Science, Service, Stewardship

Performance Criteria for Assessing Impacts

Lynne Barre

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Overview

- PSRMP Biological Opinion
  - NOAA commitment
  - Metrics/criteria
- Examples

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Puget Sound Resource Management Plan (PSRMP)- Biological Opinion

Conservation Measures:

- NMFS will provide information on existing performance criteria to evaluate impacts of fisheries on salmon and marine mammals to the science panel and seek advice on scientific considerations (e.g., biological significance, measurability, etc.)

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Criteria/Metrics in PSRMP Opinion

Presented at Workshop 1:

- Using Ward 2010 correlation (FRAM), we used the reduction in available prey from fishing to estimate a decrease in SRKW population growth rate, resulting in a reduction in population abundance over time (i.e., 12.1 %-15.4% reduction in prey = 0.2-0.6 fewer whales in 3 years.)
- Prey Ratios: a reduction in the ratio of metabolic needs of the whales (kcal needs of whales)/available metabolic energy from prey (kcal of available Chinook salmon)

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DFO Evaluation- Workshop 1

Ford, J.K.B, Wright, B.M., Ellis, G.M., and Candy, J.R. 2010. Chinook salmon predation by resident killer whales: seasonal and regional selectivity, stock identity of prey, and consumption rates. DFO Canadian Science Advisory Secretariat Research Document 2009/101. iv + 43 p.

- Estimate of consumption by the current resident populations
- Assuming that resident killer whale populations grow at their maximum rate of 2.6% over the next 10 years, an estimate of Chinook needed to support these populations each year by 2018
- Estimate of SRKW requirements in critical habitat July-August
- Significant long-term correlation between resident killer whale mortality rates and coast-wide Chinook salmon abundance (CTC)

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Panel Feedback

Reduction in available prey correlated with population growth rate

- additional clarification needed on whale and salmon data (CTC, FRAM)
- new analyses and presentations for Workshop 2

Prey Ratios

- lacked an objective means for evaluating the ratios or interpreting an effect on SRKW

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Examples of Other Criteria/Metrics

NMFS has used a variety of risk assessment frameworks to evaluate impacts of specific actions on the survival and recovery of protected species:

1) Qualitative evaluations based on ecological relationships

2) Case-specific quantitative analysis of effects of a particular level of mortality on probability of persistence and recovery

3) General quantitative framework with reference limits for human-caused mortality

Note: While some of these examples include management thresholds, we are only asking the panel to consider the scientific aspects of the performance criteria.

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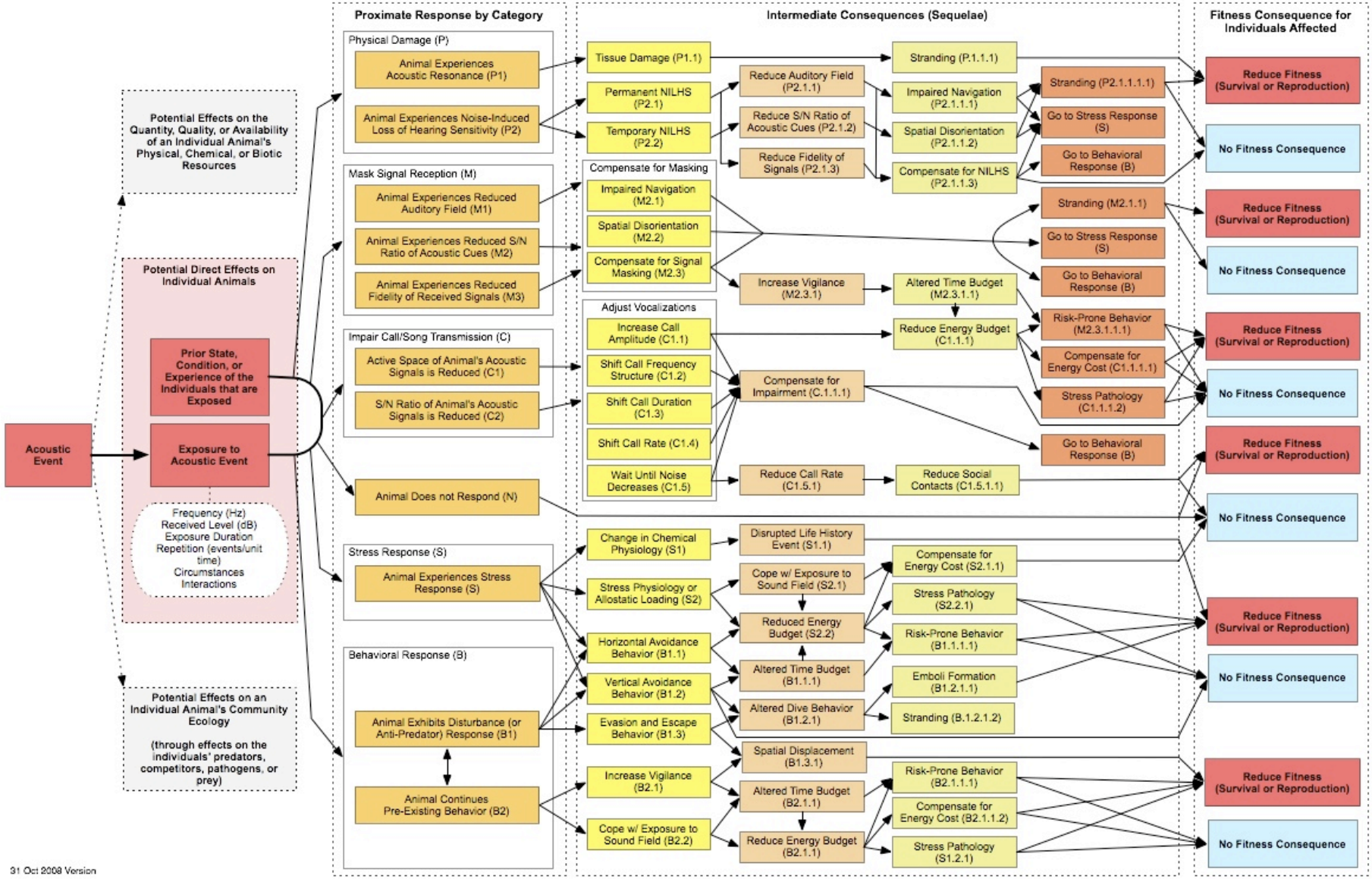
Qualitative Analysis

Marine Mammals and Acoustic Effects

Exposure – Response Assessment Framework

Individual fitness– Population viability – Species status

Qualitative assessment of impacts related to behavioral responses to different sound levels (avoidance, disruption of feeding, changes in behavior budget) considering factors such as likelihood, severity, frequency, duration



Conceptual model of the potential responses of endangered and threatened species upon being exposed to active sonar and the pathways by which those responses might affect the fitness of individual animals that have been exposed.

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Quantitative Analysis: Case-specific

Viable Risk Assessment Procedure (VRAP)

Defines the highest allowable exploitation rates, Rebuilding Exploitation Rate (RER), expected to result in low risk to survival and high probability of recovery of the population in the long term

- Uses 2 biological abundance-related reference points (escapement thresholds) and 2 policy derived risk criteria based on acceptable probabilities of a population following below threshold

NMFS. 2000. RAP- A Risk Assessment Procedure for Evaluating Harvest Mortality on Pacific Salmonids.

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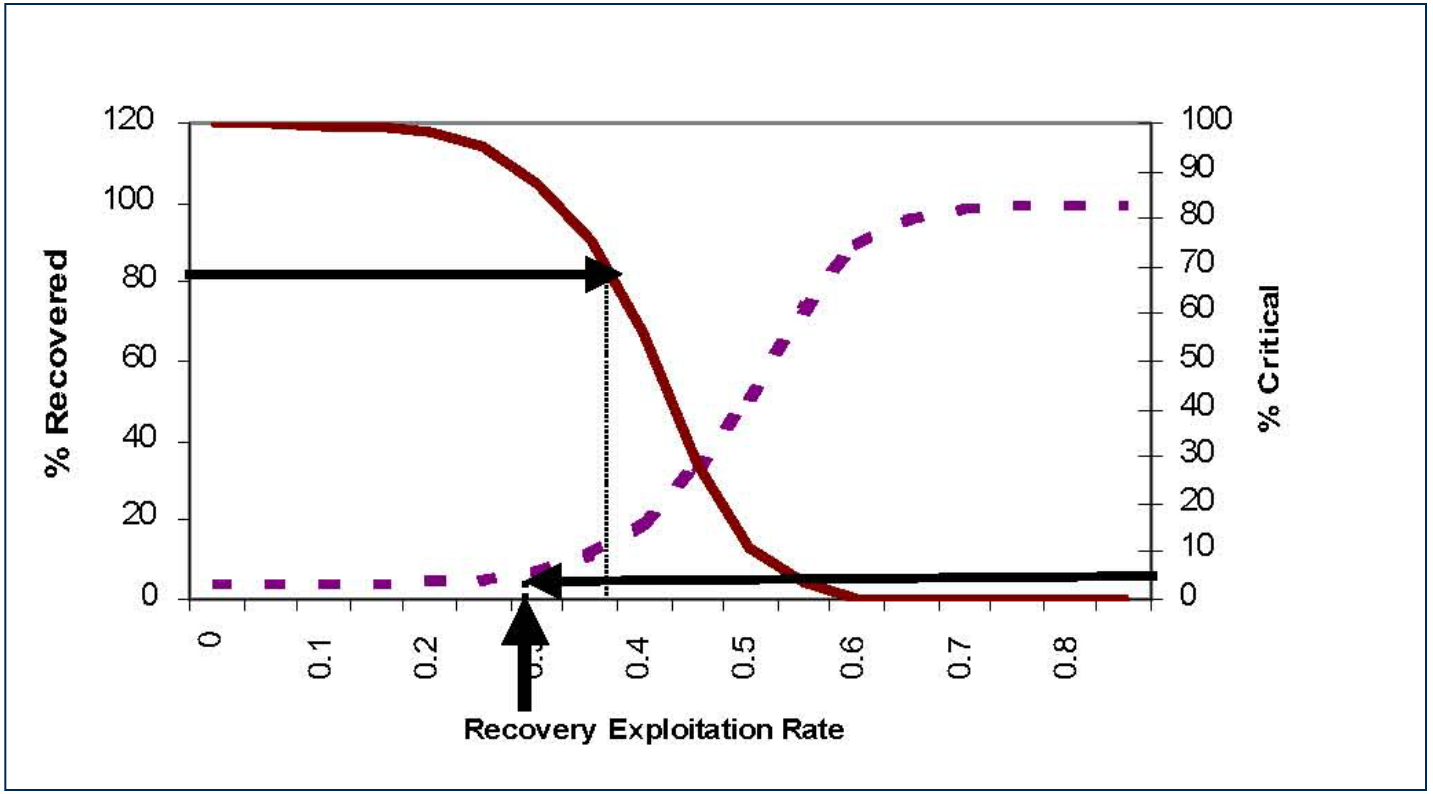
RER Application



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Quantitative Analysis: General

Potential Biological Removal (PBR) is calculated as

Nmin* 0.5 Rmax * F

- the minimum population estimate of the stock (Nmin);
- one-half the maximum theoretical or estimated net productivity rate of the stock at a small population size (0.5Rmax); and
- a recovery factor of between 0.1 and 1.0 (F).

Southern Resident killer whales (from 2010 Stock Assessment Report)

85 whales*(1/2 of 4%)*0.1Endangered= 0.17 whales/year

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PBR Applications

Zero Mortality and Serious Injury Goal

- Annual fishery mortality and serious injury <10% of PBR

Negligible Impact Determinations for fisheries permits

- Total human-caused mortality <10% of PBR- all fisheries permitted
- Total human-caused mortality exceeds PBR, but fishery mortality is <10% PBR- individual fisheries permitted
- Fishery mortality >10% PBR for stable/increasing population- individual fisheries reviewed for permitting
- For declining population, more conservative criterion is warranted
- Fishery mortality >PBR, no fishery permits

List of Fisheries- determines requirements under MMPA

- Category I: fishery mortality and serious injury > or = to 50% of PBR
- Category II: fishery mortality and serious injury > 1% and < 50% of PBR
- Category III: fishery mortality < or = 1% PBR

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Additional Information on PBR

Taylor, B.L., P.R. Wade, D.P. DeMaster, and J. Barlow. 2000. Incorporating Uncertainty into Management Models for Marine Mammals. Conservation Biology 14: 1243-1252.

Lonergan, M. 2011. Potential biological removal and other currently used management rules for marine mammal populations: A comparison. Marine Policy 35: 584-589.

Moore, J.E. and R. Merrick. 2011. Guidelines for Assessing Marine Mammal Stocks: Report of the GAMMS III Workshop, February15-18, 2011, La Jolla, CA. Dept. of Commerce, NOAA Tech Memo NMFS-OPR-47.

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Other Performance Criteria Examples

Pace, R.M., III. In review. Scaling the influence of anthropogenic mortality reduction on recovery prospects of North Atlantic right whales. Submitted to Biological Conservation.

Ford, M., Sands, N., McElhany, P., Kope, R., Simmons, D., and Dygert, P. 2007. Analyses to support a review of an ESA jeopardy consultation on fisheries impacting Lower Columbia River tule Chinook salmon, National Marine Fisheries Service Northwest Fisheries Science Center and Northwest Regional Office, Seattle, WA. October 5, 2007.

NWFSC. 2010. Lower Columbia River Tule Chinook Salmon Life-cycle Modeling.

Supplemental Consultation on Operation of the Federal Columbia River Power System. 2010. http://www.nwr.noaa.gov/Salmon-Hydropower/Columbia-Snake-Basin/final-BOs.cfm

Merrick, R. and H. Haas. 2008. Analysis of Atlantic Sea Scallop (*Placopecten magellanicus*) Fishery Impacts on the North Atlantic Population of Loggerhead Sea Turtles (*Caretta caretta*) NOAA Technical Memorandum NMFS-NE-207.

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Questions for Consideration

- Based on data and uncertainties, what criteria are robust for assessing impacts of fisheries on the whales?
- If the effects of prey reduction on killer whale population dynamics due to a specific action were quantified in a manner similar to the effects of a direct harvest or harvest bycatch action, would using a bycatch-oriented framework such as PBR be a reasonable approach for assessing these effects?
- If the effects of prey reduction on killer whale population dynamics cannot be adequately quantified, are there alternative frameworks for evaluating the risks of a particular level of prey reduction?