
Hatchery, Harvest, Habitat Integration &
Adaptive Management
Welcome!

Workshop objectives

By the end of the workshop, participants will be able to:

1. Describe the process of H-integration and its relation to an adaptive management plan
2. Convince others of the importance of coordinated actions
3. Identify and apply H-integration tools
4. Describe scientific measures being developed to evaluate the combined recovery actions on VSP parameters
5. Identify the watershed's current H-integration status
6. Describe how progress will be tracked through adaptive management and monitoring

Workshop Structure

- Built around the six steps to integration
- Includes case studies as examples
- Includes a worksheet to identify ways to tailor implementation of the steps
- Includes table group and large group discussions
- Will ask for your honest feedback on this approach to advance H-integration

Day One Agenda (Part 1 of 2)
9:00 **Welcome, introductions, and opening remarks**
<u>Session 1</u> **Context setting and group discussion: How do H-integration and Adaptive Management and Monitoring relate?**
Overview of all H-integration steps
<u>Session 2</u> **Step 1: Identify people across all H-sectors needed and how to involve them**
11:00—11:10 **Break**
11:10 **Continue Step 1**
<u>Session 3</u> **Steps 2 and 3:** **#2: Gain common understanding of how system works** **#3: Describe and agree on how to meet goals**
Noon working lunch

Day One Agenda (Part 2 of 2)

<u>Session 4</u> **Step 4 Examine, evaluate and select complementary suites of actions (part 1)**
3:30 **Review context** **Discuss day 2 agenda**
4:00 **Close**

Day Two Agenda (Part 1 of 2)
9:00 **Q&A and reconnect**
<u>Session 5</u> **Step 4: Examine, evaluate and select complementary suites of actions (Part 2)**
10:30—10:40 **Break**
10:40 **Continue Step 4**
Noon lunch **Haiku readings!**

Day Two Agenda (Part 2 of 2)

Session 6 **Step 5: document rationale and hypotheses, and describe implementation steps**
Session 7 **Step 6: Build & implement a verification, effectiveness & accountability system**
Session 8 **Next steps ’06 to ‘07 & resources available**
Feedback on overall H-I approach and process **Haiku contest winner announced!**
3:30 **Closing Speaker**
4:00 **Close**

Haiku contest rules

- Write a haiku referencing adaptive management or the 6 steps to H-integration

  (if you're the rhyming type, limericks are ok)

- Haikus are typically three line poems following a 5, 7, 5 syllable pattern

- Prepare a haiku to read during the Wednesday lunch break

- Our celebrity judging panel (Patricia and Chris) will decide a winner to be announced before Wednesday's closing remarks

Sample Haiku

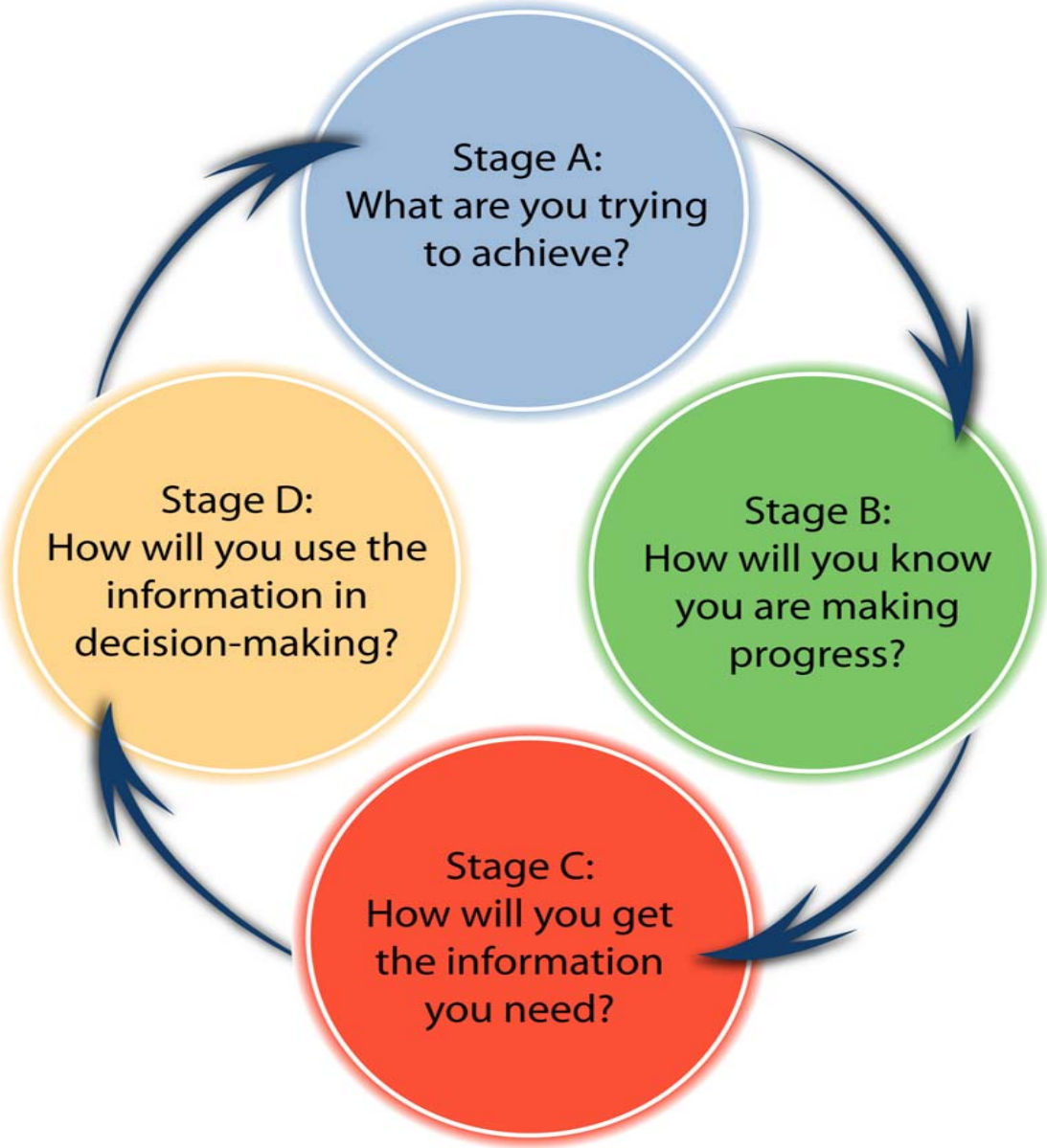
H – integration

Adaptively managing

Salmon are happy


Hatchery, Harvest, Habitat Integration &
Adaptive Management

The Evaluation Cycle



The First Focus of Adaptive Management: H-integration

•Resource managers need a common understanding of how their system works to develop a common set of goals and recovery actions *(STAGE A)*

• H-integration metrics examine cumulative effects of all the Hs on VSP parameters *(STAGE B)*

• Establish a Verification and Accountability System that transparently shows how each H-sector is working to address recovery goals *(STAGES C and D)*

• An integrated AMM program will help decision-makers clearly see the interaction and cumulative effects of actions among the H-sectors (Stage D)


Hatchery, Harvest, Habitat Integration &
Adaptive Management

Definition and Overview of H-Integration Steps

Vision

To recover self-sustaining, harvestable salmon runs in a manner that contributes to the overall health of Puget Sound and its watersheds and allows us to enjoy and use this precious resource in concert with our region's economic vitality and prosperity.

Context

- Objective is NOT to create another plan
- H-Integration the first focus of adaptive management and monitoring (AAM)
- Iterative process
- We’re here to look at how to advance H-Integration

H-Integration is a continuum

Continuum of H-Integration Strategies

Contradictory —
Actions are inconsistent & mutually detrimental

Non-Aligned —
Actions do not conflict, nor enhance each other

Integrated
Actions work in concert

H-Integration

"Concerted effort of all three

H-factors working together, not canceling each other out and adjusting over time as population conditions change."

Draft Puget Sound Salmon Recovery Plan

H-integration

can be defined as
a coordinated combination of
actions among all the H-sectors--
harvest, hatchery and habitat
--that together work to achieve the
goal of recovering self-sustaining,
harvestable salmon runs.

An Integrated salmon recovery strategy

should have:

- Consistency among H-sector goals and outcomes
- Hypotheses about limiting factors and threats

An Integrated salmon recovery strategy

should have:

- Strategies designed to be biologically efficient –
  - they can achieve VSP outcomes before irreversible harm is done to the population
- Complementary suites of actions among the H-sectors to recover salmon populations

An Integrated salmon recovery strategy

Should:

- describe the relative uncertainty of the suite of actions, and how the uncertainty will be reduced through an adaptive management and monitoring program.

Elements of an integrated approach

***Coordinating*:**

- Actions in specific locations,
- Timing when actions occur (e.g. linked to salmon life cycle),
- Sequencing actions over time (i.e. the order in which they occur), and
- Choosing the magnitude of actions

There are six steps to integration…

Step One

Identify the people that need to participate and how to involve them.

Step Two

Gain a common understanding of how the system works—habitat conditions and fish populations

Step Three

Agree upon common goals and a set of short-term outcomes across the H-sectors that describe what will be achieved related to those goals in measurable terms.

Step Four

Examine, evaluate and select a suite of complementary actions across the H-s to achieve the outcomes.

Step Five

- Document:
  - Rationale,
  - implementation steps (specific complementary actions in hatcheries, harvest, and habitat),
  - expected outcomes (including effects on VSP), and
  - Benchmarks.

Step Six

Build and implement a Verification, Effectiveness and Accountability system

- Implement actions
- Monitor results
- Prepare annual performance reports
- Adjust over time

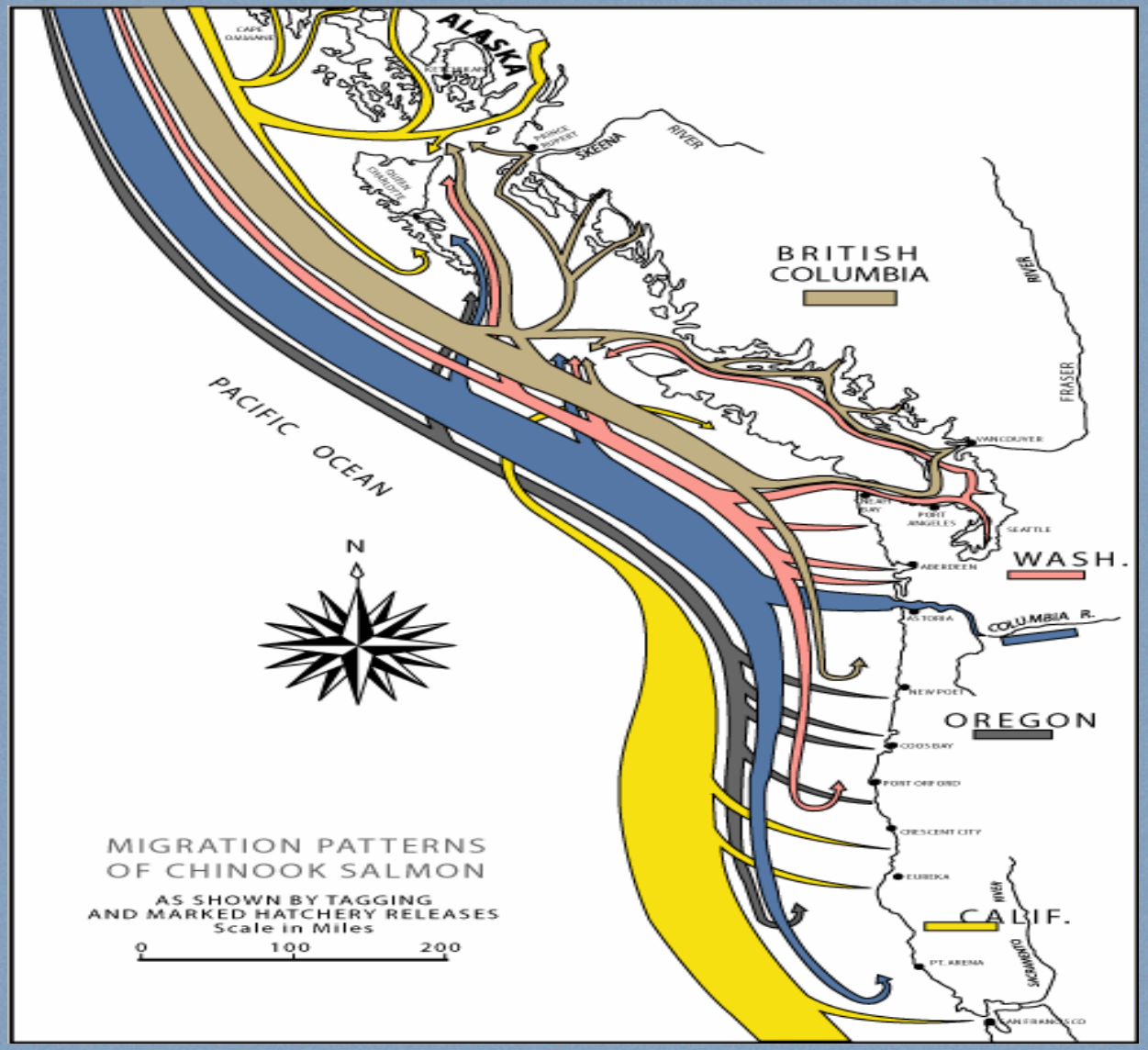

Hatchery, Harvest, Habitat Integration &
Adaptive Management

“80% of success is showing up”

Step 1:

Identify the people you need across all H sectors, and involve them

Chinook Get Around

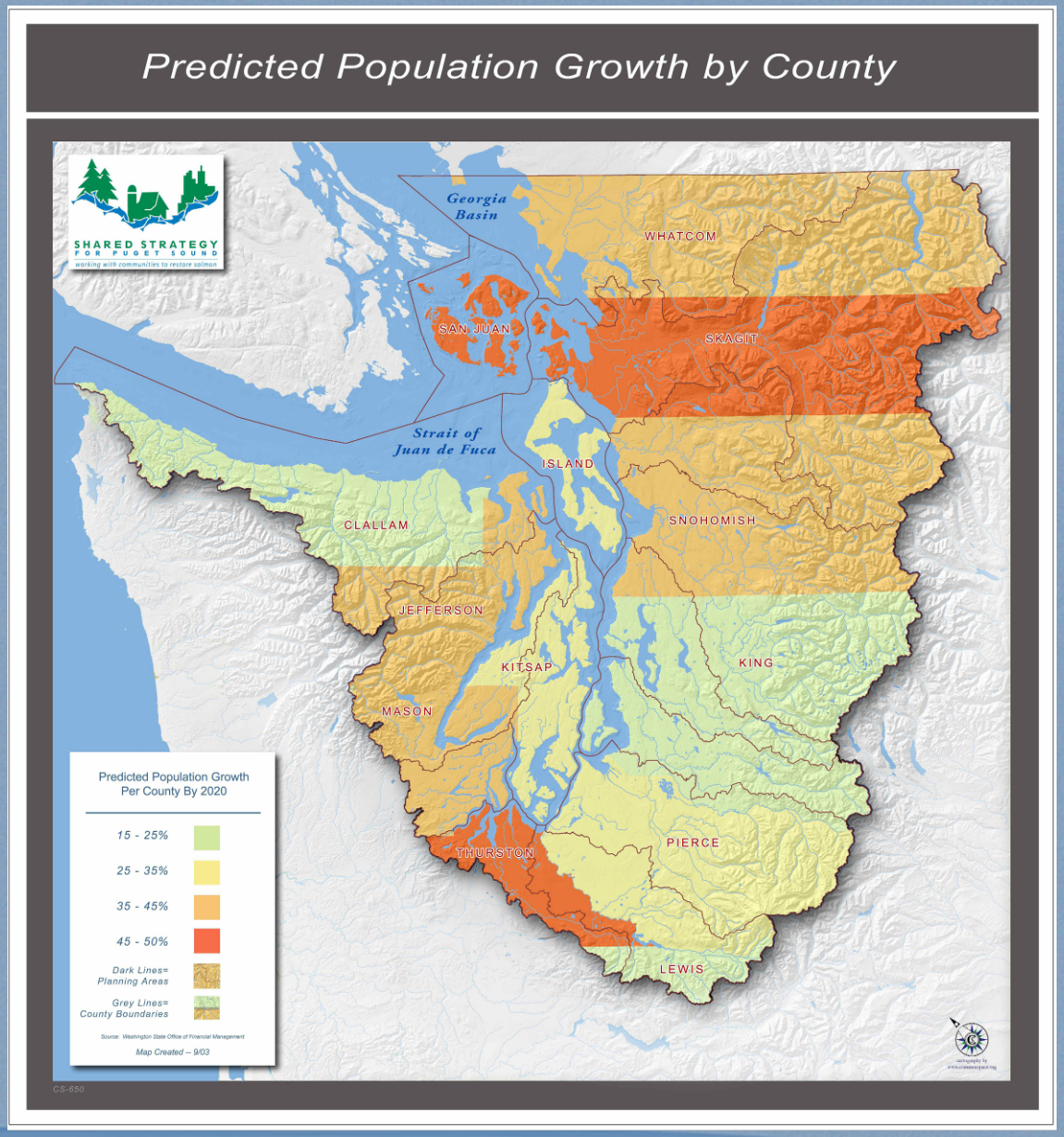


Map from “Origin and Migration of Washington's Chinook and Coho salmon.” WDFW. 1968.

Western Washington Treaty Tribes

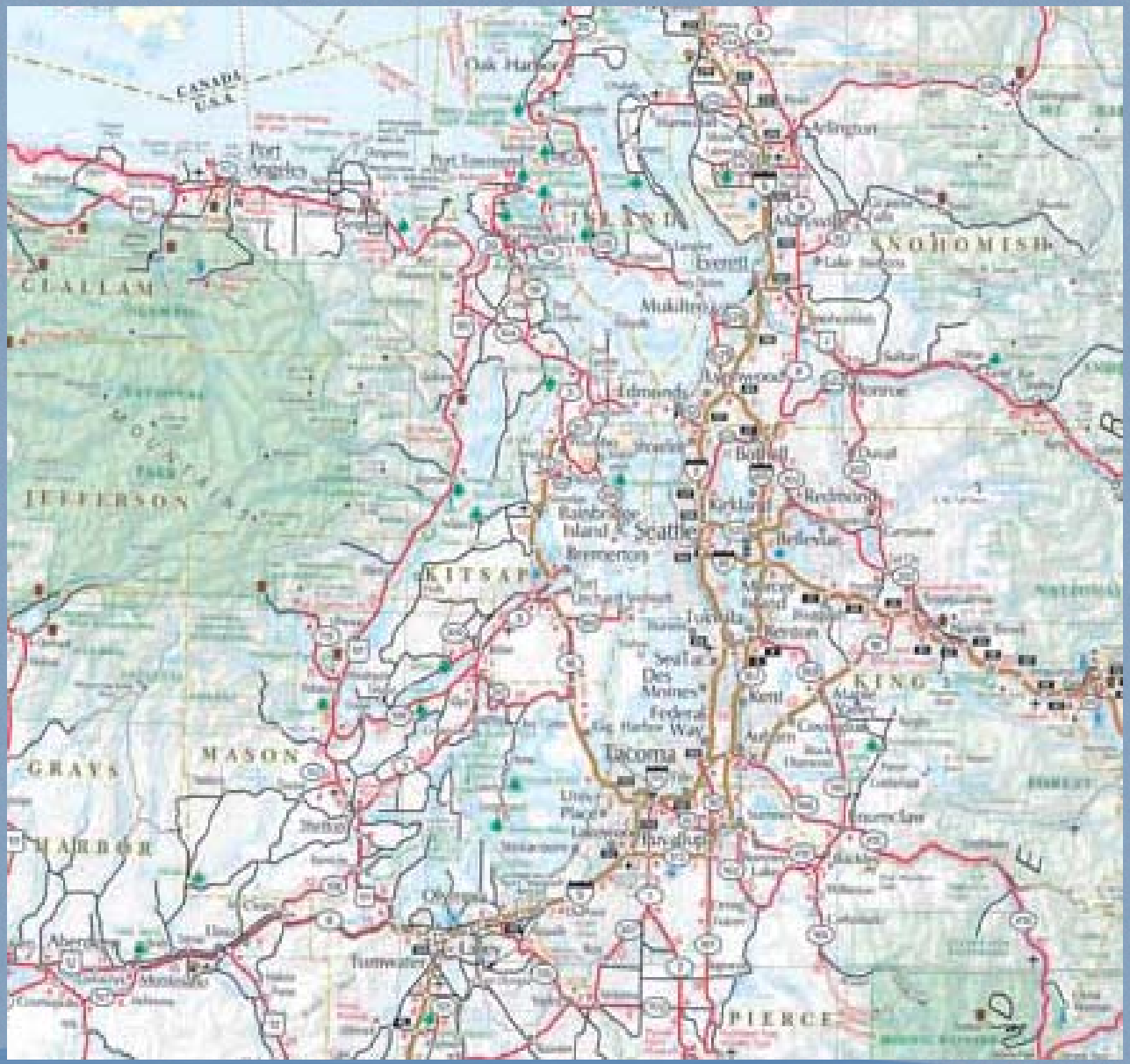
Map from Northwest Indian Fish Commission webpage: http://www.nwifc.wa.gov/tribes/index.asp#

Counties of Puget Sound

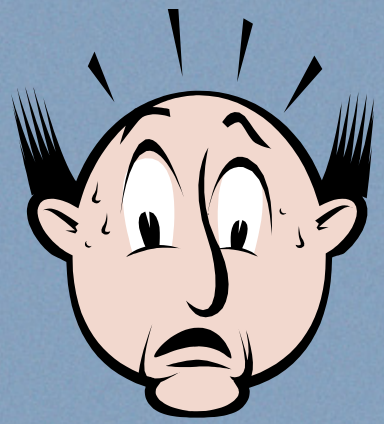


Map from Shared Strategy webpage: http://www.sharedsalmonstrategy.org/images/maps/pop_growth.pdf

Cities of Central Puget Sound



Map from WSDOT Web page: http://www.wsdot.wa.gov/Communications/Map/PDFs/FrontMapSmall.pdf



Recognize Reality

Track record of effective H coordination slim

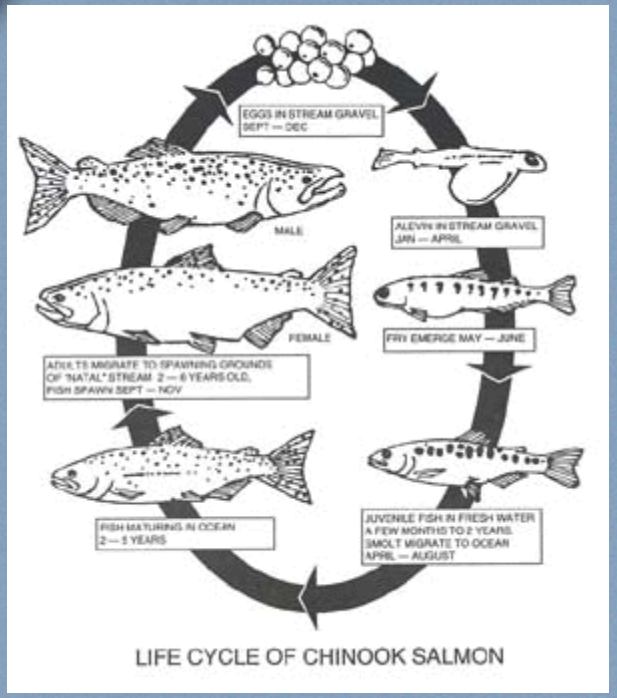
Significant effort already at getting involvement

One size does not fit all

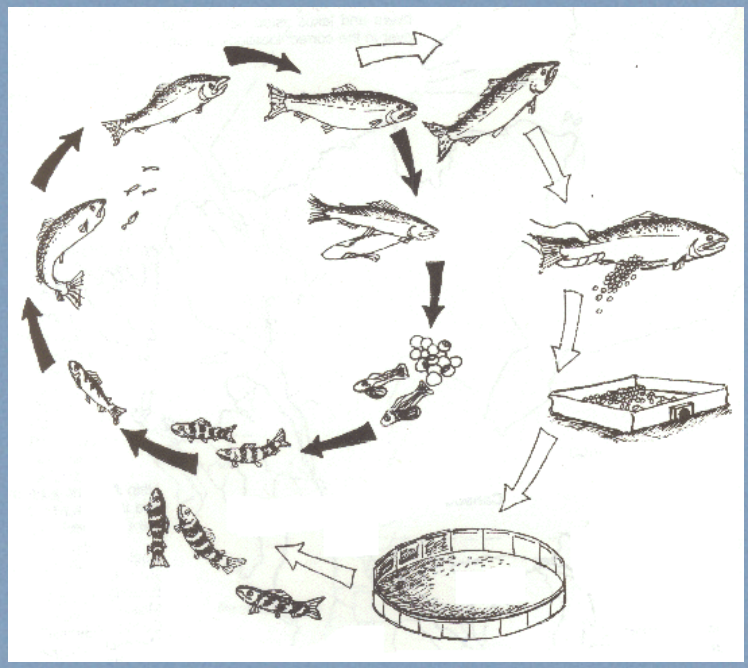
Coordination within Hs is hard enough

Start With the Watershed and the Fish

Where do your fish come from?



LIFE CYCLE OF CHINOOK SALMON

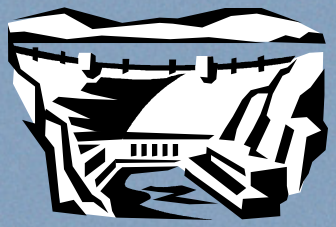


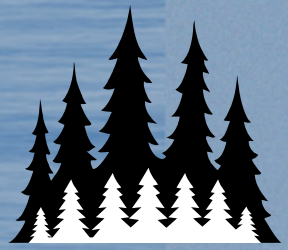
Where do they go?

Graphics from “Salmon Story” webpage: http://www.salmon.room.net/salmonstory/salmonstory.htm

Identify the Decision-makers

Who manages, protects, and restores the habitat the fish use?

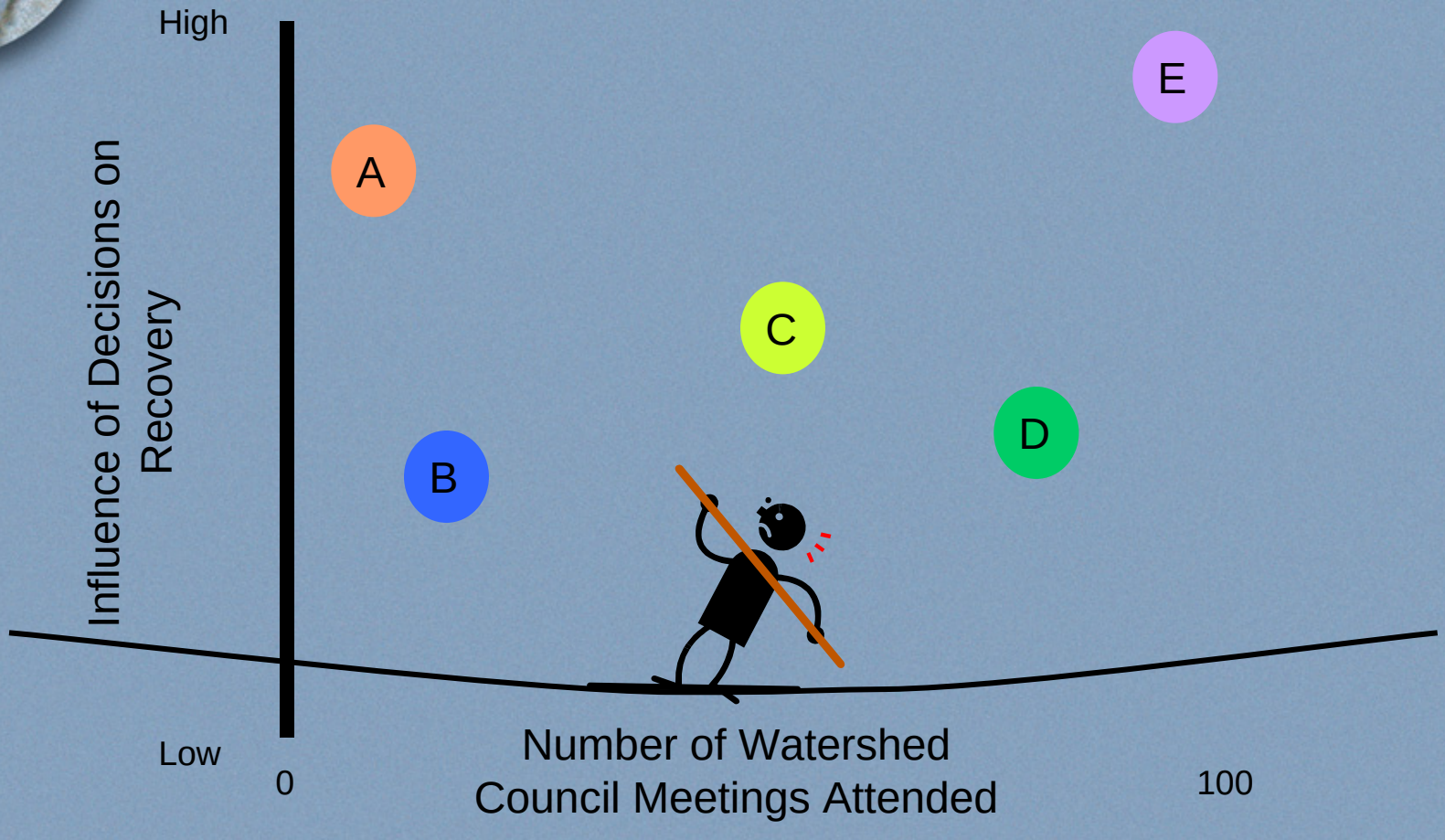




Who manages hatcheries that put fish into the watershed?

Who manages harvest of the fish?

Assess Current Involvement



Assess Current Involvement

Do they recognize the influence of their actions on recovering the fish?

Are they actively engaged in implementing the Recovery Plan?

Are better connections needed to ensure effective strategies and their implementation?

Improving Integration Effectiveness

What key decision-makers across the Hs need to be brought into implementation?

What is the right avenue for involving them?

What are effective ways to maintain the level of involvement needed?

What can your agency/watershed do to encourage involvement?

When is Step 1 Done?

Key decisions and decision-makers – in and out of your watershed – identified

Understanding of how and when decisions are made, and how they could affect recovery

Implementation program maps connections to all key decision-makers/decisions

Actions aimed specifically at maintaining involvement

“80% of success is showing up”

Step 1 worksheet questions

- **What key decision-makers** across the Hs need to be brought into plan implementation?

- **What challenges** are preventing the level of involvement you think is necessary for implementing an effective recovery strategy?

- **What are possible ways** to achieve broader or more effective involvement?

- **What are effective ways** to maintain the level of involvement needed?

- **What can your agency/watershed do** to encourage involvement?


Hatchery, Harvest, Habitat Integration &
Adaptive Management

Step Two

Gain a common understanding of how the system works.

Step Two

Gain a common understanding of how the system works –

- What is the current status of your population(s)?
- What is the current status of habitat, hatcheries, and harvest and how do they affect your population(s)?
- Does everyone agree on the status description?

The not so fine print disclaimer:

- The following sets of questions and sources of data are intended to serve as suggestions, not as a final authoritative list.
- We do not presume to have “THE ANSWER” - just some ideas.
- You probably have done much of the work to get these answers already – these can potentially serve as a list to doublecheck against.

What is the current status of your population(s)?

- What populations occur in your watershed?
- What is your best understanding of each population's:
  - abundance?
  - productivity?
  - diversity?
  - spatial distribution?

Population status: potential sources of information

- Juvenile outmigration studies
- Distribution surveys
- Otolith analysis
- Spawner surveys
- Harvest totals
- Hatchery returns

What is the current status and effect of habitat on salmon?

- What was the historical status of key habitat attributes in each spatial unit that salmon used in your watershed?
- What is the current status of key habitat attributes in each spatial unit that salmon use in your watershed?
- How did the historical and the current habitat affect salmon: abundance, productivity, diversity, and spatial structure?

Habitat status and effects: potential sources of information

- Habitat studies: on the ground and remote
- EDT modeling of impacts on salmon
- SHIRAZ modeling of impacts on salmon

What is the current status and effect of harvest on salmon?

- What is the current total exploitation rate on each population?
  - Include all fisheries: in-river, Puget Sound, ocean
- How does harvest affect salmon: abundance, productivity, diversity, and spatial structure?

Harvest status and effects: potential sources of information

Harvest manager records:

- total harvested
- age classes
- location harvested
- time harvested

What is the current status and effect of hatcheries on salmon?

- What is the origin and quantity of the broodstock they collect?
- Fish release information: how many? what sizes? where? when?
- What is the proportion of hatchery vs. natural origin fish: on the spawning grounds, in the harvest, returning to the hatchery?
- How do hatcheries affect salmon: abundance, productivity, diversity, and spatial structure?

Hatchery status and effects: potential sources of information

- Hatchery manager reports:
  - Broodstock collected (numbers, origin)
  - Spawning protocols
  - Rearing conditions
  - Numbers released (size, date, location)
- Harvest data, spawner surveys: hatchery vs. natural origin fish

Common understanding

- Does everyone agree on the status description?
- If not, how can differences of opinion be resolved?

Step Three

- Agree upon common long-term goals and short-term outcomes.

Goal – overall aim or purpose

Outcome – measurable element of a goal

Two types of goals

- *Population goals* – goal for the salmon separate from human use needs. (e.g. sustainable, locally adapted population)

- *Community goals* – goals for human use that impact salmon. (e.g. want to continue salmon harvest, use land and water for economic development, living spaces, farming)

Measurable Population Outcomes

- Productivity/Capacity
- Abundance/Escapement
- Proportion of natural origin and hatchery origin fish on the spawning grounds

Measurable Community Outcomes

- Numbers of harvestable fish
- Land use (types and density of uses)
- Water use (user groups and quantities needed)

Goals and outcomes should -

- Be based on the common understanding developed in Step 2.
- Make a significant contribution to recovery of stock.
- Be clearly prioritized when they might be in conflict.

Process to define goals and outcomes -

Both technical and policy people need to participate:

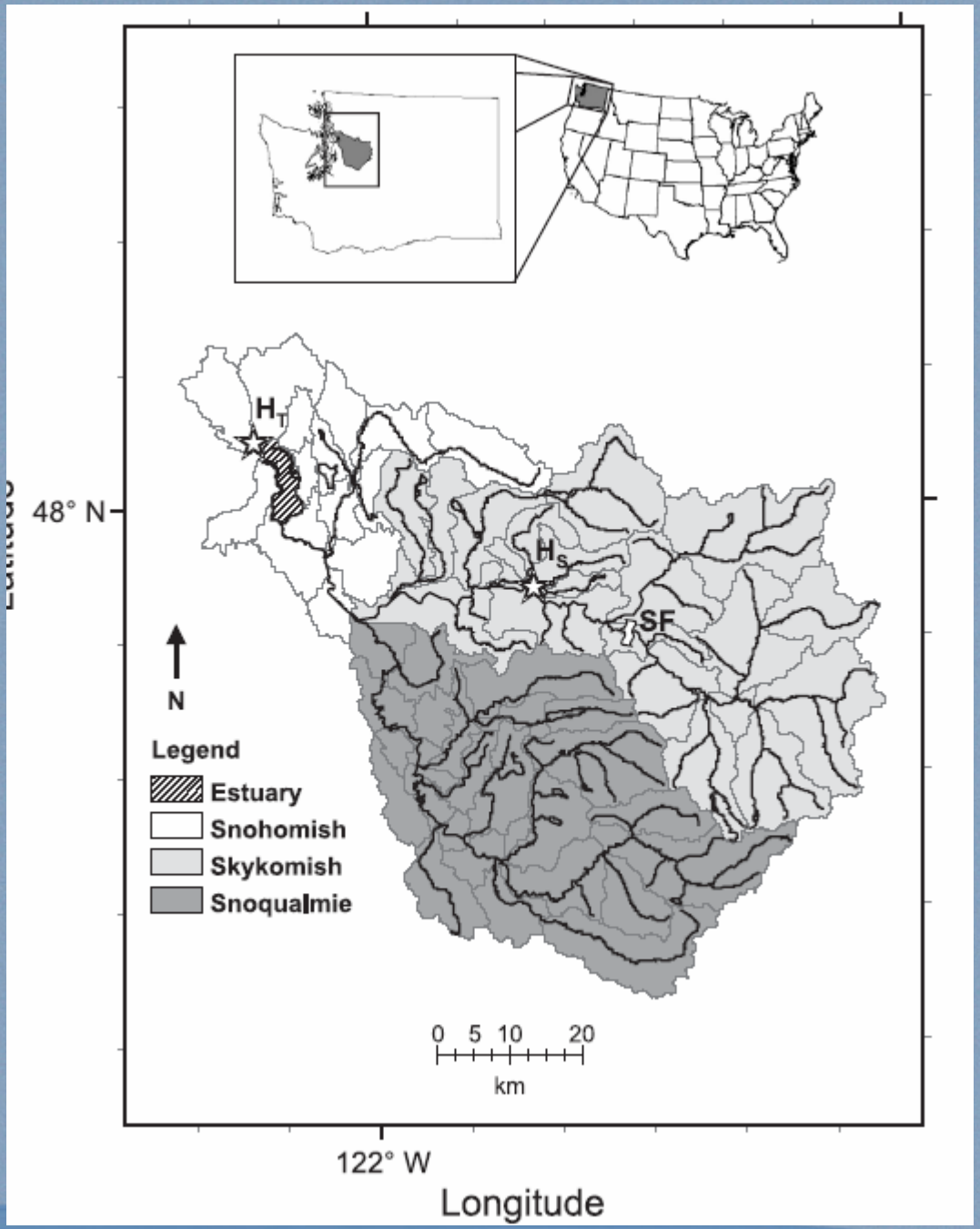
1. Policy people outline draft long-term goals.
2. Technical people use status evaluation in step 2 to evaluate long-term goals, suggest potential measurable outcomes.
3. Policy people review and revise goals and outcomes after considering technical analysis.
4. Repeat steps 1 through 3 until satisfied.


Hatchery, Harvest, Habitat Integration &
Adaptive Management

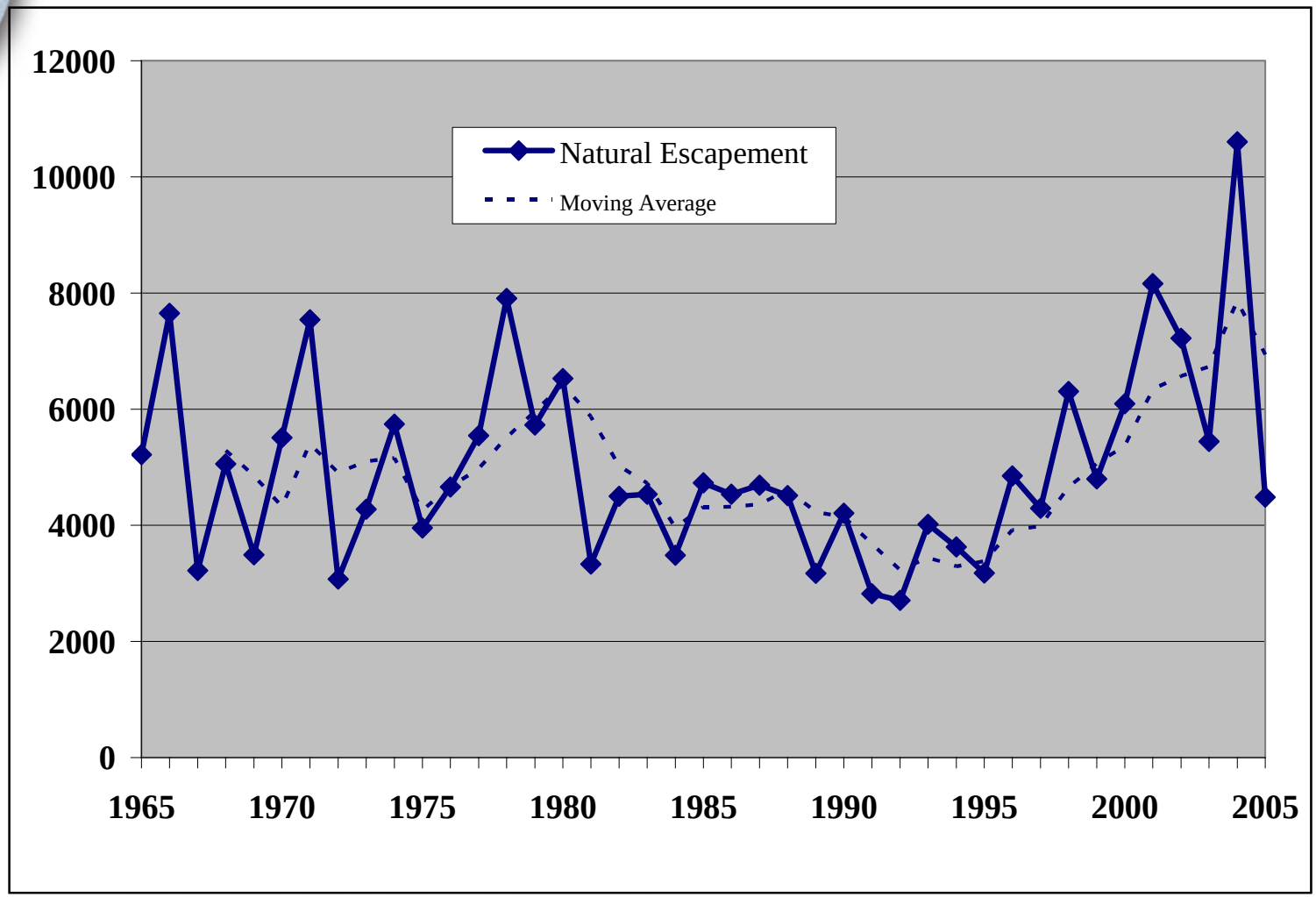
Snohomish Basin Chinook

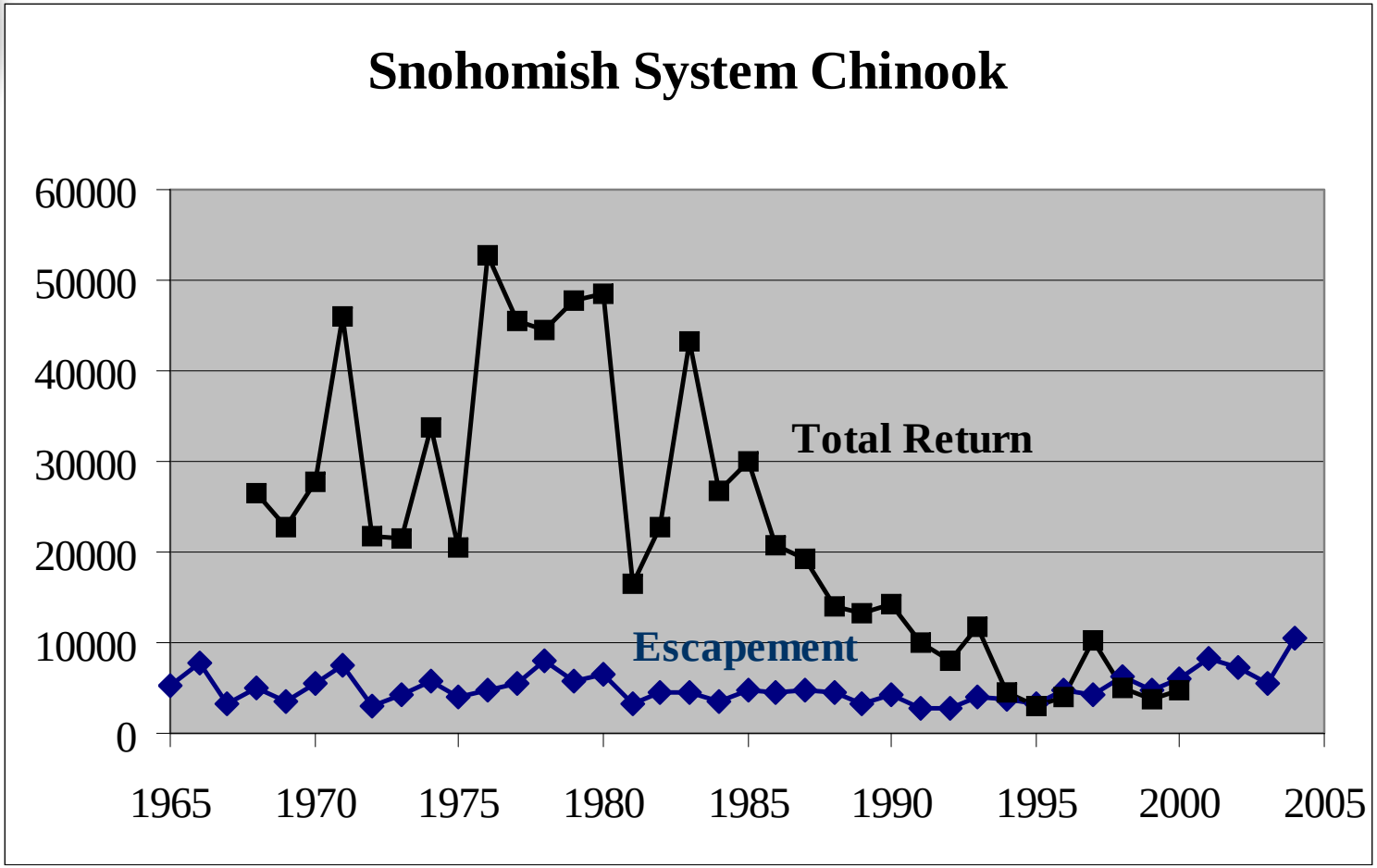
Common Understandings

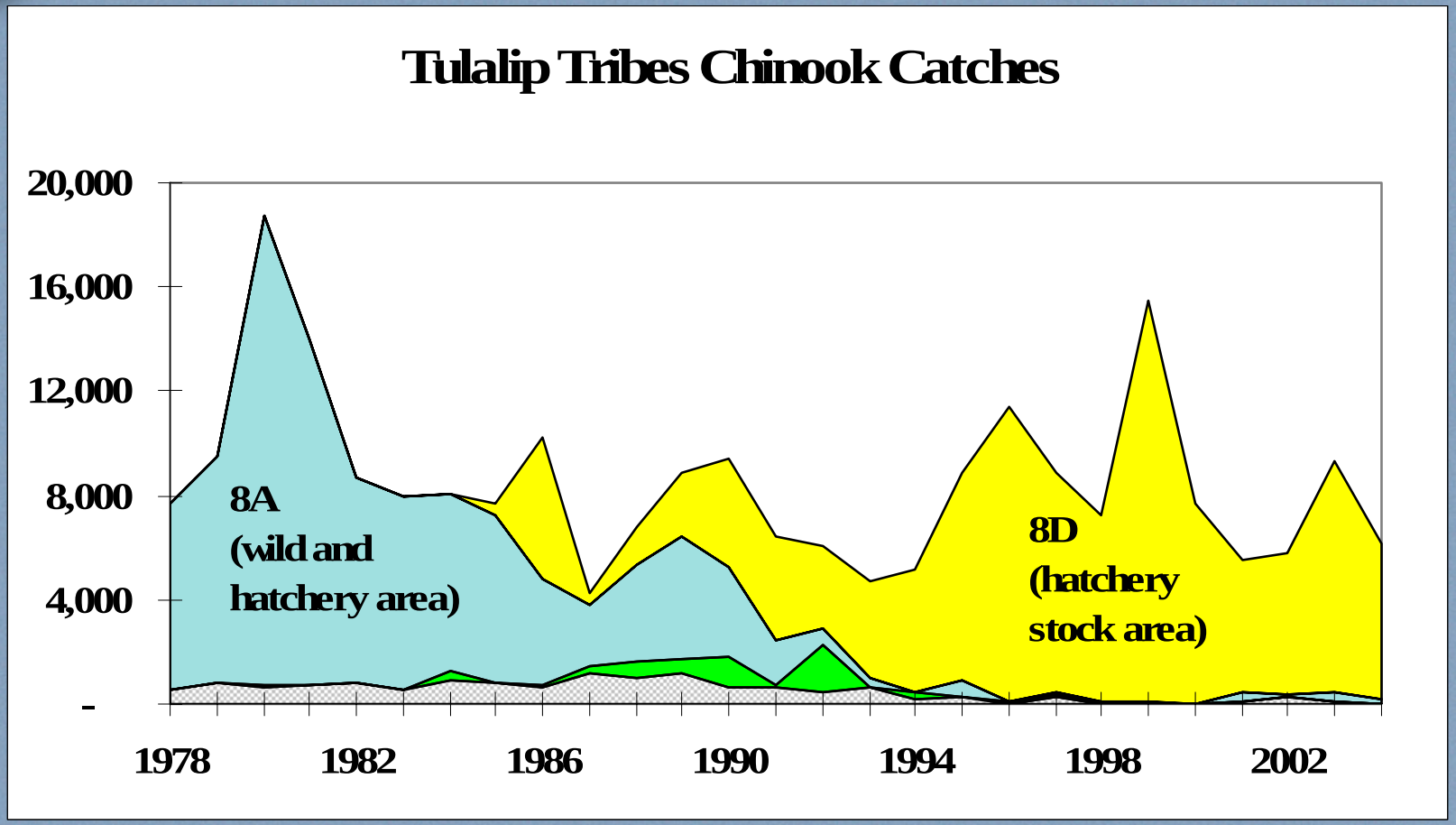
- **Resource Status** ←
- Recovery Goals
- Management Goals


48° N
H_T
H_S
SF
N
Legend
Estuary
Snohomish
Skykomish
Snoqualmie
0 5 10 20
km
122° W
Longitude

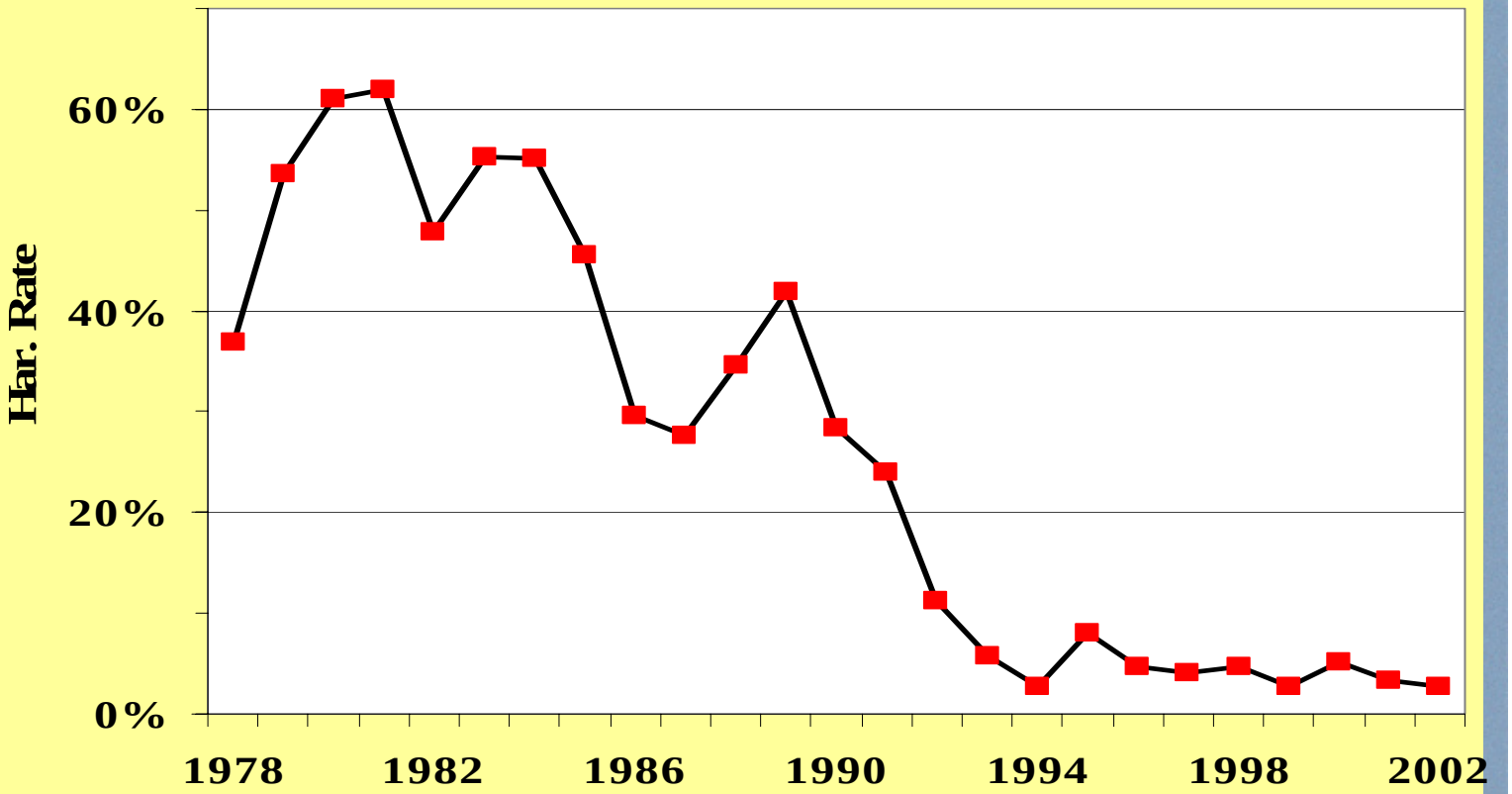
Population Status




Snohomish System Chinook
60000
50000
40000
30000
20000
10000
0
1965
1970
1975
1980
1985
1990
1995
2000
2005
Total Return
Escapement


Tulalip Tribes Chinook Catches
20,000
16,000
12,000
8,000
4,000
-
8A
(wild and
hatchery area)
8D
(hatchery
stock area)
1978
1982
1986
1990
1994
1998
2002

Area 8A/8D Harvest Rates on Wild Chinook



Hatchery-origin fish contribution to natural escapement (1997-2001)

- Snoqualmie population: 6% - 28%
- Skykomish population: 25% - 65%

Snohomish Basin Chinook

Common Understandings

- Resource Status
- **Recovery Goals**
- Management Goals

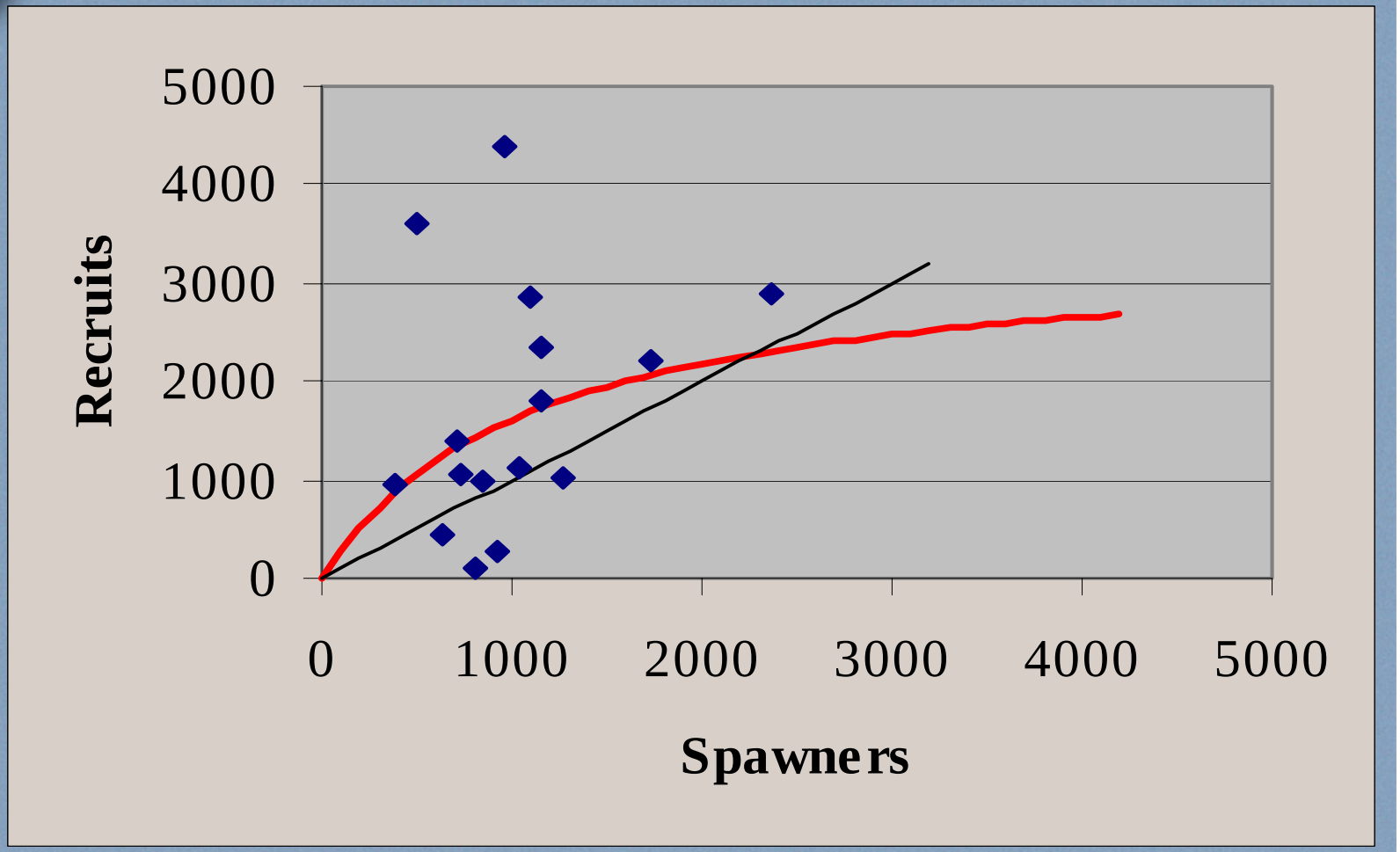
From June 2005 Snohomish Recovery Plan

FORUM MISSION: *To protect, restore, and enhance the productivity and diversity of all wild salmon stocks in the Snohomish River basin to a level that will sustain fisheries and non-consumptive salmon-related cultural and ecological values.*

Recovery Goals

- Viable populations
- Allow for fisheries
- Based on properly functioning habitat

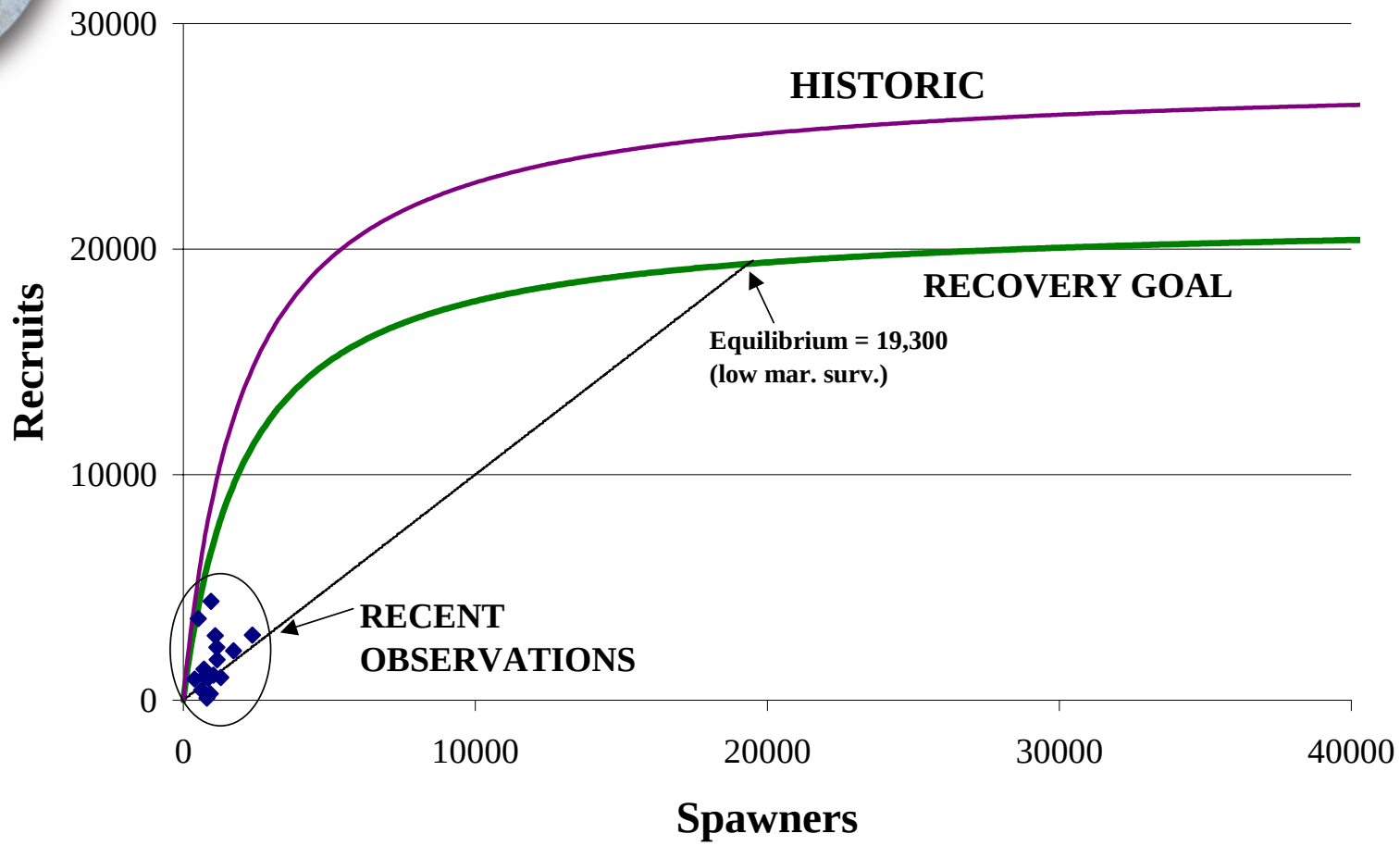
Snoqualmie Population: Current Conditions



EDT Results

Snoqualmie

Scenario	Productivity	Capacity	Equilibrium
Historic potential	13.2	27,779	25,675
"80%"	10.6	22,223	20,124
"PFC"	9.8	20,877	18,747
Current	3.1	3,374	2,286
GOAL	**10.0**	**21,500**	**19,300**


30000
20000
10000
0
Recruits
HISTORIC
RECOVERY GOAL
Equilibrium = 19,300
(low mar. surv.)
RECENT
OBSERVATIONS
0
10000
20000
30000
40000
Spawners

Recovery Goals

- Viable populations (checks with TRT criteria)
- Allow for fisheries (abundance/productivity ranges provided to Shared Strategy)
- Based on properly functioning habitat (EDT analysis was set up this way)

Snohomish Basin Chinook

Common Understandings

- Resource Status
- Recovery Goals
- **Management Goals** ←

Management Goals
10-year plan

- Habitat actions based on subbasin strategy groups
  - scenarios compared with Shiraz model
  - Begin to move populations to recovery goal

Management Goals
10-year plan

- Harvest management limits harvest of wild Snohomish Chinook
  - recovery exploitation rate (RER) based on VRAP model
  - will allow population to respond to habitat improvements with minimal impact from harvest
- Harvest opportunity provided to target on hatchery fish
  - Tulalip Bay terminal area fishery
  - Selective sport fisheries

Management Goals
10-year plan

- Hatchery management minimizes impact of hatchery production on wild stock recovery goals
  - Finish conversion to all local broodstock
  - Integration of wild broodstock into hatchery broodstock
  - Mass-marking of hatchery fish

How can we use this information?

Step 2 worksheet questions

Consider if you have the following information for your watershed…

- **What is your current understanding** of the biological status of the Chinook stock(s) in your watershed?
- **Do you have an understanding** of the status of habitat and its effect on salmon in your watershed?
- **Do you have an understanding** of the status of harvest and its effect on salmon in your watershed?
- **Do you have an understanding** of the status of hatcheries and their effect on salmon in your watershed?

Step 3 worksheet questions

• Has your watershed defined measurable population outcomes that are agreed upon by representatives of all the H's for…

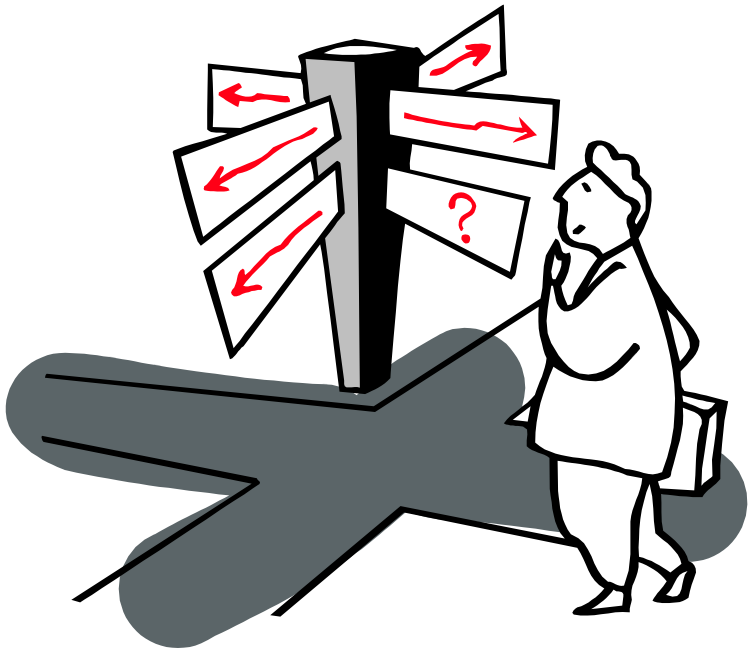
• Has your watershed defined measurable community outcomes that are agreed upon by representatives of all the H's for…

• If the answer to any of the above questions is no, what are the potential challenges to being able to define these desired outcomes?

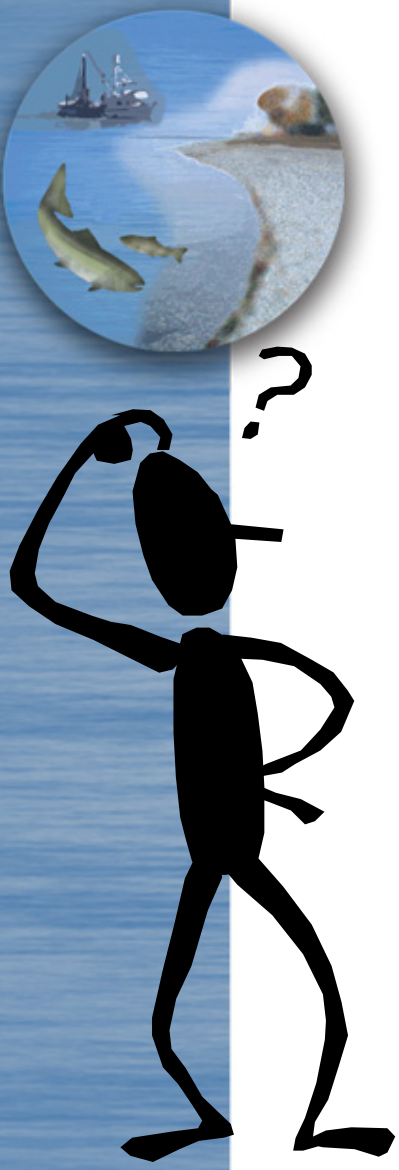
• What are some next steps you can take to help your watershed define agreed upon outcomes for each of these questions?


Hatchery, Harvest, Habitat Integration &
Adaptive Management

Evaluating All-H Integration: Approach and Tools



Jim Scott
WDFW & TRT



Topics

- What are we attempting to accomplish?
- What is the proposed approach?
- What enhancements (if any) are needed to existing tools?
- How can we make it better?

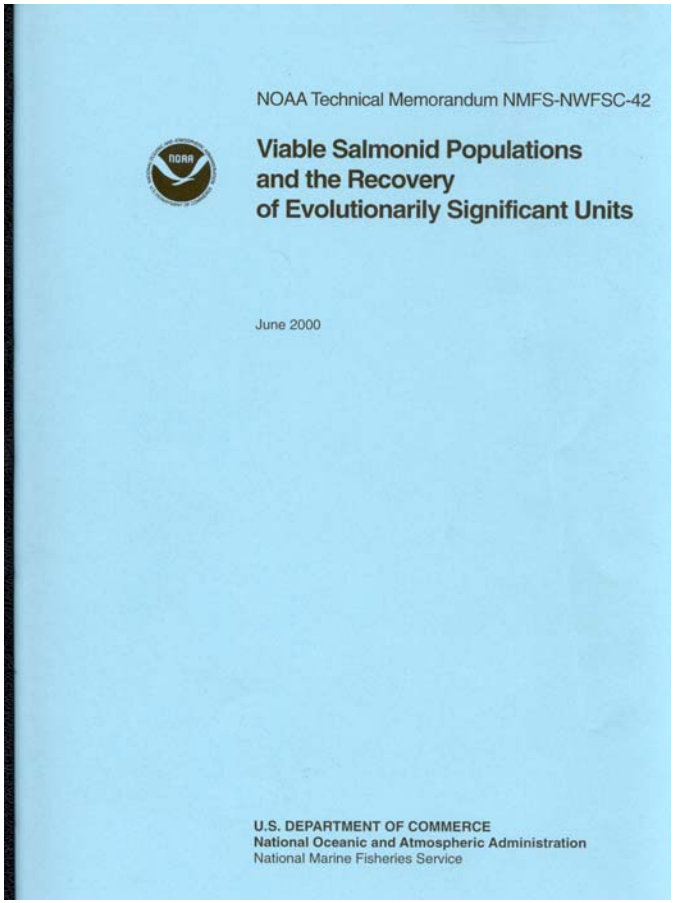
You're Trying to Do What?

- Promote integration – coordinated combination of actions among the H-sectors
- Facilitate evaluation of the trade-offs inherent in alternative suites of actions
- Develop hypotheses about expected outcomes to drive monitoring and adaptive management

Currency?

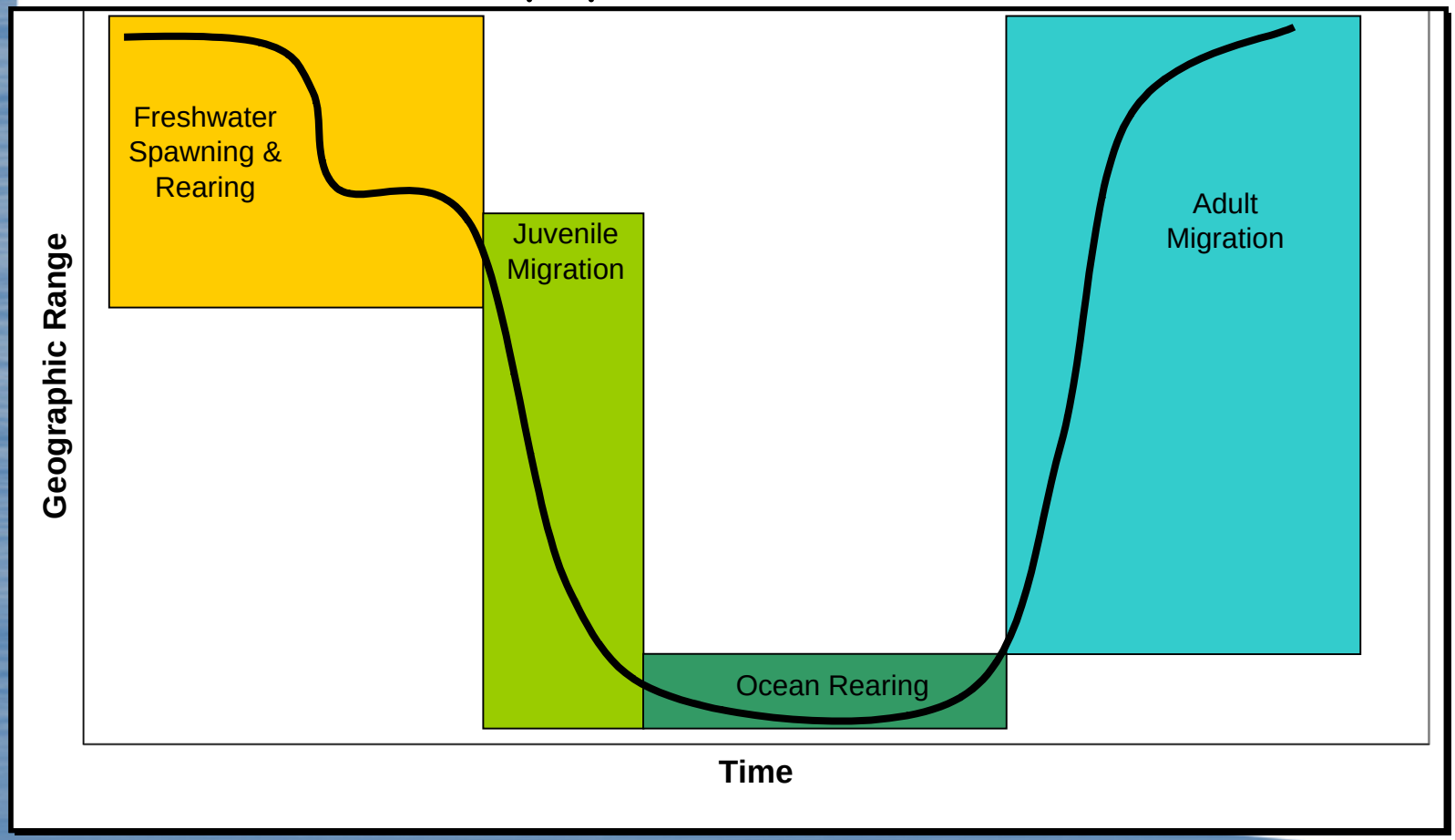
Viable Salmonid Population

- ✓ Diversity
- ✓ Spatial Structure
- ✓ Abundance
- ✓ Productivity



Development of Metrics

Trajectory. Pattern through time and space of a segment of a population.

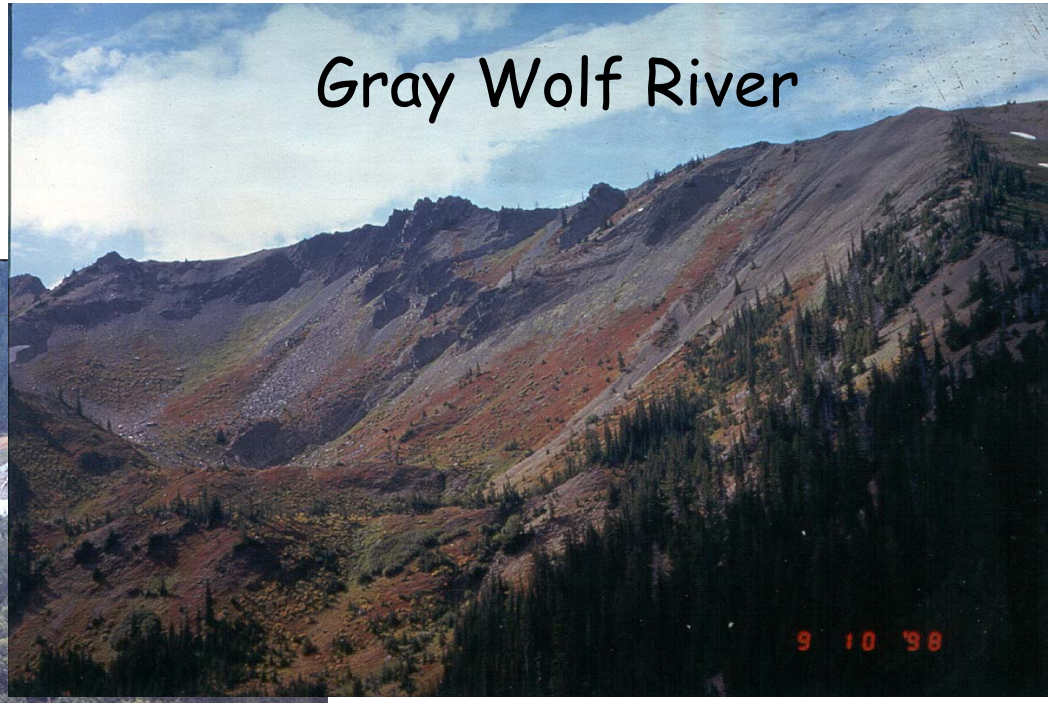


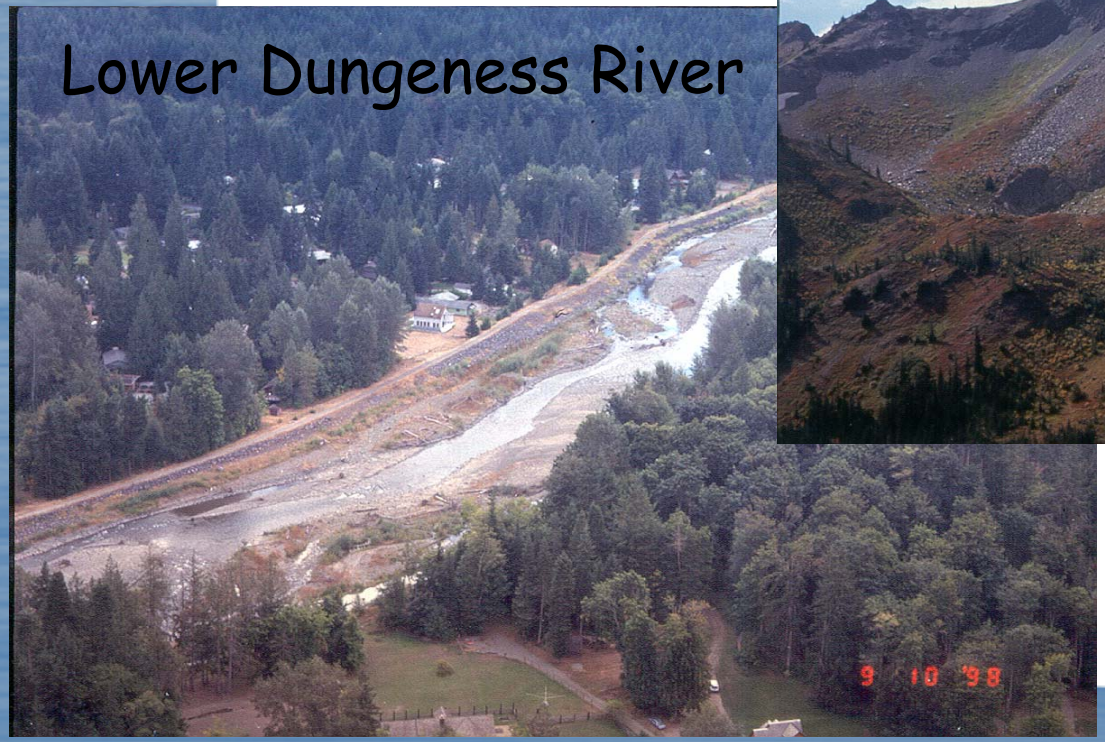
Development of Metrics for Planning Purposes

1) Simulate population using EDT, EDT Population, SHIRAZ, or other model that tracks population trajectories

2) Compare number of successful trajectories under alternative strategies

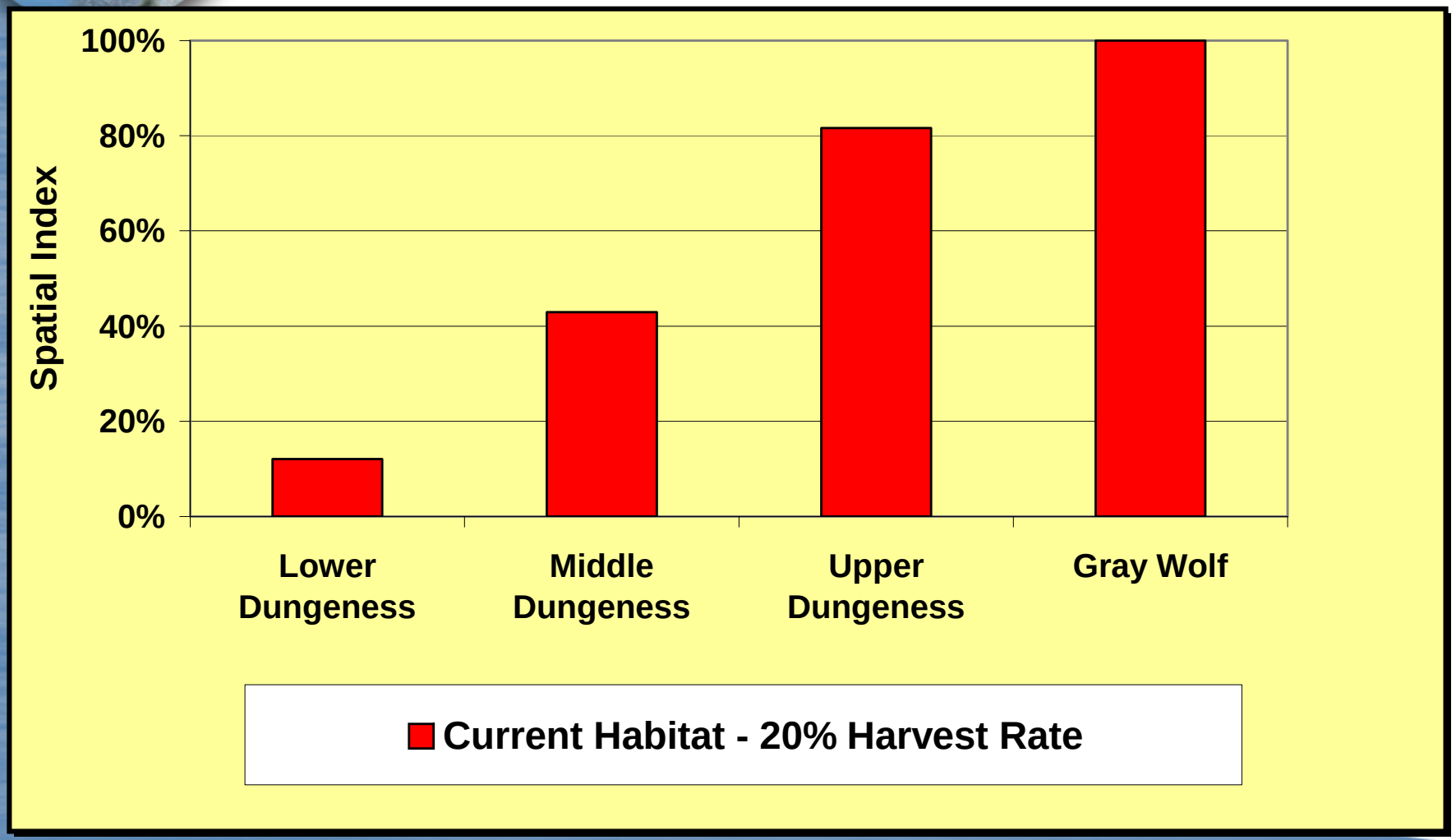
Application Example
Dungeness River



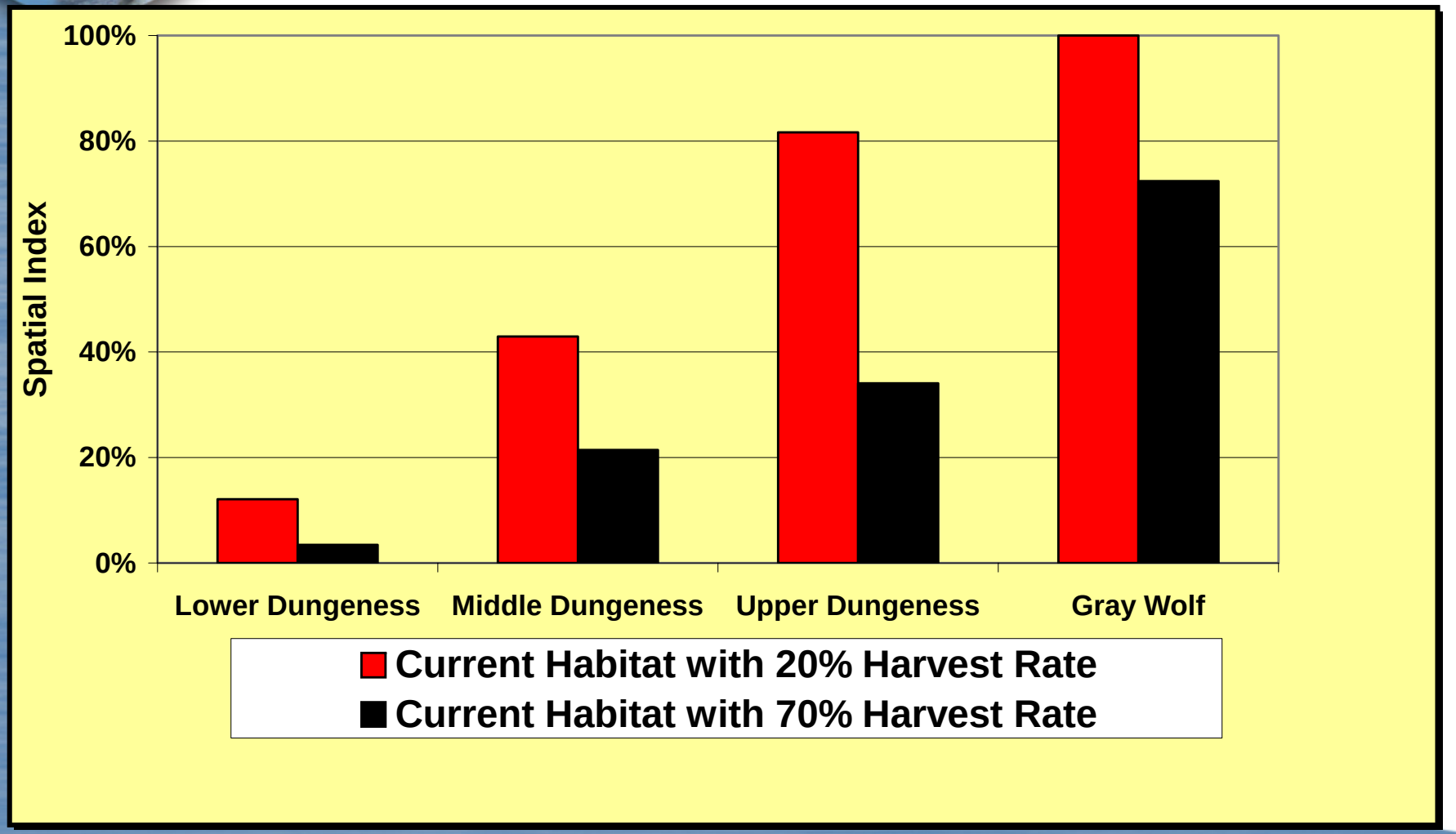


Photos courtesy of
Dungeness River
Management Team

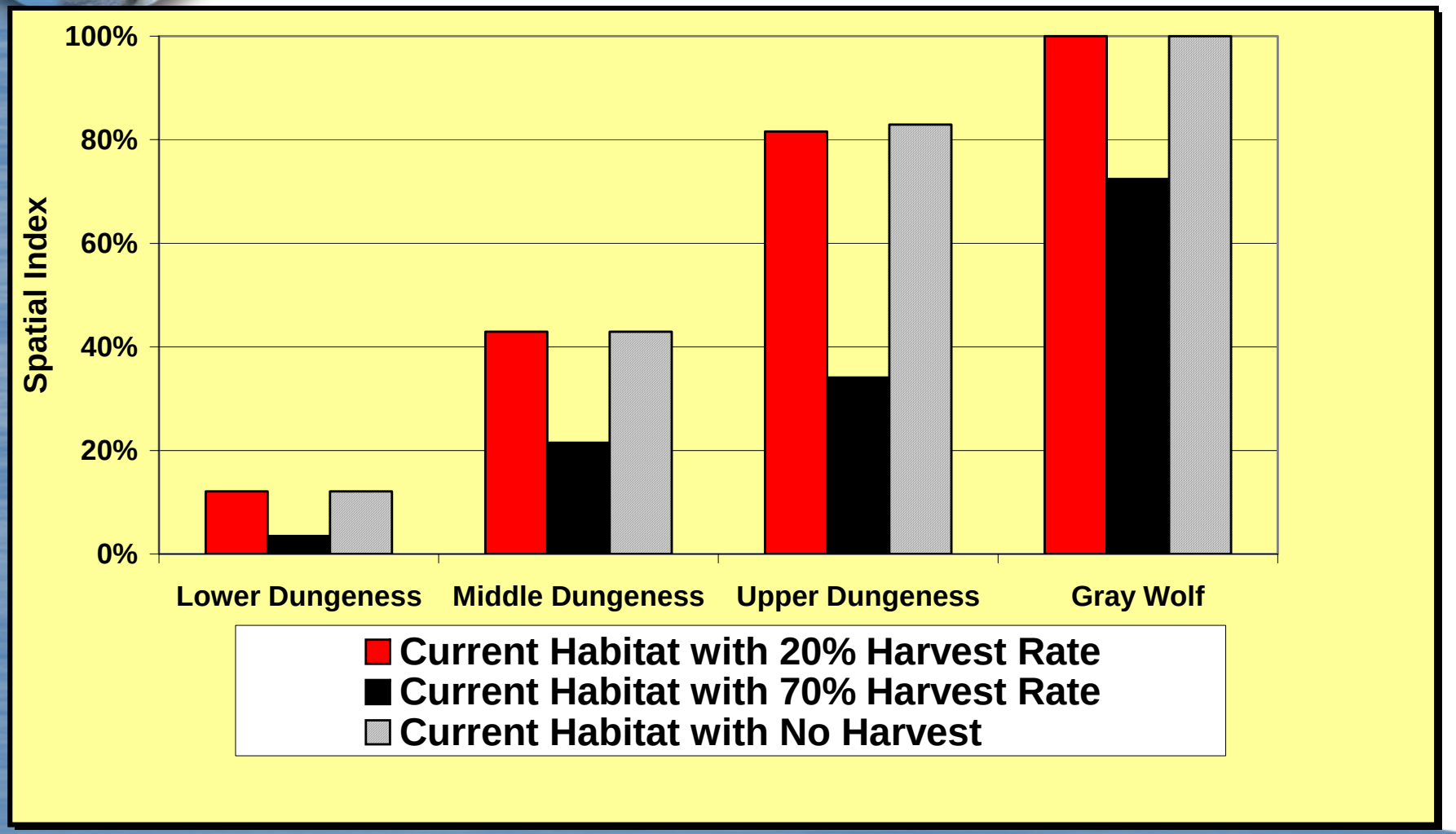
Hypothesis for Current Status



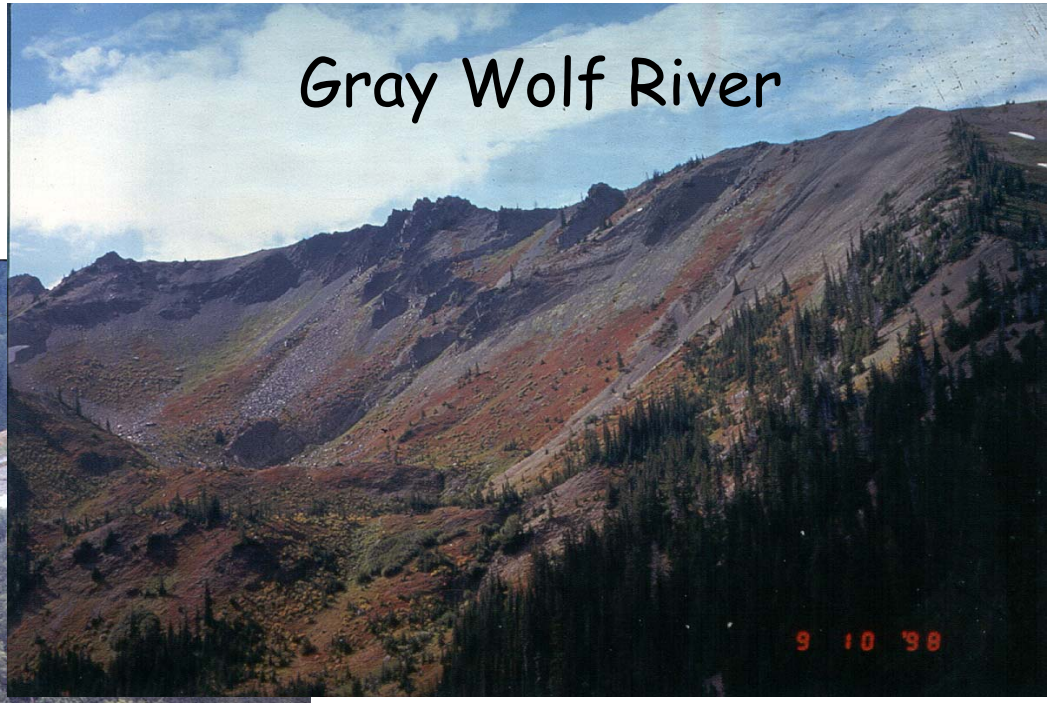
Hypothesized Effects of 70% Fishery Harvest Rate

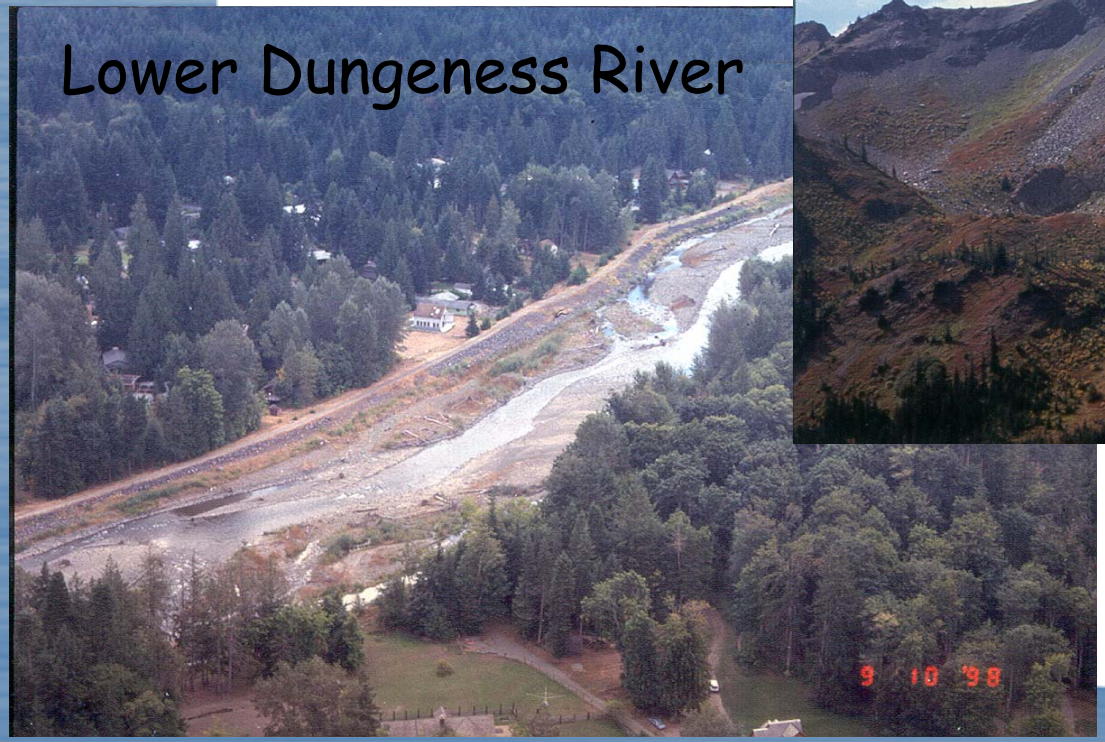


Hypothesized Effects of No Fishery Harvest



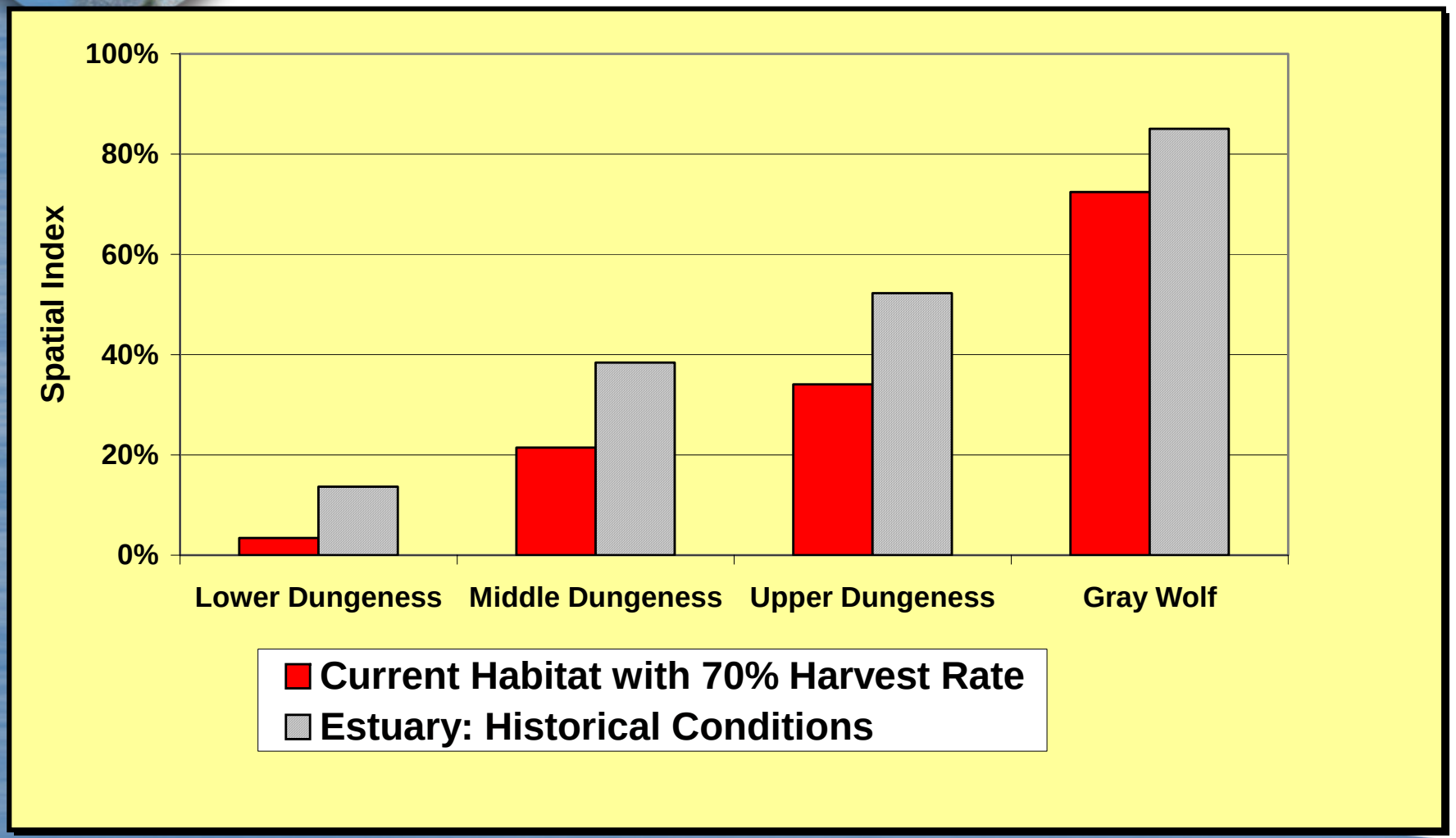
What About Habitat Restoration?



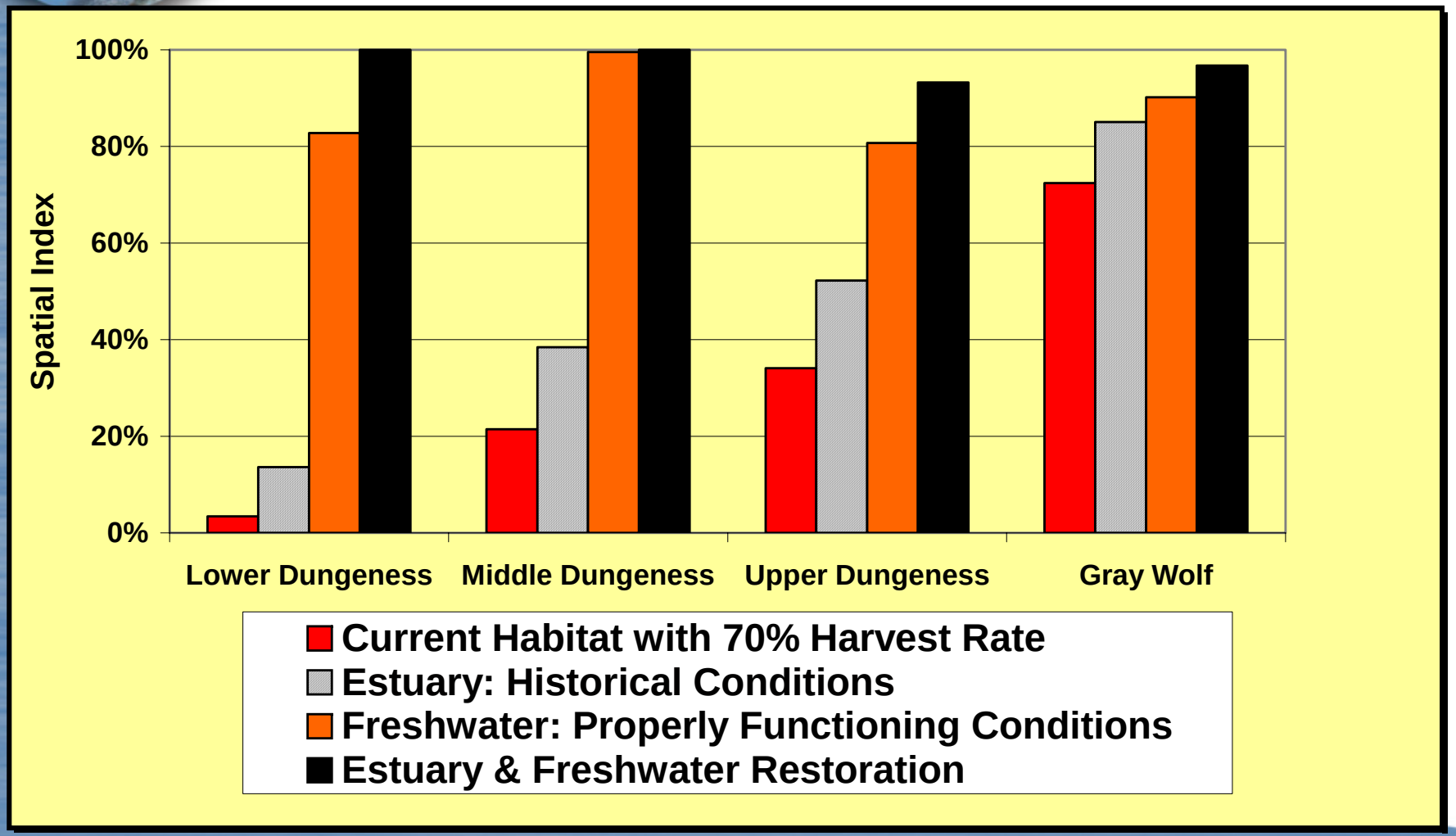


Photos courtesy of
Dungeness River
Management Team

Hypothesized Effects of Habitat Restoration



Hypothesized Effects of Habitat Restoration

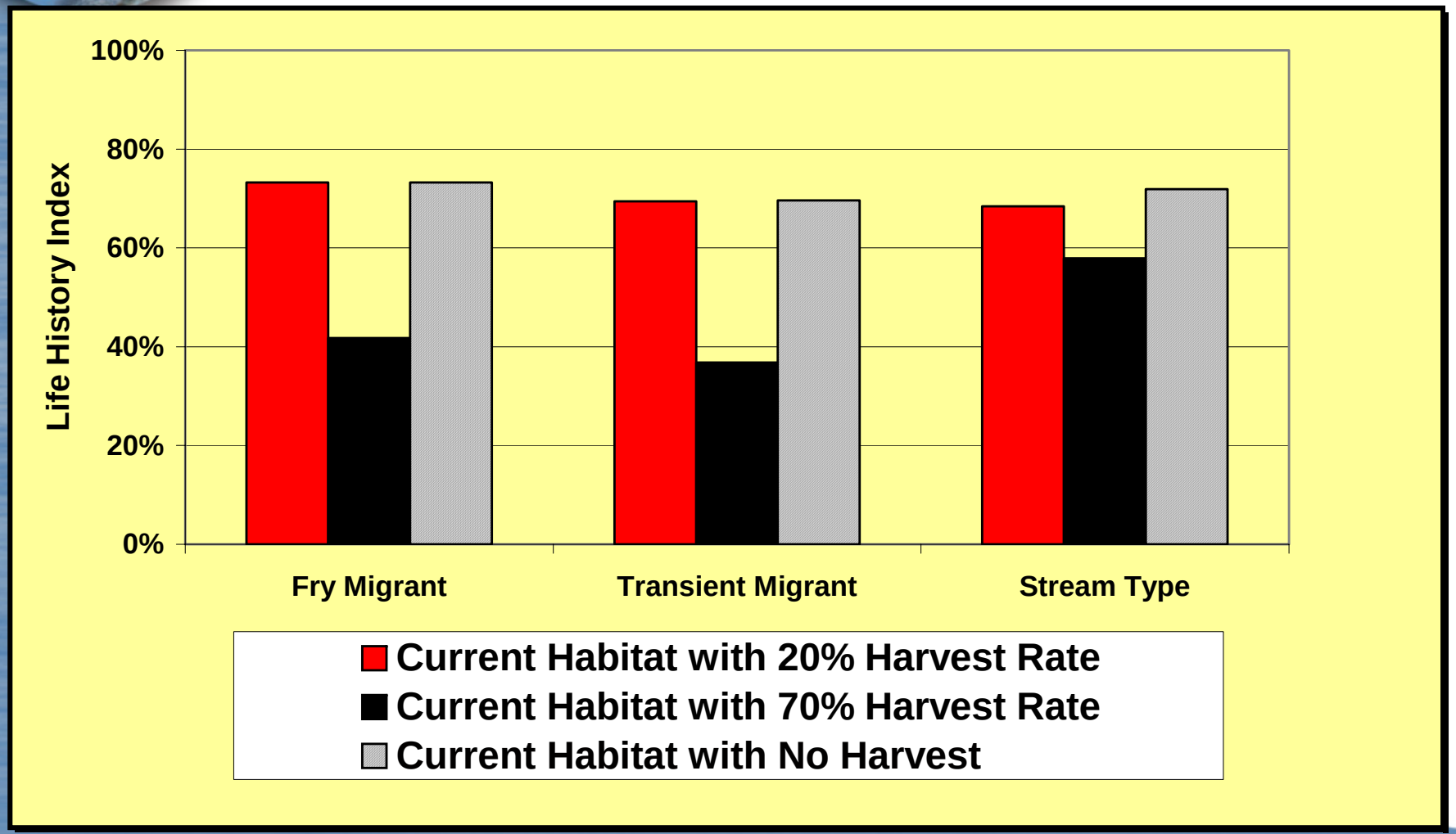


Life History Diversity

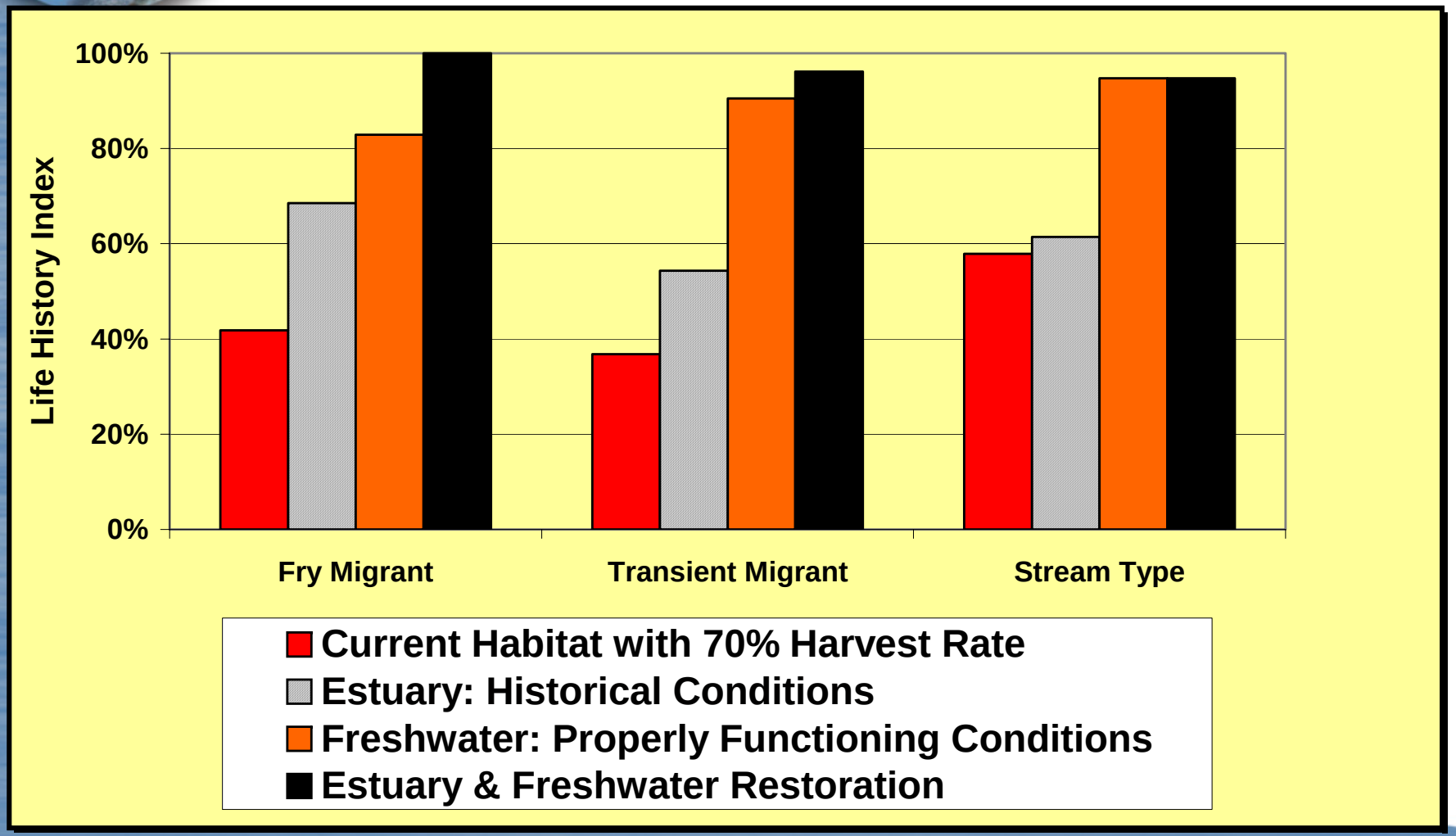
Reimers (1971) categorized Chinook salmon life histories in Sixes River Oregon:

- **Stream Type** – downstream migration after one year of freshwater residence
- **Ocean Type** – downstream migration within first year after emergence
  - Fry Migrant with downstream migration soon after emergence
  - Transient Migrant with short estuarine residence
  - Transient Migrant with extended estuarine residence
  - Fall Migrant

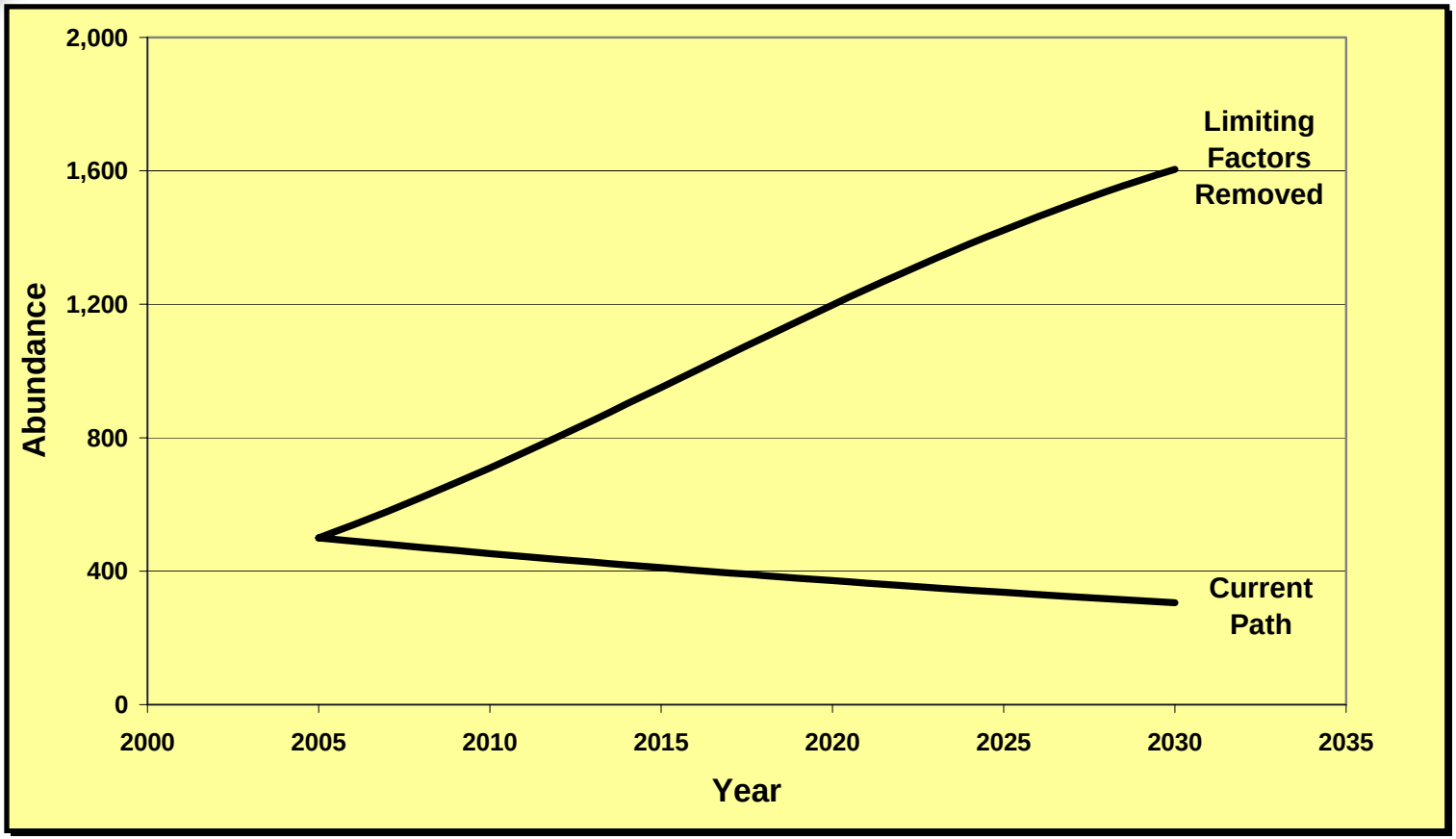
Hypothesized Effects of Harvest on Life History Diversity



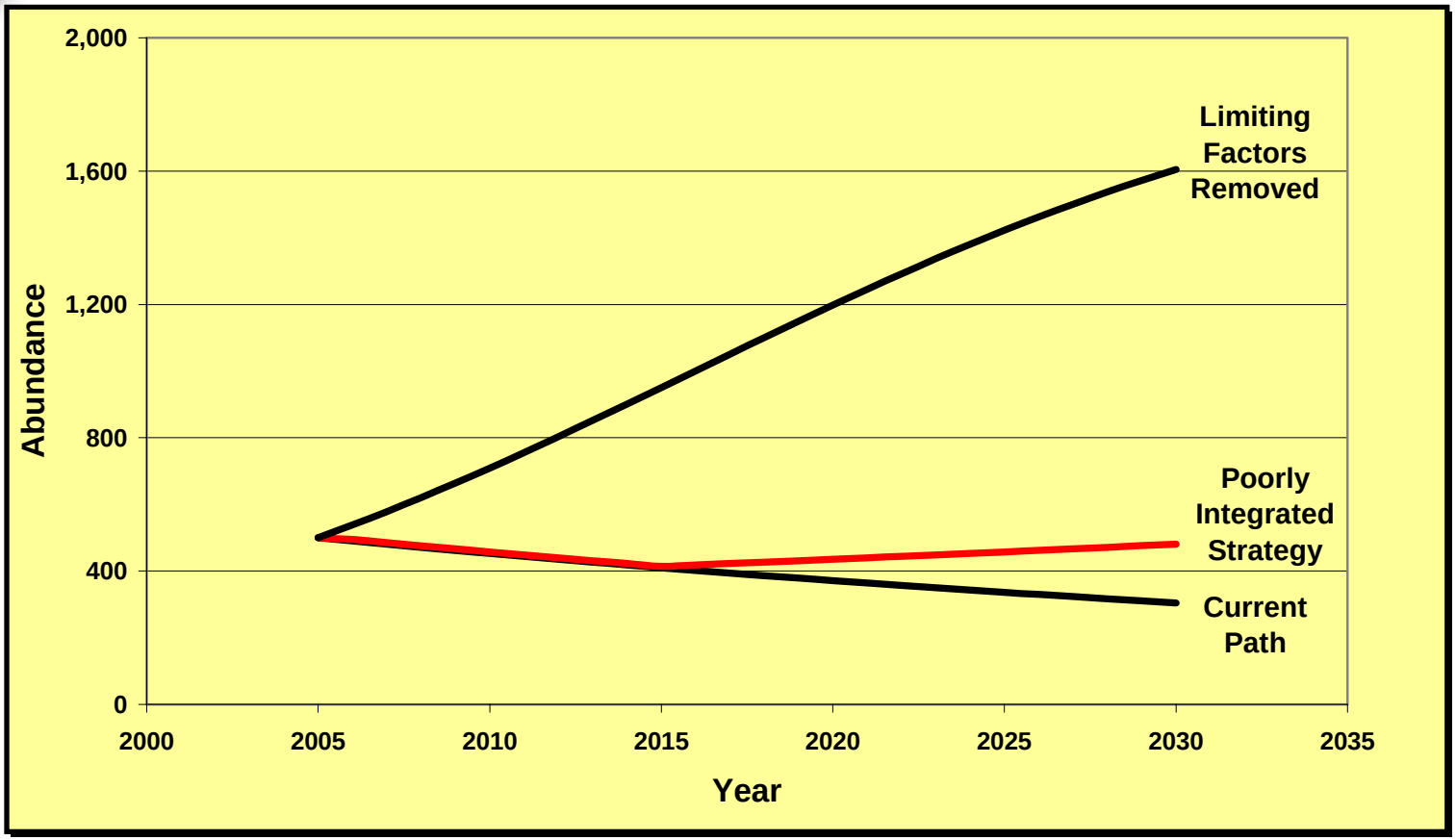
Hypothesized Effects of Habitat Restoration on Life History Diversity



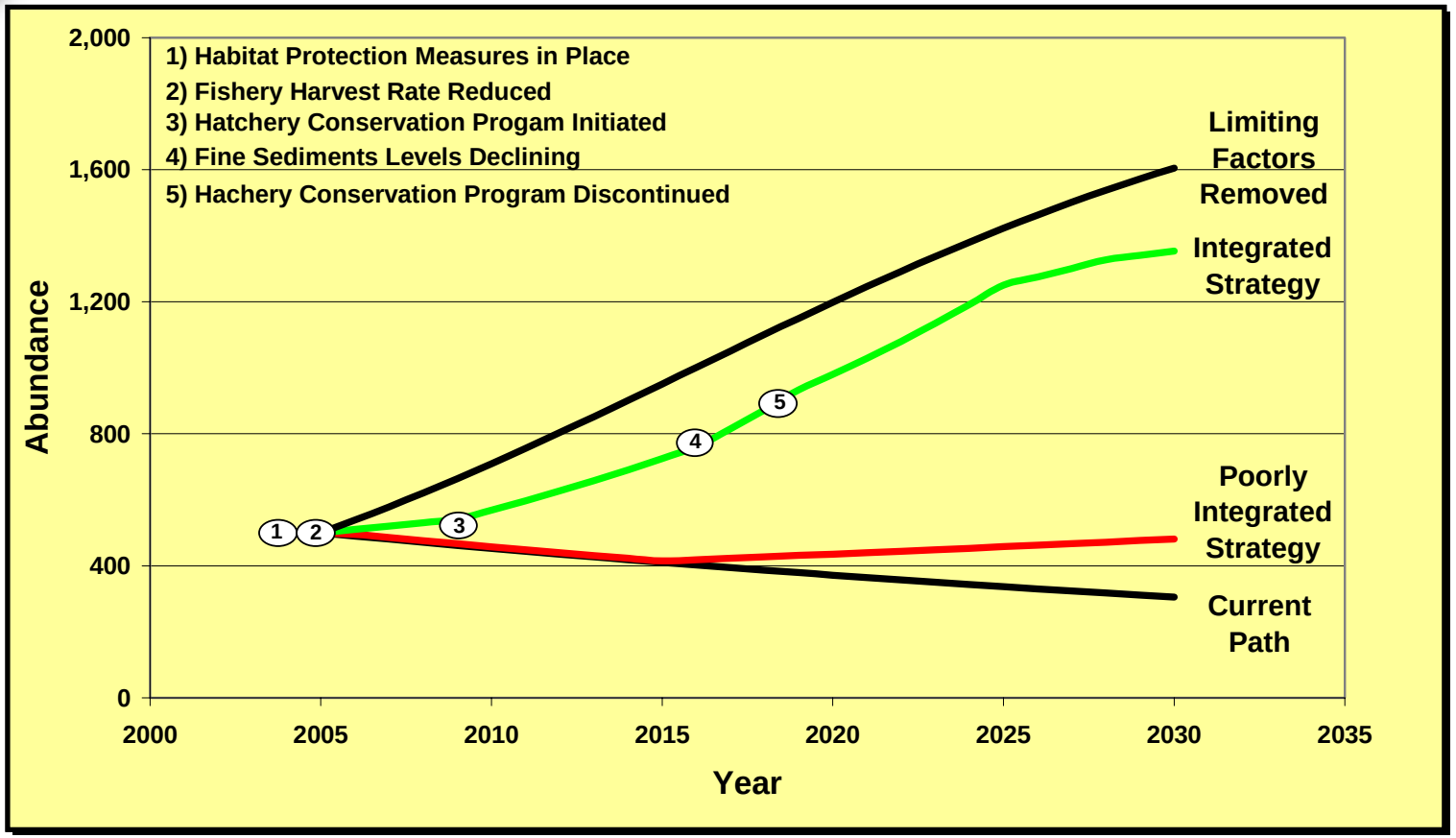
Abundance & Productivity

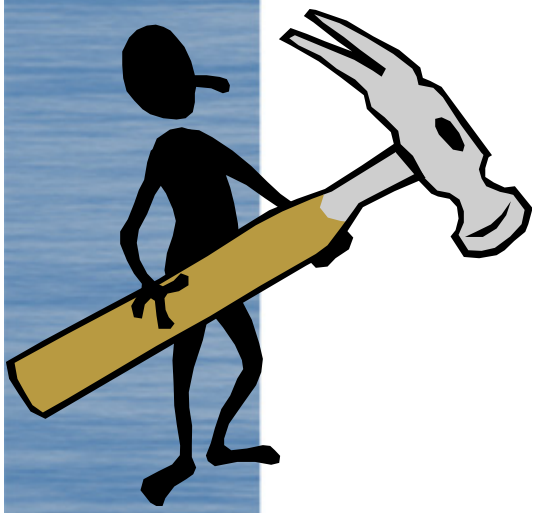


Poor Strategy Provides Limited Benefits



Contrast Alternative Suites of Actions





Tool Talk…

- Reviewed analytical tools currently available
- Concluded no single tool was adequate to meet current needs
- Compiled critiques of All H-Analyzer (AHA)
- Evaluated 3 alternative short-term solutions

Tool Talk…

Three short-term alternatives:

- Clearly state tool limitations
- Supplement with other tools
- Develop enhanced tool

Table 1. Draft compilation of AHA review comments and options to address those comments.

Review Comment	Alternative 1 Clearly State Tool Limitations	Alternative 2 Supplement With Other Tools	Alternative 3 Develop Enhanced Tool
1) Managers should consider the model a tool for heuristic exploration of integrated strategies for hatchery, harvest, and habitat actions rather than a quantitative predictor for specific populations. (PSTRT)	Explain and document use of tool consistent with recommendation.	EDT population model, SHIRAZ, or other tools available for some watersheds.	Develop watershed specific empirical model. (Varies by watershed; generally longterm task.)
2a) Developers should provide documentation for the model, including the strengths and limitations of the model and sensitivity analysis. (PSTRT) 2b) The AHA model should not be used…until it is properly documented and validated in a substantive review. (ISAB)	Implement recommendations.		
3a) Users should be able to incorporate uncertainty in the parameter estimates and the model should display uncertainty of the results. (PSTRT) 3b) Allowance should be made for variation in	Explain and document use of tool as heuristic evaluation of alternative strategies; do not apply as tool for viability analysis.	1) Provide results from EDT sensitivity analysis. 2) EDT population model, SHIRAZ, or other tools available for some watersheds.	3) Improve simulation of variability in stock-recruit function using empirical data. (July 2006) 4) Incorporate uncertainty in genetic analysis (Busack et al. 2005). (July

Tool Talk…

Review Comment	Shortterm Approach
1) Managers should consider the model a tool for heuristic exploration of integrated strategies for hatchery, harvest, and habitat actions rather than a quantitative predictor for specific populations. (PSTRT)	1) Add explicit time dimension. 2) Apply complementary tools such as SHIRAZ, EDT, and EDTP.
2a) Developers should provide documentation for the model, including the strengths and limitations of the model and sensitivity analysis. (PSTRT) 2b) The AHA model should not be used…until it is properly documented and validated in a substantive review. (ISAB)	Provide documentation and evaluate model performance relative to independent empirical data.
3a) Users should be able to incorporate uncertainty in the parameter estimates and the model should display uncertainty of the results. (PSTRT) 3b) Allowance should be made for variation in additional critical input parameters, such as productivity, capacity, and harvest rate. (ISAB)	1) Incorporate stochastic variation in: a) freshwater and marine survival; b) initial population abundance; and c) harvest management controls. 2) Incorporate uncertainty in genetic parameters affecting fitness (Busack et al. 2005).

Summary

- What are we trying to do?
  - Promote integration
  - Facilitate comparison of strategies
  - Develop hypotheses about expected outcomes to drive monitoring and adaptive management
- Currency: VSP characteristics
- Metrics: Planning & monitoring
- Tools
  - No single perfect tool
  - Improved tools under development
  - Current tools provide substantial insights

Spatial Structure Metric

Spatial index for reach i under current conditions:

$$S_i^C = \frac{(\#\text{ viable trajectories current conditions})}{(\#\text{ viable trajectories historical conditions})}$$

where a trajectory is defined as viable if the intrinsic productivity is greater than or equal to 1.

Example – Spatial Structure

Reach	Trajectory	Productivity	
		Scenario 1	Historical
1	1	0.6	14.0
1	2	0.9	18.0
1	3	2.3	16.0

Reach 1

Viable under Scenario 1	1
Viable Historically	3
Spatial Index	**33%**

Example – Life History Index

Reach	Life History Pattern	Productivity	
		Scenario 1	Historical
1	Fry Migrant	0.6	14.0
1	Transient Migrant	0.9	18.3
1	Stream Type	2.3	16.0
2	Fry Migrant	0.0	16.7
2	Transient Migrant	2.0	15.0
2	Stream Type	4.0	14.7

	Fry Migrant	**Transient Migrant**	**Stream Type**
Viable under Scenario 1	0	1	2
Viable Historically	2	2	2
Life History Index	0%	50%	100%

Dungeness River
Spatial Structure & Life History Summary

Current Habitat Condition and 20% Fishery Harvest Rate

	Spatial Structure				
Life History Type	Lower	Middle	Upper	Gray Wolf	All
Fry Migrant	8%	51%	78%	100%	73%
Transient Migrant	14%	42%	83%	100%	69%
Stream Type	0%	32%	82%	100%	68%
All	12%	43%	82%	100%	70%

The All H Analyzer (AHA)

a tool to examine

suites of actions

What does AHA do?

AHA attempts to answer, given a certain set of actions:

- How many hatchery and natural origin fish will:
  - be harvested?
  - return to the spawning grounds?
  - return to the hatchery?
- What is the proportion of natural influence (PNI) on the population?

AHA Inputs

Habitat:

- How productive is the habitat (productivity)?
- How much habitat is available (capacity)?

Harvest:

- What is the harvest rate on natural origin and hatchery origin fish:
  - in the ocean?
  - in Puget Sound?
  - in the terminal river fishery?

Hatchery:

- How much broodstock does the hatchery collect?
- How many smolts are produced?
- What percentage of hatchery fish: return to the hatchery? spawn in the wild?

habitat productivity

habitat capacity

Subbasin	Species	Stock Name	Current	
My Basin	Coho	My Stock		
Habitat:	Productivity | Capacity		4.30	3,111
	Min NOR Escapement | %Kelt		1	
	Variable SAR? (Y/N)		y	
Harvest:	Harv.Rate -Marine	[NORs|HORs]	0.15	0.4
	-Mainstem	[NORs|HORs]	0.15	0.25
	-Terminal	[NORs|HORs]	0.01	0.1
	Total Expl. Rate	[NORs|HORs]	0.28	0.60

Harvest rates

Other	Program Name	Sunsite	Div	Contri
	Integrated	pNOB	pHOS	
Primary Hatchery Program	Broodstock Composition: Goal			
	Realized		68%	
		Local	Import	
	[Broodstock | Smolt Release]	810	937,859	
	HOR Destination [Hat | River]	80%	20%	
	[Recruits/Spawner | Fitness?]	17.8	y	

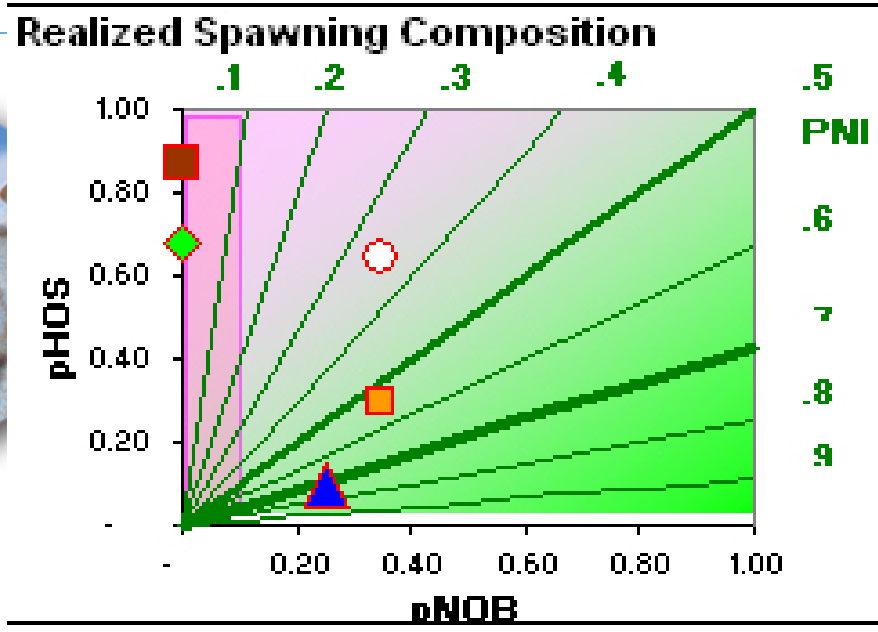
Hatchery broodstock

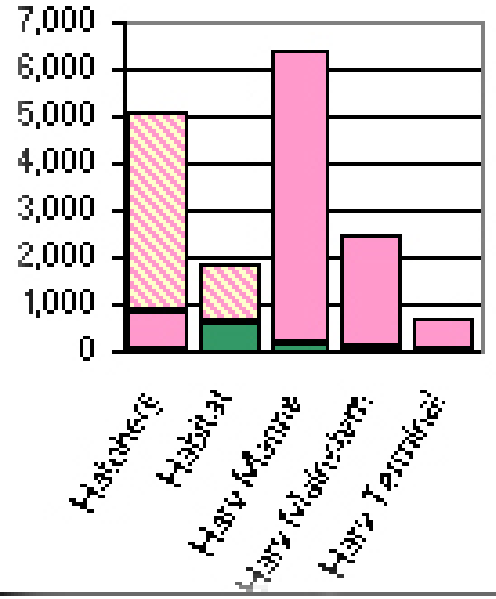
Hatchery smolts

% of hatchery fish: return to the hatchery? spawn in the wild?

AHA Outputs

- How many hatchery and natural origin fish will:
  - be harvested?
  - return to the spawning grounds?
  - return to the hatchery?
- What is the proportion of natural influence (PNI) on the population?





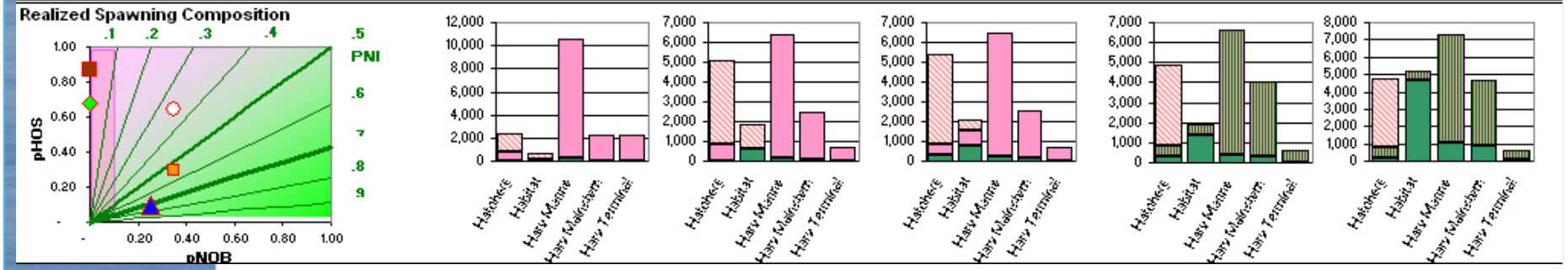
What is the proportion of natural influence on the population?

How many hatchery and natural origin fish will:

- be harvested?
- return to the spawning grounds?
- return to the hatchery?

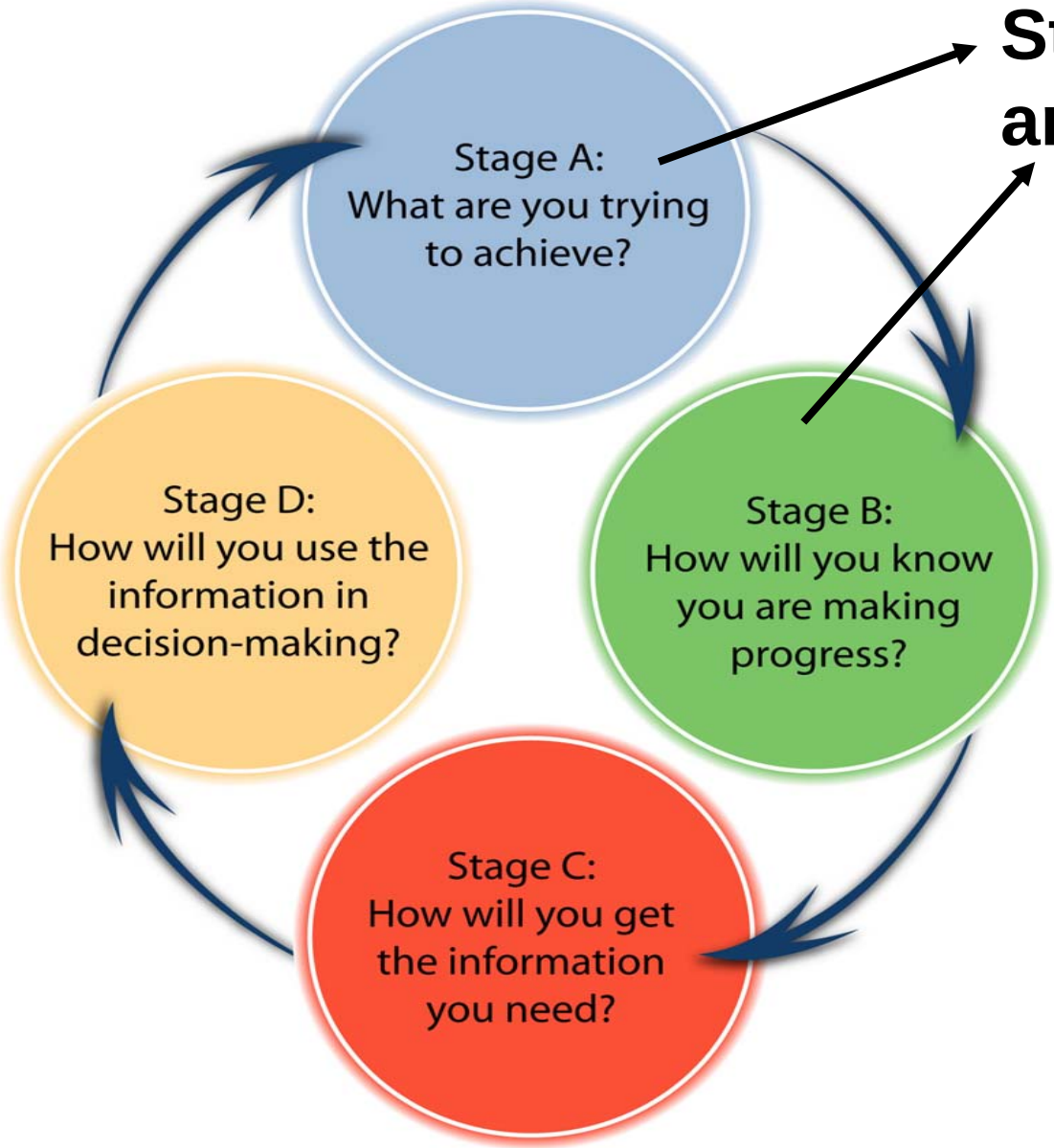
Test and compare short-term and long-term scenarios

Subbasin	Species	Stock Name	Before Listing		Current		Short-Term A		Short-Term B		Long-Term (PFC)	
My Basin	Coho	My Stock										
Habitat:	Productivity | Capacity		4.30	3,111	4.30	3,111	4.30	3,111	5.30	3,888	11.70	7,701
	Min NOR Escapement | %Kelt		1		1		1		1		1	
	Variable SAR? (Y/N)		y		y		y		y		y	
Harvest:	Harv.Rate -Marine	[NORs|HORs]	0.65	0.65	0.15	0.4	0.15	0.4	0.15	0.4	0.15	0.4
	-Mainstem	[NORs|HORs]	0.4	0.4	0.15	0.25	0.15	0.25	0.15	0.4	0.15	0.4
	-Terminal	[NORs|HORs]	0.1	0.1	0.01	0.1	0.01	0.1	0.01	0.1	0.01	0.1
	Total Expl. Rate	[NORs|HORs]	0.81	0.81	0.28	0.60	0.28	0.60	0.28	0.68	0.28	0.68
Other	Program Name		Integrated									
	Broodstock Composition: Goal		pNOB	pHOS	pNOB	pHOS	35%	50%	35%	50%	25%	35%
Primary Hatchery Program	Realized			87%		68%	35%	65%	35%	29%	25%	10%
			Local	Import	Local	Import	Local	Import	Local	Import	Local	Import
	[Broodstock | Smolt Release]		810	937,859	810	937,859	810	937,859	810	937,859	810	937,859
	HOR Destination [Hat | River]		80%	20%	80%	20%	80%	20%	90%	10%	90%	10%
	[Recruits/Spawner | Fitness?]		17.8	y	17.8	y	17.8	y	17.8	y	17.8	y




Hatchery, Harvest, Habitat Integration &
Adaptive Management

The Evaluation Cycle



Steps 1, 2,3 and 4

6 Steps to Integration

1. Identify and involve needed participants
2. Gain a common understanding of the system
3. Agree upon common goals and outcomes across H-sectors
4. Examine, evaluate, and select a suite of complementary actions
5. Document rationale, implementation steps, expected outcomes and benchmarks
6. Build and implement a Verification, Effectiveness and Accountability System

Day Two Agenda (Part 1 of 2)
9:00 **Q&A and reconnect**
<u>Session 5</u> **Step 4: Examine, evaluate and select complementary suites of actions (Part 2)**
10:30—10:40 **Break**
10:40 **Continue Step 4**
Noon lunch **Haiku readings!**

Day Two Agenda (Part 2 of 2)

Session 6 **Step 5: document rationale and hypotheses, and describe implementation steps**
Session 7 **Step 6: Build & implement a verification, effectiveness & accountability system**
Session 8 **Next steps ’06 to ‘07 & resources available**
Feedback on overall H-I approach and process **Haiku contest winner announced!**
3:30 **Closing Speaker**
4:00 **Close**


Hatchery, Harvest, Habitat Integration &
Adaptive Management
See you tomorrow!