Bull Trout: The Forgotten Fish

Recovering Bull Trout through Critical Connections

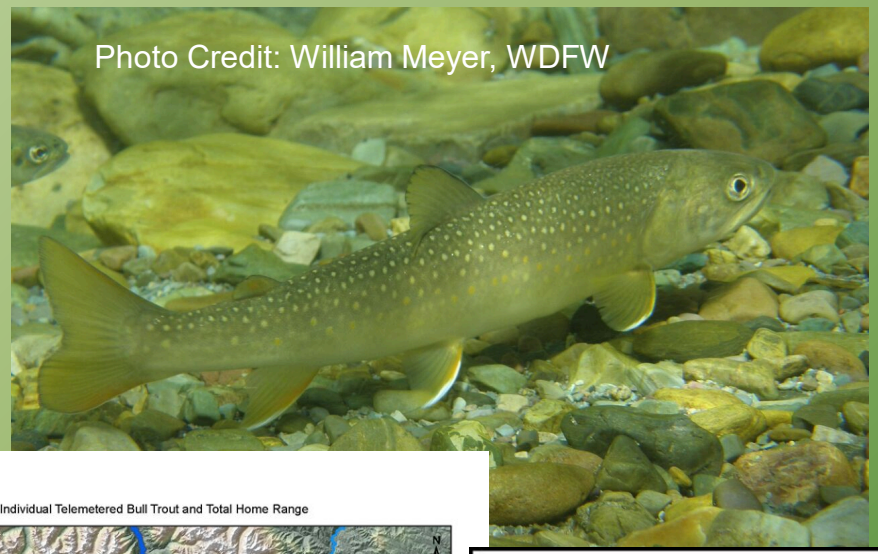
Photo Credit: Joel Sartore, National Geographic & Wade Fredenberg, USFWS.

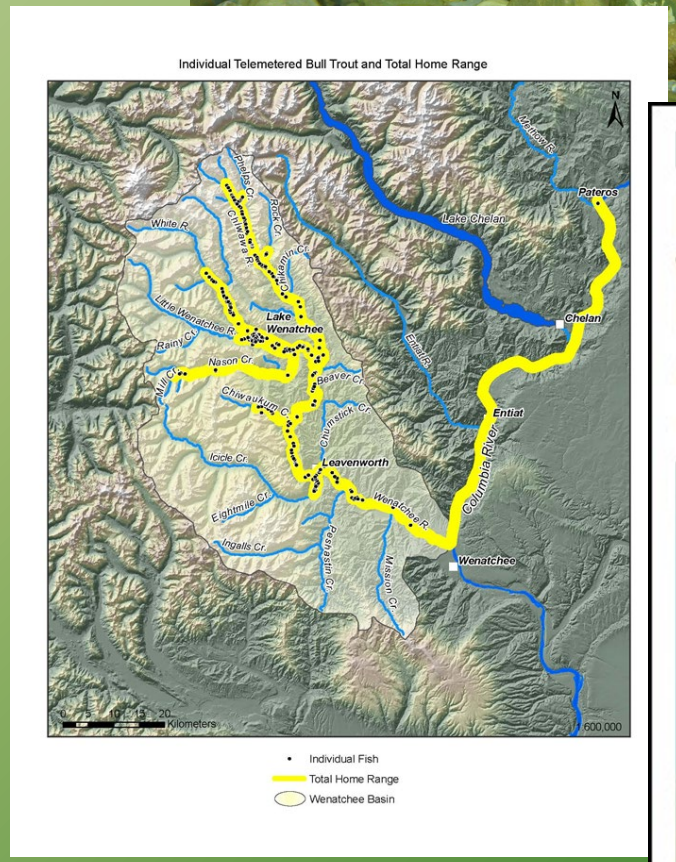
April 8, 2019

Judy Neibauer, USFWS, Wenatchee, WA
Central WA Bull Trout Recovery Coordinator

Overview:

- **Biology: 4Cs & Life History**
- **Migrations/Movements**
  - Spawning and FMO
  - Seasonal/Annual
- **Recovery Planning**
  - History
  - Strategy
  - Tools
  - Implementation





The 4Cs to Healthy Bull Trout -
Cold, Clean, Complex, and Connected

- WATER: Cold, Clean, and Connected habitat for spawning, overwintering, rearing (i.e. ~220days in gravel – 1 school year)

- SHELTER: Complex habitat with deep pools for overwintering and instream wood, undercut banks, overhanging vegetation, aquatic vegetation for cover. They need clean, loose streambed substrates for spawning

- FOOD: Connected habitat for juveniles, sub-adults, and adults to migrate and forage …*year round…* for a variety of prey items

Bull Trout
Life History Forms

Photo Credit: Bart Gammet, USFWS

Photo Credit: Wade Fredenberg, USFWS
Joel Sartore, National Geographic

Photo Credit: Dave Herasimtschuk

Photo Credit: William Meyer, WDFW

Photo Credit: Shannon Downey, USFWS

Photo Credit: USFWS
Photo Credit: USFWS

Migrations and Movements are Critical to Survival –

…Overview of Wenatchee, Entiat,Yakima population migrations

Wenatchee River Telemetry 2000-2004:

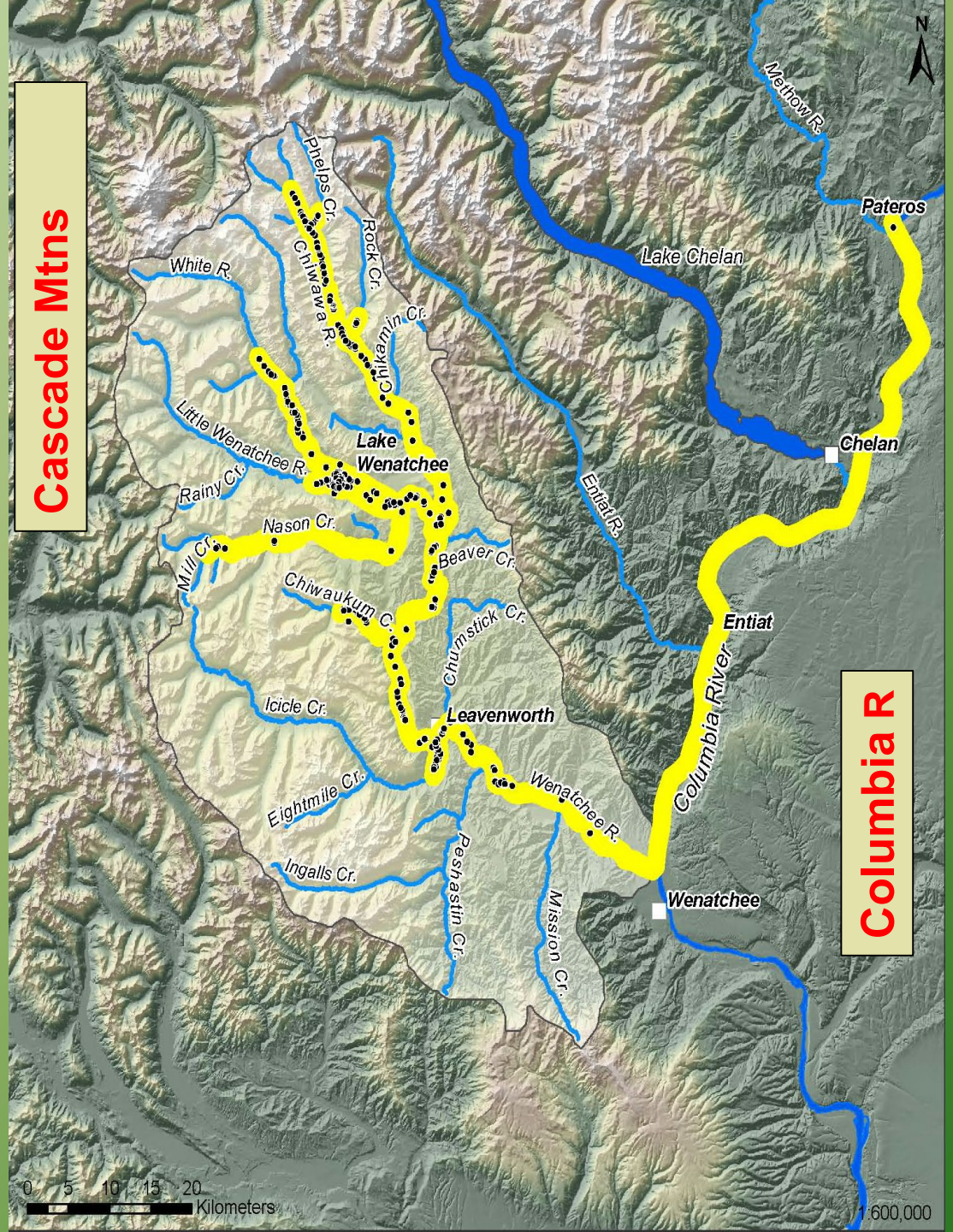
7 Local Populations

- **Necessary Connections to Lake, Rivers, and Columbia**

- **General Migrations**
  Up - May to July
  Some move into spawning areas 1st week of July
  Spawn - August to October
  Down – September to October
  Winter - November to April

- **Fish Groups:** Upper, Middle, Lower Basin, & Long range movers

*KellyRingel et al 2014



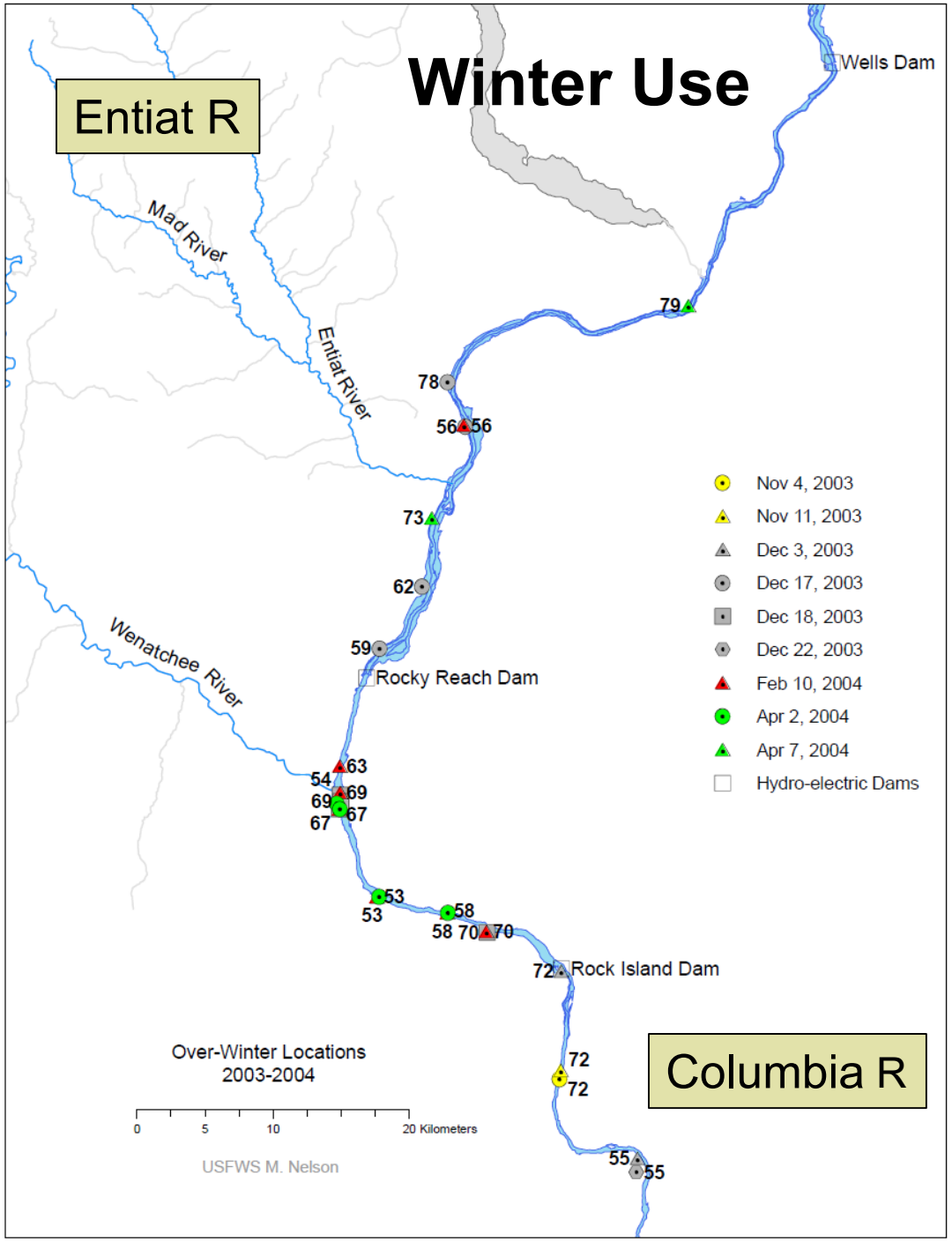
Entiat River Telemetry 2007-2013: USFWS

Entiat Fish

2 small Local Populations

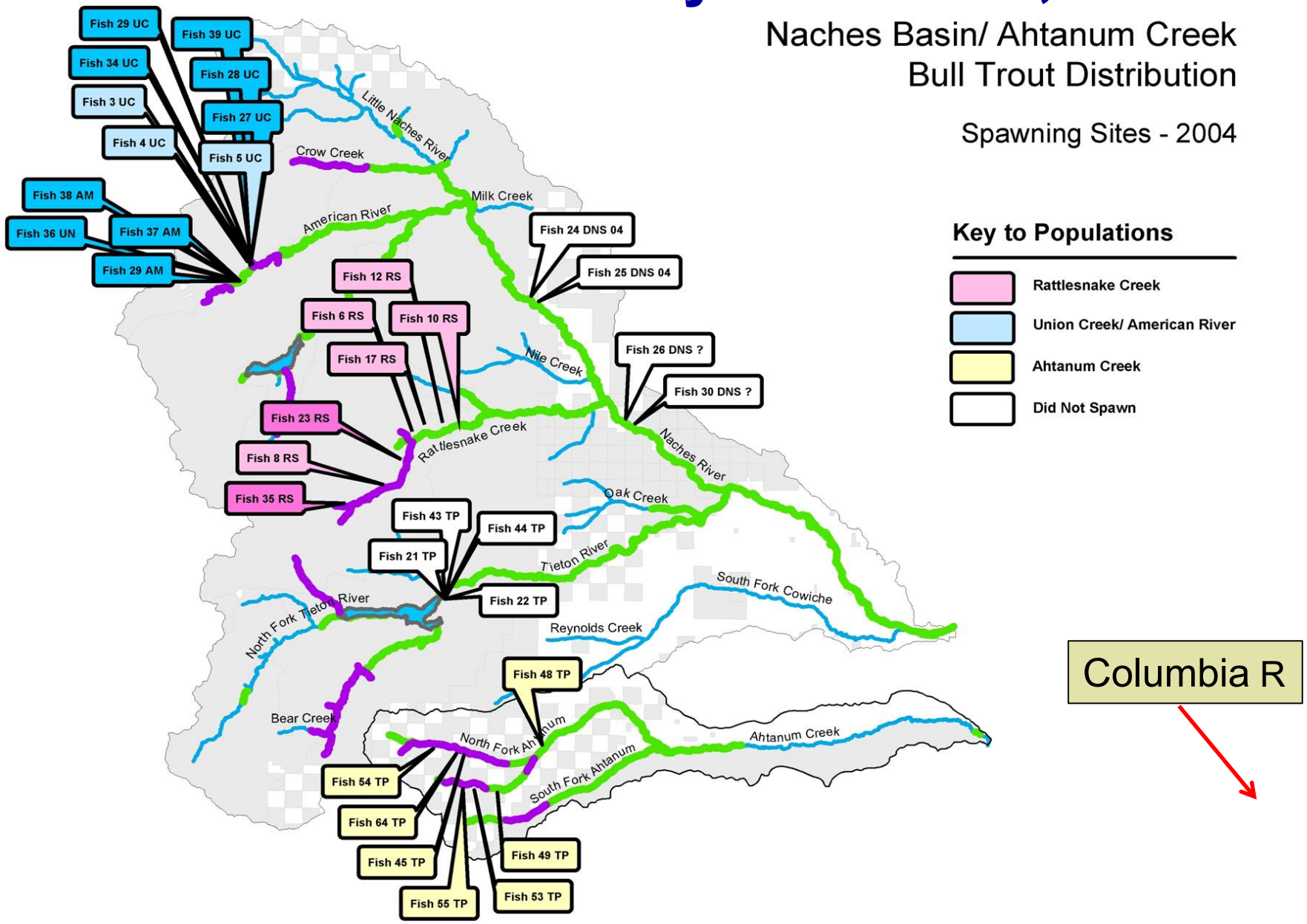
- **90% use Columbia November-April**

- **Small Basin Size**
- **Anchor Ice, Non-natives, Log Jams**
- **Dams – passage through turbines, spill, smolt bypass**



*Nelson 2014

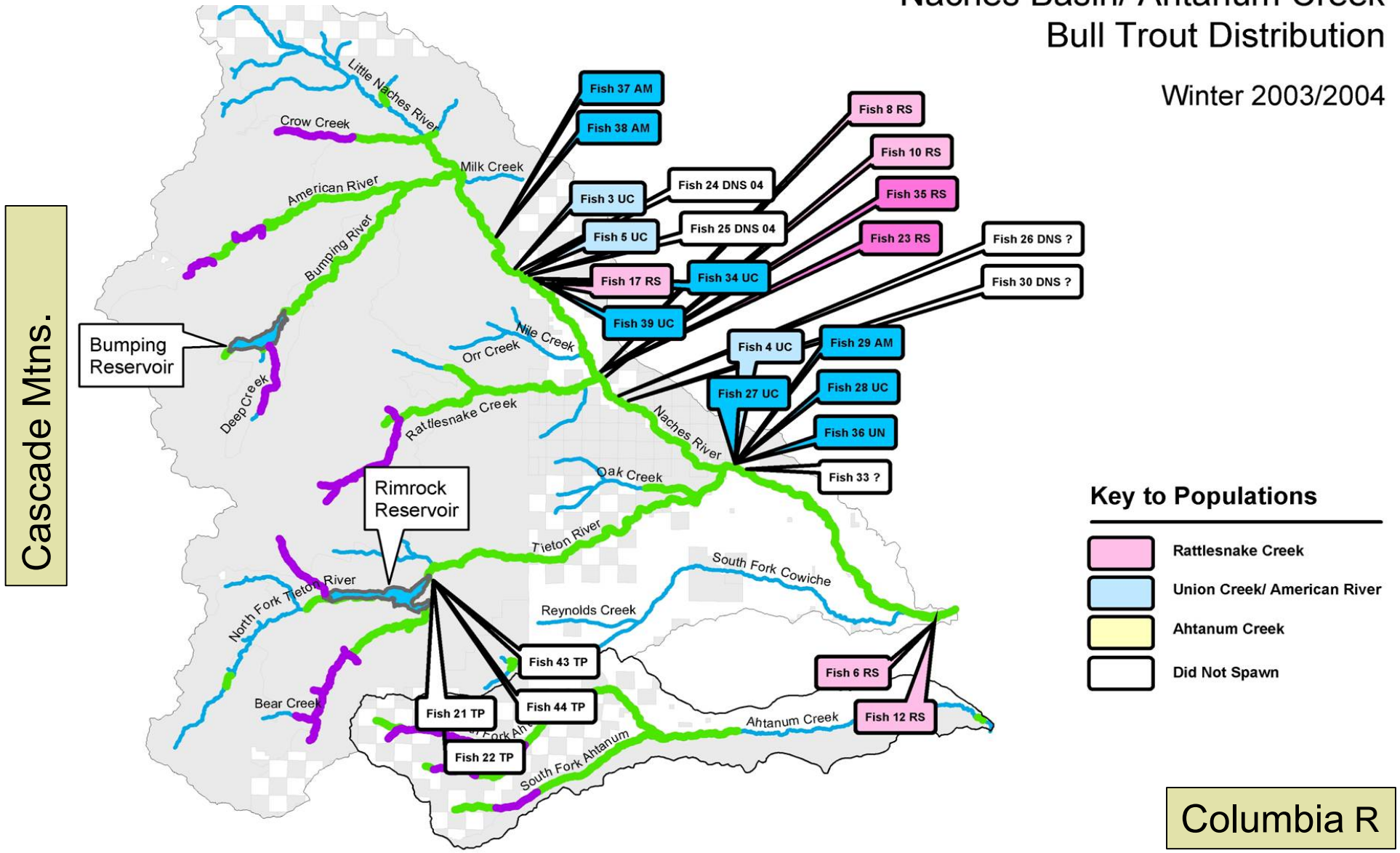
Yakima River Telemetry 2003-2006, WDFW



*Mizell and Anderson 2015

Naches Local Populations

16 Yakima Local Populations - Low abundances

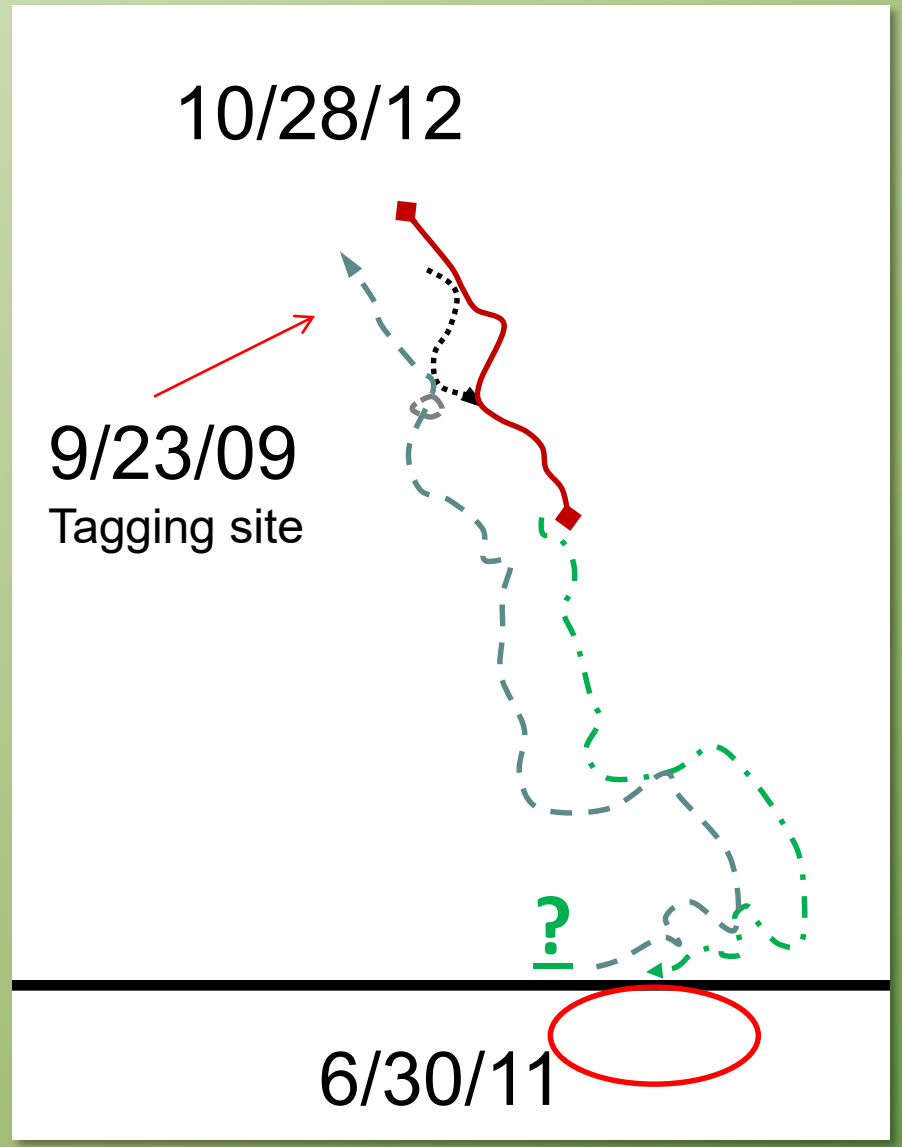


*Mizell and Anderson 2015

Subadult PIT Tag Movements: Use of Col. R

243mm BT observed in Yakima in June

Slide courtesy of Mark Nelson, USFWS

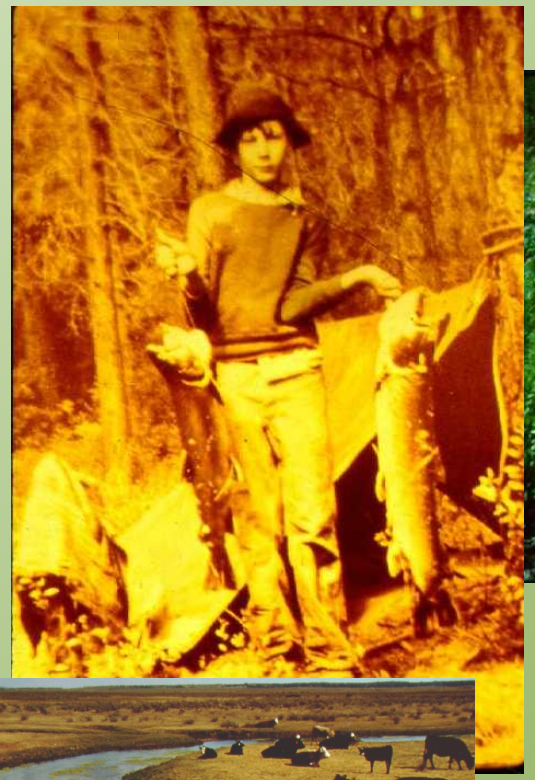


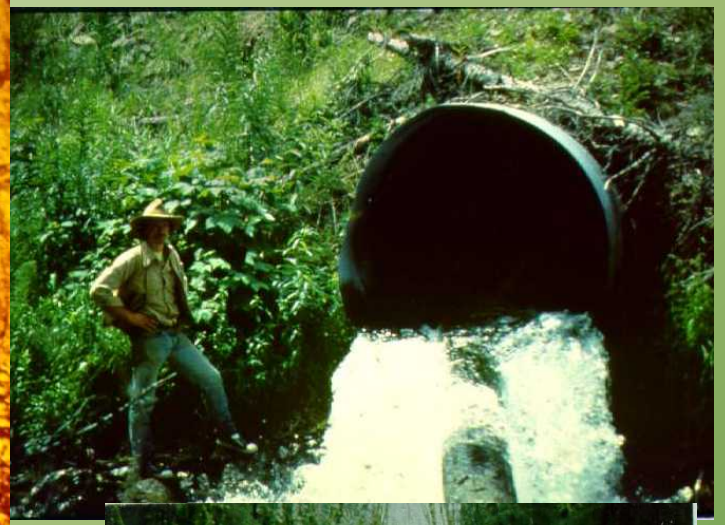
Three Years of movement: Upper Entiat R, Col. River, Middle Yakima River, and back

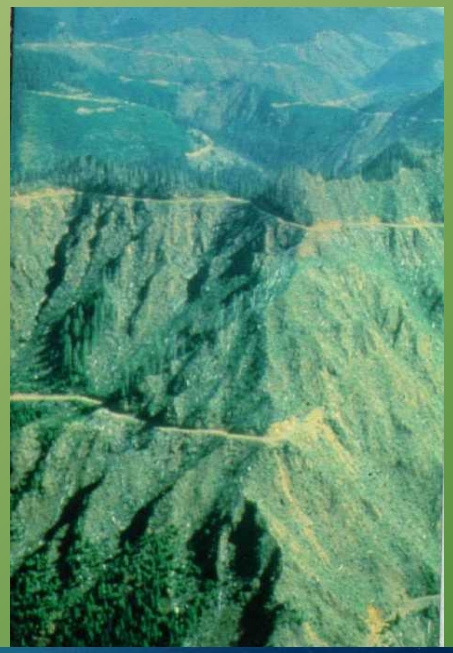
One way migration: ~333rkm (207 miles)

Total migration: ~666 rkm (414 miles)

With the continued Legacy of Threats: What do we do?







USFWS Listing/Recovery Planning History

1994-1997: Warranted but Precluded

1998/1999: Listed DPS's then Conterminously with Interim Recovery Units (RUs)

2002/2004: Draft Recovery Plans Prepared

2004-2010: Listed Designated Critical Habitat

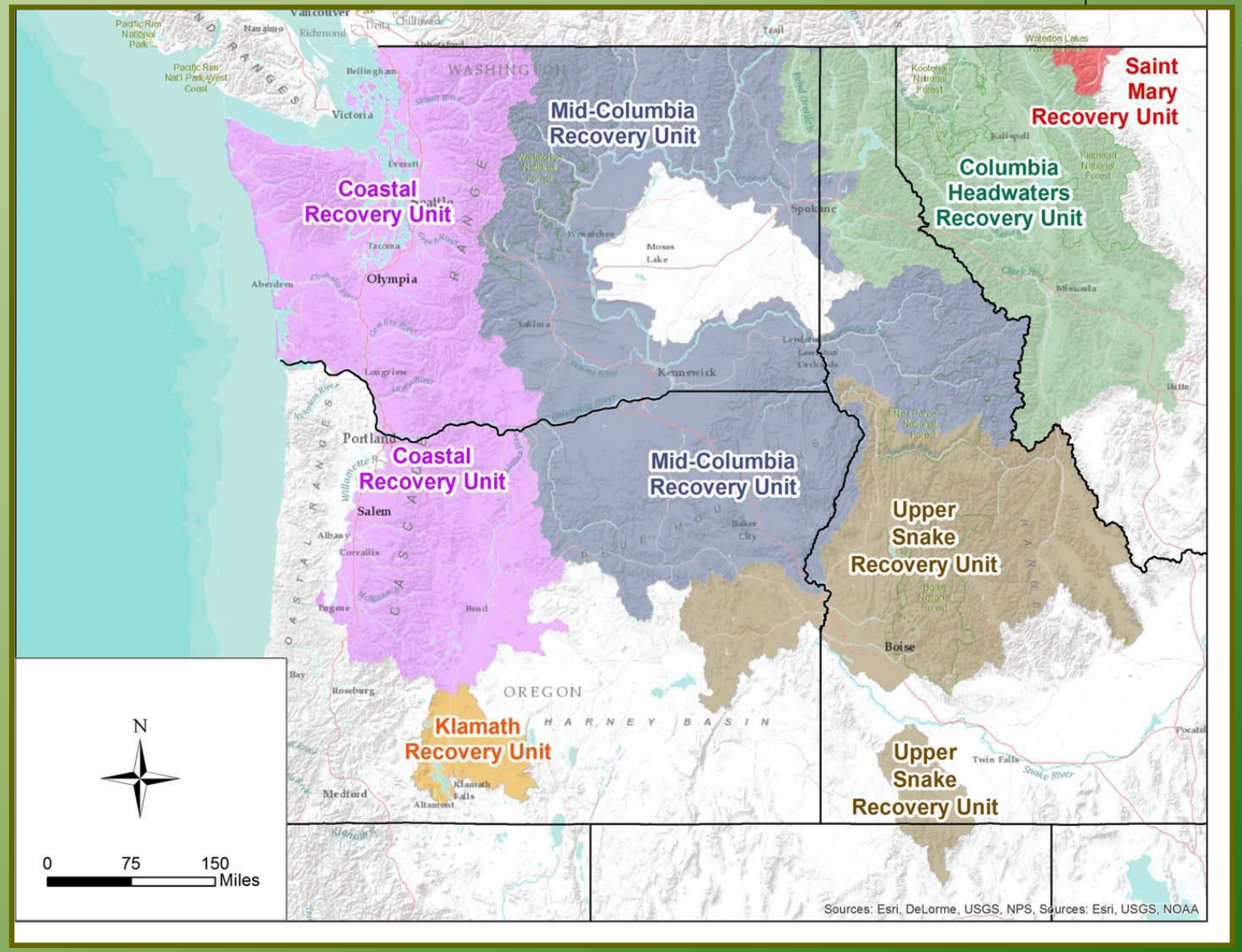
2008 & 2016: 5-Year Status Reviews

- 2015: <u>Final Recovery Plan Released</u> (17 years post-listing) - Incorporating 6 RUs, new information, and RU Implementation Plans

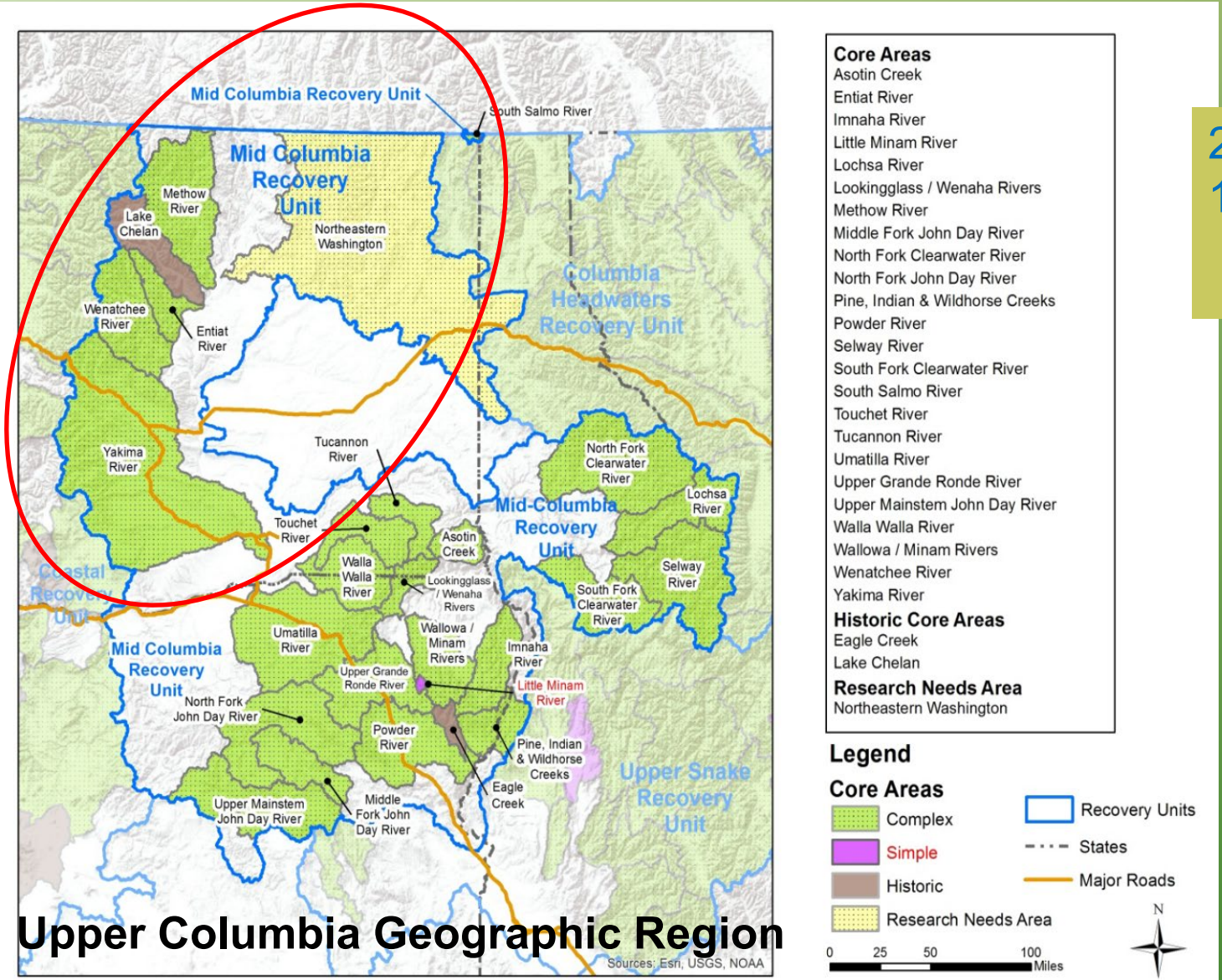
ESA Listing: 1 Distinct Population Segment with 6 Recovery Units (RUs)

Wide Distribution…

But <u>very low numbers</u> in most populations



Geographical Regions: Example - Mid-Columbia Recovery Unit



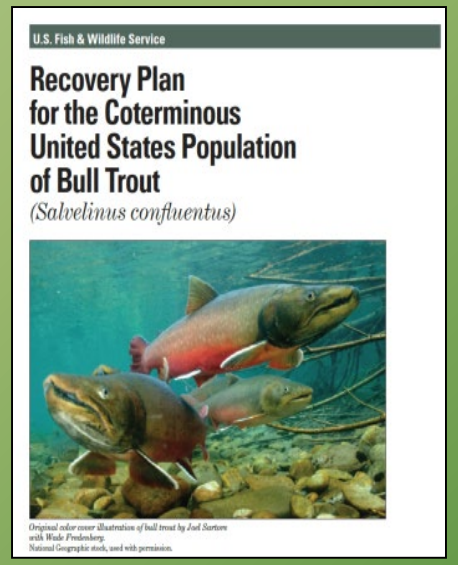
Upper Columbia Geographic Region

24 Core Areas
142 Local Pops

Recovery Implementation Scales

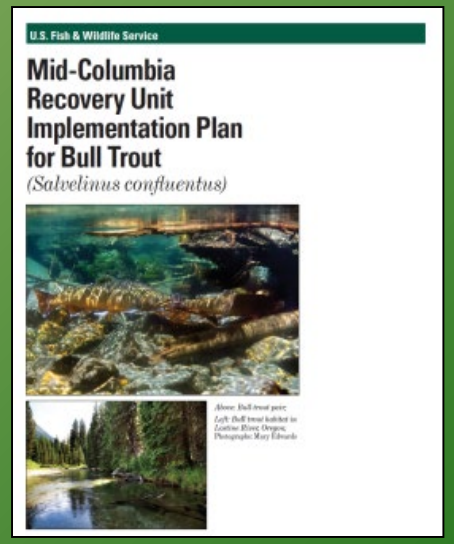
USFWS Recovery Plan

- "Broad-Scale" Plan
- Rangewide Criteria and Threats
- 6 New Recovery Units



Recovery Unit Implementation Plan (RUIP)

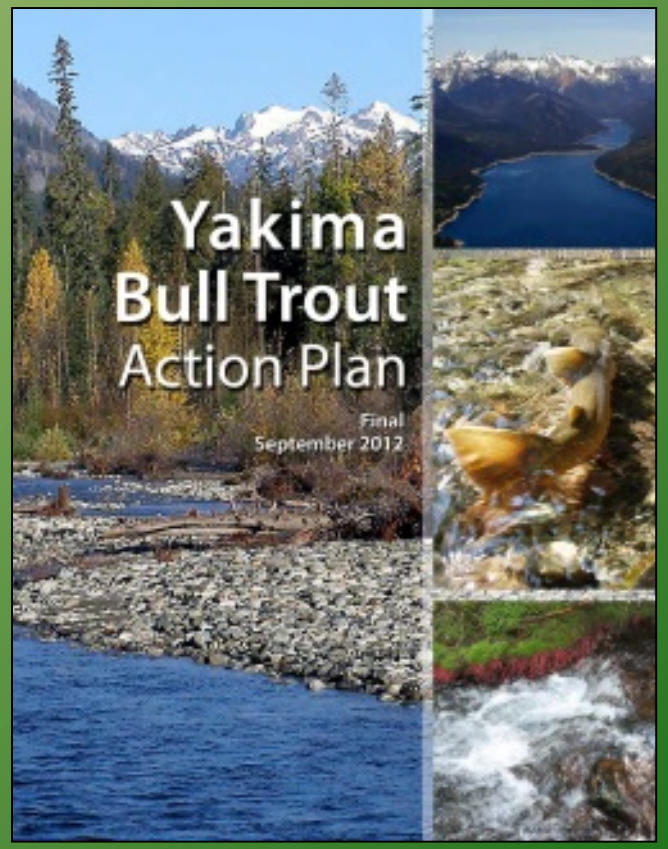
- "Mid-Scale" Plan
- RU & General Core Area Info
- Primary Threats
- Recovery Measure Narrative, Actions, Implementation Schedule



Recovery Implementation Scales
(Continued)

Example: “Core Area” Scale Plan
Yakima Basin Bull Trout Action Plan

- Local Plan
- All Partners develop
- Links to Yakima Basin F&W Recovery Plan
- USFWS 5-year Action Plan
- Threat Analysis, Data, Actions
- Literature & Information Dbase
- Easy Updates



Recovery Strategy

Overall Goal:

Manage threats and ensure sufficient distribution and abundance to improve the status of bull trout throughout their extant range

We expect that…

- **Bull trout will be geographically widespread across representative habitats and demographically stable;**
- **Genetic diversity and diverse life history forms of bull trout will be conserved; and**
- **Cold water habitats essential to bull trout will be conserved and connected.**

Recovery Criteria: Threats Based

Effective Management Involves*:*

- ✓ **For the Coastal, Mid-Columbia, Upper Snake, and Columbia Headwaters RUs:**
  - Primary **threats effectively managed** in at least 75 percent of all **core areas** and **local pops**

- ✓ **In FMO habitat outside core areas:**
  - **Connectivity and habitat in shared FMO** areas should be **maintained** in a condition sufficient **for regular bull trout use and successful dispersal** among the connecting core areas

*FMO = Forarge, Migration, Overwintering habitat

RUIP – Threats Table

Pg.C-18

Geographic Region Core Area (Complex) *Core Area (Simple)*	Number of Local Populations	PRIMARY THREATS[1]		
		Habitat	*Demographic*	*Nonnative*
		roads and railroads impact both spawning and rearing and FMO habitats. Recreation. Legacy and new recreational developments impact spawning and rearing habitat (*i.e.*, rock dam building, reduced riparian areas, and compacted stream banks) and reduce habitat complexity. **Instream Impacts** (1.2) Agriculture/Forest Management Practices/Grazing/Development/ Transportation Networks. Legacy and current management actions have degraded habitat and impacted stream channels, altered fish passage, reduced water flows, and constricted floodplains. Legacy timber, fire, recreation, and grazing management have added impacts to sediments, reduced riparian areas, stream temperatures. Current grazing management plans need to be maintained and improved in spawning areas and FMO areas. Highways, railroads, county roads along FMO development reduce complexity, create passage issues, and degrade water quality. Dewatering and Altered Flows. There are reaches of stream in FMO and spawning and rearing areas that naturally dewater and	Management and Transportation systems have impeded passage and have reduced habitat complexity. Dewatering. Stream reaches naturally dewater during times of low snowpack/rain and maybe further impacted with climate change. Entrainment (hydropower and diversions)/Fish Passage/Altered Flows. Entrainment and altered flows occur at all hydropower dams on the Columbia River and at other diversions/dams in the Wenatchee core area where fish passage is impeded. Some passage barriers alter timing and migration from spawning/rearing to migration areas. Altered flows and climate change have or will have caused reduced or limited use of some migratory corridors. Climate Change. Climate change is predicted to impact stream flows and temperatures that will cause barriers for passage and reduced refuge. **Fisheries Management** (2.2) Angling/Harvest/Poaching. Fishing regulations and harvest rules have improved but need to continue protect bull trout. Illegal poaching occurring in several basins. Introduced Species. Brook trout overlap with bull trout in both spawning and rearing and FMO habitat.	identified brook x bull trout hybrids within the basin. Salmon recovery involves output of high numbers of smolts, with some residualization and species competition which may have impacts to preybase and small populations of bull trout. Climate Change. Predatory non-native species occur within FMO habitats and risk potential spread esp. as waters warm with climate change.

RUIP - Recovery Action Narrative

Mid-Columbia RUIP
Pg. C-101

Yakima River Core Area

1. Actions to Address Habitat Threats

1.1. Upland/Riparian Land Management

Agriculture Practices

1.1.1. Maintain, restore, and protect riparian areas. Work with landowners, conservation districts, State, etc. to develop good management practices for riparian areas adjacent to spawning, rearing and forage/migration/overwintering habitats (*i.e.*, Ahtanum Creek, Teanaway, Yakima, and Naches Rivers).

Forest Management Practices

1.1.2 Maintain, restore, and protect riparian zones and stream channels associated with bull trout habitat. Along with ongoing implementation of the NW Forest Plan and implementation of the Forest Aquatic HCP on DNR lands implement specific forest practices and special use permits to protect and restore bull trout. Implement the Okanogan-Wenatchee Forest Restoration Strategy to protect and improve riparian reserves and stream channels as part of management planning. Develop, monitor, and adjust new Okanogan-Wenatchee National Forest Plan to incorporate at least these strategies and goals to insure protection of floodplains, riparian areas, and stream channels to maintain and restore bull trout habitat. As well, focus on land/water acquisitions that assist in improving riparian and instream habitats.

Livestock Grazing

1.1.3 Reduce grazing impacts. Fencing, changes in timing, and the use of riparian pastures, off site watering and salting, and other measures can be used to minimize grazing impacts. Evaluate ongoing allotment management for effects to bull trout and bull trout critical habitat. Modify management as needed, to reduce or eliminate effects that would retard recovery of bull trout populations and/or bull trout designated critical habitat. Conduct implementation and effectiveness monitoring, using accepted interagency monitoring protocols currently. Apply monitoring

RUIP - Recovery Measures

Core Area	Threat Factor	Recovery Action Priority	Recovery Action Number	Recovery Action Description	Recovery Action Duration	Responsible Parties	Comments	Estimated Costs (x $1,000)					
								Total Cost	FY 16	FY 17	FY 18	FY 19	FY 20
Yakima	A	2	1.1.3	Reduce grazing impacts.	O	USFS, WDNR, Counties, Cons Dist		1,000					
Yakima	A	2	1.1.4	Reduce impacts to riparian areas and stream banks.	O	WDFW, DOE, USCOE, Counties, Cities, Cons Dist,	Combined with salmon recovery	10,000					
Yakima	A	1	1.1.5	Reduce habitat and floodplain impacts.	O	WSDOT, Fed Hwys, Counties	Combined w/ salmon recovery	10,000					
Yakima	A	2	1.1.6	Reduce impacts from recreation to riparian areas.	C	USFS, WDNR, WDFW, Parks and Rec, Pvt Rec Groups, BT Task Force		5,000					
Yakima	A	2	1.2.1	Protect and improve riparian areas and floodplains.	O	WDFW, NRCS, Cons Dist, Counties	Combined with salmon recovery	10,000					
Yakima	A	2	1.2.2	Implement stream restoration in degraded stream reaches.	O	USFS, WDNR, PTC, Yakama, BOR		15,000					
Yakima	A	3	1.2.3	Reduce cumulative impacts in FMO to populations that are impacted during natural dewatering of spawning and rearing areas.	C	BOR, USFS, WSDOT, Ahtanum Irrig Dist, WDNR		*					
Yakima	A	2	1.2.4	Reduce impacts to riparian areas in spawning reaches.	O	USFS, WDNR, Cons Dist, NRCS,		1,000					
Yakima	A	1	1.2.5	Develop adequate passage to connect FMO to spawning and rearing areas.	5-20	BOR, WDFW, Yakama, USFWS, NOAA, BPA		166,000					
Yakima	A	1	1.2.6	Connect FMO and spawning and rearing habitat.	5-20	BOR, WDFW, Yakama, USFWS, NOAA, BPA	See 1.2.5	TBD					

Page C-227

Local Scale Example:
Yakima Action Plan

Gold Action #2: Implement Lower Gold Floodplain Restoration Plan

Action Type: Recovery

Life stage(s) affected: Spawning/egg incubation, Pre/post spawning migrations, Juvenile Rearing

Threat addressed: Dewatering

Associated RUIP Actions: 1.15, 1.21, 1.22, 1.24

Severity: Significant

Link to Threats Table: G1,G2,G3,G4,G10,G11,G12,G19,G25, G26

RUIP Pg.195

Action Description

Gold Creek Floodplain Restoration (USFS) which would include the removal of legacy dikes and road fill from the gravel pit operation, relocation of ADA accessible trail away from Gold Creek, relocation of the footbridge out of floodplain, restoration of hydraulic connectivity through the parking area, installation of an engineered logjam in Gold Creek and replacement of the current Forest Service road bridge.

Justification/Background

The US Forest Service, in the process of completing a large-scale scoping NEPA document, included this project as a placeholder for restoration actions suggested by the results the a hydrological study (Gold #1).

Key Partners

USFS, USFWS, BOR, YBFWRB, KCT

Time to Implement: 3-5 years

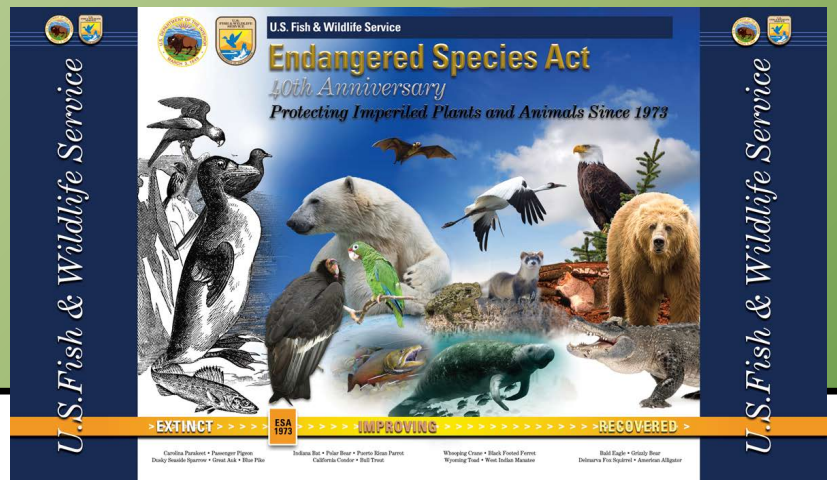
Time to Benefit: 5+ years

Cost Estimate: $1 million

Cost Derivation

Cost estimate is based on Forest Service initial estimate for project implementation.

Recovery and the ESA: More than just tools and plans….



- **Endangered Species Act (ESA) -** Provides tools for Pathways to Recovery
- **Recovery Plans -** Establish the necessary structure and guidance that move a species towards **Survival and Recovery**
- **Section 4, 6, 7, 8, 9, and 10 → Recovery Actions**

ESA Tools... not just permits... They are agreements that involve ongoing coordination for conservation planning

ESA Recovery Implementation Tools

Other Sections of ESA provide tools to promote Survival and Recovery

- **Section 4 –** Recovery Planning and Protective Regulations –
  - 4dRule with WDFW and Tribes for direct and incidental catch for fishing
- **Section 6** – Cooperation & Agreements - USFWS and States implement recovery actions and manage Incidental take in their ongoing work (i.e. Sec 6 funding goes to WDFW)
  - Brook trout removal; BT rescue, Redd surveys; Fish management
- **Section 7** - Federal Consultation -BOR, BPA, DOT, USFS, NPS, COE, NMFS, etc.
  - Held to a higher authority – Seciotn
  - Dams and diversions, FERC, Recreation, roads management, restoration projects, fires, floods,
- **Section 10** – Exceptions for Recovery Permits for partners (i.e., handling and HCPs)… Projects that involve a partner's plan for doing **good science & conservation** for bull trout.
  - DOE – Fish health surveys; CRITFC - Col. River and Lake Wenatchee sockeye work; CWU-I90 Surveys and monitoring; USFS – Surveys; FERC – BPA-PUDs monitoring

Specific Examples

Water Supply – Methow, Wolf Creek
USFS Sec 7 & Irrigation District HCP

- Affects One BT local population
- Construction (wells, diversion, etc.)
- Operation (fish screen, passage, return flows)
- Maintenance

Water Supply - Yakima Irrigation Project

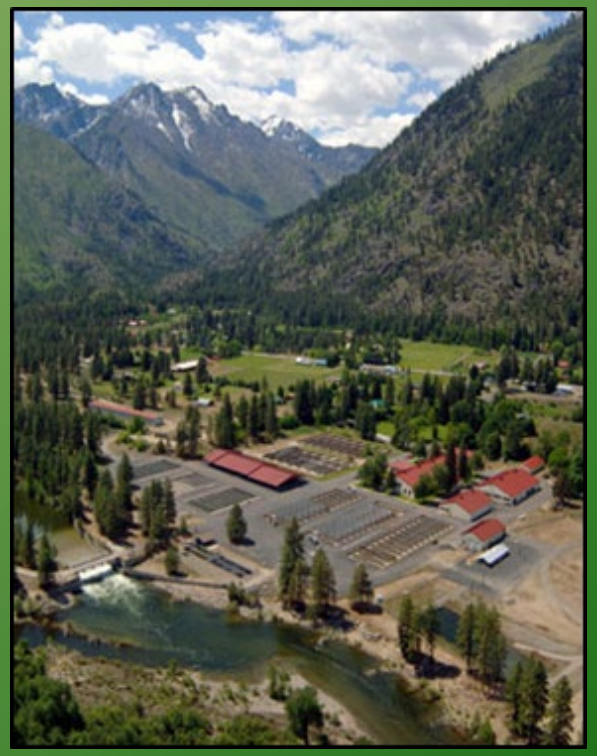
- Affects the Whole Core Area – 15 BT Local Populations
- Reservoir Operations
- Water conveyance – Diversions, pipes, ditches

Specific Examples Con't.

Land Management Project –

Wenatchee, Nason Restoration

- Affects several BT Local Populations & overlaps with salmon habitat
- Multiple agencies: USFS permits, Salmon Rec funding, tribes and county plan
- Instream Habitat - Riparian/floodplain restoration

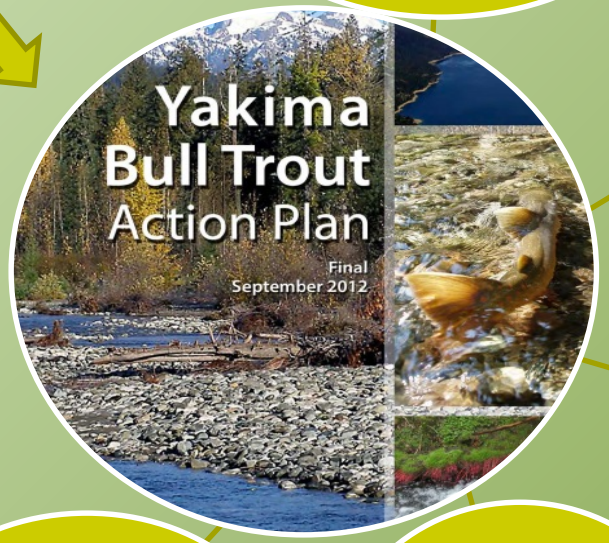


Land Management Project - Wenatchee-Leavenworth NFH

- Affects multiple core areas (i.e., Wenatchee, Entiat BT Local Populations) & overlaps with salmon
- Multiple agencies: USFWS, tribes, USFS, WDFW, NMFS
- Ongoing Operations & maintenance – Water quality, water quality, fish passage

Implementation Planning Examples

Bull Trout Recovery Work Groups



Population Restoration Actions- Fish Salvage, Re-introductions, non-natives

Land/Water Management– Forest Plans, Dams, FERC, PUDs, DOT, Agriculture

Habitat Restoration Actions– Restoring Complexity and Connecting habitats

Baseline Studies– Reservoir Food Webs, Stream Temperature, Habitat

Monitoring- Redd surveys, Genetics, Migration, etc.

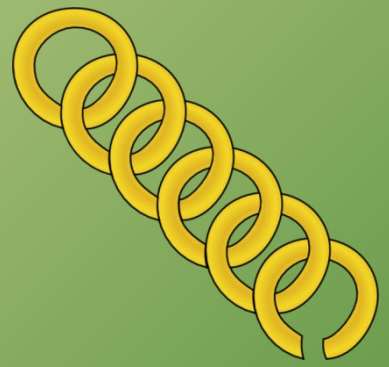
Water Management: Dam Operations - BOR/COE/BPA

Land Management: USFS/DNR/WDFW/ Tribes

Fish Management: State/USFWS/NOAA/ Tribes

Scientific Studies: CWU, UofW, USGS, USFWS, USFS, DOE TFW, WDFW, BPA, etc..

We can Link local “Action” Plans to Salmon Recovery processes



- Regional Tech Teams
- Implementation Technical Team
- Watershed Action Teams
- Habitat Work Schedule Dbase (USFWS-ROAR
- and HABITS dbases)
- Implementation Schedule (USFWS schedules,
- & see Yakima Action Plan)
- Adaptive Management loops/Plans
- Education/Science workshops

Collaboration:
Moving Bull Trout to the Frontline

- Steelhead and salmon seem to take precedence…
- Can we collaborate better for efficiency?
- Consider a "WHOLE WATERSHED" or ecosystem approach to restoration
- Leverage funding opportunities (BiOps, USFWS recovery funds, actions funded for salmon in FMO)
- In areas of overlap, Consider Bull Trout in planning– they are part of the native fish assemblage
- Consider implementation of ESA Sec 4, 6, 7, and 10 within core areas and their relationship to larger restoration plans

What’s Next?

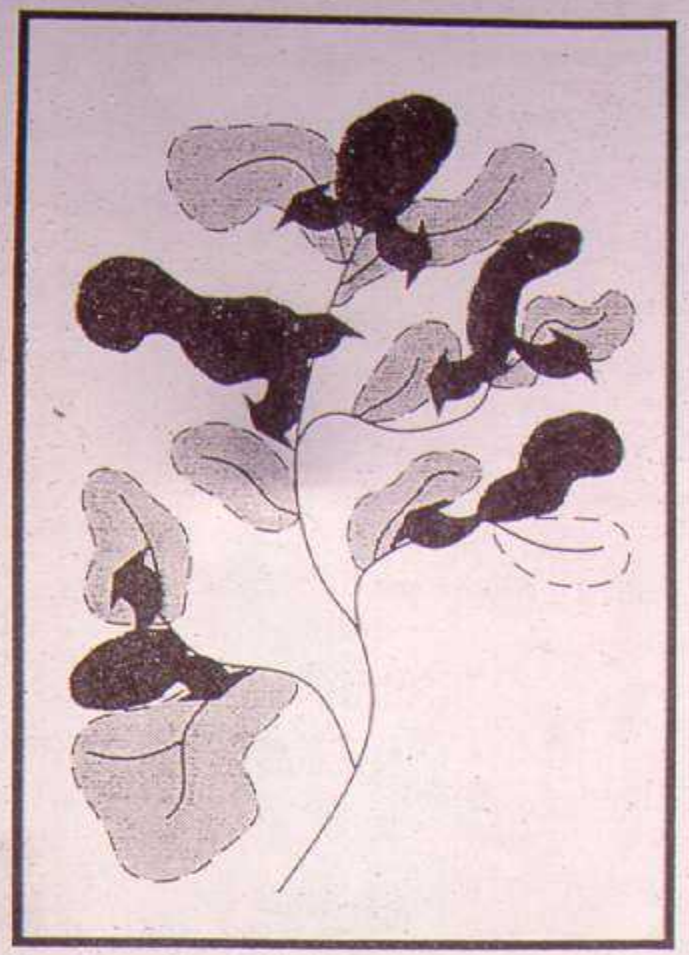
Extra Slides

Differences Between Bull Trout and Salmon

- Colder temperature requirements
- Generally spawn in headwater streams
- Very long incubation to emergence time (220+ days)
- Occur primarily in freshwater
- They don't generally die: They can spawn repeatedly and may live more than 13 years
- Juveniles need several years of invertebrate prey base
- Migratory adults are an apex predator and require migratory corridors connected to a prey base, good cover, and deep overwintering habitat
- Body colorings: Light spots on dark background
- Few population surveys & they require effort (Peterson et al 2002;Thurow et al 2004)

Myth busted: They are good to eat!

Metapopulation dynamics



Schematic of a metapopulation

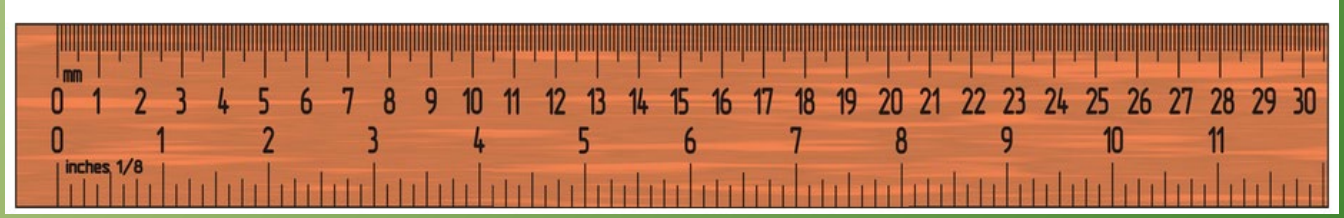
Dark shading represents higher quality habitat and stronger populations that provide dispersing individual bull trout. Light shading represents lower quality habitat that still supports populations but little dispersal to other populations.

From Rieman and McIntyre 1993

Why 75%?

Photo Credit: Dave Herasimtschuk

- 75% is the minimum
- Acknowledgement recovery may not be possible in all areas (due to climate change, non-natives, habitat loss, etc.)
- Need to insure Resilience, Redundancy, & Representation is met

How will recovery be measured?

- Assessment Workshop Process
- Threats Assessment Tools
  - i.e., Appendix E of Recovery Plan, BT Matrix, Habitat Information (reach and watershed assessments), Population Information
- 5-yr Status Updates (i.e. 2008 and 2016)
- Evaluation of Recovery Unit Status (i.e., 5 listing factor analysis)