



Goals, Objectives, and Performance Metrics for the IPHC Management Strategy Evaluation (MSE)

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PURPOSE

To review the MSAB goals and objectives; add new, remove outdated, or update goals and objectives as necessary. Link goals and objectives with performance metrics.

BACKGROUND

Defining goals and objectives is a necessary part of a management strategy evaluation (MSE) which should be revisited often to make sure that they are inclusive and relevant. The MSAB has developed five goals with multiple objectives for each (Tables A1–A5 in Appendix A). Performance metrics can be developed from the goals and objectives by defining a measurable outcome, a probability (i.e., level of risk), and time-frame over which it is desired to achieve that outcome.

GOALS AND OBJECTIVES

The goals and objectives include

- biological sustainability,
- fishery sustainability, access, and stability,
- minimize wastage,
- minimize bycatch and bycatch mortality, and
- serve consumer needs.

An additional goal, preserve biocomplexity, was considered at MSAB09, but no measurable objectives were associated with it. Measurable objectives may need to be based on abundances in specific areas, which would require a multi-area model.

PERFORMANCE METRICS

IPHC-2017-MSAB09-08 Rev 2 presented thirteen performance metrics associated with the goals and objectives in Appendix A. Table 1 presents a summary of the measurable objectives and associated performance metrics. All of the performance metrics will be easy to calculate, but the performance metrics associated with wastage may have little meaning. This is because wastage is an assumed function of the commercial+wastage mortality and the size at age for an age 8 male halibut. When the commercial+wastage mortality goes up, the wastage also increases, and when age 8 males are small, the wastage increases. A more meaningful calculation of wastage would occur if length-at-age and length-specific discards could be modeled. Unfortunately, that would require a significant amount of work given the variability in growth. The performance metric for wastage will be calculated, but it is unlikely that they will be presented.

Table 1: Measurable objectives and associated performance metrics, as reported in the MSAB09 Report (IPHC-2017-MSAB09-R).

Biological Sustainability				
Measurable Objective	Outcome	Time-frame	Probability	Performance Metrics
Maintain a minimum of number of mature female halibut coast-wide	Number of mature female halibut less than a threshold	10 year period, long-term	0.01	Median average number of mature female halibut
Avoid very low stock sizes	dRSB < Limit of control rule	10 year period, long-term	0.05	$P(dRSB < Limit)$
Mostly avoid low stock sizes	dRSB < Threshold of control rule	10 year period, long-term	0.25	$P(dRSB < Threshold)$
When Limit < Estimated Biomass < Threshold, limit the probability of declines	SSB declines when 20% < RSB < 30%	10 year period, long-term	0.05 – 0.5, depending on est. stock status	$P(SSB_{i+1} < SSB_i)$ given 20% < RSB < 30%
Spawning Biomass	An absolute measure	10 year period, long-term	NA	Median \overline{RSB}
Fishery Sustainability, Stability, and Access				
Measurable Objective	Outcome	Time-frame	Probability	Performance Metrics
Maintain directed fishing opportunity	Fishery is open	Each year	0.05	$P(FCEY = 0)$
Maximize yield in each regulatory area		Each year	0.5	
Maintain median catch	Within $\pm 10\%$ of 1993-2012 average	Within 5 yrs, 10 yr per, long term		$P(FCEY > 110\% \text{ or } FCEY < 90\%)$
Maintain average catch	> 70% of historical 1993-2012 average	10 year period, long-term	0.1	$P(FCEY < 70\%)$
Limit annual changes in TAC, coast-wide and/or by Regulatory Area	Change in FCEY < 15%	10 year period, long-term		$P\left(\frac{FCEY_{i+1} - FCEY_i}{FCEY_i} > 15\%\right)$
Absolute	FCEY	10 year period, long-term	NA	Median \overline{FCEY}
Absolute	Variability in FCEY	10 year period, long term		Average Annual Variability (AAV)

Minimize wastage				
Measurable Objective	Outcome	Time-frame	Probability	Performance Metrics
Wastage in the longline fishery	<10% of annual catch limit	10 year period, Long-term	0.25	$P(\text{wastage} > 10\%FCEY)$
Absolute	Wastage	10 year period, Long-term		Median $\overline{\text{wastage}}$
Minimize bycatch and bycatch mortality				
Measurable Objective	Outcome	Time-frame	Probability	Performance Metrics
Serve consumer needs				
Measurable Objective	Outcome	Time-frame	Probability	Performance Metrics
Preserve biocomplexity				
Measurable Objective	Outcome	Time-frame	Probability	Performance Metrics

REPORTING RESULTS

The thirteen performance metrics described above would be reported in a table as rows with the columns representing different management strategies (Table 6). Additionally, figures will be created as necessary to show specific performance metrics against the management procedures, as well as interesting trade-offs between performance metrics.

RECOMMENDATION/S

That the MSAB:

- 1) **NOTE** paper IPHC-2017-MSAB10-08 which provides a review of the goals and objectives previously defined by the MSAB, and associated performance metrics.
- 2) **CONSIDER** the goals and objectives and suggest additions or deletions. Add objectives for goals that currently do not have objectives (4 & 5). In particular **CONSIDER** the goal of preserving biocomplexity and **RECOMMEND** associated objectives.
- 3) **RECOMMEND** additional performance metrics to report to evaluate future simulations.
- 4) **SUGGEST** ways to report the performance metrics and results from the simulations considered in paper IPHC-2017-MSAB10-09.

ADDITIONAL DOCUMENTATION / REFERENCES

Table 2: An example of how the performance metrics calculated from the simulations may be reported.

Performance Metrics	Management Procedures				
	SPR=35%	SPR=40%	SPR=45%	SPR=50%	SPR=55%
Biological Sustainability					
Median average RSB	XXXX	XXXX	XXXX	XXXX	XXXX
Median average # mature females	XX%	XX%	XX%	XX%	XX%
P(RSB<20%)	XX%	XX%	XX%	XX%	XX%
P(RSB<30%)	XX%	XX%	XX%	XX%	XX%
P(\downarrow SB 20–30%B ₀)	XX%	XX%	XX%	XX%	XX%
Fishery Sustainability					
Median average FCEY	XXXX	XXXX	XXXX	XXXX	XXXX
P(FCEY=0)	XX%	XX%	XX%	XX%	XX%
P(FCEY<>10% average)	XX%	XX%	XX%	XX%	XX%
P(FCEY < 70% average)	XX%	XX%	XX%	XX%	XX%
P(Δ FCEY > 15%)	XX%	XX%	XX%	XX%	XX%
AAV	XXXX	XXXX	XXXX	XXXX	XXXX
Minimize Wastage					
Med average wastage	XXXX	XXXX	XXXX	XXXX	XXXX
P(wastage > 10%)	XX%	XX%	XX%	XX%	XX%



APPENDIX A: GOALS, MEASURABLE OBJECTIVES, AND INTENT

Table A1: Objectives for the biological sustainability goal along with intent and performance metric quantities (measurable outcome, probability, and time-frame). Acknowledgements to Michele Culver (WDFW) for originally putting this table together.

Goal	Objective	Measurable Outcome	Probability	Time-frame	Intent
Biological Sustainability	1.1. Keep biomass above a limit below which no fishing can occur	a) Maintain a minimum number [spawning potential ratio?] of mature female halibut coast-wide	0.99	Each year	<ul style="list-style-type: none"> • Ensure that conservation needs of the stock are met for long-term sustainability with a high degree of certainty • Regularly monitor stock biomass (i.e., continuation and improvement of survey and stock assessment efforts) to detect changes in status and abundance • Define reference points and harvest targets (e.g., MSY) • Take a risk-averse approach when the stock is below the threshold
		b) 2) Maintain a minimum spawning stock biomass of 20% of the unfished biomass	0.95	Each year	
	1.2. Account for all sizes in the population?	c)			
	1.3. Reduce harvest rate when abundance is below a threshold	d) Maintain a minimum spawning stock biomass of 30% of the unfished biomass	0.75	Each year	
	1.4. Risk tolerance and assessment uncertainty	e) When Limit < estimate biomass < Threshold, limit the probability of declines	0.05 – 0.5, depending on est. stock status	10 years	

Table A2: Objectives for the fishery sustainability goal along with intent and performance metric quantities (measurable outcome, probability, and time-frame). Acknowledgements to Michele Culver (WDFW) for originally putting this table together.

Goal	Objective	Measurable Outcome	Probability	Time-frame	Intent
Fishery Sustainability and Stability and Assurance of Access – Minimize Probability of Fishery Closures	2.1. Maintain an economically sufficient level of catch (i.e., target) across regulatory areas	a) Maintain directed fishing opportunity	0.95	Each year	<ul style="list-style-type: none"> • Ensure that the directed fishery has viable fishing opportunities every year • Provide directed fisheries that are economically beneficial to individual participants, local businesses, and broader communities • Support efforts to allow continued access to the halibut resource within acceptable conservation limits
		b) Maximize [Optimize?] yield in each regulatory area	0.5	Each year	
		c) Maintain median catch within $\pm 10\%$ of 1993-2012 average	?	Within 5 yrs	
		d) Maintain average catch at > 70% of historical 1993-2012 average	0.9	Each year	
	2.2. Limit catch variability	e) Limit annual changes in TAC, coast-wide and/or by Regulatory Area, to < 15%		Each year	

Table A3: Objectives for the minimize wastage goal along with intent and performance metric quantities (measurable outcome, probability, and time-frame). Acknowledgements to Michele Culver (WDFW) for originally putting this table together.

Goal	Objective	Measurable Outcome	Probability	Time-frame	Intent
Minimize Wastage	3.1. Harvest efficiency	a) Wastage in the longline fishery < 10% of annual catch limit	0.75	Over 5 years	<ul style="list-style-type: none"> Support fishing practices that reduce wastage Regulatory revisions that promote efficiency

Table A4: Objectives for the minimize bycatch goal along with intent and performance metric quantities (measurable outcome, probability, and time-frame). Acknowledgements to Michele Culver (WDFW) for originally putting this table together.

Goal	Objective	Measurable Outcome	Probability	Time-frame	Intent
Minimize Bycatch and Bycatch Mortality	4.1.	a)		Over 5 years	<ul style="list-style-type: none"> Support fishing practices that reduce bycatch and bycatch mortality

Table A5: Objectives to serve consumer needs goal along with intent and performance metric quantities (measurable outcome, probability, and time-frame). Acknowledgements to Michele Culver (WDFW) for originally putting this table together.

Goal	Objective	Measurable Outcome	Probability	Time-frame	Intent
Serve Consumer Needs	5.1.	a)			<ul style="list-style-type: none"> Strive to avoid or minimize regulatory changes that result in large fluctuations in product availability