Acceptable levels of risk of exceeding Limit Reference Points:

Uncertainty and implications for Target Reference Points and Harvest Control Rules

MOW3/WP-02

SPC-OFP
MOW3 Meeting, Apia, Samoa
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Introduction

Aims

- Introduce the concept of uncertainty in the evaluation of management options;
- Demonstrate the relationship between acceptable risk and uncertainty and potential minimum standards for target reference points;
- Show what this all means for where the stocks are now; and
- Highlight the importance of developing Harvest Control Rules so that we can more fully evaluate the implications of particular levels of risk.
Management Framework

Acceptable levels of risk of exceeding Limit Reference Points:

Introduction

Management Framework
Risk, limits and uncertainty

Approach

Analysis

Discussion

Management Objectives
Social/Economic/Biological/Ecosystem/Political

Limit reference points
(where not to go)

Target reference points
(where you want to be)

Acceptable Risk

Biological constraints

Multispecies considerations

Adaptive Management Cycle

Stock Assessment
(where we think we are)

Performance Indicators
(How are we doing?)

Harvest Control Rule
(defines management action)

Fisheries being managed

Management action
What is risk?
Approach

Basis

- 30 year stochastic projections across a range of models for the four tuna stocks

Methods

1. Undertake projections for several models and combine results taking into account SC10 plausibility weighting
   - Find scalars that gave a 5, 10, 15, and 20 % risk of exceeding the LRP
   - Compile important performance metrics including median depletion level
Acceptable levels of risk of exceeding Limit Reference Points:

**Introduction**

**Management Framework**

**Risk, limits and uncertainty**

**Approach**

**Analysis**

**Discussion**

**Distribution of depletion for different scalars**

### Bigeye tuna risk profiles

- **Risk = 5%**
  - Median = 0.28

- **Risk = 10%**
  - Median = 0.26

- **Risk = 15%**
  - Median = 0.25

- **Risk = 20%**
  - Median = 0.24

**Spawning depletion SB/SBF=0**

### SP-albacore tuna risk profiles

- **Risk = 5%**
  - Median = 0.38

- **Risk = 10%**
  - Median = 0.37

- **Risk = 15%**
  - Median = 0.35

- **Risk = 20%**
  - Median = 0.33

**Spawning depletion SB/SBF=0**
General lessons

- The lower the acceptable risk, the higher and further away from the LRP you need to keep the stock;

- The greater the uncertainty, the higher and further away from the LRP you need to keep the stock; and

- The expected average biomass levels here give some indication of the minimum value of a TRP that could be compatible with the LRP and a given risk level.
Discussion

1. How do we choose a risk level?

2. What might be the consequence of breaching the LRP for the different stocks?

3. Could allowable risk levels vary by species?

4. How does uncertainty impact on our allowable exploitation levels and what does this mean?