

Structured Decision Making

Structured Decision Making

- Carefully organized analysis of problems
- Based in decision theory and risk analysis
- Set of concepts and steps rather than a rigidly-prescribed approach
- Integrates science and policy
- Meaningful stakeholder involvement

Steps

1. Clarify the Decision Context
2. Define Objectives and Evaluation Criteria
3. Develop Alternatives
4. Estimate Consequences
5. Tradeoffs and Optimization
6. Implement and Monitor



1. Decision Context

- Define the question or problem
- Identify who needs to be involved
- Clarify roles and responsibilities
- Identify and examine constraints
- Conduct scoping session with key stakeholders

2. Objectives & Evaluation Criteria

- Establish the framework for evaluating alternatives
- Focus decision makers on what matters
- Provide a basis for consistently and transparently comparing alternatives
- Focus and streamline data collection and modeling

2a. Identifying Objectives

- Brainstorm the things that matter
- State the objectives simply:
 - The thing that matters
 - Direction you'd like to move
- Separate them into means (how) and ends (what)
- Create an objectives hierarchy

2b. Objectives Hierarchy Example

Manage resources to
promote ecological and
native species integrity

Contribute to
humpback
chub (HBC)
recovery

Minimize
impact of
invasive
species
introduction

Minimize
impact of
disease
introduction

Maintain
native fish
management
goals
through
reduction of
non-native
species

Example drawn from a 2011 USGS report detailing a structured decision making project near Grand Canyon National Park.

2c. Evaluation Criteria

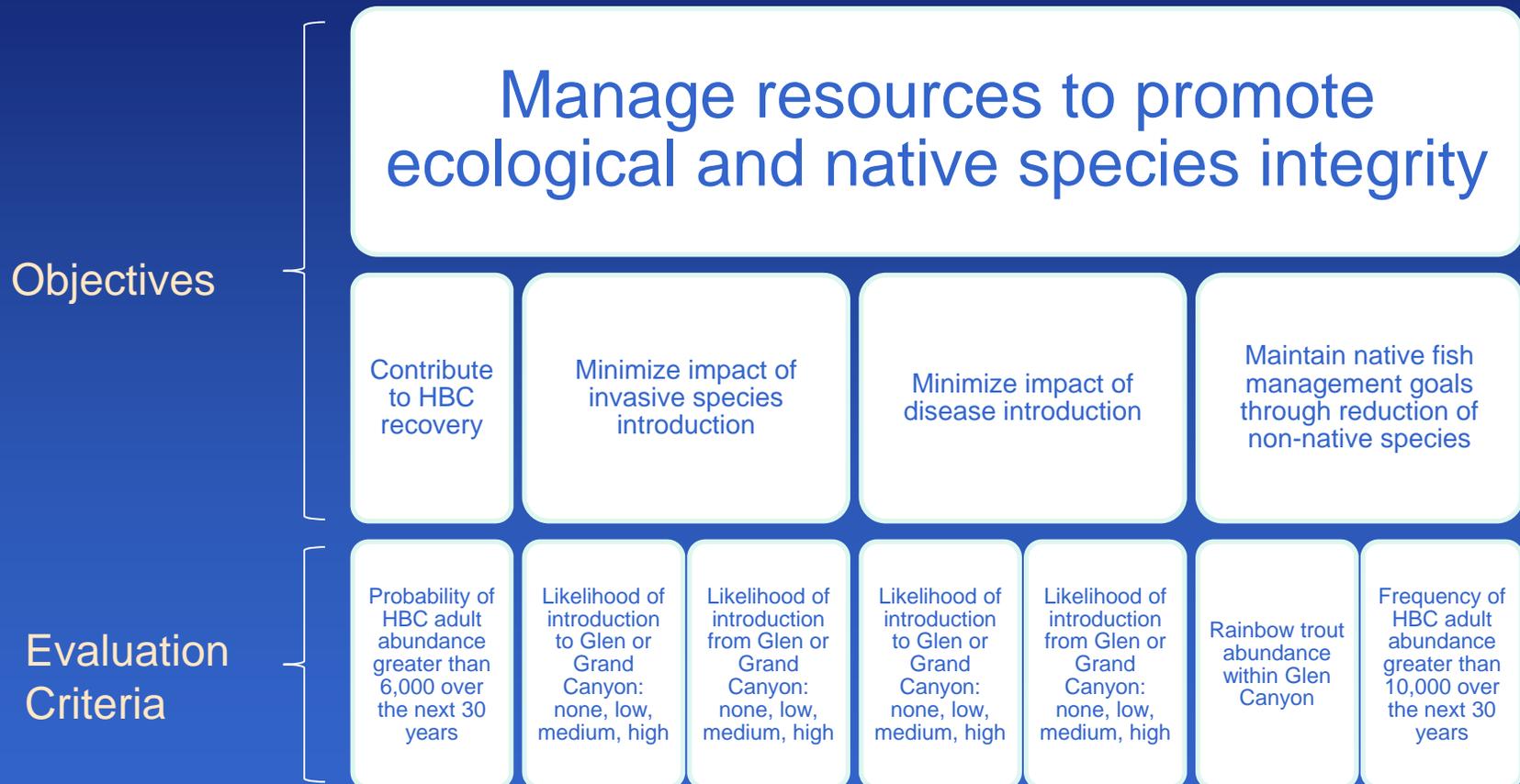
- Characterize the degree to which different alternatives are expected to meet objectives
- Compare alternatives accurately and consistently
- Expose trade-offs
- Prioritize information needs
- Communicate rationale and improve transparency of decisions

2d. Evaluation Criteria

- Accurate and unambiguous (clear relationship between criteria and consequences)
- Comprehensive but concise
- Direct and ends-oriented
- Measurable and consistently applied
- Understandable
- Practical
- Explicit about uncertainty

2e. Evaluation Criteria

Example



3. Develop Alternatives

- Value-focused (address the things that matter)
- Technically sound
- Clearly and consistently defined
- Small in number and high in quality
- Comprehensive and mutually exclusive
- Able to expose fundamental tradeoffs
- Developed collaboratively

4. Estimate Consequences

- Estimate the consequences of the alternatives with respect to the evaluation criteria using available knowledge and predictive tools
- Conduct analyses, not value judgments
- Utilize consequence tables
- Recognize and incorporate uncertainty
 - Understand the relevance and significance of the uncertainty
 - Report level of agreement/disagreement among experts

4a. Consequence Table Example

Objectives	<u>HBC Recovery</u>	<u>Invasive species import</u>	<u>Invasive species export</u>	<u>Disease import</u>	<u>Disease export</u>	<u>Non-native Fish abundance</u>	<u>Native fish goals</u>
Evaluation Criteria	Probability (HBC > 6,000 for 30 yrs)	Risk	Risk	Risk	Risk	Rainbow Trout	Frequency (HBC > 10,000)
	Maximize	Minimize	Minimize	Minimize	Minimize	Minimize	Maximize
No Action	.232	None	None	None	None	6,486	.19
Status Quo	.346	Low	Low	Low	Low	4,673	.25
LCR removal	.341	Low	Low	Low	Low	4,673	.26
Sediment curtain	.557	Low	Low	Low	Low	333	.43
Stranding flow	.228	None	None	None	None	5,302	.17

5. Tradeoffs & Optimization

- Selection and optimization of an alternative involves value-based choices
- Areas of disagreement should be documented and presented to decision-makers
- Differences between views of technical specialists and non-technical stakeholders should be highlighted
- Can utilize structured preference assessment methods such as multi-criteria decision making tools

6. Implement and Monitor

- Implementation relies on an adaptive approach
- Can include passive monitoring and/or active experimentation
- New information may be related to changing conditions, technologies, or values
- Continue to build relationships, develop analytical tools, and reduce uncertainties

For More Information

www.structureddecisionmaking.org

USGS Report:

Runge, M.C., Bean, Ellen, Smith, D.R., and Kokos, Sonja. (2011). *Non-Native Fish Control below Glen Canyon Dam: Report from a Structured Decision-Making Project*. U.S. Geological Survey Open-File Report 2011-1012, 74 p., at <http://pubs.usgs.gov/of/2011/1012/>.