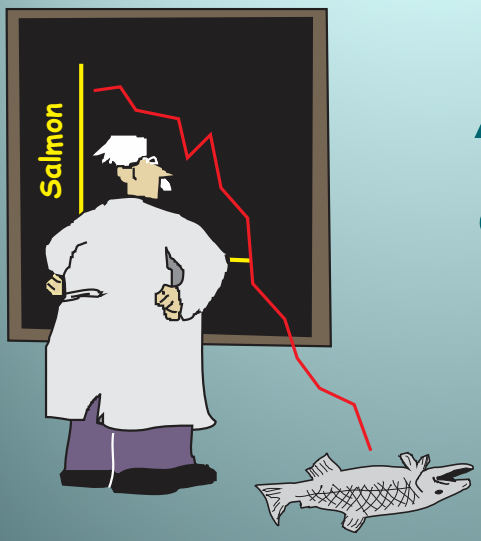
Salmon Factors for Decline



Analyzing all the H's

Ray Beamesderfer
February 3, 2022

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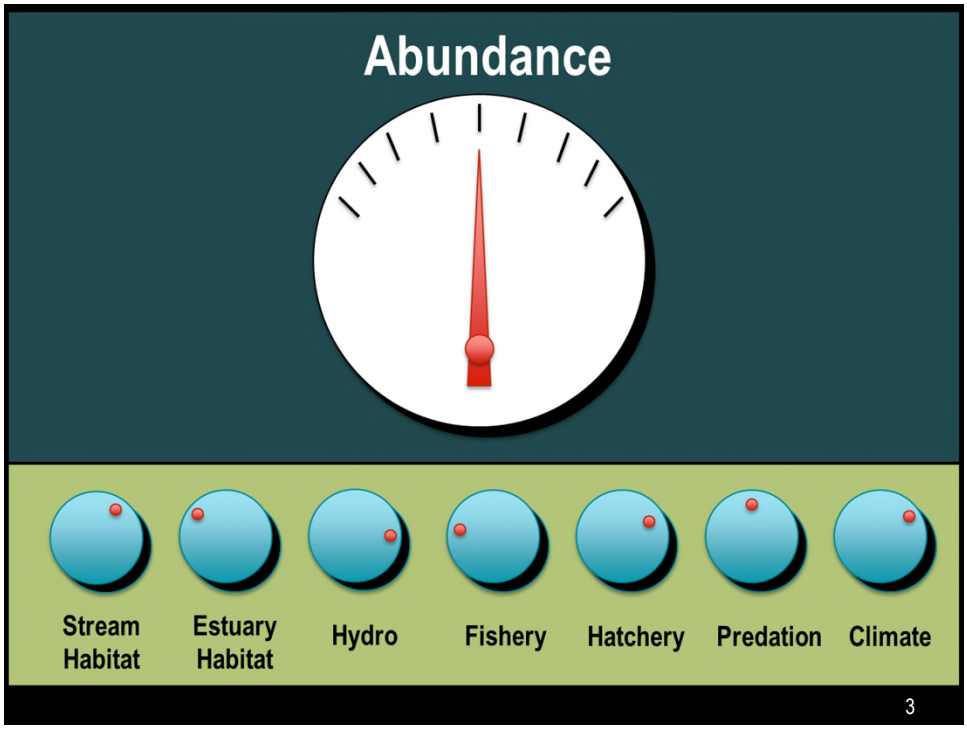
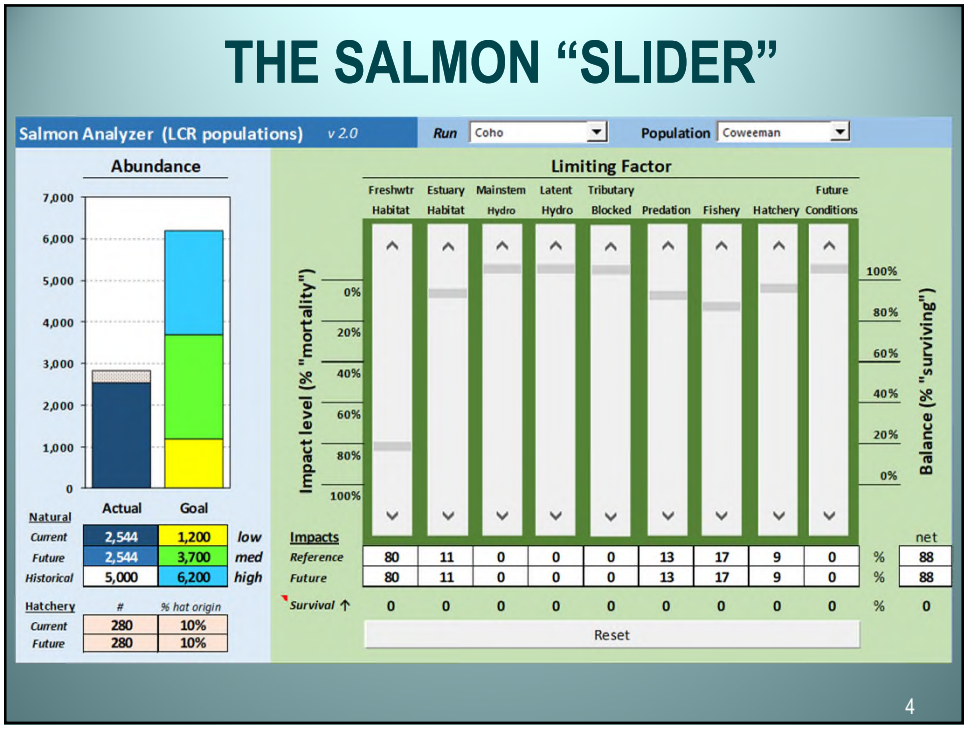

Abundance
Stream Habitat
Estuary Habitat
Hydro
Fishery
Hatchery
Predation
Climate
3


THE SALMON "SLIDER"
Salmon Analyzer (LCR populations) v 2.0
Run Coho
Population Coweeman
Abundance
Actual
Goal
Natural
Current 2,544 1,200 low
Future 2,544 3,700 med
Historical 5,000 6,200 high
Hatchery # % hat origin
Current 280 10%
Future 280 10%
Limiting Factor
Freshwtr Habitat
Estuary Habitat
Mainstem Hydro
Latent Hydro
Tributary Blocked
Predation
Fishery
Hatchery
Future Conditions
Impact level (% "mortality")
Balance (% "surviving")
Impacts
Reference 80 11 0 0 0 13 17 9 0 % 88
Future 80 11 0 0 0 13 17 9 0 % 88
Survival 0 0 0 0 0 0 0 0 0 % 0
net
Reset
4

APPROACH DEVELOPMENT

Lower Columbia River Salmon Recovery Plan

https://www.lcfrb.gen.wa.us/_files/ugd/810197_c681994ff6cf4df5bbc14263ad766fd1.pdf

NOAA Columbia Basin Partnership

https://s3.amazonaws.com/media.fisheries.noaa.gov/2020-10/MAFAC_CBP_Phase2_Appendix-C_BiologicalAnalysis_Final_20200829_508.pdf?null

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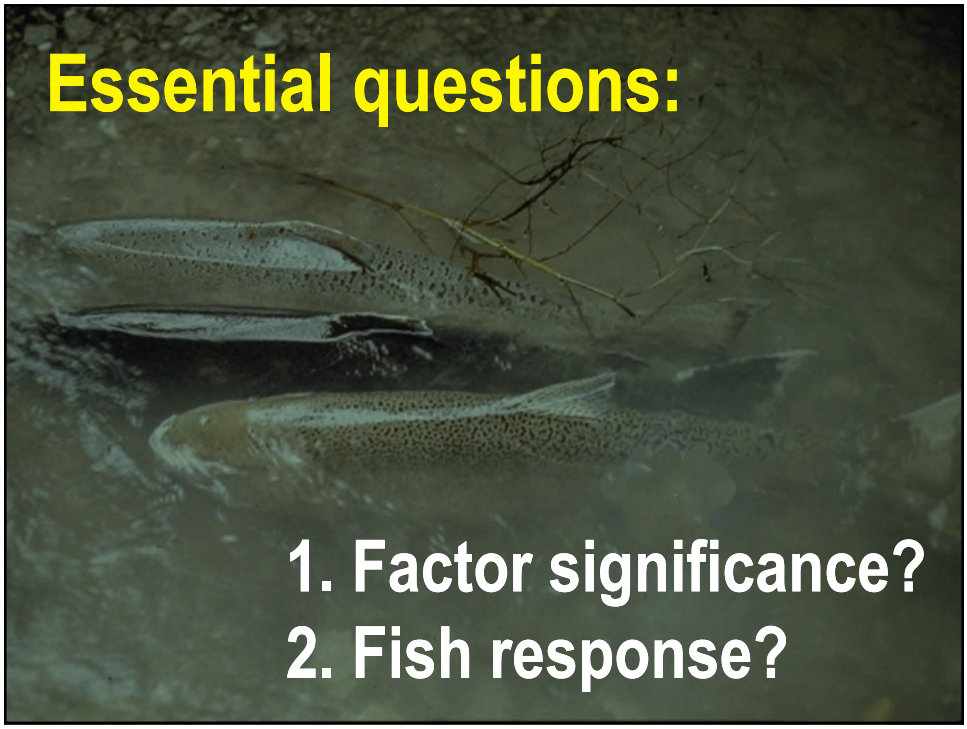
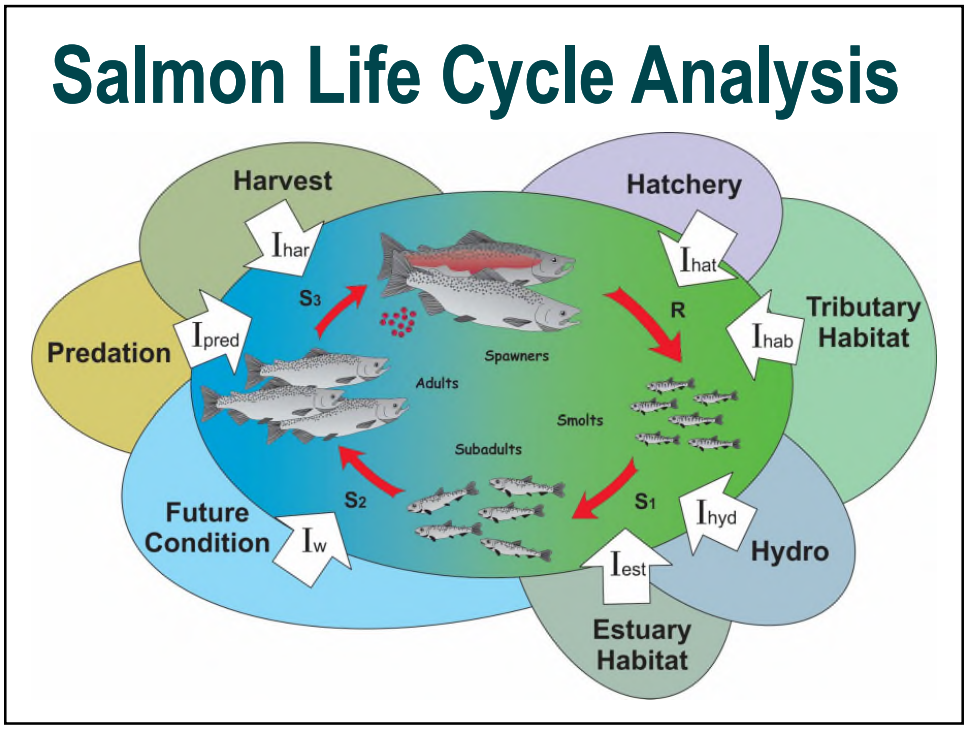
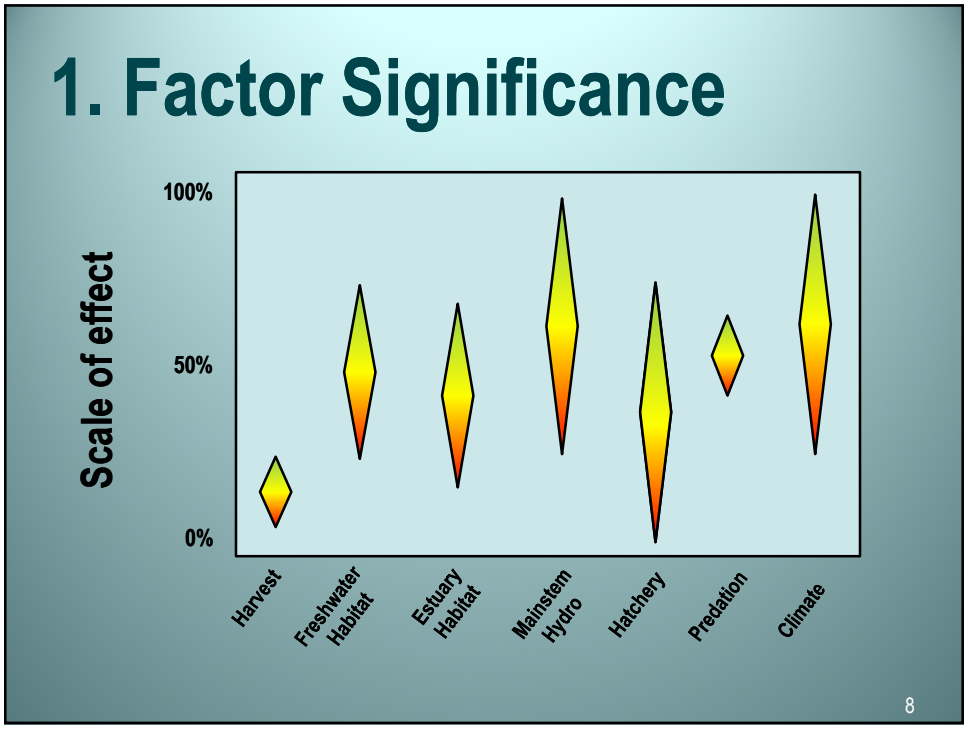



Salmon Life Cycle Analysis
Harvest
Hatchery
Predation
Tributary Habitat
Future Condition
Hydro
Estuary Habitat
Ihar
Ihat
Ipred
Ihab
Iw
Ihyd
Iest
S3
S2
S1
R
Spawners
Adults
Smolts
Subadults


1. Factor Significance
Scale of effect
100%
50%
0%
Harvest
Freshwater Habitat
Estuary Habitat
Mainstem Hydro
Hatchery
Predation
Climate
8

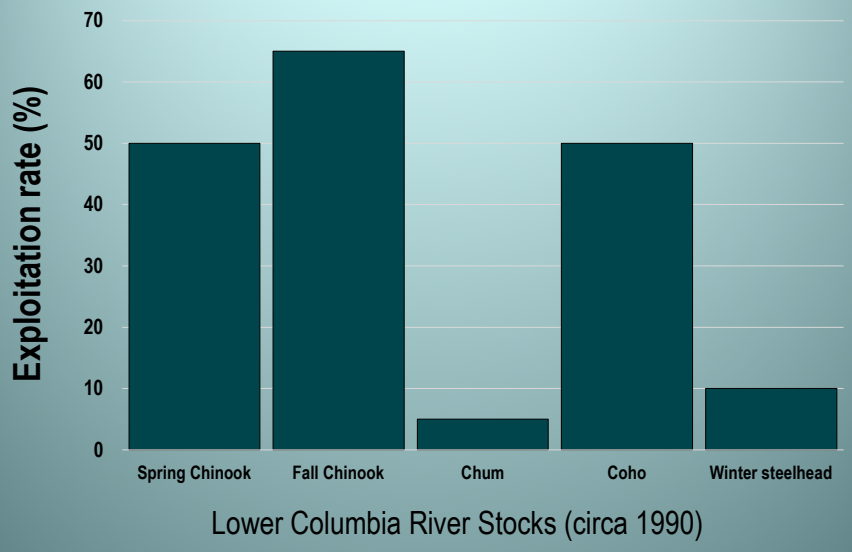
A Common Currency: Impacts

% reduction in recruitment or survival rate affecting abundance

- Fishery exploitation rate
- Dam passage mortality rate
- Sea lion predation rate
- Hatchery-related reduction in fitness
- Reduction in habitat quantity or quality

9

Fishery Impacts



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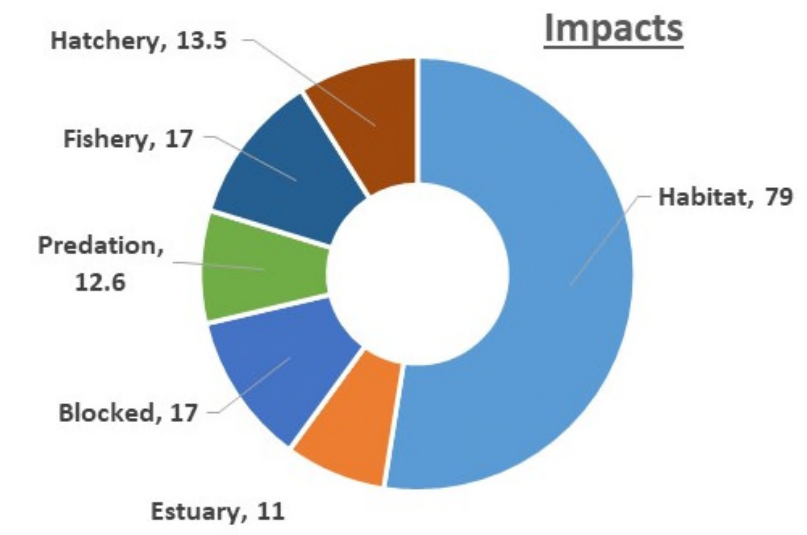
Lower Columbia Coho



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Heat Map of Limiting Factors

	Stock	Tributary Habitat	Estuary	Hydro/ Mainstem	Hydro/ Latent	Hydro/ Blocked	Predation	Fishery	Hatchery
Lower Columbia	Spr Chinook	85	17	0	0	30	14	17	29
	Fall (tule) Chinook	70	21	0	0	15	11	33	25
	Fall (bright) Chinook	10	21	0	0	40	11	47	0
	Chum	95	50	5	0	0	2	1	10
	Coho	80	11	0	0	5	13	17	22
	Sumr Steelhead	65	28	4	0	40	19	5	8
	Win Steelhead SWW	60	28	0	0	0	19	5	17
	Win Steelhead LCR	65	28	0	0	10	19	5	9

<5%	5-20%	21-30%	31-50%	>50%

Impacts defined by associated % reduction in abundance

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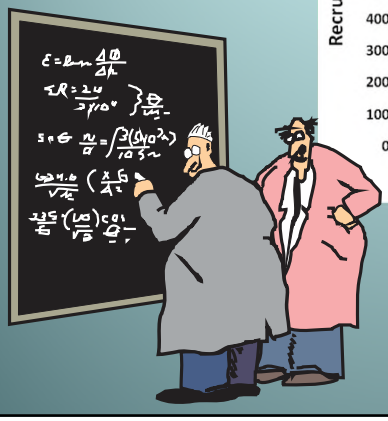
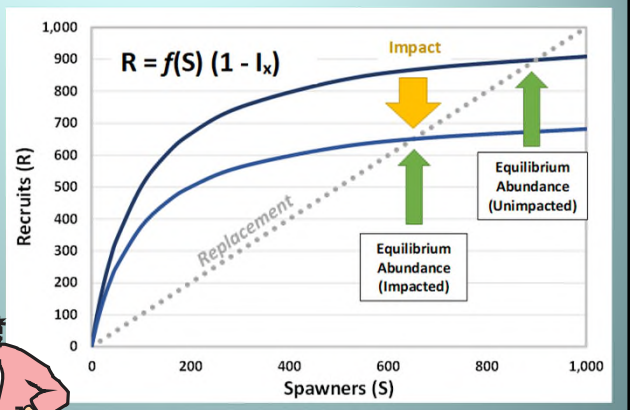
2. Fish Response





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All models are wrong

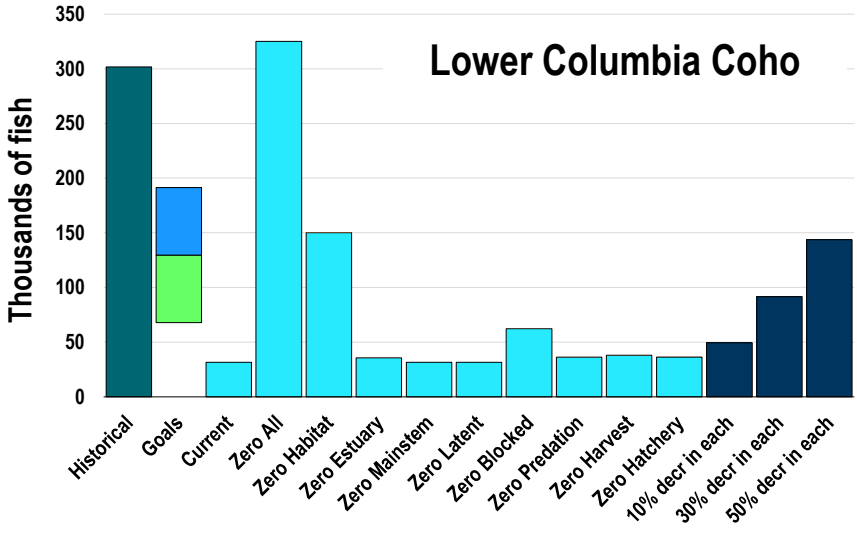
Some

useful

14

15

Model Analysis




Emergent Properties
• No single factor
• Compounding
• Multiple pathways