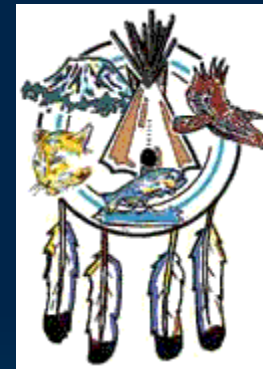


# Northern Pike Minnow Predation and Movement

Presented by  
Michael Berger, Joe Jay Pinkham  
Linda Lamebull

**Yakama Nation**



# Project Objectives

- The purpose of this project is:
- **1<sup>st</sup>**- to estimate the number of salmon smolts being consumed by Northern Pike Minnows within the Lower Yakima River
- **2<sup>nd</sup>**- to develop an Index of Catch Per Unit Effort for relative abundance measures.
- **Lastly**, to track movement of NPM that have been pit/radio tagged in our sections

# Consumption data

- During tagging, every 5<sup>th</sup> 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.

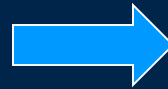
# Removal of stomach for analysis



# Removal and storage of stomach contents.

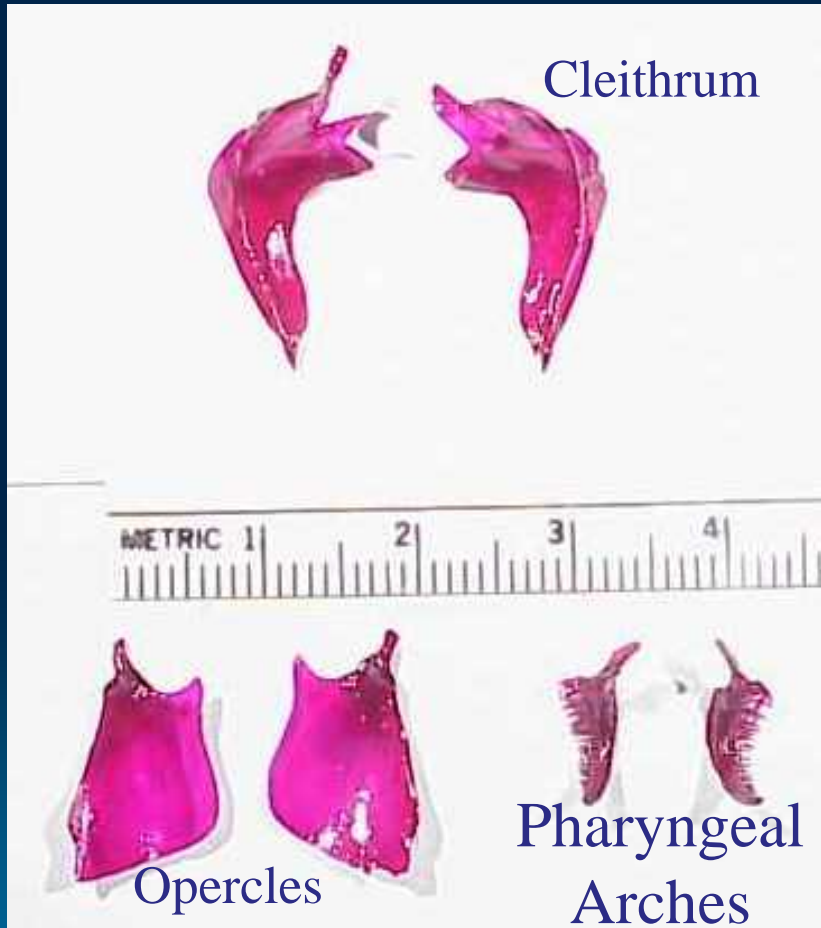


# Analysis of contents via stained hard structures

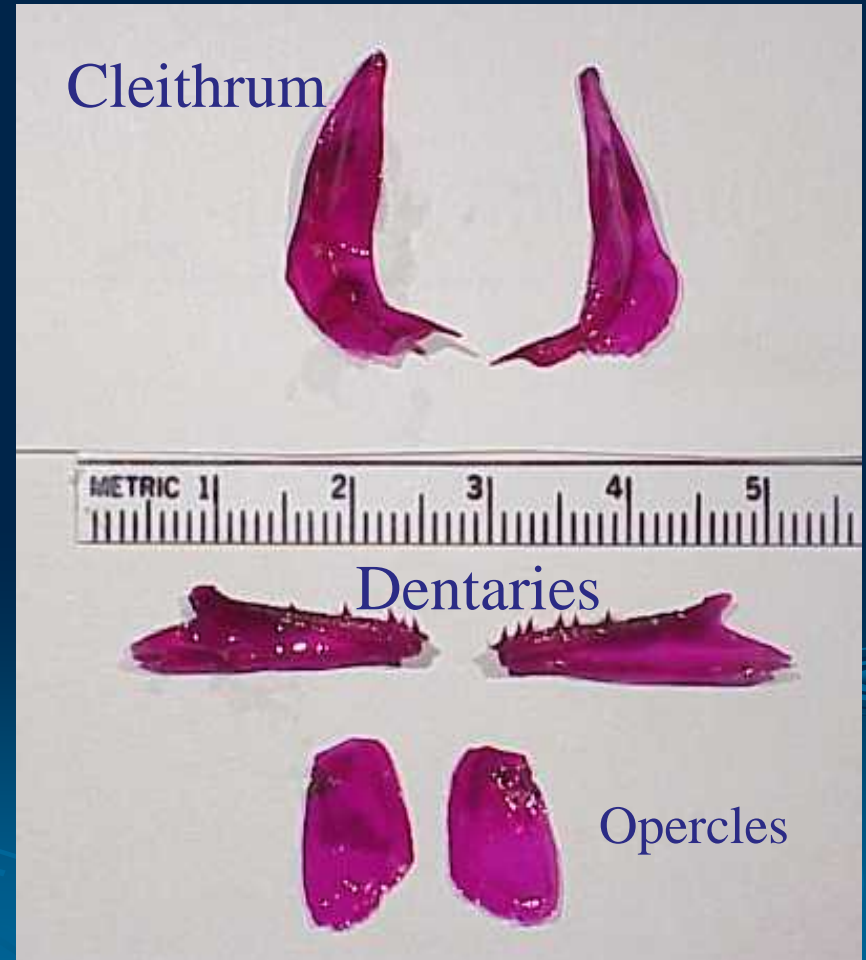


# Identification to species

## Largescale Sucker



## Chinook Salmon



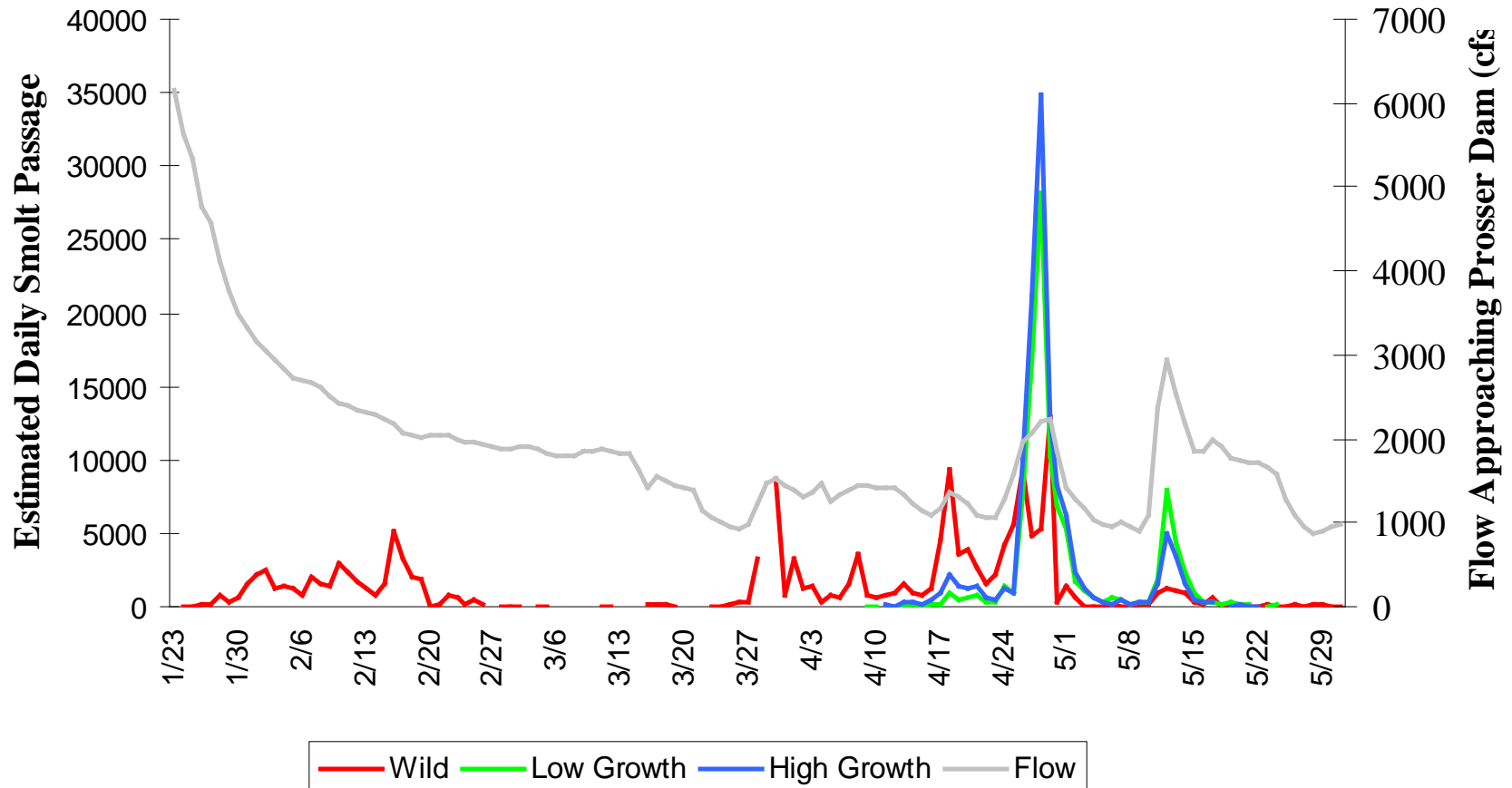
# 2004 Stomach Contents

Location	Salmon	Steelhead	Total # fish caught	Total # fish of stomachs
Gap to gap (sites 1-3)	4	1	91	14
Toppenish (sites 4-6)	5	3	281	50
Granger (sites 7-9)	1	1	163	29
<b>Totals</b>	<b>10</b>	<b>5</b>	<b>535</b>	<b>93</b>



# 2005 Juvenile Passage Data

**Wild and Hatchery Spring Chinook Smolts  
Chandler Juvenile Facility, 2005 (provisional)**



# Catch Per Unit Effort: Developing an Index of Relative Abundance

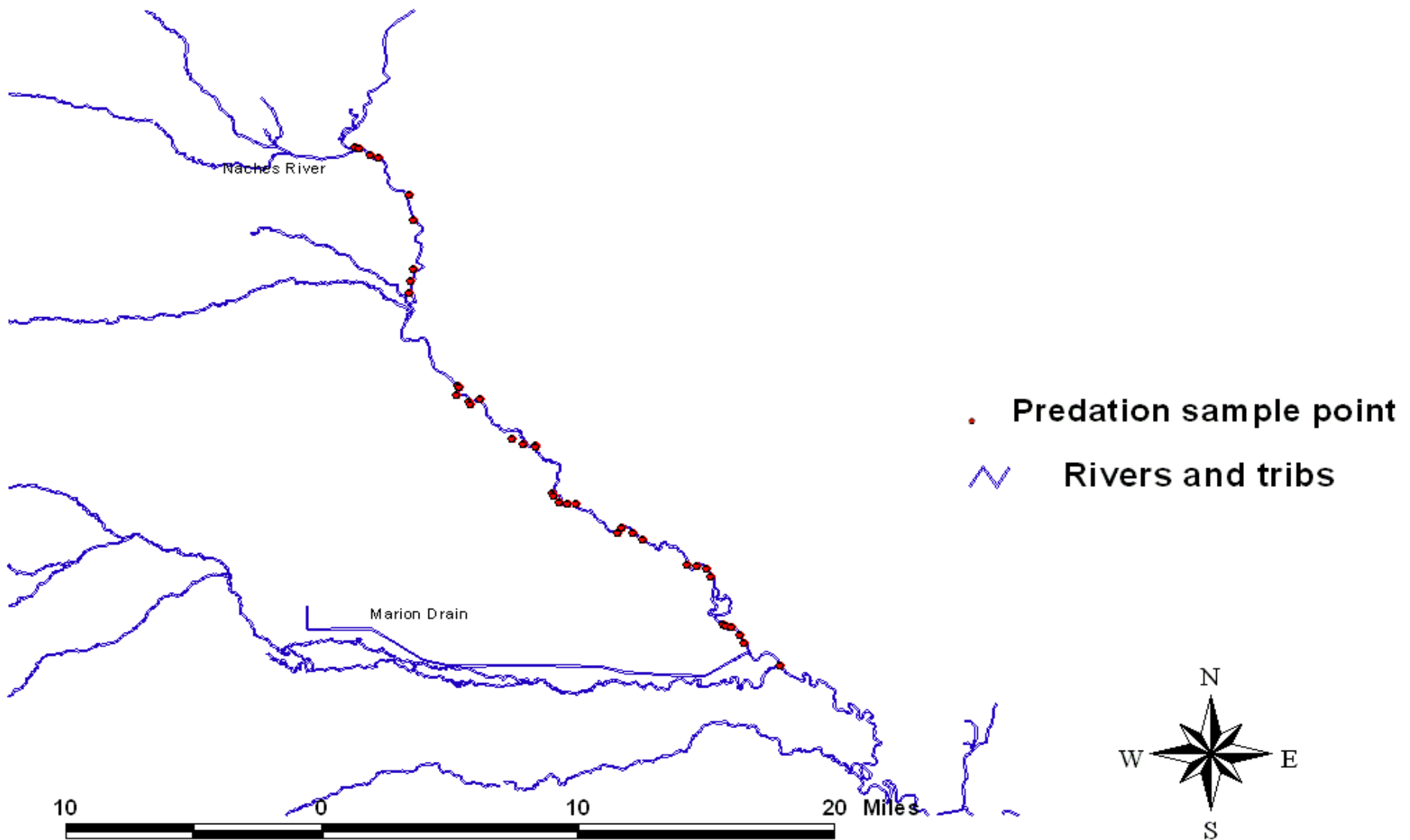
**CPUE** = # fish caught/duration of  
effort (minutes shocking)



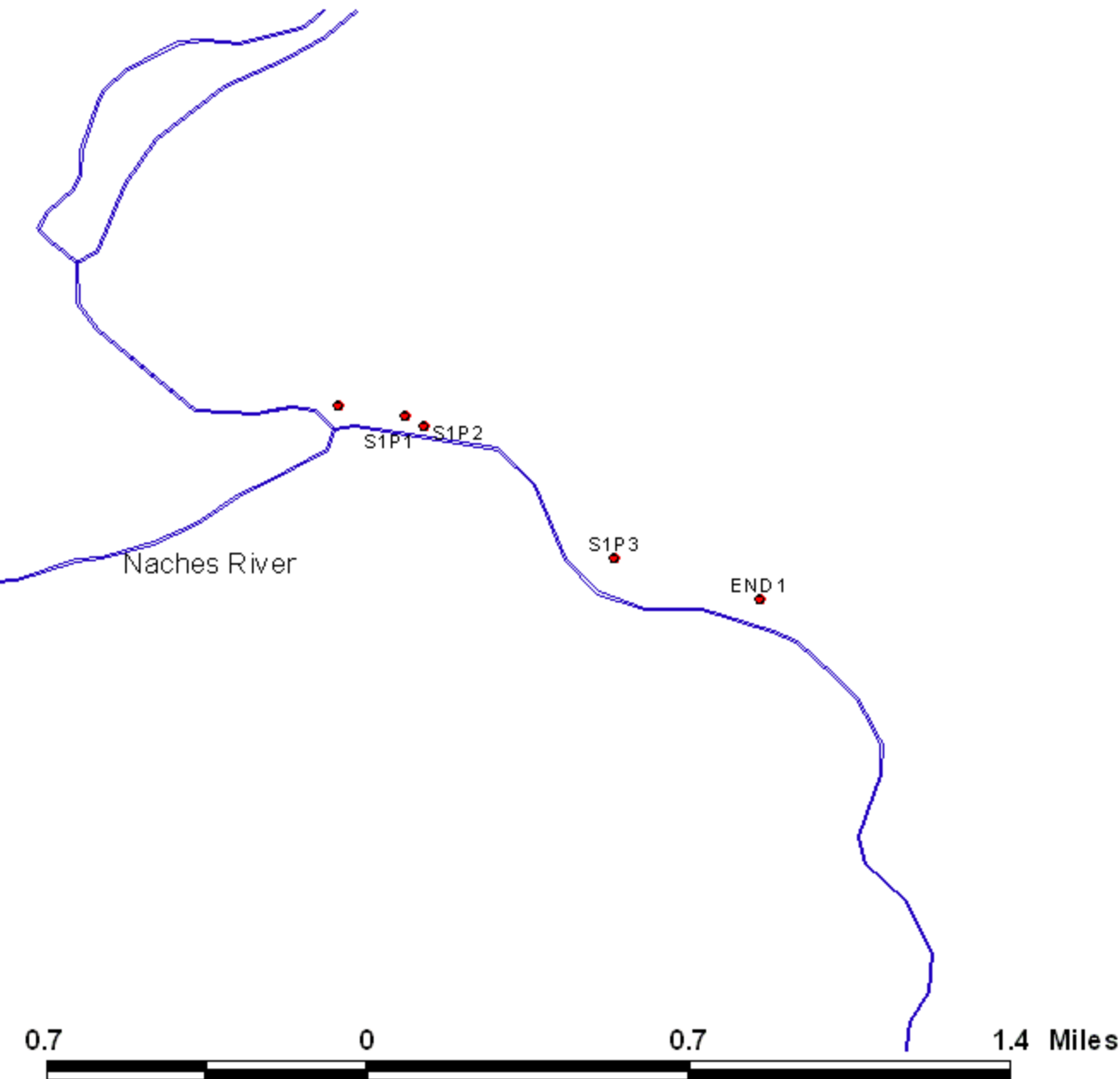
# Why use an index?

- Usually considered a “short cut”
- Less expensive
- Less time consuming
- Other methods such as “Peterson mark-recapture fail to provide valid estimates

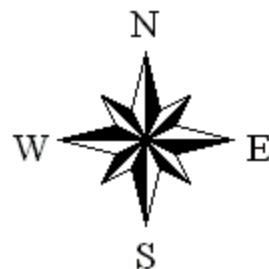
# Predation Sample locations



# Close up of a sample section



● sample points  
~ Rivers and tribs



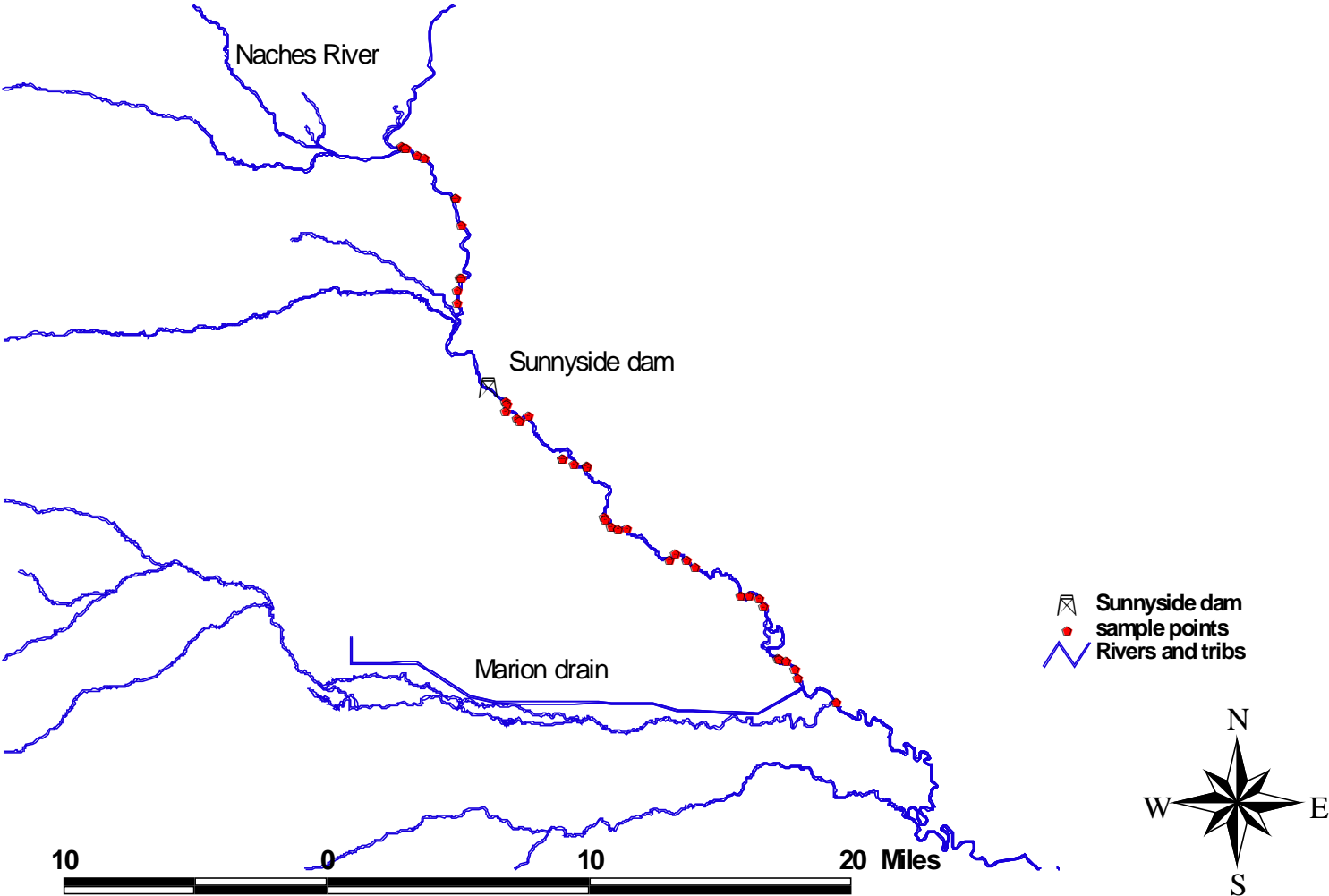
# What factors can effect CPUE?



# Environmental and Biological Factors include:

- Conductivity
- Turbidity
- **Flow \*\***
- Weather
- Temperature
- **Need to protect** adult Spring Chinook from electro fishing damage (= loss of NPM due to premature recovery from stun affect)

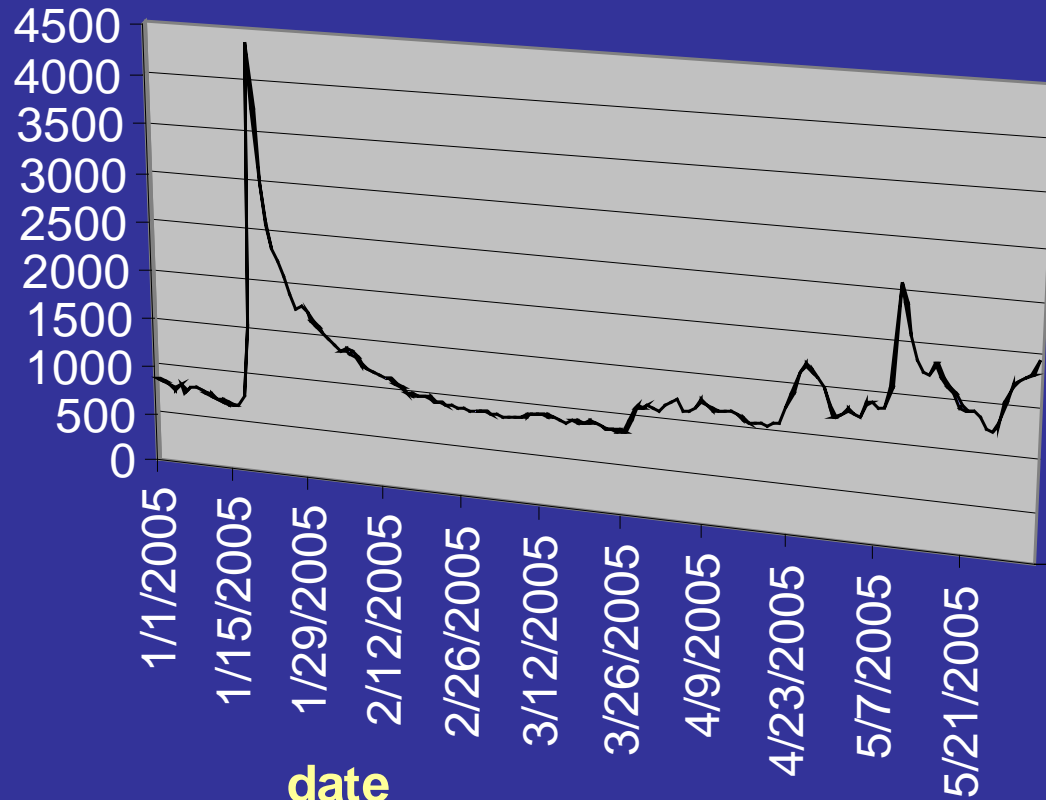
# Sample points in reference to Sunnyside dam





# River Flow Above Parker dam (Sunnyside dam), taken near Umtanum

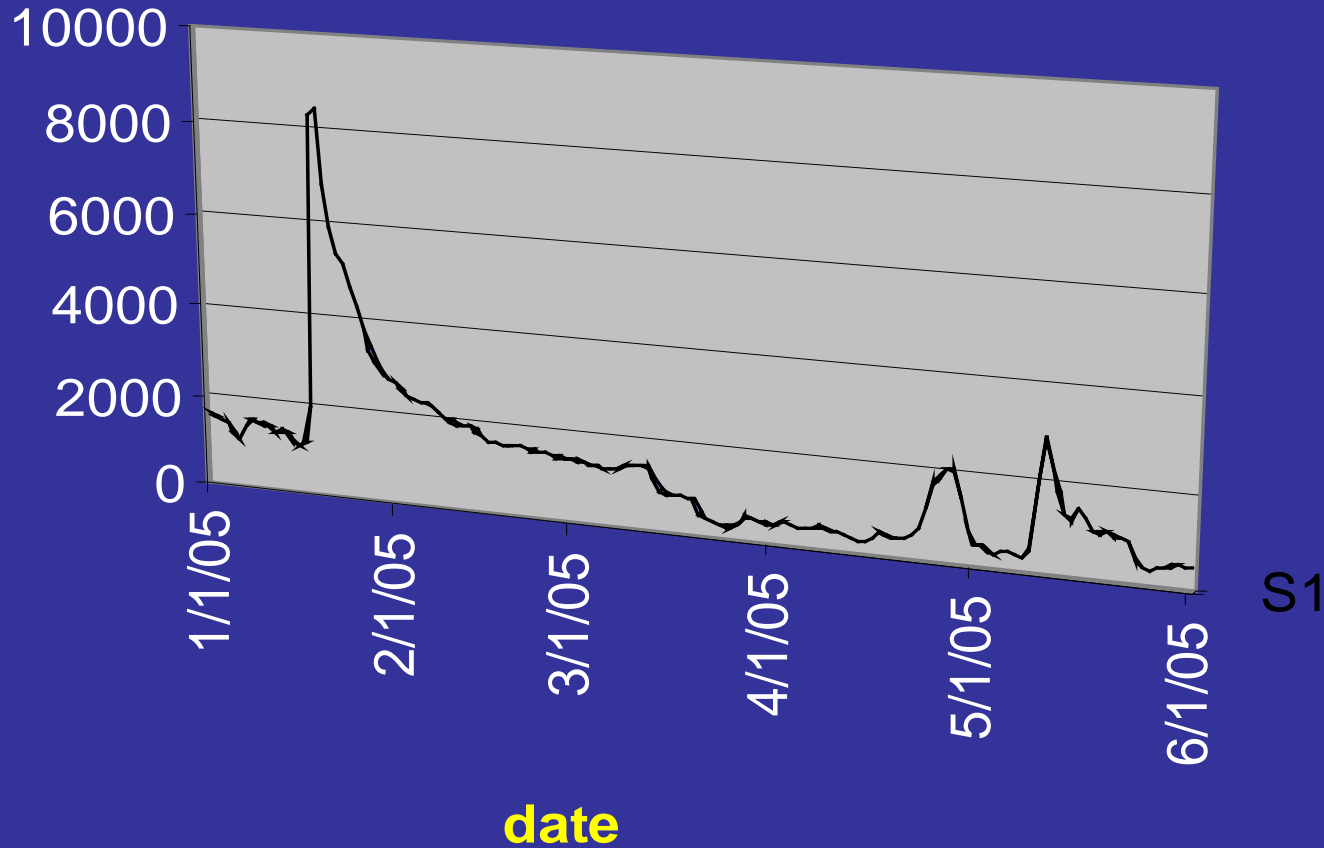
**Flow at Umtanum**



Q

# River Flow below Parker dam

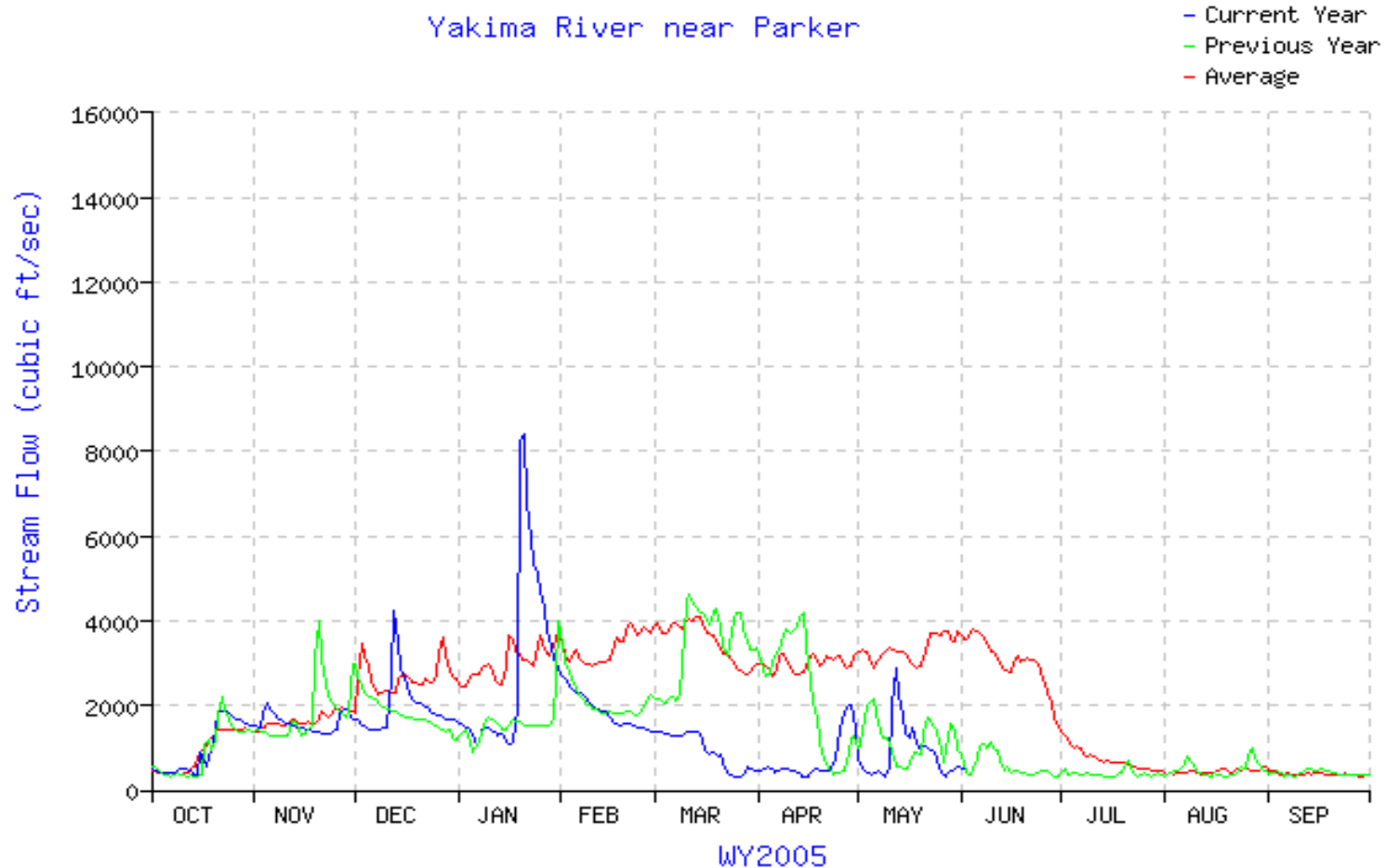
Flows below Parker



Q

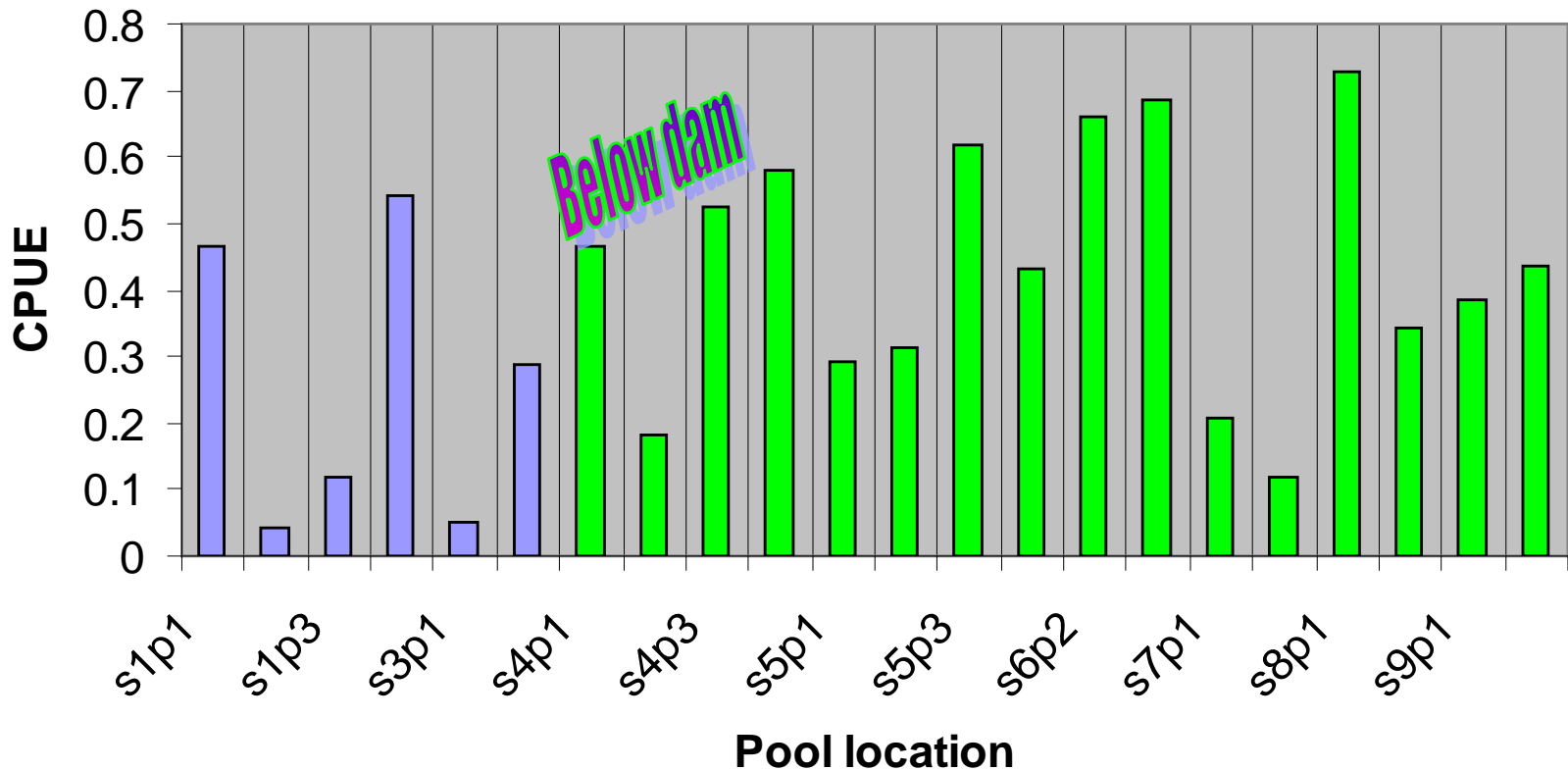
S1

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



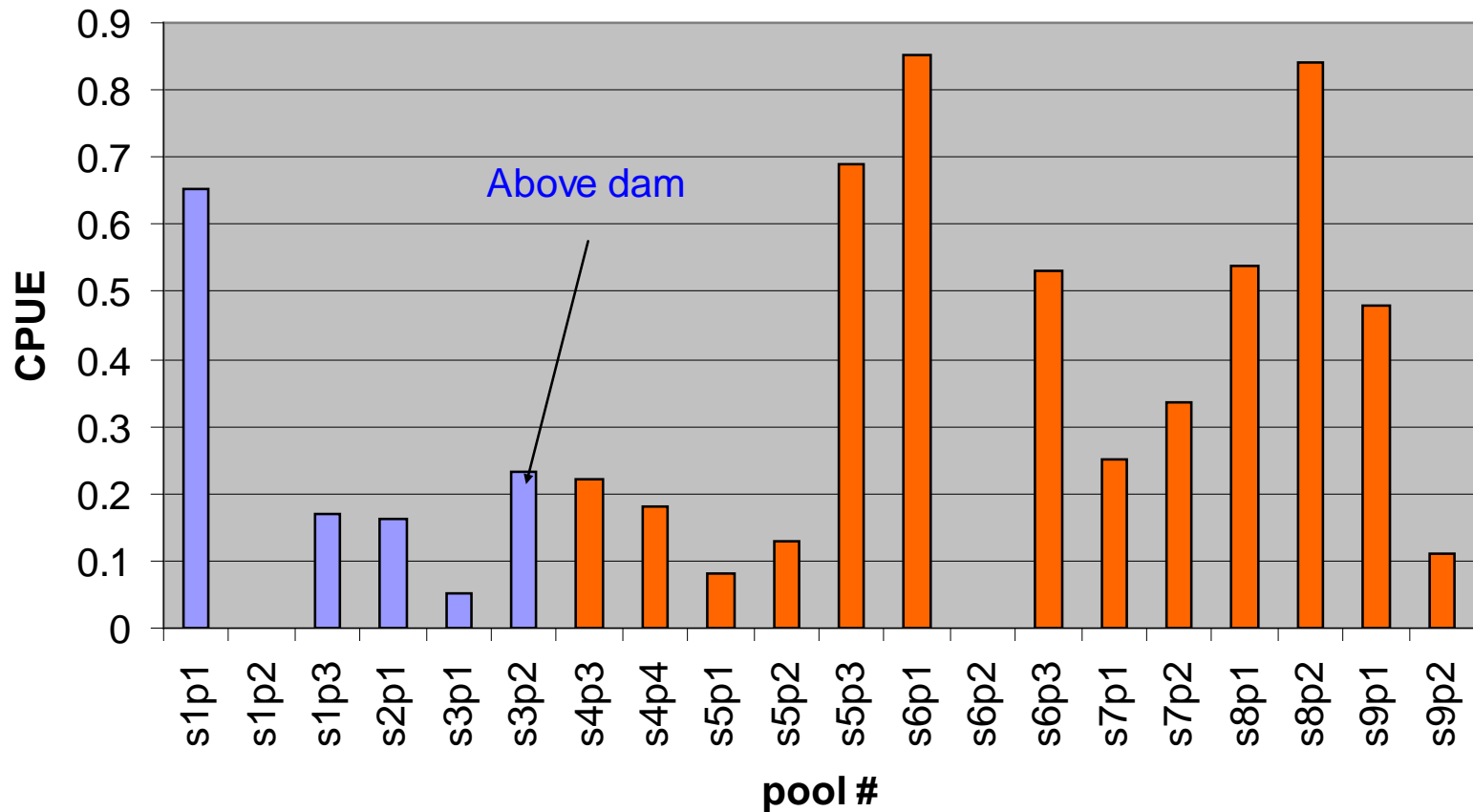
# CPUE Total for March 25<sup>th</sup> - May 24<sup>th</sup> 2004

Total CPUE per pool to date

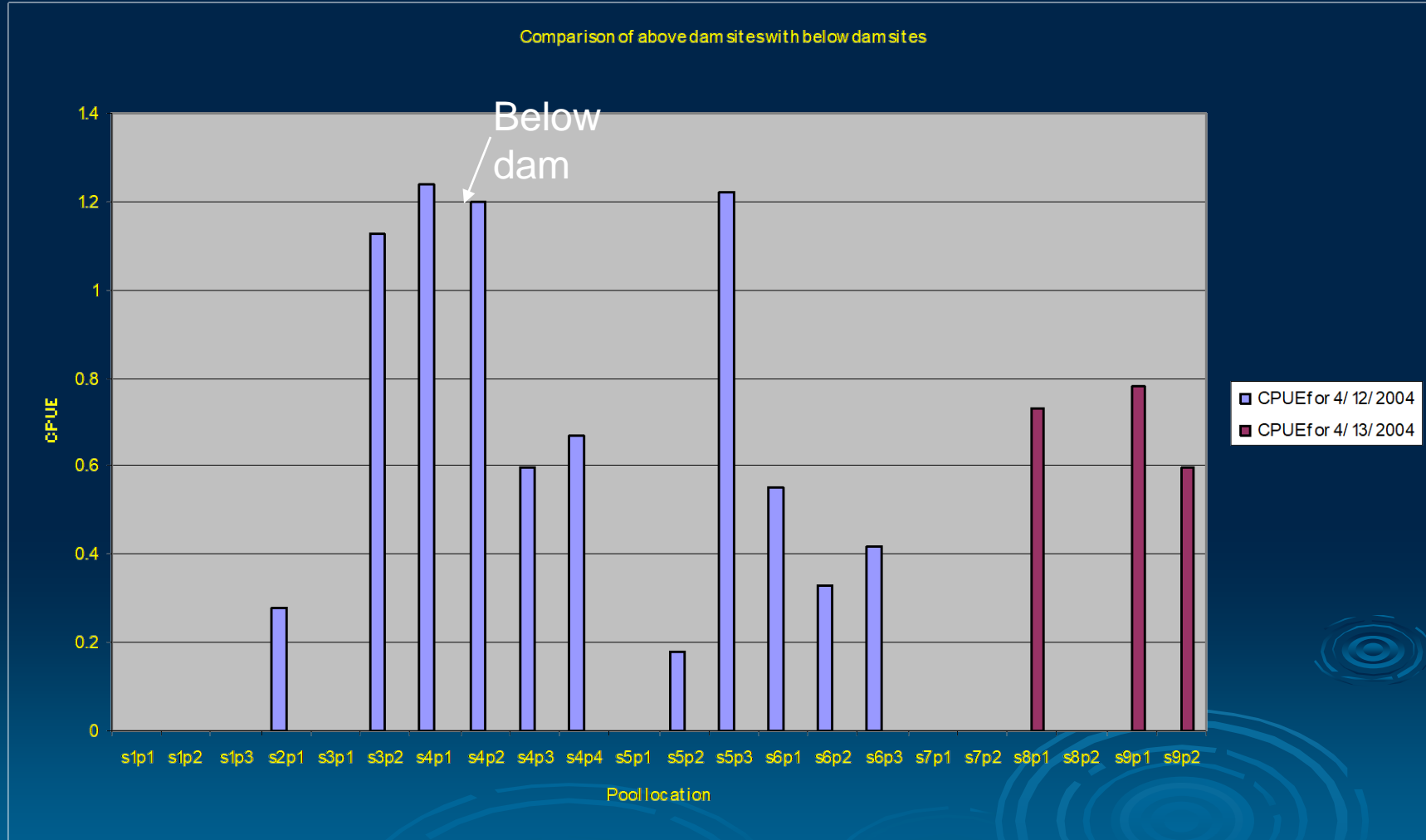


# Catch per Unit Effort for March – June 1, 2005

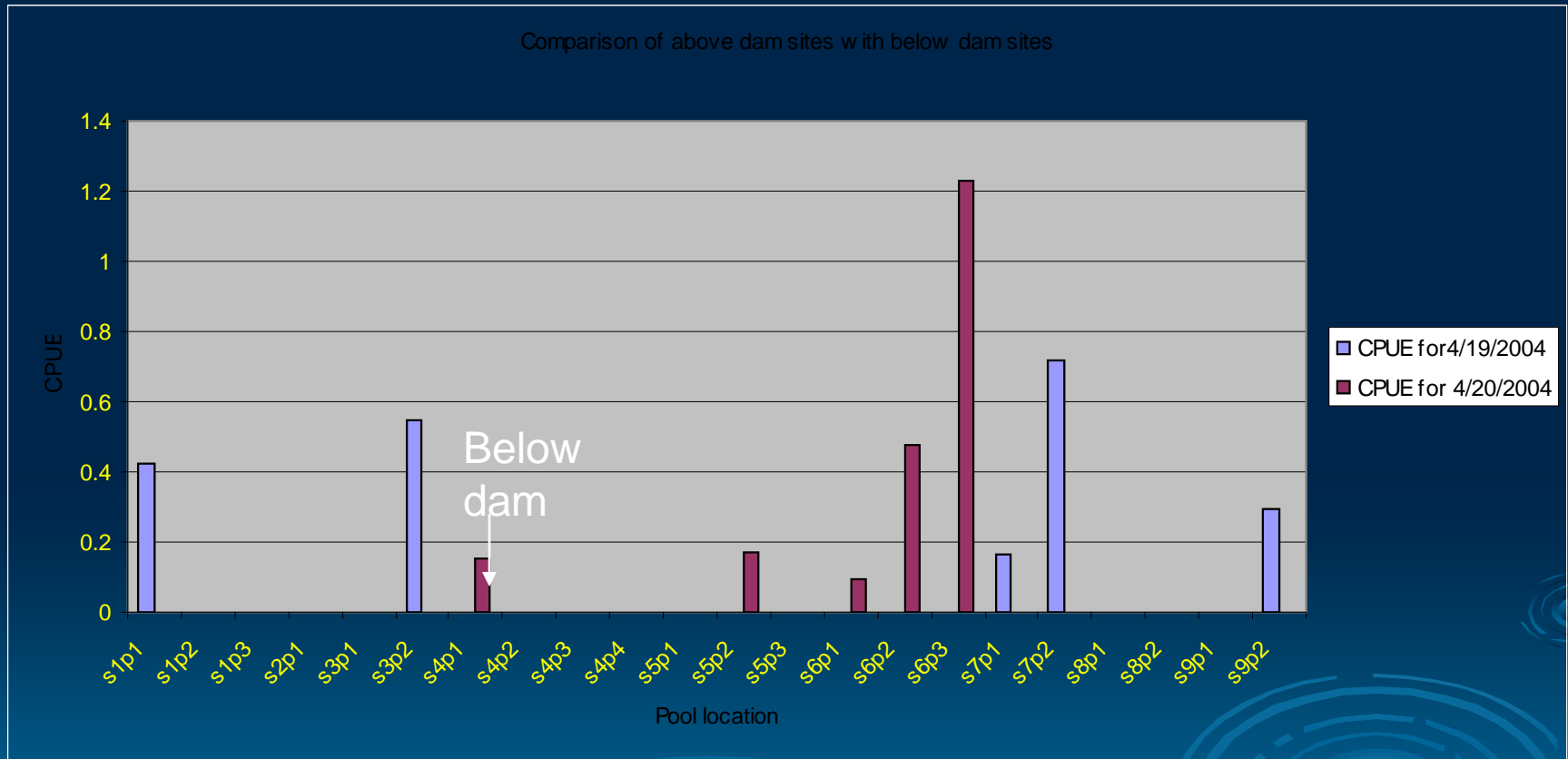
## CPUE ave March-June 1



# High water Period Below Dam 2004



# Low Water Period Below Dam due to water withdrawal 2004



# Tracking Movement

- Fish are collected and marked in pool habitats within 1-mile sections, separated by 2-mile buffers (total of 9 sections)
  - Entire reach from Naches River confluence to Toppenish Creek(33.3miles) is shocked to track movement between sections
  - Shocking schedule:
    - \*Once a Month in Spring
    - \*Once in Summer
    - \*Once in Fall
    - \*Once in winter
  - **This year starting April 1**, 20 radio tags were placed on fish caught throughout the various sample sections. The lifespan on these tags is 390 days at 4 second intervals, and should yield additional information we could not get with shocking of pit tagged fish.
- \*\* i.e.- tributary migrations



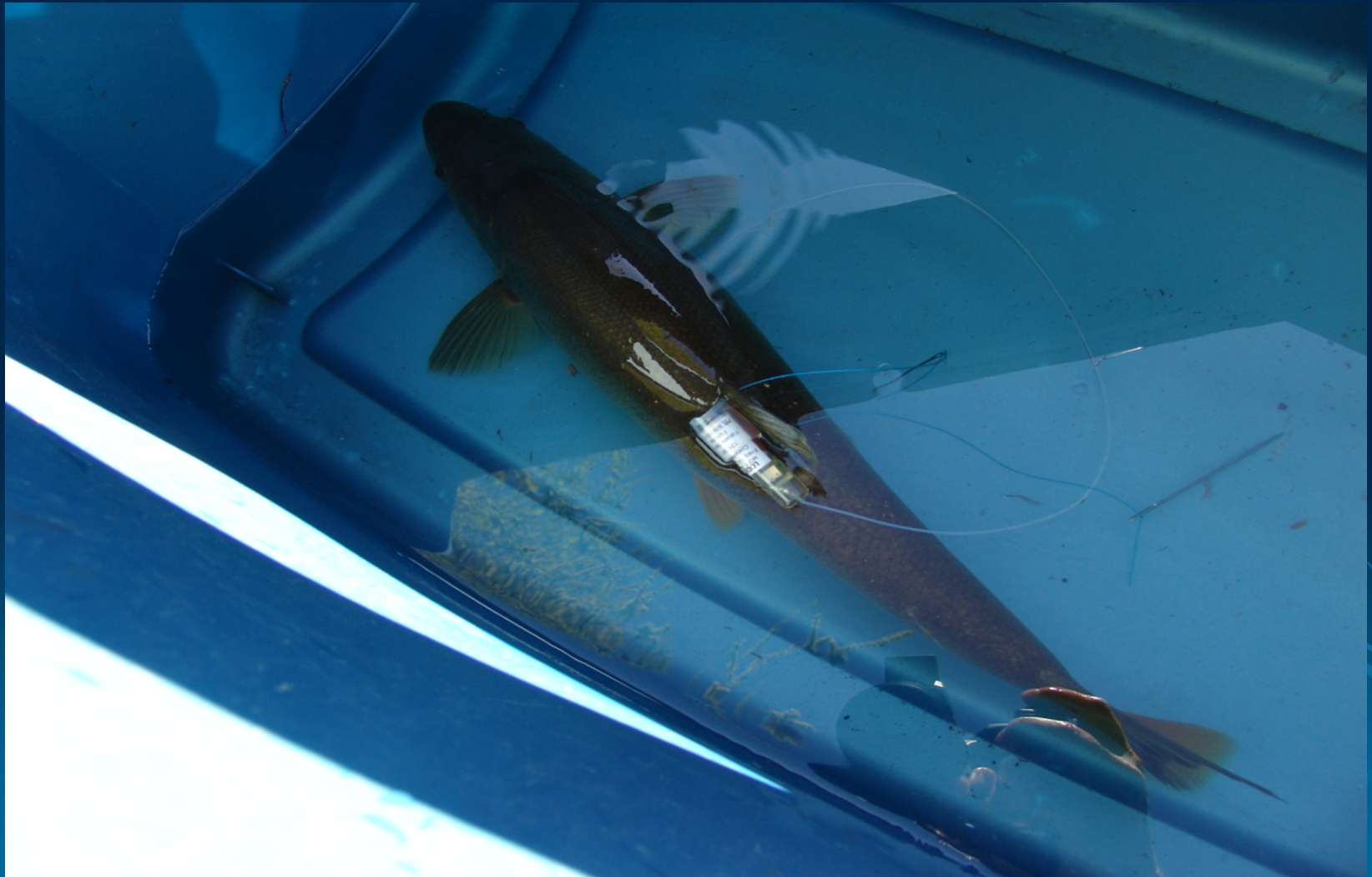
# Tag methodology: External attachment of tag on left side of dorsal fin



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

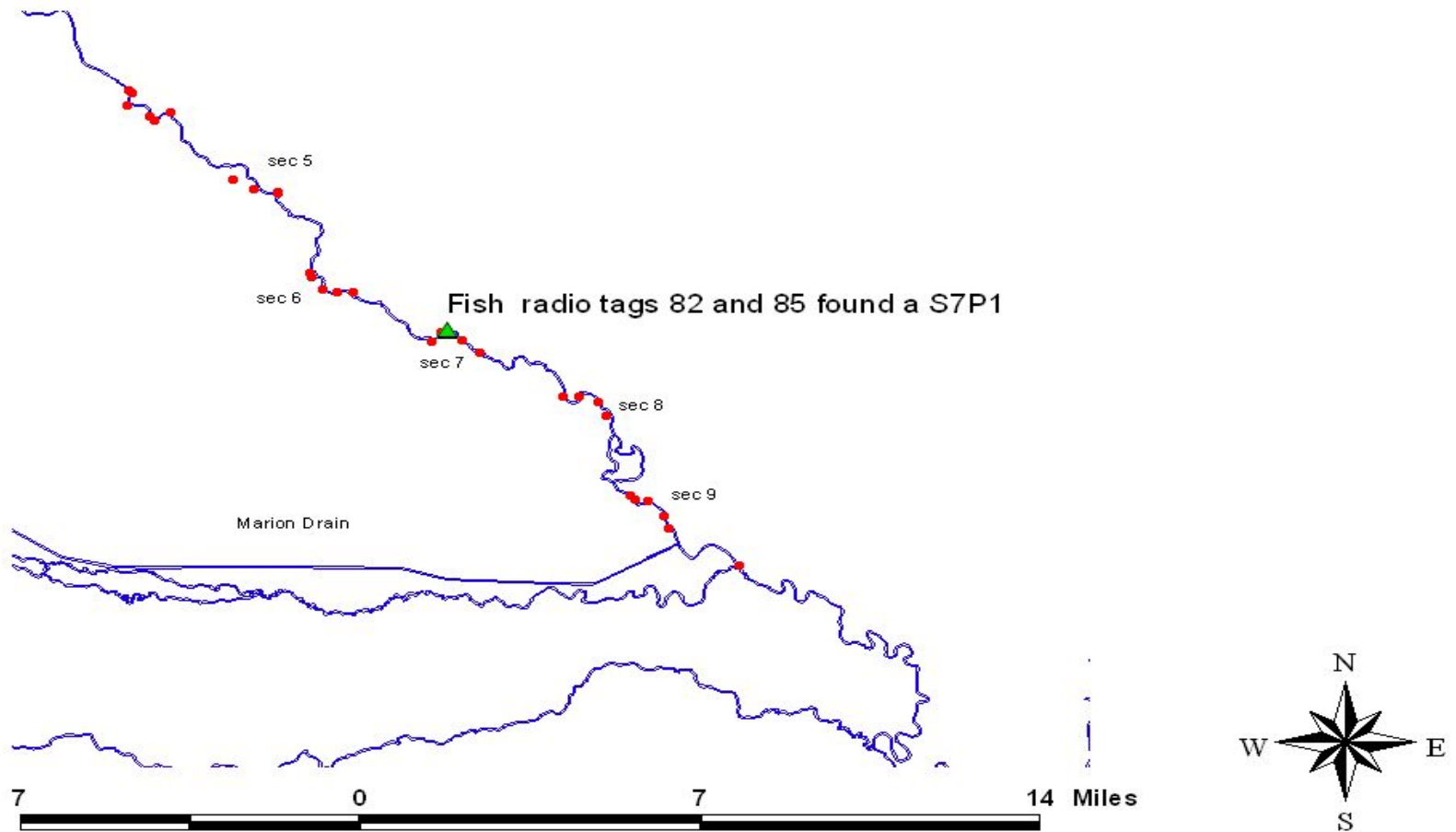


The end result- tag lies on the side of the dorsal resulting in minimal damage to the fish



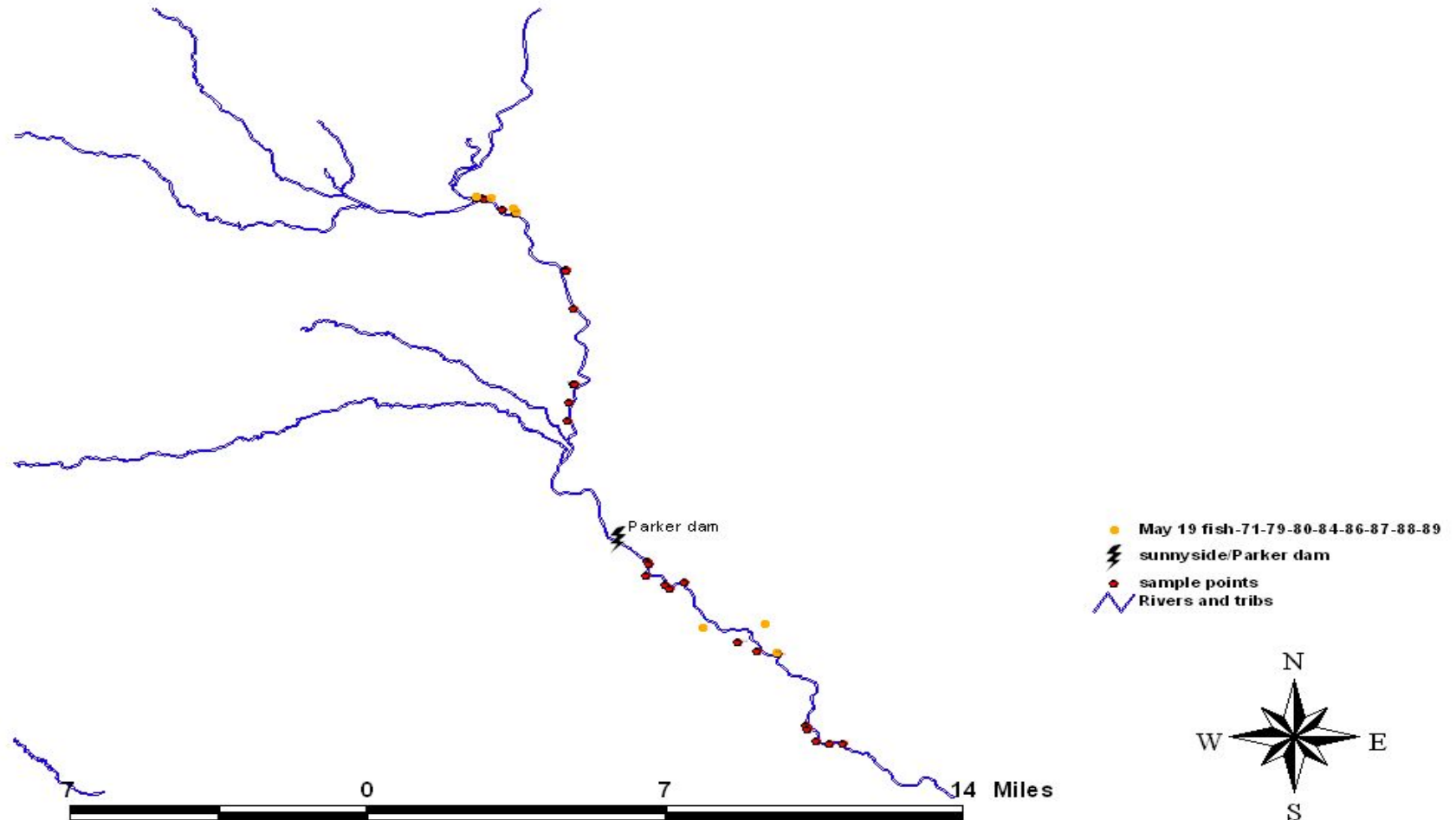
# Tracking of radio tags

## May 21 radio tagging



# Locations of tags 79-89

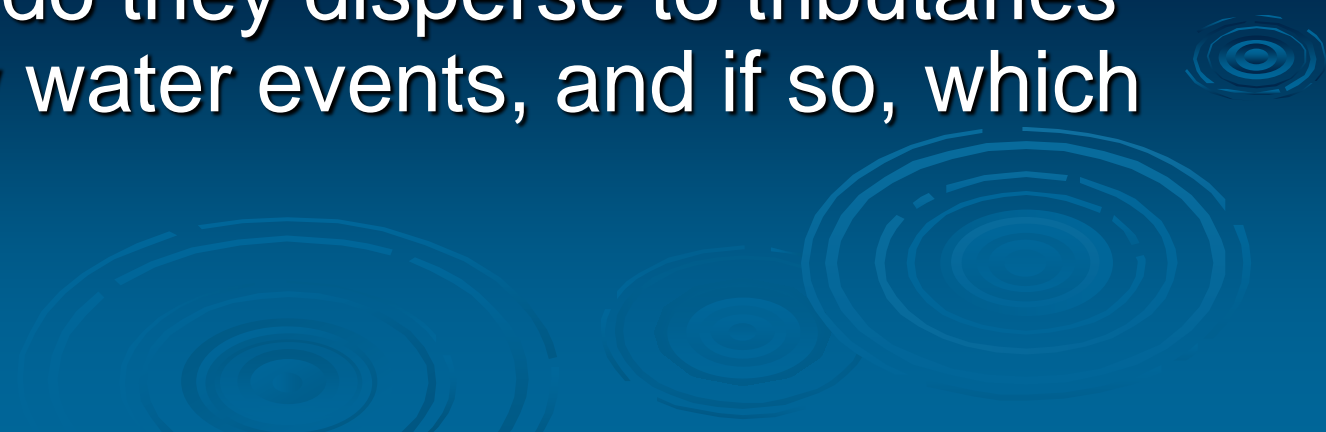
Location of tags 79,80,84,86,87,88,89



# Locations of tagged fish

- For the May 21 tracking, tags **82 & 85** were found in the same section and pool they were tagged in.
- Radio tags **79,80,84,86,87,88,89**: these tags were found very close to original pools where tagging occurred. In only 2 cases did fish move, **#79** moved 1383 meters upstream, and **#84** also moved about 1453 meters upstream.

# Movement: more questions created than answered....

- Fish often stay put, with a predisposition to stay in pools where they were tagged.
  - Anomaly seen: often, tags disappeared for periods of time from the main stem, only to suddenly reappear a few days later.
  - Question: do they disperse to tributaries during low water events, and if so, which ones?
- 
- The background of the slide features several concentric, light blue circular ripples that resemble water droplets or ripples on a pond, scattered across the lower half of the frame.

# Conclusions

- **Consumption:** still pending, but salmon smolts have been found in larger NPM.
- **CPUE:** Depends on several factors, but prey presence/absence and river flow (Q) seem to effect this index the most.
- **Movement:** Northern Pike Minnow seem to be site tenacious for the most part, but this is highly dependent on **water levels**. Radio tagging has revealed that many tags disappear when water levels drop, only to reappear suddenly with water increase. This may be an indication of tributary usage during lower flows. Aerial flights are planned to help reveal these movement patterns.





# Acknowledgements

- Many thanks to **Joe Jay Pinkham** and **Linda Lamebull** for tireless determination and patience while in the field.
- Special thanks to USACE **Bob Wertheinmer** for introduction to radio tag attachment methods and technical support.

# Questions

