Examining the Early Life History of Coho Salmon (*Oncorhynchus kisutch*) from a Study of Otolith Microstructure

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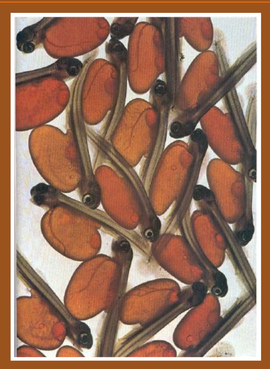
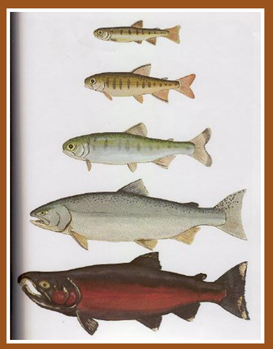
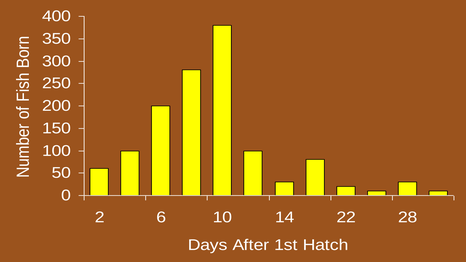




CONCERNS FOR YOUNG FISH

Birth Date

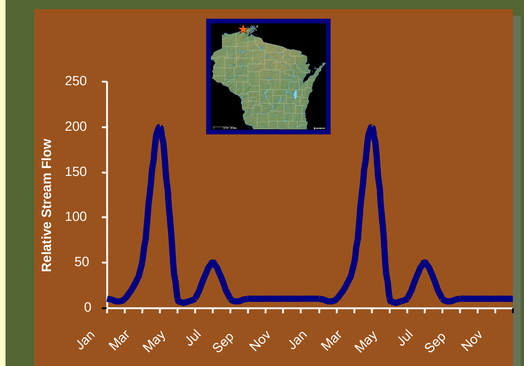


In Oregon populations of coho salmon, emergence timing (date when fish swim out of gravel nest) is drawn out over a one month period. (Data from Koski, 1966, Masters Thesis, Oregon State University)

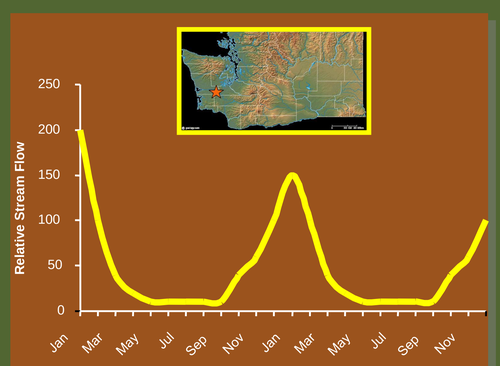
Consequences

- **Length of growing season**
- **Risk of predation**
- **Access to resources**
- **Establishment of dominance hierarchies**

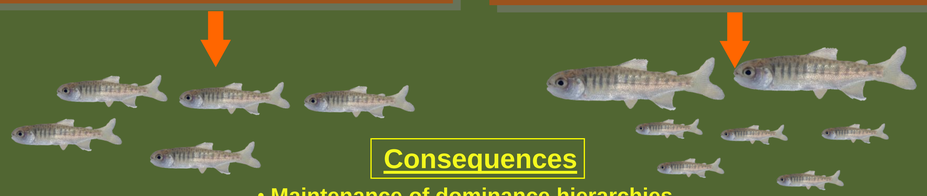
Stream Flow and Environmental Stability



In **Great Lakes** streams, high flow events regular in spring, but also occur in summer, creating environmental instability.



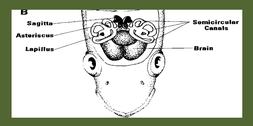
In **West Coast** streams, high flow events are limited to the winter months, resulting in summer stability.

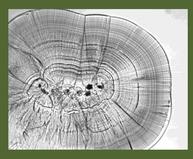


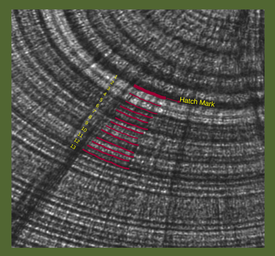
Consequences

- **Maintenance of dominance hierarchies related to flow stability**
- **Break down of hierarchies may equalize summer growth of young fish**

EAR STONES TELL A STORY

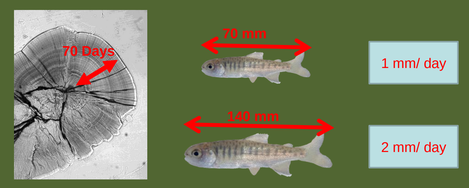






Back Calculation of Birth Date

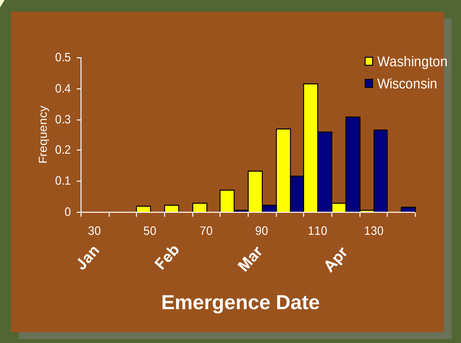
Viewed in cross-section, daily growth increments of calcium carbonate are evident. Hatching is a physiologically stressful event, which produces a distinctive landmark upon the otolith. Daily increments were counted by light microscopy under oil immersion. From the total ring counts, we estimated birth date by back-calculation.

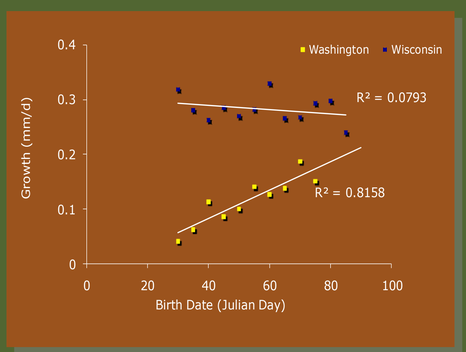


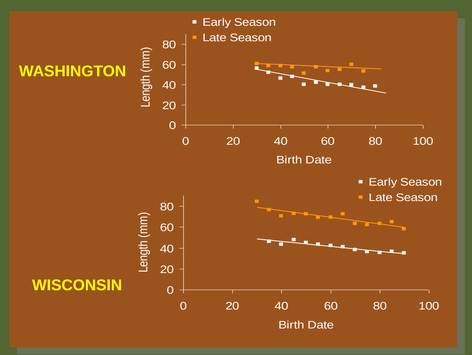
Growth Assessment

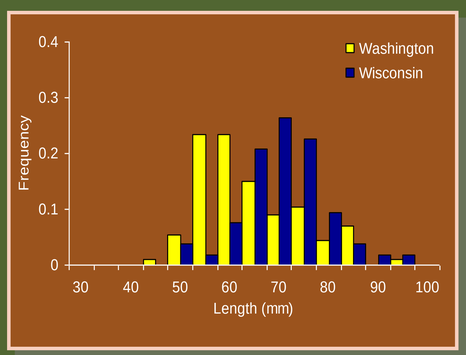
The total size of the fish was recorded at the time of capture. By dividing age by size, we can obtain a daily growth estimate for each fish.

RESULTS AND DISCUSSION









By examining otoliths of young coho salmon we have gained a rare glimpse into the very early life of this species. From our findings we are able to make the following observations and conclusions.

- Emergence of salmon in Wisconsin is delayed; possibly in response to spring flood regime
- Washington salmon show compensatory growth (younger fish grow more rapidly in summer)
- However, end of summer size remains linked to birth date in Washington fish.
- Flow variability has effects on population growth patterns

STUDY GOALS

- Determine the hatching window for populations of coho salmon in Washington and Wisconsin
- Determine the effect of birth timing on growth of young coho salmon in these two different populations

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