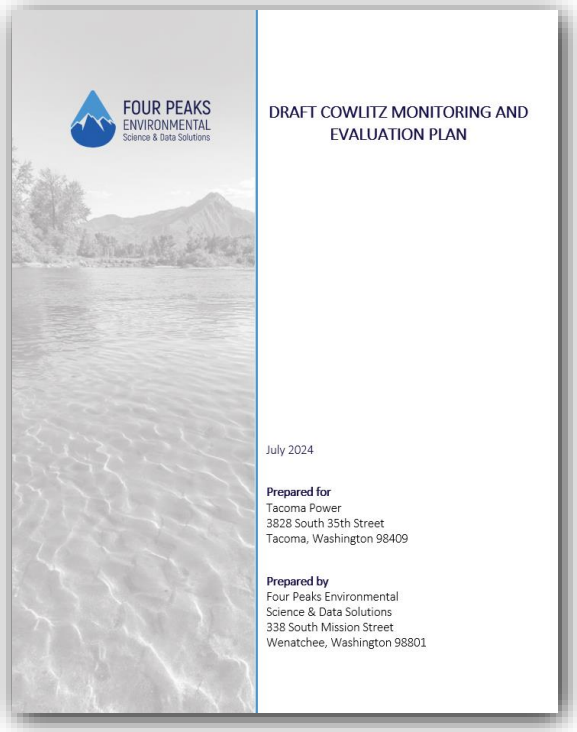
Cowlitz Monitoring and Evaluation Plan

Greg Mackey

FOUR PEAKS ENVIRONMENTAL Science & Data Solutions

Jenise Bauman

TACOMA PUBLIC UTILITIES



Contributors

Name	Organization
Greg Mackey	Four Peaks Environmental Science & Data Solutions
Jenise Bauman	Tacoma Public Utilities
Matt Bleich	Tacoma Public Utilities
Scott Gibson	Tacoma Public Utilities
John Best	Washington Department of Fish and Wildlife
Thomas Buehrens	Washington Department of Fish and Wildlife
Bryce Glaser	Washington Department of Fish and Wildlife
Todd Hillson	Washington Department of Fish and Wildlife
Josua Holowatz	Washington Department of Fish and Wildlife
Chip Nissell	Washington Department of Fish and Wildlife
John Serl	Washington Department of Fish and Wildlife

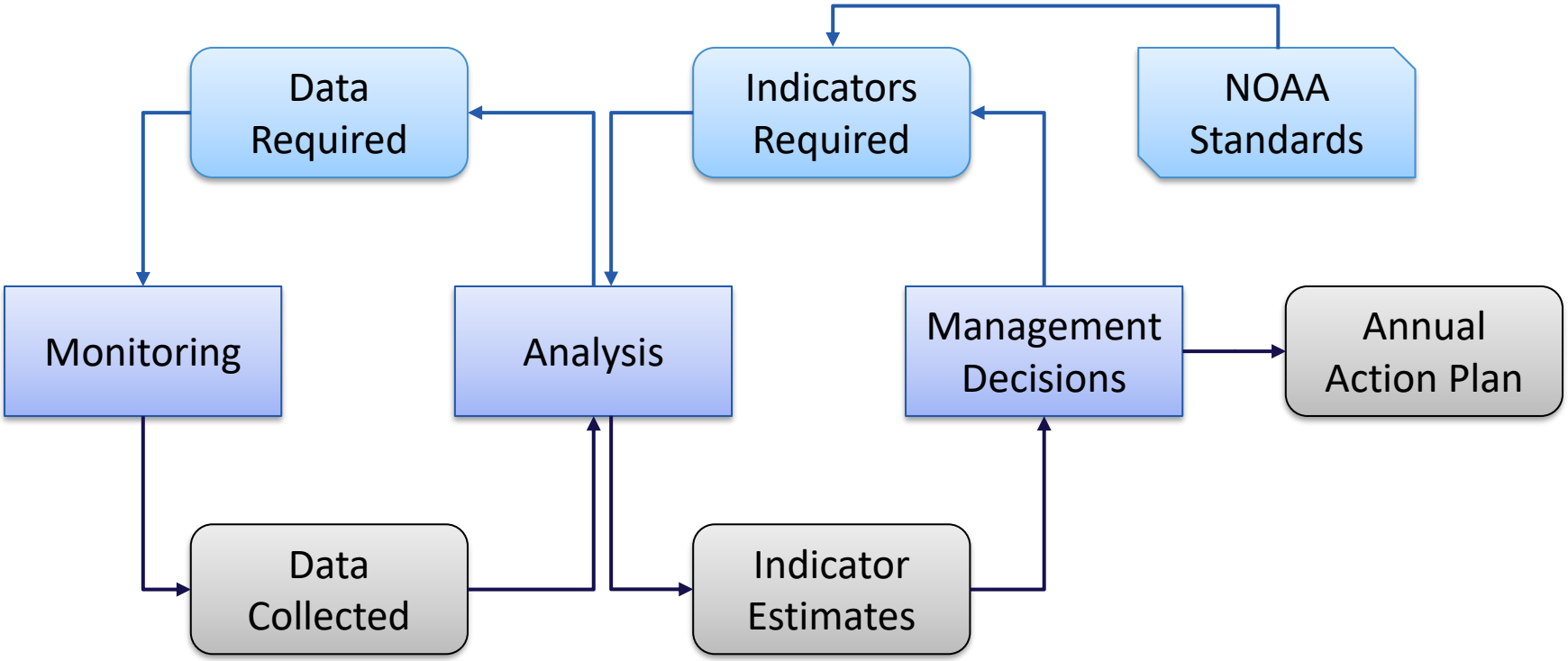
Introduction

- Cowlitz River Hydroelectric Project Settlement Agreement
  - Fish Monitoring Plan
    - To assess the Fisheries and Hatchery Management Plan (FHMP)
      - *"The emphasis of this agreement is ecosystem integrity and the restoration and recovery of wild indigenous salmon runs, including ESA-listed indigenous and unlisted stocks to harvestable levels."*
- Emphasis
  - *Effective upstream and downstream passage*
  - *Habitat restoration and improvement*
  - *Adaptive management program*
  - *Restore natural production*
  - *Artificial production program to compensate for unavoidable impacts*
  - *Consistent with Endangered Species Act (ESA) recovery*
  - *Fish production for sustainable fisheries*

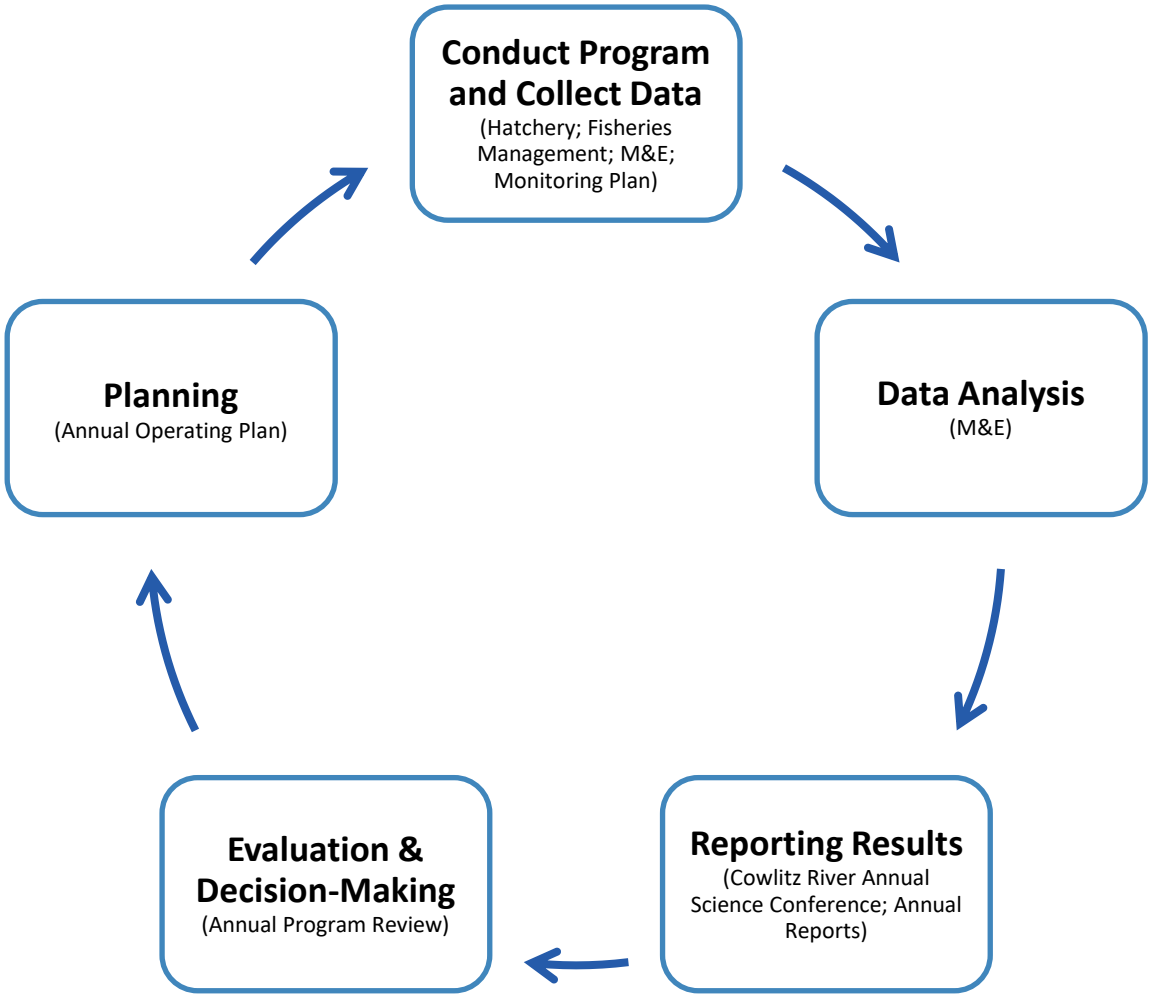
Plan Objectives

- Provide protocols and framework for monitoring and analysis
  - Generate key information to inform management decisions
  - Track the status and trends of populations
  - Achieve FHMP and recovery objectives
  - Evaluate performance relative to goals
- Adjust hatchery programs and recovery actions according to the Adaptive Management Plan
  - Test key assumptions and adjust accordingly
  - Provide critical information
    - Set management targets
    - Set decision rules

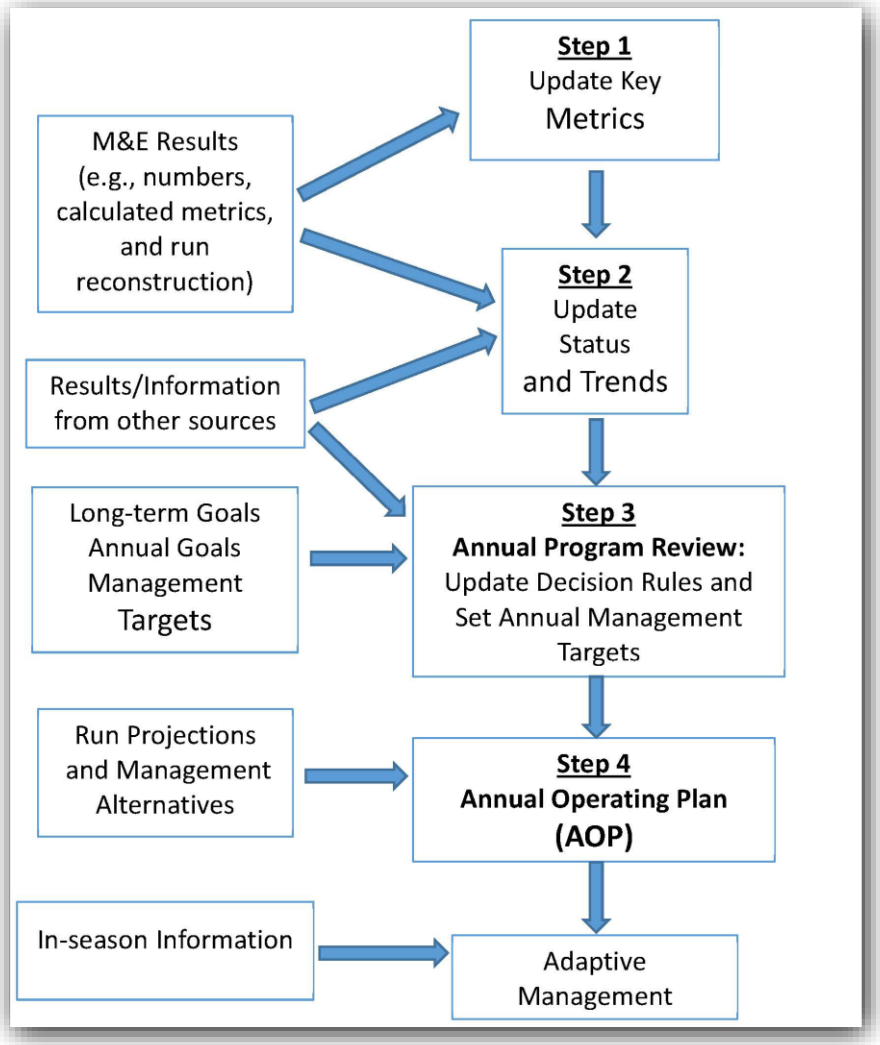
Monitoring and Evaluation and Decision-Making Process



Adaptive Management



Overview of Management Process



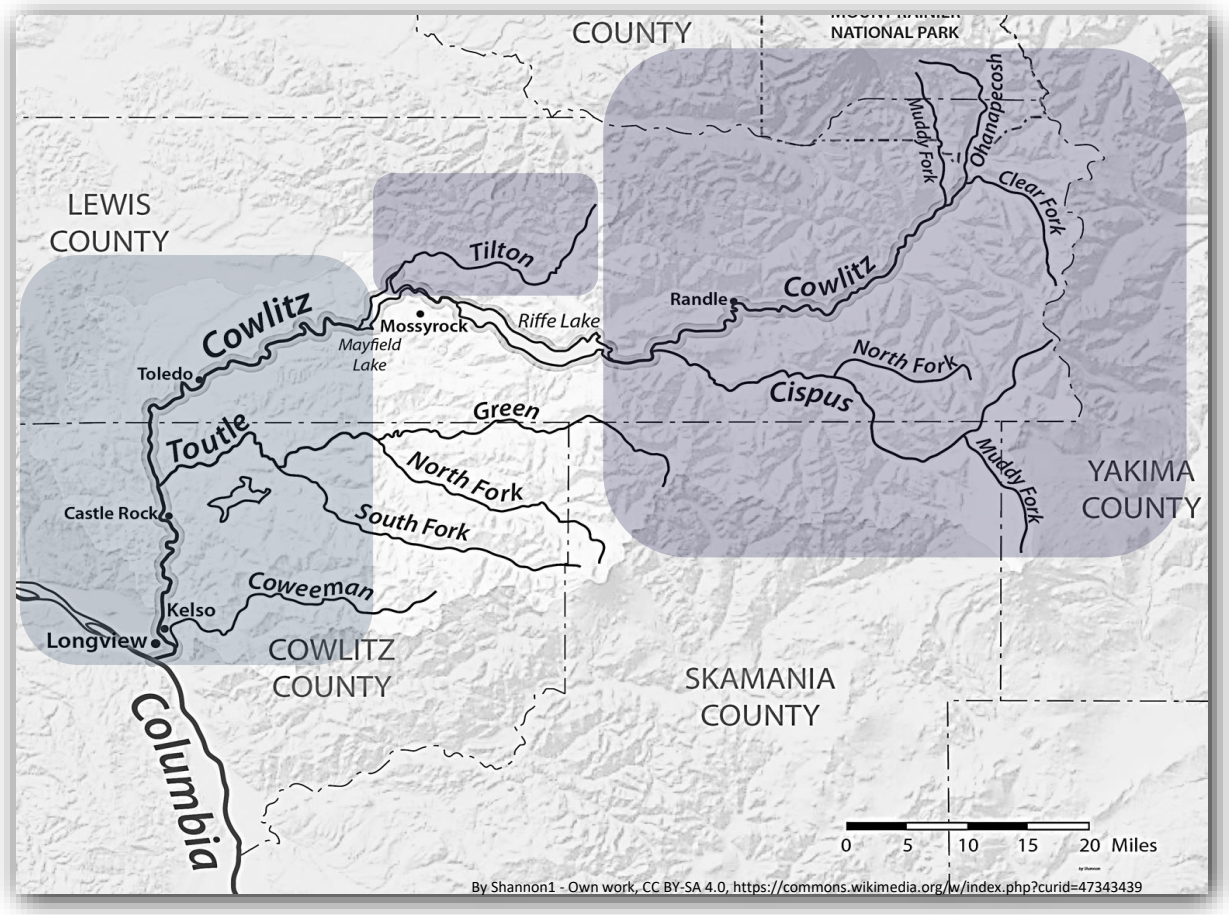
Management Objectives Sources

- 2020 FHMP
- Coho Salmon Transition Plan
- Fall Chinook Salmon Transition Plan
- Spring Chinook Salmon Transition Plan
- Winter Steelhead Transition Plan
- Recovery Plan for Lower Columbia River Coho Salmon, Lower Columbia River Chinook Salmon, Columbia River Chum Salmon, and Lower Columbia River Steelhead

Management Objectives by Species

Species	Population	Management Objectives Sources
Coho	Lower Cowlitz	• Coho Salmon Transition Plan • FHMP Final • ESA Recovery Plan
	Tilton	
	Upper Cowlitz	
	Cispus	
Fall Chinook	Lower Cowlitz	• Fall Chinook Salmon Transition Plan • FHMP Final • ESA Recovery Plan
	Upper Cowlitz	
Spring Chinook	Tilton	• Spring Chinook Salmon Transition Plan • FHMP Final • ESA Recovery Plan
	Upper Cowlitz	
	Cispus	
Winter Steelhead	Lower Cowlitz	• Winter Steelhead Salmon Transition Plan • FHMP Final • ESA Recovery Plan
	Tilton	
	Upper Cowlitz	
	Cispus	
Summer Steelhead	No recognized population	• FHMP Final
Chum Salmon	Cowlitz – Fall	• FHMP Final • ESA Recovery Plan
	Cowlitz – Summer	
Coastal Cutthroat	Cowlitz	• FHMP Final

Upper and Lower Cowlitz

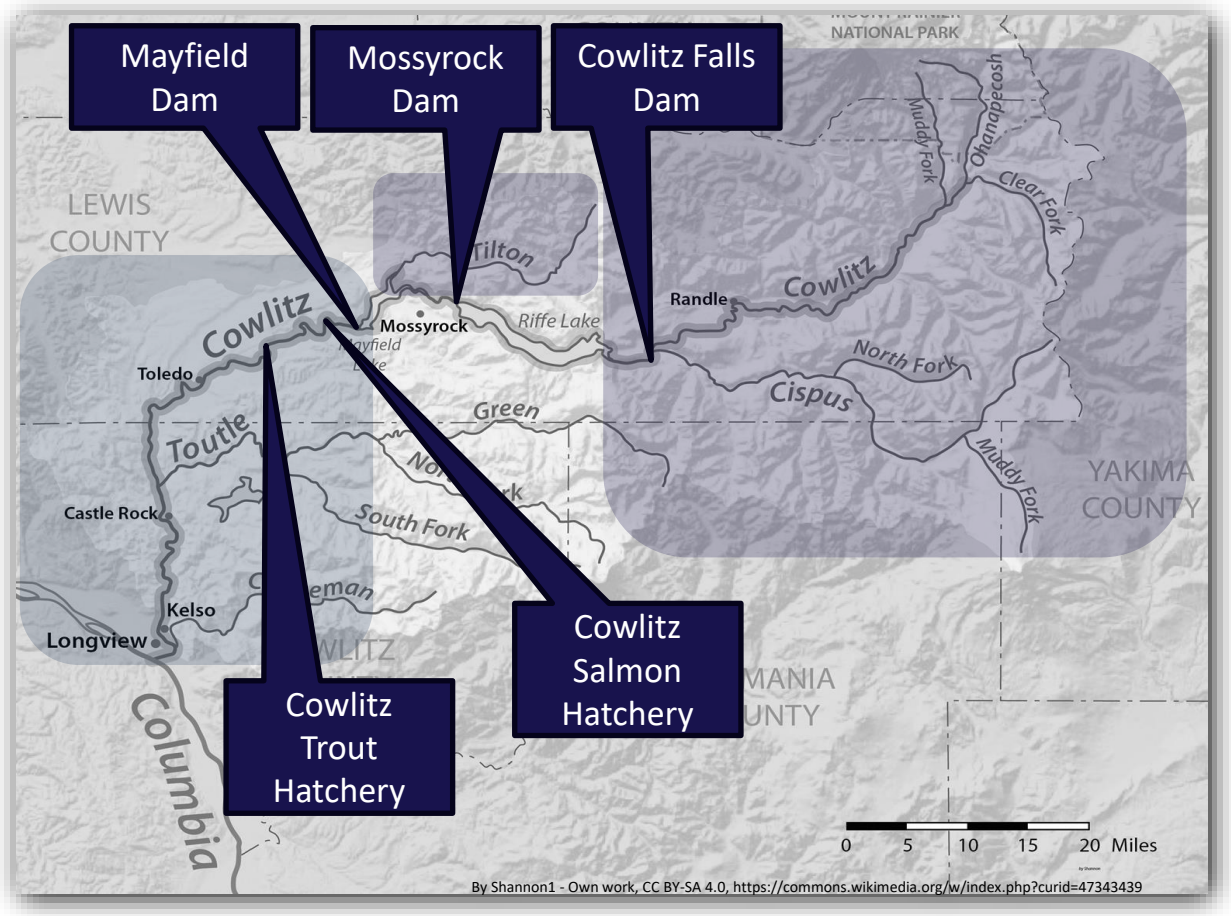


Legend

Upper Cowlitz Basin

Lower Cowlitz Basin

Facility Locations



Legend

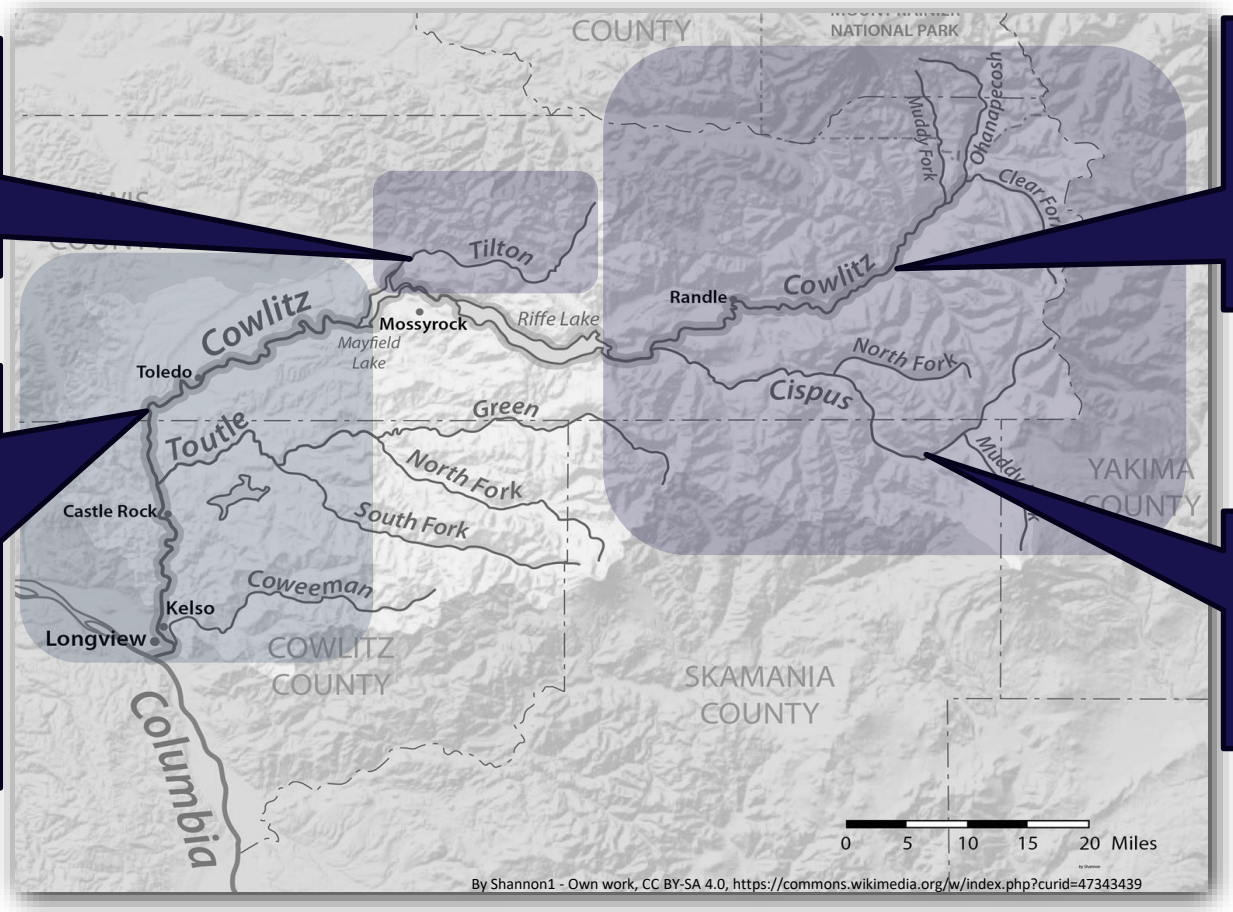
- Upper Cowlitz Basin
- Lower Cowlitz Basin

FOUR PEAKS ENVIRONMENTAL
Science & Data Solutions®

Salmonid Populations

Tilton River
Coho
Spring Chinook
Winter Steelhead
Coastal Cutthroat

Lower Cowlitz River
Coho
Fall Chinook
Spring Chinook
Winter Steelhead
Summer Steelhead
Chum Salmon
Coastal Cutthroat



Upper Cowlitz River
Coho
Fall Chinook
Winter Steelhead
Coastal Cutthroat

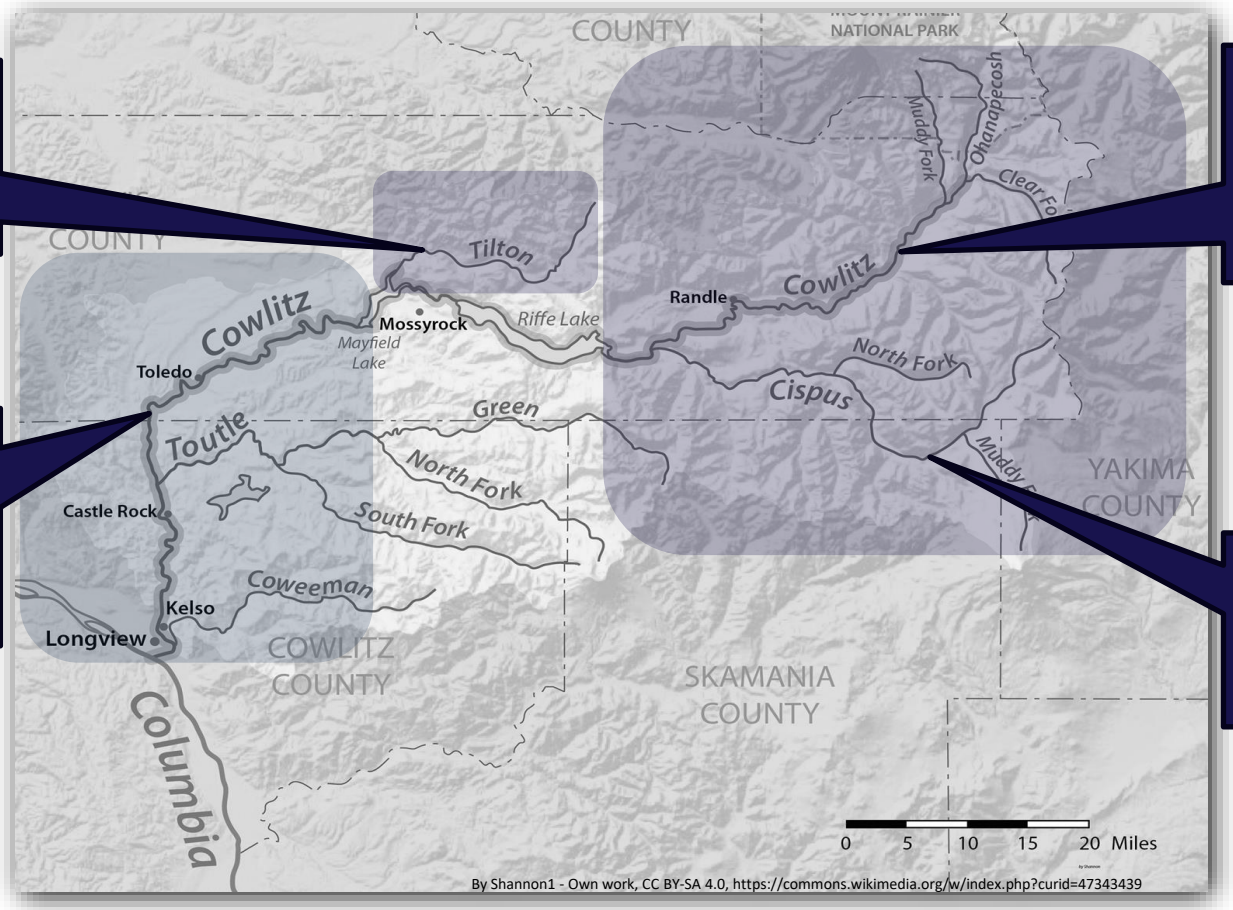
Cispus River
Coho
Fall Chinook
Winter Steelhead
Coastal Cutthroat

FOUR PEAKS ENVIRONMENTAL
Science & Data Solutions®

Hatchery Programs

Tilton River
Coho
Spring Chinook
Winter Steelhead

Lower Cowlitz River
Winter Steelhead
Summer Steelhead
Coastal Cutthroat



Upper Cowlitz River
Coho
Fall Chinook
Winter Steelhead

Cispus River
Coho
Fall Chinook
Winter Steelhead

FOUR PEAKS ENVIRONMENTAL
Science & Data Solutions®

Hatchery Programs (cont.)

Species	Hatchery Program	Type	Program Goal	Hatchery
Coho	Upper Cowlitz Coho Salmon	Integrated	Conservation/ Harvest	Cowlitz Salmon Hatchery
Fall Chinook	Upper Cowlitz Fall Chinook	Integrated	Conservation/ Harvest	Cowlitz Salmon Hatchery
Spring Chinook	Upper Cowlitz Spring Chinook	Segregated moving to Integrated	Harvest/ Conservation	Cowlitz Salmon Hatchery
Winter Steelhead	Lower Cowlitz Winter Steelhead	Segregated	Harvest	Cowlitz Trout Hatchery
	Upper Cowlitz Winter Steelhead	Integrated	Conservation/ Harvest	Cowlitz Trout Hatchery
	Tilton Winter Steelhead	Integrated	Conservation/ Harvest	Cowlitz Trout Hatchery
Summer Steelhead	Lower Cowlitz Summer Steelhead	Segregated	Harvest	Cowlitz Trout Hatchery
Coastal Cutthroat	Cutthroat	Segregated	Harvest	Cowlitz Trout Hatchery

Baseline and Directed Studies

- Baseline Studies
  - Viable Salmonid Population (VSP) and population assessment metrics
  - Hatchery program metrics
  - Trapping and hydroelectric fish facility metrics
  - Harvest metrics
- Directed Studies
  - Designed to diagnose specific questions or issues identified from baseline studies information to address management objectives and decision making
  - Directed studies are intended to inform
    - Future actions
    - Program design
    - Management decisions
    - Hatchery operations
    - Facility operations

Baseline Studies – Prioritization

- Prioritization of the monitoring components within the baseline studies is based on
  - VSP parameters
  - Data used for life cycle modeling
  - Data used to inform management decisions
- Additional monitoring focuses on
  - Compliance with ESA terms and conditions and reasonable and prudent measures
  - Effectiveness of management actions
  - Consistency with recovery plan elements

Baseline Study Metrics

Metric Type	# of Metrics	Origins	Life Stages
VSP and Population	20	Natural, Hatchery	Spawner, Adult, Smolt
Hatchery Program	16	Natural, Hatchery	Adult, Broodstock, Juvenile
Hydro Facilities	3	Natural, Hatchery	Adult, Smolt
Harvest	2	Natural, Hatchery	Adult

Directed Studies

Category	Number of Studies
Diversity	2
Hatchery	1
Management	3
Productivity	5
Productivity and Fish Health	1
VSP Parameters	1

Populations and Hatchery Programs Metrics

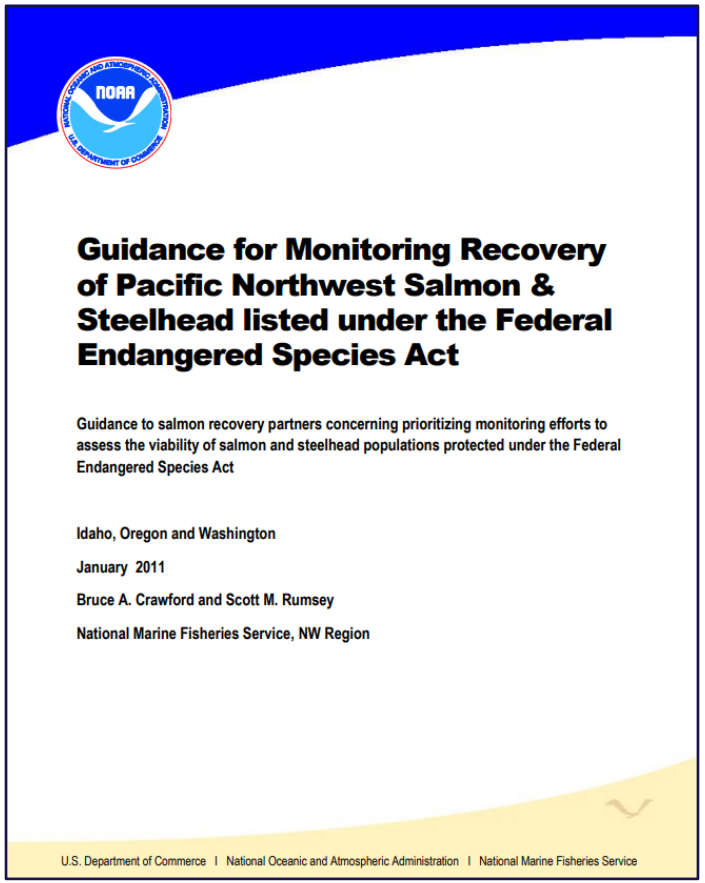
Species	# of Populations	# of Hatchery Programs
Coho Salmon	4	1
Fall Chinook Salmon	2	1
Spring Chinook Salmon	4	2
Winter Steelhead	4	3
Summer Steelhead	0	1
Chum Salmon	2	0
Coastal Cutthroat	1	1

Metric Targets Overview

Metric Category	# of Targets	Notes
Population status	3	ESA listing, population type, recovery phase
Abundance categories	4	Low and normal for natural and hatchery origin fish
Population metrics	38	Includes natural and hatchery origin fish as appropriate
Hatchery program metrics	38	Hatchery-related including PNI metrics
Facility assessment metrics	8	Adult and juvenile metrics for hydro facilities
Fishery/harvest metrics	16	Numerical and percentage metrics for each type of fishery and location

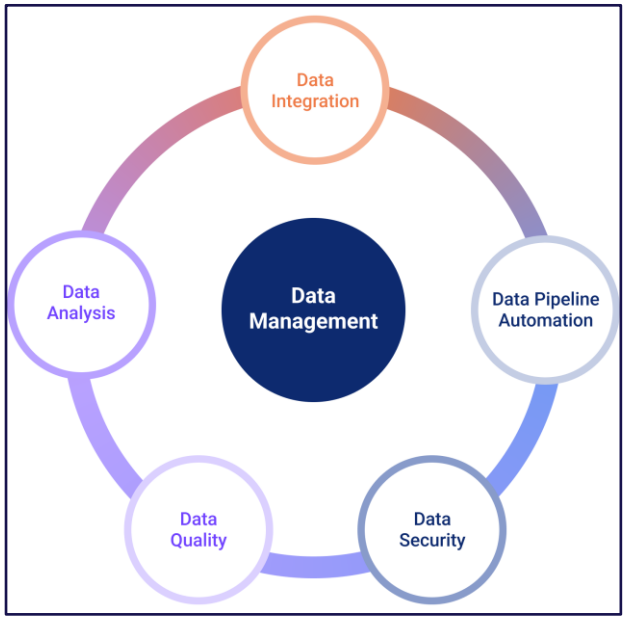
Data Collection and Quality Control and Quality Assurance

- Incorporates Crawford and Rumsey guidelines (2011) for
  - VSP spawner abundance
  - VSP productivity
  - VSP spatial distribution
  - VSP diversity
- Accuracy and precision
- Confidence levels
- Avoid metrics that are biased/unreliable
- Variance
- Power analysis and sample size



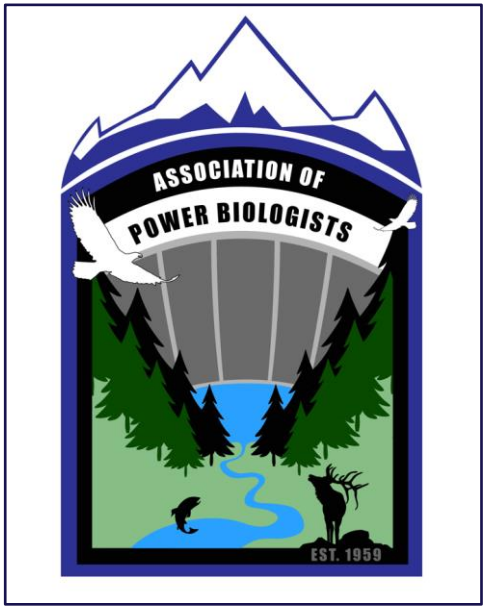
Data Management

- Provide data dictionaries and metadata to practitioners from Tacoma Public Utilities and WDFW- accessible platform
- Facilitate accurate communication among partners
- Interface with regional databases
- Designed to assess and evaluate data to improve transparency and enable repeatable calculations
- Standardize reporting for applications such as annual reports and VSP parameters



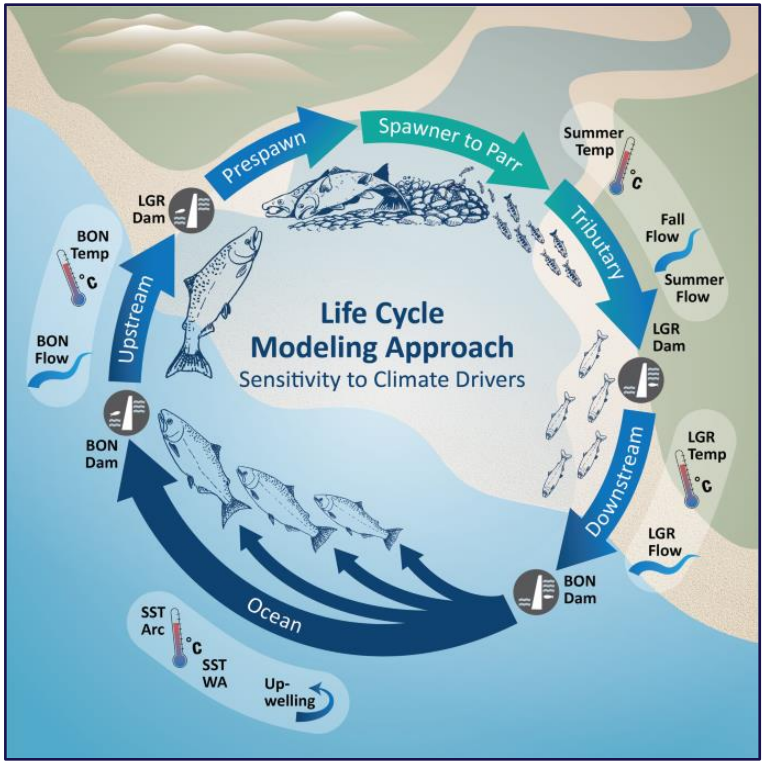
Reporting

- Annual reporting – Washington Department of Fish and Wildlife annual reports
- Cowlitz Falls North Share Collector annual report
- Hatchery broodstock collection and release numbers
  - Steelhead release estimates
  - Barrier weir adult data
  - Number of fish transported to Upper Cowlitz/Tilton
- Science Conference
- Future: Life cycle model outputs
- Other reporting opportunities



Future Implementation

- Refine the M&E Plan once it has been implemented
- Develop quantitative framework
- Integrate a data management system
- Develop life cycle models to test key VSP and population metrics
- Identify data gaps and key uncertainties
- Develop and implement Directed Studies to address key uncertainties



Additional Work

- M&E Plan implementation is a key component of restoration and recovery efforts
- Incorporate findings from the M&E Plan in management decisions
- Use analyses and life cycle models to direct assessment work
- M&E Plan must integrate into the Adaptive Management Framework