

Atlantic Salmon Team



2 Tiered Problem

- Why we came
 - To explore the value of SDM in the context of the recovery of Atlantic salmon
- However... we quickly realized objectives are key to an overarching strategy
- And could be one of the reasons why we struggle to make decisions

Decision Problem

Choose a management strategy and a set of (or portfolio) actions to maximize the probability of recovery within the budget and logistical constraints we face.

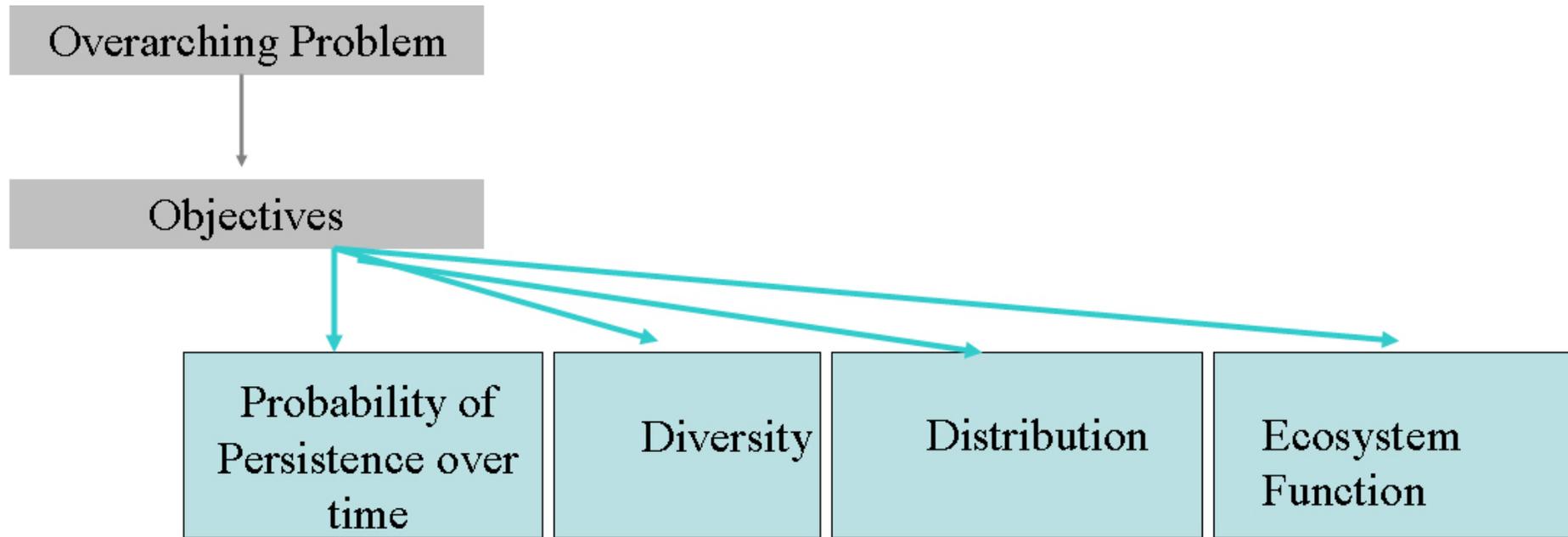
Who Decides? The management board

How often? Five year cycle with annual review

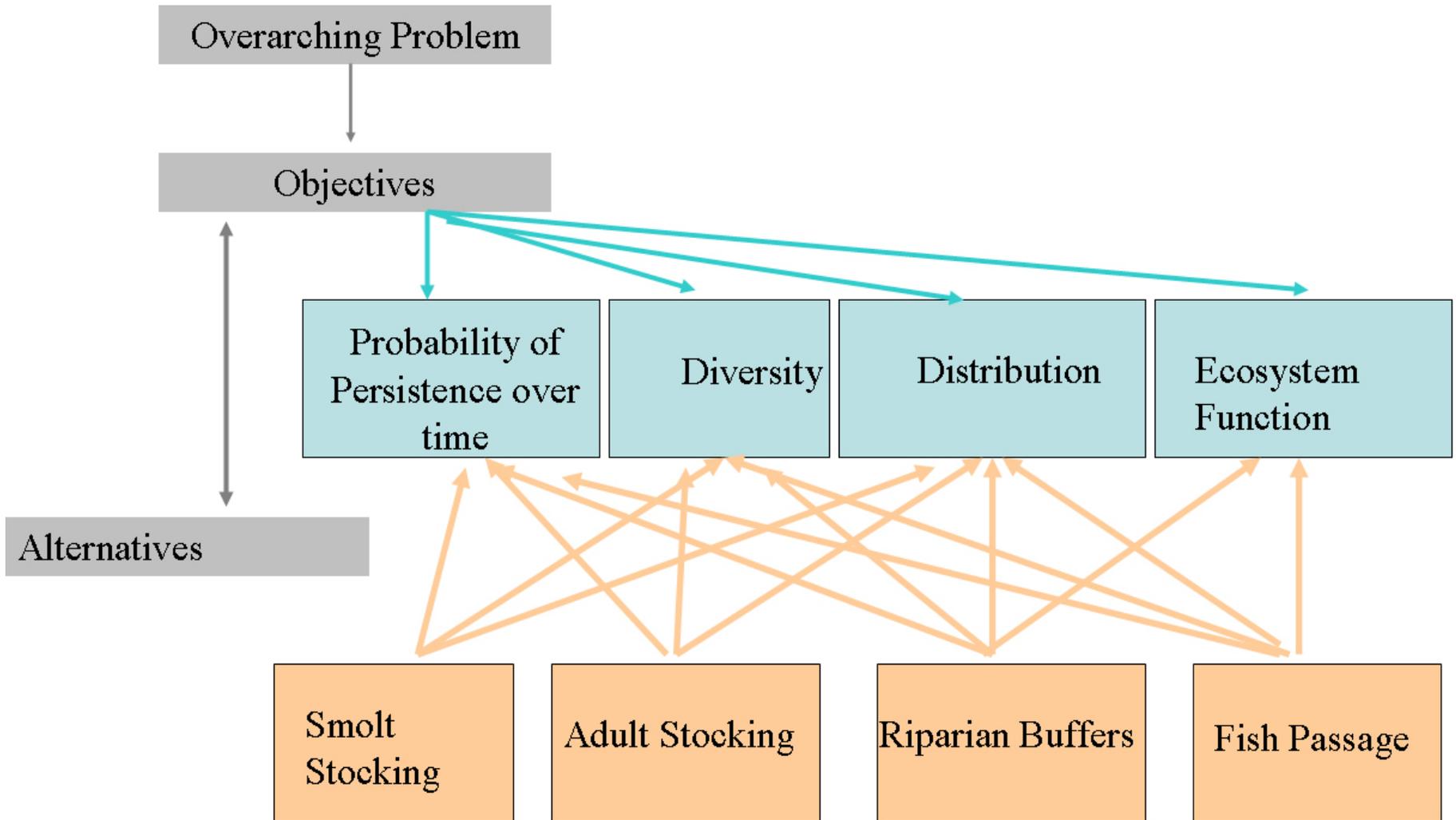
Multiple Objectives

- Maximize the likelihood of a greater than or equal to 95 % probability of persistence of the DPS in the wild over 100 years
- Maximize the probability of maintaining genetic diversity
- Maximize the probability of maintaining populations in all of the currently occupied rivers (distribution)
- Restoration of ecosystem function

Influence Diagram - Objectives



Influence Diagram - Alternatives



Model/Consequences

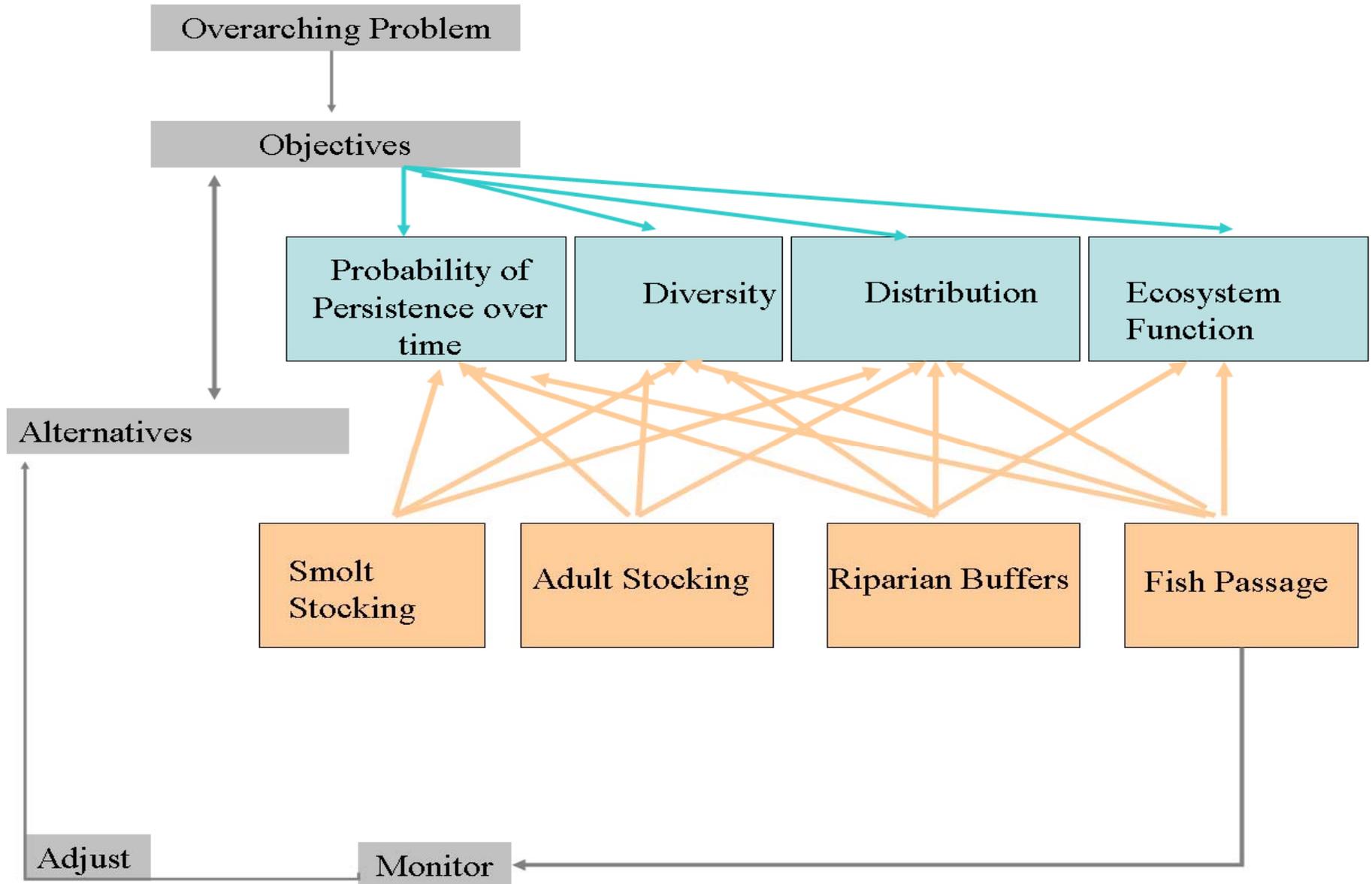
- Expert Opinion
- PVA

SMART

(Simple Multi Attribute Ranking Technique)

Consequences Matrix	100 years				
	Objectives				
Action	P(persist)	Heterozygosity	Distribution	Ecosystem Function	Cost
<i>Measure</i>	<i>%probability</i>	<i>Ave</i>	<i>probability</i>		<i>\$</i>
Passage Lower Penobscot Dam	30	0.35	0.8	10	5M
Riparian Buffers - 3 rivers w/passage	15	0.4	0.8	30	5M
Adult Stocking - Narraguagus River	5	0.3	0.9	0	5M
Smolt Stocking - Sandy River	15	0.3	1	0	5M
Weight	0.7	0.1	0.1	0.1	Value
Passage Lower Penobscot Dam	1	0.5	0	0.333333333	0.7833333
Riparian Buffers - 3 rivers w/passage	0.4	1	0	1	0.48
Adult Stocking - Narraguagus River	0	0	0.5	0	0.05
Smolt Stocking - Sandy River	0.4	0	1	0	0.38

Select Alternative



Analysis and Insights: Finding the Solution

- Start at the strategic level (objectives) rather than the tactical level (actions) -- if you don't, you'll have to circle back.
- Explore how the parts of the decision link together – make sure there are no missing links.
- Explore alternatives through consequence matrices and SMART ranking systems.
- Use sensitivity analysis for both action consequences and objective weights.
- Recognize when the analysis has gone far enough and make a choice.

Analysis and Insights: Insights About the Decision

The Decision: Fund the fish passage project.

- Being specific about the action descriptions helped us analyze the alternatives and reach the decision more easily.
- Doing sensitivity analysis gave us more confidence in the decision.
- By linking the decision to the objectives, its value to the overall goal became clearer.
- Our decision is one of many linked decisions.

Analysis and Insights: General Thoughts

- Objectives drive decisions ...and all actions relate back to objectives.
- All objectives should be identified.
- Identifying fundamental objectives is difficult.
- There's a real difference between fundamental & means objectives ...but some objectives can be both.
- Weighting objectives can have a big impact on decisions.
- Reflecting on action ranks can lead to refinement of objectives.
- Reality checks help clarify objectives.
- Specificity helps illuminate objectives.

Analysis and Insights: General Thoughts

- We didn't need to know true values to demonstrate that a factor is influential.
- The consequences matrix provides a way to compare dissimilar actions.
- It's possible to explore uncertainty when all factors are in a common currency.
- Research should focus on uncertainties that relate to important management objectives and actions, not just on anything we don't know.
- SDM can be as prescriptive or as flexible as you want it to be.

Uncertainty and Its Effects

We dealt with uncertainty about action consequences with:

- Reality checks
- Sensitivity analysis

We recognized that our numbers represent a range.

Identifying uncertainty did not prevent us from making a decision we could all agree with.

Next Steps

Goal: Adopt an SDM process for interagency work on ATS recovery.

Premise: We all acknowledge that “Difficult Decisions Need to Be Made.”

Steps:

- Prepare a memo to management and technical team
 - Insights and why we seem to be struggling
 - SDM is integral to adaptive management
 - Etc.

Next Steps

- Brief managers of each agency about:
 - what SDM is
 - what we did at the Rapid Prototyping workshop
 - the strengths and weaknesses of process compared to alternatives
- Brief NOAA.
- July 24-25 meeting: Propose an agenda that allows us to go forward in an appropriate way. Link to objectives and adaptive management.
- Fall – workshop with outside expertise.