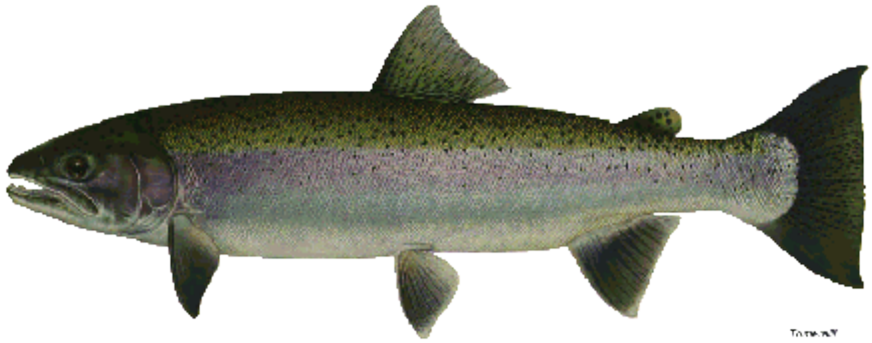
# Snake River Spring/Summer Chinook ESU

## 2010 Current Status Updates

**National Marine Fisheries Service**



# Outline

**Background: ICTRT Viability Criteria**

**Current ESU status - two questions**:

How has status changed relative to prior BRT status reviews?

- 2005 Review
- Time of listing (1997)

What is the current status of the ESU relative to viability and recovery criteria?

# Background

- Initial TRT tasks
  - Identify historical populations
  - Identify "viability criteria" for each population
  - Identify guidelines for viable ESUs (e.g., how many and which populations?)

- Viable Salmonid Populations and ESUs
  http://www.nwfsc.noaa.gov/assets/25/5561_06162004_143739_tm42.pdf
  (link from TRT publications webpage)

- TRT Reports:
  http://www.nwfsc.noaa.gov/trt/index.cfm

  - Individual TRT sites
    - ESU Populations
    - Draft Viability Criteria (ESU & Population)
    - Status assessments and analyses
    - Recovery plan reviews

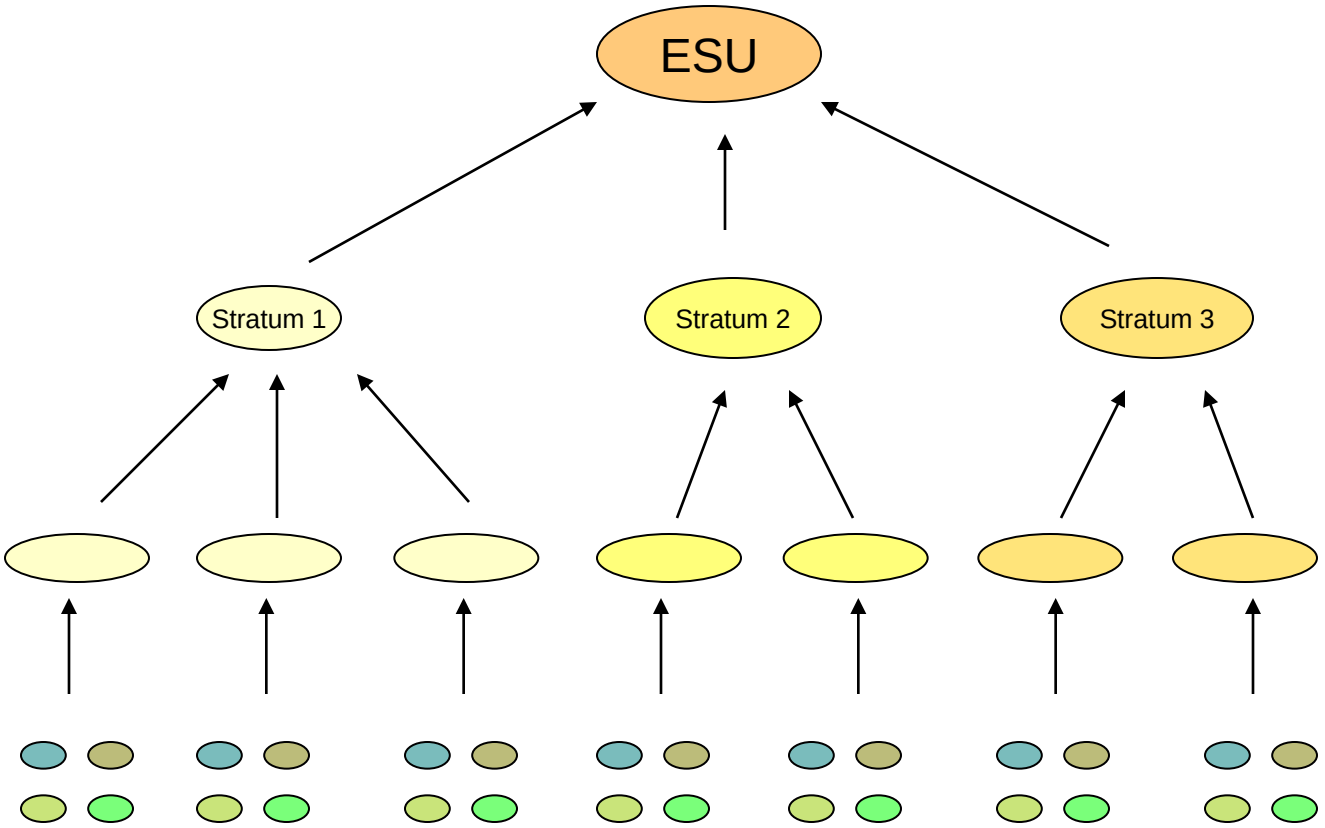
# TRT Hierarchical Criteria

**ESU Status**

**Stratum Status**

**Population Status**

**Population Attributes**




Abundance ,productivity
Spatial structure, diversity

# General Approach: ESU Viability

## ESU Level Criteria

- Expressed in terms of the desired status of populations within Major Population Groupings

- **Populations – Key level in ESU hierarchy**

- **Population Level Criteria**
  - Abundance & Productivity
  - Spatial Structure & Diversity
  - Integrating these components for a population

# Identifying Historical Populations

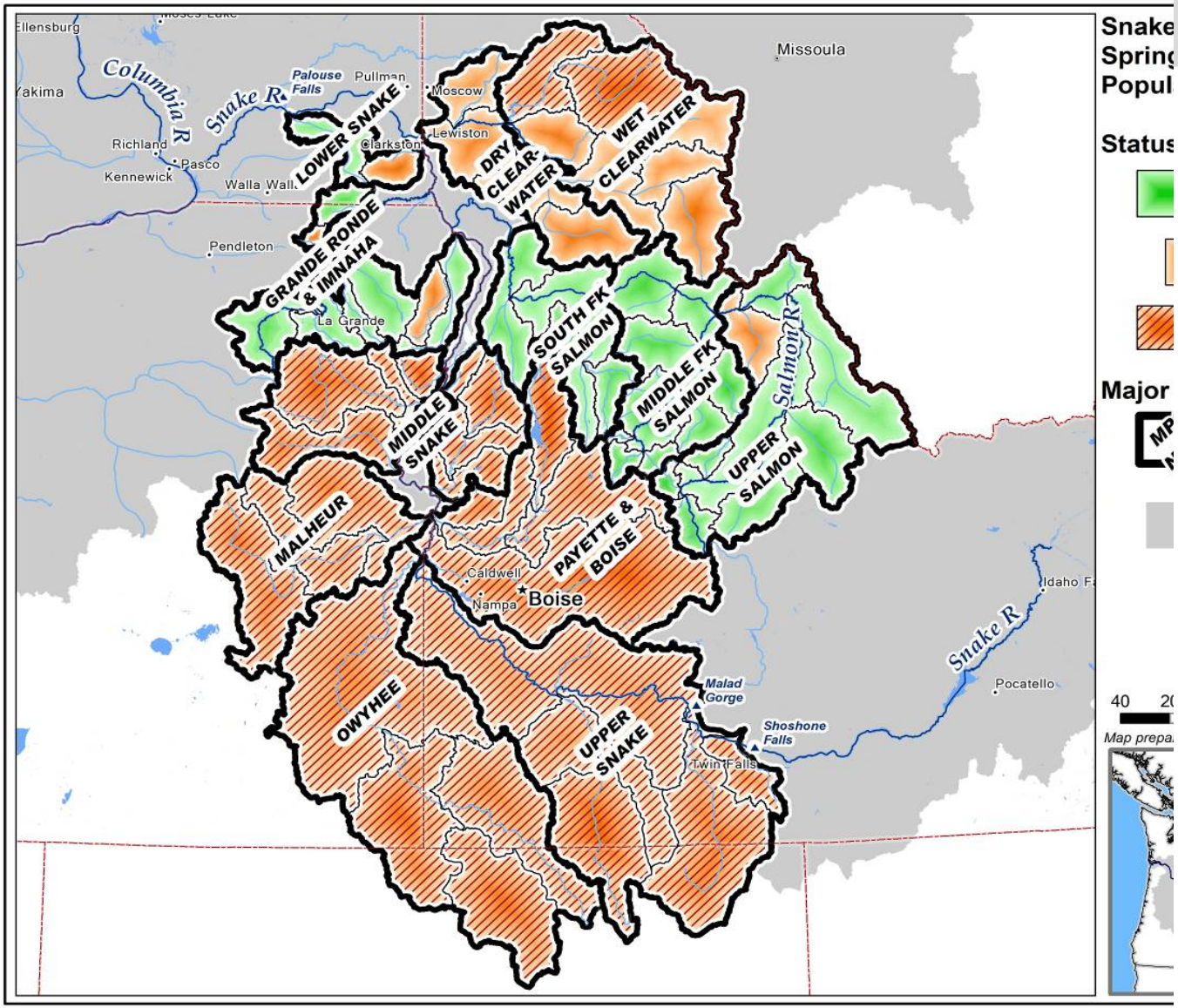
- **Starting point: Historical distribution on the landscape**
  - Early Field studies
  - Anecdotal reports, fisheries records
  - Habitat analyses, natural barriers

- **Minimum area to sustain a functioning independent population**

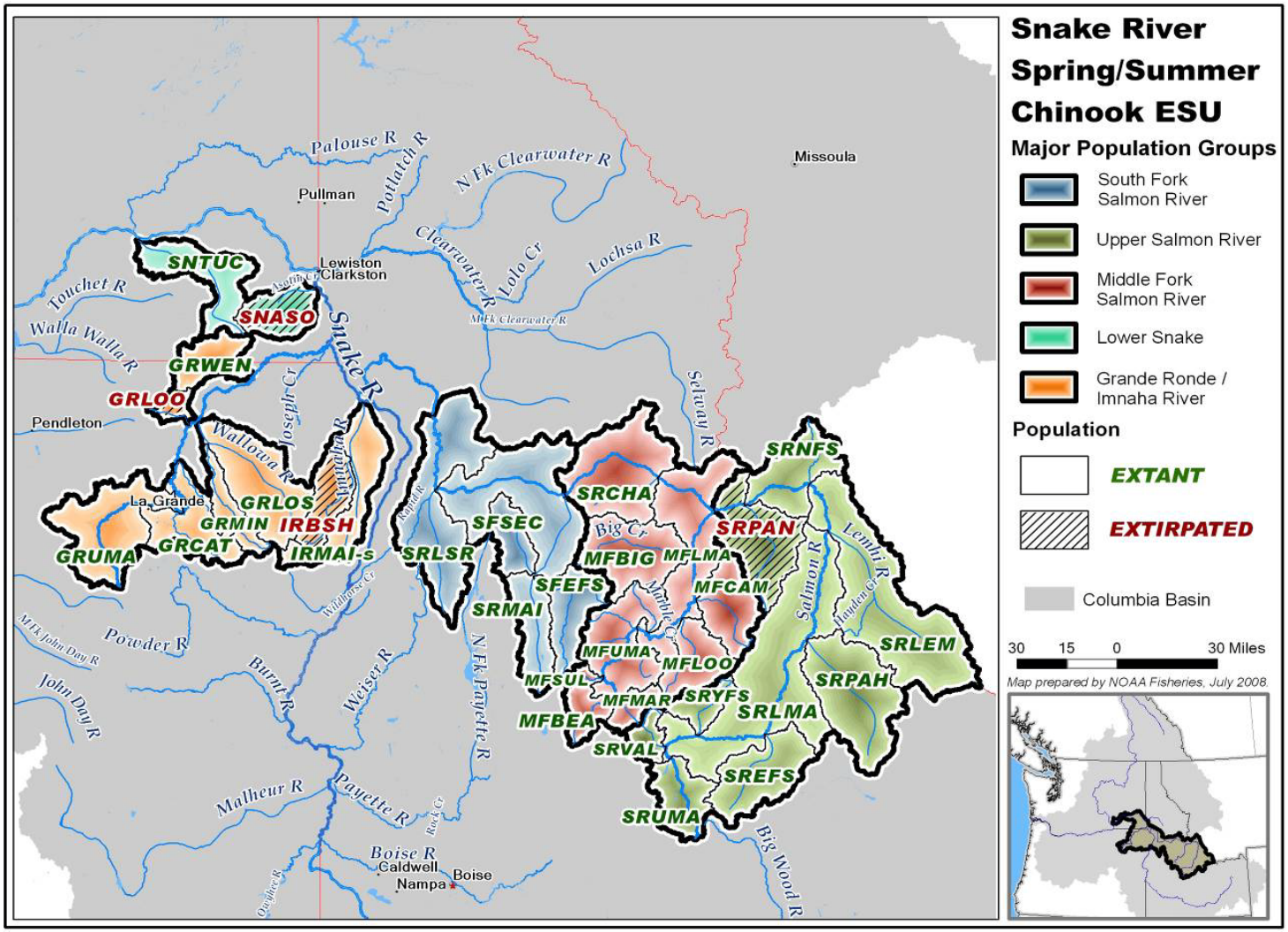
# Identifying Major Population Groups (within ESU strata)

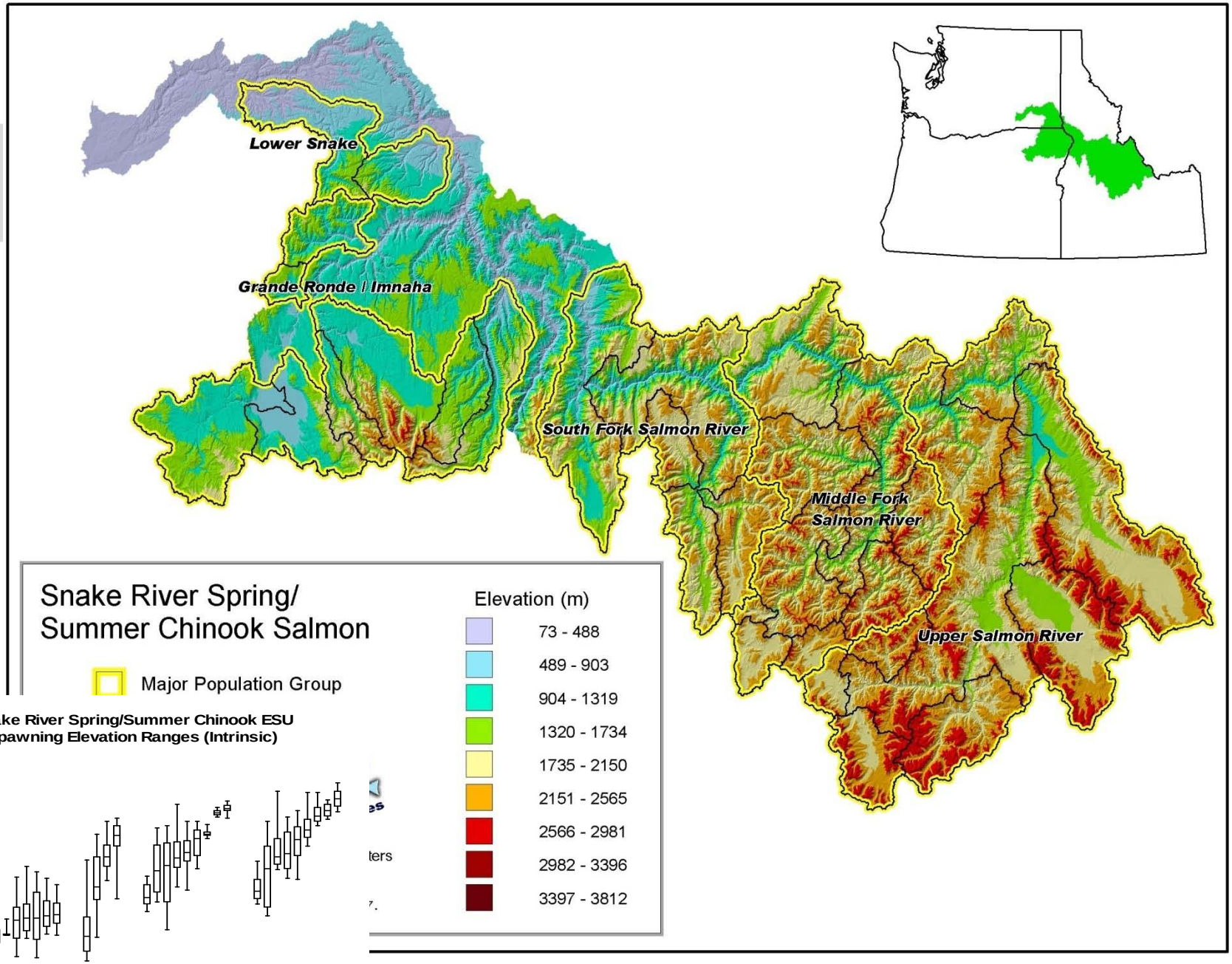
- Emphasis on:
  - Genetics
  - Environmental and Habitat characteristics
    - e.g., Ocean basins, ecoregions, elevation
  - Life History patterns
    - e.g., Adult return run timing, demographic correlations, age at return

# National Marine Fisheries Service



# National Marine Fisheries Service




Lower Snake
Grande Ronde / Imnaha
South Fork Salmon River
Middle Fork Salmon River
Upper Salmon River
Snake River Spring/ Summer Chinook Salmon
Major Population Group
Elevation (m)
73 - 488
489 - 903
904 - 1319
1320 - 1734
1735 - 2150
2151 - 2565
2566 - 2981
2982 - 3396
3397 - 3812


Snake River Spring/Summer Chinook ESU
Spawning Elevation Ranges (Intrinsic)
Elevation (m)
2400
2100
1800
1500
1200
900
600
300
SNASO
SNTUC
GRWEN
GRLOO
GRCAT
IRBSH
GRMIN
IRMAI
GRLOS
GRUMA
SRLSR
SFMAI
SFEFS
SFSEC
MFLMA
MFBIG
SRCHA
MFLOO
MFCAM
MFUMA
MFSJL
MFBEA
MFMAR
SRNFS
SRPAN
SRPAH
SRLMA
SRLEM
SREFS
SRYFS
SRVAL
SRUMA
Populations

# ESU Level Criteria

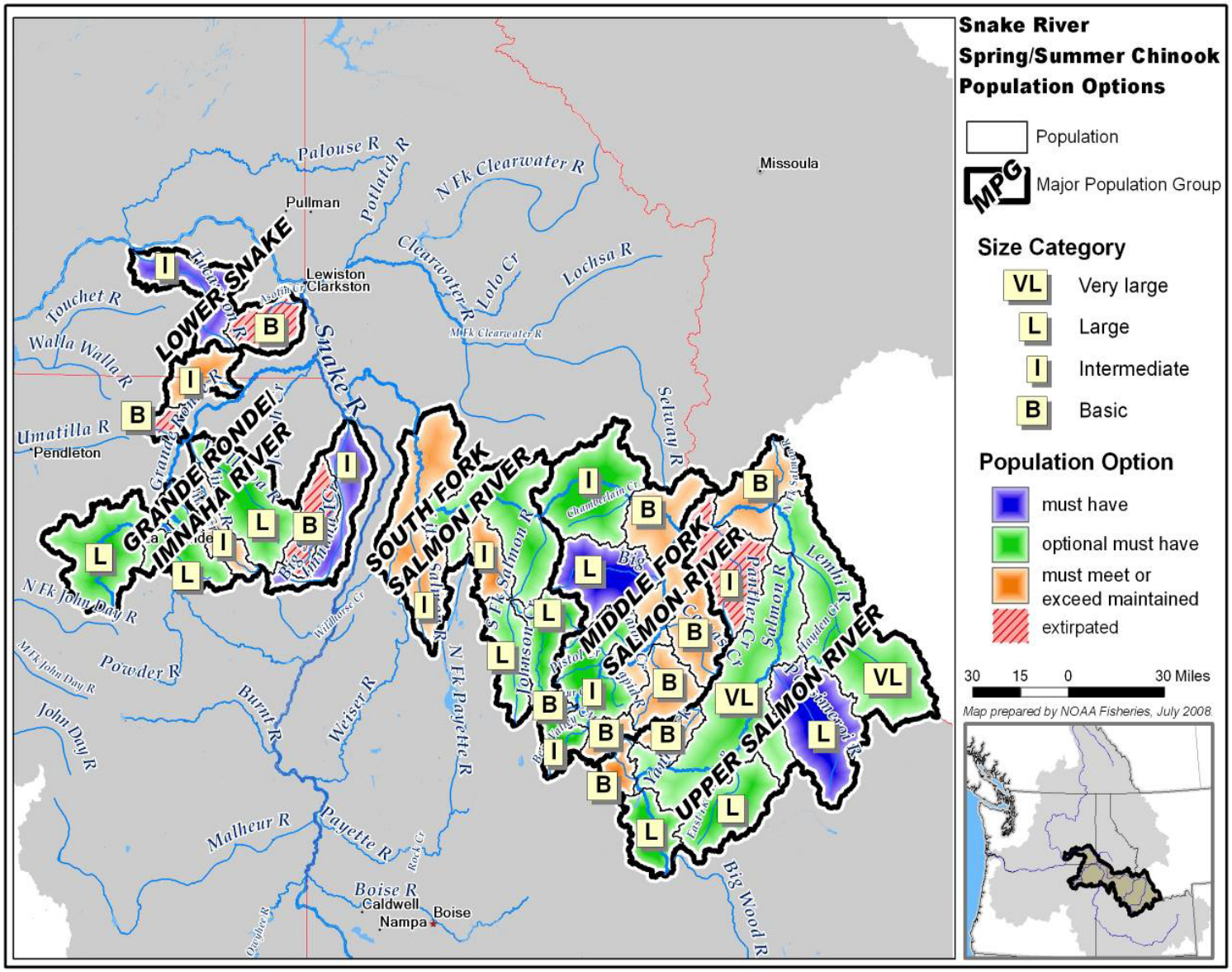
- **Viable Salmonid Population (VSP) Guidelines**
  - Consistent with historical setting, Multiple populations, some geographically widespread, some in close proximity to one another.
  - All Populations within an ESU should not share the same catastrophic risk.
  - Populations displaying diverse life histories/phenotypes should be maintained
  - Some populations should exceed VSP guidelines.

# ESU Viability Criteria (ICTRT)

- An ESU would have a high probability of persistence if:
  - **At least one-half of the historical populations (minimum of 2) in each extant Major Grouping are meeting population viability criteria. (Major extirpated areas considered on a case by case basis.)**
  - **High viability populations should include all major life history patterns and representative number of large/intermediate populations.**
  - **At least one population in each extant strata should be rated at Very Low risk.**
  - **The remaining extant populations are maintained – i.e., not in immediate danger of extinction**

Note: For some multi-population ESUs, there may be combinations of pop status across major groupings that could result in low risk without a requirement that all major groupings individually meet criteria – case by case consideration.

# National Marine Fisheries Service



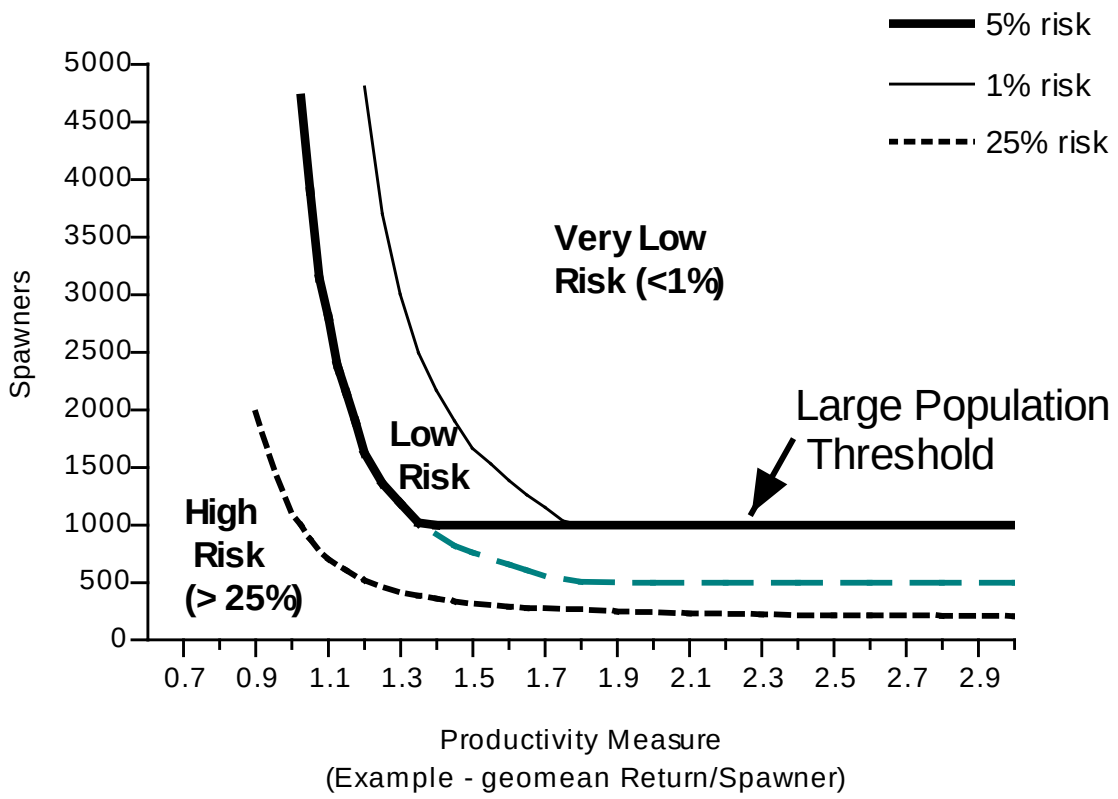
# Population Viability

- VSP Guidelines (McElhany et al., 2000) identify four basic components to consider:
  - Abundance
  - Productivity
  - Spatial Structure
  - Diversity

# Abundance/Productivity Criteria

- **Abundance refers to the average number of spawners in a population over a generation or more.**
- **Productivity (or population growth rate) refers to the performance of the population over time.**
- Abundance should be high enough that:
  - In combination with intrinsic productivity, declines to critically low levels would be unlikely assuming recent patterns of environmental variability
  - Compensatory processes provide resilience to the effects of short-term perturbations
  - Within population substructure is maintained (e.g., multiple spawning patches, etc)

# Example Viability Curve: ICTRT



## Washington Lower Columbia Recovery Plan Diagram

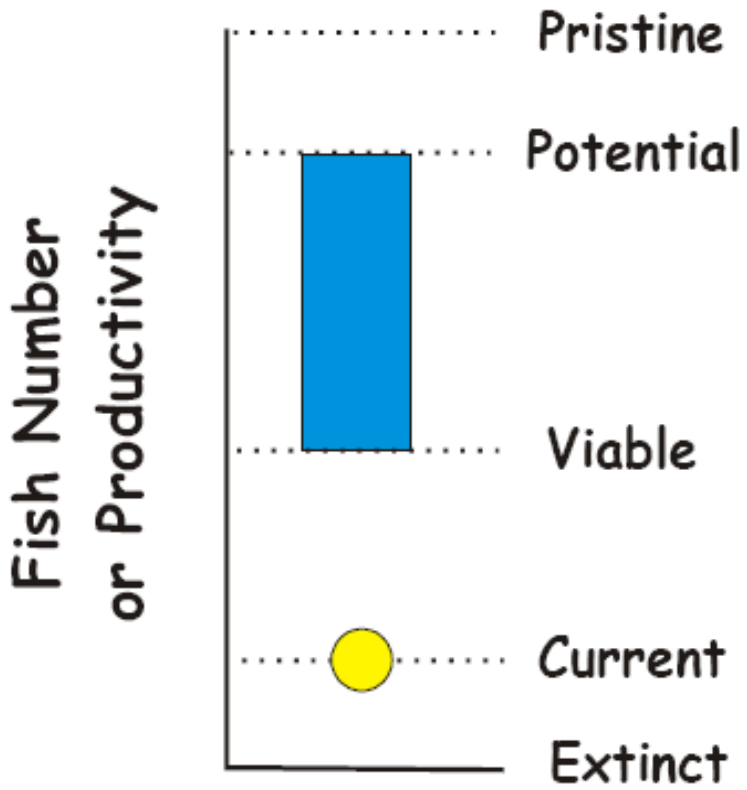



**Figure 11.** Schematic relating population abundance and productivity to viability levels identified by the Willamette/Lower Columbia Technical Recovery Team and population goals described by the recovery scenario.

# Population Level: Spatial Structure Considerations

- Spatial Structure refers to the geographic distribution of a population and the processes supporting that distribution.

- Basic rationale:
  - Multiple spawning reaches within a population provides protection against local catastrophic loss
  - Some production areas may be inherently more productive than others – potentially serving as sources to a broader range of areas after prolonged periods of low survival, etc.

# Population Criteria: Diversity Considerations

- Traits and Life History strategies
  - Loss of major life history strategies
  - Reductions/changes in traits
- Genetic Characteristics
  - Direct measures
  - Indirect: Influences of artificial production
- Dispersal and Gene Flow Effects
  - Gaps in spawning
  - Selective effects of human activities
  - Spawning distribution vs habitat types

National Marine Fisheries Service

# Assessing Population Viability: ICTRT

Spatial Structure/Diversity RISK

Criteria: Distribution,
Life history/genetics
Supporting processes

Abundance & Productivity RISK

Criteria:
Recent Abundance
And Productivity
vs
Viability Curve

| | Very Low | Low | Moderate | High |
|---|---|---|---|---|
| **Very Low (<1%)** | HV | HV | V | |
| **Low <5%** | V | V | V | |
| **Moderate <25%** | | | | |
| **HIGH** | | | | |

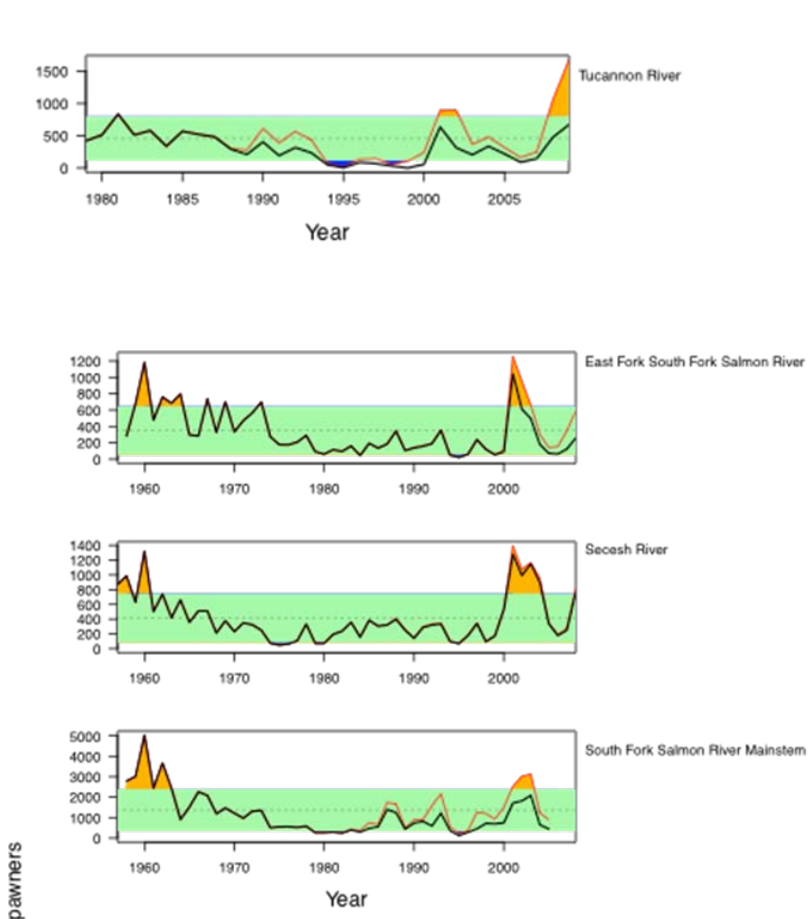
V = Viable population

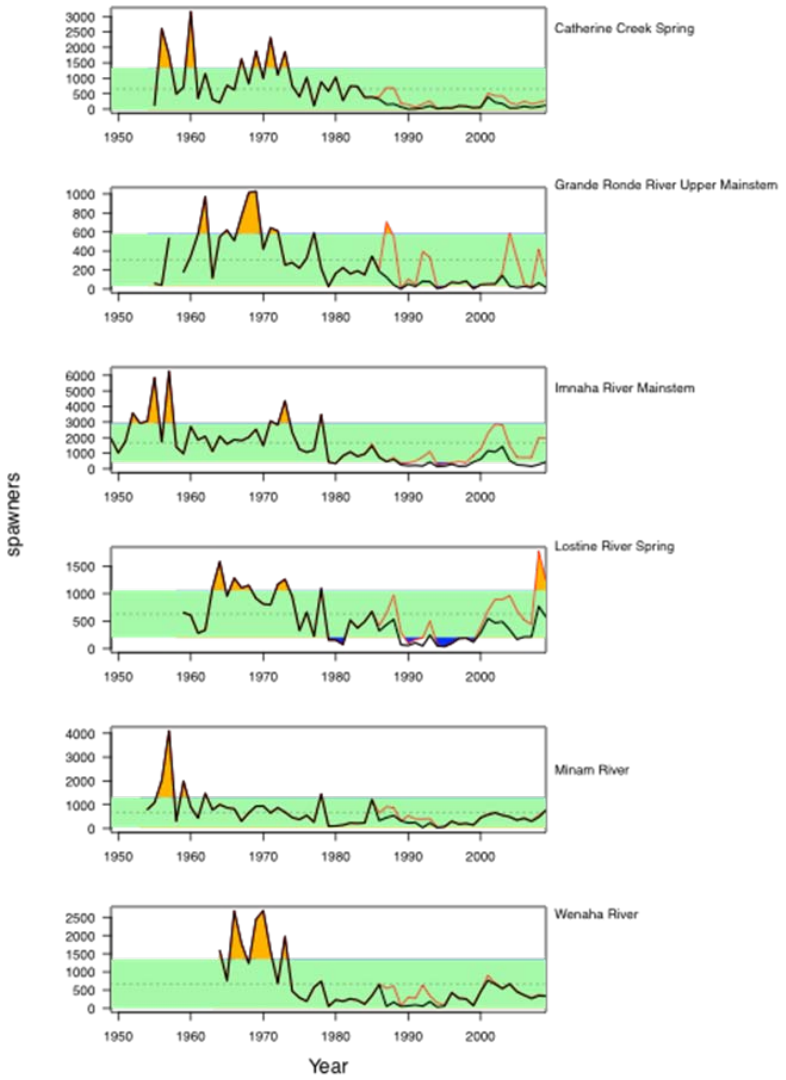
# Integrating SS/D metrics

| Goal | Mechanism | Factor | Metrics |
|---|---|---|---|
| | | a. number and spatial arrangement of spawning areas. | Number of MaSAs, distribution of MaSAs, and quantity of habitat outside MaSAs. |
| **A. Allowing natural rates and levels of spatially-mediated processes.** | **1. Maintain natural distribution of spawning areas.** | b. Spatial extent or range | Proportion of historical range occupied and presence/absence of spawners in MaSAs |
| | | c. Increase or decrease gaps between spawning areas. | Change in occupancy of MaSAs that affects connectivity within the population. |
| **B. Maintaining natural levels of variation.** | **1. Maintain natural patterns of phenotypic and genotypic expression.** | a. Major life history strategies. | Distribution of major life history expression within a population |
| | | b. Phenotypic variation. | Reduction in variability of traits, shift in mean value of trait, loss of traits. |
| | | c. Genetic variation. | Analysis addressing within and between population genetic variation. |
| | **2. Maintain natural patterns of gene flow.** | a. Spawner composition. | (1) Proportion of natural spawners that are unnatural out-of ESU spawners. |
| | | | (2) Proportion unnatural out-of MPG spawners. |
| | | | (3) from a within MPG brood stock program, or within population (not best practices) program |
| | | | (4) Proportion local (within population) broodstock program using best management practices. |
| | **3. Maintain occupancy available habitats** | a. Distribution across habitat types. | Change in occupancy across ecoregion types |
| | **4.Maintain integrity of natural systems.** | a. Selective change in natural processes or impacts. | Ongoing anthropogenic activities inducing selective mortality or habitat change within or out of population boundary |

# National Marine Fisheries Service

## Abundance: Lower Salmon, South Fork and Grande Ronde/Imnaha MPGs



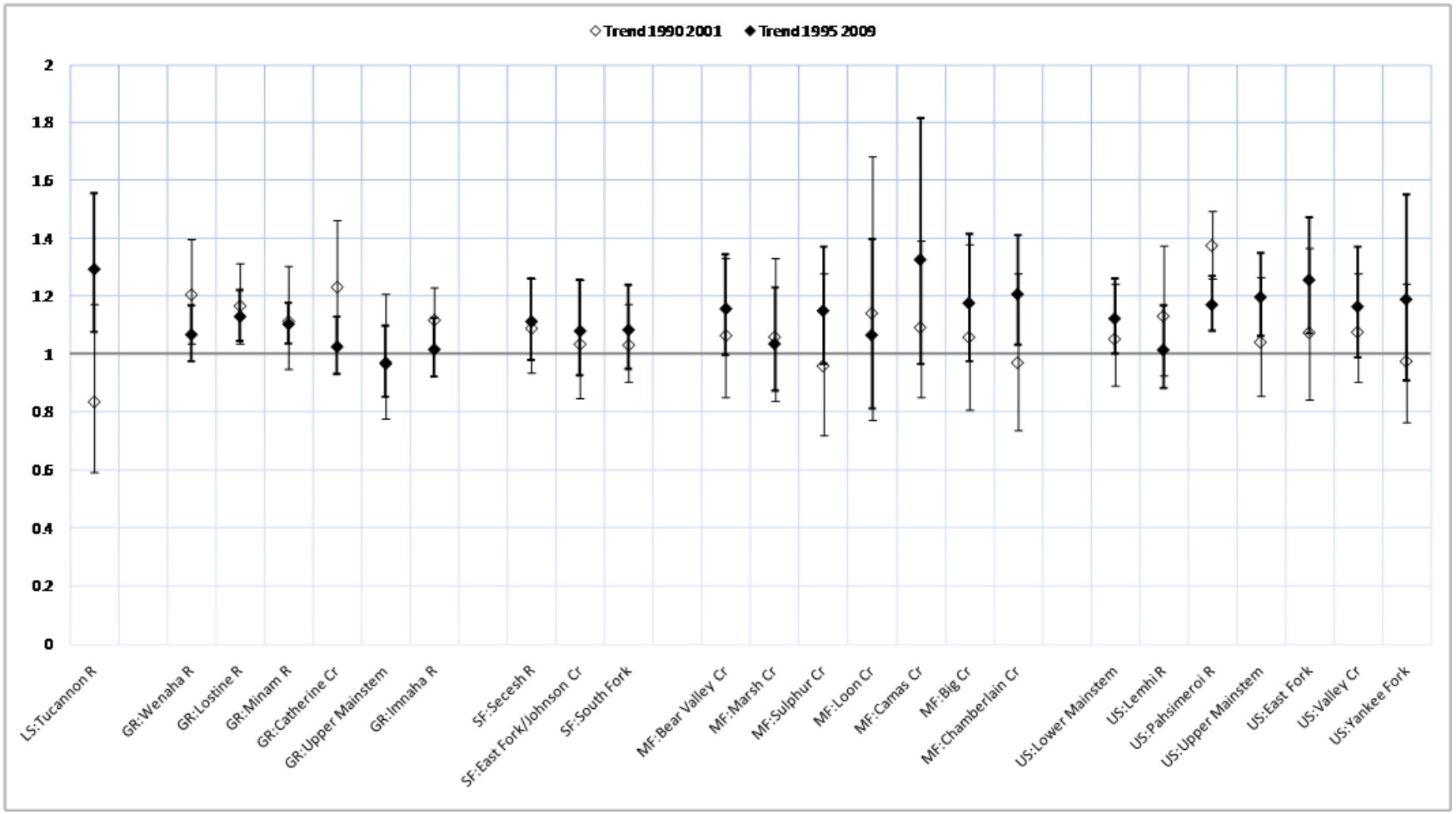
# National Marine Fisheries Service

## Abundance:
## Middle Fork and Upper Salmon MPGs

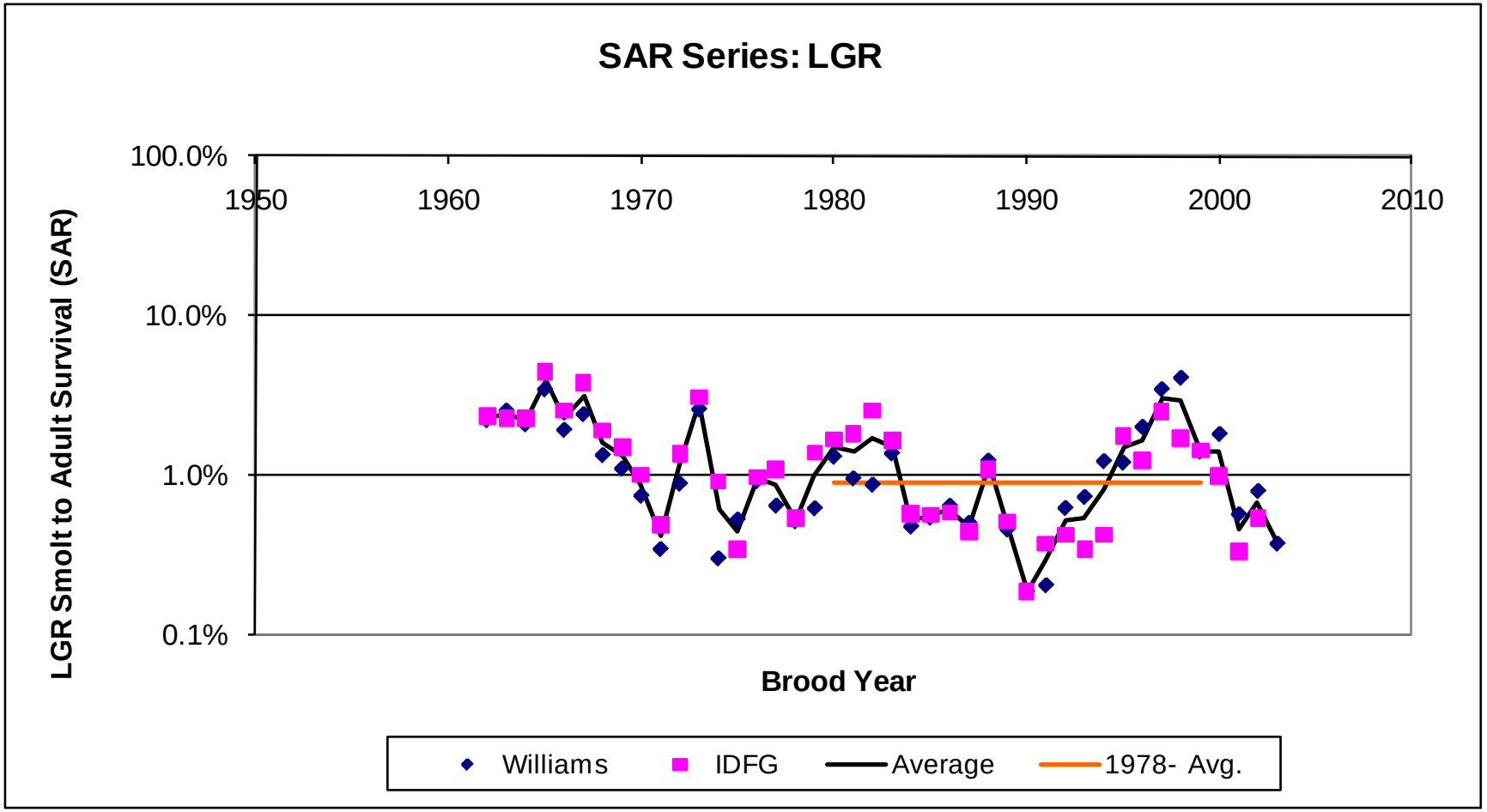
# Populations: Natural origin spawner abundance (most recent 5 year brood cycle)

| Category | LOWER SNAKE | GRANDE RONDE | SOUTH FORK | MIDDLE FORK | UPPER SALMON |
|---|---|---|---|---|---|
| UP (CHG>25%) | **1** | **4** | **3** | **5** | **6** |
| SAME | | **1** | | **1** | **2** |
| DOWN (CHG>25%) | | **1** | | | |
| | **1** (EXP) | **2** (EXP) | | **2** (INS) | **2** (INS)<br>**1** (EXP) |

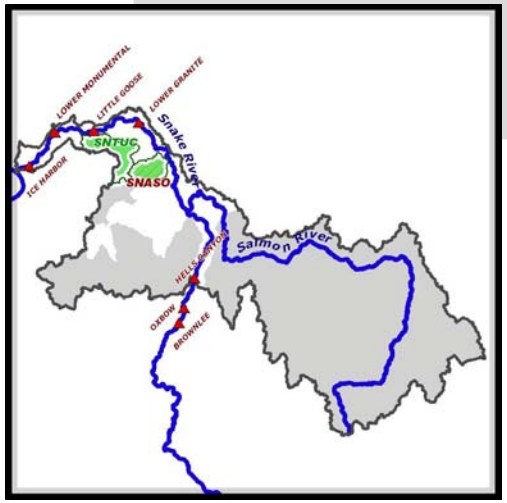
# Populations: Recent Trend in natural origin spawner abundance



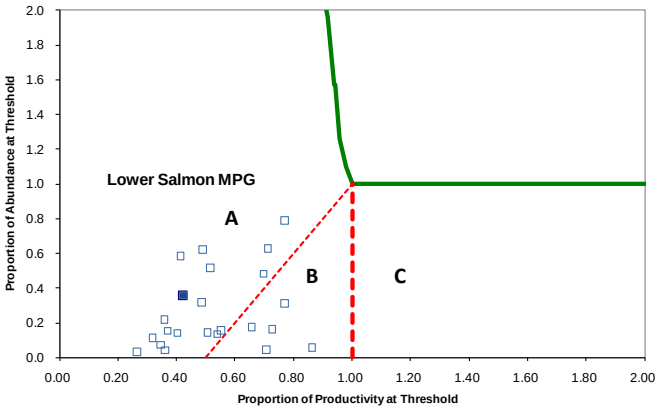
# National Marine Fisheries Service



# National Marine Fisheries Service




**Tucannon:** **SS(s), ,phen, HAT**
***Asotin:*** ***(functionally extirpated)***

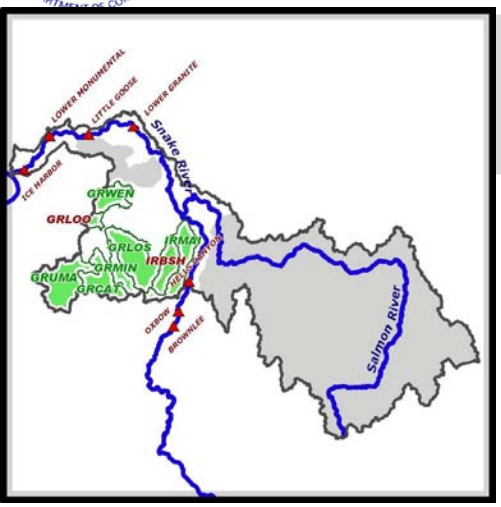



**ıdance/**
**ivity Risk**

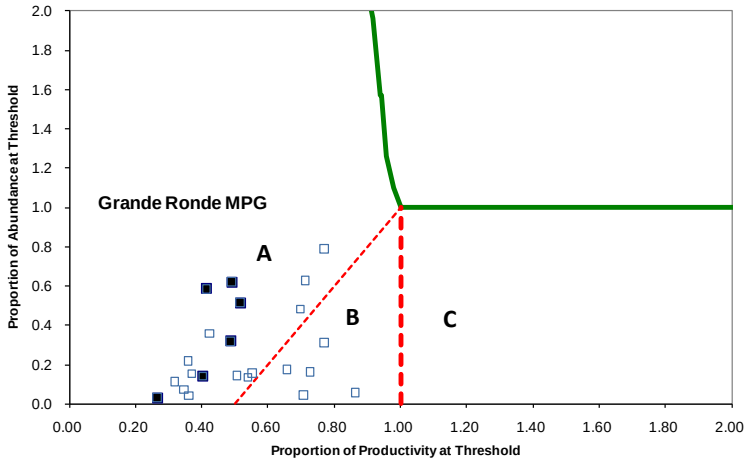
**Spatial Structure/Diversity Risk**

| | Very Low | Low | Moderate | High |
|---|---|---|---|---|
| **Very Low** (<1%) | **HV** | **HV** | **V** | **M** |
| **Low** (1-5%) | **V** | **V** | **V** | **M** |
| **Moderate** (6 – 25%) | **M** | **M** | **M** | **HR** |
| **High** (>25%) | **HR** | **HR** | **HR Tucannon River** | **HR Asotin Creek** |

# National Marine Fisheries Service




| Population | Spatial Processes | | | Diversity | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Structure | Range | Gaps | Life History Patterns | Pheno Var. | Genetics | Spawner Composition | Ecoregion Distribution | Selectivity |
| Wenaha River | **M** | L | L | VL | L | **M** | **H (a.1)** | L | L |
| Lostine / Wallowa Rivers | L | **M** | L | **M** | **M** | L | **H (a.1, a.4)** | L | L |
| Minam River | **M** | L | L | VL | L | **M** | **H (a.1)** | L | L |
| Upper Grande Ronde River | **M** | **H** | **H** | **M** | **M** | **M** | **H (a.1)** | L | **M (hb)** |
| Catherine Creek | **M** | **M** | **M** | **M** | **M** | **M** | **H (a.1, a.4)** | **M** | **M (hb)** |
| Imnaha River | **M** | L | L | L | L | **M** | **H (a.4)** | L | **M (ht)** |
| Lookingglass Creek | extinct | extinct | extinct | extinct | extinct | extinct | extinct | extinct | extinct |
| Big Sheep Creek [1] | **H** | **M** | **M** | L | **M** | **M** | **H (a.3)** | L | L |

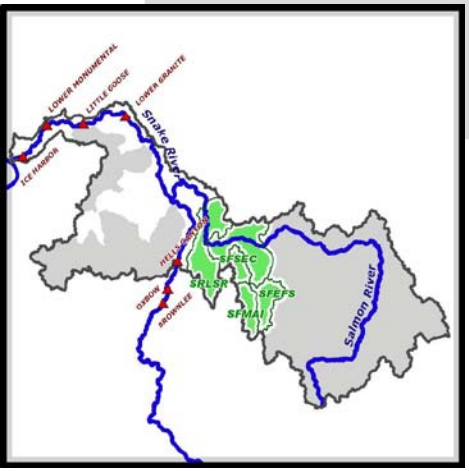



**Spatial Structure/Diversity Risk**

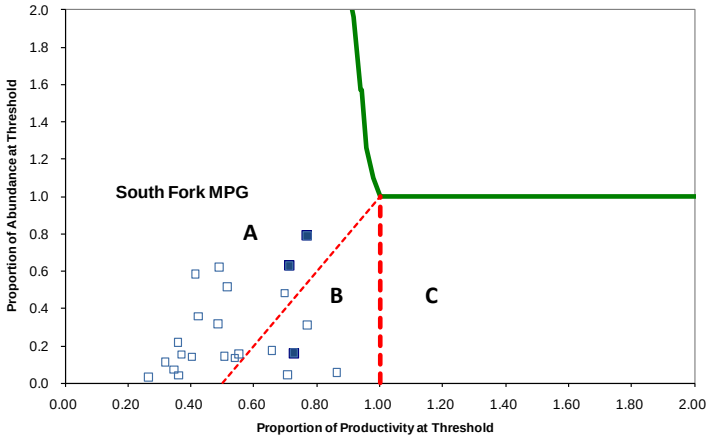
| | Very Low | Low | Moderate | High |
|---|---|---|---|---|
| **Very Low** (<1%) | **HV** | **HV** | **V** | **M** |
| **Low** (1-5%) | **V** | **V** | **V** | **M** |
| **Moderate** (6 – 25%) | **M** | **M** | **M** | **HR** |
| **High** (>25%) | **HR** | **HR** | **HR** Wenaha Lostine/Wallowa Minam Catherine Imnaha | **HR** Upper Grande Ronde |

# National Marine Fisheries Service

## South Fork Salmon MPG




| Population | Spatial Processes | | | Diversity | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Structure | Range | Gaps | Life History Patterns | Pheno Var. | Genetics | Spawner Composition | Ecoregion Distribution | Selectivity |
| South Fork | L | VL | L | L | L | **M** | **H** (a.4) | L | L |
| | **M** | L | L | VL | L | L | L | L | L |
| East Fork South Fork Salmon River | L | VL | L | VL | L | L | **M** (a.4) | L | L |
| Little | **M** | L | L | VL | L | L | L | L | L |



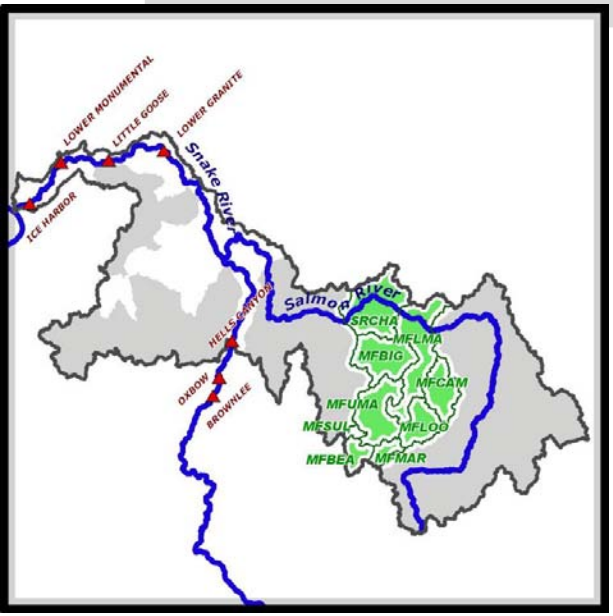

**ındance/**
**ctivity Risk**

**Spatial Structure/Diversity Risk**

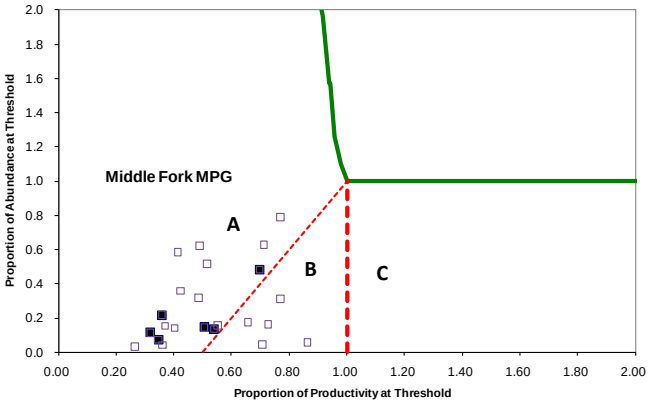
| | Very Low | Low | Moderate | High |
|---|---|---|---|---|
| **Very Low** (<1%) | **HV** | **HV** | **V** | **M** |
| **Low** (1-5%) | **V** | **V** | **V** | **M** |
| **Moderate** (6 – 25%) | **M** | **M** | **M** | **HR** |
| **High** (>25%) | **HR** | **HR** Secesh R. E. Fork S. Fork Little Salmon | **HR** S. Fork Salmon | **HR** |

# National Marine Fisheries Service

## Middle Fork Salmon River MPG




| Population | Spatial Processes | | | Diversity | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Structure | Range | Gaps | Life History Patterns | Pheno Var. | Genetics | Spawner Composition | Ecoregion Distribution | Selectivity |
| Chamberlain Creek | **M** | VL | L | L | VL | VL | VL | **M** | L |
| Big Creek | L | VL | VL | L | L | **M** | VL | L | L |
| Lower Middle Fork Salmon River | **H** | L | L | L | L | **M** | VL | **M** | L |
| Camas Creek | **H** | VL | L | L | L | **M** | VL | L | L |
| Loon Creek | **H** | VL | L | L | L | **M** | VL | L | L |
| Upper Middle Fork Salmon River | **H** | VL | L | L | L | **M** | VL | L | L |
| Sulphur Creek | **H** | VL | L | L | L | **M** | VL | L | L |
| Bear Valley Creek | VL | VL | VL | L | L | L | VL | L | L |
| Marsh Creek | **M** | VL | L | L | L | L | VL | L | L |

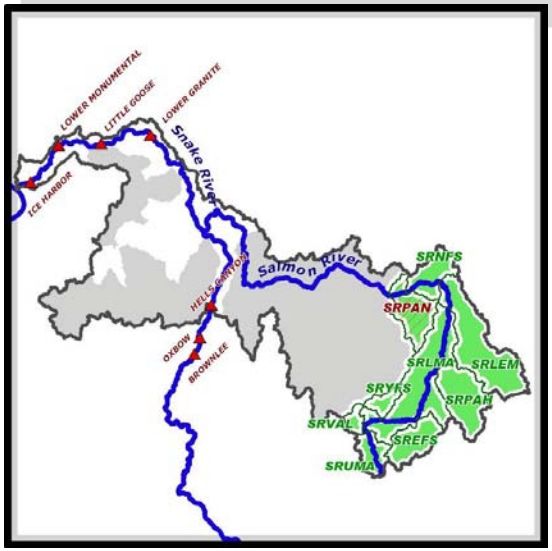



**Abundance/ Productivity Risk**

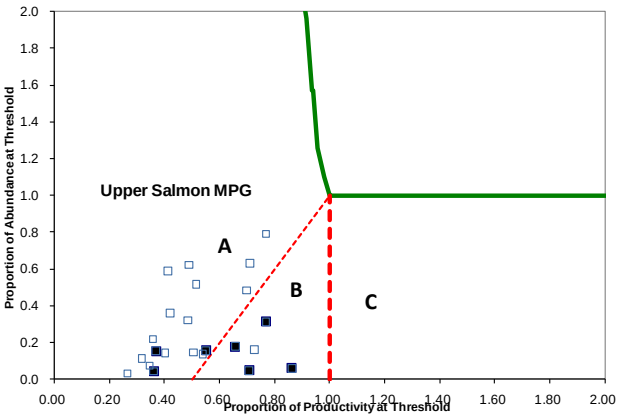
**Spatial Structure/Diversity Risk**

| | Very Low | Low | Moderate | High |
|---|---|---|---|---|
| **Very Low** (<1%) | **HV** | **HV** | **V** | **M** |
| **Low** (1-5%) | **V** | **V** | **V** | **M** |
| **Moderate** (6 – 25%) | **M** | **M** | **M** | **HR** |
| **High** (>25%) | **HR** | **HR** Chamberlain Marsh Cr | **HR** Big Cr. Lower Mid-Fork Camas Loon Upper Mid-Fork | **HR** |

# Upper Salmon MPG




| Population | SSD Factors |
|---|---|
| Lemhi: | SS,LFH,phen, SEL |
| Pahsimeroi: | SS,LFH ,GEN, HAT,SEL |
| Yankee Fork: | SS, GEN, HAT,SEL |
| East Fork: | GEN, SEL |
| North Fork: | SS |
| Upper Salmon: | gen, hat |
| US Lower Main: | ss, phen |
| Valley: | ss gen |
| Panther (extirpated) | |




**Abundance/ Productivity Risk**

**Spatial Structure/Diversity Risk**

| | Very Low | Low | Moderate | High |
|---|---|---|---|---|
| **Very Low** (<1%) | HV | HV | V | M |
| **Low** (1-5%) | V | V | V | M |
| **Moderate** (6 – 25%) | M | M | M | HR |
| **High** (>25%) | HR | HR North Fork Lower Main. | HR Valley Upper Main. | HR Lemhi Pahsimeroi East Fork Yankee Fork |

# Summary

- **Population level status ratings remain at high risk across all MPGs within the ESU.**
- **Although recent natural spawning abundance estimates have increased, all populations remain below minimum natural origin abundance thresholds.**
- **Relatively low natural production rates and spawning levels below minimum abundance thresholds remain a major concern across the ESU.**
- **The ability of populations to be self-sustaining through normal periods of relatively low ocean survival remains uncertain.**
- **Factors cited by the 2005 BRT (Good et al. 2005) remain as concerns or key uncertainties for several populations**