



SPAWNING NEWS

SOUTHERN SOUTHEAST REGIONAL
AQUACULTURE ASSOCIATION

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www.ssraa.org

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YEAR | IN | REVIEW

Irregularities reigned in 2016 fisheries

By **DAVID LANDIS**
SSRAA General Manager

The 2016 fishing season was like no others, at least like none we have seen in SSRAA's history. It was full of unique events and contradictions.

A striking aspect of what we have observed is the variability of runs all around the Pacific. The Bering Sea and the Yukon had large runs of sock-eye and chum, and just to the south of us in Johnstone Strait, B.C., and in Puget Sound, fall chum were strong. Across the Pacific in Hokkaido, Japan, fall chum were the weakest in decades.

For the most part, SSRAA's chum returns were close to the forecasts, but the fish were notably smaller. Chinook and coho were both weak, although at SSRAA's newest facility at Klawock River Hatchery the coho run was reasonably strong.

It is no secret that Mother Nature was not particularly kind to Southeast Alaska salmon runs. We have been warned of, and we've been waiting for, the effects of a warm ocean—The Blob—for some time now. After this season, we may know some of what this can look like in terms of SSRAA's salmon returns.

It was widely reported earlier this year that The Blob had dissipated and was no longer a negative factor for ocean productivity, but since that time new science has revealed that the upper water column was mixed by wind



Cost recovery harvest by the FV Teasha occurred in a year featuring unusual Pacific salmon returns, hangover from The Blob and fishing fleets harvesting outside typical ranges. But SSRAA's goal of widening the common-property portion of harvest progressed; see page 4.

We've been waiting for the effects of a warm ocean—The Blob ... After this season, we may know some of what this can look like in terms of SSRAA's salmon returns.

action and returned to normal temperatures while residual cool temperatures were still apparent at 150 to 200 meters below the surface. It is possible that there will be lasting effects on SSRAA returns over the next several years, since these warm temperatures have likely disrupted the food supply that our salmon rely on, leading to smaller and healthier fish. The warm waters

See Year in review on 4

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SSRAA experimenting with novel method for thermal-marking salmon

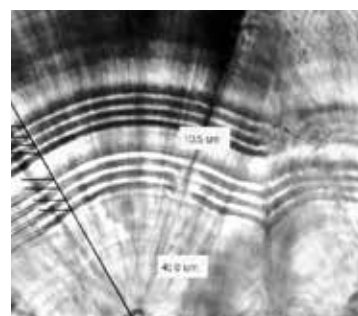
A FASTER METHOD OF CODING OTOLITHS AIMS AT BIG SAVINGS IN THE FUEL BUDGET

By **JOHN HOLT**
SSRAA Research & Evaluation Manager

SSRAA staff and a specialist in computer imaging are experimenting with a process that we hope will cut by more than 80 percent the time and the fuel expense of marking our salmon. The innovation requires that we develop a software program for reading a new type of thermal mark.

For 12 years, we've used thermal marking on the otoliths, or ear bones, of hatchery salmon to distinguish our fish from wild stocks and those from other aquaculture producers. The process is used primarily on chum, either during or immediately following egg incubation, or during both periods. The marks are microscopic bands (resembling barcodes) and each hatchery facility is assigned a unique set of marks. The bands are created by exposing eggs to varying water temperatures during incubation. For example, if normal water temperature in the incubator is 11 degrees Celsius, chilling the water to 7 degrees for 24 hours creates a dark band on the otolith. Repeating the process several times in pre-determined warm/cold water intervals results in a distinct banding pattern. Following incubation, the fish are reared in the hatchery, released into the ocean and return as 3- to 5-year-olds. We collect otoliths from some of these fish at processors. The otoliths are read at great magnification in SSRAA's otolith lab and the results are

used in evaluating rearing and release strategies and in determining survival percentages of hatchery releases. Since each hatchery has its own set of thermal marks, SSRAA fish can be distinguished from those produced by other hatcheries in Alaska, Canada and the Lower 48. In fact, thermal marks are used by hatcheries worldwide, and thus it is possible to determine the hatcheries of origin of most enhanced salmon caught in ocean fisheries.



If a new process and software work out, thermal marks can be laid faster at less cost—but they'll be smaller than these bands, mere microns apart. To learn about a staff member who built the otolith lab, see page 3.

But only a finite number of marks is available. As hatcheries expand rearing strategies and increase the number of release sites, additional marks are required to distinguish new culturing strategies and release sites from those already in use. This results in complex marks that take more time and expense to produce. Currently, SSRAA's longest marks take approximately three weeks to create. Longer marks present two primary challenges. First, if they are too long and are not finished before eggs hatch, components of the marks become obscured and therefore cannot be distinguished from otoliths with different

See Thermal marking on 3

**The board of directors
and the staff of
Southern Southeast
Regional Aquaculture
Association wish our
readers and friends
the best of the holiday
season and fair seas
in the year to come**



SUN	MON	TUE	WED	THU	FRI	SAT
		1	2	3	4	5

SSRAA calendar

- Dec. 12 SSRAA Finance Committee / Ted Ferry Civic Center, Ketchikan
- Dec. 13 SSRAA Production Committee / Ted Ferry Civic Center, Ketchikan
- Dec. 14 SSRAA Board of Directors / Ted Ferry Civic Center, Ketchikan
- Jan. 26 SSRAA Finance Committee / Sunny Point Conference Center, Ketchikan
- Jan. 27 SSRAA Board of Directors Annual Meeting / Sunny Point Conference Center, Ketchikan
- March 9 SSRAA Production Committee / Location TBA, Ketchikan
- March 10 SSRAA Board of Directors / Location TBA, Ketchikan

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This publication is mailed free to all limited-entry salmon permit holders for purse seine, drift gillnet, power troll and hand troll in Alaska Districts 1-8. It is also mailed free to any person interested in SSRAA.

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The 21-member SSRAA Board of Directors includes 13 commercial fishers along with representatives of interest groups and the public.

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Jake Arnold	Lead Maintenance Technician

ssraa | PEOPLE

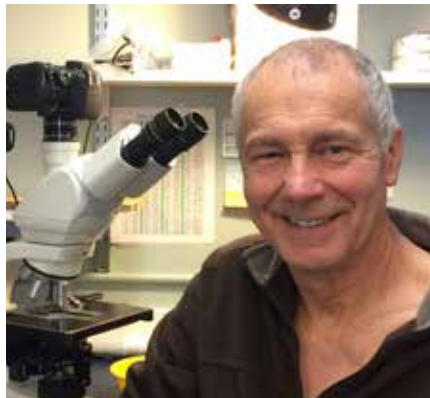
MAGNIFYING OUR IMPACTS A career deflection led to the otolith lab

A computer monitor fills with a black and white image that might be a moonscape or the contour map of a volcano. But it's a calcium disk from the head of a hatchery chum salmon, backlit and magnified 400 times. It's an otolith. Alan Murray's job is to read it.

Every picture tells a story. The pattern of shadows in an otolith tells where and when the fish was hatched by SSRAA or another aquaculture operation. Find a number of salmon with the same mark in random samples at fish processors' sorting tables and there's a very consequential non-fiction story to tell.

"Literally millions of dollars ride on the information that we extract from these otoliths, so it has to be accurate," Murray said. He set up the lab more than a dozen years ago and has seen tens of thousands of these specimens. "Determining our contribution to the common property fisheries is one of the most important reasons we do this. But when we produce our predictions at the end of the season based on what we found, this has a huge impact on fishermen, as far as what they're going to do for the next year." Murray assumes that decisions on hiring, equipment and where commercial fishers run their boats hang on his study of calcium dots that fit five wide across a dime.

Murray was the first and only otolith wrangler when he pioneered the lab in 2002. He's trained two other present staff members to find, grind, slide-mount and examine the so-called ear bones. Staff use powerful microscopes, digital cameras, imaging software and a massive database to harvest data. Three other SSRAA employees collect the otoliths at processors during fishing season.



Alan Murray

Literally millions of dollars ride on the information that we extract from these otoliths, so it has to be accurate.

Sampling volume has increased enormously. "The first year, I might have looked at 8,000 samples," Murray said. "In November, three of us did 15,000 or 16,000 otoliths." Sample more fish and the story gains depth, detail and reliability.

Working with SSRAA is the third chapter in Murray's career story. He grew up in Bellevue, Wash., and was a radar technician in the U.S. Army before hiring on at the pulp mill in Sitka—where he met his wife, Susan. They ran retail businesses in Juneau and Ketchikan for more than 27 years. By the mid-1990s they leaned toward closing Murray Records & Tapes on Main Street and Murray enrolled at UAS Ketchikan campus. Gary Freitag, then SSRAA's research and evaluation manager and an instructor at the college, hooked Murray into fisheries courses. Murray also took classes with Rod Neterer, then the production manager at SSRAA. Freitag hired Murray for a more than two-year internship investigating coho lake-rearing habitat.

The Bakewell Lake program came out of that research. On the way to his associate's degree in fisheries sciences, Murray wrote a paper on thermal marking. That knowledge was essential after Murray joined the SSRAA staff as a fish culturist. "Gary came to me one day and said, 'I want you to build an otolith lab.' I had to learn how," Murray said. "I visited otolith labs in Juneau. I took a class in Access to learn how to use databases."

Murray said the usefulness of otolith marks isn't limited to off-season statistical tables. "A fisher can offload their catch at a processor and within a few hours we know something about the makeup of the run," he said.

Thermal marking

CONTINUED FROM 1

marks. Second, many sites must heat or chill water to create the two different water temperatures necessary for producing marks. This may require purchasing of diesel used to operate boilers that produce heated water; the longer the mark, the longer boilers need to operate and the more expensive it is to create marks.

In response to these challenges, the SSRAA Board of Directors in March 2016 approved funding for cutting-edge research in otolith marking and reading. The two proposed experiments approved by the board include one to vastly reduce the time and expense of creating new marks and another to use computer "vision" to read thermal marks.

The first experiment is being performed at SSRAA's Deer Mountain Hatchery. Fall chum salmon eggs are otolith-marked in small quantities (625 eggs) in a small-scale incubator array designed and built specifically for the experiment. Composed of thirty-six MacDonald-type hatchery jars, each with a valve to control flow of warm and cold water, the array allows very fine manipulations of water temperature fluctuation during the thermal marking process. (See the marked photo with this article.) In the standard hatchery application, each band within the mark requires either 12 or 24 hours to complete,

but our experiment investigates whether bands can be created in less time. Since each incubator contains a separate experiment, we can evaluate thirty-six different marks and are varying the duration of cold-water exposure between one and nine hours.

The first phase of the experiment was completed in mid-November and preliminary results indicate that a mark that would normally take 240 hours to create can be created in 30 hours—nearly an 88 percent reduction in time. If used in a hatchery situation, this reduction in time necessary to complete a mark would translate into an 88 percent reduction in diesel use. However, since this method requires so much less time to create a mark, the marks are much smaller and are being referred to as micro-marks. Some of the micro-marks are so small that they cannot be seen with human vision and identifying them will require computer vision/pattern recognition software.

This leads us to the second experiment. SSRAA research and evaluation staff recruited Timothy Lu, a scientific programmer, to develop computer vision software. Lu is a recent master's degree graduate from USC's program in neuroimaging and arrived in mid-July. He immediately went to work with SSRAA's port sampling team. Lu quickly mastered the skills of collecting and reading otoliths—essential for understanding the complexity and variability in otolith marks. Both mark complexity and mark variability will be manipulated in the computer vision program. The goal of the experiment is to



The experimental incubator array at Deer Mountain Hatchery: 1) hatching jars; 2) valves; 3) water supply pipes; and 4) head box.

create a program that recognizes and categorizes images of otolith marks automatically. Additionally, it would be able to "see" marks invisible to human vision that we create with techniques developed in the incubator experiment. The two experiments identify opportunities to save money and time in the otolith marking of SSRAA salmon.

As of October, proof of concept was established and the software program, in a very rudimentary form, was able to classify traditional otolith marks with about 80 percent accuracy and confidence. Once the program achieves an otolith mark classification accuracy of at least 90 percent, the next step will be to train it to recognize micro-marks. When this happens and the experiment is completed, SSRAA will apply the final process to SSRAA production.

It may be a few years away, but we'll continue publishing updates as we move toward the goal.

Year in review CONTINUED FROM 1

have also brought more predators to the return corridors, making populations more vulnerable.

Whether these warm ocean conditions were partially or nearly entirely to blame, you saw the end results on the grounds and we observed them in the return: an overall weak run; a great variety in fish size and ripeness; unusual behavior such as fish remaining deep in the water column; and some sex ratios (our bedrock measure of run timing) that were contradictory and confusing.

Everyone seems to have a story or stories about how irregular the 2016 run was.

Summaries of each species for 2016 follow here. These numbers won't change dramatically going forward, but they are still preliminary.

SUMMER CHUM

With the exception of Anita Bay, generally all SSRAA summer chum returns were close to the forecasts: Kendrick, 96 percent of forecast; Nakat, 104 percent; Neets, 105 percent; and Anita, 144 percent. Historically, this is as well as we have done in forecasting summer chum returns.

There were two factors that didn't occur in line with the historic situation. The average weight in cost recovery was 8.5 pounds, whereas the historic weight is 9.7-10 pounds. The harvest of summer chum returning to Neets Bay away from the Neets Bay SHA (interception) was greater than usual, at 28 percent as opposed to more common situation of about 20 percent of the return. If early season net rotations in the SHA are included with interception, 37.5 percent of returning summer chums were harvested before they reached the terminal area or before cost recovery began.

In general, survival for both wild and enhanced chinook in Southeast Alaska in 2016 was very poor. Most of the natural chinook index systems failed to meet escapement goals, including the Unuk River stock.

FALL CHUM

Much like the summer run, the falls survived close to what was forecast at Nakat (90 percent). The Neets Bay return assessment of survival (80 percent) was probably complicated by late-season predation by marine mammals in the SHA. Fall chums followed somewhat the same pattern as the summers, in general. Terminal fishing was all at the barrier net. We also had our typical rainstorm during eggtake, and although it didn't wipe us out, we kept putting fish over the barrier and an unprecedented number of seals and sea lions took their toll.

CHINOOK

In general, survival for both wild and enhanced chinook in Southeast Alaska in 2016 was very poor. Most of the natural chinook index systems failed to meet escapement goals, including the Unuk River stock. To some degree, SSRAA's fish were the exception. The total return was about 55 percent of what was forecast, but some releases did much better than others, particularly Anita Bay (76 percent of forecast). The chinook released at Whitman Lake did not do well (30 percent of forecast). The ex-vessel value compensated in part for the drop in survival, particularly for trollers.

COHO

Survival of SSRAA coho releases was not the worst we have experienced, but it was not a good return. The exception was Klawock, where survival was similar to what has occurred in recent years—about 5 percent. One difference between 2015 and 2016 is that the summer coho did well in 2015, in a relative sense considerably better than fall coho. That situation was reversed in 2016, though none of SSRAA's traditional coho releases did well in 2016. The coho were large this year, however, which is also a marine survival indicator.

Several other harvest-related features are worth noting. First, with the exception of several opportunities at Amalga and Deep Inlet, the seine fleet

fished almost exclusively in southern Southeast. Neither the early return of enhanced chum salmon nor the pink salmon return warranted any serious seine effort in northern districts. Consequently, for most of the 2016 summer season, virtually the entire active seine fleet was focused in Districts 101, 102 and 104, and as a result more than the usual number of summer chum returning to Neets Bay were caught before they reached the SHA. Secondly, the chum troll effort in Neets and Behm Canal was less than in previous years. The harvest numbers per boat as well as the price for chum were actually better than in 2015; regardless, participation, effort, and subsequently harvest, were less this year.

Long-sought 75/25 split in salmon harvests is exceeded in preliminary tallies for 2016

It was an early SSRAA corporate goal that at some point in time SSRAA could be sustained by harvesting 25 percent of returning fish. The general consensus then was that meeting the 75/25 split between common property and cost recovery would require both good survival and good prices for chum salmon harvested in cost recovery. This didn't appear possible for a number of years, but was nonetheless retained as a goal. As you can see in this table, we have essentially achieved that goal, although we did end the season short on cost recovery.

Species	Release Site	Common Property Harvest in Fish	SSRAA Cost Recovery Harvest in fish
Summer Chum	Nakat	270,936	0
	Kendrick	832,049	0
	Anita Bay	558,426	0
	Neets Bay	606,397	521,110
Fall Chum	Nakat	63,000	0
	Neets Bay	55,000	84,234
	Total Chum	2,385,800	605,344
	Percentage	79.76%	20.24%
Coho Salmon	Burnett Inlet	7,917	1,500
	Neck Lake	11,302	12,404
	Anita Bay	13,081	0
	Crystal Lake	460	0
	Herring Cove	9,012	1,070
	Nakat	15,203	0
	Neets Bay	82,393	9,247
	Bakewell Lake	0	0
	Klawock Lake	181,128	26,385
	Total Coho	320,498	50,606
	Percentage	86.36%	13.64%
Chinook	Neets Bay	10,492	815
	Herring Cove	3,548	1,864
	Anita Bay	12,436	0
	Crystal Lake	2,312	0
	Total Chinook	28,788	2,679
	Percentage	91.49%	8.51%

SSRAA | PEOPLE

ELEVATION AS ELATION The Neets Bay 25k Challenge is up and *running*

By SHONA HILTON
For the Spawning News

At mile 10, my body decided it was time to remind me I had not done nearly enough training for almost 16 miles with 2,500-plus feet of elevation gain.

My husband, Neets Bay Hatchery Manager Steve Hilton, gently encouraged me to eat something and was rewarded with a glare and a snarl. With several miles still to go, I just had to stick to my plan of running on the flat and downhill sections and walking the uphill climbs—even though everything felt like an uphill climb. I put my head down and placed one foot in front of the other, letting the overgrown alders smack me in the face and quietly hoping a bear would jump out at me so I had an excuse to stop running. Sadly, none came to my assistance, despite the fact that I was moving like a wounded animal panting through the woods.

Steve sensibly stayed a quarter-mile ahead, leaving me in my personal bubble of suffering. He's done this drill before.

But as we came down the last hill to the Fire Cove dock I had that feeling of elation you get when you've struggled hard for something and won. Not my best time by far for a 25k but I was done. I could eat, drink and be merry. Then I remembered I still had to take the short walk from the hatchery dock to our house. Nothing was going to be more painful after stiffening up on the boat trip home, of that I was sure. It hurt, yes, but the challenge was in the bag.

Purely selfish reasons led me to set up the event in the first place. Feeling unfit and unmotivated after several months of doing very little solid exercise, I needed something to get me up and out the door. Fishing is fine, paddling speedily away from over-interested sea lions is exhilarating, and I love sneaking about in the woods hunting, but running long distances through forests and mountains is also one of my favorite hobbies. Conveniently, we discovered that the old logging road leading from the Fire Cove dock to an overlook above the hatchery was exactly the right distance for a 25k, with a legit amount of climbing. And what's better than being rewarded with a stunning view of



The author's family and Neets Bay hatchery staff pioneered a mountain challenge that goes 16 miles out and back with half a mile of elevation gain. Exhaustion, complaining—and camaraderie—are waypoints on the trail.

I needed something to get me up and out the door. Fishing is fine, paddling speedily away from over-interested sea lions is exhilarating, and I love sneaking about in the woods hunting, but running long distances through forests and mountains is also one of my favorite hobbies.

your home after strenuous exercise—and realizing you have no choice but to backtrack all the miles again before you can lie on your sofa. The rules were simple: run or hike the route before Labor Day; provide proof you did it; be safe; and let bears and wolves have the right of way. The gauntlet was laid down for those who chose to compete for the cash prize, and swag bags with an engraved souvenir pint glass were to be handed out to everyone who did the distance.

Spending several hours out in the woods is not everyone's cup of tea, I respect that. But I was delighted at how many of the staff out here made the trek up the hill—some more than once. I had the pleasure of completing it not only with Steve, but with several staff members on two other occasions. I always

feel conversation flows best for me when I'm out moving through nature and I really enjoyed the company of those who joined me out there, using the time to get to know people better in a relaxing, if exhausting, environment. For some, the climb was something they could do easily and for others it was a big achievement, something they had never done before—and I delighted in their feeling of accomplishment. But the highlight for me was the group hike, which my kids joined. Sixteen miles with a couple thousand feet of climbing is a solid distance for adults, never mind for a 13-year-old and a 10 year-old, and they didn't complain once (thanks partly to our wonderful seasonal, Zach, who chatted with them and encouraged them the whole way). I'm so very proud of them and pleased that our youngest now uses it as the benchmark to measure all his hikes. All of a sudden, three to five miles (which used to provoke claims of exhaustion and possible lifelong trauma) are now nothing. Funny how your perception changes once your goals are reached and overcome. Deer Mountain to Silvis Lake traverse, here he comes.

The competitive side was a two-horse race between Steve and fish culturist Mike McWaters. Actually it was a one-horse race, because although Steve put in an excellent time of 2:42 I wouldn't let him benefit from the prize money (that's what happens when you're married to the organizer) and all glory went to Mike, who also put in an excellent time and could be in line to beat Steve next year.

And that is me laying down the gauntlet again. There will be a next year and anyone with a tenuous link to Neets Bay Hatchery can enter in the fun; just get in touch to let myself or Steve know you're in and to get the details. There may be other events, too; possibly the Neets Bay Almost A Marathon. I'm working on that one. It's simply about getting out and enjoying what we have here in glorious Southeast Alaska while utterly exhausting yourself, complaining incessantly and secretly hoping bears make you stop running—oh wait, that's just me.

2016 SEASON REVIEW | Klawock River Hatchery

The transition to operation as a SSRAA hatchery went smoothly. The PNP permits were in place on July 1 and Prince of Wales Hatchery Association personnel became SSRAA employees on July 24 to coincide with the new pay period and acquisition of a State of Alaska loan. There were a few minor housekeeping items to accomplish, with no effect on SSRAA. At this time, the goal is to have these finalized by the end of the calendar year. At that point, POWHA will be dissolved.

Operations are running smoothly under manager Jeff Lundberg.

Klawock had excellent survival of

coho from brood year 2013, surpassing all other hatcheries. Klawock River Hatchery contributed 191,000 coho to common property fisheries. When all numbers are final, survival will be 6-6.5 percent. The value to the troll fleet alone will likely exceed \$2 million. The statement below was emailed to Jeff Lundberg by Ron Josephson, ADFG biologist, to sum it up best:

"I am showing Klawock coho as 12% of the troll catch for South-

east. That's pretty remarkable. In 2013 and 2015, it was 8% and that was exciting at the time, but this year is something else."

— Ron Josephson, ADFG

	District													Grand Total
	101	102	103	104	105	106	109	113	114	116	152	154	157 (blank)	
DRIFT						396								396
PURSE		1,284	1,457	16,265									2,783	21,789
TROLL	515	639	35,320	16,109	3,712	92	2,077	60,908	152	304	30,196	3,229	752	158,769
SPORT		73	3,550	3,524				2,869					67	10,083
Grand Total	515	1,996	40,327	35,898	3,712	488	2,077	63,776	152	304	30,196	3,229	752	191,037

SSRAA contributions | PRELIMINARY ESTIMATES OF HARVESTS OF ENHANCED SALMON IN 2016

COHO	Common Property				Special Harvest Area			SSRAA	Cost			Total	% forecast	Survival 2016	5-year Average
	Release Site	Gillnet	Seine	Troll	Sport	Gillnet	Seine		Troll	Brood	Recovery				
BURNETT INLET	5,355	1,147	1,152	62				3,300	2,785			13,801	63%	5.8%	9.6%
NECK LAKE	9,424	1,074	730	6,600					9,619			27,447	45%	1.4%	5.1%
ANITA BAY	3,755	86	4,343	258	2,437	616						11,495	74%	1.9%	5.5%
CRYSTAL LAKE	78		383	8				697				1,166	106%	5.8%	3.5%
HERRING COVE	2,413	122	6,477	612				3,411	1,664			14,699	63%	4.4%	6.7%
NAKAT	2,706	166	4,556	288	3,628							11,344	49%	4.5%	8.0%
NEETS BAY	23,335	616	58,408	1,575		272	93	3,000		22,000		109,299	43%	3.0%	6.8%
KLAWOCK RIVER	396	21,794	158,942					4,013	27,573	24,242		236,960			
% By Group	11%	6%	55%	2%	1%	0%	0%	3%	10%	11%		100%			
Total	47,462	25,005	234,991	9,403	6,065	888	93	14,421	41,641	46,242		426,211			

CHINOOK	Common Property				Special Harvest Area			SSRAA	Cost			Total	% forecast	Survival 2016	5-year Average
	Release Site	Gillnet	Seine	Troll	Sport	Gillnet	Seine		Troll	Brood	Recovery				
ANITA BAY	6,858	123	1,637	246	2,052	1,529	20					12,465	76%	4.6%	3.2%
CRYSTAL LAKE	193	24	790	458				1,679				3,144	87%	0.6%	0.4%
CITY CREEK	994	311	25	18								1,348			
HERRING COVE	444	320	2,357	467				1,913	1,864			7,365	39%	1.9%	1.7%
NEETS BAY	411	813	1,482	398	1,794	3,944	64					8,906	33%	4.8/2.1%	2.9/3.2%
% By Group	27%	5%	19%	5%	12%	16%	0%	11%	6%	0%		100%			
Total	8,900	1,591	6,291	1,587	3,846	5,473	84	3,592	1,864	0		33,228			

S CHUM	Common Property				Special Harvest Area			SSRAA	Cost			Total	% forecast	Survival 2016	5-year Average
	Release Site	Gillnet	Seine	Troll	Sport	Gillnet	Seine		Troll	Brood	Recovery				
ANITA BAY	209,827	216,286			71,700	61,436						559,249	145%	1.4%	2.1%
NAKAT	82,228	34,014			154,696							270,938	104%	4.3%	4.5%
NEETS BAY	57,436	264,377	59,185		4,525	167,913	86,097	180,970	599,588	2,000		1,422,091	115%	2.2%	3.4%
KENDRICK	44,288	648,051				153,829						846,168	97%	3.1/4.4%	3.2/4.0%
% By Group	13%	38%	2%	0%	7%	12%	3%	6%	19%	0%		100%			
Total	393,779	1,162,728	59,185	0	230,921	383,178	86,097	180,970	599,588	2,000		3,098,446			

F CHUM	Common Property				Special Harvest Area			SSRAA	Cost			Total	% forecast	Survival 2016	5-year Average
	Release Site	Gillnet	Seine	Troll	Sport	Gillnet	Seine		Troll	Brood	Recovery				
NEETS BAY	32,113	14,481						26,212	145,913	5,000		223,719	89%	2.0%	1.5%
NAKAT	53,990	1,281			15,395							70,666	101%	2.6%	0.6%
% By Group	29%	5%			5%			9%	50%	2%		100%			
Total	86,103	15,762	0	0	15,395	0	0	26,212	145,913	5,000		294,385			

SSRAA returns | PRELIMINARY FORECAST FOR 2017

Species	Site	5 YR	4 YR	3 YR	CP	Terminal	Total
S Chum	Neets	120,000	700,000	500,000	356,400	963,600	1,320,000
S Chum	Nakat	34,000	160,000	32,000	113,000	113,000	226,000
S Chum	Anita	51,500	285,500	144,000	240,500	240,500	481,000
S Chum	Kendrick	52,000	600,000	190,000	589,400	252,600	842,000
F Chum	Neets	42,600	140,000	30,000	53,150	159,450	212,600
F Chum	Nakat	40,000	56,800	0	33,880	62,920	96,800

Species	Site	6 YR	5 YR	4 YR	CP	Terminal	Total
Chinook	Whitman	750	8,200	7,800	5,025	11,725	16,750
Chinook	Neets	800	10,000	11,400	6,660	15,540	22,200
Chinook	Anita	1,100	10,100	4,200	4,620	10,780	15,400
Chinook	Crystal	480	2,300	800	1,790	1,790	3,580
Chinook	PSN						0

Species	Site	CP	Terminal	Total
Coho	Whitman	15,750	5,250	21,000
Coho	Neets	153,750	51,250	205,000
Coho	Nakat	15,750	5,250	21,000
Coho	Anita	15,075	2,300	20,100
Coho	Neck	30,870	10,290	41,160
Coho	Burnett	13,568	4,523	18,090
Coho	Crystal	600	8,700	9,300
Coho	Klawock	154,000	66,000	220,000

Releases | SMOLT RELEASES IN 2016

Species	Site	Date	Number	Size gms
S. Chum	Neets Bay	4/07-4/21	62,630,000	2.50
	Nakat Inlet	4/13/16	8,287,000	2.83
	Kendrick Bay	4/15/16	24,352,000	2.57
	Kendrick Bay Late Large	5/1/16	5,000,000	5.50
	Anita Bay	4/8-4/16	20,003,000	2.73
	Anita Bay Late Large	4/29/16	2,138,000	4.08
	Burnett Inlet	4/15/16	5,352,000	3.16
	Total		127,762,000	
Fall Chum	Neets Bay	4/21/16	17,410,000	1.77
	Nakat Inlet	4/25/16	8,210,000	2.82
	Burnett Inlet	4/25/16	5,057,000	2.38
	Total		30,677,000	
F. Coho	Whitman Lake	5/13/16	298,000	22.30
	Neets Bay	5/10-5/23	3,657,000	23.70
	Nakat Inlet	5/9/16	538,000	28.94
	Anita Bay	5/18/16	559,000	27.80
	Crystal Lake	5/9/16	159,000	15.80
	Total		5,211,000	
S. Coho	Burnett Inlet	5/16/16	230,000	26.80
	Neck Lake	5/6/16	1,822,000	25.60
	Total		2,052,000	
Chinook	Whitman Lake	5/13/16	682,000	23.70
	Neets Bay	5/23/16	715,800	22.70
	Anita Bay	5/15/16	450,000	28.56
	Deer Mountain	5/19/16	97,000	34.60
	Carroll Inlet	5/15/16	388,000	29.30
	City Creek	5/15/16	98,000	21.90
	Crystal Lake	5/11/16	573,000	23.50
	Total		3,003,800	

All Species Total

168,705,800

Eggs | EGG INVENTORY IN 2016

SSRAA egg inventory as of 11/15/2016

	Eggs	Goal
Whitman Lake		
Fall Coho	3,500,000	3,500,000
Chinook (Chickamin R)	1,600,000	1,600,000
Nakat Inlet Summer Chum	8,400,000	8,300,000
Kendrick Bay Summer Chum	31,200,000	31,000,000
Neets Bay		
Coho	3,000,000	3,000,000
Summer Chum	65,000,000	65,000,000
Neets Fall Chum	16,000,000	20,000,000
Nakat Fall Chum	8,000,000	8,000,000
Crystal Lake		
Chinook (Crystal Creek)	1,320,000	1,350,000
Chinook (Chickamin R)	520,000	520,000
Coho	200,000	200,000
Burnett Inlet		
Burnett Summer Chum	19,000,000	15,000,000
Burnett Fall Chum	5,000,000	5,000,000
Anita Bay Summer Chum	23,000,000	23,000,000
Burnett Summer Coho	2,200,000	2,200,000
Klawock River		
Coho	5,000,000	5,000,000
Port St. Nicholas		
Chinook	135,000	135,000
Total	193,075,000	192,805,000