Objective Setting

Fisheries decision-making

NATURE ANALYTICS

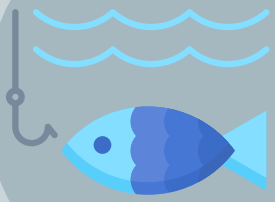
www.natureanalytics.ca

The objective-setting process: Why is it important?

Setting objectives is one of the most important things decision-makers or participants in a decision process can do to improve decision quality.

An objective-setting process consists of defining fishery management objectives and clarifying participants' interests.

Setting fisheries objectives allows participants to present their interests, fostering transparency and helping them identify common ground, mutual benefits, and potential trade-offs.



Clear objectives facilitate dialogue, negotiation, and the likelihood of achieving sustainable fishery management by balancing conflicting interests.

Stakeholder participation is essential for defining clear objectives, and fostering mutual understanding of desired fishery management outcomes.

Goethel et al. 2019

The value-focused thinking framework for setting objectives

- The value-focused thinking (VFT) framework advocates a more fundamental view of values (principles, beliefs, dreams, aspirations) in decision-making processes.
- The VFT framework helps set objectives rooted in stakeholders' values by characterizing what matters for them in a given decision context.

The VFT framework focuses on:

Applying VFT can lead to better decisions because this approach often results in sets of objectives that best represent the desired outputs.

Keeney, 1996; Gregory et al. 2001

Defining values and objectives

- **Effective fisheries management requires a clear set of values and objectives defined in an inclusive stakeholder process to guide decision-making.**
- **Misunderstanding the concepts of values and objectives leads to overly broad objectives lacking substantial justification and clear measurability.**

Values and objectives are components of decision problems.

Values	Objectives
• Values reflect what matters to people regarding the specific decision problem. • Value represent core principles, beliefs, and ideals shaping decision processes. • Values arise from diverse stakeholder perspectives, including ethical, social, cultural, ecological, and economic factors. • Value are typically defined with a low level of specificity. For example: “keep the fish population healthy” and “provide fair, economic benefits for all fishers”. • Values are difficult to use operationally as they are too broad to define specific performance measures.	• Objectives set the vision for the fishery and provide a way to measure management success. • Objectives are something specific we want to achieve, They are clear and provide a framework for assessing management effectiveness and help to guide decision-making processes. • Objectives stem from values, translating broad principles into tangible targets. • Fisheries management involves multiple, often conflicting objectives, such as conservation, catches, jobs, food production, and profitability.

Barber and Taylor 1990; Gregory et al. 2001; Clemen and Reilly 2013; https://harveststrategies.org/

Fundamental and operational objectives

Fundamental objectives:

- Describe the fundamental reasons behind our interests in a management decision. These are high-level objectives that are often too broad to quantify and, therefore, measure (e.g., conserving marine biodiversity, promoting sustainable fisheries).

Operational objectives:

- They are objectives whose achievement influences the extent to which fundamental objectives are met. They represent how fundamental objectives can be translated into measurable, concrete, and actionable goals.

The SMART model: A practical model to define operational objectives

Specific
Clearly defined so that everyone involved in the project shares a common understanding of the objective's terms.

Measurable
Defined in relation to a standard scale (numbers, percentages, etc.)

Achievable
Practical and appropriate within the project context, aligning with legal, social, and economic considerations.

Result - oriented
Represents the necessary changes to achieve the expected outcomes.

Time-limited
It must be achievable within a specific timeframe.

Keeney 2007, 2008; Punt et al. 2017; FAO 2003; Conservation Standards 2020

Classification of operational objectives

Operational objectives can be classified into three categories:

- **Biological or Ecological Objectives**: Aimed at ensuring population sustainability (e.g., conserving spawning biomass).
- **Social Objectives**: Define desired outcomes related to the interaction of people involved in the fishery (e.g., improving working conditions for fishers).
- **Economic Objectives**: Focus on maximizing fishing activities and potential economic benefits (e.g., maximizing annual catch or profits).

Measuring the achievement of operational objectives

Once the operational objectives are classified, stakeholders must determine how to measure their success. To do this, they must agree on:

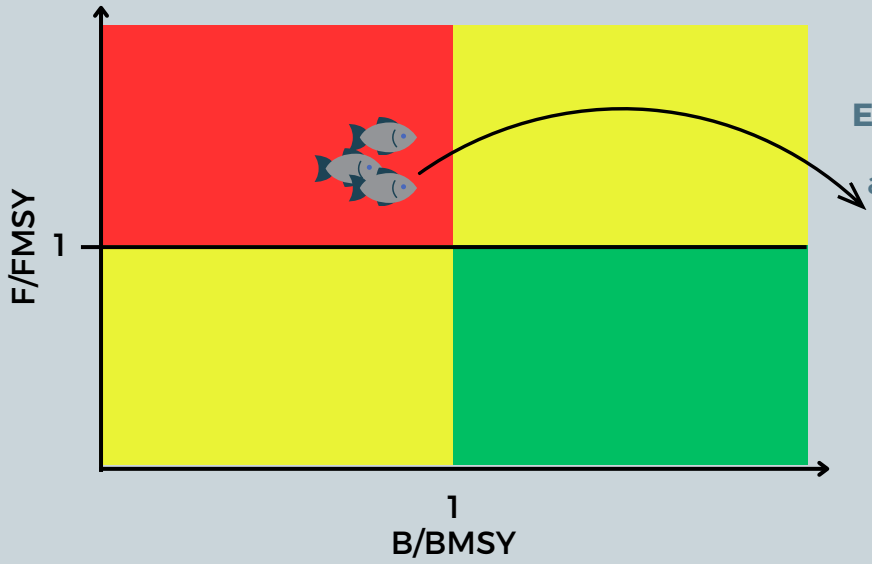
1. The definition of measurement criteria.
2. Reference points or indicator values against which to assess progress.
3. The timeframe for achieving the objectives.
4. Sometimes, specify additional performance metrics to use in decision-frameworks like management strategy evaluation (MSE)

1 The definition of measurement criteria.

- Operational objectives require a measurement criterion. We need to determine **what is being measured**.
- Examples include: catch, fishing mortality, the percentage of mature fish in catches, CPUE, or the percentage of non-target species in the catch.
- We must assess whether the measured values are moving in the right or wrong direction to achieve the defined objectives. To do so, measurement criteria should be linked to reference points or some indicator values.

2 Reference points or indicator values against which to assess progress.

- Used to assess the status of exploited populations in relation to defined management objectives.
- They represent targets, thresholds, and limits within the fisheries system.
- Data-rich fisheries typically have well-defined reference points (RPs) associated with sustainable fishing levels or healthy stock conditions.
- For example, if the measurement criterion is fishing mortality or biomass the RPs could include fishing mortality at MSY (FMSY) or a measurement of the biomass relative to BMSY



Example Operational objective:
Keep biomass (B) above BMSY and fishing mortality (F) below FMSY

Measurement criteria:
B and F

The objective is not achieved because B is below BMSY and F is above FMSY

Mace 1994; Conservation Standards 2020

3 The timeframe for achieving the objectives.

- Short-term objectives: Address immediate needs or minor improvements that can be achieved in a short period. For example, reducing bycatch by X% through modifications to fishing gear.
- Medium-term objectives: Can be achieved within a few years. For example, maintaining fishing mortality (F) at or below FMSY can be accomplished by establishing sustainable catch limits in the coming years.
- Long-term objectives: Aim to introduce significant changes or systemic transformations that will take longer to achieve (several years or decades). Examples could include reaching the target biomass for fish populations.

4 Additional performance metrics.

- Statistics that summarize different aspects of the results of a simulation trial used to assess how well a specific management strategy achieves some or all of the overall management objectives.

Some Common Performance Metrics:

Catch-related

Measured using the average catch achieved during the projection period.

Depletion risk-related

Commonly assessed using the probability of spawning biomass falling below a specified threshold.

Catch stability-related

Typically evaluated using the average annual variation (AAV) in the Total Allowable Catch (TAC) from one year to the next.

Redemeyer et al. 2007

Trading-off versus satisficing among fishery objectives

- Defining and identifying trade-offs among fishery objectives requires recognizing conflicts that arise when balancing different goals.

- Stakeholders should understand that achieving one objective can often benefit or hinder others.

- A common trade-off occurs between short- and long-term objectives, such as maximizing harvest today versus ensuring future yields. Typical conflicts include:

    - Maximizing catches vs. minimizing biomass depletion risk.
    - Increasing average catch vs. reducing interannual variability
    - Maximizing profits vs. increasing employment (higher income for fewer fishers vs. lower income for many).

No single management action can fulfill all objectives, especially when they conflict. Instead, a range of management actions will perform "relatively well" to achieve management objectives.

Trading-off versus satisficing

- **Trading-off** recognizes that any minimum performance thresholds will always be somewhat arbitrary, as it will depend on the desired objectives of each fishery participant. Therefore, decision-makers should try to find strategies that achieve the best balance among multiple objectives.

- **Satisficing** involves identifying management actions that meet stated minimum performance (e.g., risk tolerance) for each fishery participant's objectives with the understanding that no stakeholder group's objectives will be perfectly satisfied.

Walters and Martell 2004; Miller and Shelton 2010; Punt et al. 2017; Goethel et al. 2019

Examples of Fisheries Management Objectives and Their Components

	Fundamental Objectives	Operational Objectives	Measured Criterion	Reference Point (RP) or Indicator	Time Period	Perf. Metrics
Biological	Ensure the reproductive health of the stock	Maintain SB above the limit RP at least 95% of the time	SB levels	SB > SBlim	Long term	P (SB < SBlim)
Social	Maintain employment opportunities in fishing communities	Minimize the probability of employment falling below X%	Employment rate	Employment rate > X%	Short term	P (employment rate < X%)
Economic	Promote stability in catches year to year	Limit interannual variability in catches	Annual catch variability (AAV)	AAV < 15%	Med term	P (AAV > 15%)

REFERENCES

Barber, W.E., and Taylor, J.N. 1990. The Importance of Goals, Objectives, and Values in the Fisheries Management Process and Organization: A Review. North American Journal of Fisheries Management 10(4): 365–373. doi:10.1577/1548-8675(1990)010<0365:tiogoa>2.3.co;2.

Clemen, R.T. and Reilly, T., 2013. Making hard decisions with Decision Tools. Cengage Learning.

Conservation Standards (CS) 2020. Conservation Action Classification v4.0. In the Open Standards for the Practice of Conservation. (Available at http://conservationstandards.org/wp-content/uploads/sites/3/2020/12/CMP-Open-Standards-for-the-Practice-of-Conservation-v4.0-English.pdf /)

Edwards, W., Miles, R.F. and Von Winterfeldt, D., 2007. Advances in decision analysis. Cambridge, New York.

FAO Fisheries Department 2003. The ecosystem approach to fisheries. FAO Technical Guidelines for Responsible Fisheries. No. 4, Suppl. 2. Rome, FAO. 2003. 112 p. https://www.fao.org/3/Y4470E/y4470e09.htm

FAO Fisheries Department 2009. Enhancing stakeholder participation in nfps – tools for practitioners. Rome, FAO. https://www.fao.org/forestry/18937-0cec011072752e3e58b9e536253590330.pdf

FAO Fisheries Department 2023. Stakeholder Analysis. Text by Adapted by EAF Toolbox Team based on FAO (2009). Fisheries and Aquaculture Division [online]. Rome. [Cited Monday, August 28th 2023]. https://www.fao.org/fishery/en/eaftool/eaf_tool_16/en

Françozo, R.V., and Belderrain, M.C.N. 2022. A problem structuring method framework for value-focused thinking. EURO Journal on Decision Processes 10: 100014. doi:10.1016/j.ejdp.2022.100014.

Goethel, D. R., Lucey, S. M., Berger, A. M., Gaichas, S. K., Karp, M. A., Lynch, P. D., ... & Wilberg, M. J. 2019. Closing the feedback loop: on stakeholder participation in management strategy evaluation. Canadian Journal of Fisheries and Aquatic Sciences, 76(10), 1895-1913.

Graham, J., Charles, A., and Bull, A. 2006. Community fisheries management handbook. Gorsebrook Research Institute, Saint Mary's University, Halifax, N.S.

Gregory, R., Arvai, J., and McDaniels, T. 2001. Value-focused thinking for environmental risk consultations. In Research in Social Problems and Public Policy. Emerald (MCB UP), Bingley. pp. 249–273. doi:10.1016/S0196-1152(01)80031-4.

Gregory, R., Failing, L., Harstone, M., Long, G., McDaniels, T., & Ohlson, D. 2012. Structured decision making: a practical guide to environmental management choices. John Wiley & Sons.

REFERENCES

Gregory, R., Failing, L., Harstone, M., Long, G., McDaniels, T., & Ohlson, D. 2012. Structured decision making: a practical guide to environmental management choices. John Wiley & Sons.

Keeney, R.L. 1996. Value-focused thinking: Identifying decision opportunities and creating alternatives. European Journal of Operational Research 92(3): 537–549. doi:10.1016/0377-2217(96)00004-5.

Keeney, R.L. 2007. Developing Objectives and Attributes. In Advances in Decision Analysis, 1st edition. Edited by W. Edwards, R.F. Miles Jr., and D. Von Winterfeldt. Cambridge University Press. pp. 104–128. doi:10.1017/CBO9780511611308.008.

Keeney, R.L. 2008. Applying Value-Focused Thinking. military oper res 13(2): 7–17. doi:10.5711/morj.13.2.7.

Mace, P. M. 1994. Relationships between common biological reference points used as thresholds and targets of fisheries management strategies. Canadian journal of Fisheries and aquatic Sciences, 51(1), 110-122.

Miller, D.C.M., and Shelton, P.A. 2010. “Satisficing” and trade-offs: evaluating rebuilding strategies for Greenland halibut off the east coast of Canada. ICES Journal of Marine Science 67(9): 1896–1902. doi:10.1093/icesjms/fsq083.

Rademeyer, R. A., Plagányi, É. E., & Butterworth, D. S. 2007. Tips and tricks in designing management procedures. ICES Journal of Marine Science, 64(4), 618-625.
Walters, C.J. and Martell, S.J., 2004. Fisheries ecology and management. Princeton University Press.