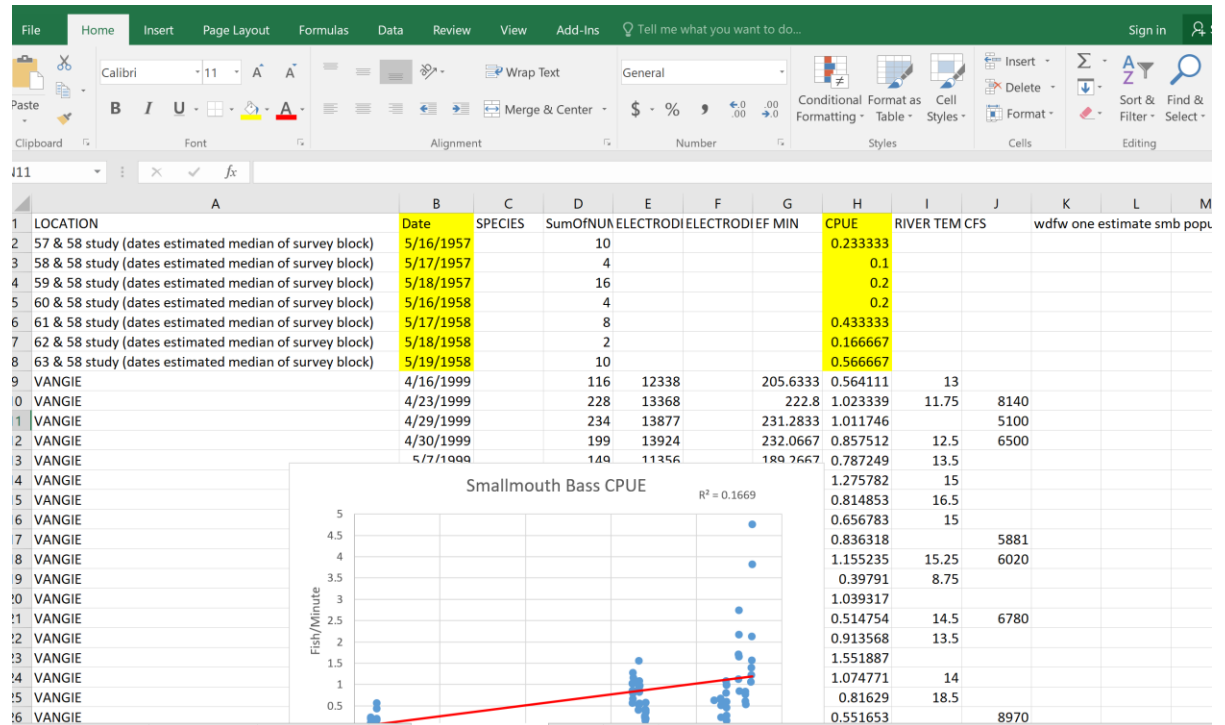


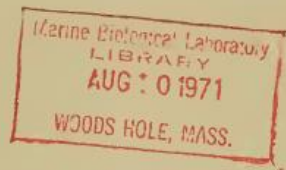
Fish Data sets of the Lower Yakima River

- 1957 to 1958 USFWS & Bureau of Commercial Fisheries - lower 174 miles of the river
- 1999 to 2001 WDFW - 2 lower river sections near Benton City and below Wanawish Dam
- 2011 to 2013 Mid-Columbia Fisheries and Yakama Nation – Yakima River Delta
- 2018, 2019 , 2021– USGS and Yakama Nation – Lower 100 miles of the river

The screenshot shows the Microsoft Access interface with a table named 'WDFW-ASSEMBLAGE DATA'. The table has columns for 'COHO TOTAL', 'COHO ADULT', 'COHO JUV', 'WHITEFISH T', 'WHITEFISH A', 'WHITEFISH JL', 'WHITEFISH Y', 'NPM TOTAL', 'NPM ADULT', and 'NPM JUV'. The data is organized into rows, with some rows having multiple columns populated with numerical values.



**Distribution and Abundance of Fish
in the Yakima River, Wash.,
April 1957 to May 1958**



SPECIAL SCIENTIFIC REPORT—FISHERIES No. 603

UNITED STATES DEPARTMENT OF THE INTERIOR

U.S. FISH AND WILDLIFE SERVICE

BUREAU OF COMMERCIAL FISHERIES

USFWS and Bureau of Commercial Fisheries Fish Data Set

- Conducted from April 8, 1957 to May 20, 1958
- Assessment of Fish Distribution and Abundance
- Active counts of all species
- Relatively little can be found for other parameters that link to survey events

- Parameters (Resistivity - Specific Conductivity)
Fish distribution were classified by two environmental parameters
 1. High temps and low temps
 2. High flows and low flows

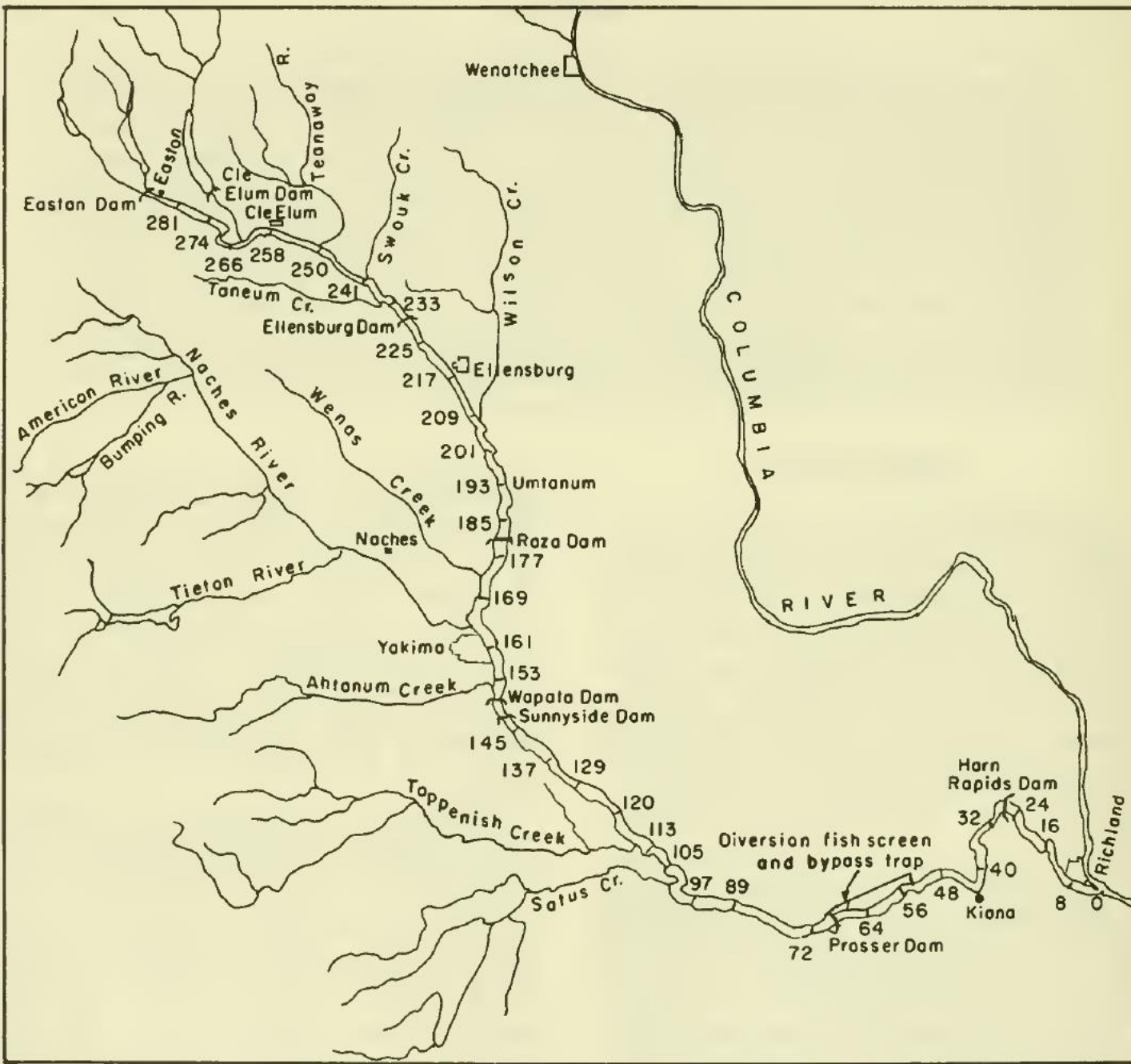


Figure 1.--Sampling sites along the main stem (lower 281 km.) of the Yakima River, by distance (km.) from the mouth of the river.

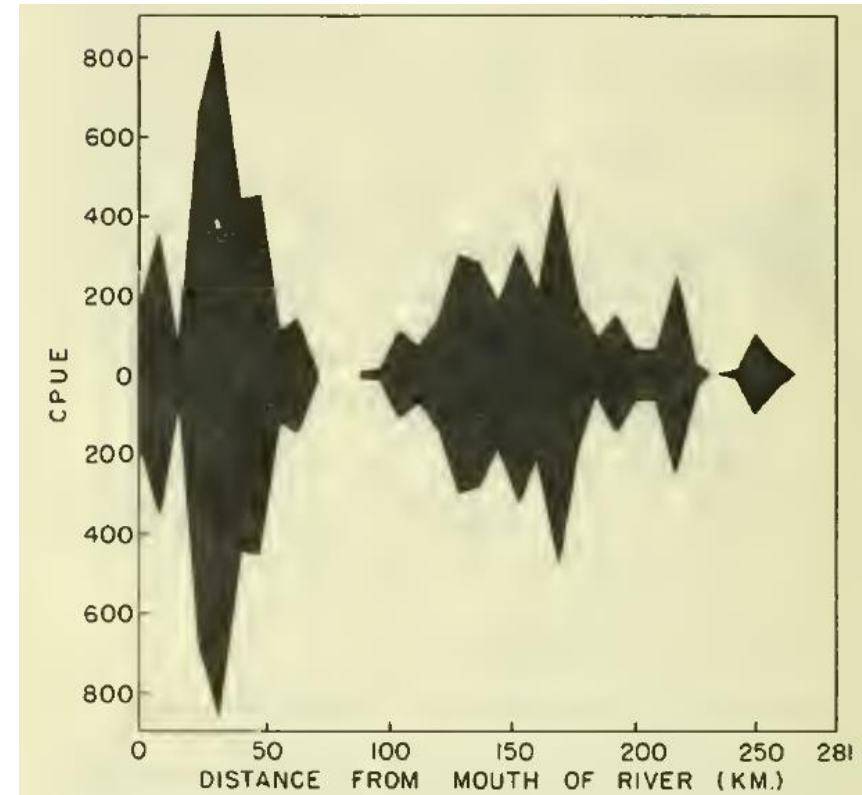


Figure 16.--CPUE (catch per unit of effort) of northern squawfish from the main stem of the Yakima River in 1957 and 1958, by sampling site.

CPUE – Catch Per Unit Effort is the standard

Catch can come in any form, these data sets are catch from electrofishing

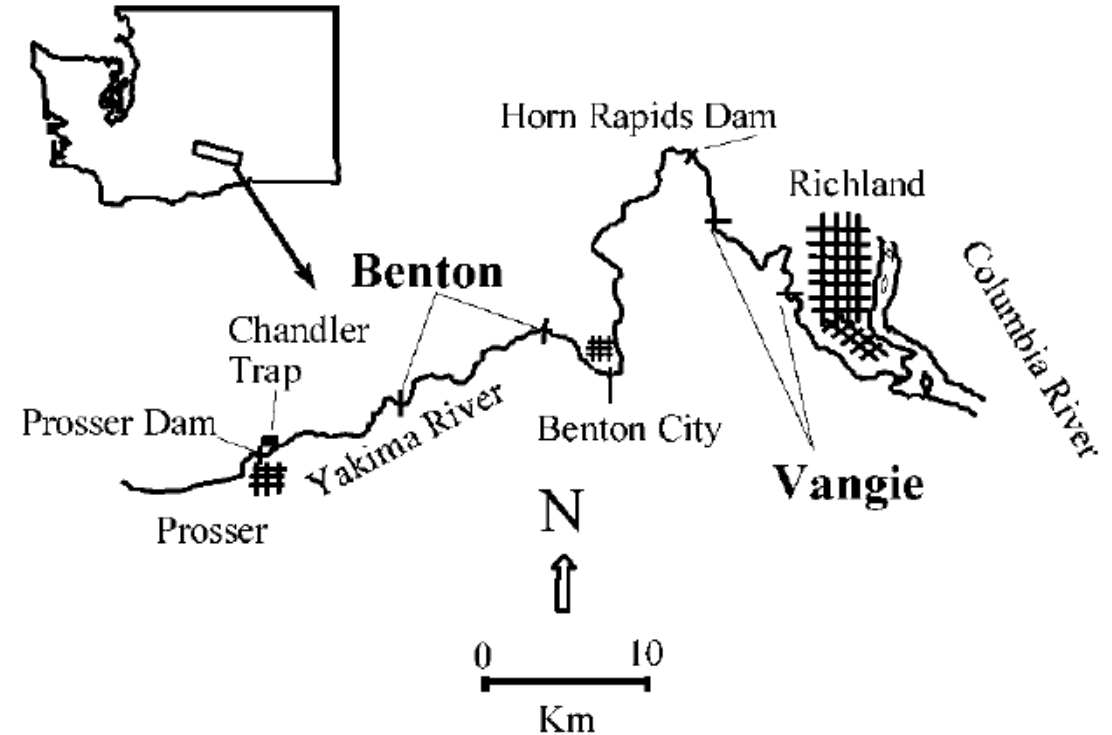
Table A-24.--Numbers of smallmouth bass caught and CPUE (catch per unit of effort), main stem of the Yakima River, 1957-58

Distance upstream from river mouth	April 8- June 20		July 15- Aug. 7		Sept. 18- Oct. 18		Nov. 12-22		Jan. 1-21		Mar. 3-21		May 12-20		Total	
	Km.	No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE	No.	CPUE	No.
0	-	-	5	12	21	34	10	18	-	-	18	32	4	12	58	108
8	10	14	5	6	-	-	4	6	3	6	-	-	8	26	29	58
16	4	6	13	20	4	4	6	10	1	2	3	4	2	10	33	56
24	16	12	3	4	54	94	30	54	30	40	4	4	10	34	147	242
32	-	-	6	12	-	-	12	26	5	8	5	8	3	10	31	64
40	4	4	1	2	-	-	6	18	1	4	1	2	5	18	18	48
48	8	8	23	24	23	36	7	12	-	-	5	10	8	18	74	108
56	-	-	1	2	2	4	-	-	-	-	9	20	11	24	23	50
64	2	2	4	6	11	16	3	12	1	2	5	16	11	20	37	74
72	2	2	1	2	-	-	-	-	-	-	-	-	1	2	4	6
97	-	-	1	2	-	-	-	-	4	6	-	-	-	-	5	8
105	-	-	3	6	-	-	-	-	-	-	-	-	-	-	3	6
137	-	-	-	-	-	-	-	-	-	-	1	2	-	-	1	2
Total	46	48	66	98	115	188	78	156	44	68	51	98	63	174	463	830

Be careful this data is in 100th's of minutes

WDFW – Fish Data

- Smallmouth Bass Study with solid count numbers
- Combine Relative Abundance with Mark/Recapture for Population Estimate
- Data for other species is subjective as counts were not actively recorded
- Parameters include
 1. Temp during three times of survey
 2. Turbidity secchi disk



Effects of Predation by Nonnative Smallmouth Bass on Native Salmonid Prey: the Role of Predator and Prey Size

ANTHONY L. FRITTS AND TODD N. PEARSONS

Washington Department of Fish and Wildlife, 600 Capitol Way North,
Olympia, Washington 98501-1091, USA

Smallmouth Bass Predation on Hatchery and Wild Salmonids in the Yakima River, Washington

ANTHONY L. FRITTS* AND TODD N. PEARSONS

Washington Department of Fish and Wildlife, 600 Capitol Way North,
Olympia, Washington 98501-1091, USA

Delta Fish Data Set

- Yakima Delta assessed for fish species by Yakama Nation and Mid-Columbia Fisheries in 2011 to 2013 (some 2014 and 2020)
- High numbers of introduced fish predators, primarily Bass and Catfish
- Predator removal occurred during surveys
- Parameters
 1. Active counts of all species
 2. Turbidity secchi disk
 3. Water temperatures (small thermometer)

FISHERIES

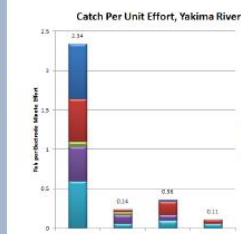
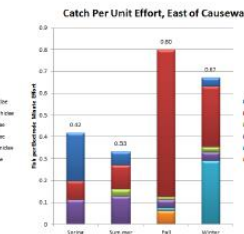
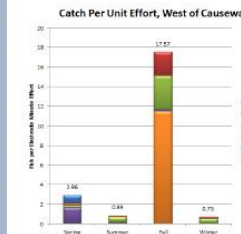
The Yakima Delta Assessment included surveying the area around Bateman Island for the number and types of fish. Young salmon and steelhead are found in the area only when they migrate out to the ocean in the spring. Non-native species such as bass and catfish are abundant in the area.



Thirty-eight electrofishing surveys were conducted by Yakama Nation Fisheries from May 2011 through April 2013 using a jet-boat equipped with an electrofishing unit. The electrofishing probes pulsed direct current with varying frequencies dependent on specific conductivity and water temperature. The length of time the electrode was operating was recorded to calculate catch per unit effort, which is used as an estimate of species use for each survey location.



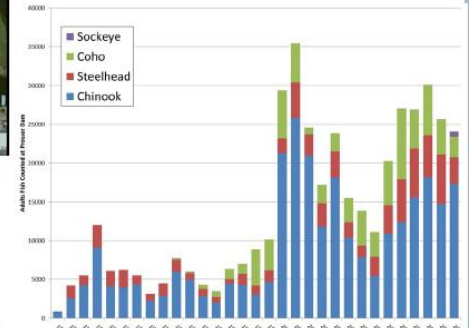
The graphs below display the cumulative number of each fish species found per the cumulative number of electrode minutes over the 38 surveys.



Family	Common Name	Scientific Name
Salicidae	Steelhead/Rainbow Trout	Oncorhynchus mykiss
Salicidae	Coho Salmon	Oncorhynchus kisutch
Salicidae	Chinook Salmon	Oncorhynchus tshawytscha
Salicidae	Marbled Murrelet	Uria lomvia
Salicidae	Clupeidae	Clupea pallasii
Salicidae	Carb	Carb
Salicidae	Sculpin	Cottus bairdii
Salicidae	Smallmouth Bass	Micropterus dolomieu
Salicidae	Largemouth Bass	Micropterus salmoides
Salicidae	White Crayfish	Decapoda
Salicidae	Channel Catfish	Ictalurus punctatus
Salicidae	Striped Bass	Morone saxatilis
Salicidae	Yellow Perch	Perca flavescens
Salicidae	Sculpin	Cottus asotus
Salicidae	Walleye	Stizostedion vitreum
Salicidae	Yellow Perch	Perca flavescens
Salicidae	Sculpin	Cottus asotus
Salicidae	Walleye	Stizostedion vitreum

The Yakima River historically hosted runs of steelhead trout, Spring, Summer, and Fall Chinook, coho, and sockeye salmon. While some species have persisted at low numbers, like federally-protected steelhead, others such as Summer Chinook and coho were extirpated from the Yakima.

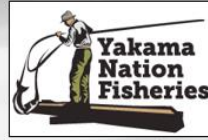
Historically, Summer Chinook spawned in the middle reaches of the Yakima and Naches Rivers. After decades of decline due to heavy fishing pressure in the ocean and the Columbia and poor conditions in the Yakima Basin, Summer Chinook had not been seen in the Yakima since the 1980's. The Yakama Nation recently began releasing hatchery-raised juvenile Summer Chinook, and in 2013 over 1,000 adults returned from the Pacific Ocean to spawn in the Yakima River.



The graph above displays adult salmon counted at Prosser Dam from 1983-2013. Juvenile salmon migrate out through the Yakima Delta area to the Columbia River, and adult fish migrate from the Columbia up into the Delta. Water temperatures upstream of the Bateman Island Causeway in the Yakima River Delta reach levels that are harmful and even lethal to these migrating salmonids and have created habitat ideal for predatory warmwater fish species.

The water temperatures form a "thermal barrier", which is a particular concern for species that migrate later in the summer, such as sockeye and Summer and Fall Chinook. Juvenile salmon and spring adult runs (such as Spring Chinook) must adapt migration timing so that they are through the lower Yakima River before temperatures rise rapidly in June and July. Fall adult migratory species are thought to hold in the Columbia River while waiting for Yakima River temperatures to decrease in September and October.

Computer modeling of the Yakima Delta area suggests that allowing flow through the causeway would lengthen the cool water period in the spring and decrease the extreme warm water temperatures in the summer.



Lower Yakima River Survival Study 2018 – Currently Ongoing

Tobias Kock¹, Michael Porter², Pat Monk³,
and Russell Perry¹

¹U.S. Geological Survey

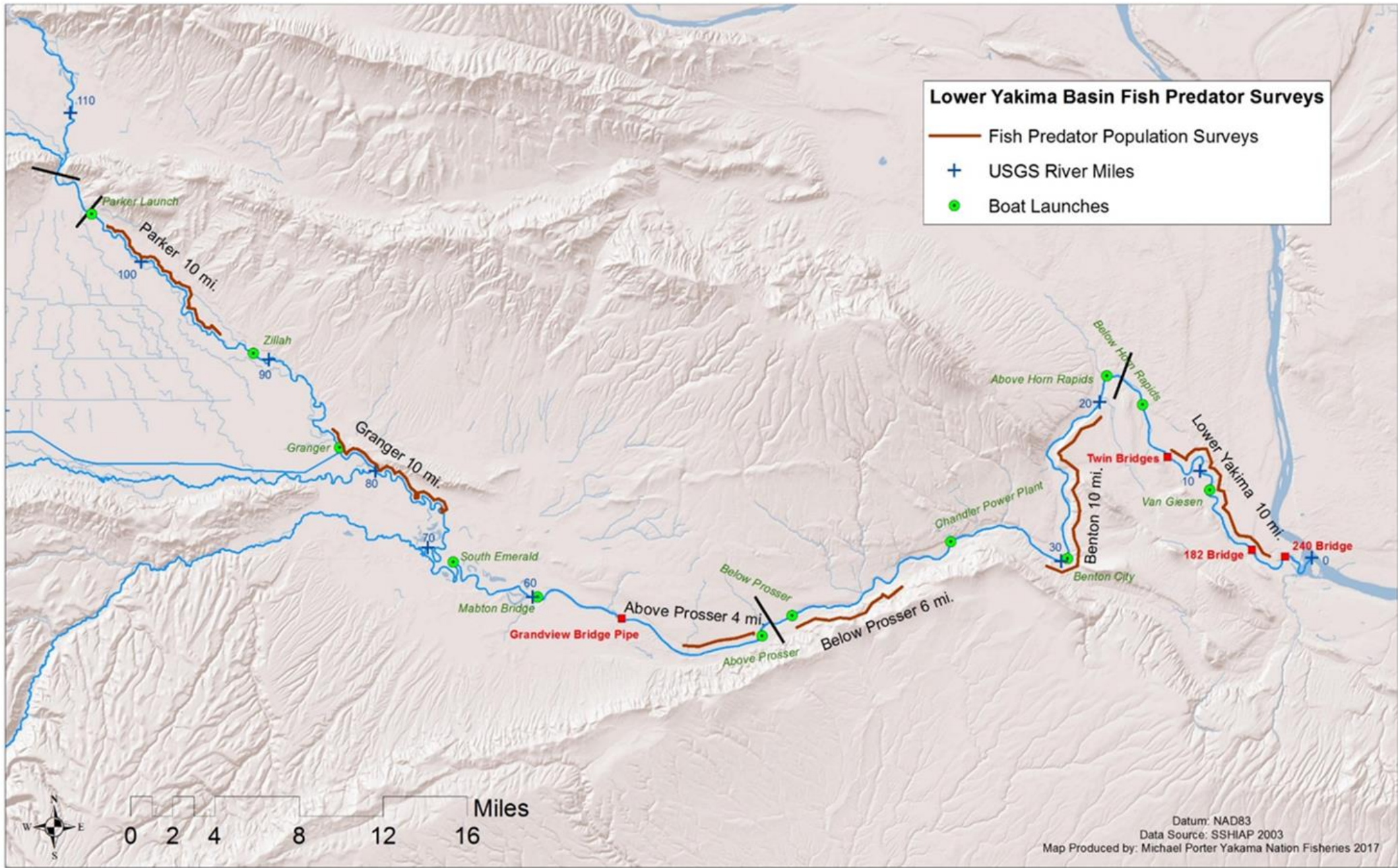
²Yakama Nation Fisheries

³Bureau of Reclamation

U.S. Department of the Interior
U.S. Geological Survey

Lower 100 Miles of Yakima River Fish Data Set

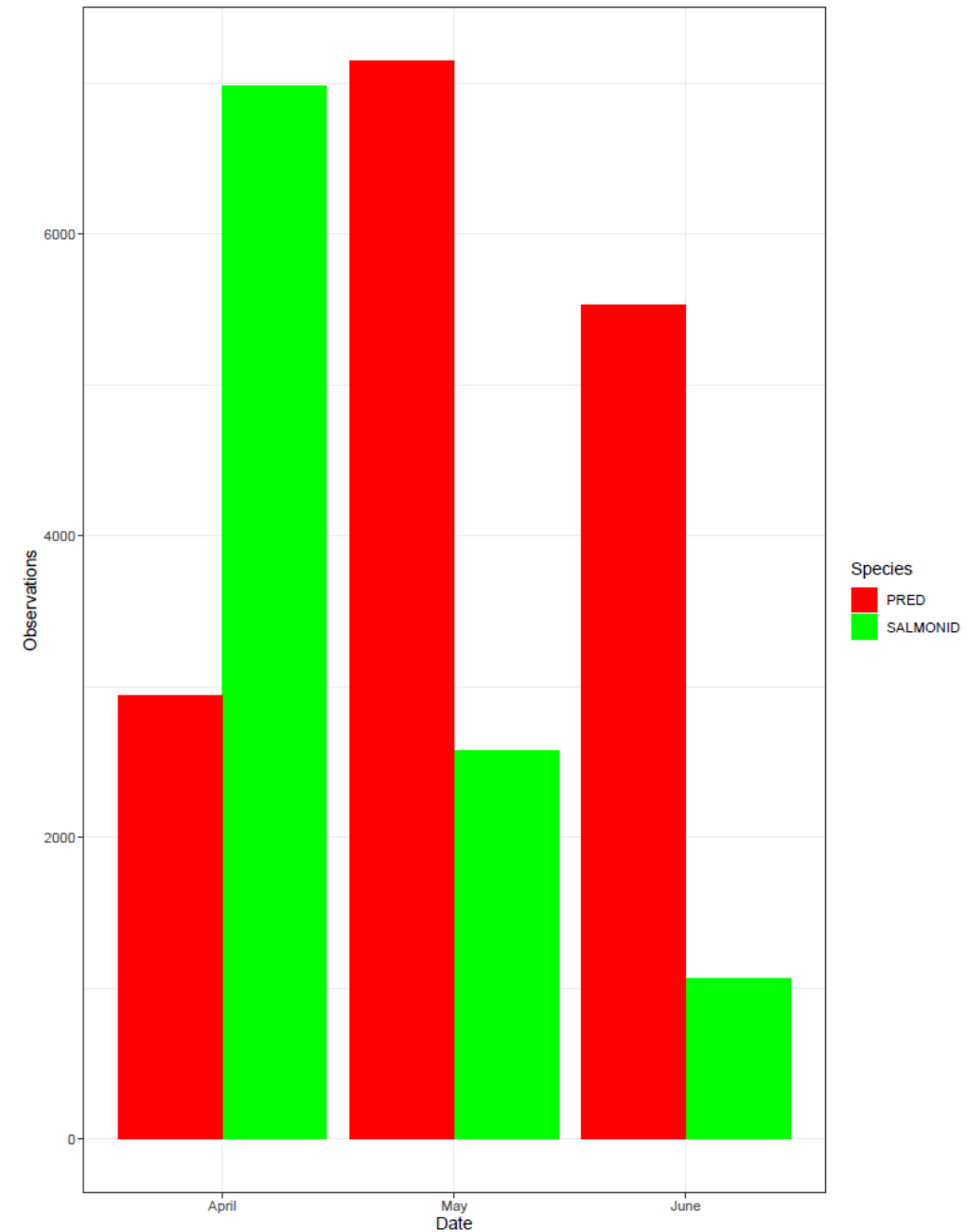
- USGS and Yakama Nation predator surveys
- 6 river sections covering ~50 miles
- 2018, 2019, & 2021 during the spring smolt outmigration (ends usually early June)
- Parameters
 1. Active counts of all species
 2. Turbidity secchi and NTU
 3. Some D.O.
 4. Temperatures at beginning of survey, also continuous monitors setup in or near each survey location



Identifying Smolt Mortality

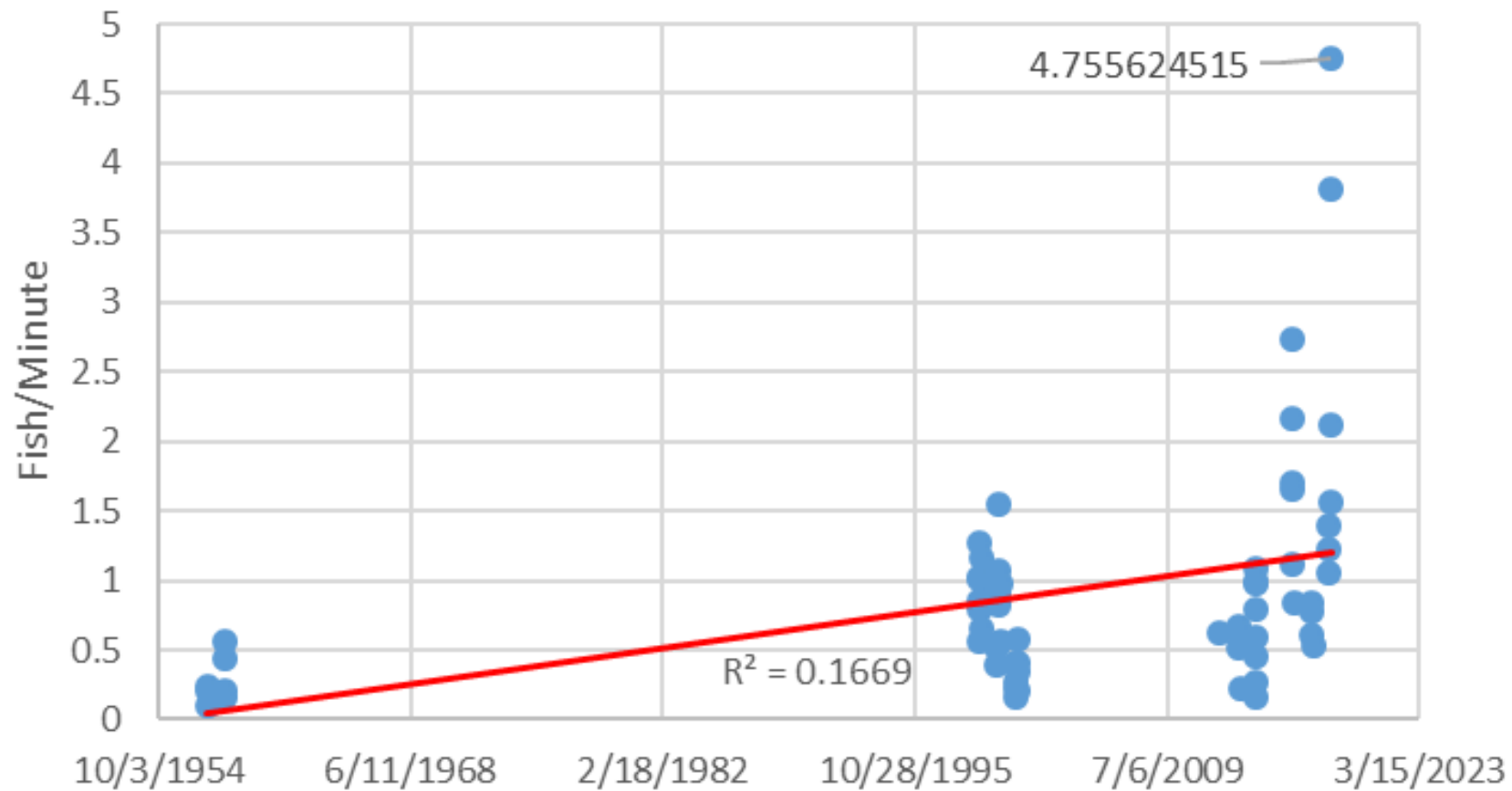
Smolt Predators

- Increased river temperatures promotes influx of non-native fish predators
- Low water flows create exposed rock and lower water stage creates increased avian predator opportunities
- Flip during peak of the smolt migration that shifts fish abundance to greater amounts of fish predators



Salmon Vs Predator Abundance

Lower Yakima River Smallmouth Bass CPUE



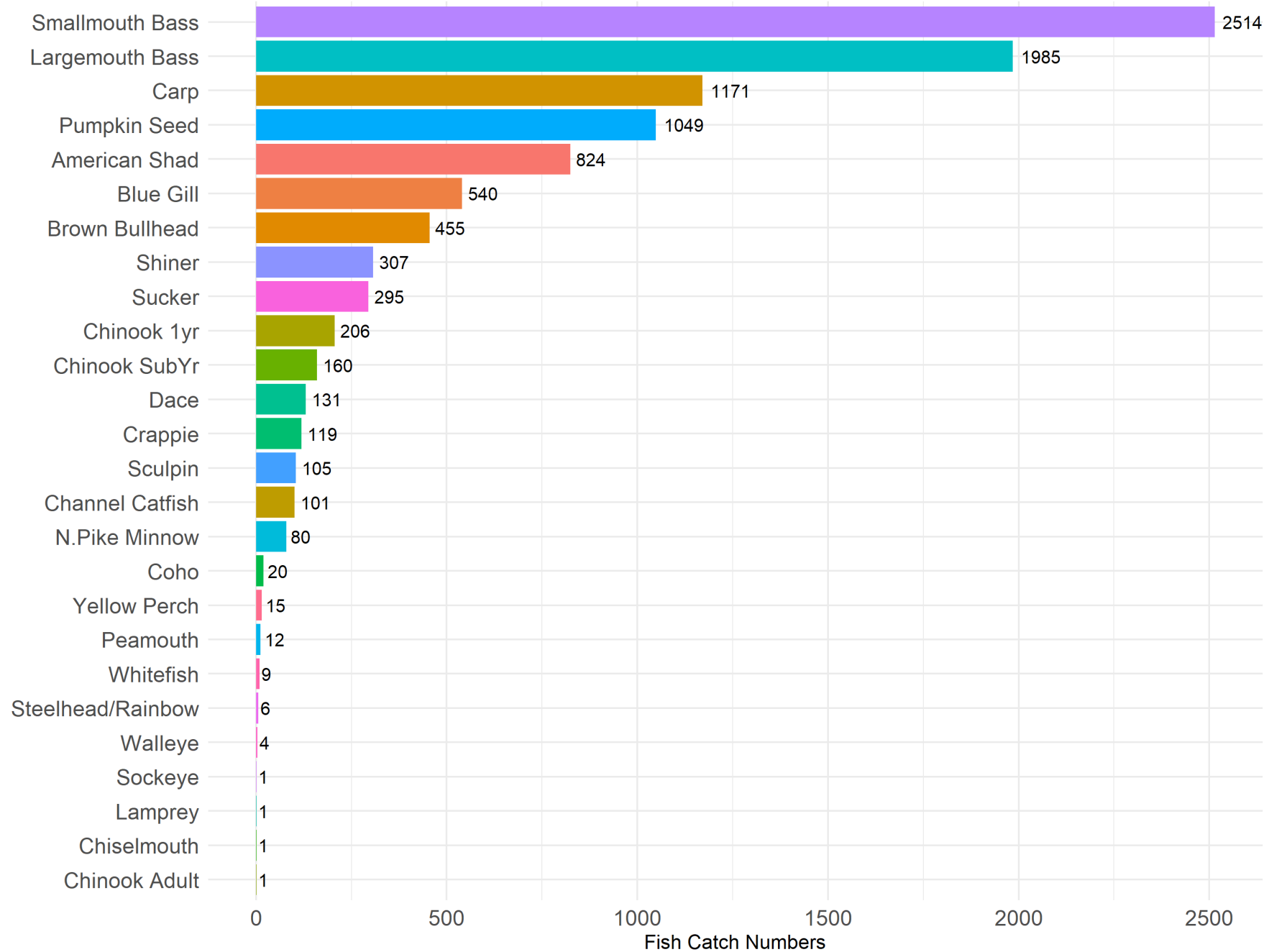
Fish Predators

- Yakima Delta
- High numbers of fish predators, primarily Bass and Catfish
- Nursery area for these predators
- Reports of introduced Alligator Gar, March 2020 resurveyed



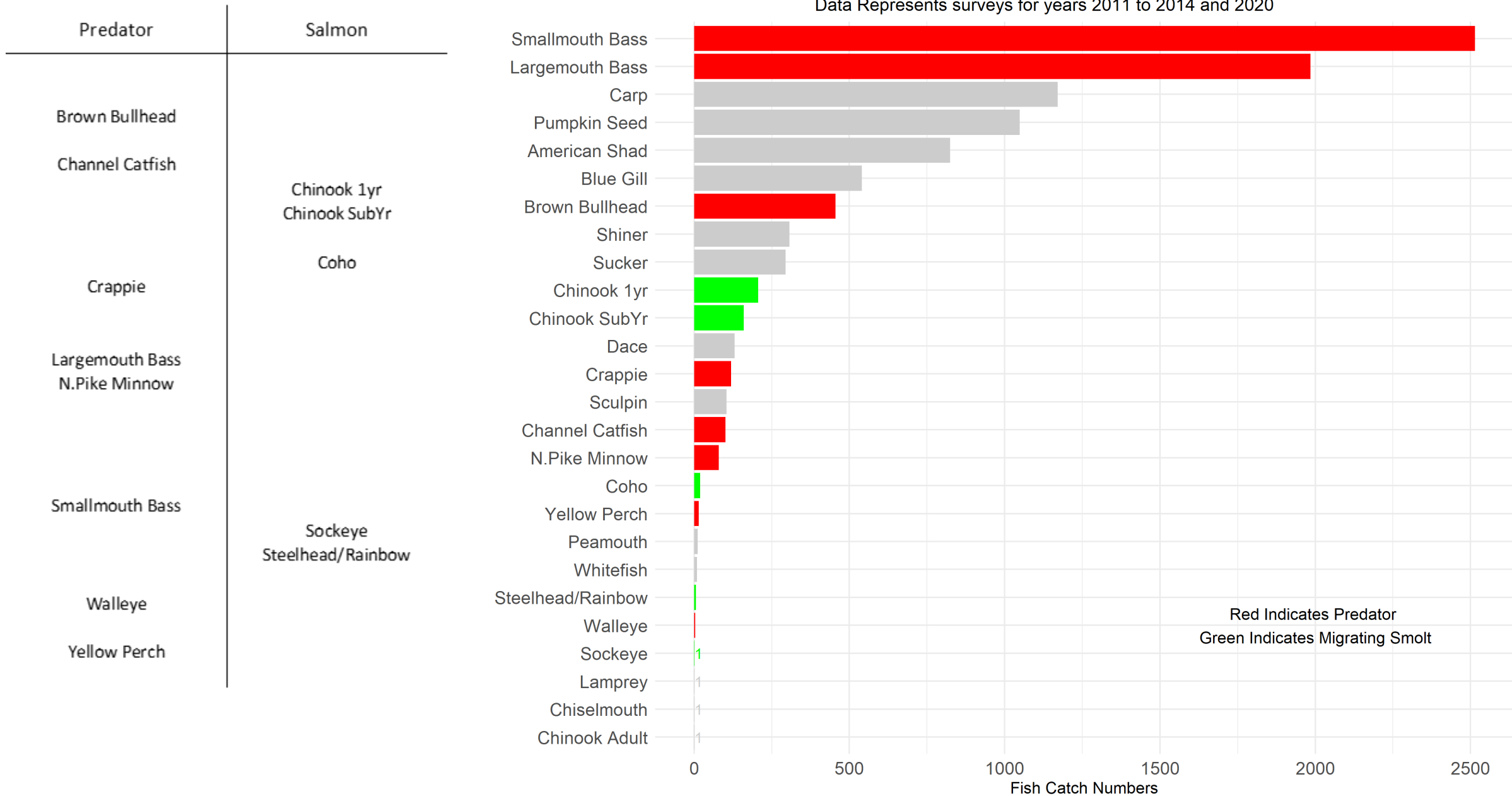
Yakima River Delta West Fish Catch

Data Represents surveys for years 2011 to 2014 and 2020



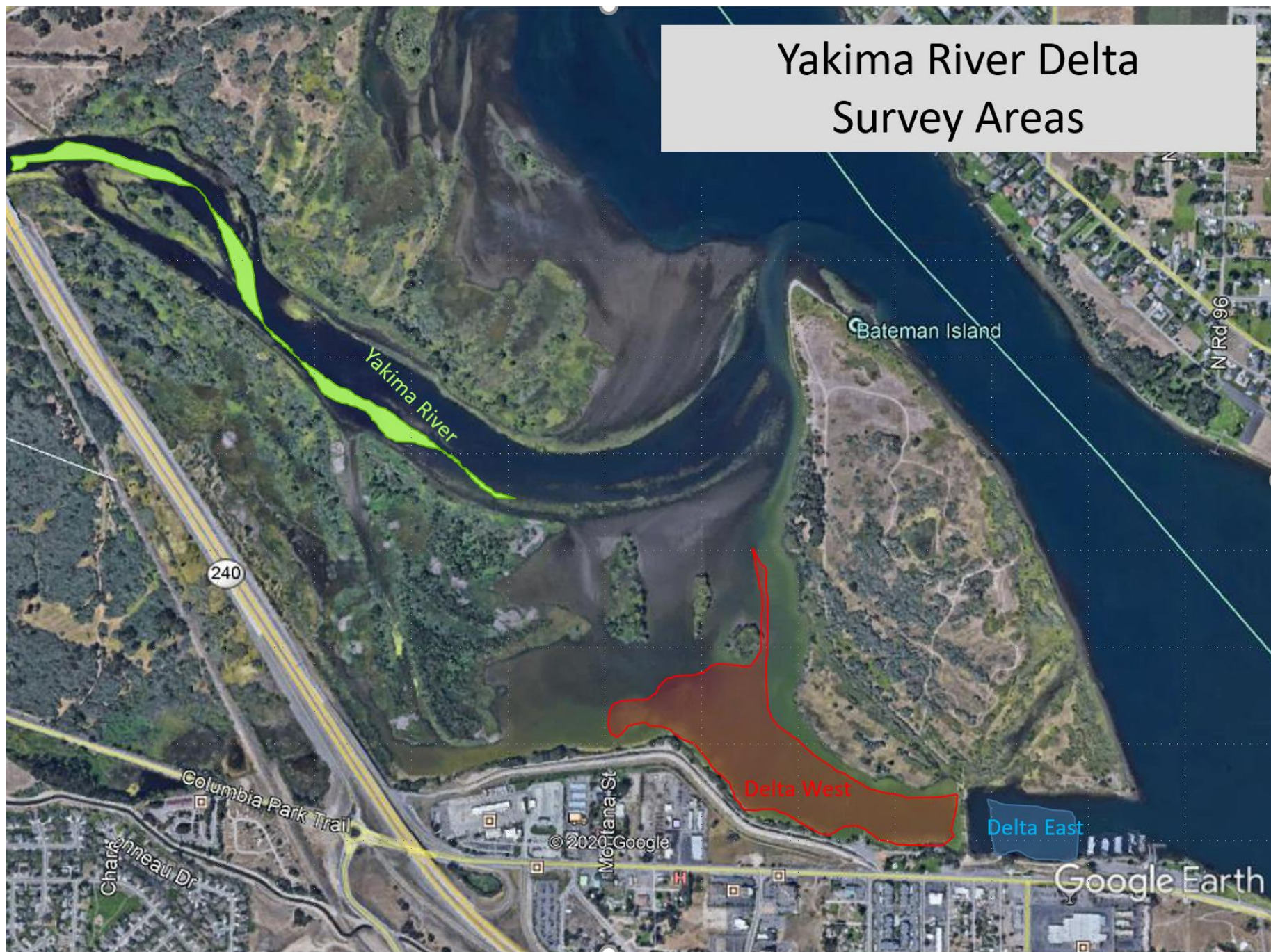
Yakima River Delta West Fish Catch

Data Represents surveys for years 2011 to 2014 and 2020



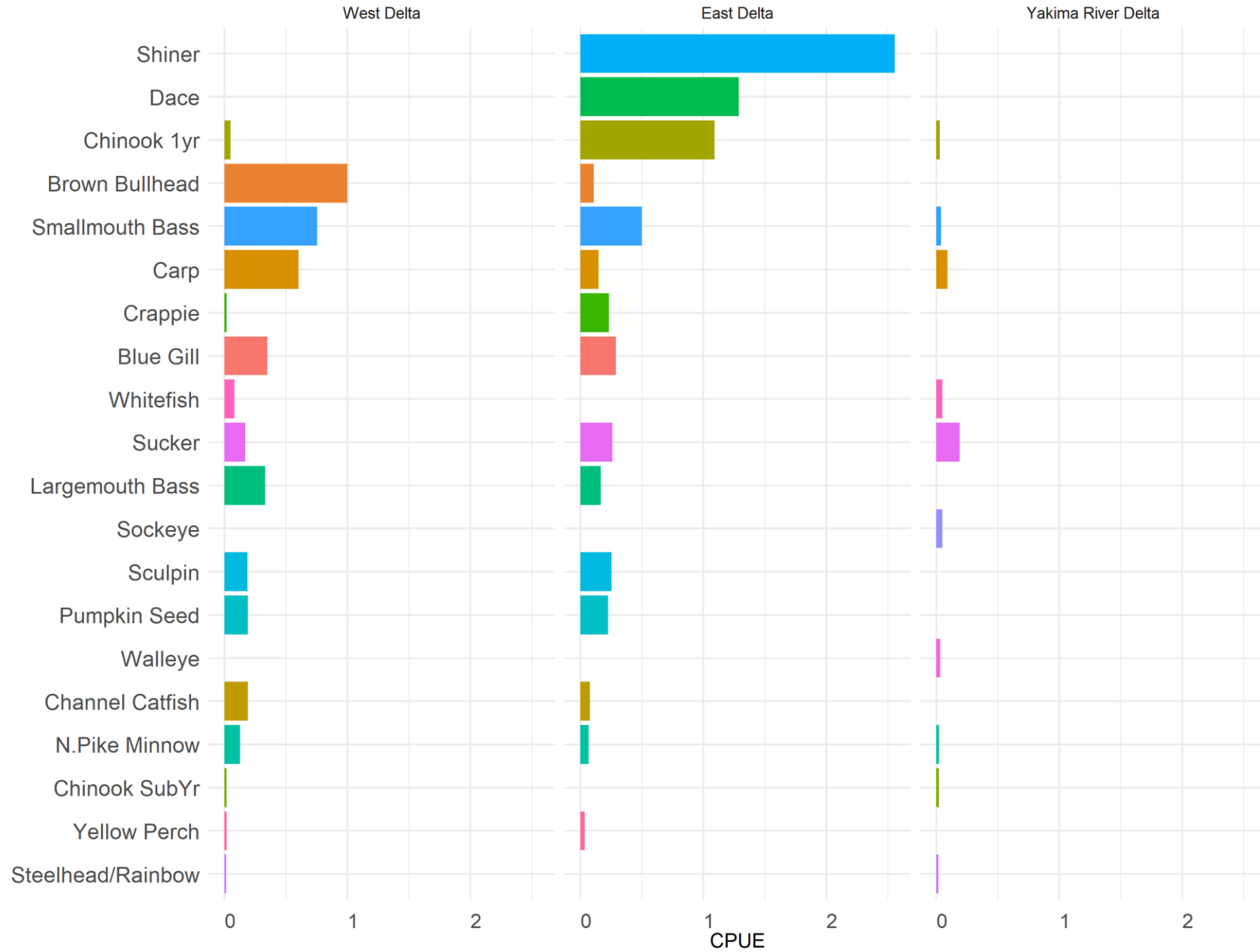
Red Indicates Predator
Green Indicates Migrating Smolt

Yakima River Delta Survey Areas



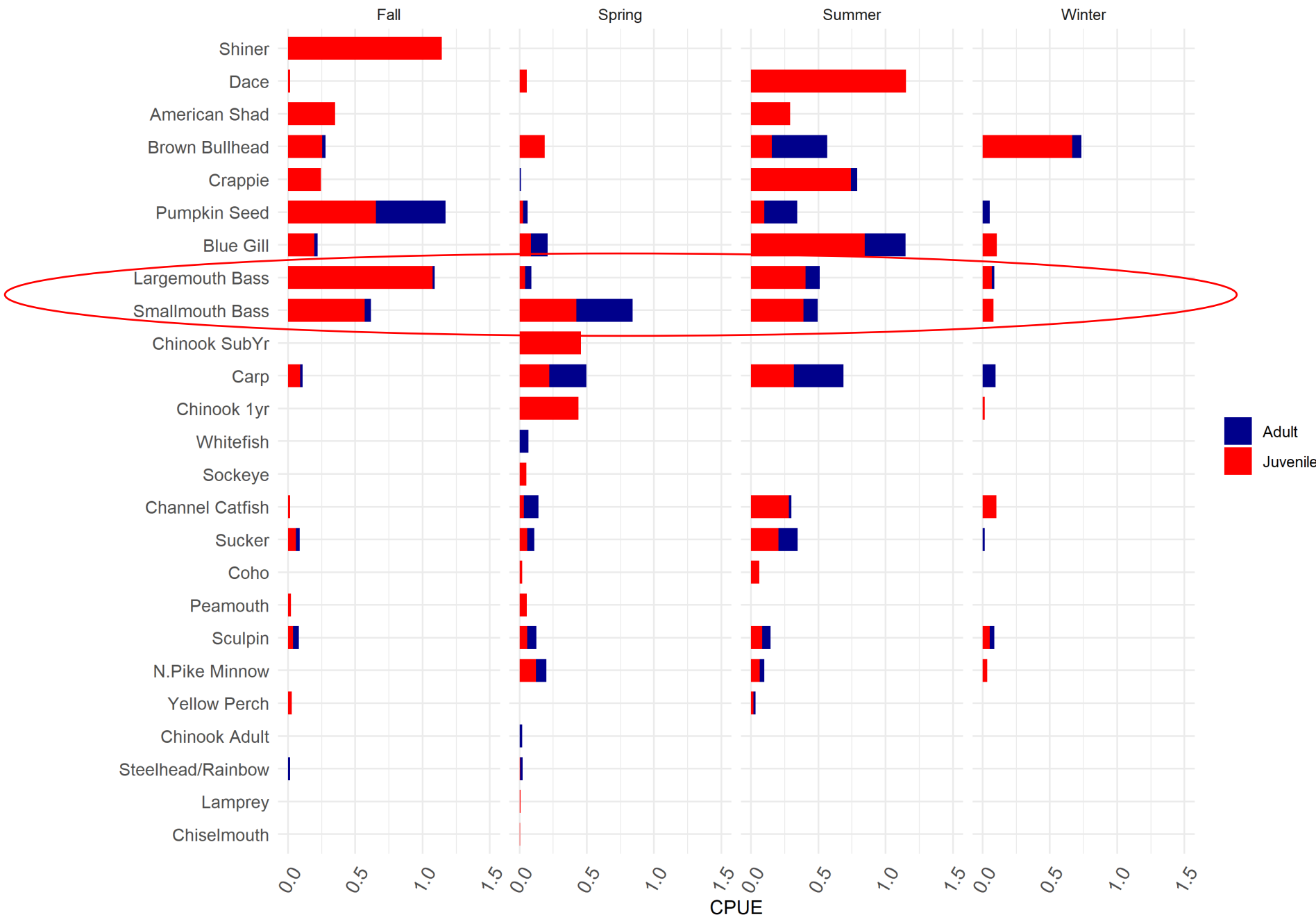
Yakima River Delta 3 Locations

Fish Relative Abundance for 2013



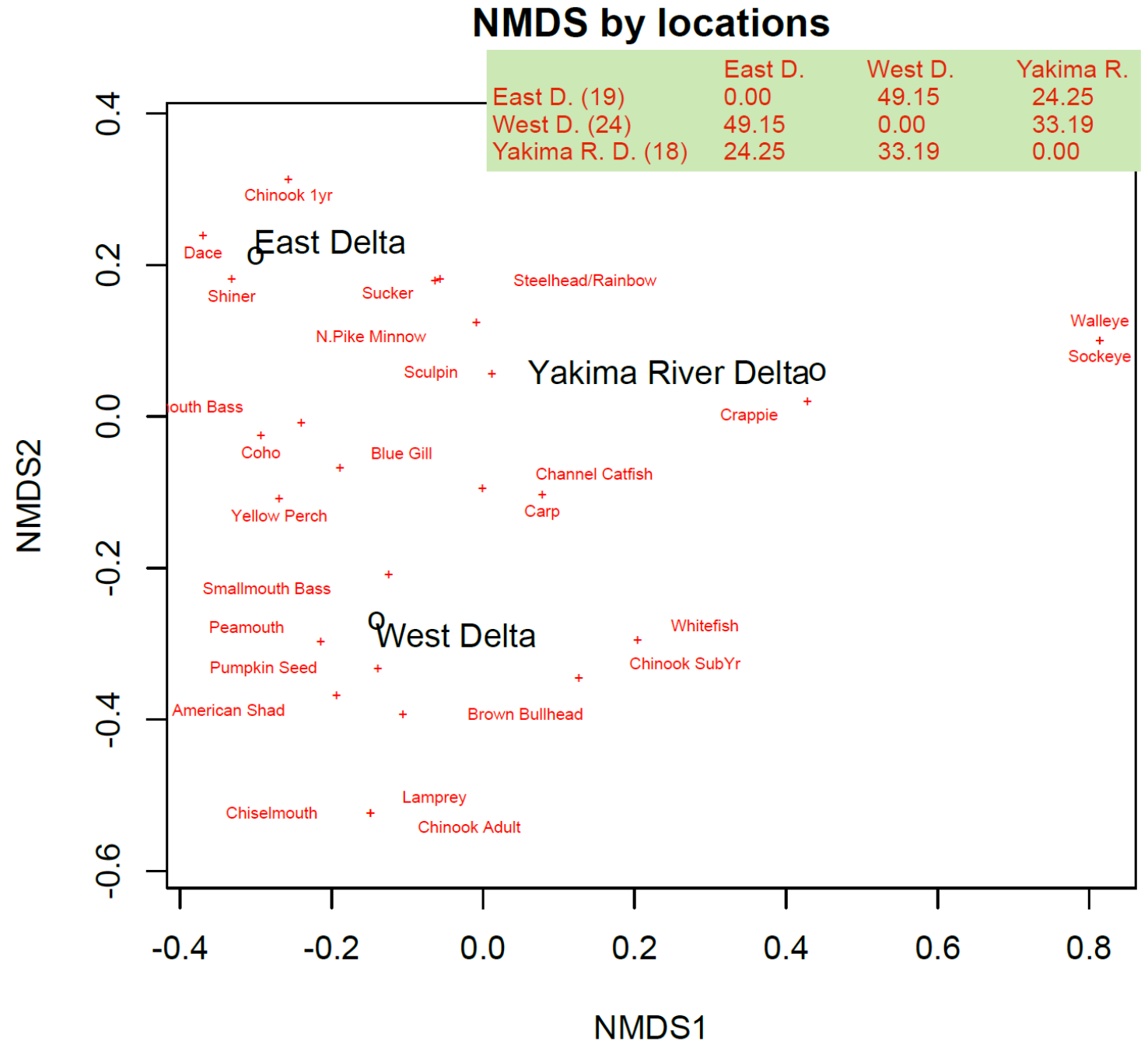
Yakima River Delta Seasonal Fish CPUE

Relative Abundance 2011-14 & 2020



Non-metric multidimensional scaling

- Total number of species in East, West and Yakima River Delta were 19, 24, and 18, respectively
- Species composition similarities between East Delta and West Delta were about 49%
- East Delta and Yakima River were similar only by 24%.
- West Delta and Yakima River were similar only by 33%



Fish Data and Water Quality of the Lower Yakima River

Next Steps

- Fish health - D.O. – Temp. – PH – What environmental parameters do we need to record?
- Temperature & Fish Model to predict distribution and river mile presence
- Continuing studies – What data do we need for upcoming projects?

Multiple agency coordination for combining fish data with habitat projects

Yakima River Delta – West Causeway August, 2020

