

Mid Columbia Coho Reintroduction Program

Using Adaptive Management
to Achieve Success

Mid-Columbia Coho Program Overview



■ Long Term Vision

To re-establish naturally spawning coho populations in the mid and upper Columbia tributaries to biologically sustainable levels, which provides harvest in most years.

■ Guiding Principles and Mandates

- Tribal Restoration Plan- Provides an adaptive management framework to restore the Columbia River salmon
- Treaty of 1855-Provides the opportunity for tribal harvest of coho in YN's usual and accustom fishing areas

■ Biological Objectives

To develop a locally adapted spawning coho stock to support harvest with two identifiable metrics:

- Maintain a 3-year mean of natural origin returns in both the Methow and Wenatchee basins to exceed 1,500 fish
- Achieve a total harvest rate of 23%(includes mixed stock, mainstem, and terminal harvests)

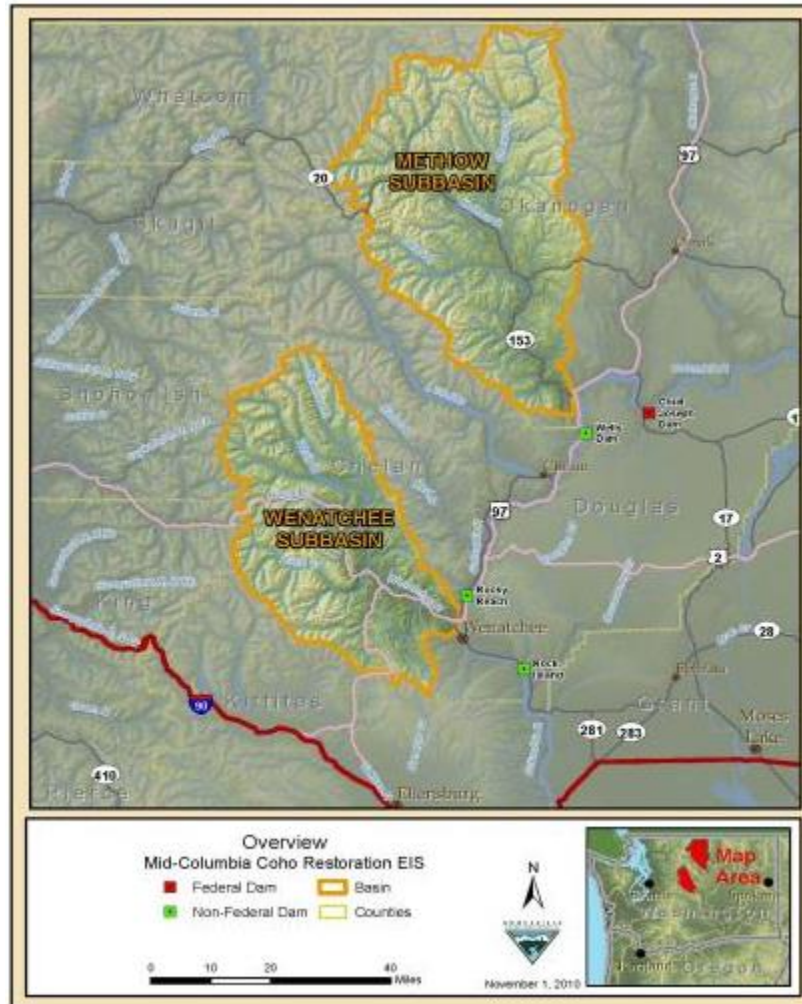
■ Implementation Plan

Development of a long-term, comprehensive plan that emphasizes:

- Establishing a local brood source capable of returning to Upper Columbia tributaries
- Progressive brood development towards preferred habitats using a phased approach
- Focus on decreasing domestication while increasing population fitness



Mid Columbia Coho Reintroduction Program



Project Background

■ Historical Abundance (annual escapement)

- Wenatchee-7,000-8,000
- Methow-23,000-31,000

■ Most abundant species within upper Columbia tributaries

- Construction of hydro facilities
- Outsourcing of local brood eggs across the region
- Impassable tributary dams
- Restricted habitat



Coho Salmon
Methow River 1910, Mullan (1992)

Project Undertaking: An Uphill Battle



■ Project Limitations

- Extirpation of coho in the region
- Lack of useful, scientific based species interaction studies
- ***Lack of fish production and acclimation/release facilities***

■ Determine feasibility

- A Technical Work Group(TWG) was developed to address key concerns from various agencies
- Objectives were created to see what evaluations were needed to study potential interactions with listed and endemic stocks



Feasibility Study Goals

- **Determine whether a broodstock could be developed from Lower Columbia River (LCR) coho**
- **Initiate natural production in areas of low risk to sensitive species, such as spring Chinook and steelhead**
- **Study potential interactions that may occur among listed/sensitive species and reintroduced coho**



Broodstock Development



■ Wenatchee River

- Icicle Creek
 - Primary broodstock development source
- Nason and Beaver creeks
 - Species Interactions
 - Natural Production

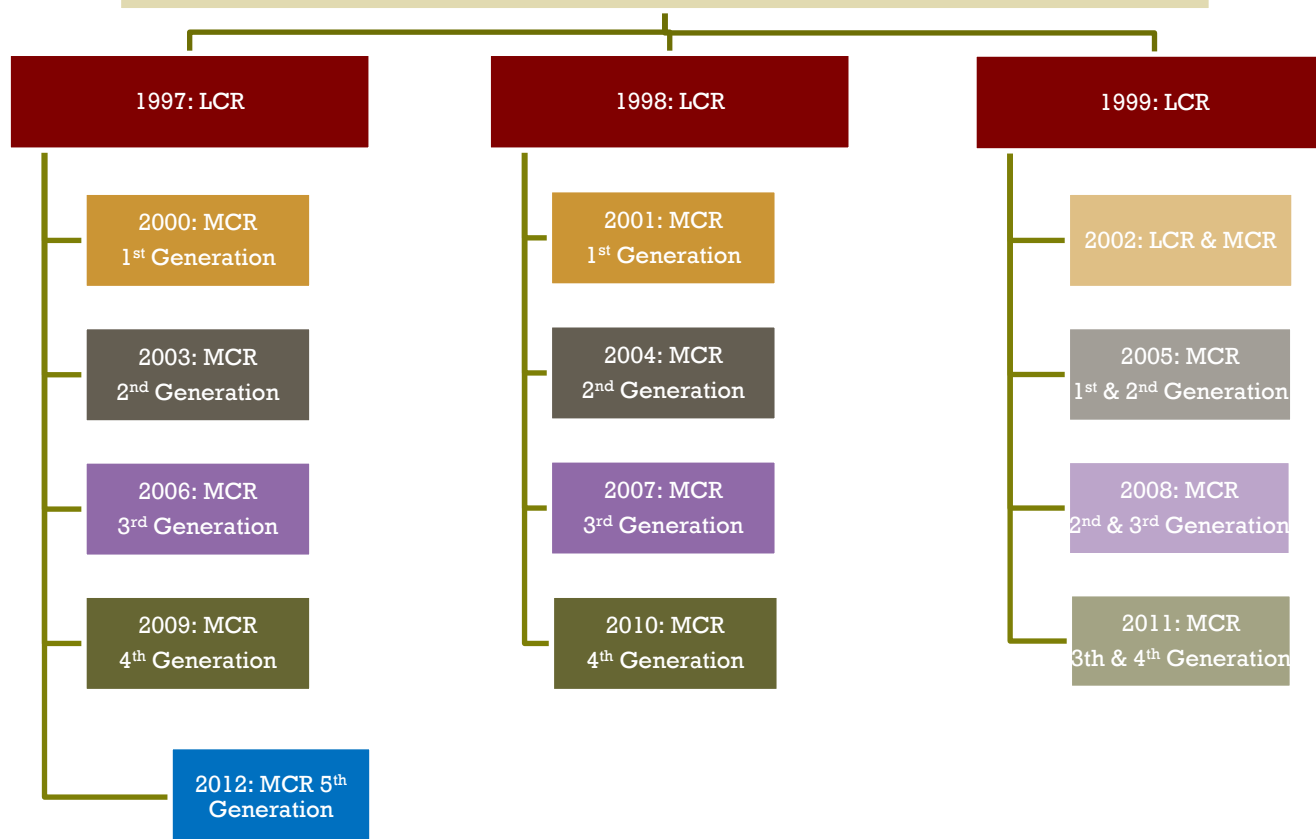
■ Methow River

- Winthrop NFH
 - Broodstock Development
- Wells FH
 - Supplemental Broodstock Development

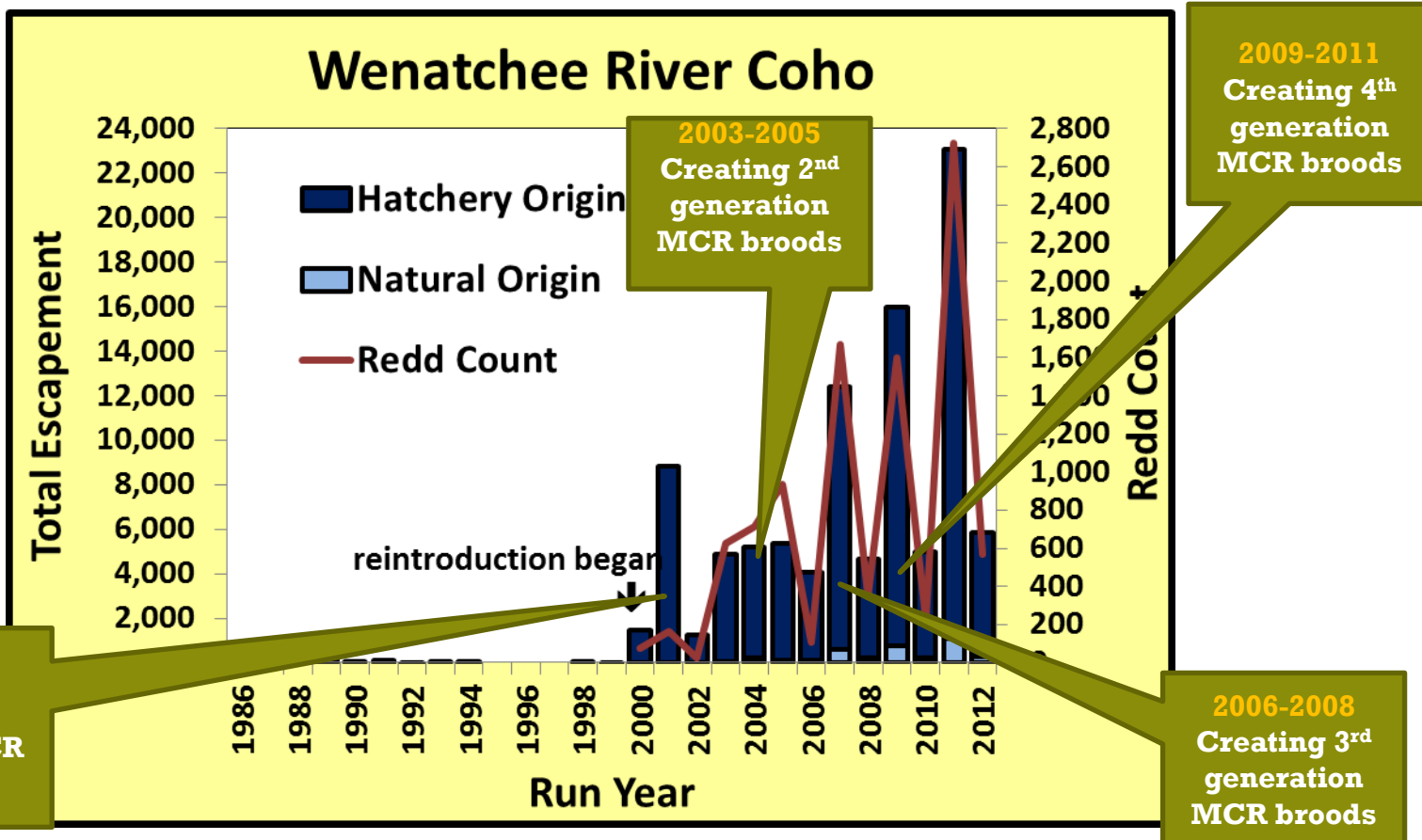


Broodstock Development

The Development of a Local Broodstock Wenatchee Basin (Brood Year & Source)



Broodstock Development Wenatchee River Basin



Broodstock Development Wenatchee River Basin



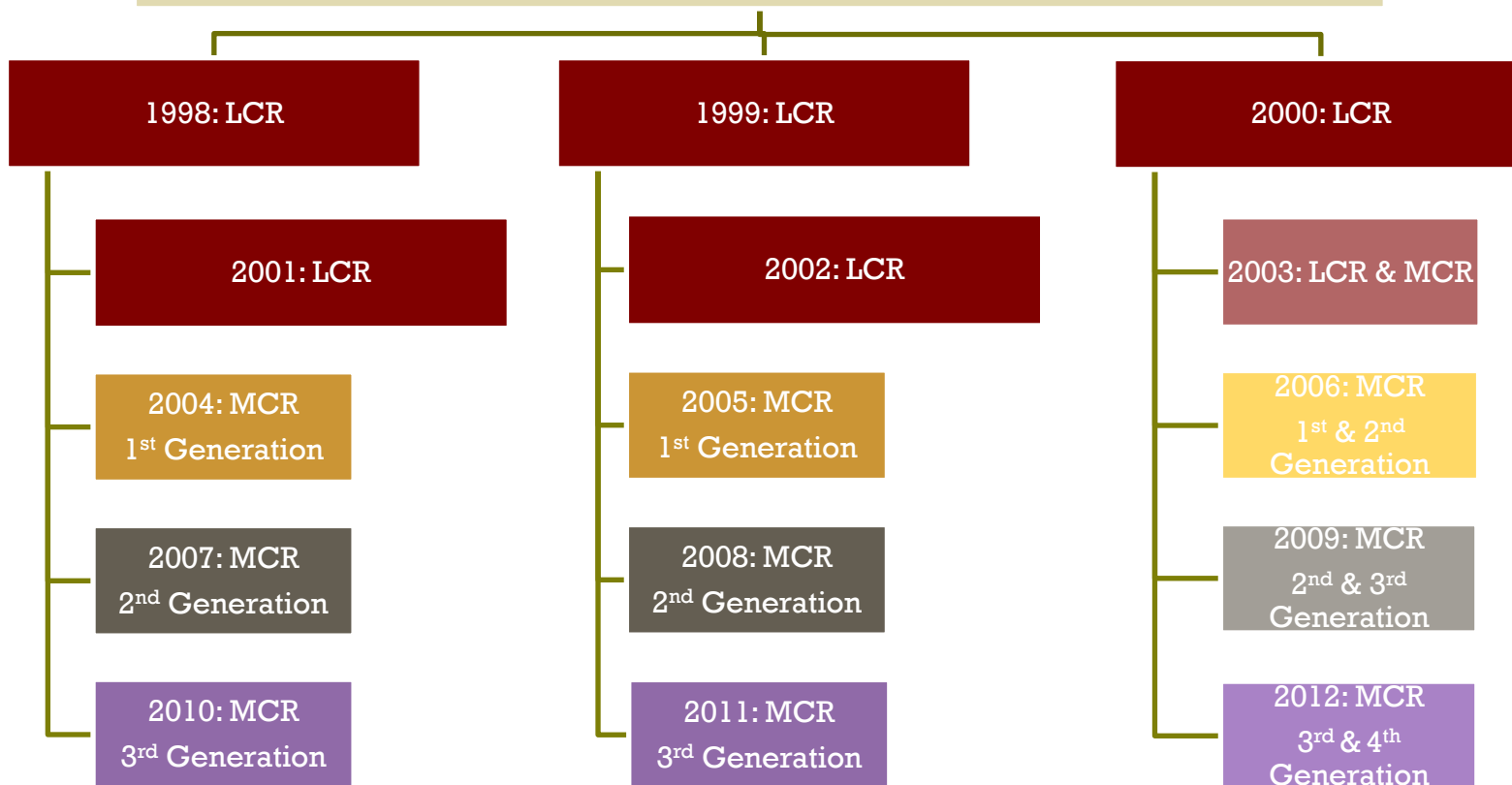
■ Mean Escapement (generations removed from LCR)

- 1st generation: 3,857
- 2nd generation: 5,142
- 3rd generation: 7,052
- 4th generation: 14,689

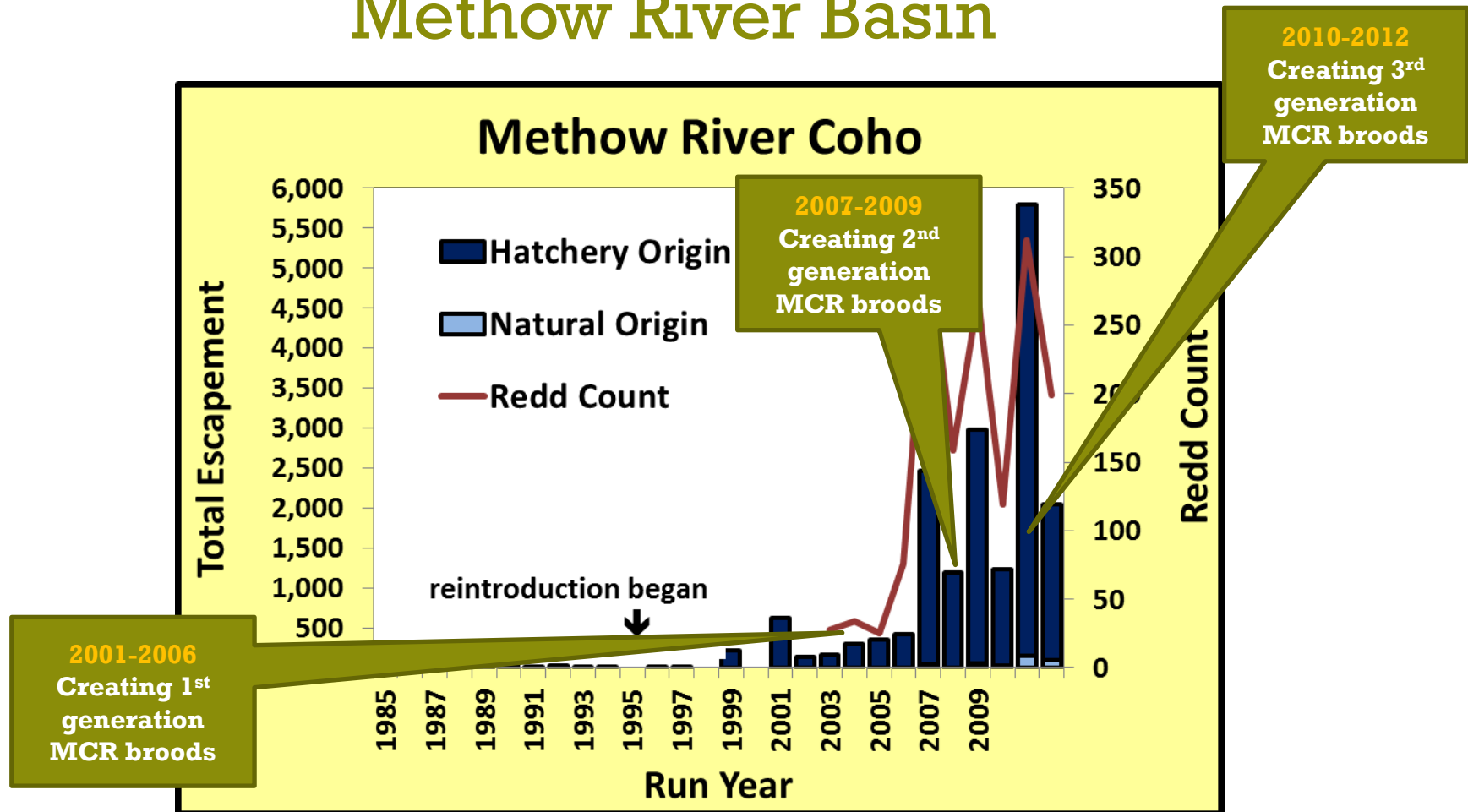


Broodstock Development

The Development of a Local Broodstock Methow Basin (Brood Year & Source)



Broodstock Development Methow River Basin



Broodstock Development Methow River Basin



■ Mean Escapement (generations removed from LCR)

- 1st generation: 328
- 2nd generation: 2,213*
- 3rd generation: 3,022*

* denotes an increase in hatchery release
production (500K release starting in
2006)



Feasibility Phase Species Interactions

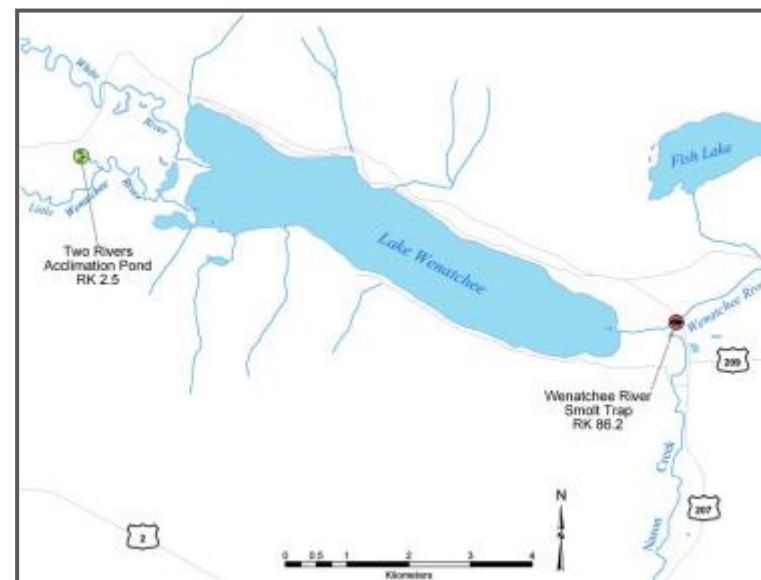


- ☐ Predation
- ☐ Redd superimposition
- ☐ Residualism
- ☐ Competition



Direct Predation Hatchery Releases

- No detected predation on sockeye fry by hatchery coho
- Sockeye-coho interaction evaluations (2003)
 - Coho smolt radio-telemetry
 - Hatchery smolt movement through Lake Wenatchee
 - Hydro-acoustic surveys
 - Sockeye fry distribution and diel movements
 - Tow-net transects
 - Sockeye fry distribution data-verification of species composition



Direct Predation Hatchery Releases

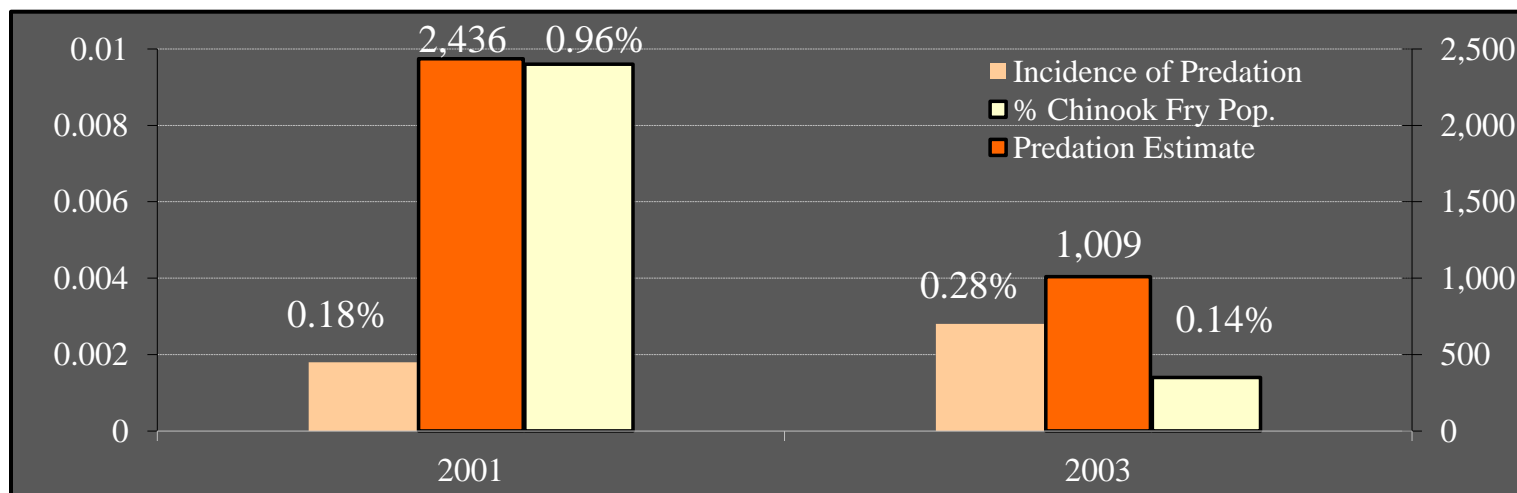
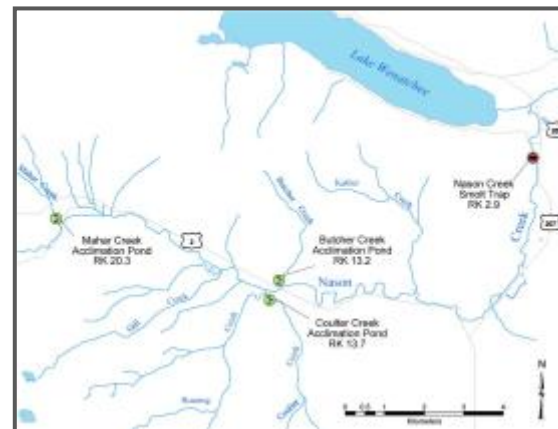
- Low incidence of predation by hatchery coho on spring Chinook fry.

- Modeling Variables

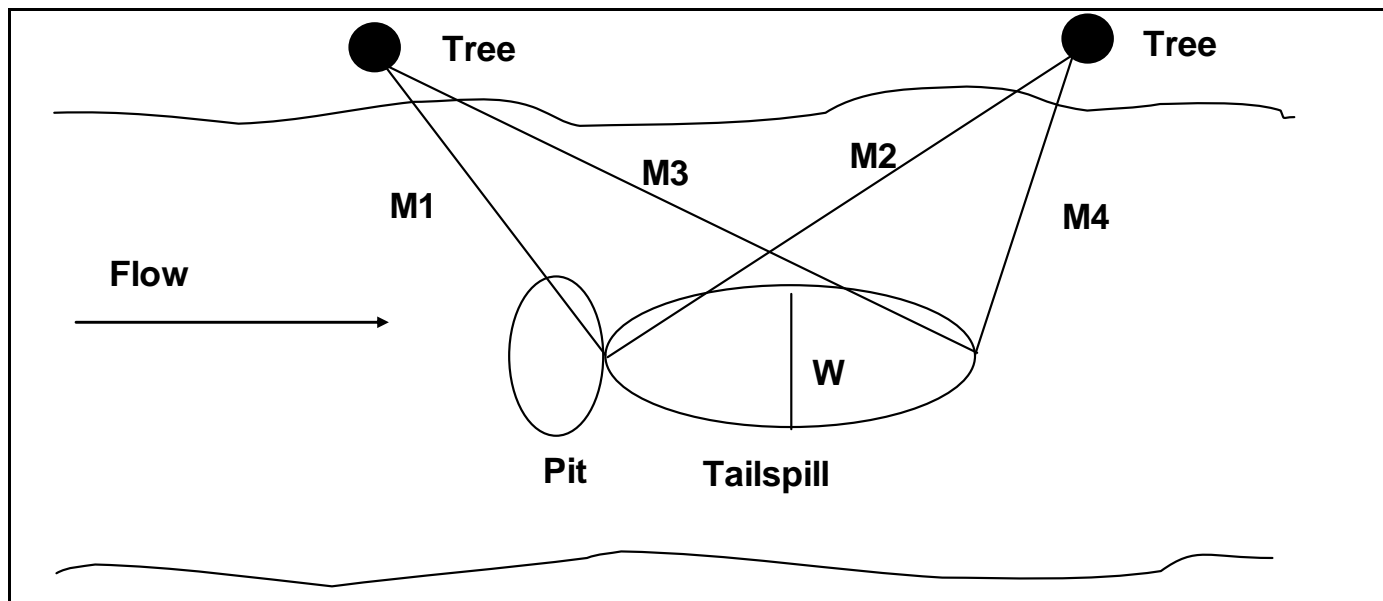
- Number of coho in-stream
- Mean residence time
- Gastric evacuation rates

- Samples sizes

- 1,033 in 2001
- 1,056 in 2003



Natural Production Redd Superimposition



- 2001 – Redd Superimposition Evaluation
 - No superimposition found on Nason Creek

Rates of Residualism



■ Low Rates of Residualism

■ 2000

- Icicle Creek: 4 residuals observed (expands to 20; 3 surveys; 20% sample rate)
- Nason Creek: No residuals observed (3 surveys 20% sample rate)
- Methow River: 4 residuals observed (expands to 25 (3 surveys; 28% sample rate)

■ 2001

- Icicle Creek: 2 residuals observed, (expands to 10; 1 survey; 20% sample rate)
- Nason Creek: No residuals observed (1 survey; 25% sample rate)
- Methow River: 1 residual observed (1 survey; 26.8% sample rate)

Species Interactions

■ Microhabitat Use Studies – 2002 & 2003

- Used fry plants as surrogates for naturally produced coho
- Established Control and Treatment Reaches
- Habitat Based Evaluation

■ Results

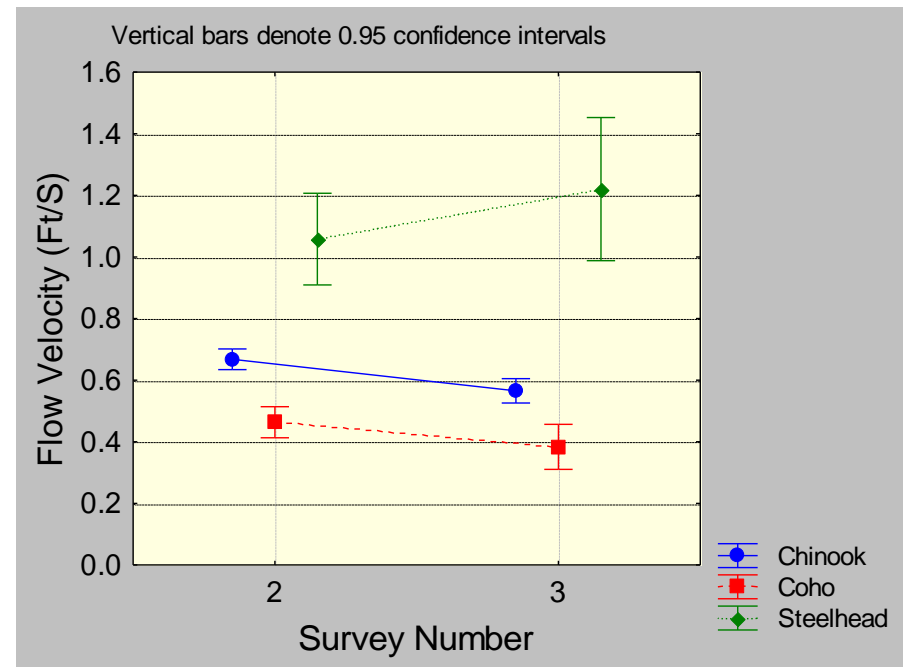
- Coho, Chinook, and steelhead select different microhabitats when they co-occur
- No evidence of habitat displacement



Flow Velocities used by Chinook, Coho, and Steelhead



- MANOVA to analyze habitat use
 - Independent variables
 - Species (STHD, SCK, COH)
 - Dependent variables
 - Flow velocity
 - Water depth
 - Substrate size
 - Surveys where all 3 species were found
 - **Results:** coho observed in slowest water and steelhead in fastest water.

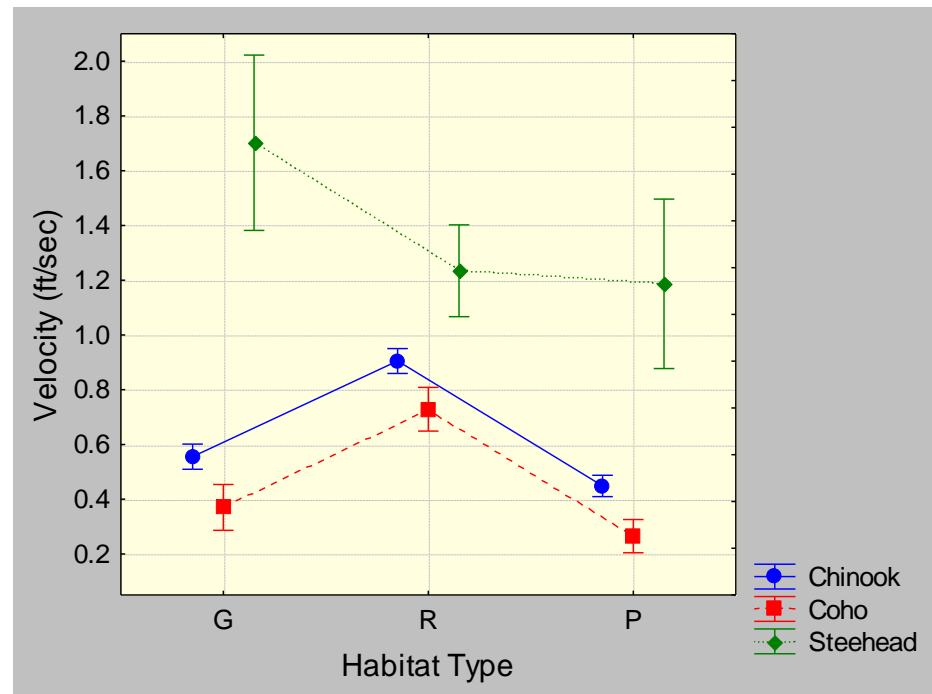


Flow Velocities used by Chinook, Coho, and Steelhead



■ MANOVA to analyze habitat type

- **Results:** Steelhead found in fastest water regardless of habitat type
- **Results:** Chinook found in significantly faster water than coho





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Long Term Plan-Phased Approach

Master Plan Development

- Phased Approach to Reintroduction
 - **Broodstock Development Phases**
 - **Natural Production Phases**



Proposed Phased Approach



■ Broodstock Development Phases

■ **Broodstock Development Phase 1 (BDP1)**

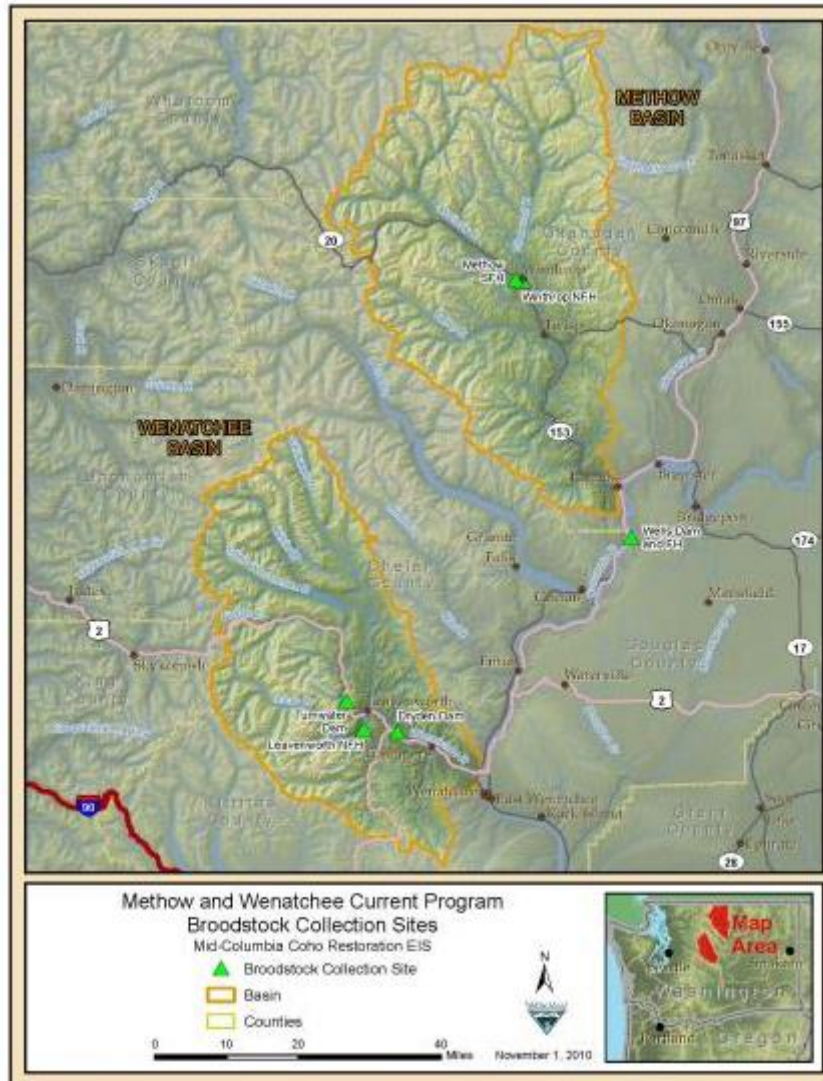
- Focus: Initial broodstock development
 - Biological criteria: 100% local broodstock

■ **Broodstock Development Phase 2 (BDP2)**

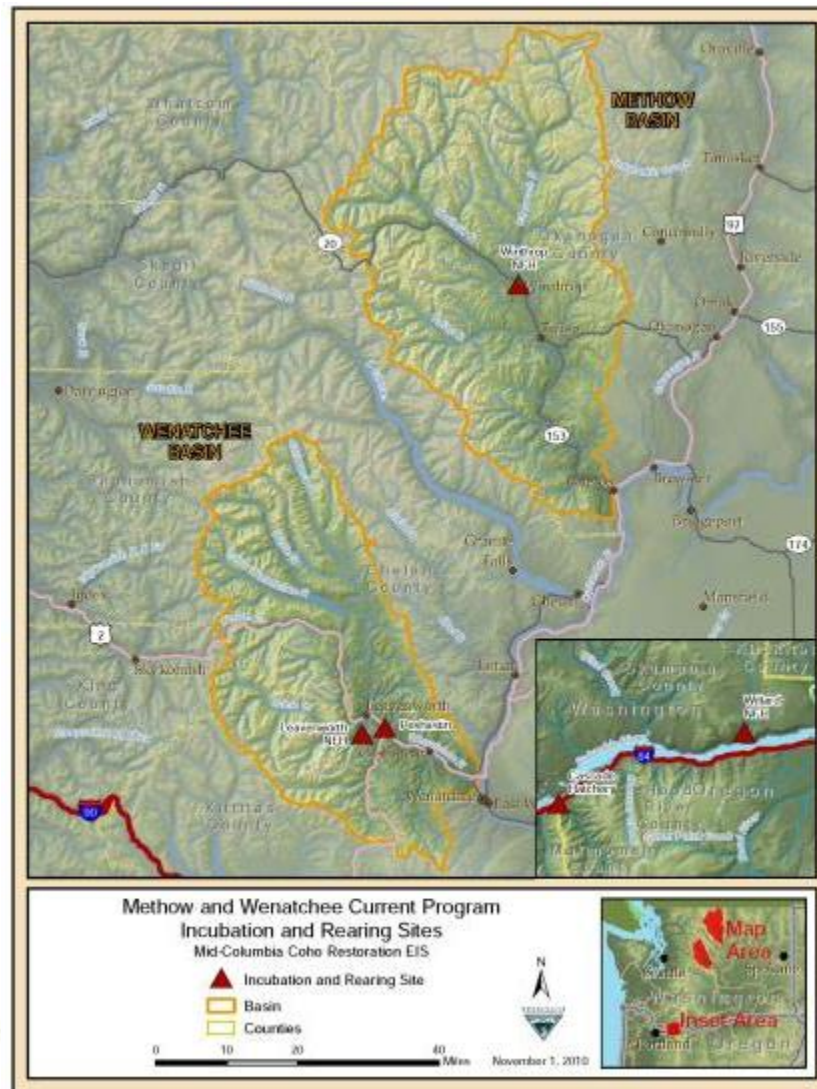
- Focus: “fine-tune” broodstock development
 - Biological Criteria: 3 yr. mean of 50% of the brood comprised from trappable fish at upper basin collection sites



Mid Columbia Coho Reintroduction Program

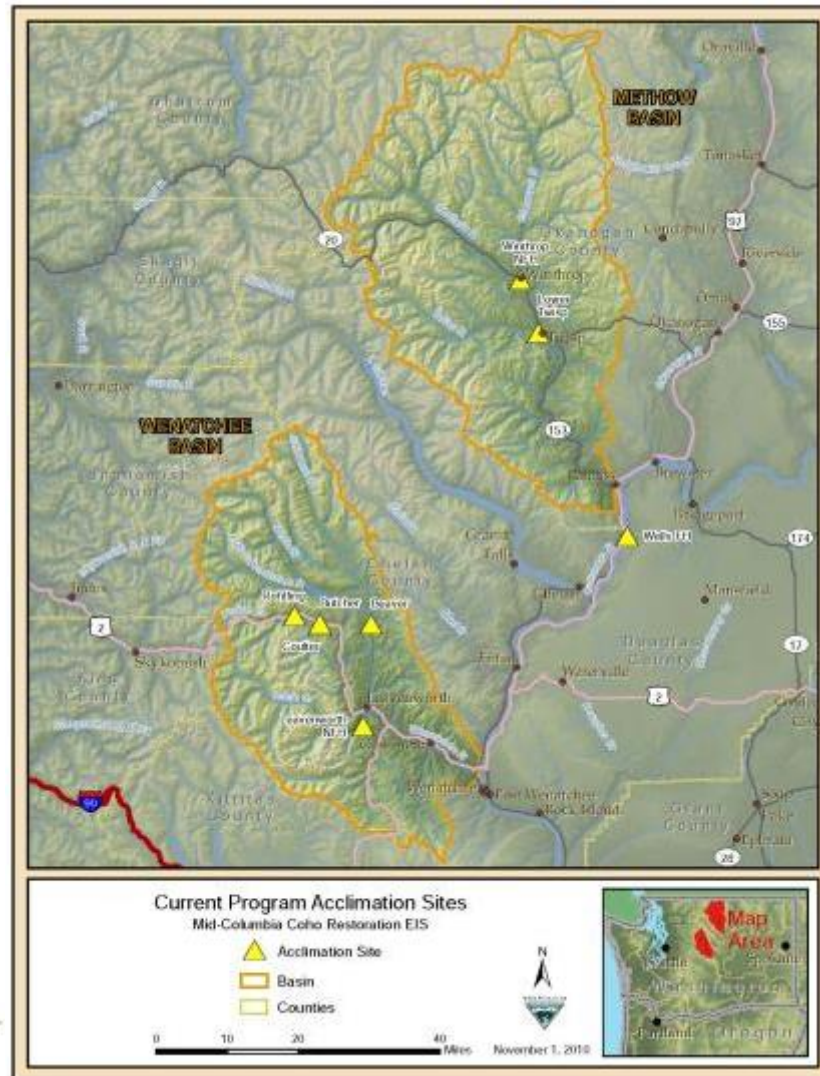


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Proposed Phased Approach



■ Natural Production Phases

■ NATURAL PRODUCTION IMPLEMENTATION PHASE (NPIP)

- Initiate releases into most habitat areas, begins the 'local adaptation' process

■ NATURAL PRODUCTION SUPPORT PHASE

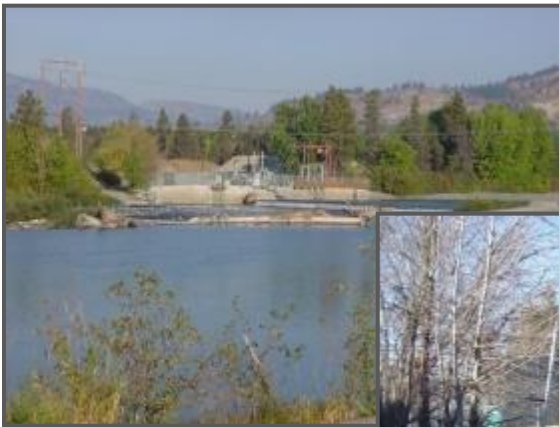
- Emphasizes local adaptation – goal PNI > 0.50

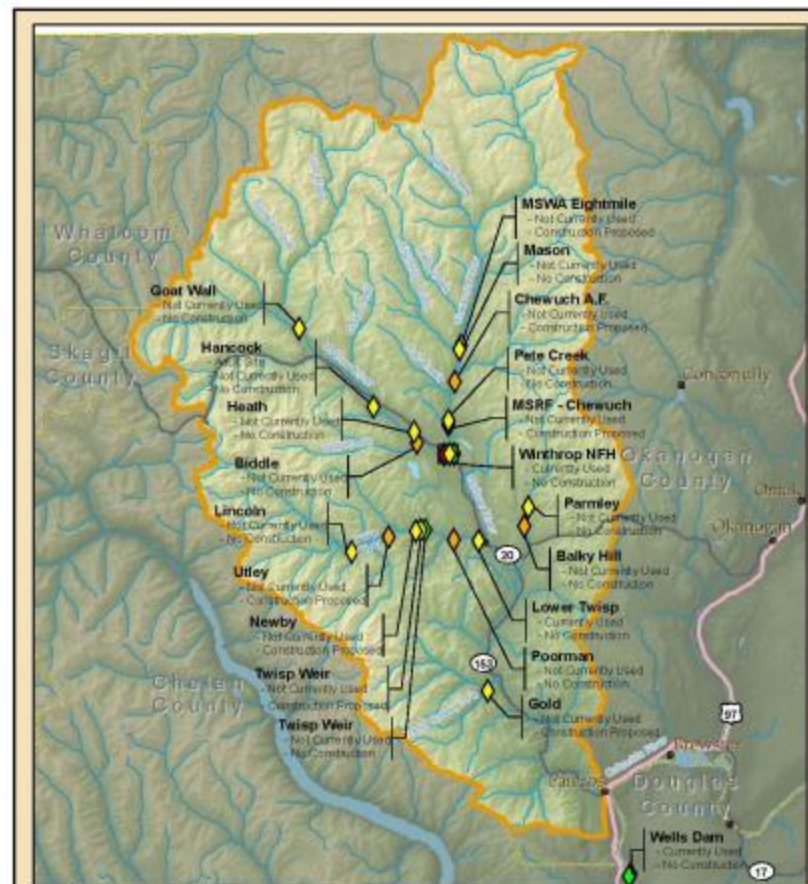
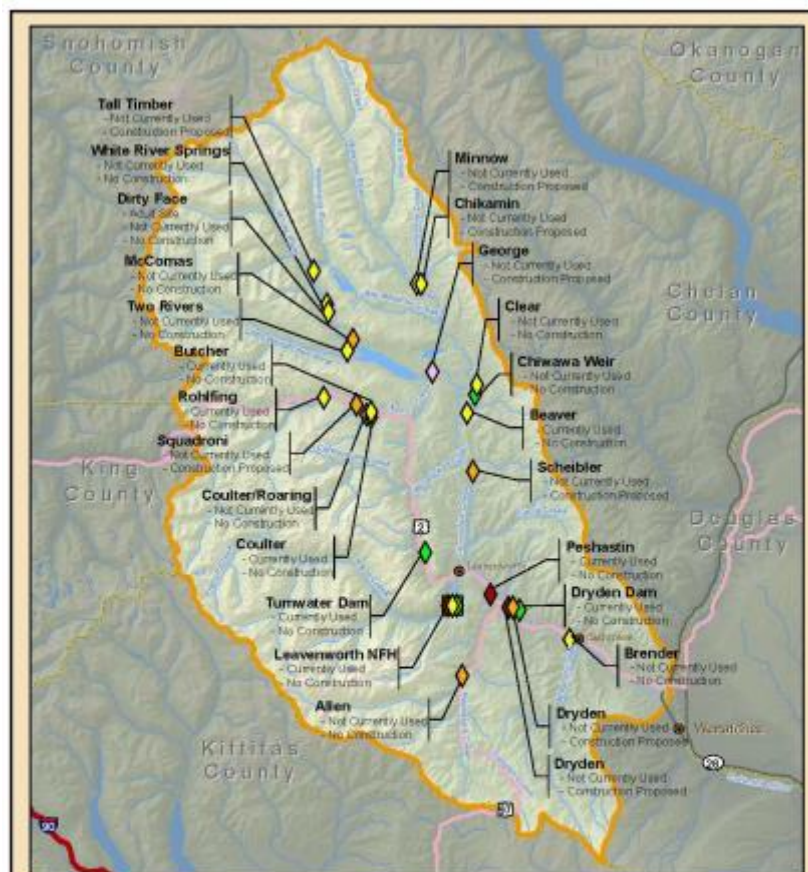


How do we get there?



- ❑ Need to focus on program infrastructure
 - ❑ Adequate adult capture sites
 - ❑ In-basin facilities for adult spawning/egg incubation/early rearing
 - ❑ Additional sites to acclimate juvenile coho throughout the Methow and Wenatchee basins





Semi-Natural Acclimation Sites



- ☐ Disconnected waterways
 - ☐ Beaver ponds
- ☐ Constructed earthen ponds
- ☐ Existing waterways
 - ☐ Side channels/wetland complexes





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Monitoring and Evaluation



Monitoring and Evaluation

- Goal: to monitor and evaluate the results of reintroduction so that operations can be adaptively managed
 - Demonstrate when phased restoration goals are met
 - Provide science based recommendations for management consideration

Monitoring and Evaluation



- Project performance indicators
 - Smolt-to-adult survival rates
 - Egg-to-emigrant
 - Smolt-to-smolt survival rates
 - In-pond Survival
 - Spawning escapement & distribution
 - Adult-to-adult productivity
- Species interactions
 - Monitoring of NTTOC species
- Adaptability to local conditions
 - Genetic Monitoring
 - Past brood years (2001-2011) are being genotyped by CRITFC
 - Morphometrics and life history traits
 - Adult energetics studies
 - Mark-recapture study in the Wenatchee basin
 - Juvenile swim performance



Project Performance Indicators

Methods and Techniques

■ CWT Tags

- SARs
- Harvest rates
- Natural Return Rates
- Adult-adult survival
- Natural smolt production*
- Egg to emigrant Survival*
- Spawning escapement and distribution



■ PIT Tags

- Release to McNary Survival
- In-pond survival
- Volitional release run-timing and tributary residence

Project Performance Indicators

Methods and Techniques

■ Smolt Trapping

- Volitional release and run timing*
- Natural smolt production*
- Egg-to-emigrant Survival*
- NTTOC –size*
- NTTOC – abundance*
- Predation*
- Morphometrics and life history traits*

■ Electrofishing/Snerding

- NTTOC – size
- Could also be used for distribution and abundance



Project Performance Indicators

Methods and Techniques

■ Underwater Observation

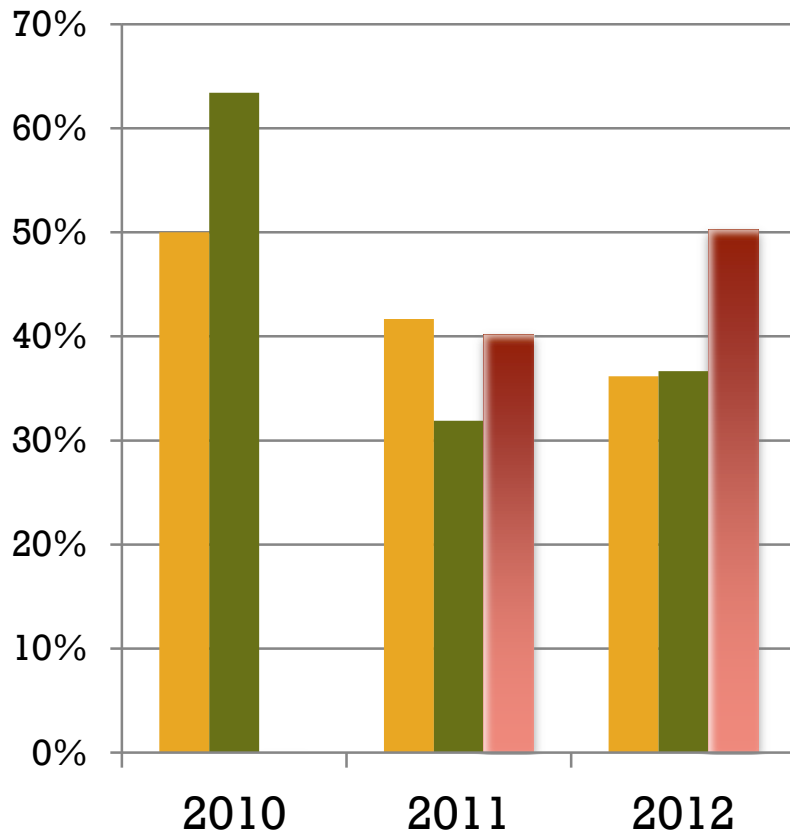
- NTTOC distribution*
- NTTOC abundance*
- Competition

■ Redd Counts

- Spawning escapement and distribution
- SARS
- Adult-Adult survival
- Morphometrics and life history traits



Methow Juvenile Survival



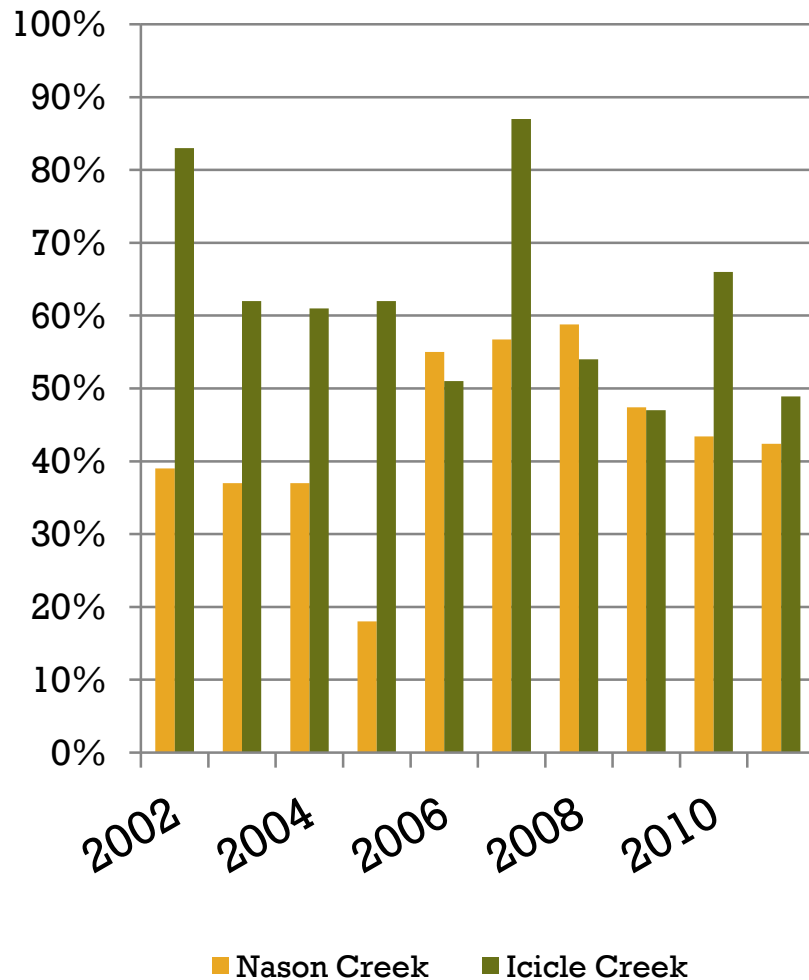
- Winthrop NFH BC
- Winthrop NFH
- Lower Twisp Pd.



Juvenile Performance

Juvenile survival estimates were performed using PIT tag data captured from release sites to McNary Dam.

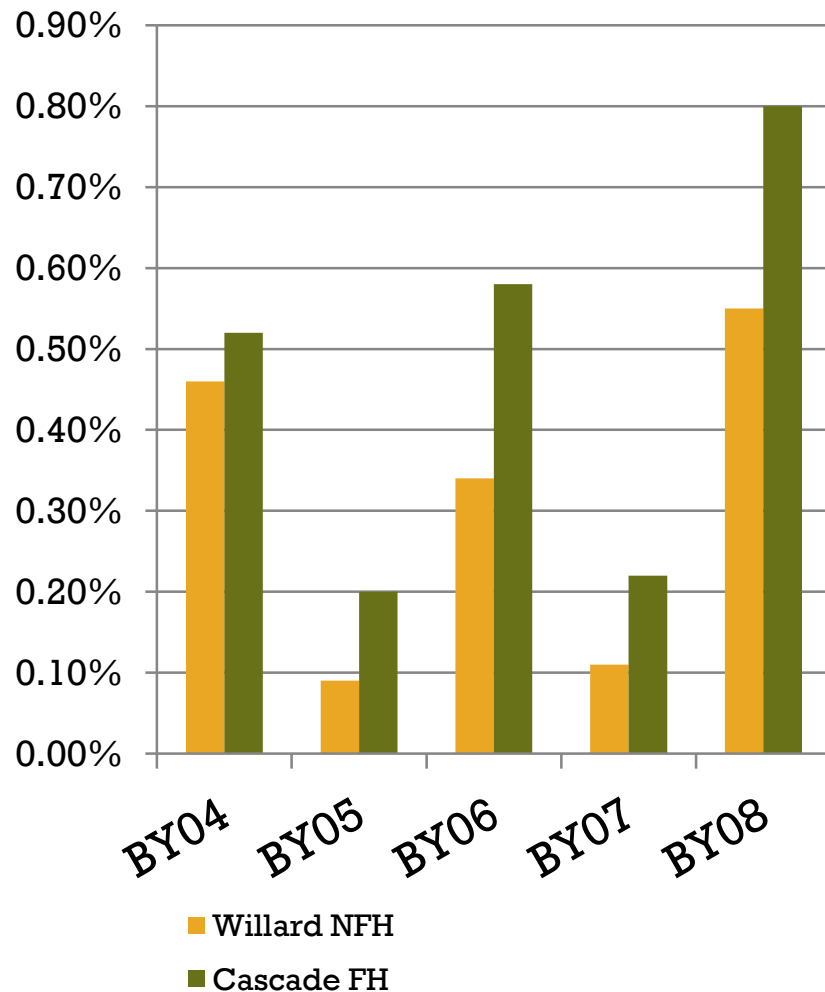
Wenatchee Juvenile Survival



Juvenile Performance

Juvenile survival estimates were performed using PIT tag data captured from release sites to McNary Dam.

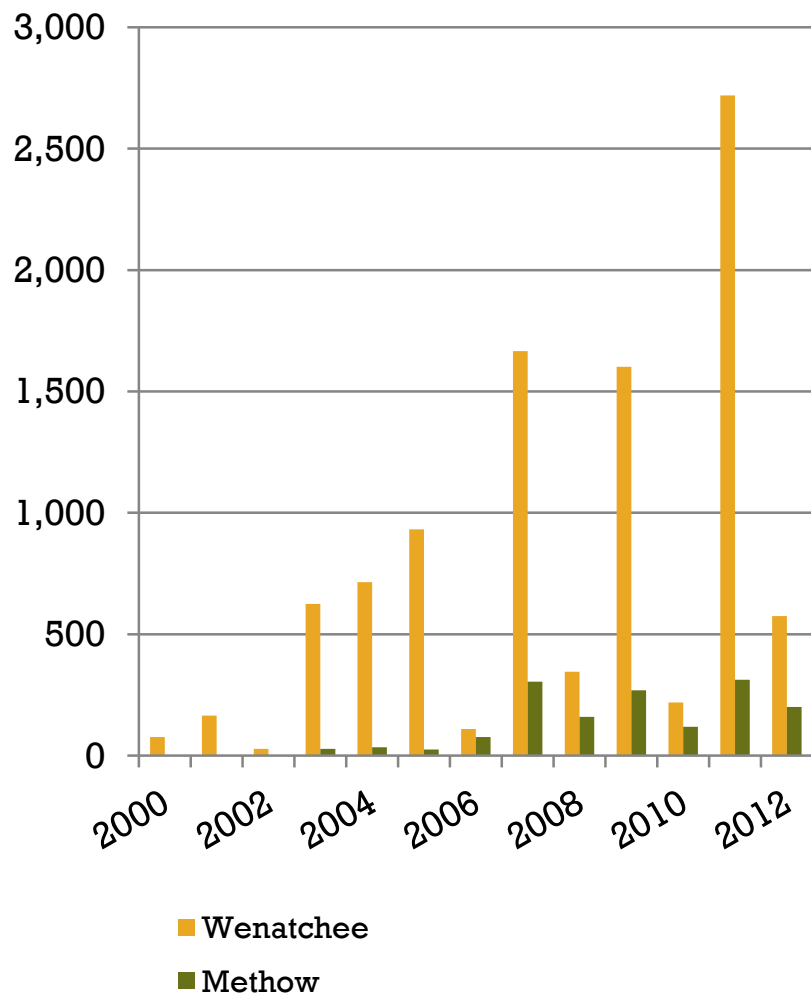
Wenatchee SARs (brood year)



Adult Performance

Smolt-to-Adult Return ratios or rates provide a metric for survival and determined from CWT analyses and/or scale analyses

Coho Project Redd Counts (return year)



Adult Performance



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Project Milestones and Timelines

Project Benefits

- Provide increased cultural and socio-economic value to the region
- Opportunity to study the local adaptation process and at what rate it can occur
- Supplying marine nutrients at the onset of winter
- Increase abundance of a keystone species within ecological communities

Key Project Milestones

■ March 2010

- Finalized Mid-Columbia Coho Reintroduction Master Plan

■ March 2012

- YN and BPA co-authored and NEPA approved Final Environmental Impact Statement (FEIS)

■ July 2012

- Received a Record of Decision (RoD) from BPA to move forward with long term implementation
 - Project level NEPA and SEPA coverage

■ Fall 2012/Winter 2013

- Finalizing Biological Assessments (BA) for impacts to ESA listed species for NOAA and USFWS review and consultation

■ Spring 2013

- Supplemental Analyses to original NEPA/SEPA for additional sites and changes



Key Project Milestones (con't)

■ Fall 2013

- Begin broodstock collections for increased production for releases in targeted tributaries in Methow basin to initiate wide-scale natural spawning
- Site development of several acclimation sites in Methow and Wenatchee basins

■ Summer/Fall 2014

- Begin construction on Natapoc Hatchery Facility (Wenatchee in-basin, full-term rearing)
- Finalize Methow acclimation sites/construction for increased releases in spring of 2015

