Enhancement Methods

Hatchery Releases
Remote Release Sites
Lake Plants of Fry and Smolts
Lake Fertilization
Streamside Incubation
Eyed Egg Plants



Updates...



- ন্থ Check the Gradebook!
- 🛯 Looking ahead.....the end is in sight
 - 🛯 Exam 3:
 - Will be due by 12/14 but I will issue it late next week which will give you 2 weeks to complete it. No late work will be accepted.
 - Project due 12/7. You can submit them as soon as 11/30. If you want me to preview what you have, that needs to happen prior to 11/30.
 - Solution Now is the time to get caught up
- R Two more regular meetings: 11/30 and 12/7
- R Next week: Water Quality

What to take away from this session:

What are some various types of salmon enhancement projects?

- CR List examples of each
- A Why might one type of project be used over another? Be able to describe each type

Hatchery Releases

Hatchery Releases

- Realized Typically a "central incubation facility"
- Collecting broodstock/eggs for transport to another facility
- Collecting broodstock/eggs/fry for transport to a remote site
- Realize the second seco



Locations of Hatcheries within Southeast Alaska



Locations of Hatcheries within Southcentral Alaska



Special Harvest Area vs. Terminal Harvest Area



- Special HA = for private hatchery ops to harvest for cost recovery
- Terminal HA = commercial fleet fishes on hatchery-produced fish
- Important because:
 - Contributes to the common property
 - Can be back up for broodstock returns to hatchery
 - SHA pays the bills!





Cost recovery/broodstock

No guarantee what is going to return!
Marine survivals – an estimate
What if the run is weak?





Central Incubation Facilty

Acts as a "warehouse" of sorts
Set up to receive and distribute fish at various lifestages

Revolve"







Remote Release Sites





SSRAA Remote Rearing Sites

Kendrick Bay
Nakat Inlet
Anita bay
Long Lake
Hugh Smith Lake
Neck Lake and Neck Creek

Target a specific area/fishery
 Return timing of species/stock plays a big role
 Collaborate with ADFG for management

Remote Re	lease Sites
Neek Lk, Hugh Smi All Remote Sit	th Lk , Kendrick Bay tes are for Production
Neck	
Summer Coho Eggtake, Incubation,Rearing at Burnett Inlet Hatchery Lake Rearing and Lake Release at Neck Lake 1.6M	Sockeye Remote Eggtake at McDonald Lake Incubation and Rearing at Burnett Inlet Hatchery Smolts for Neck Lake Raceway Rearing and Release 400K
Hugh Smith Lake Sockeye Remote Eggtake at Hugh Smith Lake Incubation and Rearing at Burnett Inlet Hatchery Fry for Lake Rearing at Hugh Smith Lake 400K	Kendrick Bay Summer Chum Eggtake At Neets Bay Incubation and Rearing at Whitman Lake Kendrick Bay Short Term Rearing and Release 10M
=====================================	Onsite Hatchery Operation Transport Core Onsite Program Remote rearing or release program d Italic K=thousands #=millions

Lake Plants Using Fry & Smolts

Real Fry Plants_- what are these?

- A) a way to grow fish in the ground
- B) half plant / half fish
- C) a dish commonly associated with people from southern Indiana
- Image: Optimized state
 Image: Optized state
 Image: Optized state</th



- Used in areas where it is not generally feasible to use a pen rearing strategy.
- Pen rearing in a remote spot is expensive! What are some of the costs?
- Frees up rearing space at the hatchery (sometimes this is a bad thing......)





Long Lake/Neck Lake

- Fry are transported
- Reared in netpens
- Smolts overwinter / volitional release





Fry planting logistics

Real Boats and planes are expensive

What's the "payoff"?



Important to have a good handle on outmigrating smolts when lake planting/rearing



What's going on here?

Comparison of "payoffs"

		()				_
Wild Fry Production			Hatche			
Adult Escapement		1,140				
Assume 50% females		570				
Minus 90 females for hatchery b	roodstock	480	480 90 females			
Eggs/female		3,400		Eggs/fema	le	3,400
Total eggs available		1,632,000		Total eggs	available	306,000
Resultant hatched wild fry@ 4%		65,000		Resultant h	atchery fry @ 78%	238,600
28% survival to fall fry		18,300		28% survival to fall frv		66,800
70% survival fry to smolt		12,810		70% survival fry to smolt		46,800
12% survival smolt to adult		1,500		12% survival smolt to adult		5,616
	Pre - S	molts				
	90 females					
	Eggs/female			3,400		
	Total eggs available			306,000		
	Resultant hatchery fry @ 78%		238,600			
	95% survival to fall pre-sm		-smolt	226,600		
	80% surviv	al to smolt/		181,300		
	12% surviv	/al smolt to a	adult	22,000		

Lake Fertilization

Enhancing the productivity of an oligotrophic lake through nutrient addition





McDonald, Deer and Karluk Lake



Karluk Lake has historically been the largest producer of well as one of the largest sockeye salmon producers in th runs and returns of sockeye salmon to Karluk Lake have



7n





Karluk Lake

Frazer Lake Red Lake

Bare Lake — Akalura Lake





Streamside Incubation

- What are some advantages?
- Disadvantages?





Eyed Egg Plant – What?





Education, Employment & Training Program

Community Benefits

Norton Sound Fisheries Research & Development Program

Revolving Loan Program

Community Energy Fund

CDQ Management

Norton Sound Seafood Products

Vessels

Publications

Staff / Offices

Links



TORS EMPLOYMENT APPLICATIONS

Norton Sound Fisheries Research & Development Program

The NSEDC Fisheries Research and Development (FR&D) Program promotes scientific research in the Norton Sound region with an emphasis on supporting local fisheries. For established fisheries, FR&D aims to provide Norton Sound communities with as much benefit as possible from the resource while at the same time ensuring its long-term sustainability. FR&D also works to explore the potential of under-utilized stocks and, when possible, enable greater use by local residents.



Reflecting its importance in the region, many of our projects focus on salmon. Our member communities utilize all five species of Pacific salmon. When salmon stocks were in decline in the 1990s, NSEDC began working with other stakeholders and started funding projects to reverse the trend. One of our first collaborative efforts was with the Alaska Department of Fish and Game to fund interns working on summer salmon projects. This collaboration continues today. Other salmon projects include chum and Coho stock rehabilitation by means of mist incubation and eye-egg planting; sockeye rehabilitation through lake fertilization; and various salmon-counting projects using weirs, towers and sonar equipment.

In addition to our work with salmon, our projects support other local fisheries and investigate possible future fisheries. These include research on red king crab, the most lucrative single-species fishery in Norton Sound; and herring, the largest under-utilized stock in Norton Sound. We are also investigating the possibility of a long-line fishery for cod and halibut in the northern communities of Teller, Brevig Mission, Wales and Diomede.



Shaktoolik River Sonar



Salmon Counting Projects



Salmon Lake Restoration



Red King Crab Research



Re-establishment of Depleted Salmon Runs



Juvenile Coho Salmon Studies



Northern Communities Developing Fishery





Facilities around the state

Prince William Sound Aquaculture Corporation

DEVELOPING SUSTAINABLE SALMON FISHERIES FOR ALASKA AND THE WORLD

NEWS &

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ECONOMIC IMPACT

RESOURCES

EMPLOYMENT

WELCOME

Prince William Sound Aquaculture Corporation (PWSAC) is a private nonprofit aquaculture association founded in 1974 by local fishermen and other stakeholders to optimize Alaska's wild salmon resources.

PWSAC produces hatchery-born, ocean-raised wild salmon for the commercial, sport, personal use and subsistence fisheries in the Prince William Sound and Copper River regions.

With headquarters in Cordova, Alaska, PWSAC operates four remote salmon hatcheries in Prince William Sound and one on the Copper River in Payson About 600 million salmon fry/smolt



FAO

CONTACT



HATCHERIES

Armin F. Koernig Hatchery

The Armin F. Koernig Hatchery (AFK) was the first hatchery established by PWSAC in 1975. It is located on 17 acres in Sawmill Bay, Evans Island, in the southwestern district of the Sound. PWSAC owns the land and buildings. AFK produces pink salmon and has the responsibility of the Port Chalmers chum salmon remote release operations.

Wally Noerenberg Hatchery

Wally Noerenberg Hatchery (WNH) was completed in 1985. It is located on public lands managed as a State Marine Park by the Alaska Department Natural Resources in Lake Bay on the southern tip of Esther Island in the northern district of the Sound. PWSAC utilizes the site under a State Park Special Use Permit and owns the buildings. WNH produces pink, chum, coho and Chinook salmon.

Cannery Creek Hatchery

Cannery Creek Hatchery (CCH) is a state-owned hatchery built by ADF&G in 1978. PWSAC manages and operates the pink salmon facility for ADF&G under a 20-year professional services agreement at no cost to the state. This hatchery is located on public lands managed by the United States Forest Service on the eastern shore of Unakwik Inlet in the northern area of the Sound. PWSAC has managed and operated CCH since July 1, 1988.

Main Bay Hatchery

Main Bay Hatchery (MBH) is a state-owned hatchery built by ADF&G in 1981. PWSAC manages and operates the sockeye salmon facility for ADF&G under a 20-year professional services agreement at no cost to the state. The hatchery is situated on public lands managed by the United States Forest Service in Main Bay on the western shore of the Sound. PWSAC has managed and operated MBH since July 1, 1991.

Gulkana Hatchery

The Gulkana Hatchery (GH), near Paxson, is also a state-owned hatchery built by ADF&G in 1973. PWSAC manages and operates the sockeye salmon facility for ADF&G under a 20-year professional services agreement at no cost to the state. The hatchery is located on public lands managed by both





Wally Noremburg Hatchery





PWSAC updated the egg-take systems at AFK, CCH, and WNH with electroanesthesia technology and mechanized the system. This has increased the efficiency of the operation (more eggs per hour, less manpower) and eliminated the wear and tear on hatchery technicians by reducing the handling of live adult salmon.

The top left picture shows the CCH egg-take raceway where a fish culturist is operating the hydraulic raceway crowder, fish lift, and electroanesthesia unit. This egg-take step took a total of nine people with the old system. The top right picture shows the operation of lifting the fish out of the raceway and into the electroanesthesia unit. Once the fish are anesthetized they slide into the egg-take room through an opening in the wall just past the window. Another person (lower left picture) then sorts the fish by sex.

Once in the egg-take room and sorted, the fish slide to one of four fish culturists who extract the gametes as shown in the lower right picture. The eggs and sperm slide into a common trough that empties into a single bucket.

Fertilization of the eggs occurs once water is added to the bucket in the rinse tank activating the sperm. Fertilization is instantaneous but the fish culturists allow the eggs to stay in contact with the milt for 30 seconds just to make sure. The excess sperm, ovarian fluid, and blood are then rinsed and the eggs are gently poured into the incubator.











New Chenega





<u>The Corporation</u>

- <u>Board of Directors</u>
- DIPAC Committee List
- DIPAC Staff List
- The Ladd Macaulay Visitor Center
- Aquarium Web Cam
- The Salmon Shop
- DIPAC Scholarship Program Information md Application
- Scholarship Program Word version
- <u>E-mail the Scholarship Program</u>
- Scholarship Awards
- DIPAC's 2009 Economic Report

Douglas Island Pink & Chum, Inc.

2697 Channel Dr. Juneau, Alaska 99801 Phone: Toll Free 1-877- 463 - CHUM (2486) or 907- 463 - 5114 Fax: 907- 463 - 3213



DIPAC MEETING SCHEDULE



The original DIPAC hatchery was established at Kowee Creek on Douglas Island in 1976. Kowee Creek Hatchery is a small facility built over one of Joe Juneau's original gold mining adits. The hatchery was originally used to incubate up to 10 million pink and/or chum salmon and was later used as a research facility by the University of Alaska. The hatchery is no longer in use and the permit has been returned to the State of Alaska.

Sheep Creek - south of Juneau



Snettisham – remote site south of Juneau







"Producing Salmon for Tomorrow"

NORTHERN SOUTHEAST REGIONAL AQUACULTURE ASSOCIATION, INC.







Medvejie Hatchery





Fry rearing complex – fish out!

Deep Inlet remote release site

Harvest time – fish back!







Takatz Bay Project



Can you catch king salmon off the dock? Yes, you can.



Sawmill Cove Hatchery

Deer Lake Project





Chilkat River, Haines





Armstrong-Keta, Inc.

Port Armstrong Hatchery









Port Armstrong Hatchery





Neets Bay

Over View



Whitman Lake



Crystal lake Hatchery

Burnett Inlet Hatchery

Burnett Inlet Hatchery

diren



About Forecasts & Updates Hatcheries Research Outreach



About KRAA

Visit a Hatchery





Upcoming Events

There are no upcoming events at this time. View Full Calendar

kraa.org/#





About Forecasts & Updates Hatcheries Research Outreach



Pillar Creek Hatchery

Pillar Creek Hatchery (PCH) was constructed in 1990 as a cooperative project between ADF&G and KRAA. PCH is owned by the State of Alaska and is located on Kodiak Island Borough land that is leased to the State of Alaska. KRAA operates the facility under an agreement with the State.

Pillar Creek Hatchery

9547 E. Monashka Bay Road 907-486-4730

Al Seale Manager

Kitoi Bay Hatchery - then



History of Kitoi Bay Hatchery

- •1953, Originally constructed by the Dept. of the Interior, US Fish and Wildlife Service as a Sockeye Research facility
- •1964, Site was destroyed by the tsunami resulting from the "64 earthquake"
- •1965, Alaska Department of Fish and Game (ADFG) rebuilt the site, Part of the FRED Division
- •1972, Pink salmon were first produced at Kitoi
- •1976, Pink salmon production increased and became a priority
- •1981, Chum salmon were first produced at Kitoi
- •1988, Kodiak Regional Aquaculture Association (KRAA) began working with ADFG as a joint operation

And now



Annually we release approximately:

- •145 million pink fry
- •21 million chum fry
- •1 million coho smolt
- •400 thousand coho fry
- •415 thousand sockeye smolt
- •120 thousand sockeye presmolt
- •We employ 8 full time staff positions, and up to 13 seasonal positions that vary in duration

Site is approximately 17 acres in sizeWe coexist with a robust population of Brown Bears

Valdez

Fisheries Development Association

VFDA was formed to raise, propagate, and market fish and fish products, and to develop renewable fisheries resources for the benefit of sports fishermen, commercial fishermen, fish processors, tourists, and all businesses dependent upon the fishing industry in Alaska.

SEARCH THIS WEBSITE ...

ANPAT AT 1

Home	About Us	Solomon Gulch Hatchery	Fisheries Programs	Education & Em	ployment Opportunities
			Cold Storage Facility		
	ne Hato	hery	Solomon Falls Seafood		
			Fisheries Businesses Incu	lbator	omon Gulch Hatchery (SGH) in 1981, and
		and the	and the	consistently sind by the Solomon Valley Electric As	ce then. The water for the hatchery is provided Gulch Hydroelectric Plant, owned by the Copper ssociation through a cooperative agreement.
				VFDA employs a employees, and Other staff inclu maintenance su staff lives in the	a hatchery crew of twelve full and part-time is directed by Hatchery Manager Rob Unger. Ides an assistant manager, fish culturists, Ipport staff, and night watchmen. The hatchery Valdez community.
24 		W Street		SGH has a perm pink salmon and	itted green egg capacity to incubate 230 million d 2 million coho salmon each year. These egg

Q



SHELDON JACKSON HATCHERY

Sheldon Jackson hatchery has trained many of Alaska's fisheries biologists, fisheries managers and aquaculture specialists since its inception in 1974. We are continuing to use the hatchery as a training tool. The hatchery has a partnership with the Northern Southeast Regional Aquaculture Association (NSRAA) for the Deep Inlet fishery. We also provide training and research for NSRAA and the UAS Fisheries Technology program We currently are permitted by the Alaska Department of Fish and Game to raise coho, pinks and chums. Our permits allow production of 250,000 coho, 3 million pinks, and 12 million chums (with 9 million released at Deep Inlet). The hatchery is the only training facility of its kind in Alaska. SSSC utilizes it today as a training and educational tool for K-12 students and visiting undergraduates as well as students in the UAS Fisheries Technology Program. We provide tours of the hatchery where visitors learn about the special relationship hatcheries have with commercial fishing, how hatcheries work in Alaska, and how they capitalize on the life cycle of the salmon.



SITKA SOUND SCIENCE CENTER



UAS Fish

Tech

SSSC has a special partnership with the University of Alaska Fisheries Technology Program which is based at the UAS campus in Sitka. The Fish Tech Program provides associate degrees and certification in aquaculture and fisheries management. Faculty for the program are Reid Brewer and SSSC chair Jim Seeland. The SSSC provides hands on training opportunities for students in the programs. Workshops and internships occur out of the Science Center Hatchery through the program.

Here is an example of a past collaborative program offered at SSSC through the UAS Fish Technology

Program UNCETP Aquaculture Workshop Sitka Jap 2012



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Salmon Connection:

This video was created to promote knowledge and understanding of salmon ecosystems and the relationship between human activities and natural resources. The Salmon Connection Exhibit was funded by the National Science Foundation and was done in conjunction with the University of Washington to communicate salmon research to a public audience. Ray Troll did the art work, Tenji Inc. did the exhibit design and University of Washington graduate students helped with the language for the signs. The idea is to demonstrate the connection between the intertidal and healthy salmon fisheries and the connection between healthy salmon and a diversity or "portfolio" of salmon stream habitats. The exhibit uses a fun new tank, artwork and a game as ways to engage the public in the salmon connections.



Some sweeeeeeet videos featuring very talented actors/actresses.....







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Hatcheries and Stocking Hatcheries

Hatcheries Fish Stocking Statewide Update Stocking Plan

FAQ Lake Stocking Policy Video & Contacts

William Jack Hernandez Sport Fish Hatchery



William Jack Hernandez Sport Fish Hatchery

Hatchery Background:

Construction of the William Jack Hernandez Sport fish Hatchery was completed in June of 2011. Located in Anchorage at the intersection of Reeve Blvd. and Post Road, this fully enclosed, recirculating aquaculture system (RAS) based facility uses the best available technology to conserve water and reduce heating demand for the production of Chinook and coho salmon, rainbow trout, and Arctic char.

Fish Production:

With over 100 rearing tanks, there is space for production of more than 6 million sport fish each year. These fingerling (1" to 2"), smolt (3" to 5") and catchable (7"– 12") fish are released throughout South Central Alaska from Cordova to Kodiak, Homer, Kenai, Seward, Anchorage, Mat/Su and Talkeetna. Sport fishing activity supported through these fish releases accounts for over \$20 million a year in economic impact on local communities.





Hatcheries and Stocking Hatcheries

Hatcheries	Fish Stocking Update	Statewide Stocking Plan	FAQ	Lake Stocking Policy	Video & Photos	Contacts	
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Ruth Burnett Sport Fish Hatchery



Ruth Burnett Sport Fish Hatchery



Hatchery Background:

The Ruth Burnett Sport Fish Hatchery is located near downtown Fairbanks. The hatchery sits just across the street from the Chena River near Pioneer Park and the Carlson Center. The facility houses a state of the art rearing system which utilizes modern recirculating aquaculture technology. Recirculating systems allow for a more efficient use of water resources by allowing conservation of up to 95% of the required water. Water for all phases of production will be provided by two on-site wells.

To aid in the design of a fish hatchery in Fairbanks, the Alaska Department of Fish and Game began operation of an experimental hatchery in 2004. The data collected was used to determine the feasibility of the new hatchery and measure the impact a fish hatchery would have on Fairbanks regional sport fisheries. ADF&G determined that the fish produced at the Ruth Burnett Sport Fish Hatchery would reduce the pressure on wild stocks, increase sportfishing opportunity, and provide diversity in sport fisheries throughout the interior.

Fish Production:

The Ruth Burnett Sport Fish Hatchery will meet the sport fish stocking needs for Fairbanks region by providing Arctic char, rainbow trout, Chinook (king) salmon, and coho (silver) salmon. Arctic char and rainbow trout will originate from captive brood stock held at the William Jack Hernandez Hatchery in Appendix Ears for Chinook salmon, and coho

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		CDQ Management Commercial Fishery Regulations Vessels		Incubation and Egg Planting Projects Salmon Lake Sockeye Norton Sound Red King Crab		mmunities and more an 8,700 people in the aring Strait region of									
												Herring Monitoring		of univestern Alask	ld.
												Clean Waters		COMMUNITY	MAP
FISHERI	ES RESEA	RCH & DI	EVELOPM	IENT		OUR PROGR	AMS								



SALMON LAKE SOCKEYE

Salmon Lake Limnology

Unlike other salmon species, sockeye salmon require a lake habitat during the juvenile phase of their lifecycle. Salmon Lake plays an integral part in determining the quantity of sockeye salmon that return to the Pilgrim River each year. As a result of the depleted sockeye returns in the 1990s, Norton Sound Economic Development Corporation (NSEDC) helped sponsor a limnology study of Salmon Lake from 1994 to 1996. Based on the study looking at the health of the lake, it was decided that fertilization of the lake would be an appropriate way to increase sockeye salmon returns. Limnology studies continue today to determine the amount of fertilization applied to Salmon Lake each year and to ensure that fertilization does not have any negative impacts on the lake ecosystem.

Salmon Lake Fertilization



in the growth of phytoplankton and zoop which, in turn, leads to an increase in the of salmon. Salmon fry feed on zooplankto feed on phytoplankton that rely on nitrogen and phosphorous in the waters for growth. NSFR&D simply puts nitrogen and phosphorous in the lake to sustain an adequate amount of phytoplankton and zooplankton to support a healthy population of juvenile sockeyes. Since 1996, NSEDC has sponsored 50% or more of the cost of lake

Fertilization of Salmon Lake leads to an in

fertilization.

It is NSFR&D's aim to provide for stable sockeye salmon runs that meet the area's subsistence and escapement needs every year.

Pilgrim River and Salmon Lake Smolt

To evaluate the effectiveness of Salmon Lake fertilization, NSFR&D looks at the health condition of salmon lake smolts that outmigrate from the lake in the spring. A larger smolt has a better chance of survival in the ocean than a smaller smolt; therefore, the NSFR&D crew looks at the age and size of smolts leaving the lake. These data are used to gauge the effectiveness of the fertilization applied in previous summers.

Pilgrim River Weir

The most sure-fire way to gauge the effectiveness of the Salmon Lake fertilization project is to determine the yearly adult returns. To find out how many sockeye salmon return to the Pilgrim River, NSFR&D operates a weir counting station, employing fisheries technicians every summer. Their counts not only determine the effectiveness of the fertilization program, but the counts also help the Alaska Department of Fish and Game manage the subsistence fishery.



SALMON ENUMERATION PROJECTS

To effectively manage fisheries, prioritize salmon enhancement projects and maximize the use of salmon for subsistence and commercial fishing, accurate numbers are a necessity. Norton Sound Fisheries Research and Development (NSFR&D) operates salmon escapement projects throughout the region with counting towers, weirs and sonar projects. Knowing how many pinks, chums, cohos, sockeyes and Chinooks enter the region's streams and rivers helps to ensure we have fish in the future and allows for informed management decisions. This, in turn, provides more fish for people's drying racks and more money in commercial fishermen's wallets.

NSFR&D operates the following escapement or enumeration projects:

- North River Tower
- Shaktoolik River Tower/Sonar
- Inglutalik River Tower
- Fish River Tower
- Eldorado River Weir
- Snake River Weir
- Pilgrim River Weir



INCUBATION AND EGG PLANTING PROJECTS

Building upon the projects to document the numbers of salmon returning to area streams and rivers, the NSFR&D team focuses their salmon rehabilitation efforts where they will have the most impact around the Norton Sound region.

NSFR&D operates the following salmon rehabilitation projects:

- South River Chinook
- Solomon River Chum
- Snake River Chum
- Snake River Coho
- Consultation work with Native Village of White Mountain for their Niukluk River Chinook incubation project



Currently, the NSFR&D team uses a process of egg takes, incubation and egg planting for the rehabilitation projects. In the late summer, eggs and milt are taken from fecund salmon and the eggs are fertilized and placed in incubators until the eggs mature. Once at the eyed-egg stage, the eggs are planted in the watersheds they were taken from.

The success of the rehabilitation projects can be

For this week:

Work on getting caught up and/or start putting your project together.....

