

# **Use of Hydraulic Sampling Methods to Source Spring Chinook Salmon Eggs For a Captive Propagation Program**

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## **Co – Author Acknowledgements**

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**National Oceanic & Atmospheric Administration**

# **Background and History**

## **Captive Rearing Program for Salmon River Chinook Salmon**

- **Ongoing since 1995.**
- **Actions coordinated by Chinook Salmon  
Captive Propagation Technical Oversight  
Committee.**

# Background and History

## Captive Rearing Program for Salmon River Chinook Salmon

- Cooperative – multi agency / tribe.

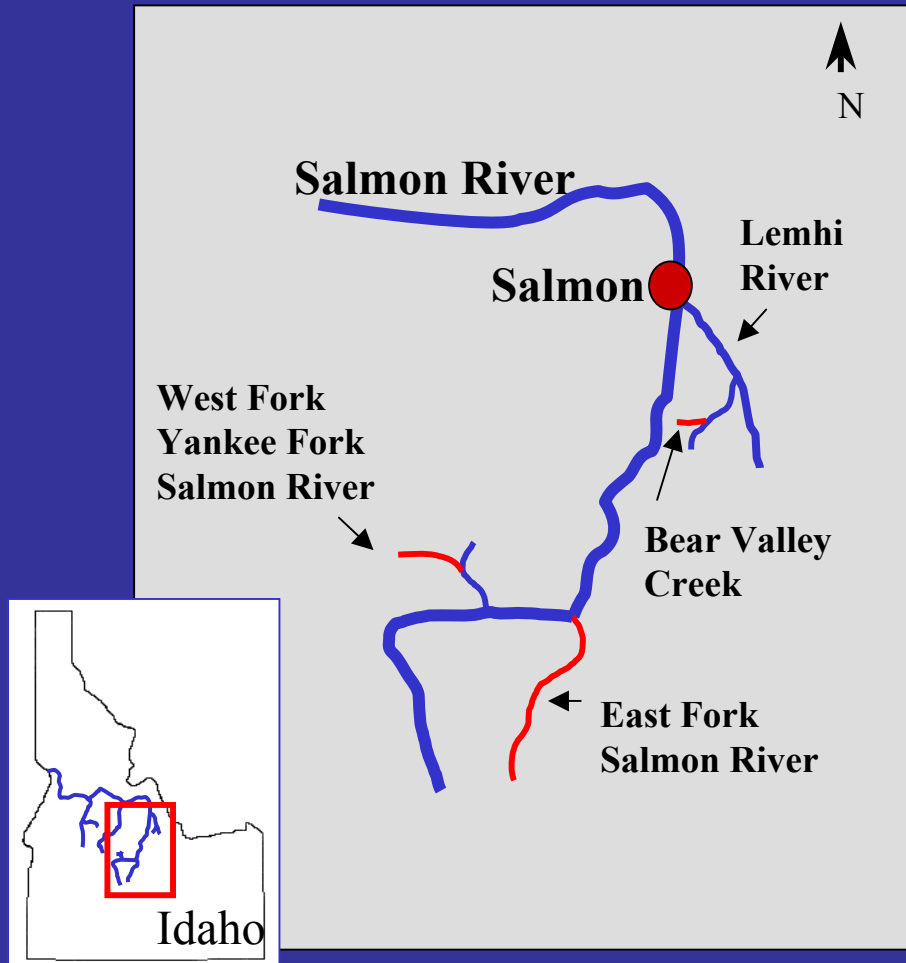


National Oceanic  
and Atmospheric  
Administration

National Marine  
Fisheries Service



# Chinook Program Study Area



# Rearing Facilities



**IDFG - Eagle, ID**



**NOAA – Manchester, WA**

## Program Goals:

- Prevent the extinction of three spring chinook salmon stocks using captive rearing strategies.
- Minimize intervention impacts –  
Captive rearing vs captive broodstocking

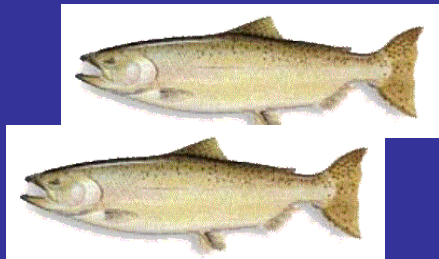
## **Primary Objectives:**

- **Develop and test captive rearing techniques.**
- **Provide captively-reared adult spawners to the natural environment.**
- **Evaluate post-release behavior and spawning success.**



# Captive Rearing Concept

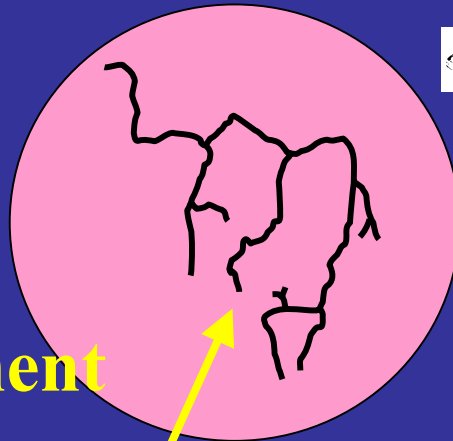
1) Wild Adults Spawn



2) Collect Eggs  
or Juveniles



Supplement

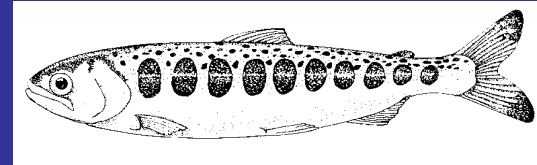
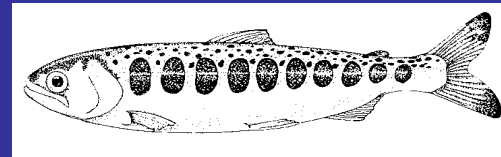
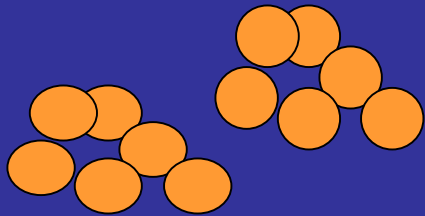


3) Rear to Adult  
Life Stage



4) Release Adults for  
Natural Spawning

# What Life Stage To Start With:



**Collect Eggs or Juveniles?**

## History – Parr Collections

- Juvenile collections initiated in 1995 (brood year 1994) and discontinued in 1999.
- Approx. 200 parr from each stream.

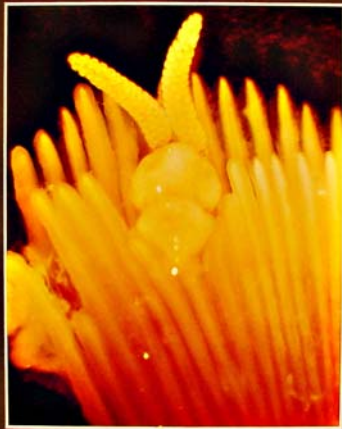
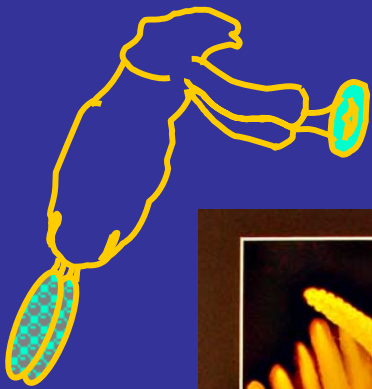


# **Parr Collections - What Did We Learn?**

# Parr Collections - What Did We Learn?

- **Gill parasites** *Salmincola californiensis* (Lemhi)

**Manual removal – negative impacts**



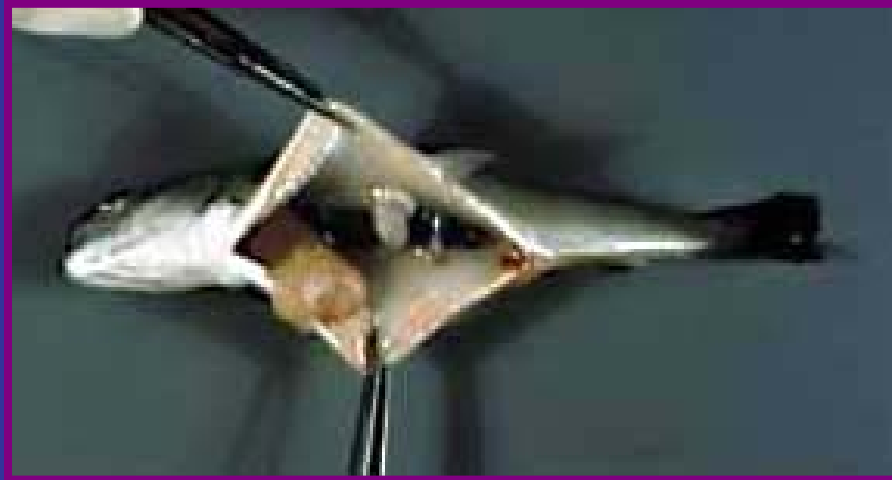
*Salmincola californiensis*



## Parr Collections - What Did We Learn?

- **Bacterial kidney disease (all streams)**

**Significant mortality in seawater and freshwater**

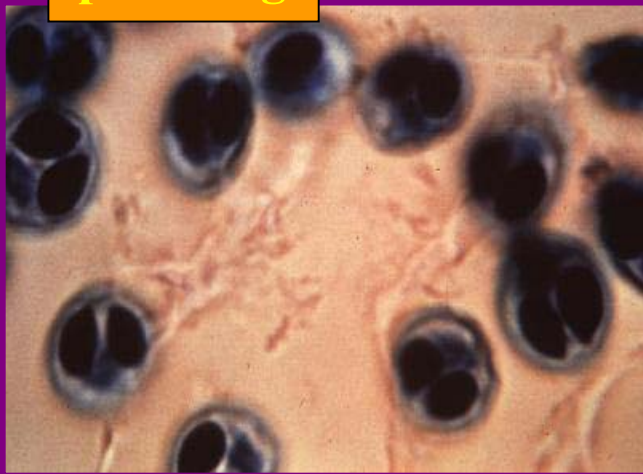


# Parr Collections - What Did We Learn?

- Whirling disease (Lemhi)

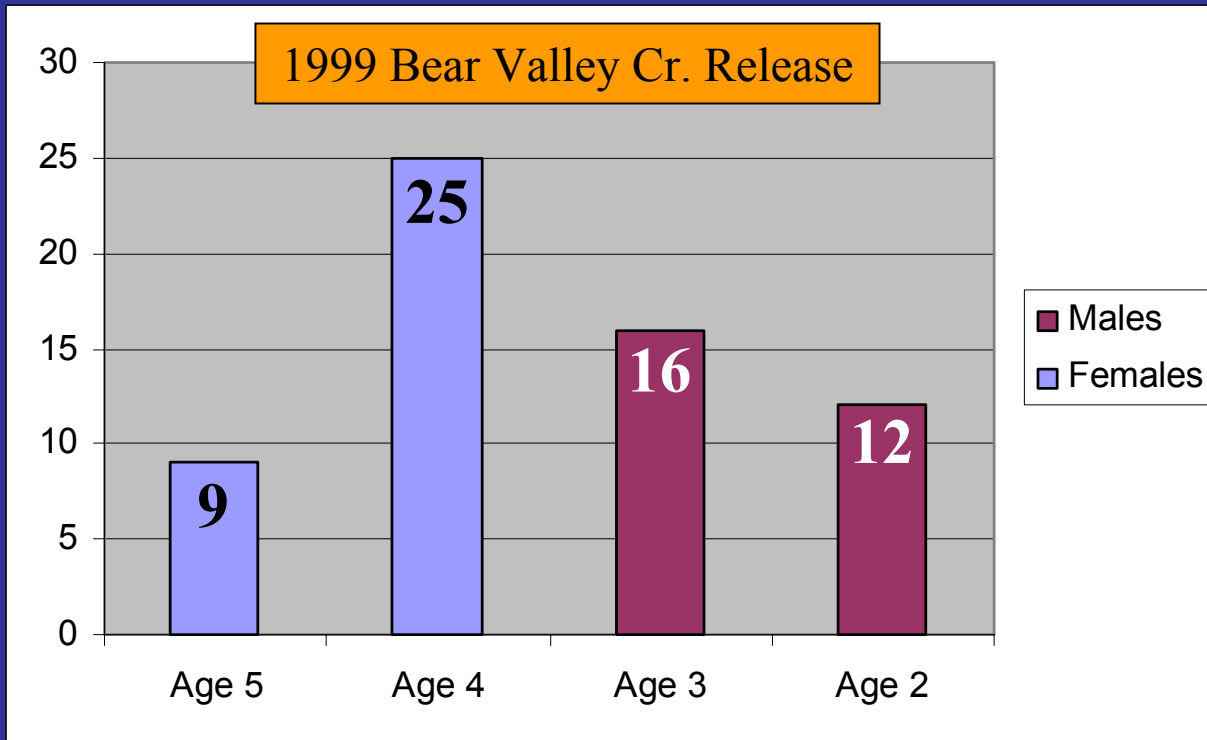
**Deformities in adults may impact  
spawning interactions**

spore stage



## Parr Collections - What Did We Learn?

- **Skewed sex ratios at collection (all streams)**  
**30% male, 70% female typical**





## Parr Collections - What Did We Learn?

- Conversion to hatchery diet  
Slow for all groups  
(growth and size target impacts)



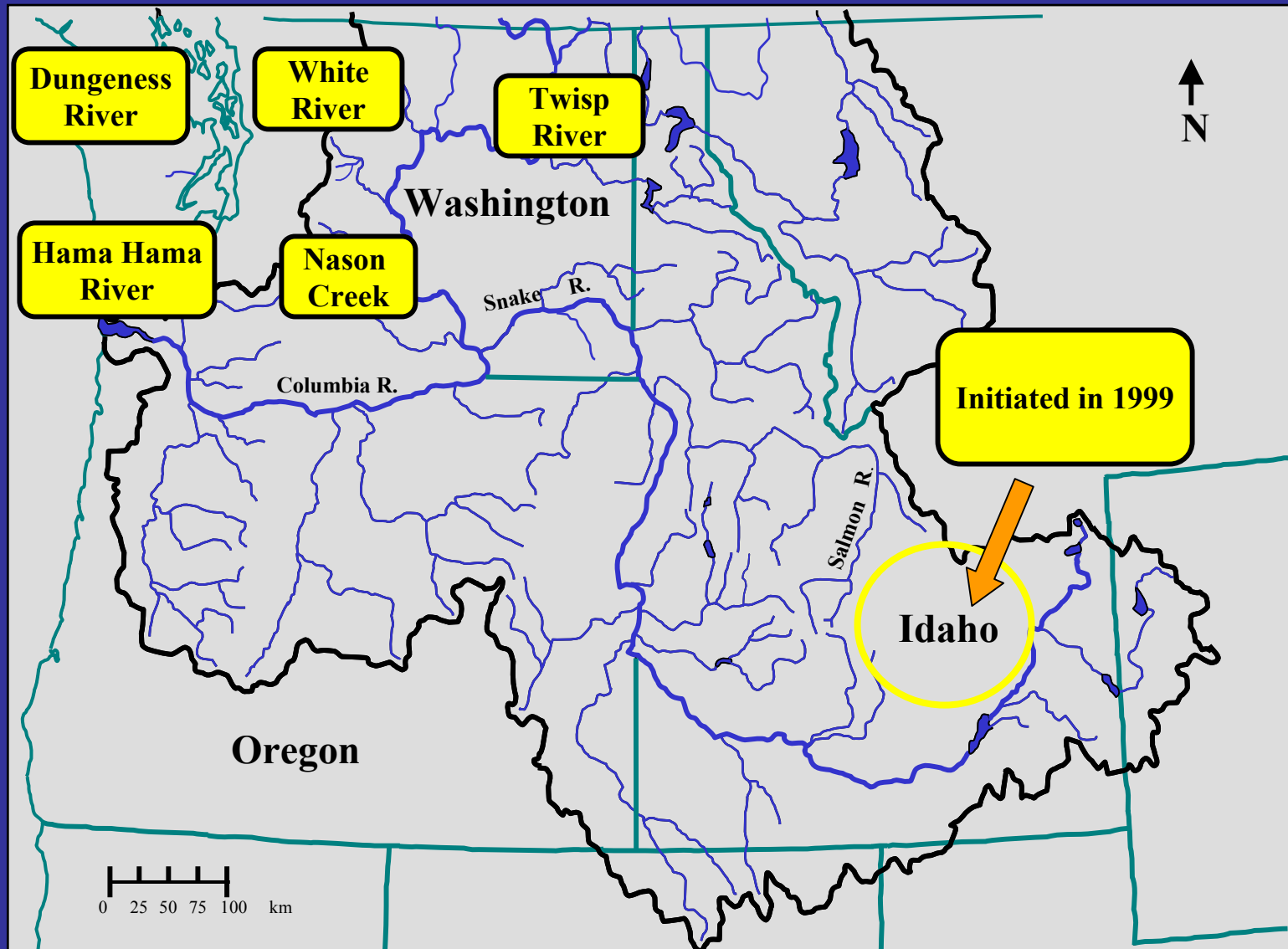
# Why Start with Eggs?

- Fish health -
  - ✓ No gill parasites, WD
  - ✓ Egg disinfection (BKD)
- Sex ratio -
  - ✓ *Assumed* 50/50 (+/-) ratio
- Known family representation -
  - ✓ *Assumes* # redds equates to # unique families
- Growth target -
  - ✓ Rapid conversion to hatchery diet

# History of Hydraulic Sampling

- Experimented with in 1950's.
- First reported in the literature in 1960's.
- Used primarily to evacuate pink salmon redds for the purpose of estimating fecundity and mortality of eggs and fry.
- Recently, described as an alternate method to egg boxes for planting eggs in streams.

# Who Collects / Has Collected Eyed-Eggs?



# Hydraulic Sampling - IDFG

- Field observations –
  - ✓ Redd data
    - location
    - completion date
    - marking
  - ✓ Water temperature monitoring
    - thermographs





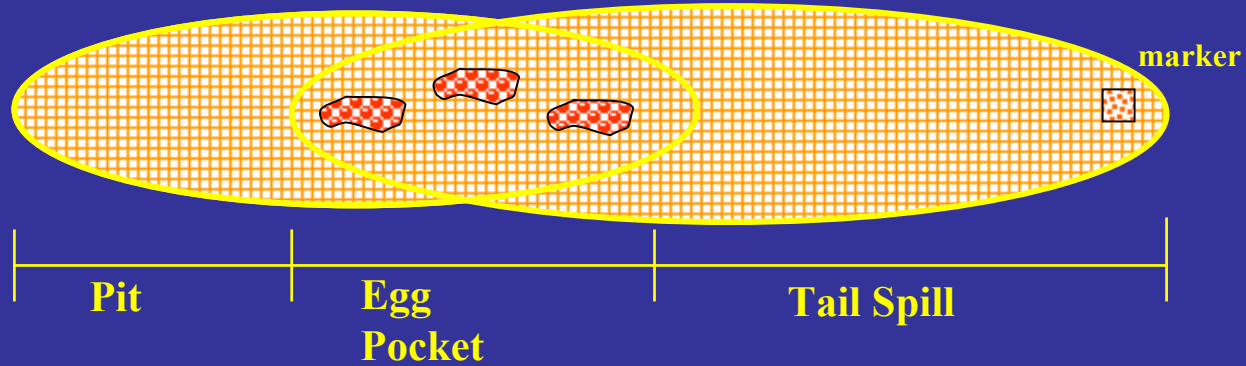
# Hydraulic Sampling - IDFG

Chinook salmon redd (marked with rod)

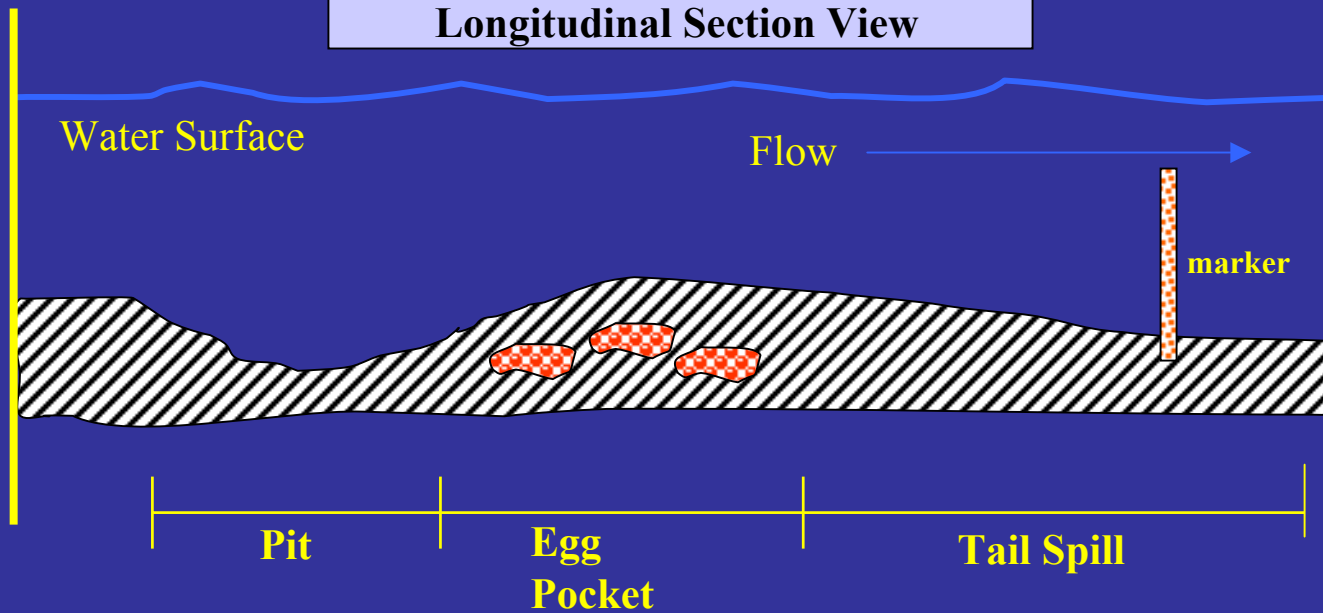


# Redd Characteristics

Plan View



Longitudinal Section View



# Hydraulic Sampling - IDFG





# Hydraulic Sampling - IDFG





# Hydraulic Sampling - IDFG

A



P. Hassemer

## Collection Objectives

- **Collect 300 eyed-eggs per stream -**
  - **target six redds (~50 eggs per redd)**
- **275 fry available at ponding**  
**(90+% eyed-egg to ponding survival)**
- **260 smolts available for seawater transfer**  
**(95+% ponding to smolt survival)**

# Preliminary Findings

- Excellent survival to date (egg – smolt)

Brood Year	Egg Source	# Eyed Collected	Number Poned	% Survival Eye-Pond	Smolt Inventory	% Survival Pond-Smolt
1999	Lemhi	264	244	92.42	235	96.31
1999	EFSR	143	141	98.60	138	97.87
2000	EFSR	503	497	98.81	439	88.33
2000	WFYF	304	296	97.37	280	94.59
2001	EFSR	311	297	95.50	285	95.96
2001	WFYF	272	268	98.53	257	95.90
2002	EFSR	328	317	96.65	(Pre-smolts)	
2002	WFYF	308	284	92.21		
Totals:		2433	2344	96.34		93.75

## Preliminary Findings

- Excellent survival to date (egg – smolt).
- *Salmincola*, WD eliminated.
- Mortality associated w/BKD absent in freshwater phase & greatly reduced post-seawater transfer.
- Sex ratios more evenly balanced.  
(initiated in 1999 & still awaiting final age-5 maturation)

# **Drawbacks – Eyed Egg Sourcing**

- **“Redd safety” issues –**
  - **trampling**
  - **harm to remaining eggs ?**
- **Redd construction dating and location mapping are critical (time / labor intensive)**
- **Accurate temperature monitoring is critical**
- **Precocial male maturation may increase**



