

Chinook salmon emergence timing and life history review

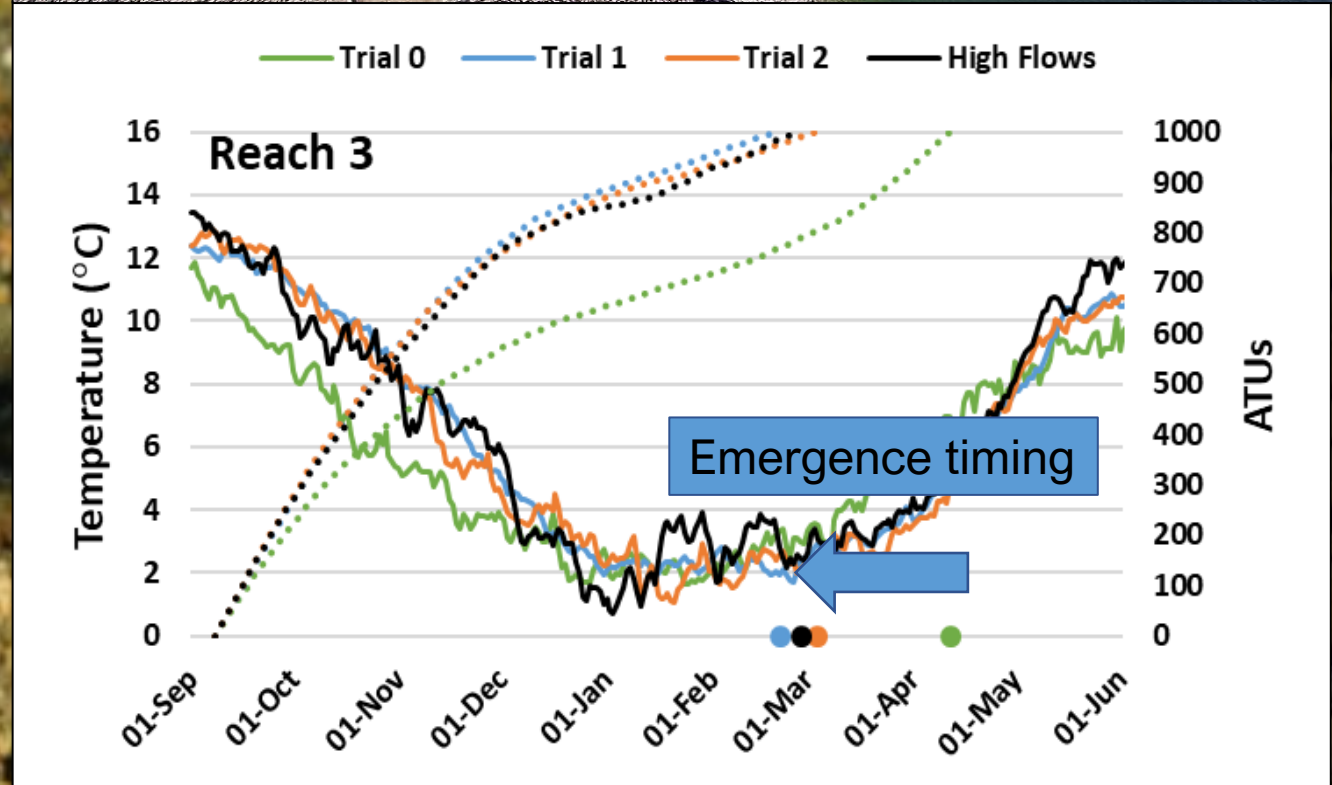
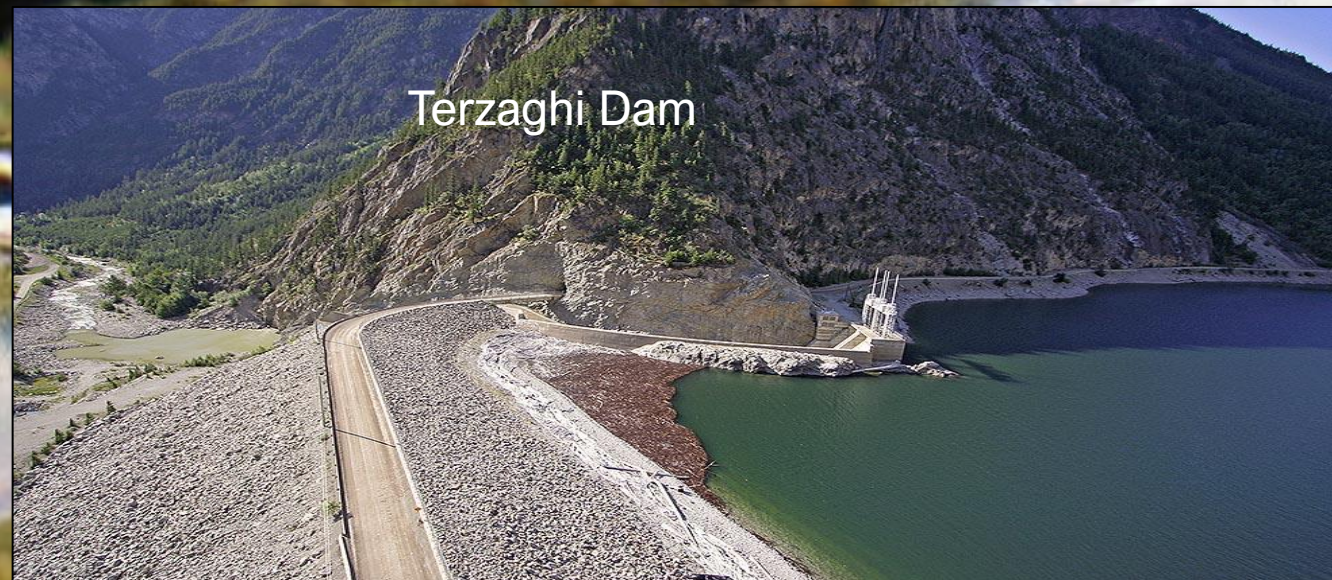
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Emergence timing issue

- Water temperatures in the Lower Bridge River were altered by the flow release at Terzaghi Dam, particularly during fall
- Exposes developing embryos to elevated temperatures
- Could accelerate development and lead to early emergence by juveniles from nests (redds)





New MON-1 Management Questions

1. Do increased water temperatures and early emergence associated with Terzaghi Dam flow releases affect the survival of juvenile Chinook salmon in the Lower Bridge River?
2. What freshwater rearing habitats are used by Lower Bridge River juvenile Chinook salmon and is rearing habitat use influenced by Terzaghi Dam flow releases?



Objectives

1. Review MON-1 databases for emergence and life history information
2. Review published and grey literature on Chinook salmon life histories, early emergence issues in other watersheds
3. Provide recommendations on future research needs

Chinook salmon early emergence

- Chinook salmon juveniles have been incidentally observed emerging as early as mid-November on the LBR
- Observations largely during 2002-2010, 'Trial 1' of the WUP flow experiment; not subsequently monitored

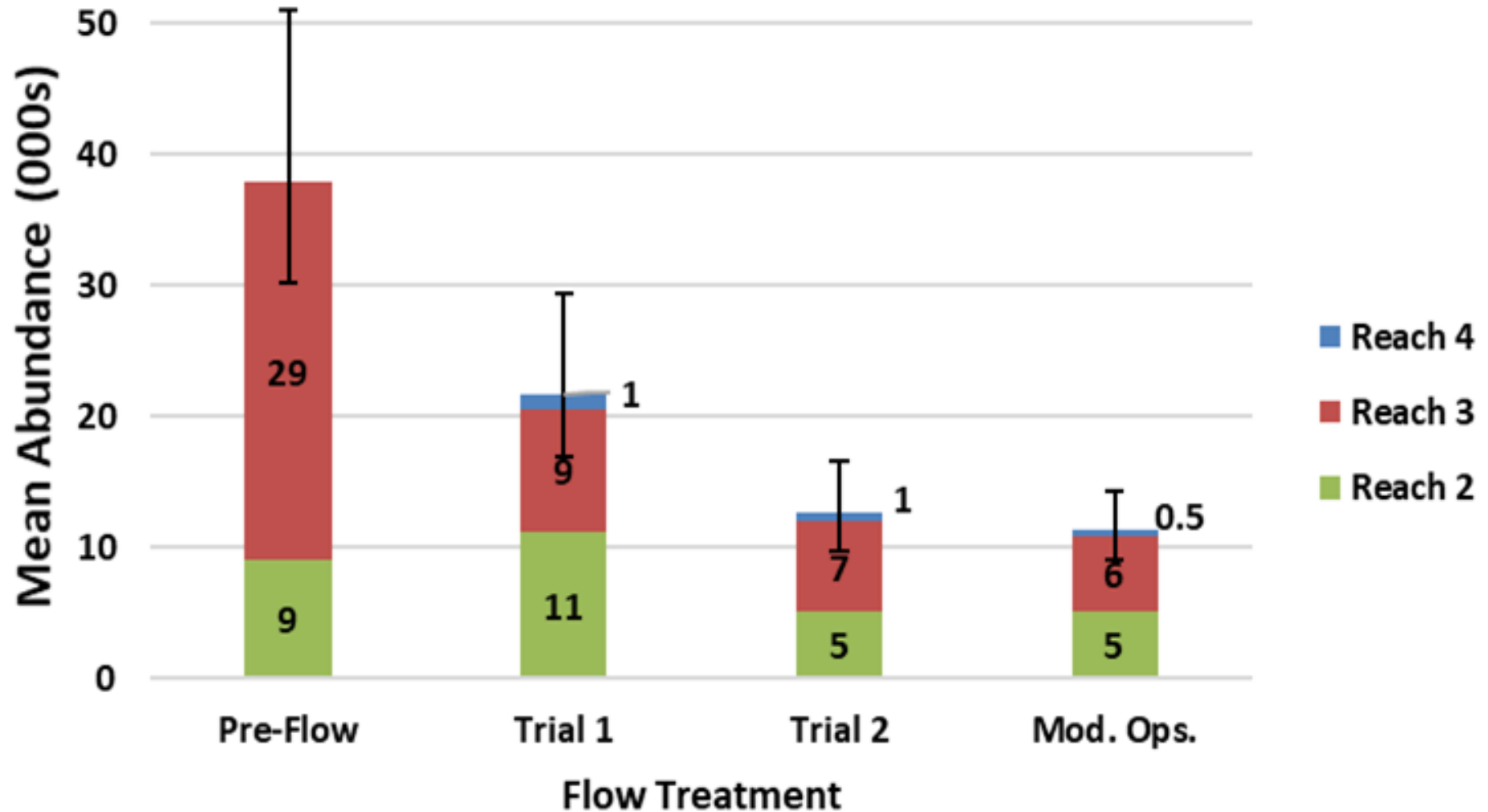


Year	Dates	Chinook fry count	Size (mm)
2002	10-17 Dec	3	34 – 35
2003	12-14 Dec	24	31 – 39
2004	15-17 Nov	7	32 – 36
	11-14 Dec	53	32 – 40
2005	14 Nov	2	25 – 34
	12-14 Dec	14	32 – 42
2006	11 Dec	1	23
2007	30 Nov	1	33
2010	8 Dec	1	32



December 2005

Standing stock assessment surveys

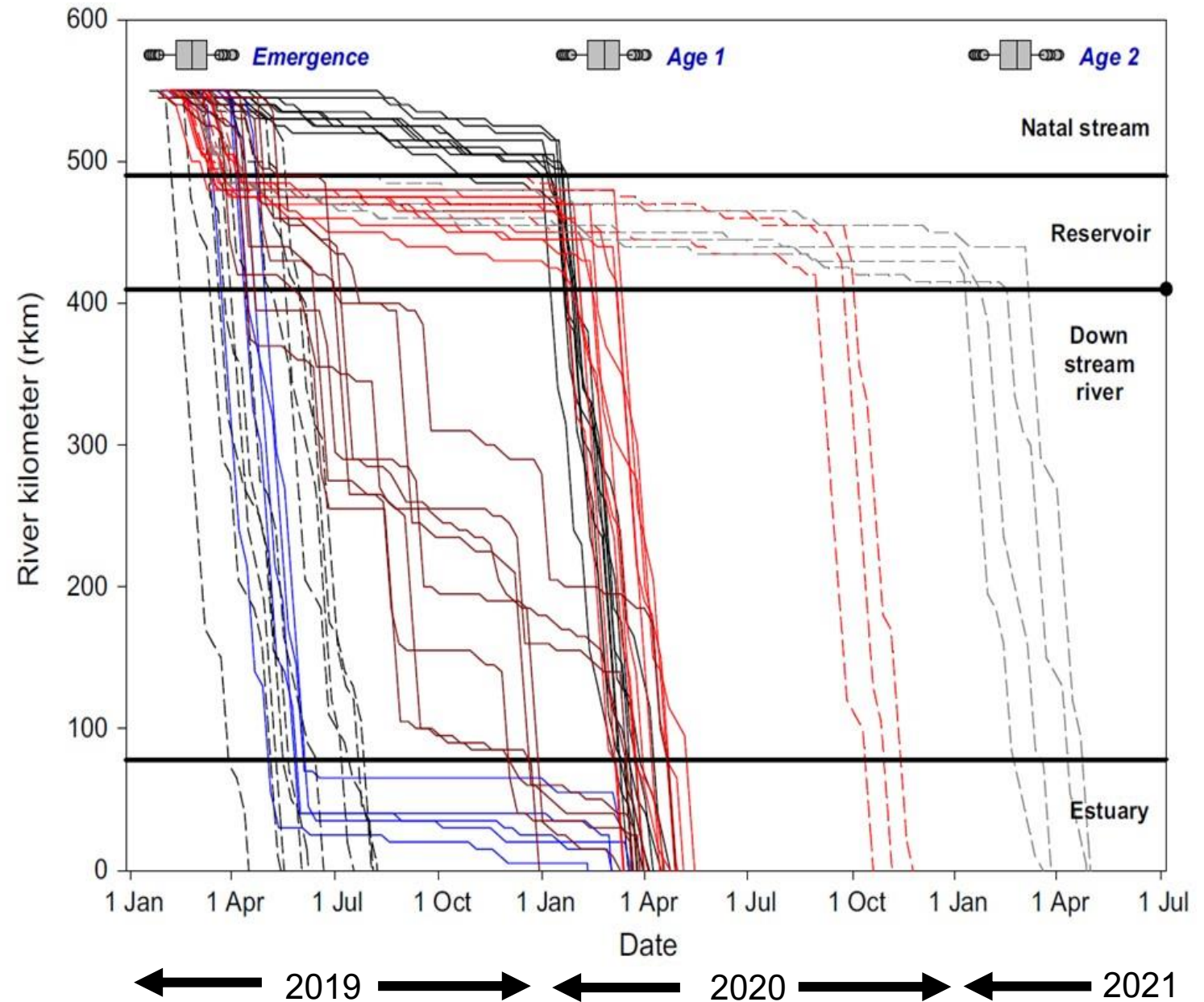


What's underlying these declines?

1. Early emergence = match-mismatch hypothesis?
 - Poor overwinter survival?
 - Early outmigration from LBR?
2. Adult recruitment has also been declining across the Fraser River during the same time period; population is escapement-limited?

Juvenile Chinook salmon life history

- Chinook salmon juveniles outmigrate from natal rivers all months of the year
- Most juveniles leave their natal stream during the spring and early summer months
- In “stream-type” populations such as in the Bridge River, most juveniles leave natal river as subyearling fish
- Rear in more productive downstream habitats
 - e.g., mainstem Fraser River
 - Other tributaries
 - Estuary



Uncertainties

1. Emergence timing

- When do juveniles emerge across the watershed?
- What proportion of the LBR's production is affected by early emergence?
- What proportion of early emergers survive?

2. Juvenile outmigration

- At what time of year/life-history stage do juveniles leave the LBR?
- When do early emergers leave the LBR and in what numbers?

3. Life-history reconstruction

- What habitats are used during freshwater rearing?
- What are the implications of Big Bar straying on genetic and life history composition?

Recommendation: Emergence Timing Research

To address new MON-1 management questions:

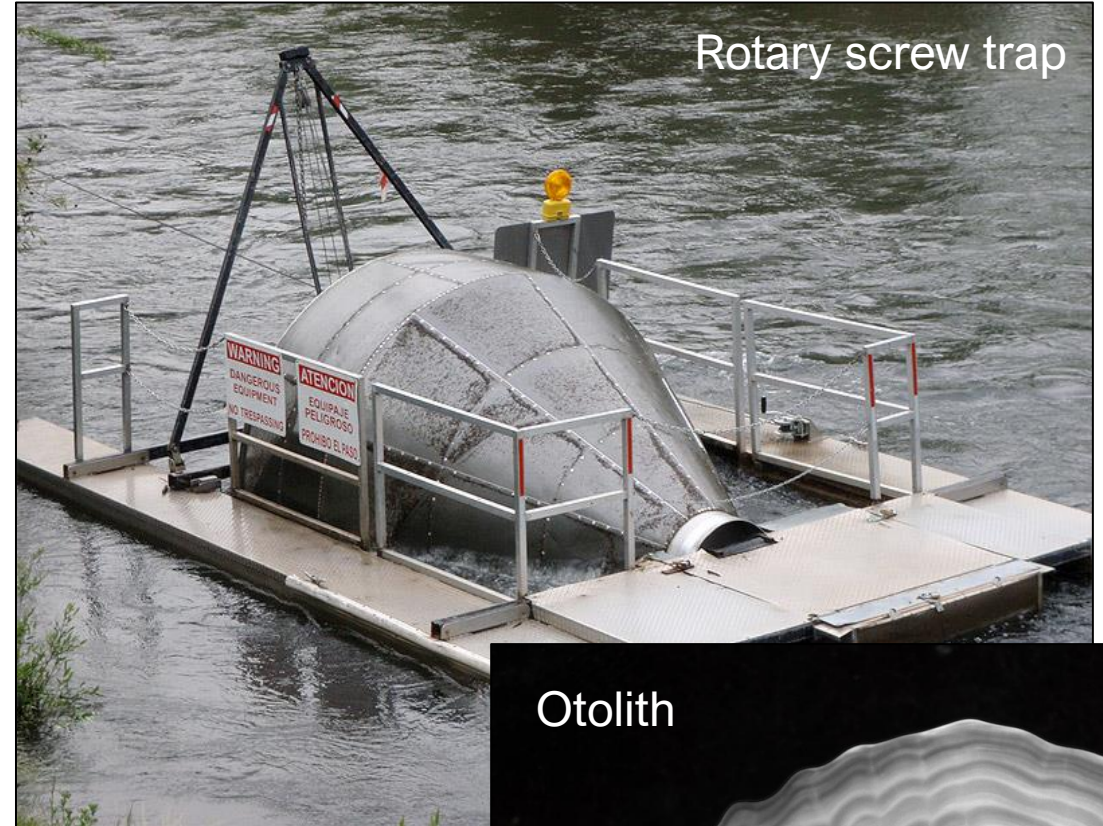
- Monitor fry emergence timing near spawning grounds, Dec-Apr; inclined plane traps could be used to sample emerging fry (e.g. in headwaters of Nechako River)
- Quantify fry production over time, e.g., using mark-recapture experiments
- Mark fry (e.g., VIE) so they can be resighted at later stages, e.g. during outmigration



Inclined Plane Trap in Alaska

Recommendation: Life History Research

- Develop juvenile outmigration program to better characterize outmigration timing and abundance, life history stage; rotary screw trap operations in reach 1, ~Feb/Mar – Nov? (thaw – ice-up)
- Conduct life-history reconstruction research on adult salmon e.g., using otolith microchemistry
- Couple adult life history research with genetics studies to identify stray contributions



Otolith

