

PARASITIC COPEPOD INFECTION ON SALMONID SPECIES REARING IN WILLAMETTE VALLEY RESERVOIRS

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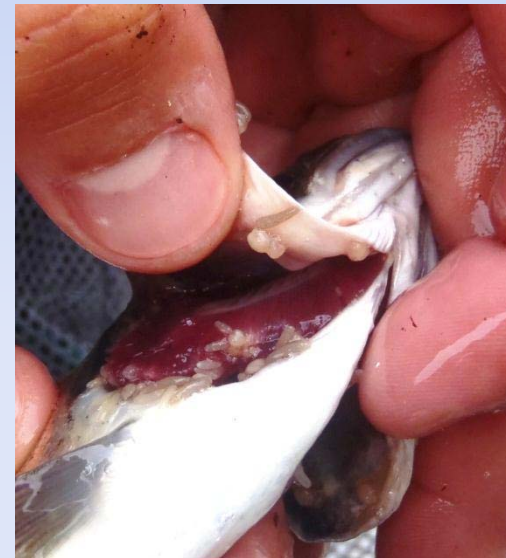
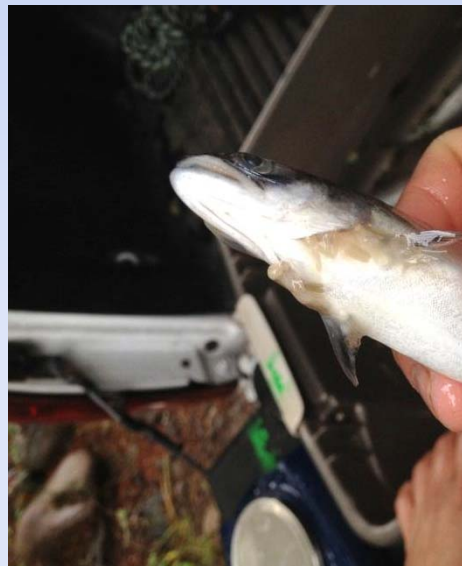
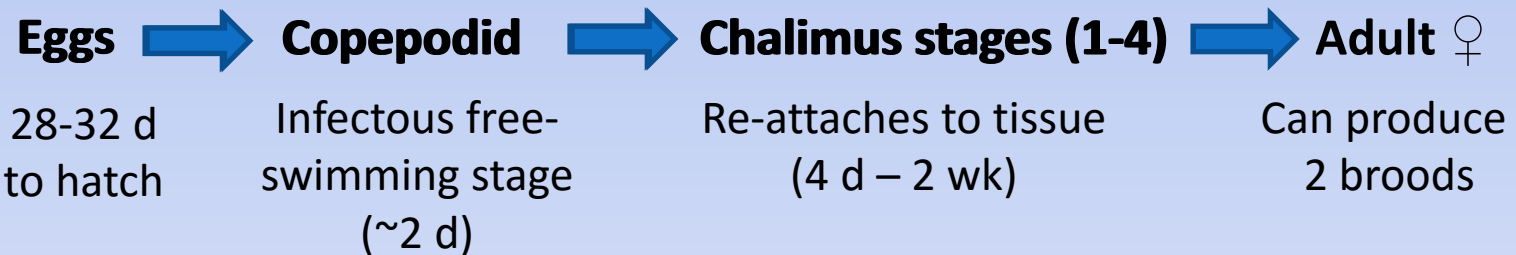
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Background

- *Salmincola californiensis* only infect *Oncorhynchus* spp.
- Can cause physical damage to gill structure/mortality
- Incidence of infection tends to increase with fish size

Life Cycle



Objectives

- Compare susceptibility to parasitic copepods among *Oncorhynchus* species in reservoirs
- Compare infection between stream-rearing and reservoir-rearing Chinook
- Evaluate changes in infection through time
 - Prevalence and Intensity on gills

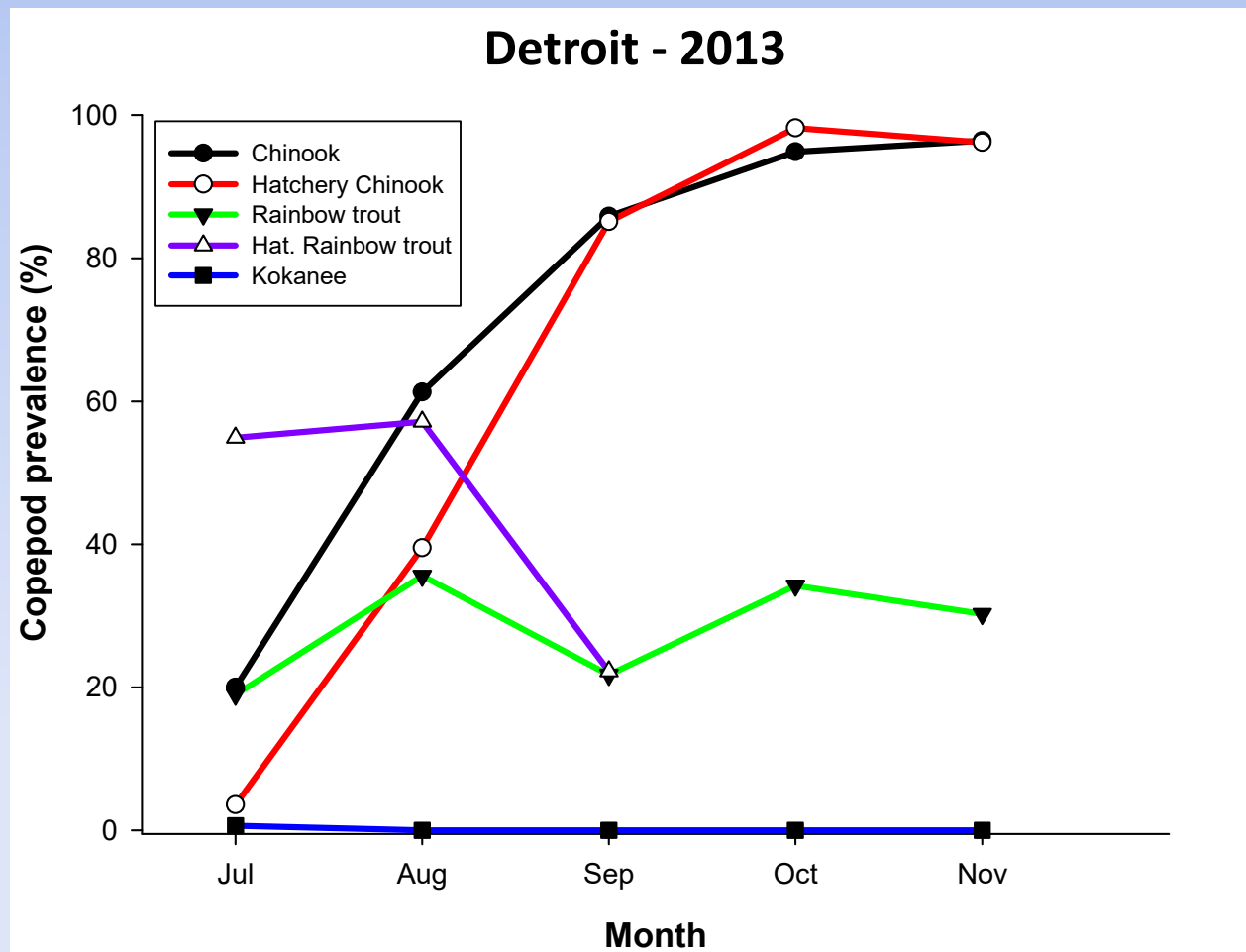
Methods

- All fish collected were examined macroscopically for ♀ copepods on gills and fins
 - Counted copepods on subsample of fish
- Screw traps, gill nets, electrofishing, seining
 - Detroit, Foster, Cougar, Lookout Point, and Fall Creek (USACE)

Results

Prevalence Among Species

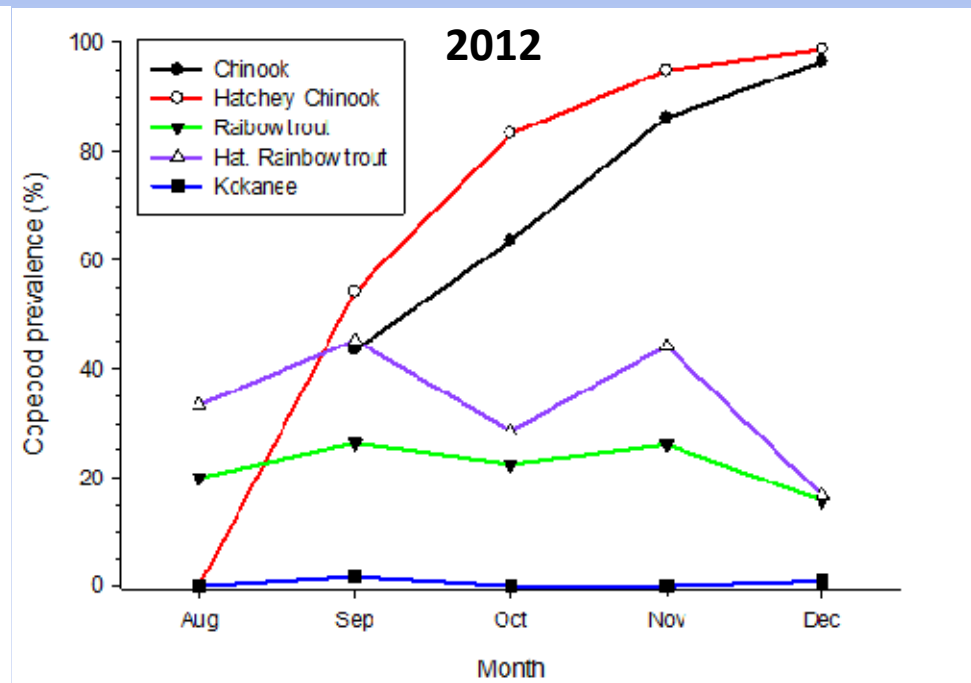
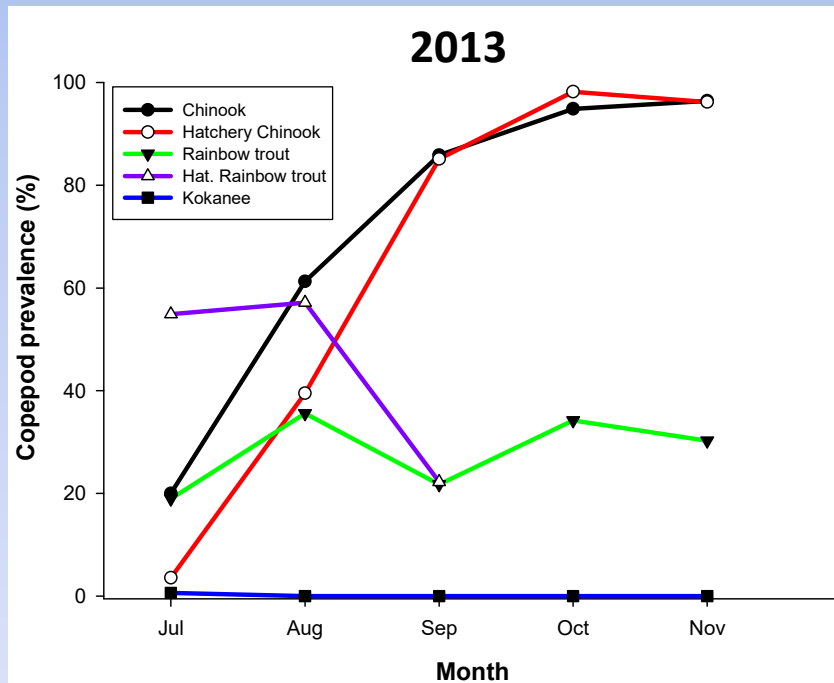
- Chinook were the most susceptible to parasitic copepods
- Kokanee were least susceptible



Results

Prevalence Among Species

➤ Similar patterns between years



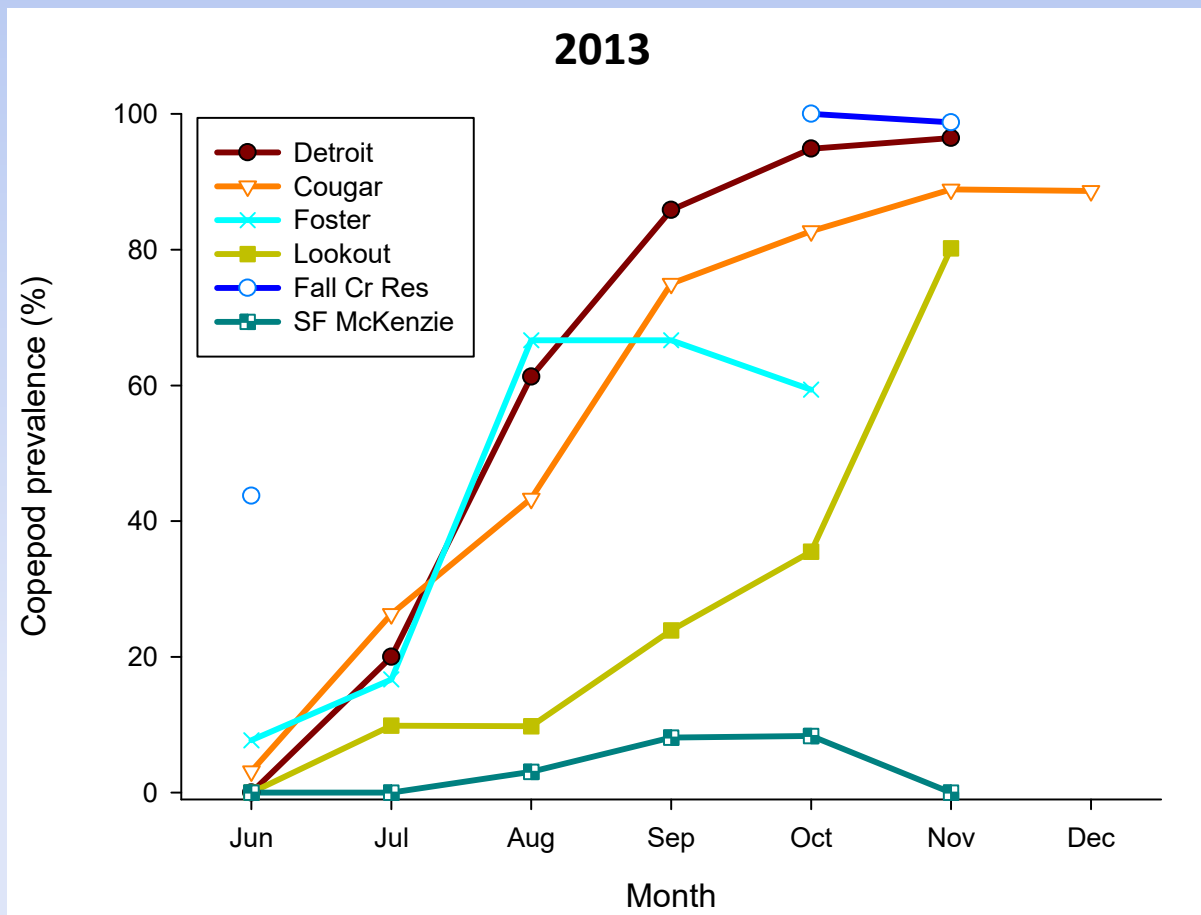
Possible Reasons for Different Susceptibility

- Habitat/movement (kokanee deeper in summer)
- Diet (copepodids <0.7 mm in length)
- Adaptation (gill raker spacing, immune response)

Results

Prevalence Comparisons Among Reservoirs/Streams

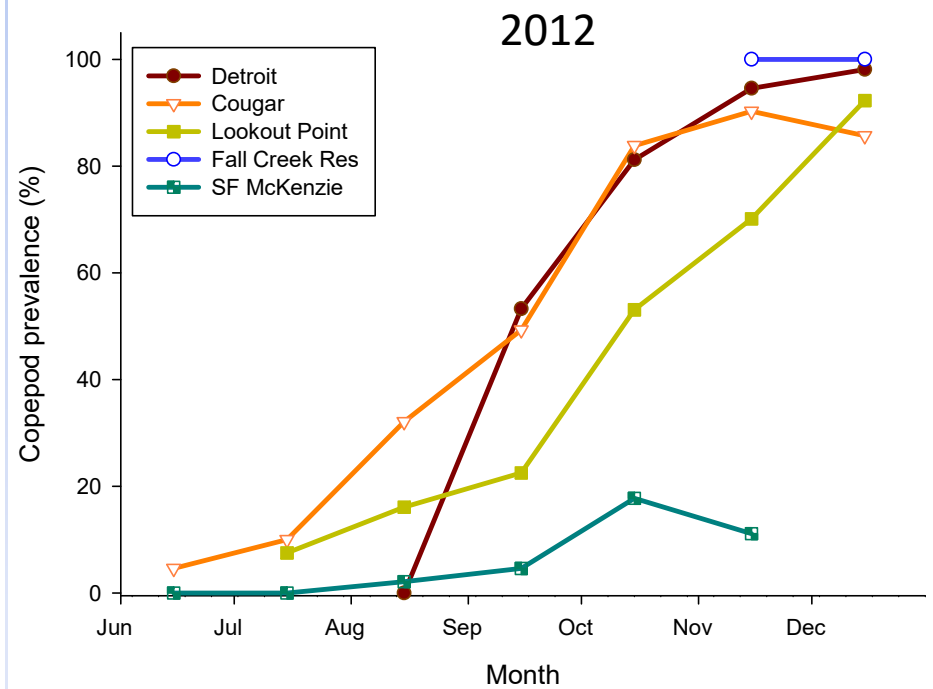
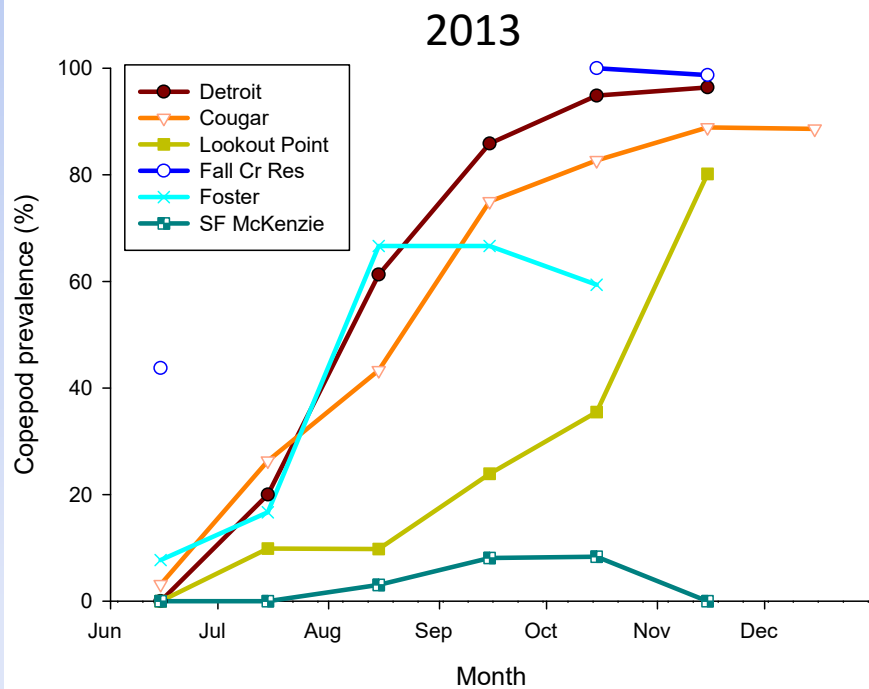
- Prevalence on Chinook increased with time spent in reservoirs
- Copepods were rare for stream-rearing Chinook



Results

Prevalence

➤ Patterns consistent between years



Attachment Location on Chinook



Fins

Reservoir 22%

Stream 75%

Gills

78%

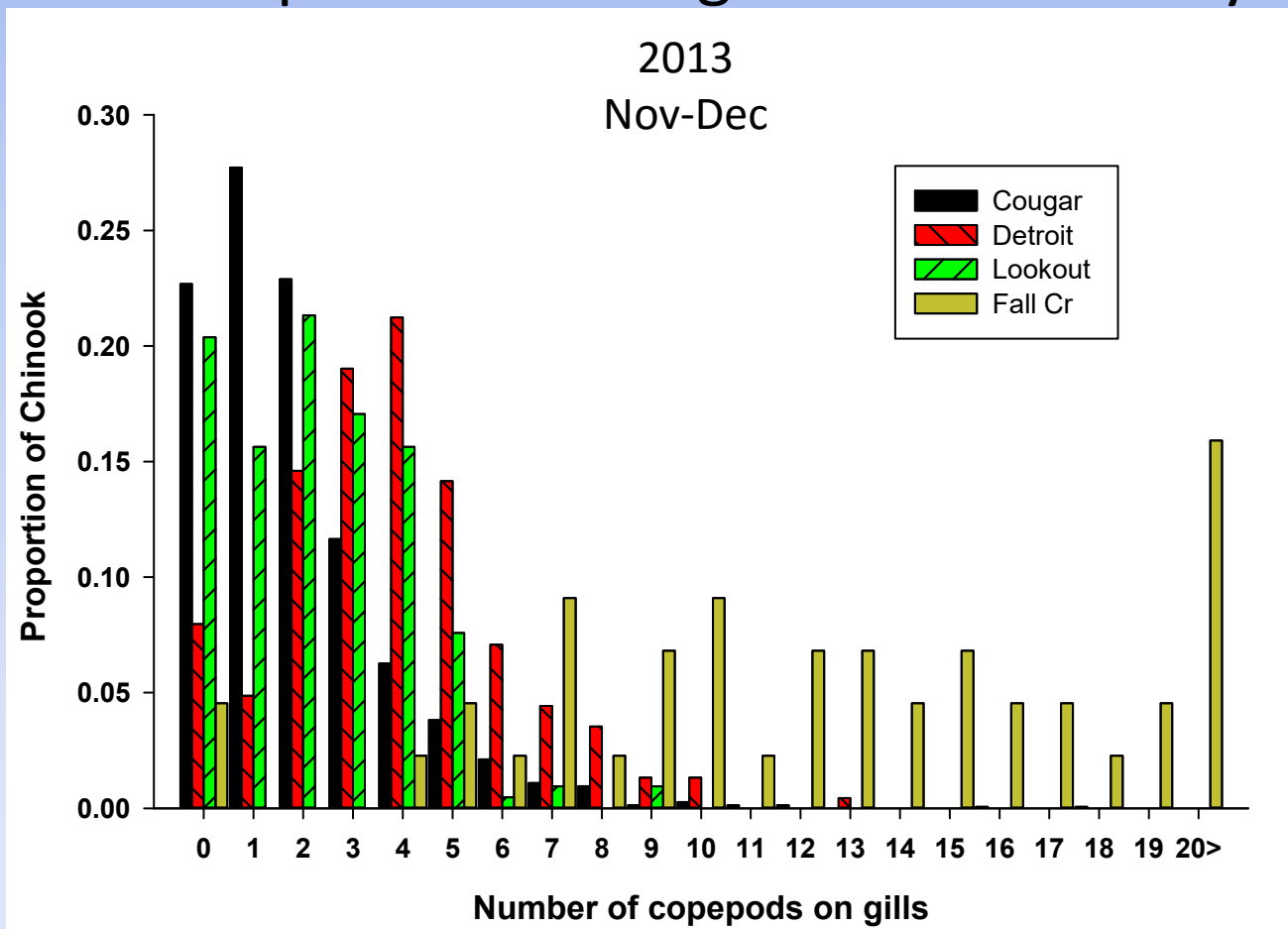
25%

- Copepods more common on gills of reservoir-rearing juvenile Chinook

Results

Intensity

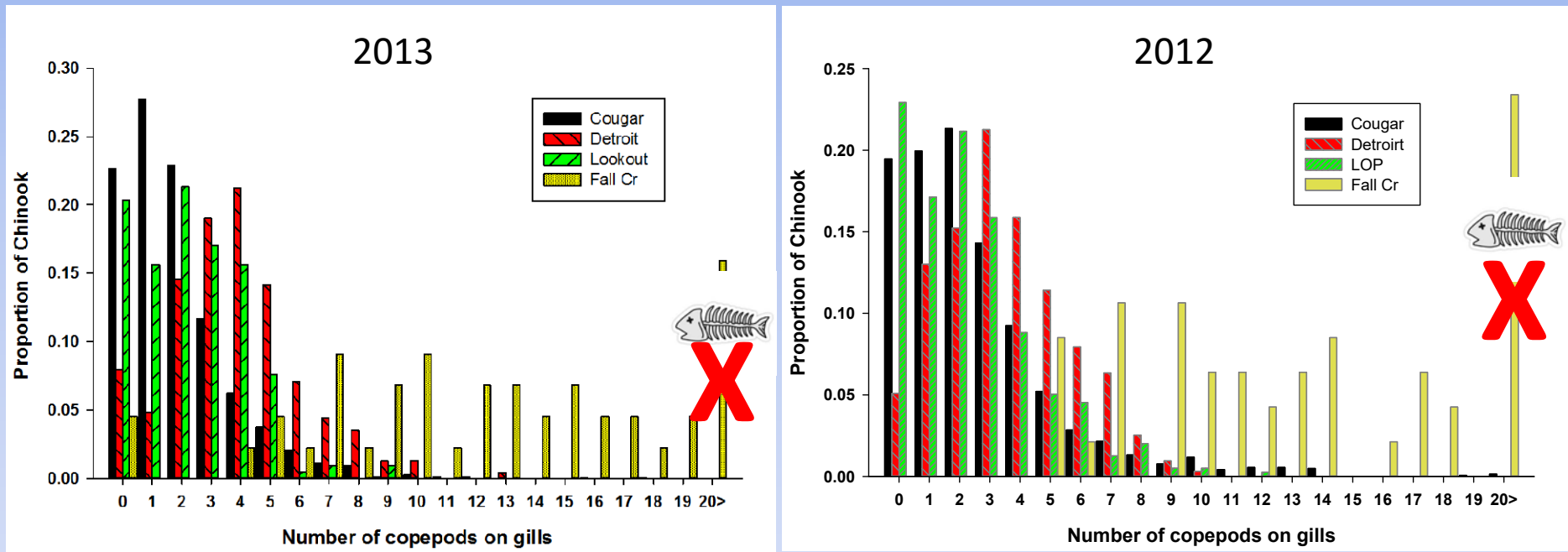
Comparison Among Reservoirs –subyearling Chinook



➤ Fall Creek Reservoir Chinook have greater intensity of infection

Intensity of Infection

- Similar pattern between years

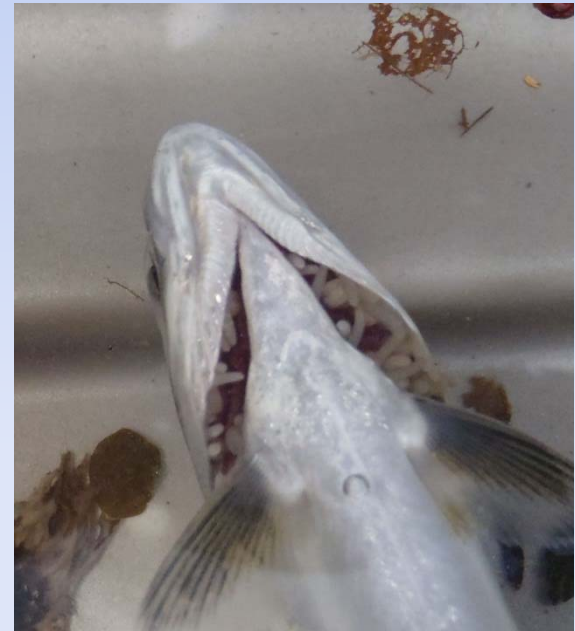


- 90% mortality of sockeye smolts during saltwater trials with >20 gill copepods
 - ~15-20% of Fall Creek late season migrants lost

Pawaputanon, K. 1980. Effects of parasitic copepod, *Salmincola californiensis* (dana, 1852) on juvenile sockeye salmon, *Oncorhynchus nerka*. Dissertation. The University of British Columbia. Vancouver.

What's the source of copepods in Fall Creek Reservoir??

- Two drawdowns that flushed nearly all juvenile Chinook out of reservoir
 - no yearling to infect next cohort
- Some infected resident trout could hold over in stream/residual pools
 - but prevalence only around 25% for rainbow (Detroit)
- Prevalence was ~40% by June
- **Adult Chinook and Steelhead transported above reservoir are infected**



The Source???



Adult Chinook at Willamette Hatchery, 2013

- Adult Chinook & steelhead likely picking up copepods in lower Columbia/Willamette
- Outplant site is close to reservoir (within 2-d drift to reservoir for copepodid)

Conclusion

- Chinook in reservoirs are particularly susceptible to parasitic copepods
- Infection prevalence and intensity increase with duration in reservoirs
- Fall Creek Reservoir Chinook have greatest infection
- Adults may be major source of copepods

Future Direction

- What are the effects of high intensity infection?
 - Does >20 gill copepods cause 90% mortality in Chinook smolts?
- Consider treatment of highly infected adult fish before transporting above dams – Fall Creek

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John Elliott
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Keenan Smith

A landscape photograph showing a wide, calm river in the foreground with a rocky, light-colored shoreline. The background is a steep, forested hillside with various green trees. The word "QUESTIONS?" is overlaid in large, bold, yellow capital letters in the center of the image.

QUESTIONS?