Status and Trends Monitoring Design Templates

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With backup provided by the Status and Trends Workgroup

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Primary management question

The Problem: Delisting of Snake River Sp/Sum Chinook ESU

The Decision: SRSS Chinook ESU “is no longer at risk of extinction” (5% in 100 yrs)

Inputs to the Decision – must define:

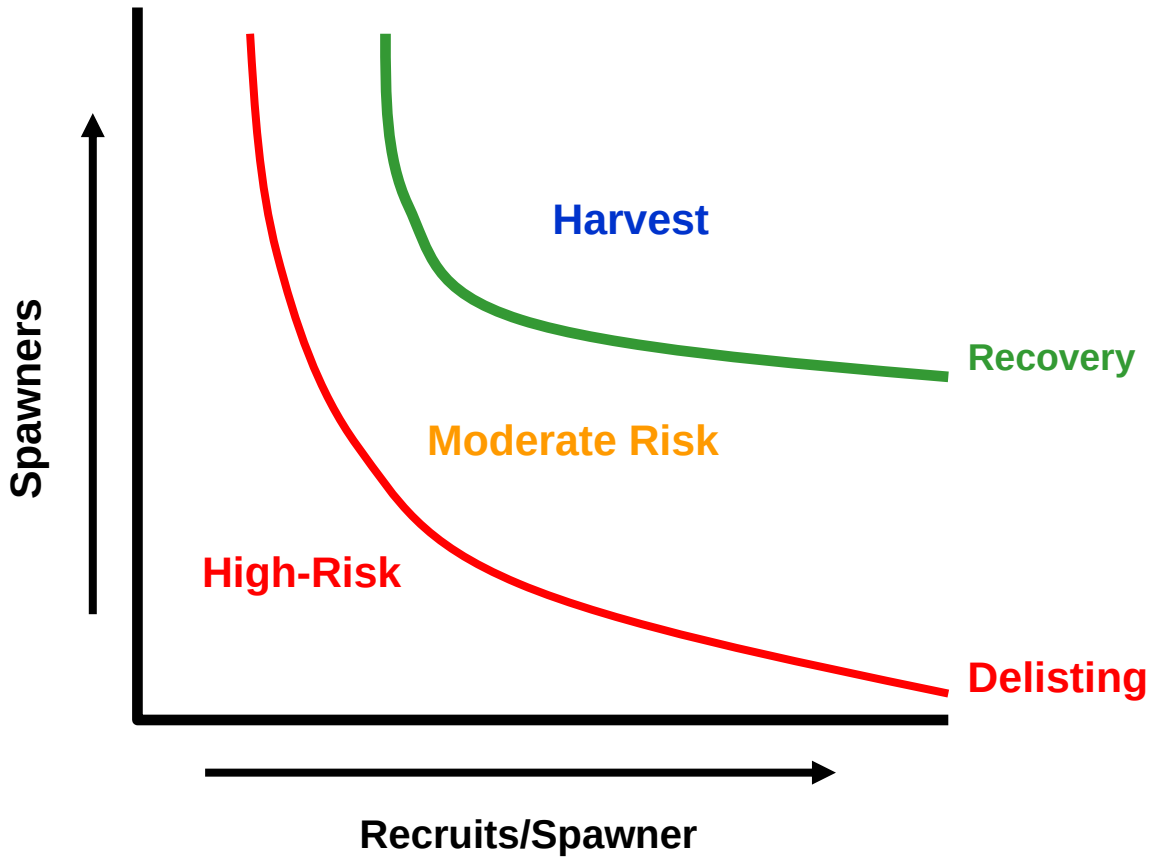
- Performance measures
- Uncertainty in data
  - Natural variability – spatial and temporal
  - Sampling & measurement

Evaluate sensitivity of decision to inputs:

- Test scenarios (= monitoring designs)

Decision Rules - A/P

•A/P viability curve: Risk < 5% of decreasing to below critical number of spawners/year for a generation in a 100 years



Decision Rules – SS/D

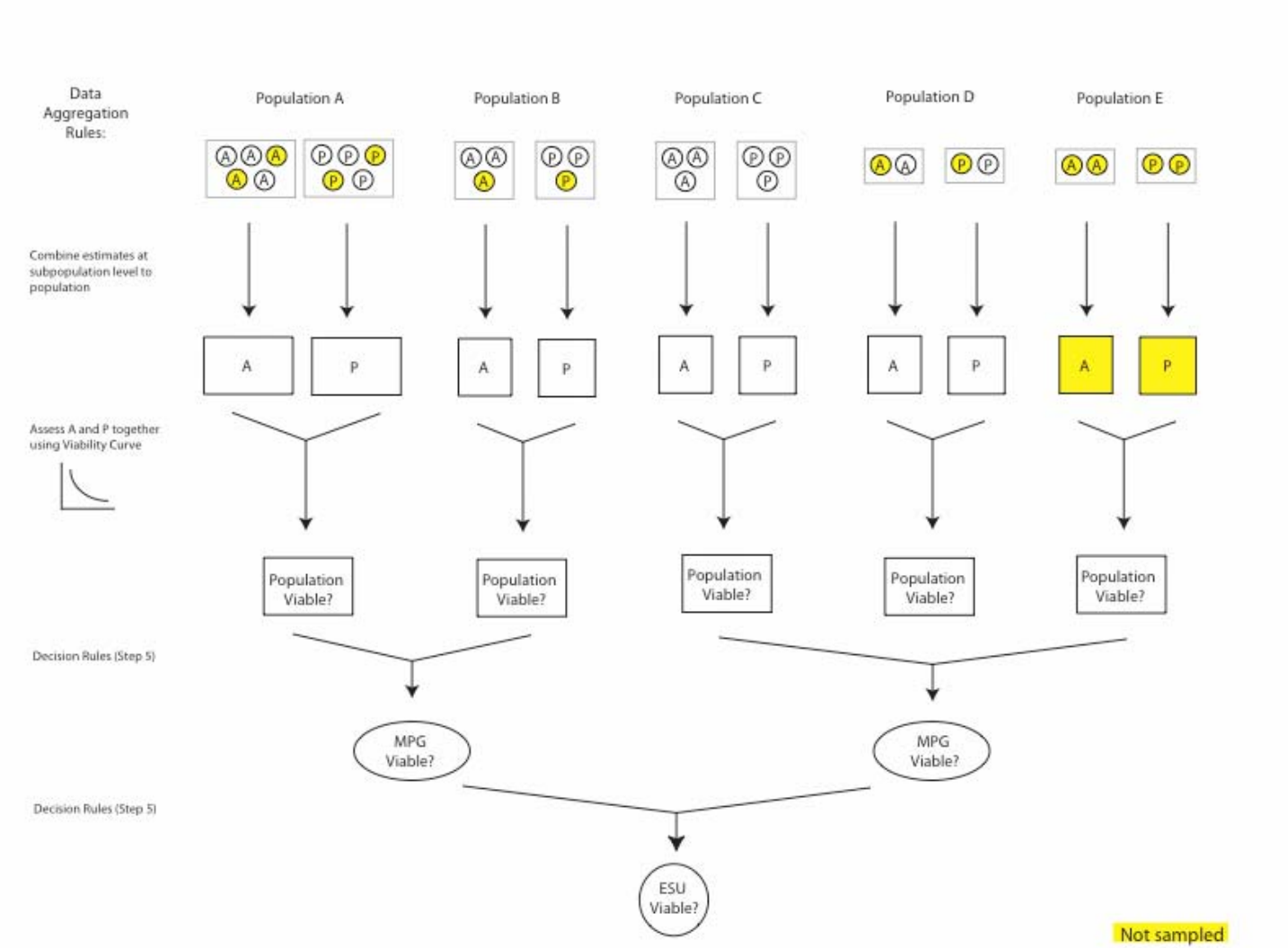
- SS/D: Categorical, weight of evidence approach
- Uncertainty → increased risk ratings

Goal	Mechanism	Factor	Metrics		Assessed Risk Level			
					Metric	Factor	Mechanism	Goal
A. Allowing natural rates and levels of spatially-mediated processes.	1. Maintain natural distribution of spawning aggregates.	a. number and spatial arangement of spawning areas.	A.1.a	Number of MSAs, distribution of MSAs, and quantity of habitat outside MSAs.				
		b. Spatial extent or range of population	A.1.b	Proportion of historical range occupied and presence/absence of spawners in MSA				
B. Maintaining natural levels of variation.	1. Maintain natural patterns of phenotypic and genotypic expression.	a. Major life history strategies.	B.1.a	Distribution of major life history expression within a population				
		b. Phenotypic variation.	B.1.b	Reduction in variability of traits, shift in mean value of trait, loss of traits.				
		c. Genetic variation.	B.1.c	Genetic analysis encompassing within and between population variation				
	2. Maintain natural patterns of gene flow.	a. Spawner composition.	B.2.a(1)	Proportion of natural spawners that are hatchery fish, life history similarity, proportion of broodstock that is of natural origin, degree of selectivity in broodstock collection.				
			B.2.a(2)	Proportion of natural spawners that are hatchery strays.				
			B.2.a(3)	TBD (Exogenous strays)				
		b. Increase or decrease gaps or continuities between spawning aggregates.	B.2.b	Change in gap distances and spawner distribution.				
	3. Maintain occupancy in a natural variety of available habitat types.	a. Distribution of population across habitat types.	B.3.a	Habitat diversity index and occupancy.				
	4.Maintain integrity of natural systems.	a. Change in natural processes or impacts.	B.4.a	Cumulative selectivity score across all relevant impacts				

Decision Rules
A/P x SS/D Viability Matrix

A/P risk	SS/D risk: Very Low (VL)	Low (L)	Moderate (M)	High (H)
Very Low (VL) <1%	V	V	V	
Low (L) 1-5%	V	V	V	
Moderate (M) 6-25%				
High (H) >25%				

Aggregating population metrics to ESU metric



Monitoring Design Simulation

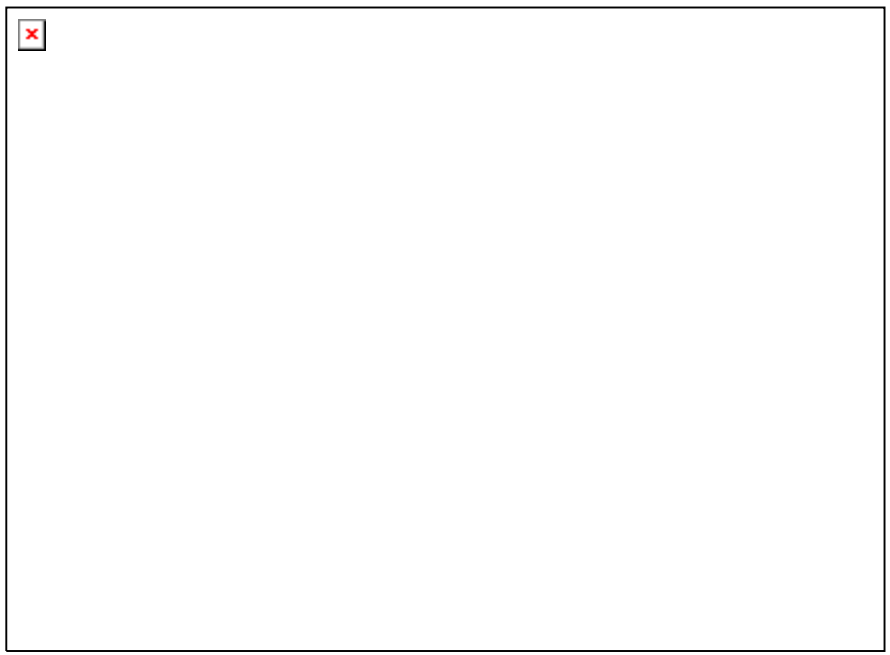
1. Generate data = simulated time series by population. Reflect reality for a) high, b) low, and c) moderate risk. Use realistic spatial and temporal variance structure.

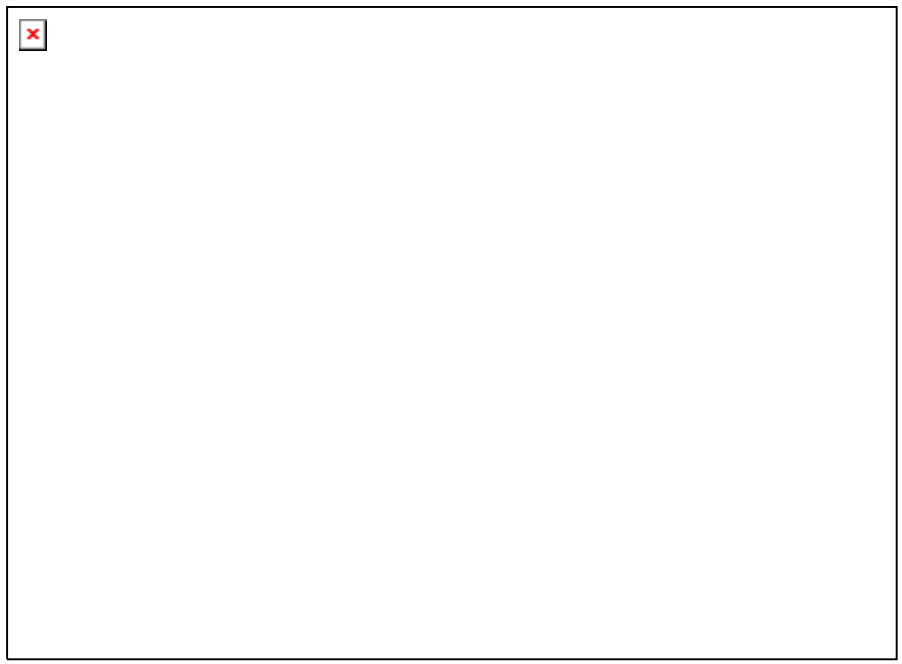
2. Take input data and generate “monitoring data” using alternate monitoring programs.

3. Take monitoring data, put into decision rules. Re-sample iteratively.

4. Conduct sensitivity analysis, to investigate influence of model components.

Example Abundance and Productivity Data





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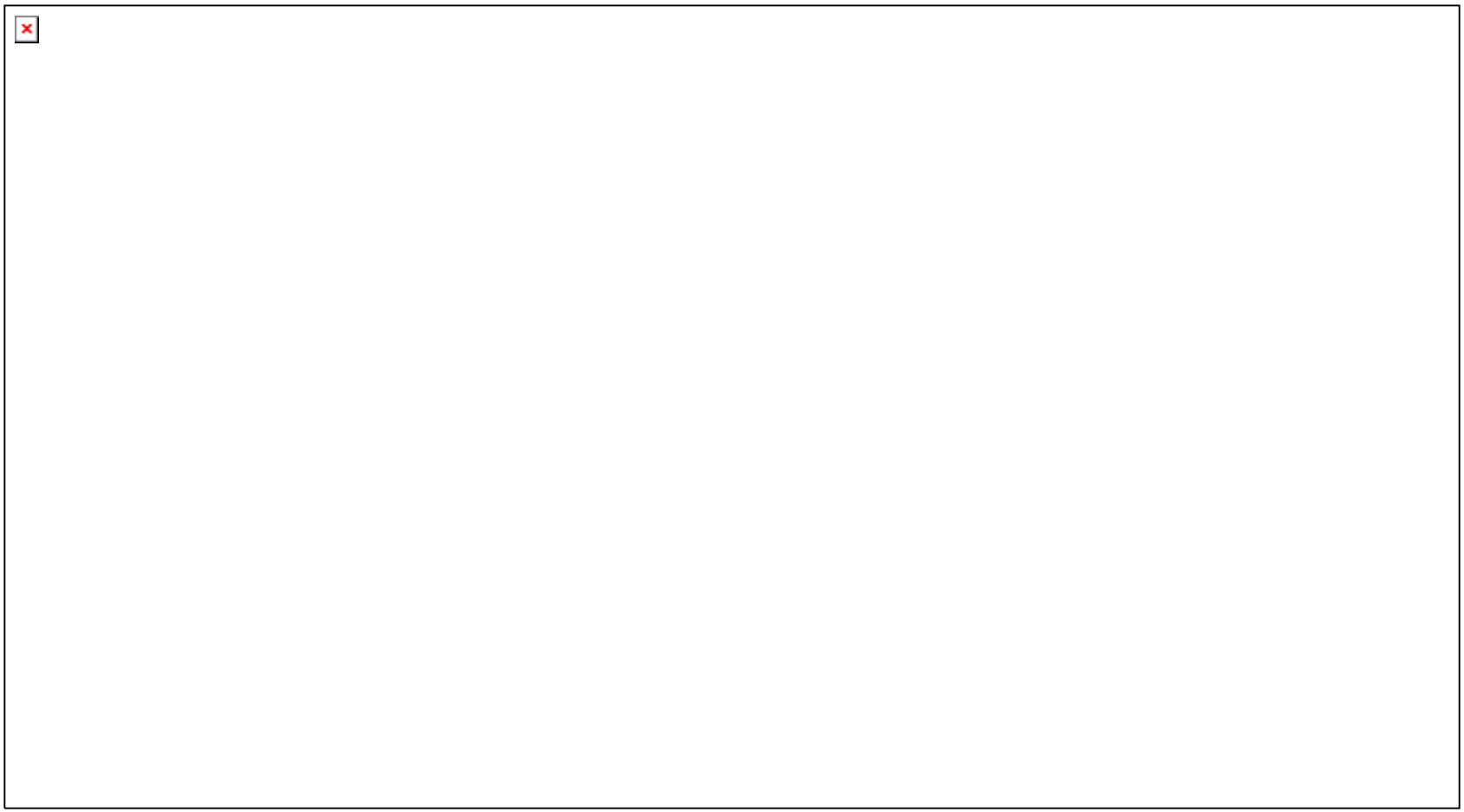
Monitoring methods to evaluate PMs

Analytical method	Abundance	Productivity	Spatial structure	Diversity
Count of adult fish	☑	☑	☑	
Count of redds	☑	☑	☑	☑
% spawners natural-origin	☑	☑		
Age-structure of spawners	☑	☑		
Sex ratio of spawners	☑	☑		
Count of smolts			☑	
Rate of smolt survival to LGD				☑

Current Monitoring Efforts for SRSS Chinook

Hypothetical “Medium” Monitoring Efforts for SRSS Chinook



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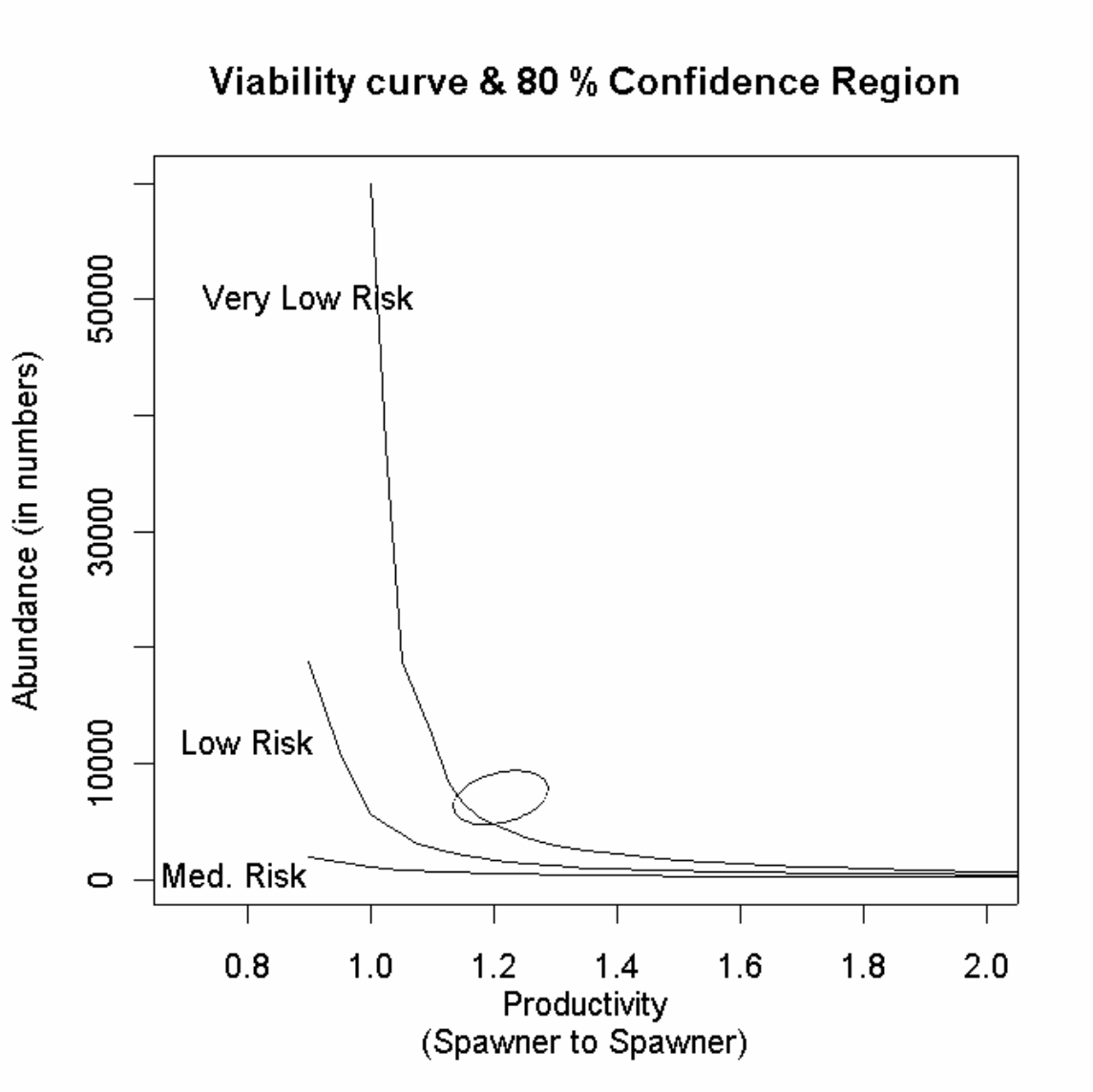
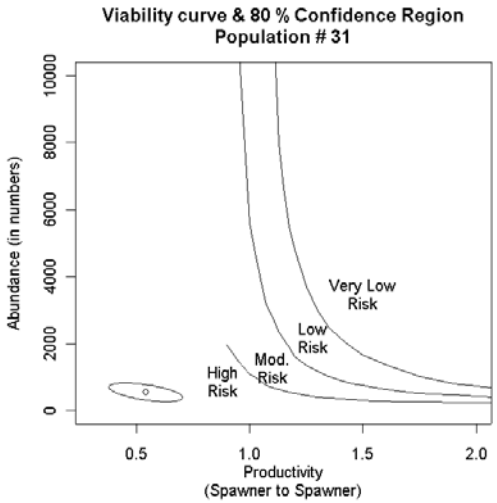
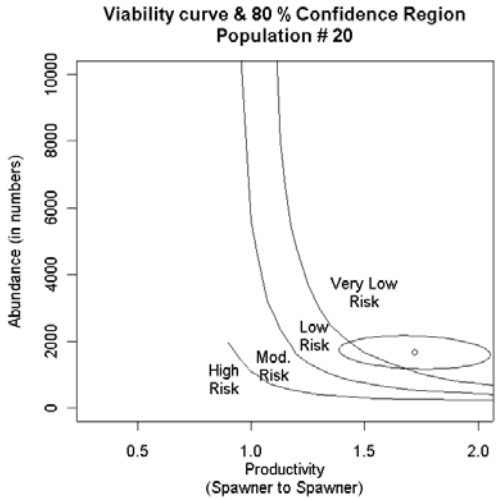
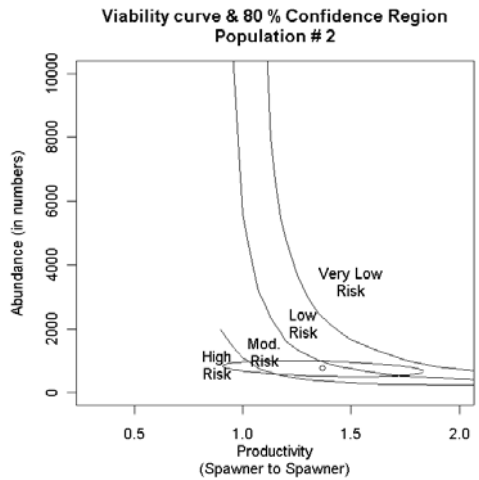
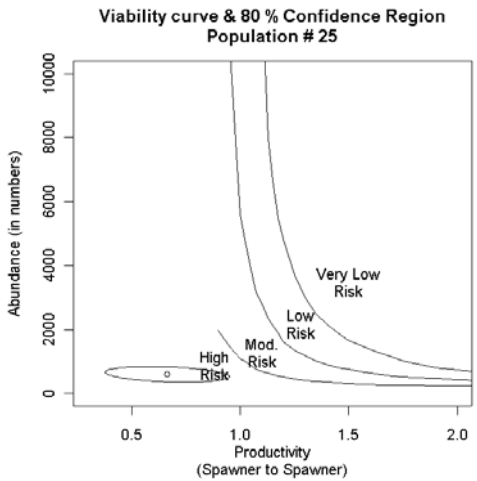

Viability curve & 80 % Confidence Region
Very Low Risk
Low Risk
Med. Risk
Abundance (in numbers)
0
10000
30000
50000
0.8
1.0
1.2
1.4
1.6
1.8
2.0
Productivity
(Spawner to Spawner)

Example Abundance/Productivity Assessment of Snake River Sp/Su Chinook populations

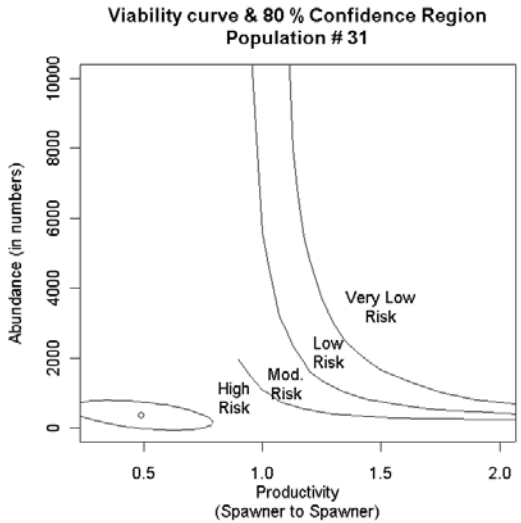


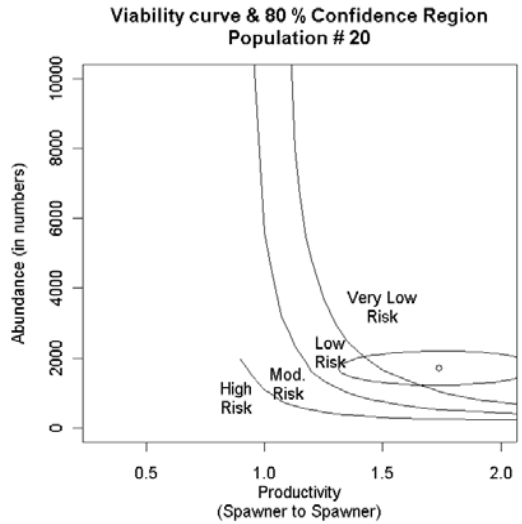


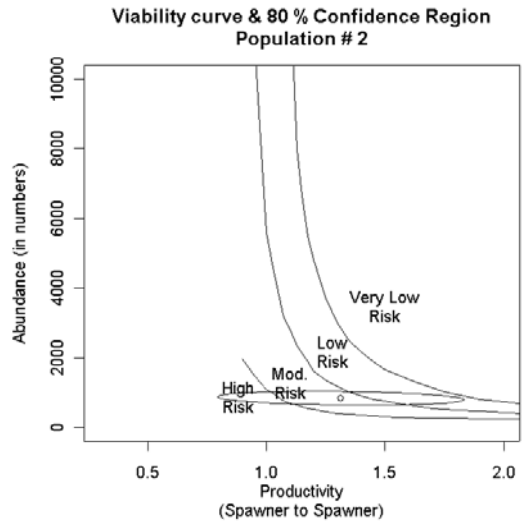


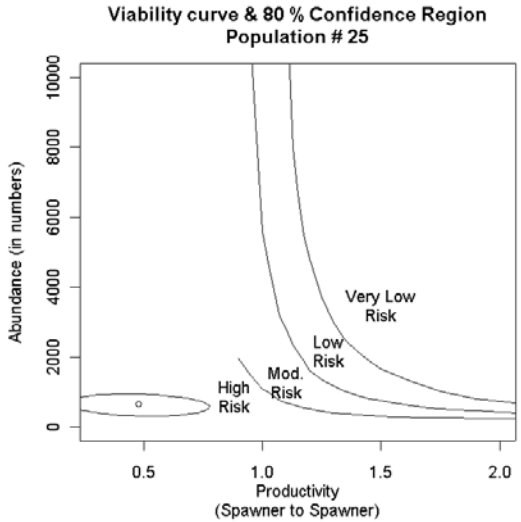


Example Abundance/Productivity Assessment of Snake River Sp/Su Chinook populations with measurement uncertainty (CV = 20%)









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