Alaska Salmon Culture I / FT122 - 2016

Our Class!

Aaron Cook

Douglas Donovan

- Try to upload an image of yourself so others can see you
- Introduce yourself: where are you? Why are you in this class? Any background you'd like to share. Got a good fish story? Assignment 1 – post to Discussion Board

Christina Lundin

Emily Schwartz

Your instructor……

- Grew up in MO
- Grad from UM/Columbia B.Sc F+W Bio
- Move to WA state late 70's; trout farm
- Move to AK 1980
- To Sitka 1982
- UAS since 2008
- Now in Silver City, NM

Challenges of online education:

- Technical problems

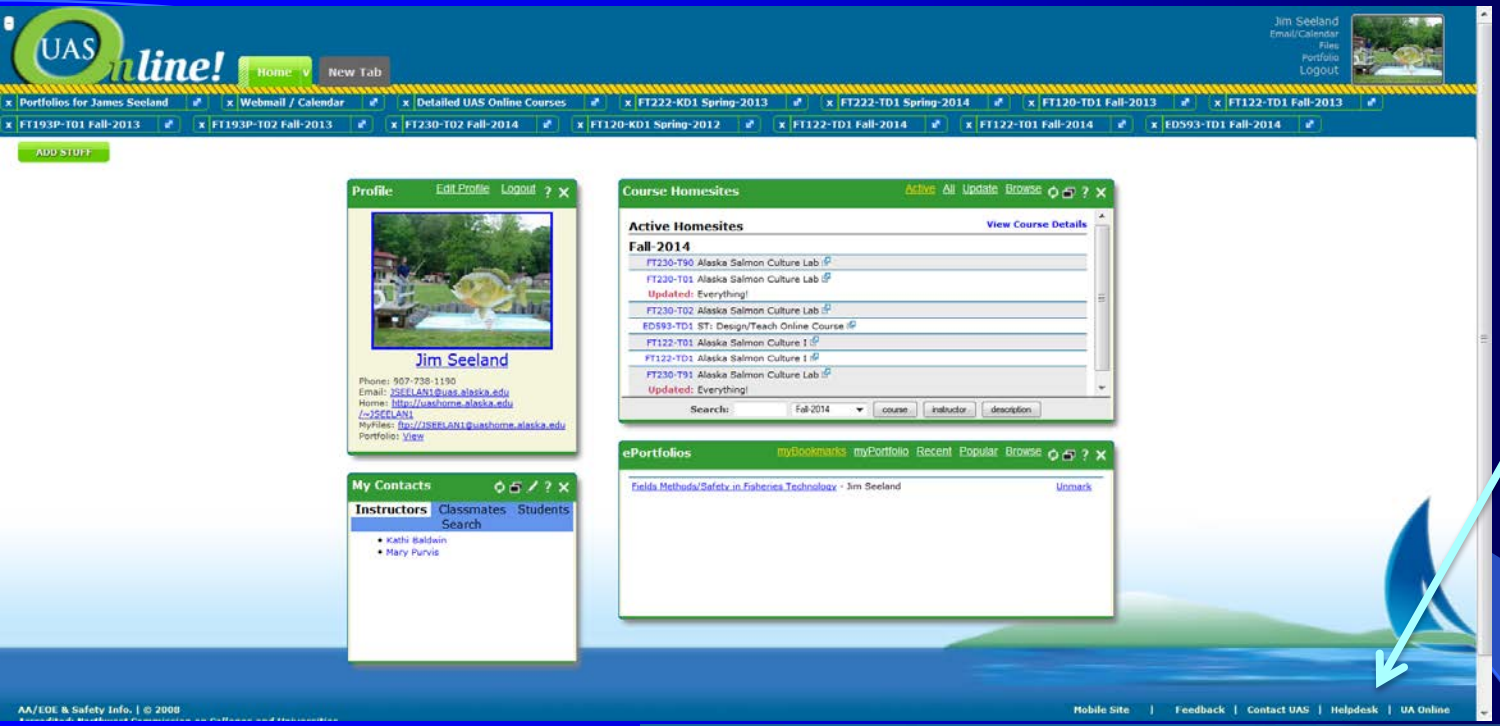
- Communication

- Feeling like part of a group

Online ed challenges……..

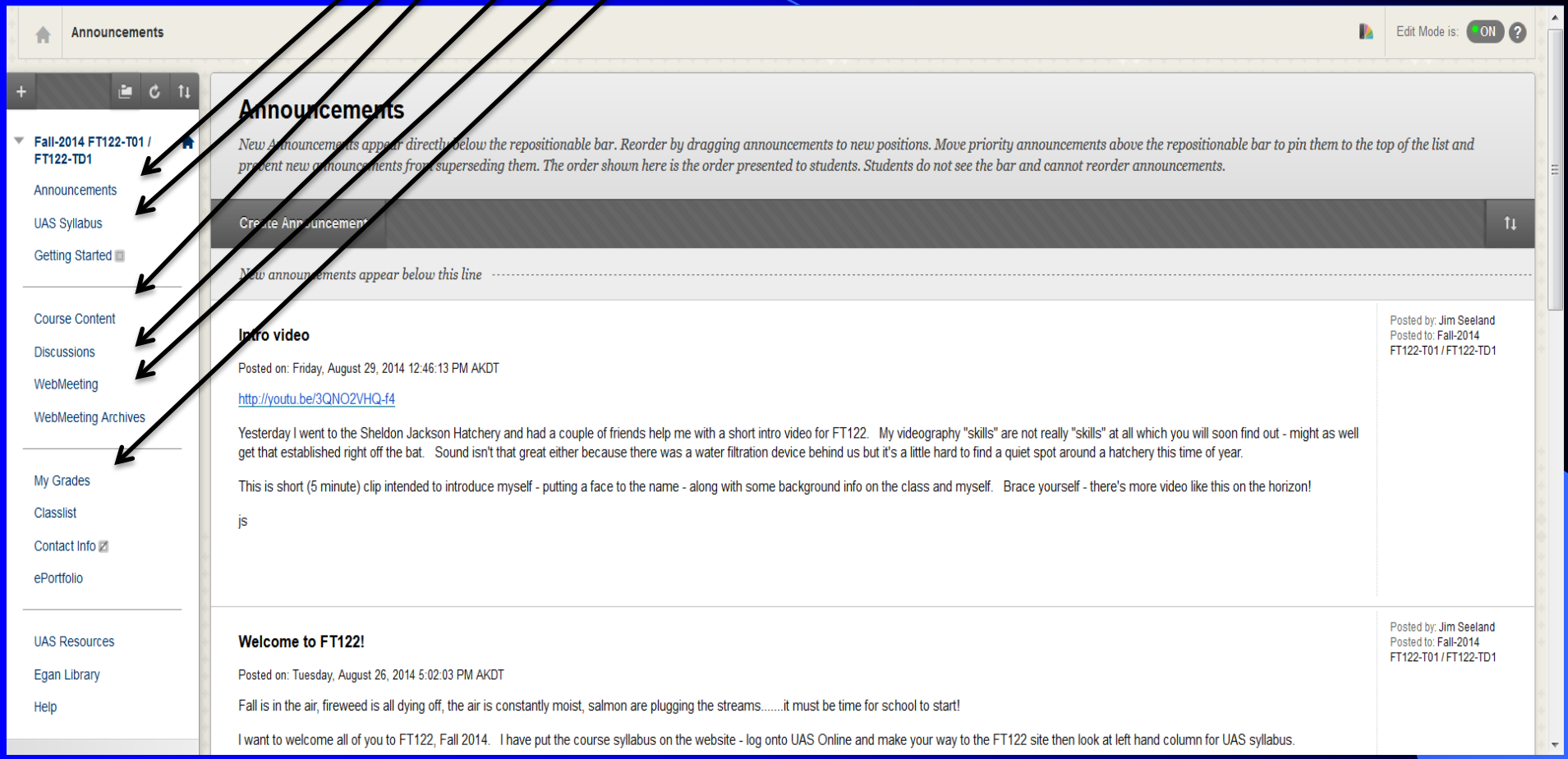
- Not enough contact with professor

- Balancing home/work/education



If you have tech issues, call the HelpDesk!

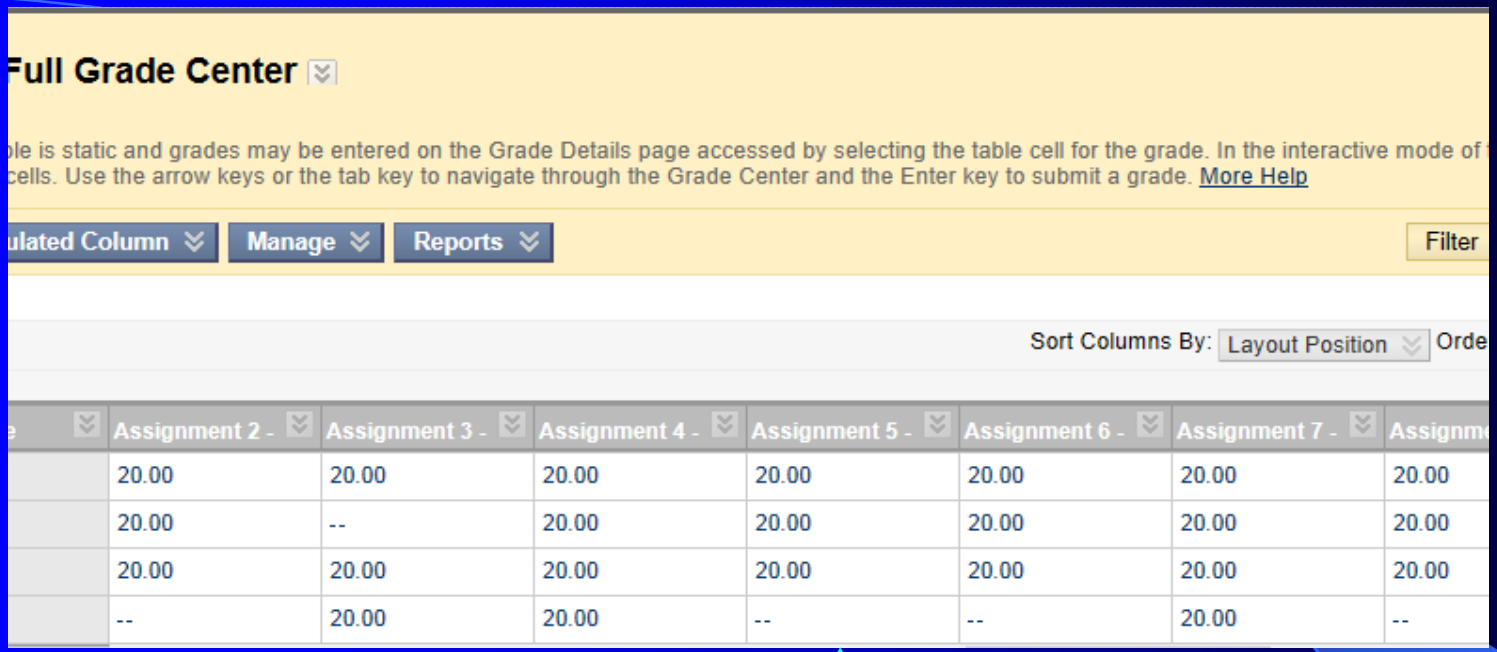
The Homesite



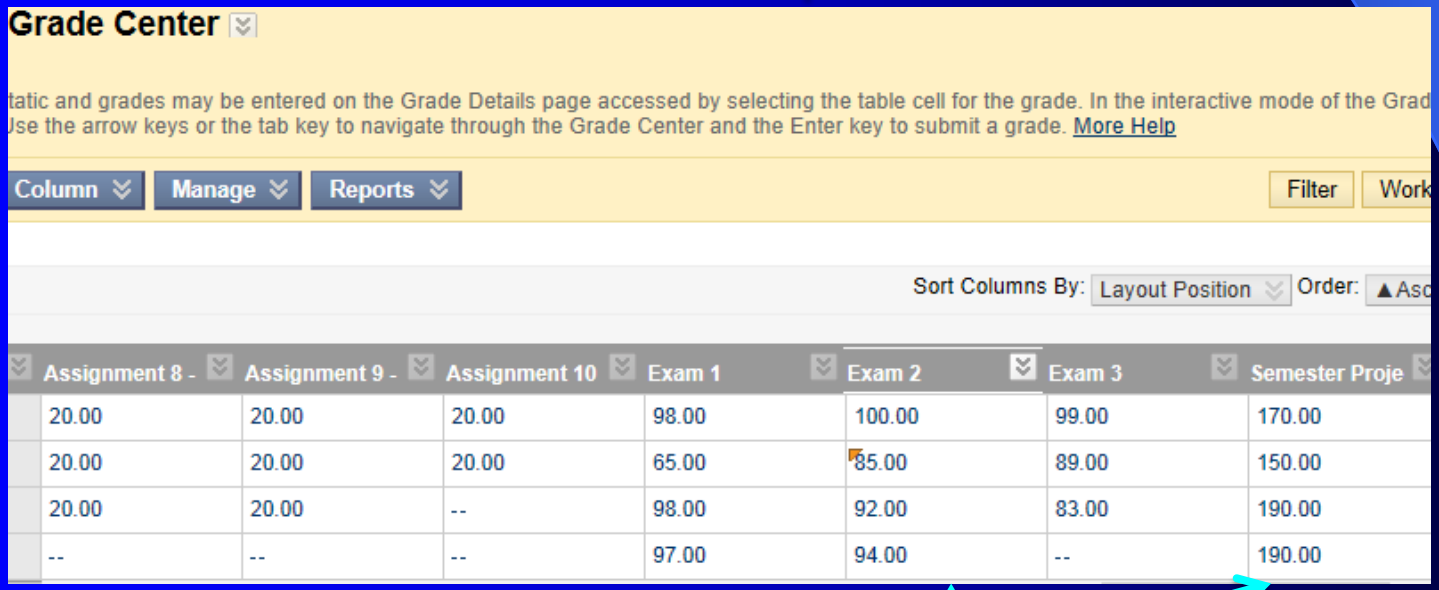
- Fall-2014 FT122-T01 / FT122-TD1
  - Announcements
  - UAS Syllabus
  - Getting Started
  - Course Content
  - Discussions
  - WebMeeting
  - WebMeeting Archives
  - My Grades

Gradebook – check here from time to time and keep me honest!

Last Name	First Name	Last Access	Availability	Weighted Total	Total	8/31 - intro and	9/7	9/14	9/21
Lundin	Christina	August 28, 2016	Available	--	--	--	--	--	--
Donovan	Douglas	August 26, 2016	Available	--	--	--	--	--	--
Cook	Aaron	August 29, 2016	Available	--	--	--	--	--	--
Schwartz	Emily	August 28, 2016	Available	--	--	--	--	--	--



Assignments



Exams and Project

How the Gradebook looks by end of semester

al	9/2	9/9	9/16	9/23	9/30	10/7 - recorded	10/14
	20.00	20.00	20.00	20.00	20.00	20.00	20.00

10/28	11/4	11/11	11/18	11/25	12/2	Assignment 1 -
20.00	20.00	20.00	20.00	20.00	20.00	20.00

Assignment 2 -	Assignment 11	Assignment 3 -	Assignment 4 -	Exam 1	Assignment 5 -	Assignment 6 -
20.00	20.00	20.00	20.00	100.00	20.00	20.00

Exam 2	Assignment 8 -	Assignment 9 -	Assignment 10	Exam 3	Assignment 7 -	Semester Proje	12/9
97.00	20.00	20.00	20.00	97.00	20.00	92.00	20.00

The syllabus

Alaska Salmon Culture I – FT122
Fall Semester 2016
University of Alaska Southeast / Sitka
3 credit lecture

Class times/location
Lecture: Wednesdays, 5 – 7:30pm

This is a web-based course that students enter through UAS online/Blackboard. You will need access to a computer and a headset with microphone. We will utilize the Webmeeting function (Blackboard Collaborate) which you will find on the left hand tool bar of the homepage of UAS on-line and we will review using this the first night of class.

Instructor:
Jim Seeland
Cell: 907-738-1190 (call or text)
Email: jim.seeland@uas.alaska.edu

Office hours:
Tuesday 3-5pm
Wednesday 3-5pm
Contact me to arrange an appt.

Mailing address:
1332 Seward Ave.
Sitka, AK 99835

Required text(s):
No textbooks are required for this course. Instructor will provide reference materials through electronic media throughout the course.

How to Begin:
1. Read your **Getting Started Packet** (sent by US Mail), return required forms
2. To access the class you will need to set up a UAS user name and password. To do this follow the instructions at: https://uascentral.uas.alaska.edu/elmo. Make sure to write down your user name and password for future reference. If you have difficulty with the on-line format, remember that the help desk is available as are several tutorials. Contact the help

Class Meeting Schedule:

Topic	Week
Introduction and overview of course Overview of Pacific Salmon Production in Alaska ADF&G Oversight Regional Associations ADF&G Enhancement Programs Non-Regional Associations Historic Production Levels (ADF&G Annual Report)	8/31 and 9/7
Brood Stock Chum & Pinks Chinook Coho Sockeye Adult Holding	9/14
Eggtake Techniques Adult Anesthesia	9/21 and 9/28
Methods of Collecting Eggs Fertilization & Sperm Activators Fecundity & Green Egg Enumeration Water Hardening & Egg Disinfection	Exam 1 + Review
Remote Site Egg Collection Fish Transport Permit Brood Stock Capture and Holding Spawning Techniques Used in the Field ADF&G Guidelines for Sockeye Salmon	10/5
Incubators Types, Design & Function Typical Installations Substrates, Loading Densities, Flow Requirements	10/12
Egg Incubation Receiving Shipped Eggs Green or Eyed Loading Green Eggs Sensitivity of Eggs During Incubation Temperature Units Eyed Eggs Causes of Mortality Shocking, Picking & Survival Estimate Loading Eyed Eggs Fungus Control and Treatments Shipping Eggs Thermal Marking Moist Incubation	10/19 and 10/26 Exam 2 + Review
Enhancement Projects Statewide Lake Rearing Projects Lake Fertilization Fish Stocking Remote Rearing Sites Hatchery Releases	11/2
Hatchery Site Selection Locating a Suitable Water Supply Barrier Lakes River Systems Municipal Water Supplies	11/9
Hatchery Design Physical Plant Water Supply- Gravity, Recirculation, Pumped Bio-Criteria	11/16
Water Quality Dissolved Oxygen Carbon Dioxide pH, Alkalinity & Conductivity	11/23
Fry Production Hatch Common Diseases During Fry Development	11/30
% Yolk Sac Absorption Volitional and Non Volitional Ponding Early Rearing Review for Exam 3	
Exam 3 + Review	12/7,14

Final Exam Week = 12/12 - 12/17
Semester Project due no later than 12/7/16 @ 5pm

Grading (see below for details):

Semester Project	100 points
Exams (3 @ 100pts)	300 points
Assignments (10 @ 20pts)	200 points
Class participation (15 @ 20pts)	300 points
Semester total	900 points

Grading Scale:

A 93-100%	B+ 87-89%	C+ 77-79%	D+ 67-69%	F less than 60%
A- 90-92%	B 83-86%	C 73-76%	D 63-66%	
	B- 80-82%	C- 70-72%	D- 60-62%	

Specific Information and Expectations:

- **Communication:** the key to any online class is good communication with the instructor. Feel free to contact me anytime, preferably by email but phone contact/text is fine too. I want to know if you are not going to be able to make it to class for whatever reason and certainly if you are struggling with any of the work and/or concepts in the course.
- **Semester Project:** this is intended to help students understand what goes on in a salmon enhancement facility by detailing key activities throughout the year. This project can be a continuation of the semester project used in FT122. The instructor will work with students who do not have ready access to a facility in order to create a project which meets the objectives for this element of the course.
- **Exams:** cover material presented during the course. Exams do not build upon one another (like a mid-term or final) and are reviewed in class the day they are available. All exams are "take home" in that students have approximately one week from the date of issue to complete the exam and turn it into the course website.
- **Assignments:** these are designed to provide students with additional details on various topics discussed in class. Typically, these require either contacting the facility the student is monitoring for their semester project and/or doing some light research.
- **Class participation/attendance:** I like students to show up for the live/interactive class and provide this as an incentive to do so. Sharing discussion and personal experiences is an important element toward gaining a fuller understanding of the material presented. If a student is present in class he/she will receive credit. Understanding that "life gets in the way" for schooling, all classes are recorded and can be accessed through "Webmeeting Archives" on the website. If a class is missed, participation credit will be given if a 2-3 paragraph summary is provided to the instructor.
- **Gradebook:** students are encouraged to check the Gradebook on a regular basis to assure they are receiving proper credit for their work.

Web Meetings:
Feel free to interrupt me at any time. Use the "raise your hand" function to be sure I see you. Off-topic chatting is distracting to everyone, so keep text messages on topic. Collaborate sends all messages to the instructor, even if you send only to another student.

Time and Effort:
We have only two and a half hours of scheduled meeting time per week. Much of the coursework involves independent study and you should be prepared to work very hard. An average student can expect to put in about 9 hours of study per week, outside of scheduled meetings, to earn an average grade. I am here to help you learn and will do whatever I can to assist you. Tutorials available at: http://tss.learningspaces.alaska.edu/tutorials/

- Plagiarism – What it is And How to Avoid it
- How to Write a Basic Essay
- Note Taking
- How to Study
- Email Etiquette
- Basic Grammar
- Test Taking Tips
- Time Management for Students

Important dates:

1st day of class	August 31
Last day to withdraw from the class without a grade and 100% refund:	Sept 9
Deadline to withdraw from full time classes	Nov 4
Thanksgiving Break	Nov 24 - 27
Finals week	Dec 12 - 17
Instructor must have grades posted by	Dec 21 @ noon

Semester Project

FT122, Alaska Salmon Culture I, Fall 2016
8/31/16
Semester Project

The goal of the semester project is to put you in touch with real world experiences so you can see what you learn online put into action. You are NOT required to visit a site but doing so will really help you understand what is presented in class much more. Email and/or phone calls will suffice for most of the information you collect but in-person collecting of information is better.

FT122 Semester Project format. Students will work with the instructor to find a suitable study facility (hatchery) in order to complete this project. Once a relationship is established, collect the following information:

- weekly activities log. This should include major events such as eggtakes and fish transports as well as more mundane tasks such as equipment maintenance, clean-up, etc.
- daily temperature data
- incubation data, fry rearing data
- any significant fish culture tasks that happened during the week

Take the information you have collected from your respective facilities and plug it into the format below. Start your weeks as early as you can and try to list as many projects as you can recall or can ask about.

If no enhancement facility is accessible to you, we will work on an alternative project. The topic must relate to some aspect of the salmon enhancement industry. Examples might be: management issues, educational programs, or current research projects. For these alternative formats we need to communicate clearly on what is expected so I know how to evaluate your project.

Return the completed project to me by 12/7/16 @ 5pm. Use the information that you are exposed to in this class as a guideline. If you can't think of what to list or ask the instructor. Think about water quality issues, eggtake and incubation, various types of containers. "Simple" stuff like setting up incubators or cleaning raceways counts! Activities don't need to be spectacular – just relate what happened in a particular week. Often the fish culturists at your facility are keeping their own log and you may be able to contact them to collect the information.

You can submit drafts of your project to me prior to the final submittal date.

You should just be collecting information during most of the semester. In the final 2-3 weeks you should compile your information and put it into a format similar to below:

Example of format for this project:

Weekly log of hatchery activities for:

Facility:
Name:
FT122 – Fall, 2016
Date:

Week 1: September 10-16

- average water temperature =
- chum eggtake (provide numbers of eggs taken, dates, species, stock, etc._
- fry/fingerling work (provide chores, sizes if available, feed type, size of feed, amount fed / day if known)
- special activities or events (flooding, unexpected mortality, remote eggtake prep, etc.)
- accumulated temperature units on a specific lot of eggs

Week 2: September 17-23

Also, provide a temperature graph for the entire period if you are able to. Preferably in a spreadsheet format where you can just enter date and temperature and have the program draw you a nice line graph but a simple table is fine too. If you have more than one temperature regime monitored (for instance saltwater and freshwater), just be sure to differentiate the two on the graph or in the table. We can talk more about the specifics toward the end of the semester.

Like all of your work, I expect it to be free of spelling and grammatical errors.

Example of an "A" – level project

Douglas Island Pink & Chum (DIPAC)

Weekly Statistics: September 30 – December 7, 2007
Fin & Fish I – Semester Project
Completed December 8, 2007

Week 1: September 30- October 6
Average water temperature = 7.6

- Chinook eggtake (5 lots) ~1,300,00 eggs taken on 8/14-8/28
- Chum eggtake (15 lots) 120,998,273 eggs taken on 7/25-8/12
- Coho eggtake: not yet-taken at the end of Oct.
- Fry/fingerling work:
  Chinook, Oct. 1, fish size 4.97-7.27g, size sampling, feed type is Alitec, feed size is 1.3&1.5mm, amount fed 2.7-3.15% bw/day-7days a week
  Coho, Oct. 1, fish size 5.13-5.60g, size sampling, feed type is Alitec, size is 1.3, amount fed 2.00% bw/day-7days a week
- Special activities or events:
  1. Finished chum egg picking on 10/1. 97.3% overall survival, green to eyed egg.
  2. Water quality analysis
  3. Shipped 300K Chinook eggs to Hidden Falls Hatchery.
  4. Shocked, picked & seeded first lot of Chinook eggs. 98.3% green-to-eyed survival.
  5. Pulled hatch trays on first 3 lots of chum.
- Accumulated temperature units on a specific lot of eggs
  Chum lot #1: 641 CTUs on 10/7
  Tahini River Chinook lot #1: 402 CTUs on 10/7

Week 2: October 7-13

- Average water temperature = 7.3
- Chinook eggtake - none
- Chum eggtake – none
- Coho eggtake - none
- Fry/fingerling work:
  Chinook: feed type is Alitec, size is 1.3&1.5mm, amount fed 2.7-3.15% bw/day-7days a week.
  Coho: feed type is Alitec, size is 1.3, amount fed 2.00% bw/day-7days a week

Tahini River Chinook lot #1: 558 CTUs on 11/16
Macaulay Coho lot #1: 67 CTUs on 11/16

Week 8: November 18-24

- Average water temperature = 3.3
- Chinook eggtake – none
- Chum eggtake – none
- Coho eggtake - none
- Fry/fingerling work :

Chinook: feed type –Alitec, feed size-1.5 mm, amount fed 0.35-1.09% bw/day, 3 days/wk

Coho: feed type-Alitec, feed size-1.5 mm, amount fed 0.87-0.89% bw/day, 3 days/wk

- Special activities or events:

1. Coded-wire tagged ~21,000 Coho fingerlings.
2. Routine incubation work on BY07 chum & Chinook (screen cleaning, mort removal).

- Accumulated temperature units on a specific lot of eggs:

Chum lot #1: 885 CTUs on 11/23
Tahini River Chinook lot #1: 581 CTUs on 11/23
Macaulay Coho lot #1: 90 CTUs on 11/23

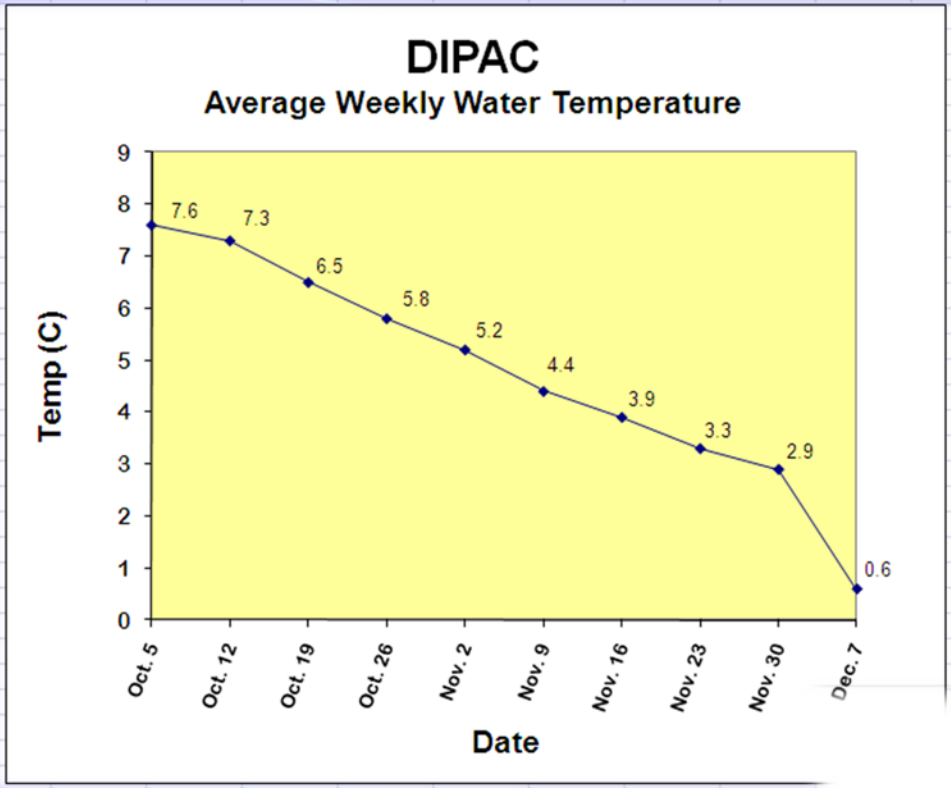
Week 9: November 25-December 1

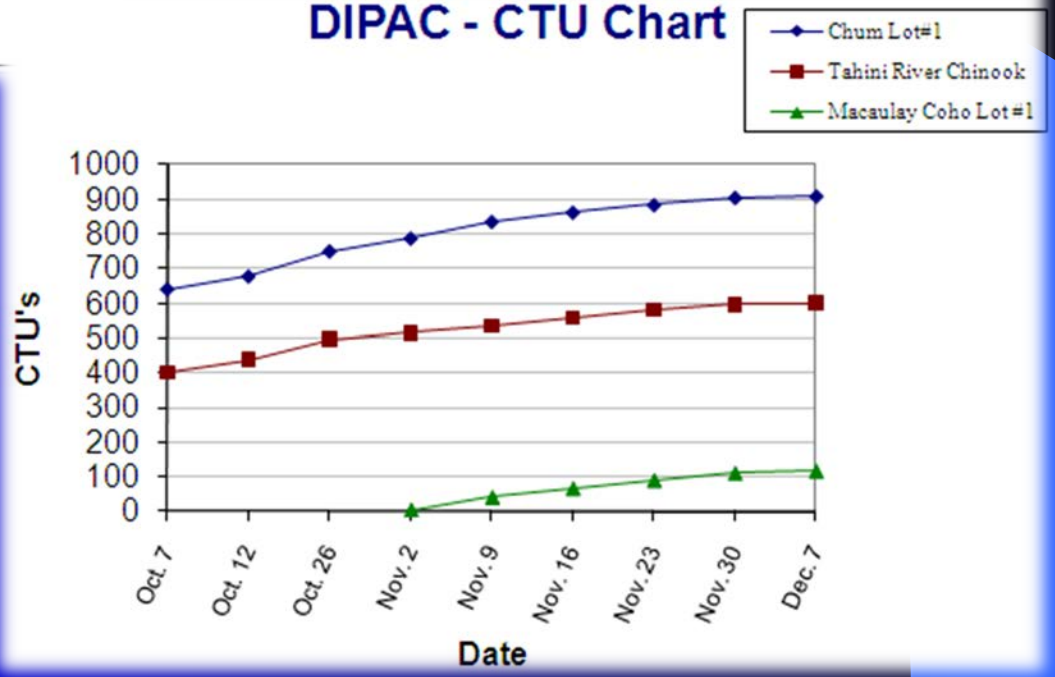
- Average water temperature = 2.9
- Chinook eggtake – none
- Chum eggtake – none
- Coho eggtake - none
- Fry/fingerling work:

Chinook: feed type –Alitec, feed size-1.5 mm, amount fed 0.35-1.09% bw/day, 2 days/wk

Coho: feed type-Alitec, feed size-1.5 mm, amount fed 0.87-0.89% bw/day, 2 days/wk

- Special activities or events (flooding, unexpected mortality, remote eggtake prep, etc.)


DIPAC
Average Weekly Water Temperature
Temp (C)
9
8
7
6
5
4
3
2
1
0
7.6
7.3
6.5
5.8
5.2
4.4
3.9
3.3
2.9
0.6
Oct. 5
Oct. 12
Oct. 19
Oct. 26
Nov. 2
Nov. 9
Nov. 16
Nov. 23
Nov. 30
Dec. 7
Date


DIPAC - CTU Chart
Chum Lot#1
Tahini River Chinook
Macaulay Coho Lot#1
CTU's
1000
900
800
700
600
500
400
300
200
100
0
Oct. 7
Oct. 12
Oct. 26
Nov. 2
Nov. 9
Nov. 16
Nov. 23
Nov. 30
Dec. 7
Date

TU Record

Date	AM	PM	Avg			
9/1/02	8	8.5	8.25	**Lot 1**		
9/2/02	8	8.5	8.25	8.25		
9/3/02	8	8.5	8.25	16.5		
9/4/02	8	8.5	8.25	24.75	**Lot 2**	
9/5/02	8	8.5	8.25	33	8.25	
9/6/02	8	8.5	8.25	41.25	16.5	
9/7/02	8	8.5	8.25	49.5	24.75	
9/8/02	8	8.5	8.25	57.75	33	
9/9/02	8	8.5	8.25	66	41.25	**Lot 3**
9/10/02	8	8.5	8.25	74.25	49.5	8.25
9/11/02	7.8	8	7.9	82.15	57.4	16.15
9/12/02	7.8	8	7.9	90.05	65.3	24.05
9/13/02	7.8	8	7.9	97.95	73.2	31.95
9/14/02	7.8	8	7.9	105.85	81.1	39.85
9/15/02	7.5	7.7	7.6	113.45	88.7	47.45
9/16/02	7.5	7.7	7.6	121.05	96.3	55.05
9/17/02	7.5	7.7	7.6	128.65	103.9	62.65

Alaska Salmon Culture 1 - Exam 3
12/2/2014
Due: 12/10/14 by 5pm No Late Work Accepted!

1. Describe gas super saturation, why it is a problem in fish culture, and list some methods of reducing it. Give a brief description of each method. **10pts**

2. Go to http://tagotoweb.adfg.state.ak.us/OTO/ and perform the following operation:
   a. go to Voucher Summary Report
   b. Run a report to find marks for Broodyr 2004 chinook at NSRA, all hatch codes
   c. list the results
   d. what is a "Hatch Code"? The answer can be found at the website. **15pts**

3. Describe three different methods of temperature manipulation for otolith marking. For each, list some of the advantages and disadvantages. Provide detail for why a facility might use one method over the other. (note: this relates to methods of varying water temperature) **15pts**

4. Describe your ideal hatchery facility. Address at least the following critieria:
   - water source
   - species you want to rear
   - rearing (saltwater/freshwater?)
   - location: remote, near town, other **15pts**

5. We talked about the various types of salmon enhancement projects this semester. For each of the following provide: name of the project, location, organization associated with it, basic objectives and how they achieve them.
   a. Lake rearing
   b. Lake fertilization
   c. Fish stocking
   d. Remote rearing
   e. Hatchery facility **20pts**

6. There are some tools that enhancement facilities can use to "stretch" their water. One of these is use of a "biofilter". Using www.praqua.com and other sources, find out what biolters can do for a facility. What do they do? How do they work? What is the result? Are there different sizes? Explain the process in some detail. Are there different types of biofilters? I have put the William Jack Hernandez Production Planning document in Resources. Check out section 4.2 for application examples. **15pts**

7. Regarding project planning: go to http://www.praqua.com/projects and check out the variety of

Exams

- Typically "situational"
- Use archives and ppt's to help you study
- Allow lots of time!
- Take home style – have 6-7 days to complete
- Turn in directly to Gradebook
- We look at this prior to posting
- No testing station required
- You can contact me during the week to ask for clarification or if you are struggling

Miscellaneous

- There will be some classes that I will be out of town for
- I can encounter tech problems too!
- Sometimes I'll pre-record and send out an announcement
- We may have guest speakers who will sub for a scheduled class
- I have to post official office hours but you can contact me anytime
- If you are stuggling with content, tech issues, time management – please let me know before you consider dropping out!

Any questions before we get into the meat of things?

AK Salmon Culture Lab

- date changed to end of October
- Angie Bowers will instruct
- Fun and totally interactive!
- Sitka is a great spot for the lab – 3, very different, facilities
- UAS lab facility

Alaska Salmon Culture Lab

Fisheries Technology

One Lab – Two Options

Sept. 29 – Oct. 1, 2015

William Jack Hernandez Sport Fish Hatchery
Anchorage, Alaska

FT230-T91 CRN: 78955
(No Housing)

Oct. 26 – 28, 2015

Sitka Sound Science Center
Sitka, Alaska

FT230-T01 CRN: 78953
(No Housing)

FT230-T02 CRN: 79847
(Housing Available)

Topics Include:

- ✓ **Eggtake techniques:** family tracking techniques and sampling methods
- ✓ **Incubation equipment and use:** types of incubators, water flow and loading densities
- ✓ **Feeding techniques:** types of feeds, delivery methods for both salt and freshwater applications
- ✓ **Rearing:** types of containers, densities, maintenance
- ✓ **Pathology:** some common diseases, diagnosis, basic lab techniques
- ✓ **Evaluation methods:** coded wire tagging and otolith marking procedures

Students can expect to come away with more in-depth knowledge of salmon culture techniques as applied in Alaska's enhancement facilities. Lab includes both classroom and onsite hatchery work, as well as opportunities to interface with industry professionals.

Cost without housing: $210
Cost with housing: $334 (4 nights)
Limited tuition / travel assistance is available.

For further information about the course or available financial assistance, contact instructor:
Jim Seeland, Asst. Professor of Fisheries Technology
jim.seeland@uas.alaska.edu
Phone (907) 747-7742
Cell (907) 738-1190

Register today!
907-747-7700
1-800-478-6653
student.info@uas.alaska.edu

UAS University of Alaska Southeast

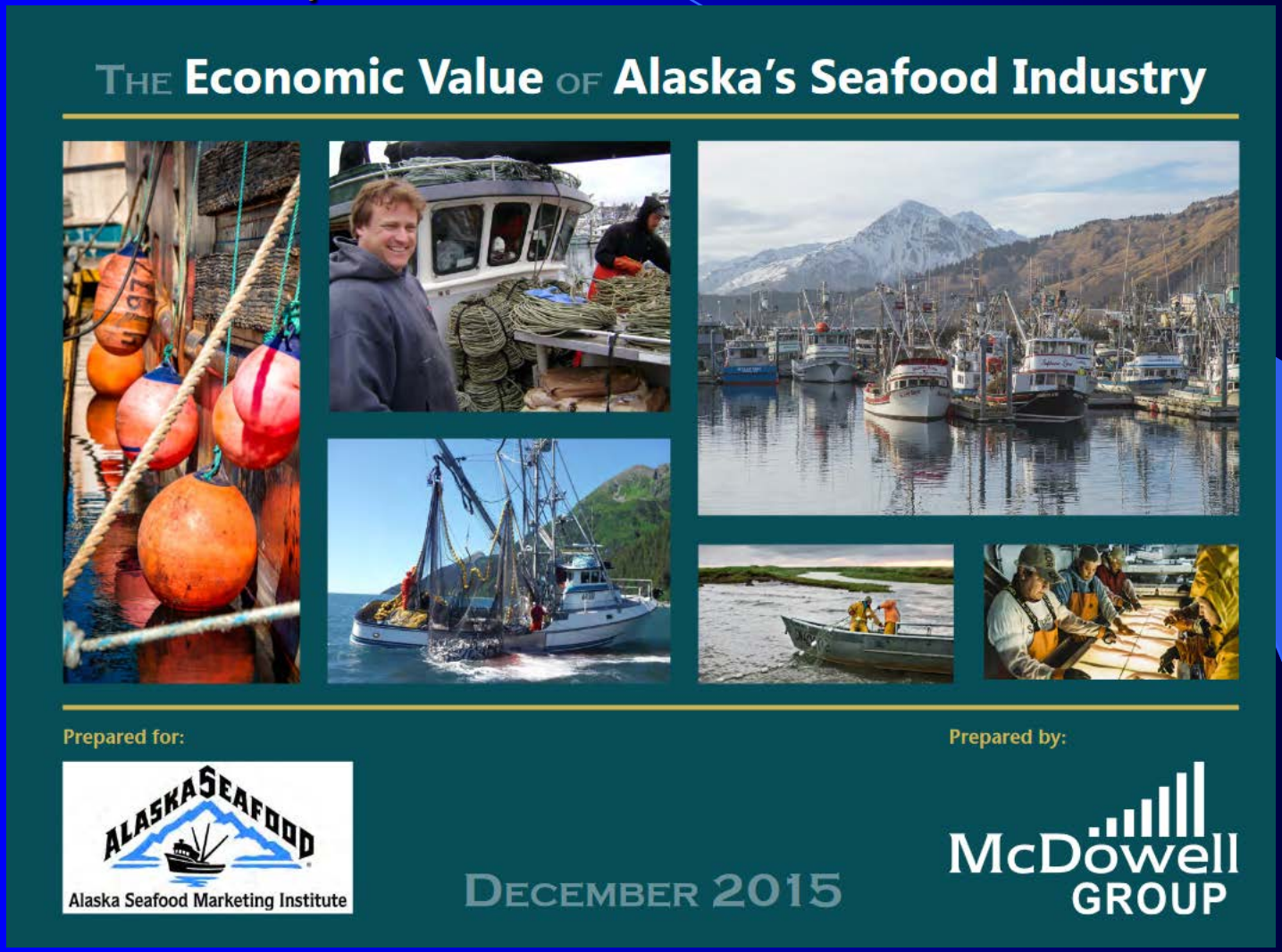
UAS is an AA/EO employer and educational institution.

Overview of Pacific Salmon Production In Alaska

So what's the big deal about AK salmon?

ASMI – another great resource!

http://www.alaskaseafood.org/



This report is in Course Content/Readings

Executive Summary

The Seafood Industry: A Cornerstone of Alaska's Economy

60,000 workers in Alaska's seafood industry earn $1.6 billion in annual labor income, based on 2013 and 2014 averages. Including multiplier effects, the seafood industry accounts for $2.1 billion in total labor income and $5.9 billion in total economic activity in Alaska.

A total of 31,580 fishermen earned income in Alaska's commercial fisheries, including skippers and crew. Those fishermen operated a fleet of 8,600 vessels. 17,600 Alaska resident commercial fishermen had total gross (ex-vessel) income of $735 million in 2014.

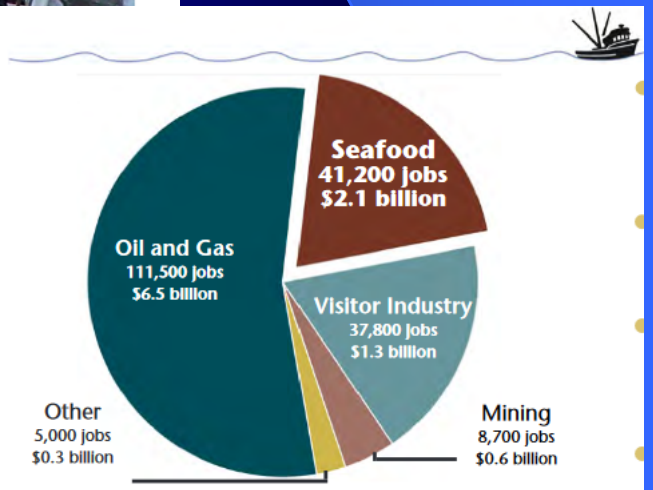
Alaska's 2014 seafood harvest of 5.7 billion pounds had a total ex-vessel value of $1.9 billion. Processors generated 2.8 billion pounds of Alaska seafood products in 2014 with a first wholesale value of $4.2 billion.

Alaska seafood processing employment, including on-shore and off-shore, included an estimated 25,055 workers in 2014. Shore-based processing employment in Alaska peaked at just under 20,800 jobs in 2014, with annual average employment of about 9,200. Shoreside and floating processors paid a total of $400 million in wages in 2014.

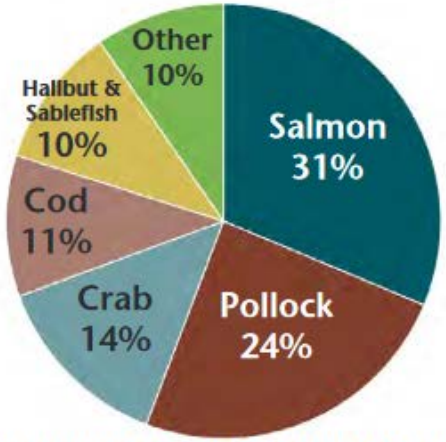
Seafood Industry Impact on Alaska's Economy, 2013/14 Averages

Direct Impacts	Number of Workers	Labor Income ($Millions)
Commercial Fishing	31,580	$920
Processing	25,055	$460
Management/ Hatcheries/Other	2,904	$204
Total	59,539	$1,584

Total Impacts	
FTE (Full-Time Equivalent) Jobs	41,200
Labor Income	$2.1 Billion
Economic Output	$5.9 Billion



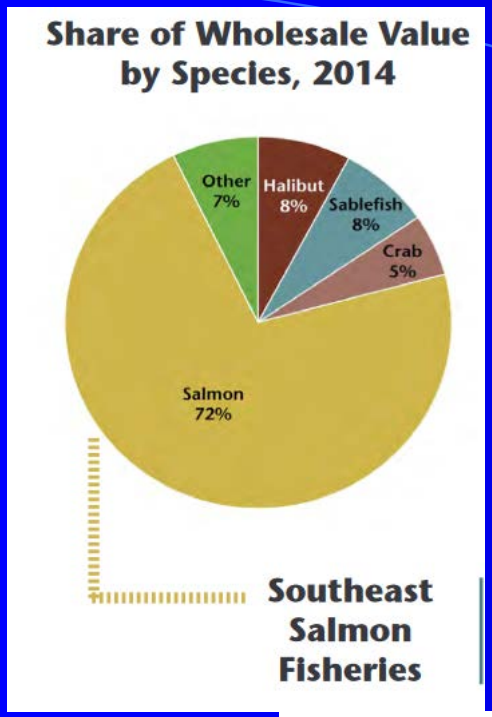
Total Employment and Labor Income Supported by Key Private Sector Basic Industries in Alaska

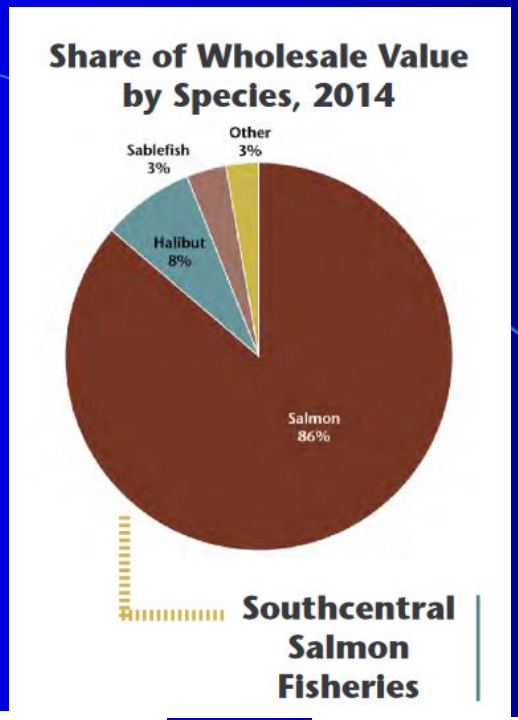


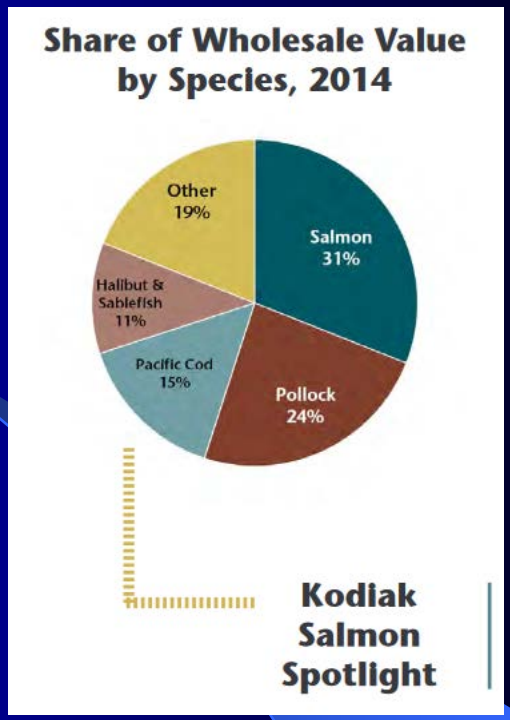
Portion of Total Ex-Vessel Value, by Species, 2014

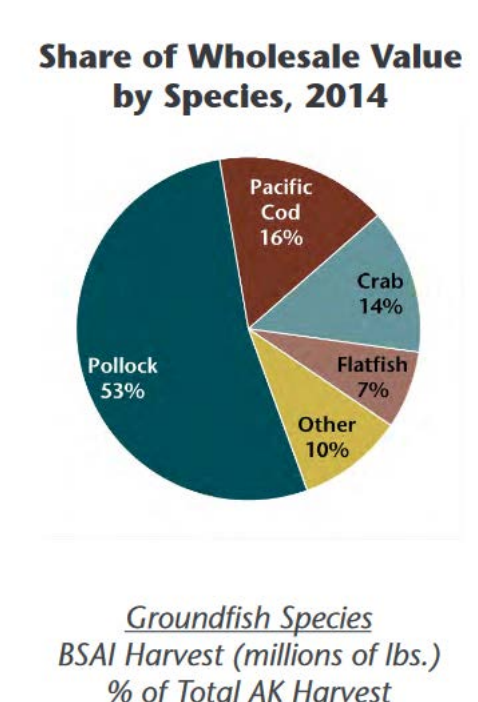
Salmon	
Direct Total	
FTE Jobs	18,400
Labor Income $M	$845
Value Added $M	$2,151
Secondary Total	
FTE Jobs	19,700
Labor Income $M	$1,119
Value Added $M	$2,917
Total Contribution	
FTE Jobs	38,100
Labor Income $M	$1,964
Value Added $M	$5,068

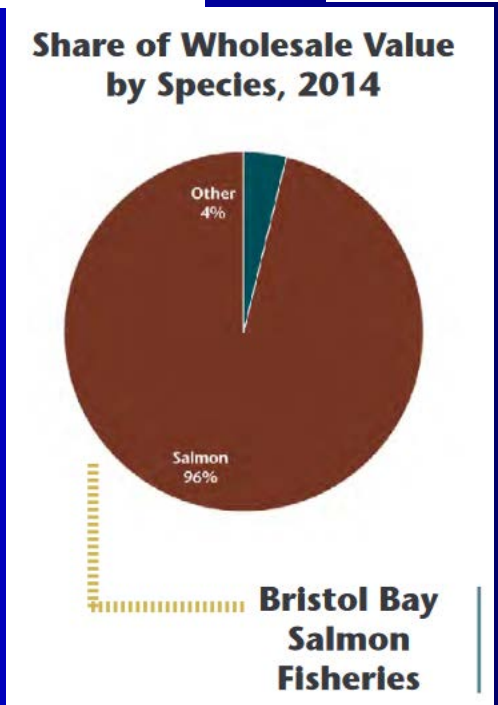
- Salmon is still king in Alaska. By all measures, salmon are responsible for the greatest economic impact (jobs, income, and total value) among all species in the Alaska seafood industry. Salmon's total contribution to the national economy includes approximately 38,400 FTE jobs and just under $2 billion in annual labor income.











Bering Sea & Aleutian Islands Region

How AK salmon fisheries are managed

Commercial Fisheries Management

Alaska's fisheries are known worldwide as a model for sustainable management. The efforts of the region's biologists, managers, and policy makers help ensure healthy stocks and productive fisheries for Alaska's harvesters and the businesses that rely on their catches. A key aspect of Alaska's successful model is the seperation of entities that set policy (**Alaska Board of Fisheries** and **North Pacific Fishery Management Council**) and those that enforce and study allocations and harvest limits.

Alaska's commercial fisheries are managed by the **Alaska Department of Fish and Game** (ADF&G) and the **National Marine Fisheries Service** (NMFS), a division of NOAA. With some exceptions, fisheries managed by ADF&G occur within three miles of Alaska's coast while NMFS manages offshore fisheries. Both agencies work in coordination to conserve and develop Alaska's fishery resources.

Some Alaska fisheries have an international component. Pacific halibut are jointly managed with Canada via the **International Pacific Halibut Commission**. Transboundary salmon harvests in Southeast Alaska and the Yukon River are subject to the **Pacific Salmon Treaty**.

The State of Alaska has several agencies that further support the seafood industry in Alaska:

- The **Commercial Fisheries Entry Commission** implements Alaska's limited entry law by issuing the fishing permits for state fisheries whereas NMFS issues permits for the federal fisheries.
- The **Department of Environmental Conservation** issues discharge permits for seafood processing facilities.
- The **Department of Commerce, Community, and Economic Development** is charged with promoting economic development in Alaska, including the seafood industry.
- The **Alaska Seafood Marketing Institute** is a public-private partnership between the state and the seafood industry with the mission to increase the economic value of Alaska seafood.
- The State also provides training opportunities and extension services through the **University of Alaska** system, **Alaska Sea Grant**, and **Alaska's Institute of Technology (AVTEC)**.

If there are so many salmon in AK, why have hatcheries?

Hatchery production in Alaska is intended to supplement—not replace—wild stock production. There are no *stocks of concern* in Prince William Sound or Southeast Alaska, where most hatchery production occurs, indicating that adequate escapements to wild stock systems are being met over time in areas with the most hatchery production. Abundance-based wild stock management priority and habitat protection reflect the state's commitment to conservation of wild stocks, and provide the foundation for its salmon fisheries enhancement program.

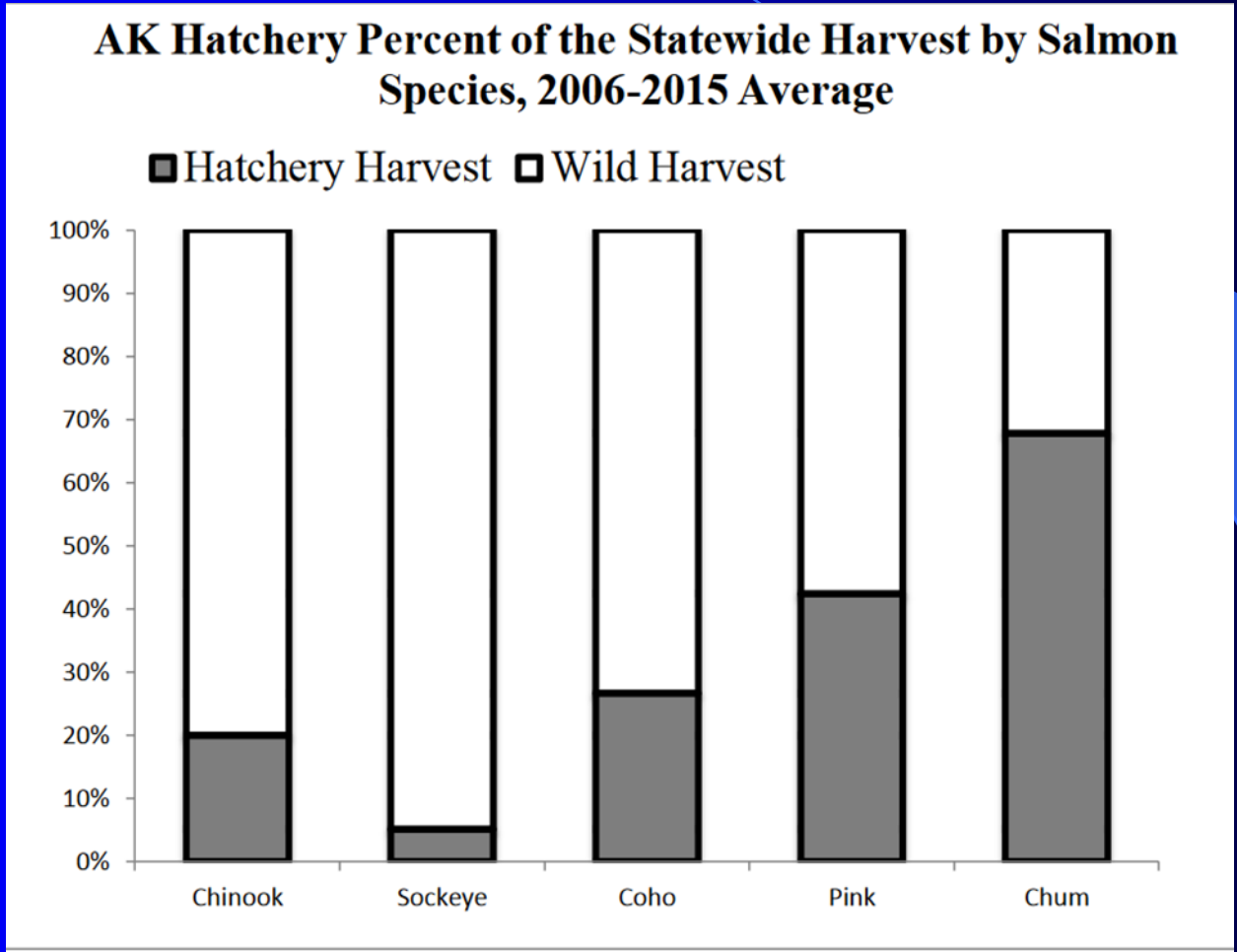


Figure 8.–Alaska hatchery contribution to the commercial fishery by species, 2006–2015.

Salmon returns weren't always so bountiful…..

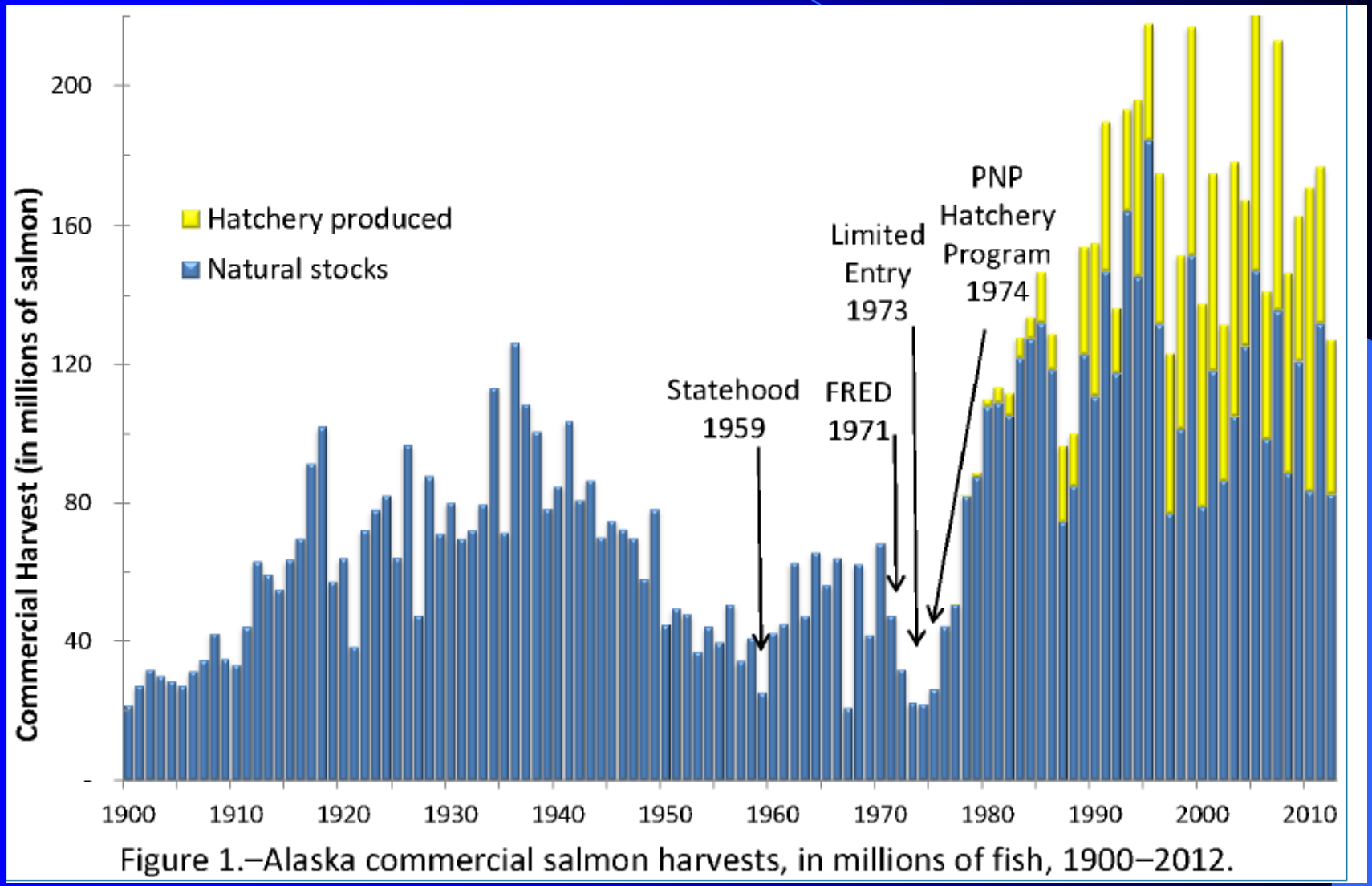
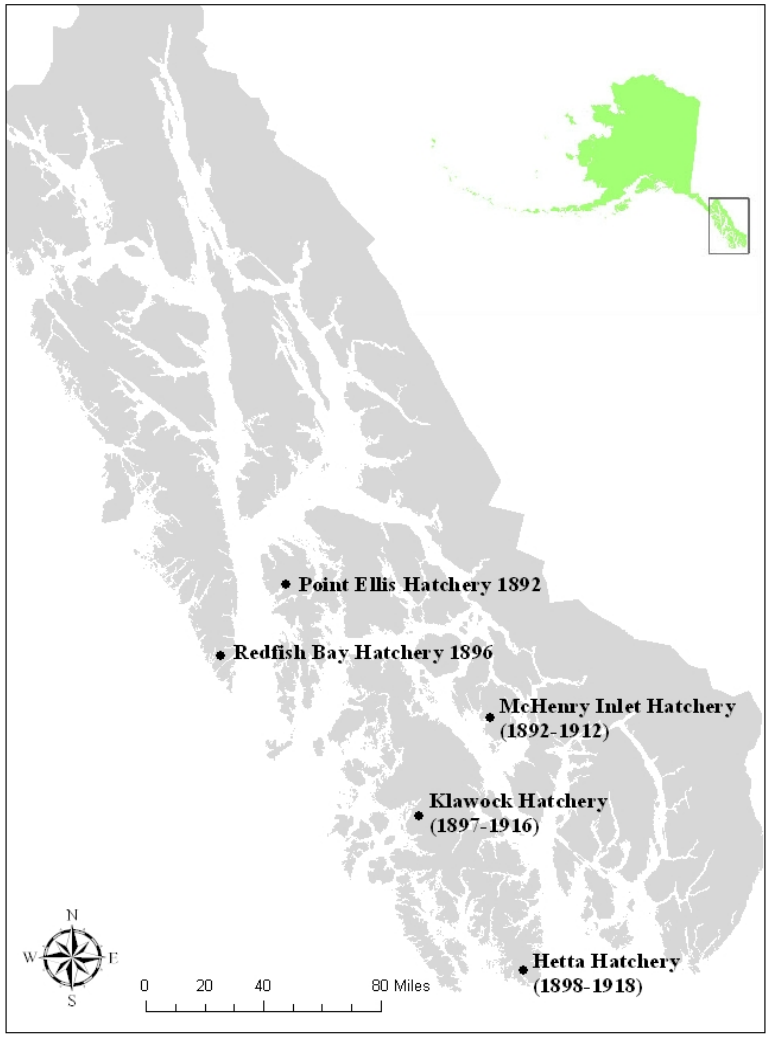


Figure 1.–Alaska commercial salmon harvests, in millions of fish, 1900–2012.

Pre-1900 Southeast Alaska Hatcheries

The first hatcheries in Southeast Alaska were primarily sockeye salmon hatcheries associated with canneries

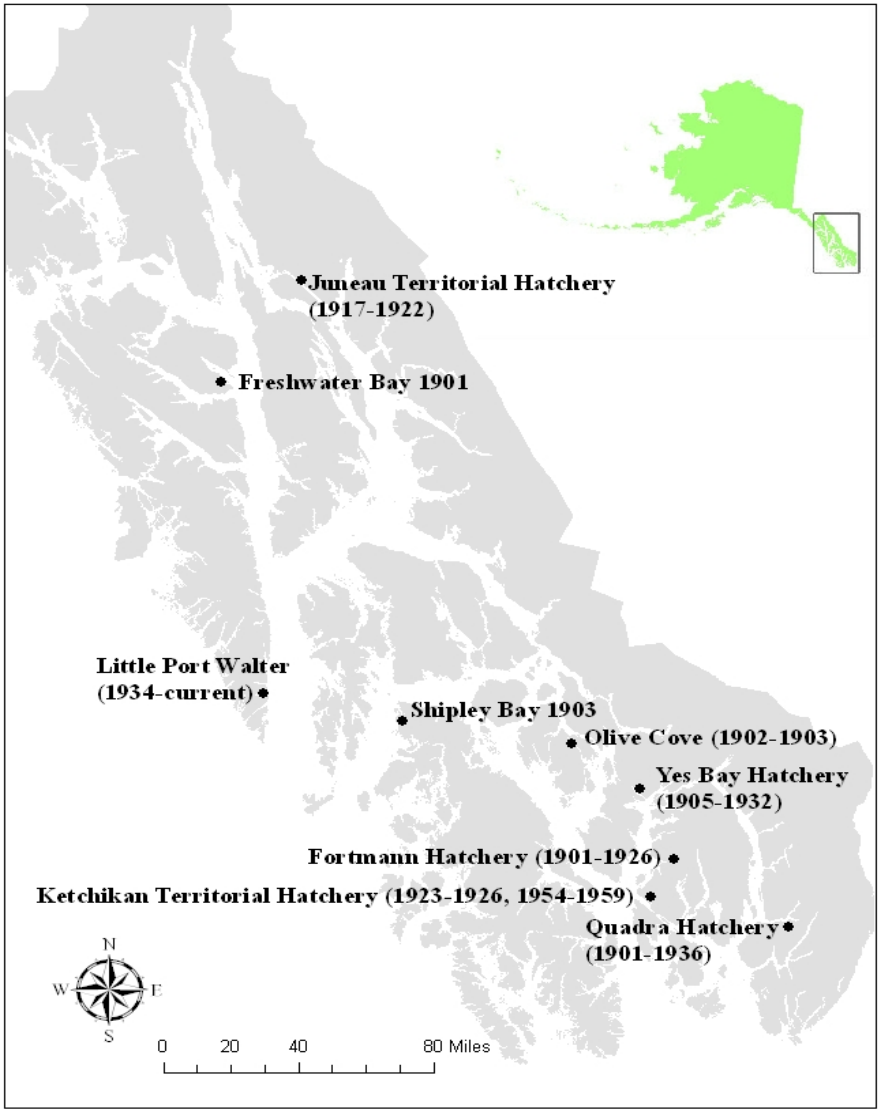


Southeast Alaska Hatcheries: 1900's

1900: Mandatory Hatchery Act; requires a hatchery to be built for cannery operation

1905: Federal Bureau of Fisheries takes over fisheries management in territory of Alaska

1936: last cannery hatchery closes



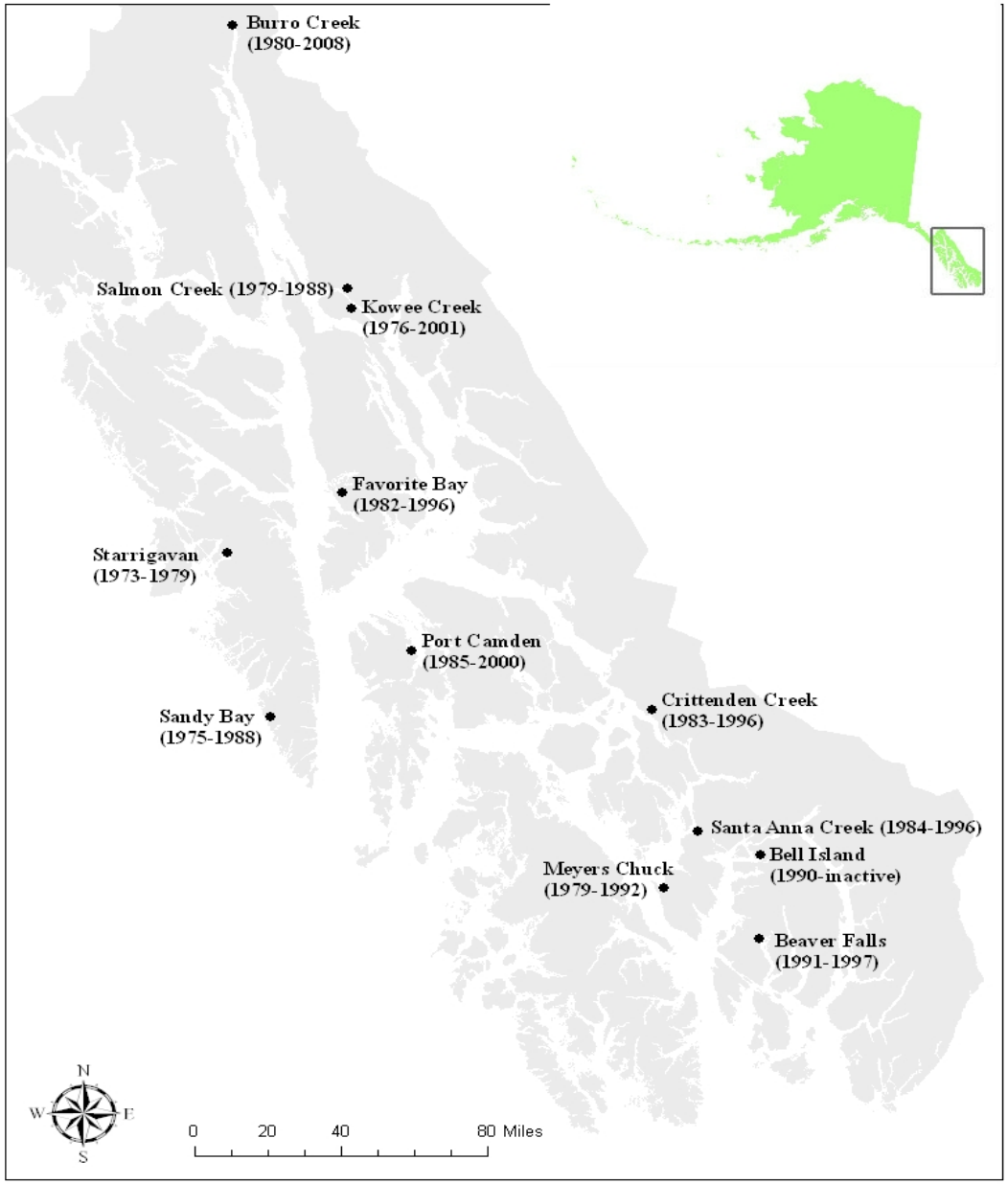
The Modern Era

1959: Alaska becomes a State

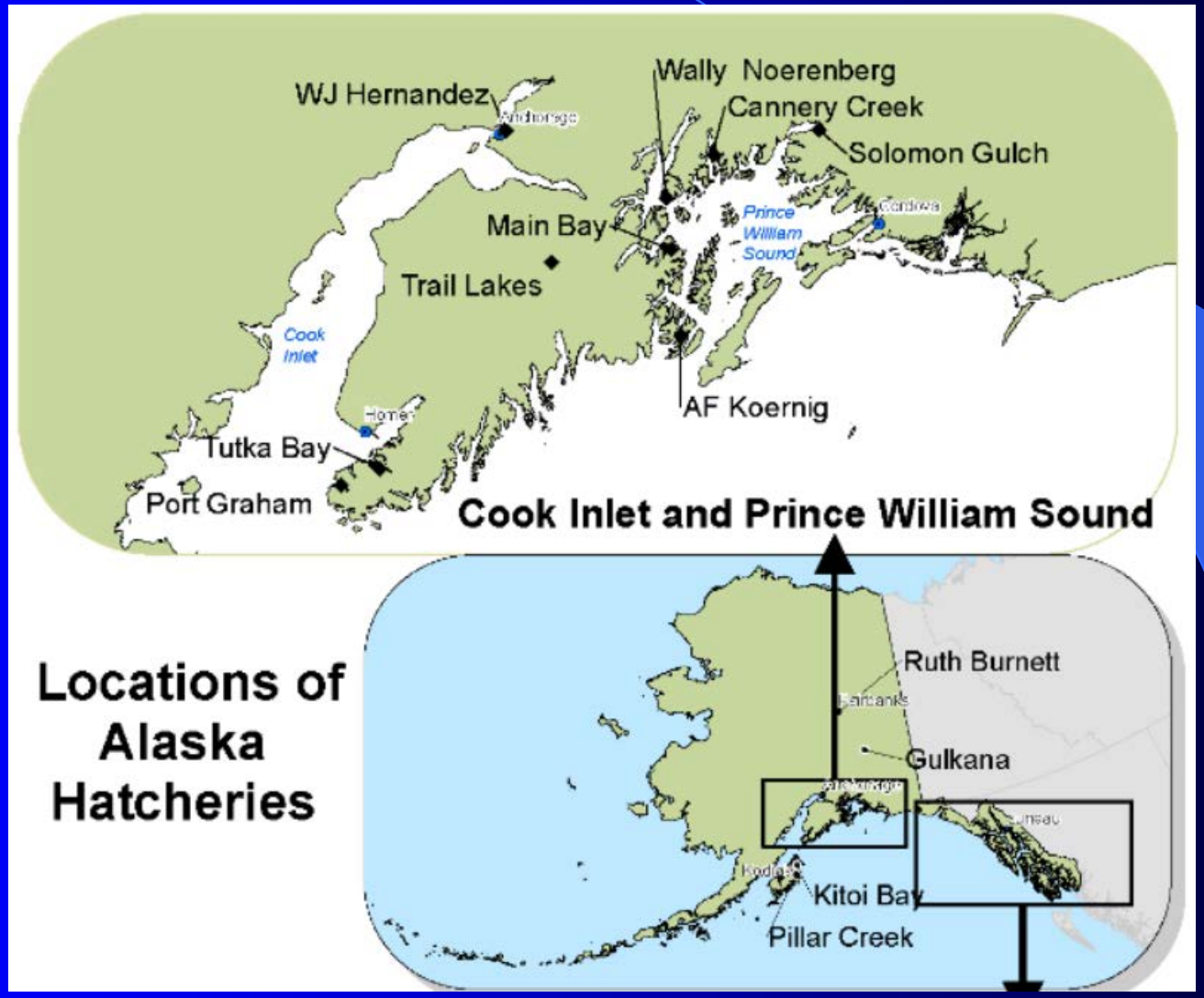
1971: State of Alaska develops Fisheries, Rehabilitation, Enhancement and Development Division

1974: Private Non-Profit Hatchery Permits

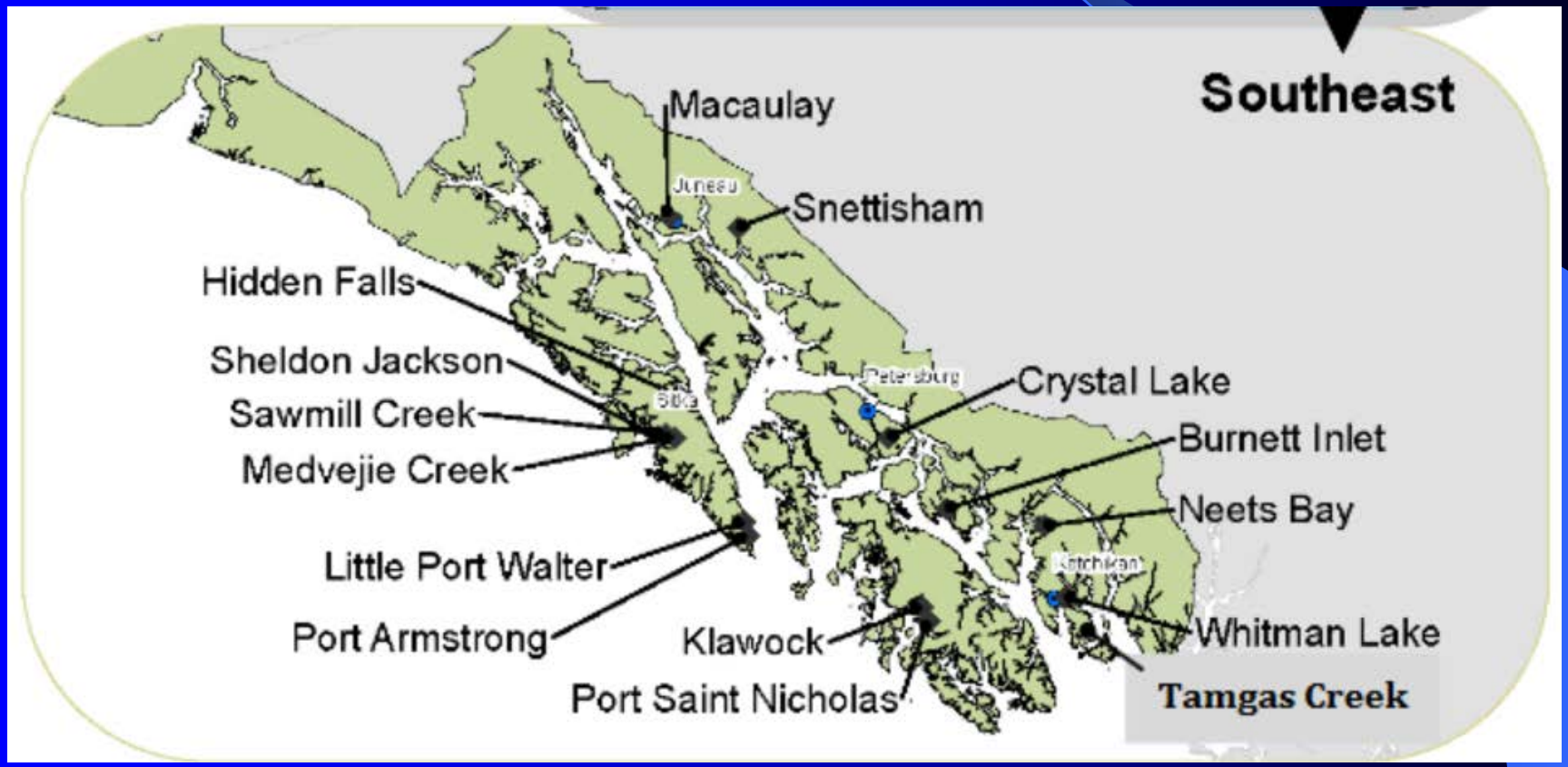
1988: State hatcheries are contracted to PNPs.



Hatchery locations today: Southcentral/Kodiak



Hatchery locations today: southeast



What is "salmon enhancement"?

Enhancement Methods

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

ADFG website – great resource for information on AK hatcheris

Regional Information Report No. 5J16-03

Alaska Fisheries Enhancement Annual Report 2015

ABSTRACT

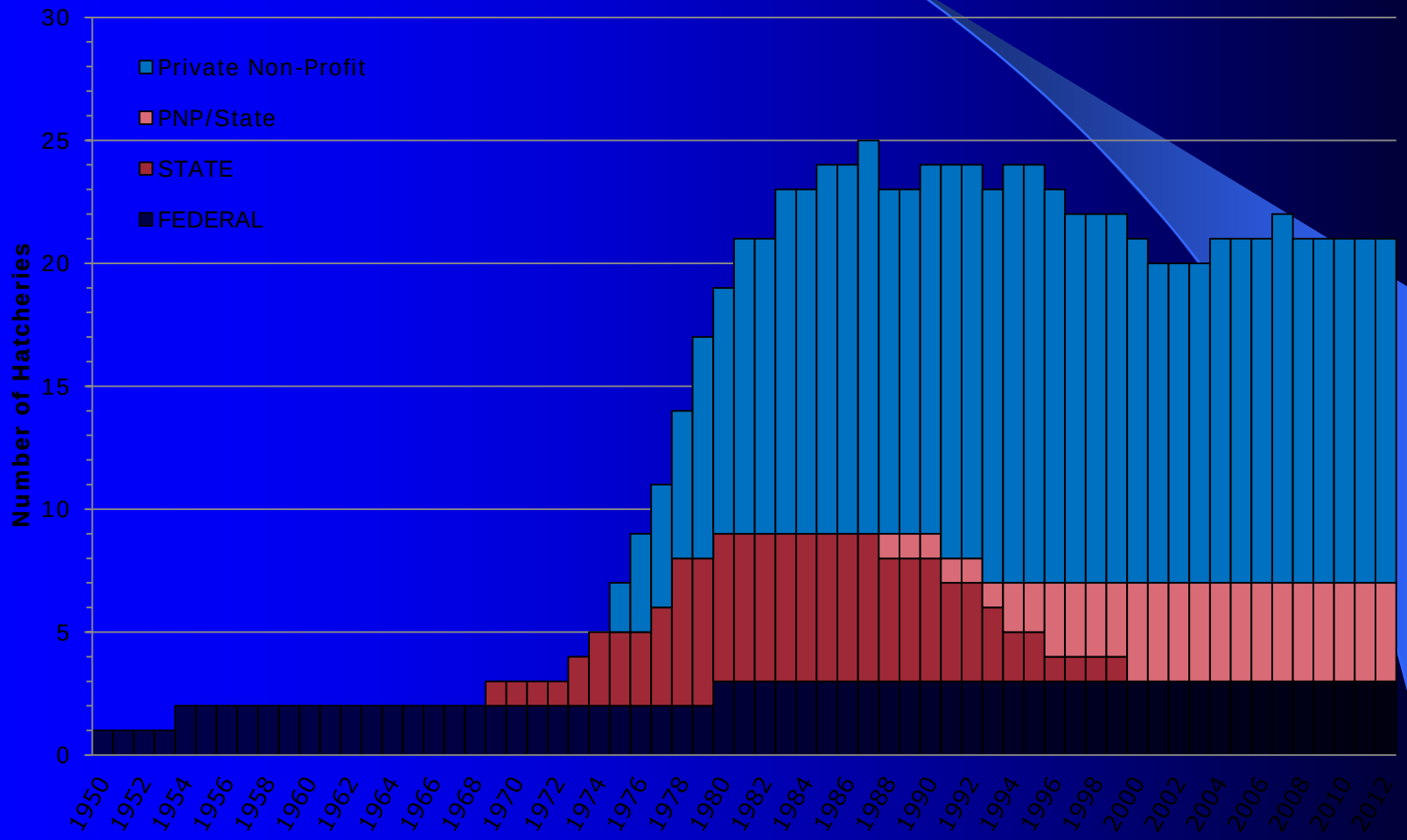
This annual report reviews the Alaska salmon fisheries enhancement program. The success of this program is attributable to the development of statutes, regulations, and policies that require hatcheries to be located away from important natural salmon stocks and use local broodstock sources. In addition, to maintain genetic diversity, Alaska hatcheries use large numbers of broodstock for production, and do not selectively breed for size (or other traits). Nearly all hatchery releases are marked so that fisheries managers can determine the strength of wild stocks in the catch and manage them conservatively.

Currently, 29 hatcheries are operating in the state. Most (25 facilities) are operated by private nonprofit corporations, which are funded primarily from the harvest and sale of a portion of hatchery returns. Two additional hatcheries are operated by the state, one research hatchery by the National Marine Fisheries Serivce, and one hatchery by the Metlakatla Indian Community.

The 2015 salmon season was the 2nd highest harvest in state history—a 264 million fish commercial harvest comprised of the 3rd highest catch ever for wild stocks (170 million) and the 2nd highest catch for hatchery stocks (93 million). The statewide exvessel value of the commercial hatchery harvest in 2015 was about $125 million, and the first wholesale value of the commercial hatchery harvest was about $350 million.

Hatchery production in Alaska is intended to supplement—not replace—wild stock production. There are no *stocks of concern* in Prince William Sound or Southeast Alaska, where most hatchery production occurs, indicating that adequate escapements to wild stock systems are being met over time in areas with the most hatchery production. Abundance-based wild stock management priority and habitat protection reflect the state's commitment to conservation of wild stocks, and provide the foundation for its salmon fisheries enhancement program.

Salmon Hatcheries in Southeast Alaska by Operator



Eggs taken / juveniles released over time

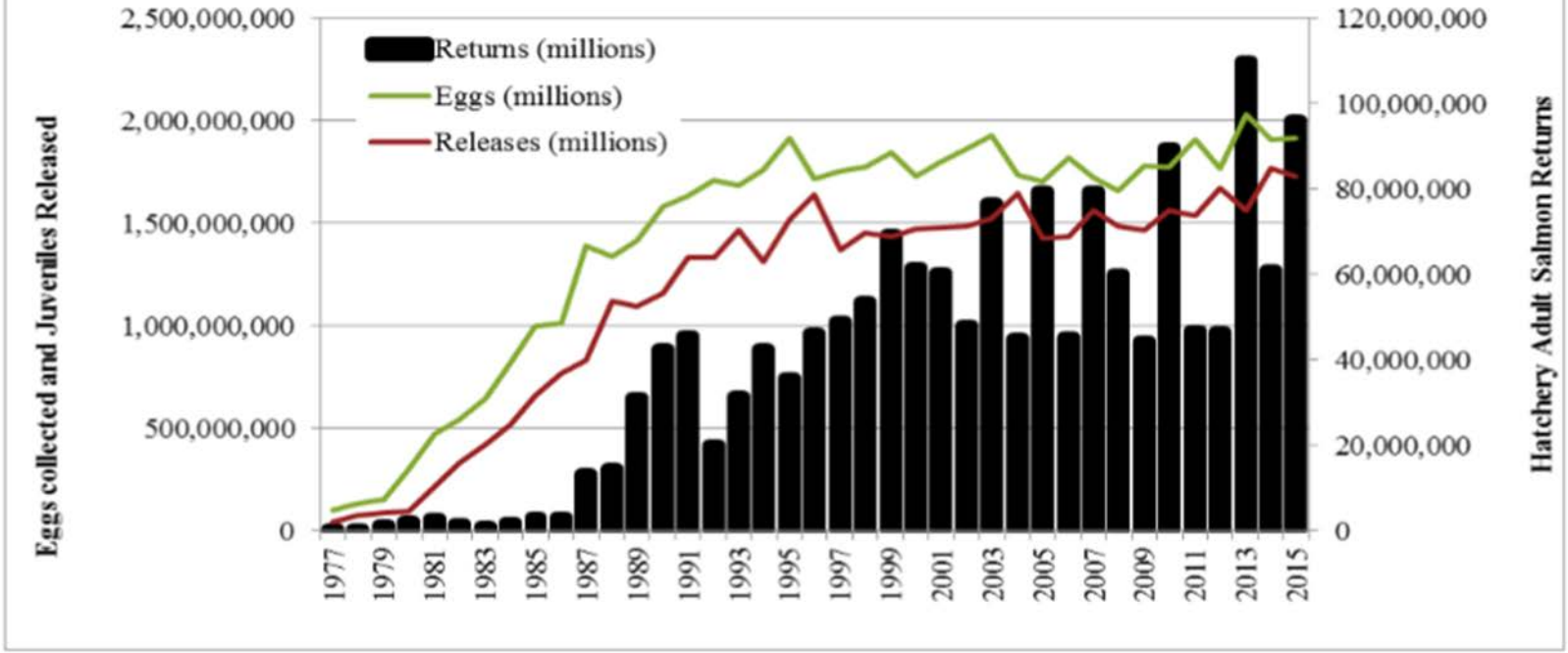


Figure 11.–Total salmon eggs collected, juveniles released and adult returns for Alaska salmon hatchery programs, 1977–2015.

Impacts of AK hatcheries

Economic Impacts of Private Nonprofit Aquaculture Associations in Southeast Alaska

Prepared for:
Northern Southeast Alaska Regional Aquaculture Association, Douglas Island Pink and Chum, Inc., and Southern Southeast Regional Aquaculture Association

PREPARED BY:
McDowell GROUP
Juneau • Anchorage

June 2010

Total Economic Impacts

- In 2008, hatchery operations and the commercial harvesting and processing of salmon produced by NSRAA, DIPAC, and SSRAA generated total direct, indirect, and induced economic output of $171 million.

- In 2008, direct, indirect, and induced employment and payroll generated as a result of NSRAA, DIPAC and SSRAA operations totaled 971 jobs and $50 million in labor income. Direct employment is estimated at 662 with $33 million in labor income in 2008, while economic multiplier impacts (indirect and induced) of the rearing, harvesting, and processing of hatchery-produced salmon added 309 jobs and $17 million in labor income.

Commercial Ex-vessel Volume and Value

- In common property fisheries from 2001 to 2008, the commercial fleet harvested 326 million pounds worth $130 million in ex-vessel value of salmon produced by NSRAA, DIPAC, and SSRAA. Cost recovery efforts added 210 million pounds of salmon worth $88 million.

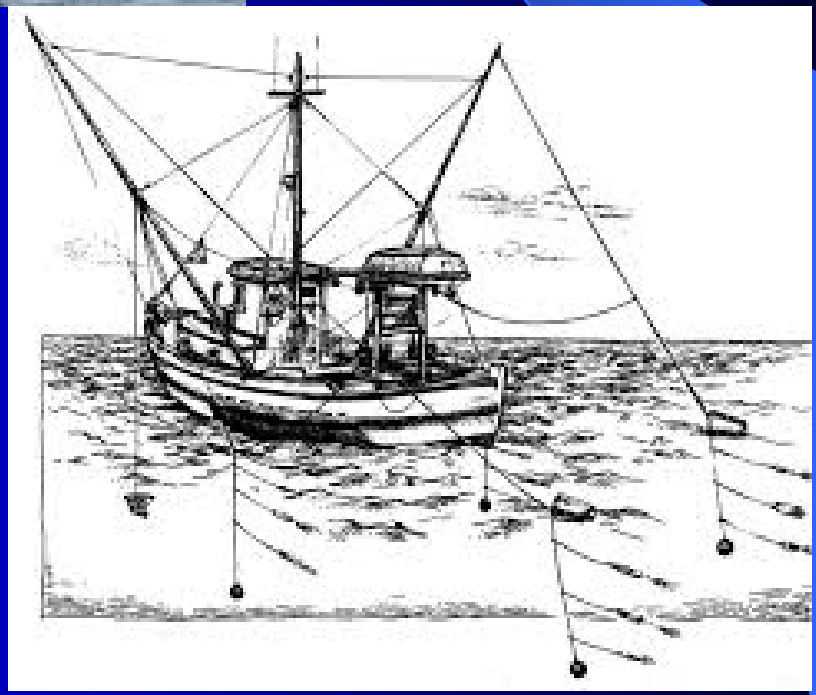
- From 2001 to 2008, salmon reared by NSRAA, DIPAC, and SSRAA and harvested by commercial fishermen accounted for 30 percent of the ex-vessel value and 25 percent of the volume of the total Southeast Alaska salmon harvest.

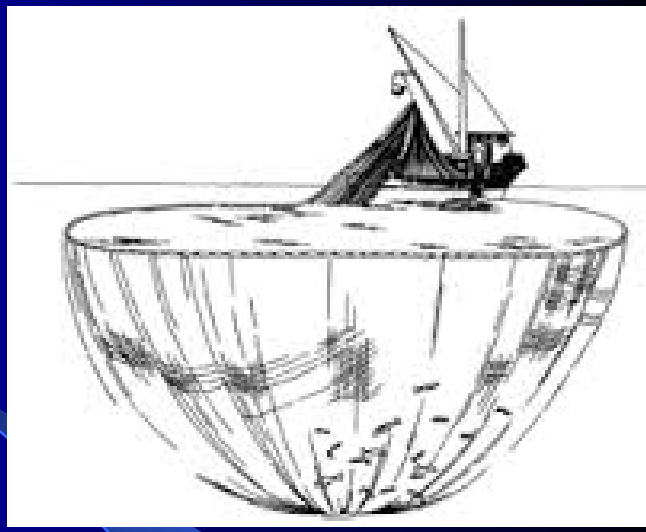
This report is in Course Content/Readings

for tonight anyway……

Gear Groups

Salmon Troller





Purse seining

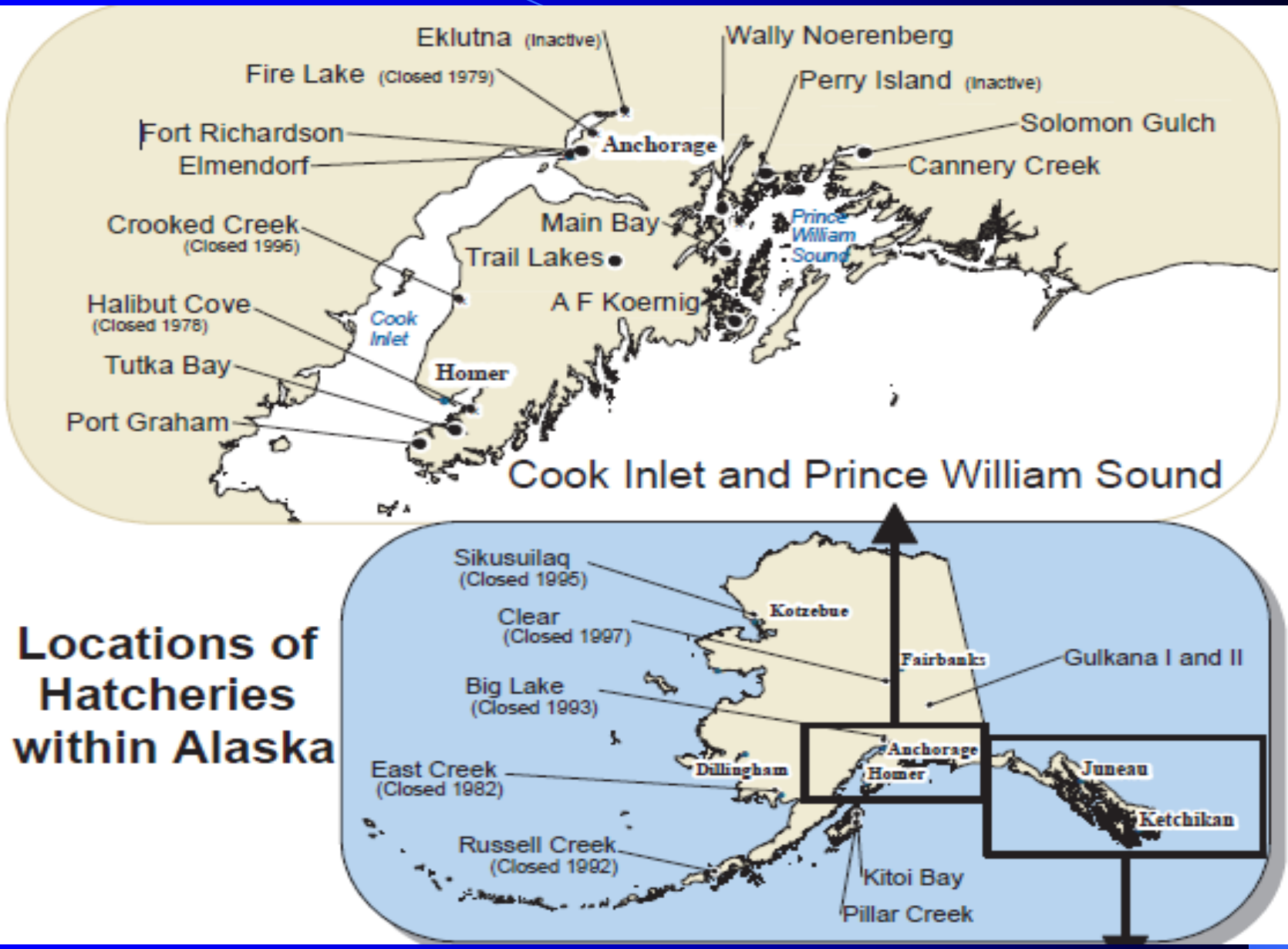
Gill net

Subsistence

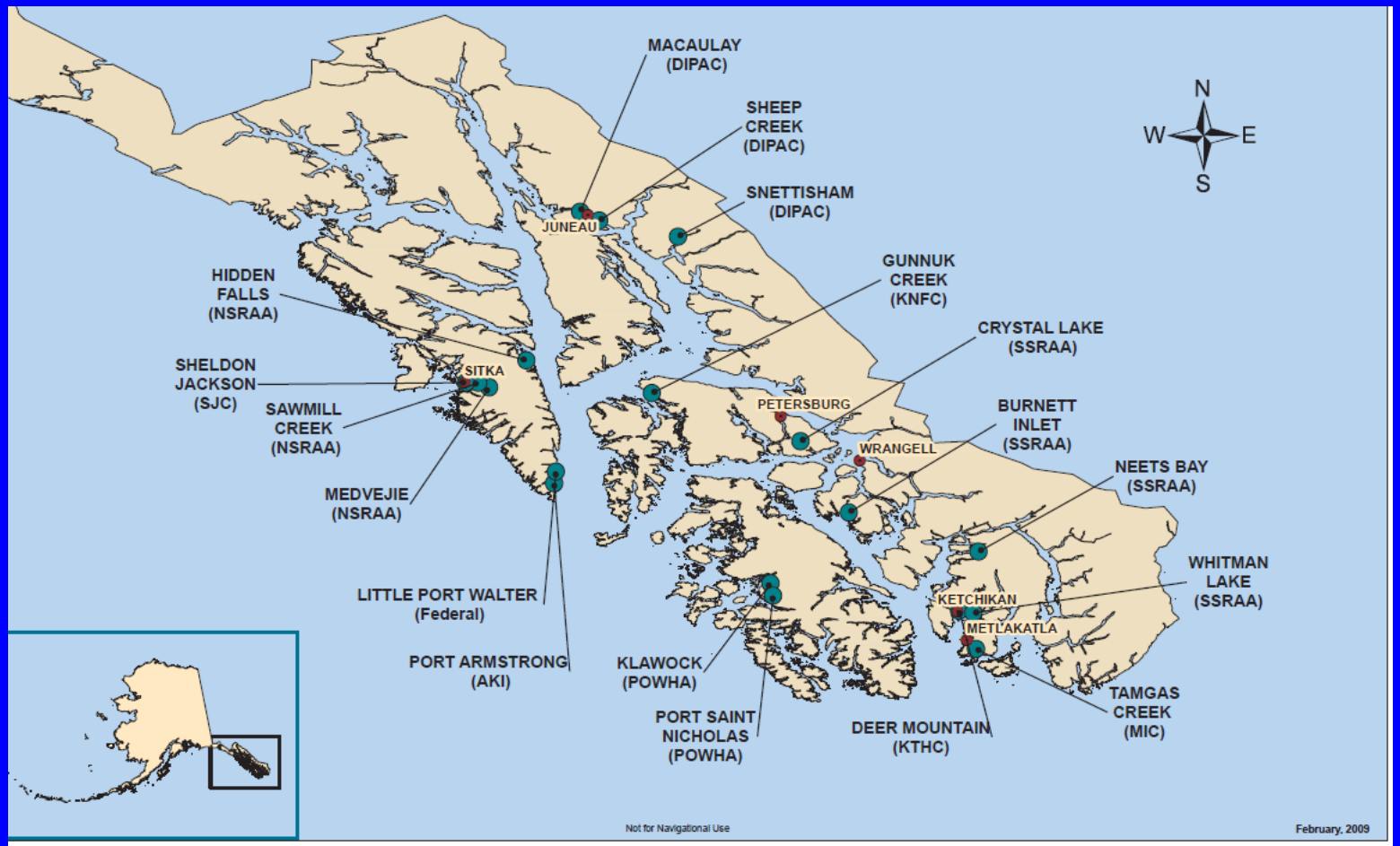
Alaska Fisheries Enhancement Programs

- 1. Programs operated and funded by the State of Alaska
- 2. Private Non – Profit Regional Aquaculture Associations
- 3. Private Non – Profit Non-Regional Assoc. commonly, referred to as Mom & Pop operations

Southcentral / Interior hatchery locations



Southeast hatchery locations



HATCHERY OPERATORS

SSRAA: Southern Southeast Regional Aquaculture Association
NSRAA: Northern Southeast Regional Aquaculture Association
AKI: Armstrong-Keta, Inc.
DIPAC: Douglas Island Pink and Chum, Inc.
KTHC: Ketchikan Tribal Hatchery Corporation
KNFC: Kake Nonprofit Fisheries Corporation
POWHA: Prince of Wales Hatchery Association
SJC: Sheldon Jackson College
MIC: Metlakatla Indian Corporation

http://www.adfg.alaska.gov/index.cfm?adfg=fishingHatcheriesFacilities.main

1. Programs Operated and Funded by the State of Alaska

- Two Sport Fish Hatcheries:
  - William Jack Hernandez / Anchorage
  - Ruth Burnett Hatchery / Fairbanks
- CWT and Otolith Labs in Juneau
- Pathology Services with labs in Juneau and Anchorage
- PNP Program Administration performed by Commercial Fish Div. in Juneau
- Dept. Commerce Fisheries Enhancement Loan Program

Two sportfish hatcheries

Fort Richardson State Fish Hatchery

The Fort Richardson State Fish Hatchery is located on Fort Richardson, a U.S. Army post near Anchorage, Alaska. The hatchery sits on the banks of Ship Creek, just downstream of the Glenn Highway. The facility was built in 1958 by the U.S. Army to provide fish for post lakes. The Fort Richardson Hatchery is being phased out and production is being transferred to the new William Jack Hernandez Hatchery.

» More about the Fort Richardson State Fish Hatchery

Ruth Burnett Sport Fish Hatchery

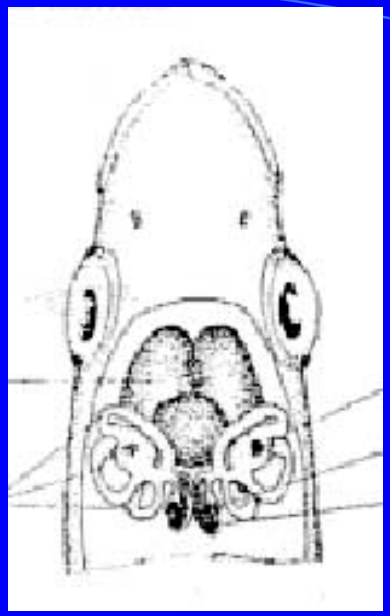
The Ruth Burnett Sport Fish Hatchery is a state of the art hatchery facility located in Fairbanks Alaska, owned and operated by the Alaska Department of Fish and Game. Fish produced at the hatchery will reduce pressure on wild fish stocks, increase sport-fishing opportunity, and provide diversity in sport fisheries throughout Interior Alaska. The RBSFH will produce rainbow trout, Arctic grayling, Arctic char, coho salmon and Chinook salmon for stocking in over 125 landlocked lakes.

» More about the Ruth Burnett Sport Fish Hatchery

William Jack Hernandez Sport Fish Hatchery

This facility is located at the site of the old Elmendorf Hatchery. The public visitor area is open daily (seven days a week) from 8:00am – 4:00pm.

» More about the William Jack Hernandez Sport Fish Hatchery



Alaska Department of
Fish and Game

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Fish & Game State of Alaska

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Licenses & Permits | Commercial | Sport | Subsistence | Personal Use | Aquatic Farming | Hatcheries | Research

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- Gene Conservation Lab
- Pathology Lab
- Mark Tag and Age Lab
  - General Information
  - Mark Lab
    - Mark Reports
    - Scale Age Meeting
    - Otolith Workshop
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    - Tag Reports
    - My Taglab
  - Age Lab
  - ASL Respository

ADF&G Home » Fishing » Research » MTA Laboratory

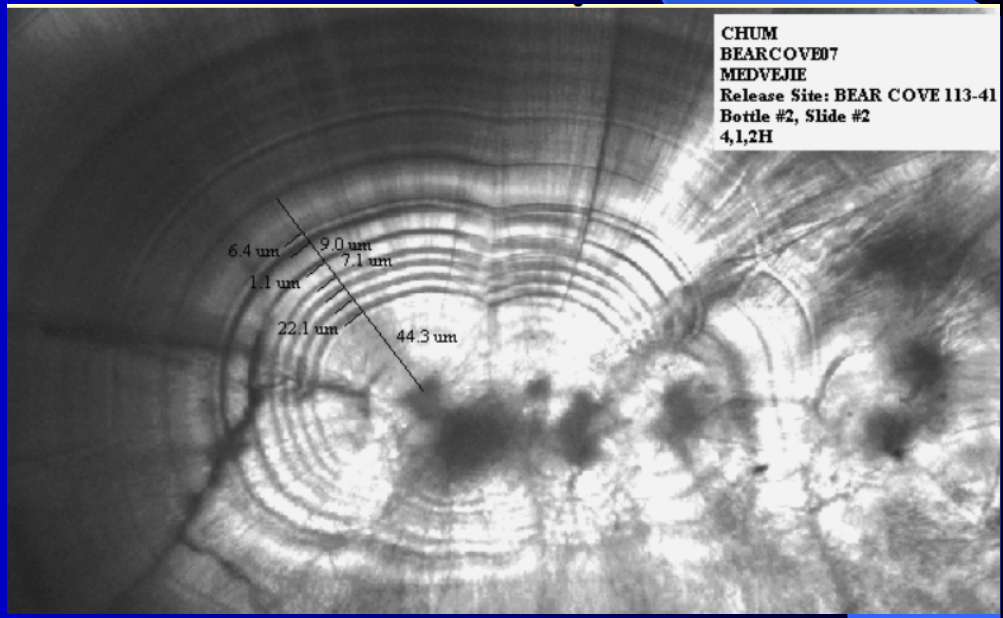
Mark Lab
Otolith & Thermal Marking Laboratory

Otoliths

Otoliths or "fish ear bones" consist of three pairs of small carbonate bodies that are found in the head of teleost (bony) fish. Otoliths are used by fish for balance, orientation and sound detection. They function similarly to the inner ear of mammals.

These pairs of otoliths differ in location, function, size, shape, and structure. The three pairs (Figure 1) of otoliths are most commonly called the lapilli, asterisci, and sagittae.

In Pacific salmon, the asteriscus and lapillus are usually quite small, only a millimeter in size, but the sagittae are much larger, ~5 mm. Thus, the sagittae are the most studied. They are often referred to as "the otoliths," although this term more correctly applies to all three structures *(Figure 2)*.

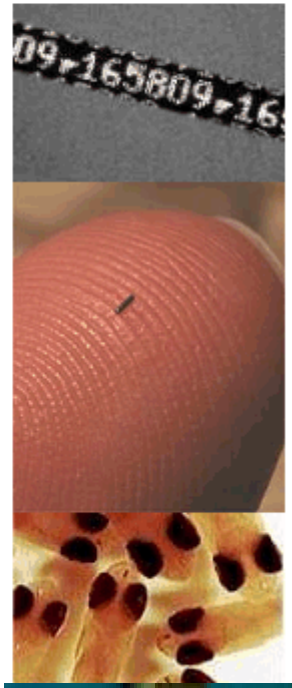


Tag Lab

Coded Wire Tag Laboratory - fact sheet last updated August 2010

What is a Coded Wire Tag?

Coded Wire Tags (CWT) are small pieces (0.25 x 0.5 or 1.0 mm) of stainless steel wire that are injected into the snouts of juvenile salmon and steelhead. Each tag is etched with a binary code that identifies its release group. Until recently all tagged fish also had their adipose fin removed. The adipose clip is the external flag identifying which adult fish bear a CWT to samplers, processors and fishers. Heads of all adipose clipped fish recovered in Alaskan waters are sent to a lab in Juneau where the tags are found using very sensitive metal detectors, dissected out of the head and decoded. Release, catch/sample and recovery data are merged and estimates of contribution of tag groups to sampled fisheries are updated each day. This stock identification tool is used by researchers and managers to evaluate success of hatchery practices, estimate survival, find out where release groups are caught and to determine stock contribution of sampled fisheries. Alaska's CWT release and recovery program is an integral part of a large coordinated coastwide program.



Coastwide Releases

Since 1968, 78 agencies in 5 states and British Columbia have used

Fish Pathology Laboratory

Mission Statement

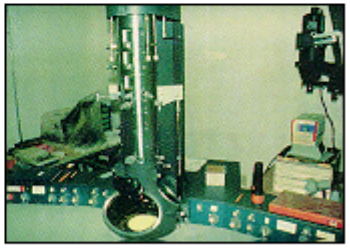
Our Mission

The Fish Pathology Section monitors and controls finfish and shellfish diseases statewide (according to Title 16 of the Alaska Statutes) by conducting diagnostic surveys, developing finfish and shellfish disease policies and by advising the Commissioner of the Alaska Department of Fish and Game and other state and federal authorities on fish disease issues.

Facilities & Staff

- Diagnostic laboratories in Anchorage and Juneau with state-of-the-art technology; transmission electron microscopy, ELISA, DNA probe, PCR.
- Staff experienced and highly trained in Microbiology, Fish Health, and Aquatic Veterinary Medicine.
- Staff comprised of two Fish Pathologists, two Microbiologists, and one Laboratory Technician.
- American Fisheries Society, Fish Health Section Certifications of Fish Pathologist and Fish Health Inspector held by staff members.

Laboratory Contact Inform



Transmission electron microscope used for examination of viruses.

- Supervise fish health activities at 34 Alaska finfish hatcheries.
- Conduct hatchery inspections annually.
- Detect fish diseases and recommend appropriate preventative measures and treatment.
- Assist hatchery personnel with field sampling and conduct workshops for training in finfish and shellfish disease recognition.

PNP Administrative Support

Salmon Enhancement & Hatcheries

Salmon hatchery operators are required to have permits for the operation of a hatchery (Hatchery Permits) as well as its specific activities (Fish Transport Permits).

Hatchery Permits

Hatchery Permits are required for the construction and/or operation of a private non-profit salmon hatchery in Alaska. Issuance of a Hatchery Permit requires an extensive review of the proposed hatchery, including the suitability of the proposed site, the hatchery design, the effects on fisheries, and the potential effects on wild salmon stocks, as well as a public hearing. Hatchery Permits are not transferable and do not expire.

- Hatchery Permit Application Process and Additional Information

Permit Alteration Requests (PARs)

Permit Alteration Requests are used to request changes to a Hatchery Permit. A PAR must be used to change the hatchery's permitted capacity, broodstock source, or approved release sites. Permit alterations are reviewed by regional planning teams and approved by the commissioner.

- Permit Alteration Request Application Process and Additional Information

Fish Transport Permits (FTPs)

Fish Transport Permits are required to transport, possess, export from the state, or release into the waters of the state, any live fish or eggs. Permits are subject to a department review that takes approximately 45 days. Reviewers may make recommendations as to whether the permit should be issued. Fish transport permits are valid for a fixed term identified in the permit.

- Fish Transport Permits Application Process and Additional Information

Reporting Forms

Hatchery operators are required to submit annual reports of egg takes, releases, and adult returns. Annual reports from each hatchery must be submitted by December 15th. The disposal of salmon carcasses used for broodstock must be documented in carcass disposal logs, which are due no later than the end of the calendar year.

- Reporting Forms Process and Additional Information

Loan Programs

Fisheries Enhancement

Loan Program Goal and Objectives

Loans may be made for planning, construction, and operation of fish hatchery facilities, including preconstruction activities necessary to obtain a permit, construction activities to build the hatchery facility, and costs to operate the facility. Loan funds may not be used to reimburse an applicant for expenses which were paid for more than six months before receipt of the application by the Division of Economic Development.

Eligibility

Loans may be made to qualified regional associations or private, nonprofit corporations who have obtained a private, nonprofit hatchery permit from the Alaska Department of Fish and Game. Loans may also be made for planning and preconstruction purposes prior to receipt of a hatchery permit from the Alaska Department of Fish and Game.

Lending Limits

The maximum loan amount is $10,000,000. If a request for more than $1,000,000, the applicant must be a regional association or private, nonprofit corporation approved by the regional association in the specific area of the proposed hatchery development.

Loan Terms

The maximum loan term is 30 years. Terms of all loans will be fixed by the loan committee in consideration of the purpose of the loan, the needs of the borrower, the collateral offered and the ability to repay the loan. No repayment of the principal is required for an initial period of six to ten years; no interest on the principal shall accrue during that period.

Interest Rate

Interest rate will be fixed at the time of loan approval. Current Interest Rates

2. Private Non – Profit Regional Aquaculture Associations

- 1975: legislature creates PNP system
- PNP system places burden of salmon enhancement on the user group (commercial fishermen)
- Voluntary creation of regional aquaculture associations
  - Cook Inlet Regional (CIAA)
  - Prince William Sound Regional (PWSAC)
  - Kodiak Regional (KRAA)
  - Northern SE Regional (NSRAA)
  - Southern SE Regional (SSRAA)
- Yakutat?

3. Non – Regional Assoc.

- No funding from regional taxation + no rep on regional planning team
- "mom and pop"
- Non Regional Assoc.
  - Valdez Fisheries Assoc. (VFDA)
  - Douglas Island Pink & Chum (DIPAC)
  - Kake Tribal (KNFC)
  - Armstrong-Keta Inc. (AKI)
  - Metlakatla (MIC)
  - Sitka Sound Science Center (SSSC)
  - Prince of Wales Hatchery Assn. (POWHA)

Regional Planning Teams – provide oversight

- Responsible for salmon enhancement planning
- Reviews management plans
- Review new hatchery permits and permit alterations
- Comprised of fishermen, reps from regional aqua assoc., regional ADFG staff
- Southeast, Yakutat, PWS, Cook Inlet, Kodiak, Chignik, Norton Sound/Bering Strait all have RPT's

PNP Program Funding

- Capital Improvement and Operating Loans provided by the State of Alaska
- Assessment Taxes
- Terminal and Special Harvest Areas
- Cost Recovery

Contact:
Pattie Skannes

Phone: (907) 747-6688
Fax: (907) 747-6693

Sitka Area Office
304 Lake Street Room 103
Sitka, Alaska 99835
Date: August 11, 2015
Time: 12:00 p.m.

SPECIAL HARVEST AREA TROLL FISHERY ANNOUNCEMENT

Sitka. . . The Alaska Department of Fish and Game announced today the following information concerning the commercial salmon troll fishery:

In cooperation with the Northern Southeast Regional Aquaculture Association (NSRAA), the waters of the Bear Cove Special Harvest Area (SHA) will close to trolling effective 12:01 a.m., August 12, 2015, until further notice.

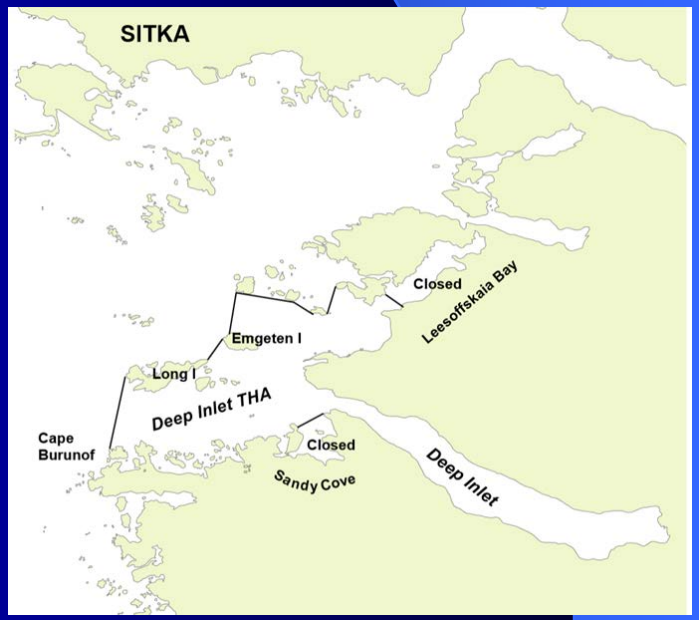
The waters of the Bear Cove SHA are as follows:

Bear Cove SHA (113-35): The waters of Bear Cove and Silver Bay east of a line from 57°00.63′ N. lat., 135°09.80′ W. long., to 57°00.75′ N. lat., 135°10.58′ W. long., to 57°01.07′ N. lat., 135°09.93′ W. long. [5 AAC 40.042(a)(4)].

Within Bear Cove, waters east of a line from a point on the south shore at 57°00.77′ N. lat., 135°09.08′ W. long., to the north shore at 57°00.94′ N. lat., 135°09.23′ W. long., will remain closed for the season [5 AAC 33.375(b)].

This closure is being implemented at the request of NSRAA in order to meet coho salmon broodstock goals at the Medvejie Creek Hatchery. When broodstock goals are met, the waters of the Bear Cove SHA will reopen to trolling.

The Emergency Order corresponding with this announcement is EO 1E1415.



What might some concerns be regarding enhanced salmon projects?

What Guidelines are Used by the State of Alaska to insure the protection of wild stocks and to regulate fisheries enhancement ?

- Genetics Policy
- Salmon Escapement Goal Policy
- Transportation, Possession, & Release of Live Fish
- Policy for Management of Mixed Stock Salmon Fisheries

Genetics Policy

- Stock Transport
- Interstate – no salmonids will be allowed into the state for release into Alaskan waters
- Inter-regional – Environments within the state vary greatly and again movement of fish and eggs is generally restricted.
- Regional – Allowed only when genetics and geography of two sites are quite similar. Highly scrutinized by ADFG and RPT

Not!

Genetics Policy

- Protection of Wild Stocks – priority 1
- The policy is designed to prevent detrimental effects of gene flow from other populations by reducing straying of hatchery stocks.
  - Do you know what straying is? Why would it be a problem?
- It is very difficult to initiate any enhancement project that would use anything but the indigenous stock for the enhancement effort.
- A watershed with significant wild stocks can only be enhanced with fish or eggs from the indigenous stock.

Genetics Policy

- Maintenance of Genetic Variance
  - Limits on how many sites can use the same genetic stock
  - In hatchery populations brood fish are selected widely across the entire span of the run using significant numbers of fish.

Salmon Escapement Goal Policy

- The Alaska Constitution mandates the Dept. of Fish & Game to Manage fishery resources on a sustained yield basis.
- ADFG manages returns in-season by EO
- Stock assessment of index streams to identify what "sustained yield" is

Fish Transport Permit – a way to manage movement of stocks

- No person may transport, possess, export from the state, or release into the water of the state, any live fish unless the person holds a fish transport permit (FTP) issued by the commissioner or his/her authorized designee and the person is in compliance with all the conditions of the permit.
- An FTP is required for transport of any life stage of fish from gametes to adults.

Fish Transport Permit Approval Process

PROJECT LEADER

↓

Submit FTP Application

↓

Regional Planning Team Review
(what's this?)

↓

ADFG Review (what departments might review this?

↓

ADFG Commissioner's Approval

Example of FTP application

Applicant **Rod Neterer**	**Organization** **SSRAA**	
Mailing Address **2721 Tongass Ave.** **Ketchikan, AK 99901**	**Phone** **225-9605**	**Species** **Sockeye**

Stock Origin/Original Donor Stock
Neck Lake/McDonald Lake

Proposed Stocking Location
Burnett Inlet

Project summary- Summary statement of precisely what is being proposed.

ADFG has requested that SSRAA terminate collection of eggs from McDonald Lake Sockeye wild stock for Neck Creek releases beginning in 2007.

SSRAA is proposing to rear and release up to 40,000 Sockeye smolt of McDonald Lake stock from the Burnett Inlet Hatchery on an annual basis to establish a returning brood stock eliminating the need to collect eggs from wild stock at McDonald Lake.

There are currently 400,000 MacDonald juveniles rearing at the Burnett Inlet Hatchery. These smolts will be transported to the raceway at Neck Creek in March for growout and release in May 2003. SSRAA is proposing to release 40,000 of these smolts from the Burnett Inlet Hatchery in May 2003 to establish a reliable brood source for future smolt releases from Neck Creek.

Returning brood fish would be captured using the existing Fish ladder / Raceway complex, and held in isolation for spawning at the Burnett Inlet Hatchery. All smolts have been thermally marked. The 40,000 smolts released from Burnett Inlet Hatchery will not have a distinguishable mark from fish released at Neck Creek. Subsequent brood year releases will be differentially marked.

Applicant/Organization: SSRAA **Date:** 1/20/03

Project Leader: Rod Neterer **Telephone No** 225-9605

Effective Period: Indefinitely **Species:** Sockeye

Transport Date(s): Release Mid May

Stock Origin/Original Donor Stock: McDonald Lake

Maximal Number Allowed: 40,000 **Lifestage:** Smolt

Incubation and Rearing Location(s): Burnett Inlet

Release Location: Burnett Inlet

Purpose and Benefits: To establish a reliable source of brood stock returning to BIH eliminating the need for continued remote egg takes from wild stock McDonald Lake Sockeye. Returning adults will contribute common property fisheries.

Evaluation Plans: Smolt releases will be thermally marked to evaluate marine survival and contribution common property fisheries.

Is release site landlocked? No

Native Stocks present, their status, and effects of the proposed action on them: Pink and Coho salmon as well Dolly Varden and Cutthroat trout. We do not anticipate any harmful effects.

History of previous transports of this stock: Previous transports of this stock have been well documented.

Disease history of stock to be transported:. Disease history for this stock is well documented and on file with CFM&D Division pathology lab in Juneau.

Description of proposed egg-take methods: Eggs will be taken in accordance with standard sockeye culture practices as described in A.D.F.&G's **Alaska Sockeye Salmon Culture Manual**.

Isolation measures planned to control disease during transport, including description of container, water source, and method and plan for transport: Does not apply. Fish will be released directly into Burnett Inlet.

Source of water for rearing and proposed effluent discharge location: Burnett Lake water discharged into Burnett Inlet.

Management of Mixed Stock Salmon Fisheries

- Conservation of wild stocks is given highest priority

Disease Transmission From Cultured Salmonids to Wild Fish Stocks:

*recall that ADFG manages for sustainability

Perspectives on the Alaskan Hatchery Program

ADFG Fish Pathology

Fewer significant pathogens and diseases in Alaskan salmonids than in other areas of North America:

Why might this be?

Fewer significant pathogens and diseases in Alaskan salmonids than in other areas of North America:

- Geographic isolation
- Colder water temperatures
- Protective legislation

Categories of Disease Agents in Alaska

- Indigenous pathogens
- Emergent pathogens
- Exotic pathogens

Emergent Pathogens

- Appear due to environmental disturbances or anthropogenic activities; later found to be indigenous

a. North American Viral Hemorrhagic Septicemia Virus (VHSV) in environmentally stressed Pacific herring

b. *Hematodinium sp.* Bitter Crab Dinoflagellate in commercially fished Tanner crabs

Exotic Pathogens

- Originate elsewhere
- Brought to new area by fish and/or fish products
- Most serious concern to wild and hatchery fish stocks
- No record of occurrence in Alaska

Disease Considerations for Wild and Hatchery Fish Interactions in Alaska

1. Exotic fish pathogens prevented from introduction by state legislation
2. Alaskan hatchery stocks of fish originate from native salmonids with indigenous pathogens
   - prevalence of Rs and IHNV can approach 100% in wild fish stocks

Considerations (contd)

3. Hatchery Water Supplies

- Many have resident fish species carrying indigenous pathogens
- Exception is fishless or depurated water supplies for sockeye salmon facilities

Are you paying **attention** in class?

Considerations (contd)

4. Statewide Fish Disease Policy

- Rigorously controls fish pathogens and their diseases in the hatchery environment
- Clinically diseased fish cannot be released where the pathogen does occur - no amplification
- Healthy fish with history of pathogen cannot be released where the pathogen does not occur in resident stocks - no dissemination
- Policy manages both the pathogens and diseases

Considerations (Contd)

5. Hatchery Release Sites

- Most are established for minimal interactions with wild fish stocks or no interaction at all
- Pathogen transmission most likely to occur when fish densities are high in freshwater
- Pathogen transmission least likely to occur after fish disperse into marine environment

The Trend

4. Statewide fish disease database

- NO increasing trends in prevalences of the indicator pathogens, Rs and IHNV
- NO increasing trends in the levels (titers) of IHNV
- NO significant difference in prevalences of indicator pathogens regarding hatchery Vs wild fish stocks

Disease Interactions

5. IHNV-wild and hatchery isolates (1977-1996)

- Low genetic diversity with stasis over time (RNAse Protection Assay)
  - genome fingerprint
  - nucleotide sequences
- No change in salmonid species susceptibility
- Virus evolutionarily constrained in Alaska
- Apparently unaffected by hatchery practices

The Good News

- NO change observed in prevalences of other regulated pathogens common to both wild and hatchery salmonids
- NO recorded evidence of significant disease in wild salmonid stocks that can be attributed to transmission from hatchery fish

Conclusion

- Status quo for disease in Alaskan salmonids appears relatively static with cyclical peaks and declines
- Hatchery practices and hatchery fish stocks have NOT increased pathogen levels and prevalences in wild salmonid stocks

Not to say we can let our guard down……