

**SOUTHERN
OREGON
NORTHERN
CALIFORNIA
COAST COHO
WORKGROUP**



FISHERY HARVEST CONTROL RULE RISK ASSESSMENT

SONCC coho Workgroup

- Established by the Council in April 2020
- November 2020 PFMC
 - Progress report
 - Supplemental Workgroup Report 2
- April 2021 PFMC
 - Progress report
- June 2021 PFMC
 - Updated draft risk assessment
 - Range of Alternatives
- September 2021 PFMC
 - Review the Risk Assessment and Range of Alternatives
 - Consider a Preliminary Preferred Alternative

Changes to the WG report since June 2021

- Evaluated the range of alternative control rules
- Identified control rules representing “status quo” levels of fishing
- New analysis on effects to fisheries
 - Attempt to infer ocean fishery effects
- Implementation of control rules
 - Technical aspects
- Revised “Summary and Recommendation” section that includes:
 - Interpretation of key risk assessment results
 - A recommendation regarding data and models used for SONCC stock assessment

Organization of the Workgroup report

Status of SONCC coho ESU

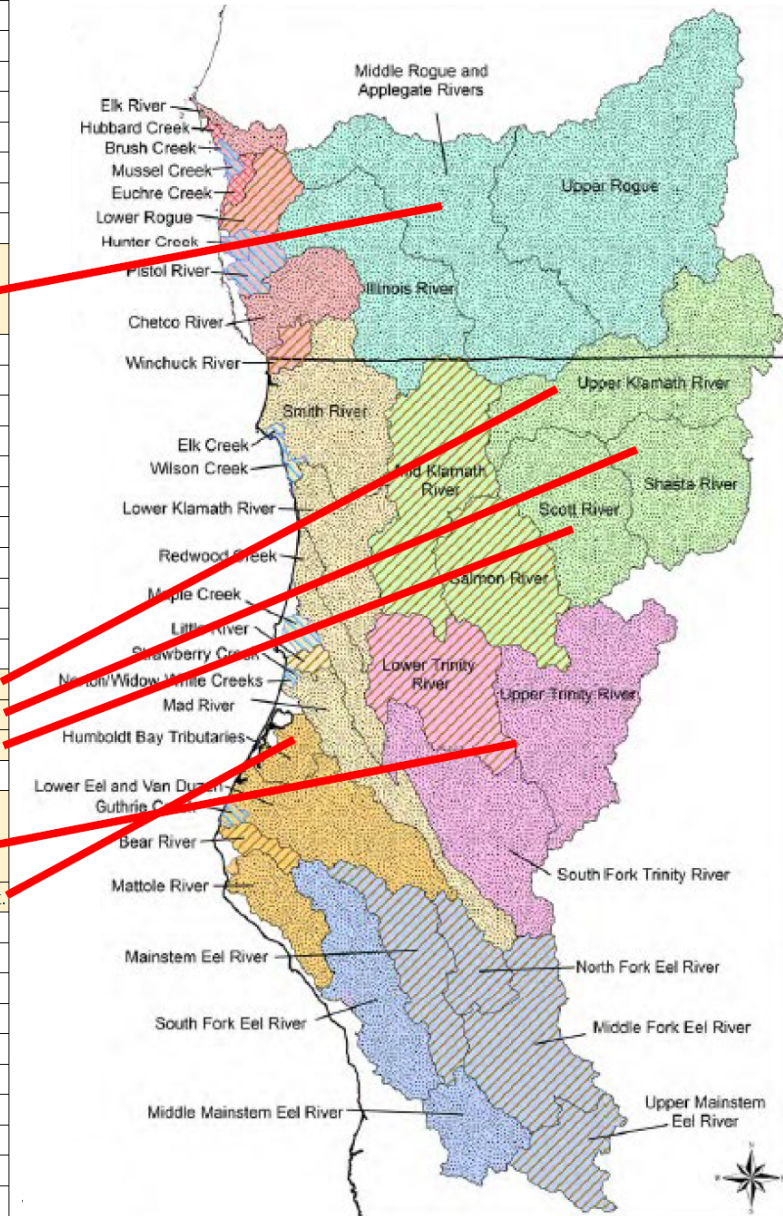
Fishery Description

Harvest Control Rules

Risk Assessment

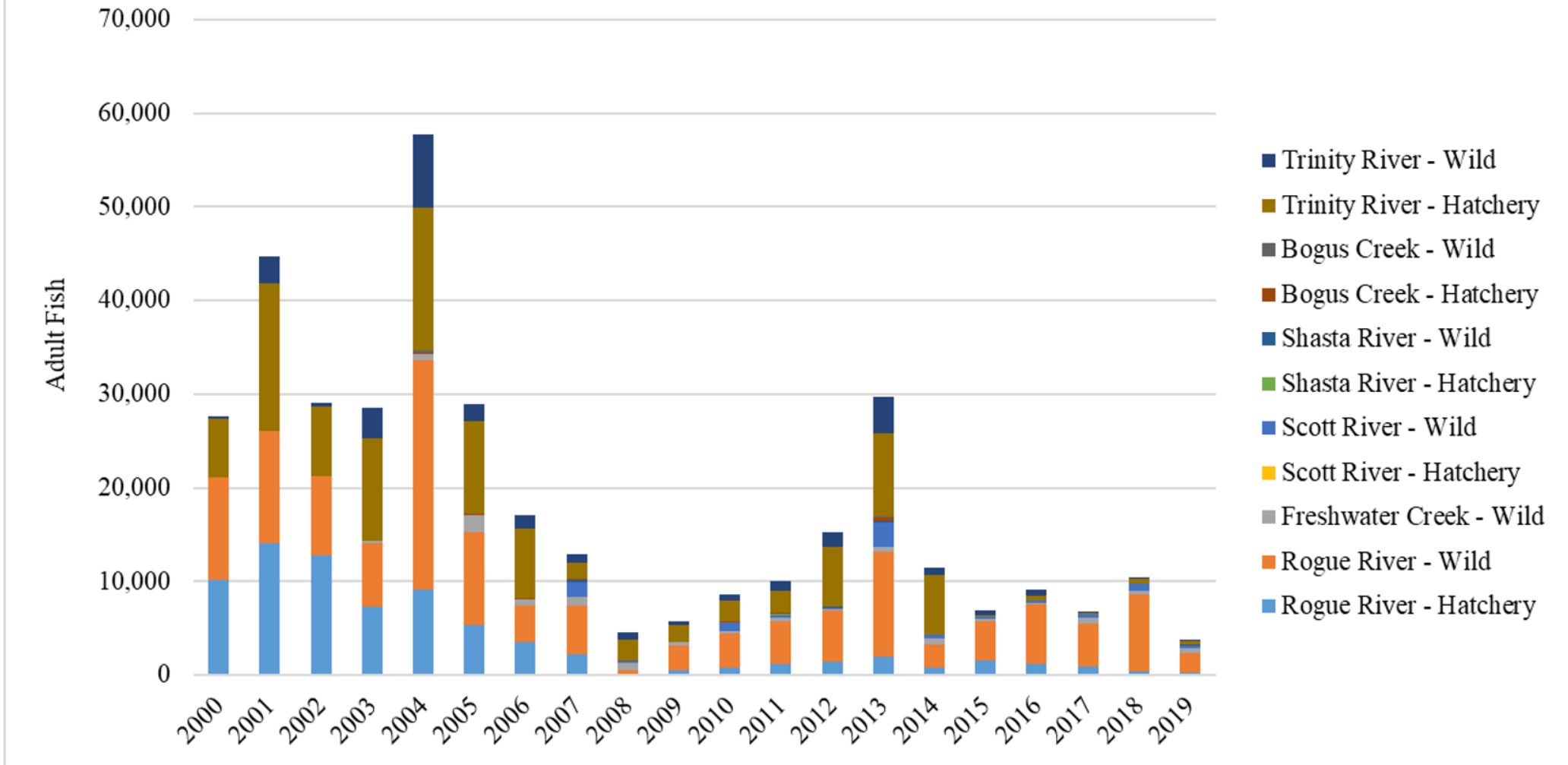
Implementation

Stratum	Populations	Risk status	Risk goal	Recovery role	Recovery criteria	Intrinsic potential (km) ^a	Analysis populations
Northern Coastal Basin	Elk R	High	Low	Core	2,400	62.6	--
	Brush Crk	High	Juveniles	Dependent	--	--	--
	Mussel Crk	High	Juveniles	Dependent	--	--	--
	Lower Rogue R	High	Moderate	Non-core 1	320	80.9	--
	Hunter Crk	High	Juveniles	Dependent	--	14.6	--
	Pistol Crk	High	Juveniles	Dependent	--	30.2	--
	Chetco R	High	Low	Core	4,500	135.2	--
Interior Rogue R	Winchuck R	High	Moderate	Non-core 1	230	56.5	--
	Illinois R	High	Low	Core	11,800	324.8	Rogue
	Middle Rogue/Applegate R	High	Moderate	Non-core 1	2,400	17.4	
Upper Rogue R	Moderate	Low	Core	13,800	18.8		
Central Coastal Basin	Smith R	High	Low	Core	6,800	204.7	--
	Elk Crk	High	Juveniles	Dependent	--	151.0	--
	Wilson Crk	High	Juveniles	Dependent	--	18.8	--
	Lower Klamath R	High	Low	Core	5,900	34.2	--
	Redwood Crk	High	Low	Core	4,900	7.0	--
	Maple Crk/Big Lagoon	--	Juveniles	Dependent	--	9.9	--
	Little R	Moderate	Moderate	Non-core 1	140	136.5	--
	Strawberry Crk	--	Juveniles	Dependent	--	190.9	--
	Norton/Widow White Crk	--	Juveniles	Dependent	--	393.5	--
	Mad R	High	Moderate	Non-core 1	550	13.8	--
Interior Klamath	Middle Klamath R	Moderate	Moderate	Non-core 1	450	47.8	--
	Upper Klamath R	High	Low	Core	8,500	249.8	Bogus Crk
	Shasta R	High	Low	Core	4,700	589.7	Shasta R
	Scott R	Moderate	Low	Core	6,500	683.2	Scott R
Interior Trinity	Salmon R	High	Moderate	Non-core 1	450	900.9	--
	Lower Trinity R	High	Low	Core	3,600	113.5	Trinity R
	South Fork Trinity R	High	Moderate	Non-core 1	970	424.7	
Upper Trinity R	Moderate	Low	Core	5,800	206.3		
Southern Coastal Basin	Humboldt Bay tributaries	Moderate	Low	Core	5,700	250.5	Freshwater Crk.
	Lower Eel/Van Duzen R	High	Low	Core	7,900	113.5	--
	Guthrie Crk	--	Juveniles	Dependent	--	102.1	--
	Bear R	High	Juveniles	Non-core 2	--	241.8	--
Interior Eel	Mattole R	High	Moderate	Non-core 1	1,000	365.0	--
	Mainstem Eel R	High	Low	Core	2,600	68.4	--
	Middle Mainstem Eel R	High	Low	Core	6,300	231.5	--
	Upper Mainstem Eel R	High	Juveniles	Non-core 2	--	--	--
	Middle Fork Eel R	High	Juveniles	Non-core 2	--	--	--
	South Fork Eel R	Moderate	Low	Core	9,300	463.7	--
	North Fork Eel R	High	Juveniles	Non-core 2	--	--	--



^a Equal to depensation threshold for population.

Escapement of SONCC Coho Populations 2000 - 2019



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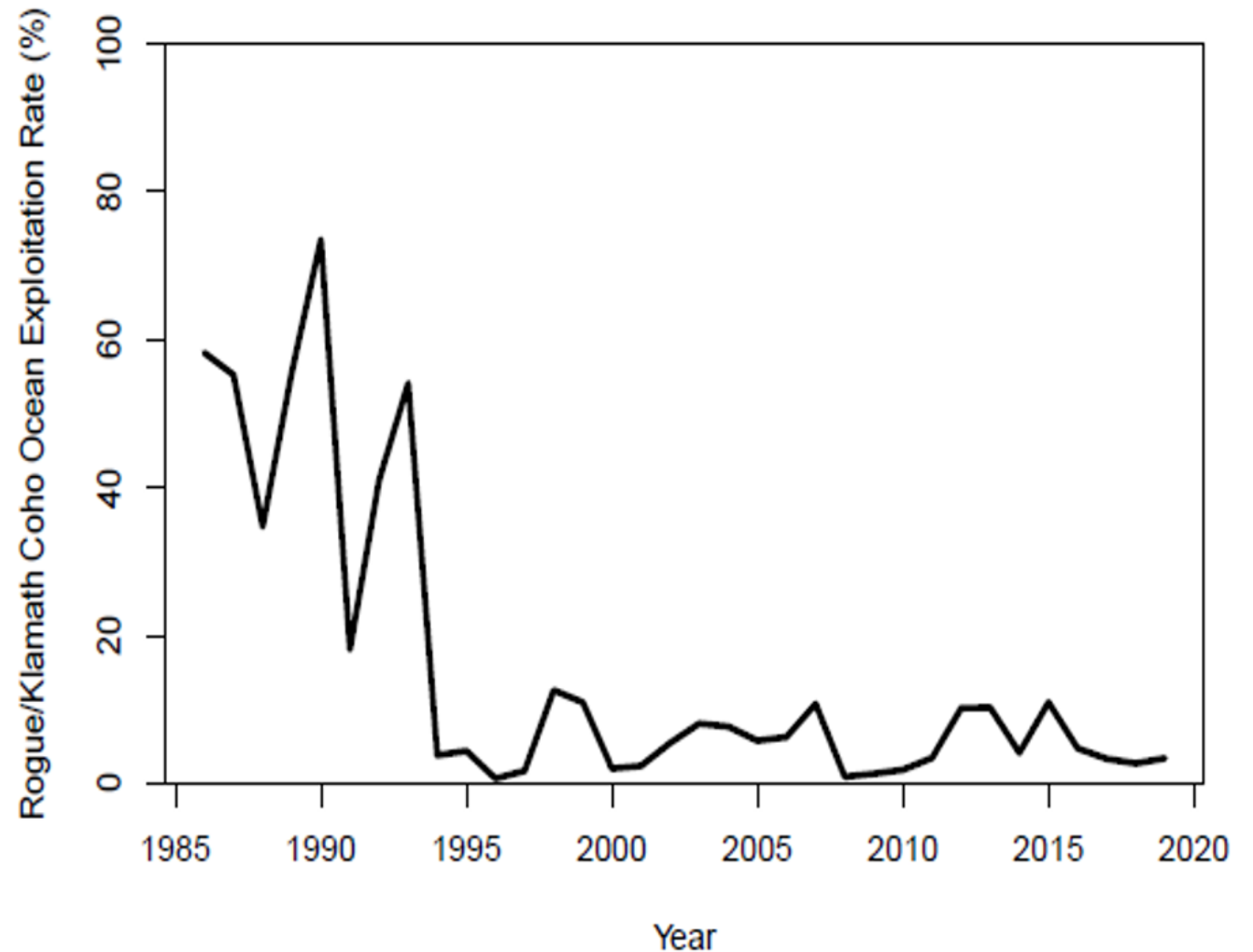
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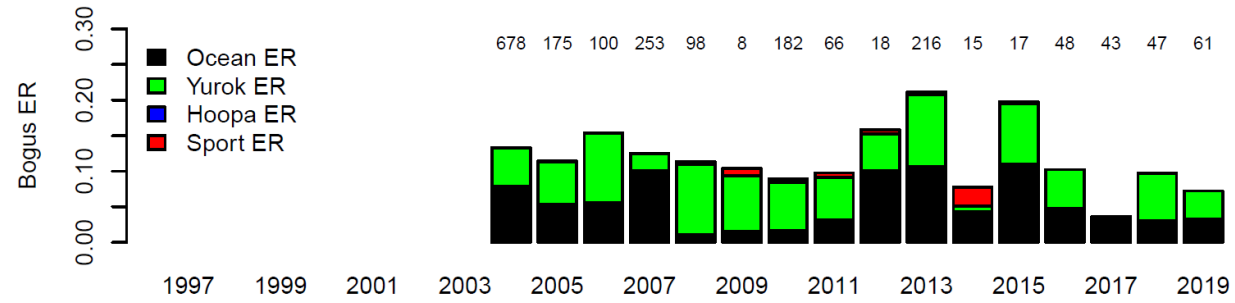
Ocean fisheries affecting SONCC coho

- Mostly non-retention impacts in commercial and recreational fisheries targeting Chinook
- Limited to a 13% ocean ER



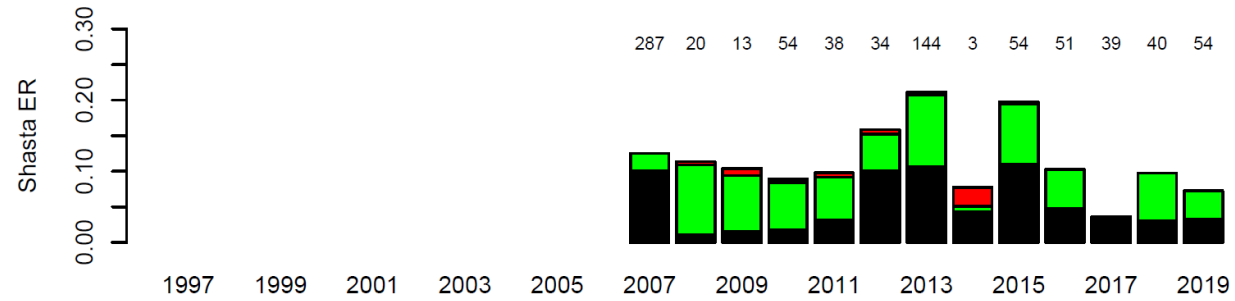
Freshwater fisheries

- Tribal
 - Yurok Tribe, Hoopa Valley Tribe
 - Manage fisheries for the benefit of its members and conservation of the resource
- Recreational
 - Retention of coho is prohibited in California
 - Small scale mark-selective fisheries in Oregon

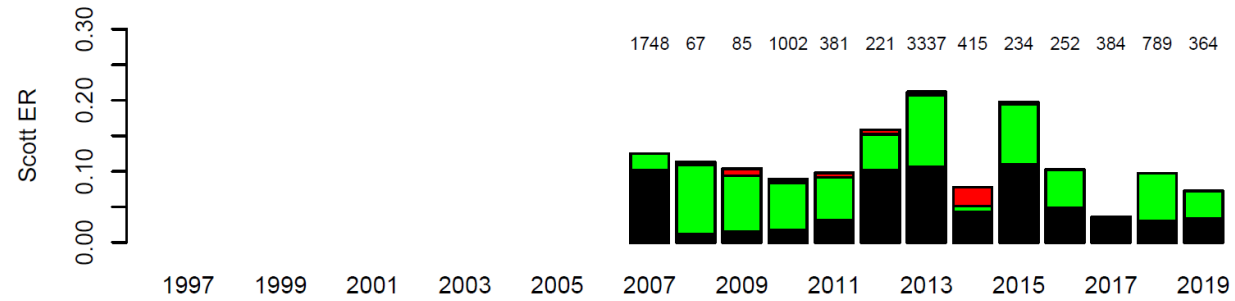


Mean total ER

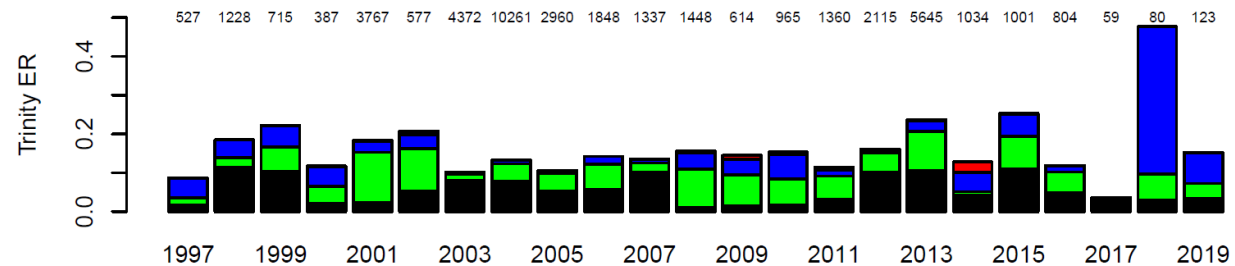
11.8%



11.4%



11.4%



14.9% (omits 2018 outlier)

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Constant, total ER control rules

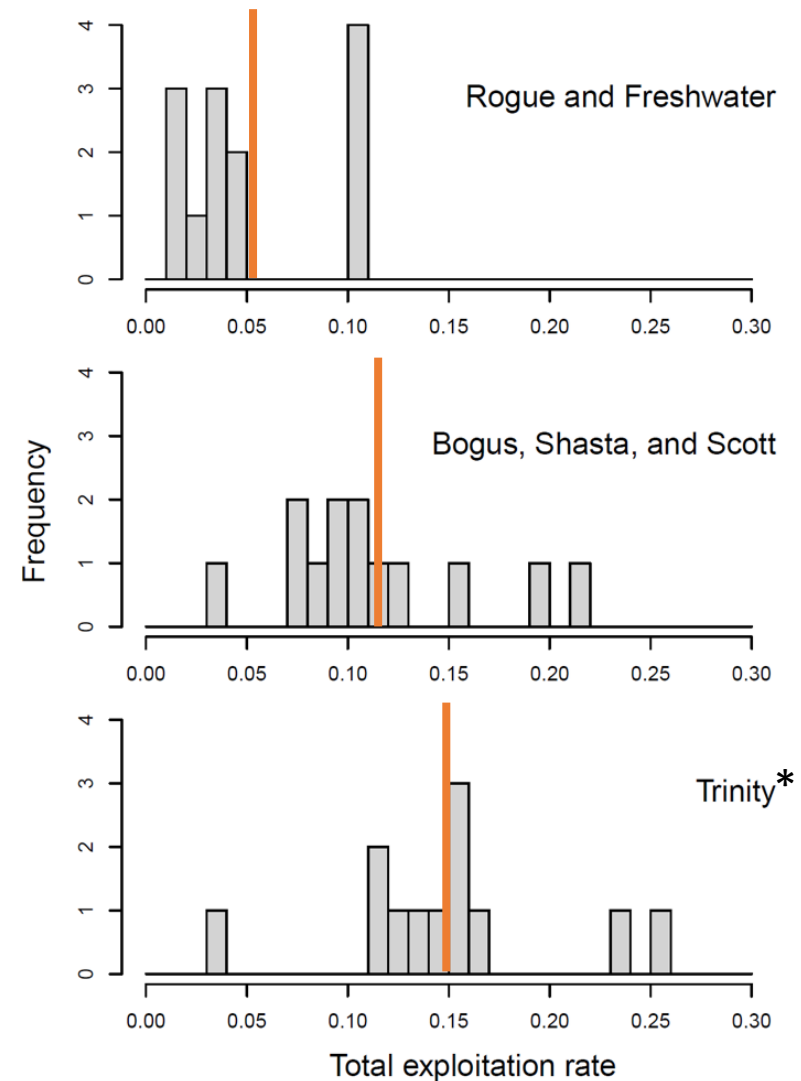
Control Rule	Maximum ER
1	0.00
2	0.07
3	0.13
4	0.14
5	0.15
6	0.16
7	0.17
8	0.18
9	0.19
10	0.20

Control rules representing status quo

Rogue/FW Creek: CR 2 (7% ER)

Bogus/Shasta/Scott: CR 3 (13% ER)

Trinity: CR 5 (15% ER)



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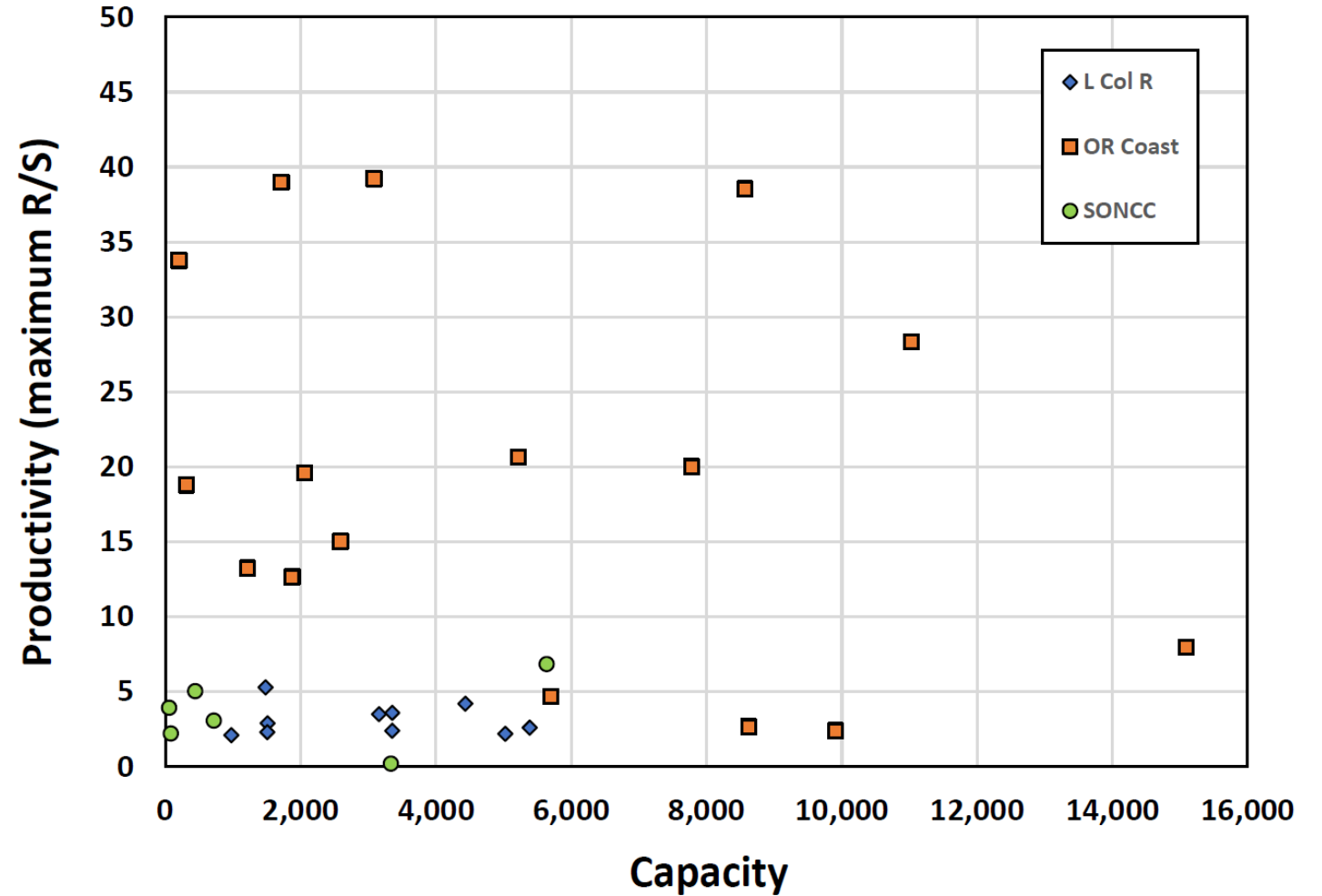
Implementation

Risk assessment components

- Estimation of productivity and capacity (spawner-recruit analyses)
- Risk assessment model
 - Assess effects to extinction risk
 - Assess effects to fisheries
- Sensitivity analyses

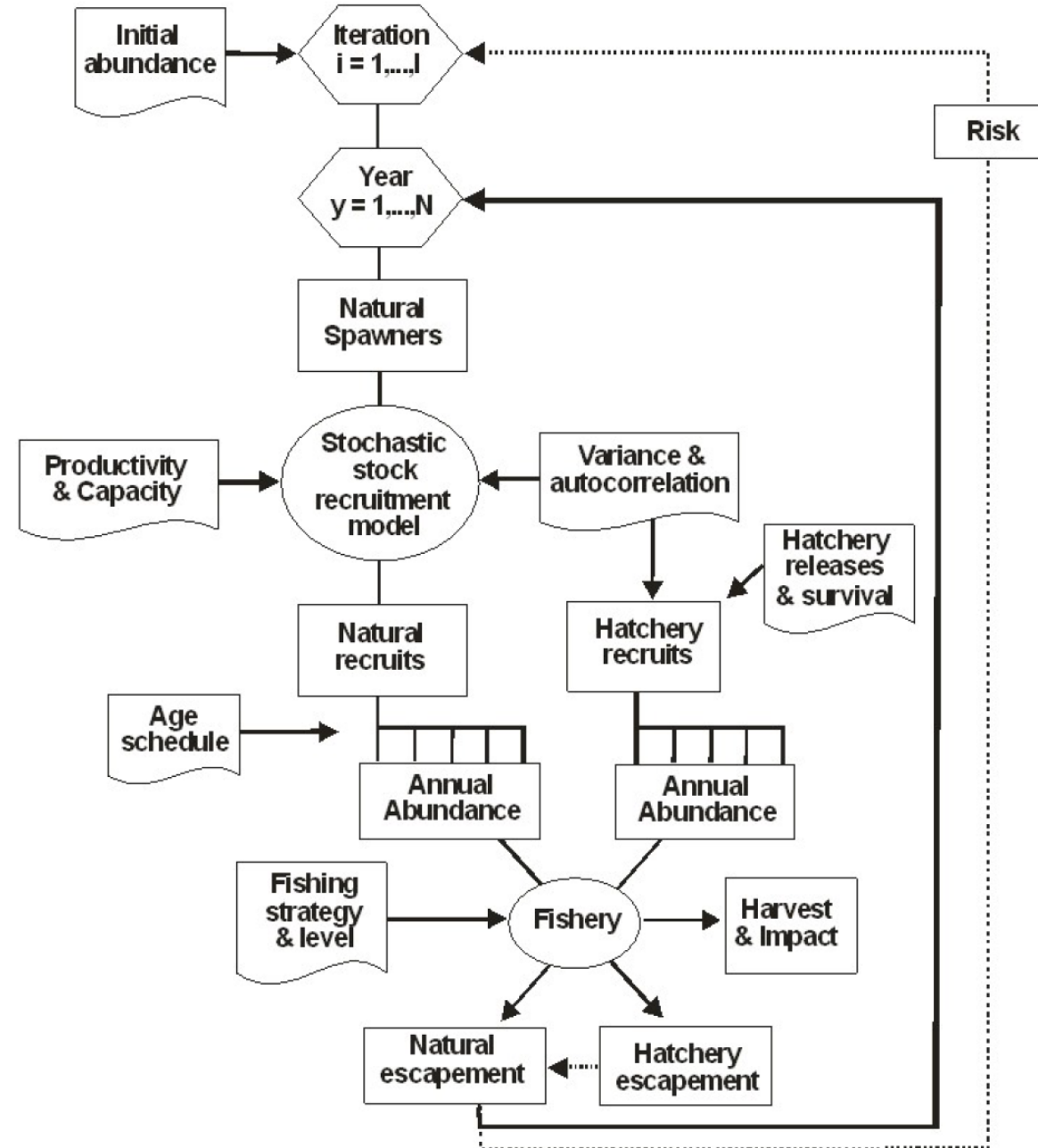
Productivity and Capacity

- Necessary model inputs
- Generally low productivity
- Low to moderate capacity

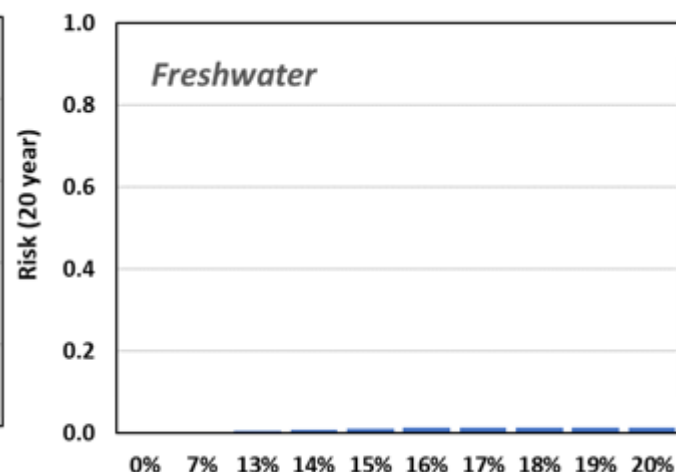
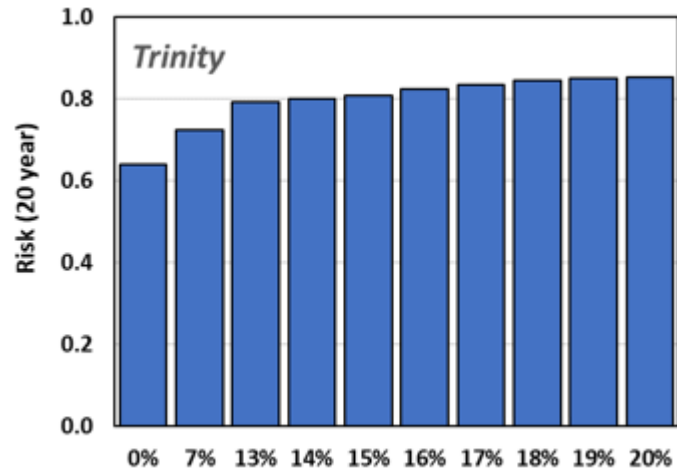
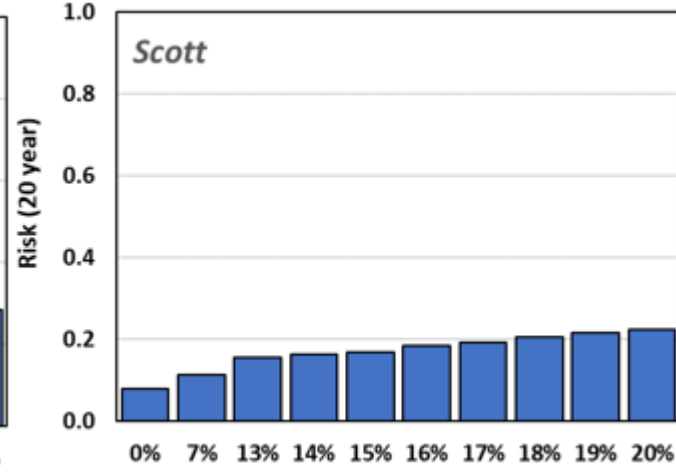
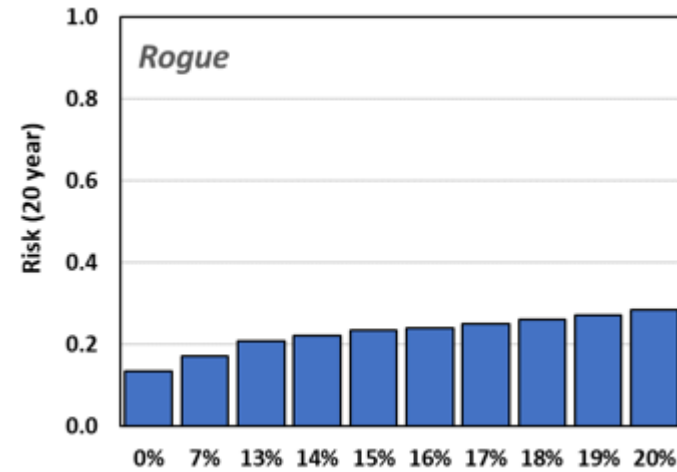
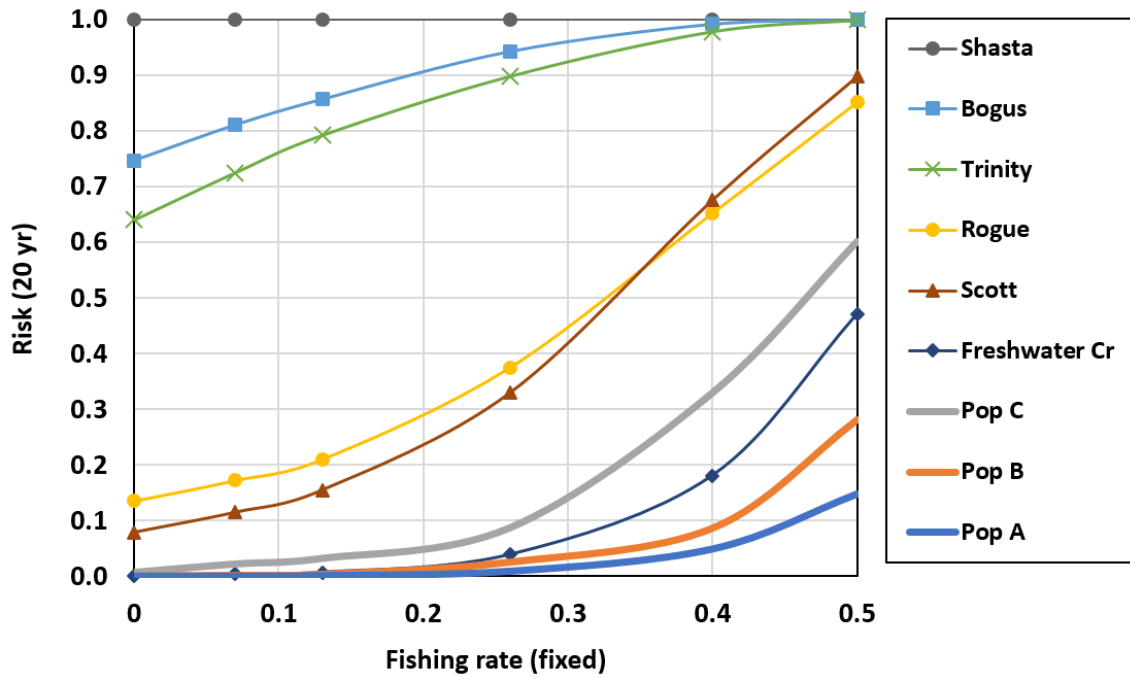


Model structure

- Centered around stock-recruitment models
- Stochastic
- Accounts for autocorrelation in survival and productivity
- Accounts for depensation at low abundance
- Accounts for management error

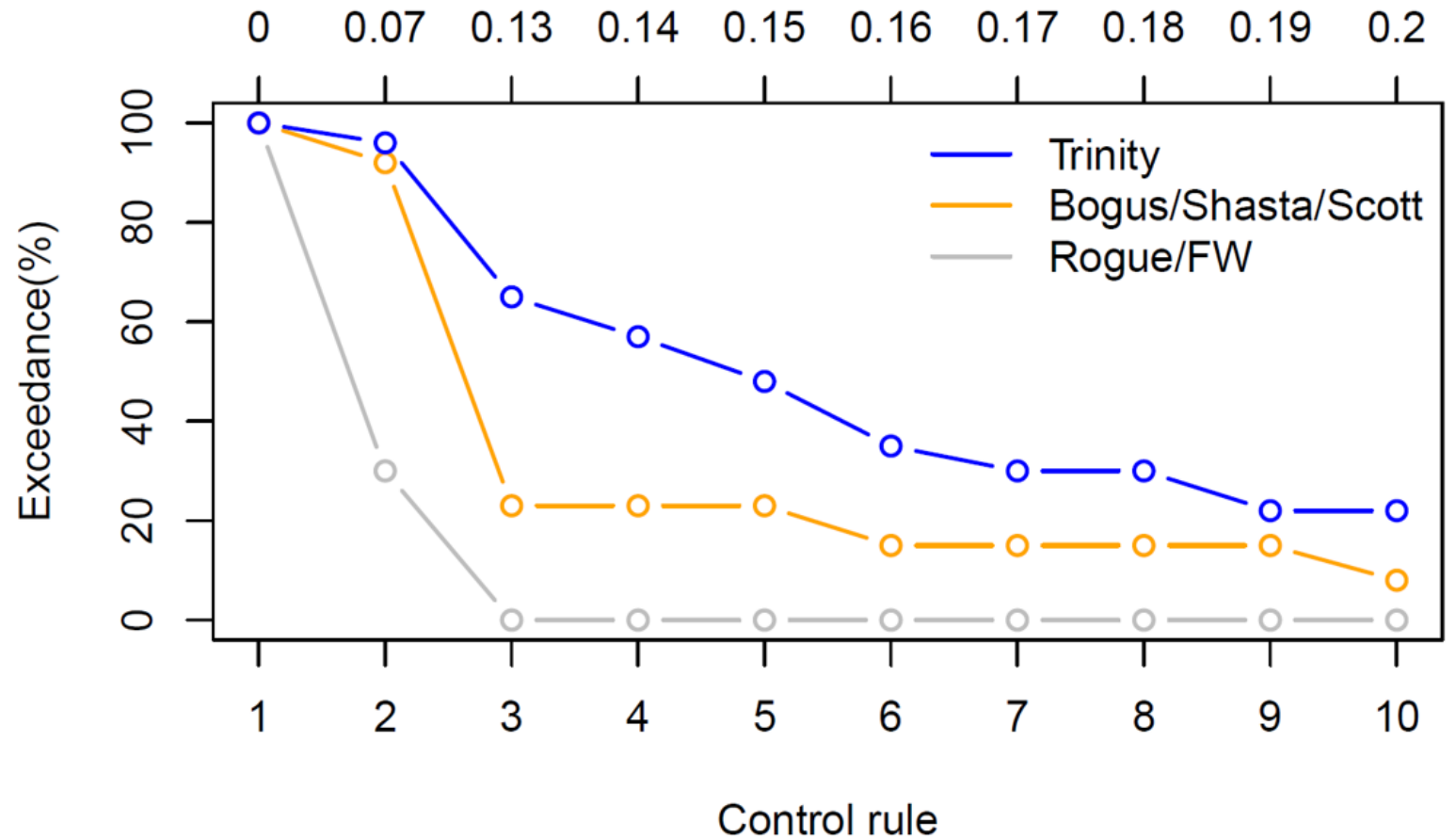


Results: extinction risk under fixed ERs



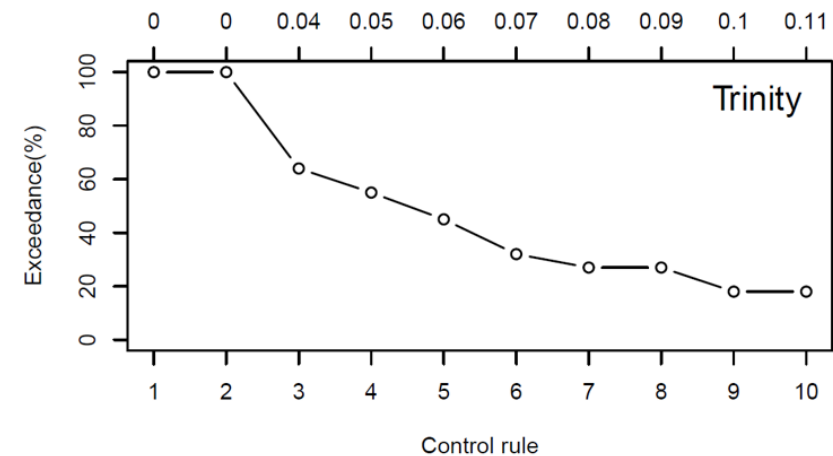
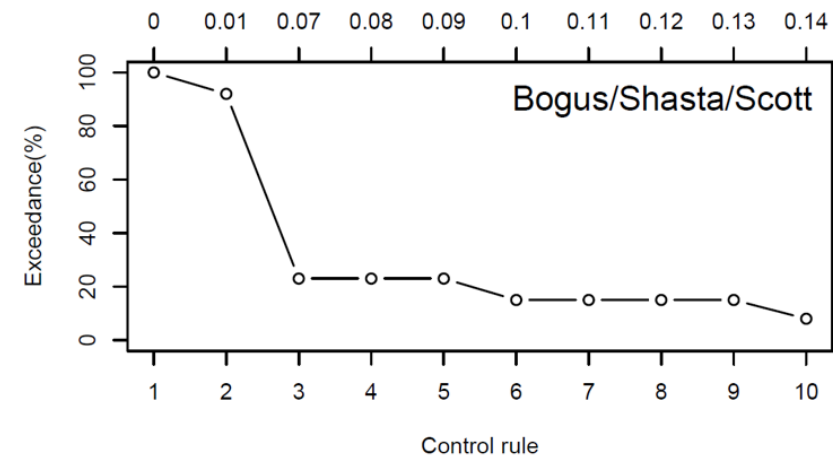
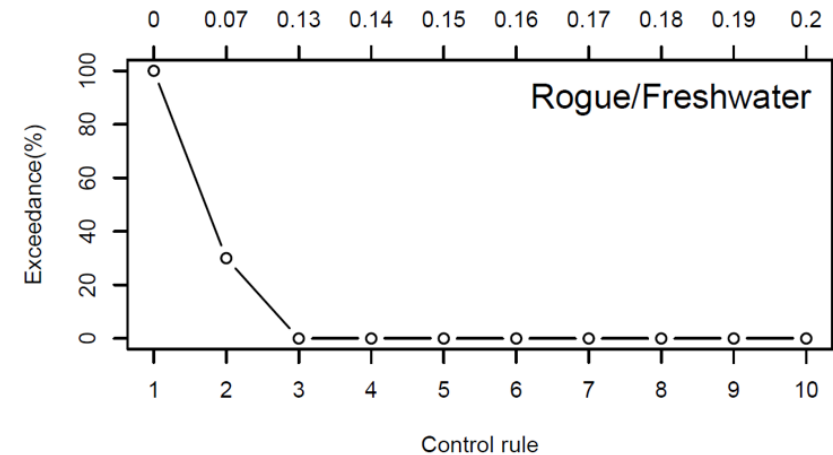
Effects on fisheries

Exceedance:
the percent of years
that the estimated
total ER exceeded
the control rule
maximum



Effects on fisheries: ocean focus

- Subtract mean freshwater ERs from total ER to isolate potential ocean ER
- Subtract mean freshwater ERs from the control rule
- Compute the percent of years where the total ER cap would have been exceeded, given the observed ocean ER and the mean freshwater ER



Sensitivity analyses

- Effects of hatchery strays
 - Little effect on risk for SONCC populations
- Fishery implementation error
 - Conservation risks minimally sensitive
- Effects of alternative stock-recruit parameters
 - Little difference in risk for parameters estimated here, and from a Trinity HGMP

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Control rule implementation

- Allowable ocean ERs can be determined by subtracting projected freshwater ERs from the total ER specified by the control rule
- The allowable ocean ER would be constrained by the SONCC population unit with the highest freshwater ER
- In the absence of new methods, freshwater ERs could be characterized by recent year means
- Coho FRAM can be used to project the ocean ER component, given planned ocean fisheries
- Population units with lower freshwater ERs could potentially have more freshwater fishing opportunity

Implementation, continued

- Postseason ERs can be assessed using cohort reconstructions
- A total ER control rule can be implemented with the data and tools currently available
- However new monitoring, models, and management approaches have the potential to improve stock assessment

Summary

- All populations identified in the SONCC coho ESU recovery plan are at high or moderate risk
 - Escapement to natural areas has generally declined
- Preliminary analysis of 10 constant, total ER control rules
- The analysis considered performance measures for:
 - conservation (spawner escapement, extinction risks)
 - fisheries (potential effects on ocean and freshwater fisheries)
- Range of risks across SONCC ESU
 - High for Shasta, Bogus, and Trinity
 - Relatively low for Freshwater Creek
 - Intermediate for Rogue and Scott

Summary (continued)

- Total ERs specified by the control rules are exceeded by estimates of past ERs for various SONCC population units
 - Indicates that management action would be needed to meet total ER caps
 - The frequency of fishery management action depends on the control rule and by the SONCC population unit
 - Population units with higher freshwater ERs would be expected to have more frequent management interventions

Recommendation

- Recommend an investigation into methods used to forecast ocean fishery ERs for both hatchery and naturally produced SONCC coho
- This investigation should initially be focused on analyses that can be conducted using existing data.
- The investigation should also identify whether new methods could improve the forecasts of marine exploitation rates if additional data were available (e.g. GSI or CWT's and adipose fin clips on all hatchery fish).