

Northern Pike Minnow Predation 2007

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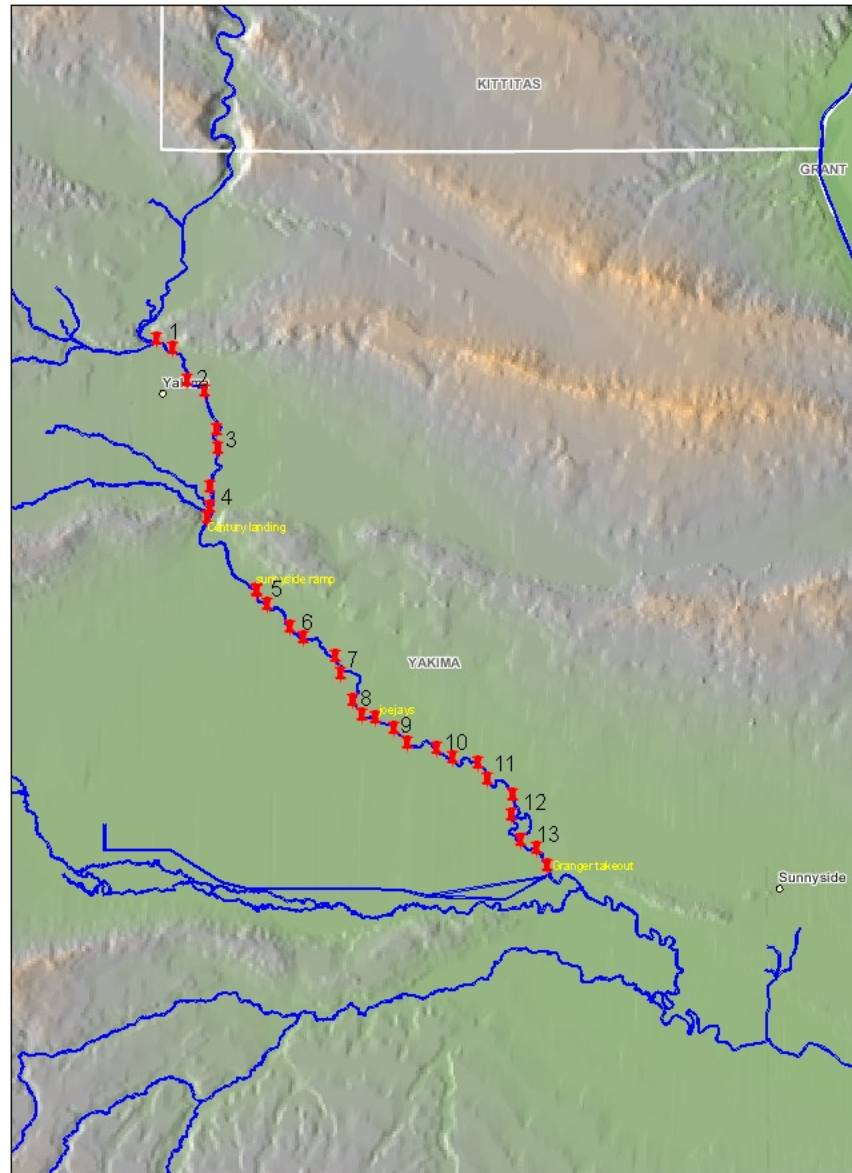
Yakama Nation



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.

Sample transects location 1-13



Population Estimate Methodology Change

- Both the entire right and left bank of each one mile transect is shocked. These one mile sections are separated by two mile non-sampled sections. Thanks to the higher water levels, this has been very successful, allowing us to get out **367** marks/**11** recaptures in 2006, **303** marks/**11** recaptures in 2007 and **228** marks/**5** recaptures in 2008.

Statistical Format Used

- One of the simplest ways to estimate population from our catch data was to use Schabel's adjusted formula (Ricker W.E. 1975) :

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

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

Fin Clip on Dorsal



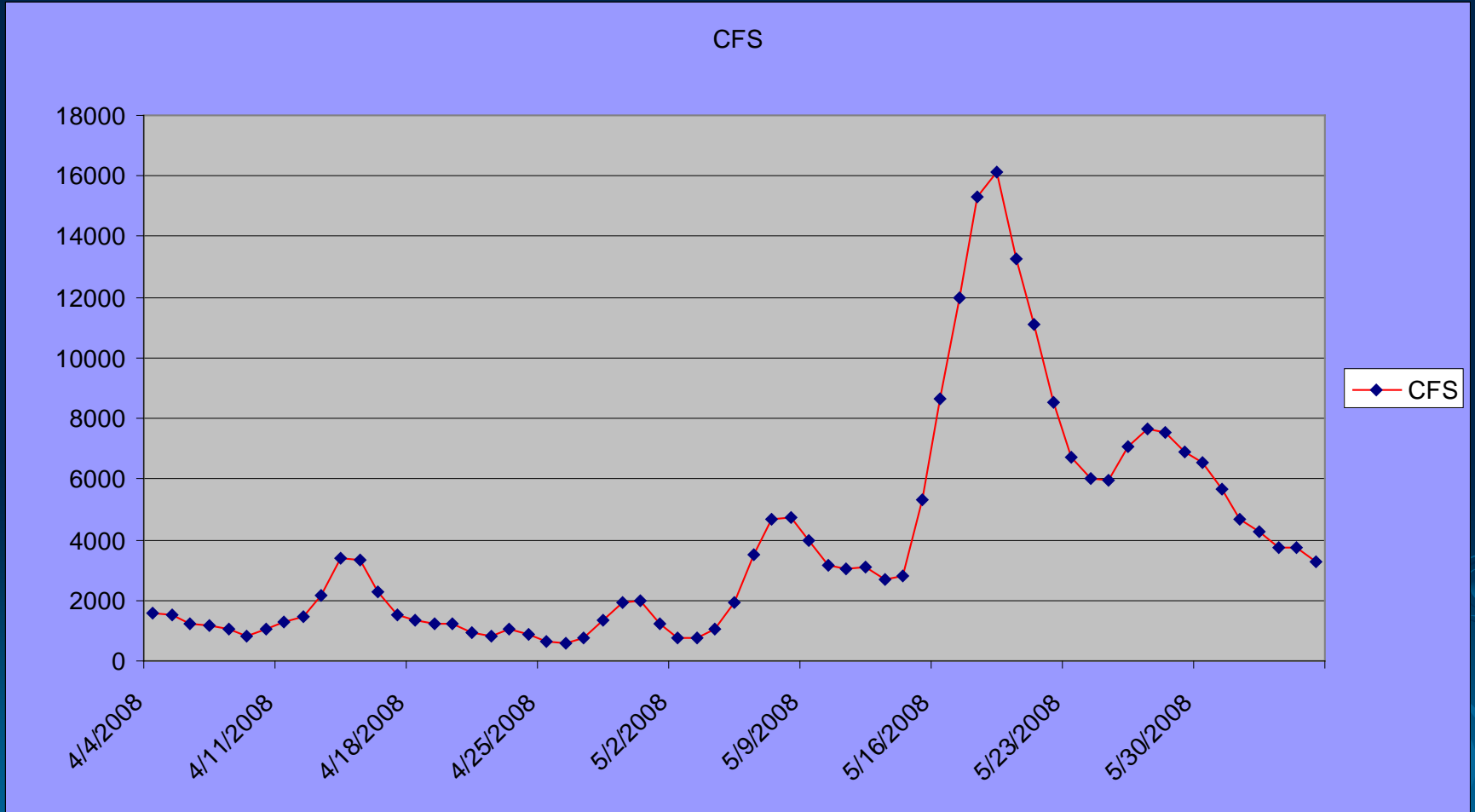
What factors can effect recapture and capture for population estimate?



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)

River Flow at Parker dam (Sunnyside dam)



Consumption data

- During mark/recapture trials 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 conducted at the lab to retrieve more accurate determination of species in gut.

Removal and storage of stomach contents.

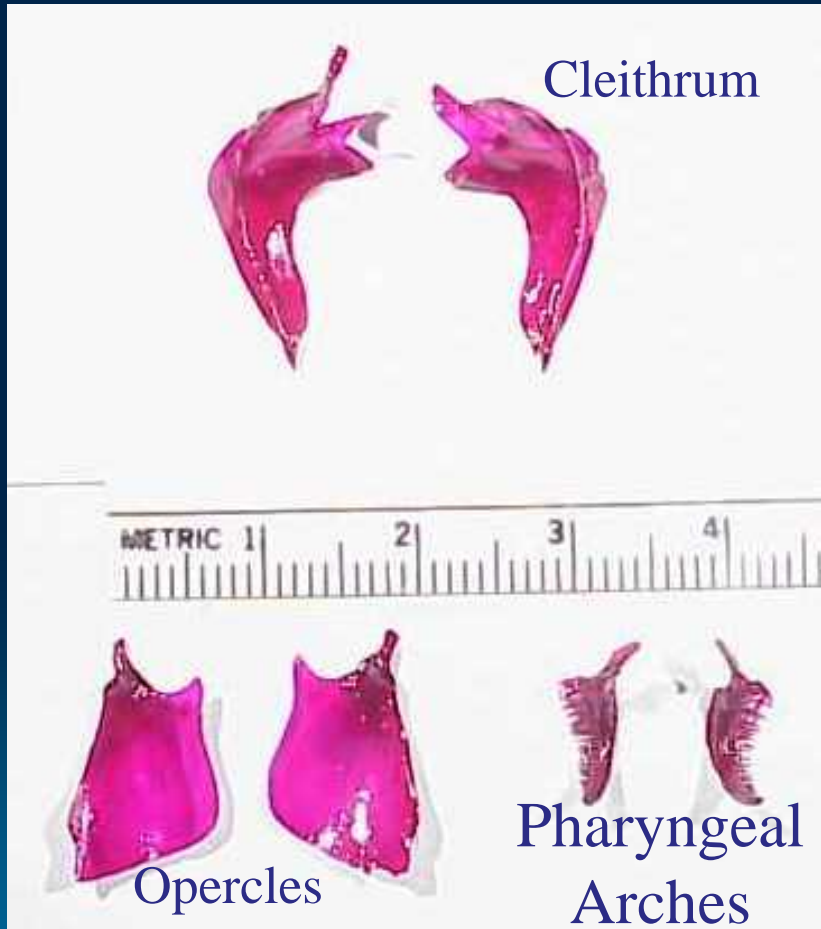


Analysis of contents via stained hard structures

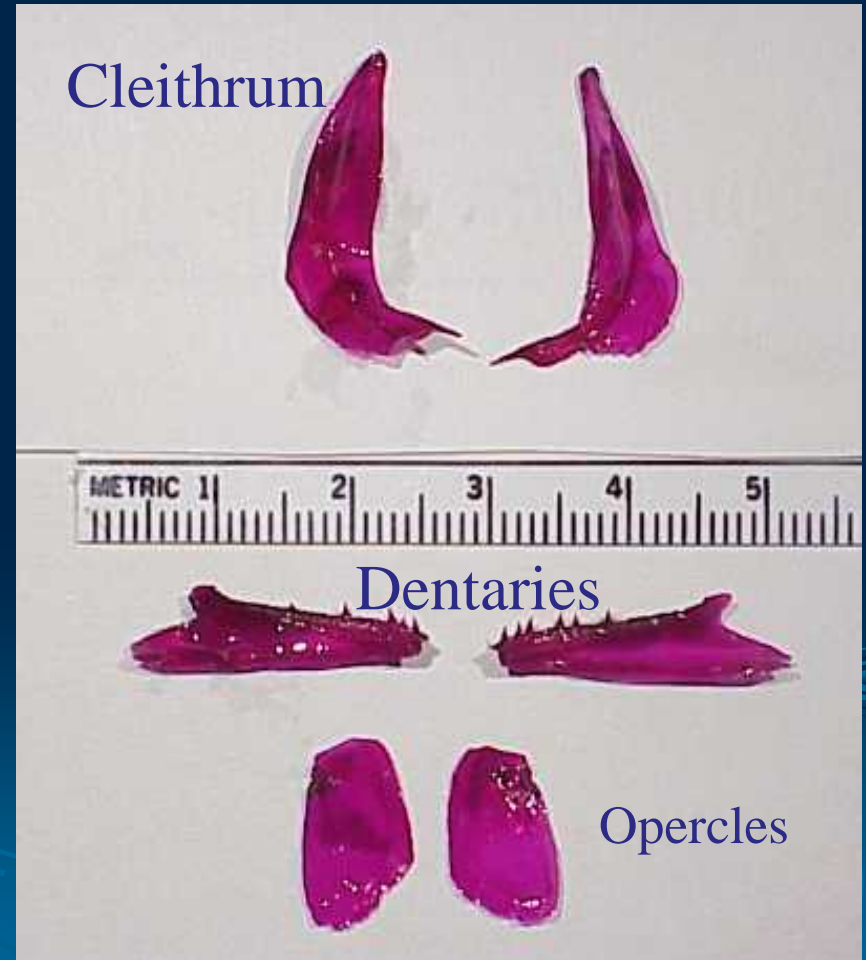


Identification to species

Largescale Sucker



Chinook Salmon



Equation for consumption Rate (Ward et al 1995)

$$C = n(24/ET_{90})$$

where: n = # salmonids observed in gut per day.

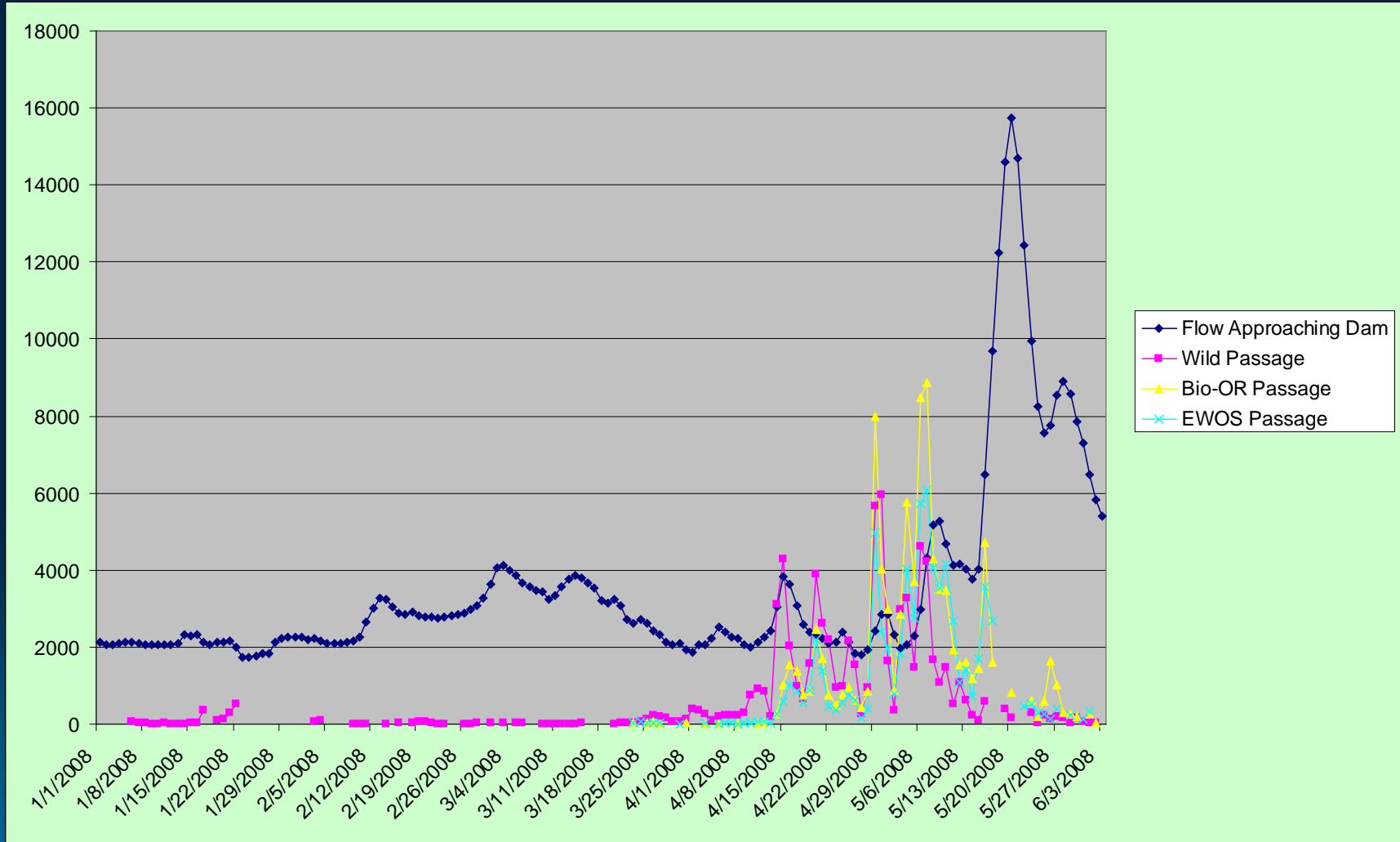
ET_{90} = all fish species present in the gut at time of sample.

C will be used in determining SE which is the daily number of salmonids eaten.

2007 Stomach Contents

Species found in gut	Number found (out of 77 stomachs taken)
Sculpin	3
Large-scale sucker	1
Whitefish	5
Chisel mouth	4
Invertebrate	39
Steelhead	2
Chinook	9
Total salmonids found in gut	11

2008 Juvenile Passage Data near Prosser Dam



Conclusions

- **Population est:** Present estimates of this lead us to believe that around **10,303** 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 **32,188** and **4,639**, respectively.

Conclusions Continued

➤ Consumption: 2007

$$SE = PE * F * C$$

Where: SE= Salmon eaten per day

PE= Pop est of NPM

F= Fraction of NPM stomachs
with at least one salmon

$$\underline{SE = 870.3 \text{ Salmon eaten per day}}$$

Salmon Eaten total = 2611 per day over my 39 mile sample areas or 4217 salmon eaten per day from Naches confluence to Prosser dam(63 miles).

References

- Ricker W. E. 1975. Computation and interpretation of biological statistics of fish populations. Fisheries Research Board Canada Bulletin 191.
- Ward, D. L., J. H. Peterson and J. J. Loch. 1995. Index of predation on salmonids by northern squawfish in the lower and middle Columbia River and in the lower Snake River. Transactions of the American Fisheries Society 124:321-334.
- Fresh K. L., S. L. Schroder, and M. I. Carr 2003. Predation by northern pike minnow on hatchery and wild coho salmon smolts in the Chehalis River, Washington. North American Journal of Fisheries Management. 23:1257-1264.

Acknowledgements

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Questions

