

Habitat Status and Trend Monitoring to Assess Watershed Health

Stormwater Monitoring Workshop
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Outline

- ◉ Brief History
- ◉ Goals & Objectives
- ◉ Design
- ◉ Limiting Factors
- ◉ Indicators & Metrics
- ◉ Stormwater Endpoints



2002-Present

- 2002
 - The Washington Comprehensive Monitoring Strategy (CMS) for Watershed Health and Salmon Recovery December 2002
 - Calls out extensive, statistically valid (status and trends) monitoring to answer key habitat, water quality, water quantity, and other factors that impact wild salmon
- Jul 2005
 - SRFB Funded Framework Development (Ecology, WDFW, CC)
- Sep 2006
 - Completed QA Monitoring Plan
- Mar 2008
 - Leg Awards “Start-up” Funding to PSP - IAA with Ecology

QA Monitoring Plan

Status and Trends Monitoring for
Watershed Health and Salmon Recovery

Quality Assurance Monitoring Plan



December 2006
Ecology Publication No. 06-03-203

- Ecology
- Conservation Comm.
- WDFW

Goal of S&T

“The goal of the monitoring is to provide quantitative, statistically valid, and consistent estimates of the status and trends in **physical, chemical, and biological** conditions of Washington’s rivers and streams. The data collected...can be used to report on the health of **salmonid habitat.**”

Behind The Goal

ESA

“...**de-listing** requires ...an explicit analysis of the physical or biological conditions that affect the species’ continued existence...

“...“objective, measurable criteria” required under section **4(f)(1)(B)**.”

CWA

SEC. 101. (a) The objective of this Act is to restore and maintain the **chemical, physical, and biological integrity** of the Nation’s waters.

NOAA. 2007. *Adaptive Management for ESA-Listed Salmon and Steelhead Recovery: Decision Framework and Monitoring Guidance*.
<http://www.nwr.noaa.gov/Salmon-Recovery-Planning/>

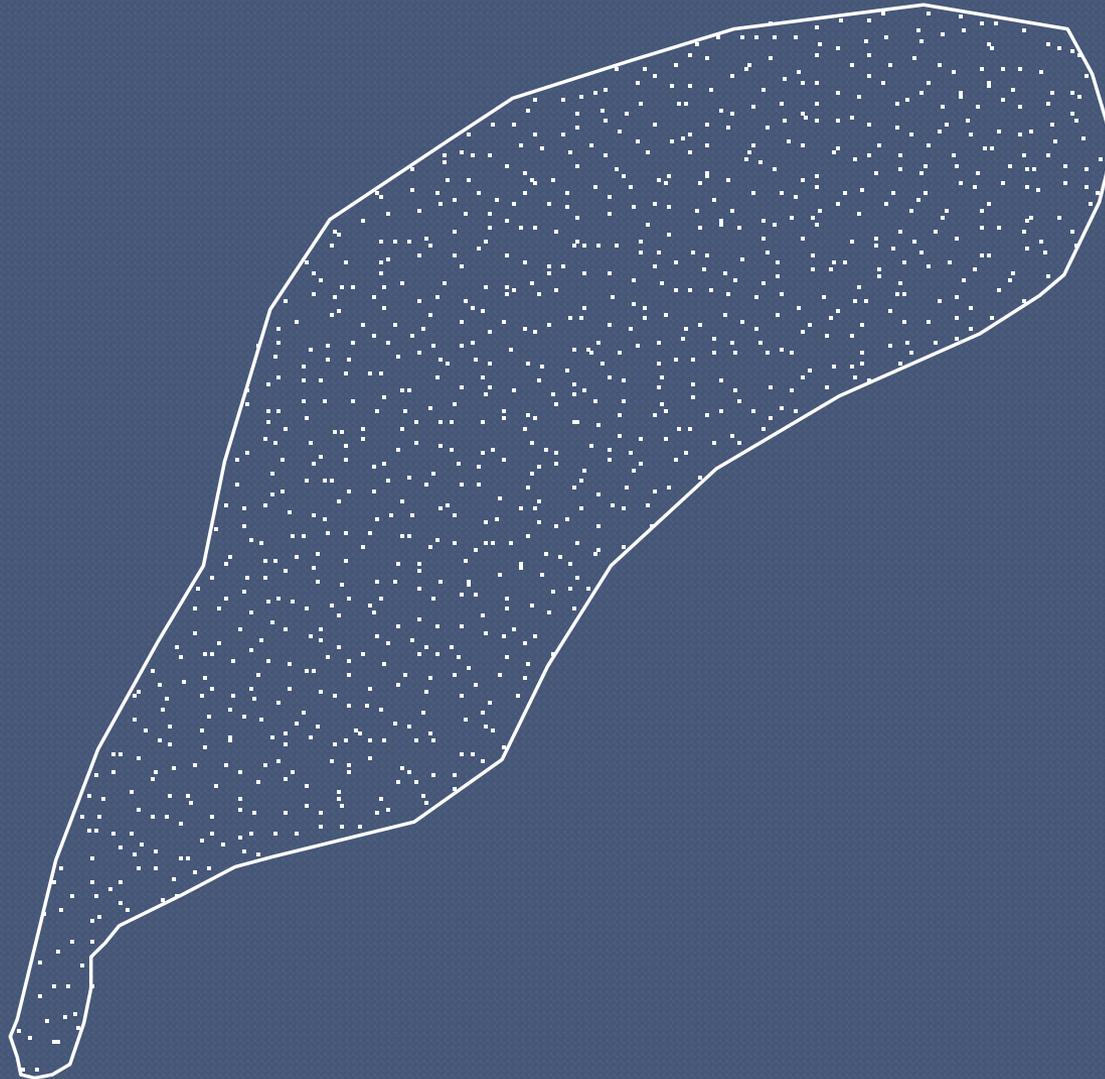
Objectives of S&T

- ◉ Frame for state, SRR, and WRIA
- ◉ Minimum confidence in status $\geq 80\%$
- ◉ Core metrics, methods
- ◉ Incorporate existing monitoring
- ◉ Develop partnerships

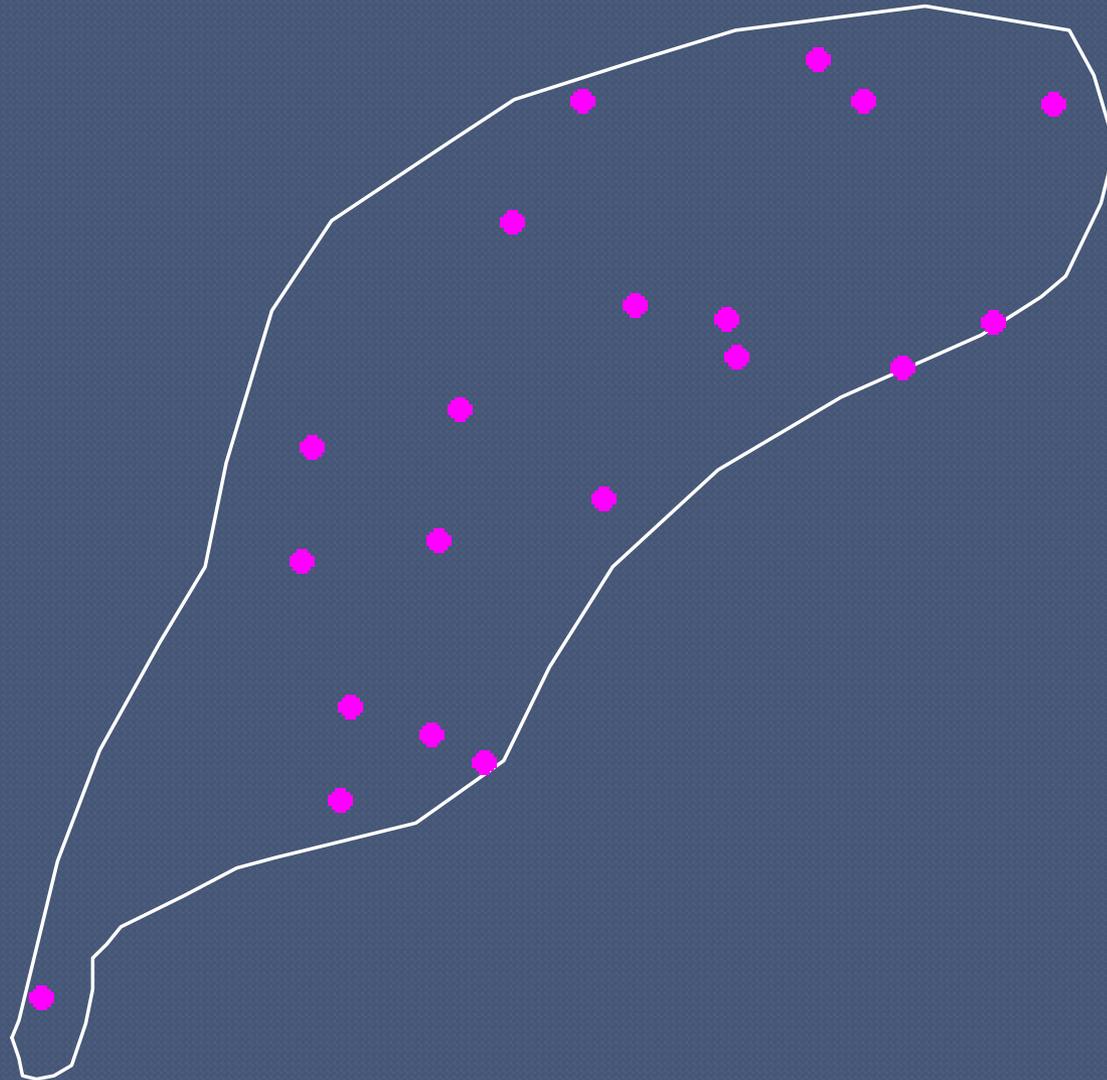
The Design-Master Sample

- Create a design that allows and facilitates integration up front rather than after the fact
- A Master Sample is a very large, spatially dense sample that can be subset to meet specific needs at a variety of spatial scales
- **Generalized Random Tessellation Stratified Methodology (GRTS)**
- Current GRTS design allows creation of a Master Sample so that sequential subsets are spatially balanced

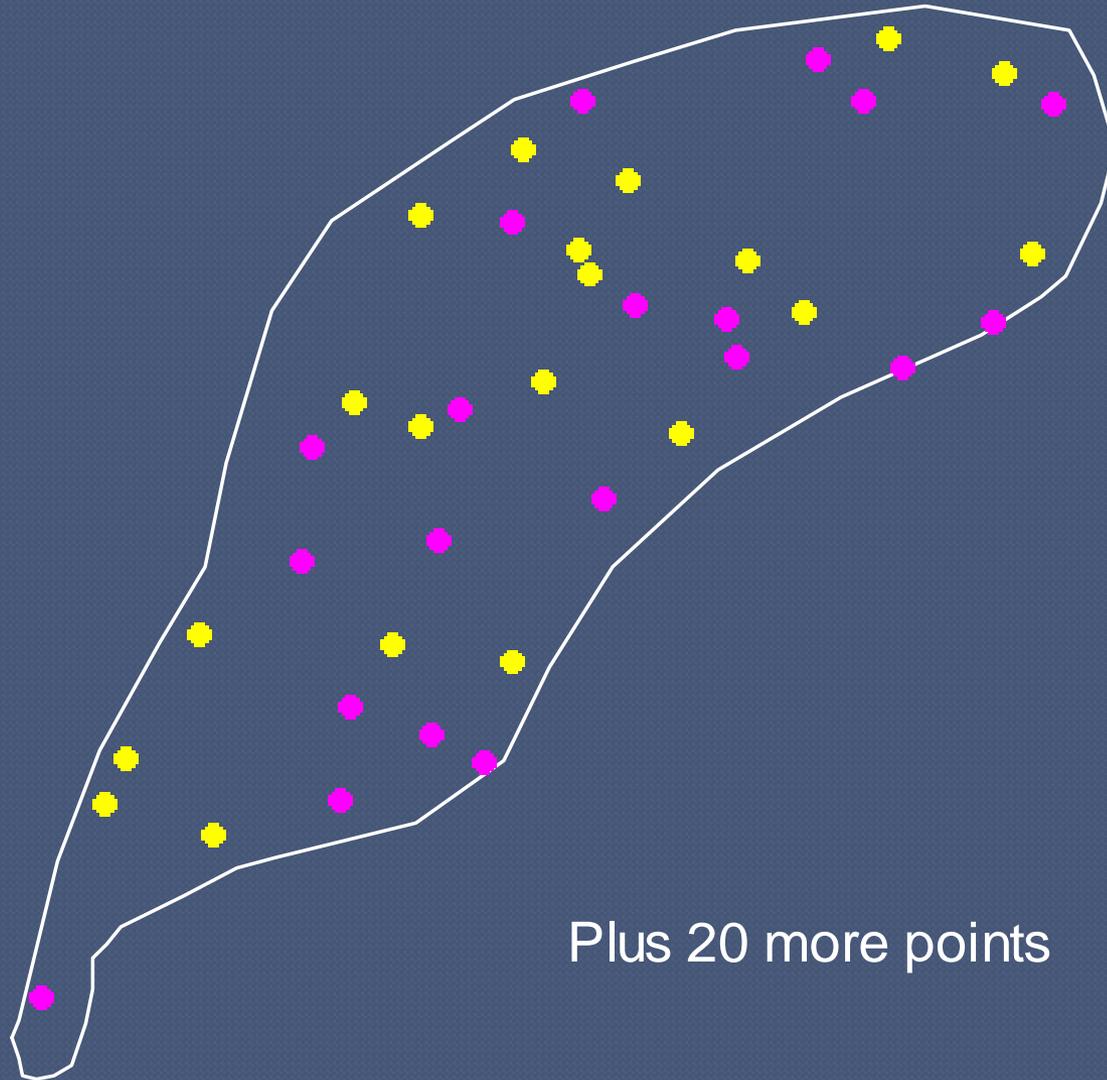
1000 point GRTS Sample



20 point GRTS Sample

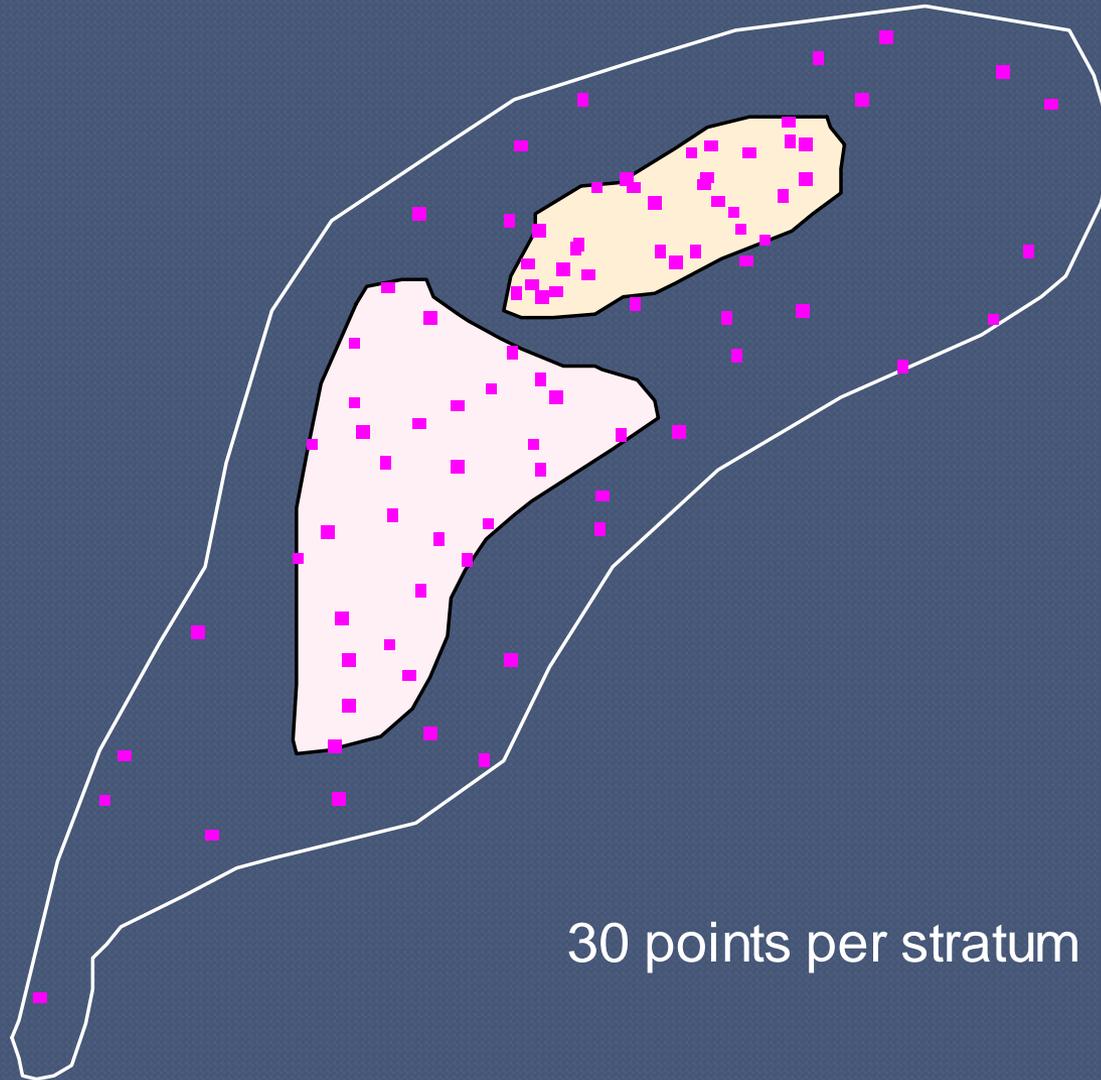


20 point GRTS Sample



Plus 20 more points

Stratification Example

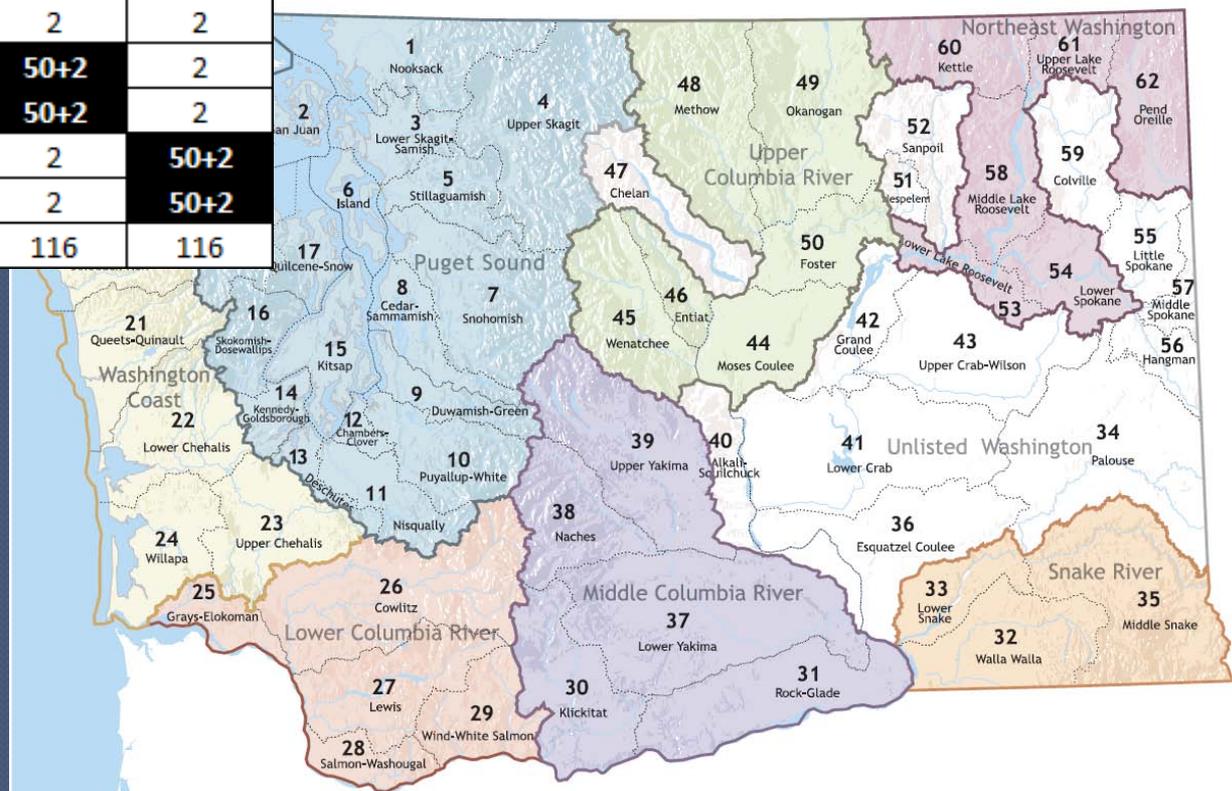


30 points per stratum

The Design

- GRTS - WA Master
- 4-year rotation
- Fixed “sentinel” stations
- Multiple reporting scales

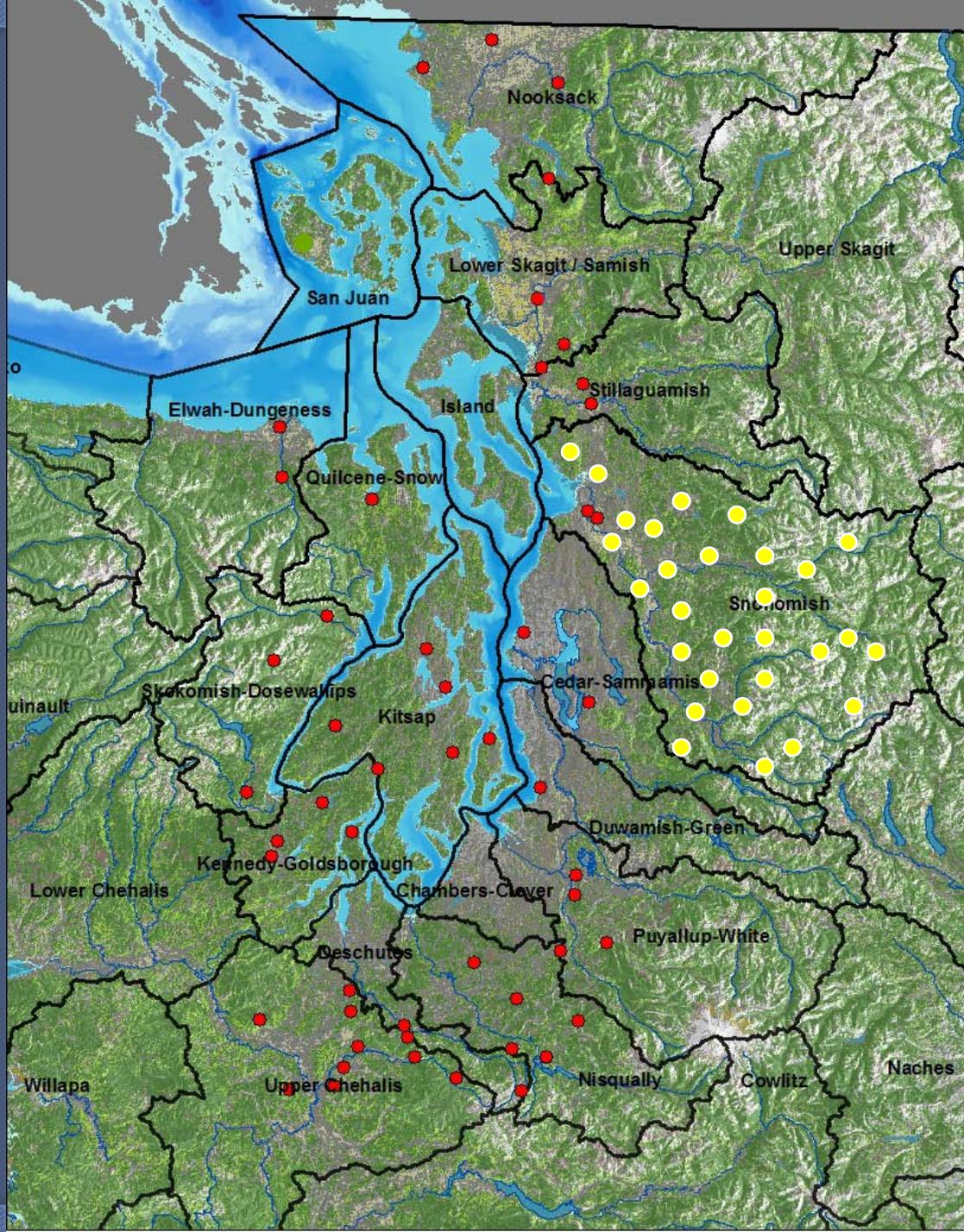
SRR	2009	2010	2011	2012
Puget	50+2	2	2	2
Coastal	50+2	2	2	2
SRR3	2	50+2	2	2
SRR4	2	50+2	2	2
SRR5	2	2	50+2	2
SRR6	2	2	50+2	2
SRR7	2	2	2	50+2
Unlisted	2	2	2	50+2
TOTAL	116	116	116	116



50 Sites From State Wide Master Sample For The Puget Sound

Allows Other
Sites to be
Added

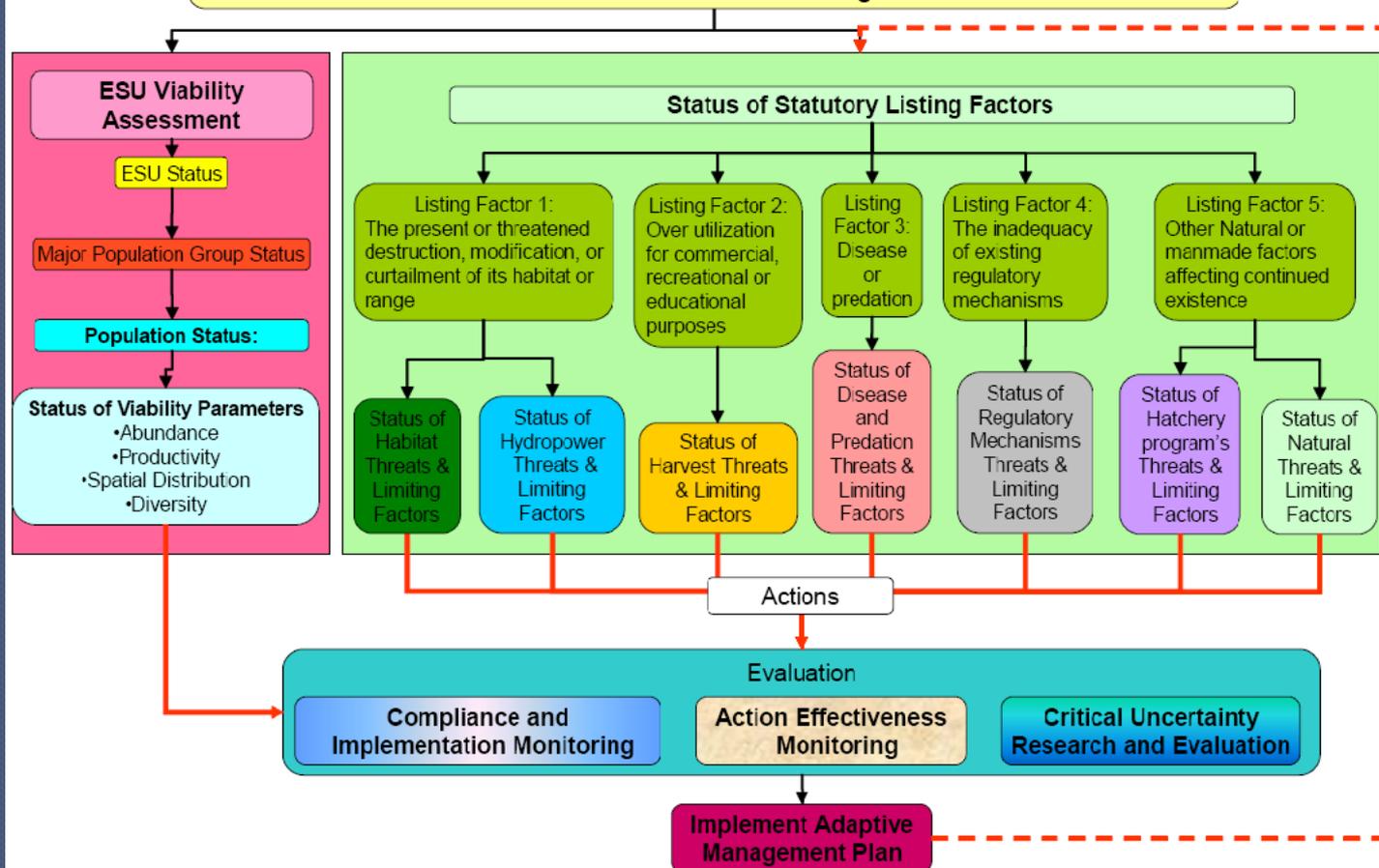
e.g., 30 Sites
From State
Wide Master
Sample For
WRIA 7



Limiting Factors

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



Limiting Factors – Indicators

2008 State of Salmon in Watersheds:
 Statewide **MAJOR LIMITING FACTORS**
<http://www.governor.wa.gov/gspro/publications/sosreport/2008/report.pdf>

Nearshore
 Riparian Habitat
 Passage
 Flood Plain, Channel Morphology
 Sediment
 Flow
 Water Temperature

Channel Structure
 Riparian Conditions
 Large Woody Debris
 Sediment Quantity
 Water Quality

2007 Report to Congress:
 Puget Sound Recovery Domain

<http://www.nwr.noaa.gov/Salmon-Recovery-Planning/PCSRF/upload/PCSRF-Rpt-2007.pdf>

**Major Factors
 Limiting
 Recovery**

	Puget Sound Chinook ESU	Ozette Lake Sockeye ESU	Hood Canal Summer Chum ESU
Degraded Habitat—Estuarine and Nearshore Marine	•		•
Degraded Habitat—Floodplain Connectivity and Function	•	•	•
Degraded Habitat—Channel Structure and Complexity	•	•	•
Degraded Habitat—Riparian Areas and Large Woody Debris Recruitment	•	•	•
Degraded Habitat—Stream Substrate	•	•	•
Degraded Habitat—Stream Flow			•
Degraded Habitat—Water Quality	•		
Degraded Habitat—Fish Passage			
Hatchery-related Adverse Effects			
Harvest-related Adverse Effects			
Predation/Competition/Disease		•	
PCSRF Projects Addressing Major Habitat Limiting Factors	53%	75%	59%

www.governor.wa.gov/gspro/publications/sosreport/2008/report.pdf

www.nwr.noaa.gov/Salmon-Recovery-Planning/PCSRF/PCSRF-Documents.cfm

Indicators and Metrics

Water Quality

DO, pH, Temp, P, N, Cond, Cl,
Invert score, Fecal coliform,

Turbidity, Suspended solids

% substrate by size, Embeddedness,
Bed stability, Bank instability

Fish Cover by type, Pool area,
Depth, Width, Area,
Quantity of Side-channels,

Wood pieces/km
Wood volume

Riparian Vegetation Structure
Canopy Cover

Riparian Disturbance by land use
category

Sediment

*sediment chem.

Channel/Floodplain
Structure

Large Woody
Debris

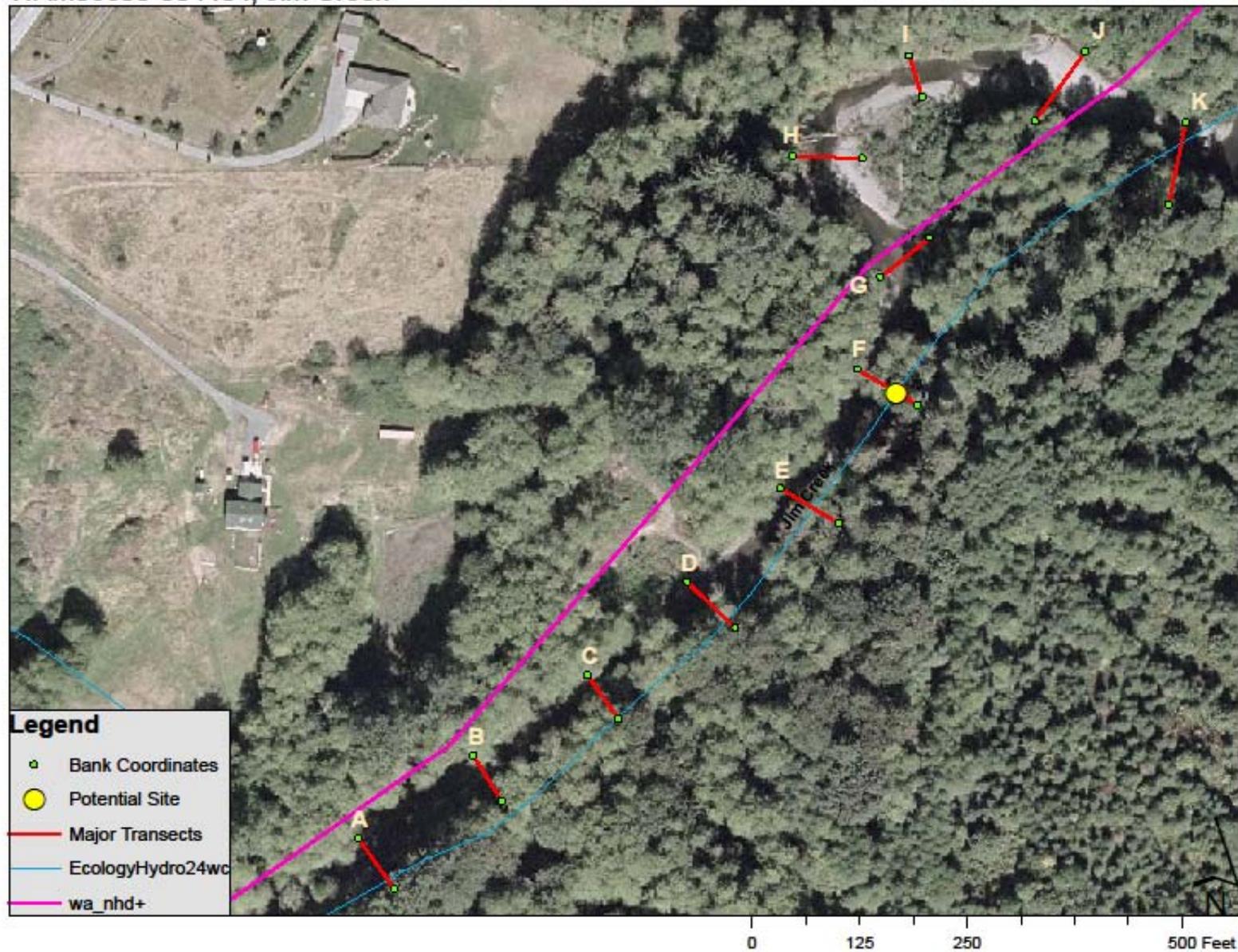
Riparian
Conditions

Metric/Method Selection

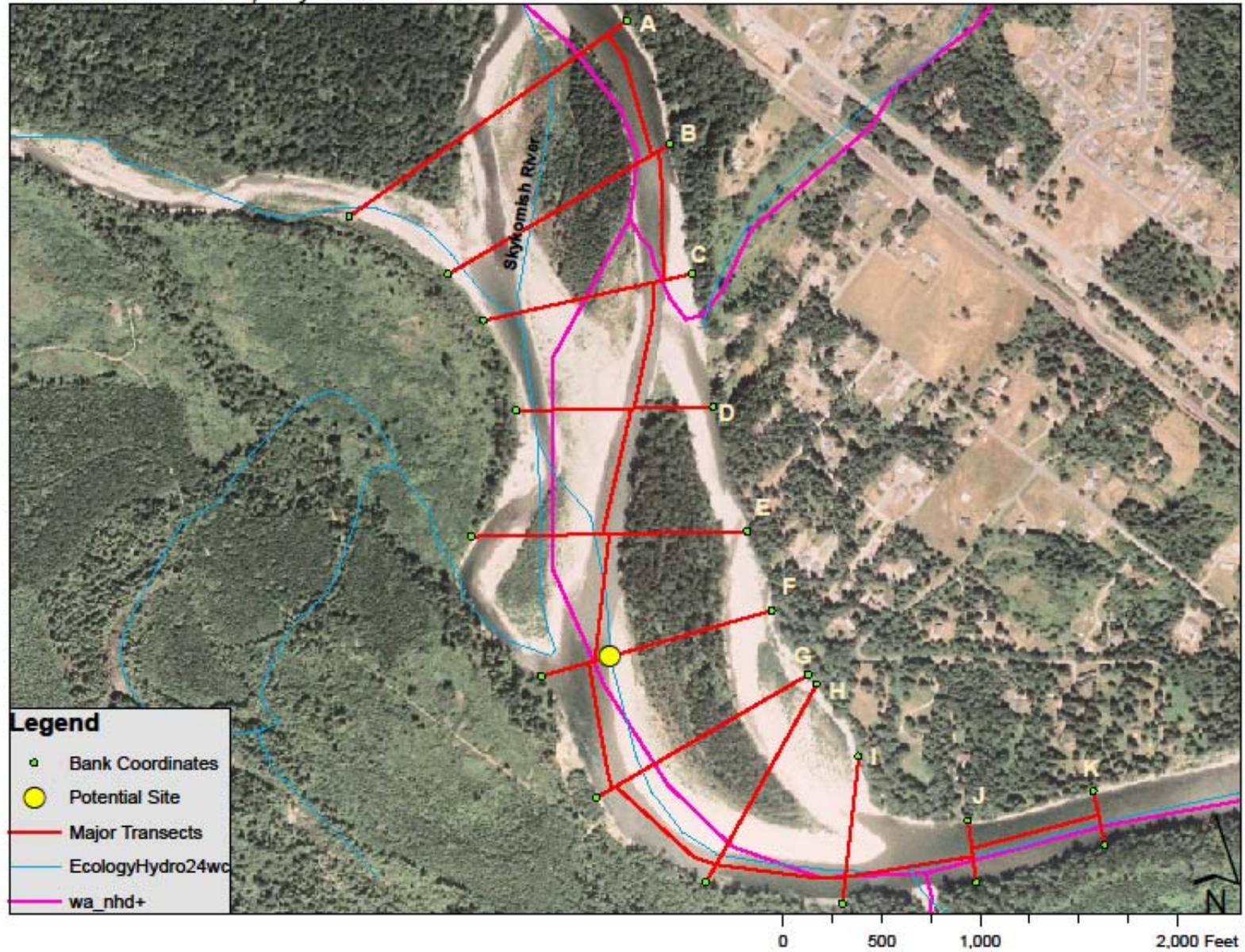


- Established
- Simple
- Inexpensive
- Reliable
- Extensive
- Relate to biota

WAM06600-004404, Jim Creek



WAM06600-001899, Skykomish River



Legend

- Bank Coordinates
- Potential Site
- Major Transects
- EcologyHydro24wc
- wa_nhd+



















Implementation

Are management actions consistent with objectives and plans?

Need to answer: what management actions have been put in place?

Loadings

What are the concentrations and loads of toxics, nutrients, and pathogens to Puget Sound?

What is the status of key basin scale indicators and how are they changing (trends)?

Need answered: What are the key indicators or endpoints needed to assess impact of stormwater on beneficial uses?

Status and Trends

Validation

Are expected environmental responses achieved after implementing a set of management actions?

Need to answer: what are the cause and effect relationships between stormwater and key indicators?

Effectiveness

How effective are BMPs.

Need to answer: What are the suite of stormwater management actions needed to prevent and reduce the adverse impacts from stormwater?

Questions?

