Developing an Evaluation Tool

Steller Sea Lion Mitigation Committee
Seattle

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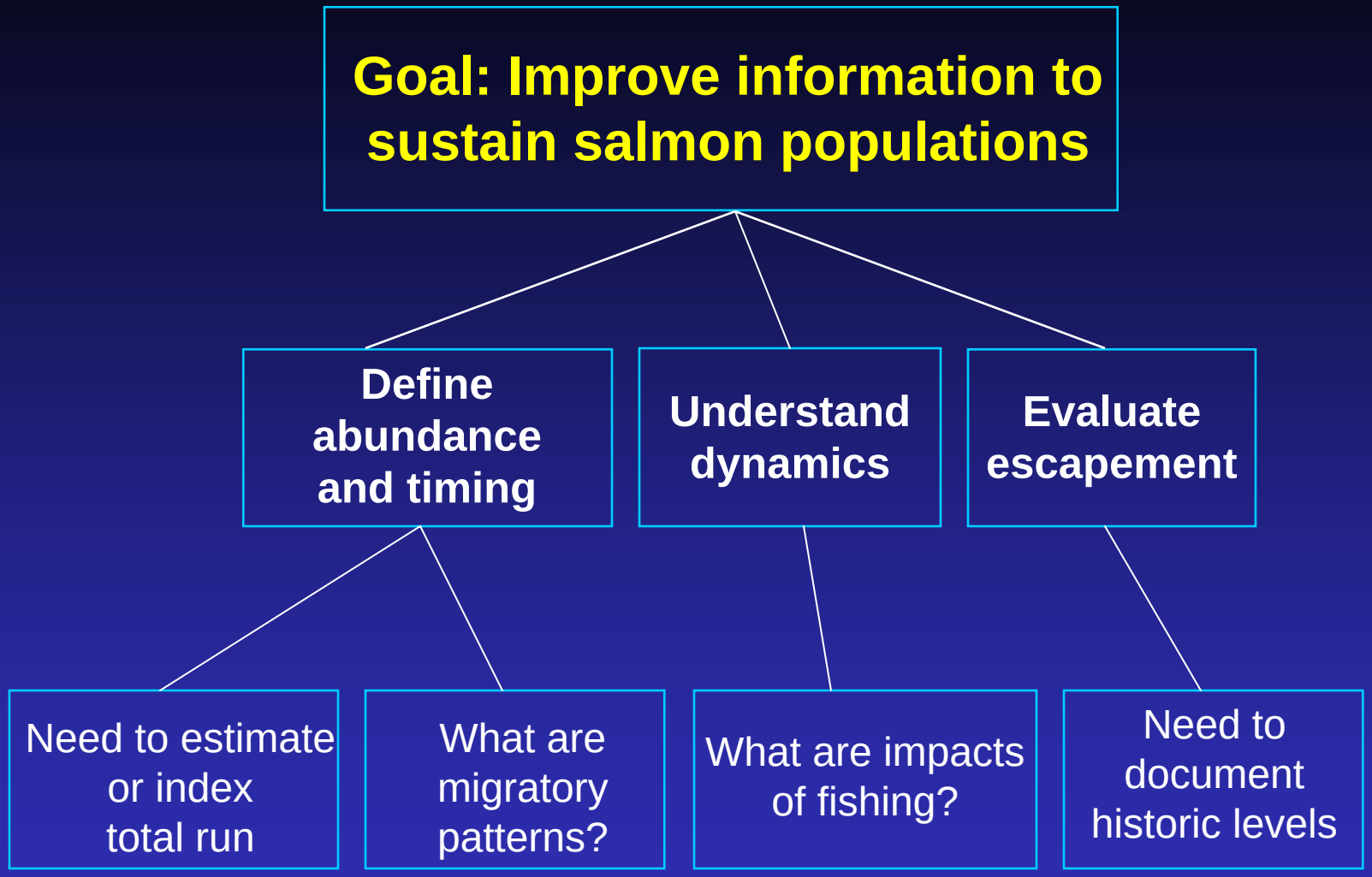
Overview

- Review the AHP & we do an example together
- Demonstrate how the “tool” can be used in the actual evaluation process
- Introduction to the problem
  - Review mission
  - Dimensions along which impacts will be judged
  - Variables that are on the table for change that pertain to the dimensions
  - Scoping survey: data concerning variables
- Develop hierarchy
- Criteria for judging importance; then rate
- Synthesize

Analytic Hierarchy Process

- **What is AHP?**
  - A systems approach for thinking: examine parts of the whole system and their linkages
  - A tool for integrating expert judgments
- **Why AHP?**
  - Clearly & concisely communicates the problem
  - Considers different points of view
  - Encourages explicit statements of preference, importance
  - Increases the likelihood of finding an optimal solution
- **How does it work?**
  - Structures the problem into a hierarchy
  - Prioritizes elements based on judgments


Goal: Improve information to sustain salmon populations
Define abundance and timing
Understand dynamics
Evaluate escapement
Need to estimate or index total run
What are migratory patterns?
What are impacts of fishing?
Need to document historic levels

Rating Scales

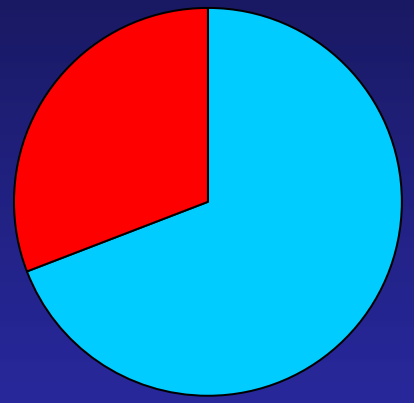
9 Extremely important

7 Very strong

5 Strong

3 Moderate

1 Slight

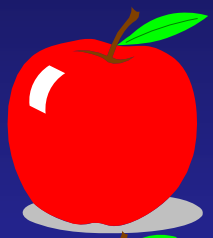


Criteria for Weighting

Use criteria to help judge importance (or preference) among elements in a group:

- **Degree of allocation conflict & intensity of management**
- **Degree of conservation concerns; or, vulnerability of stocks to overexploitation**
- **Is there a sequential nature, where inquiry into one area is pending the results from some other area?**

Use Expert Judgment to Compare

Size Comparison	Apple A	Apple B	Apple C	Resulting Priority Eigenvector	Relative Size of Apple
 Apple A	1	2	6	6/10	0.6
 Apple B	1/2	1	3	3/10	0.3
 Apple C	1/6	1/3	1	1/10	0.1

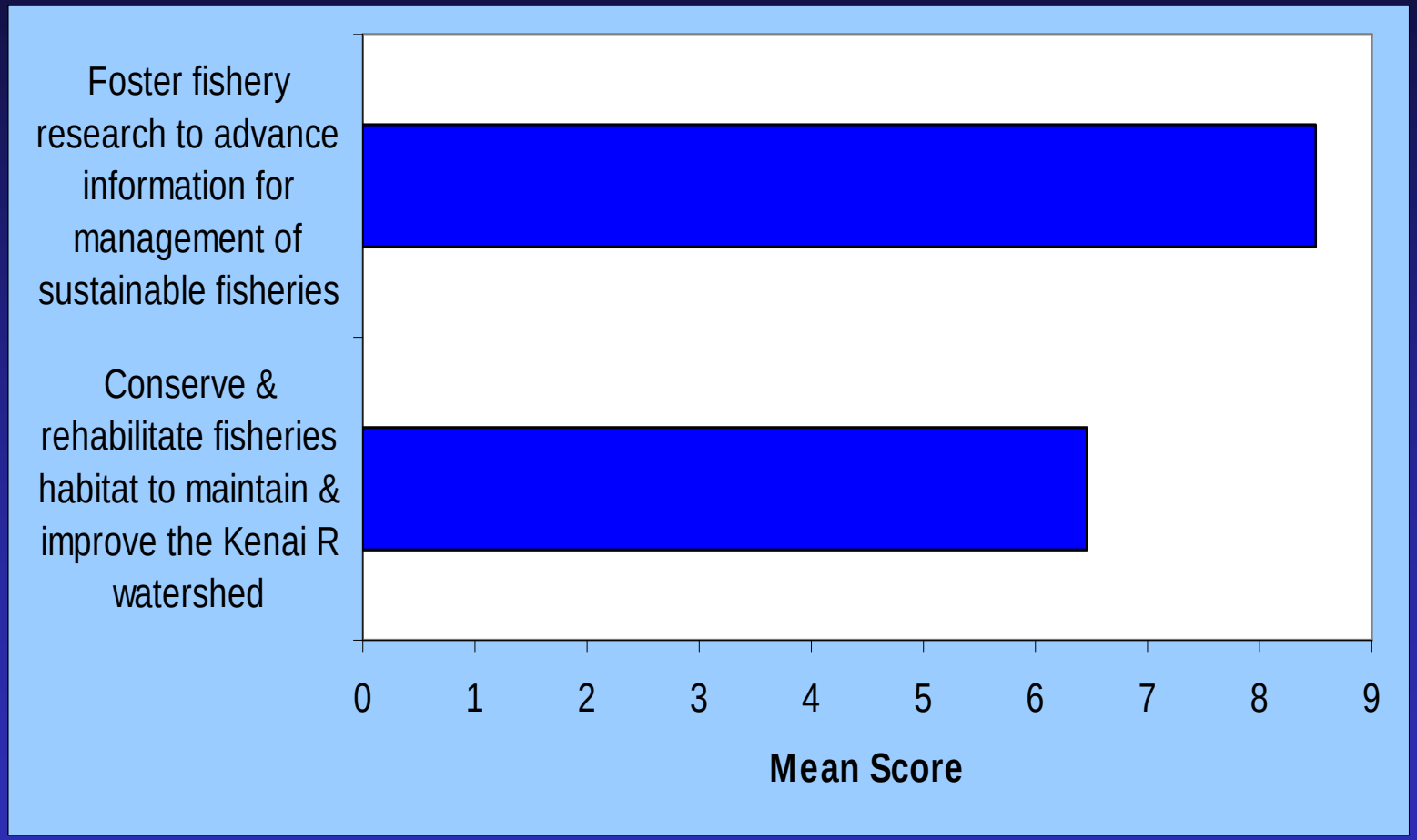
Sum column numbers.
Divide each number by column total to obtain a normalized matrix.
Obtain the average across each row.
This gives normalized relative priorities = approximate eigenvector.

Combining Judgments

- **Dissent & debate**
  - Explores alternative viewpoints
  - Debate can bring judgments closer through learning
  - Leads to understanding & cooperation
  - A well-informed person can effect change in belief !

- **When consensus is lacking:**
  - The geometric mean is the appropriate method for combining judgments made on a ratio scale
  - We record the spread

Synthesize to Get Priorities



Mission

- **To build upon previous efforts in developing a rational approach to evaluating proposed changes in regulations (relative to existing mitigation measures) that encompass relevant and observable dimensions of the SSL and their prey field.**

Hierarchy

- **Categories:**
  - **Fish assemblage & ecology**
  - **SSL foraging ecology**

Hierarchy

- **Category: Fish assemblage & ecology**

- **Dimensions:**
  - **Possible adverse response of prey field**

    Will prey availability be altered?

    (Based on the assumption that more aggregated prey are easier for SSL to capture)

  - **Likelihood of prey depletion (reduced abundance and aggregations)**

    Will prey be meaningfully depleted?

    (Based on the assumption that less fish diminishes the value of the prey field)

Hierarchy

- **Category: SSL foraging ecology**

- **Dimensions:**
  - **Degree of impact to adult female SSL through competition**

    (based on assumption that females have dual roles of maintenance and reproduction)

  - **Degree of impact to almost/recently weaned SSL through competition**

    (based on assumption that weanlings have smaller body size, lesser diving capability and can energy balance over a shorter period of time than adults)

Importance of Dimensions

- **Importance can be based on:**

  The degree to which change may impact the prey field, resulting in an adverse affect on the energy balance of an individual SSL.

Variables

- Gear type
- Vessel size
- Geographic areas
- Fish species
- Seasonal aspects
- SSL site characteristics
- Fishing in proximity to the SSL site

- Fish biomass & SSL prey needs are not uniformly understood (by area & over time).

Fish species by geographic area

EGOA	CGOA	WGOA	EAI	CAI	WAI
P cod	P cod	P cod	P cod	P cod	P cod
Pollock	Pollock	Pollock	Pollock	Pollock	Pollock
Mackerel	Mackerel	Mackerel	Mackerel	Mackerel	Mackerel

Fish species by geographic area

EGOA	CGOA	WGOA	EAI	CAI	WAI
P cod 6	P cod 6	P cod 6	P cod 6	P cod 5	P cod 5
Pollock 6	Pollock 6	Pollock 6	Pollock 6	Pollock 5	Pollock 2
Mackerel n/a 0	Mackerel n/a 0	Mackerel 2	Mackerel 4	Mackerel 7	Mackerel 7

Gear type by vessel size as a proxy for relative removal rate & proportion

< 60 ft	60-125 ft	>125 ft
Trawl	Trawl	Trawl
LL	LL	LL
Pot/Jig	Pot/Jig	Pot/Jig

Gear type by vessel size as a proxy for relative removal rate

< 60 ft	60-125 ft	>125 ft
Trawl 7	Trawl 8	Trawl 9
LL 1	LL 2	LL 3
Pot/Jig 0.1	Pot/Jig 0.5	Pot/Jig 1

SSL location type by proximity

Summer rookery	Summer haulout	Summer other	Winter rookery	Winter haulout	Winter other
0-3nm	0-3nm	0-3nm	0-3nm	0-3nm	0-3nm
3-10nm	3-10nm	3-10nm	3-10nm	3-10nm	3-10nm
10-20nm	10-20nm	10-20nm	10-20nm	10-20nm	10-20nm
20+nm	20+nm	20+nm	20+nm	20+nm	20+nm

SSL location type by proximity

Summer rookery	Summer haulout	Summer other	Winter rookery	Winter haulout	Winter other
0-3nm 9	0-3nm 9	0-3nm 5	0-3nm 9	0-3nm 9	0-3nm 5
3-10nm 8	3-10nm 8	3-10nm 4	3-10nm 8	3-10nm 8	3-10nm 4
10-20nm 7	10-20nm 7	10-20nm 3	10-20nm 5	10-20nm 5	10-20nm 2
20+nm 4	20+nm 4	20+nm 1	20+nm 4	20+nm 4	20+nm 1

GOAL	CATEGORY	DIMENSION	VARIABLE	VARIABLE	SUB-UNIT
		[along which impacts of alternatives will be judged].	1st ORDER	2nd ORDER	
		Importance can be based on:			
		(1) the degree to which change may impact the			Trawl
		prey field, resulting in an adverse affect on the			H&L
		energy balance of the SSL	Vessel size		Pot
					Jig
		Possible adverse response of prey field to the proposed			Mackerel
		alternative (incorporates concepts of prey switching,	Area		Pollock
		quality, changes in fish schooling behavior)			P cod
		Question: will the alternative alter prey availability?			0-3nm
			Season	SSL site	3-10nm
					10-20nm
					20+nm
	Fish Assemblage				
	& Ecology				Trawl
					H&L
			Vessel size		Pot
		Liklihood of depletion of prey (e.g., reduced number of			Jig
		fish aggregations).			Mackerel
		Question: will the alternative meaningfully deplete prey?	Area		Pollock
					P cod
					0-3nm
			Season	SSL site	3-10nm
					10-20nm
					20+nm
					Trawl
					H&L
			Vessel size		Pot
		Degree of impact to SSL through competition (incorporates			Jig
		spatial & temporal aspects of SSL foraging)			Mackerel
	SSL Foraging	Question: will the alternative compete with SSL?	Area		Pollock
	Ecology	Note: should this include concept of wenalings??			P cod
					0-3nm
			Season	SSL site	3-10nm
					10-20nm
					20+nm
					Trawl
					H&L
			Vessel size		Pot
		Degree of disturbance to almost/recently weaned SSL			Jig
		Question: will alternative impact almost/recently			Mackerel
		weaned SSL?	Area		Pollock
		Note: should this be changed to Degree of disturbance to			P cod
		behavior??			0-3nm
			Season	SSL site	3-10nm
					10-20nm
					20+nm

Removals

- Area – EGOA, CGOA, WGOA, EAI, CAI, WAI, Pribs
- Species - cod, pollock, mackerel
- When – Summer A May – July/ B aug - sept
  Winter A oct – dec /B jan - april
- Biomass/Harvest -
- Duration – increase, decrease, or keep same length of fishery
- Rationalized fishery? Yes or No