RECLAMATION

Managing Water in the West

Integrated Plan- Fisheries/Habitat Benefits

Yakima River Basin Water Enhancement Project Workgroup

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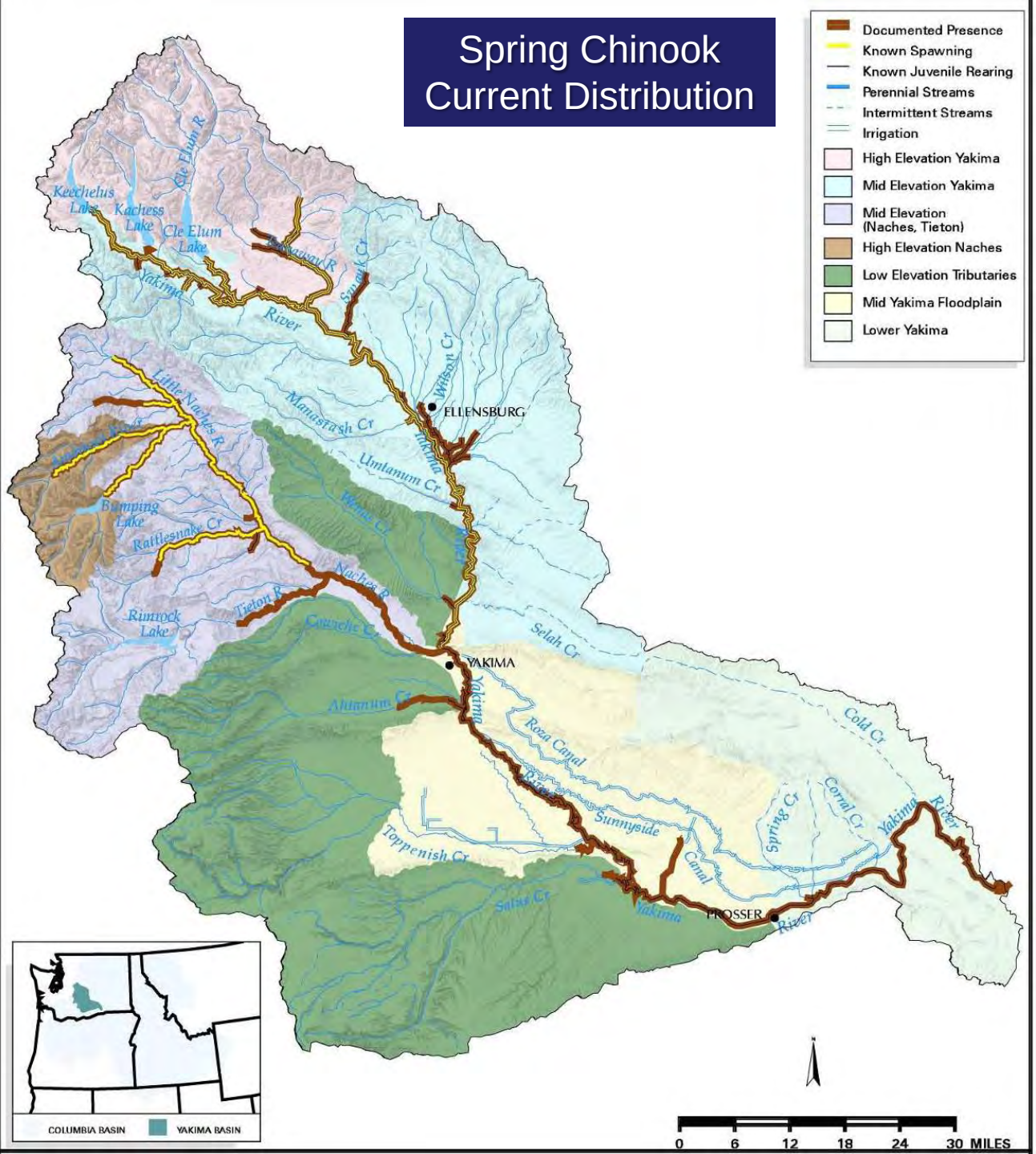
U.S. Department of the Interior
Bureau of Reclamation

Today's Presentation

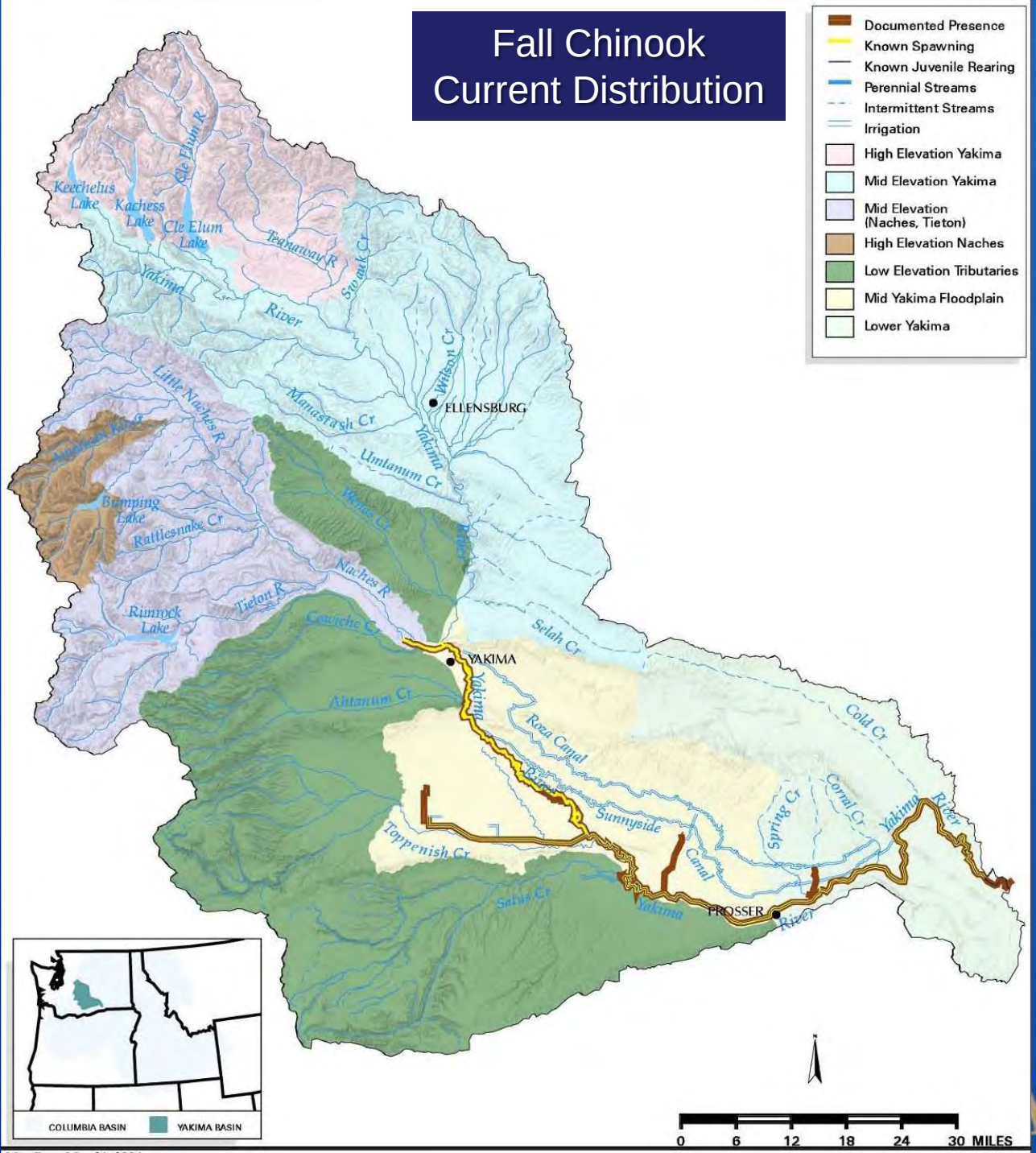
1. Quick Review of Species Distribution
   - Current

2. All-H Analyzer (AHA) model results
   - Integration of Natural and Hatchery fish
   - Minimum, maximum, and average run sizes

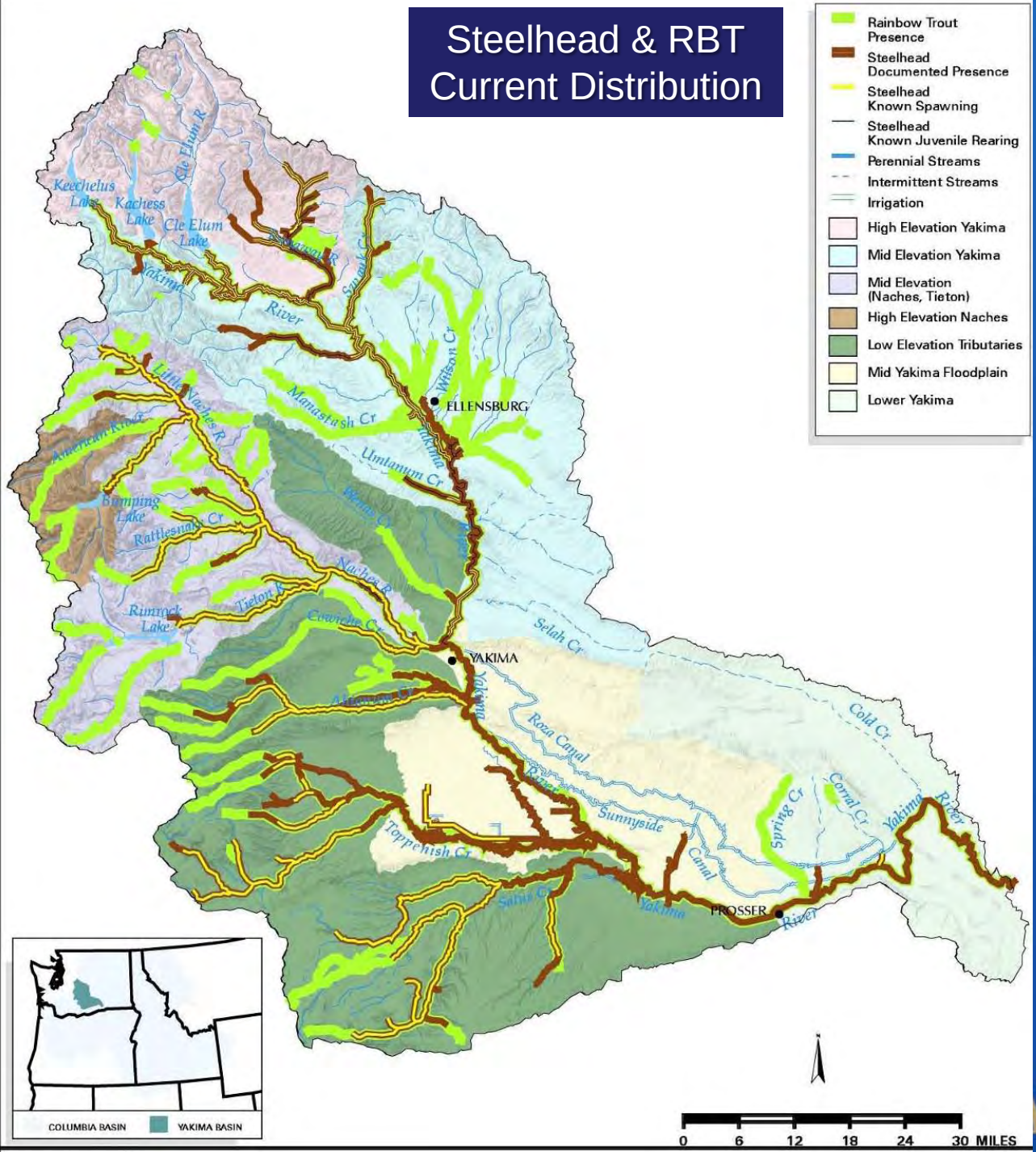
3. Summary of the Restoration Diagnosis
   - Ecosystem Diagnosis & Treatment (EDT) model
   - Decision Support System (DSS) habitat model


Spring Chinook
Current Distribution
Documented Presence
Known Spawning
Known Juvenile Rearing
Perennial Streams
Intermittent Streams
Irrigation
High Elevation Yakima
Mid Elevation Yakima
Mid Elevation (Naches, Tieton)
High Elevation Naches
Low Elevation Tributaries
Mid Yakima Floodplain
Lower Yakima
Cle Elum R
Keechelus Lake
Kachess Lake
Cle Elum Lake
Yakima River
Teanaway R
Swauk Cr
Wilson Cr
ELLENSBURG
Manastash Cr
Taneum Cr
Umtanum Cr
Little Naches R
Bumping Lake
Rattlesnake Cr
Wenas Cr
Naches R
Tieton R
Rimrock Lake
Cowiche Cr
Selah Cr
YAKIMA
Ahtanum Cr
Yakima River
Roza Canal
Sunnyside Canal
Toppenish Cr
Satus Cr
PROSSER
Cold Cr
Spring Cr
Coral Cr
Yakima River
COLUMBIA BASIN
YAKIMA BASIN
0 6 12 18 24 30 MILES

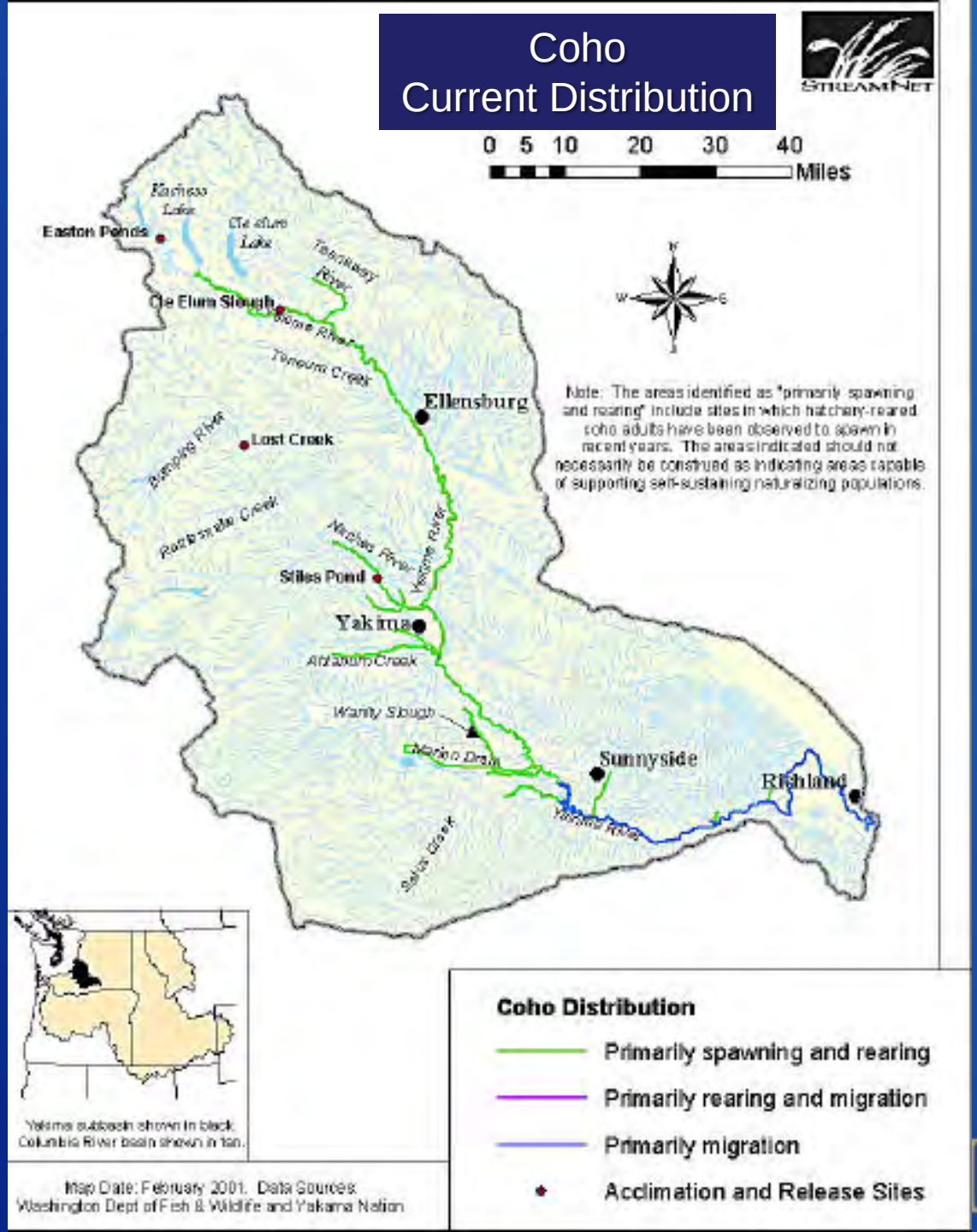
Fall Chinook Current Distribution

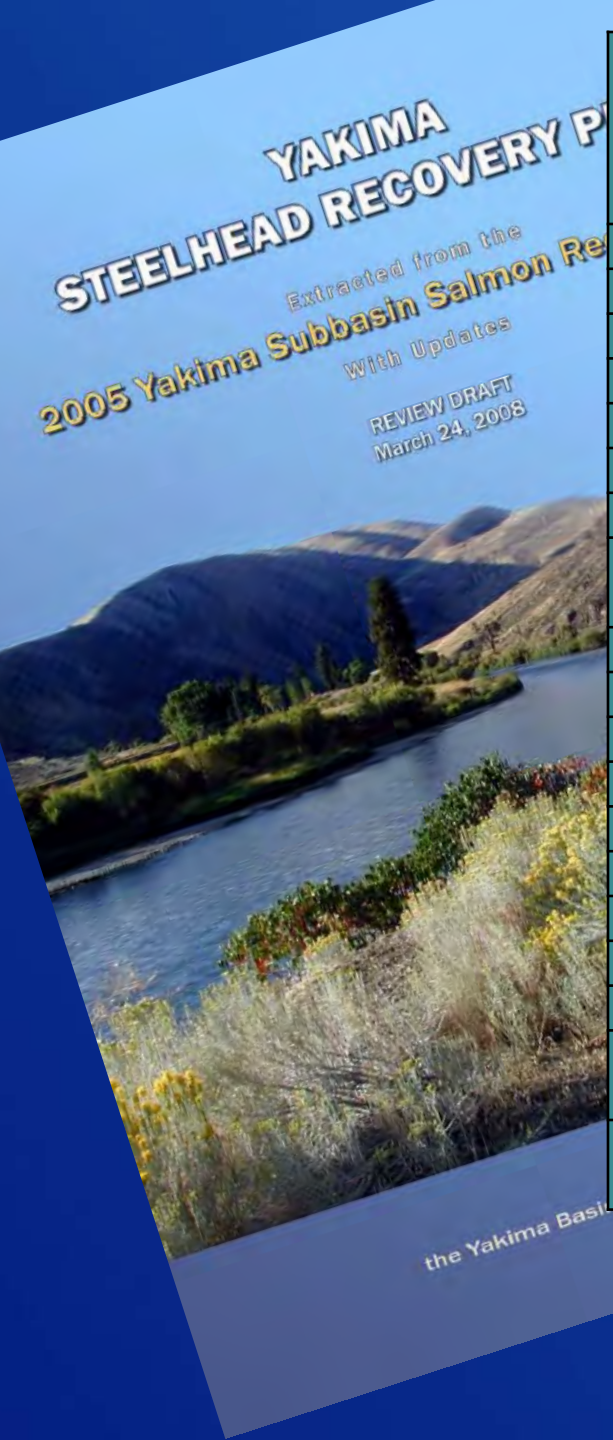


Steelhead & RBT Current Distribution



Coho Current Distribution





Recovery Plan Action Categories	Number of Actions Within Category and Their Subbasin Locations
Administrative	Basin Wide- 1
False Attraction	Lower Mainstem- 1
Fish Passage ✦	Naches- 2, Satus- 2, Toppenish- 2, Upper Yakima- 7
Fish Screens	Basin Wide- 1
Flip Flop ✦	Naches- 1, Upper Yakima- 1
Flow	Naches- 1
Forest Health ✦	Basin Wide- 1
Habitat ✦	Basin Wide- 2, Lower Mainstem- 2, Naches- 15, Satus- 3, Toppenish- 3, Upper Yakima- 8
Hatchery Supplementation	Basin Wide- 3
Infrastructure	Lower Mainstem- 1
Nutrients	Basin Wide- 1
Power Subordination	Lower Mainstem- 1, Upper Yakima- 1
Regulatory	Basin Wide- 3
Reservoir Operations	Basin Wide- 1, Naches- 1, Upper Yakima- 1
Roads	Naches- 1, Satus- 1, Toppenish- 1
Sediment Transport	Naches- 2
Storage	Lower Mainstem- 2, Naches- 2
Water Conservation ✦	Basin Wide- 3, Lower Mainstem- 1, Naches- 7, Toppenish- 2, Upper Yakima- 2
Water Quality ✦	Lower Mainstem- 1, Satus- 2, Toppenish- 1, Upper Yakima- 1

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Modeling Work Flow

Took Actions from the Yakima Steelhead Recovery Plan

↓

Associated YBSRP Actions to EDT Level 2 attributes and EDT Reaches

↓

Applied a Level of Effectiveness by Reach & Action

↓

Run EDT Scenarios
- Restoration Only
- Restoration + Phase I Fish Passage

↓

Combine Natural Population Results (EDT) with Hatchery Population Results (All-H Analyzer model)

↓

Produce Integrated Population Estimates for each Species & Scenario

Effectiveness Categories

- Low potential = heavy permanent infrastructure (15%)
- Medium = Mixed ownership, agricultural/rural (30%, 50% & 70%)
- High = Predominately Public lands, relatively intact (85%)

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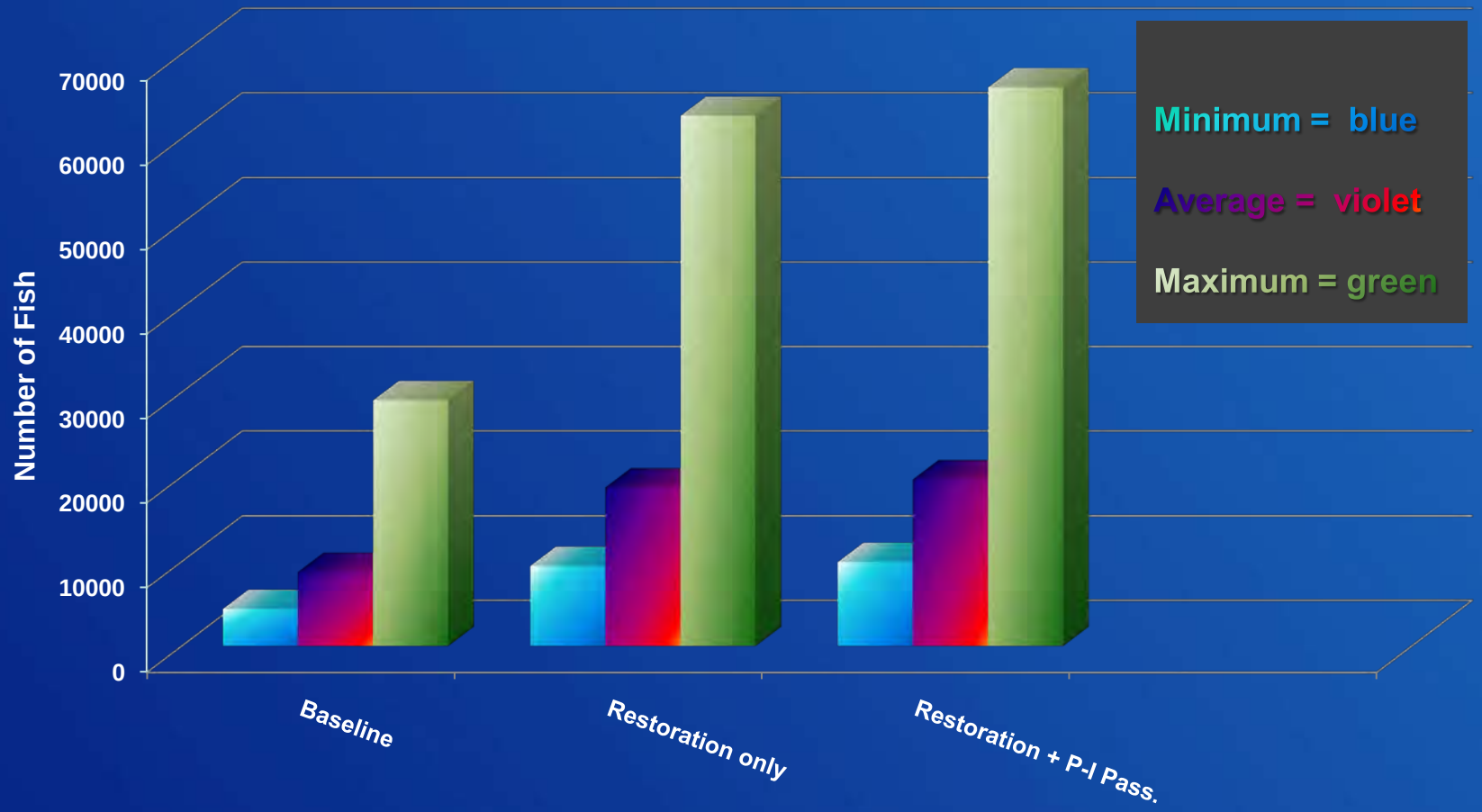
EDT Modeled Scenario Descriptions

- Baseline
  - Based on the existing habitat condition ratings in the model. Represent habitat conditions over the past 10 years.
- Restoration only
  - Improved habitat conditions and tributary passage based primarily on actions summarize in the Yakima Basin Steelhead Recovery Plan.
- Restoration + Phase I Passage
  - Same as the “Restoration only” scenario, plus fish passage at Bumping and Cle Elum dams.

Spring Chinook



Scenario	Minimum	Average	Maximum
Baseline	4,406	8,763	29,074
Restoration	9,507	18,720	62,714
Restoration + P	9,973	19,668	66,071

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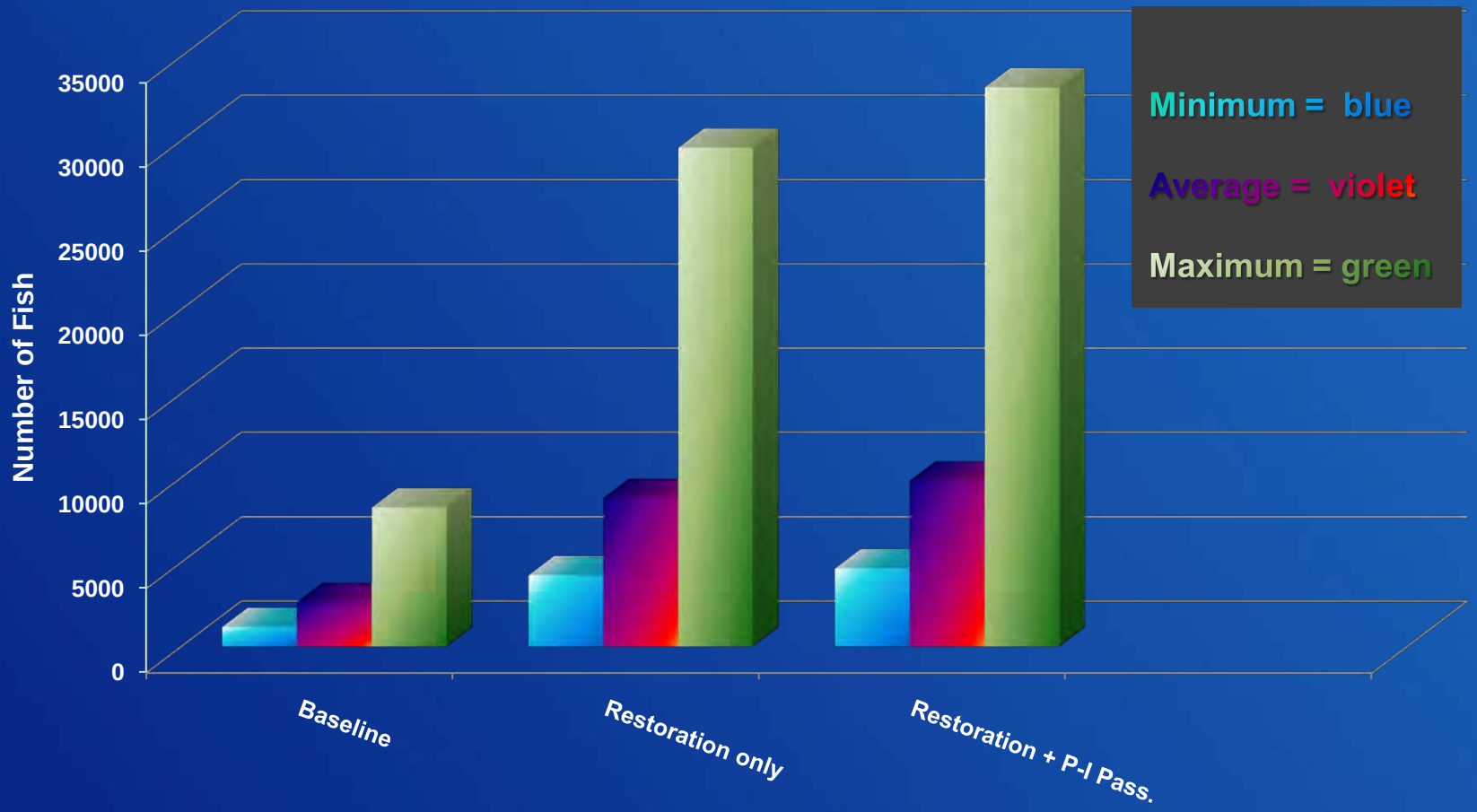
Steelhead



Scenario	Minimum	Average	Maximum
Baseline	1,167	2,646	8,247
Restoration	4,245	8,795	29,599
Restoration + P	4,649	9,825	33,183

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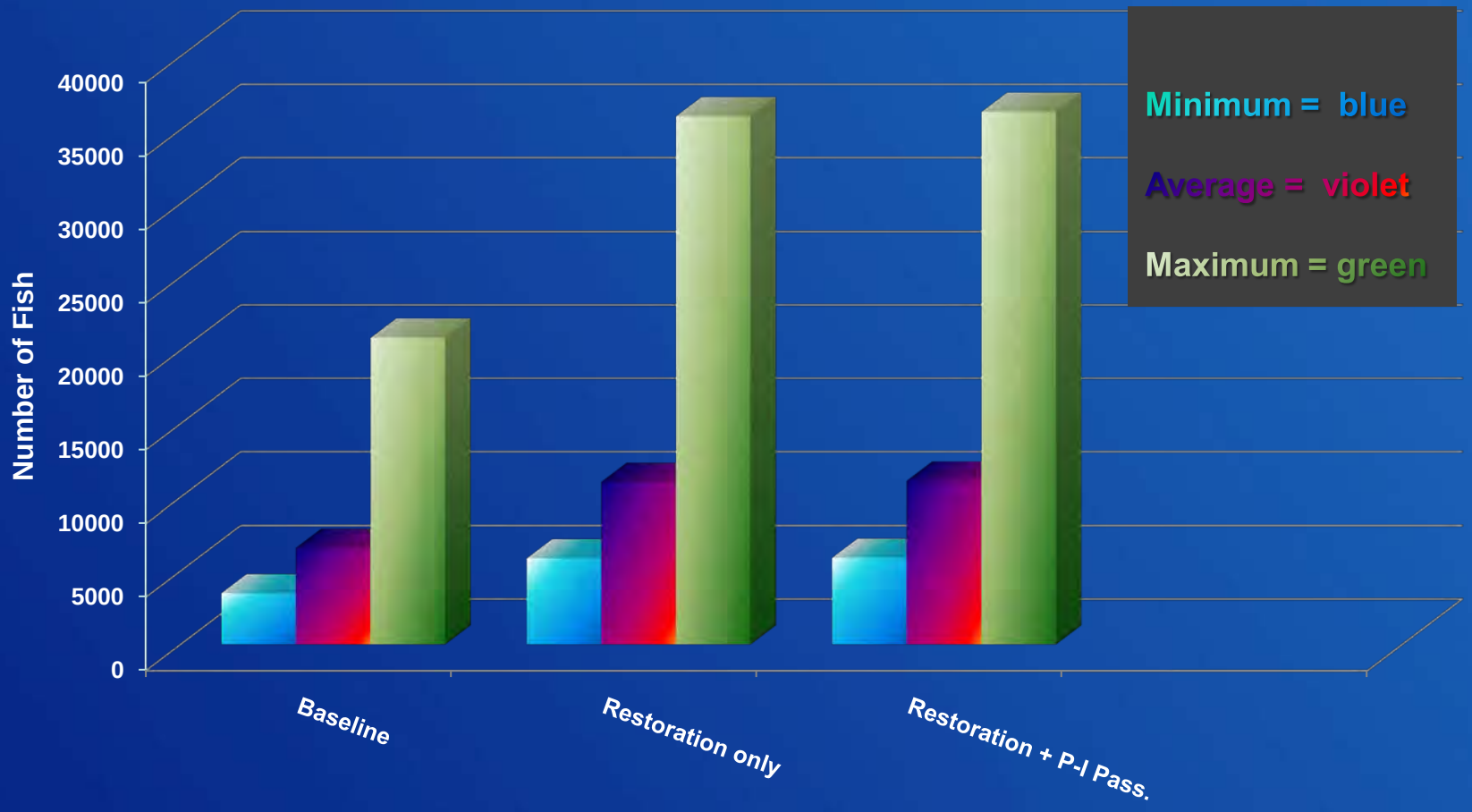
Coho



Scenario	Minimum	Average	Maximum
Baseline	3,502	6,582	20,872
Restoration	5,876	11,038	35,931
Restoration + P	5,914	11,115	36,228

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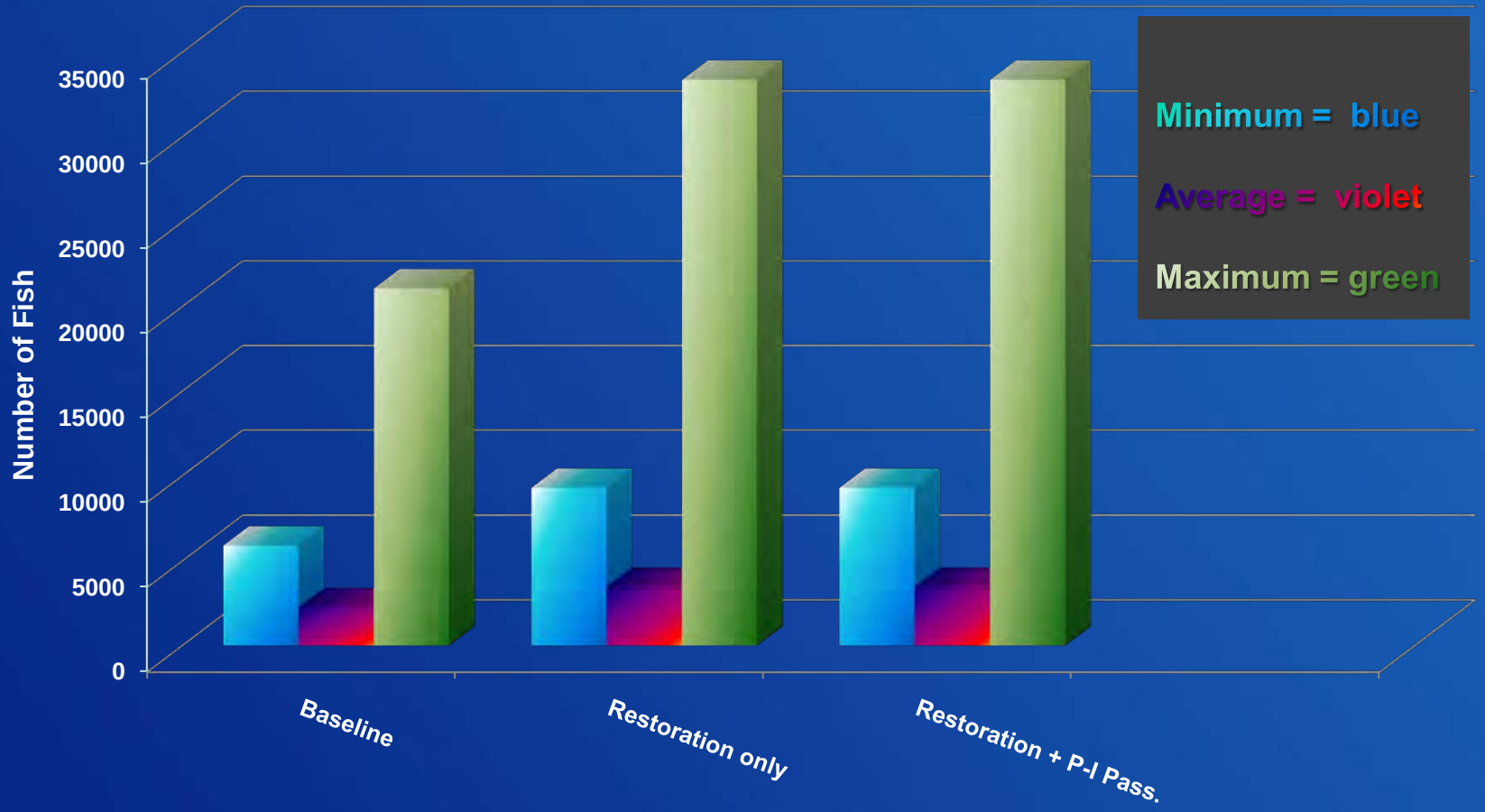
Fall Chinook



Scenario	Minimum	Average	Maximum
Baseline	2,259	5,924	21,092
Restoration	3,475	9,304	33,386
Restoration + P	3,475	9,304	33,386

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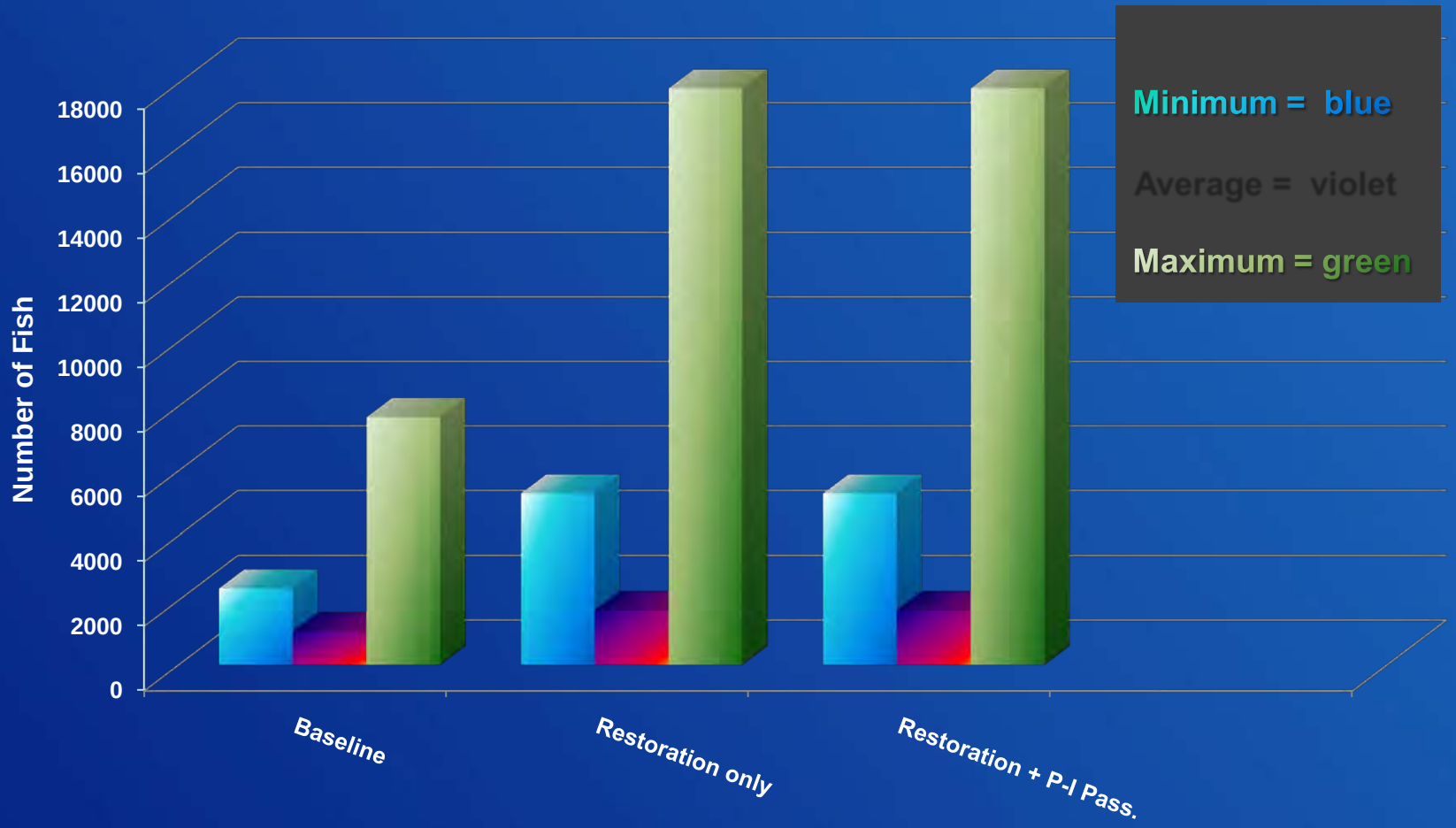
Summer Chinook



Scenario	Minimum	Average	Maximum
Baseline	1,051	2,373	7,670
Restoration	1,702	5,302	17,846
Restoration + P	1,702	5,302	17,846

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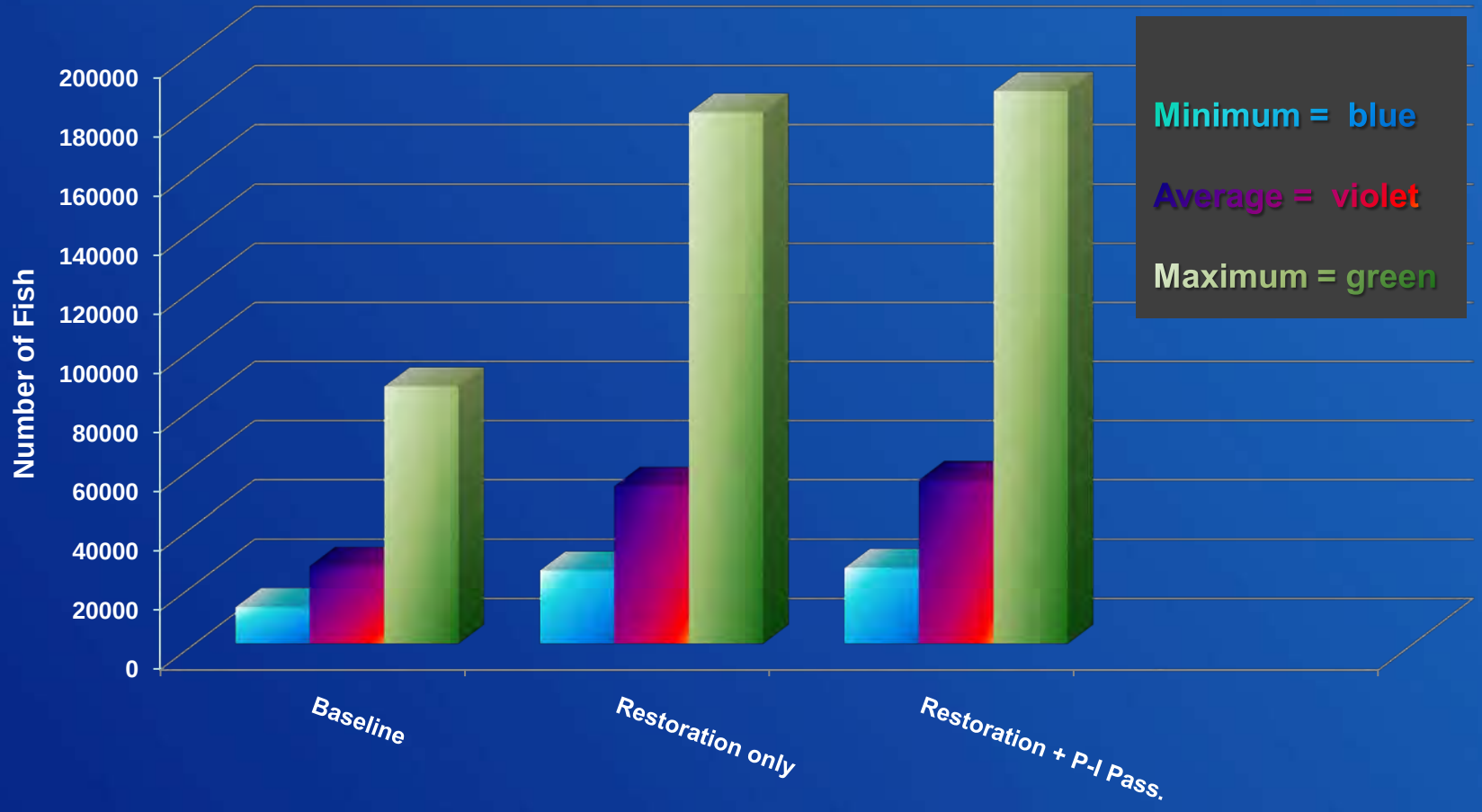
All Species Combined wo/ Sockeye



Scenario	Minimum	Average	Maximum
Baseline	12,385	26,288	86,956
Restoration	24,805	53,158	179,475
Restoration + P	25,712	55,214	186,714

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"Based on the range of estimated smolt production under average conditions, we estimate that Cle Elum Lake could eventually produce sufficient smolts to yield an adult return of 30,000 to 50,000 sockeye salmon."

TS No. PN-YDFP-008, Grabowski (2007)

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"Using mid-range values, and considering the estimated historic production of perhaps 9,900 sockeye salmon adults, we estimate that Bumping Lake could produce from about 10,000 to 17,000 adult sockeye salmon when the species is fully restored there."

TS No. PN-YDFP-010, Grabowski (2007)

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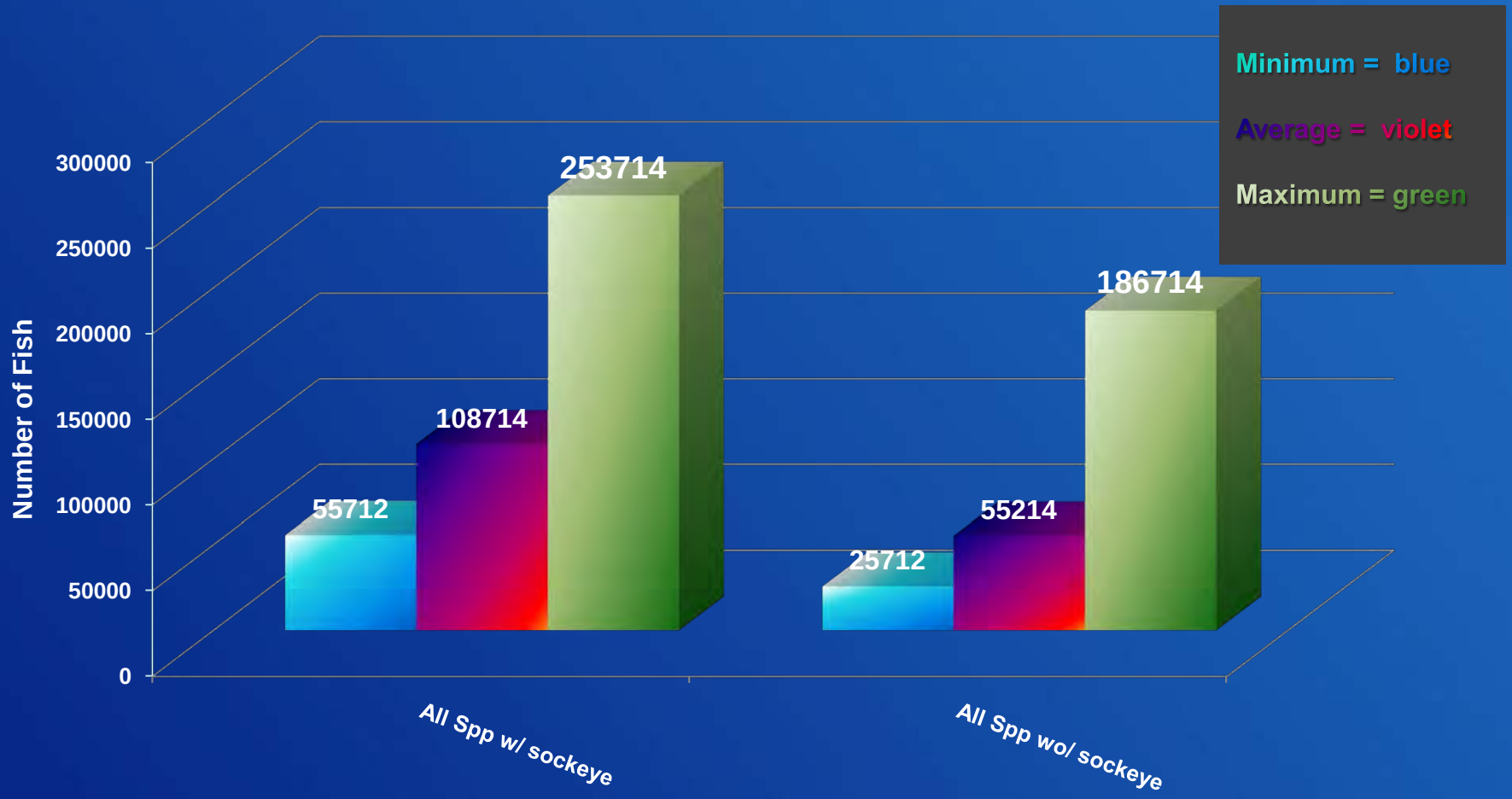
All Species Combined w/ Sockeye



Cle Elum + Bumping	Low-Average	Mid-Average	Upper-Average
Sockeye	30,000	53,500	67,000

Based on the range in average sockeye adult numbers reported by Grabowski (2007) for Bumping and Cle Elum.

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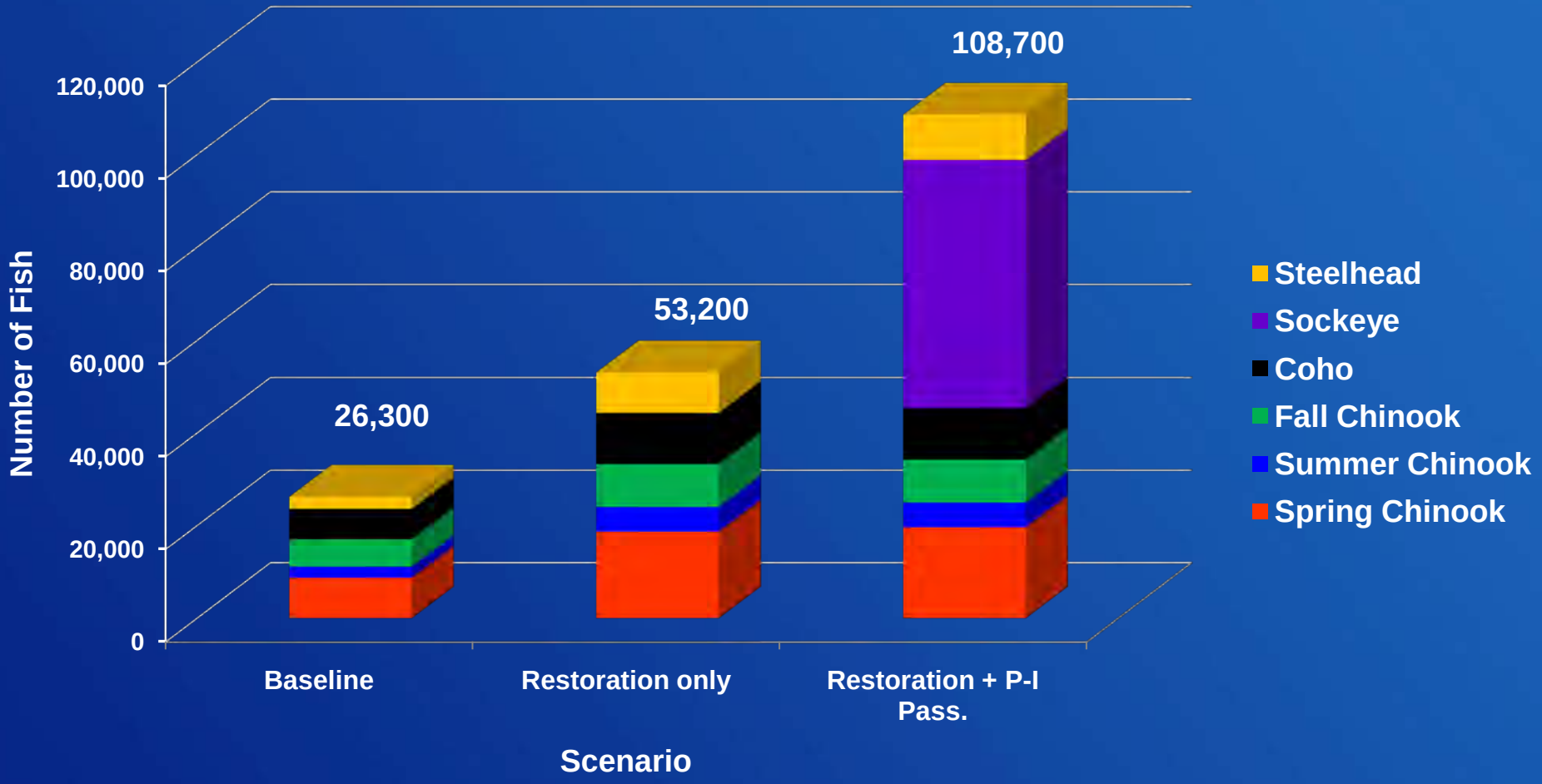
All Species Combined w/ Sockeye for Average Condition



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EDT Diagnosis- Key Findings

- Increase in Key Habitat
- Allow Passage
  - Cle Elum & Bumping
  - Tributaries
- Increase in Habitat Diversity

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Diagnosis- Key Findings

Comparison of Additional Habitat VS. Additional Fish Abundance, Cle Elum

- Spring Chinook
  - % Increase in river miles = 8.2%; % increase in abundance = 12%
- Coho
  - % Increase in river miles = 4.8%; % increase in abundance = 12%
- Steelhead
  - % Increase in river miles = 4.7%; % increase in abundance = 13%

Comparison of Additional Habitat VS. Additional Fish Abundance, Bumping + Rimrock

- Spring Chinook
  - % Increase in river miles: Bumping + Rimrock = 20% ; % increase in abundance = 16%
- Coho
  - % Increase in river miles: Bumping + Rimrock = 17% ; % increase in abundance = 6%
- Steelhead
  - % Increase in river miles: Bumping + Rimrock = 23%; % increase in abundance = 15%

Decision Support System Model
Habitat Results for the Floodplains

- Easton
- Kittitas
- Lower Naches
- Wapato

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Easton Floodplain

Integrated Structural Scenario: %Change in Habitat Amount Relative to FWIP

Life Stage	Spring Chinook	Fall Chinook	Coho	Steelhead
Spawn/Incubation	16.5% ★	----	10.0% ★	7.3%
Fry	-1.9%	----	-3.2%	1.8%
Summer Rearing	3.1%	----	-2.5%	1.3%
Winter Rearing	0.3%	----	-2.0%	-1.2%
Sub-Adults (sth)	----	----	----	6.2%
Adult Holding	11.9% ★	----	10.0%	14.0% ★

★ = A change in the amount of habitat >10% is considered biologically meaningful.

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Kittitas Floodplain

Integrated Structural Scenario: %Change in Habitat Amount Relative to FWIP

Life Stage	Spring Chinook	Fall Chinook	Coho	Steelhead
Spawn/Incubation	17.3% ★	----	-6.9%	3.2%
Fry	1.9%	----	1.0%	-3.4%
Summer Rearing	-2.2%	----	-8.6%	-10.3% ★
Winter Rearing	-8.9%	----	-10.3% ★	-9.8%
Sub-Adults (sth)	----	----	----	0.3%
Adult Holding	4.2%	----	-6.9%	-2.9%

★ = A change in the amount of habitat >10% is considered biologically meaningful.

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Lower Naches Floodplain

Integrated Structural Scenario: %Change in Habitat Amount Relative to FWIP

Life Stage	Spring Chinook	Fall Chinook	Coho	Steelhead
Spawn/Incubation	20.6% ★	----	36.7% ★	14.4% ★
Fry	5.3%	----	11.5% ★	3.5%
Summer Rearing	-5.0%	----	-10.6% ★	-1.0%
Winter Rearing	-2.8%	----	-2.7%	-4.2%
Sub-Adults (sth)		----		-2.9%
Adult Holding	-0.7%	----	36.7% ★	-1.7%

★ = A change in the amount of habitat >10% is considered biologically meaningful.

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Wapato Floodplain

Integrated Structural Scenario: %Change in Habitat Amount Relative to FWIP

Life Stage	Spring Chinook	Fall Chinook	Coho	Steelhead
Spawn/Incubation	----	9.1%	-6.6%	----
Fry	----	2.9%	4.3%	----
Summer Rearing	----	2.3%	-2.8%	----
Winter Rearing	4.0%	----	3.8%	3.7%
Sub-Adults (sth)	----	----	----	----
Adult Holding	----	----	-6.6%	----

★ = A change in the amount of habitat >10% is considered biologically meaningful.

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Next Steps-

- Make revisions to the EDT model input data set based on input from the habitat sub-committee and the modelers.

- Re-run the 2 existing scenarios in EDT and AHA models.

- Run a new scenario with passage allowed at all 5 BOR dams.

- Investigate improved smolt survival benefits to the natural and hatchery populations using the EDT & AHA models.