Northern Southeast Regional Aquaculture Association FISHRAP

NSRAA 1308 Sawmill Creek Road

Sitka, Alaska 99835

Nonprofit Org U. S. Postage Paid Sitka Alaska Permit #38

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Highlighting releases, returns, policy and legislation affecting the Southeast Alaska salmon fisheries

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F/V New Sunrise trolling in Sitka Sound.

Troll & Gillnet Fleets Break Records in 2022

Salmon returns may not have been remarkable this season, but combined with historic salmon prices, they resulted in strong numbers at NSRAA and throughout Southeast Alaska, with some record catches in the mix.

At \$24.2 million, NSRAA's commercial ex-vessel value for 2022 was second only to 2018, the year of the historic chum return at Crawfish Inlet. NSRAA's total value of \$34.44 million, which includes its \$10.2 million cost recovery catch, also came in at the second highest ever.

"It was great to have such strong salmon prices," says NSRAA General Manager, Scott Wagner. "That high price allowed us to make our cost recovery goal at Crawfish Inlet."

Without those prices, NSRAA would have missed its cost recovery goal by several million dollars. Cost recovery operations are used to fund the organization's annual budget.

Both the troll and gillnet fleets set records this year. The troll fleets record catch of \$9.2 million was nearly double its previous record of \$5.8 million, from 2021.

"That was really cool to see," says Ben Adams, NSRAA Research and Evaluation Manager. "The gillnet fleet broke our all-time value record. They had really good prices and a pretty decent return at Deep Inlet, near NSRAA's Medvejie Hatchery, but it was their catch at Southeast Cove – which came to a value of \$340,000 – that brought them to their record."

For the most part, it was the strong salmon prices that boosted those values to record or near-record levels, but the troll fleet also set a record with a catch of nearly one million fish. Though the seine fleet did not break records this year, the total value of its NSRAA catch was still in the top five.

All combined, NSRAA's catch (excluding cost recovery operations) comprised 20 percent of the total commercial value for Southeast Alaska – nearly double the organization's 10-year average contribution of 12 percent.

"Building on 2021, we're headed in a better direction than we were in 2020, which is definitely encouraging," Ben says.

Scott hypothesizes that this year's record salmon prices were the result of a strange melee of post-pandemic forces, mixed with the aftermath of two disappointing chum years resulting in little, if any, stock remaining in freezers, and large spikes in food prices worldwide, among other factors. He believes it's unlikely prices will hold at that level into 2023, but is hopeful they'll remain close to 2021 prices, which was the previous record.

"That would be more realistic, but we won't know until spring," Scott says.

As the organization looks forward to next season, staff and board are reviewing whether it would be prudent to split cost recovery efforts between the east and west sides of Baranof Island. NSRAA has been conducting its main cost recovery operations at Crawfish Inlet since 2018, but the numbers of chum returning there each year are on the decline.

"It's just a matter of time until Crawfish Inlet underperforms our needs for cost recovery," Ben explains.

This summer's strong record return of three-year-old chum to NSRAA's Hidden Falls Hatchery and Southeast Cove, both on the east side of Baranof Island, boosted both next year's forecasts for that area, as well as hopes that salmon returns in the Chatham Strait are on the upswing after more than a decade of declining returns.

"It might be good to split cost recovery between Crawfish Inlet and Southeast Cove, so if we come in under forecast at one site, we don't end up way under our goal," Ben explains. "With our budget growing every year, we have to harvest more fish to fund our operations, so we've got to start looking at diversifying."

The board will make the final decision regarding 2023 cost recovery efforts at its meeting in March.

Hidden Falls Sees Improved Chum Returns

NSRAA's Hidden Falls Hatchery recorded its highest chum return in nearly a decade, boosting hope among staff and the seine fleet that this season marks a long-awaited turnaround.

Salmon returns to Hidden Falls and nearby locations in Chatham Strait have been on the decline for more than a decade. Ocean survival dropped so precipitously, in fact, Hidden Falls was forced to cancel its

General Manager's Notes



This past year has marked a tremendous turnaround since 2020 for NSRAA, Southeast Alaska salmon fisheries, and the commercial salmon fishermen of the region. NSRAA's 2022 commercial value to the fleets, of \$24.2 million dollars, was the second highest ever, only \$4 million behind the record 2018 Crawfish Inlet return. This value was primarily driven by record chum prices paid to all three salmon gear groups. Although this was the second high-

est commercial total value overall, it was a record for both the troll and gillnet fleet. Troll value came in at a staggering \$9.2 million dollars, blowing last years \$5.8 million dollar commercial troll value out of the water, and representing 38 percent of NSRAA's total commercial value. In total, between Deep Inlet and Crawfish Inlet, the trollers harvested an estimated 983,000 NSRAA produced chum salmon. The 2022 season was also a record commercial value for the gillnet fleet, at \$3.9 million, just edging out the 2011 value of \$3.8 million.

Looking forward to 2023 returns, NSRAA is expecting to see a shift in chum survival and returns from the west side of Baranof Island, to the east side. The Medvejie/Deep Inlet chum forecast for 2023 is 947,000, which is very similar to the 2020 total return of 818,000 chum salmon. It is important to keep in mind that in 2020 there was an extended closure of Deep Inlet to allow for chum brood stock capture and transport. It is a near certainty there will need to be a 7 to 10-day closure of Deep Inlet near the peak of the fall chum return in 2023. In 2020, NSRAA moved an estimated 40,000 adult chum from the Deep Inlet THA to Bear Cove.

While it is great to finally see some glimmer of light on improved chum marine survivals for Hidden Falls, returns to the west side of Baranof are concerning. Our current theory is this is the result of a very large black cod age class presence in the Sitka Sound and Crawfish region in 2019 and 2020. In 2020, we obtained an emergency Fish Transport Permit to move the Medvejie chum brood stock fry from Bear Cove to outer Silver Bay for release, in an effort to avoid the large mass of juvenile black cod in Bear Cove. In 2022, the three-year-olds returning to Bear Cove from this 2020 chum release had the lowest marine survival on record. Compare that to the marine survival of the three-year-old chum returning to Hidden Falls in 2022, which was the highest in 39 years.

Since 2018, NSRAA has experienced widely fluctuating three-yearold chum salmon marine survival and age at return. The most notable example of this is the 2018 return to Crawfish Inlet, with a total return of 3.5 million chum salmon. The majority of the fish returning to Crawfish in 2018 were three-year-olds from the brood year 2015 and this particular brood year had 65 percent return as three-year-olds instead of the majority typically returning as four-year-olds. NSRAA is initiating a data review to determine if there is any way to improve our forecasting models to account for these large age shifts at return. The million dollar question for 2023 is whether the great 2022 Hidden Falls three-year-old chum survival truly indicates a near historic marine survival, or is just a shift in age at return. See article on page 7 of this issue of the Fish Rap for a more detailed description of this project.

I would like to thank NSRAA's tremendous staff for another great year and wish everyone Happy Holidays!

Seat Wayn

fisheries in 2020 and 2021, in order to ensure it would have enough fish to collect the eggs required for the next brood year's release.

"With the low marine survival and poor forecasts, we've needed to protect those broodstock, because we needed all the returning fish to reach our eggtake goal," explains Hatchery Manager, Jon Pearce.

This year, NSRAA forecasted an estimated return of 300,000 chum to Hidden Falls, so it was an exciting surprise when an estimated 486,000 chum returned to the facility this season. It was the facility's highest chum return since 2013 and strong enough that NSRAA was able to open the Hidden Falls Terminal Harvest Area to the commercial fleet, once it had enough data to indicate the return was adequate for the next brood year and had completed its cost recovery test fishing operations.

This year's return had the highest marine survival of three-year-olds in 39 years, which may be an indicator of another strong return next year. It was a welcome change for both staff and the fleet, one they hope promises continued improvement next year.

"Even on the low end of the forecasts for next year, it would still be an improvement from this year," Jon says. Hidden Falls recorded the lowest returns in its history between 2013 and 2021, with marine survivals well below 0.5 percent. Next year's return of four-year-olds is estimated at a survival of 1.1 to 4.1 percent.

"We still work just as hard on bad years, so it was nice to have a good year," Jon says. "Mother Nature can still throw curveballs, but I hope we're coming out of this slump and we're going to start to have some better years out here."



Medvejie Experiments with New Testing Technique

The staff at NSRAA's Medvejie Hatchery has added a new tool to its arsenal in its efforts to maximize fish health and minimize mortalities before the salmon are released into the Pacific Ocean.

Raising salmon, or any living being, for that matter, is not an exact science. For salmon, it can be especially difficult to determine when the fish are ready to smolt. There is no set age or date when the fish are ready to move from freshwater to saltwater. Many factors influence that transition time each season, including water temperature, hours of daylight and other environmental factors – what works one year, won't necessarily work the next.

Being able to determine that time is incredibly important, though. If the fish are moved to saltwater too soon or too late, it can result in high losses and poor performance.

Traditionally, NSRAA has tested the fish for readiness by transferring test groups of about 100 fish at a time to saltwater. If the test group survives well after a week or two, the whole group of salmon is moved to saltwater. But sometimes the test group will fare well, while the bulk of the salmon do not.

"Last year, for example, we had 88 percent survival among our zero-check Chinook test group, but when we sent the whole population to



Chinook broodstock gather at Medvejie Hatchery.

saltwater, we lost 70 percent of the fish within the first ten days or so," explains Hatchery Manager, Jared Nelson. "There are environmental factors or fish health issues that could have played a role, you just don't really know."

Not only has the traditional saltwater testing method been undependable, it also takes a lot of time. The test groups are typically moved to saltwater for a week of monitoring, but if they don't do well, then another test group must be moved to saltwater for a week, and it can sometimes take as long as a month before a test group has survived well enough for staff to feel comfortable enough to transfer the bulk of the fish.

"Given that amount of time, you might miss the window for the transition," Jared says. "Salmon can revert back to parr characteristics, so you might miss that that peak readiness and transfer them too late."

This year, Jared and his staff are going to lean into science to help them better determine that readiness window more quickly. NSRAA has purchased equipment that will allow the staff to analyze blood chloride samples. In short, when salmon are physiologically ready to move to saltwater, their blood chloride levels are within a specific index. Instead of testing 100 fish for a week at a time, they can test 10 fish and have results within 24 hours.

"This is a common practice in salmon fish farms, where they're trying to focus on the transition period and get them into saltwater for growth as soon as possible," Jared explains.

The Medvejie staff plans to focus its testing efforts first on the zerocheck Chinook. These fish are released to sea after only six months, instead of the traditional 18-months, making it critical to find that transition window as soon as possible. But the blood chloride sampling can be used for any species from any and all of NSRAA's hatcheries.

"We need something different than our old method," Jared says. "If we can test them every other day to key in on that small window of readiness, I'm hoping we'll have better survival and growth once they move to saltwater."

Gunnuk Creek Struggles With Water Quality

Water quality continues to be the main challenge for incubation success at NSRAA's Gunnuk Creek Hatchery.

NSRAA purchased Gunnuk Creek Hatchery, located near the village of Kake on the northwest side of Kupreanof Island, from the State of Alaska in 2014. Under its previous management, the hatchery struggled with poor fish survival due to low flows, high debris and dramatic temperature fluctuations within the watershed that fed the facility's water system.

Knowing this, NSRAA installed a complex water treatment system as part of its renovations. The system includes filtration in the form of drum filters and settling tanks to remove solids in the water from erosion within the watershed, UV treatment to kill any bacteria, fungi or protozoa, and a temperature-controlled recirculation system to ensure consistent water temperatures.

It hasn't been enough.

This season was only the second time staff collected eggs on site at Gunnuk Creek. Previously, eggs were collected at NSRAA's Hidden Falls Hatchery and transferred as zygotes to Gunnuk Creek for incubation. But despite all the precautions that went into designing the new water system, water remains the biggest hurdle to the facility's success.

"Unfortunately, our water source has proven to have poorer water quality than we originally estimated," explains Hatchery Manager, Ryan Schuman.

Last season, Gunnuk Creek lost more than 8 million immature chum due to a fungal growth that resulted from a pump failure. This year, during incubation, the staff encountered a large percentage of hatch failure and early alevin death. The failure to hatch rate was 16 to 18 percent, nearly double that of those zygotes fertilized at NSRAA's Medvejie Hatchery and later transferred to Gunnuk Creek, for a total loss of approximately 2.4 million.

"After consulting with the Alaska Department of Fish and Game pa-

thology lab in Juneau, and relevant literature, we've concluded the most likely cause of the pre-hatch and early developmental loss was high water temperatures at fertilization and during early development," Ryan says.

He and his staff have since installed improved water chillers and hope those will prevent similar losses during incubation next year.

"We have also insulated all recirculation system plumbing to maximize our efficiency when heating or cooling the water for incubation," Ryan says. "With the changes made to our system this year, we have improved our water quality. Through continued water quality testing and efforts to improve our water quality, I'm confident we will improve moving forward."

Though this year's incubation losses were not inconsequential, they were still an improvement over last year's, and Ryan is optimistic the hatchery will have more success next season.



The staff at Gunnuk Creek Hatchery worked to improve the facility's water chillers this season.

Sawmill Creek: New Infrastructure Complete

Progress continues toward the expansion of NSRAA's Sawmill Creek Hatchery. Now that the infrastructure work is complete, the organization is looking forward to breaking ground on the new building next summer.

Sawmill Creek is a 60,000-square-foot facility, with a 5,000-squarefoot hatchery building, on the outskirts of Sitka. It was originally designed to rear 2 million coho smolt annually for remote release. NSRAA has since added 50 million chum to the facility's production and recently began rearing Chinook there, as well.

Once the second building is completed, the facility will be more than double its current size, allowing the organization the capacity to increase its production to 50 million chum, 2 million coho and 2 million Chinook, annually.

The final stages of excavation and infrastructure work to accommodate the expansion were completed this summer at the existing facility. The work to expand the capacity of the hatchery's water system for the increased production required that the water be shut down for the second summer in a row, prompting the staff to move the current brood year of fry to Medvejie for short-term rearing. The focus of this summer's work included the installation of a new drain line, a water collection vault and a new parallel outfall. The organization continues to move forward with engineering plans for the new building, which will include 15,000-square-feet of incubation and indoor rearing space with a complete recirculating aquaculture system.

Though the goal is to break ground for building construction next summer, it will still be several years before the building will be complete, says Operations Manager, Adam Olson. NSRAA receives funds for the expansion through the Pacific Salmon Mitigation Program, which distributes funds annually. The project has been broken down into stages in order to remain within that annual distribution.

Unlike the infrastructure work, which required the fish be moved out of the facility for the past two summers, construction of the building will not interfere with hatchery operations. A new building will be erected on a plot of land adjacent to the current building.

As with most construction projects, the timeline is still tentative, but Adam hopes the building will be completed and ready for increased production by the summer of 2025 or 2026.



Final infrastructure work at Sawmill Creek Hatchery this summer included the installation of a new outfall pipe.

Deer Lake: Record Precipitation Compromises Coho

Record precipitation this winter appears to have compromised emigration numbers at NSRAA's Deer Lake project this spring.

Southeast Alaska received a record amount of precipitation in the first two months of 2022, combined. According to the weather data from Little Port Walter, a research facility south of Juneau which has recorded weather and precipitation for more than 80 years, the average precipitation for the area in January and February is 40 inches. The precipitation total for that time period this year, from a combination of snow and rain, was 80 inches.

"It was the most precipitation recorded in that two month period since Little Port Walter began collecting data in 1938," says Project Leader, Schuyler Mace.

Located just eight miles north of Little Port Walter, on the southeastern short of Baranof Island, Deer Lake is one of NSRAA's remote projects and part of the organization's coho enhancement program. Currently, coho fry are overwintered in the 977-acre lake with the goal of releasing more than 2 million fish from Mist Cove each spring. Some fish are overwintered in net pens while others swim freely in the lake, which is almost 900-feet at its deepest point.

Over the years, the survival rate of the fish swimming freely in the lake for the winter has exceeded that of the fish in the net pens, prompting staff to gradually increase the ratio of the fish in the lake, so that, now, only one-quarter of the fish are overwintered in net pens.

As a remote project, staff are only on site full-time from March through December. Crews make regular trips to the project site throughout the winter to check on the coho and to avoid any unexpected disasters. When Schuyler and his crew visited the site at the end of January, there was 4- to 5-feet of snow on the ground. When they returned to open camp six weeks later, all that snow was gone.

"All the rain melted the snow," he says.

They didn't think much of it. A few months went by before they realized something was wrong.

"This would have been the second year of having the increased number of fish released into the lake for the winter," Schuyler explains. "The first year was a success. We met our goal of 1.5 million fish released that spring. This year, though, we only had one million fish that emigrated."

What happened to the other 500,000? There was no indication of high mortality within the lake over the winter. Perhaps the fish didn't emigrate and were still in the lake? But a mark/recapture study indicated the fish were no longer in the lake.

"The big question is: where did they go?" Schuyler says. As the staff attempted to answer that question, Schuyler began to review the weather and precipitation data for the winter. Once he saw the record precipitation, a previously unforeseen scenario came into view: the large water events may have falsely triggered the smolt to push out of the lake sooner than natural.

If this happened, the fish would have gone over the waterfall and died. Unfortunately, without the weir in place, the fish cannot emigrate from the lake naturally.

Schuyler remains optimistic, despite the setback. "This was an environmental event that was out of our control. We're still seeing better marine survival among the fish that overwinter in the lake than those in the net pens."

NSRAA Contributions to Fisheries 2021-2022								
	GILLNET		SEINE		TROLL		ALL	
	2021	2022	2021	2022	2021	2022	2021	2022
Chum	378,915	502,309	1,530,845	1,500,110	651,358	984,922	2,561,119	2,987,341
Chinook	3,700	2,255	2,599	959	<mark>5,084</mark>	4,207	11,383	7,421
Coho	1,949	1,110	6,569	9,872	37,291	<mark>57,974</mark>	45,809	68,956
All	386,585	507,696	1,542,034	1,512,963	695,754	1,049,125	2,620,332	3,065,740

Salmon Lake: Annual Study Ends

Fifteen years after NSRAA began work at Salmon Lake, NSRAA has removed all equipment and returned the area to its natural state.

NSRAA was required to operate a weir at Salmon Lake, at the end of Silver Bay, near Sitka, as part of its agreement with the Alaska Department of Fish & Game (ADF&G) under the Sawmill Creek Hatchery's basic management plan. The objective of the study was to monitor the lake for any hatchery-produced coho or strays and estimate the number of fish returning to the lake each year.

An average of 1,800 adult coho returned to Salmon Lake each year, well surpassing the 700 minimum required to sustain a healthy stock. While it is expected there may be an occasional stray from a nearby hatchery release site, part of the study was to ensure those hatchery-produced fish are not straying at a number that would impact wild species.

"We found only 17 hatchery tags in 15 years," says Annie Causey, NSRAA Special Projects Manager. "Of those strays, only 13 were adults – 11 were released from Bear Cove and two from Deep Inlet. NSRAA only tags a portion of its fish, so when we expand that out to estimate those fish numbers, we had an estimated 38 total hatchery fish at Salmon Lake over 15



Anthony Walloch (ADF&G) and Ryan Lawton (NSRAA) sample coho salmon from the Salmon Lake fish box at the weir.



NSRAA and ADF&G team up to remove weir and equipment from Salmon Lake.

years. This comes out to total NSRAA hatchery fraction of about 0.13 percent."

The operational plan under which NSRAA was required to operate the Salmon Lake weir was scheduled to expire in 2022, but due to the low number of strays, NSRAA was not required to monitor the weir for the final year and staff was able to break down the site, remove the weir and all equipment this summer. NSRAA partnered with Sitka Trail Works, which had hired a helicopter to deliver supplies for trail maintenance in the area this summer, to remove equipment from the site.

The weir was returned to ADF&G for use on the Situk River in the Yakutat area. The \$14,000 earmarked for Salmon Lake operations in 2022 was used toward the removal of supplies and equipment from the weir site.

ADF&G operated the weir at Salmon Lake for several decades before NSRAA took over operations in 2007. The removal of the weir and equipment marks the first time in more than 30 years that Salmon Lake will be in its natural state.

"We tried to eliminate any sign that we were ever there," Annie says.



Helicopter removes equipment from Salmon Lake.

Board Member Profile: Joe Cisney



Cisney with his sons, Jacob and Gunnar.

Joe Cisney has spent his career making a living from the ocean. He wants to ensure younger generations can do the same.

"I've spent most of my life on the ocean," says Joe. "I really feel most comfortable when I'm on the water."

Like many kids from Alaska's fishing towns, Joe was on the boat at a young age. He is the third generation of his family (maternal and paternal) born and raised in Petersburg. The ocean is in his blood.

But if Joe had to name one thing that hooked him into this lifestyle, it wasn't the beauty or challenge of the ocean; it was the responsibility.

Joe began working summers on his father's seine boat when he was 13, and, as he says, was "on the fast track to becoming captain." Joe was 19 when he began to captain and, eventually, he bought his own seiner. After almost 40 years working a seine boat, it's become second nature. Over the years, Joe has seined for salmon and squid, and has also fished Dungeness crab, halibut and black cod. He can't imagine another life.

"I've always been my own boss," Joe says. "I love the freedom, and the big chunks of time off that you would never get with a 9-to-5 job. I don't know that I could give that up."

Ten years ago, after their sons were born, Joe and his wife, Jenny, moved to Whidbey Island, Washington, to be closer to the grandparents. F/V Natalie Gail conducts cost recovery at Hidden Falls.

They just moved back to Petersburg this summer. As much as the family enjoyed their time in Washington, it didn't make sense anymore for Joe to commute back and forth between Washington and Alaska for fishing opportunities. Besides, now that the boys are 10 and 12, it's time they learn the Alaskan lifestyle. Next summer, the couple's oldest son will start working for his dad, as Joe did for his and Jenny for hers when they were that age.

"They've gone on the boat every year since they were born," Joe says. "I've really enjoyed working on the boat with my wife over the years, and having my kids on the boat has been great. I know at least one of them is going to want to be a fisherman."

Joe joined the NSRAA board about five years ago, and has also since joined the Southeast Alaska Seiners (SEAS), as well.

"There's good and bad fish politics, but I feel like I'm helping, at least," Joe says.

In his time with NSRAA, Joe says he's learned a lot about the business of aquaculture and the organization's dedication to raise fish and create more opportunities for the fleets.

"It's been really helpful," he says. "I understand the process well enough now to where I don't question how things are done because I can see the bigger picture. I'm really happy with how NSRAA conducts its business."

But Joe's time on the NSRAA board and with SEAS has also illustrated how tenuous the commercial fishing life can be. With climate change, salmon returns are on the decline, fish are returning younger and smaller and forecasting is less dependable, and fleets have to fight to retain their fishing opportunities.

For Joe, the fight isn't just about his business or his fleet, it's about this way of life. He wants to protect that lifestyle for his sons and generations to come.



New Hires and Promotions

NSRAA welcomed five to its full-time staff this year:

- Whitney Frazier, Special Projects Assistant
- Chelsea Huckbody, Evaluation Program Assistant
- Vince Lour Blanc, Sawmill Maintenance/Fish Culture
- Sara Valetta, Medvejie Culturist
- Sydney Walshak, Medvejie Culturist

Congratulations to the following staff members for their promotions this year:

- Cain DePriest, from Medvejie Hatchery Manager to Traveling Maintenance Engineer
- Jared Nelson, from Medvejie Assistant Manager to Hatchery Manager
- Taylor Scott, from Medvejie Culturist to Assistant Manager
- Alyssa Tomczyk, from Evaluation Program Assistant to Evaluation Laboratory Manager

Will Returns To Chatham Strait Improve?

NSRAA's forecast for next season is similar to 2022, but it could represent a big shift in its salmon returns.

"Our hope is that, overall, we'll come in the ball park and it will still be a good year," says NSRAA General Manager, Scott Wagner, acknowledging that forecasts have not been dependable lately.

At 3.4 million, next year's forecast for all species, combined, is slightly short of the 3.7 million forecast for 2022. But this season's return came in above the forecast, at 4.1 million, aided by surprisingly strong three-year-old returns to NSRAA's Hidden Falls Hatchery and Southeast Cove, boosting hope that the long decline in salmon survivals in Chatham Strait is finally turning around.

"More fish are expected to come back to our projects on the east side of Baranof Island than we've had in a long time," says Ben Adams, NSRAA Research and Evaluation Manager.

"The major shift in 2023 is the dramatic reduction in the forecast for the Deep Inlet return and the increase in the East Baranof chum," Scott adds.

When the ocean survival of salmon returning to Hidden Falls and other sites in Chatham Strait began to plummet, NSRAA changed the focus for both its cost recovery operations and fleet contribution to the west side of Baranof, where salmon returns remained strong. But returns for that side have been diminishing recently, with Deep Inlet expected to take the hardest hit next year. (Deep Inlet was the highest contributor to the 2022 return, but the brood year of four-year-olds scheduled to return in 2023 was subject to an unprecedented population of black cod that fed on the fry at the time of its release.)

Meanwhile, for 2023, an estimated 800,000 chum are forecast to return to Hidden Falls and 570,000 to Southeast Cove – more than doubling the 2022 return for the two sites – both of which already had surprisingly strong returns in 2022, especially given the poor returns in Chatham Strait for the past decade or so. All combined, NSRAA's east Baranof sites, Hidden Falls, Southeast Cove, Gunnuk Creek and Thomas Bay, are expected to total almost half the organization's return for 2023.

"I'm very excited to see how things will transpire," Ben says.

Historically, forecasters used the ocean survival of a brood year's three-year-old's return to predict the survival of the older age groups from that brood year. At 0.17 percent ocean survival to date, Hidden Fall's 2022 three-year-old chum return represented the highest ocean survival recorded in nearly 40 years.

"Does that indicate a record survival on the brood year as a whole, or is it an age shift to three-year-olds?" asks Scott. "That's the million dollar question."

Until recently, four-year-olds comprised the largest portion of a chum's brood year return, from 35 to 75 percent, and three-year-olds rarely exceeded 5 percent of a brood year's total return. But those ratios have been changing recently. Larger ratios of salmon have returned at a younger age: more two-ocean Chinook, more three-year-old chum. Lately, the ratio of Hidden Falls three-year-olds has ranged from 10 to 25 percent of a brood year, with even higher ratios of three-year-olds recorded at some of NSRAA's other sites.



The recent age shift has been skewing those historic ratios, making forecasting more difficult and less dependable. Salmon experts around Southeast Alaska are asking: Is this the new norm?

It's still too soon to know, says Ben. For now, there is no perfect formula to predict salmon returns accurately. When estimating returns, Ben examines site-specific data for the past five years, and then compares that with historical data.

"It makes forecasting very difficult," Scott says. "We have really struggled to make good forecasts."

Once he studies the possible scenarios for each site, considering both recent data and historical data to come up with a forecast range, Ben "throws the dart to see where it lands" for the final forecast. He is only half joking.

"In the past, when returns were very consistent, we could run a regression analysis and say 'this is what it's going to be' and it was quite close," Ben explains. "That's just not possible anymore."

Which is why staff at NSRAA is hopeful its upcoming scale project will help make forecasting more accurate.

Fish experts use scales to measure the age and growth of a fish. The scales have circuli, similar to tree rings, that illustrate each year of growth. This summer, staff often found it difficult to decipher the difference between four- and five-year-old fish, because there was almost nonexistent growth in the five-year-olds' last year. Fortunately, crews were able to reference otolith markings to confirm the correct age for each fish.

"This past year, we were seeing enough five-year-old chum scales with poor growth that it was a red flag," explains Alyssa Tomczyk, NSRAA Evaluation Lab Manager. "In the summer season, where the circuli are typically widely spaced to indicate a lot of growth, the growth was almost not apparent at all. We'd like to look at historical scales to see if this happened in the past and we just didn't realize it."

It's possible, she says, that some five-year-olds were erroneously recorded as four-year-olds, potentially skewing the data from past years. NSRAA just recently started pairing otolith and scales in its sampling program, which prevents errors aging fish when encountering these anomalous growth patterns.

NSRAA has archived thousands of acetate cards recording scale circuli over the past 30 years. The organization plans to purchase software that will read the scales and digitize the data for analysis. Once the data is assembled, it could offer hints to growth patterns over the years and any trends that may be affecting growth and age at return.

"It could help us in forecasting by showing us age and growth patterns," Alyssa explains. "It has the potential to be a huge project, but I think it's important to look at the historical scales to see if this has happened before, and whether the patterns can tell us anything."

"The potential to analyze early growth patterns in chum scales may provide a metric to determine if a brood year is experiencing an age shift or is exhibiting trends to indicate a strong marine survival event," explains NSRAA Operations Manager, Adam Olson. "Ultimately, the more confidence NSRAA can place on the forecast, the better our preseason planning and the more liberal our in-season management of our fisheries can be."

2023 Preliminary Chum Forecast								
Early Runs	Late Runs							
Hidden Falls	806,000	Deep Inlet (Medvejie stock)	824,000					
Southeast Cove	570,000	Crawfish Inlet	867,000					
Gunnuk Creek	26,000							
Thomas Bay	97,000							
Deep Inlet (Hidden Falls stock)	127,000							
Early Run Total	1,626,000	Late Run Total	1,691,000					
Grand Total								
3,317,000								

Keta Broodstock Numbers Improve, Gradually

NSRAA continues to move forward toward its work to develop the Keta Chinook broodstock, albeit slowly.

Little Port Walter, Alaska's oldest year-round biological research station, which operates under NOAA's National Marine Fisheries Service, began studying a natural component of zero-check Chinook from the Keta River about ten years ago.

The Keta broodstock is of particular interest to NSRAA. Traditionally raised for 18 months before being released to sea, Chinook are the most costly species to raise. Zero-check Chinook, which are released after only six months, can represent significant savings – up to 75 percent of the cost of the traditional rearing program – but only if the shorter rearing time does not compromise survival.

NSRAA has had limited success with the zero-check strategy over the years. If NSRAA can switch the broodstock for its zero-check Chinook program to the Keta, which naturally sees a portion of the smolts go to sea within six months, it could be the key to success.

NSRAA's former General Manager, Steve Reifenstuhl, began conversations toward a cooperative agreement between NSRAA and NOAA at Little Port Walter in 2018. NSRAA's staff and board have since been exploring ways to fund its portion of the cooperative work through a remote release site near Little Port Walter, ideally in nearby Big Port Walter.

But in the spring of 2021, NOAA announced it would no longer fund salmon research in Alaska, threatening the future of the Keta program. Fortunately, public outcry at the decision prompted the federal government to reinstate the program.

NSRAA now has an agreement from NOAA to work on the Keta broodstock together for five years, but no salmon research has been conducted at Little Port Walter since the spring of 2021. Currently, NSRAA staff collects the eggs from the broodstock that return to the research facility and transports them to NSRAA's Hidden Falls Hatchery for incubation. NSRAA transports the fry back to Little Port Walter for release the following spring.

To facilitate its work toward developing the Keta broodstock, releases at Little Port Walter will be conducted under NSRAA's permit that allows for cost recovery harvesting of the Chinook once there is a surplus to broodstock needs. (The research permit under which Little Port Walter collected broodstock did not allow for any harvesting.) It may be a while before there is a surplus, though.

NSRAA was able to spawn only 32 females for the Keta broodstock this fall.

"In comparison, last year we only had 12 females," explains NSRAA Operations Manager, Adam Olson. "So it's an improvement – a very small improvement – but at least it's going in the right direction."

If all goes well, those 32 females will produce 100,000 fry, the majority of which would go toward broodstock release, with about 10 percent used for research purposes.



Keta Chinook spawn at Little Port Walter.

Little Port Walter is scheduled to renew research on the Keta Chinook in the spring of 2023. Research will include blood sampling and other measurements to determine how various factors like water temperatures, length of daylight hours and fish size influence the success or timing of the transfer from fresh water to salt water.

Meanwhile, NSRAA has conducted test fishing with Alaska Department of Fish and Game in nearby Big Port Walter for the past two summers to determine whether it could be a feasible location for remote release, likely for chum and coho. Typically, the test fishing is conducted for three years, but since there was a low interception rate of hatchery-produced fish the past two summers, testing may not be required again in 2023.

If so, the board would have the opportunity to decide if it wants to pursue the opportunity for a chum release permit a year sooner than scheduled. That is unlikely to fast forward a new release project, however, says Adam.

"We're not really ready or poised to put production there yet," he explains. "We don't have additional production to move there right now, so to do so would require reducing the numbers at one of our other sites. The NSRAA board would prefer to expand its operations in Northern Southeast Alaska, not move its existing production around."

"If the board decides it wants to pursue an opportunity at Big Port and we get a permit, then we can have the discussion again about a cooperative agreement with NOAA at Little Port Walter," Scott says.



Madison Vitale takes kidney samples from the Keta Chinook for analysis.