

Northern Pike Minnow Predation 2007

Presented by
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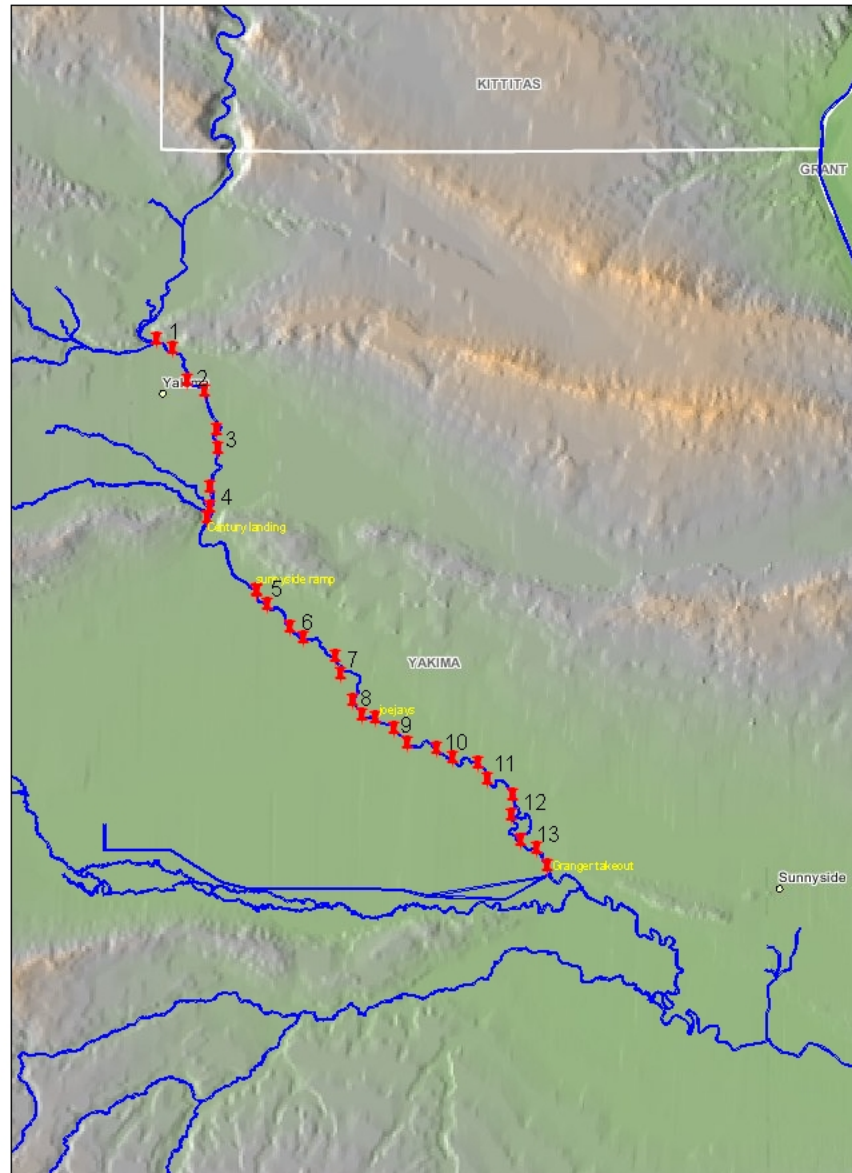
Yakama Nation



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

- Due to low re-capture rates in previous years, 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 has been very successful, allowing us to get out **367 marks/11** recaptures in 2006 and **303 marks/11** recaptures in 2007.

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?

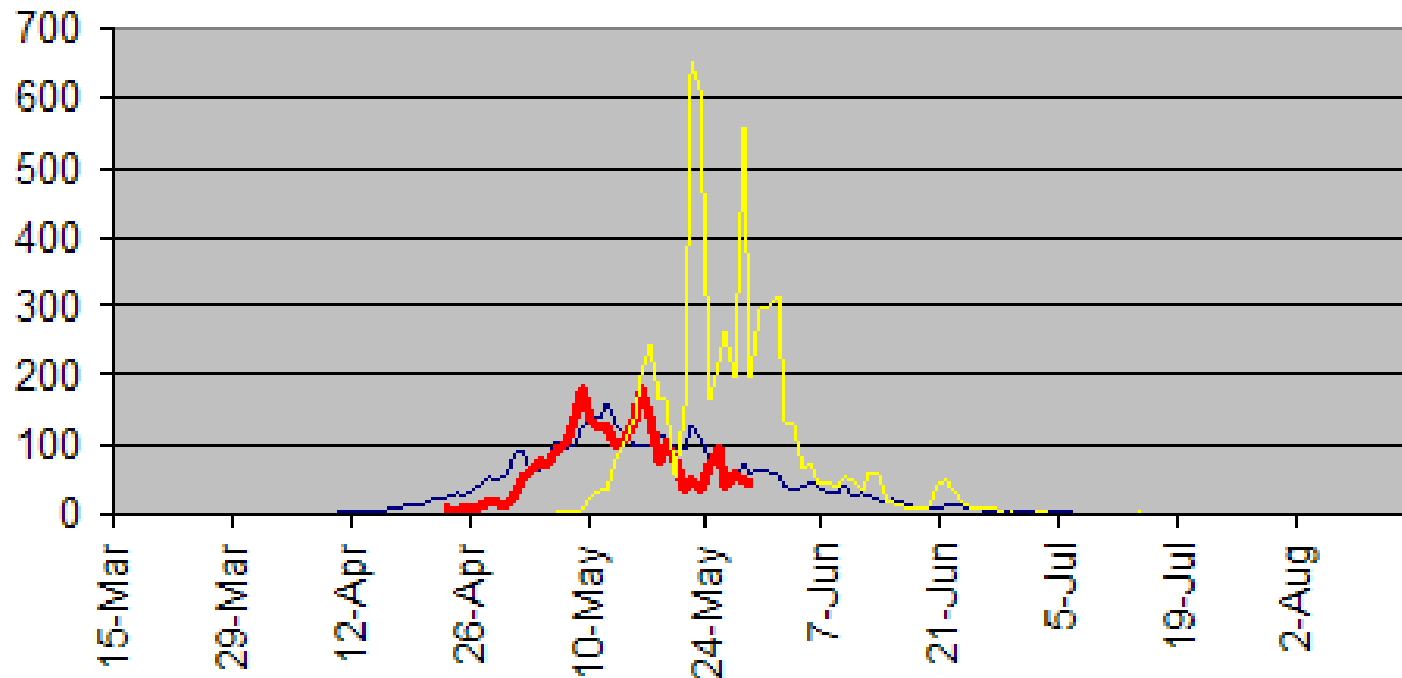


Environmental and Biological Factors include:

- 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)

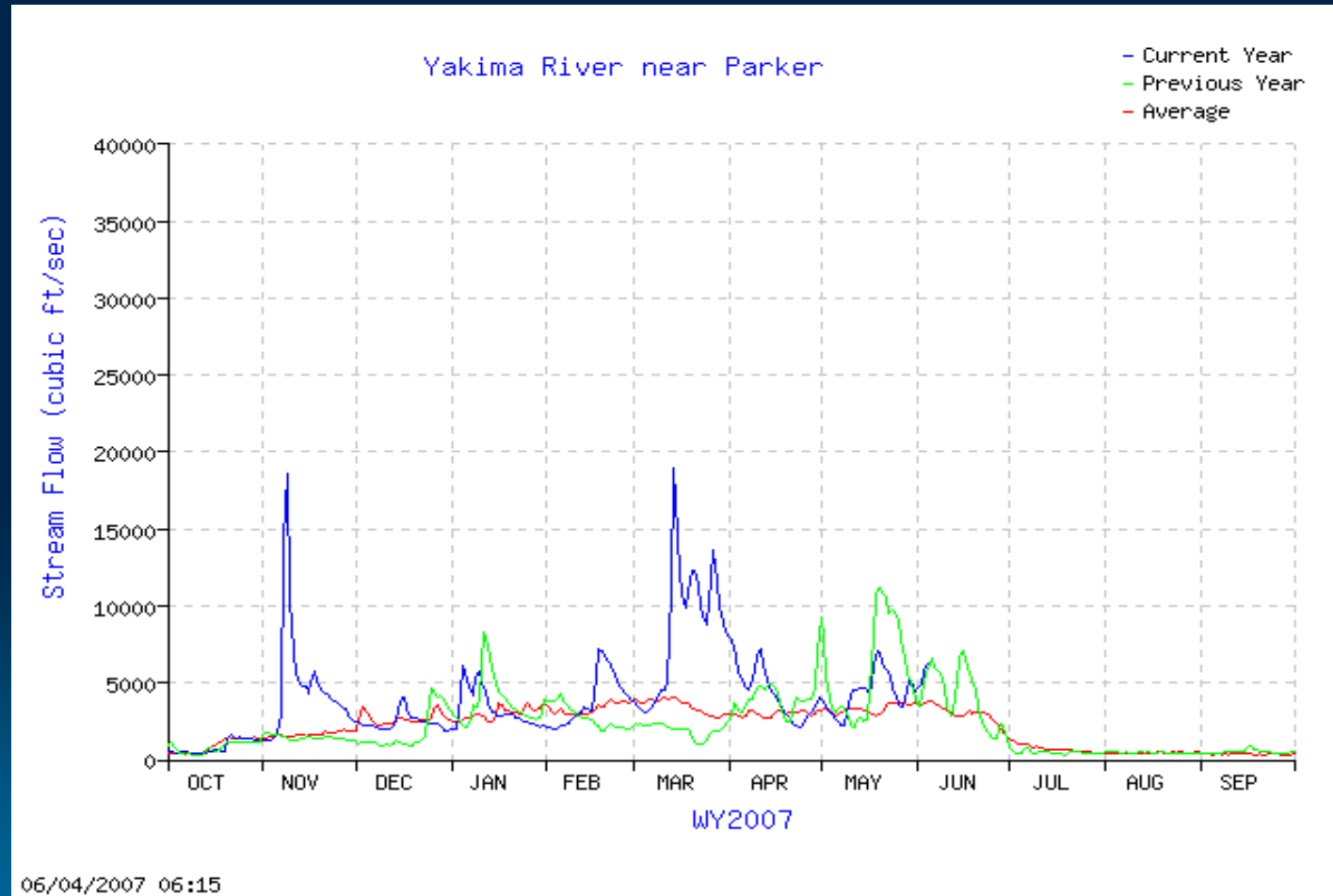
Estimated Adult Passage 07

Prosser 2007 Daily Passage



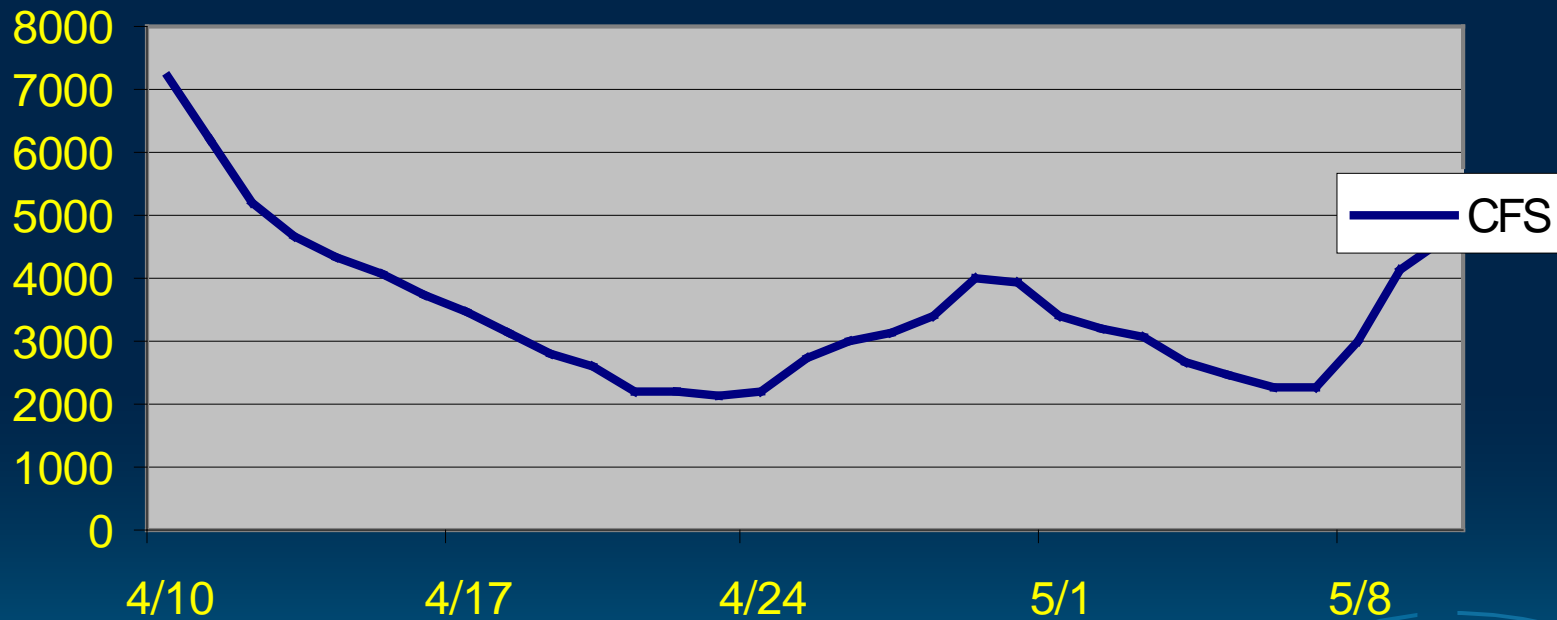
— "2007 @ 4,200" — 2007 — 2006

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



River Flow at Parker dam (Sunnyside dam)

Parker Flow s 2007



River Flow near Prosser

Prosser Flow s 2007



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 will be conducted at the lab to retrieve more accurate determination of species in gut.

Equation for consumption (Diana 1979)

- $N = E * C * A * P$
- N= number of smolts consumed
- E= number of meals a NPM could eat during the time they were available
- C= average meal size of smolts expressed as the average number of smolts consumed per NPM.
- A= number of NPM from mark/recapture est.
- P= % of NPM that had eaten smolts based on stomach analysis

Removal and storage of stomach contents.

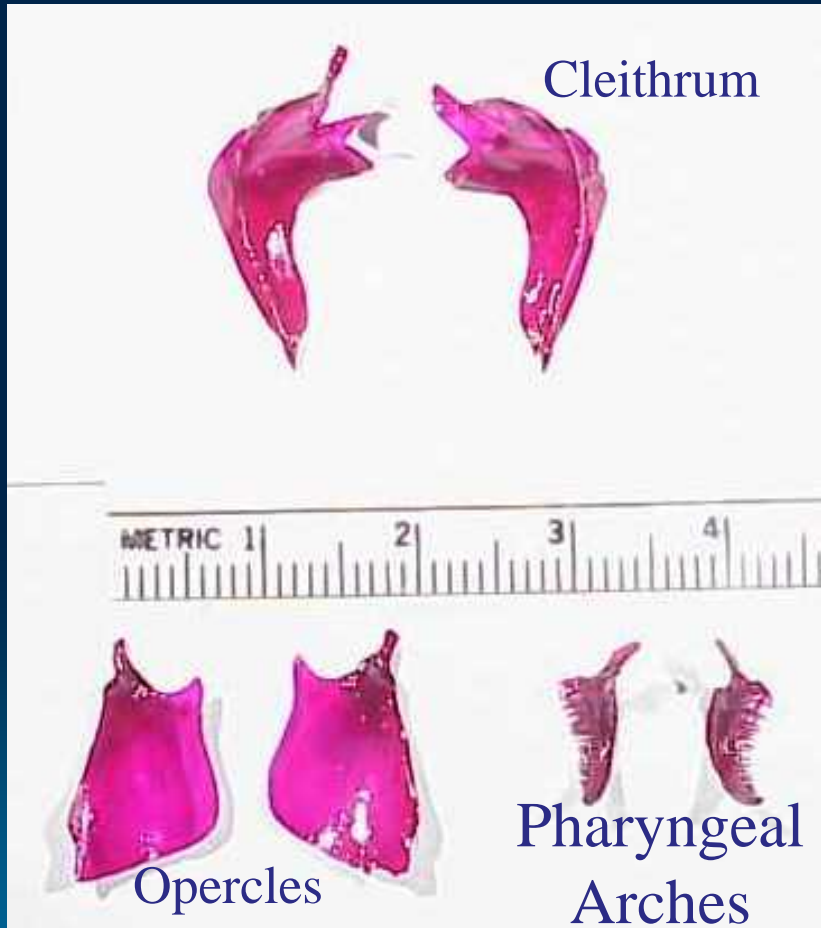


Analysis of contents via stained hard structures

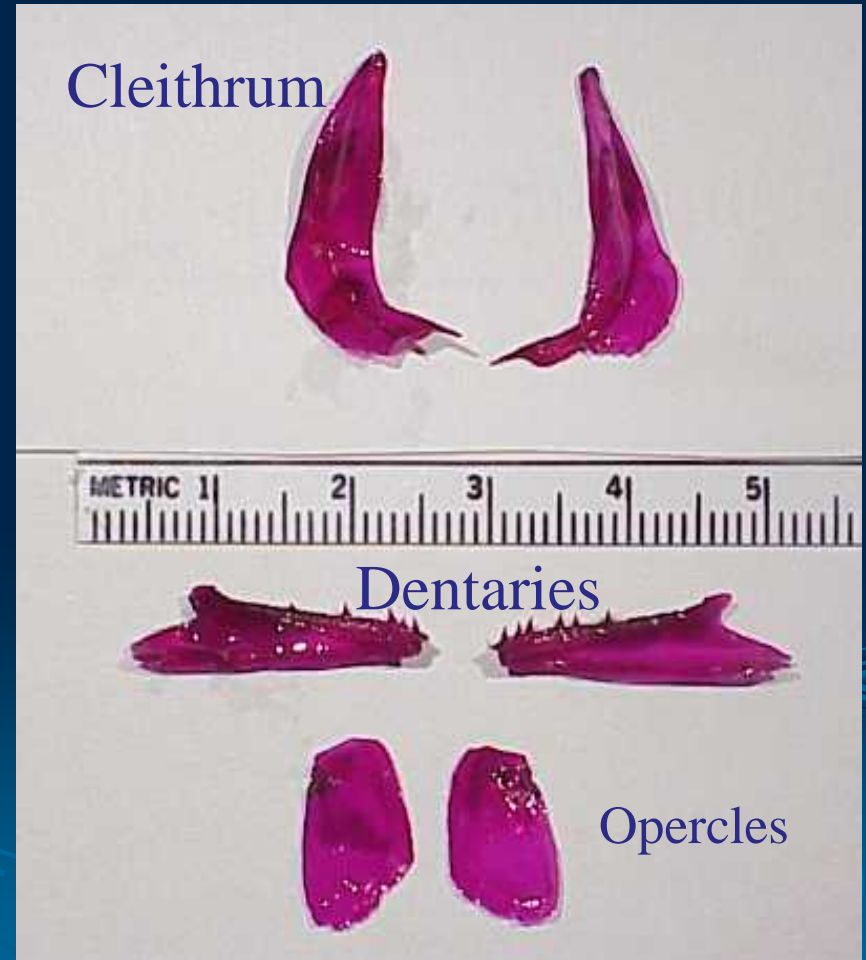


Identification to species

Largescale Sucker



Chinook Salmon

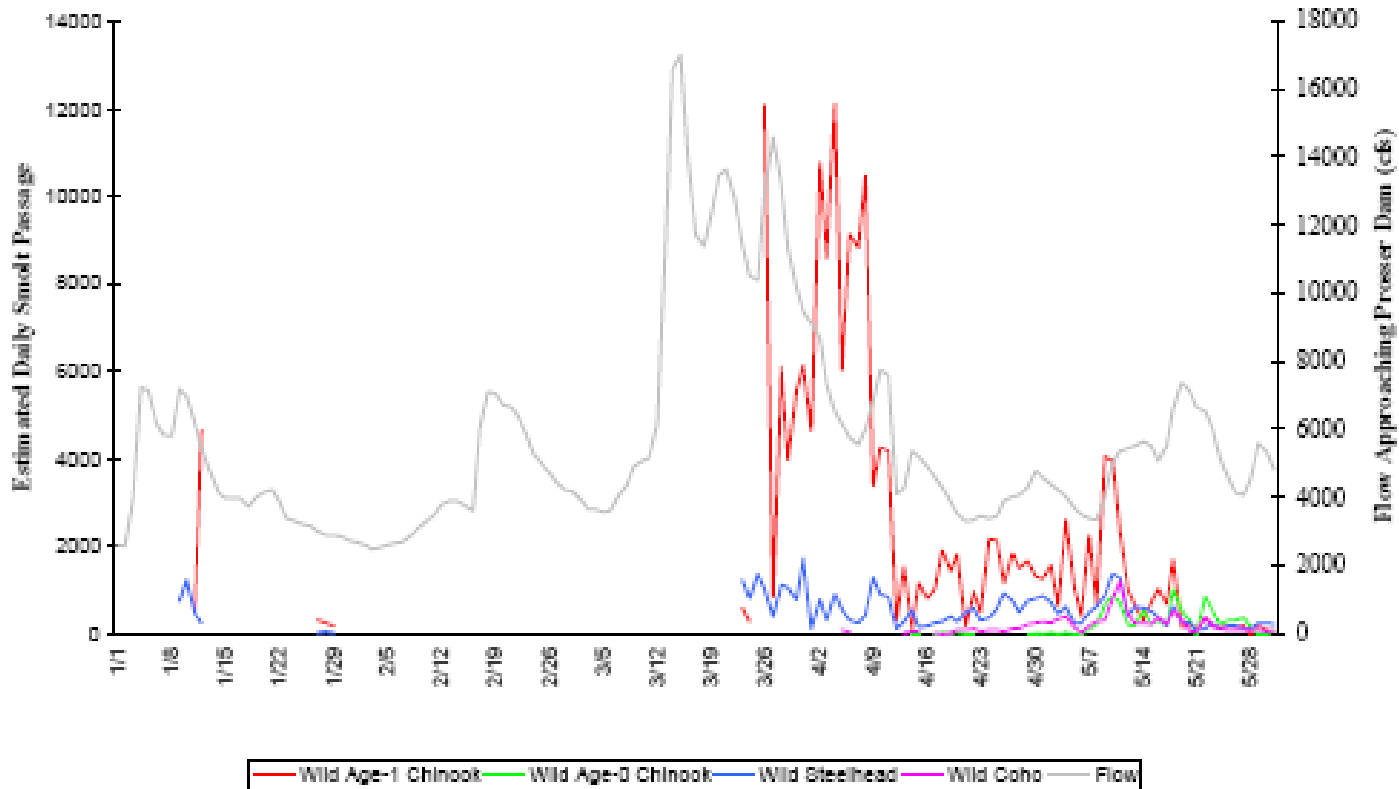


2007 Stomach Contents

| Location | Invertebrate contents | Fish contents | Total # fish stomachs searched | Total # stomachs with contents |
|------------------------|-----------------------|--------------------------------|--------------------------------|--------------------------------|
| Gap to gap (sites 1-4) | 2 | 6 | 10 | 8 |
| Toppenish (sites 5-8) | 8 | 11 | 28 | 19 |
| Granger (sites 9-13) | 11 | 21 | 40 | 32 |
| Totals | 21 | 38 (3 lamps & 10 salmon) | 78 | 59 |

2007 Juvenile Passage Data

Wild Chinook, Steelhead and Coho Smolts
Chandler Juvenile Facility, 2007 (provisional)



Conclusions

- **Population est:** Present estimates of this lead us to believe that around **9900** 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 **20162** and **5527**, respectively.
- **Consumption:** Completion sometime in July, but visual estimates of 35/59 stomachs have fish contents, most of which are salmon smolts (visuals of undigested fish show >90% are salmonids, probably coho.)

References

- Ricker W. E. 1975. Computation and interpretation of biological statistics of fish populations. Fisheries Research Board Canada Bulletin 191.
- Diana J. S. 1979. The feeding pattern and daily ration of a top carnivore, the northern pike (*Esox lucius*). Canadian Journal of Fisheries Management. 15:346-357.
- 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.

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Questions

