

The effects of domestication on predation mortality and competitive dominance



Supplementation

- The offspring of natural origin adults in the supplemented population of the upper Yakima
- Grandparents could be any combination of returning, marked hatchery adults and unmarked naturally spawned adults
- Returning marked adults that were reared in the hatchery must spawn in the river (integrated population - at least one generation of natural selection between hatchery rearing)
- Were wild in 2003 and 2004

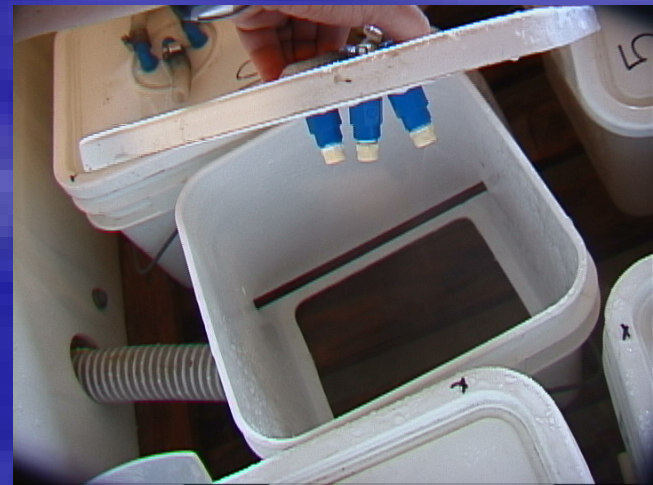
Hatchery

- The offspring of hatchery origin adults in the upper Yakima River-started with BY02 returning hatchery adults
- 2007 was 1st offspring of the 2nd generation
- Not allowed past Roza Dam to spawn (segregated - no natural selection in early life)

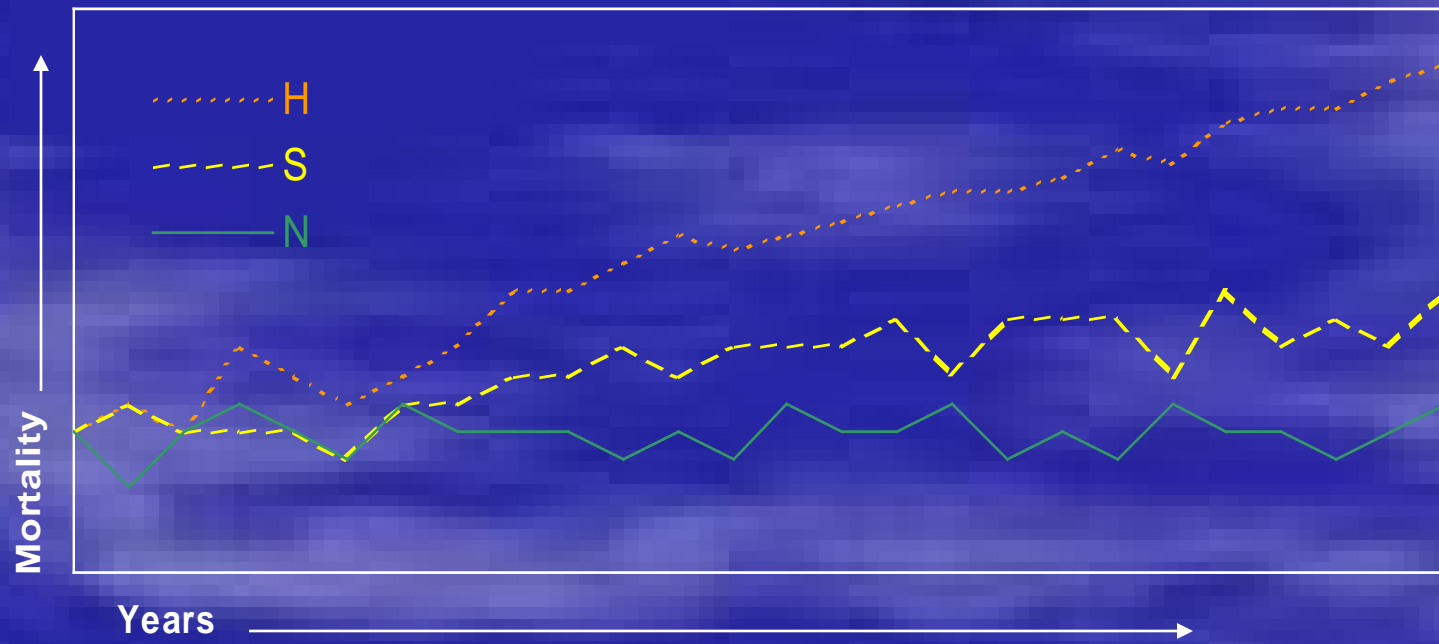
Naches



- Serve as a baseline for domestication – no history of hatchery influence
- Adult broodstock are collected of the spawning grounds when escapement is sufficient

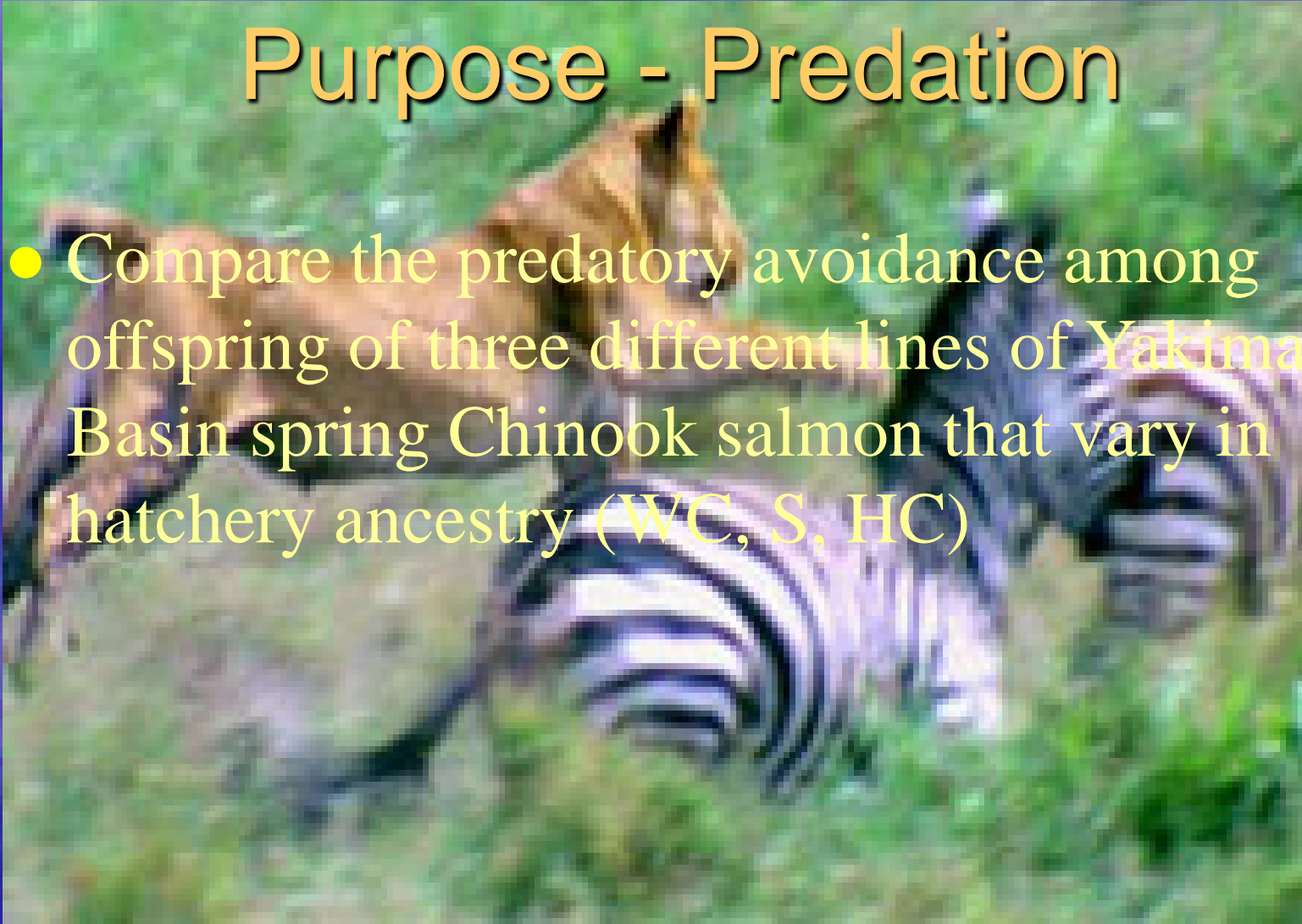


Hypothesis



Purpose - Predation

- Compare the predatory avoidance among offspring of three different lines of Yakima Basin spring Chinook salmon that vary in hatchery ancestry (WC, S, HC)



Predation Methods

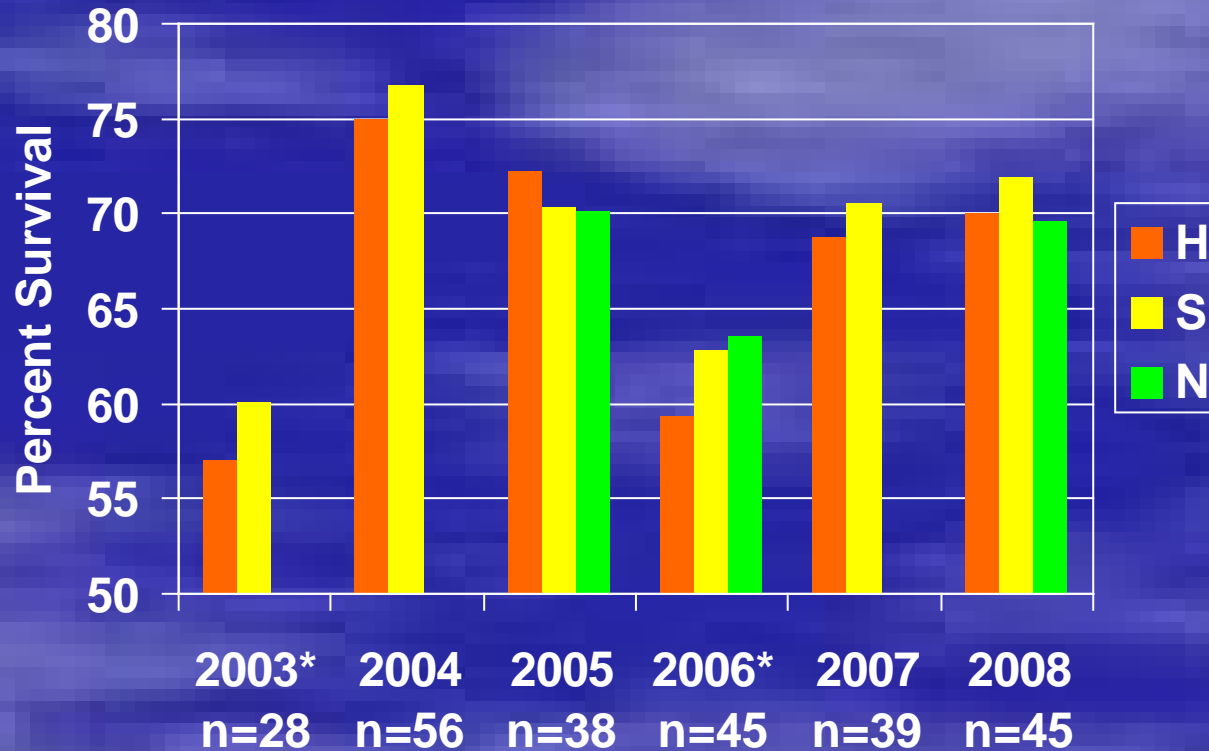
- 8 - 3m x 2.4m x 1.5m 3mm mesh net pens in a raceway were stocked with 2 rainbow trout and 2 torrent sculpins
- Size matched 50 or 75 fry of each origin, marked them, and released into each of the net pens





- At end of each trial survivors were recovered and enumerated
- Used the Wilcoxon matched pairs test for survival between origins (H vs. N, S vs. N, H vs. S)

Results – Net Pens



S were offspring of wild adults in 2003 and 2004

Summary

- Generally agrees with the hypothesis of domestication (survival; $N > H$, $S > H$, $N \geq S$)
- Differences are still small to insignificant after 2 years of 2nd generation of HC line
- May not see the same thing each year because of annual variation (e.g. 2005) and stock specific differences

Purpose - Dominance

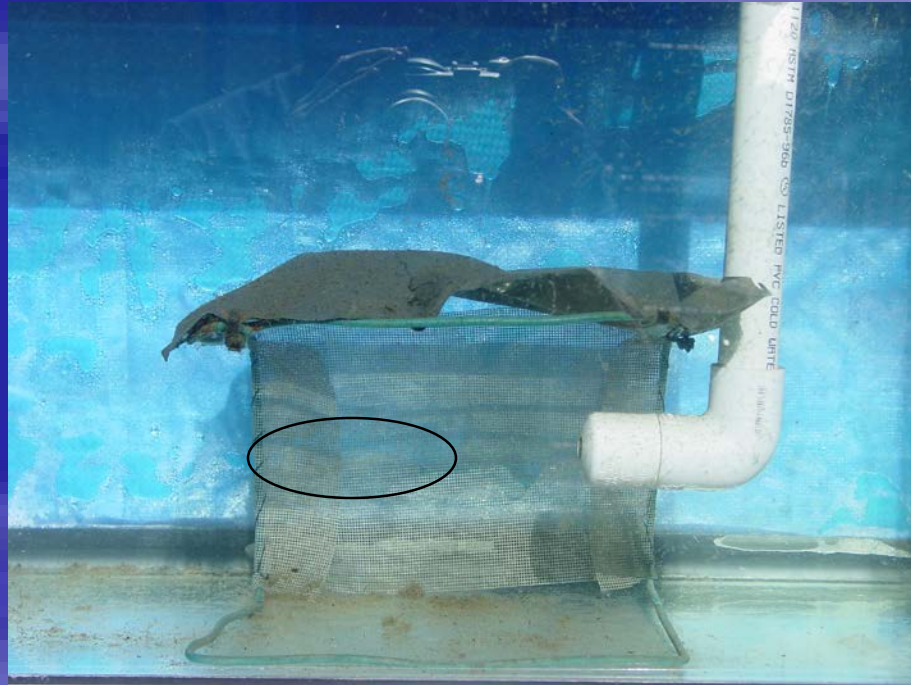
- Compare the competitive ability through measurements of aggression, holding of sweet spot, and feeding among offspring of three different lines of Yakima Basin spring Chinook salmon that vary in hatchery ancestry

Dominance Methods

- Common garden experiment
- Experiments were conducted for 7 days in 80, 30 gallon glass aquaria
- Measured aggression, holding of sweet spot, and feeding among paired fish (S vs N, S vs H, N vs H)

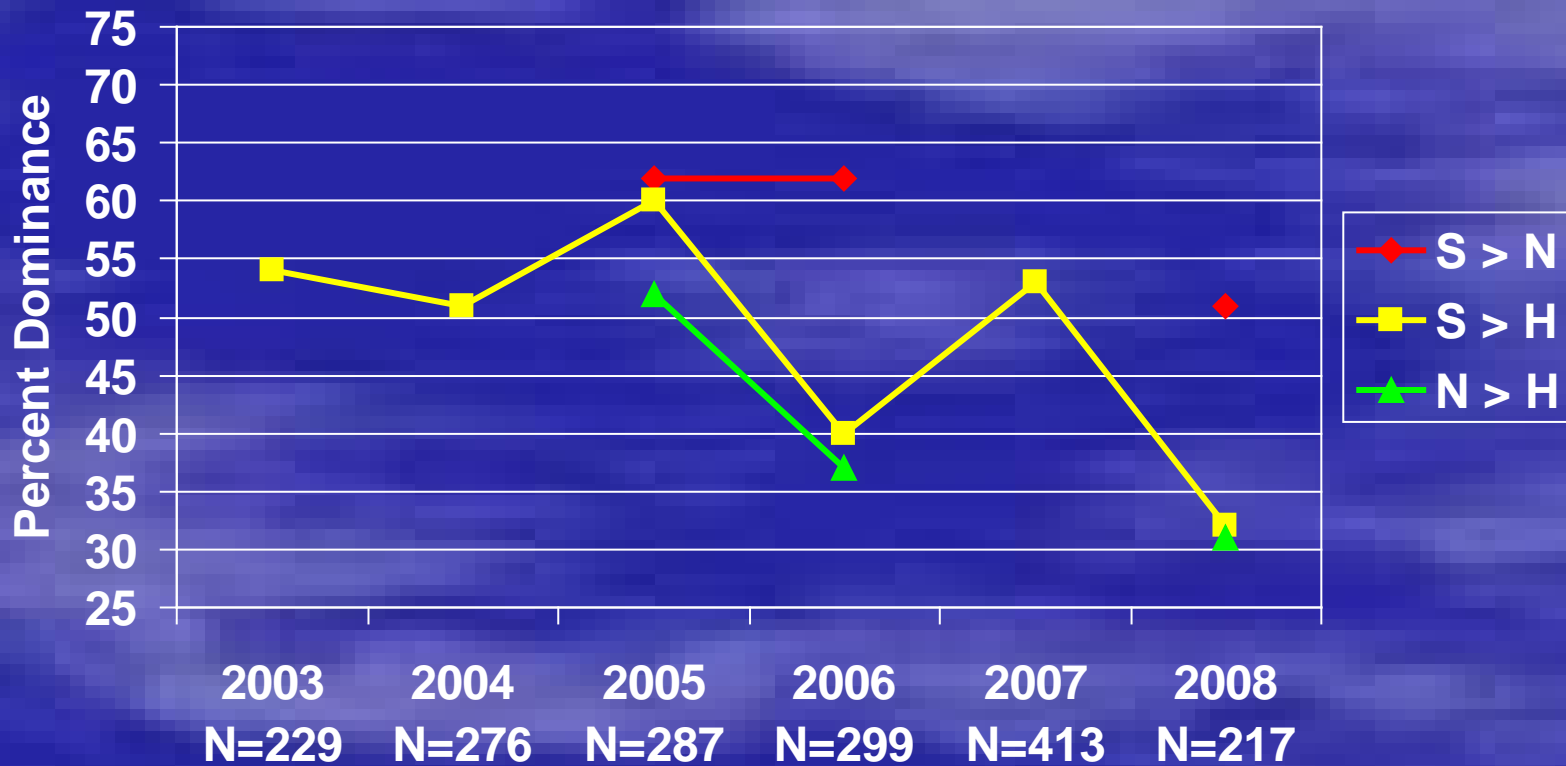


Experimental Arenas



- One good spot

Percent Dominance - Contest



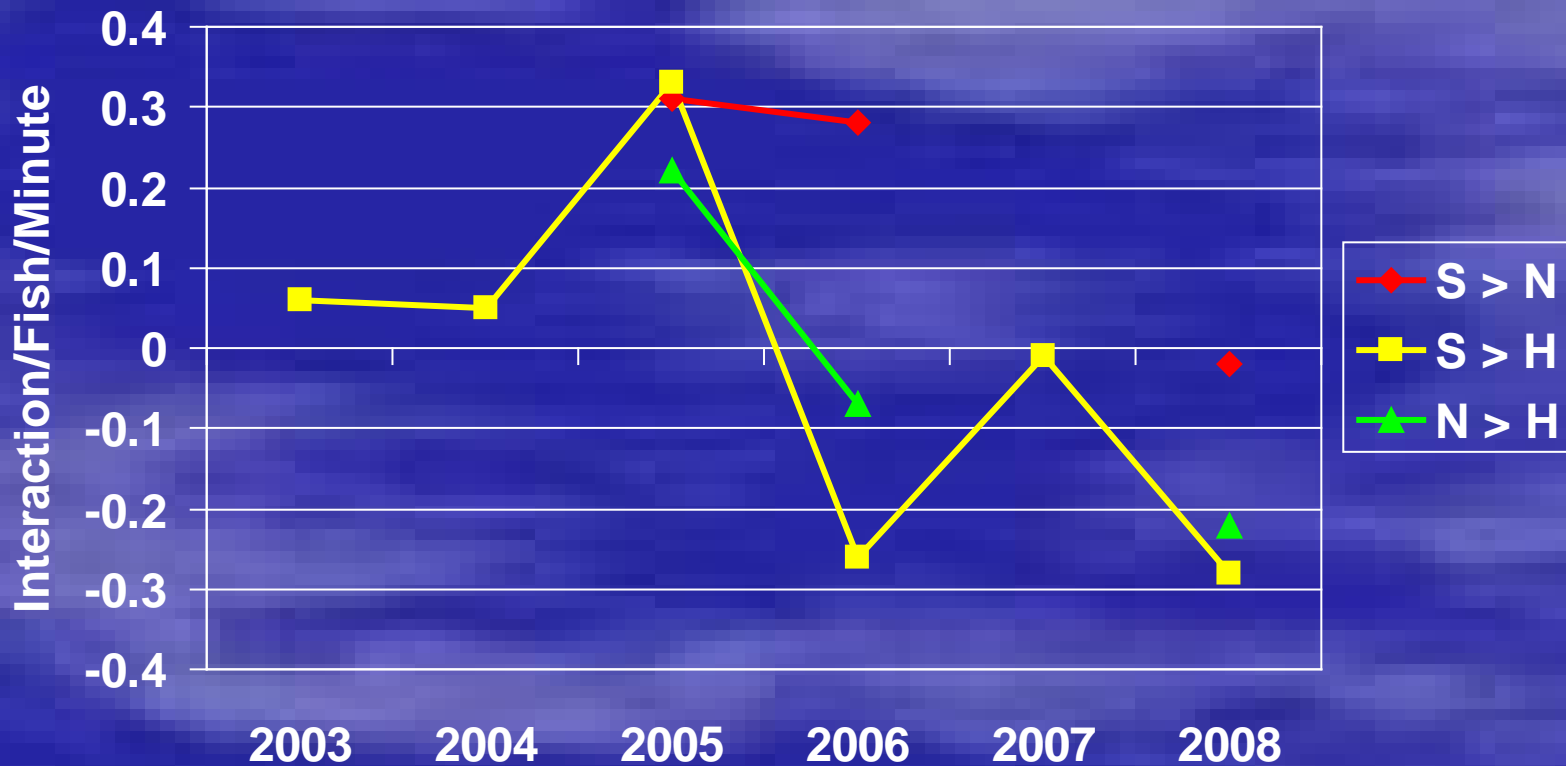
Implications

- Significant deviations in behavior may occur between years which could result in more years to detect overall differences
- Few studies have reported temporal variation in behavioral dominance (assumed constant across years)

Acknowledgements

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Aggression – Contest (difference in interaction rate)



Growth – Contest

(difference in growth rate, mg)

