

Steelhead Populations, Movement, and Habitat Use in Rock Creek

(Klickitat County)

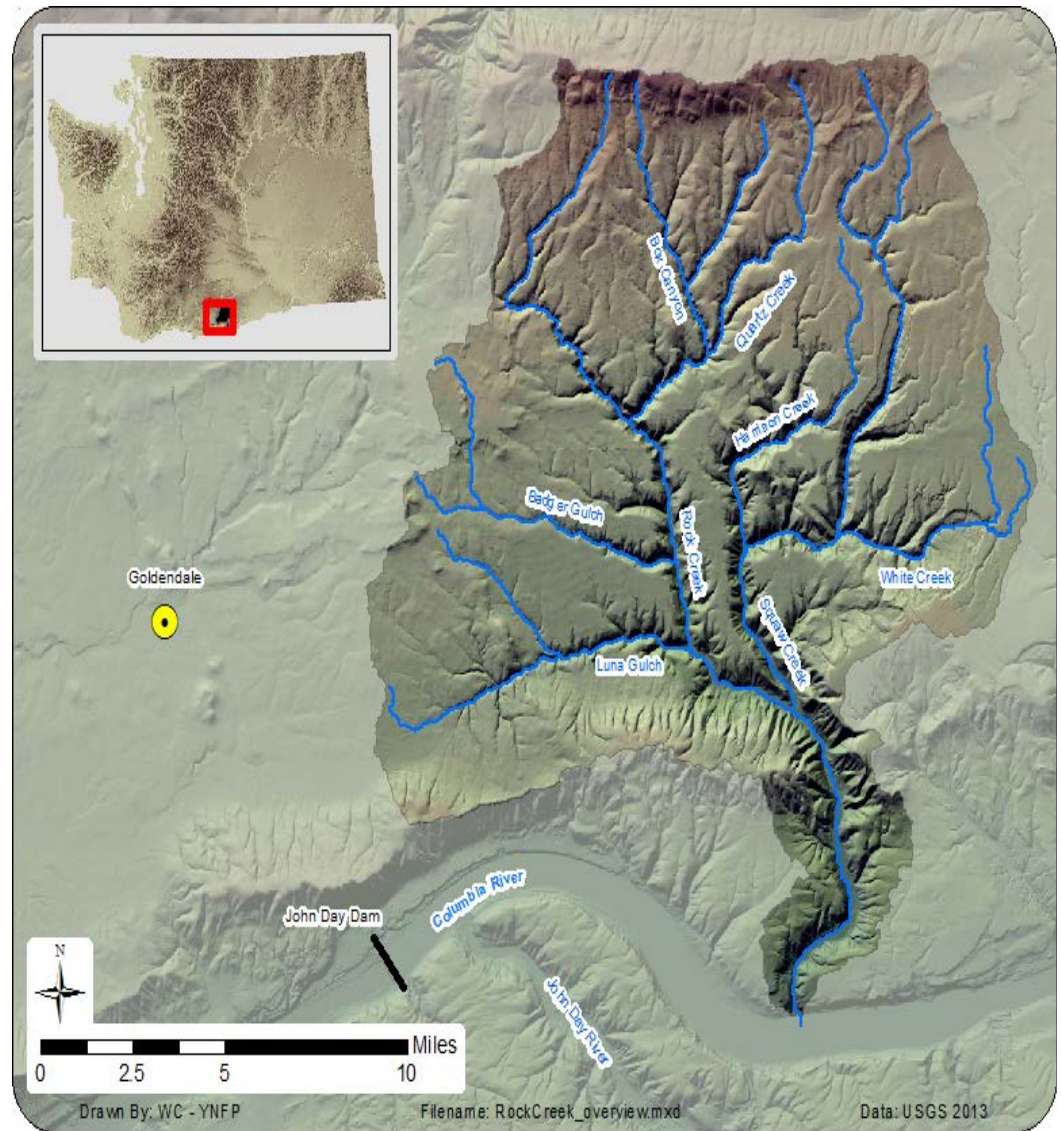


Elaine Harvey

Yakama Nation Fisheries Resource Management

LOCATION

- 226 sq-mi watershed
- eastern Klickitat County
- Columbia R. tributary at River-Mile (RM) 230
- ~12 RM upstream of John Day Dam



Within the geographic region of the Mid-Columbia River
DPS of steelhead trout (*Oncorhynchus mykiss*) [ESA
threatened]

Anadromous Salmonids in Rock Creek



- Fall Chinook
- Coho
- Middle Columbia
Summer Steelhead

Habitat

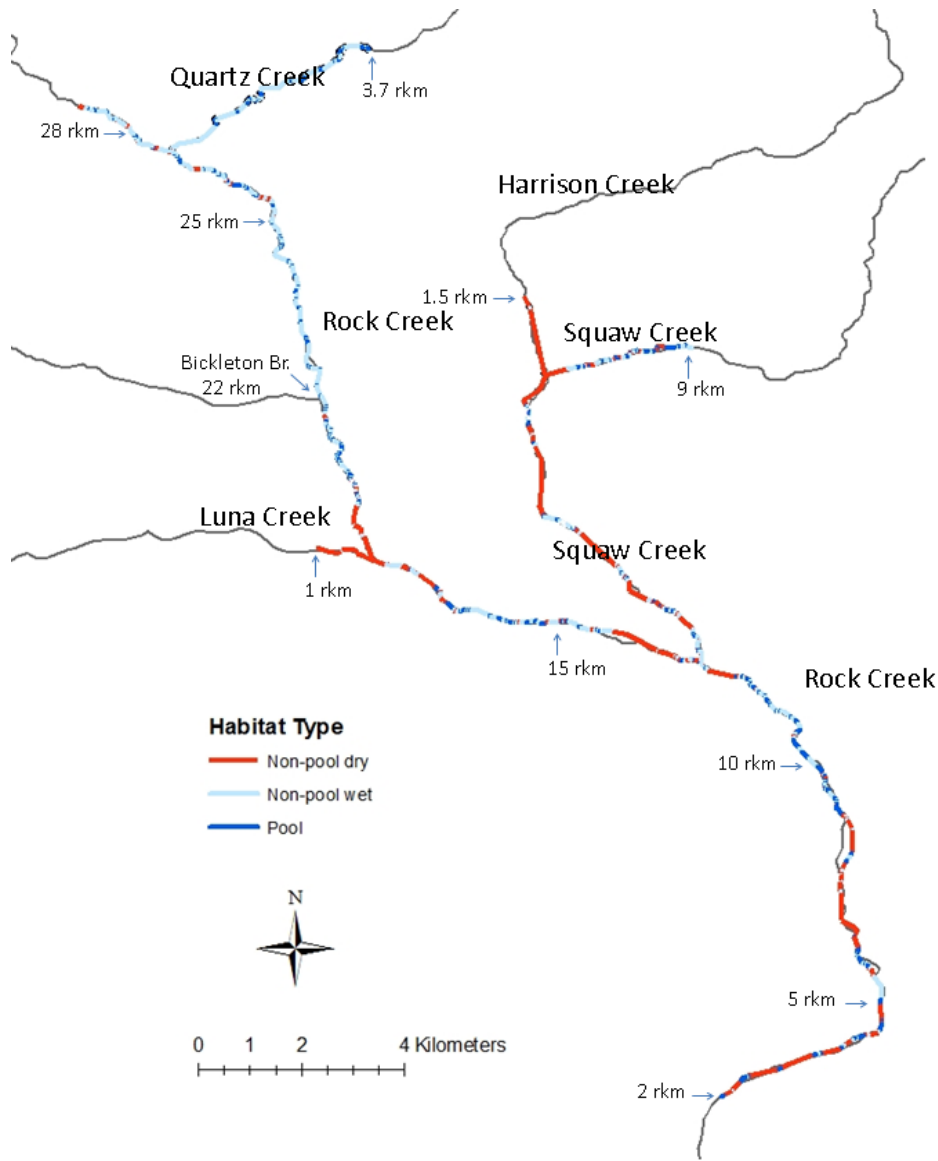
- Census of lengths of pools, wet riffles, dry riffles – in the Fall
- Rock Cr. from rkm 2 to 29, Squaw Cr. from rkm 0 to 9, Quartz Cr. rkm 0-4
- If pool- record length, width, ave. depth, max. depth



Photo by J. Burkhardt

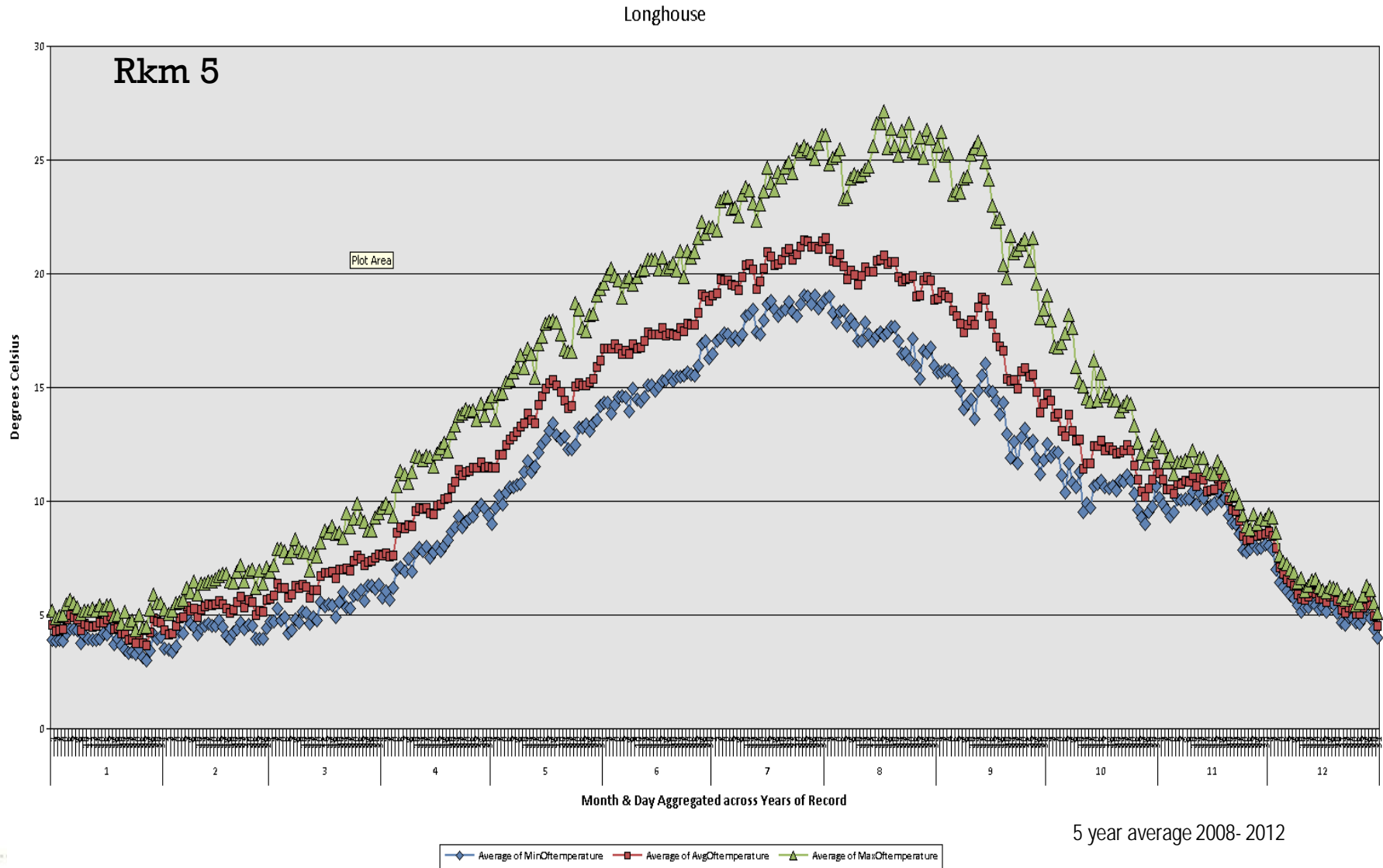


Photo by J. Burkhardt



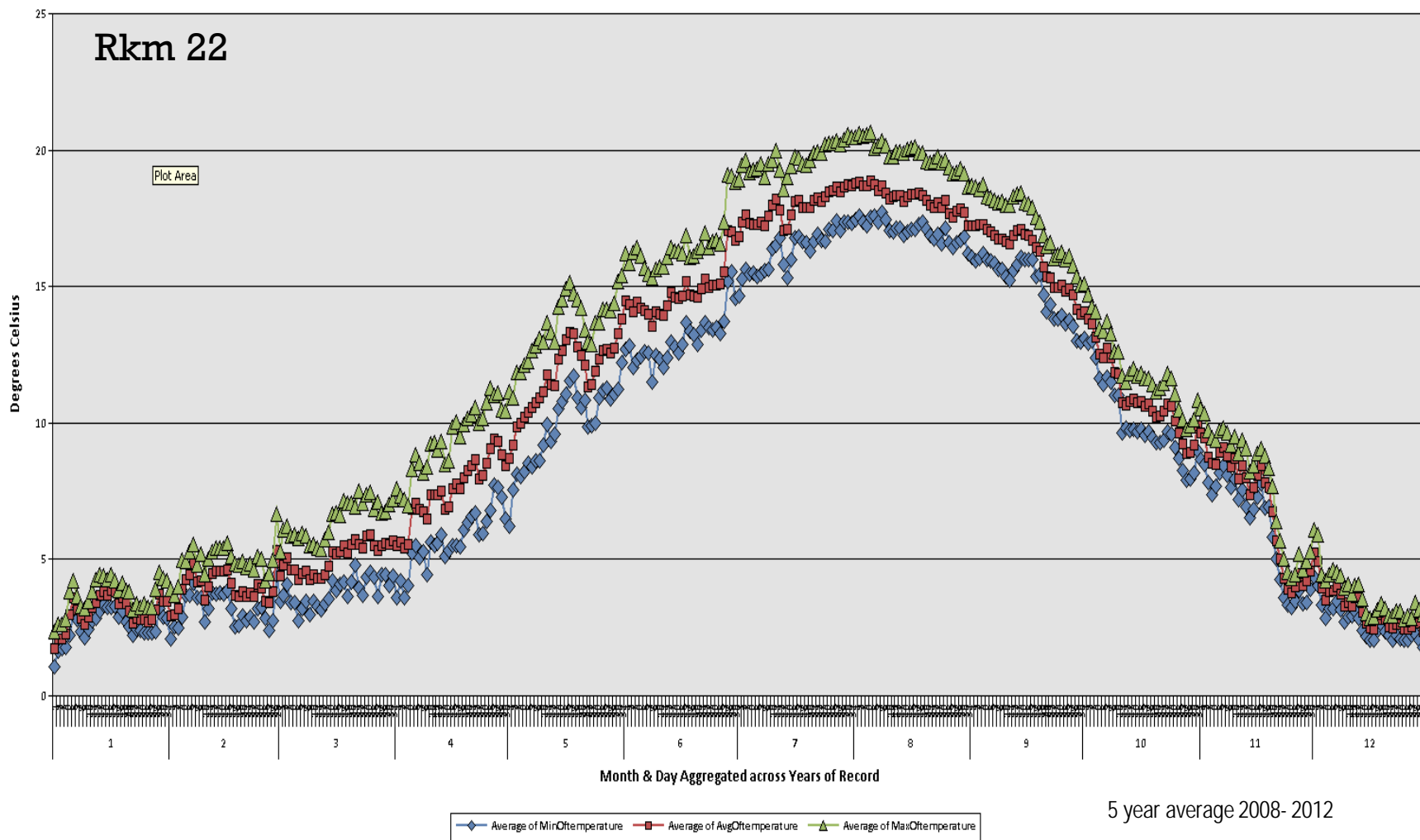
Map of habitat survey results of Rock Creek from river kilometer (rkm) 2 to 29, Squaw Creek, Quartz Creek, Harrison Creek, and Luna Creek showing the location and lengths of streambed sections that were non-pool dry, non-pool wet, and pool habitats during late September to early October.

Lower Rock Creek Temperatures



Middle Subbasin Temperatures

Bickleton Bridge



Population Estimates

$$N = [(M + 1) * (C + 1) / R + 1] - 1$$

M = number of fish marked on the first sample,

C = number of fish captured in the second sample

R = number of marked fish captured in the second sample



Photo by J. Burkhardt

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Electrofishing

- Spring and fall 2011 & 2012
- Fall 2016
- Population estimates, species composition
- Additional PIT tagging and genetic samples





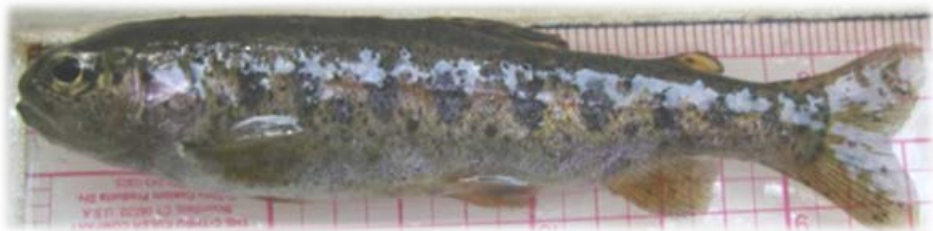
2016 Fall Sampling

- 749 juvenile steelhead caught; 464 tagged; 178 genetic samples collected
- 947 juvenile coho caught; 485 tagged
- 231 Bridgelip sucker caught
- 179 Northern Pike Minnow (lower Rock Creek)
- 66 Small mouth Bass (lower Rock Creek)

Species composition and distribution

- Steelhead, shorthead sculpin, speckled dace
- Redside shiner, bridgeline sucker
- Coho (in 2011) and Chinook (rkm 2.1) salmon
- Northern pikeminnow, smallmouth bass, brown bullhead (rkm 17.5)





Species composition



Genetic Sample Collections

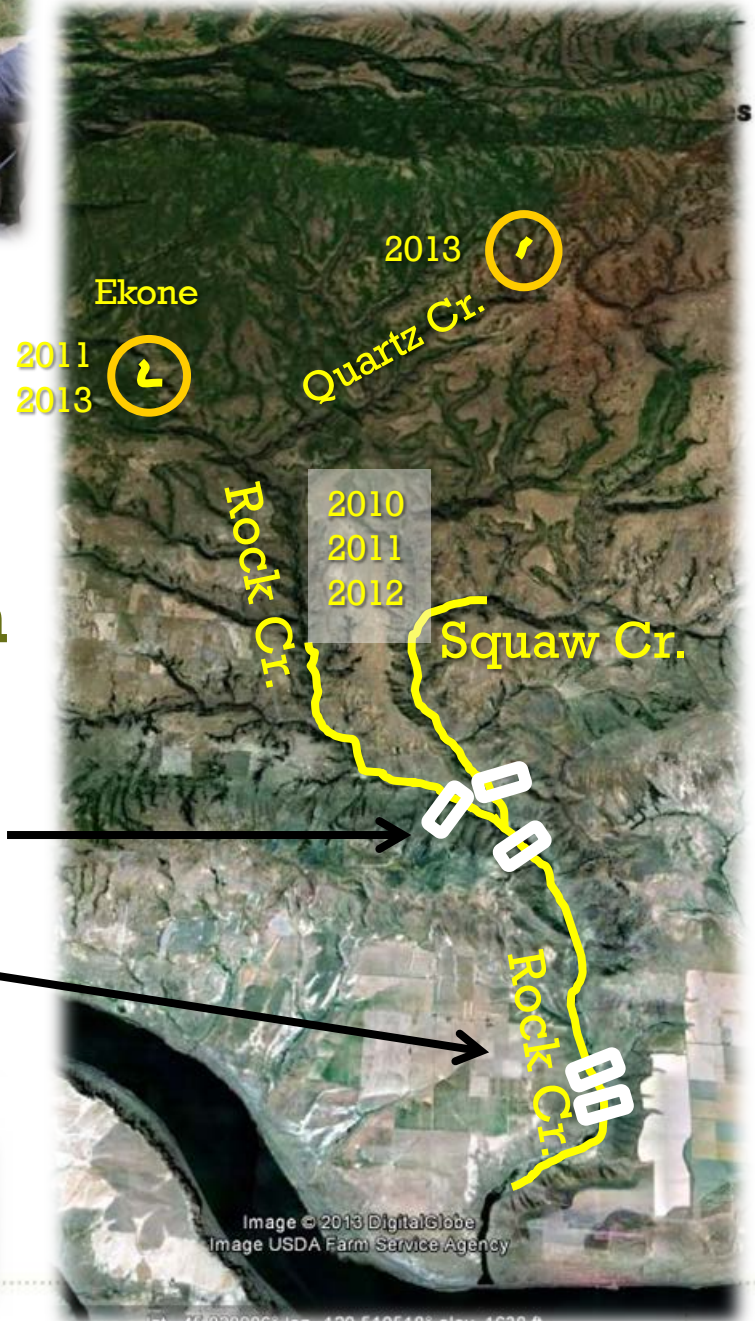


- Total of 627 individual samples 2010 – 2013
- Total of 178 individual samples 2016
- Spatially and temporally distributed



PIT-tag interrogation systems

- RCS rkm 13
- RCL rkm 5



PIT-tag interrogation systems

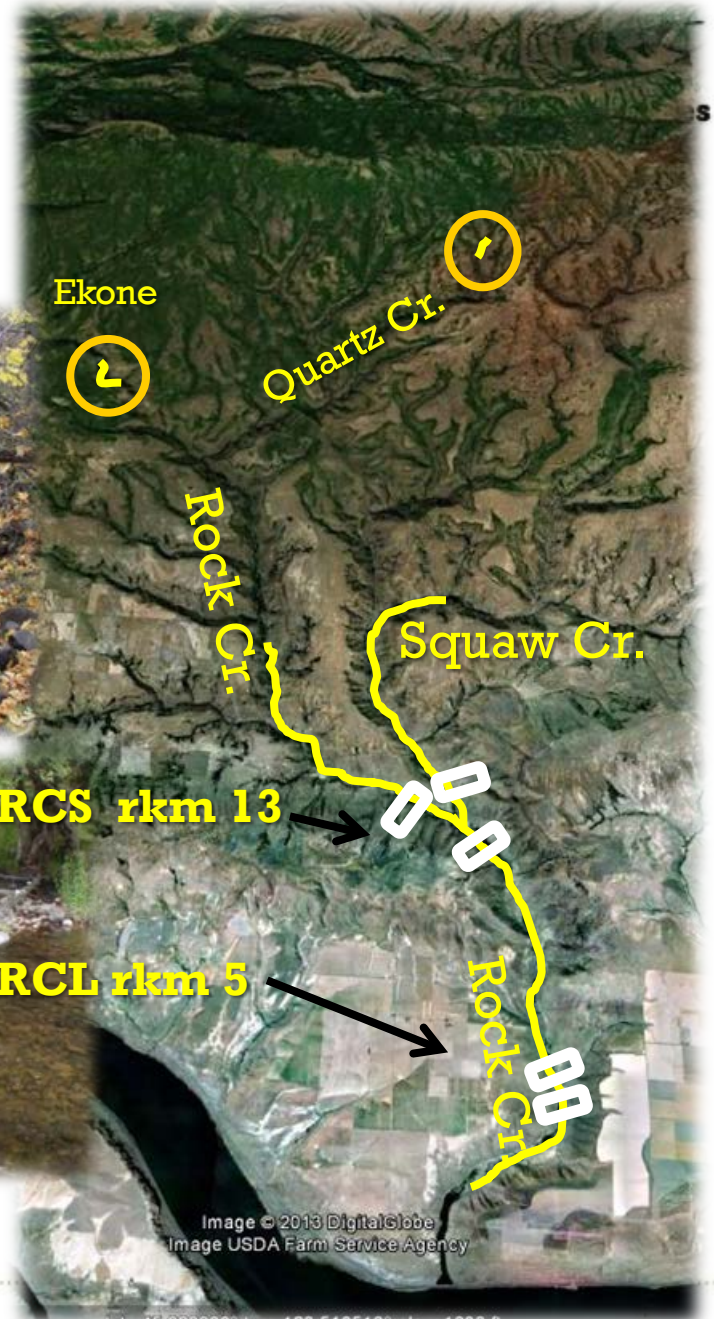


Image © 2013 DigitalGlobe
Image USDA Farm Service Agency

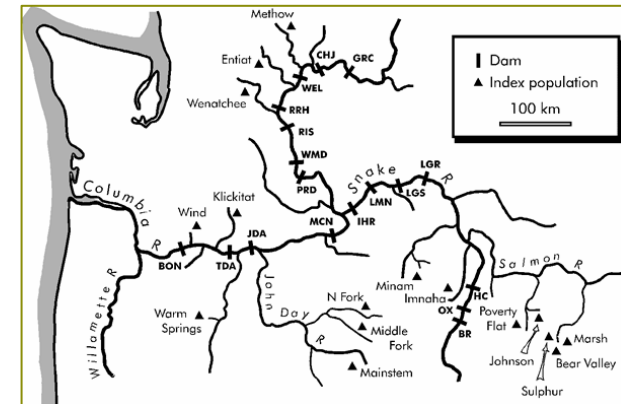
lat: 45.828986; lon: -120.510518; elev: 1638 ft

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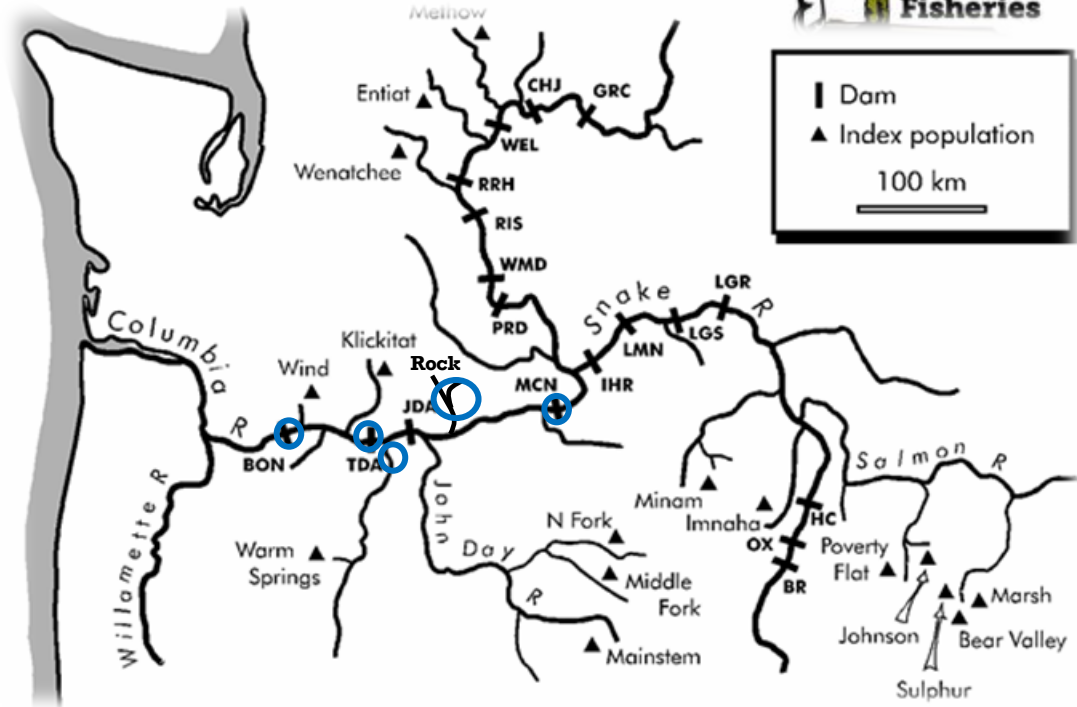
Adult Steelhead detected in Rock Creek summary

	Tag year			
Number of Steelhead	2009	2010	2011	2012
Tagged	551	97	1179	1212
Morts (tag/handle)	0	0	4	7
Detected	197	26	250	374
out-migration detection sites	Number of Steelhead Detected			
RCS	182	19	122	306
RCL	175	14	189	336
JDJ	58	9	72	97
B2J	9	0	1	23
BCC	30	2	7	28
TWX	4	0	2	6
ESANIS/LMILIS (morts)	16	2	10	24
in-migration detection sites	Number of Steelhead Detected			
BON	4	2	12	16
TD1	1	2	12	17
RCL	3	1	8	10
RCS	3	1	4	5
MCN	2	1	6	10
Smolt-to-adult return rates				
Bonneville Dam	0.7%	2.1%	1.0%	1.3%
Rock Creek	0.5%	1.0%	0.7%	0.8%



Tagged in Rock Creek

- 3,552 *O. mykiss* tagged (including 2017 tagged fish)
- 1343 (43%) outmigrated prior to spring 2017
- 34 (1%) adults returned to Bonn (data collection ongoing)
- PIT- tag interrogation provided the following evidence: steelhead spend 1 – 3 years in ocean and possibilities of kelt life histories



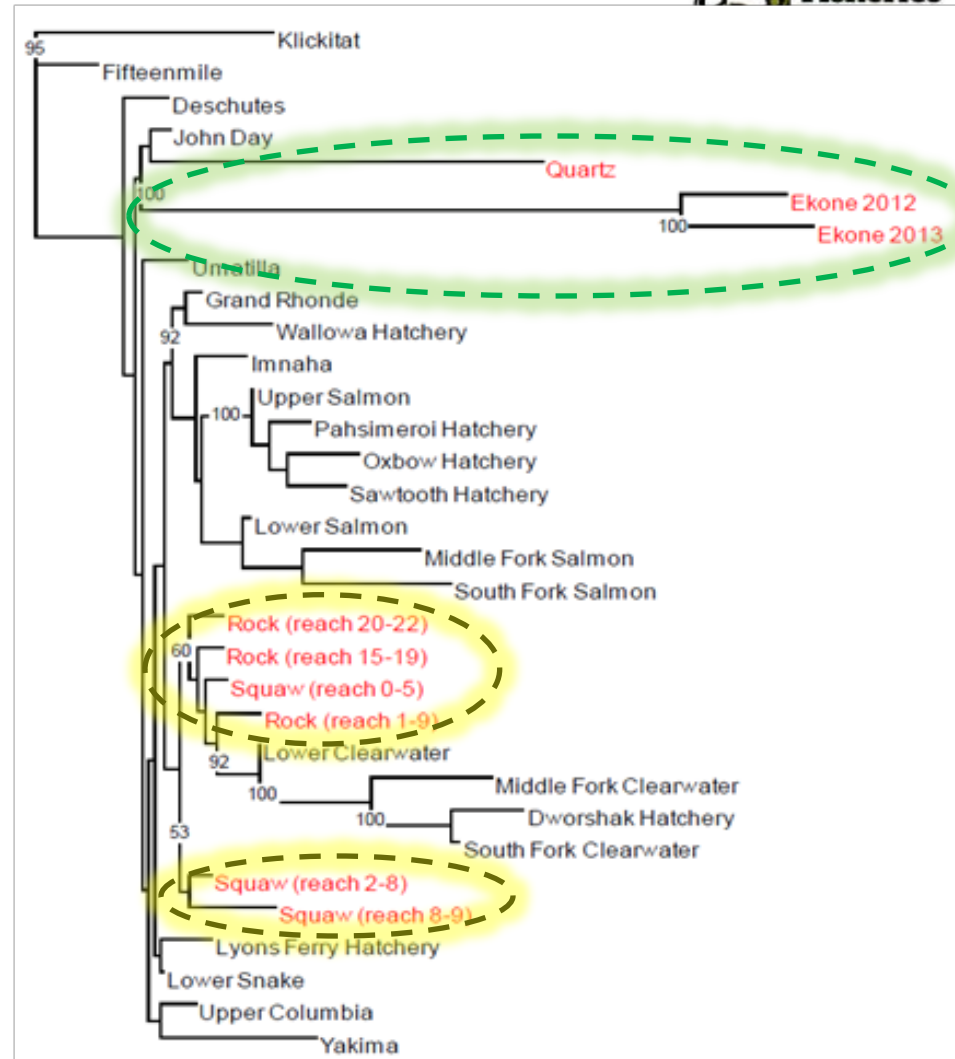
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- A smolt to adult return rate (SAR) was calculated for PIT-tagged *O. mykiss* within Rock Creek (from 2009 to 2012) and returning to Rock Creek, this ranged from 0.5% to 1.0%
- The SAR rate to Bonneville Dam was always higher (0.7% to 2.1%), indicating some straying of adults to McNary Dam (detected at MCN) or other sites for spawning potentially further upstream or in other tributaries
- A total of 22 Rock Creek PIT-tagged *O. mykiss* have been detected returning to Rock Creek for all years combined (2009 – 2012) for a SAR of 0.7% and for fish (34) detected at Bonneville the overall SAR is 1.1%
- A total of 82 out-of-basin PIT-tagged fish have been detected at the Rock Creek sites since installation

Steelhead Genetics

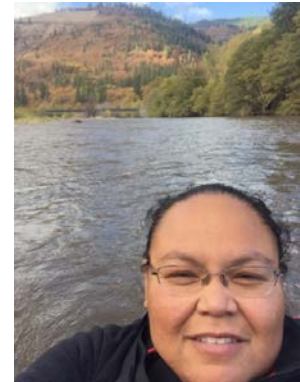


- Genetic sampling indicates the steelhead run (yellow ovals) to be highly introgressed with the Snake River DPS (Matala 2014).
- *O. mykiss* samples from sites upstream of extended higher-gradient reaches group where expected (green oval).
- Currently unclear if steelhead in Rock Creek are a viable naturalized Snake River DPS subpopulation or sustained solely by routine straying.

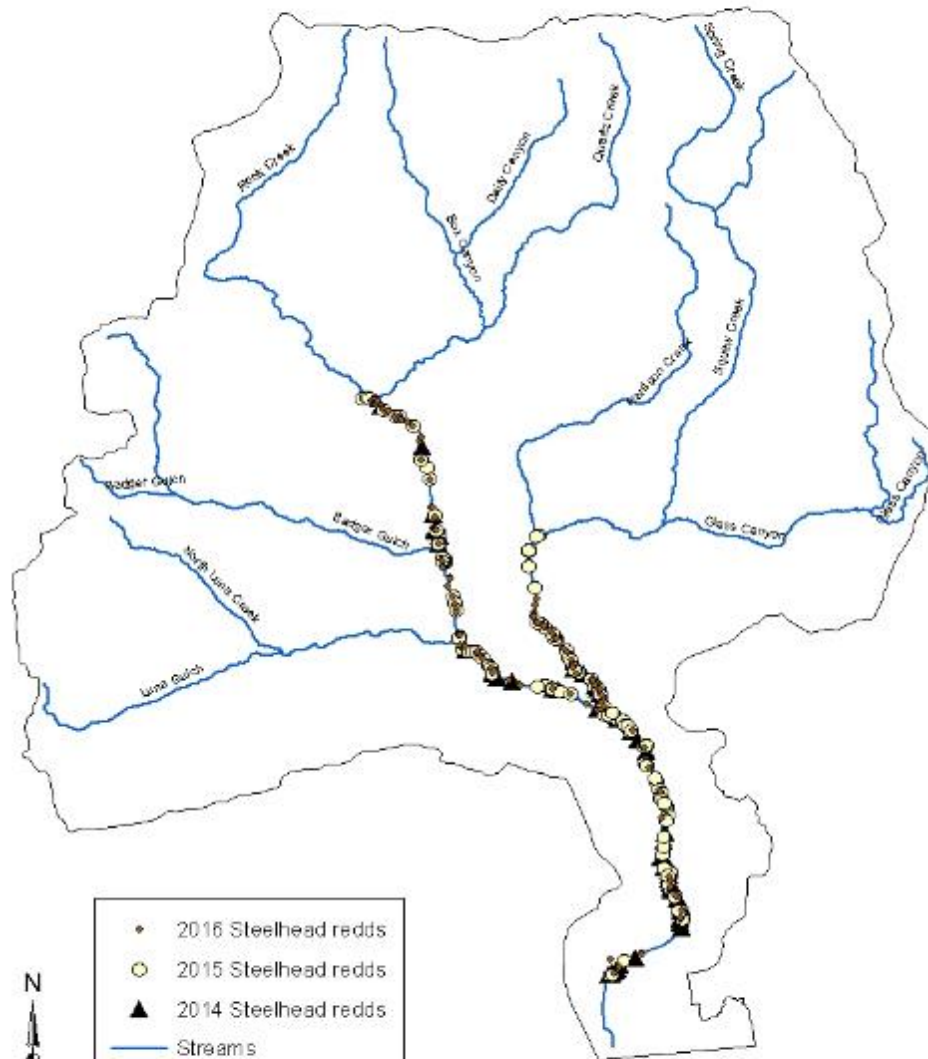


Adult salmon and steelhead spawner surveys and redd counts

- Walk or float the creek with a pontoon each winter – spring seasons
- Count adult fish observed in the creek
- Count adult dead fish “carcass” in the creek
- Count and gps redds found in the creek



2014 -2016 Rock Creek Steelhead Locations



- ◆ 2016 Steelhead redds
- 2015 Steelhead redds
- ▲ 2014 Steelhead redds
- Streams
- Rock Creek Subbasin



0 1 2 4 Miles



Fish Sampling in Inundated Rock Creek Pool

- 2016 Summer and Winter sampling





Late Spring Sampling - Rock Creek inundated pool (May 2016)

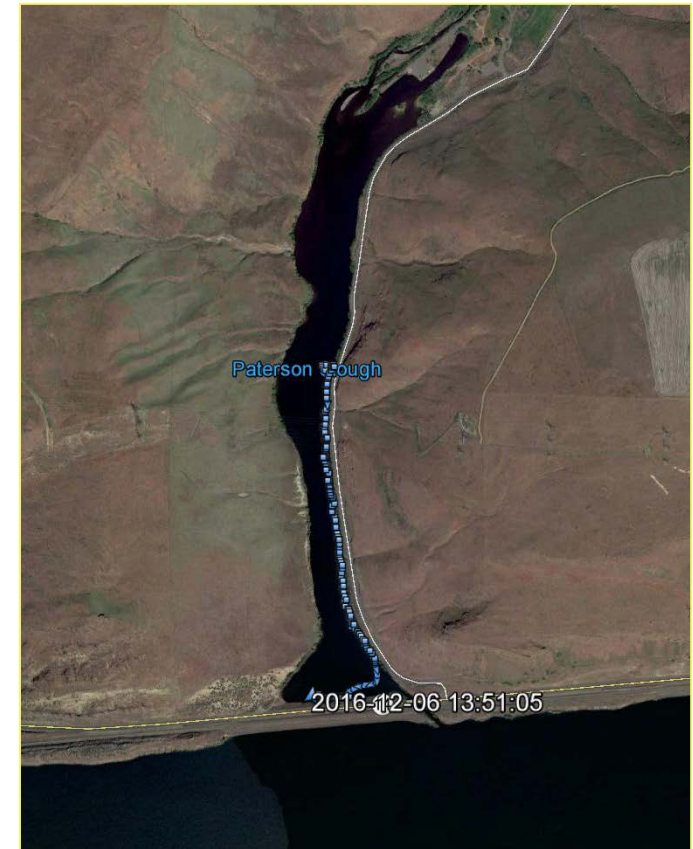
Spring Fish Species

Family	Species	Scientific Name
Cyprinidae	Carp	<i>Cyprinus carpio</i>
Ictaluridae	Brown Bullhead	<i>Ameiurus nebulosus</i>
Centrarchidae	Pumpkin Seed	<i>Lepomis gibbosus</i>
	Blue Gill	<i>Lepomis macrochirus</i>
	Smallmouth Bass	<i>Micropterus dolomieu</i>
	Large Mouth Bass	<i>Micropterus salmoides</i>
	White Crappie	<i>Pomoxis annularis</i>
Percidae	Yellow Perch	<i>Perca flavescens</i>
Cottidae	Sculpin	<i>Cottus bairdi</i>

Winter Sampling - Rock Creek inundated pool (December 2016)

Winter Fish Species

Family	Species	Scientific Name
Ictaluridae	Brown Bullhead	<i>Ameiurus nebulosus</i>
Centrarchidae	Pumpkin Seed	<i>Lepomis gibbosus</i>
	Blue Gill	<i>Lepomis macrochirus</i>
	Large Mouth Bass	<i>Micropterus salmoides</i>





Management Challenges in Rock Creek

1. Water Quantity

- Low flows each spring
- During the summer months there are disconnected pools in creek
- Population growth & increased number of exempt wells in the county

2. Water Quality

- High summer water temperatures during juvenile salmonid rearing

3. Instream habitat

- Lack of instream cover for juvenile salmonids for summer rearing in pools

4. Invasive Species

- Invasive piscivorous fish in lower reaches of Rock Creek and in the inundated lake
- Invasive trees (walnut & tree of heaven) and weeds taking over the riparian corridor (star thistle, canary reed grass, etc.)

Management Opportunities in Rock Creek

- WDFW recently purchased property in the headwaters of Rock Creek
- Headwater Assessment of fish presence, riparian condition, and meadow restoration potential
- Continued PIT- tag monitoring and genetic sampling in understand the current status of the returning adult steelhead and their offspring



Kamiltpah Band Species of Concern



- Bridgeline Sucker “Qwool Qwool”
- Steady decline of suckers in Rock Creek and tributary streams
- Suckers were at one time wide spread and abundant throughout subbasin and today only a handful are caught for annual feast ceremonies
- Sucker distribution is getting documented during population surveys



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