

Life History Diversity of Juvenile Steelhead Within the Skagit Basin

Clayton Kinsel

Shannon Vincent

Joe Anderson

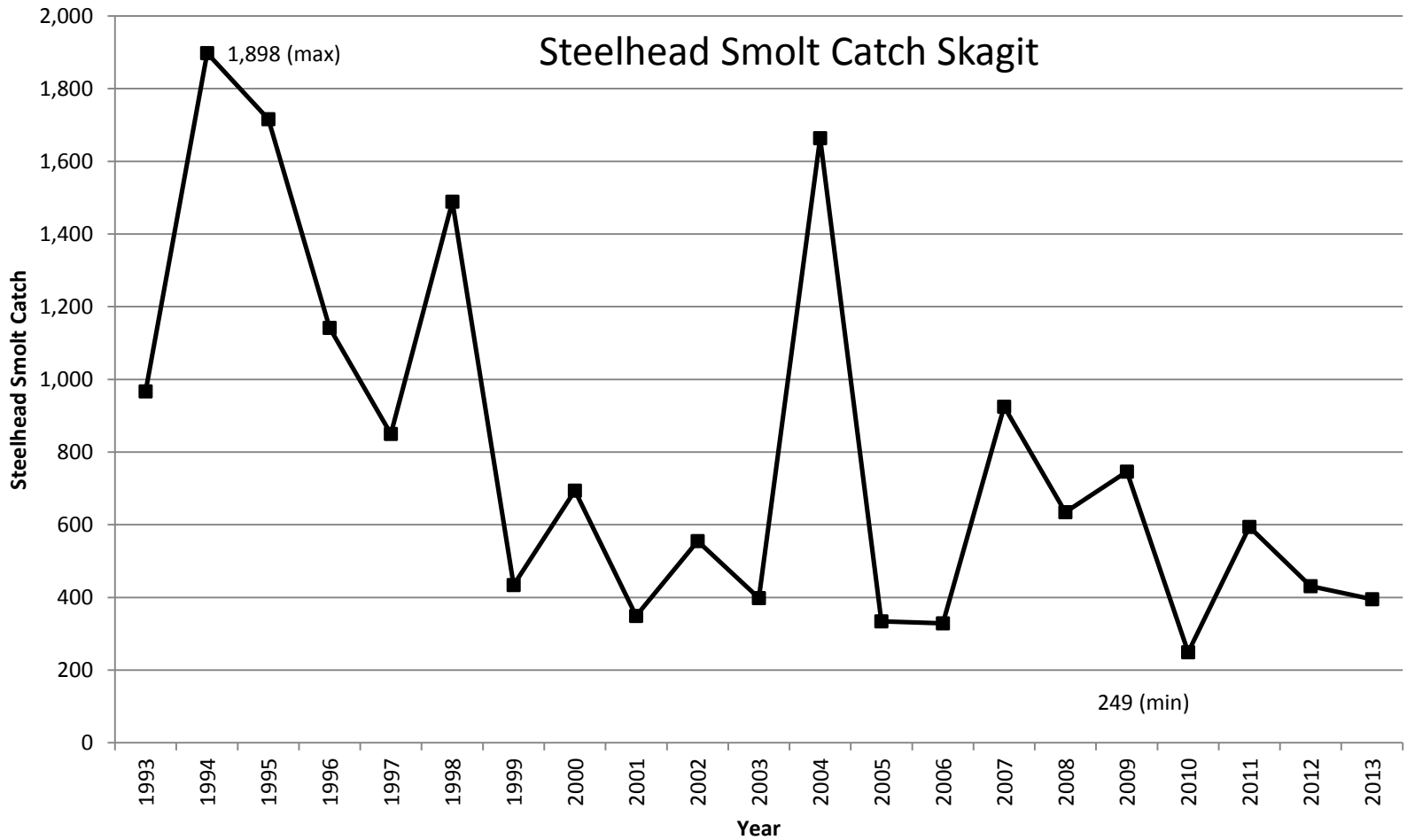
03/19/14

- Brief history and Background of our monitoring project
- Juvenile diversity as observed from our monitoring efforts
- Future of Project
- Adult age/ Repeat spawners
- Steps to protect population diversity



WDFW's Skagit River Mainstem Trap





Avg. Steelhead smolt catch is 800 fish.
varies 6.5 fold

Bacon



Illabot



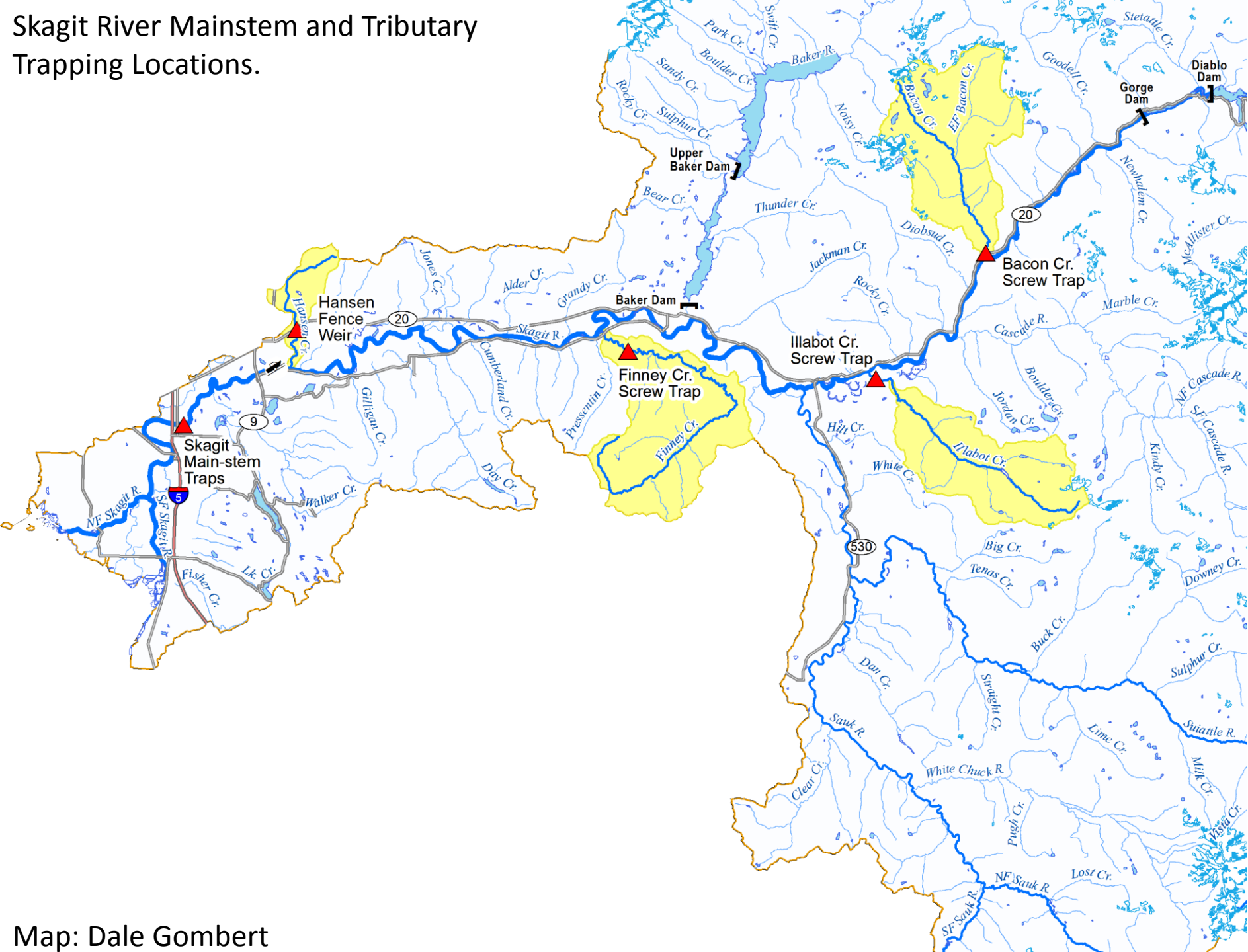
Finney



Hansen

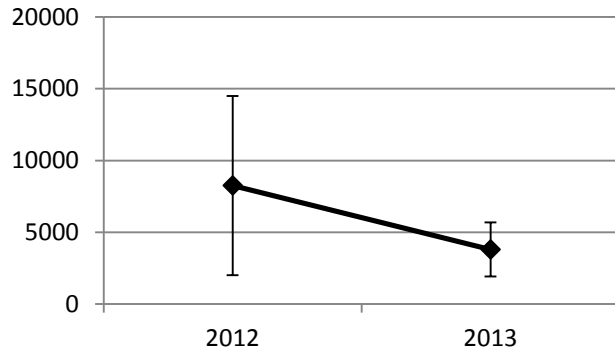


Skagit River Mainstem and Tributary Trapping Locations.

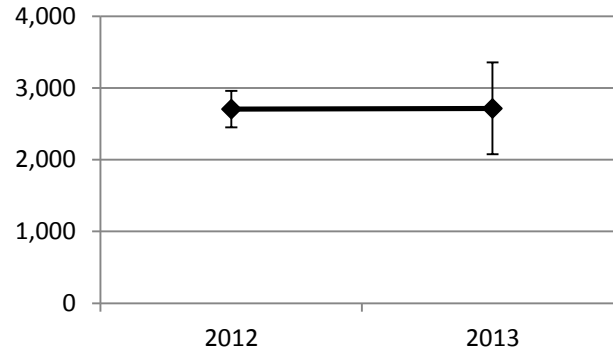


Steelhead Smolt Abundance 2012-13

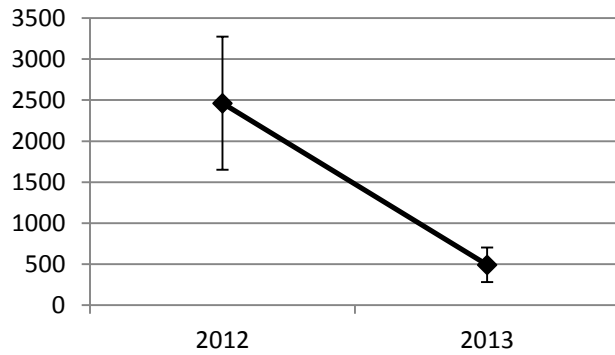
Bacon



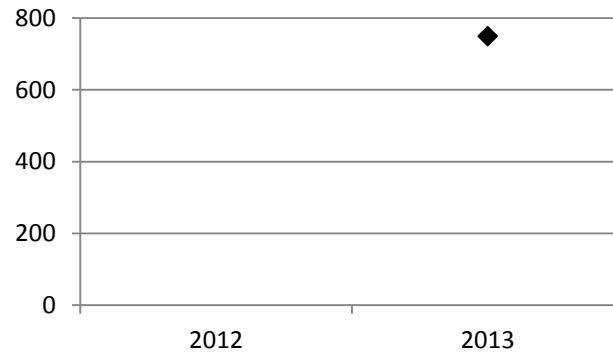
Illabot



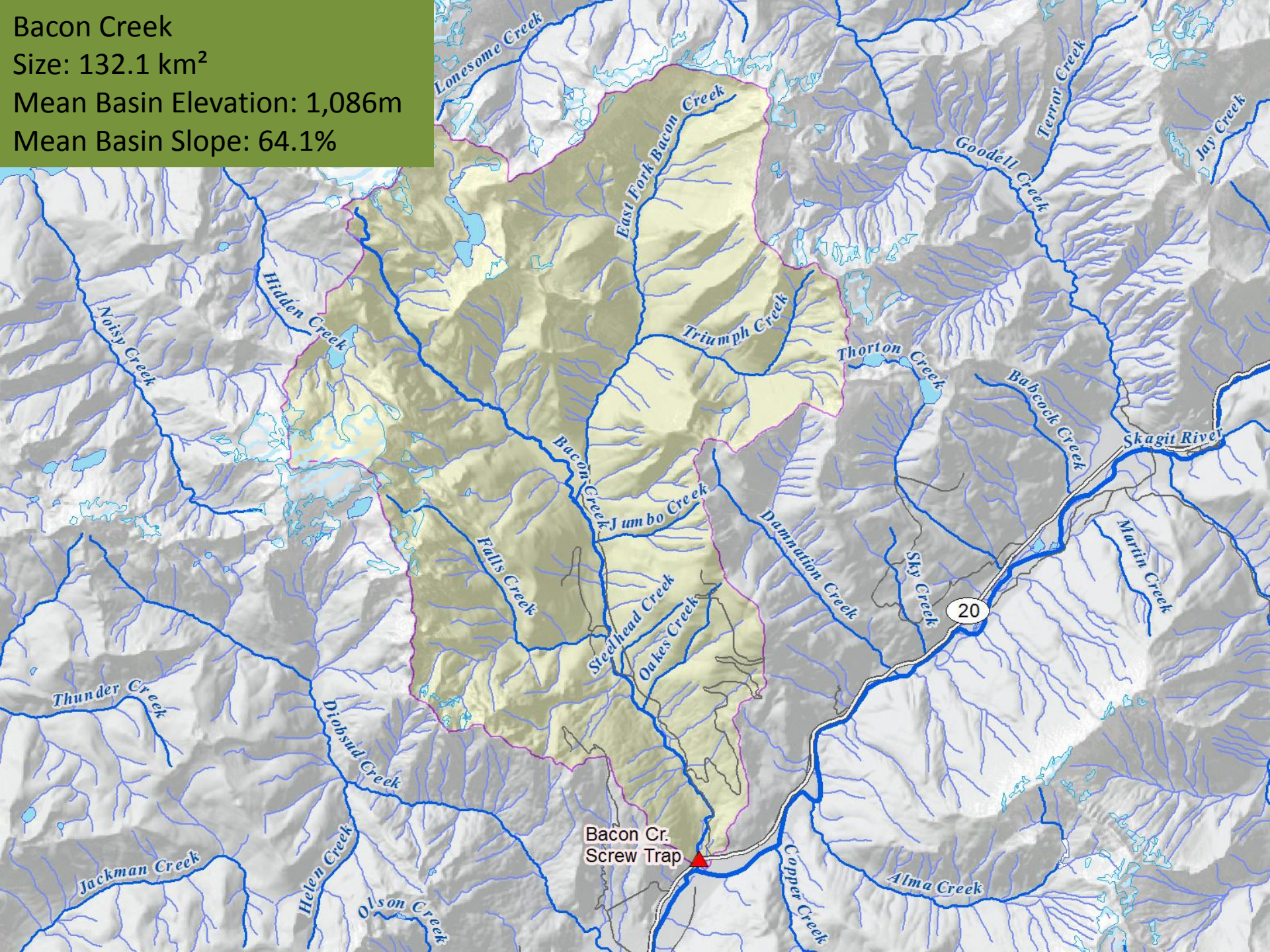
Finney



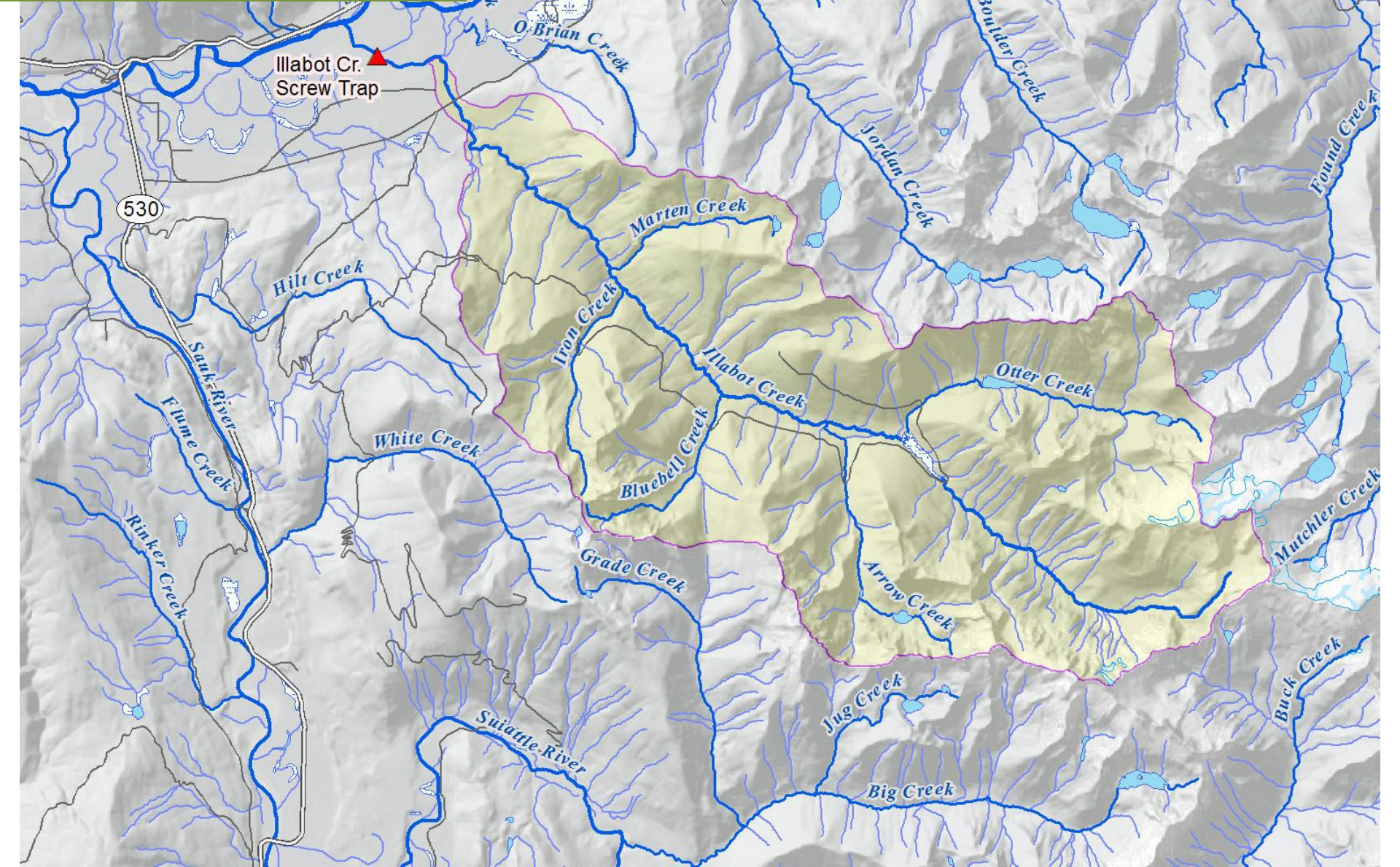
HANSEN



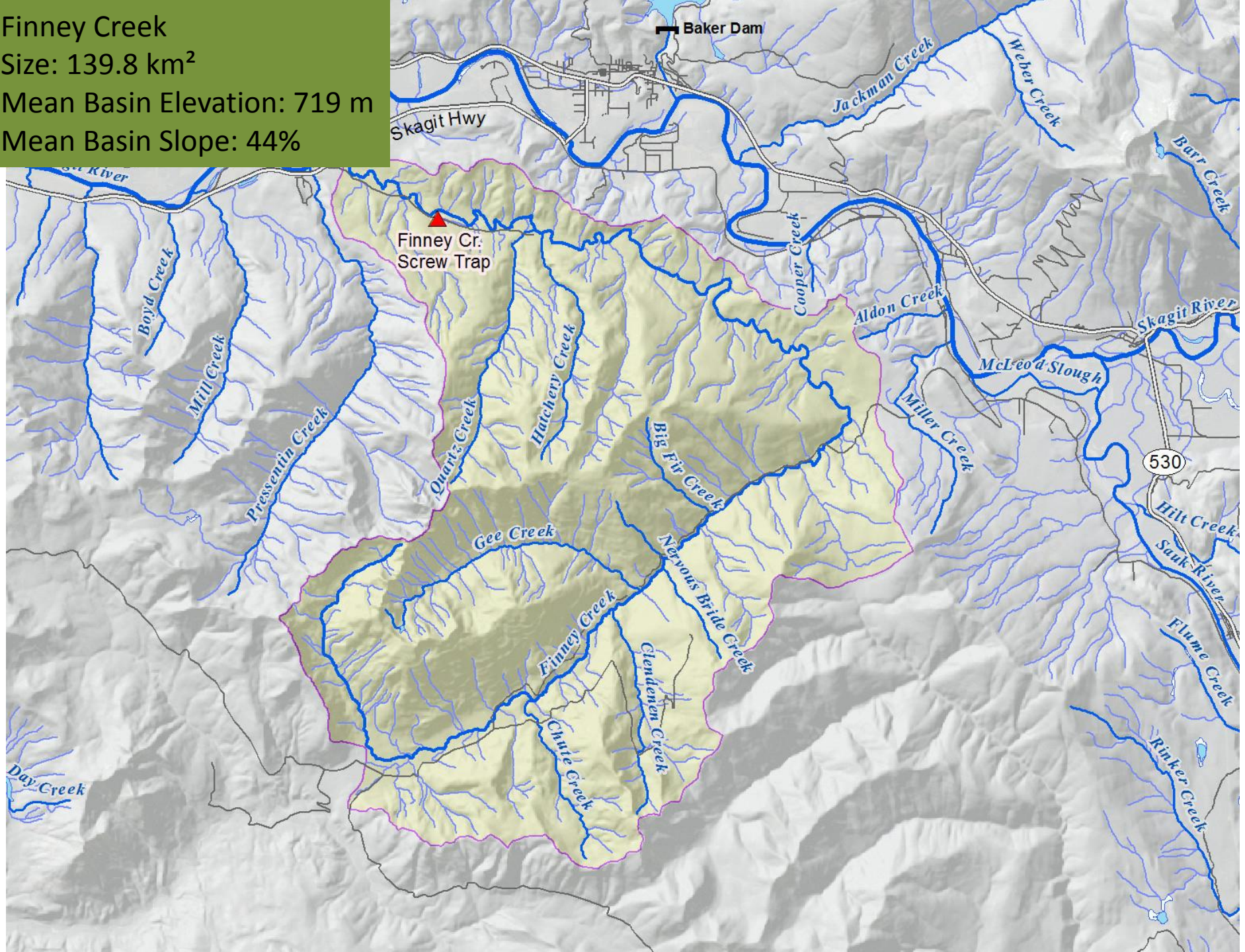
Bacon Creek
Size: 132.1 km²
Mean Basin Elevation: 1,086m
Mean Basin Slope: 64.1%



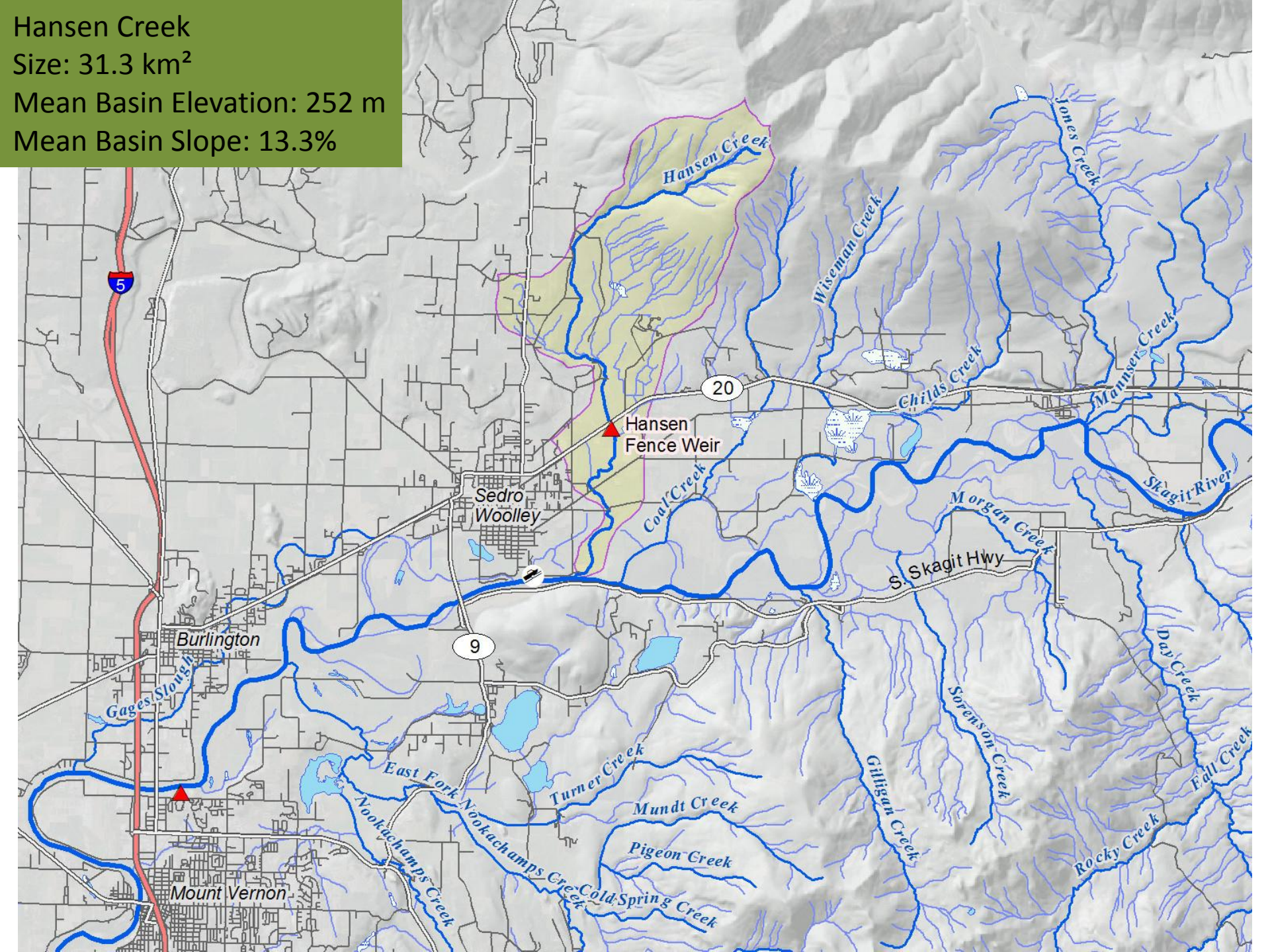
Illabot Creek
Size: 119.7km²
Mean Basin Elevation: 1,067m
Mean Basin Slope: 54.4%



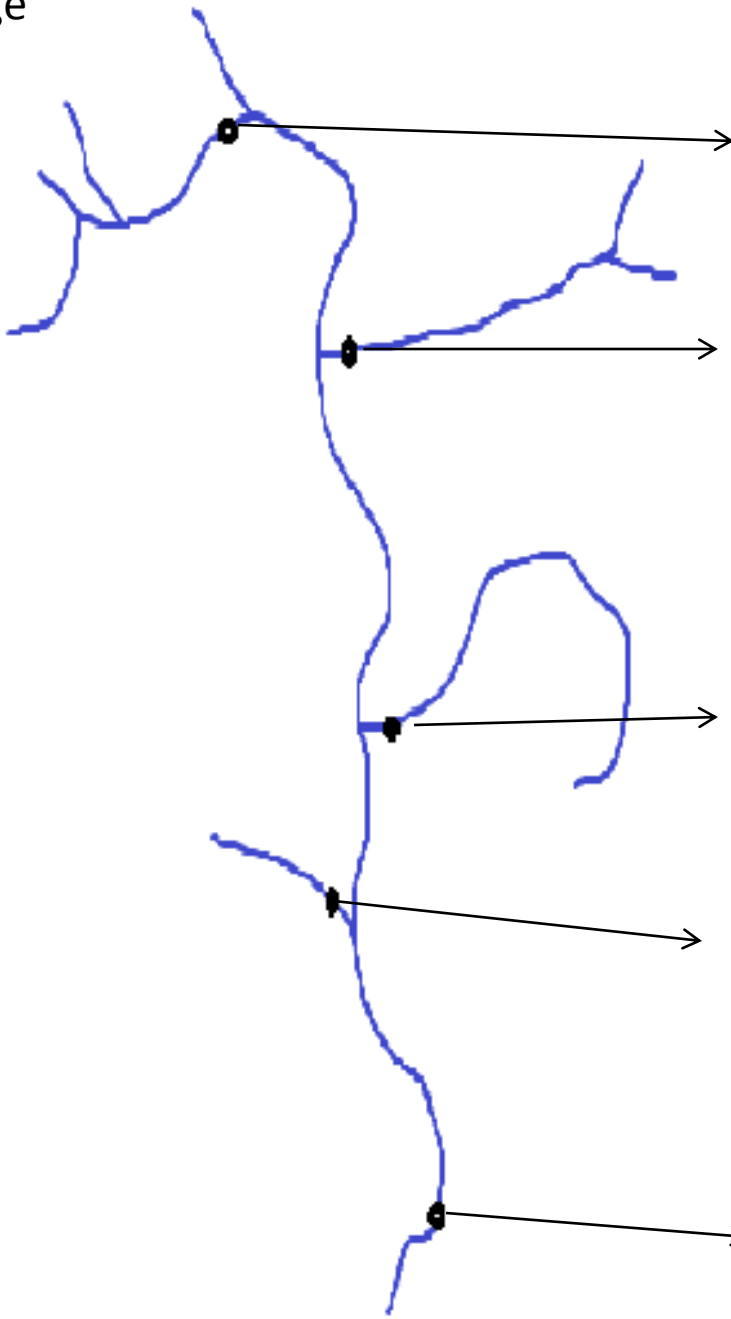
Finney Creek
Size: 139.8 km²
Mean Basin Elevation: 719 m
Mean Basin Slope: 44%



Hansen Creek
Size: 31.3 km²
Mean Basin Elevation: 252 m
Mean Basin Slope: 13.3%



Age



	Trap Site	# Sampled	# Readable	% Age 1	% Age 2	% Age 3	% Age 4
2012	Bacon	37	31	0.0%	32.3%	54.8%	12.9%
2013	Bacon	39	35	0.0%	11.4%	80.0%	8.6%

	Trap Site	# Sampled	# Readable	% Age 1	% Age 2	% Age 3	% Age 4
2012	Illabot	146	119	0.0%	4.2%	89.9%	5.9%
2013	Illabot	50	39	0.0%	15.4%	56.4%	28.2%

	Trap Site	# Sampled	# Readable	% Age 1	% Age 2	% Age 3	% Age 4
2012	Finney	32	27	7.4%	74.1%	18.5%	0.0%
2013	Finney	8	6	0.0%	100.0%	0.0%	0.0%

	Trap Site	# Sampled	# Readable	% Age-1	% Age-2	% Age-3	% Age-4
2013	Hansen	106	81	3.7%	88.9%	7.4%	0.0%

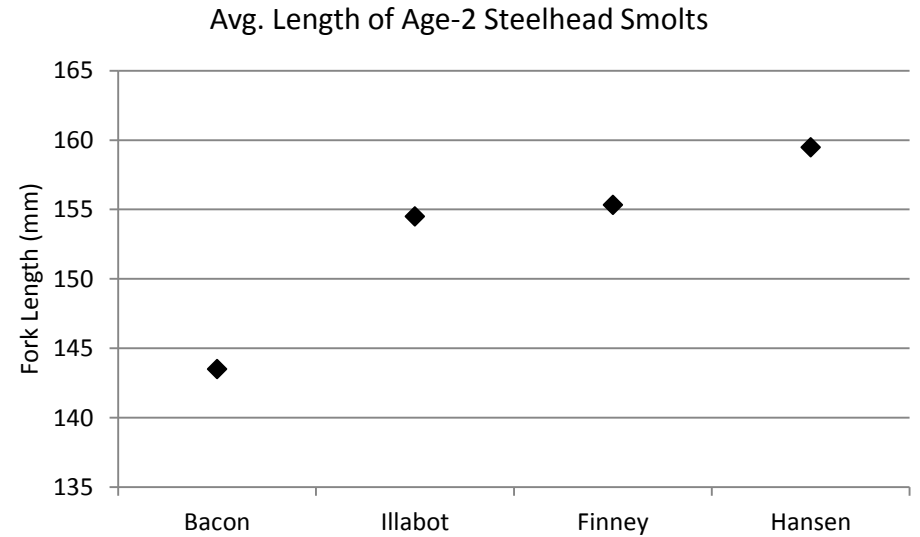
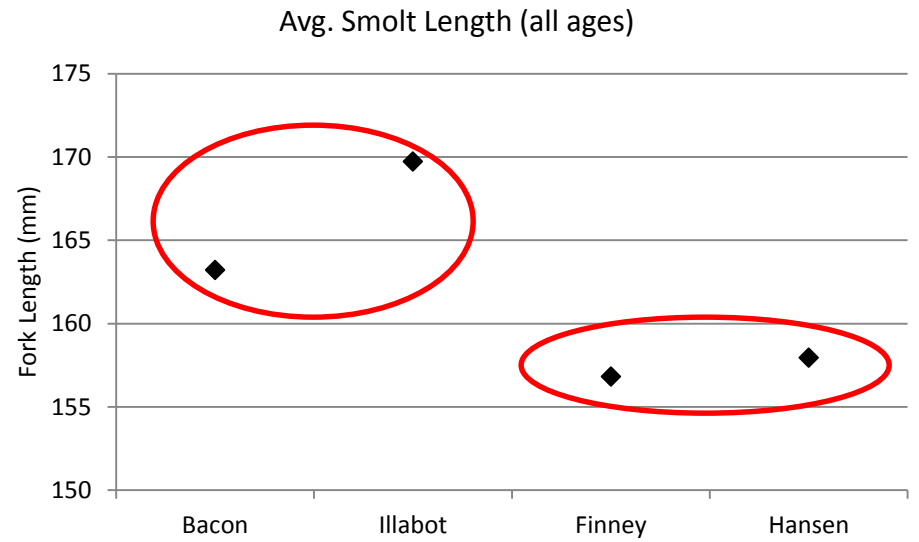
	Trap Site	# Sampled	# Readable	% Age 1	% Age 2	% Age 3	% Age 4
2012	Mainstem	93	70	0.0%	77.1%	22.9%	0.0%
2013	Mainstem	91	58	0.0%	56.9%	39.7%	3.4%

2013

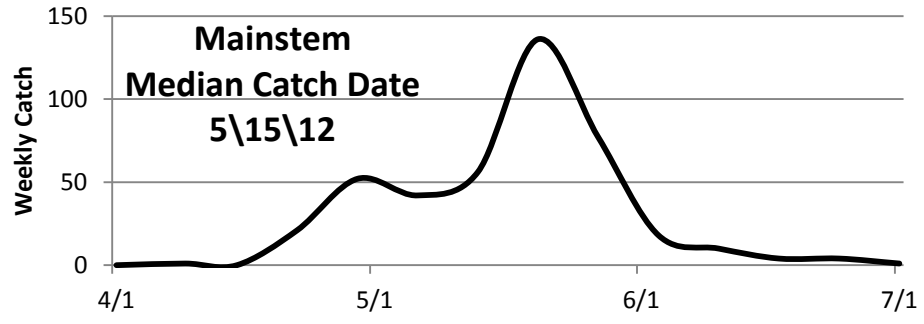
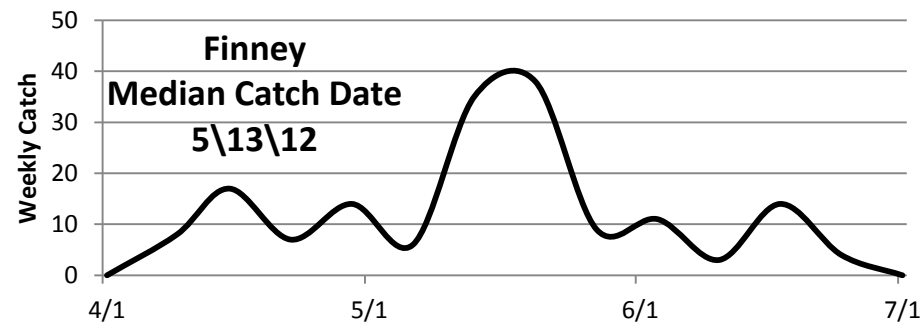
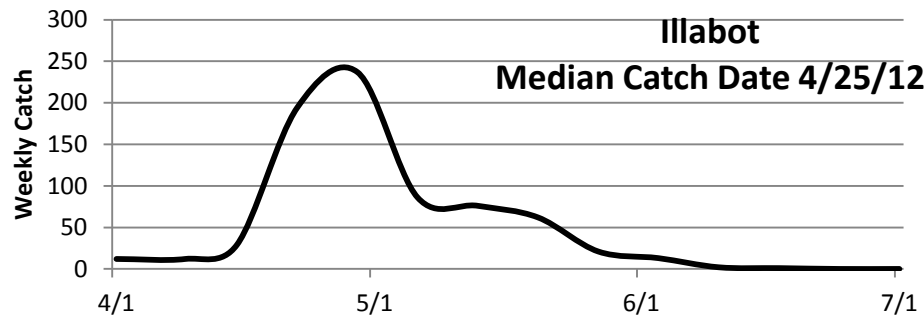
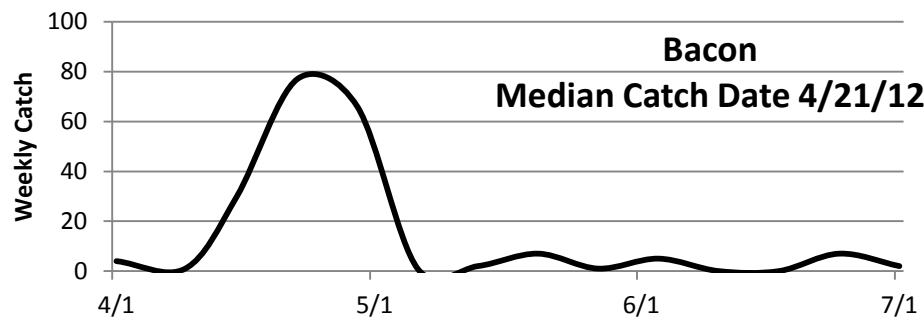
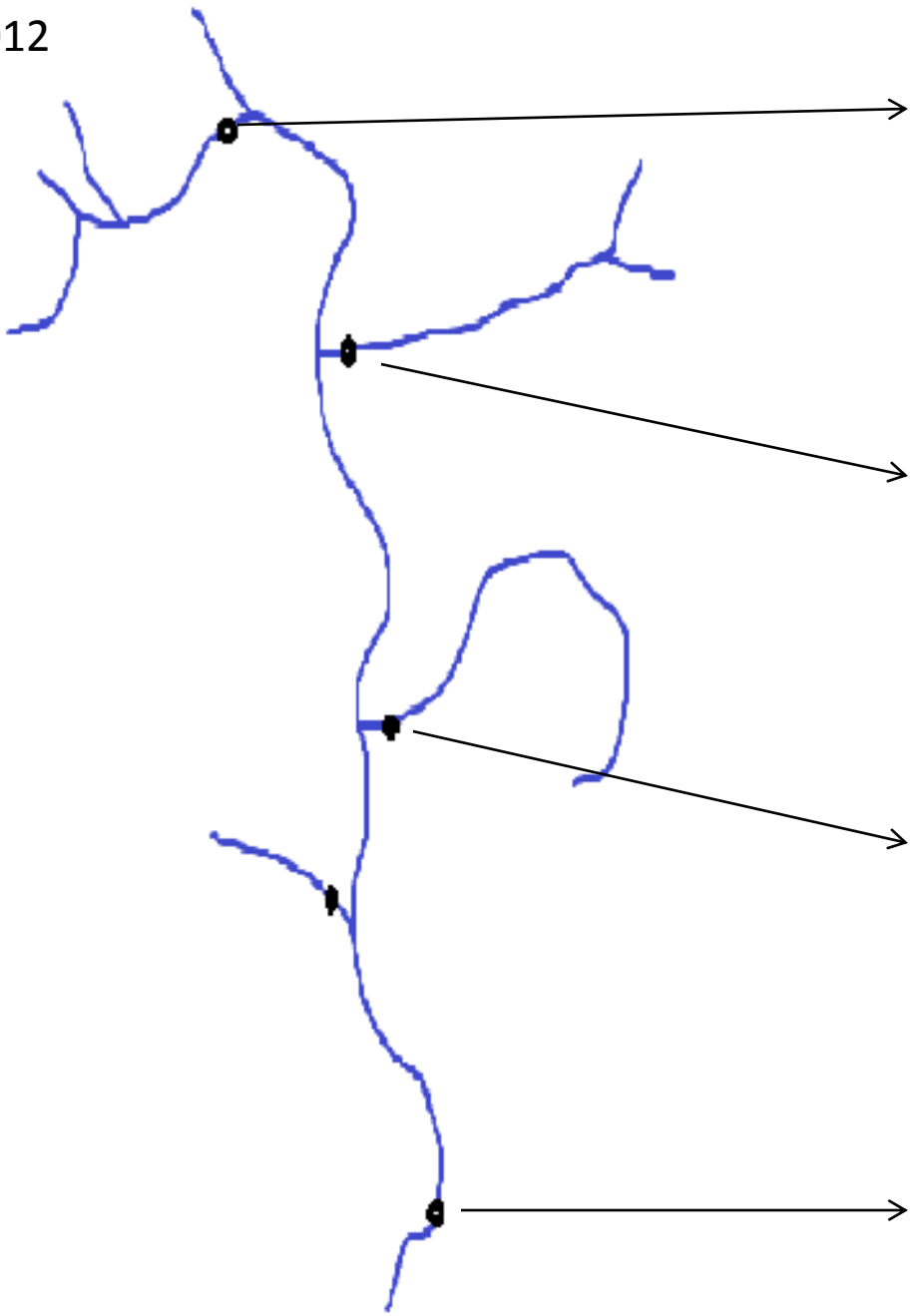
-Older smolts from higher elevation, colder streams.

-Older smolts are larger.

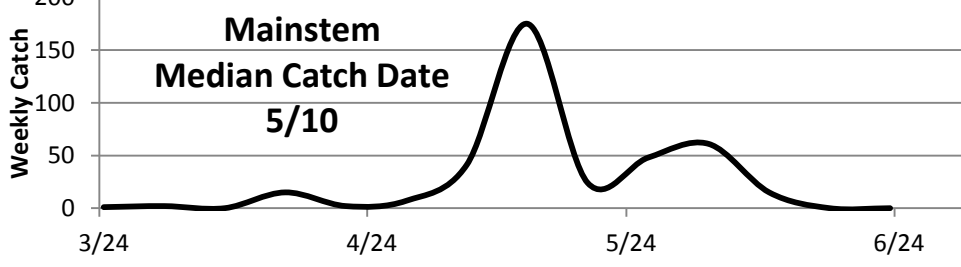
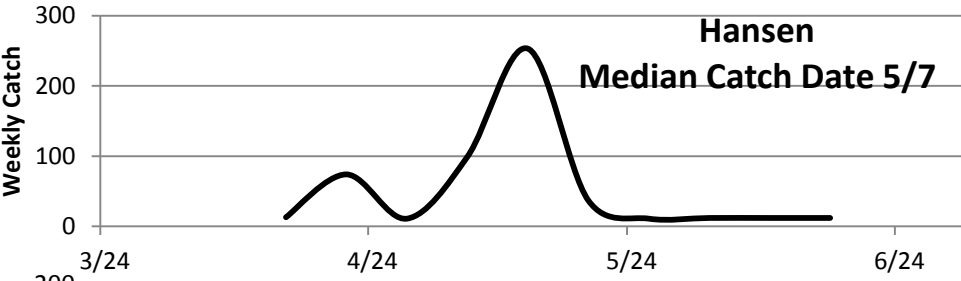
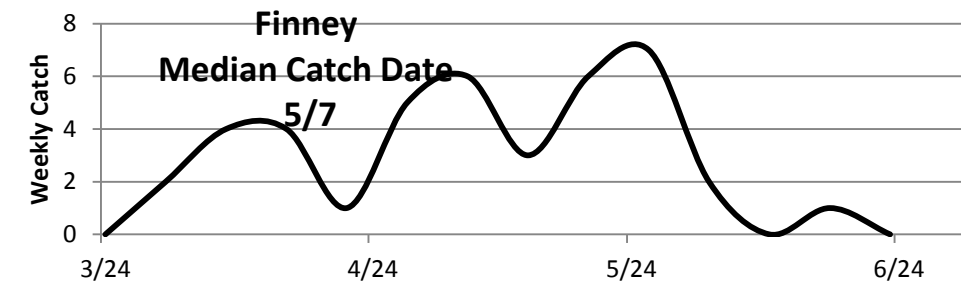
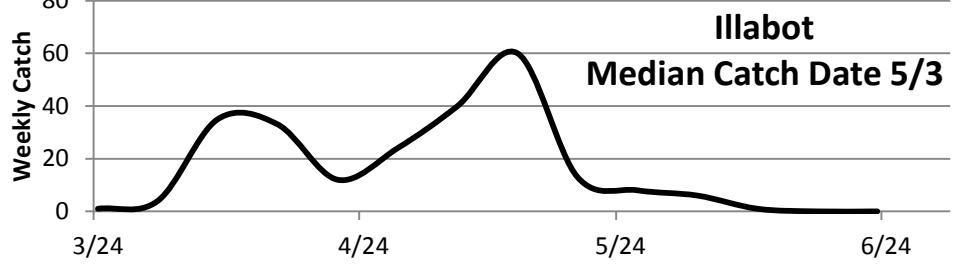
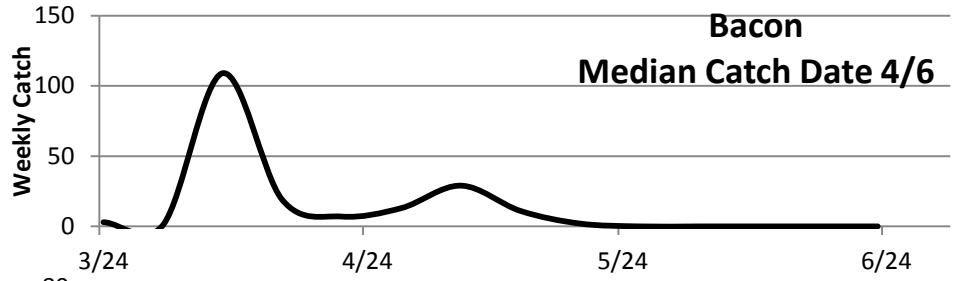
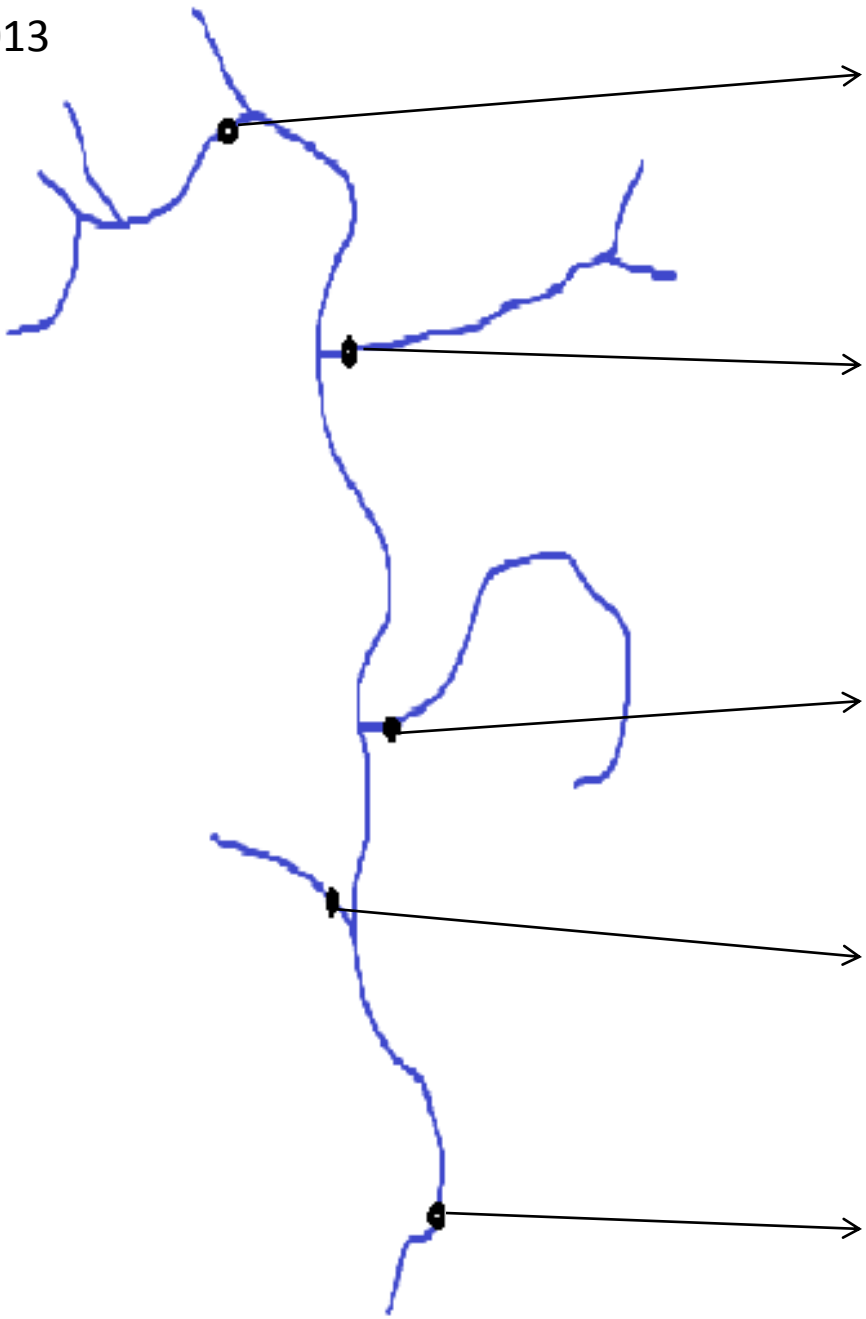
-Age-2 smolts from lower elevation warm streams are larger.



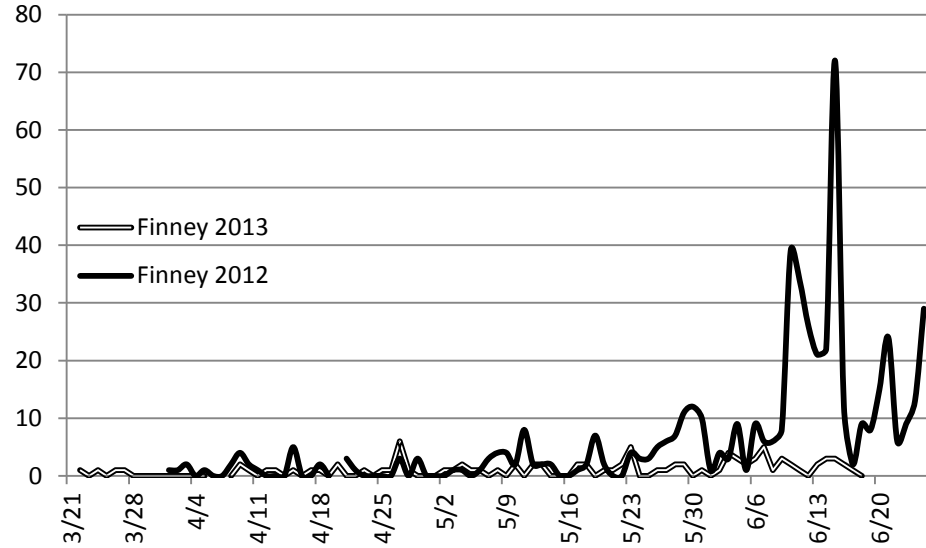
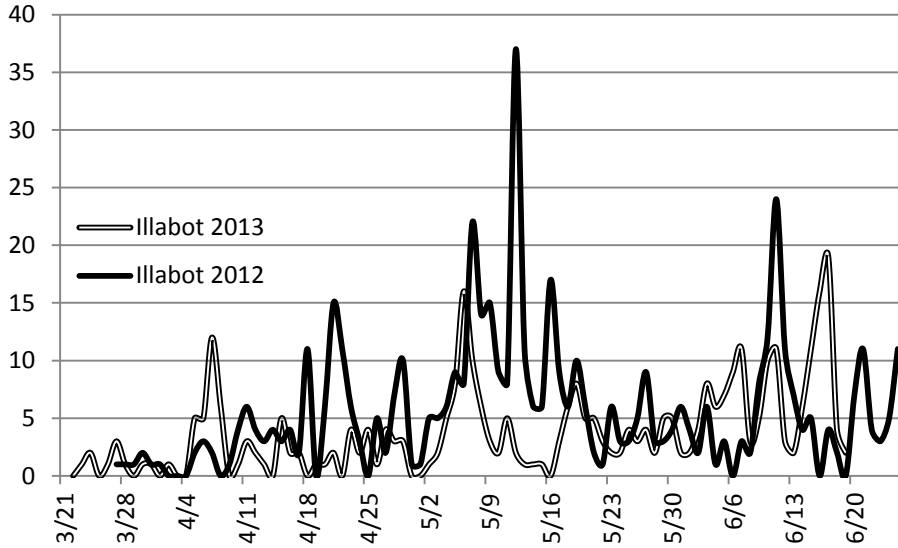
2012



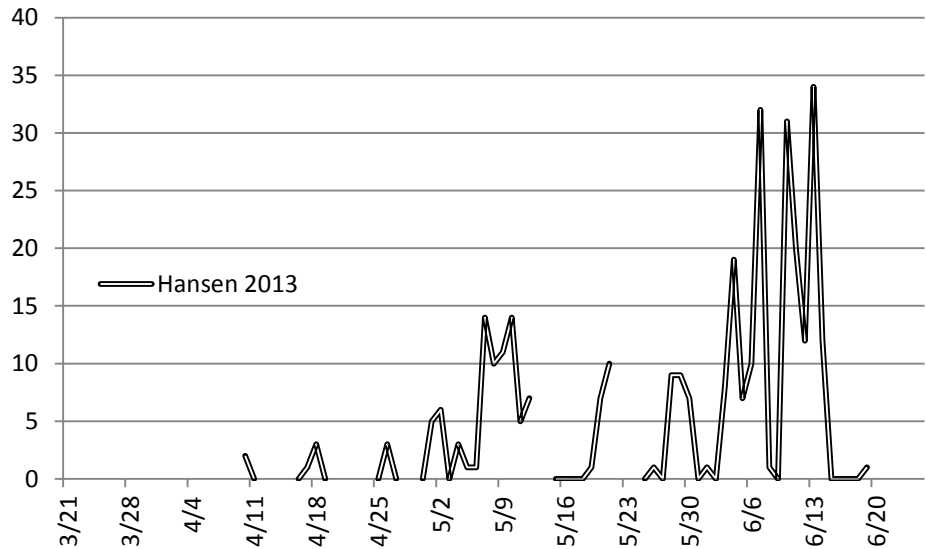
2013



SH Parr Catch



- Peak parr catches usually occur in June, or earlier with high water events.

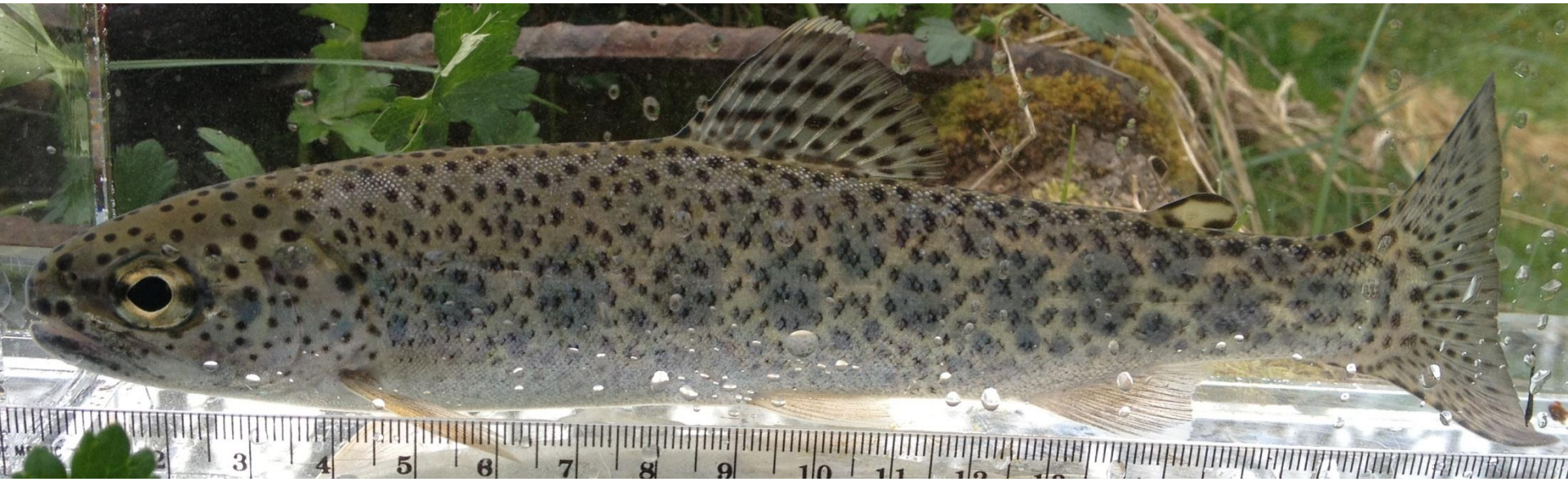


Key Aspects of Juvenile Diversity

- Smolts are older and larger from colder steeper basins.
- Younger in lower gradient, lower elevation streams. Faster growth.
- Emigration timing is earlier from further inland, higher elevation streams.
- Steelhead Parr...leaving natal streams and rearing elsewhere.
- Salmon carcasses larger/ younger smolts in some locations.

What we have learned (Tributary trapping project)

- Abundance estimates from 4 important tributaries
- Measure of juvenile population diversity among different tributary streams
- Tough to confidently estimate smolt abundance from entire Skagit. Continue to explore potential.
- Where to focus our efforts in the future and how project can evolve to continue provide important data on Skagit Steelhead.





Research plan

- Continue smolt trapping in Hansen and Illabot
- Install PIT-tag array in Hansen in 2014
- Install PIT-tag array in Illabot in 2014/15
- Sample fisheries for PIT tags
- Tag parr

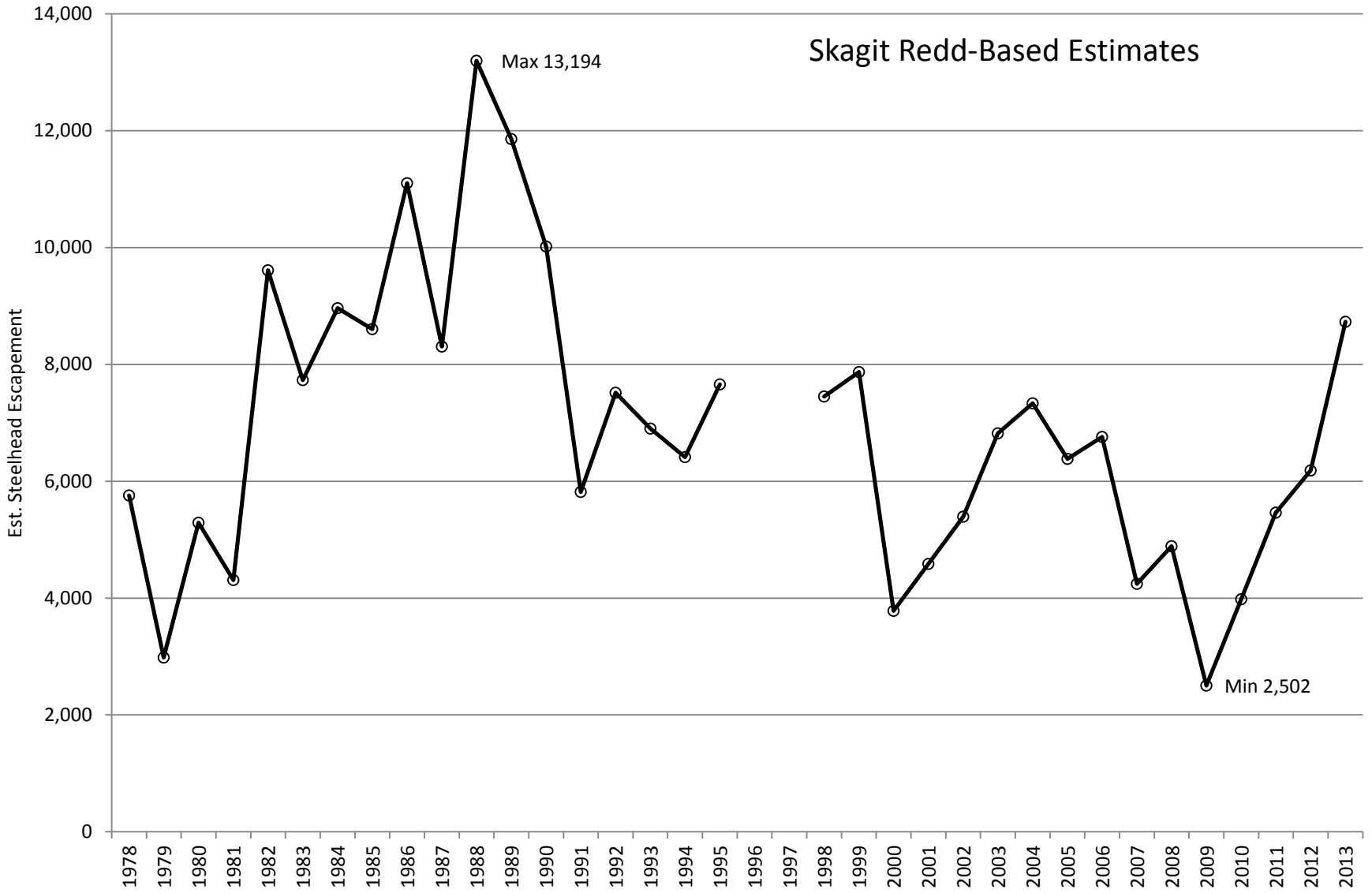
Research metrics

- Tributary abundance estimate
- Smolt life history diversity
 - Migration timing
 - Age at migration
- Parr movement/ survival
- **Smolt to adult return Rates (SAR)**

Skagit Adult Steelhead Scale Samples.

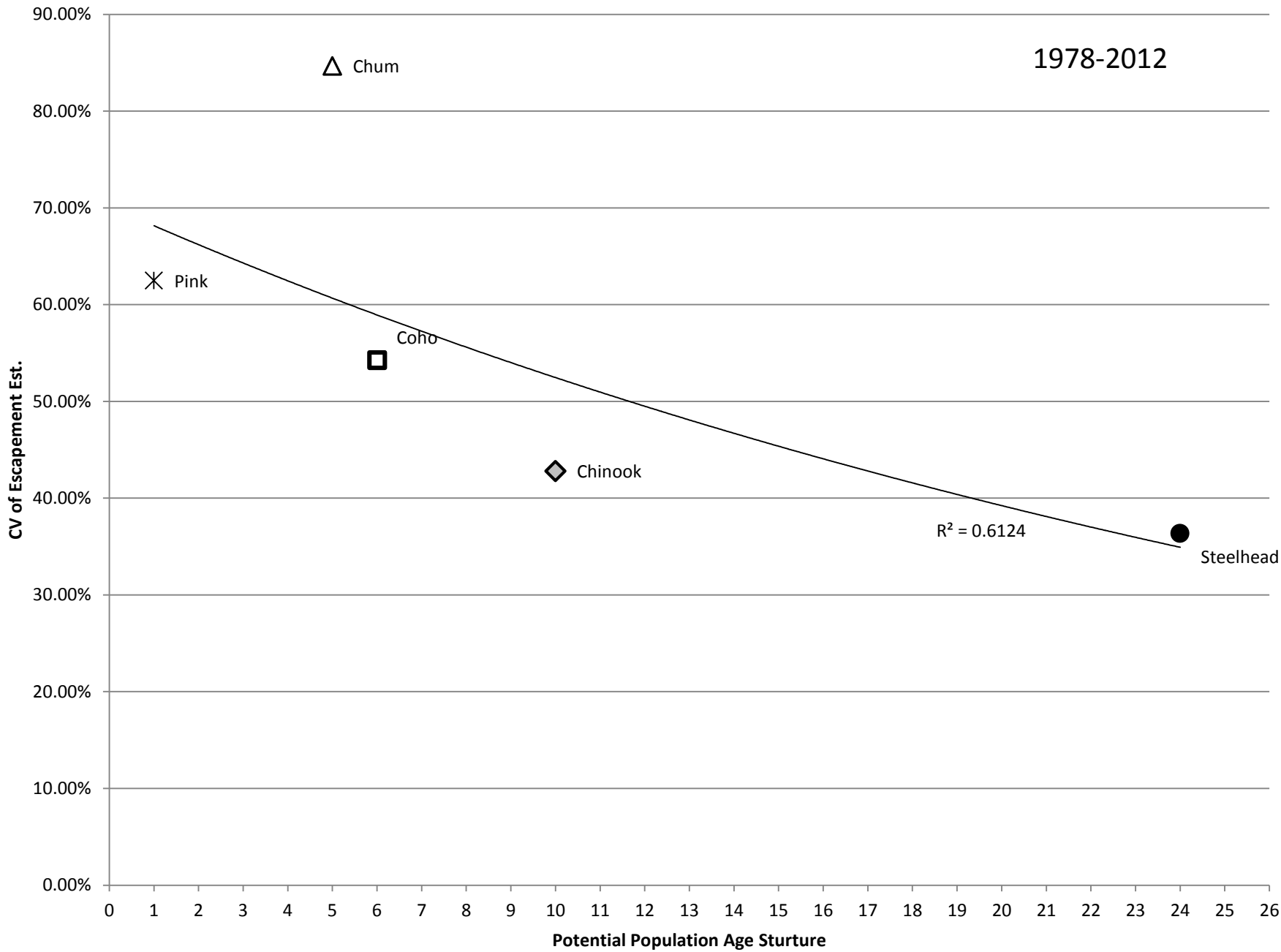
European Ageing Notation		x.xSx+	x.0+	x.1+	x.2+	x.3+
Fisherman Notation		Repeat	1-salt	2-salt	3- salt	4-salt
Year	Readable Samples	%	%	%	%	%
2005	142	10.6%	0.7%	28.9%	57.7%	2.1%
2006	322	2.8%	0.3%	57.5%	39.4%	0.0%
2007	296	14.9%	0.0%	16.6%	67.6%	1.0%
2008	208	8.7%	0.0%	70.2%	19.7%	1.4%
2009	171	7.6%	3.5%	55.6%	32.7%	0.6%
2010	185	6.5%	0.5%	80.0%	13.0%	0.0%
2011	342	11.1%	3.2%	43.9%	41.8%	0.0%
2012	381	3.7%	0.3%	67.5%	28.3%	0.3%

- Resident mykiss
- Repeat spawners



Skagit steelhead escapement varies just over five fold.

		Steelhead	Chinook	Coho	Chum	Pink
Fresh Water Age/ Juvenile Types	0		x	x	x	x
	1	x	x	x		
	2	x		x		
	3	x				
	4	x				
Saltwater Summers/ Adults Types	Resident	x				
	1 (jack)	x	x	x	x	
	2	x	x	x	x	x
	3	x	x		x	
	4	x	x		x	
	5		x		x	
	repeat spawners	x				
Potential Population age Structure (juv types*adult types)		24	10	6	5	1



Importance of diversity in recovering, protecting and managing steelhead.

- Important to protect diverse array of habitat types. In Skagit the lower elevation lower gradient streams need protected and restored(Finney, Hansen, Nookachamps, Day, Grandy).
- Manage fisheries to reduce take of parr or resident rainbows.
- Steelhead fisheries must have low harvest rates.
- Reduce take of kelts in sockeye and spring Chinook fisheries.

A vibrant rainbow arches across a dark, overcast sky. Below the rainbow, a river flows through a lush green forest. The riverbank is rocky and covered with fallen logs and debris. The water is dark and turbulent, with white rapids visible in the distance. The forest is dense with tall, thin trees, and the overall scene is serene and natural.

Thanks:

Jon-Paul Shannahan (USIT)

Brett Barkdull (WDFW)

Dave Pflug (Seattle City Light)

Ed Connor (Seattle City Light)

Jeremy Gilman (Forest Service)



Thanks to the trapping crew
and coworkers:

Jim Repoz
Dean Toba
Eric Kummerow
Shannon Vincent

Mat Gillum
Pete Topping
Matt Klungle