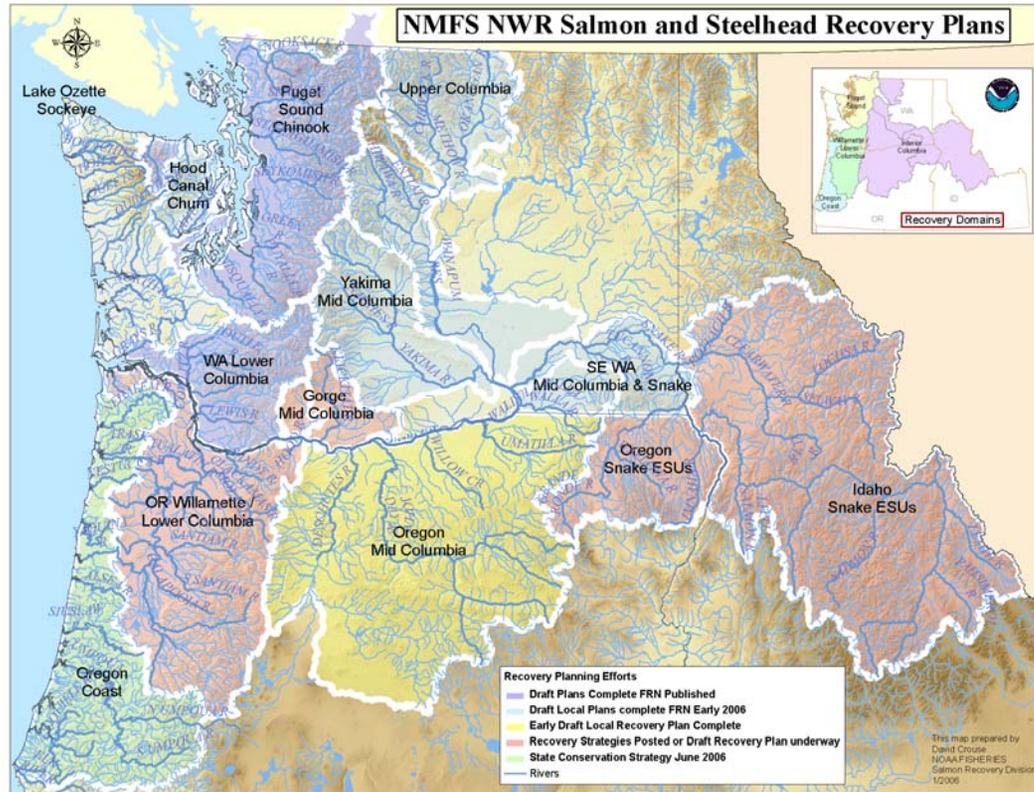


Update - Research, Monitoring & Evaluation for Salmon Recovery Planning

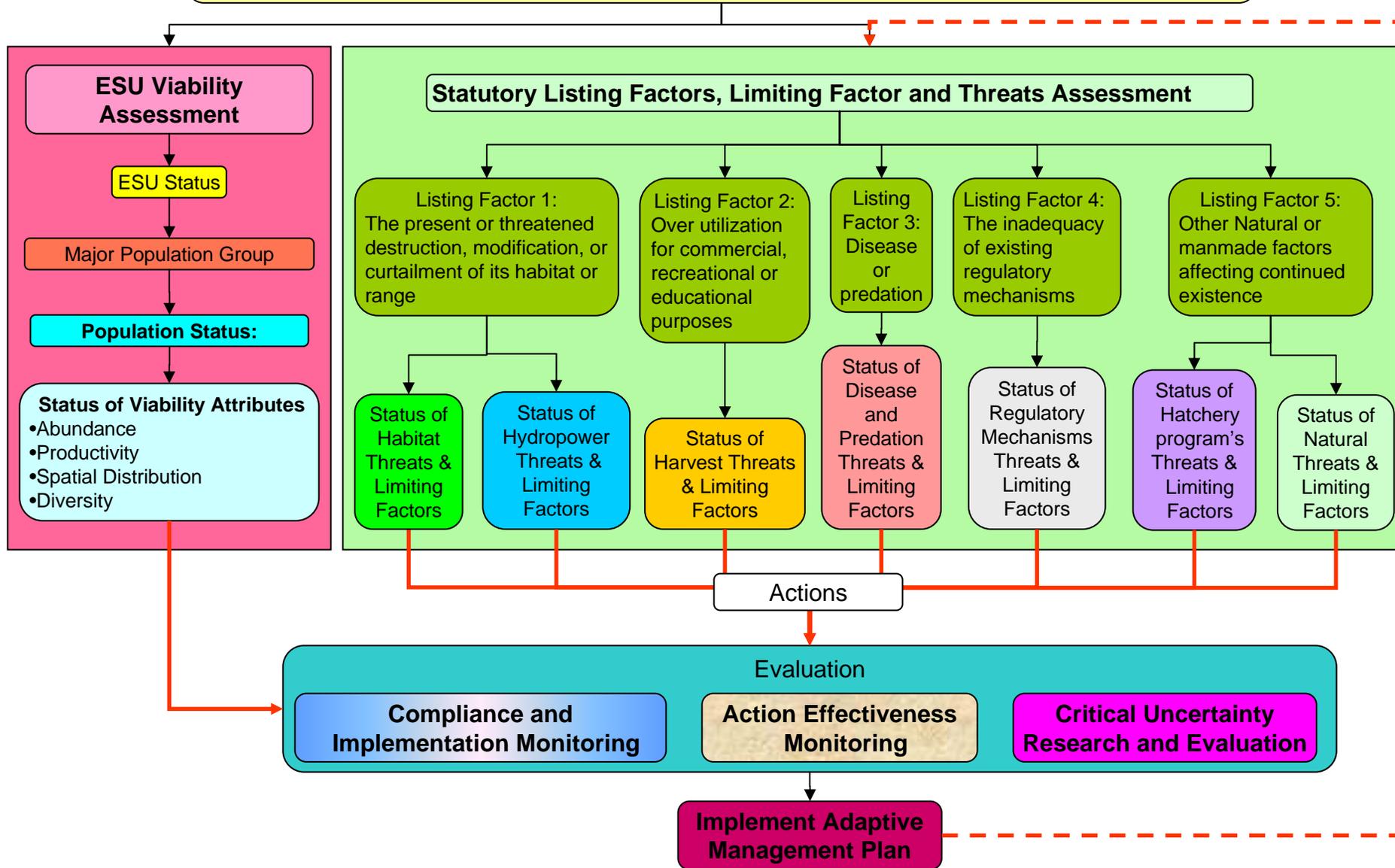


NOAA: National Marine Fisheries Service

- Northwest Regional Office
- Northwest Fisheries Science Center

NMFS Listing Status Decision Framework

NMFS will determine an ESU is recovered when an ESU is no longer in danger of extinction or likely to become endangered in the foreseeable future, based on an evaluation of both the ESU's status and the extent to which the threats facing the ESU have been addressed



RM&E Plan Design

- Should be structured around local recovery plan goals and objectives.
- Should determine the ESU status and whether the listing factors and threats have been addressed.
- Should include & describe the uncertainty around:
 - Biological Status and Trend Monitoring
 - Ecological Status and Trend Monitoring
 - Action Effectiveness Monitoring & Research
 - Implementation & Compliance Monitoring
 - Research
- Should be nested within an adaptive management framework, based on results of monitoring and research to refine the recovery plan's strategies and actions.

Adaptive Management

- Adaptive management is the process of adjusting management actions and/or directions based on new information.**
- NOAA's Decision Framework is based on implementation plans with mechanisms for evaluating output (intermediate or final) to feedback on the design and implementation of the action.**

Adaptive Management Plan Based on the Following Principles

- Revisit management strategies regularly;
- Conceptual or quantitative models to test hypotheses and guide strategy and action planning;
- Provide potential management actions;
- Track progress;
- Learning from monitoring and evaluation;
- Adjusting management strategies and actions.

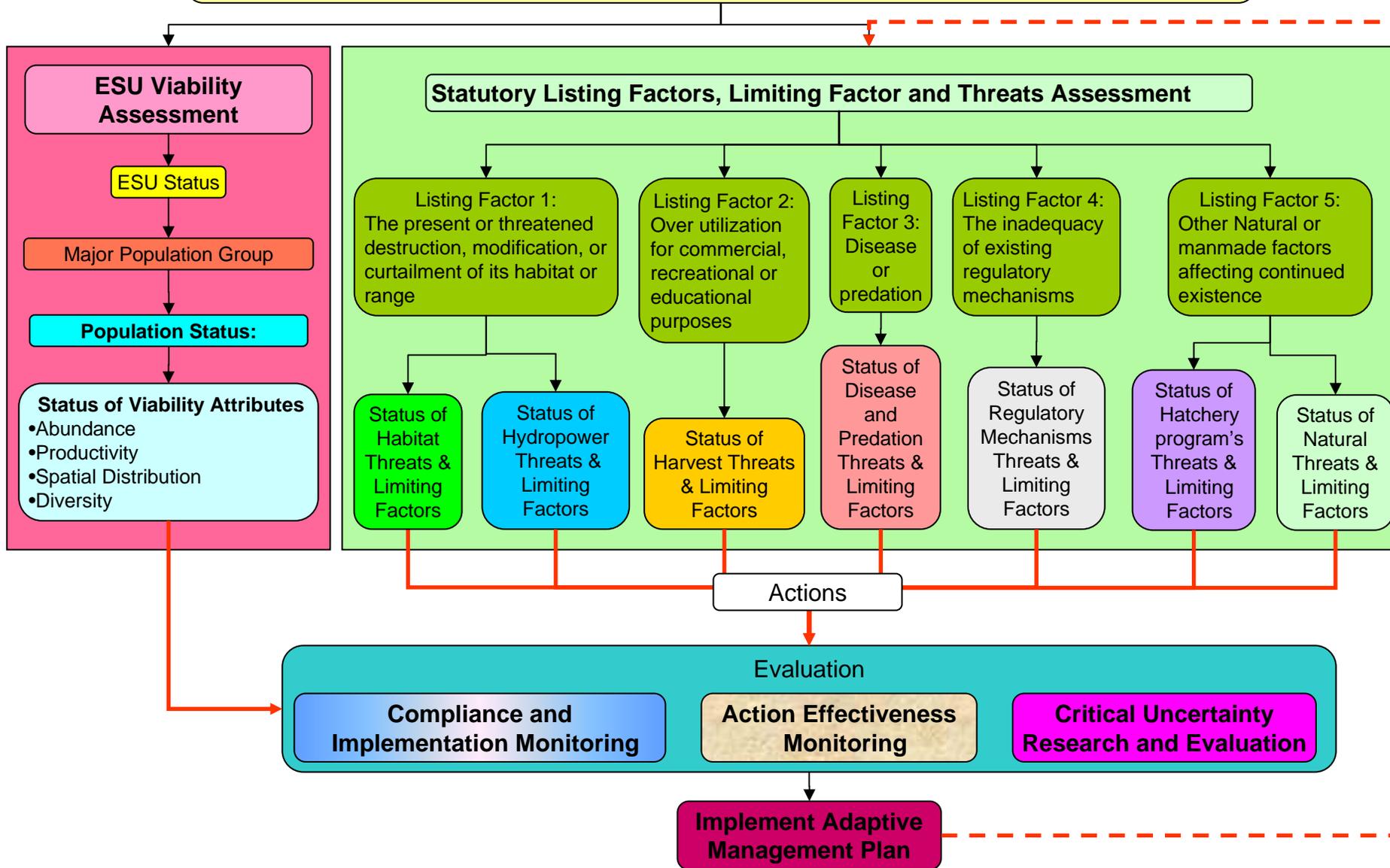
Adaptive Management and Monitoring and Evaluation for ESA Listed Salmonids

A monitoring and evaluation plan in an adaptive management framework provides answers to the two important questions in salmon recovery:

1. What is the status of the population for each of the four VSP parameters?
2. At the population level, which factors among all of the “H’s” are limiting recovery for each population/ESU?

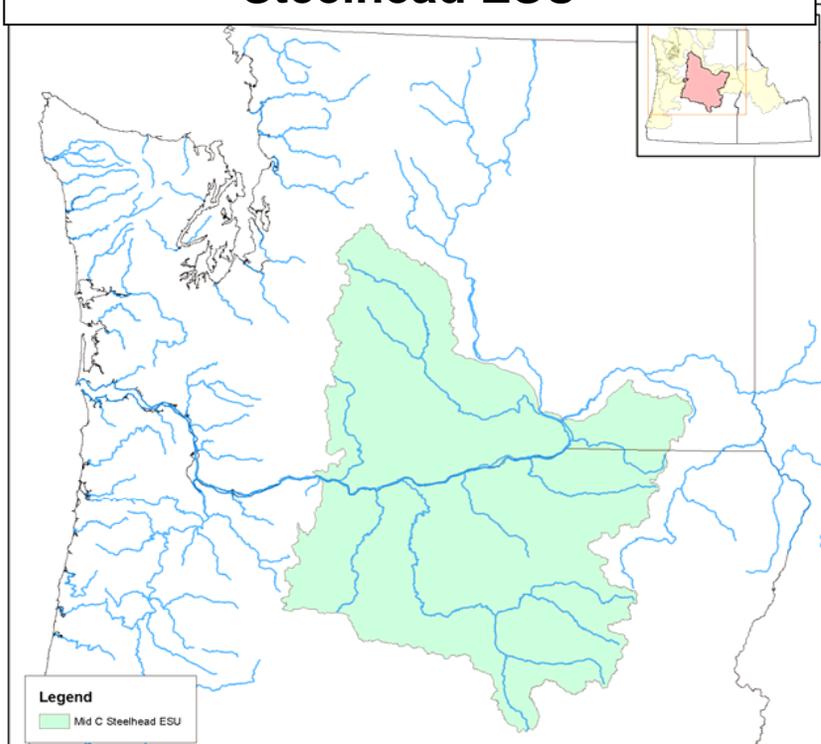
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ESU- Scale Decision & Question

Example: Mid Columbia Steelhead ESU

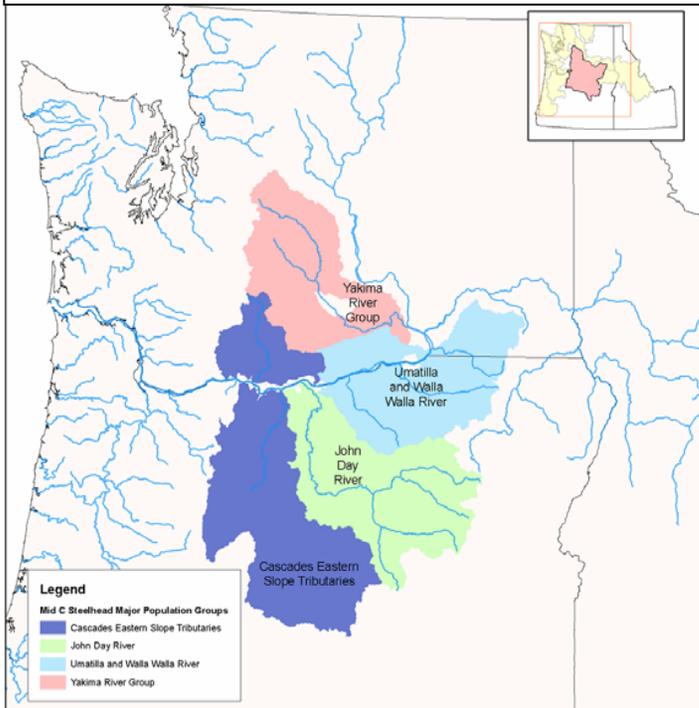


Decision: The aggregate status and change in status of the MPGs in the ESU demonstrate a level of risk, natural sustainability, or probability of persistence sufficient to warrant a change in ESU listing status.

Question: Are all MPGs within the ESU at, or clearly trending toward, a low risk status?

Major Population Group- Scale Decisions and Questions

Example: Mid-Columbia Steelhead MPG

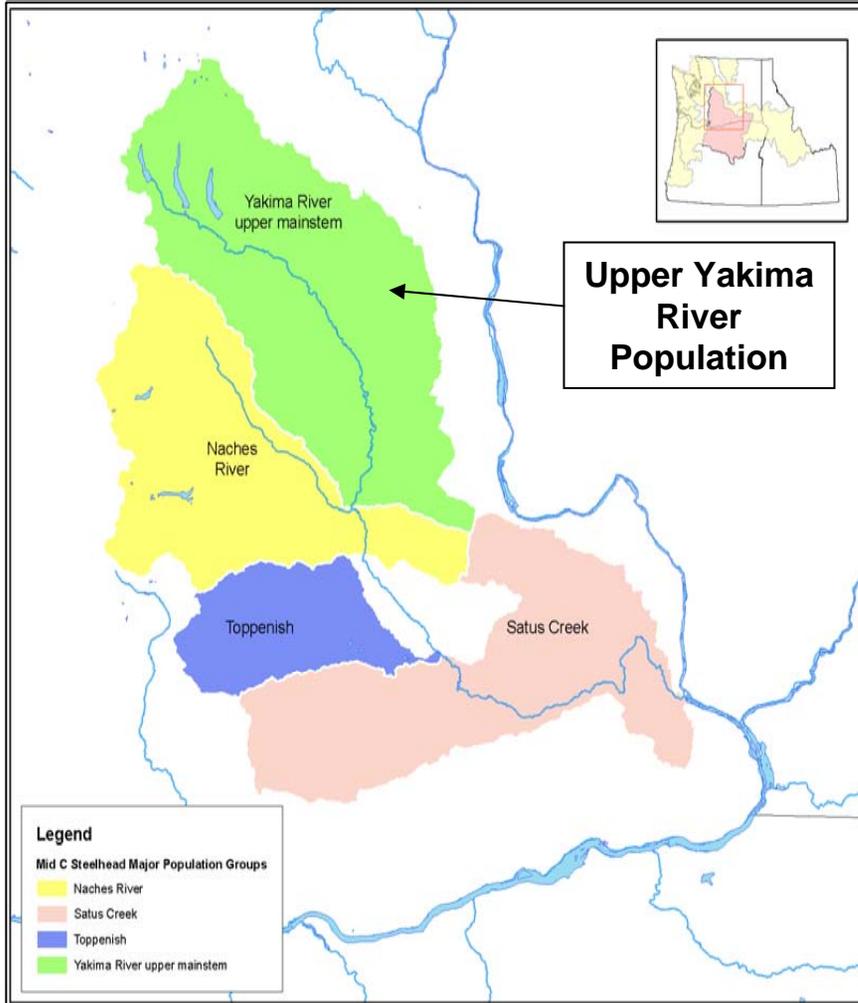


Questions: Is the number of populations at high viability/low risk consistent with recovery plans and TRT recommendations?

- 1. Overall MPG question and viability criteria**
Are 50% of historical populations (no fewer than 2) viable within the MPG?
- 2. Low-risk populations within the MPG**
Is at least one (if not proportionally represented) of each major life history type, or core/genetic legacy, population viable within the MPG?
- 3. Higher-risk populations within the MPG**
Do higher risk populations provide the degree of ecological function for MPG persistence such that overall MPG persistence does not fall below replacement?
- 4. For ESUs with only one MPG (Upper Columbia)**
Do populations in the MPG provide the degree of ecological function for MPG persistence such that overall MPG achieves desired viability objectives?

Population- Scale Decision & Questions

Mid Columbia Steelhead Yakima River MPG Populations



Decision:

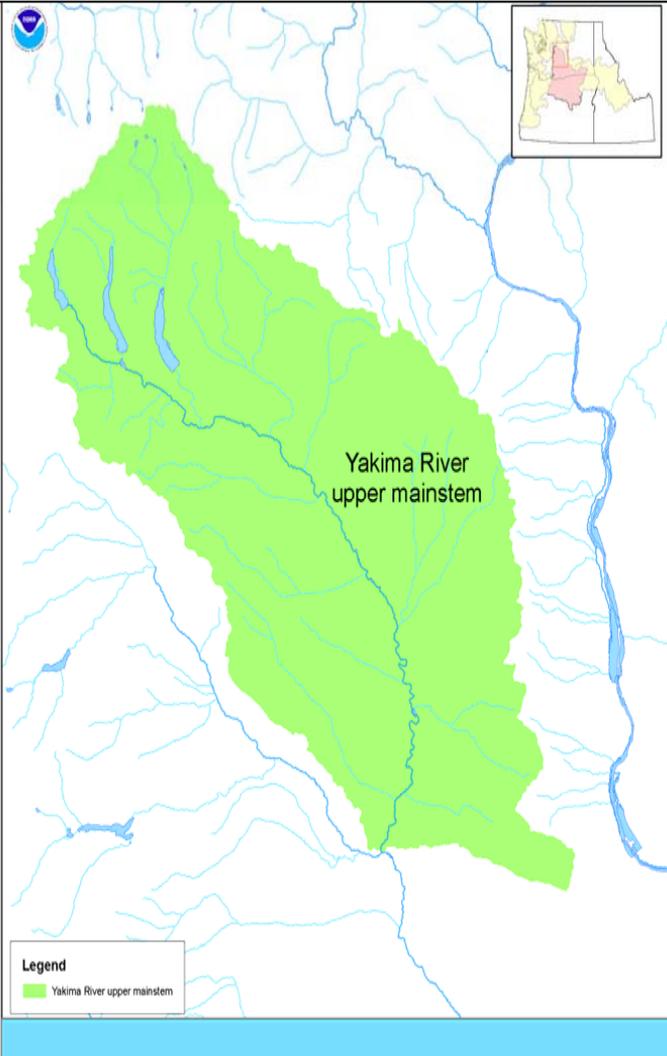
This decision/question couplet considers the population status indicators (abundance, productivity, diversity, spatial structure), based on TRT recommendations

Question:

What is the status and change in status of the population's viability parameters relative to its target viability parameters and status?

Population- Scale Decision & Questions

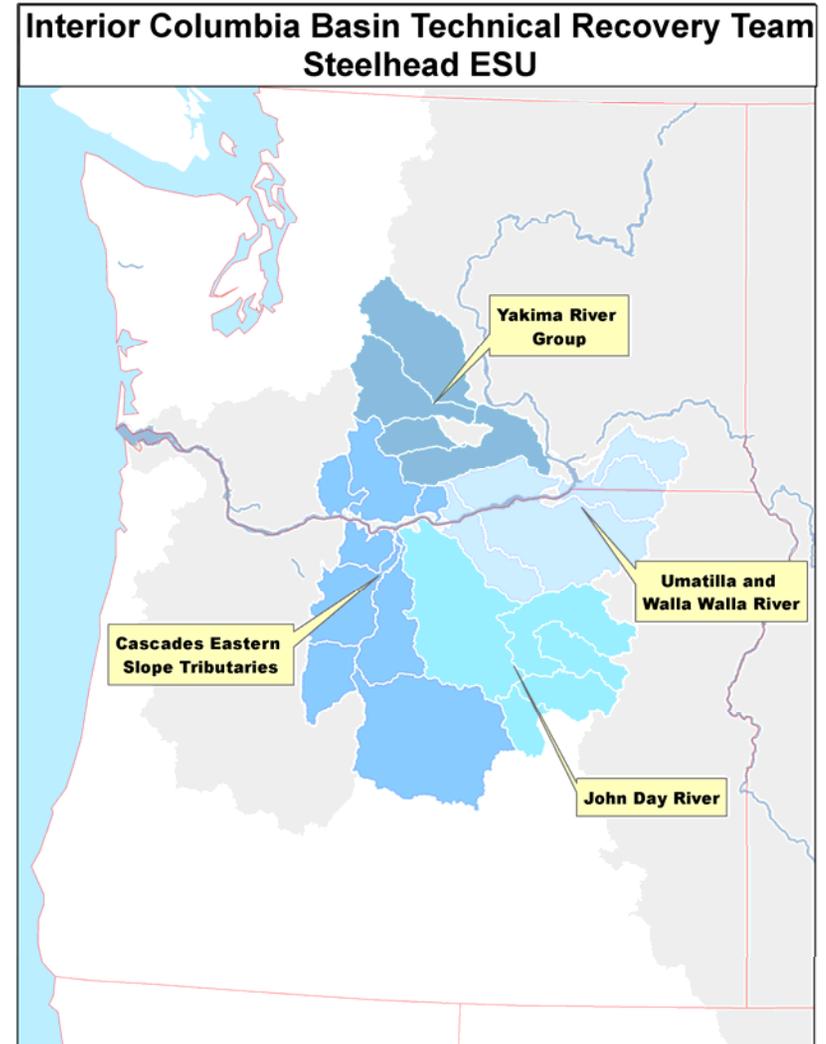
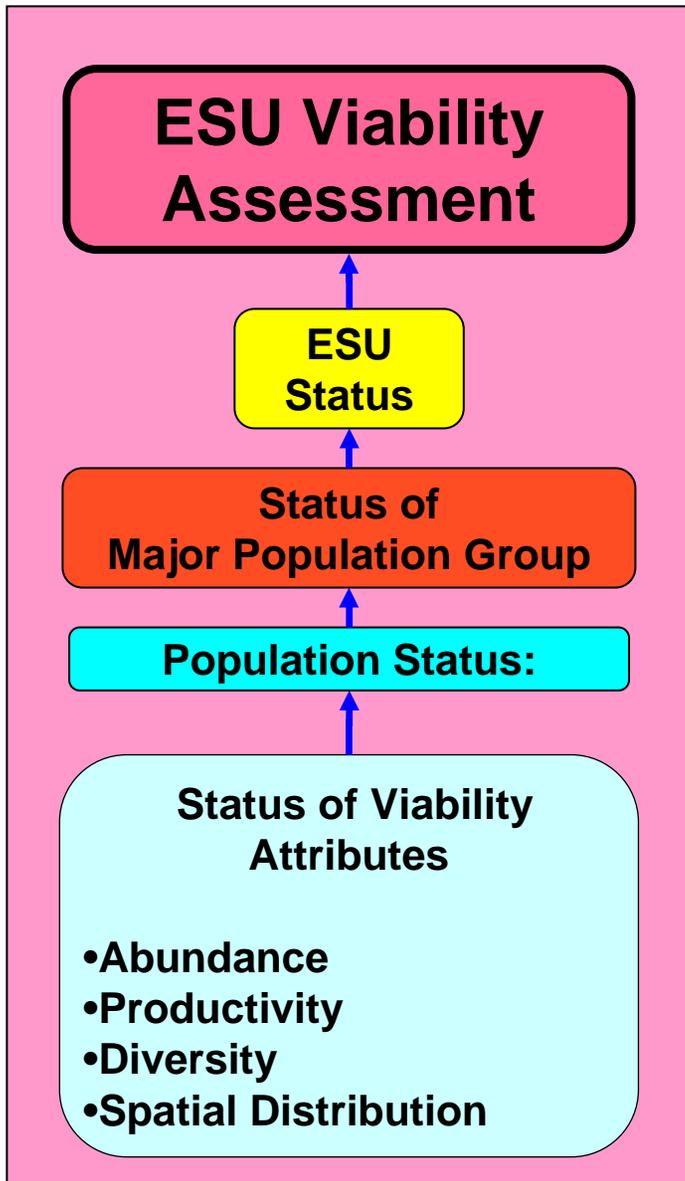
Mid Columbia Steelhead Yakima River Population



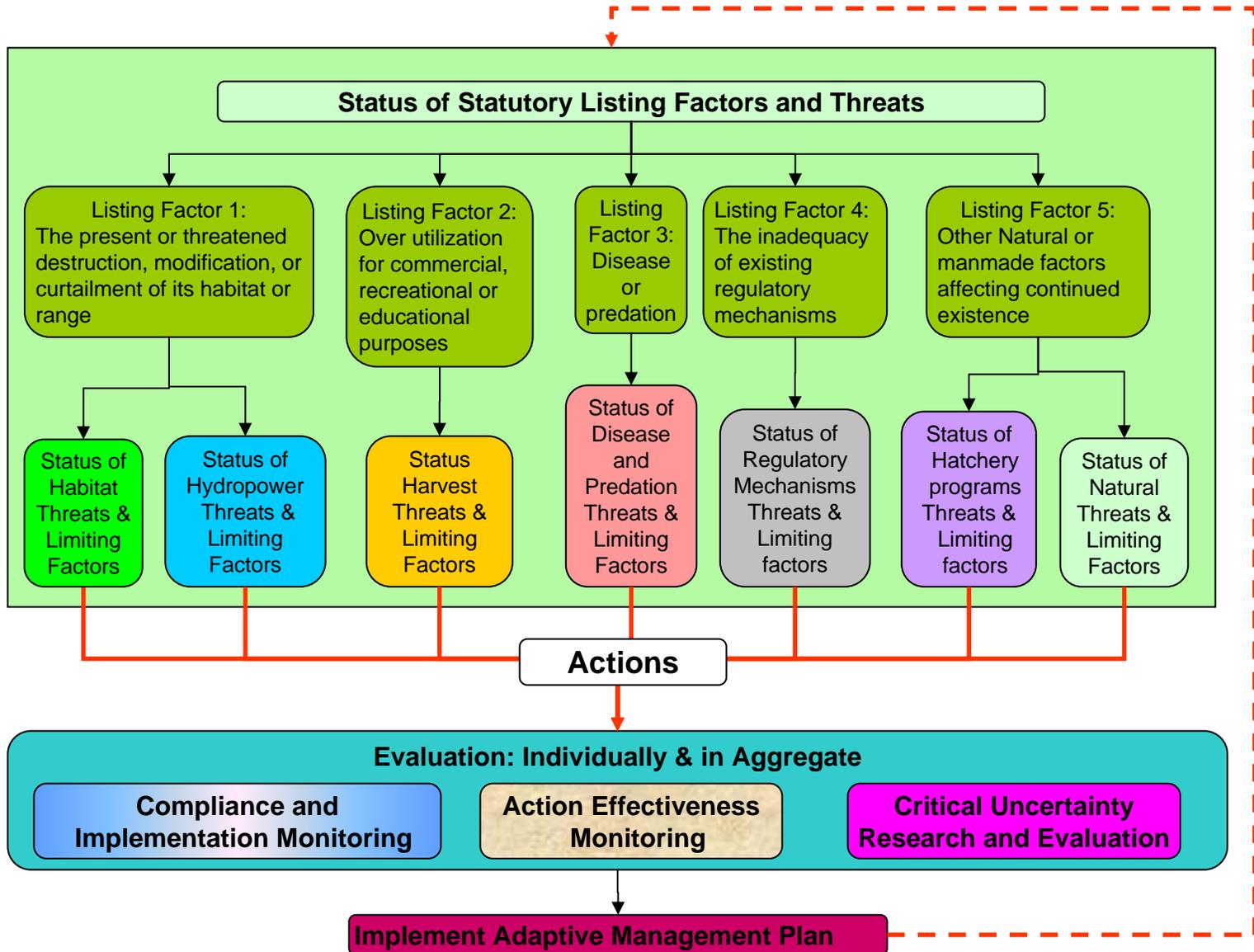
Viability Attributes

1. What is the abundance/productivity status of the population
2. What is the status of the spatial structure of the population
3. What is the current state, and change in state, of the diversity of the population
 - a. What is the current fraction and change in fraction of hatchery vs. natural spawners in the population?
 - b. What is the origin of hatchery fish in the population?
 - c. What is the effect of generations of hatchery fish on the population?

The Viability Assessment



Monitoring and Research Associated with Statutory Listing Factors and Threats



Statutory Listing Factors, Limiting Factor and Threats Assessment:

Decision:

The statutory listing factors have been addressed such that threats to the ESU have been ameliorated and no longer pose a threat to the continued existence of the ESU.

Questions to support the decision:

1. Have statutory listing factors been addressed such that threats to the ESU have been ameliorated to the extent that they no longer pose a threat to the continued existence of the ESU?
2. Is the ESU achieving or clearly trending toward a low risk status in response to actions that have been implemented to diminish those factors limiting achievement of ESU viability objectives?

Note: ESU limiting factors should be evaluated at the population level

Listing Factor 1: The present or threatened destruction, modification, or curtailment of its habitat or range:

Status of Habitat Limiting Factors

Question #1.

If there are habitat-related effects of limiting factors on observed abundance, productivity, diversity, or distribution of natural-origin fish, what is their significance for population viability?

- a) effect of habitat fragmentation and loss....**
- b) effect of fish passage conditions (Connectivity)**
- c) effect of channel morphology and complexity**
- d) effect of stream water quality**
- e) effect of water quantity**
- f) effect of interspecific interactions....**

Continued



Example: Status of Habitat Threats & Limiting Factors Continued:

Question # 1: Status of Habitat Limiting Factors

a) effect of habitat fragmentation and loss on the populations viability attributes.

Potential Metrics:

- 1. Acres of Wetland loss**
- 2. Change in Nearshore & marine habitat quantity and quality**
- 3. Miles of spawning area quantity and quality**
- 4. Change in over wintering/rearing habitat quantity and quality**

Note:

Additional metrics provided in the document

Listing Factor 1: The present or threatened destruction, modification, or curtailment of its habitat or range:

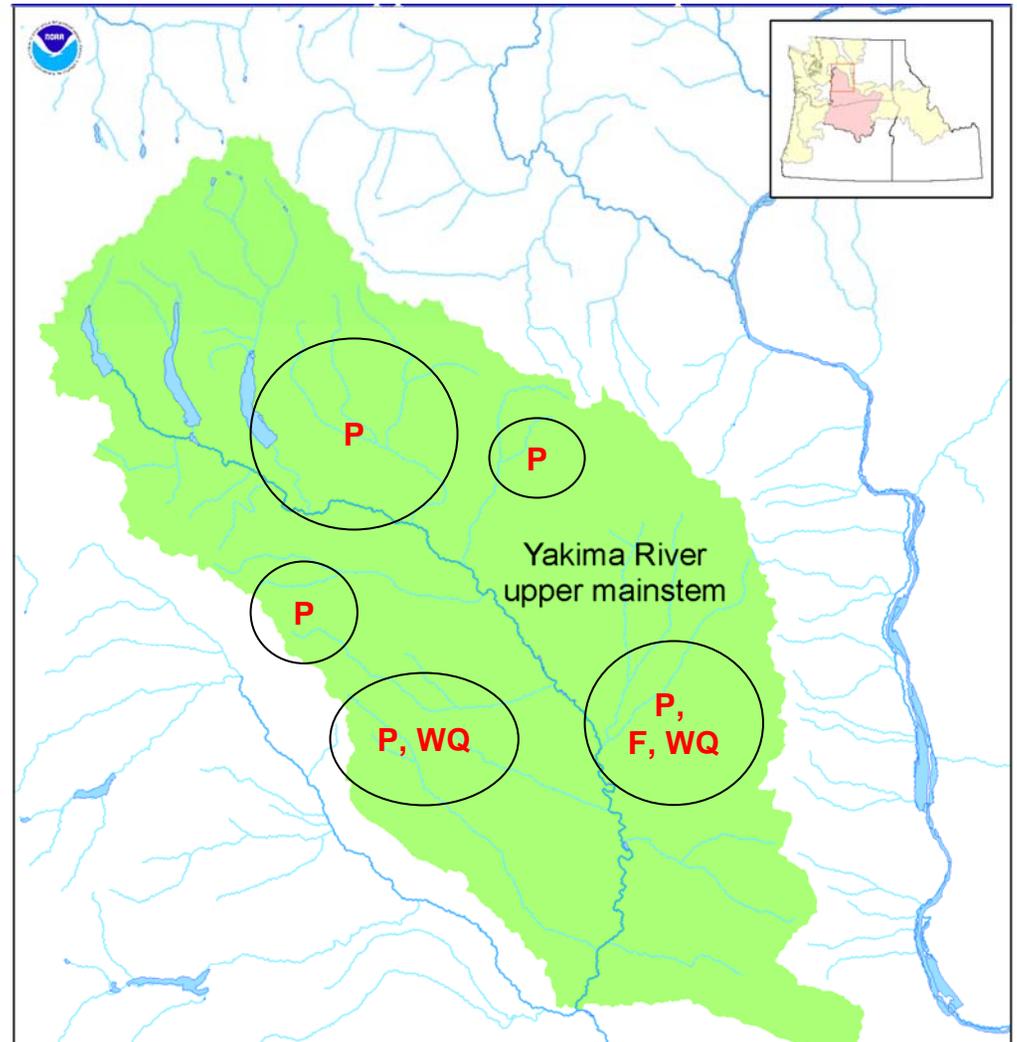
Status of Habitat Threats & Limiting Factors

- Question #2

Is the effect of this listing factor limiting the population's ability to achieve its recovery goals affected by cumulative impacts of other listing factors?

Example: Population Habitat Limiting Factor Assessment

- (D) Degraded/reduced habitat quantity, quality, diversity
- (CS) Altered tributary floodplain &/or channel morphology and complexity
- (M) Mainstem Columbia &/or Snake hydropower system mortality
- (F) Reduced tributary stream flow
- (R) Riparian degradation & loss of in-river large woody debris
- (P) Impaired tributary passage & blocks to migration
- (WQ) Degraded water quality – toxics
- (C) Competition, predation, harassment
- (T) High water temperature
- (S) Excessive sediment & embedded substrates



In the mainstem and estuary of the Columbia River monitor and evaluate other H limiting factors relative to viability to assess recovery status

How Might Monitoring & Adaptive Management Information be Used

Expect variation in amount and capacity of information for each Domain, ESU and Population

Three examples of what we might expect

- (1) Status (VSP) information rich and (LF) information poor
VSP indicators look good, confidence in viability is high
Management action tracking is poor
Connection of LF data to VSP data is poor
- (2) Status (VSP) information poor and (LF) information rich
VSP indicators hint at viability, but uncertainty is high
Management action accounting/tracking is good – lots of actions attached to LFs
Connection of LF data to VSP data is poor
- (3) Status (VSP) information moderate, (LF) information moderate, (AM) information rich
VSP indicators demonstrate progress towards viability
Management action accounting / tracking is adequate
Connection of LF data to VSP data is good

NEXT STEPS:

- **Complete guidance paper by end of April.**
- **Work with Northwest Region to develop RM&E plans based on the RM&E and adaptive management guidance document**
- **Develop monitoring decision scenarios to help provide tools to rank**
 - Monitoring VSP and Limiting Factors
 - Identify trade offs and consequences
- **Develop standardized language for listing factors and standardized data protocols like has been done in PCSRF.**

NEXT STEPS:

Complete recovery plans for region by December of 2006
(Excludes the Willamette ESU)

