Northwest **Power** and **Conservation** Council

September 7, 2016

MEMORANDUM

TO: **Council members**

FROM: **Stacy Horton, Policy Analyst/Biologist, Washington**

SUBJECT: **Panel on Upper Columbia River Spring Chinook**

BACKGROUND:

Presenters: Melody Kreimes, Upper Columbia Salmon Recovery Board (UCSRB) Executive Director, Greer Maier, UCSRB Science Program Manager, Andrew Murdoch, Washington Department of Fish and Wildlife Eastern Washington Science Division Manager, Tom Dresser, Grant County Public Utility District, Manager of Fish, Wildlife, and Water Quality, Tom Kahler, Douglas Public Utility District, Fisheries Biologist

Summary: Presenters from the Upper Columbia Salmon Recovery Board (UCSRB), Washington Department of Fish and Wildlife (WDFW), and Grant and Douglas Public Utility Districts will provide the Council with information on the status of the upper Columbia River spring Chinook, actions underway to implement the Upper Columbia Spring Chinook Salmon and Steelhead Recovery Plan, progress to date, and will identify what activities might still be needed to help improve the condition of this species.

Relevance: Of the thirteen ESA-listed salmon and steelhead species in the Columbia River Basin, analysis of adult abundance from 1990 -2014 indicates that only the upper Columbia Spring Chinook shows no statistically significant upward trend in abundance.

Background: The Upper Columbia Salmon Recovery Board (UCSRB) developed a plan for the recovery of Upper Columbia spring Chinook (listed as endangered on March 24, 1999), Upper Columbia steelhead (listed as endangered on

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Executive Director

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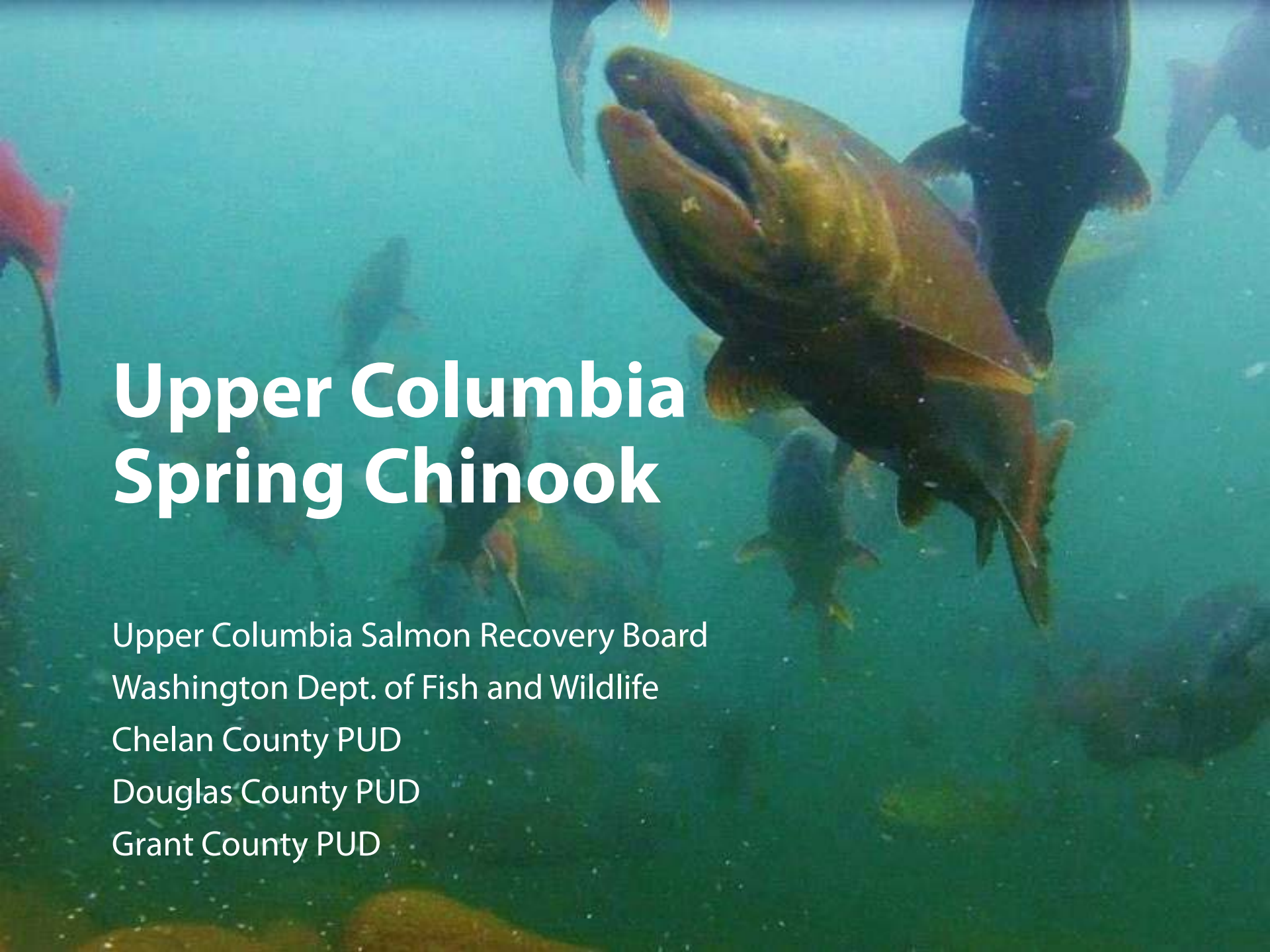
August 18, 1997; reclassified as threatened on January 5, 2006); and bull trout (the coterminous U.S. population was listed as threatened on November 1, 1999).

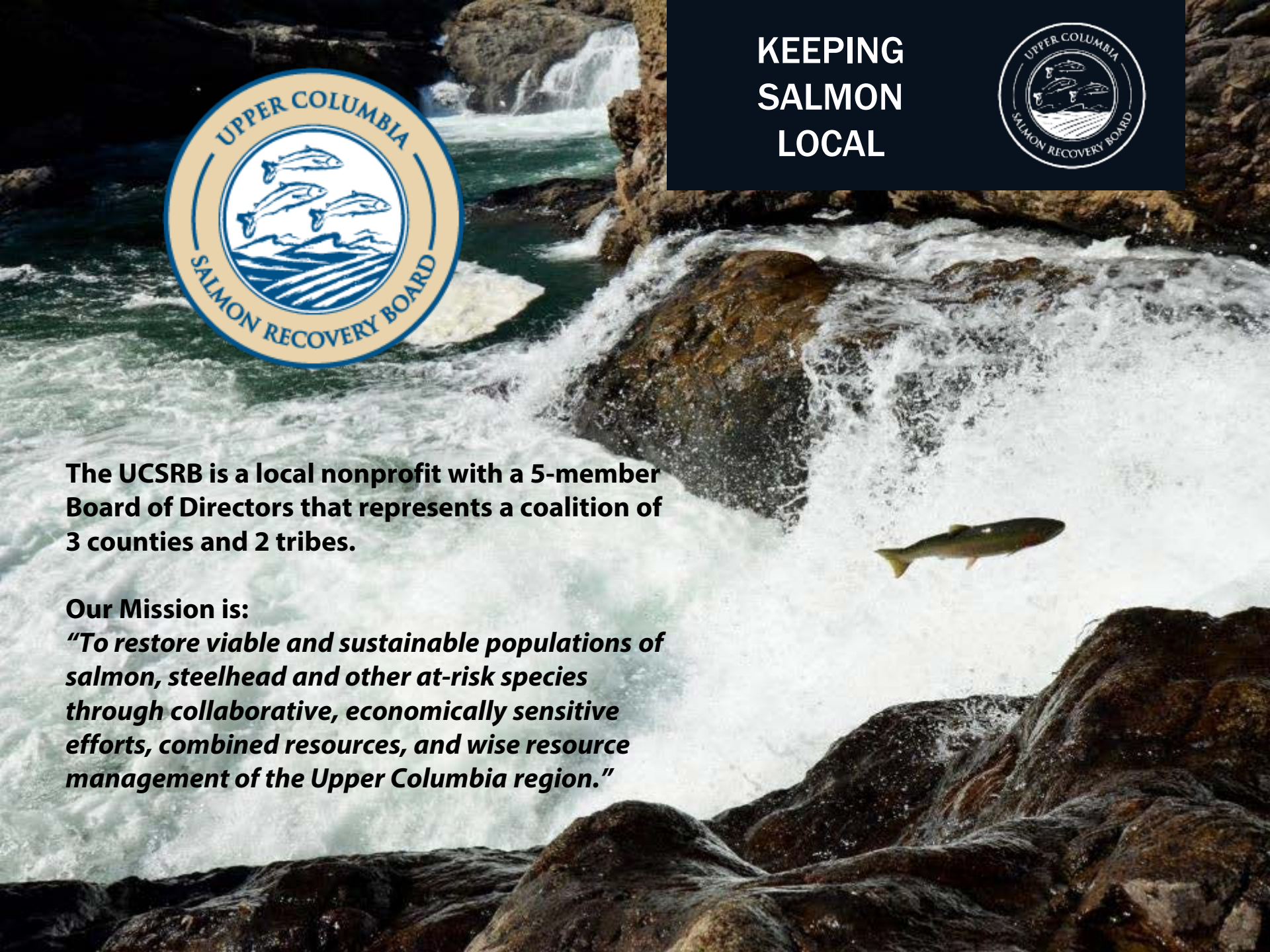
More Info: Upper Columbia Spring Chinook Salmon and Steelhead Recovery Plan* http://www.ucsrb.org/Assets/Documents/Library/Plans/UCSRP/UCSRP%20Final%209-13-2007.pdf

2016 5-Year Review: Summary & Evaluation of Upper Columbia River Steelhead, Upper Columbia River Spring-run Chinook Salmon http://www.westcoast.fisheries.noaa.gov/publications/status_reviews/salmon_steelhead/2016/2016_upper-columbia.pdf



Upper Columbia Spring Chinook

Upper Columbia Salmon Recovery Board
Washington Dept. of Fish and Wildlife
Chelan County PUD
Douglas County PUD
Grant County PUD

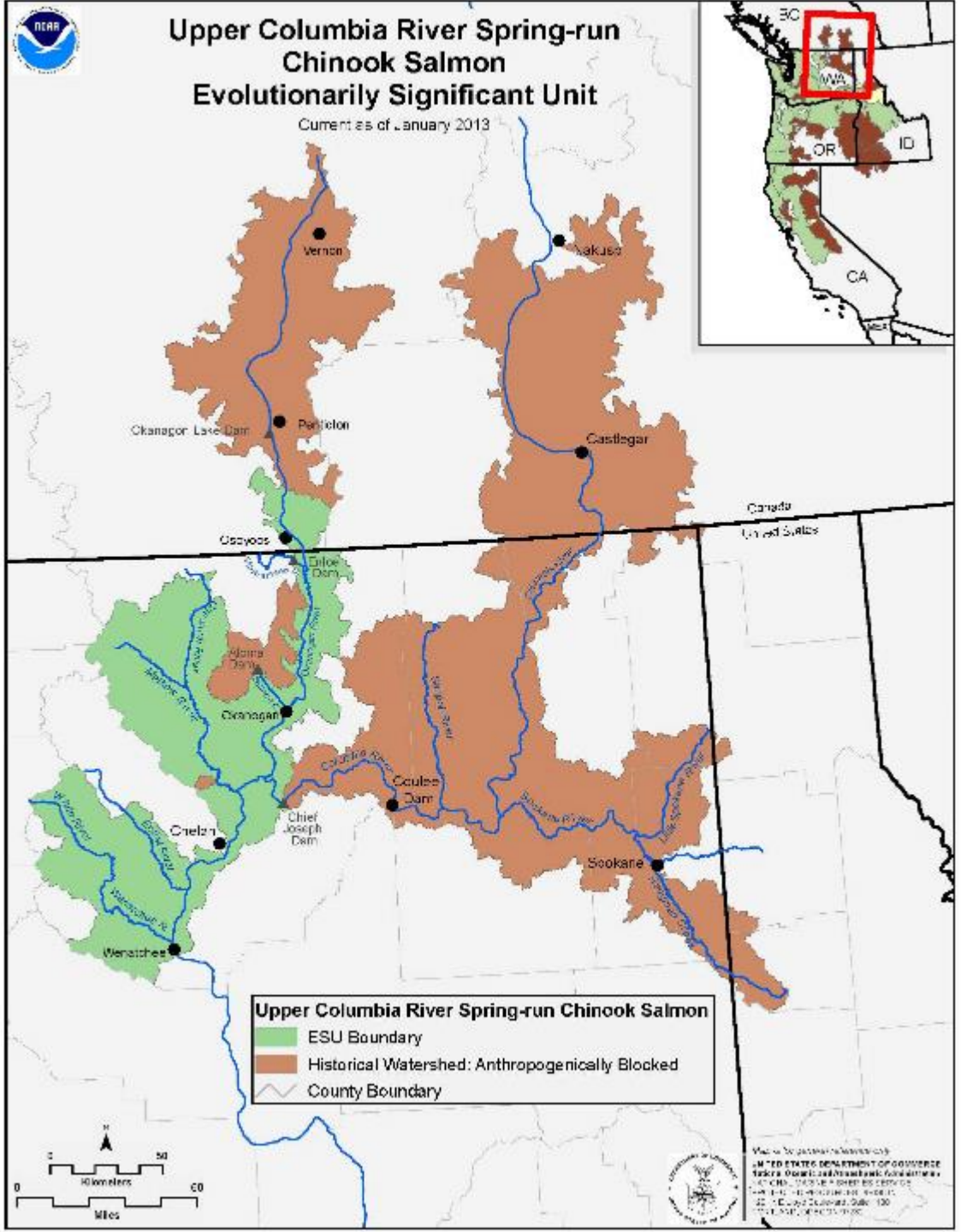


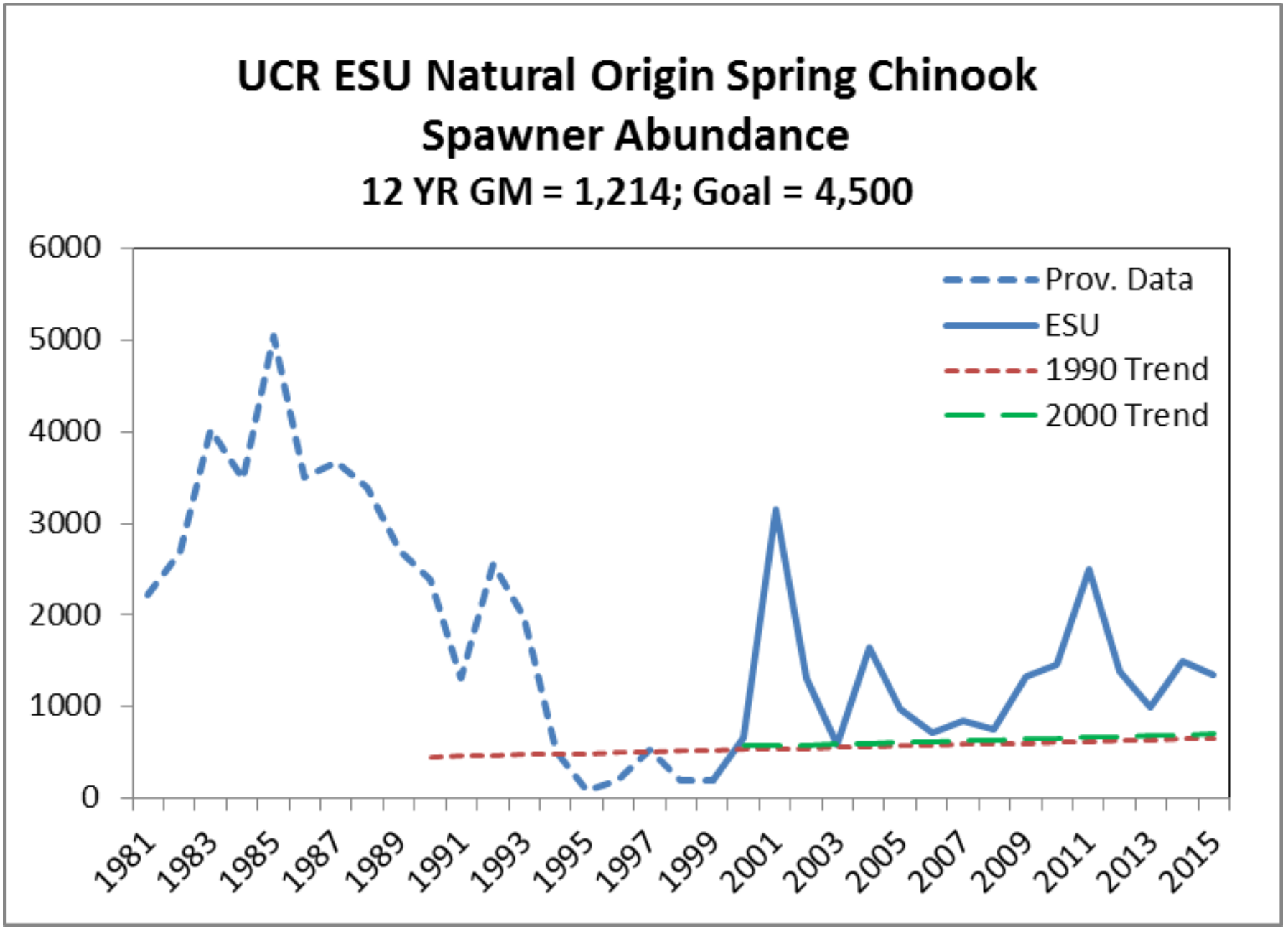
KEEPING SALMON LOCAL

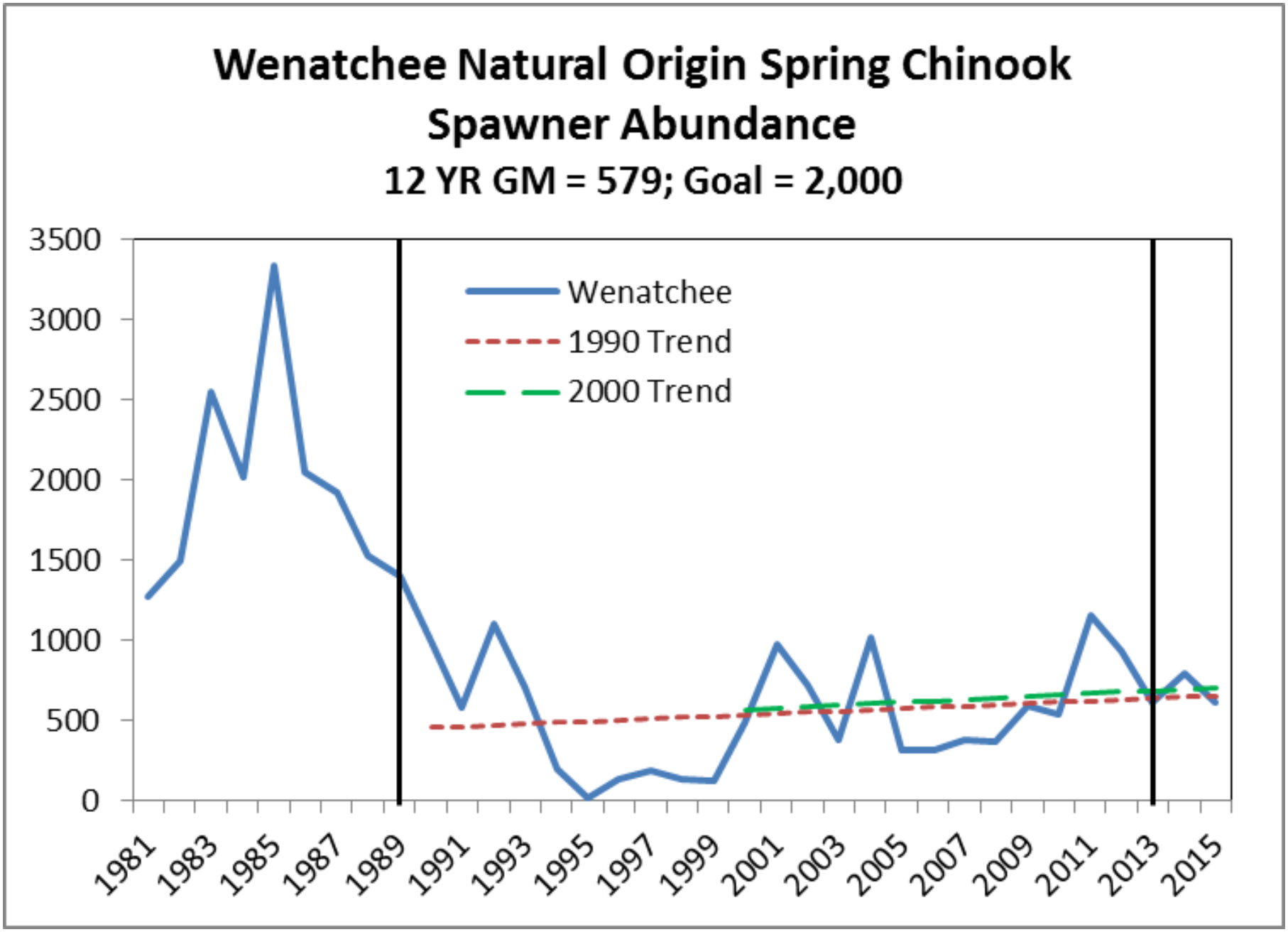
The UCSRB is a local nonprofit with a 5-member Board of Directors that represents a coalition of 3 counties and 2 tribes.

Our Mission is:
"To restore viable and sustainable populations of salmon, steelhead and other at-risk species through collaborative, economically sensitive efforts, combined resources, and wise resource management of the Upper Columbia region."

UPPER COLUMBIA SPRING CHINOOK ESU

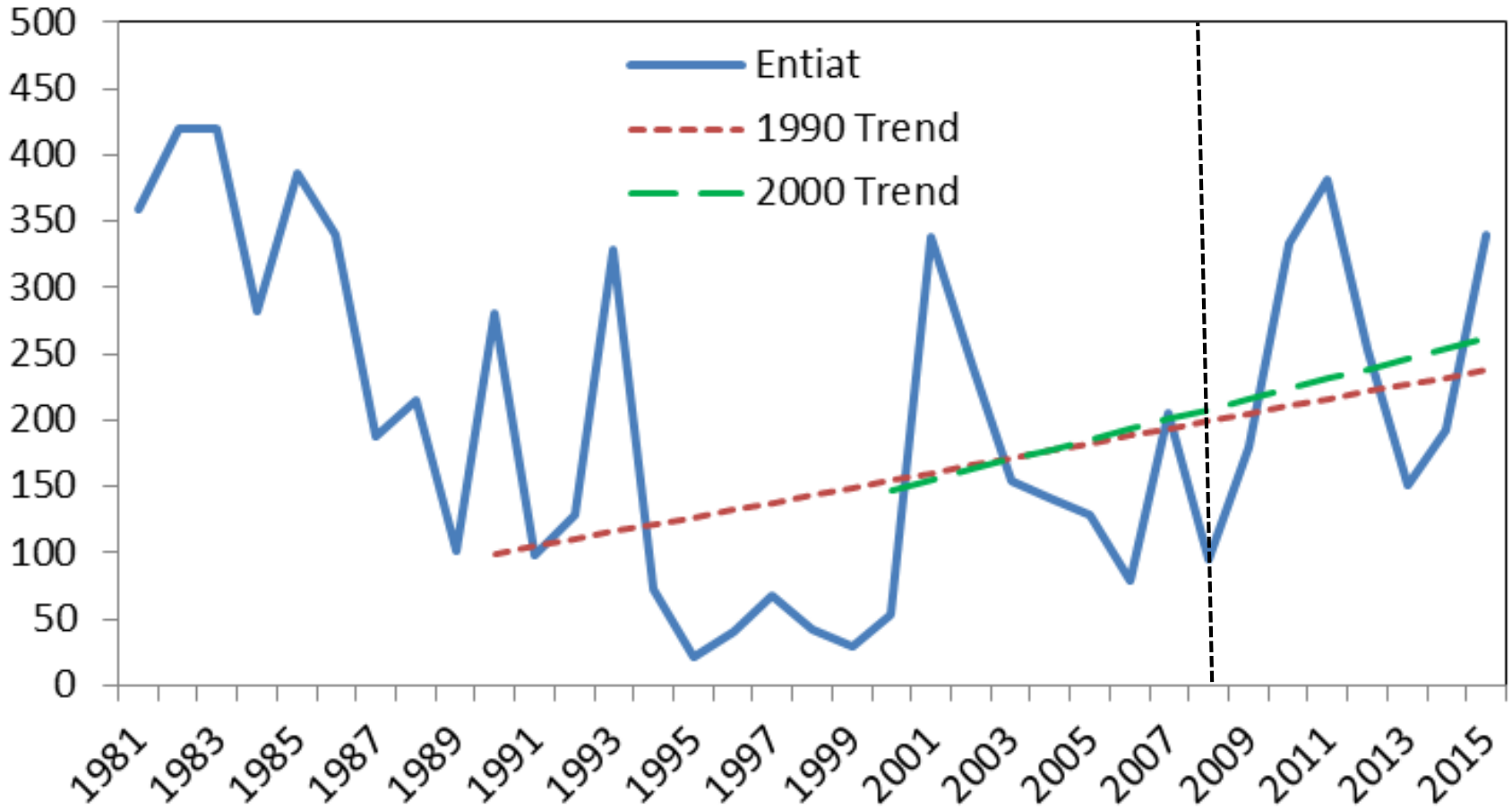


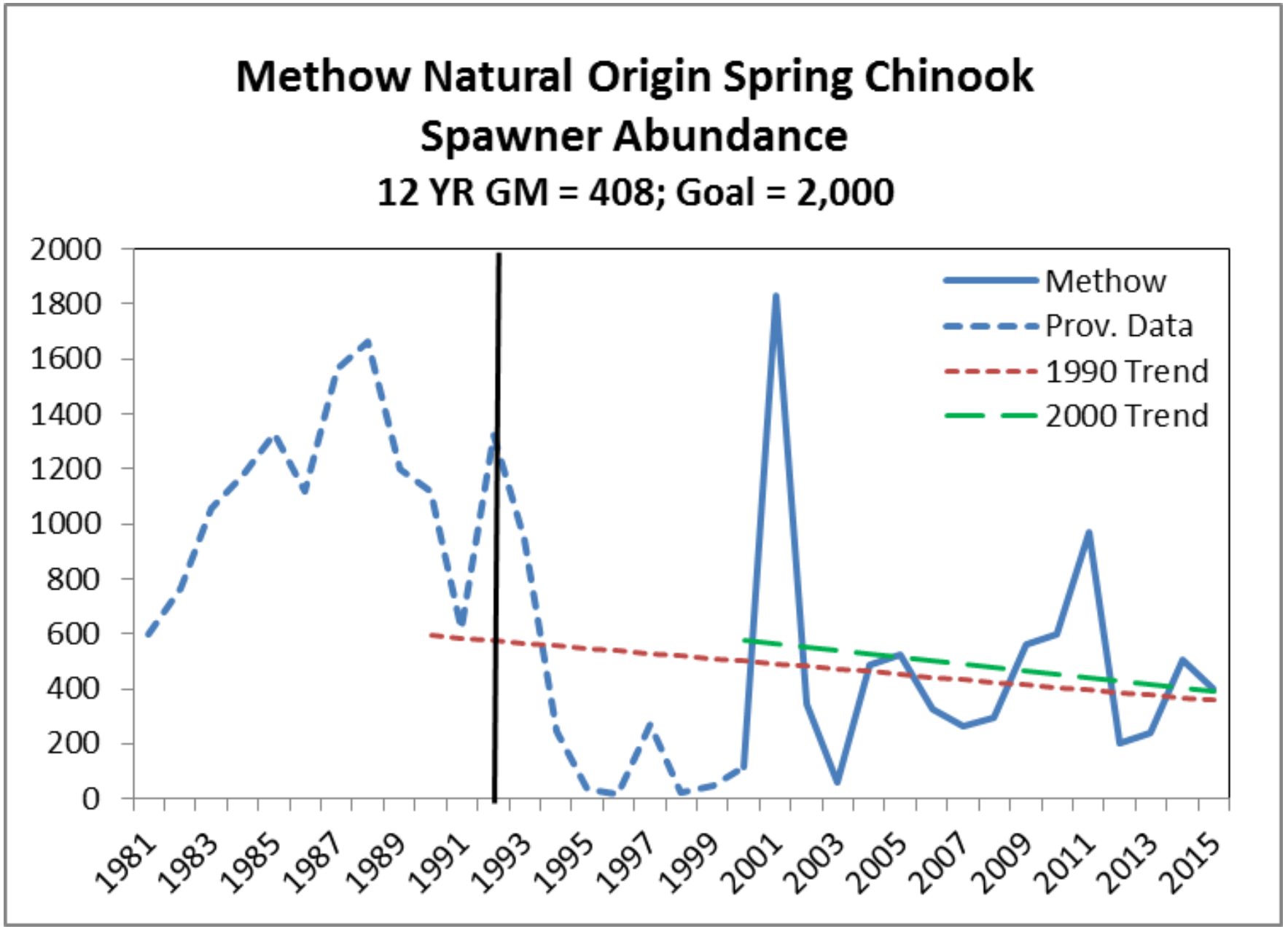

UCR ESU Natural Origin Spring Chinook
Spawner Abundance
12 YR GM = 1,214; Goal = 4,500
6000
5000
4000
3000
2000
1000
0
1981
1983
1985
1987
1989
1991
1993
1995
1997
1999
2001
2003
2005
2007
2009
2011
2013
2015
Prov. Data
ESU
1990 Trend
2000 Trend


Wenatchee Natural Origin Spring Chinook
Spawner Abundance
12 YR GM = 579; Goal = 2,000
3500
3000
2500
2000
1500
1000
500
0
Wenatchee
1990 Trend
2000 Trend
1981
1983
1985
1987
1989
1991
1993
1995
1997
1999
2001
2003
2005
2007
2009
2011
2013
2015

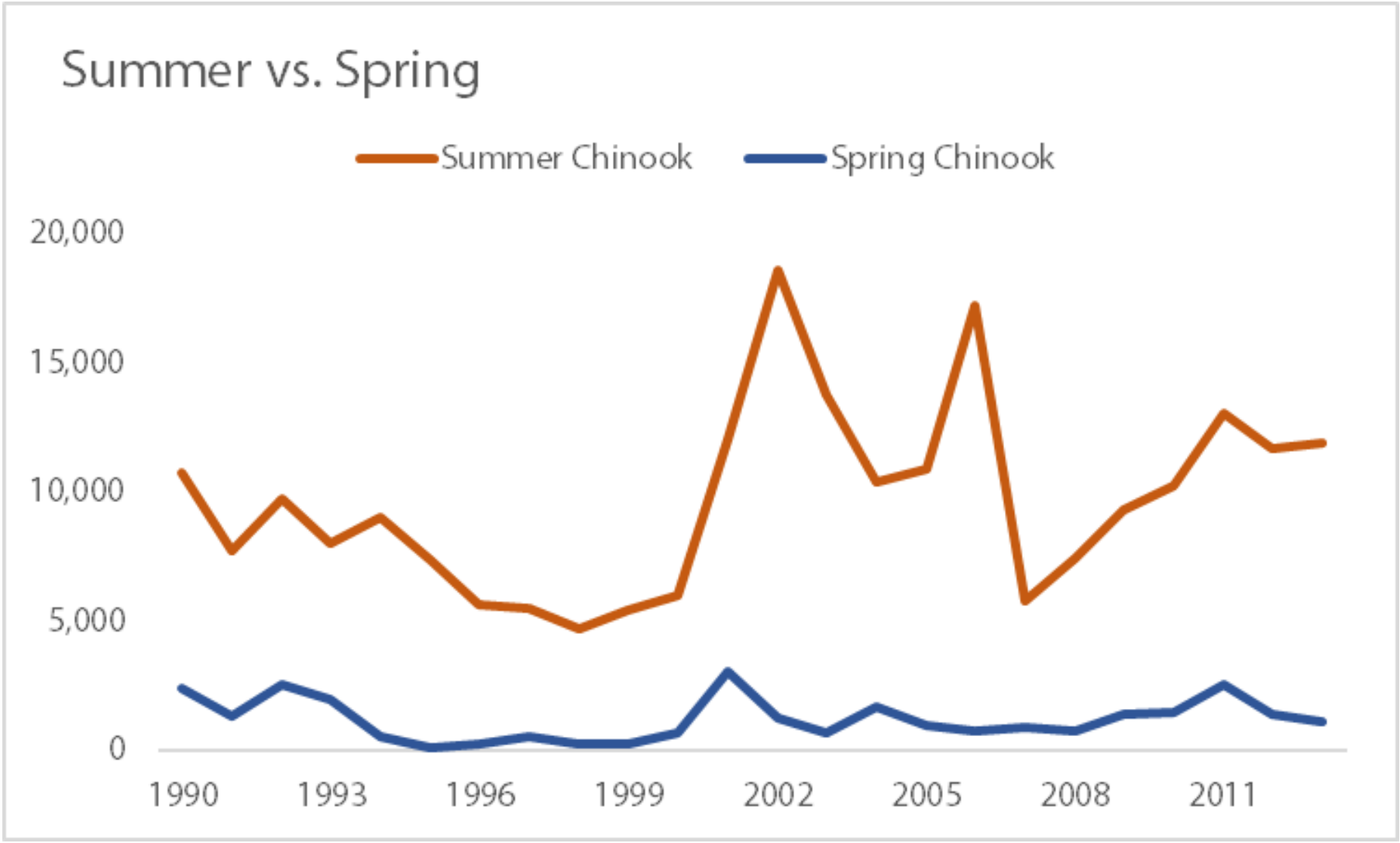
Entiat Natural Origin Spring Chinook Spawner Abundance

12 YR GM = 185; Goal = 500



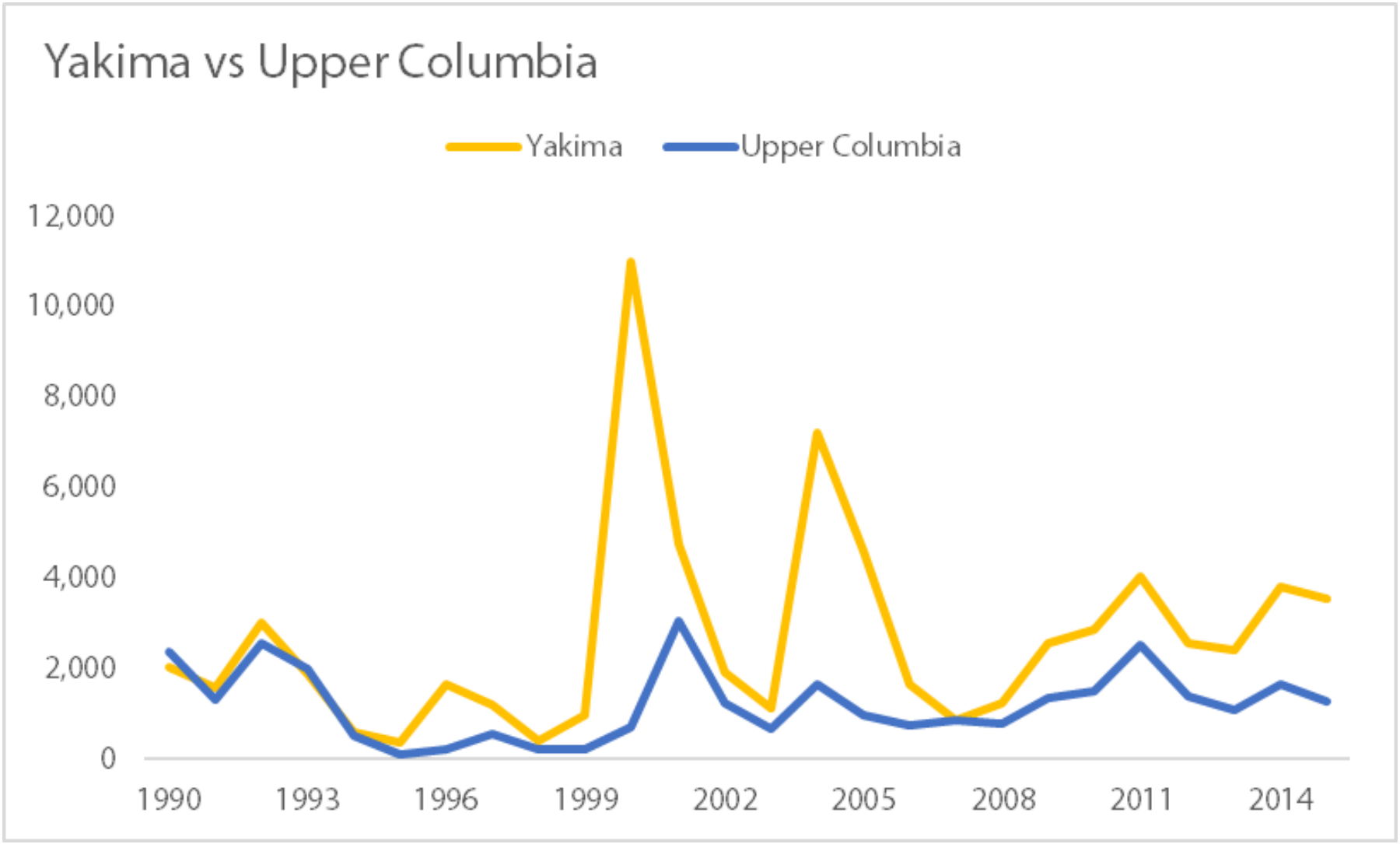

Methow Natural Origin Spring Chinook
Spawner Abundance
12 YR GM = 408; Goal = 2,000
2000
1800
1600
1400
1200
1000
800
600
400
200
0
1981
1983
1985
1987
1989
1991
1993
1995
1997
1999
2001
2003
2005
2007
2009
2011
2013
2015
Methow
Prov. Data
1990 Trend
2000 Trend

UPPER COLUMBIA SPRING CHINOOK ESU - TRENDS

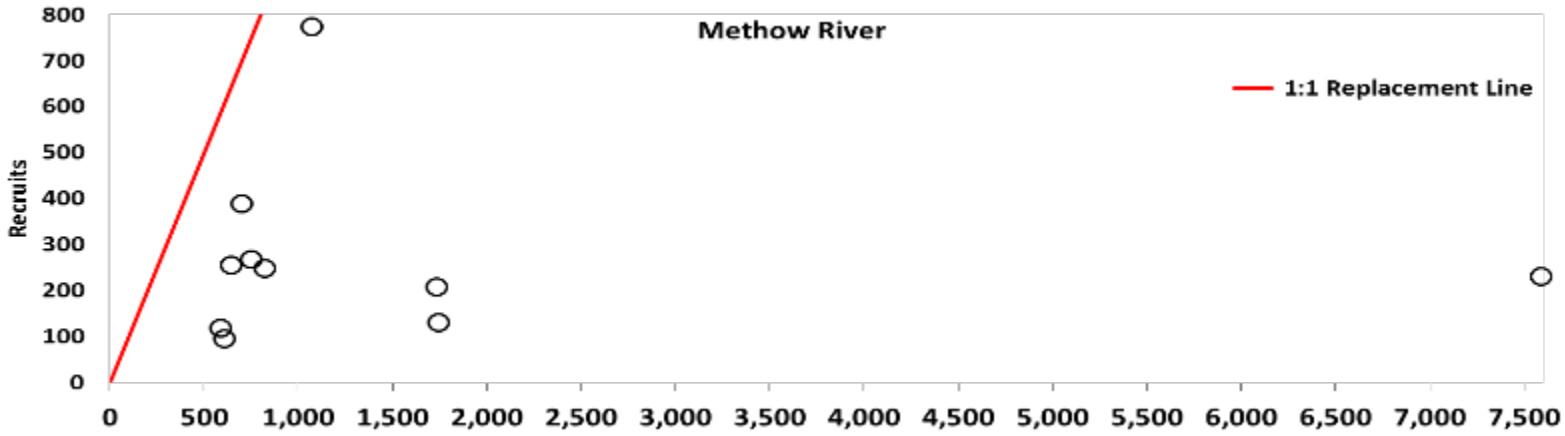


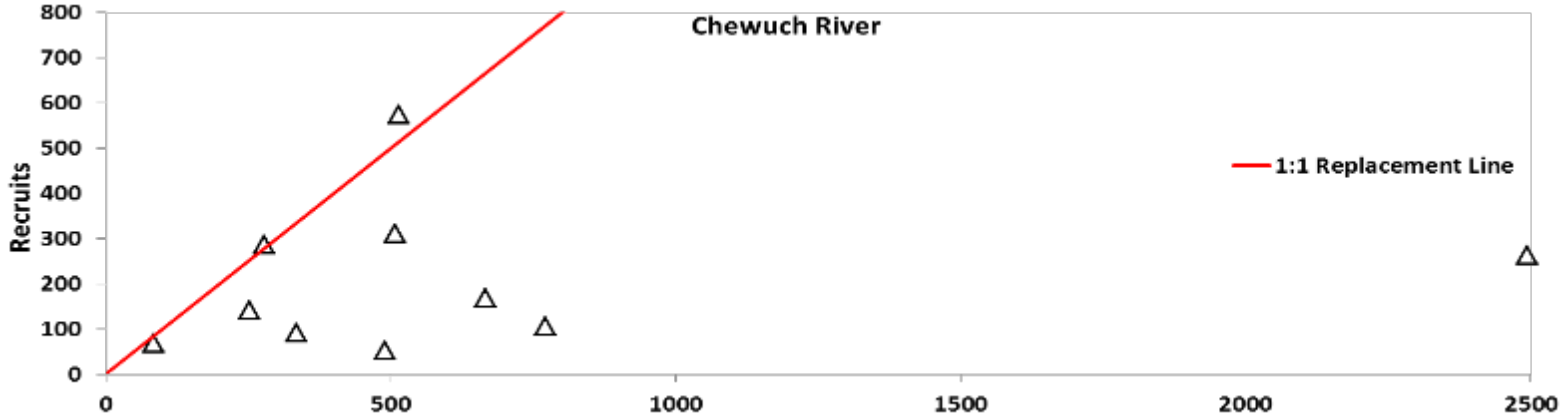
Natural origin spawners based on WDFW SASI database (1990-2013)

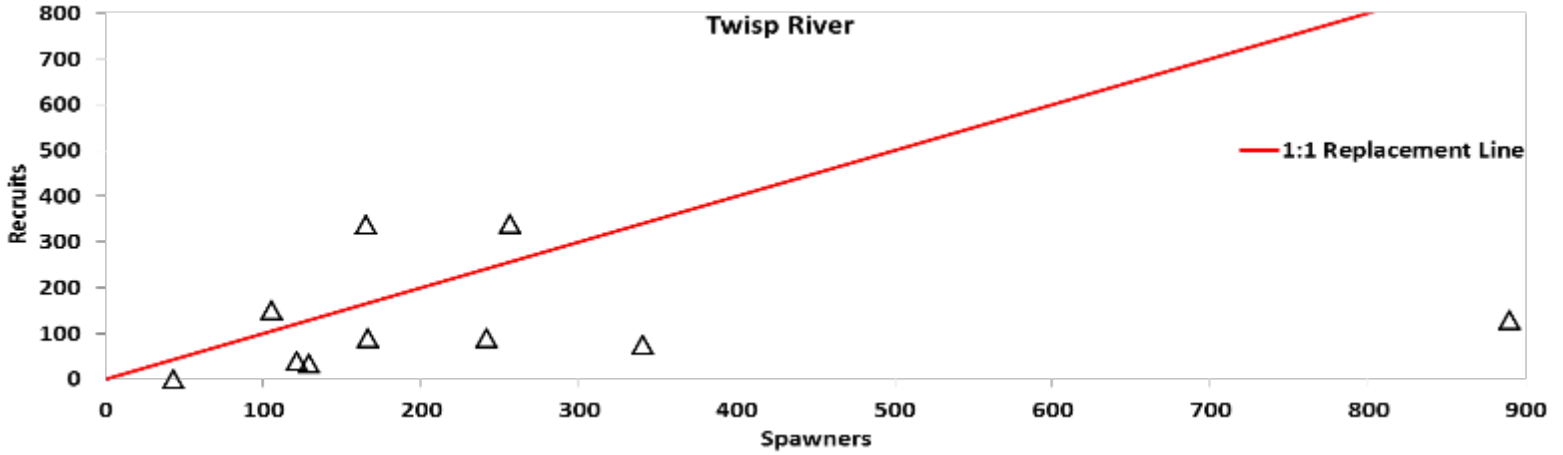
UPPER COLUMBIA SPRING CHINOOK ESU - TRENDS



Natural origin spawners based on WDFW SASI database (1990-2013)


Methow River
1:1 Replacement Line
Recruits
800
700
600
500
400
300
200
100
0
0
500
1,000
1,500
2,000
2,500
3,000
3,500
4,000
4,500
5,000
5,500
6,000
6,500
7,000
7,500

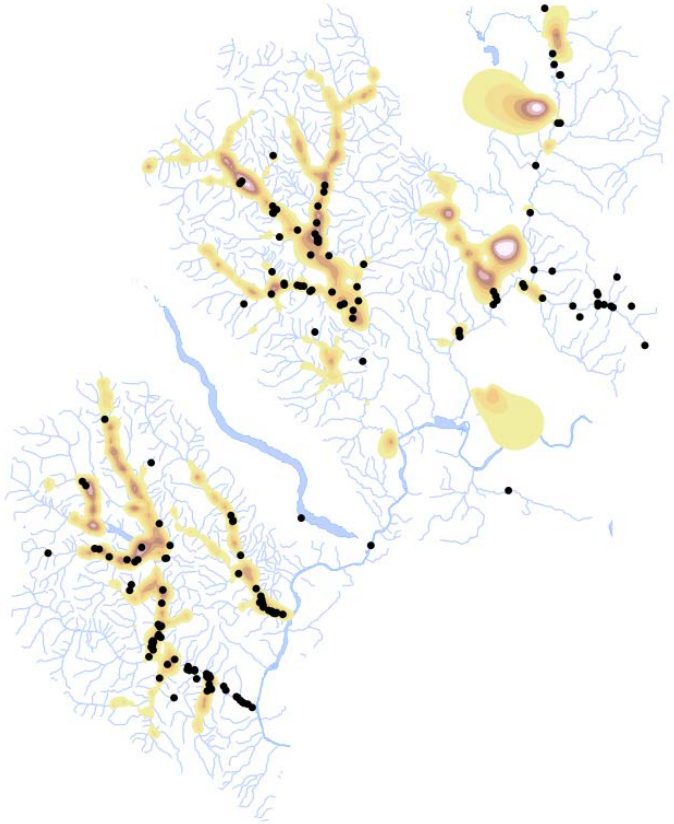

Chewuch River
1:1 Replacement Line
Recruits
800
700
600
500
400
300
200
100
0
0
500
1000
1500
2000
2500


Twisp River
1:1 Replacement Line
Recruits
800
700
600
500
400
300
200
100
0
0
100
200
300
400
500
600
700
800
900
Spawners

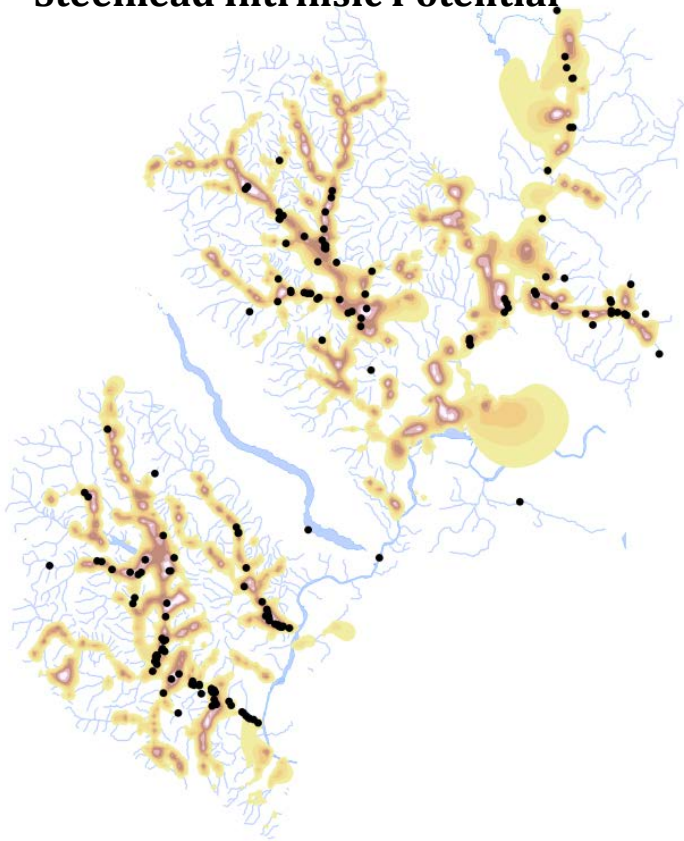
UPPER COLUMBIA SPRING CHINOOK – HABITAT WORK

UPPER COLUMBIA SPRING CHINOOK – HABITAT WORK

Chinook Intrinsic Potential



Steelhead Intrinsic Potential



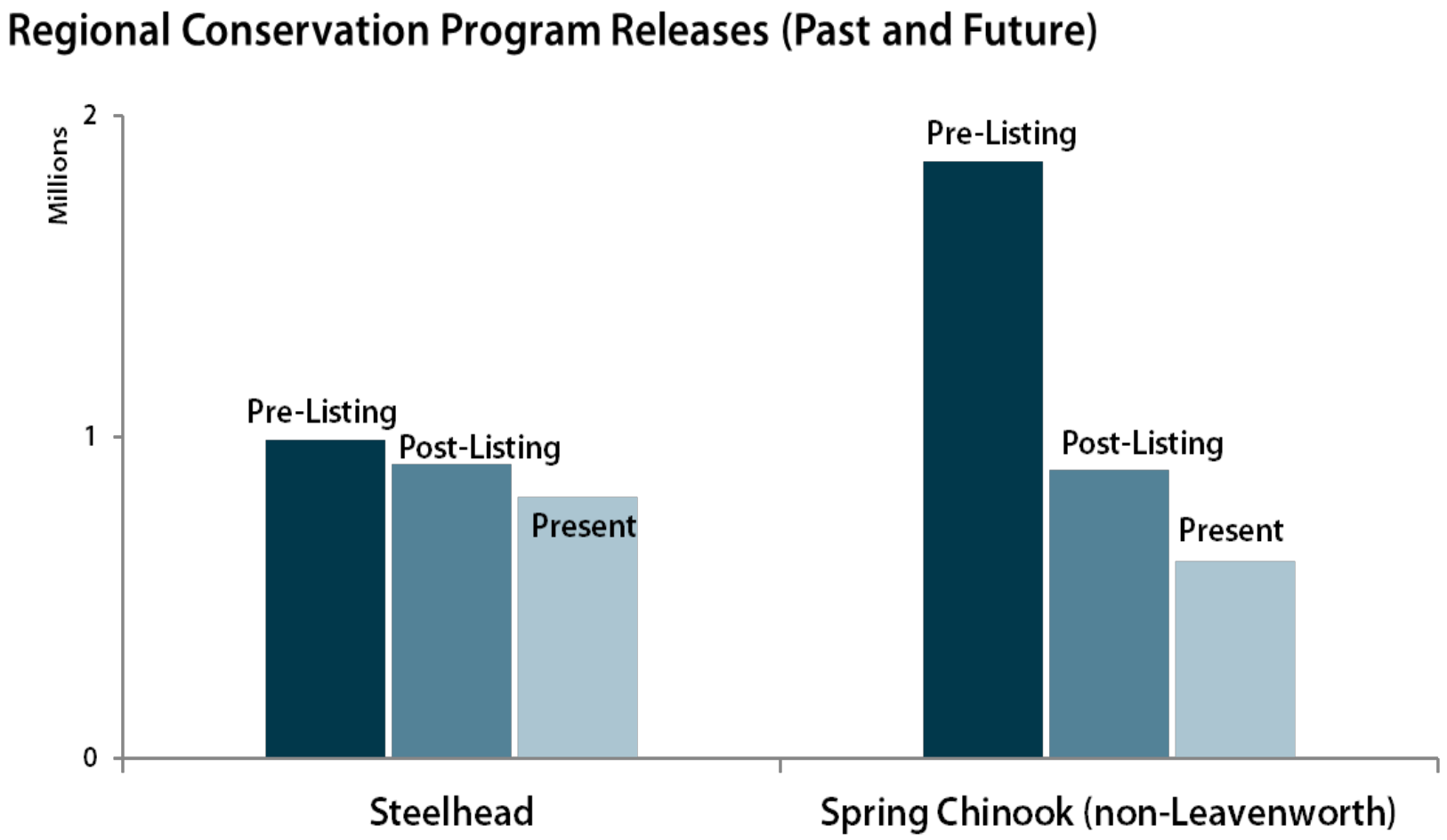
None Low Medium High

Intrinsic Potential

UPPER COLUMBIA SPRING CHINOOK – HABITAT WORK

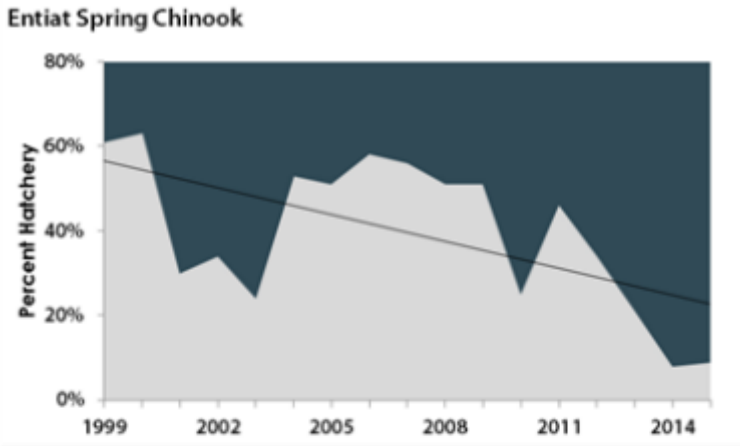
UPPER COLUMBIA SPRING CHINOOK – HATCHERIES

UPPER COLUMBIA SPRING CHINOOK – HATCHERIES

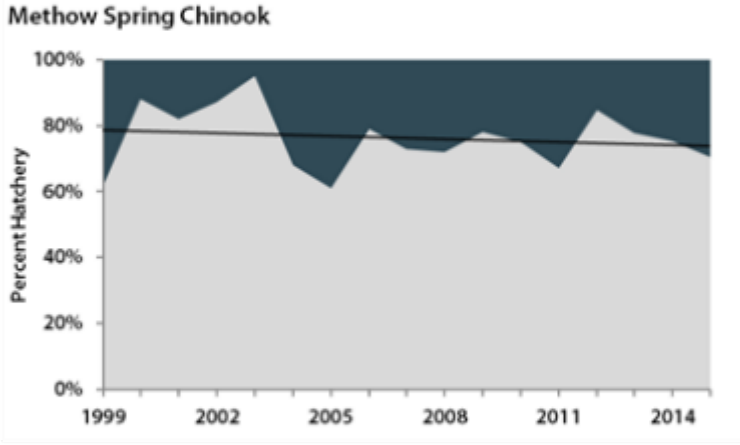


2011-2015 AVERAGE PERCENT HATCHERY SPAWNERS

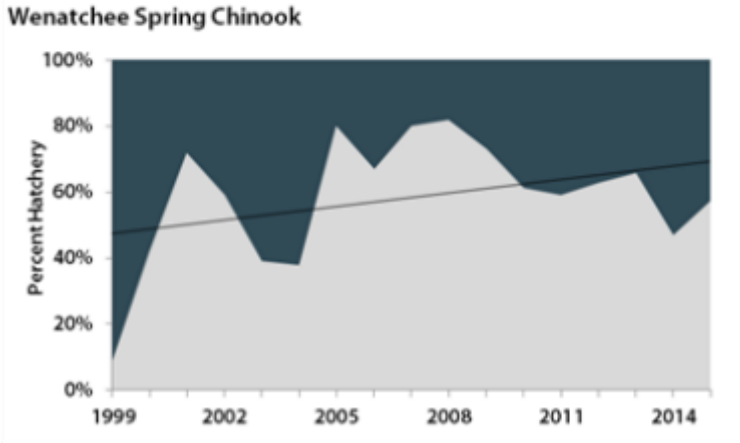
25%



75%



58%



UPPER COLUMBIA SPRING CHINOOK POTENTIAL ISSUES

Wenatchee	Entiat	Methow
High pHOS	Stray hatchery fish	High pHOS
Lake survival	Summer Chinook	Hatchery legacy
Incubation survival	Parr survival in Columbia	?
Overwinter survival	Overwinter survival	Overwinter survival
Prespawn survival	Prespawn survival	Prespawn survival

UPPER COLUMBIA SPRING CHINOOK – HATCHERY REFORM

Adult Management (pHOS reduction)

Methow

- **7,724 fish removed at hatcheries in 2015**

Wenatchee

- **384 fish removed in 2015**
- **788 fish removed in 2016**

Hatchery production reprogrammed

Production reduced

Conservation

Safety Net

UPPER COLUMBIA SPRING CHINOOK – OPPORTUNITIES

UPPER COLUMBIA SPRING CHINOOK – OUTSTANDING QUESTIONS

- Survival bottlenecks – where? and when?
- Life history and habitat use
- Fish-habitat relationships at multiple life stages
- Hatchery effects - Past and current
- What projects should we do for spring Chinook?

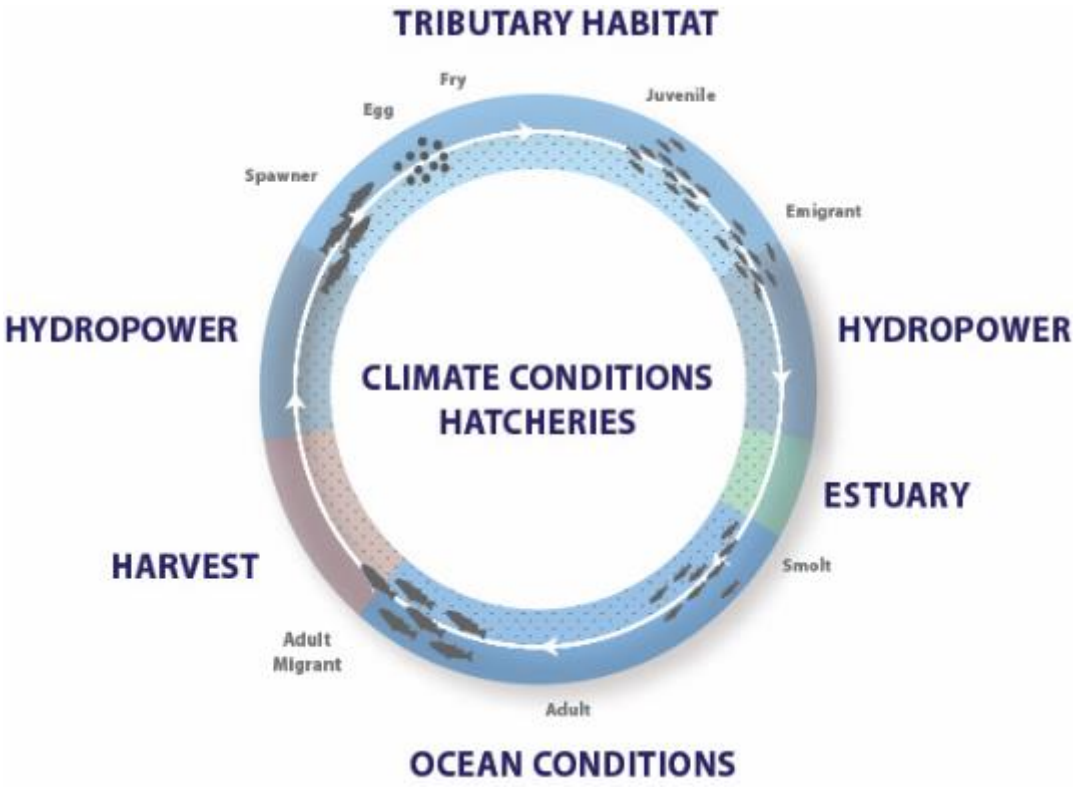
UPPER COLUMBIA SPRING CHINOOK – OPPORTUNITIES

- Life Cycle Models
  - Wenatchee (complete), Methow (initiate)
- Relative Reproductive Success Studies
  - Wenatchee (complete), Methow (initiate)
- Priest Rapids Stock Assessment Expansion
  - Spring Chinook, summer Chinook and coho
- 2016/2017 UC Habitat Project Prioritization

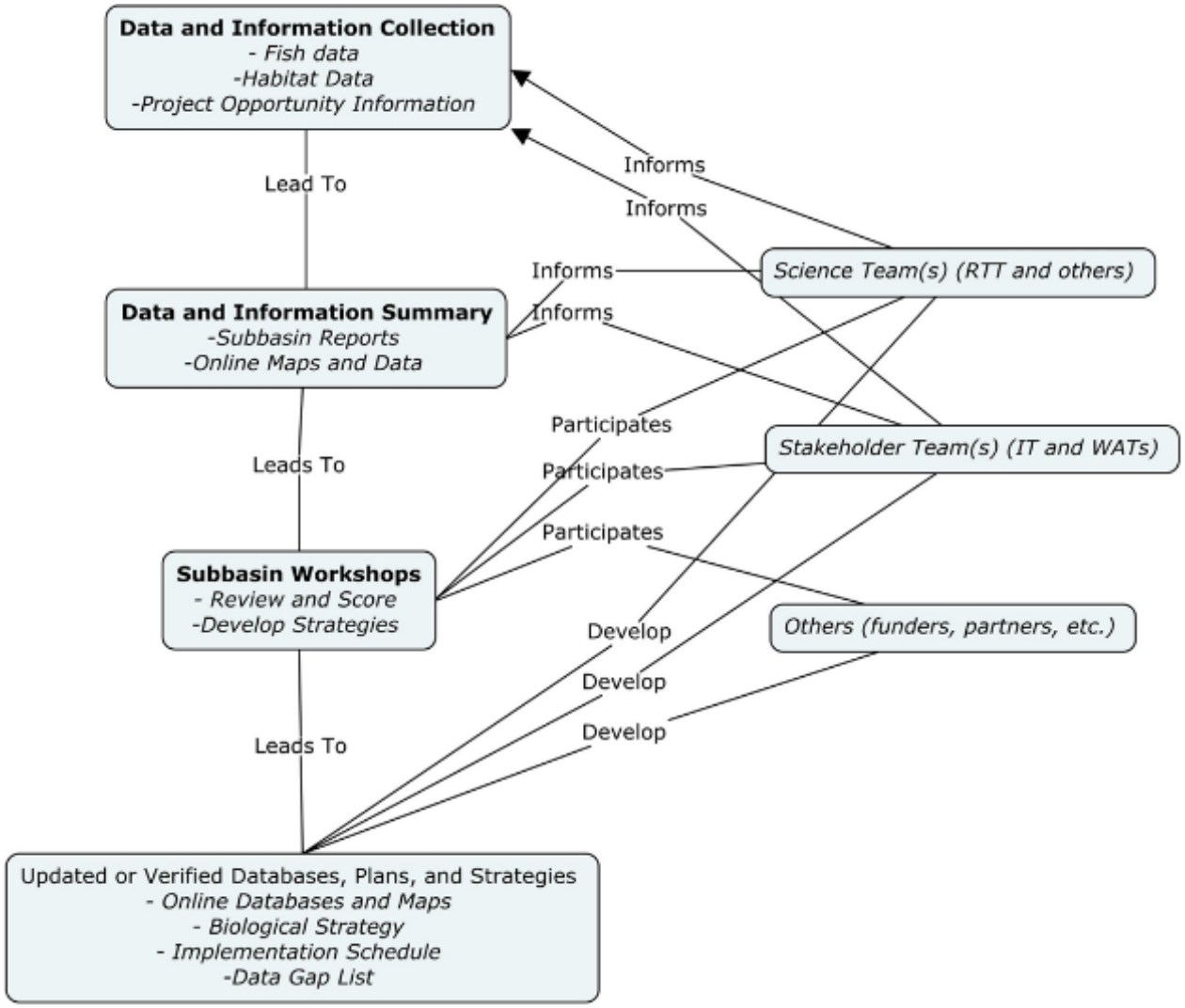
UPPER COLUMBIA SPRING CHINOOK – LIFE CYCLE SURVIVAL MODELS

KEY ATTRIBUTES:

- Gravel-to-gravel
- Fish-centric
- Empirically-based
- All-H holistic
- Transferrable
- Tied to projects and management

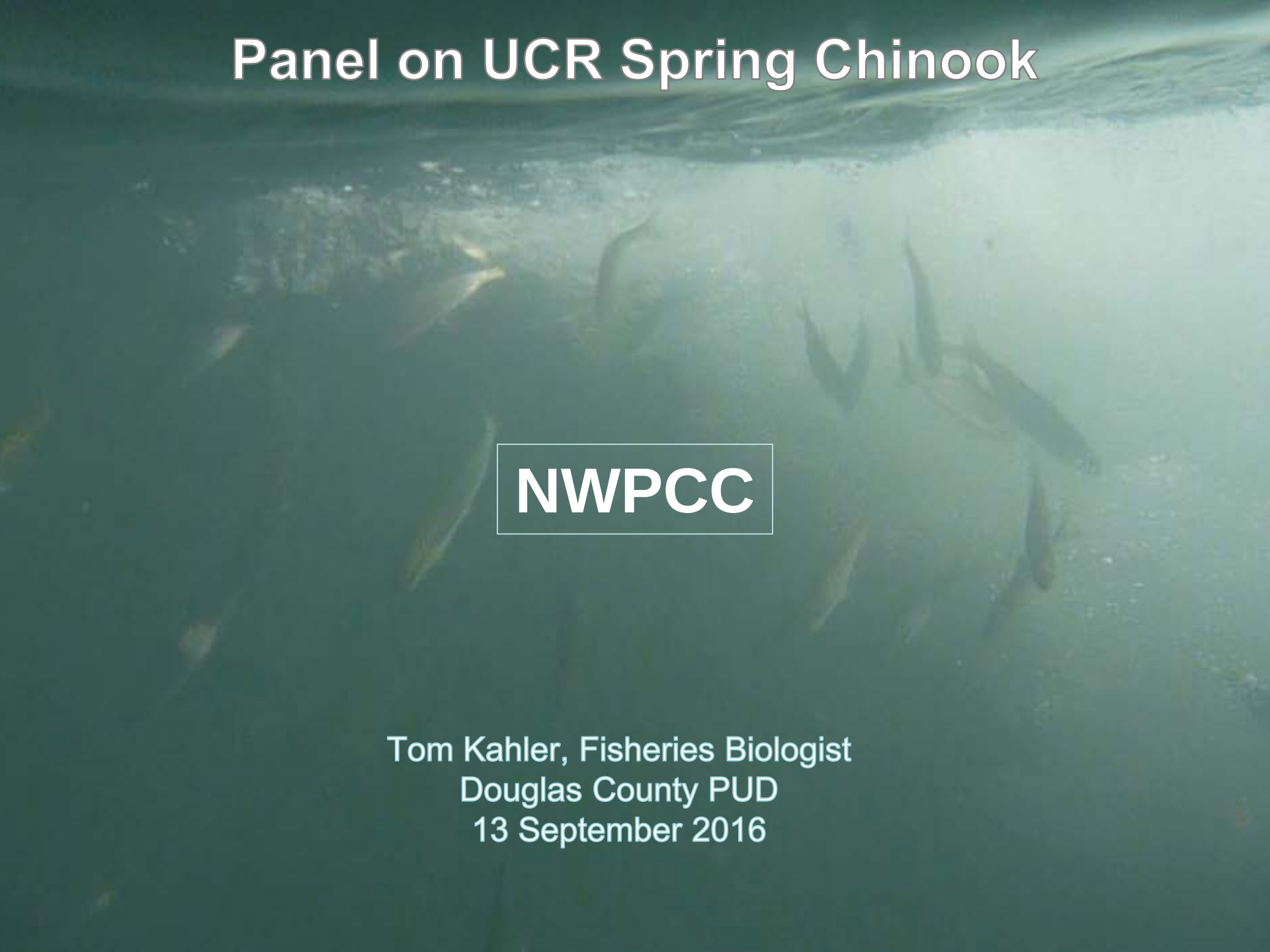


UPPER COLUMBIA SPRING CHINOOK – 2016/2017 PRIORITIZATION



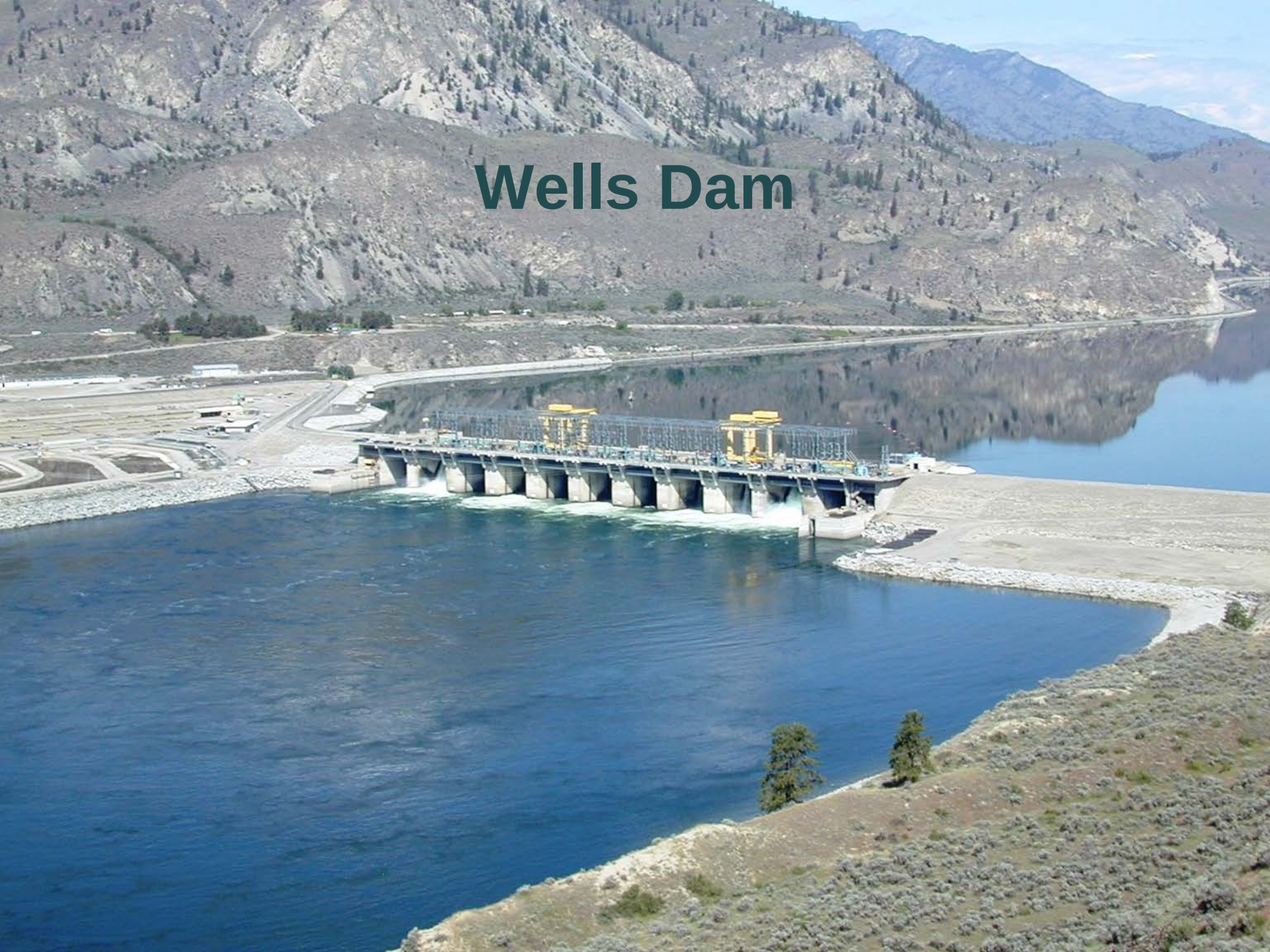

QUESTIONS

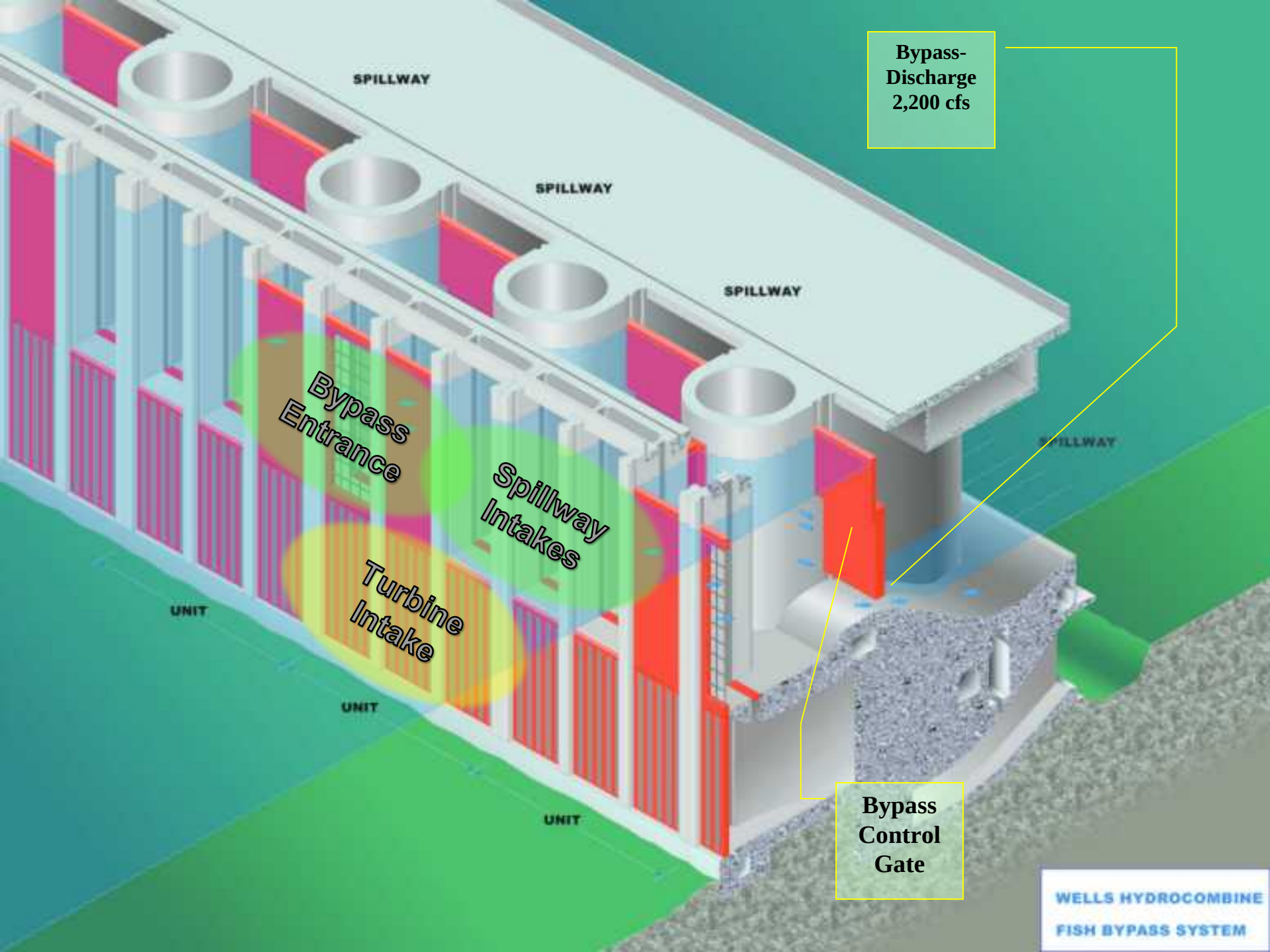
Panel on UCR Spring Chinook



NWPCC

Tom Kahler, Fisheries Biologist
Douglas County PUD
13 September 2016


Wells Dam

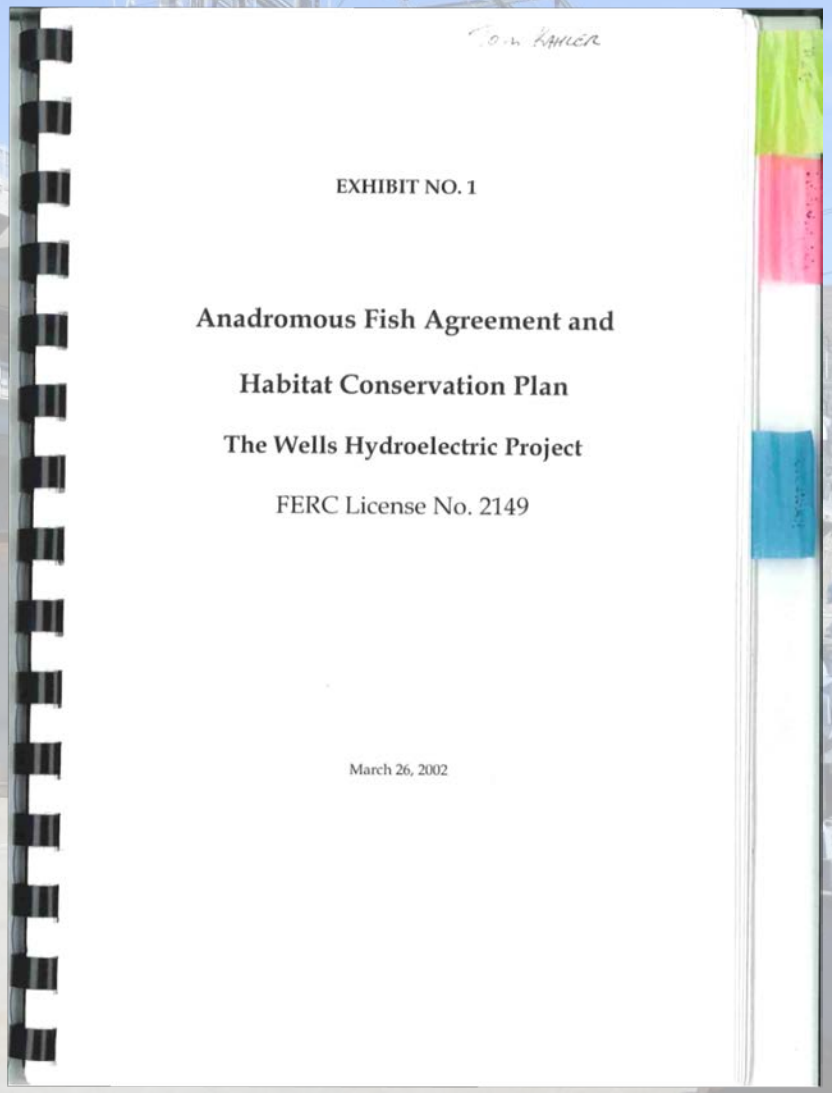

Bypass-
Discharge
2,200 cfs
SPILLWAY
SPILLWAY
SPILLWAY
SPILLWAY
Bypass
Entrance
Spillway
Intakes
Turbine
Intake
UNIT
UNIT
UNIT
Bypass
Control
Gate
WELLS HYDROCOMBINE
FISH BYPASS SYSTEM

Wells Surface Bypass System

Passage Efficiency

- Fish Guidance Efficiency (3-year hydroacoustic study):
  - 92.0% for spring Chinook and steelhead
  - 95.3% sockeye
  - 96.2% subyearling Chinook
- Balloon-tag studies: no measurable injury or mortality through the Bypass System

THE HCP PROVIDES ESA-PERMIT COVERAGE FOR HYDRO OPERATIONS



Tom Kahler

EXHIBIT NO. 1

Anadromous Fish Agreement and

Habitat Conservation Plan

The Wells Hydroelectric Project

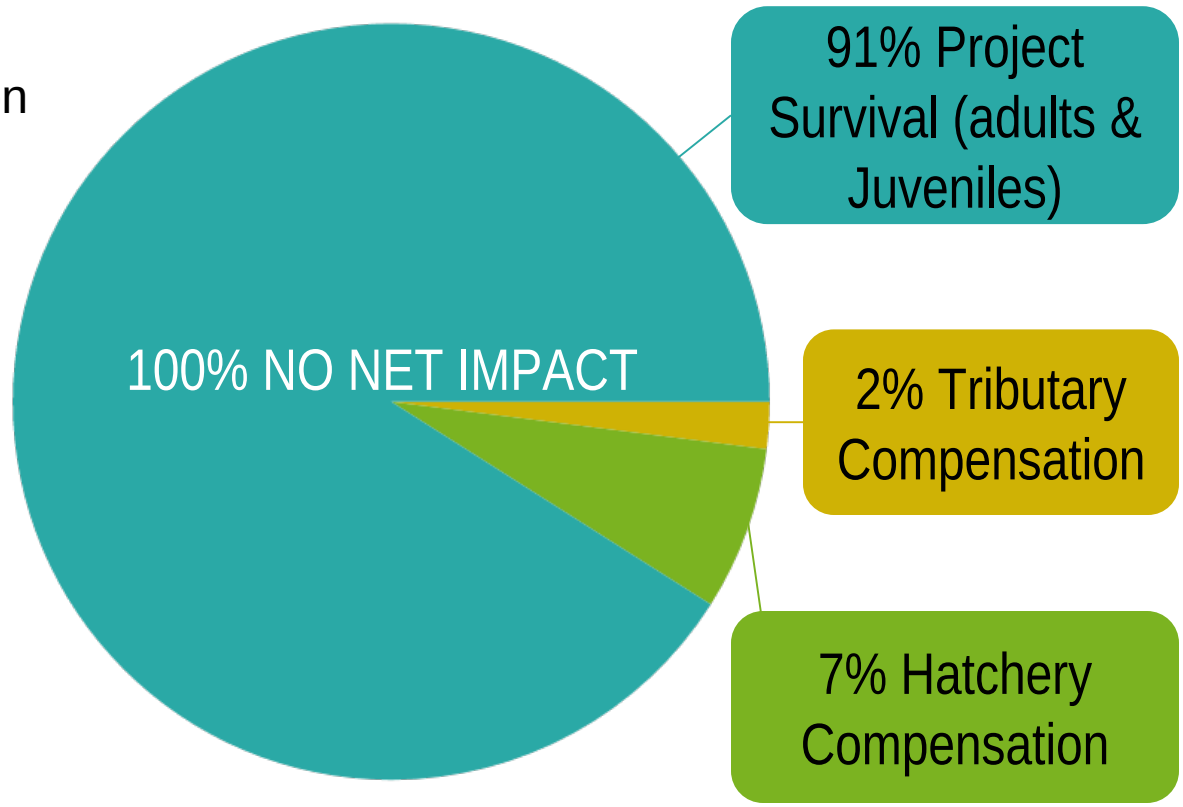
FERC License No. 2149

March 26, 2002

No Net Impact – The Foundational Philosophy of the Wells HCP

Three components of NNI:

- Project Survival Standards
- Tributary Compensation for adult mortality
- Hatchery Compensation for juvenile mortality.



Survival Standards

HCP Phase Designations

Phase III (Standard Achieved)

- 91% Combined Adult and Juvenile Project Survival or
- 93% Juvenile Project Survival

Phase III (Additional Juvenile Studies)

- 95% Dam Passage Survival or
- 95% Calculated Dam Passage Survival

Adult Survival Rates

Adult Passage Survival via PIT-tag conversion rates

- Spring Chinook 100%
- Summer Chinook 98.7%
- Steelhead 98.6%
- Sockeye 100%
- Coho Insufficient data

Includes ***all*** sources of mortality, not just hydro – substantial inter-dam harvest of summer Chinook and steelhead

Juvenile Survival Rates

Juvenile *Project* Survival of at least 93%

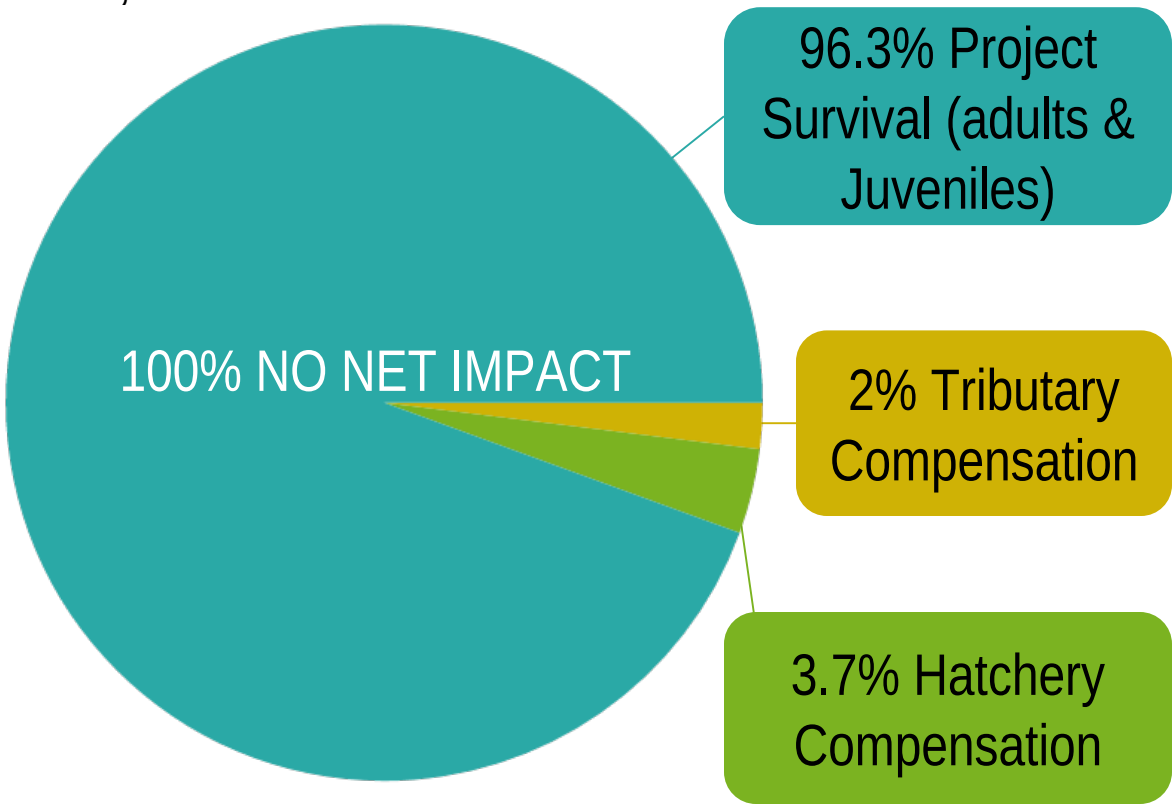
– Yearling Spring Migrants:

- 1998 – 99.7%
- 1999 – 94.3%
- 2000 – 94.6%
- 2010 – 96.4%
  - 4-year average **96.3%**

NNI hatchery mitigation set at 3.7% of spring and summer Chinook and steelhead smolts

No Net Impact – Achieved Via the Wells HCP

Because the Wells HCP calculates the hatchery mitigation rate as the average of survival studies on both yearling Chinook and steelhead, our spring Chinook NNI looks like this…



Hatchery Compensation - NNI

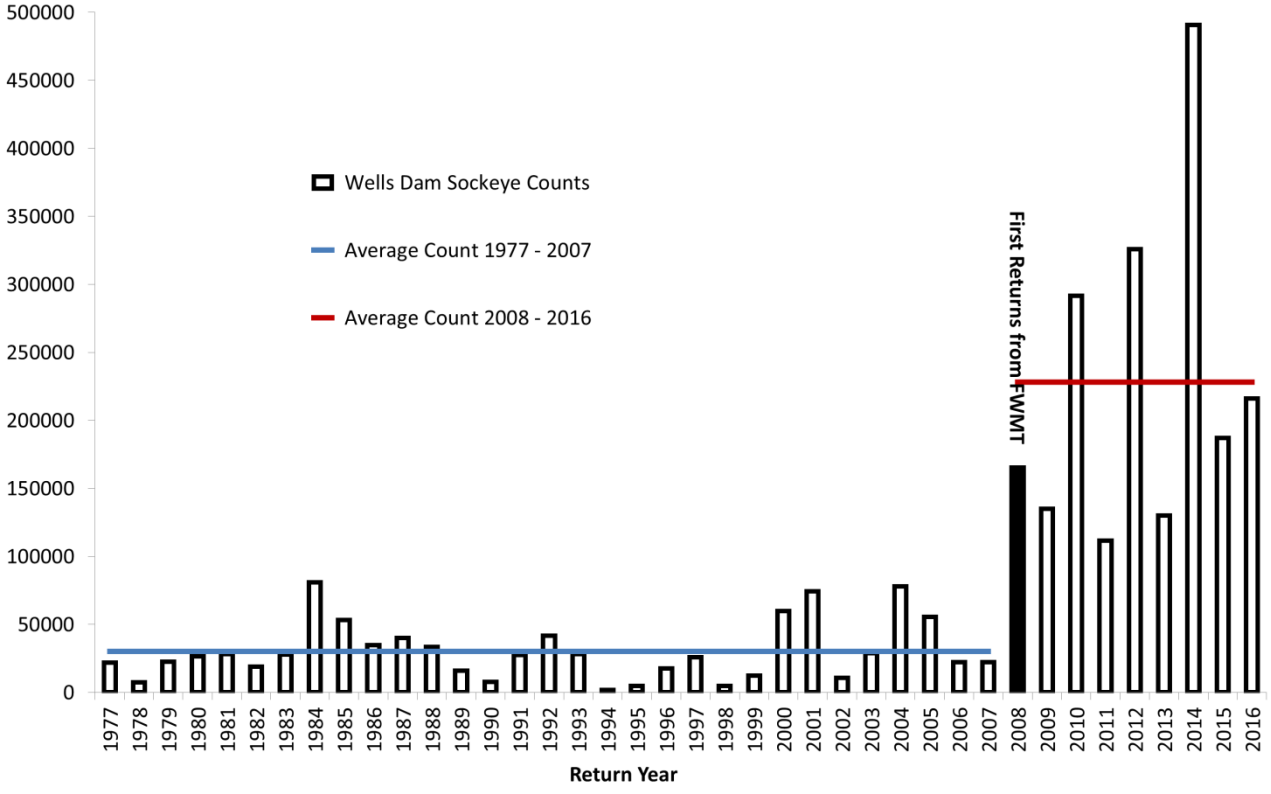
Goal: achieve the hatchery-compensation component of NNI by producing hatchery fish to replace juvenile fish losses at the Wells project (3.7% or 7%, per phase designation)

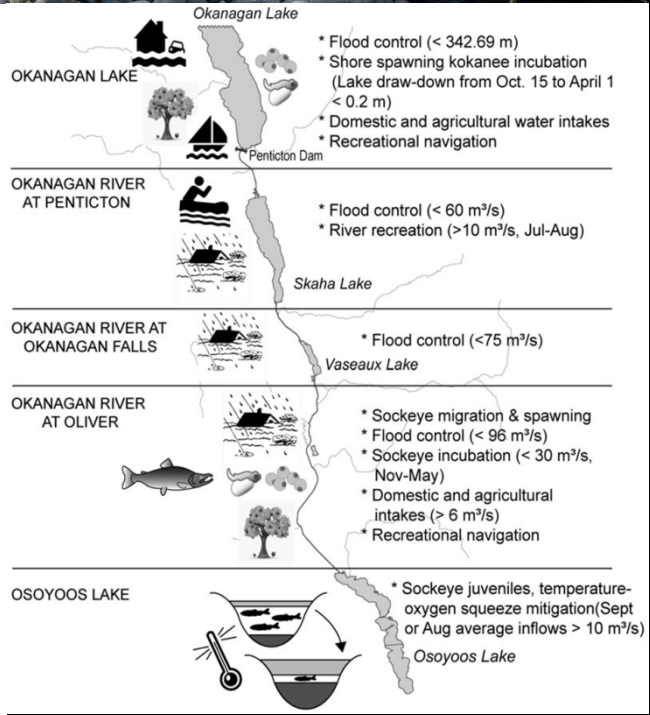
- Spring Chinook (3.7%) – Methow Hatchery (29,123 smolts)
- Steelhead (3.7%) - Wells hatchery (8,000 smolts)
- Summer Chinook (3.7%/7%) - Chief Joseph Hatchery (48,100 yearlings & 49,000 subyearlings)
- Coho (3.7%) – Wells Hatchery (up to 37,000 smolts)
- Sockeye (7%) - CANADIAN FLOW MANAGEMENT (FWMT)

Tributary Enhancement

No evidence of mortality for adult spring Chinook passing Wells Dam; nevertheless….

- Tributary Conservation Fund (Plan Species Account)
  - More than $14 million will be contributed by Douglas PUD over the life of the Wells HCP
  - More than $2.9 million in project funding to date
  - Twenty-seven major enhancement and protection projects implemented since 2004 in the Twisp, Chewuch, Methow, and Okanagan (Canada) rivers





Hyatt et al. 2015. *Canadian Water Resources Journal*. 40:87-110

Three-Pronged Approach to Reaching No-Net Impact

7% Hatchery Production

91% Combined Adult/Juvenile Survival
93% Juvenile Survival

2% Tributary Projects

Site Specific Tools to Reach NNI

Rocky Reach **Juvenile Bypass System**

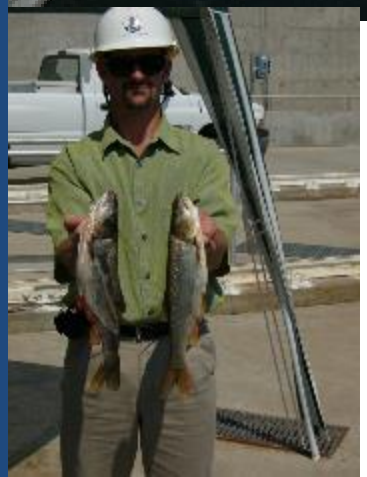
- Installed in 2002/2003

Rock Island **notched surface spill**

- Over/under
  & notched spill gates

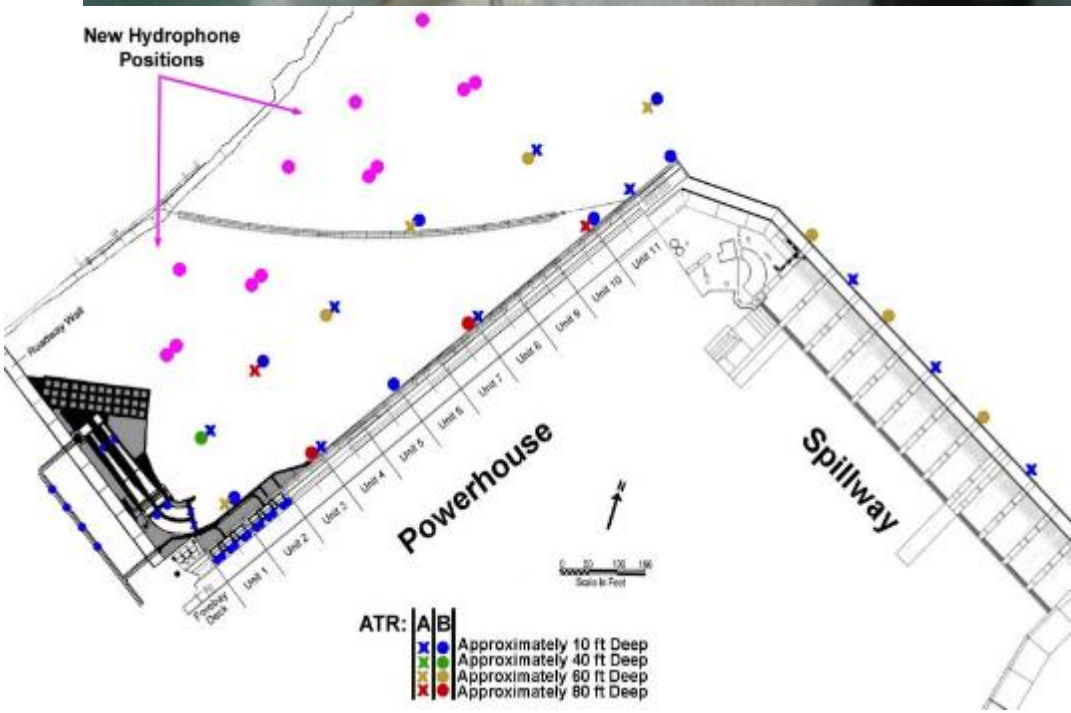
Both Projects - **Predator Control**

- Remove an average of 65,000 northern pikeminnow annually



Best Available Science for Evaluating Juvenile Survival

- Conducted **annual survival studies** from 2003-2011
- Utilized **best available science** tools and methodology over time **to refine future studies and project operations**



10-year Project Survival Achievement

Rocky Reach

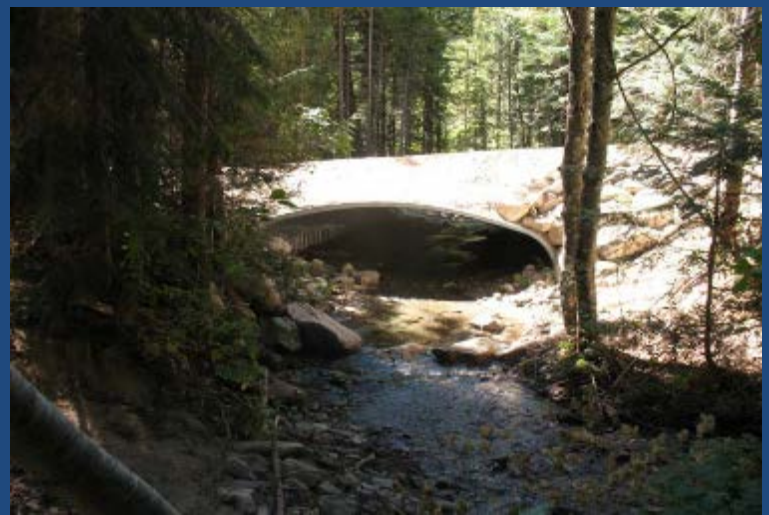
Species	Juvenile Survival	Combined Survival	Standard Achieved?
Sockeye	**93.6%**	**92.6%**	**Yes**
Spring Chinook	**92.3%**	**92.3%**	**Yes**
Steelhead	**95.8%**	**94.8%**	**Yes**

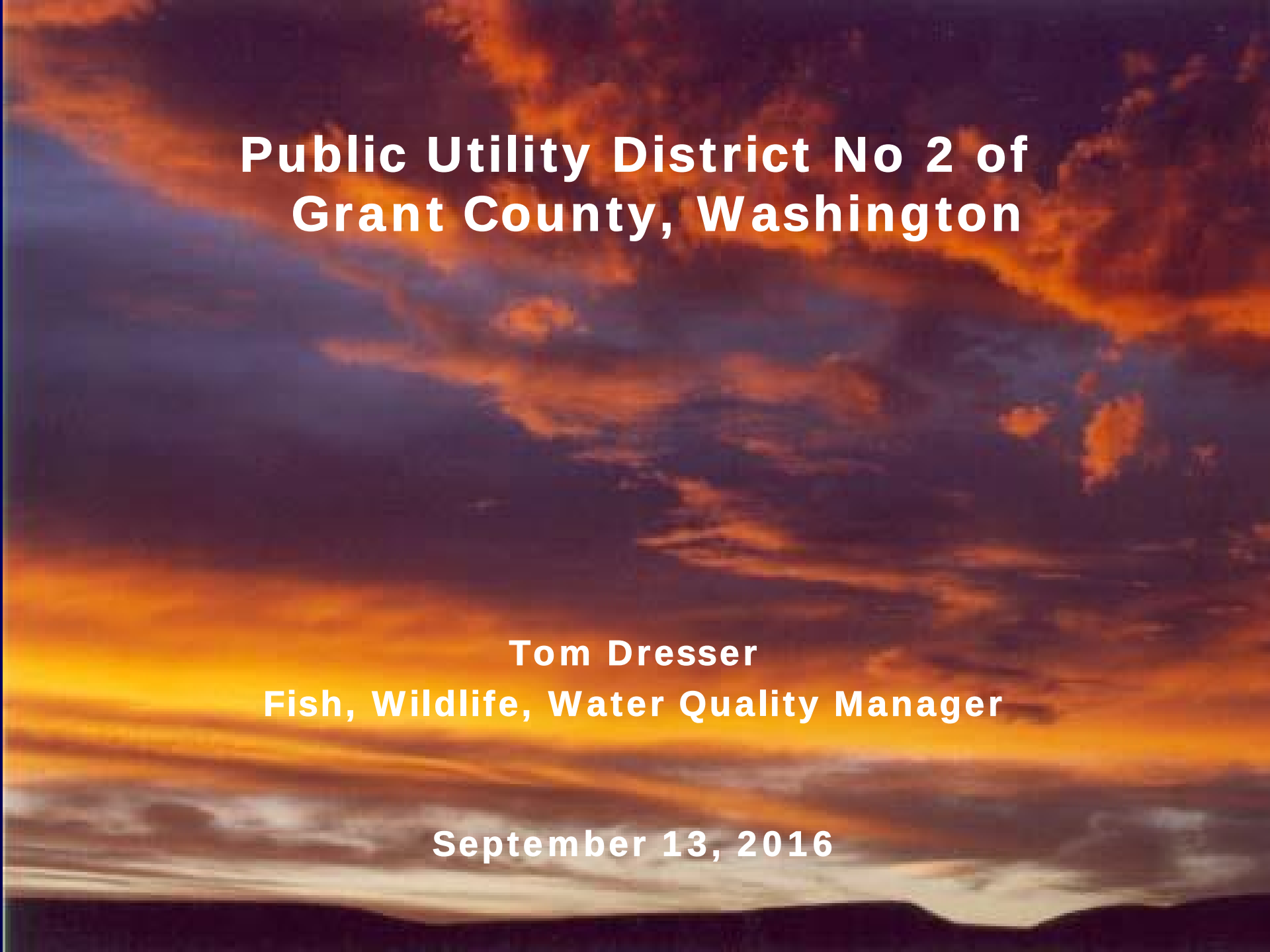
Rock Island

Species	Juvenile Survival	Combined Survival	Standard Achieved?
Sockeye	**93.3**	**91.8%**	**Yes**
Spring Chinook	**93.8**	**93.7%**	**Yes**
Steelhead	**96.8**	**96.1%**	**Yes**

Tributary Protection and Enhancement

Account	Number of Trib. Projects	Chelan PUD Funding	Total Project Funding
Rocky Reach	30	$2,335,494	$17,001,791
Rock Island	34	$3,613,865	$27,452,804
Total	**62**	**$5,949,359**	**$44,454,595**





Public Utility District No 2 of Grant County, Washington

Tom Dresser
Fish, Wildlife, Water Quality Manager

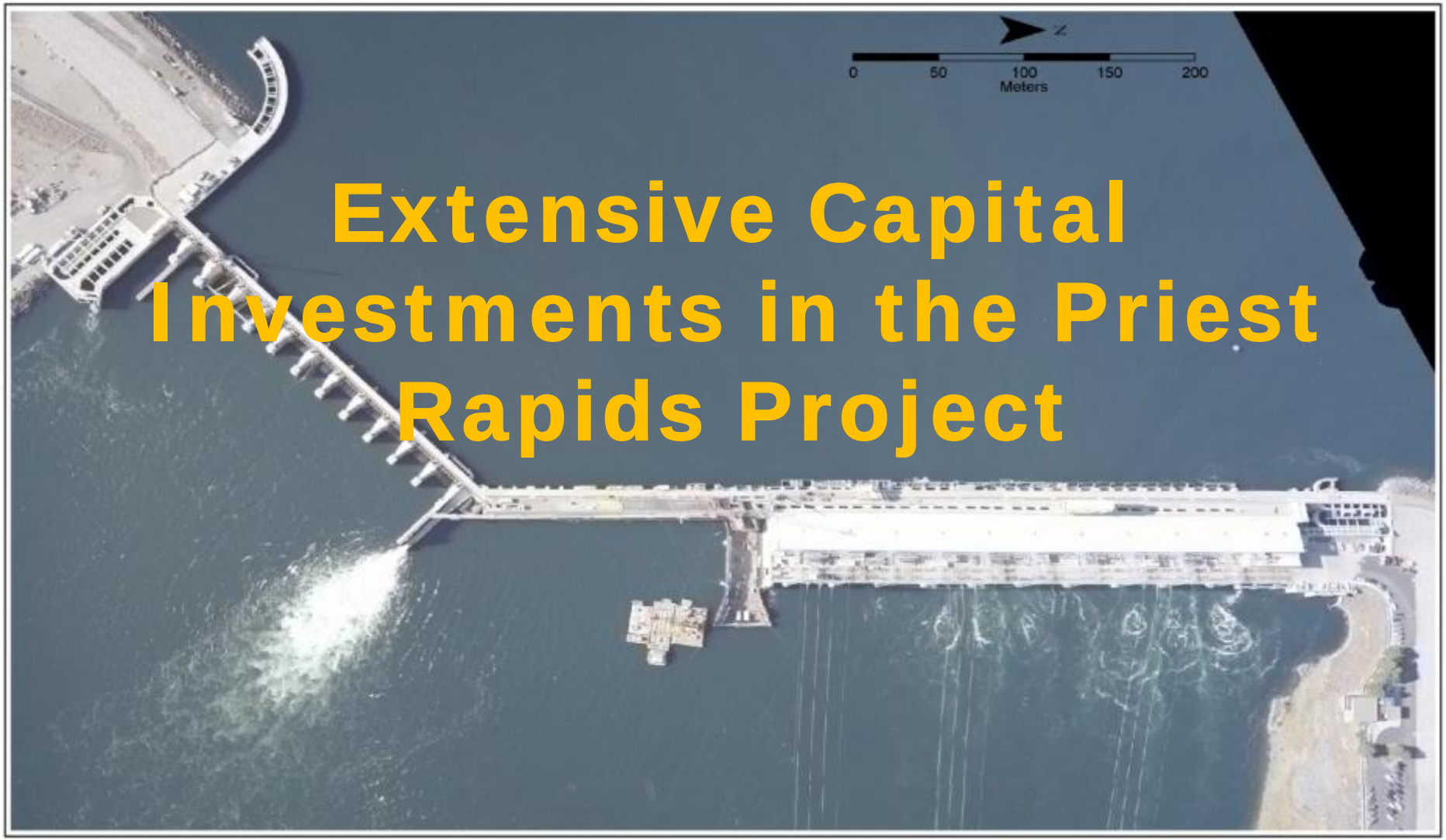
September 13, 2016

Grant PUD is Achieving No Net Impact

Hydro – meet survival standard or pay into NNI fund until survival standards are met.

Habitat fund – protect or conserve habitat.

Hatcheries – 11 programs/8.3 million hatchery fish.



Extensive Capital Investments in the Priest Rapids Project

Wanapum Future Unit Bypass, Priest Rapids Top-spill Bypass, Advanced Hydro Turbine Systems at Wanapum, Fish Mode Operations at both Wanapum and Priest Rapids Dams

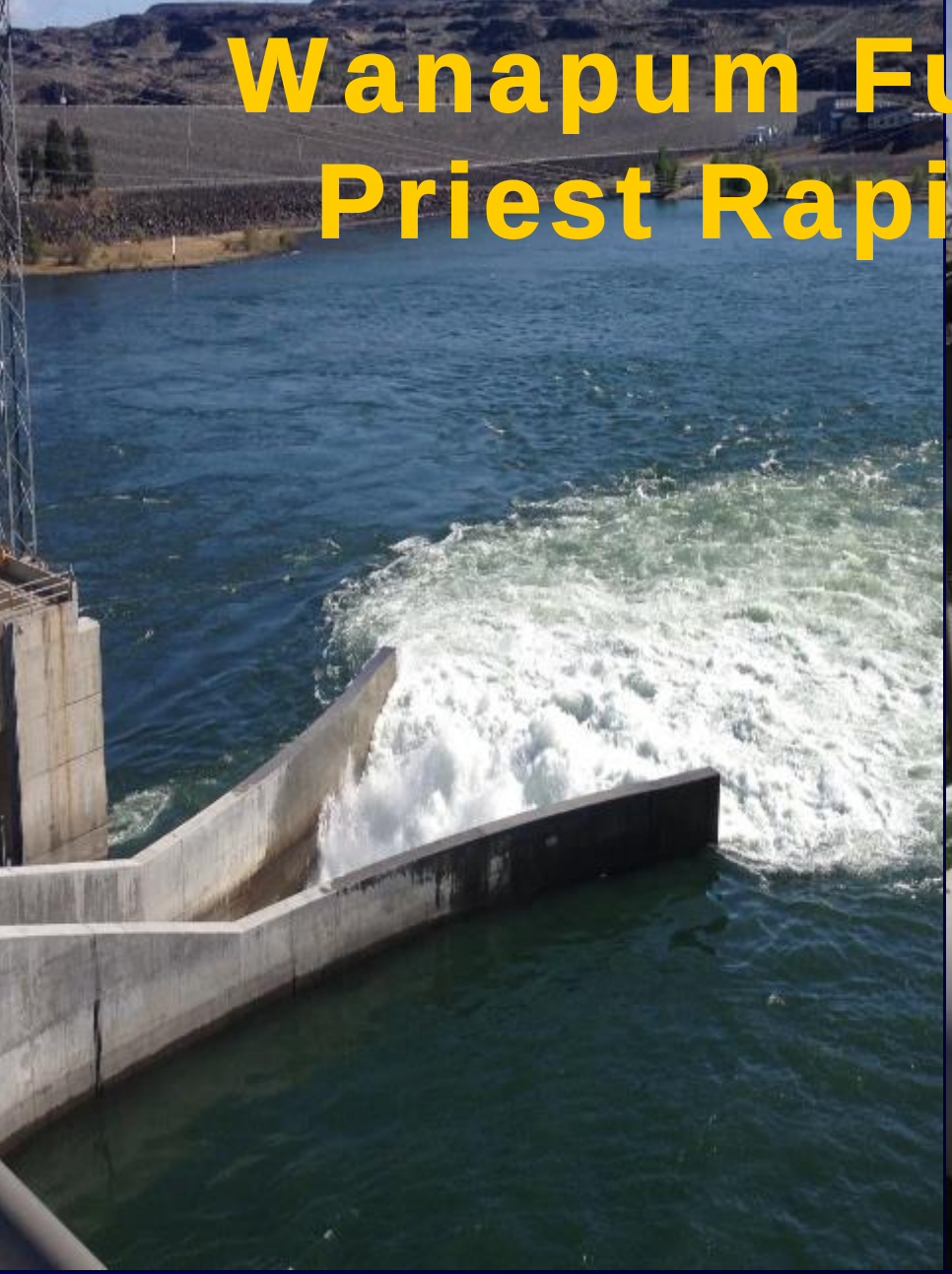
and Enhanced Predator (fish and avian) Control Programs

Advanced Turbines Wanapum Dam

Testing in 2008 indicated that survival for yearling Chinook passing through the Advanced turbine system at Wanapum Dam was >97%.

In 2014 survival for yearling Chinook passing through the Advanced turbine system at Wanapum Dam was 98.2%.

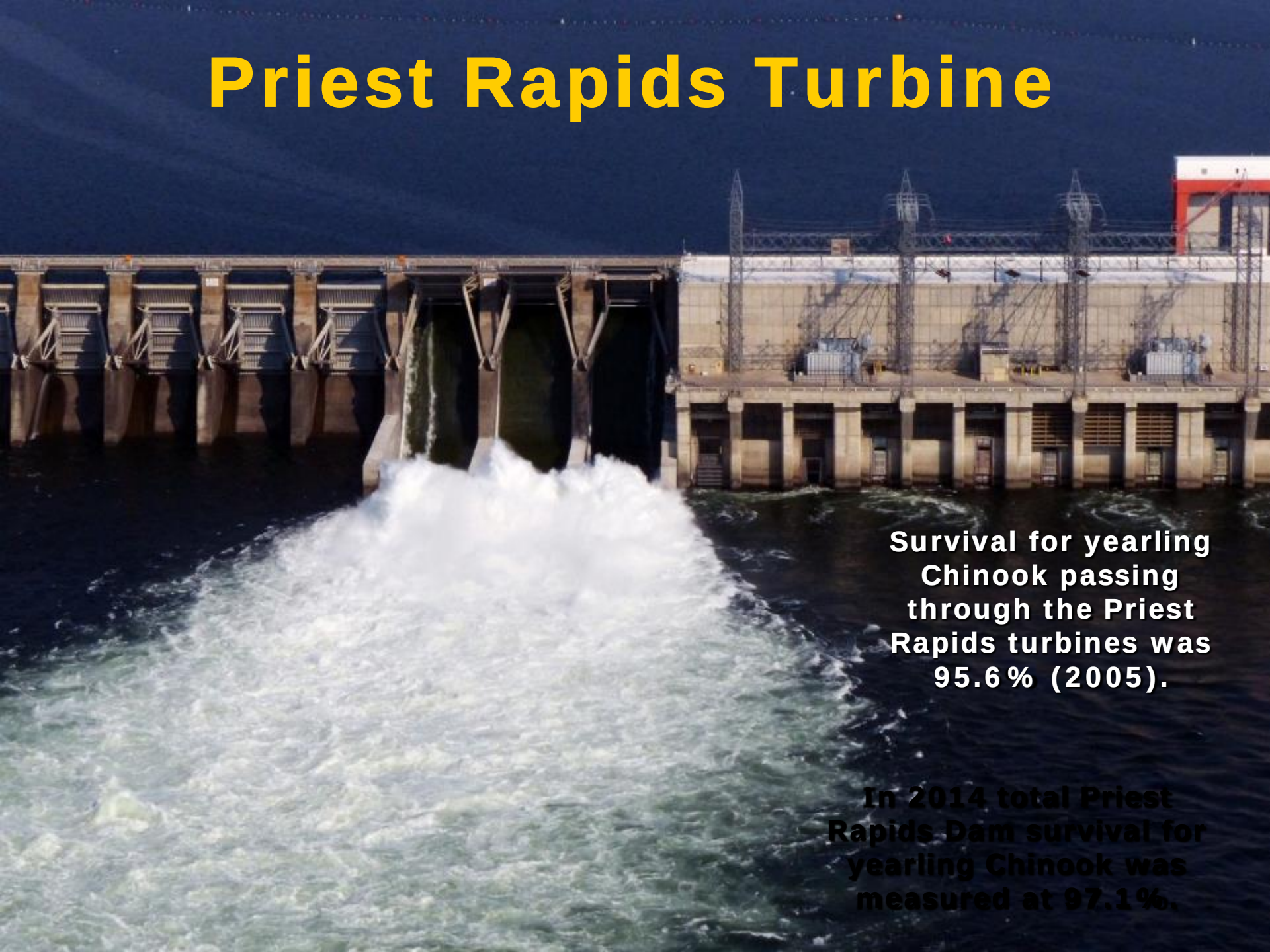
Wanapum Future Unit and Priest Rapids Bypasses



Wanapum Future Unit Bypass survival >96% (2008 & 2014).

Priest Rapids Bypass Top-spill survival >99.8% (2014).

Priest Rapids Turbine



Survival for yearling Chinook passing through the Priest Rapids turbines was 95.6% (2005).

In 2014 total Priest Rapids Dam survival for yearling Chinook was measured at 97.1%.

Species	2003-2005	Check-in (2014)	Meeting Standards (Y/N)
Yearling Chinook	**86.5%**	**90.8%** *	**Yes**

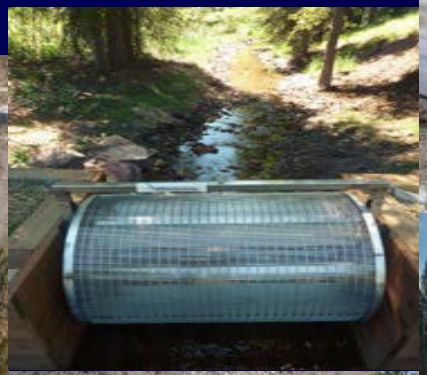
* Wanapum Drawdown

3 Separate Habitat Accounts

NNI Account - Provides near-term compensation for annual survival less than target standards;

Priest Rapids Conservation Account - Provides habitat funding for all covered species included in Salmon & Steelhead Settlement Agreement;

BiOp Account - Provides habitat funding for UCR spring Chinook & steelhead;



Combined total of ~$34.4M has been committed to date (2006-2016).

In total 84 separate projects have been funded.