Factors affecting marine growth and survival of Auke Creek, Alaska coho salmon (*Oncorhynchus kisutch*)

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Hypotheses

•Marine survival of Auke Creek coho salmon is dependent on early marine growth

•Early marine growth is primarily controlled by local biophysical processes

•Auke Creek coho salmon adult growth is affected by interannual and interdecadal climate changes in the subarctic Pacific ocean

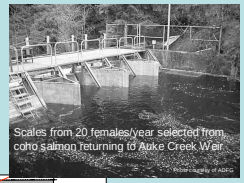
•The marine life history of Auke Creek coho salmon can be analyzed according to three phases: early marine coastal/strait, pre-winter Gulf of Alaska, and post-winter Gulf of Alaska

Study Area

• Northern Southeast Alaska

• Scales from marked adult coho salmon with known marine survival collected at Auke Creek Weir (15 miles north of Juneau) (figure 1)

• Scales from juvenile coho salmon collected at various stations throughout Northern Southeast Alaska (from Auke Bay to Gulf of Alaska) as part of ABL's Southeast Coastal Monitoring program (figure 1)



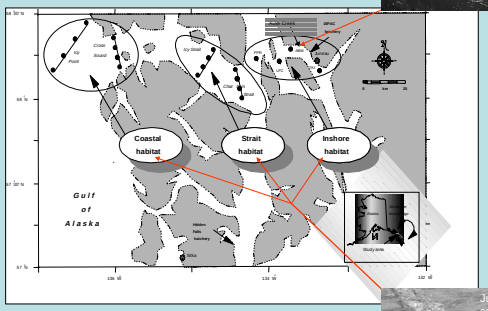


Figure 1. Scale collection sites

(modified from Orsi et al. 2000)

Methods

- Select 20 scales per year (1977-2002) from adult Auke Creek female coho salmon based on circuli quality
- Select juvenile coho scales based on location of capture
- Digitize both juvenile and adult coho salmon scales (figure 2)
- Identify scale growth zones that correspond with marine life history phases
- Measure marine growth for each zone (figure 3)
- Run correlation analysis between scale growth and:
  - size at return
  - marine survival
  - abundance of other salmon (density-dependence)
  - biophysical data

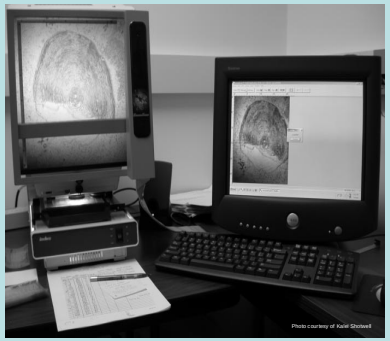


Figure 2. Scanning an adult scale impression

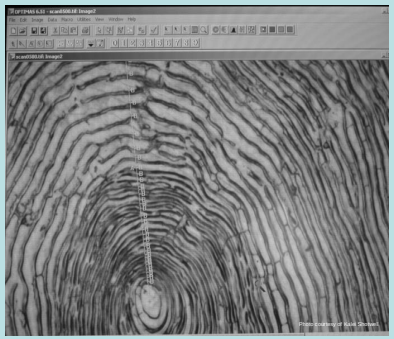


Figure 3. Measuring the distance to the annuli and the distance between circuli using Optimas™ 6.5 software

Pilot Study

• Used to determine sample size

• First year of marine growth measured for 6 fish/year for 5 years

• Obtained among years and within years standard deviation

• Modeled effect of an environmental variable as causing X% of standard deviation from year to year in the true mean

Results

• Number of years sampled is more important than number of scales sampled each year

• 20 scales/year is the most efficient sample size when considering processing time and statistical power (figure 4)

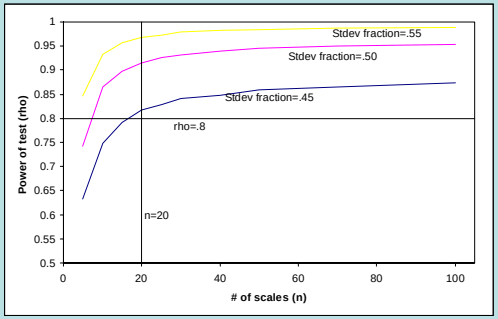


Figure 4. Statistical power given sample size and fraction of stdev due to environmental variable.

Work In Progress

• Adult coho from 1977-1991 remain to be digitized and measured

•Data input into Microsoft Access® database

• Life history transitions must be determined from juvenile coho salmon scales

• Transitions must be transposed to adult coho salmon scales

• Biophysical parameters must be chosen

• Statistical analysis of relationships between growth and environmental parameters

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