IPHC Management Strategy Evaluation (MSE)

An update

Interim Meeting 093

November 28-29, 2017

IPHC-2017-IM093-10

L. Boiter

Outline

- Overview of MSE process
- Goal, objectives, and performance metrics
- A description of the harvest strategy policy and the interim management procedure
- Simulation framework
- Investigating the scale component (Fishing Intensity)
- Preview of ideas on distributing the TCEY

Management Strategy Evaluation

MSE is a process to evaluate the harvest strategy policy and develop a management procedure that is robust to uncertainty

Six goals

Fishery objectives

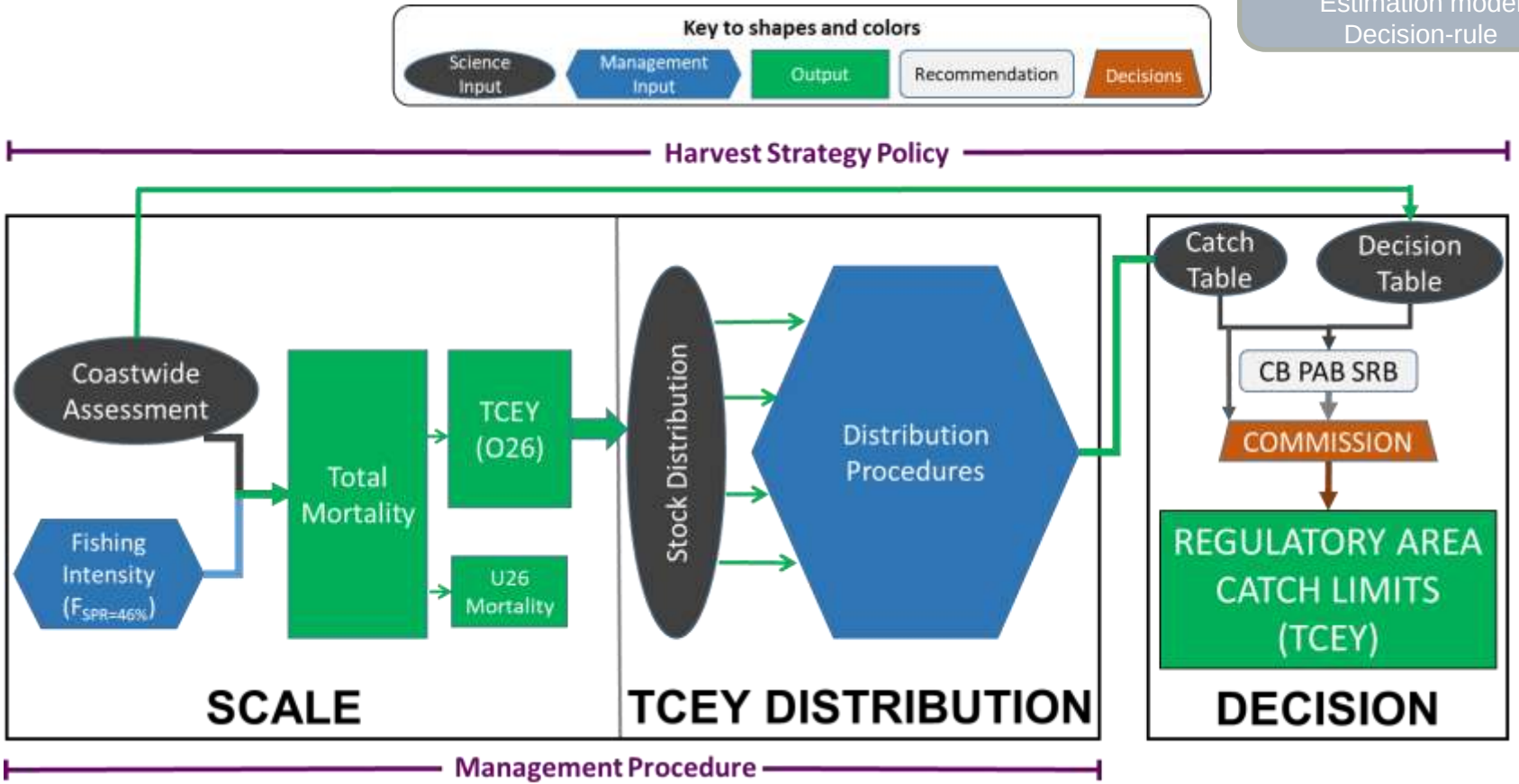
Stakeholders
Managers

1. Biological sustainability
2. Fishery sustainability, access, and stability
3. Minimize discard mortality
4. Minimize bycatch and bycatch mortality
5. Serve consumer needs
6. Preserve biocomplexity

Harvest Strategy Policy

Management procedure

Data
Estimation model
Decision-rule



Spawning Potential Ratio (SPR)

$$\frac{\textbf{Spawning Output Per Recruit with fishing}}{\textbf{Spawning Output Per Recruit with no fishing}}$$

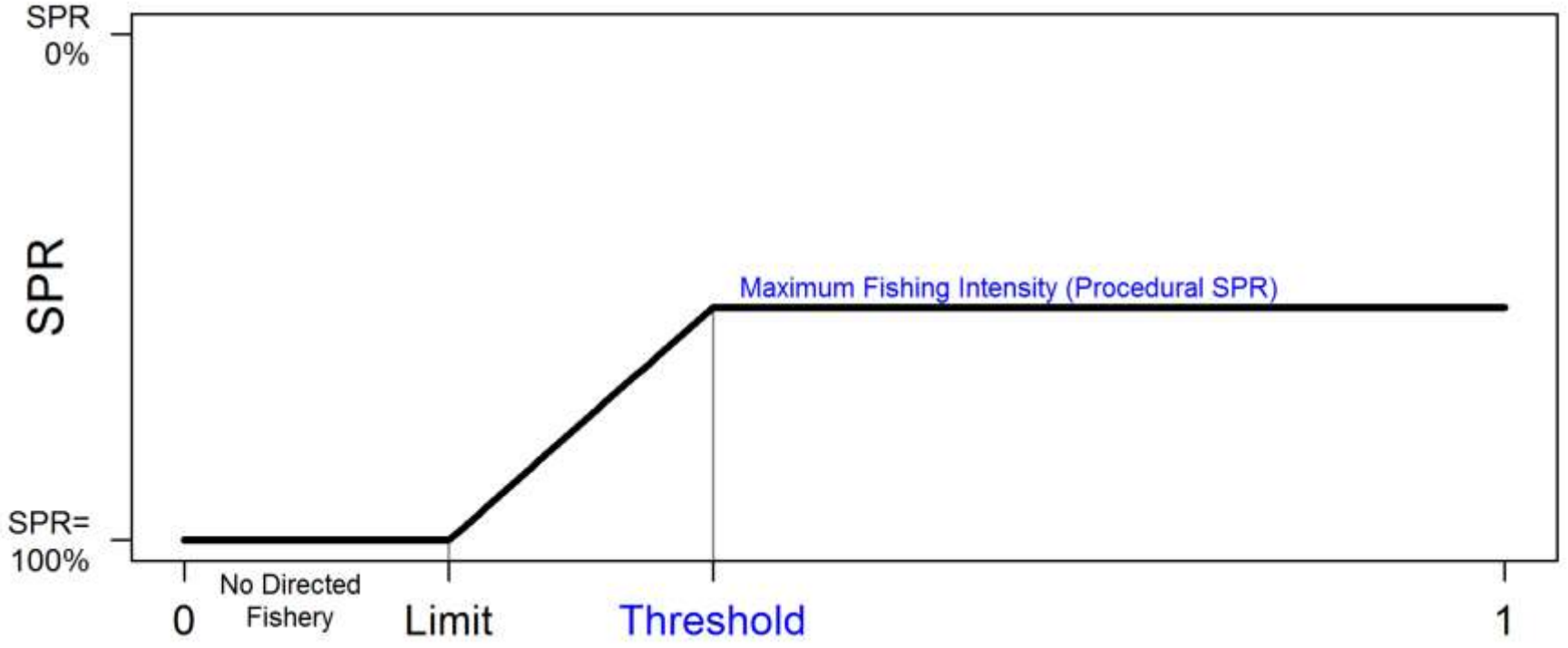
divided by

- A measure of the reduction in spawning potential due to fishing at a constant rate (F_{SPR})
- A long-term, average concept
- SPR=100% means no fishing
- SPR=40% means a 60% reduction in spawning potential

Coastwide Fishing Intensity

Fishing Intensity

- Determined from a harvest control rule



Investigating fishing intensity (scale)

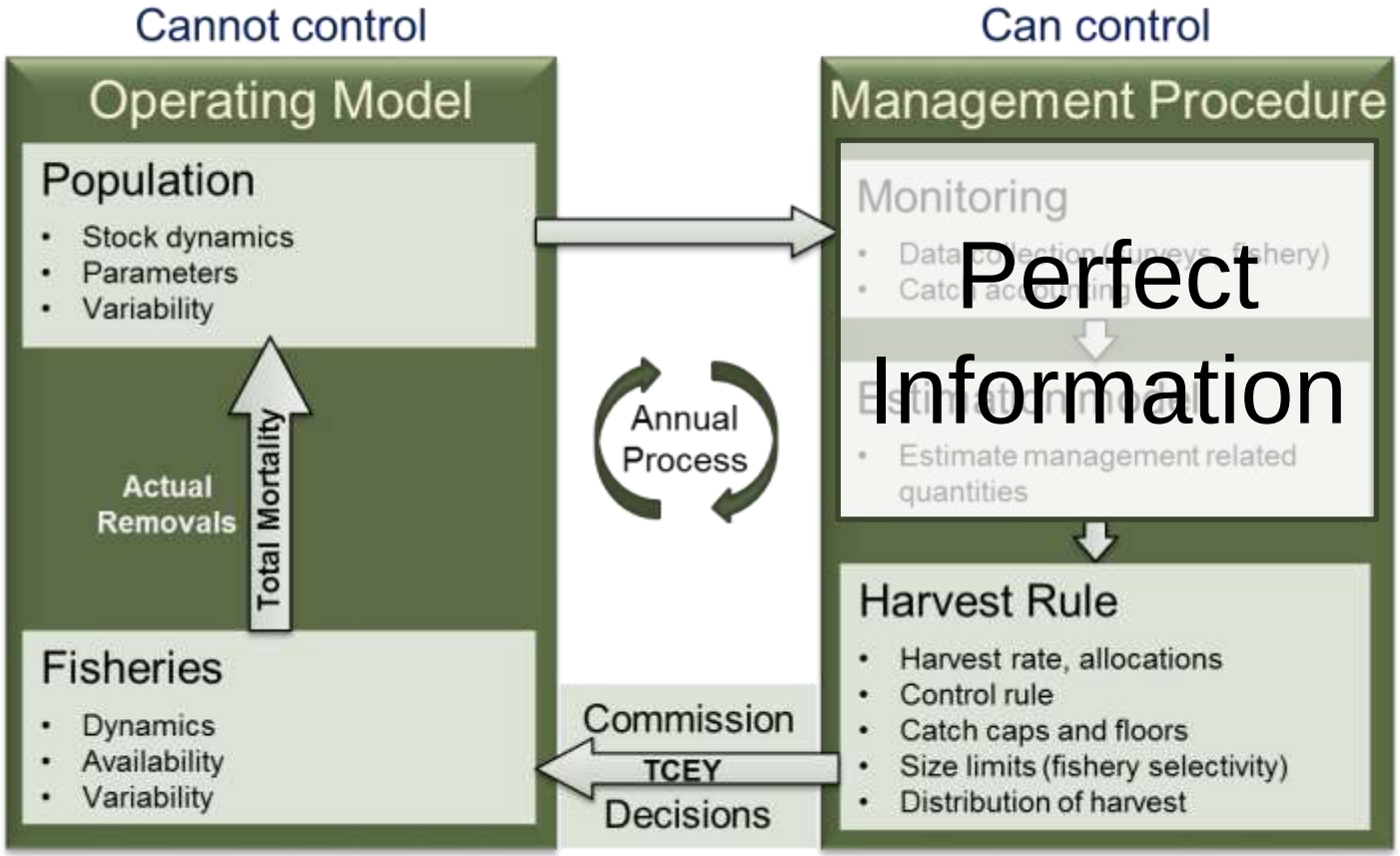
- Procedural SPR
  - ranging from 25% to 60%
- Threshold
  - 30% or 40%

MSAB09 requested more than this, but I will only report the salient results

Simulation framework

Simulation & Evaluation

Alternative scenarios
Performance
Trade-offs
Review

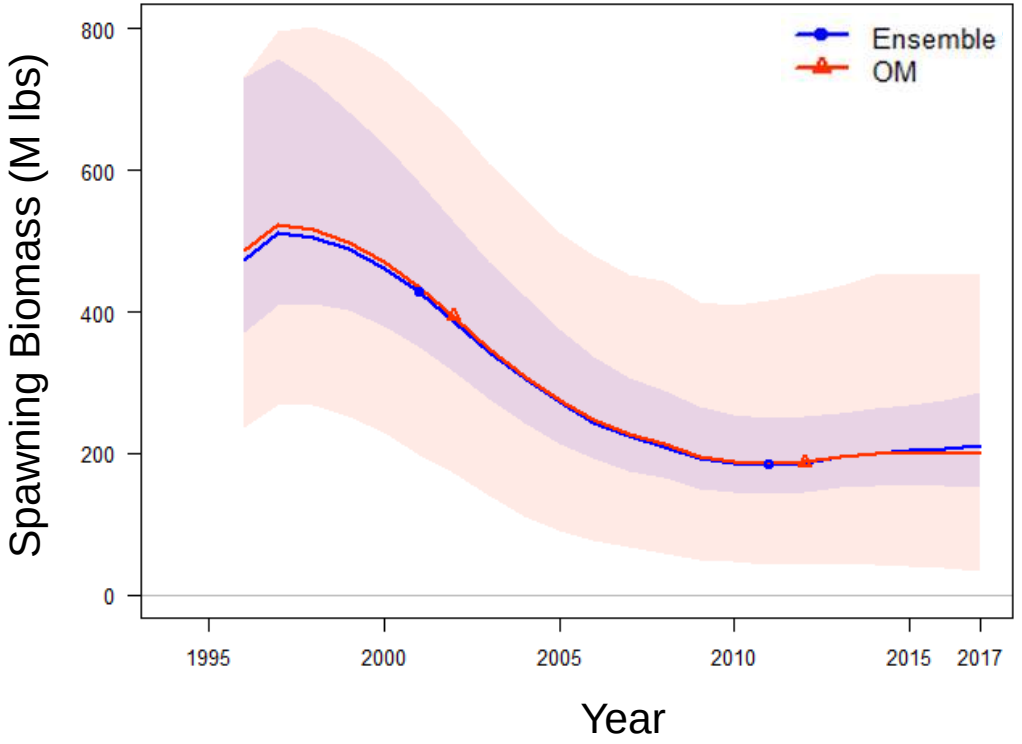


Additional uncertainty

Process	Uncertainty
Natural Mortality (M)	Estimate appropriate uncertainty when conditioning OM
Recruitment	Random, lognormal deviations
Size-at-age	Annual and cohort deviations in size-at-age with bounds
Steepness	Estimate appropriate uncertainty when conditioning OM
Regime Shifts	Autocorrelated indicator based on properties of the PDO for regime shift
TM to sources	See section on allocating TM to sources in IPHC-2017-IM093-10
Proportion of TCEY	Sum of mortality across all sources may not equal coastwide TM

The operating model

- Operating Model
  - Parameter uncertainty
  - Model uncertainty
  - Additional uncertainty



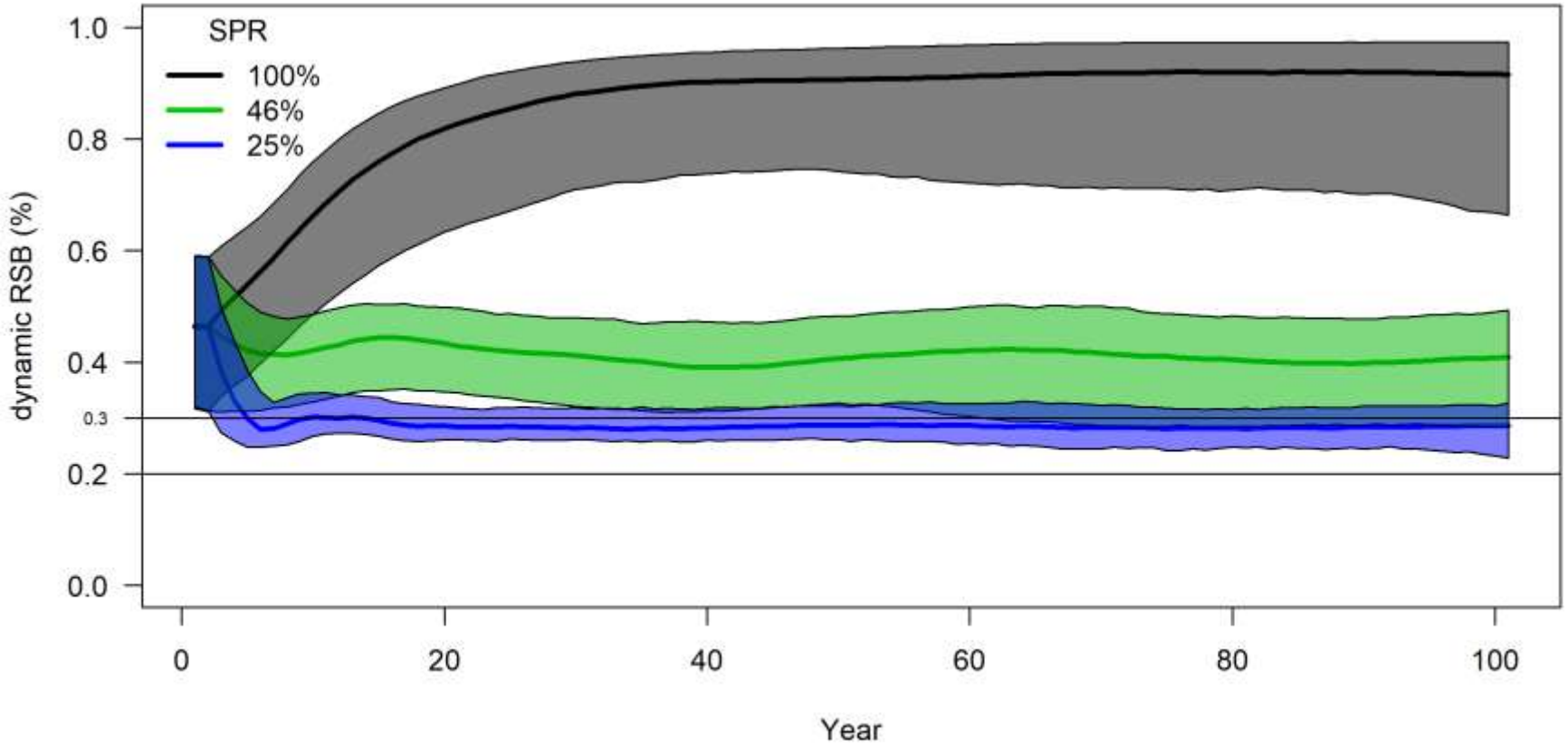
Results: Four Metrics

1. dRSB (*biological sustainability*)
   - dynamic relative spawning biomass
2. Total Mortality (*fishery yield*)
   - Total removals from all sources
3. AAV (*fishery stability*)
   - average annual variability (in total mortality)
4. Relative SPR
   - The actual SPR accounting for adjustments in harvest control rule

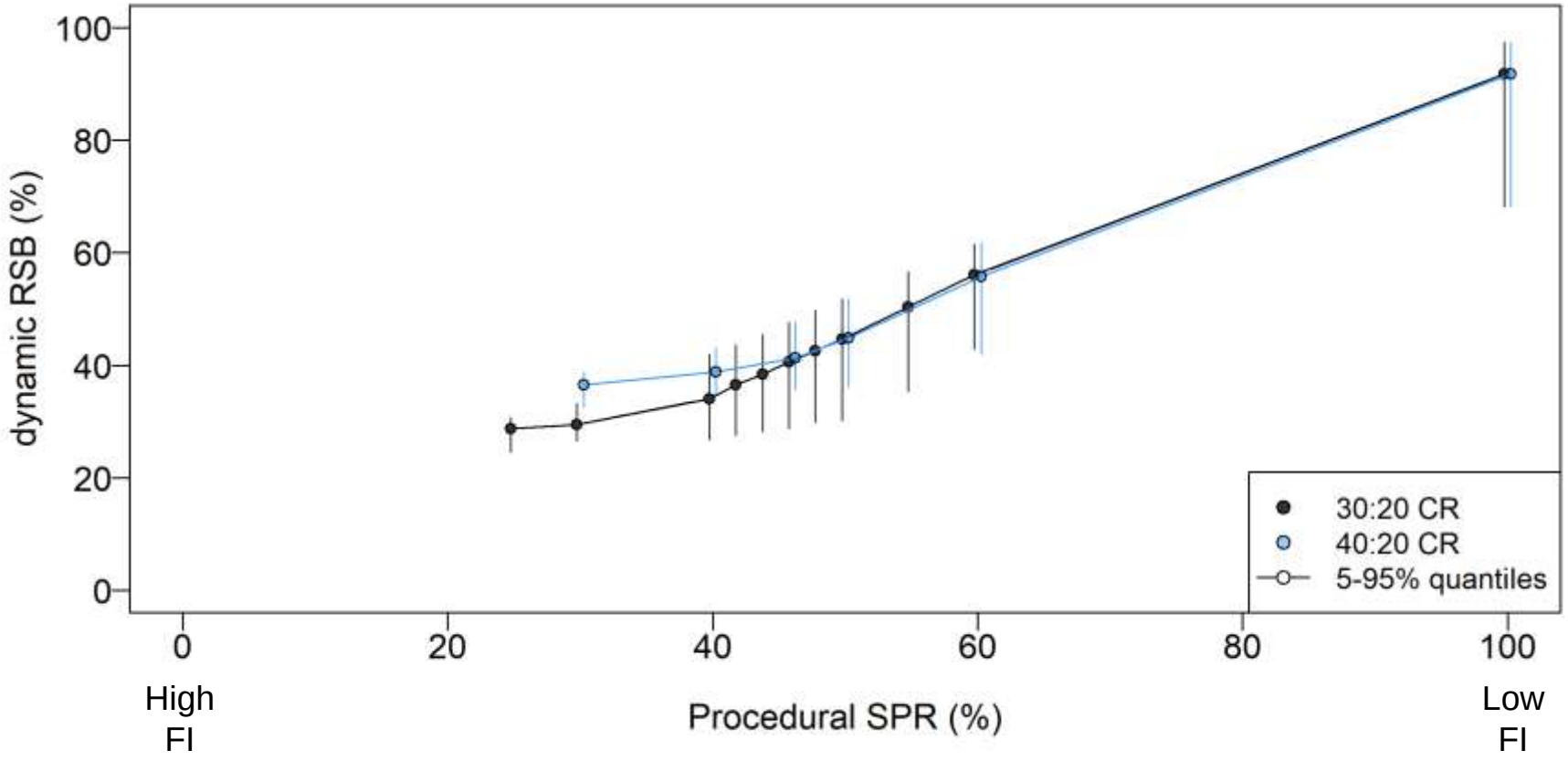
Equilibrium results

- Long-term, equilibrium results
  - Not predicting what may happen in 100 years
  - Instead, evaluating how the Management Procedure may generally behave given the uncertainty
  - A long-term strategy
- The assessment (3 year projections) is useful for short-term tactical decision making

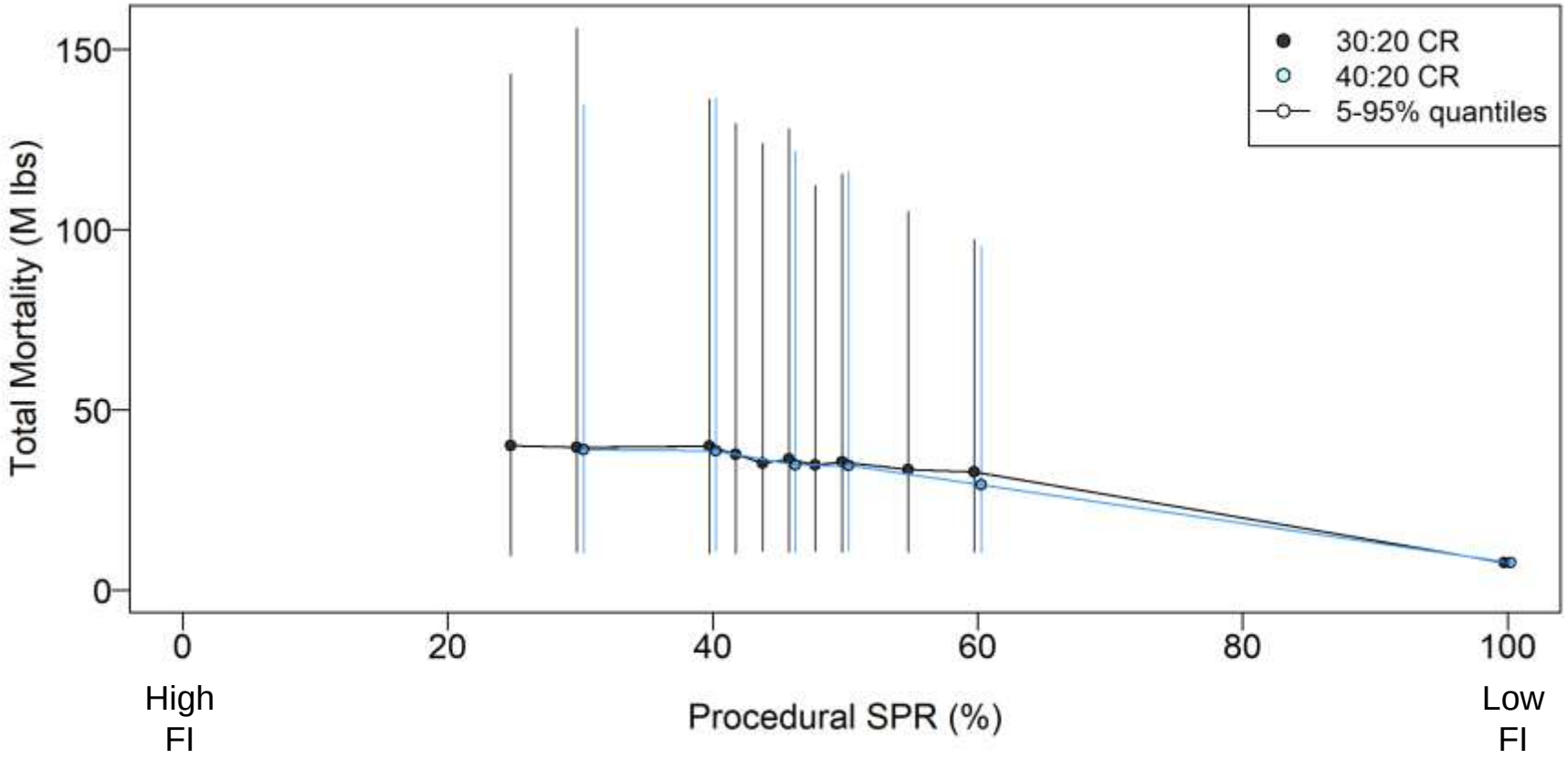
SPR simulations



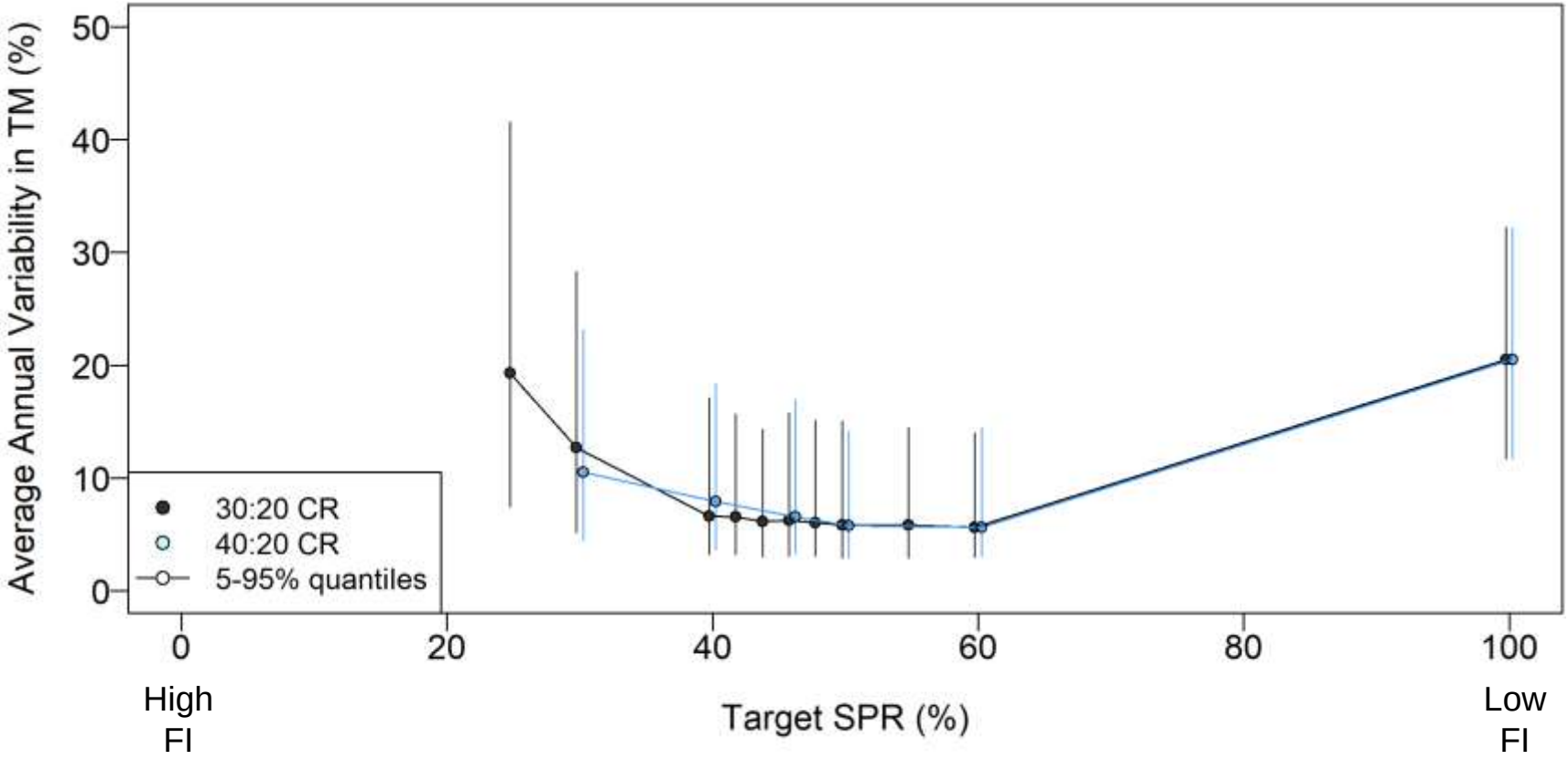
Dynamic relative spawning biomass



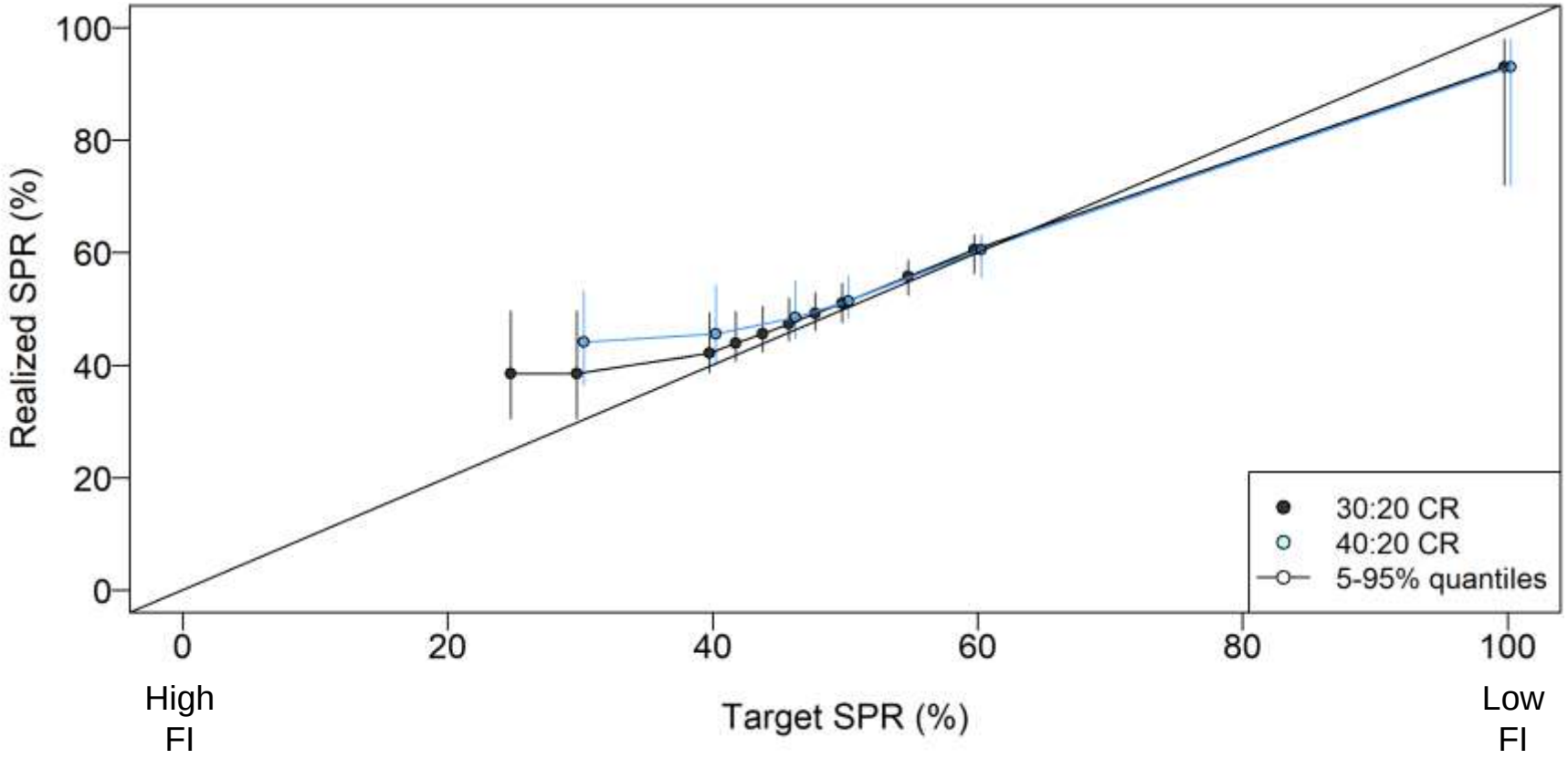
Total Mortality



Average Annual Variability (AAV)



Realized SPR



Summary of results

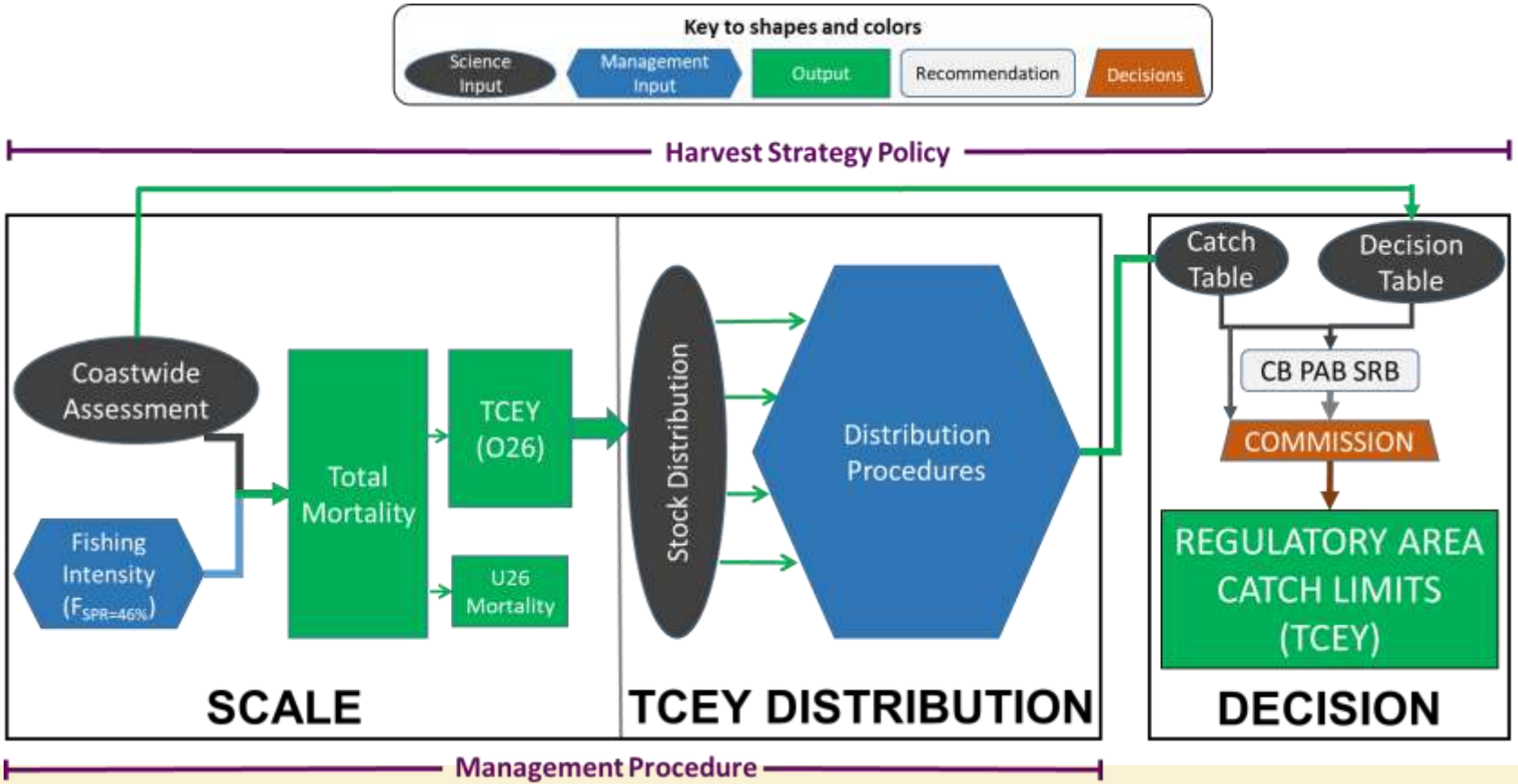
- Stock status declines with SPR, but the reduction in fishing intensity, when below the threshold, lessens the continued decline
  - The 40% threshold lessens the decline sooner
  - Variability in stock status is less at low SPR (higher fishing intensity)
- Total mortality increases with lower SPR
- Variability in total mortality also increases at low SPR
- The ramping down of fishing intensity results in a lower realized SPR than the procedural SPR

Conclusions (for 30% threshold)

- Total Mortality does not increase much at SPR values less than 40%
- AAV shows a large increase at SPR of 30%
- Stock status reductions lessened at SPR less than 40%

- These conclusions are “best case” because using perfect information
  - More comprehensive simulations will be done in 2018

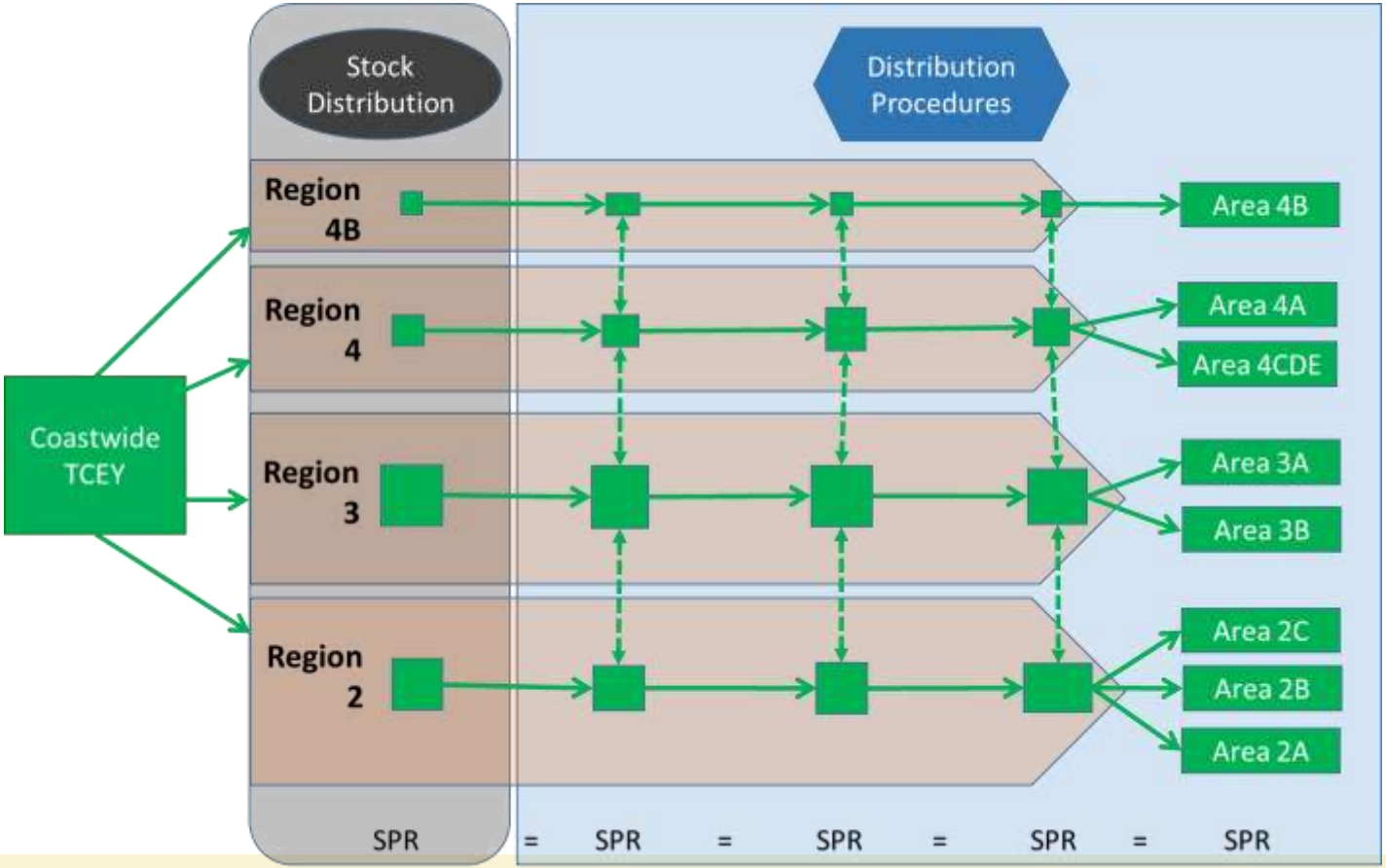
Harvest Strategy Policy



Intentionally
left blank

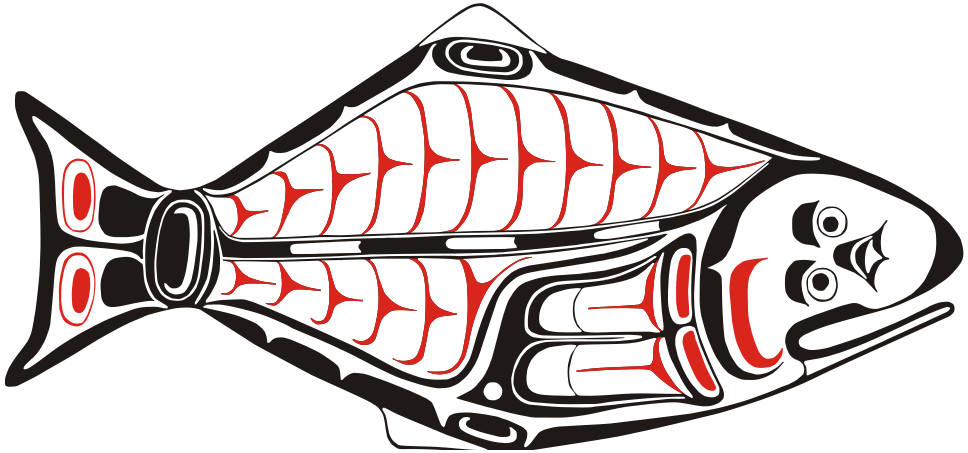
Intentionally left blank

Distributing the TCEY



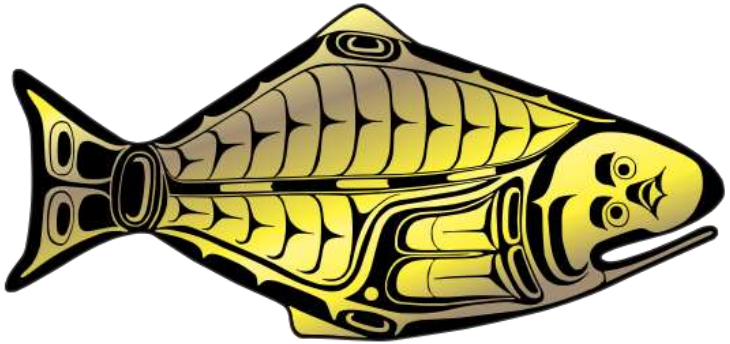
Recommendations

- **NOTE** paper IPHC-2017-IM093-10
- **CONSIDER** the simulation framework and assumptions
- **CONSIDER** the long-term results



Please stand by as we bring up the next presentation

INTERNATIONAL PACIFIC



HALIBUT COMMISSION