

Northern Pike Minnow Predation and Movement

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Yakama Nation



Project Objectives

- The purpose of this project is:
- **1st**- to estimate the population of Northern Pike Minnow in our research area.
- **2nd**- to estimate the number of salmon smolts being consumed by Northern Pike Minnows within the Lower Yakima River.
- **Lastly**, to track movement of NPM that have been pit/radio tagged in our sections

Population Estimate Methodology Change

- Due to low capture rates last year, we decided to sample both the entire right and left bank of each one mile transect. These one mile sections were again separated by two mile non-sampled sections. Thanks to the higher water levels, this was very successful, allowing us to get out 367 marks and 11 recaptures.

Statistical Format Used

- One of the simplest ways to estimate population from our catch data was to use Schabel's adjusted formula:

$$N = \frac{\sum (M * C)}{(R + I)}$$

- Where: M - number of marked fish
- C - number of fish in the recapture sample
- and R = number of marked fish recaptured.

Statistical Outcome

- After running the numbers, and finding the upper and lower confidence limits on the Poisson table:
- Expanded river estimate for the whole 39 miles is approximately **12197 NPM** (expanded from 13 miles of sampled river).
- Upper 95% confidence limit: **27106 NPM**
- Lower 95% confidence limit: **7430 NPM**

What factors can effect recapture and capture for population estimate?

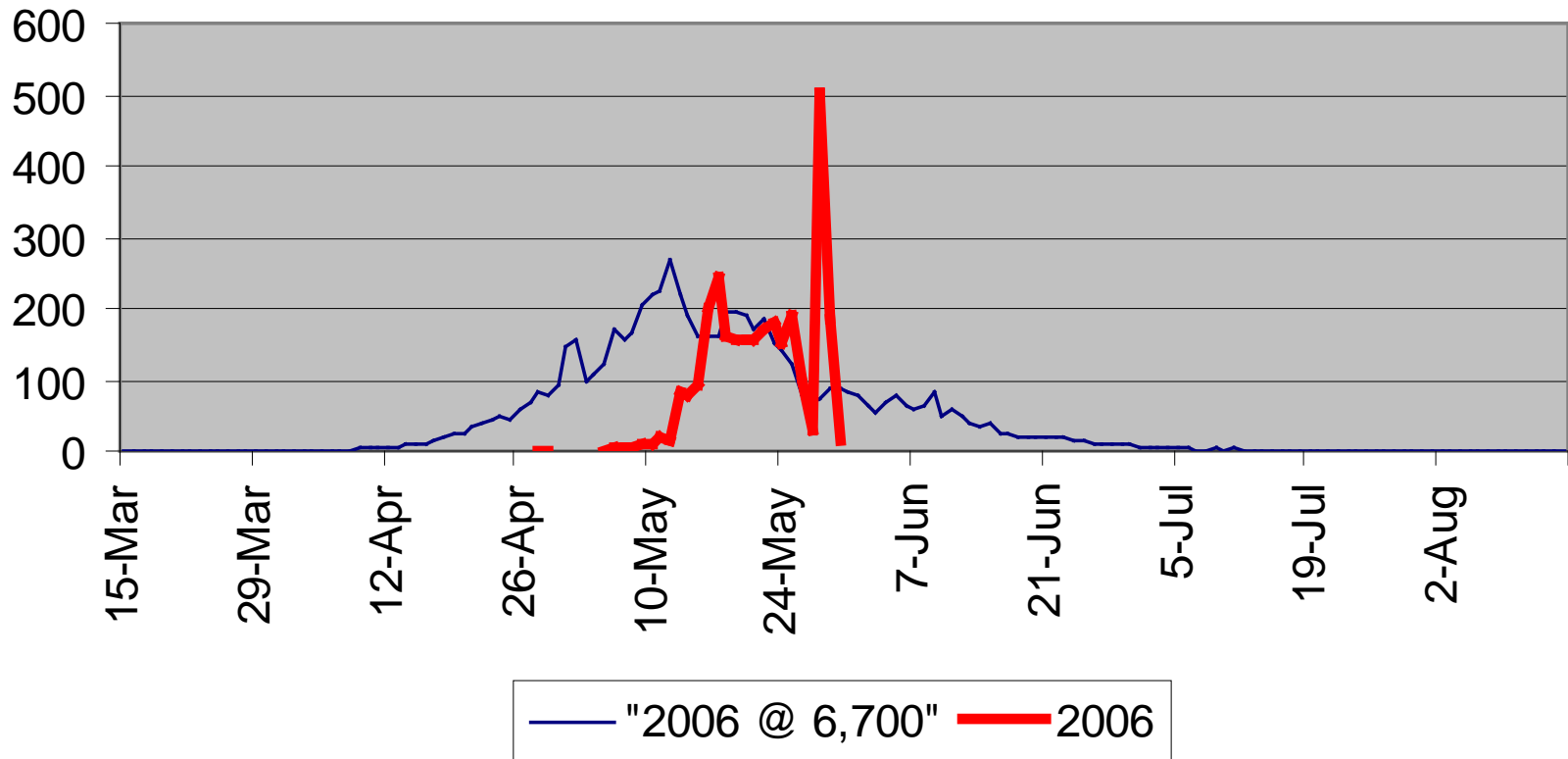


Environmental and Biological Factors in Spring include:

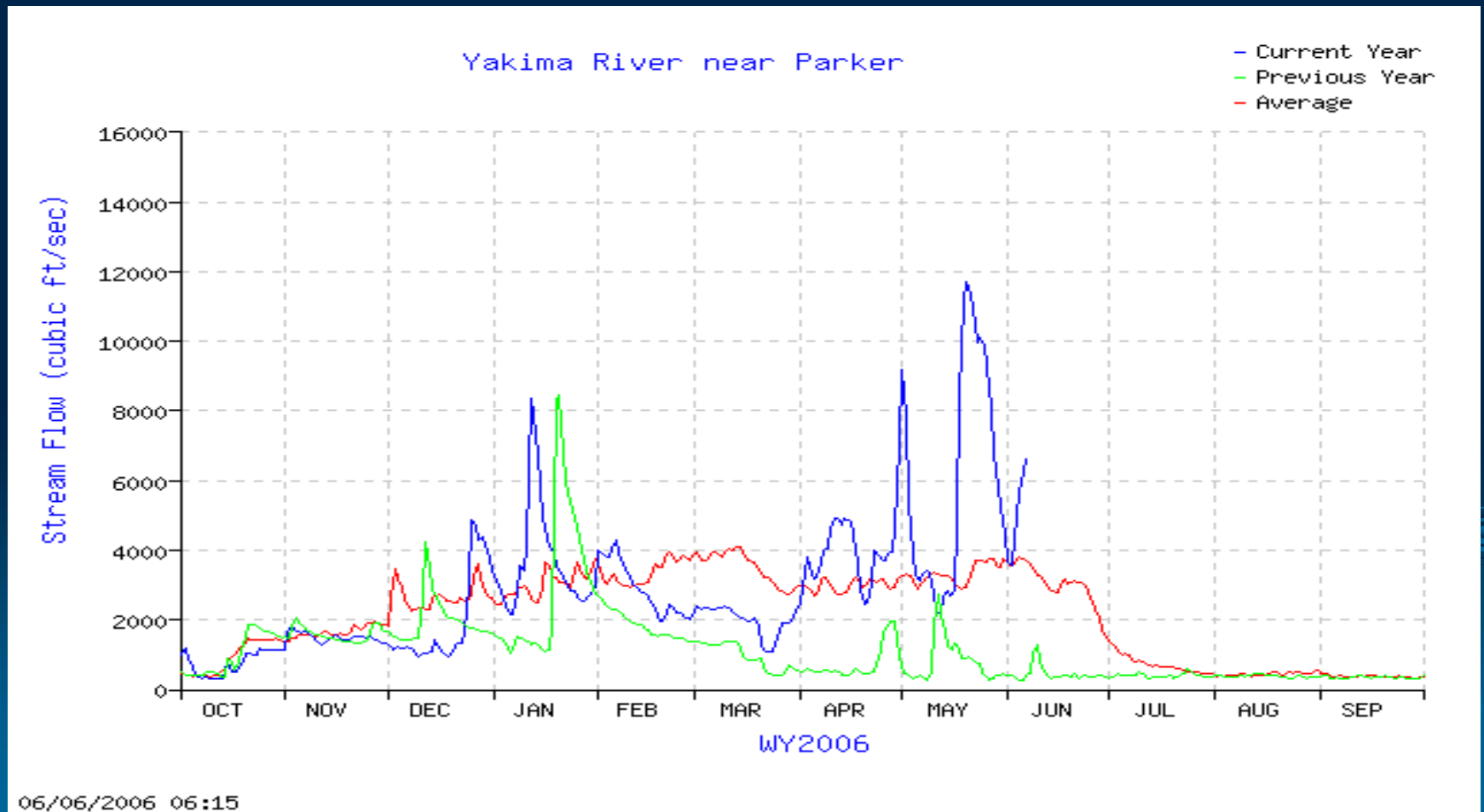
- Conductivity
- **Turbidity** (often 22" or less during high water)
- **Flow ****
- Weather
- Temperature
- **Need to protect** adult Spring Chinook from electro fishing damage (= loss of NPM due to premature recovery from stun affect)

Estimated Adult Passage 06

Prosser 2006 Daily Passage

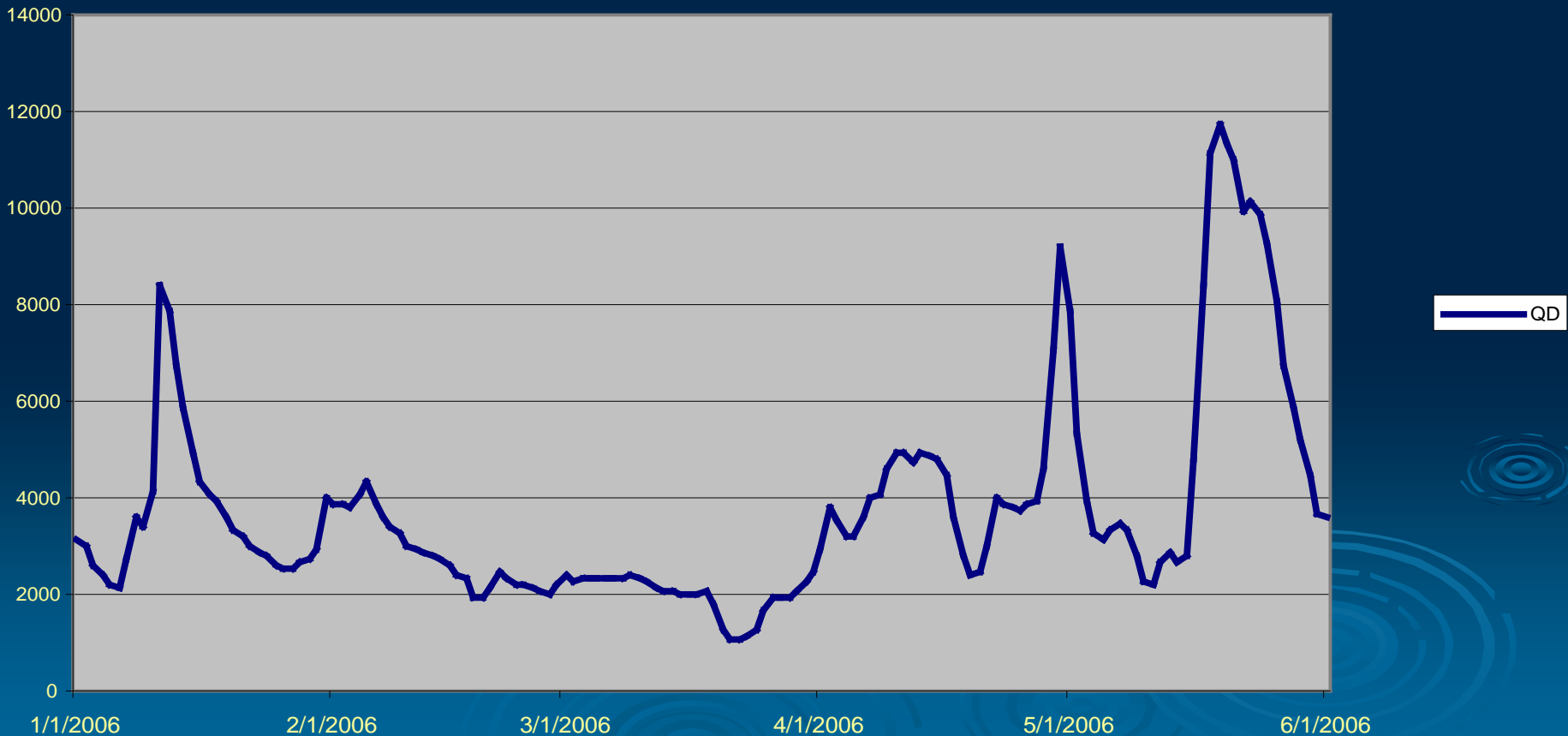


Comparison of current water year with previous and average water years at Parker.



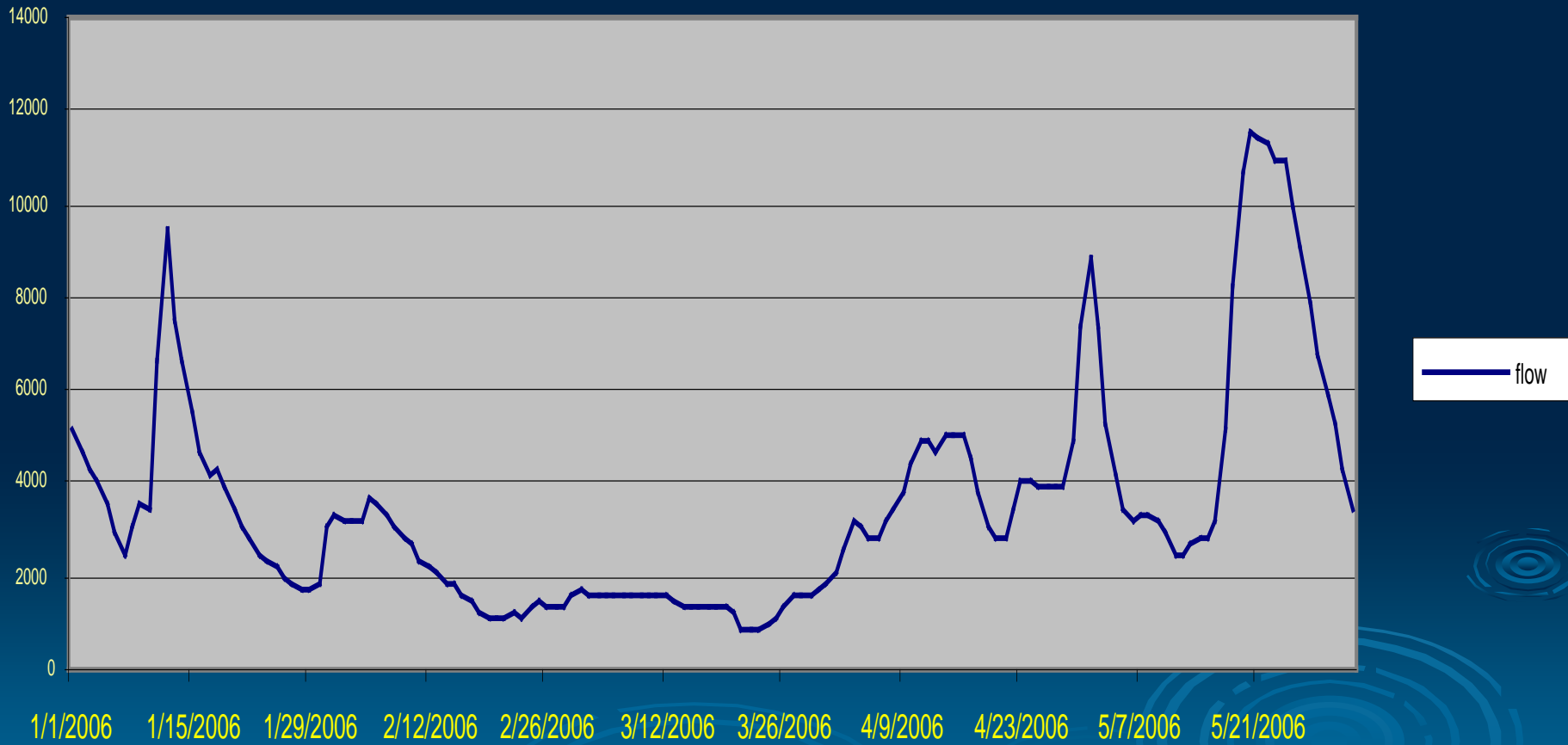
River Flow at Parker dam (Sunnyside dam)

Parker Flows 2006



River Flow near Prosser

Prosser Flows 2006



Consumption data

- After mark/recapture trials are over, we shock up fish and every 5th fish is sacrificed so that stomach contents may be taken and examined for fish and insect proportions.
- Preliminary in field “estimates” are made by eye, to determine the ratio of fish to invertebrate in the stomach.
- Further examination by microscope will be conducted at the lab to retrieve more accurate determination of species in gut.

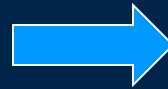
Removal of stomach for analysis



Removal and storage of stomach contents.

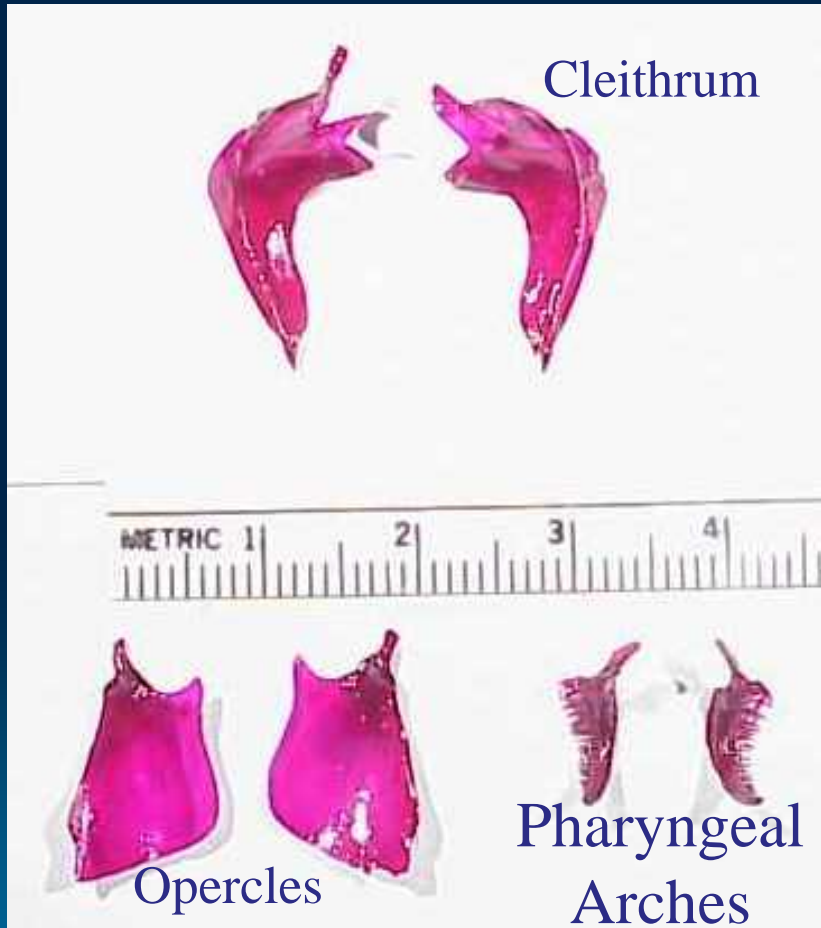


Analysis of contents via stained hard structures

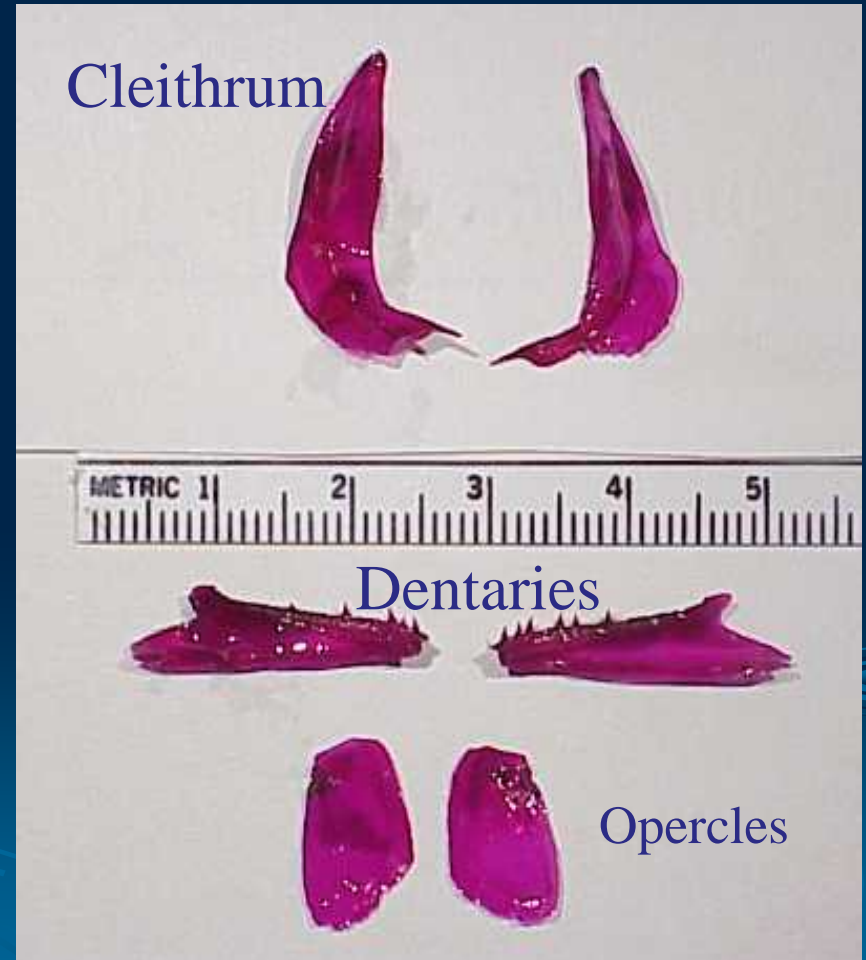


Identification to species

Largescale Sucker



Chinook Salmon

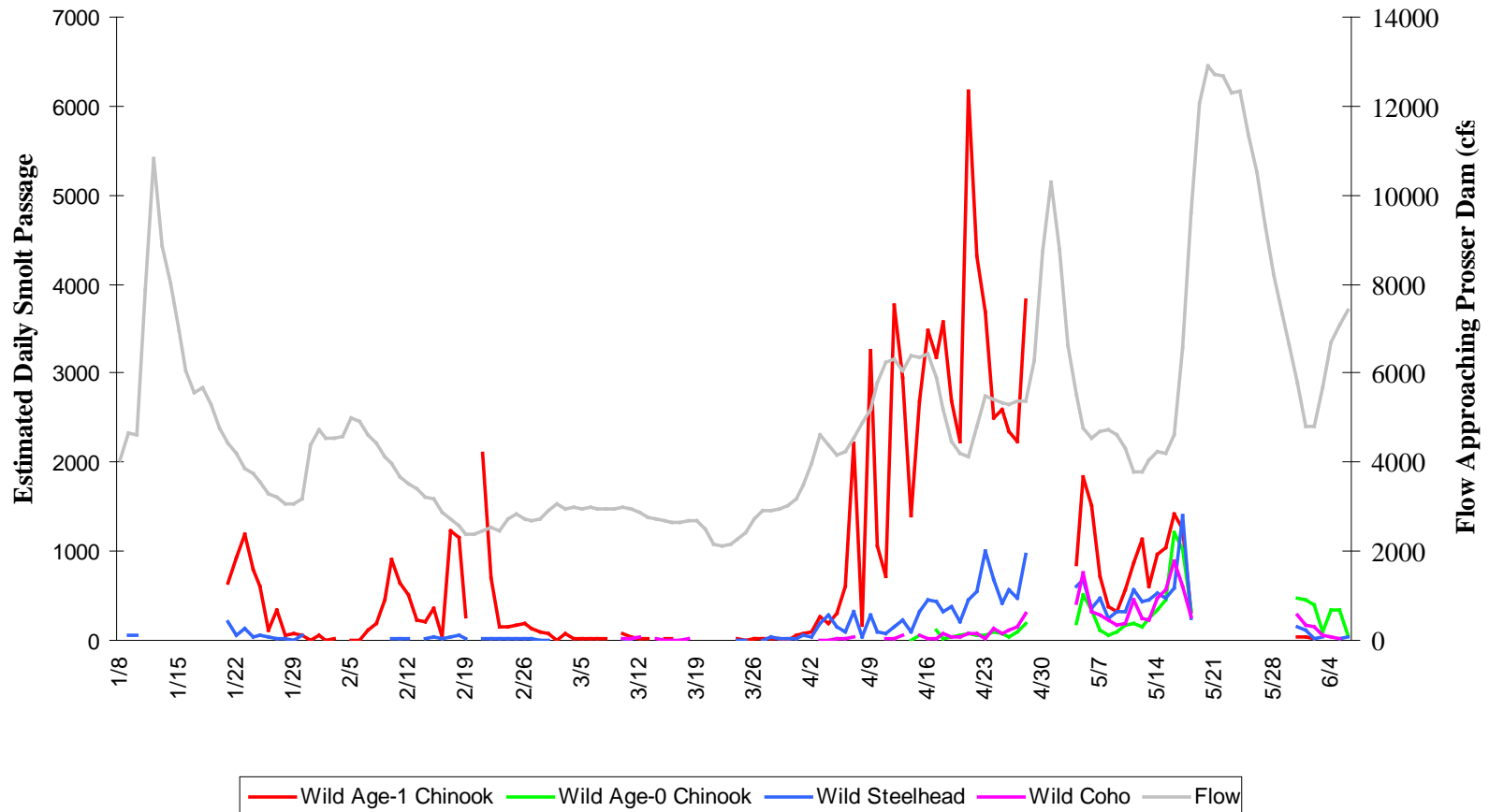


2004 Stomach Contents

Location	Invertebrate contents	Fish contents	Total # fish caught	Total # fish of stomachs
Gap to gap (sites 1-4)	2	0	10	2
Toppenish (sites 5-8)	1	0	10	1
Granger (sites 9-13)	6	2	36	8
Totals	9	2	56	11

2006 Juvenile Passage Data

**Wild Chinook, Steelhead and Coho Smolts
Chandler Juvenile Facility, 2006 (provisional)**



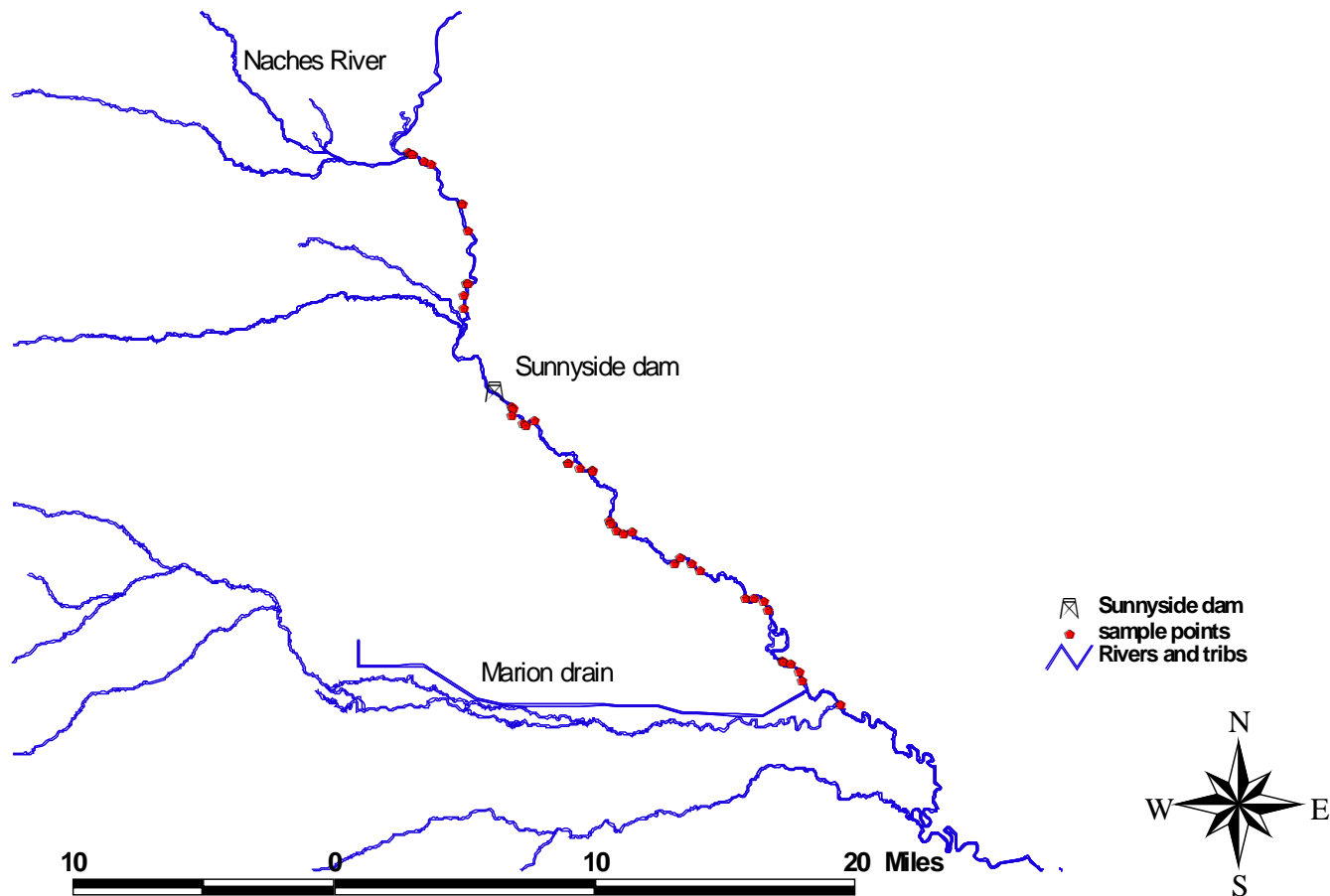
Tracking Movement

- Last year we deployed 20 tags on larger fish so that we would be able to track this species without using intrusive methods like electro shocking.

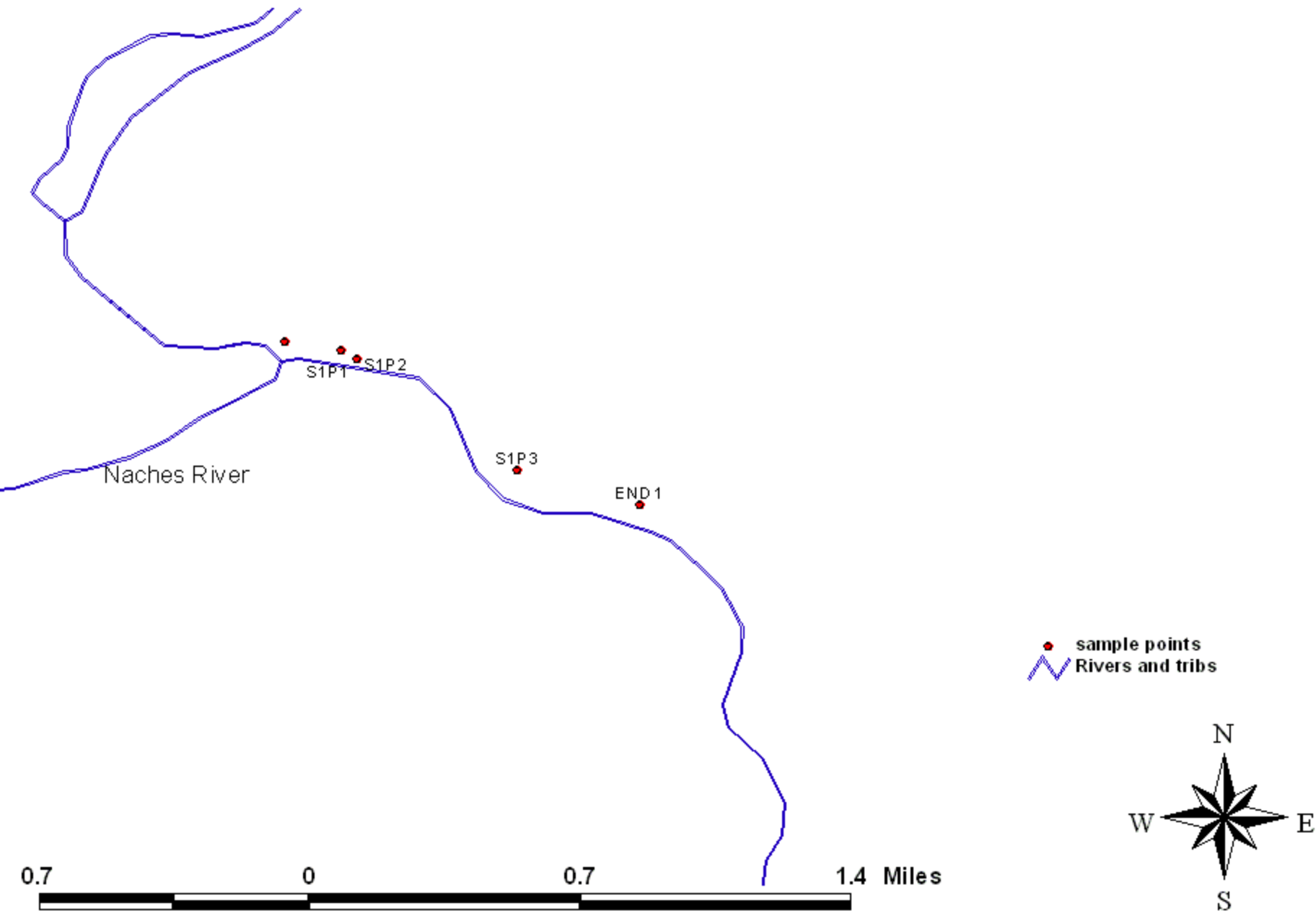


Reference Pools for Movement

Sample points in reference to Sunnyside dam



Close up of a sample section



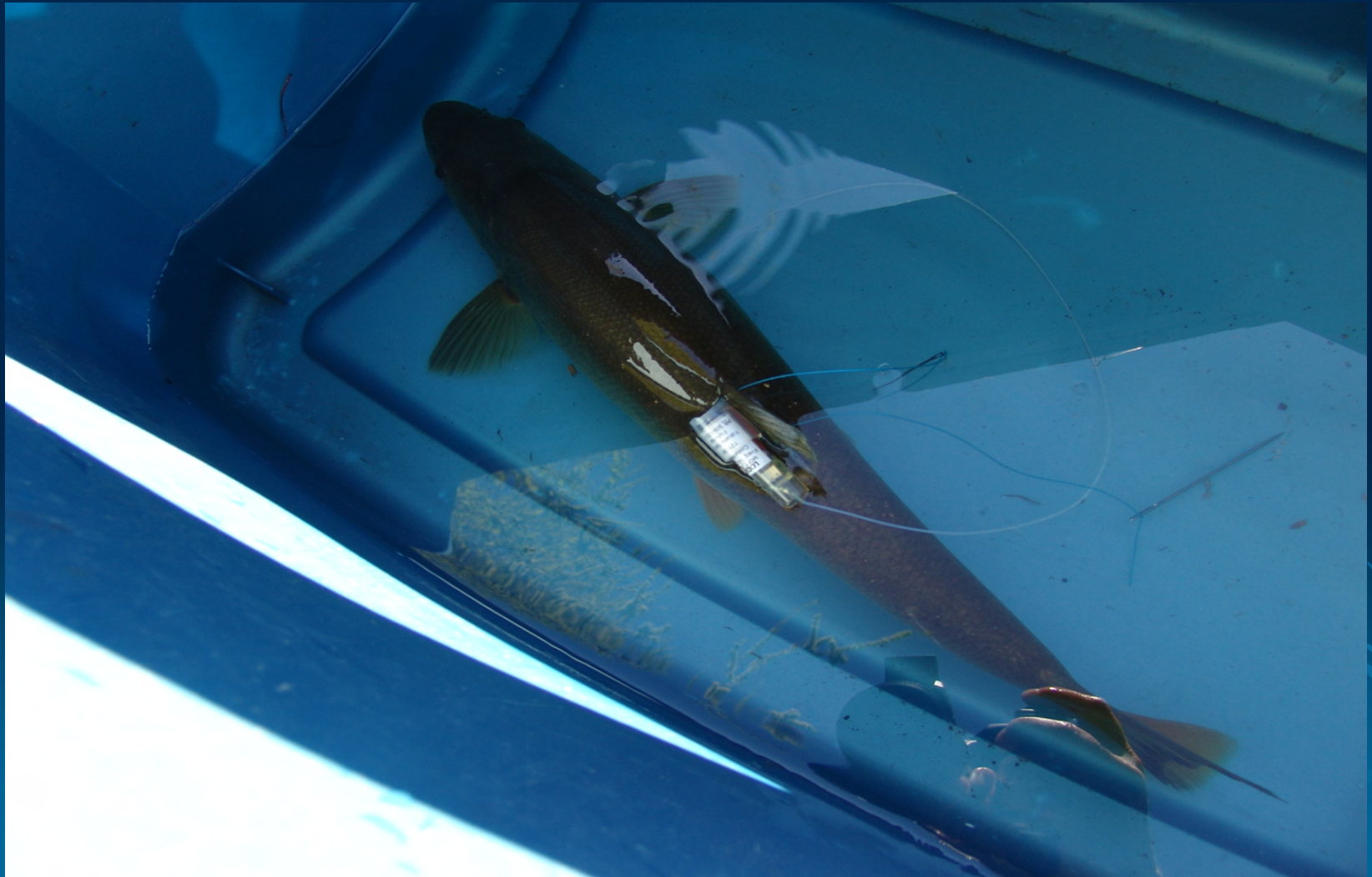
Tag methodology: External attachment of tag on left side of dorsal fin



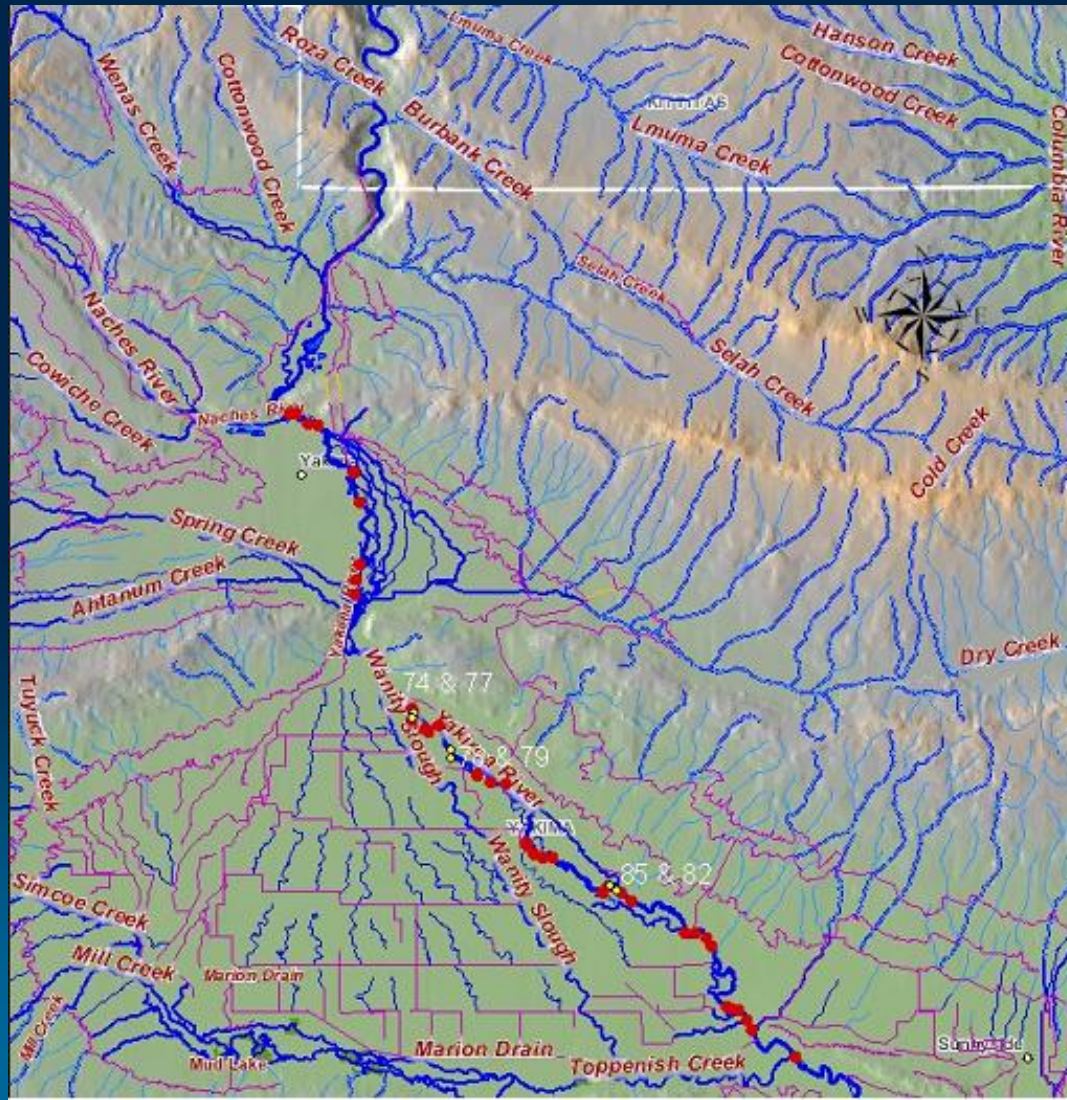
Tag is anchored on right side of fish
with a plastic saddle



The end result- tag lies on the side of the dorsal resulting in minimal damage to the fish

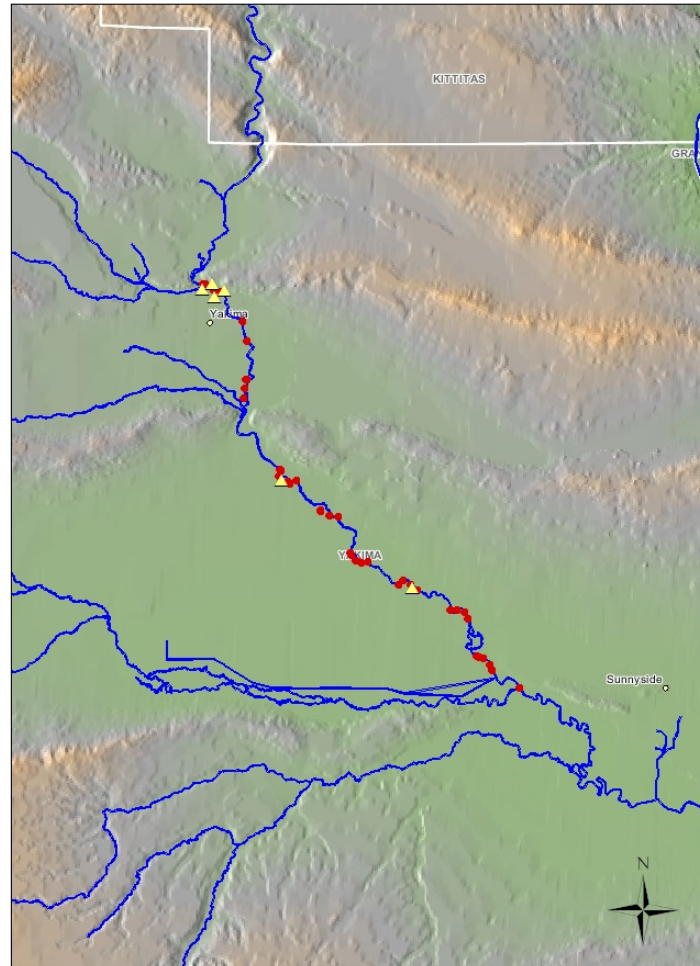


Boat tracking of radio tags



Aerial track of tags

june29, 2005 flight track



Locations of tagged fish

- For both the aerial and on the ground track sessions, the results yielded consistently showed the same thing, site tenacity. The main factor that will move fish is water fluctuation. High or low water changes the velocity gradients in origin pools causing location shift. The shift is usually only a few hundred meters.

Conclusions

- **Consumption:** still pending, but salmon smolts have been found in larger NPM.
- **Population est:** Present estimates of this lead us to believe that around 12197 Northern Pike Minnow can be found within the area from the Naches confluence to the City of Granger (approx- 39 river miles). Upper and lower 95% CI are 27106 and 7430, respectively.
- **Movement:** Radio tagging has allowed us to determine the general movement patterns via flight and boat tracking.
- Northern Pike Minnow seem to be site tenacious for the most part, but this is highly dependent on **water levels**.



Acknowledgements

- Many thanks to Predation crew: **Joe Jay Pinkham, Andrew Lewis, Quincy Wallahee** and **Denny Negel** for tireless determination and patience while in the field.
- Special thanks to **Gabriel Temple** (WDFW) for technical and statistical assistance.

Questions

