AAC 39.222).

⁸ 5 AAC 39.222



stocks.⁹ An independent Hatchery Impacts Science Advisory Group must be formed to determine whether release sized need to be limited by the board and/or sanctuaries for significant wild stocks need to be created.

2) Recent genetic pedigree data from the ADF&G-sponsored study “Interactions of Wild and Hatchery Pink and Chum Salmon in Prince William Sound and Southeast Alaska” must be presented to the board. Preliminary results in one of the streams they have been studying are consistent with what has been found with other salmon species in the Pacific Northwest: *dramatic declines in fitness of progeny (F1)*. Results were presented at the recent Alaska Marine Science Symposium meeting in Anchorage by ADF&G Fisheries Geneticist II, Kyle Shedd and must be presented to the Hatchery Committee.

3) One of the most troubling and contradictory aspects of ADF&G's inaction is the selective use of the RPT process and products. On the one hand, the RPT process is upheld as open and transparent with additional review by the ADF&G Commissioner. However, the five criteria set out in the Prince William Sound Phase III Hatchery Management Plan that are supposed to be examined by ADF&G to achieve “optimum production” are not used in the issuance of permits by the department.¹⁰ Why have these criteria not been examined when the hatcheries have requested releasing more fish? How can the RPT process be upheld as a good model when the management plan that is a product of the RPT process is being ignored?

Recommendations for members of a Hatchery Impacts Science Advisory Group made up of ocean ecologists and biologists who have done work on competition, predation and trophic-level impacts that has been published, peer-reviewed, and is free of all conflicts of interest:

Alan M. Springer
Institute of Marine Science
University of Alaska Fairbanks,
Fairbanks, AK 99775.
amspringer@alaska.edu

⁹ Act *Authorizing the Operation of Private Nonprofit Salmon Hatcheries*.

¹⁰ 1) Wildstock escapement goals must be achieved over the long term;
2) the proportion of hatchery salmon straying into wild-stock streams must remain below 2% of the wild-stock escapement over the long term;
3) the growth rates of juvenile salmon during the early marine period must be density independent over the long term;
4) the abundance of juvenile salmon predators must be independent of juvenile salmon abundance over the long term; and
5) the long-term average cost of hatchery operation, management, and evaluation must remain below 50% of the value of hatchery production.

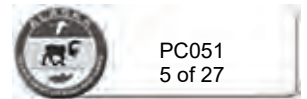


Kachemak Bay Conservation Society

3734 Ben Walters Ln, Homer, AK 99603

907 235.8214

kbayconservation@gmail.com



Greg Ruggerone
Natural Resources Consultants, Inc.
4039 21st Avenue West, Suite 404
Seattle, WA 98199
nrc@nrccorp.com

Sonia Batten
The Marine Biological Association
The Laboratory, Citadel Hill
Plymouth, Devon
PL1 2PB, UK
cprsurvey@mba.ac.uk

Peter Rand
Prince William Sound Science Center
300 Breakwater Ave.,
PO Box 705
Cordova, AK 99574
pwssc@pwssc.org

James Richard Irvine
Fisheries and Oceans Canada
Pacific Biological Station
3190 Hammond Bay Road Nanaimo,
BC V9T 6N7
250-756-7000

Michael Malick
NRC Postdoctoral Research Fellow
NOAA Fisheries, Seattle, WA.
mjm@michaelmalick.com

Also, please find attached a power point presentation by Ruggerone et. al for an outline of the kind of presentation we feel the board must hear.

Sincerely,

Roberta Highland

President,



Kachemak Bay Conservation Society

Legal References:

...in the face of uncertainty, salmon stocks, fisheries, artificial propagation, and essential habitats shall be managed conservatively as follows: (A) a precautionary approach, involving the application of prudent foresight that takes into account the uncertainties in salmon fisheries and habitat management, the biological, social, cultural, and economic risks, and the need to take action with incomplete knowledge, should be applied to the regulation and control of harvest and other human-induced sources of salmon mortality... (Policy for the management of sustainable salmon fisheries 5 AAC 39.222).

The Board of Fisheries may adopt regulations it considers advisable...for...investigating and determining the extent and effect of disease, predation, and competition among fish in the state, exercising control measures considered necessary to the resources of the state” (Regulations of the Board of Fisheries, AS 16.05.251).

As appropriate, the board and department may agree to invite other state officials and federal agencies, professional societies, scientists, or industry spokespersons to attend and contribute information on particular topics... (*Joint Protocol on Salmon Enhancement #2002-FB-215*).

The Board of Fisheries may adopt regulations it considers advisable...for...setting apart fish reserve areas, refuges, and sanctuaries in the waters of the state over which it has jurisdiction, subject to the approval of the legislature (Regulations of the Board of Fisheries, AS 16.05.251).

The Board of Fisheries may amend by regulation the terms of the permit relating to the source and number of salmon eggs, the harvest of fish by hatchery operators, and the specific locations designated by the department for harvest. (Regulations relating to released fish AS 16.10.440(b)),



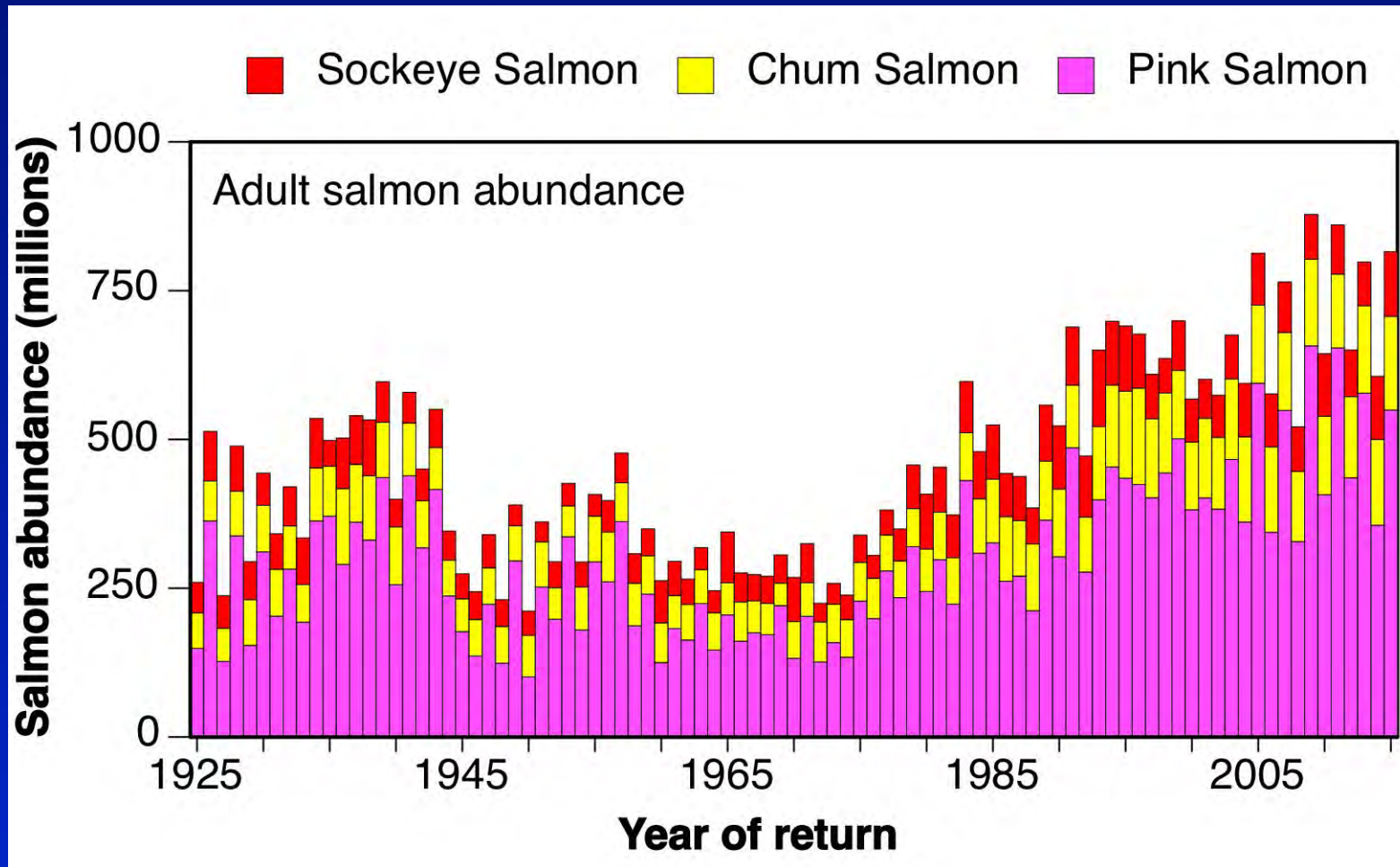
Do pink salmon affect the structure of the North Pacific ecosystem and contribute to declining Chinook salmon populations in Alaska?

Greg Ruggerone (NRC), Sonia Batten (SAHFOS), Brendan Connors (DFO), Jim Irvine (DFO), Michael Malick (OSU), Pete Rand (PWSSC), Leon Shaul (ADFG), Alan Springer (UAF)





Pink Salmon Dominate Pacific Salmon Numbers

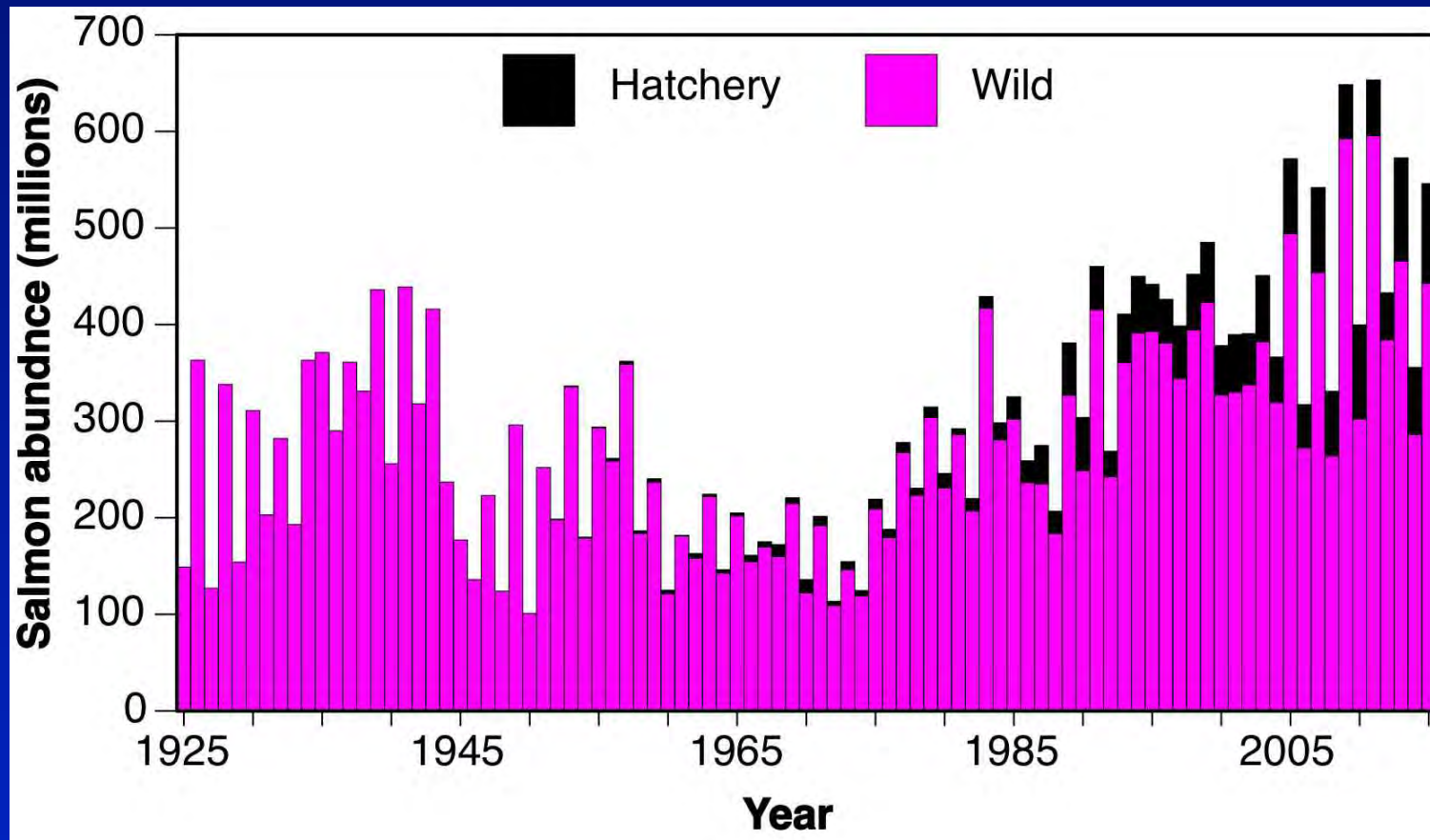


- 500 million pinks/yr, 2005-2015
- Pinks nearly 70% of all salmon

Chinook, coho, steelhead
<5% of total catch biomass



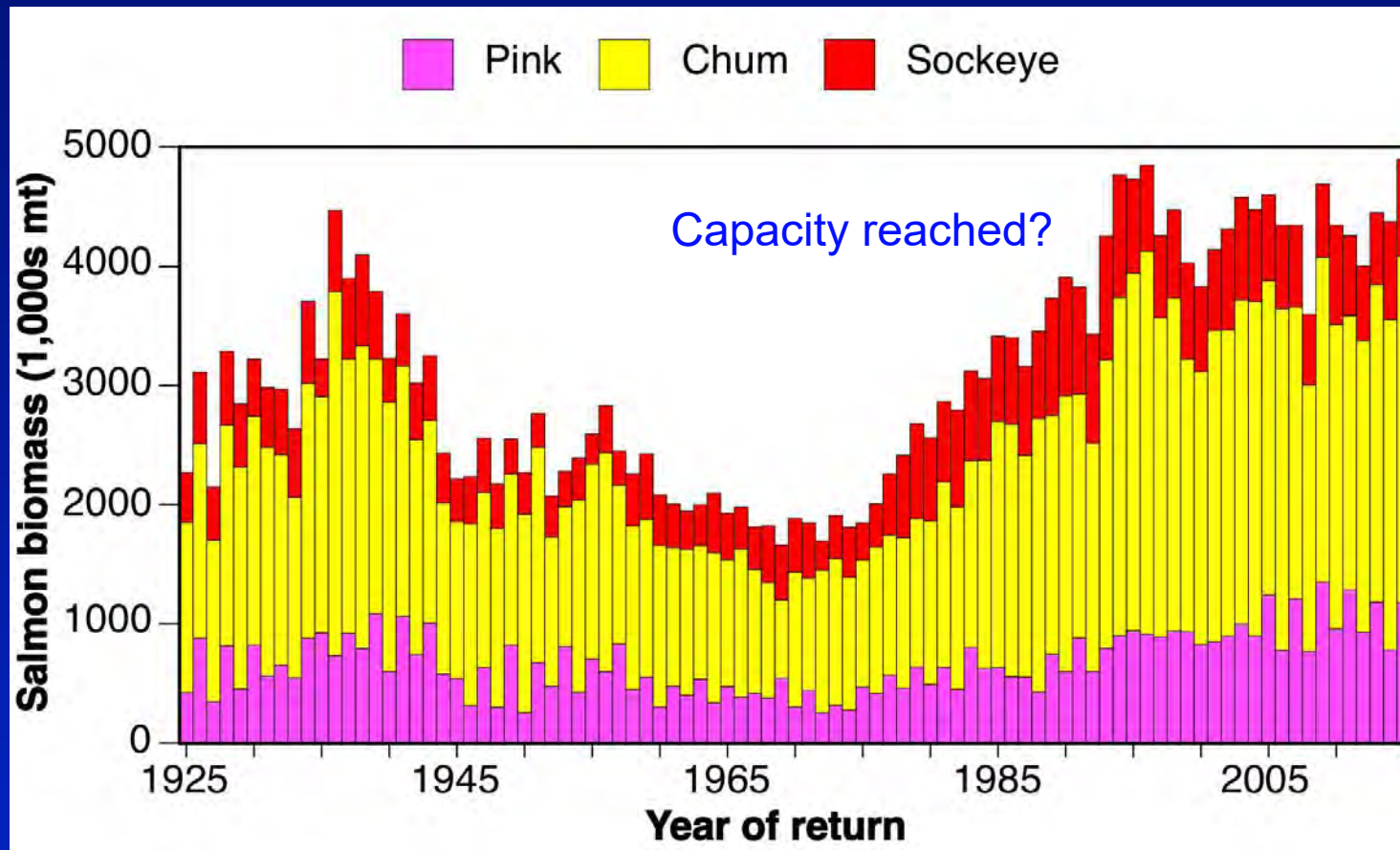
Pink Salmon Dominate Pacific Salmon Numbers



- 650 million pink salmon in peak odd-yr
- Hatchery pinks = 15% of total pink salmon
- Alaska: up to 48% commercial catch = hatchery fish (mostly pinks)



Chum Salmon Dominate Adult & Immature Biomass

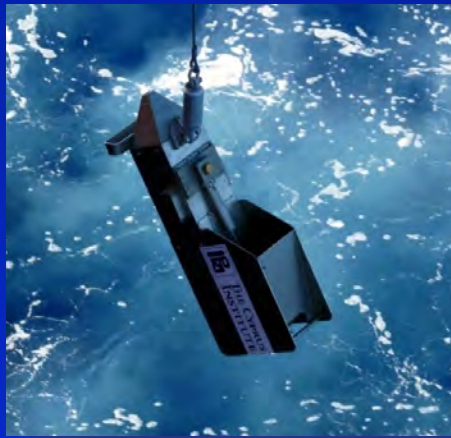
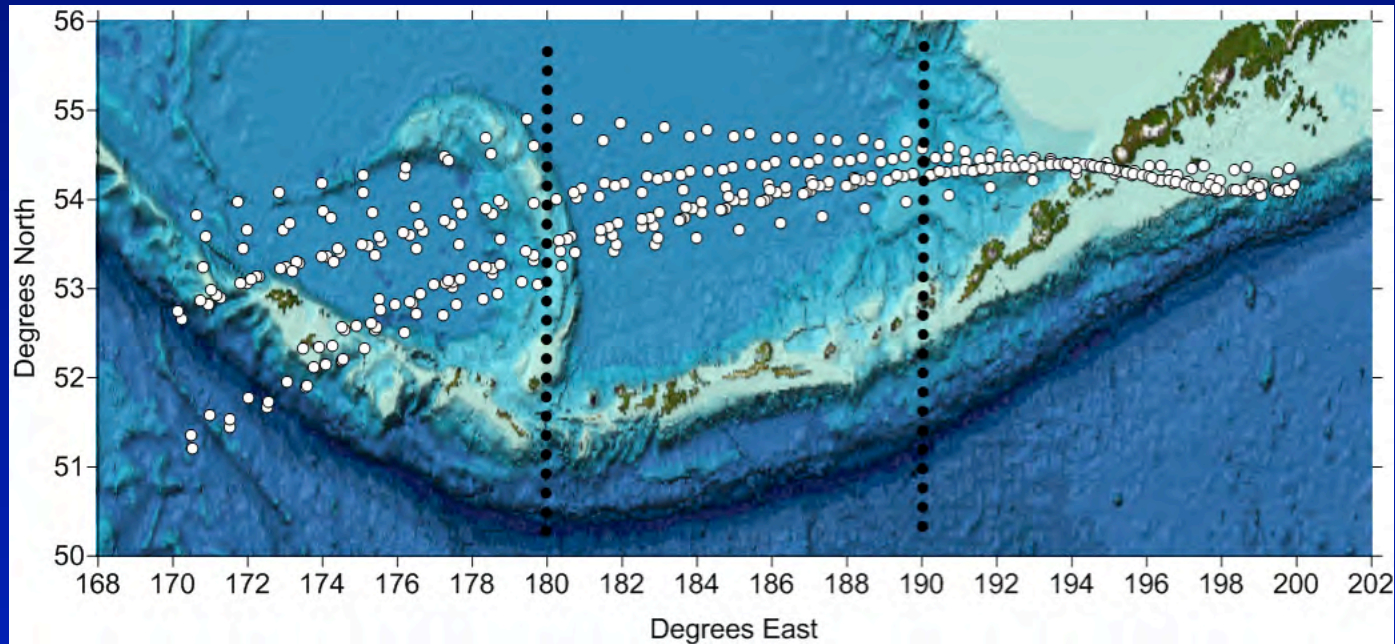


- ~40% of adult and immature salmon biomass is hatchery origin, largely due to chum (Japan, Russia, SEAK, PWS)
- Chum diet largely different from other salmon



Do Pink Salmon Cause a Trophic Cascade?

Continuous plankton recorder, June-Aug., 2000-2014



Batten et al. 2018

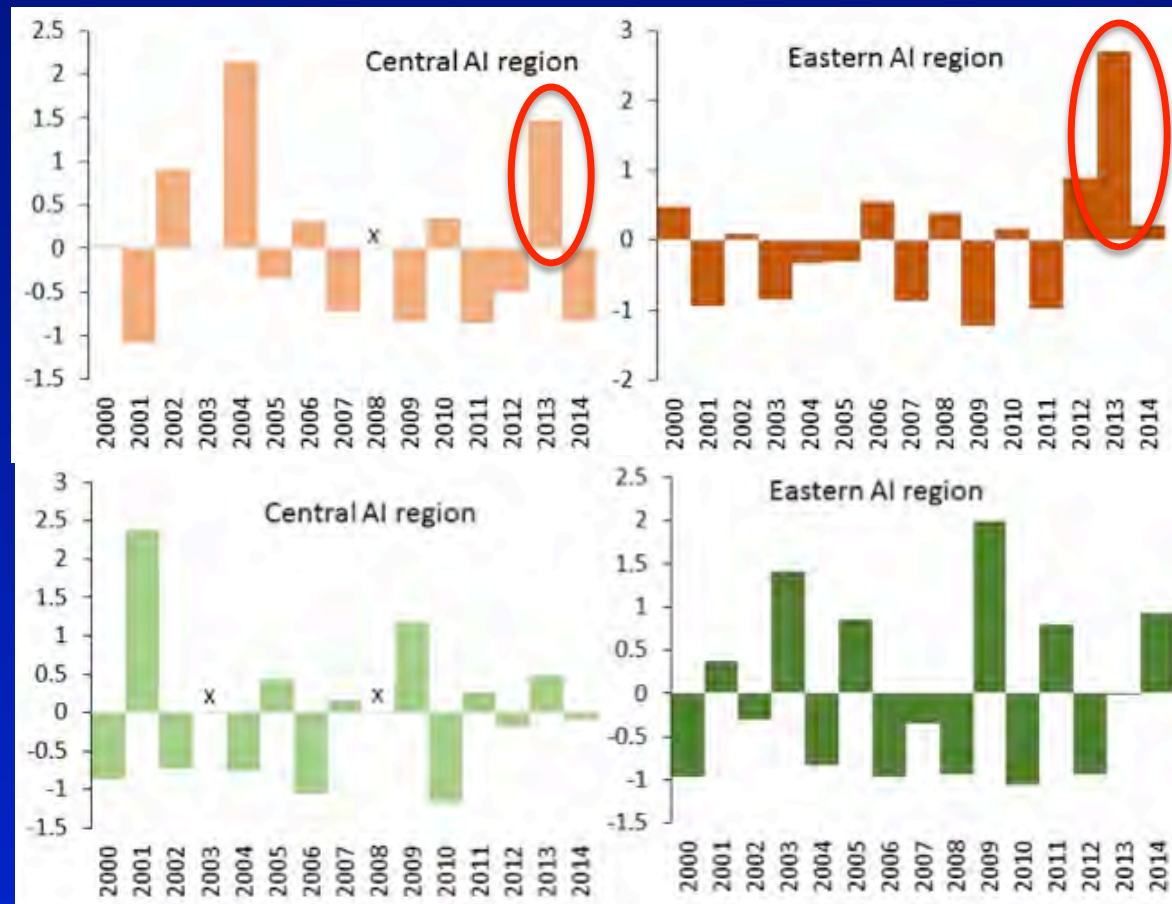
Do Pink Salmon Cause a Trophic Cascade?

Plankton Counts: June-Aug 2000-2014

Large copepods decline in odd years when pinks ~40x more abundant



Diatoms increase in odd years when more pinks and fewer zooplankton



Climate cannot explain odd/even patterns
2013: Zooplankton boomed unexpectedly. Why?

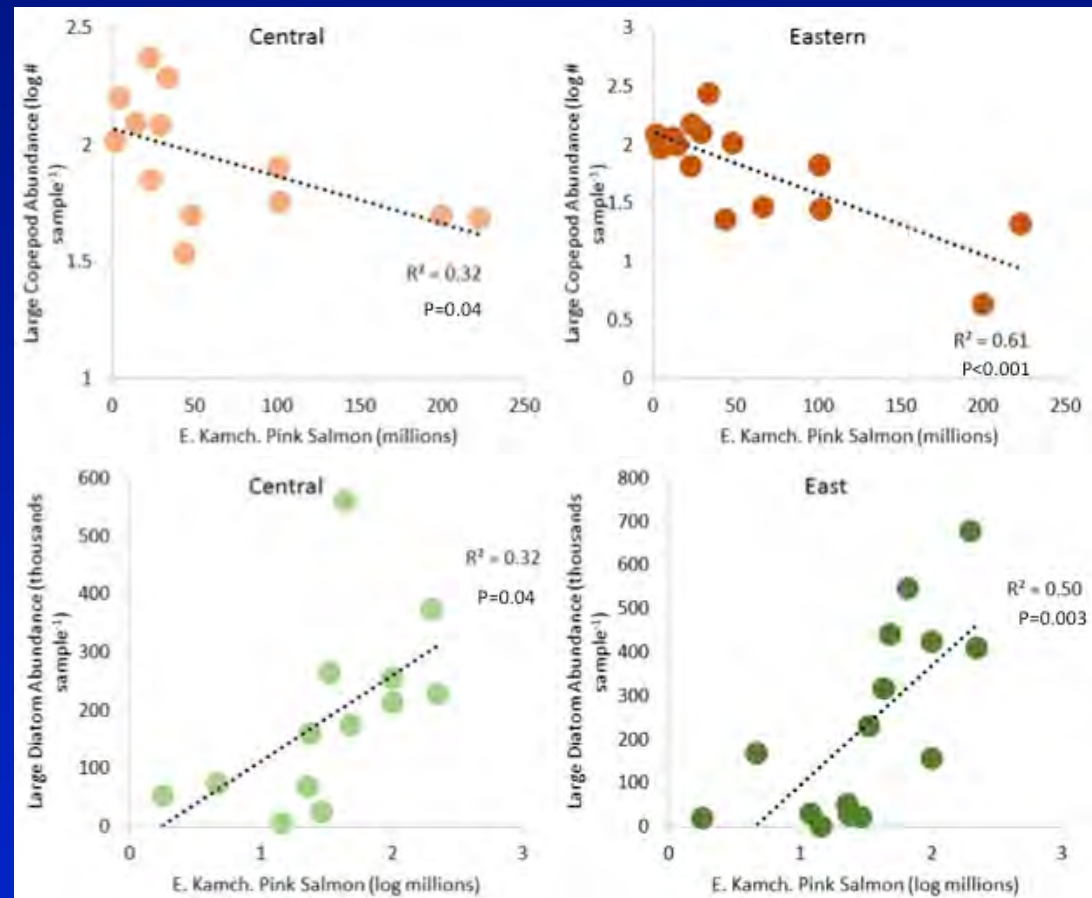
Do Pink Salmon Cause a Trophic Cascade?

Plankton response to Pink Salmon

Large copepods decline when pinks abundant



Diatoms increase when few zooplankton and many pink salmon

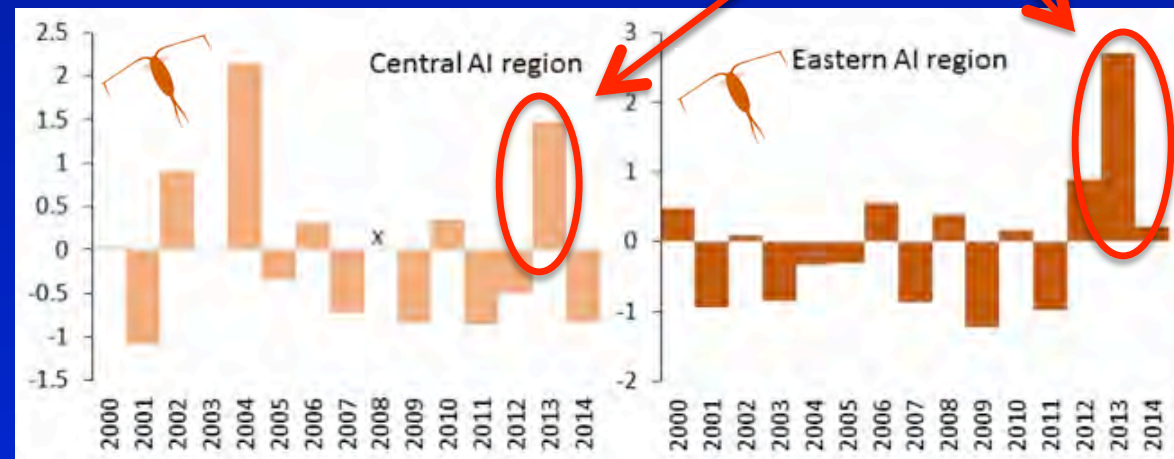
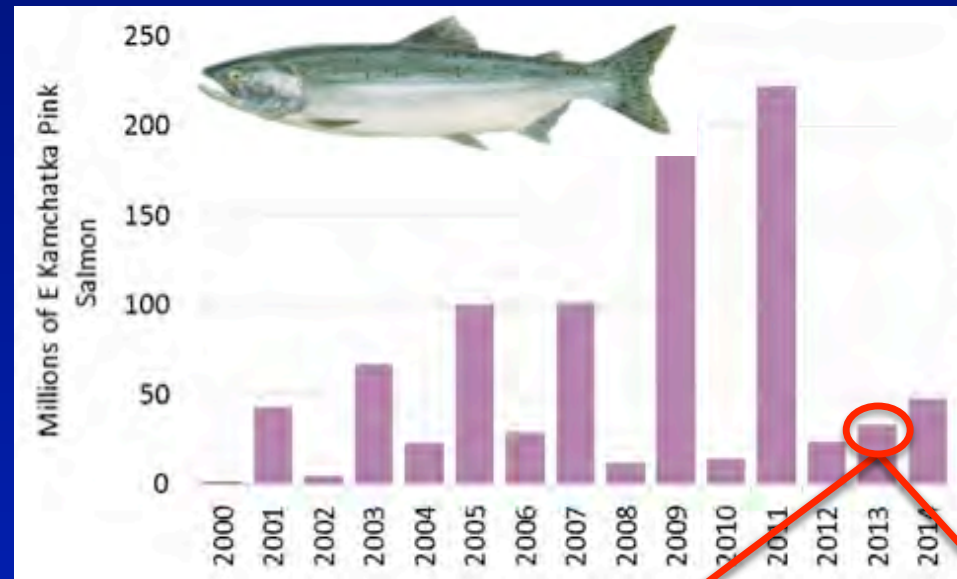


Do Pink Salmon Cause a Trophic Cascade?

2013:

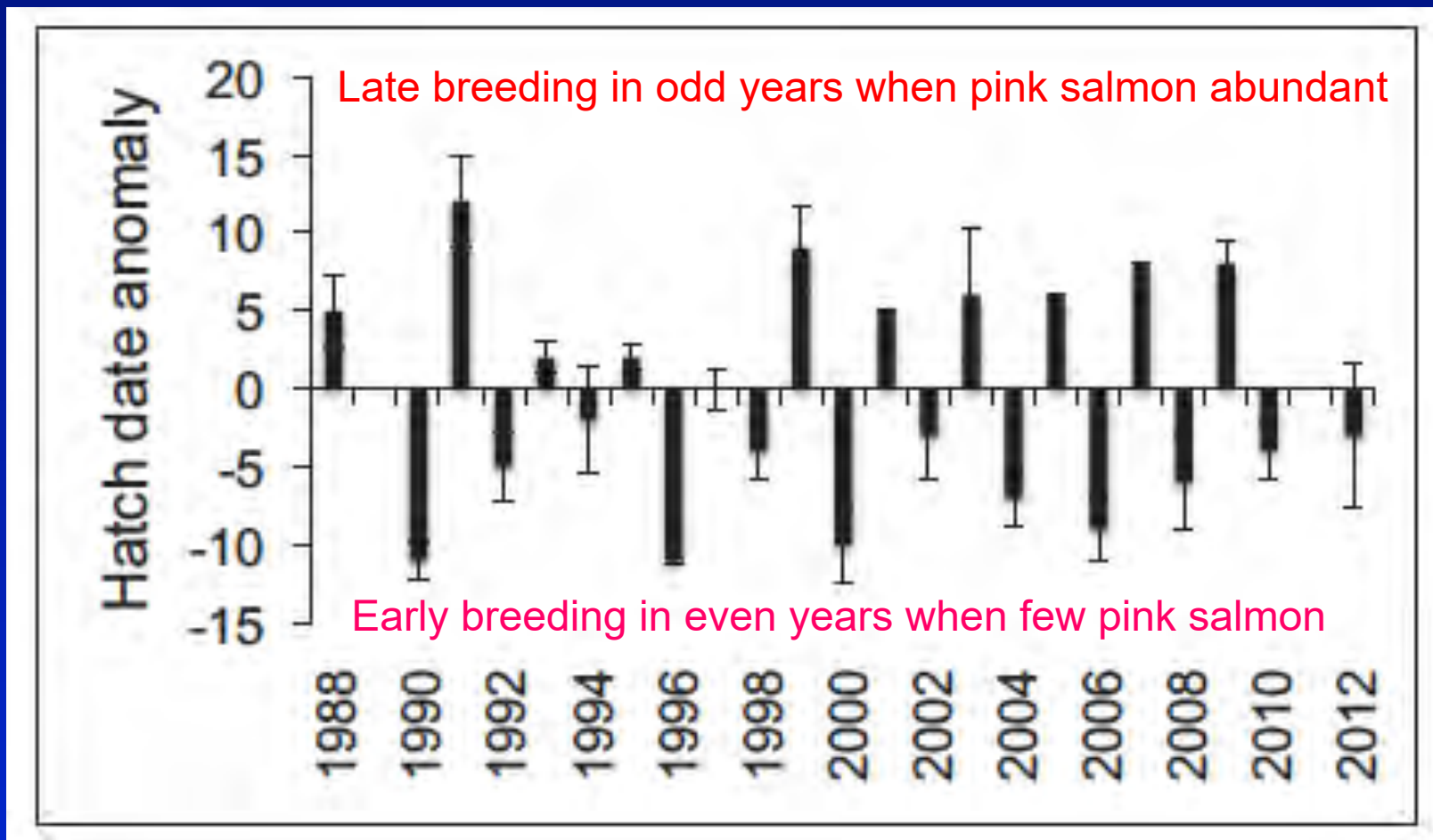
Eastern Kamchatka pink salmon unexpectedly crashed, and zooplankton rebounded sharply

- Patterns not apparent in Western Bering Sea
 - Higher zooplankton counts
 - Pinks not biennial





Do Pink Salmon Cause a Trophic Cascade? Tufted Puffins, Aleutian Islands

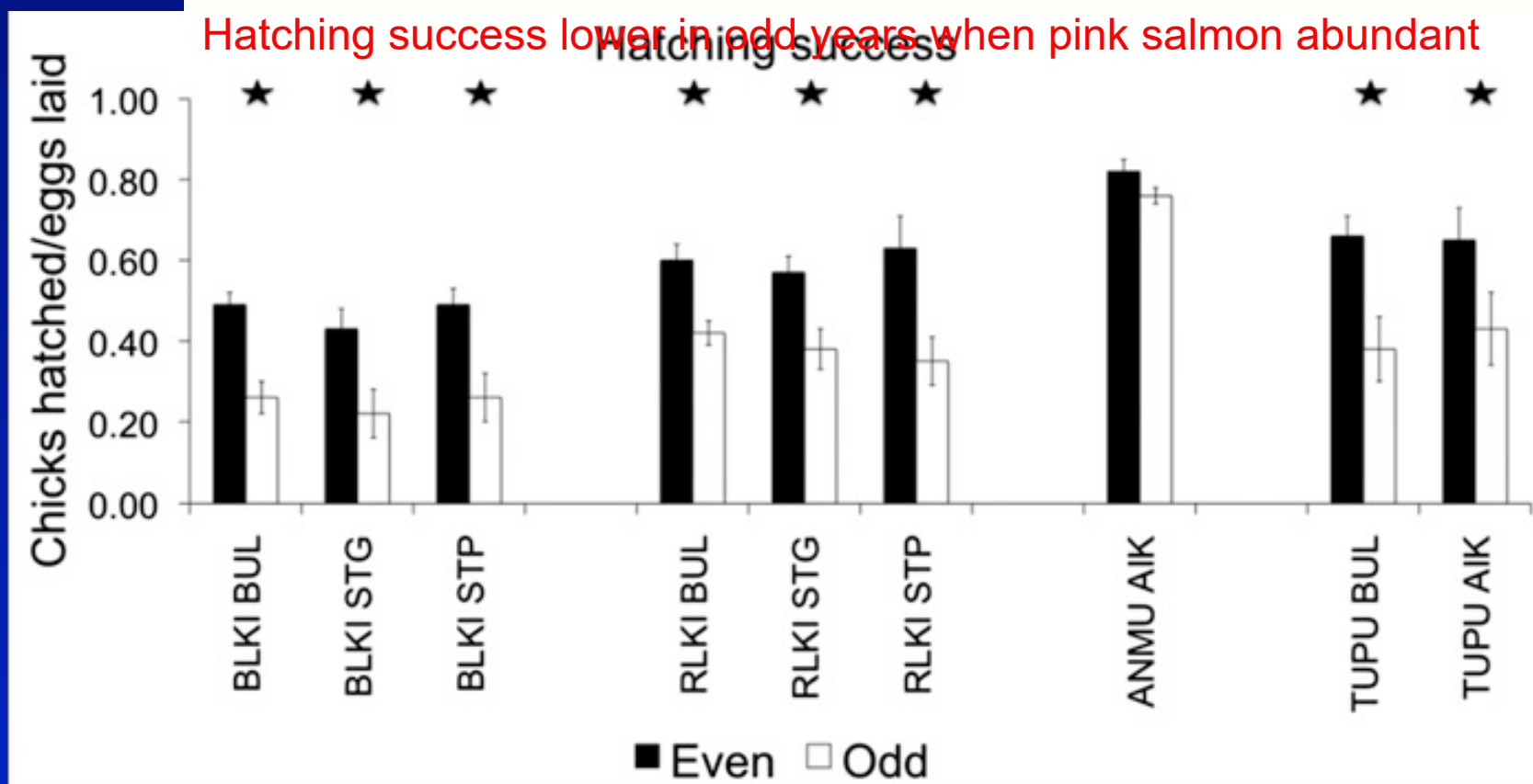


Springer and van Vliet (2014); no data in 1989, 2011



Do Pink Salmon Cause a Trophic Cascade?

Seabird Hatching Success Declines When Pink Salmon Abundant



- Negatively correlated with E Kamchatka pink salmon abundance
- Black-legged kittiwake (BLKI), Red-legged kittiwake (RLKI), Ancient murrelet (ANMU), Tufted puffin (TUPU)
- Buldir I (BUL), St George I (STG), St Paul Island (STP)



Pink Salmon Competition with Sockeye Salmon

Competition between Asian pink salmon (*Oncorhynchus gorbuscha*) and Alaskan sockeye salmon (*O. nerka*) in the North Pacific Ocean

Evidence for competitive dominance of Pink salmon (*Oncorhynchus gorbuscha*) over other Salmonids in the North Pacific Ocean



ARTICLE

Productivity and life history of sockeye salmon in relation to competition with pink and sockeye salmon in the North Pacific Ocean

Influence of the marine abundance of pink (*Oncorhynchus gorbuscha*) and sockeye salmon (*O. nerka*) on growth of Ozernaya River sockeye

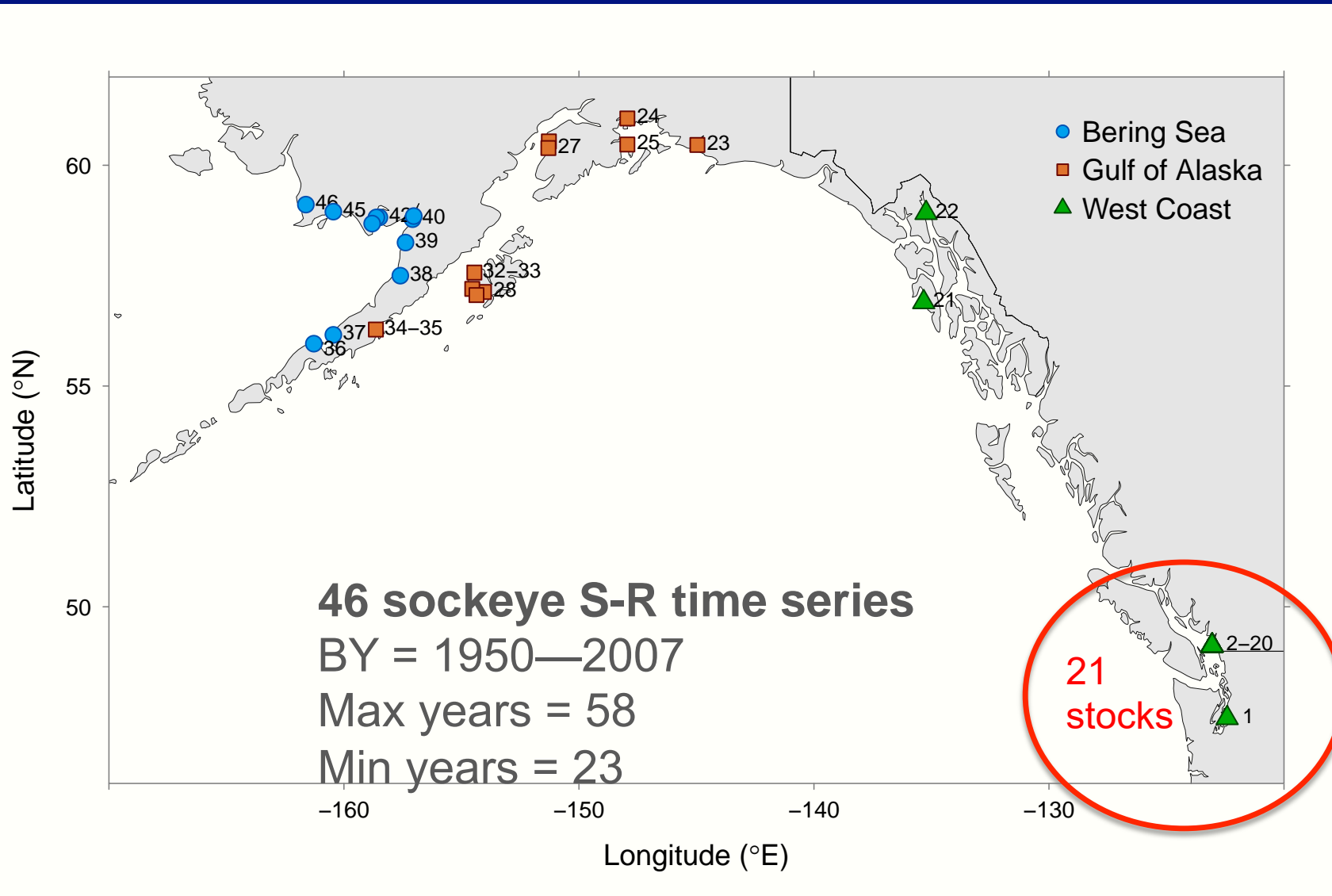
Pink and Sockeye Salmon Interactions at Sea and Their Influence on Forecast Error of Bristol Bay Sockeye Salmon

Evidence for Bottom-Up Effects on Pink and Chum Salmon Abundance and the Consequences for Other Salmon Species

Seasonal marine growth of Bristol Bay sockeye salmon (*Oncorhynchus nerka*) in relation to competition with Asian pink salmon (*O. gorbuscha*) and the 1977 ocean regime shift



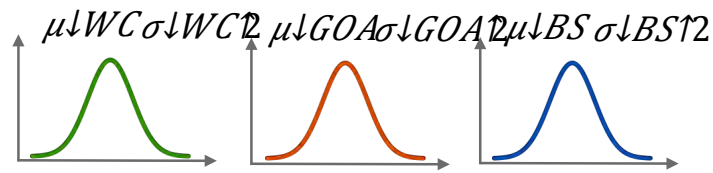
Is Pink Salmon Effect on Sockeye Mediated by Climate?



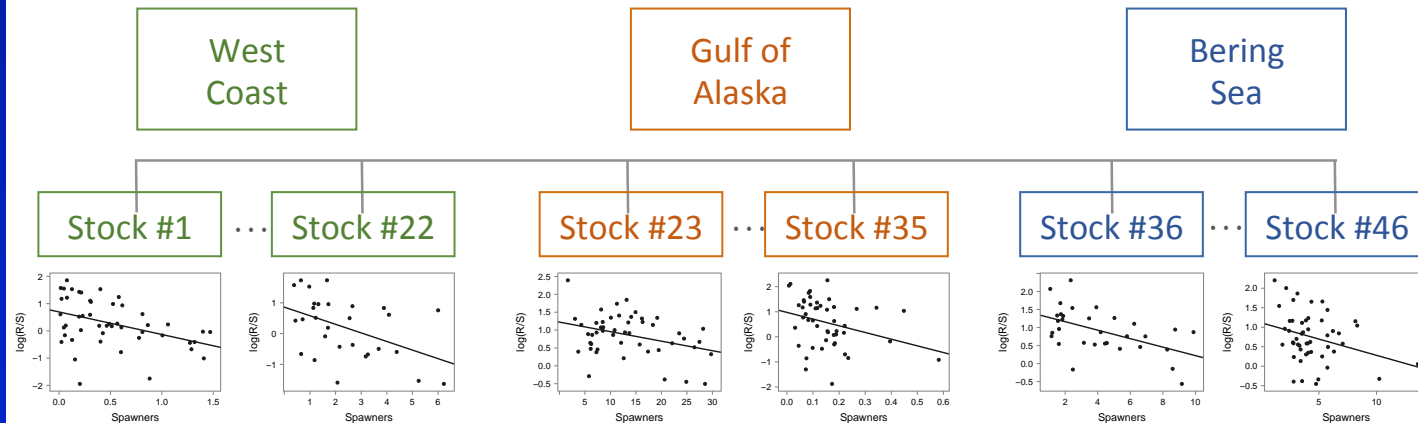


Pink Salmon Effect on Sockeye Mediated by Climate

Bayesian hierarchical models



$$\log(R_{li,t} / S_{li,t}) = \alpha_{li} + \beta_{li} S_{li,t} + \gamma_{li} SST_{li,t} + \kappa_{li} Compl_{li,t} + \chi_{li} (SST_{li,t} Compl_{li,t}) +$$





Pink Salmon Effect on Sockeye Mediated by Climate

West Coast:

- Moderate negative SST effect
- Strong adverse effect of pink salmon
- Small negative interaction (sockeye more vulnerable to pinks when high SST)

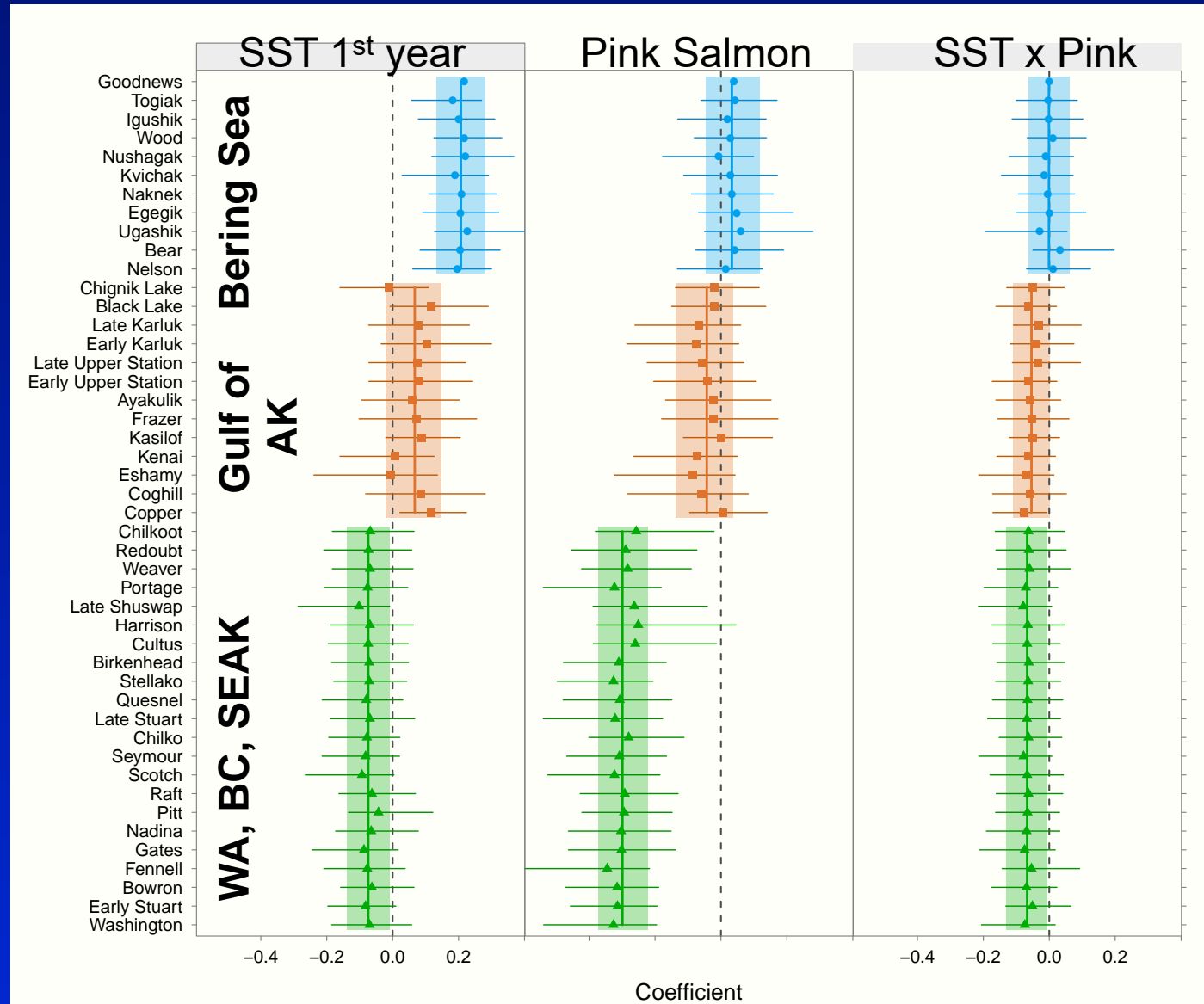
Bering Sea:

- Strong + SST effect
- No pink effect detected

Gulf of AK

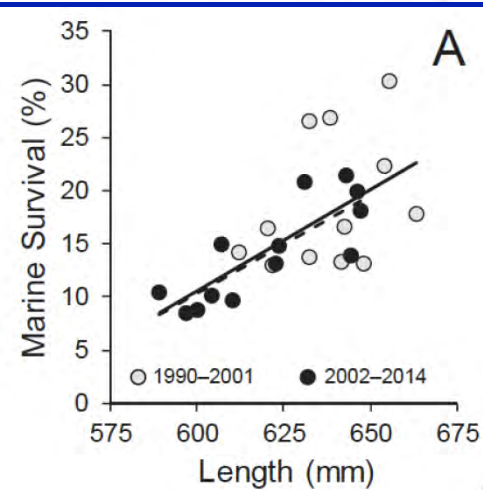
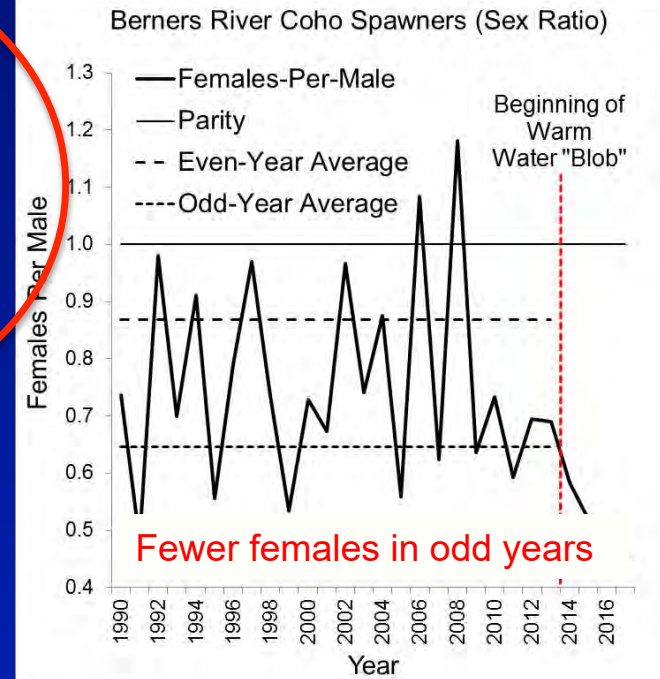
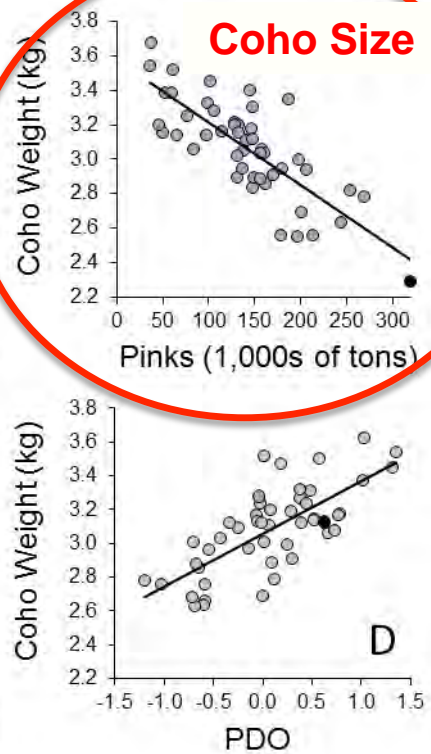
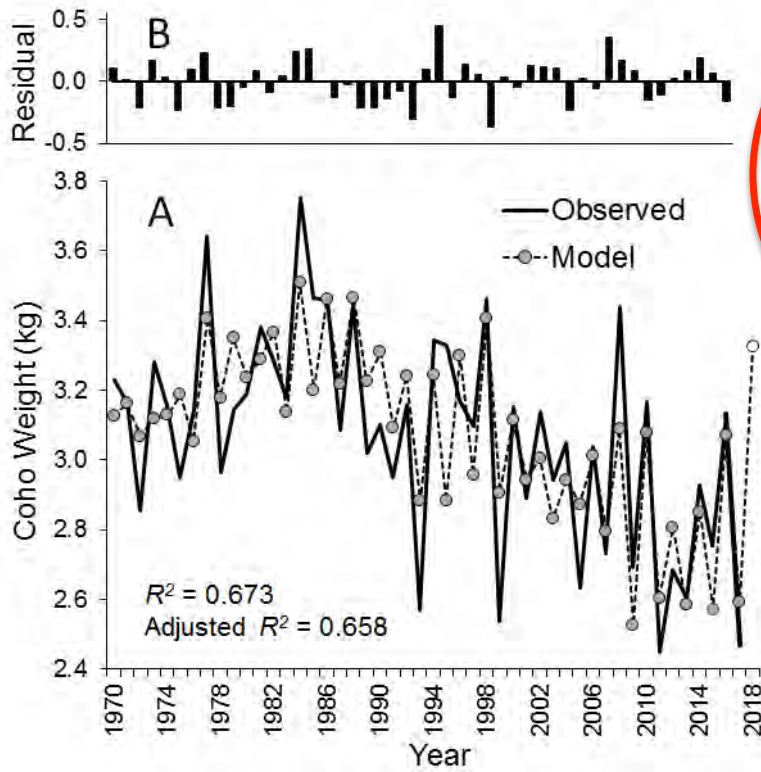
- Moderate + SST effect
- No pink effect detected

Good early ocean conditions in North benefit both pinks and sockeye & mask pink effect; age diversity masks pink effect

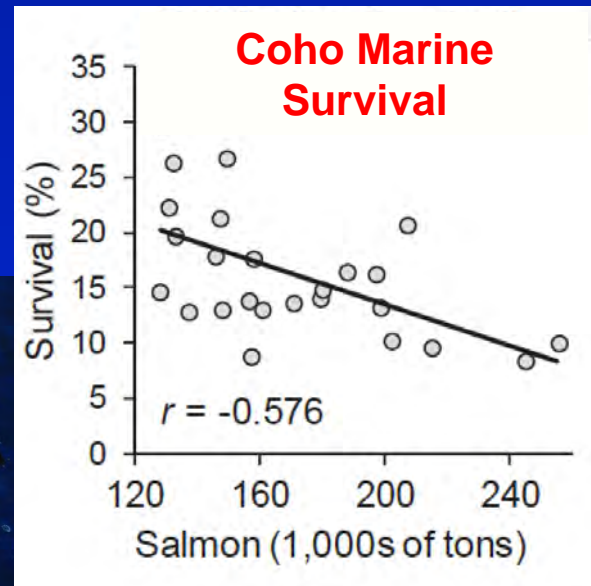




Do Pink Salmon Impact SEAK Coho Salmon?



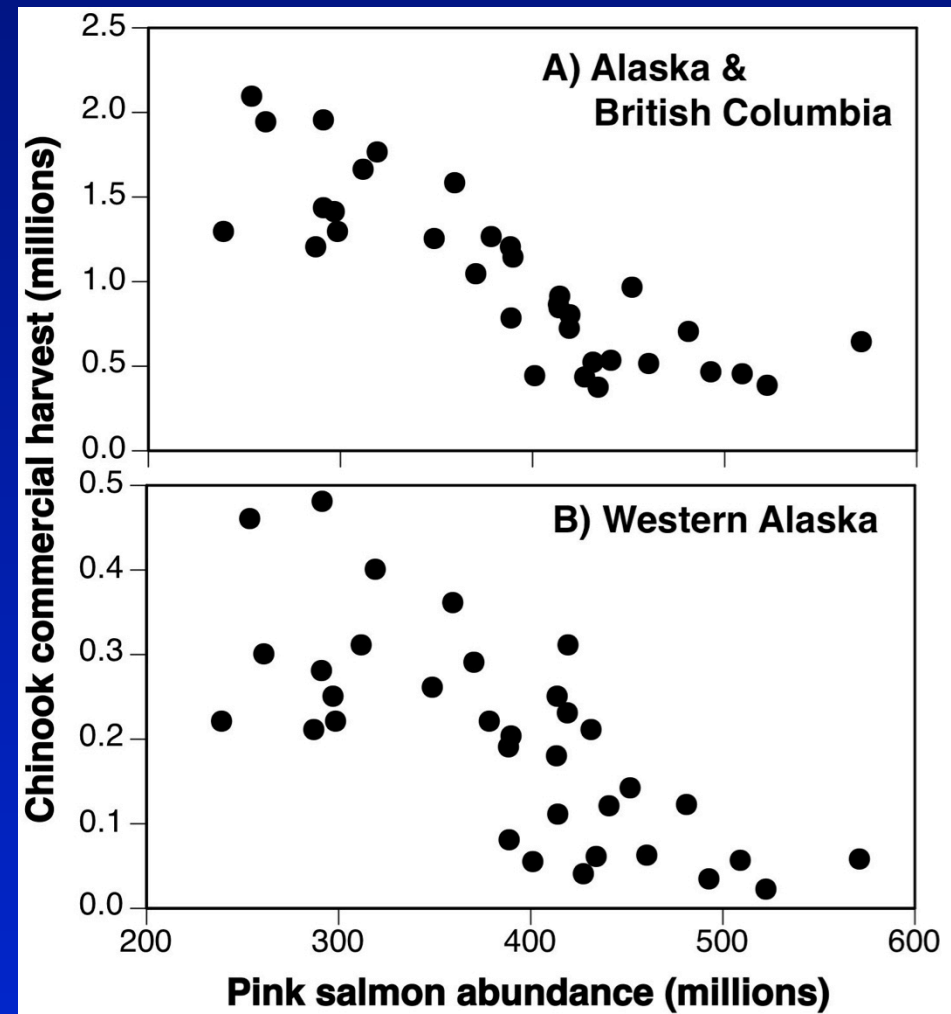
See supporting analyses
Shaul and Geiger 2014





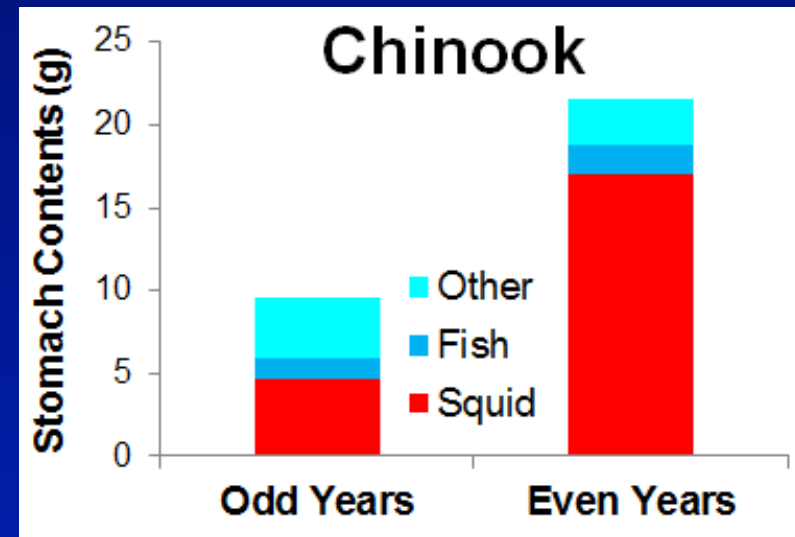
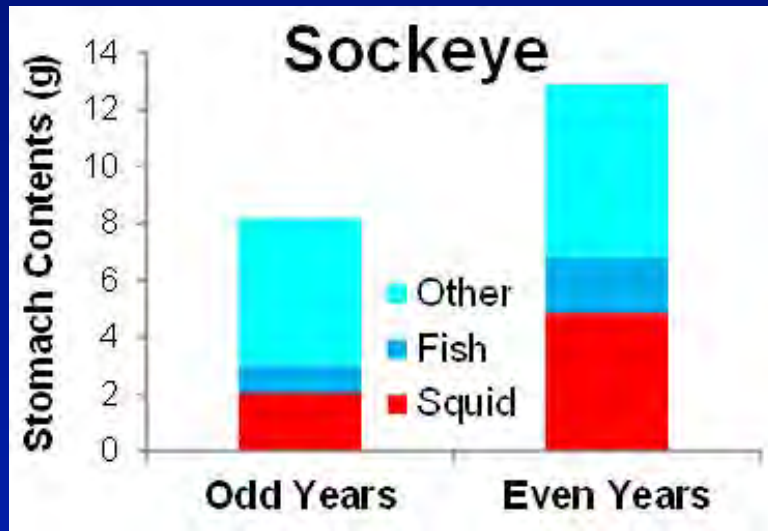
Are Pink Salmon Reducing Chinook Survival?

- Chinook abundance depressed throughout Alaska.
- Several new Stocks of Concern listings in SEAK.
- Long-term decline in size at age & age at maturation (Lewis et al. 2015)
- Pink abundance averaged over 3 yrs of overlap with Chinook

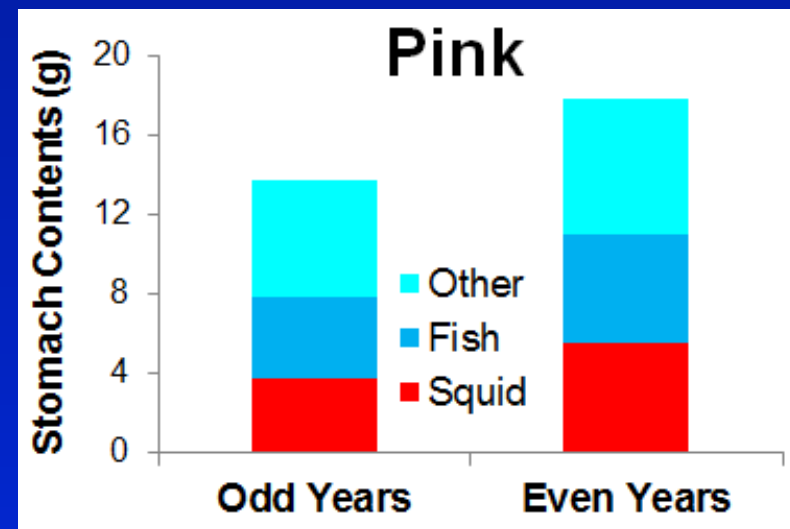




Are Pink Salmon Reducing Chinook Growth & Survival?



- Chinook feed at higher trophic level, but diet overlap (squid, fish)
- **Bering Sea:** In odd-yrs, 56% decline in Chinook stomach fullness; 68% reduction in squid & fish, 1991-2000 (Davis 2003)

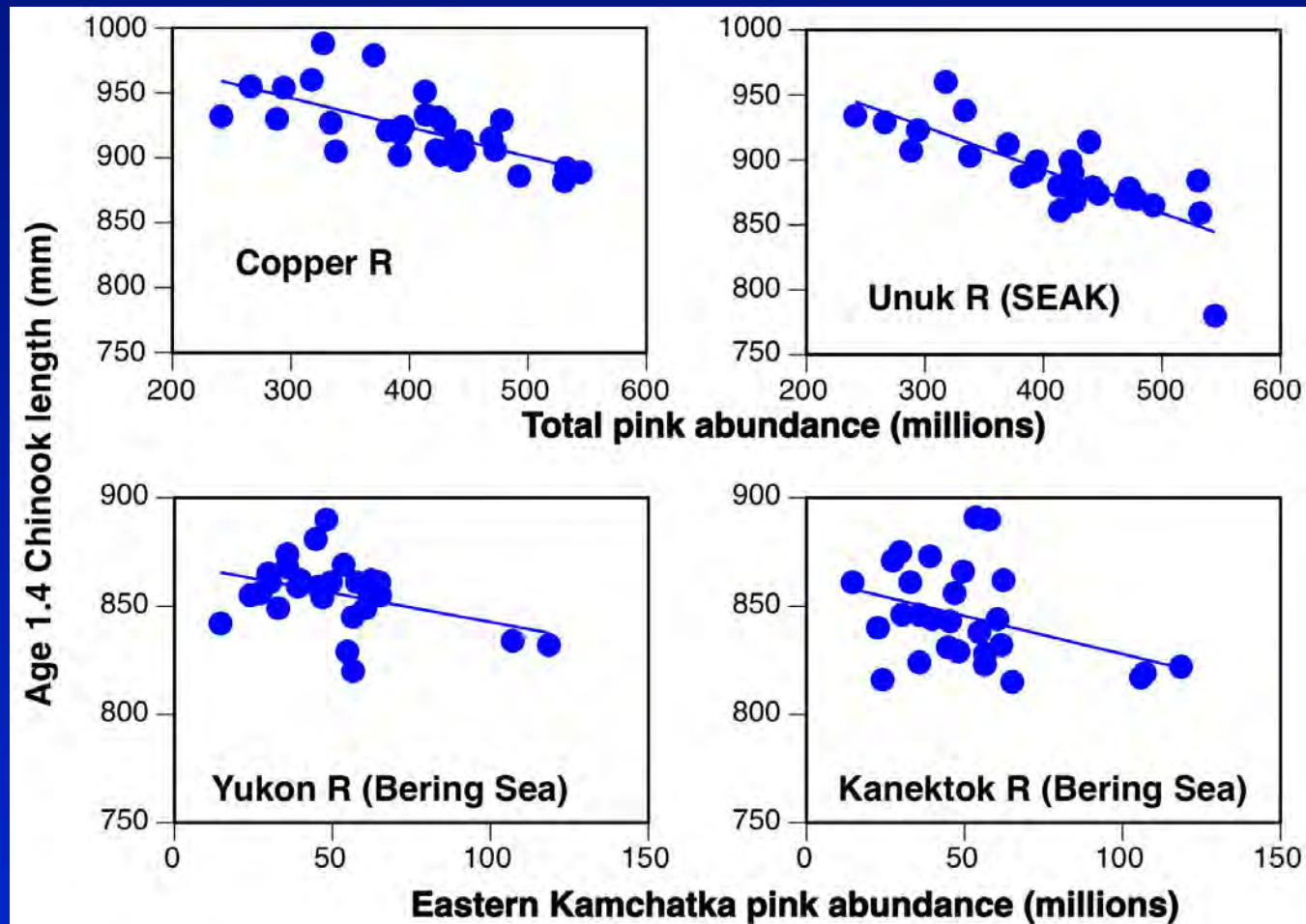


Davis 2003



Do Pink Salmon Impact Chinook Salmon?

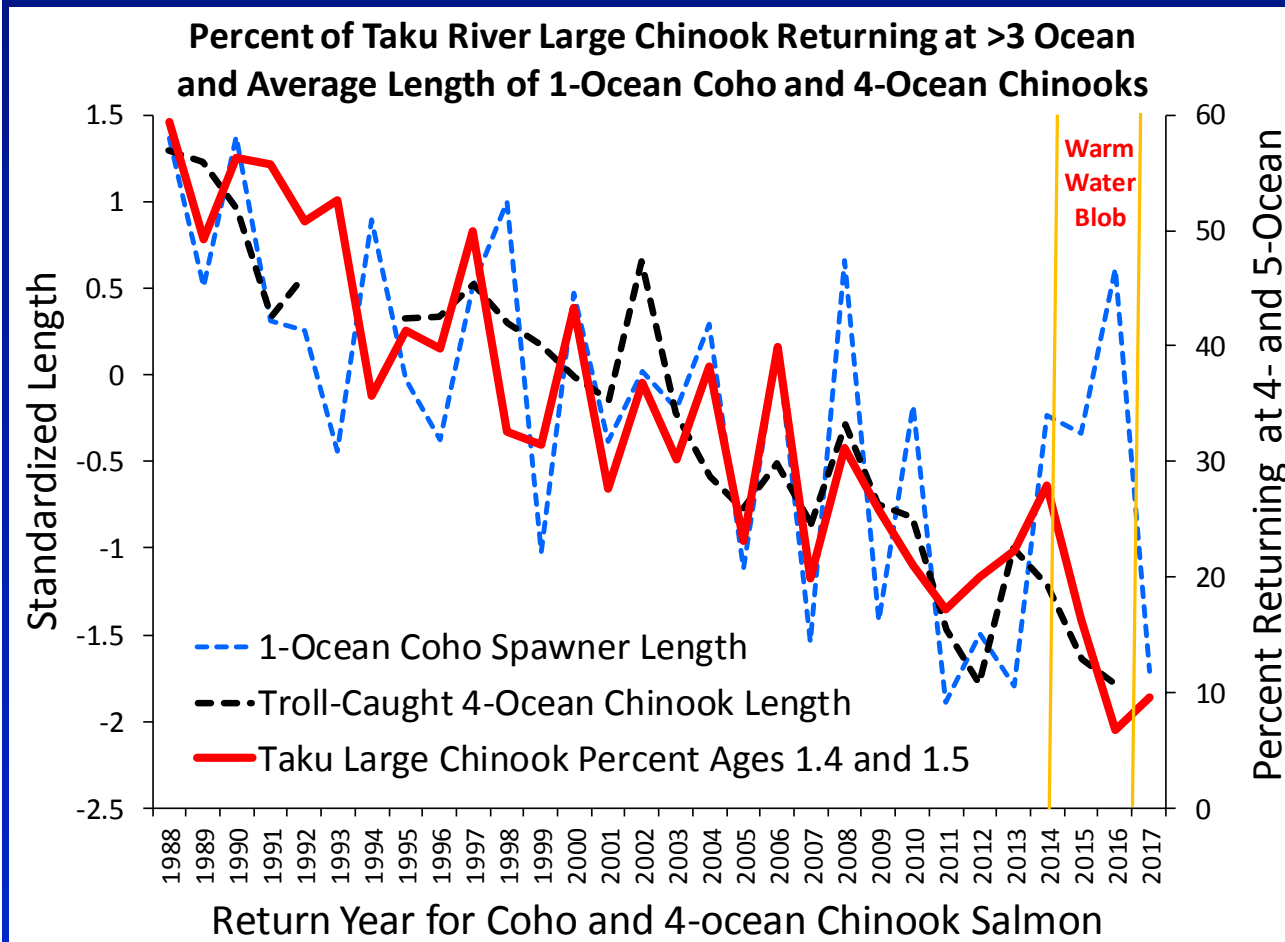
Chinook Length on pink salmon abundance



Chinook length data source: Lewis et al. 2015



Are Chinook Finding Enough to Eat? Is Late Ocean Mortality Increasing?



15 of 28 (54%) large tagged Chinook died via large predators (mostly salmon sharks). 71% of large salmon succumbed to natural mortality

Andy Seitz, UoA



Hypothesis for Decline of Chinook Salmon

- The North Pacific Ocean is supporting more pink, chum, and sockeye than ever before.
- High abundances of these species, especially pink salmon, cause a trophic cascade that reduces prey availability for higher trophic species such as Chinook and coho salmon in offshore areas.
- This trophic cascade leads to reduced growth of both Chinook and coho salmon in offshore areas.
- Reduced growth at later life stages affects overall survival, especially females, and this contributes to the observed younger age-at-maturation in Chinook salmon and low female/male ratio of Chinook & coho.

Shaul, L.D., and H.J. Geiger. 2016. Effects of climate and competition for off shore prey on growth, survival, and reproductive potential of coho salmon in Southeast Alaska. North Pacific Anadromous Fish Commission Bulletin 6:329–347.

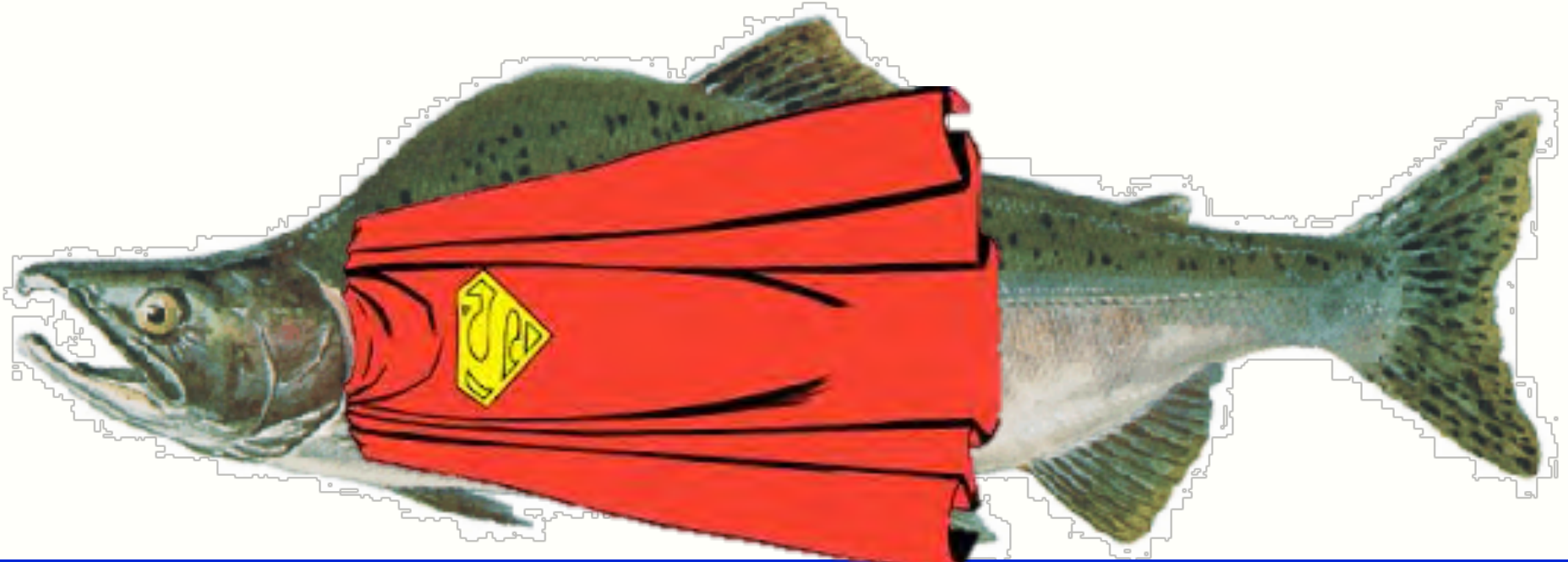
Ruggerone, G.T., B.M. Connors, B.A. Agler, L.I. Wilson, and D.C. Gwinn. 2016. Growth, age at maturation, and survival of Yukon, Kuskokwim, and Nushagak Chinook salmon. Final report to Arctic-Yukon-Kuskokwim Sustainable Salmon Initiative, Anchorage, Alaska.



Questions?

"Nobody goes there anymore. It's too crowded."

Y. Berra 1998



Submitted By
Kasandra Huffman
Submitted On
2/19/2019 9:08:41 PM
Affiliation
Commercial fishing family

Commercial fishing is the way of life and main source of income for so many Alaskans. We are a young family in Cordova who run a purse seiner in Prince William Sound. We want more than anything for salmon to be around for years to come. Hatcheries play such a huge role in our fishery and we rely on them heavily. Our livelihood depends on it, our children's futures depend on it being a lasting resource.

Commercial fishermen in Alaska put a massive amount of money back into the Alaskan economy and create an incredible amount of jobs. We are local, loyal Alaskans trying to make an honest living commercial fishing, and we deserve a fair shot and fair consideration.

Hansen Fishery Consulting
Kathy Hansen
1008 Fish Creek Rd
Juneau, AK 99801

February 19, 2019

Alaska Board of Fisheries
Reed Morisky, Chairman
PO Box 115526
Juneau, AK 99801

RE: Hatchery Committee Meeting

Yakutat fishermen approached me in 2011 interested in the steps to develop a hatchery program as their younger fishermen were leaving the regions fisheries for the more lucrative fisheries in Southeast and Prince William Sound due to their hatchery programs. The first step was to develop a non-profit corporation Yakutat Regional Aquaculture Association (YRAA) and then have the Commissioner of Fish and Game recognize the organization as the regional aquaculture association (RAA) for the region. As part of this step it was critical to develop support within the community. The recognition of YRAA as the RAA allowed for the development of a local RPT.

Once YRAA was recognized by the Commissioner, the next step was for the Yakutat RPT to update the old salmon comprehensive plan that prohibited the development of a hatchery. This took several years, including advertised public meetings, as well as a vote of the regional planning team and [The Yakutat Salmon Comprehensive Plan: Phase II](#) was approved by the Commissioner of ADF&G in Sept of 2018.

As the work on the Salmon Comprehensive Plan was ongoing, YRAA started the steps to develop a hatchery project, including looking for a suitable site with adequate water quantity and quality as well as submitting a request for a management feasibility study. We have worked with ADF&G to gather genetic fish samples to try and determine a possible broodstock source.



To make a long story short, YRAA has investigated several sites, but has not yet gotten to the point where they have put any fish in the water. The investigation and studies necessary to develop a site can be frustrating, and time consuming but an important step in the process. But it is a good process that is careful in the siting for protection of wild stocks. It is a very public process if the public pays attention to all the opportunities available, but it is easy to lose sight of the program and where you are in the permitting process as you wait for the next opportunity for public comment following studies and evaluations. For example, in Yakutat it's been 8 years and a hatchery permit hasn't even been submitted. When they hopefully get to the point of submitting a hatchery application there are requirements for public hearings.

Alaska's salmon hatchery program is based on strong scientific methodology with rigorous critical review of hatchery proposed operations including the genetics policy, pathology policies, origin of broodstock, scrutiny of rearing and release locations and interactions with naturally occurring stocks with a priority on wild stock salmon.

I support the current process, believe that it is transparent and public and that it is important and beneficial for Board of Fish members to be educated about the process and current science as it becomes available as outlined in the 2002-215-FB *Joint Protocol on Salmon Enhancement*.

Sincerely,

Kathy Hansen



Chairman Reed Morisky
Alaska Board of Fisheries
Boards Support Section
P.O. Box 115526
Juneau, AK 99811-5526

February 20, 2019

RE: **March 8 Hatchery Committee Meeting**

Dear Chairman Morisky and Board Members

Kodiak Regional Aquaculture Association appreciates the Board's efforts to learn more about Alaska's hatchery program during your upcoming hatchery committee meeting on March 8th. We are especially looking forward to hearing and seeing updated reports on hatchery related research, programmatic details and the Regional Planning Team process. It's reassuring to see the Board's renewed commitment and adherence to *Joint Protocol on Salmon Enhancement #2002-FB-215*.

The upcoming Hatchery Committee agenda indicates topics reflective of public comment KRAA and others submitted in early January. We appreciate the Board's Hatchery Committee meeting format which, we hope, will allow knowledgeable folks to provide perspective and information to the Board and foster greater understanding of the rigor of the regulatory and permitting process and the scope and detail of the Alaska Hatchery Research Project (AHRP). We believe that with a common base of best available science and accurate information, the Board of Fisheries and Alaska's hatchery community will share similar perspectives regarding the state's hatchery programs and our roadmap for the future.

Regional Planning Team Process

As hatchery operators, we rely on the expertise provided by the Department to assure that decisions related to our programs are thoroughly vetted. The State of Alaska requires ADF&G to provide for the protection of wild stocks and to adhere to the Sustainable Salmon Fisheries (SSF) policy. This is the function of the permitting process and the RPTs. The RPT process assures that projects are neither permitted nor rejected for reasons that are not supported by sound science and reason.

Issues related to salmon enhancement are complex. Whether we are looking at permitting a new release site or the potential straying interactions in Southeast Alaska and Prince William Sound, each Permit Alteration Request (PAR) requires the exercise of expertise and knowledge from the various disciplines within ADF&G (management, pathology, genetics, sportfish, etc.) as well as local knowledge, history, expertise in aquaculture, and, through the RPT, input from the public.

The Board is seeking suggestions on ways to improve public input and the RPT process. We believe the RPTs are an effective tool for making hatchery related decisions. Never the less, our current process can be augmented to create greater public awareness and engagement. Although the meetings in each region



are currently noticed publicly, we can do better. ADF&G as well as regional aquaculture associations and interested stakeholders should all engage to make the RPT meetings an open and important event. Meeting agendas as well as meeting results should be publicly advertised. Public engagement with the RPT process may depend on the issues at hand but public notice and public information about what the RPT's do should be a constant – without regard to whether or not there are “hot” issues.

Alaska Hatchery Research Project

When we examine the objectives set out by the Alaska Hatchery Research Project AHRP, we find a number of unanswered questions and outlines for expert engagement. The Science Panel assembled for the project focuses its efforts to better understand questions related to salmon enhancement within the context of the project's goals and objectives. In the long run, the work of the AHRP will help us better understand hatchery/wild interactions but it is also likely to engender new questions. This is a success. It is unrealistic to expect that most hatchery questions will be “answered” when we are working with a dynamic natural environment that is constantly changing.

As we improve our scientific knowledge, it will help us make better decisions but it will also help us ask better questions for further inquiry. We expect that as the Department and contractors works toward the conclusion of the established work of the Hatchery-Wild Interaction Study, those new lines of inquiry may investigate inherent vs. hatchery stray rates, shift focus to other species such as sockeye and coho, and perhaps begin to look more closely at the variety of parameters that may affect fidelity to natal waters. Investigations in these areas may also provide insight or highlight the relative need (or lack thereof) for potential mitigation of hatchery straying effects.

Hatchery Stock Straying

Straying is a hard-wired component of salmon behavior and life history. Intuitively, it's easy to assume that “straying” is bad and that it will have a negative impact on the naturally spawning stocks. This view is not informed by science or established natural salmon behavior. Based on best available science, including brood stock, genetics, environmental conditions, and a host of other factors, statements related to acceptable “straying” levels are imprecise. However, from what we now know, it seems unlikely that harm to wild stocks occurs with a wide range of straying levels.

During the three years (2013-2015) of the Hatchery-Wild Interaction Study's (HWI) straying component, they identified an average overall harvest rate of enhanced pink salmon was 97% (3% stray rate; Alaska Hatchery Research Project Synopsis, June, 2018) while at least one text (Groot & Margolis, 1991) identifies pink salmon stray rates as high as 10%. The hatchery pink salmon stray rates derived from 3 years of straying research during HWI are relatively low and, given relatively low genetic variability in pink salmon stocks (Templin, 2018: Presentation to the Alaska Board of Fisheries) within PWS and across Alaska, the “impact” could reasonably be negligible

Discussions of straying often turn toward relative reproductive success of hatchery origin fish that stray, and fears that hatchery fish may overwhelm natural-origin fish are often voiced. Preliminary indications for one pink salmon stream in Prince William Sound indicate that hatchery-origin females in that stream exhibit reduced reproductive success. Consequently, if this thesis is further substantiated, one could conclude there should be less fear of hatchery strays because they are less likely to reproduce. On the



other hand, questions of reproductive fitness may have more to do with the timing of hatchery “strays” entering a stream and/or environmental conditions (temperature and water level) throughout the spawning cycle than something intrinsic to hatchery “strays”. The full context of the information on this creek and others in Prince William Sound as well as the information on chums in Southeast Alaska has yet to be disseminated or fully analyzed within the context of the larger project. This new information as well as the analyses and reports on other components of this ongoing study spark new questions and may provide for further ideas for research opportunities and lines of inquiry.

Enhancement Related Research

Hatchery related research dates back at least 100 years. Much of this information can be accessed through the North Pacific Anadromous Fisheries Commission as well as the Hatchery Scientific Research Group (Pacific Northwest). It is important to see the work of the AHRP as a contribution to this larger body of research. AHRP conclusions are both informed from and limited by the research that has come before. Context for new information is important. What can seem like a startling “finding” should be confirmed with additional research and/or compared to past research. Frequently, “New” information is modified, adjusted or retracted. The Board must be careful not to act on limited recent research findings and should also consult the longer-term information about hatchery related stocks.

Merits of Including “Hatcheries” in the Board’s Annual Call for Proposals

Board cycle discussions involve questions of equity and the allocation of limited resources. The Board has balanced equity and economic/personnel resources with your compromise of a 3-year calendar – every fishery reviewed once every three years. At the time of the 3-year compromise, the Board also assumed that hatchery related proposals from each region would also be on the three-year cycle – both because the same people cover wild stocks and hatchery stocks and because the issues of hatchery produced fish and area management plans are intricately related. This process is already in place and assures hatchery proposals will be handled within the affected region’s in-cycle meetings. Revising the Board’s current protocols to encourage yearly discussions will annually require substantially increased regional resources – both from stakeholders and from the Department. Also, the Board should anticipate substantially increased Board of Fishery meeting agendas. To implement an annual hatchery-specific call for proposals, the Board would need to determine what makes hatchery issues a “special class” of issues substantially different from other regional fishery concerns – so much so that they merit review every year beyond review that occurs at the meetings related to the Joint Protocol on Salmon Enhancement. We are not aware that there is anything substantive to differentiate hatchery issues from other regional fishery issues.

Hatchery Importance

Before closing out these comments, we would like to acknowledge that there have been questions of the continued relevance of hatchery programs in times of high natural abundance. The narrative is that hatcheries were developed to supplement low abundance wild stocks and now that wild stocks are rebuilt, hatcheries should go away. The thesis of this argument is flawed. Yes, hatcheries were established to help local fishermen when runs were low but many supporters also envisioned hatcheries to help fishermen, as they are now, when runs are higher. In other words, there was no single “reason” hatcheries were developed. Instead, those that supported hatcheries and voted for the industry assessments to support hatcheries had a variety of reasons for doing so.



Are Hatcheries needed today? YES! Here in Kodiak, in 2018, hatchery fish allowed the Department to spread out the fleet and open up several other areas while avoiding those with low pink salmon abundance. Without the hatchery, many wild stock harvest opportunities would have been missed. In anticipation of the low 2018 pink return to Kodiak, KRAA was able to forego any cost recovery from the Kitoi Bay hatchery and thereby transfer the value of the hatchery fish to the common property fishery.

The road system in Kodiak provides another illustration of the continued need for Alaska's hatcheries. Coho salmon stocked in local creeks provide late season recreational and subsistence fishing opportunities that would otherwise be unavailable. In recent years of low coho salmon abundance on the Kodiak Road system, the hatchery-produced coho at Pillar Creek have been nearly the only reliable source for sport caught coho salmon on the Road System.

Finally, hatcheries continue to be needed as a hedge against climate change and changing ocean temperatures and oceanographic conditions. Natural salmon rearing conditions are swinging widely from year to year. Near shore and ocean survival seems to be changing and growth at age is not consistent. In the face of these concerns, it is hatcheries that insure continued salmon production and improve on survival of fry in the natural environment.

In closing, we hope the Board will recognize that the Regional Planning Team process is a good process that needs wider public advertising and engagement. Concern about hatchery salmon "straying" is a reasonable one, but the ongoing science related to the AHRP seeks to address those concerns through an ambitious multi-year study that was initiated through the requests of hatchery operators in cooperation with ADF&G. We are committed to assuring the sustainability of our programs and practices, and we have sought sound science as a basis for future conclusions on straying and reproductive success. As a result, we ask you to remember that this important hatchery-related research must be evaluated in context and within the framework of the larger project.

Tina Fairbanks
Executive Director



3800 Centerpoint Drive
Suite 502
Anchorage, AK 99503

February 20, 2019

Reed Morisky, Chair
Alaska Board of Fisheries Hatchery Committee
PO Box 115526
Juneau, AK 99811-5526

Dear Chairman Morisky:

Koniag is a regional Alaska Native Corporation formed under the terms of the Alaska Native Claims Settlement Act of 1971. Koniag has approximately 4,100 Alutiiq Shareholders. Our region encompasses the Kodiak Archipelago in the Gulf of Alaska and a portion of the Alaska Peninsula. The communities in our region have traditionally been dependent on fisheries resources for subsistence and commercial purposes for centuries. Koniag has long advocated on issues affecting the viability and sustainability of the villages in our region. As part of this effort, **Koniag supports sustainable salmon fisheries and strong hatchery production in Alaska.**

Koniag supports the Joint Protocol on Salmon Enhancement signed by the Alaska Board of Fisheries and Alaska Department of Fish & Game in 2002 and its intent to provide a public forum for discussion on hatcheries and we thank you for convening the Salmon Hatcheries Committee to accomplish this purpose.

Salmon fishermen, processors and communities of Kodiak Island benefit greatly from the State of Alaska salmon hatchery program. Alaska's salmon hatchery program has operated for 45 years and supplements wild salmon harvests throughout the state. **Alaska's salmon hatchery program is an example of sustainable economic development that directly benefits subsistence fishermen, personal use fishermen, sport fishermen, charter fishermen, commercial fishermen, seafood processors, as well as state and local governments, which receive fishery business fish tax revenue.**

Alaska's salmon hatchery program employs strong scientific methodology and is built upon precautionary principles and sustainable fisheries policies to protect wild salmon populations. The Alaska Department of Fish and Game regulates hatchery operations, production, and permitting through a transparent public process and multi-stakeholder development of annual management plans. Returns of hatchery and wild salmon stocks

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follow similar survival trends over time and the largest returns of both hatchery and wild salmon stocks have largely occurred since hatchery returns began in about 1980. There are no stocks of concern where most hatchery production occurs, indicating that adequate escapements to wild stock systems are being met in these areas over time.

Alaska hatcheries contributed an annual average of nearly 67 million fish to Alaska's commercial fisheries in the past decade and account for 22% of the total common property commercial catch. In 2018, approximately 3.2 million or 53% of the 6 million pink salmon harvested in the Kodiak management area were produced by the Kodiak Regional Aquaculture Association (KRAA). The preliminary ex-vessel value of the Kodiak hatchery pink salmon in 2018 is estimated to be approximately \$4.7 million. KRAA production results in over 3 million dollars annually in ex-vessel value on average, contributing significant economic benefits to local user groups, municipalities, and businesses. **The economic contributions of KRAA to the Kodiak management area resulted in 43 jobs, \$1.8 million in labor income, and almost \$1 million in total economic output in 2017.**

Alaska's salmon hatchery program has proven to be significant and vital to Alaska's seafood and sportfish industries by creating employment and economic opportunities throughout the state and in particular in rural coastal communities. **Alaska's salmon hatchery program is non-profit and self-funded through cost recovery and enhancement taxes on the resource and is a model partnership between private and public entities.** The State of Alaska has significant investment in Alaska's salmon hatchery program and associated research to provide for stable salmon harvests and to bolster the economies of coastal communities while maintaining a wild stock escapement priority. Alaska salmon fisheries, including the hatchery program, continue to be certified as sustainable by two separate programs, Responsible Fisheries Management (RFM) and Marine Stewardship Council (MSC).

Koniag affirms its support for Alaska's salmon hatchery programs and also supports unbiased and scientific methods to assess the interaction of Alaska's salmon hatchery programs with natural salmon stocks. Koniag requests the Alaska Board of Fisheries continue to work with the Alaska Department of Fish and Game, the hatchery community and industry leaders to further its understanding of the importance of the Alaska salmon hatchery program to all Alaskans.

Sincerely,
KONIAG



Shauna Hegna
President

Submitted By
Leif Dobszinsky
Submitted On
2/20/2019 12:26:44 PM
Affiliation

Hatchery Salmon are a very important part of commercial and sport fisheries of SE Alaska. That being said the RPT process is not just rubber stamped. ADFG reps use science and management guidelines when deciding on a project's merits. In my time on the SSRAA board I have witnessed one PAR request get turned down after a couple years of discussion and test fishing, and other PAR requests not even make it out of the discussion phase. The idea that the department willily nilly approves hatchery releases is untrue. The RPT meetings are also open to the public, attendance is usually based on the agenda items. With the most recent Baranof hatchery proposal and presentation drawing many in Sitka who were opposed.

Submitted By
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Submitted On
2/19/2019 3:48:18 PM
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PWSAC

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I am writing to express my support for the hatchery programs in Alaska. Before moving here last year I was just an avid fly fisherman and outdoorsman who made a living working with his hands. Since I started working for PWSAC, I have realized the importance of these hatcheries and all of those who operate them. Without these hatcheries, Alaskas commercial fishing industry, as well as sport would deteriorate at a rapid rate. Many small communities around the state depend on the business from fisherman and consumers alike. Thats not even taking into account the workers at the individual hatcheries and their families. These fish that we produce provide a sustainable living for families as well as the industry and thats something that gives me pride each day that I go to work. Being a small town farmboy from West Virginia this has been an eye opening experience for me, and I look forward to advocating for and spreading the word about this wonderful conservation effort for years to come.

Mac Smith

Submitted By
Mark Vinsel
Submitted On
2/20/2019 4:20:33 PM
Affiliation
self

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~~To: Alaska Board of Fisheries
RE: Comments on Alaska's salmon hatcheries.

Dear Chairman Jensen and Board of Fisheries members,

For disclosure, I am a board member of the DIPAC hatchery representing the roadside (non marine) sport fishing perspective, as I served as president of Raincountry Flyfishers when I first joined the DIPAC board in the mid 2000s. I am not representing DIPAC or Raincountry flyfishers, nor my employer. These comments are my own, based on perspective as an avid lifelong sport fisherman.

I have sport fished since childhood, starting on my own with a cane pole in a Virginia tidal creek, advancing to spin cast, spinning, and now have been primarily flyfishing for fifty years. I prefer fishing streams for the combination of hiking and enjoyable scenery that bring a high value of recreational experience – far beyond just catching fish for the table or for release.

I fished in “wilderness” as well as more populated areas of the western US, New England and the Rockies – twenty states in all. I developed a love for trout and especially wild trout and the beautiful places where they can be found. For me, nothing else matches the restorative recreation I get from hiking a stream flyfishing for wild trout, steelhead or salmon.

I have seen the harmful effects of the hatchery practices that were widespread across the US and elsewhere. The wild rainbow trout of the McCloud river of Northern California are a very worthwhile example of the species and provide great sport. I enjoyed fishing for them there in the emerald green waters that flow from the flanks of Mt. Shasta, but it was a mistake for these to be stocked throughout the world. The harm they have brought in displacing wild native trout and other species worldwide is a tragedy. This has rightfully brought a widespread perception that hatcheries are bad – which is now coming into awareness in Alaska.

I've lived in Alaska for 19 years and arrived with this mindset common to most conscientious and avid sport fishermen – that hatcheries are a bad idea and not a replacement for productive habitat and water resources for natural trout reproduction, where the possibility of natural reproduction still exists. Luckily in much of Alaska, the habitat for natural reproduction still exists in most areas.

I am writing now to express my support for Alaska's salmon hatcheries in general, and specifically the positive effect of the local salmon hatchery operations on the wild trout and salmon streams of the Juneau area.

In Juneau, we have a limited road system spanning about 45 miles, serving about 30,000 people plus about a million summer visitors. The road system crosses four streams big and clear flowing enough to enjoy flycasting – Cowee, Peterson, and Montana Creeks, and Windfall Creek, a short section of clear flowing fishable tributary of the Herbert River. I enjoy fishing all of these systems for dolly varden and cutthroat trout, and steelhead, and also enjoy flyfishing for wild pink salmon and hatchery chum, king and coho at public access saltwater sites.

We have a local fly shop, university, cooperative extension, and a flyfishing club all promoting flyfishing through classes and activities. In the nineteen years I have been here there is a noticeable increase in local flyfishing interest.

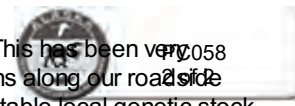
We are very fortunate that our local hatchery, DIPAC, has well developed programs for hatchery chinook and coho that are the main focus of most sport fishing in Juneau – including marine and roadside access. By attracting most of the sport fishing attention, our salmon hatcheries reduce effort and impact on our wild trout and salmon.

With the general increase in flyfishing activity here, I think our small streams would not be able to have sustainable populations of wild trout if we did not have the sport fishing opportunities provided through DIPAC's production. Our small stream systems simply cannot support an ever increasing number of flyfishers wading and fishing in them, if these were the main focus for local and visiting flyfishers.

The concerns that apply to hatchery practices elsewhere are misplaced when we look at DIPAC, through the rigorous scrutiny of their production, locations, genetic origins, and priority for non-interference with natural fish stocks that are strongly emphasized in the science-based Regional Planning Team process

Genetics

The Regional Planning Team process is very restrictive on genetics – requiring local stocks for hatchery broodstock. A few years ago,



DIPAC was able to replace the genetic stock for their coho production, from a tributary of the nearby Taku river. This has been very successful – the new coho are beautiful, large and strong and are providing great fishing at a multitude of locations along our roadside shoreline areas for anyone and without the need for a seaworthy boat. It was a multi-year process to identify a suitable local genetic stock that could be obtained without detriment to the source stream's fish numbers or risk to other local coho strains.

Interference with wild spawning fish - release and rearing sites

DIPAC does not release fish upriver in our local trout and salmon streams, where they would compete on the spawning grounds with wild trout and salmon. The process is very restrictive as to where the hatchery stocks can be penned for imprinting and released– for the purpose and with the priority of reducing impacts on wild stocks. We have steep waterfalls that provide a water source for the imprinting where natural salmon are not affected, and they are required to maintain a weir to keep hatchery chum from invading Peterson creek.

Replacement or mitigation for habitat loss

Alaska's hatcheries have not been implemented as mitigation for elimination of natural habitat or damming of rivers. Instead of this folly, their purpose is to enhance natural production, make up for the large ups and down in wild production, and provide for sport and well as commercial and subsistence – to enhance the common property resource.

As the Board of Fisheries is considering increasing its involvement in hatchery oversight – it is essential that board members and future appointees become educated in these differences from poor hatchery practices that have tarnished hatcheries elsewhere. Board members should be well versed in our practices and able to understand false arguments based on the poor reputation from faulty practices elsewhere.

I commend the board on their interest in our salmon hatchery practices as an incentive to become better informed, as this is very important matter – but I caution the Board from becoming involved in or interfering with the rigorous science based process of the Regional Planning Team and our hatchery operations.

Thank you for your attention,

Mark Vinsel
Juneau

Submitted By
Mike Mickelson
Submitted On
2/20/2019 11:01:48 PM
Affiliation

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Dear Chairman Morisky and Members of the Board of Fisheries,

Thank you for the opportunity to comment on the Hatchery Committee that precedes the 2019 Statewide Board of Fisheries Meeting. I am a lifelong Alaskan that grew up working at my families wildlife viewing and sport fishing lodge outside of Cordova, Alaska. I am a subsistence user and currently drift gillnet and purse seine in Prince William Sound. I'm a general board member for Cordova District Fisherman United, but these comments are my own.

It is critical in this upcoming conversation about hatcheries to listen to the experts, and the science that supports their conclusions. Hatcheries are complicated, while it's tempting to let our instincts as armchair scientists and users of these resources impassion knee jerk responses, we need to wait until the data is in, analyzed, and peer reviewed by the scientific community. Currently, the multi year study that began in 2012, looking at pink and chum salmon straying in Southeast Alaska and Prince William Sound has completed the field work portion of the research. The initial results have generated as many questions as they have yielded answers.

With that in mind, it would be prudent to give the scientists time to come up with final conclusions before making any big decisions. While we are waiting for results, there is much we can do in becoming educated on the subjects of hatcheries in Alaska.

Firstly, it is important to note that wild salmon stray. If we look at Prince William Sound, it was completely glaciated a little over 3000 years ago. All the wild runs in the PWS area have been colonized in that time frame. As such, it is important to determine how much straying takes place within wild stocks.

Also, hatcheries in this state use local stocks from within the region that are generally placed in locations where fish were not historically returning to in order to minimize hatchery/ wild spawning interaction. When possible, the run timing was chosen so that fish returning to a hatchery were coming back at a time that differed from the wild streams that were closest to the hatchery site

In Prince William Sound, the hatcheries were initially built to combat the loss of habit associated with the tectonic uplift of the 1964 earthquake. ADF&G managers have been letting commercial fishers target hatchery fish so wild stocks can rebuild. In 2015, Prince William Sound had the largest returns of wild pinks on record.

As far as the RPT process is concerned, up until recently there was little interest show by the public in attending the meetings. Advertising could be improved, but the biggest issue is still going to be getting people to actually show up to the meetings. Hopefully some good strategies will be generated during the Hatchery Committee meeting!

In terms of additional research, it would be great to have a non-partisan audit on the methods and final conclusions of the straying study. Thanks for the opportunity to comment!

Mike Mickelson

Pioneer Alaskan Fisheries
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2/20/19

RE: March 2018 Hatchery Committee Comments

Because of the magnitude of these issues “Institutionalize a public forum to bring a statewide perspective to issues associated with hatchery production policy and regulation”¹ and invite other state and federal agencies, professional societies, scientists, or industry.

Independent council is critical for the health of wild fish.

1. Adopt Hatchery Regulations into public Call for Proposals cycle

- Chapter 40. – PNP Hatchery Regulations
 - Example: 5 AAC 40.005 General;
 - 40.130 Management Feasibility Analysis;
 - 40.310. Regional planning team composition
 - 40.860. Performance review
 - 40.990 PNP Definitions
- Chapter 41 – Transportation, Possession, and release of live fish;
 - Example: 5 AAC 41.020. Inspection for disease of broodstock
 - 41.050. Permit conditions - control disease, genetics
 - 41.080. Reporting and control of fish diseases
- Chapter 93 – Department programs – (Use or Waste of Hatchery Salmon)
 - Example: 5 AAC 93.310. Waste of Salmon

2. Determine the extent of hatchery straying, homogenizing wild escapement systems (SEG) in the State of Alaska

Accumulate and evaluate all past and ongoing Hatchery/ Remote release straying studies

- thermal otolith marks; coded wire tagging; fin clips; other
- assemble into centralized open access report
- map and post on ADFG website
- incorporate into Annual Enhancement Reports

Accumulate and evaluate past and ongoing Hatchery Marking Programs

- Identify hatcheries or releases without adequate identifying otolith or marks
 - Hatchery sites
 - Remote Release Sites
 - Treaty involved salmon
- Identify Hatcheries or release sites with chronic hard to read otoliths or failures confounding accurate marking programs
- dates marking was initiated
- assemble into centralized open access report
- Identify date full marking compliance is anticipated
- incorporate information into Annual Enhancement Reports

¹ ADFG BOF #2002-FB-215 Joint Protocol on Salmon Enhancement

Accumulate and evaluate past and present Escapement Data

- before hatcheries
- after hatchery implementation
- Review efforts to estimate proportions of hatchery and wild harvests

Extract from escapement SEG data

- % of all SEG's never monitored for hatchery strays
- % of those monitored found contaminated with hatchery strays
- Where is monitoring of otolith marking now taking place in the State of Alaska?
- What areas of Alaska are not monitored for straying into wild systems?
- Were the 2017 pink salmon inundated areas monitored for hatchery strays? Chignik? Yakutat? Unalaska?
- Assemble needed studies into centralized open access report
- Incorporate information into Annual Enhancement Reports

“Initiation of necessary corrective measures without delay...”

39.222 (c)(5)(A)(iii); (iv)

“Wild Sanctuary Stock”² designation for all statewide uncontaminated anadromous waters

- Carefully Monitor and safeguard these sanctuary stocks
- Create regulatory corrective measures when hatchery contamination occurs

Initiate annual statewide thermal otolith monitoring for accurate SEG management

39.222 (3)

- Otolith sampling monitoring must become standard annual g protocol to identify and correct promptly how far and how much hatchery strays are expanding into wild systems.
- initiate remote release site mark monitoring sampling from all SEG's
- Broaden annual otolith sampling in remote regions (main and tributaries) Chignik; Unalaska; Yakutat; Yukon; Kuskokwim; Kenai; Bristol Bay Nome; Utqiagvik, Glacier Bay, etc

3. Food Web interactions with introduced salmon into wild systems all habitats

- Request a comprehensive Systematic Review of all food web interactions and carrying capacity studies 39.222 (c)(4)(E); (c)(5)
 - Collaboration for Environmental Evidence Review
- Compile all literature for risk assessment
- Wild fish prey Competition all life stages
- Potential Pounds of food consumed per day out-migrating hatchery biomass per 100,000,000
- Potential pounds of food consumed per day returning adults per 5,000,000

² ADFG Genetics Policy

4. Evaluate Special Harvest Areas (SHA)

Accumulate all Special Harvest Areas (SHA's) and Remote Release Sites (RRS)

- all regulatory; permit embedded; or emergency order SHA's and RRS in Alaska
- Post with map and coordinates on ADFG website and AWC Atlas
- assemble into centralized open access register
- incorporate information into Annual Enhancement Reports

Reevaluate SHA's and Remote Release Sites in proximity to wild shellfish and wild salmon rearing areas 39.222(5) (A)

- Wild run timing, fry release and hatchery adult return info
- Crustacean first demersal benthic settling, peak spawning periods larvae in plankton
- straying propensity information per each release site,
- shallow shelves jeopardizing other species from gear
- seine gear hard on bottom scraping
- closed waters opened for hatchery strays jeopardize other fish species or fisheries
- with consideration to indigenous wild portfolio salmon stocks

5. Utilize digital ADFG Anadromous Waters Atlas Quadrangle Index mapping AS 16.05.871 to depict hatchery activity near wild systems.

- Create GIS layers (5 AAC 95.011),
 - of all hatchery SHA's; THA release sites; Remote Release Sites;
 - Clarify Bathymetry showing wild fish species nearshore rearing shelves.
 - NOAA Shore Zone mapping linking food web attributes.
 - Accumulated past present statewide straying events.

<https://www.adfg.alaska.gov/sf/SARR/AWC/index.cfm?ADFG=main.interactive>
AS 16.05.020;

6. Regional Planning Teams (RPT) 39.222 (c)(4)

Adopt related RPT Regulations

Example: 5 AAC 40.300. Regional planning teams in general
40.310. Regional planning team composition
40.340. Regional planning team responsibility

Voting RPT members must not be associated in permit/PAR/AMP signing or approvals

- List performance of RPT's past and present, to report, address, and correct straying
- Performance to uphold state mandates and policies

Involve BOF public process in PAR negotiations before decisions are made

- Does the public even know RPT's exist? Why not?
- Coordinate RPT's with BOF open process for statewide perspective and notification to public
- require annotated audio webcast (like BOF soniclear) to record all RPT meetings
- Verify transparency of the RPT process,
 - How is proposed permitting communicated to the public
 - how open is the public process
 - how are meetings noticed
 - Are PAR "extensively vetted" prior to approval or denial as stated.
 - What constituency of the public is involved in decision making?

Significant Stocks³

- Are “significant stocks”⁴ based on genetic policy frameworks or arbitrary design
- Since “significance” must be defined not only by magnitude but local importance and utilization”, criteria used to determine “significant stocks” requires public review considered in BOF Call for Proposals

Portfolio Stocks⁵

- “portfolio stocks” are now recognized for the power of the combined collectives of salmon biomass into the fisheries
- portfolio stocks are an asset acknowledged that ensure sufficient genetic diversity
- Statutes do not discriminate “portfolio stocks” as non-significant to be sacrificed to hatchery contamination due to size
- **AS 16.05.730.** ...shall be consistent with sustained yield of wild fish stocks.

Re-evaluate all Comprehensive Salmon Plans (CSP)

- Are CSP’s comprehensive and balanced for “wild naturally spawning self-perpetuating fish production obligations?”
- Verify CSP’s consistency in permitting, planning, operations and management
- **Verify accuracy of information in Annual Enhancement Report**
- Are hatchery operators following regional CSPs as directed?

7. Hatchery Section of Comm Fish

- Are employees backgrounds objective to defend ADFG wild fish priority
- Can this section provide impartial decisions and reporting
- Are balanced decisions prioritizing wild fish incorporated into RPT decisions?

8. Investigate Hatchery Activated Predator Fields (HAPF)

- Magnitude Hatchery biomass draws in predation into release sites exacerbating predation on wild species (a predator pit)
- These releases activate predator fields that accumulate in rearing shelf areas of wild species fisheries or their food
- HAPF Predators drawn in by hatchery releases creates continual persistent need of Remote Release PAR’s
 - Remote Releases Precipitate increased straying

9. Standardize definitions for what is a wild spawning salmon stock as compared to hatchery stock and “magnitude” and objective of “hatcheries”.

- adopt Definitions 5AAC 40.990 and standardize with 5AAC 39.222
- generic term “hatchery” is confusing to public
- differentiate terms based on magnitude of permitted capacity to signify level of impact due to size, species and objective
- define corporate sea ranch/remote release and corporate escapement; from local community stocking programs

³ ADFG Genetics Policy

⁴ ADFG Genetics Policy

⁵ Bio-folio: applying portfolio theory to biodiversity

example: 100,000,000 is **1000 X** impact of a 100,000 release

- DEC uses “Concentrated Aquatic Animal Production (CAAP) discharge by pound, feed, feces, carcasses, medications, fungicides, pesticides.
 - Higher CAAP, higher magnitude discharge, higher level of risk to water quality

10. Roe sales /Harvestable surplus⁶

- coordinate for statewide perspective on roe sales and harvestable surplus
- Excessive broodstock collection initiated for roe sales
- inadequate reporting of roe sales
- % roe stripping per each facility by year;
- waste of the resource allowed to stray;
- Cost Recovery shortfalls;
- Cost recovery goals missed while harvestable surplus allowed to stray into wild rivers
- Hatchery marketing impacting Alaskan wild fisheries price, quality, sales

11. Acquire and evaluate List of all statewide deviations from AMPs and Permits⁷

- Substandard broodstock to egg take survival
- Substandard egg to eyed egg survival
- Substandard eyed egg to rearing survival
- Substandard reared fry to release survival
- Density dependency studies disregarded

12. Acquire and evaluate List of all statewide pathology reports

- How often are diseased salmon released into natural waters
- Does pathology lab have enough money to monitor?
- How often. For all releases?
- Example: BKD fish into Kenai, Tutka or Resurrection Bay
- Medications discharged
- Transport of eggs or fry to remote releases from diseased parents

13. Alaska General Fund Fiscal Effects of Hatcheries as benefit to all citizens

- Which hatcheries “result in substantial public benefits” that do “not jeopardize natural stocks.” AS 16.10.400
- cost analysis of how much ADFG operations devoted to hatcheries
- State of Alaska capital expenditures for facilities
- Loan analysis
- % of Commercial Fisherman solely reliant on hatcheries
- % hatchery contribution of x vessel value (not cost recovery)
- processors revenue compared to General Fund Revenue
- Processor capacity for wild fish resources
- Value adding wild fish resource
- Original intention of Wild Alaskan Salmon markets

⁶ 2009 ADFG Internal Review Recommendations

⁷ 2009 ADFG Internal Review Recommendations

14. User pay system to reduce cost to state

15. Density dependency to wild fish poundage loss to fisherman and the state

- smaller sockeye salmon documented when large pink hatchery returns and the poundage loss to the wild fish fisherman.
- ½ pound smaller equates to a loss of \$20,000,000 to state fisherman at \$1.00/ pound.

16. Cost Recovery

- State of Alaska % recovery harvest data,
- Is 2/3 hatchery adults harvested by common property annually at all hatcheries, 1/2 ?
- roe harvest data,
- broodstock collection,

17. Annual Enhancement Report Accuracy

- Upgrade to a “comprehensive annual report, containing detailed information”
- Reevaluate the “rote” used in these reports for more precision less repetition
- Aligned for consistency with actual data from ADFG Annual Management Reports.
- Clearly differentiate Cost Recovery adequately from Common Property
- All-inclusive comprehensive reporting of hatchery impact complexity.
- factual reporting to include all aspects for decision making
- a statewide perspective that relates
 - impact to wild fish quality, marketing. Processor capacity
 - saturating markets with fish or roe sales
 - influencing markets and price for wild fisheries.
 - Density dependence causing smaller wild fish
 - Poundage equals revenue loss to fisherman
 - Straying, missing marking programs,

18. Hatchery Review Oversight Committee⁸

A Knowledgeable committee is needed to assist BOF for a State-wide perspective

- Objective Independent Committee to openly deliberate issues without retribution
- To make knowledgeable recommendations to the BOF for commissioner
- review and monitor wild fish interaction with hatchery performance relative to their permits, AMP's PAR's
- Statewide perspective prior to going to Regional Planning RPT's
- Access to statewide RPT draft documents months in advance of RPT decision
 - timely access to all meetings documents and records
 - to straying,
 - production and planning
 - to food webs
 - to wild fish priority
 - to applicable regulations and statutes,
 - to adverse effects on wild fish
 - to wild fish fisherman's markets price.
 - to processing capacity
 - to quality processing of wild fish priority
 - In relation to other species

⁸ 2009 ADFG Internal Review Recommendation