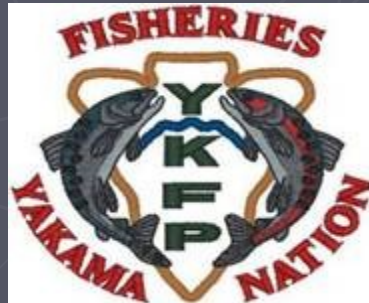


The All-H-Analyzer Model:

Overview and Applications in Anadromous Fisheries Management

Presented by Chris Frederiksen
Yakama Nation Fisheries - YKFP



Presentation Outline

2. Model Synopsis

- A. Basic background information

3. Model Components and Data Requirements

- A. 4 H's

4. Agency Use and Relative Applications

- A. Hatchery Scientific Review Group (HSRG)
- B. Columbia Basin Fish & Wildlife Authority (CBFWA)
- C. NOAA Fisheries
- D. Yakima Bureau of Reclamation (BOR)
- E. Co-managers (YN, Klickitat spring chinook)

Model Synopsis: 4-H's

Habitat



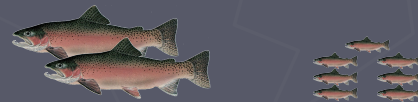
Hatcheries



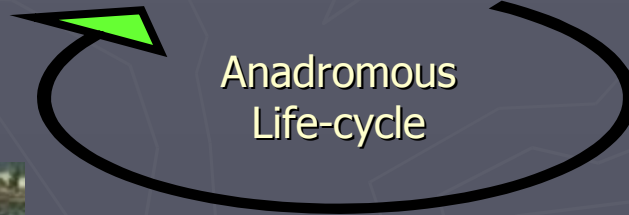
Harvest



Hydro (out of basin S)



Anadromous
Life-cycle



Model Synopsis

1. Developed by WA State Fishery Co-managers and HSRG
 - A. Hypothesis/understanding of integration between four "H" components

2. Platform For Other Models
 - A. Habitat productivity
 - B. Out of basin survival

3. Model considered a work in progress

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Harvest



Geographic Areas

1. Ocean Fisheries
 - A. Alaska, Canada, U.S.
2. Lower Columbia Fisheries
 - A. Zones 1-5 sport, commercial
3. Mid Columbia R. Fisheries
 - A. Zone 6 Tribal C&S, commercial
4. Terminal Fisheries
 - A. Tribal & Sport
 - Differential rates
 - Total exploitation rate

Out of Basin Survival (Hydro)



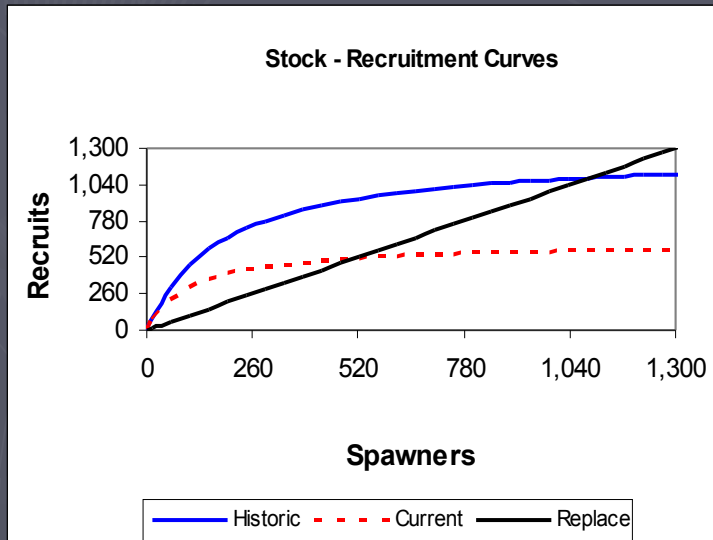
➤ Model Inputs

- Juvenile outmigrant srv.
- Ocean srv.
- Adult migrant srv.

2. Data Sources

- A. Data
 - B. Modeled survival
- FCRPS BiOp

Freshwater Habitat



1. Model Inputs

- A. Beverton-Holt Stock Recruitment function
 - 1. Capacity & Intrinsic Productivity
 - 2. Population/Subbasin scale

2. Parameter Sources

- A. Empirical data
- B. Scientific based models
 - 1. EDT
 - 2. SHIRAZ

Hatcheries



1. Model Inputs

1. # broodstock
2. Proportion of hatchery and Wild
3. Demographics and Survival
 - Juvenile release number
4. Returning Hatchery adult destination (%)
 1. Hatchery rack or natural spawning grounds

Types of Hatchery Programs

➤ Segregated Program

- Isolate hatchery/wild populations
- HSRG: <5% pHOS

➤ Appropriate Conditions

- Harvest augmentation
- Mitigation



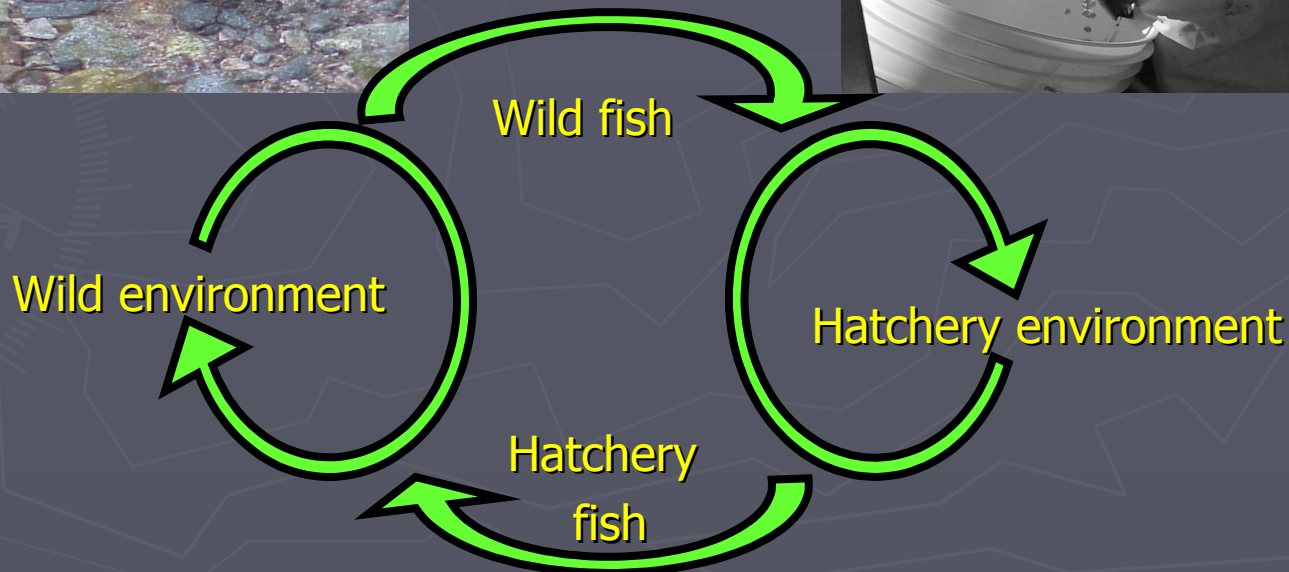
Types of Hatchery Programs

➤ Integrated Program

- Single population
- "Integrate" adult reproduction

➤ Appropriate Conditions

- Conservation goals
- Suitable Habitat



Environmental Adaptation



Hatchery
Optimum

Hatchery
selective
forces



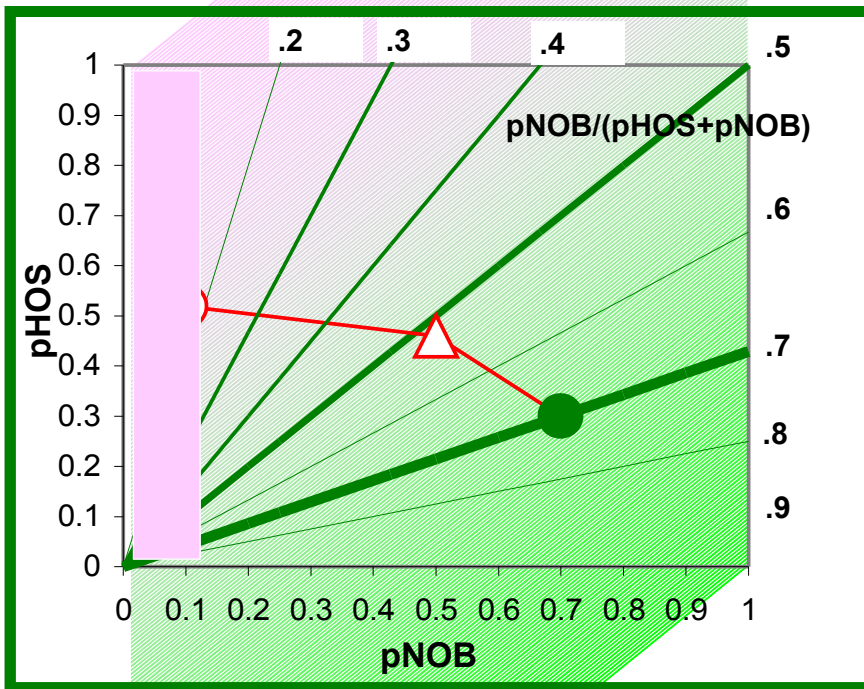
Natural
selective
forces



Natural
Optimum

Integrated
population

The PNI Concept:



1. PNI- Proportion of Natural Influence
3. Integrated programs:
 1. Minimum
 - 0.5
 2. Biological Significance
 - 1. 0.67

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Model Applications

1) Hatchery Scientific Review Group (HSRG)



B. Evaluation of hatchery programs

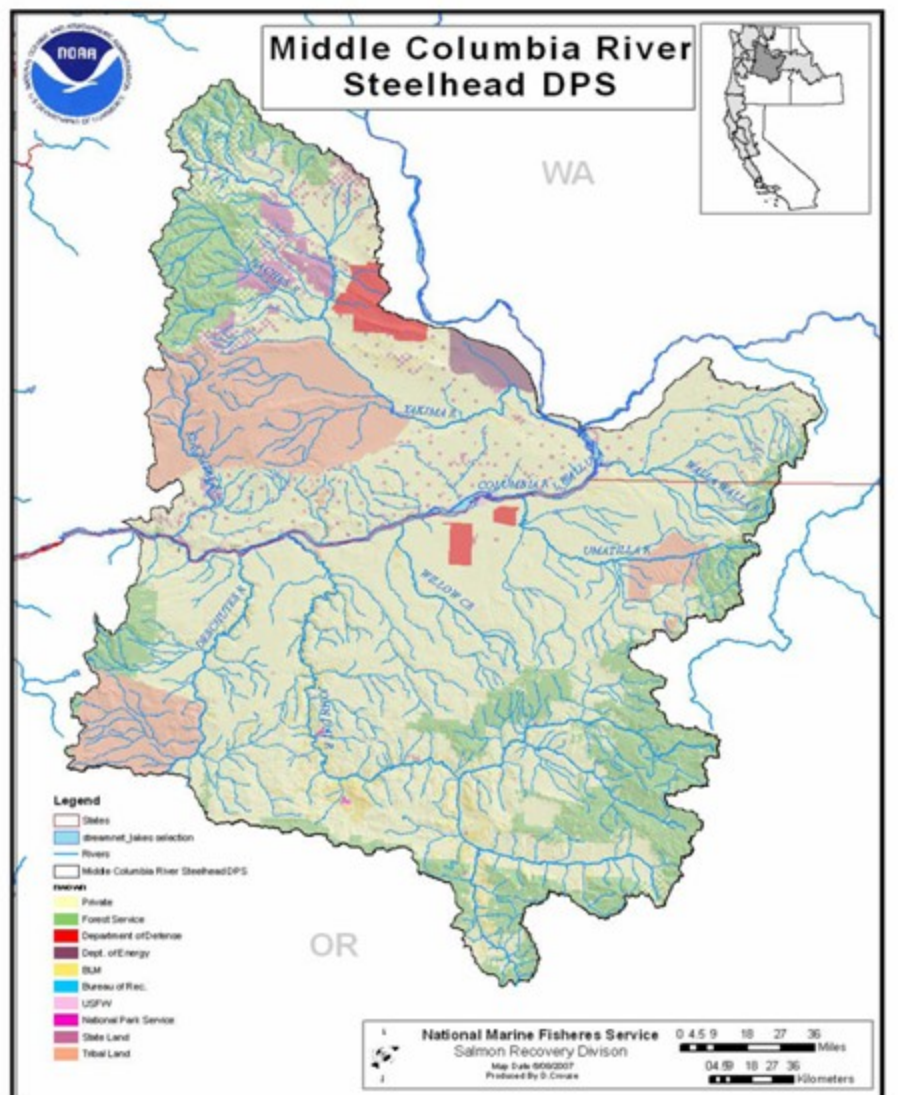
1. Effects on natural pops

C. Instrumental tool

E. Recommendations

1. Type of program
 - Segregated
 - Integrated
2. Size (juvenile release #)
3. Hatchery broodstock
4. Wild/hatchery interactions

Model Applications



1) NOAA Fisheries

B. Salmon Recovery Planning

1. All H analysis- Mid C Sthd DPS
 - a. Population A/P
 - b. 4-H components
 - Freshwater habitat
 - Juvenile outmigrant Survival
 - Predation
 - Estuarine habitat
 - Harvest
 - c. Cumulative benefits
 - Multiple actions
 - d. Future viability
 - Populations
 - DPS

Model Applications

1) Columbia Basin Fish & Wildlife Authority (CBFWA)



B. Develop amendments to the NPPC fish and wildlife program

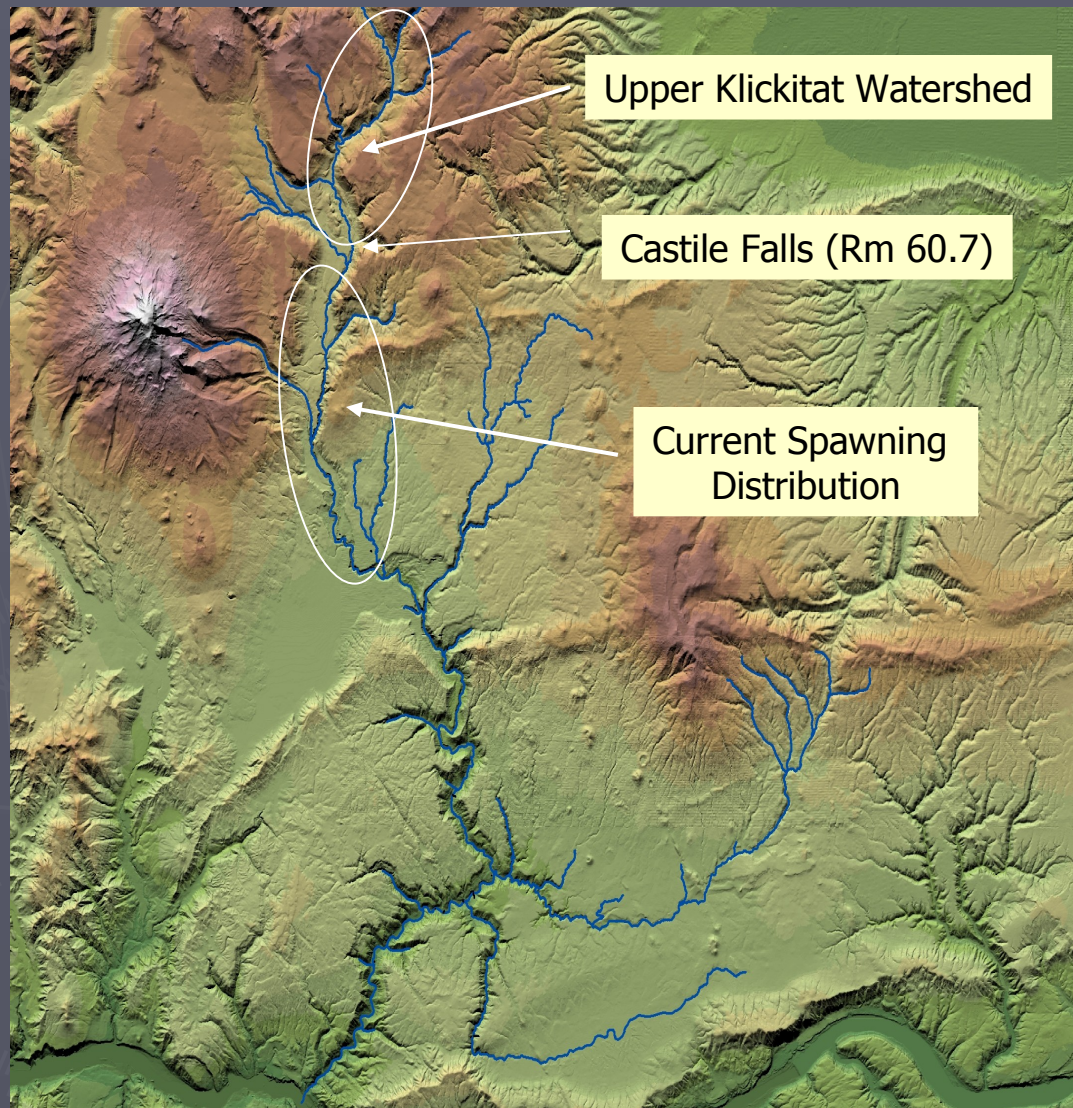
1. Primary Objective
 - a. H components
 1. Move pops toward biological goals
2. Population specific measures
 - a. Existing plans
3. Analysis provide basis
 1. Prioritizing Strategies
 2. Suites of actions

Model Applications



1. Klickitat Spring Chinook
 - B. Reform current hatchery program
 1. Conservation
 2. Harvest
 - D. Current program
 1. Harvest augmentation
 2. Mitigation
 3. Poorly run Segregated or Integrated program
 4. ~550 adults
 5. ~600k on-station smolt release
 6. 95-100% hatchery broodstock
 7. PHOS ~ 10-20%
 - PNI = 0.25

Model Applications



1. Klickitat Spring Chinook
 - Integrated program
- A. Goals
 1. Harvest
 - Increase opportunity
 2. Conservation
 - PNI ~ 0.67
- C. Program Strategies
 1. Increasing PNOB
 2. Bolster natural production
 - Upper basin habitat
 4. Removal of surplus hatchery fish

Klickitat Spring Chinook: Initial Modeling Conclusions:

2. Model configuration: Integrated hatchery program

A. EDT/AHA

- ✓ Achieve management goals

4. Results

A. Recolonization of habitat above Castile Falls

- A. Support needs for natural production and hatchery broodstock (25%)

- ★ PNI = 0.67

5. Critical Uncertainties

- o Realized habitat potential of Upper Basin
- o Actual PHOS
- o Mining rate of natural population

Questions?

