

# Anadromous Fish Screen Program

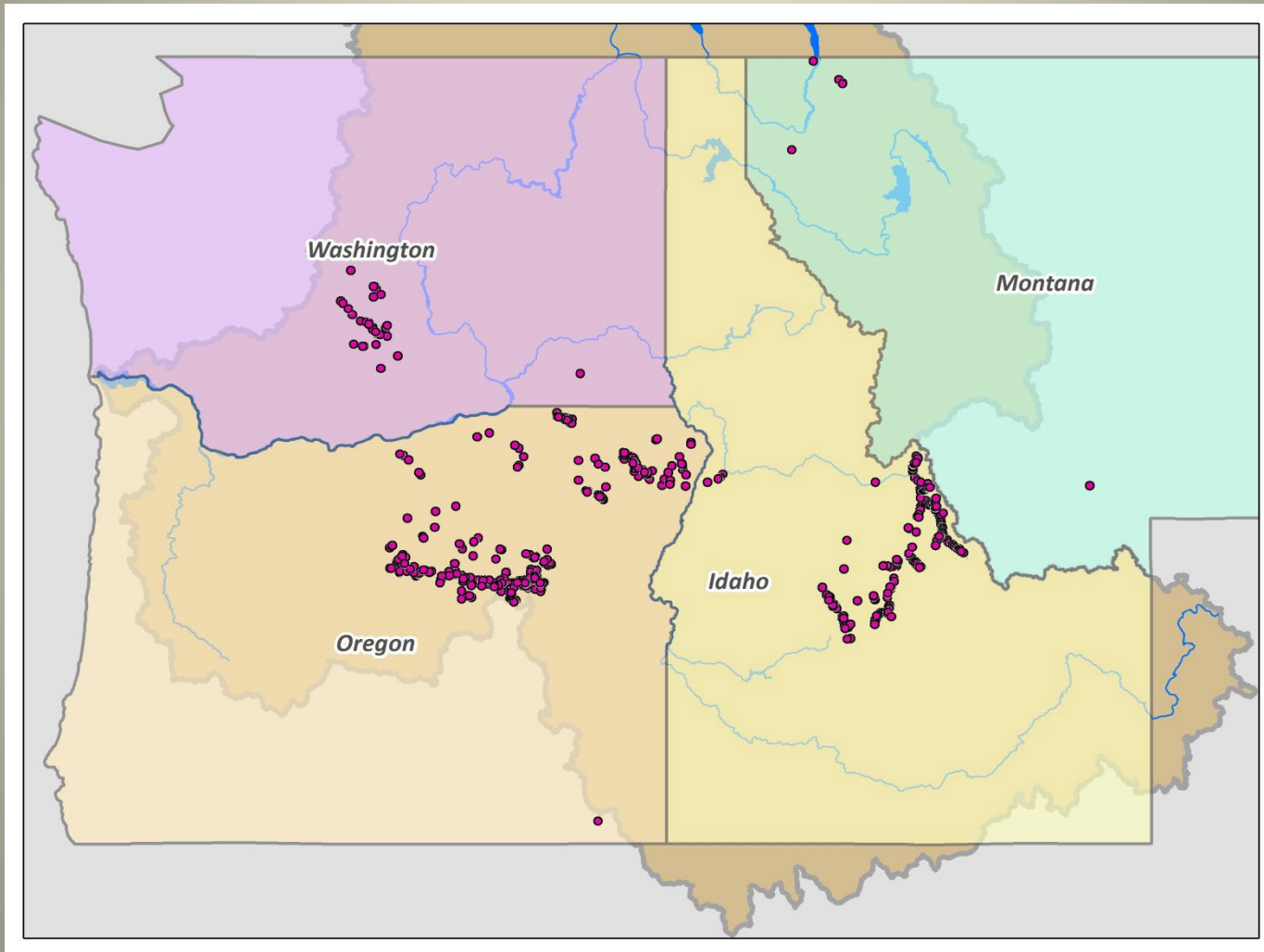


**Idaho Department of Fish and Game –**



**Paddy Murphy – Program Coordinator  
Anadromous Fish Screen, Passage, and Habitat Program  
Idaho Department of Fish and Game  
Region 7 – Salmon, Idaho**

# Existing Fish Screens by State

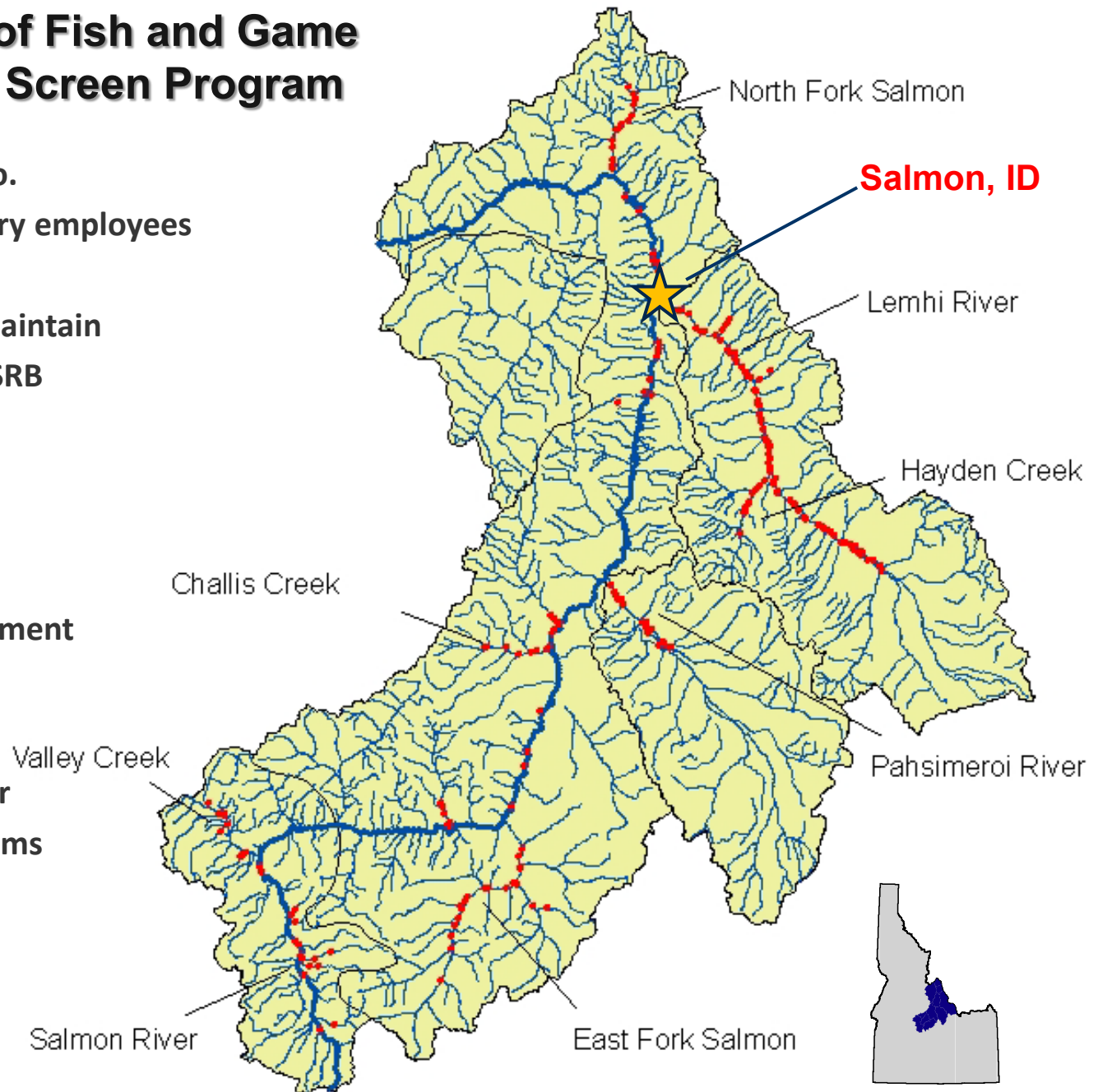






# Idaho Department of Fish and Game Anadromous Fish Screen Program

- Located in Salmon, Idaho.
- 12 full-time/ 17 temporary employees
- Installed, operate, and maintain 281 fish screens in the USRB
- NOAA Mitchell Act / BPA
- Major Limiting Factor:  
Fish passage and entrainment
- 350 miles mainstem river
- 130 miles tributary streams





# Objectives

## **Goal -**

***Increasing fry to smolt survival of  
anadromous salmon and steelhead***

- Operate and maintain 281 fish screens on a daily basis
- Improving fish passage to critical tributary habitat

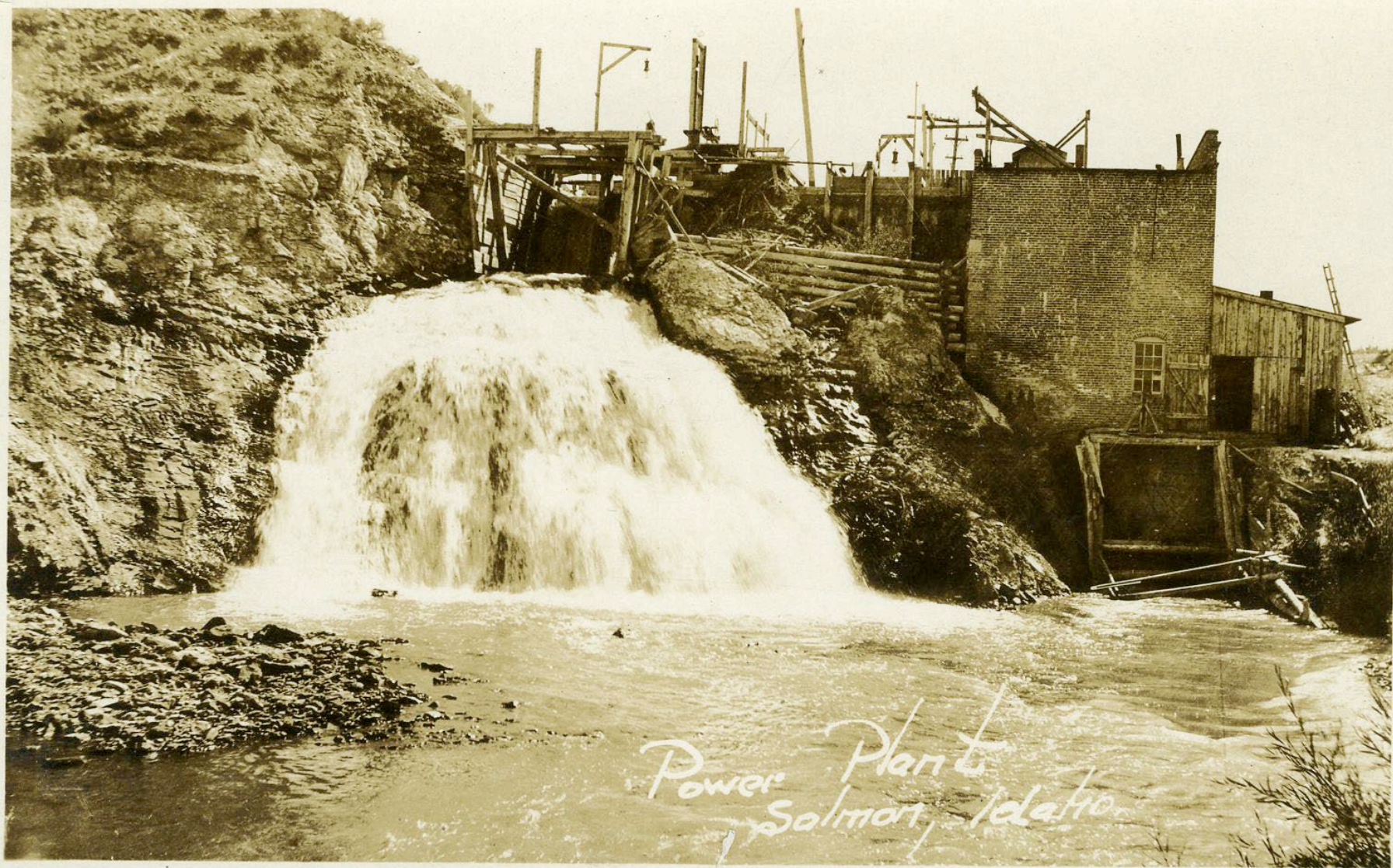






















# Chinook Salmon Entrainment

## Lemhi River

- High entrainment losses into irrigation systems provided the impetus for fish screening in the late 1950's.
- In 1958, it was estimated that 423,000 salmon fingerlings were lost in 90 irrigation canals (Gebhards 1958).
- In 1961 and 1962, it was estimated that 84 screens on the Lemhi River bypassed 271,000 and 91,500 juvenile Chinook salmon (Corley 1962).



# History of the IDFG Fish Screen Program

- Mitchell Act of 1938 expands to include the Snake River system above McNary Dam
- Columbia River Fisheries Development Program (CRFDP)
- 
- Dedicated annual funding since 1957
- Focus is anadromous fish screens and passage facilities





# 1957-1966

- **Implementation Phase**
  - *220 screens installed in Salmon River basin*
  - *Dagger Falls & Selway Falls fish ladders*



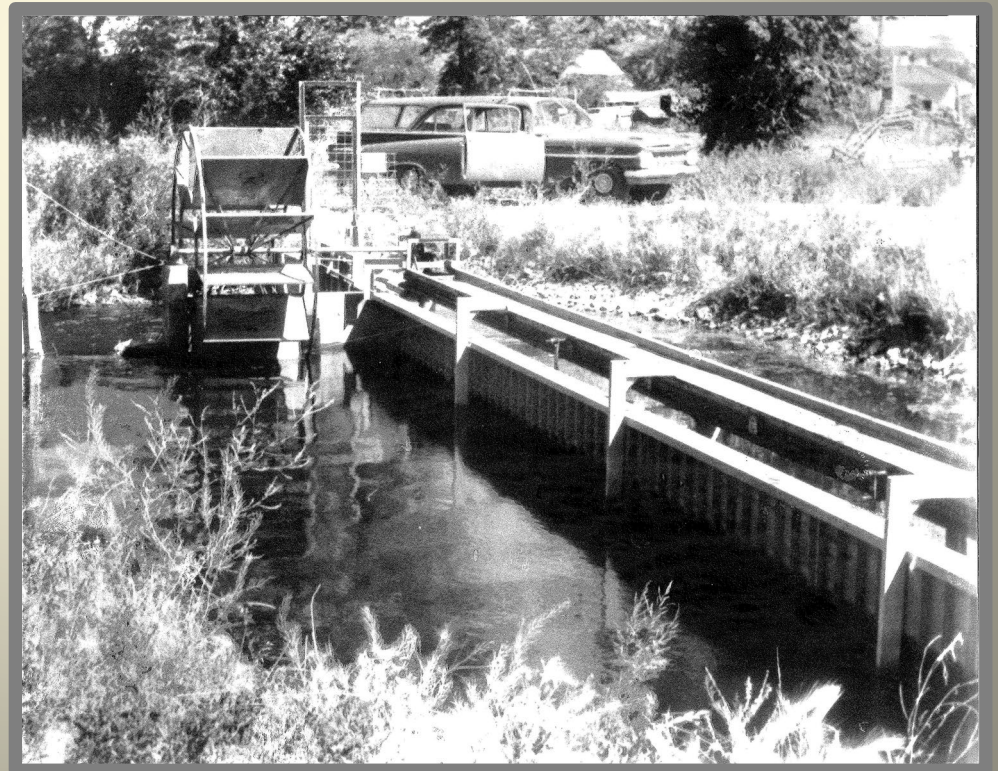
**Wiper Screen 1958**



**Louver Screen 1961**

# 1967-1972

- O&M of existing screen
- No new major projects
- Realization of wiper screen faults



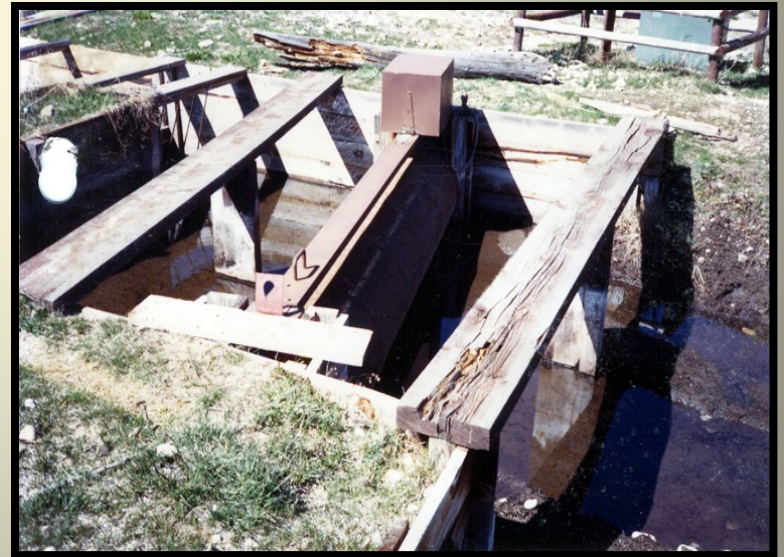


# 1973-1990

- First rotary drum screens installed
- Wooden frame screens installed as a way to save money



**Perpendicular Rotary Screen**



**Wood Frame Screen**

# Pivotal Years -

## 1991

- ESA-listings
- NOAA criteria screens
- Program Coordinator

## 1993

- BPA funding
- New Screen Shop
- Screen quality improves
- Modular fish screen





# Limiting Factor: Water Diversion

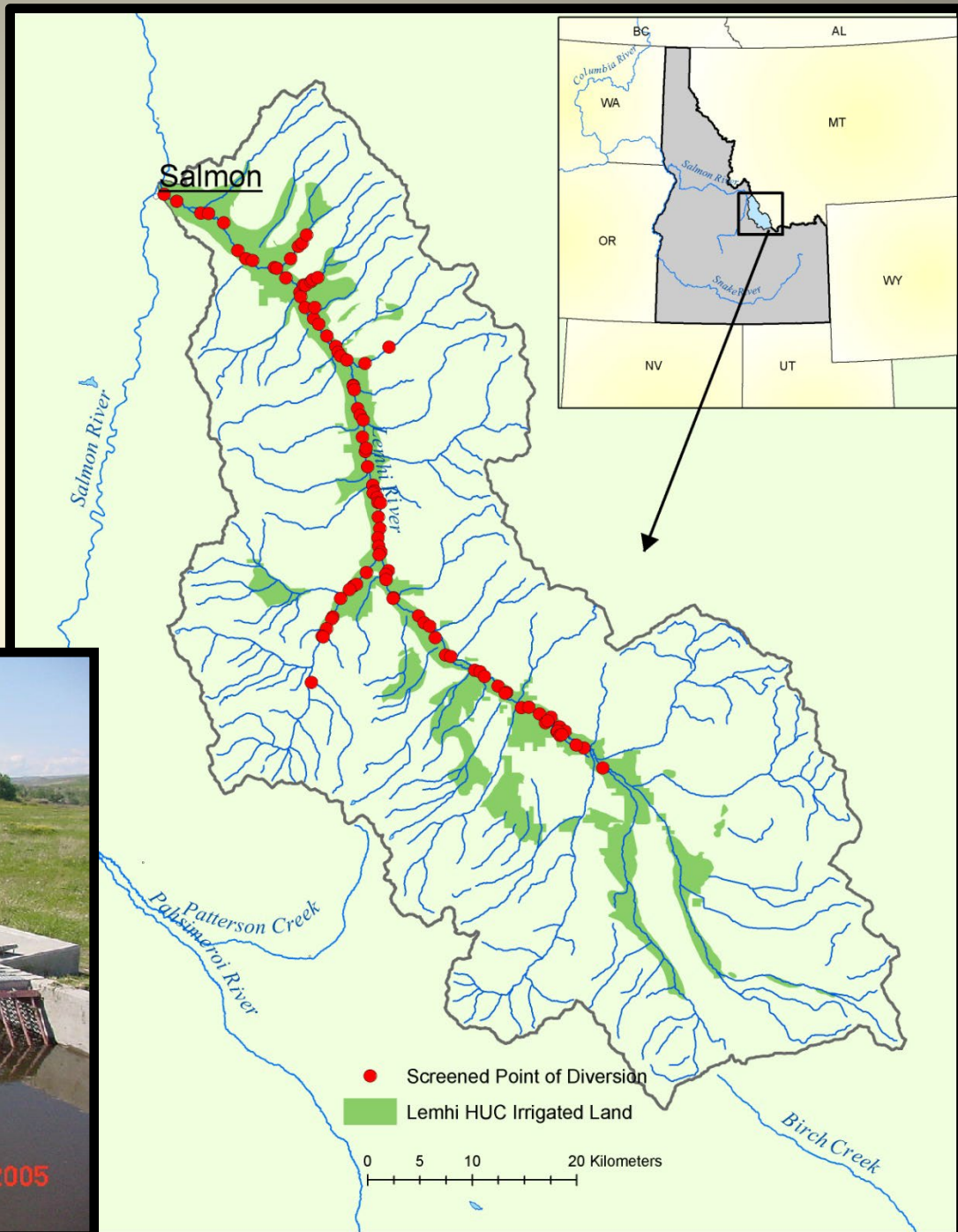
- *Entrainment*
- *Fish passage /Migration barriers*
- Isolation of populations
- Alters fluvial processes
- Decreases available habitat
- Decreases productivity
- Increases water temperatures





# Upper Salmon River Basin Fish Screening

- High percentage (> 90%) of Chinook salmon spawn on private property
- All mainstem diversions are screened
- Rotary drum screens built to NMFS Juvenile Fish Screen Criteria
- High Priority – Subbasin Plans, Recovery Plans





# Emphasis on Water Conservation and Partnerships

- *Fish screens can't resolve habitat issues*
- Screen installation is the last action

- Water conservation
- Diversion eliminations
- Diversion consolidations
- *Conservation* agreements
- Purchase water rights
- Pipeline for conveyance loss
- Sprinkler system to reduce consumption





# A Foundation Built on Relationships

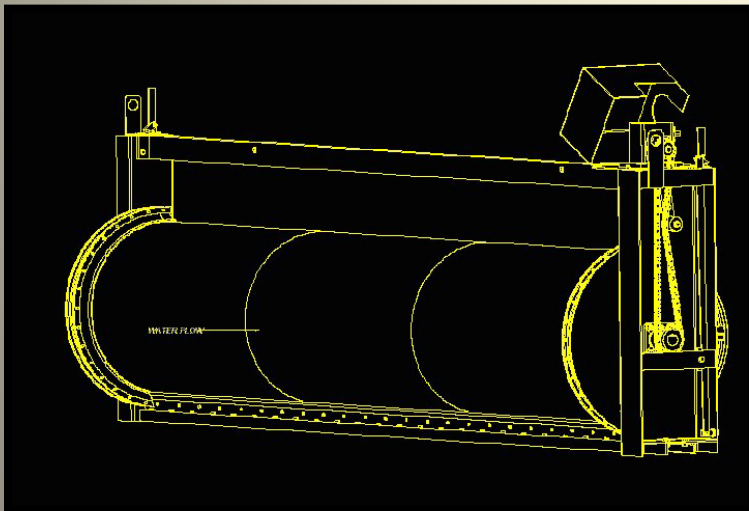


MAY 31 2006



# Fish Screens are Complex

- Needs a true Bio-Engineering approach
- Every site has its own unique characteristics
- Engineering is critical to meet criteria
- Biological interactions need consideration
- Maintenance cannot be underestimated





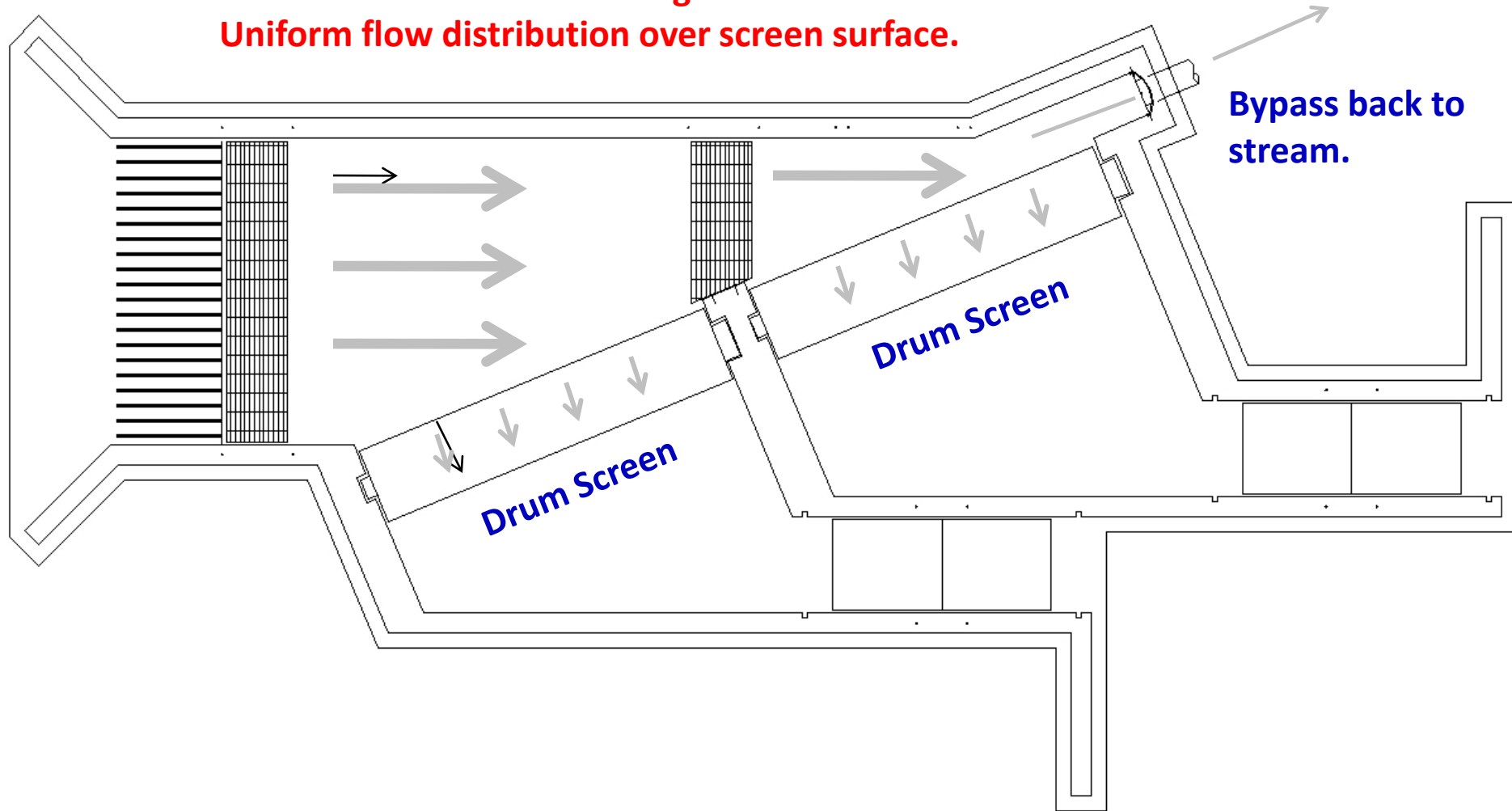
# Screen Criteria





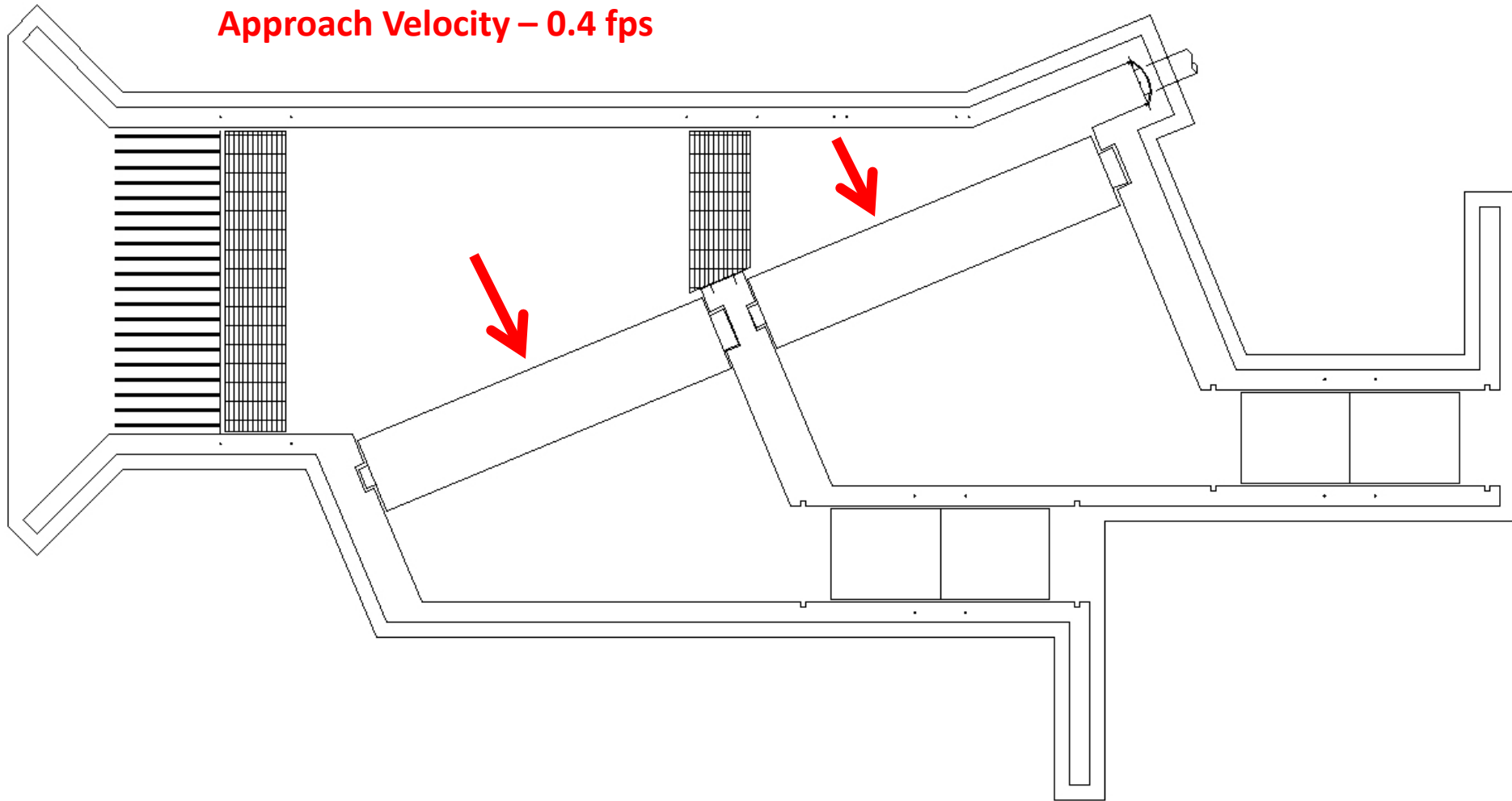
# Juvenile Fish Screen Criteria

Uniform laminar flow coming into fish screen.  
Uniform flow distribution over screen surface.



# Juvenile Fish Screen Criteria

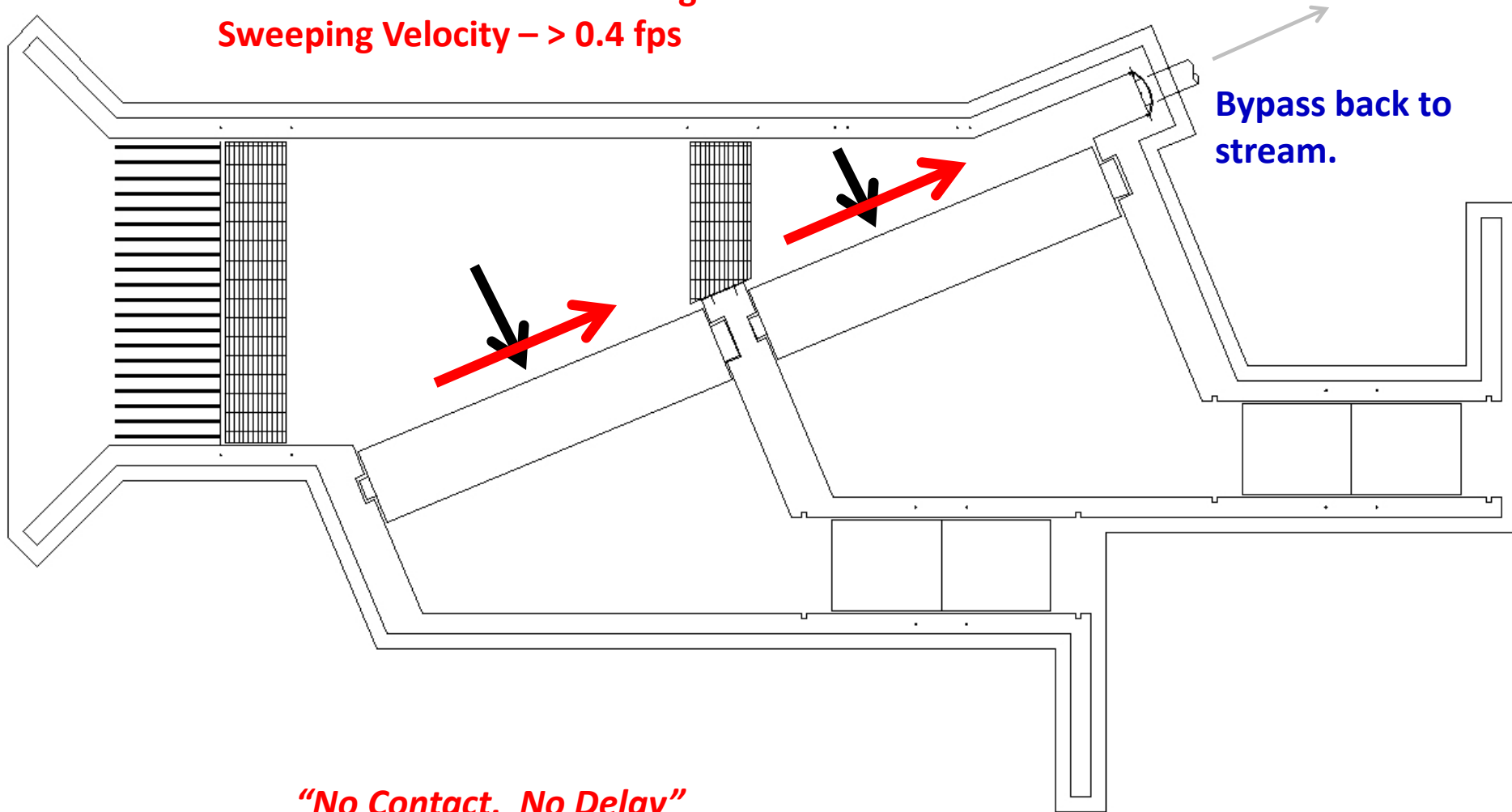
**Active Screens – Self-Cleaning Mechanisms**  
**Approach Velocity – 0.4 fps**





# Juvenile Fish Screen Criteria

**Active Screens – Self-Cleaning Mechanisms**  
**Sweeping Velocity –  $> 0.4$  fps**



# Construction and Fabrication

- **Public Works Contract – Concrete and Earth Work**
- **All metal works fabrication and finishing completed in the shop: drums, paddlewheels, drive systems, catwalks, and handrails**





# Screen Tenders





You get what you pay for..





## **“Predictable Performance with Predictable Biological Effects”**









**“Efficient passage means that passage opportunity is continually maintained by vigilant operation and maintenance.”**











● 44.611851°N, 114.169014°W ±16.4ft ▲ 4849ft



A. Cassel IDWR

Morgan Creek  
10 May 2017, 2:35 PM











# Fish Screen or Fish Trap???

Without proper maintenance  
there is no guarantee of safe fish  
passage.







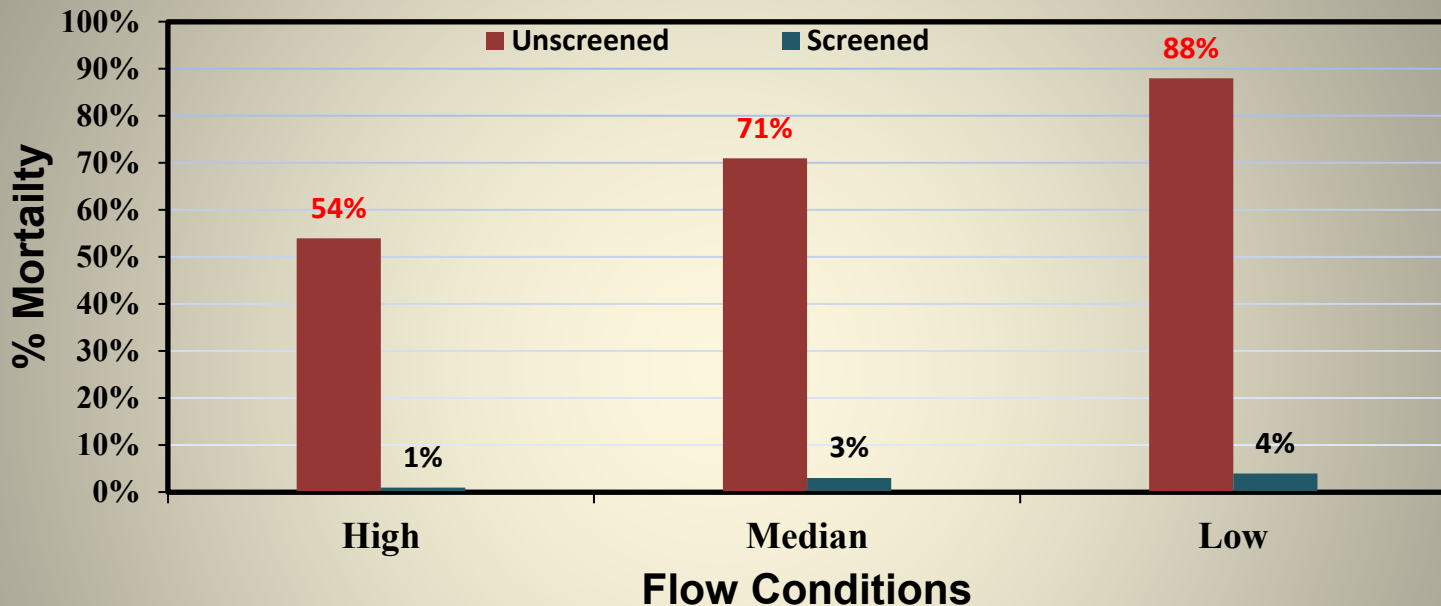
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# Entrainment Rates

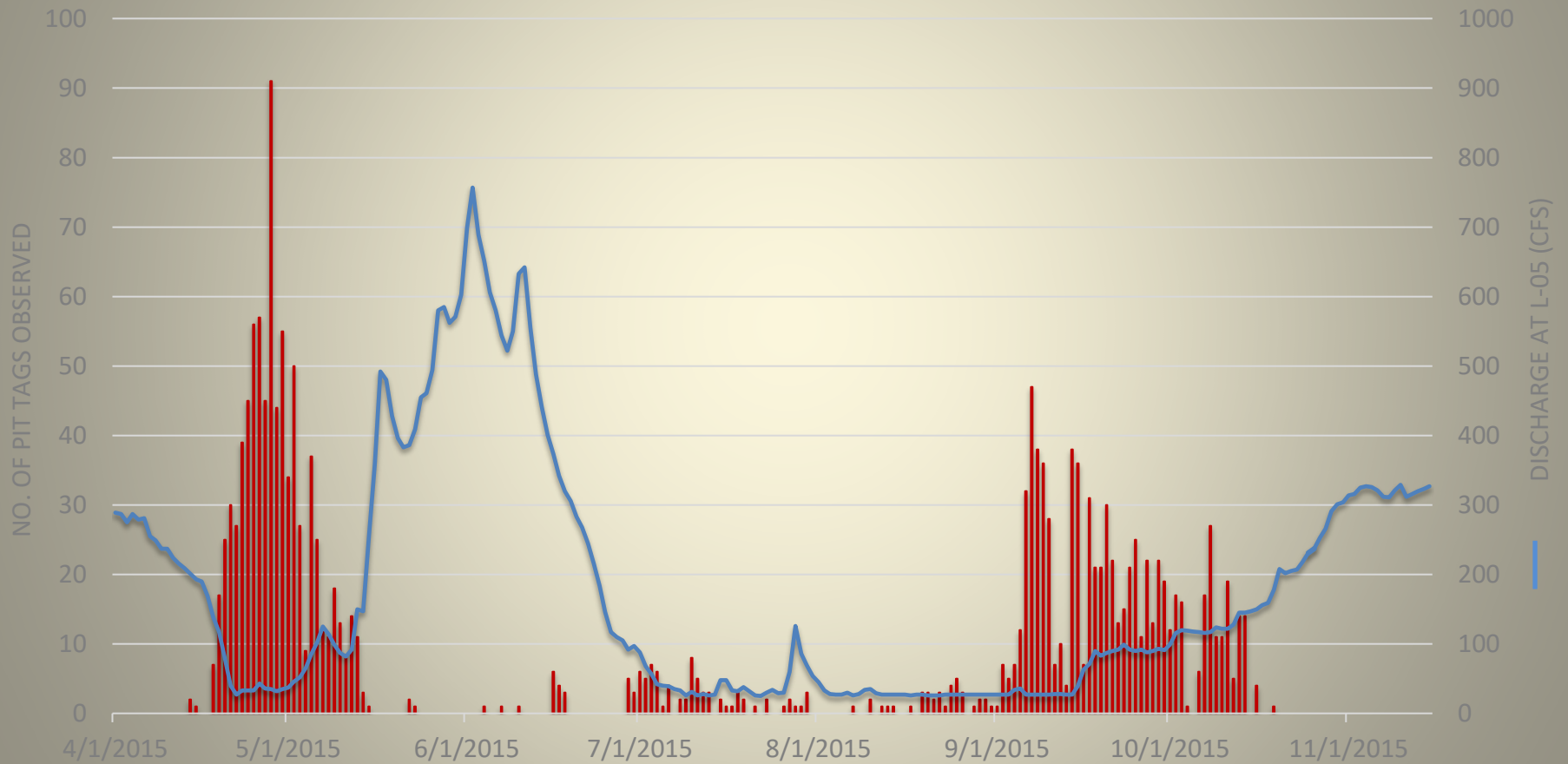


Annika W. Walters, Damon M. Holzer, James R. Faulkner, Charles D. Warren, Patrick D. Murphy & Michelle M. McClure (2012): **Quantifying Cumulative Entrainment Effects for Chinook Salmon in a Heavily Irrigated Watershed**, Transactions of the American Fisheries Society, 141:5, 1180-1190



# Entrainment Rates

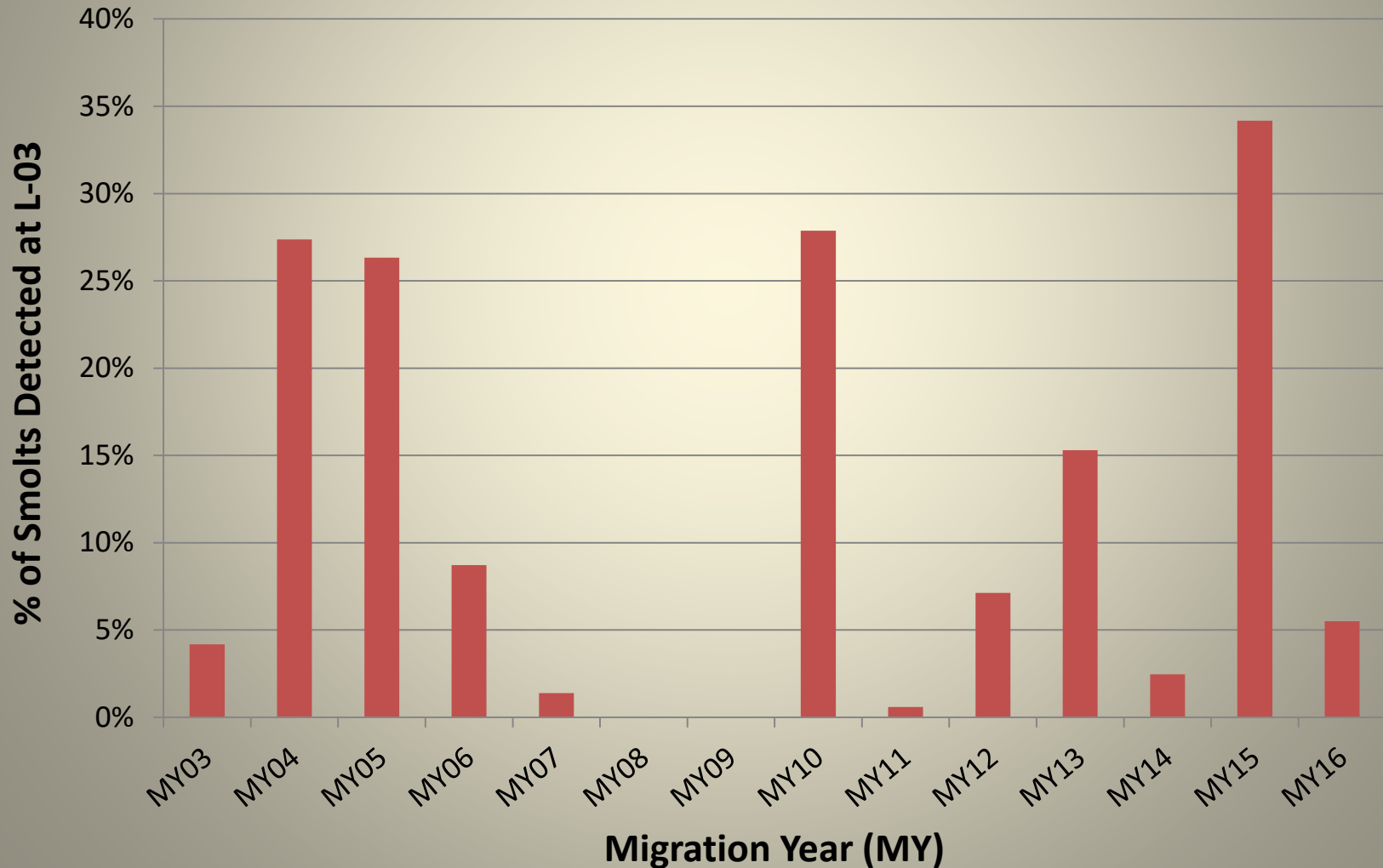
## Juvenile Chinook Salmon PIT Tag Detections at L-03 Fish Screen in 2015





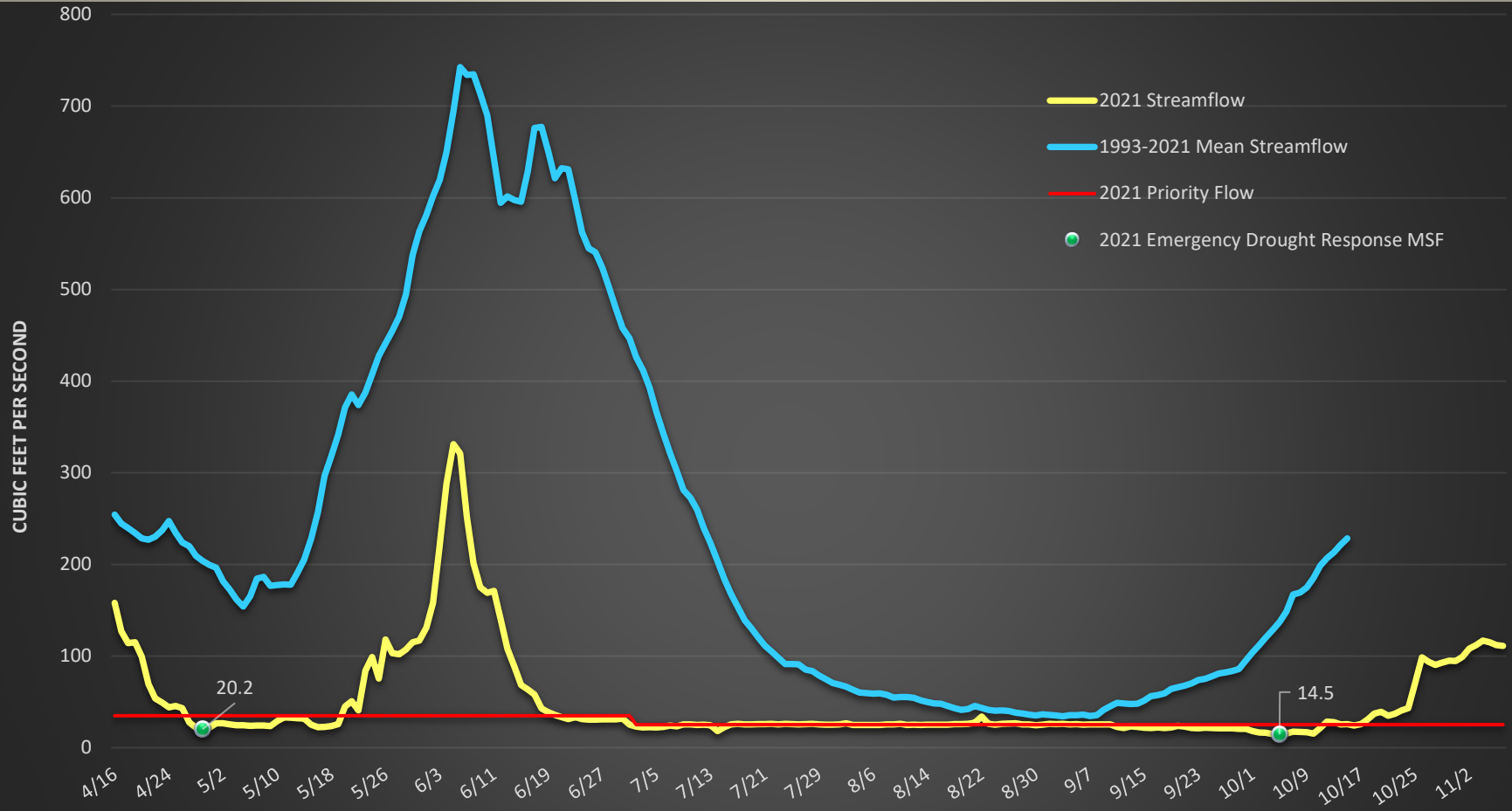
# Entrainment Rates

Percentage of LEMHIW PIT Tagged Juvenile Chinook Salmon Smolts  
Bypassed at L-03 Fish Screen





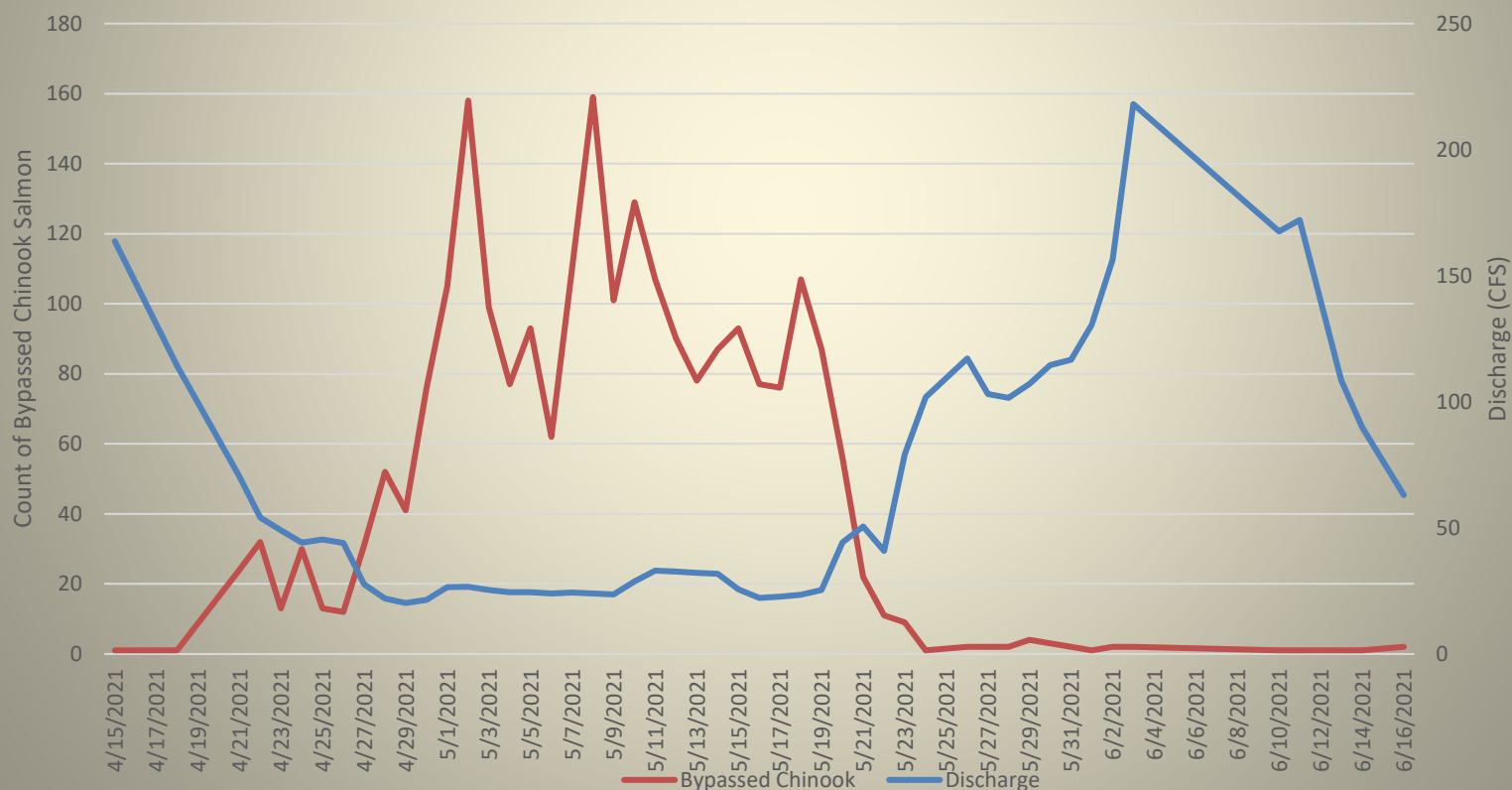
# 2022 Drought Conditions





# Entrainment Rates

Outmigrating Chinook Salmon Bypassed at L-03 Fish Screen in 2021,  
**57.6%** of Total Tagged Chinook Salmon at LLR Screw Trap





# Tributary Screening





# Bull Trout Entrainment Study

	2018	2019	2020
<i>Percent Entrained</i>	95.8%	87.2%	53.3%





# Continued Momentum





# ***Still Working on Fish Passage – May 1977 – Lower Lemhi River***





# 66 Year Summary

- Liberal funding source
- Stay with good science
- There is no perfect screen
- It's all about water and people
- Education is the key to success
- Screening must be tied to fish passage
- Fish screens can't resolve habitat issues