

# SALMON BROODSTOCKS IN SEAWATER – LIFE IN A 20' OCEAN – THE MANCHESTER EXPERIENCE

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# The Queen of Everything



# Overview

- ▣ Manchester Research Station
- ▣ Salmon Captive Brood programs
- ▣ Salmon culture in seawater – the good & the not-too-good....

# Facilities

## ▣ Manchester Research Station







22

14

16

13

18

19

9

5

4

1

6

15-A

15-B

20

12

11

21

8

Beaver Creek

Beaver Creek

# Programs

ESA-listed salmon captive broodstocks

- Sockeye, chinook, (pinks)

Steelhead research

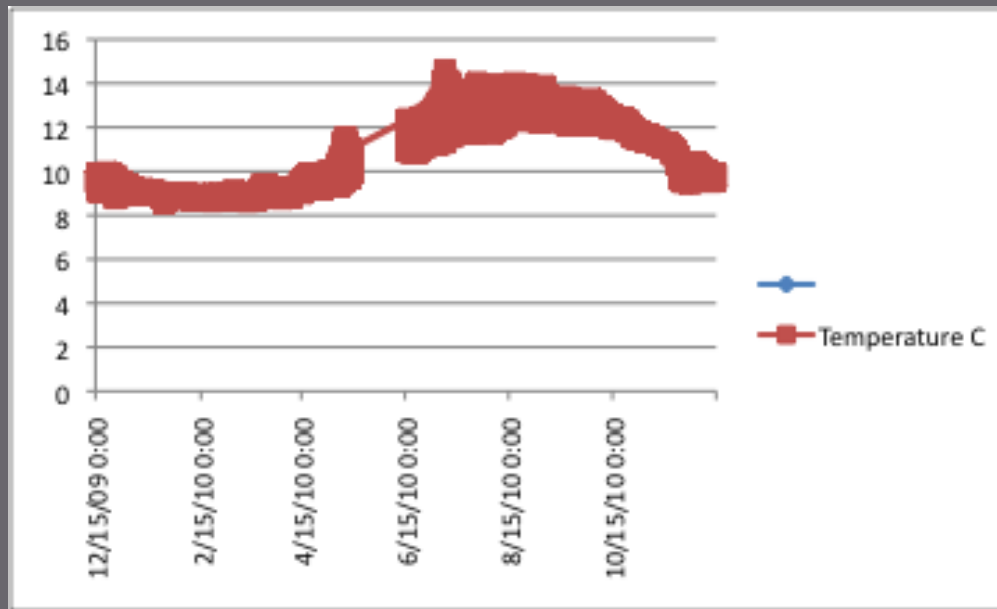
Sablefish research (aquaculture)

Shellfish research

Macroalgae (seaweed)

Genetics lab

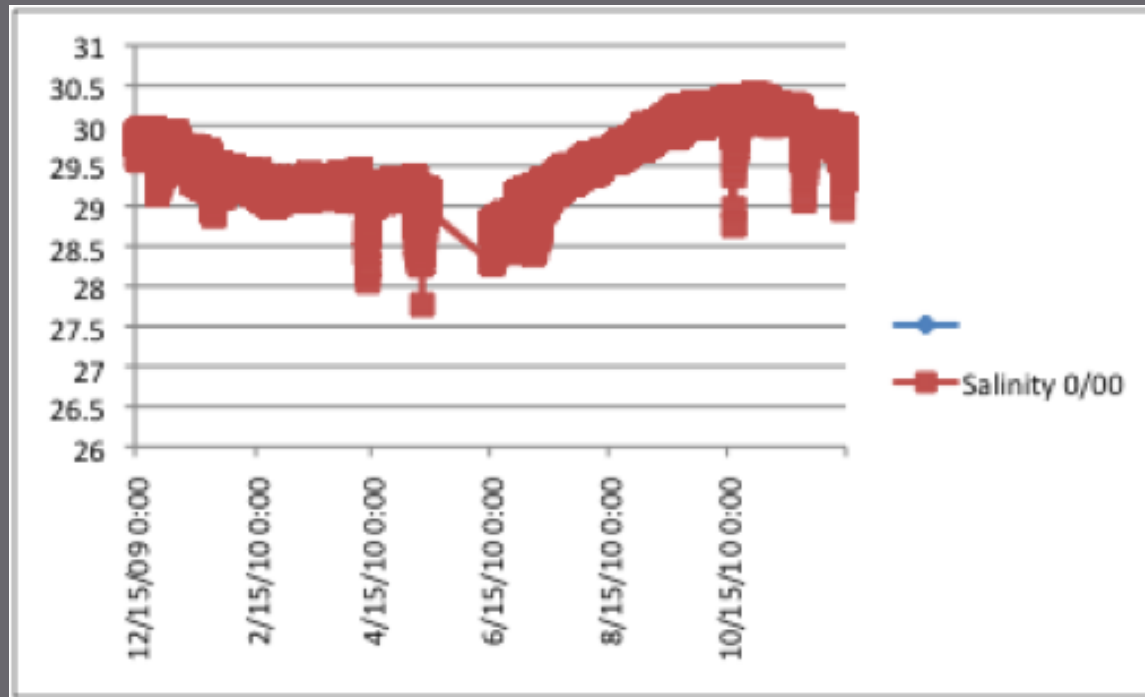
Manchester Temperature (°C) 12/15/09-  
12/14/10  
-(note-no data available for 5/14-6/15/10)



Data from NANOOS probe records  
([www.ecy.wa.gov/programs/eap/mar\\_wat/data.html](http://www.ecy.wa.gov/programs/eap/mar_wat/data.html))

# Manchester Salinity data (o/oo): 12/15/09-12/14/10

(note-no data available for 5/14-6/15/10)



Data from NANOOS probe records  
([www.ecy.wa.gov/programs/eap/mar\\_wat/data.html](http://www.ecy.wa.gov/programs/eap/mar_wat/data.html))



# Seawater Rearing Facility



# THE OLD vs THE NEW

1995



2006



# Seawater Processing

## First Step in Maintaining Biosecurity

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- 2200 gpm processed seawater
- Sand Filters remove all particles larger than 20 microns
- Cartridge Filter remove all particles larger than 5 microns
- Ultra violet light used to disinfect filtered water





# Programs & Cooperators

Redfish Lake Sockeye – 1991 to 2020??

Salmon River Spring Chinook – 1994 to 2010

- Idaho Dept of Fish and Game
- Shoshone-Bannock Tribe
- NOAA Fisheries
- Oregon Dept of Fish and Wildlife
- Bonneville Power Administration



Grande Ronde River Spring Chinook - 1994 to 2010

- Oregon Dept of Fish and Wildlife
- Confederated Tribes of the Umatilla Indian Reservation
- Nez Perce Tribe
- NOAA Fisheries
- Bonneville Power Administration





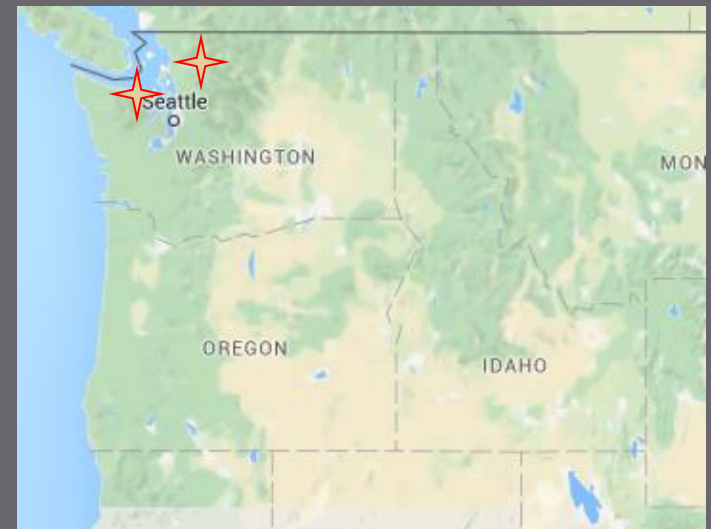
# Programs & Cooperators

## Puget Sound Spring & Fall Chinook – 2007 to 2017

- Washington Dept of Fish & Wildlife
- Lummi Tribe
- Nooksack Tribe
- Stillaguamish Tribe
- Northwest Indian Fisheries Commission
- NOAA Fisheries

## Elwha River Odd Year Pinks

- Lower Elwha Klallam Tribe
- Washington Dept of Fish & Wildlife
- NOAA Fisheries
- National Park Service



# Programs & Cooperators



# Seawater Salmon Rearing



- ▣ Manchester Research Station
- ▣ 120' x 110' brood building with 20 - 20' d tanks x 5' h
- ▣ 120' x 54' brood building with 12 - 16.5' d tanks x 5'h



# SMOLT to ADULT

## Freshwater to seawater

Smolts transferred into freshwater pools

Seawater added at 5gpm

Transition to 100% seawater in 1 – 2 days



Manchester – Bldg 22



# SMOLT to ADULT

## 1 – 5 years

Reared in variety of circulars from 6' to 20' diameter

Rearing density – 0.5 lbs/ft<sup>3</sup>

Loading density – 7 lbs/gpm

May & June – smolts coming in

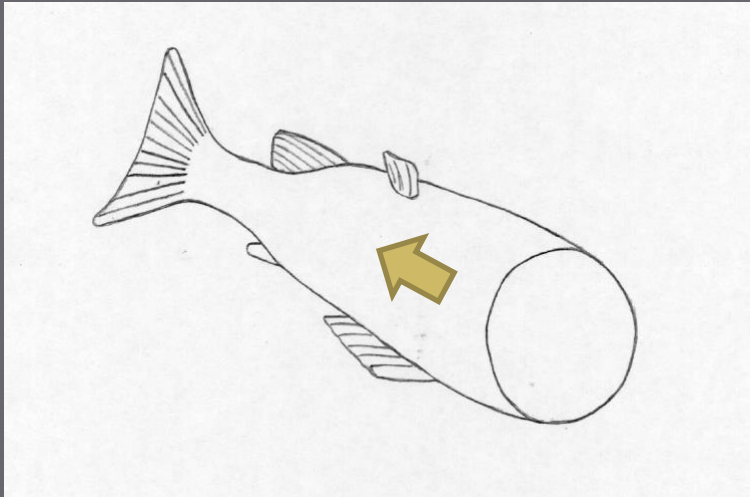
June & July – adults going out

- Maturity sorting
- Transfer back to freshwater for spawning

# Smolt to Adult

## 1 – 5 years

- ▣ Cross-sectional view of the fish.



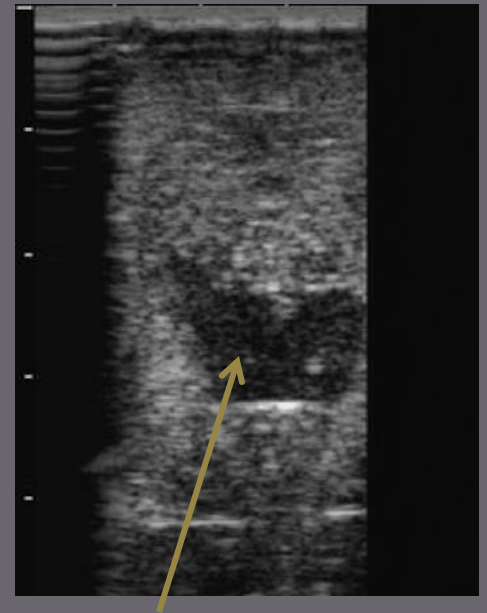
# SMOLT to ADULT

## 1 – 5 years

Maturity sorting using ultrasound (Manchester Research Station)



Eggs



Testes

# ADULT TRANSFER

## Seawater back to Freshwater

Transferred in 2/3 freshwater & 1/3 seawater  
Fish are crowded up and netted into transfer trucks  
Transfers vary from 1 – 16 hours





# ADULT TRANSFER

## Seawater back to Freshwater



# Seawater Culture Challenges & Benefits

## BENEFITS

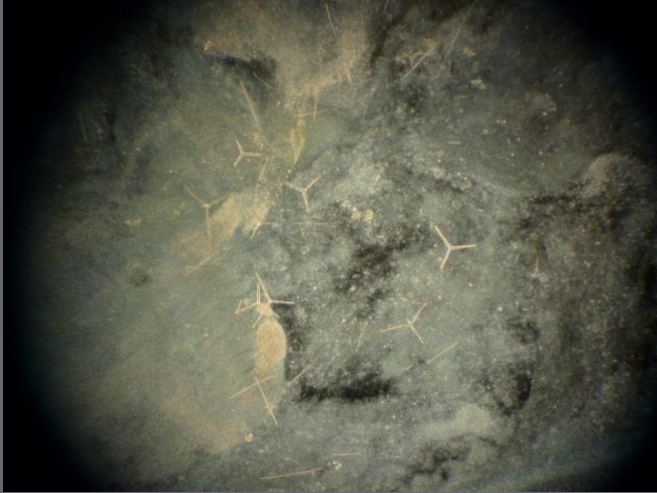
- Normal life cycle environment
- Moderate temperature fluctuations
- Excellent fin quality
- Good survival (50 – 80%)



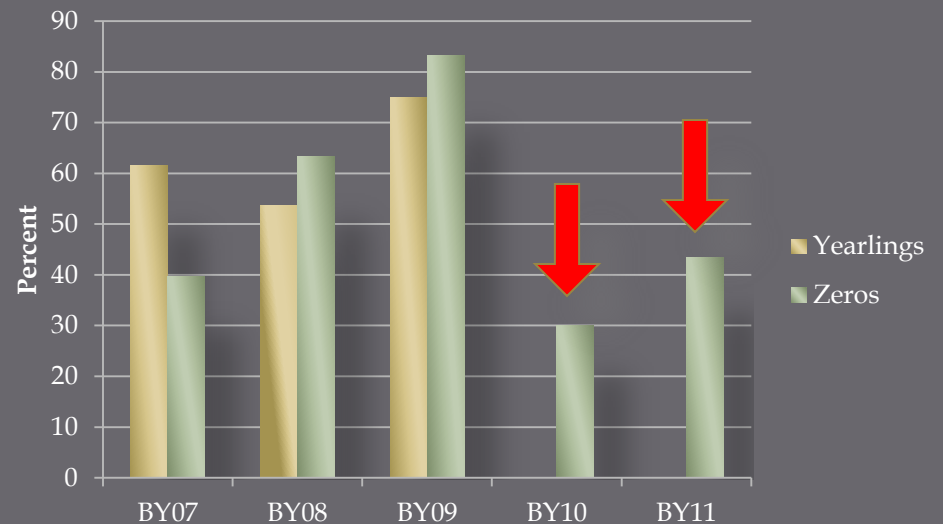
## CHALLENGES

- Transition - freshwater to seawater to freshwater
- Organic soup – crab larvae, algae blooms, jelly fish, scuba divers....
- Marine growth in inflow plumbing – mussels, sponges, barnacles, starfish
- Marine organisms in the rearing tanks – sponges
- Hell on equipment & people

# Sponge attacks



## Survival





# RESULTS





# A Big Thank You to:

All the cooperators – state, tribal, federal agencies  
(no bloodshed or fisticuffs over the years....)

Staff of the Manchester Research Station

James Hackett – facility maintenance head guy who keeps the  
whole complicated system running

# Questions?

