Overwintering distribution and behavior of adult steelhead in the FCRPS: 2013-2014

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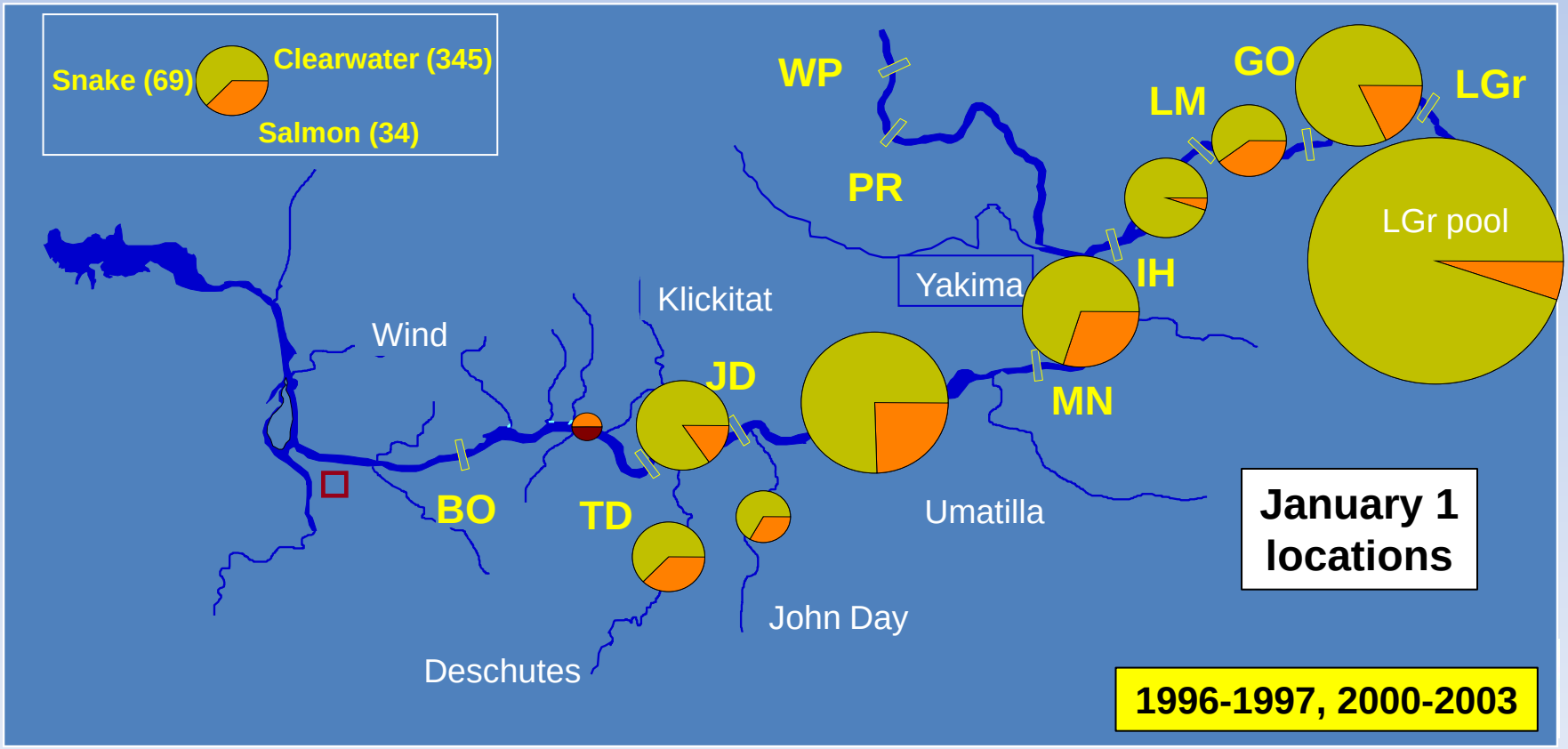
Background

- Steelhead partially winter throughout FCRPS
  - Cued by water temperature / photoperiod
  - Snake River fish have particularly diverse behaviors



Background

- 1996-2003 studies suggest that many (10,000s) steelhead overwinter in FCRPS in most years
  - Annual estimates: 7-20% of 'successful' migrants

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[Article]

Overwintering Distribution, Behavior, and Survival of Adult Summer Steelhead: Variability among Columbia River Populations

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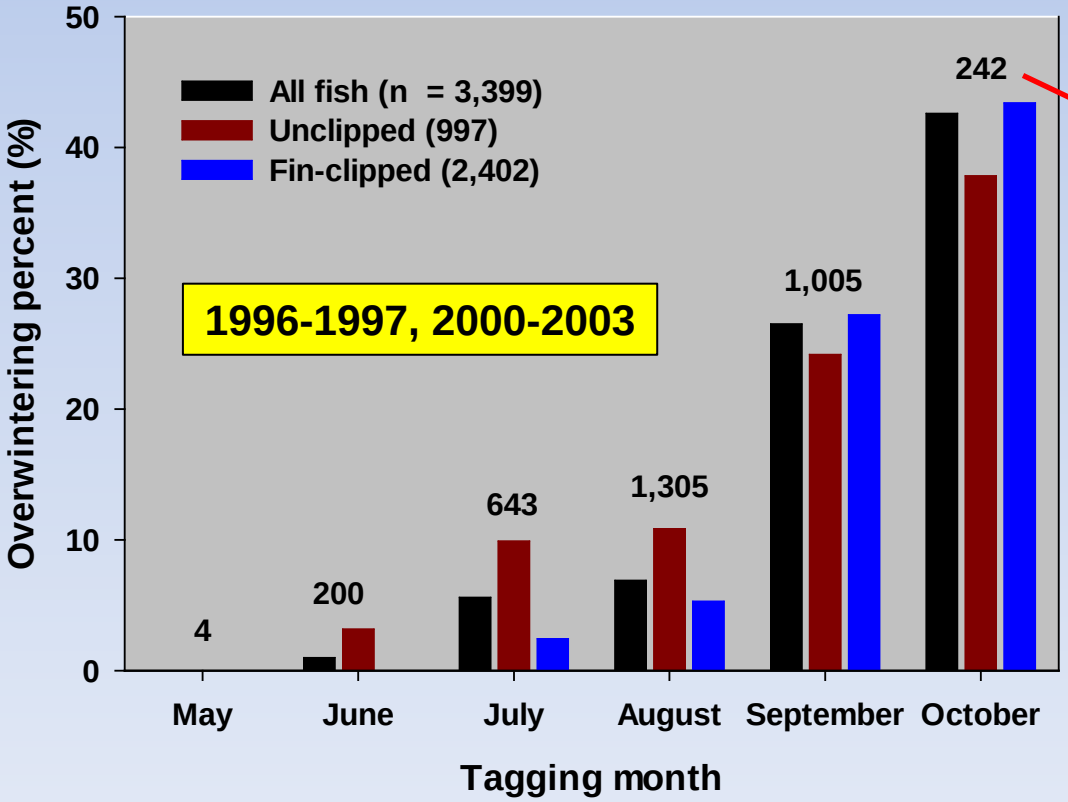
Background

- Late migrants are far more likely to overwinter
  - Many nominal ‘B-group’ Snake River fish
  - *Motivation for current study*: BiOp RPAs to increase ‘B-group’ survival, productivity + kelt survival



Relatively few late-run data over 6 years

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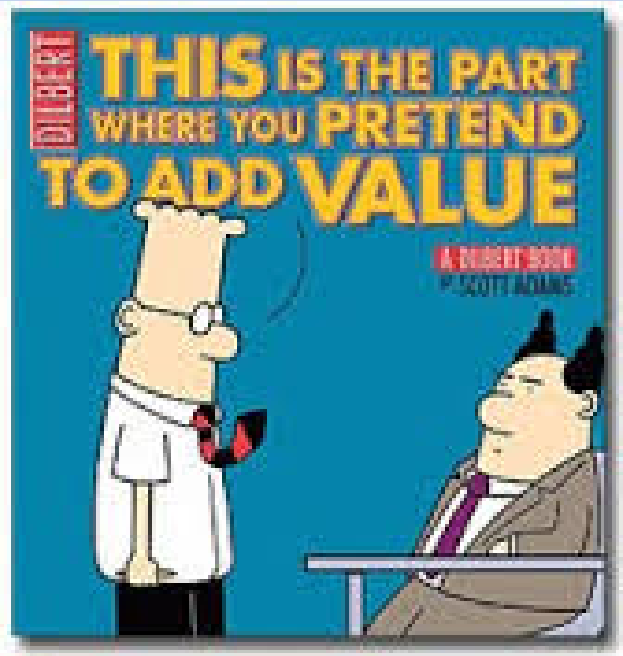
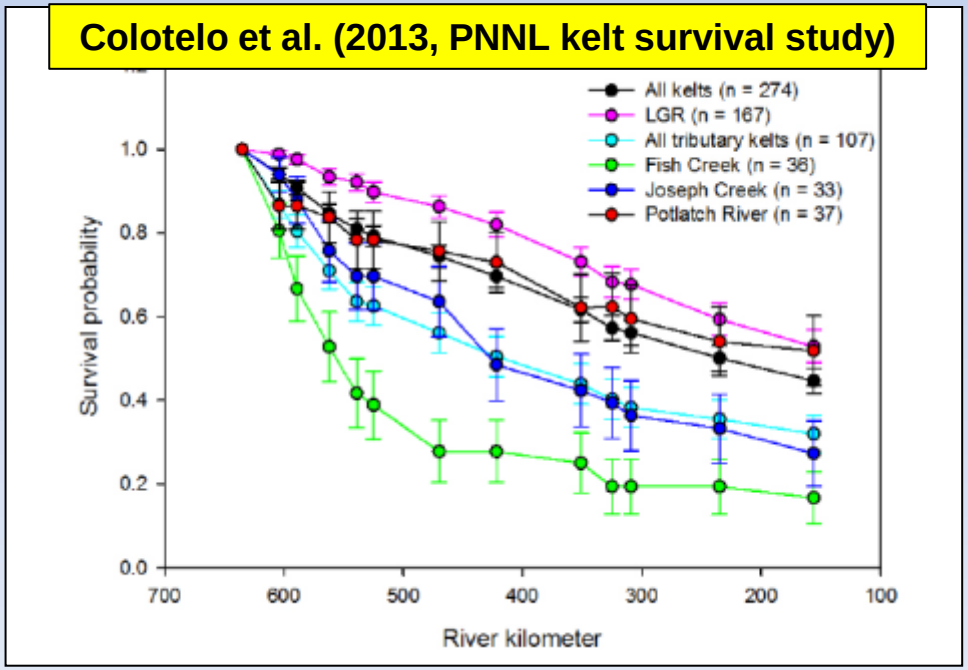
Background

- Late-run information needed:
  - Overwintering abundance and distribution
  - Fallback frequency & timing
  - Fallback routes
    - Limited surface-flow passage options = mortality risks for both prespawn steelhead and post-spawn kelts

Presentation objectives

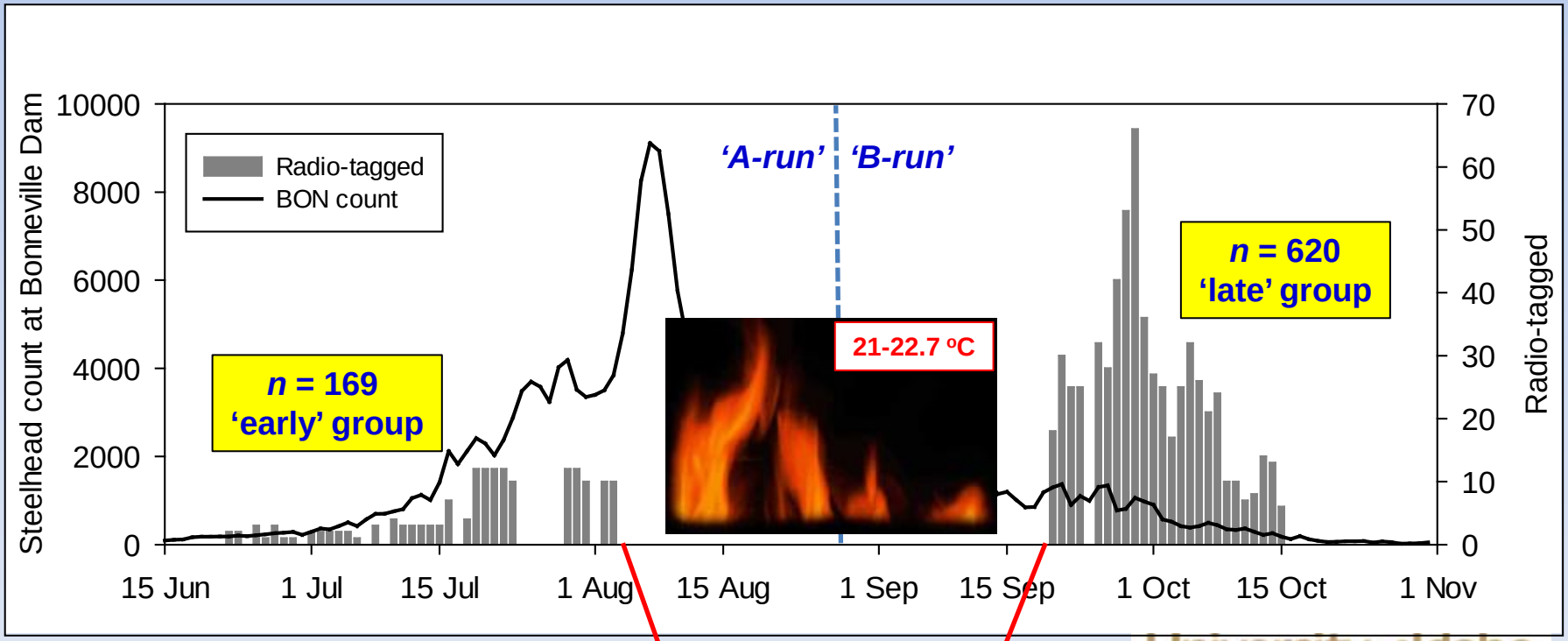
- Estimate FCRPS steelhead overwintering rate
- Summarize fish distribution through time
- Identify fallback sites, timing, routes
  - *315 day tags: 'B-run' kelt behavior & survival*





Methods

- Radio- & PIT-tagging at Bonneville Dam
  - 789 adult steelhead tagged, released downstream
  - Sample weighted for late migrants, but. . . .



Tagging restriction

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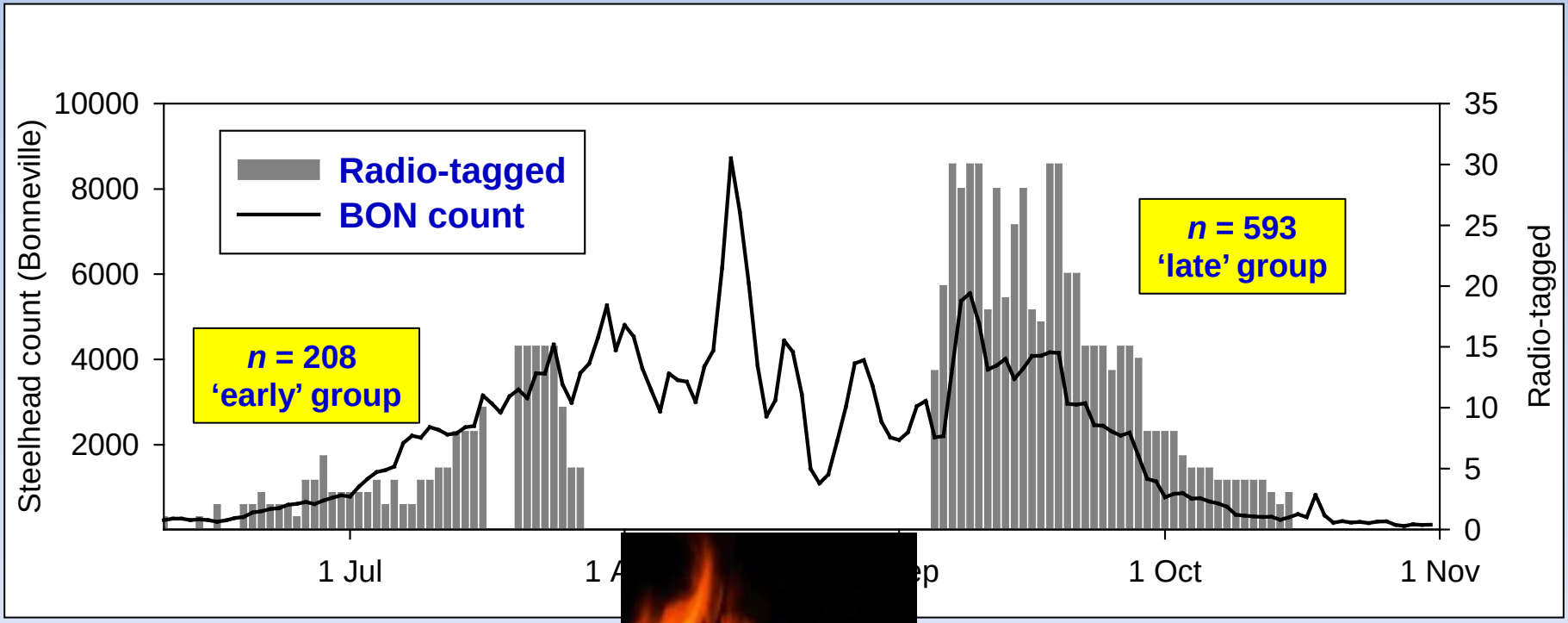
Methods

- 799 tagged in 2014 (year 2 of 2-year study)
  - *Still in-river, results in 2015*



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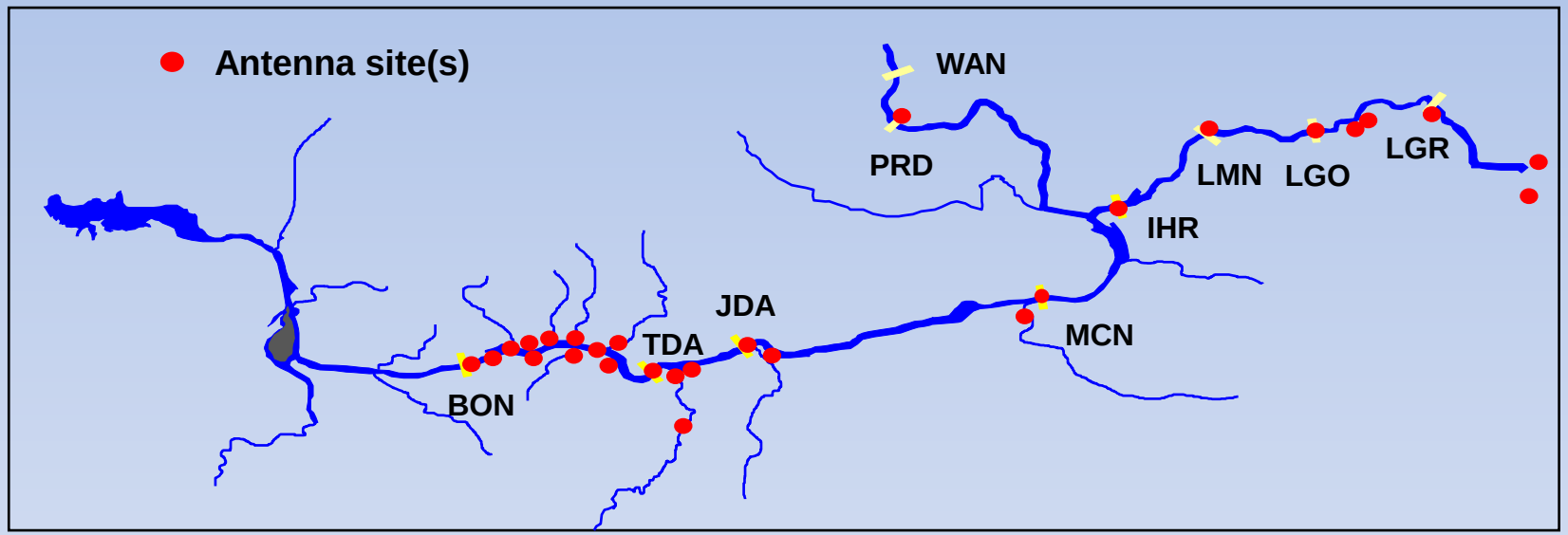
Methods

- Radiotelemetry monitoring array



Tailraces, fishways, ladders at 9 dams

Lower Columbia reservoir sites

Most major tributaries

Transmitter return: reward program

PIT-tag monitoring system primarily used for fate assignment

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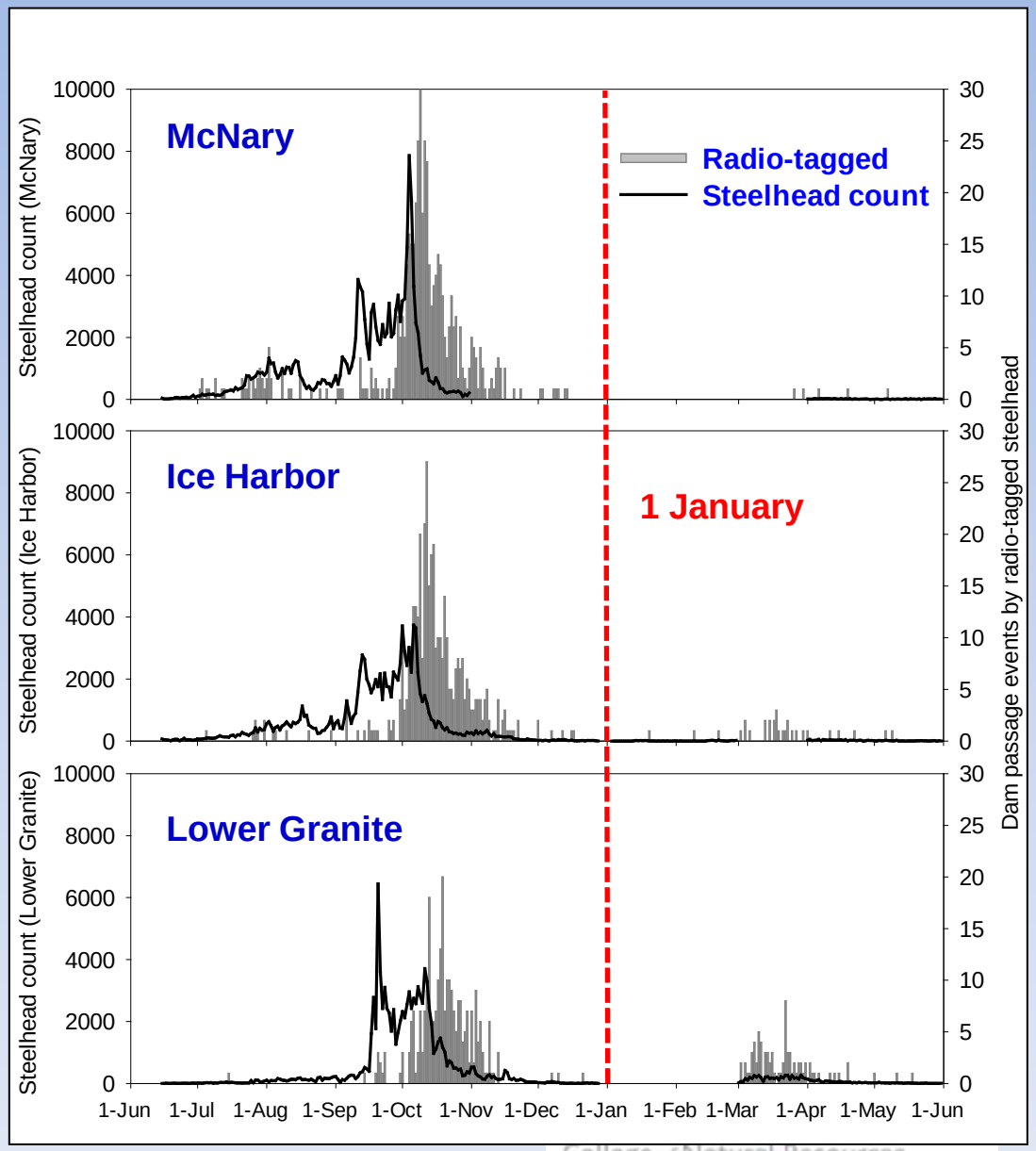
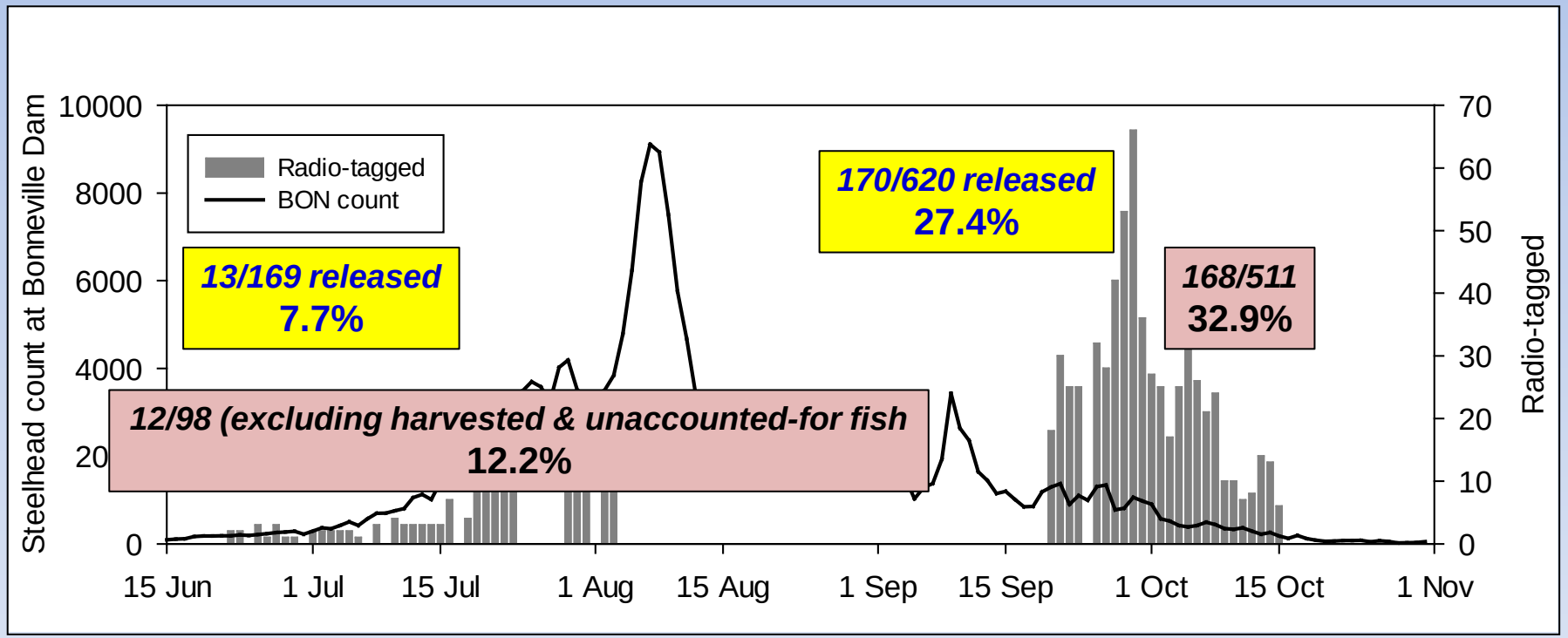
Methods

- Defining overwintering:
  - Dam passage
  - Tributary entry / FCRPS exit
    - ≥ 1 January



Results: % overwintering

- 183 fish (23.2%) met overwintering criteria



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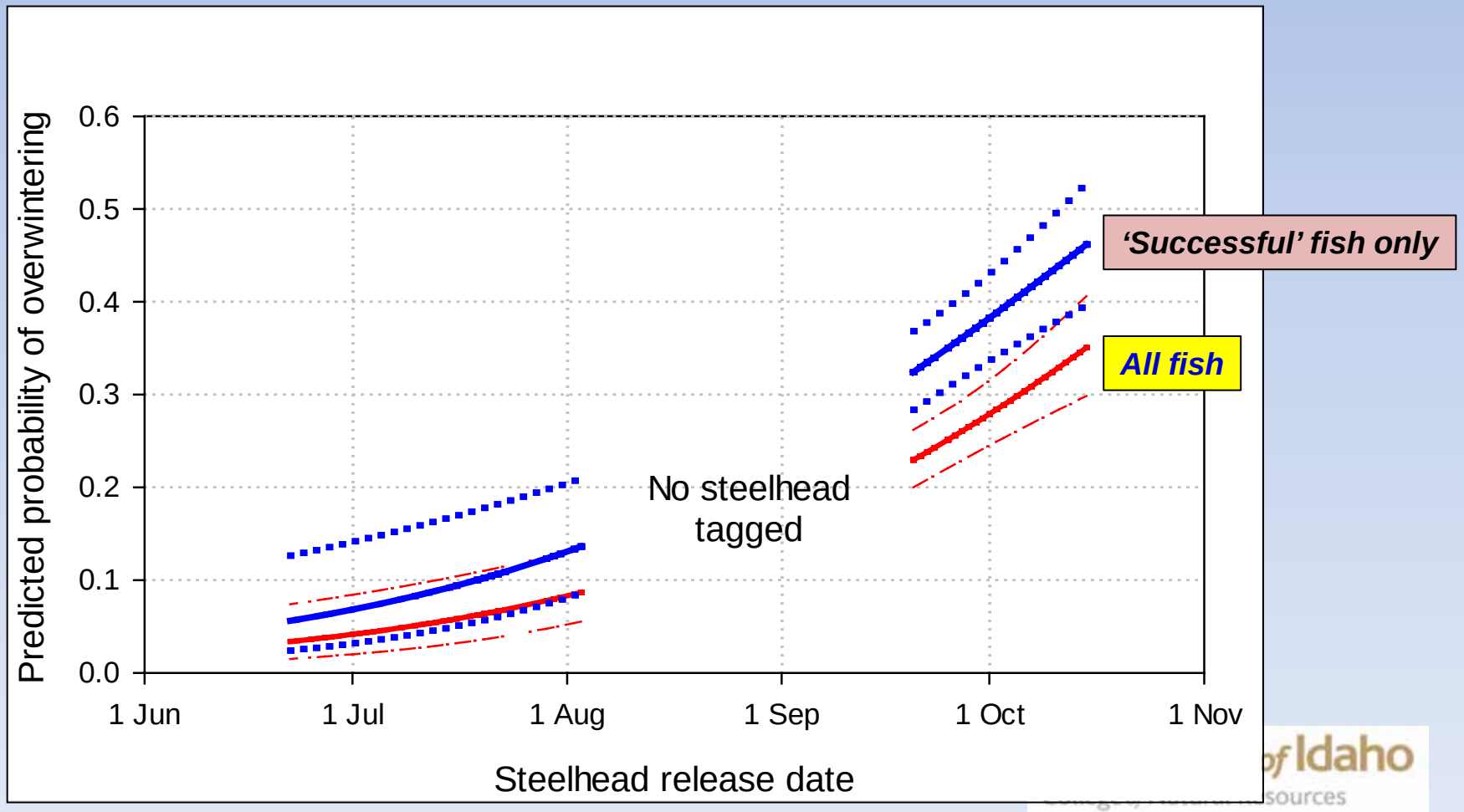
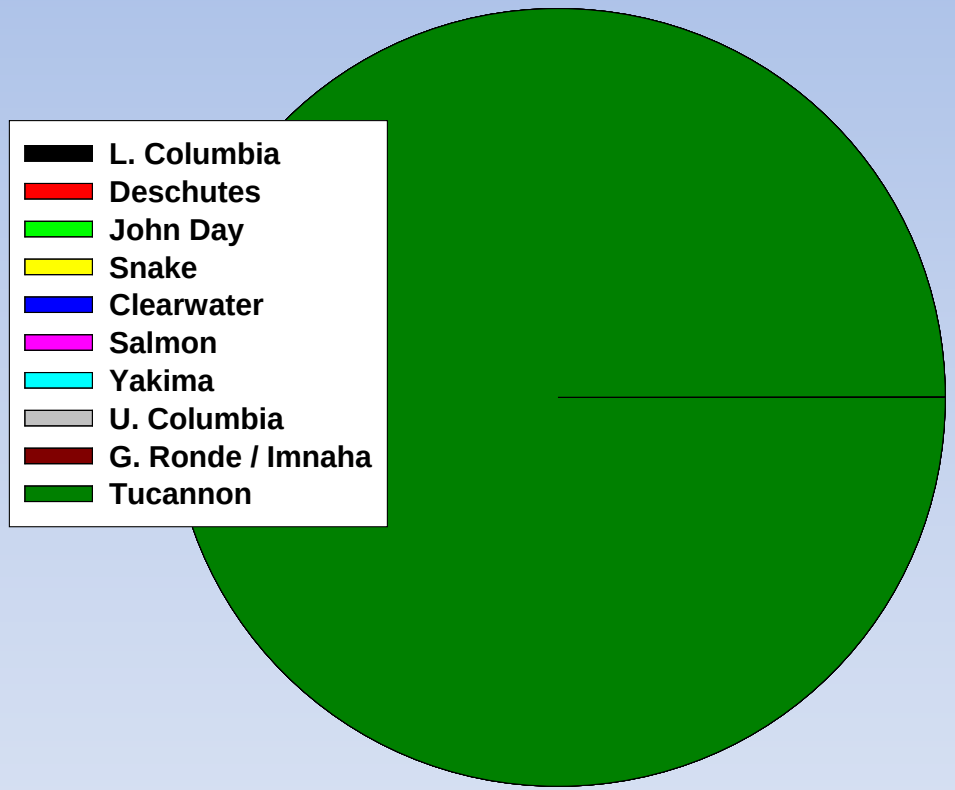
Results: % overwintering

- Logistic regression: strong seasonal effect

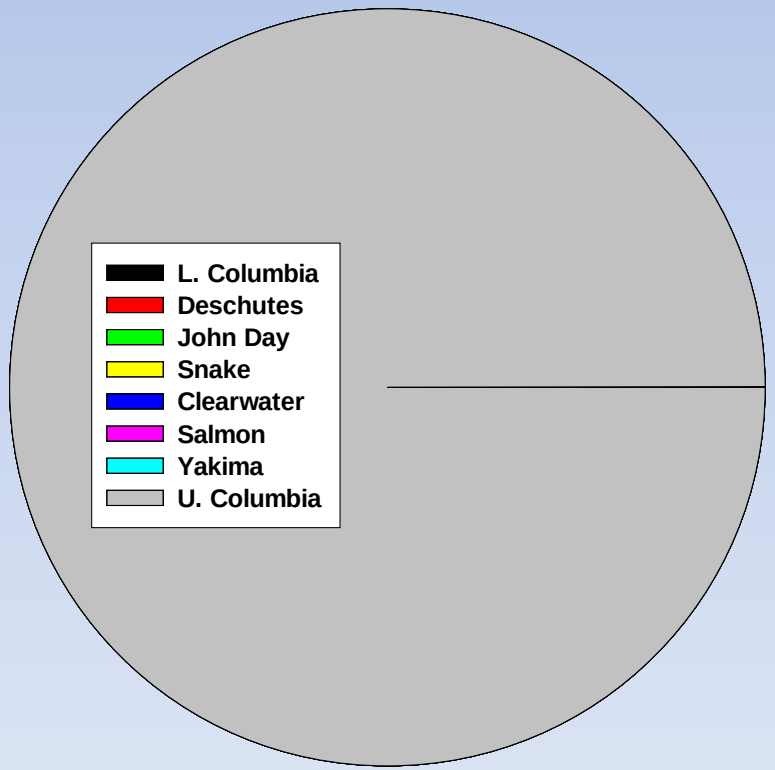


Results: composition

'Successful' 2013-2014 overwintering fish



1996-1997, 2000-2003



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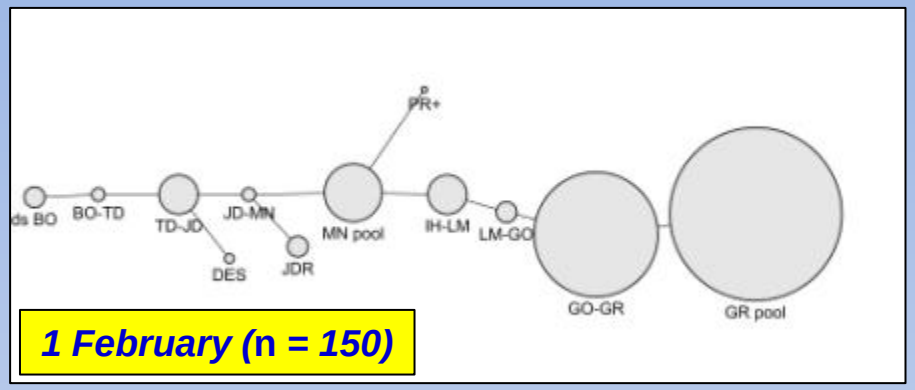
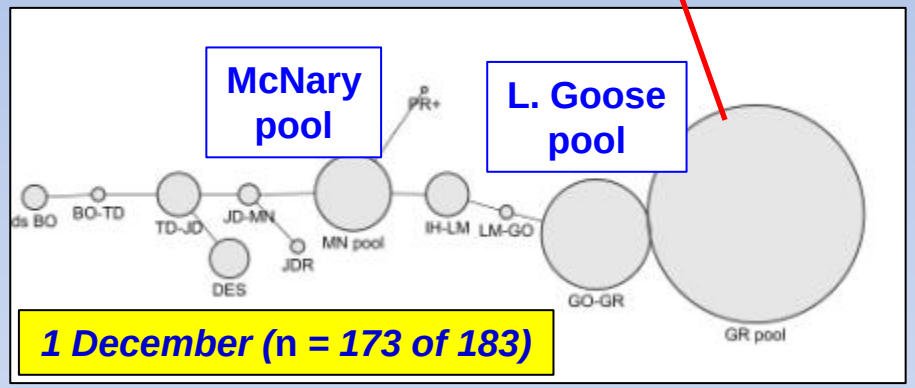
Results: winter distribution

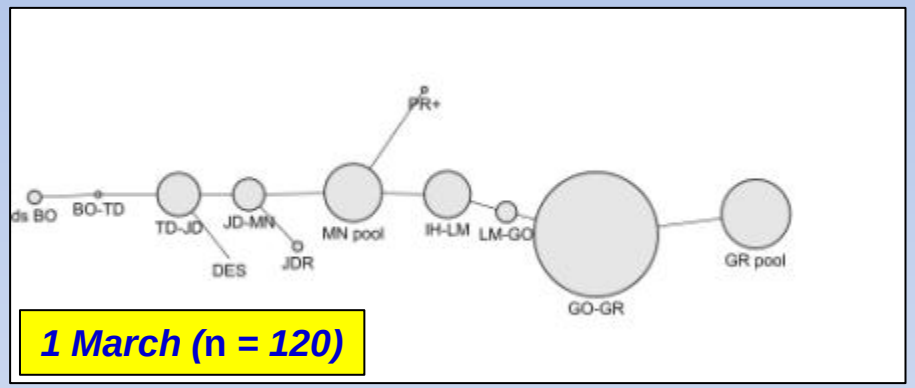


1 February (n = 150)

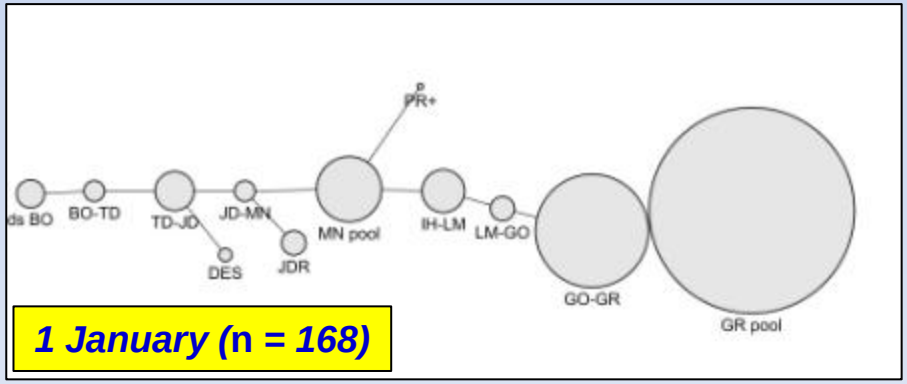
L. Granite pool



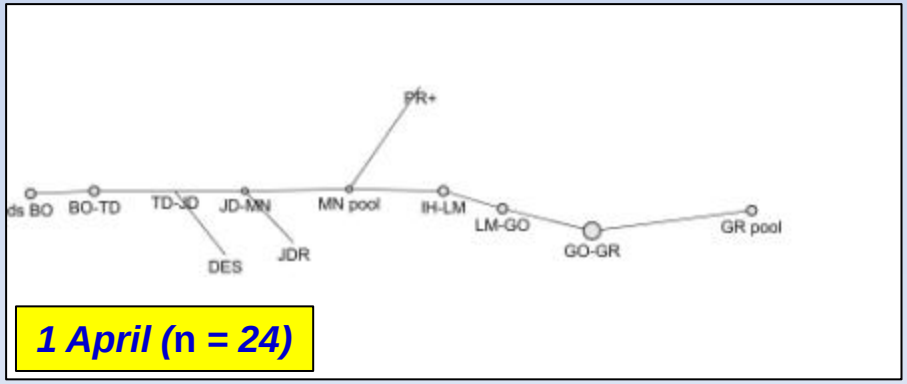
1 December (n = 173 of 183)



1 March (n = 120)



1 January (n = 168)



1 April (n = 24)

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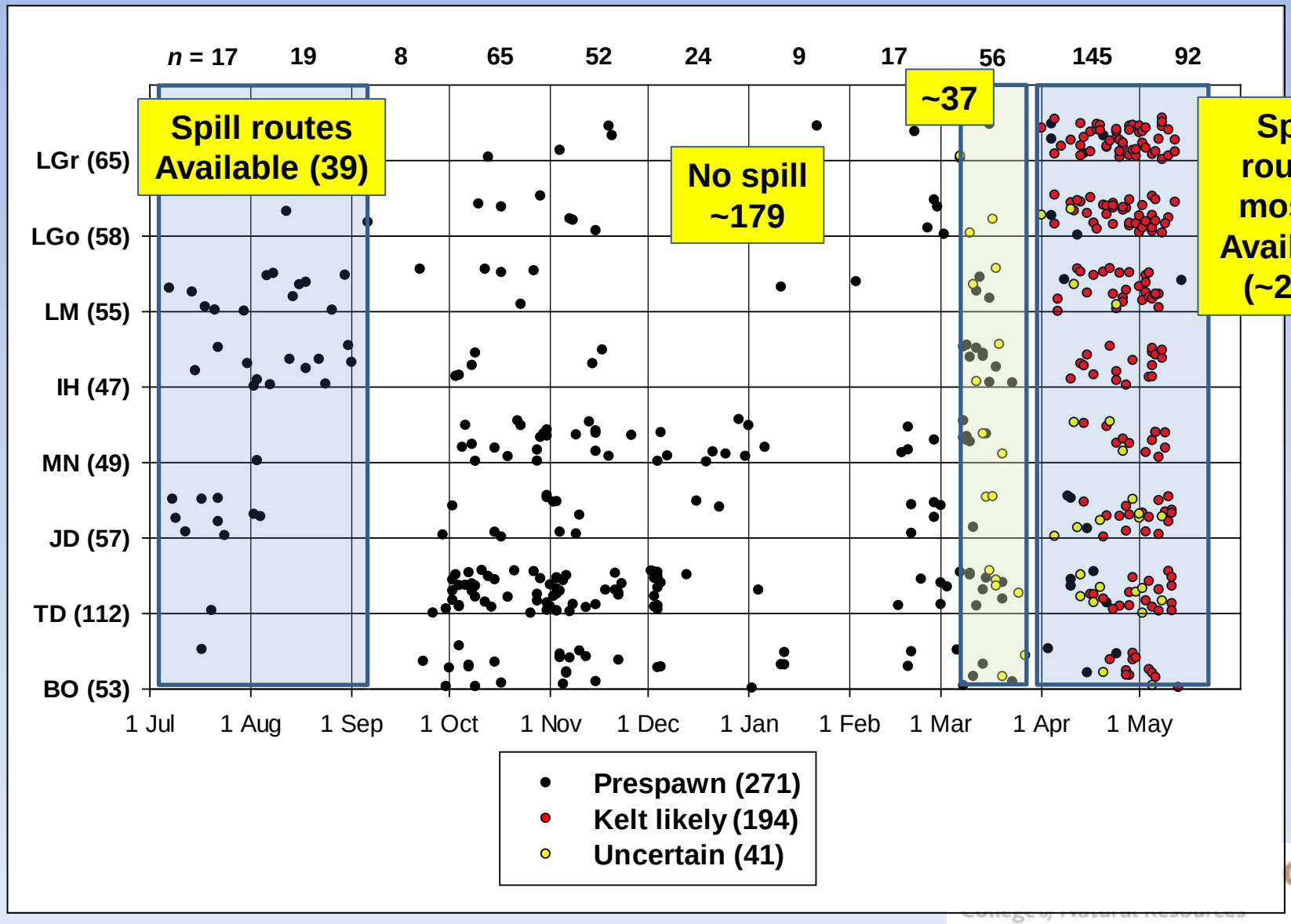
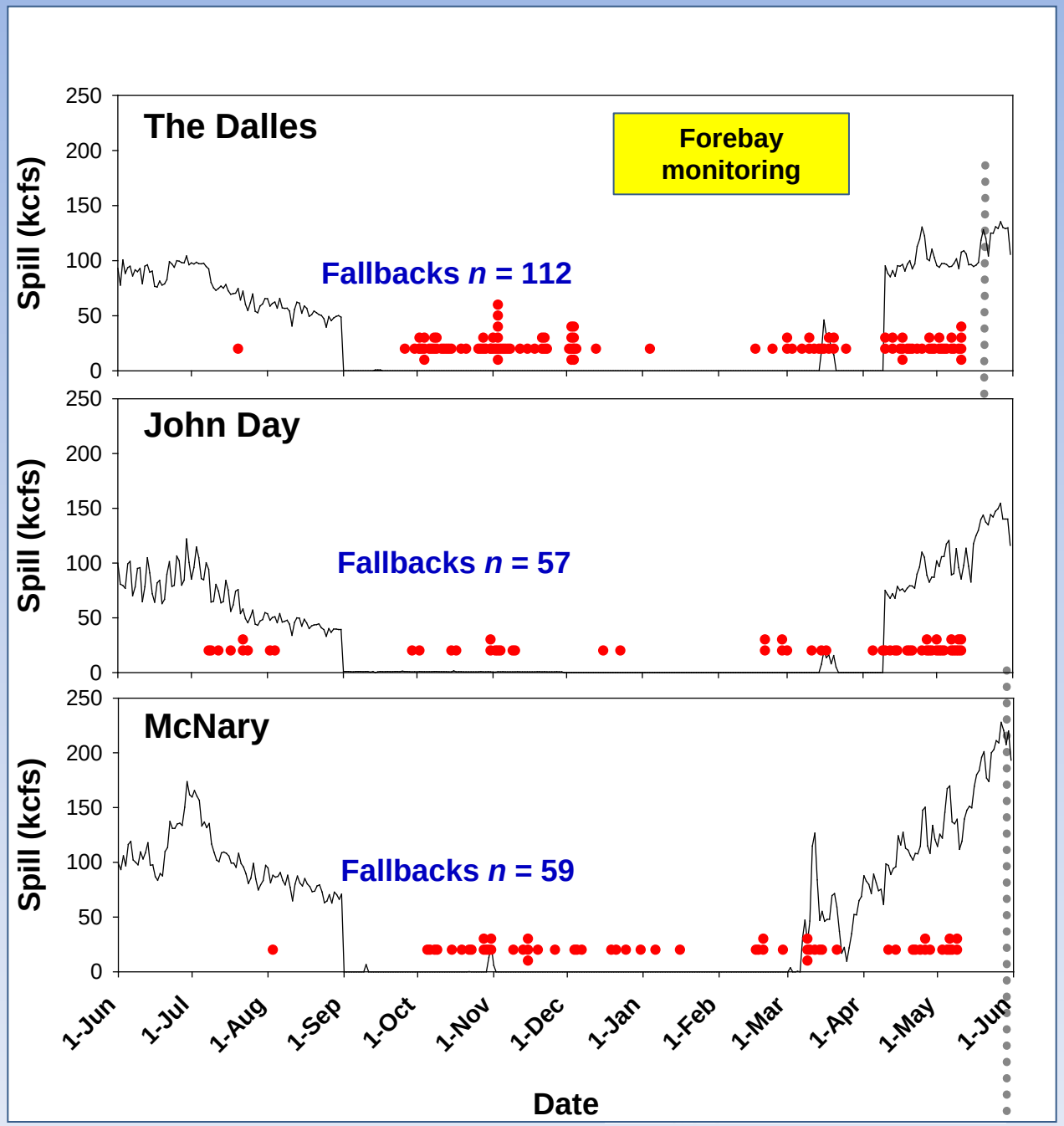
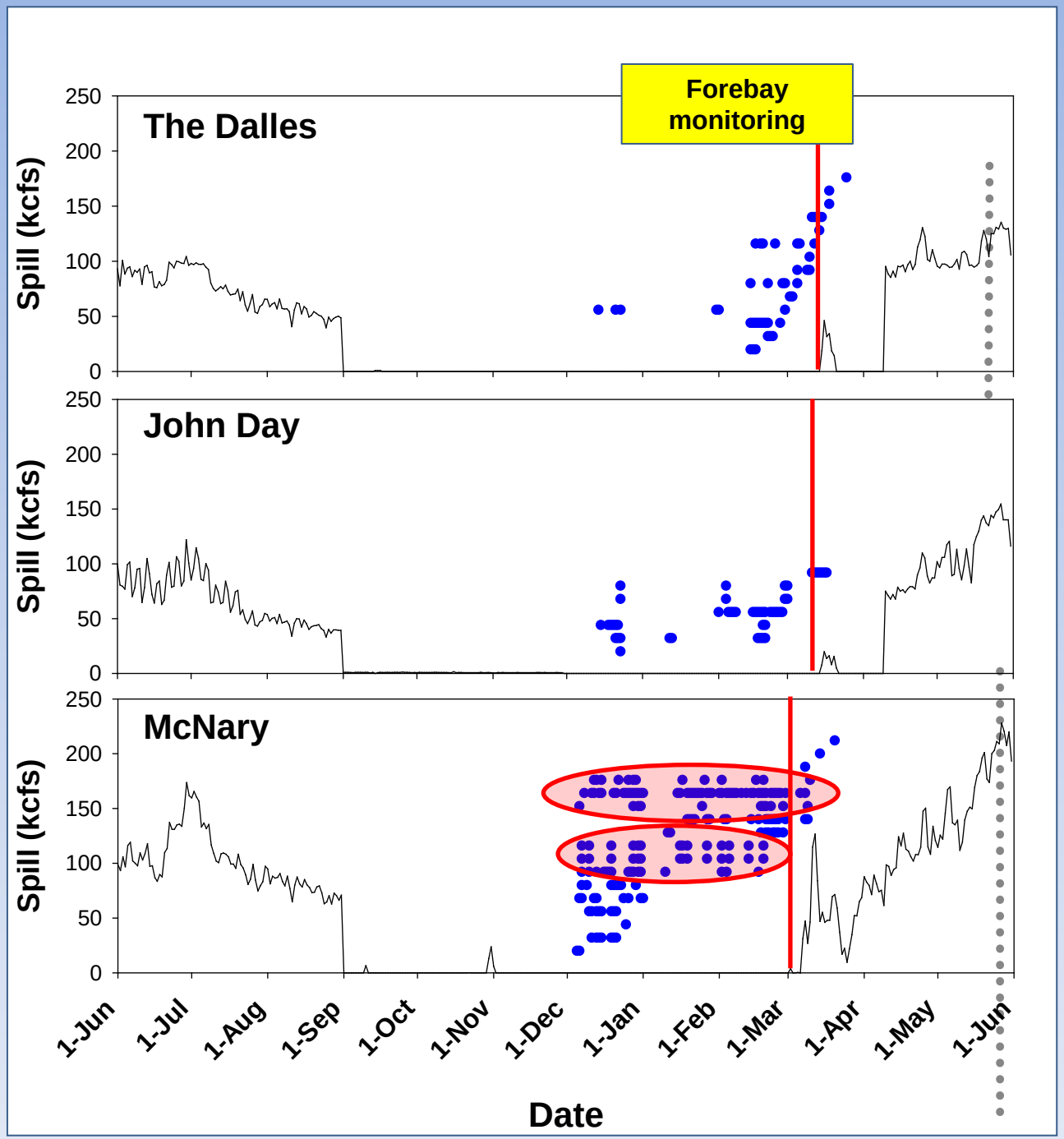
Results: fallback – 506 events



Results: fallback timing estimates



Results: forebay residency by fish that fell back



Many detections

Fell back when spill available

Results: estimated fallback routes

Fallback events during forebay monitoring period

Dam	*n*	Possible Spillway	Possible PH / lock	Likely Ice/Trash	Likely Ladder	No record	'Survived' to tributary
TD	19	5%	47% x x x x	21% x	5%	21% x	68%
JD	10	10%	60% x x x	-	-	30% x x	50%
MN	21	33% x	38% x x	5%	10% x x	14% x	71%

- Overall survival of FCRPS wintering fish: ~93%
  - Almost no harvest reported
- 1996-1997, 2000-2003 estimate: ~82%
  - Less extensive PIT system, more 'A-run'

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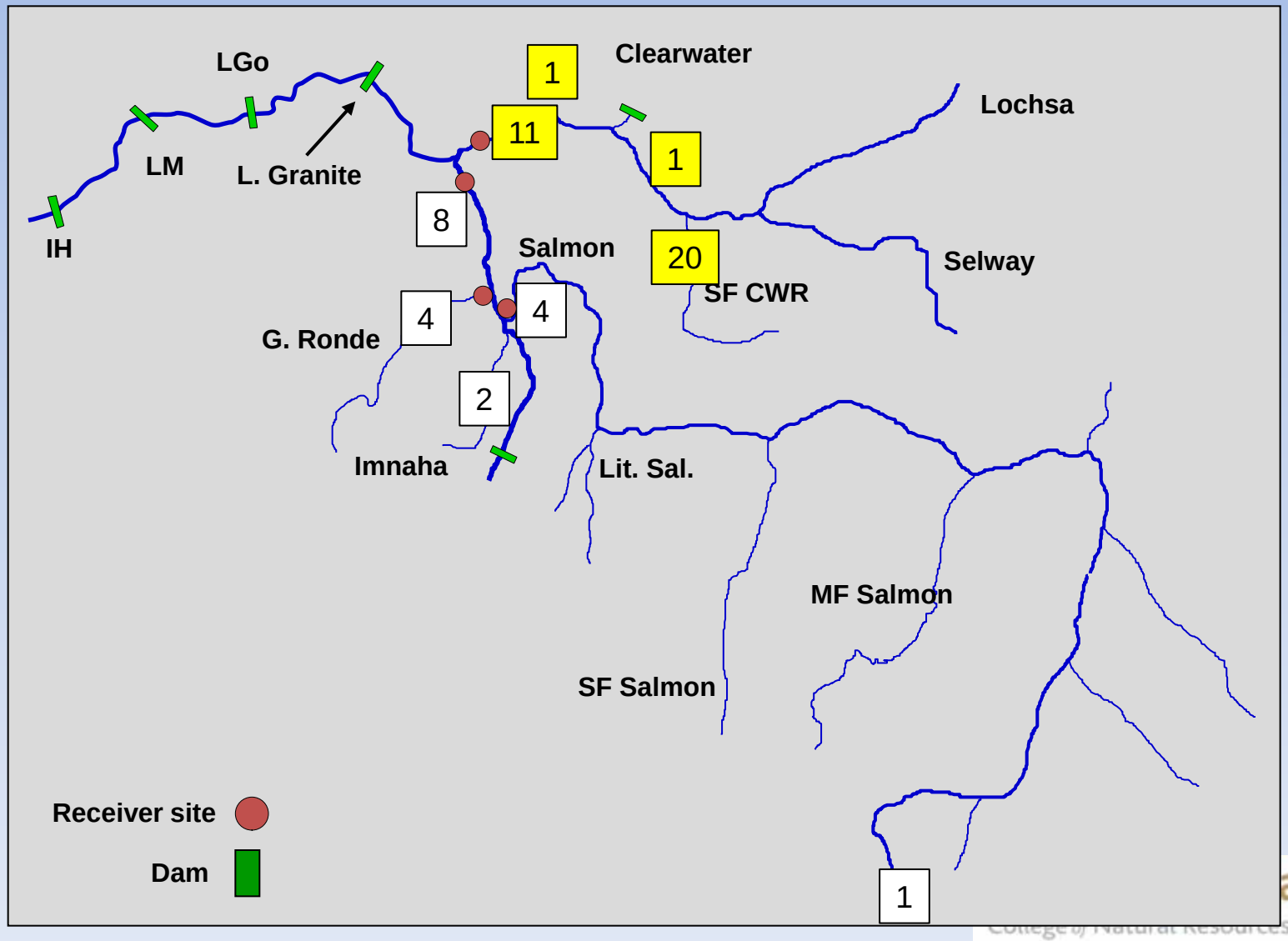
Results: 52 Snake R. kelts fell back

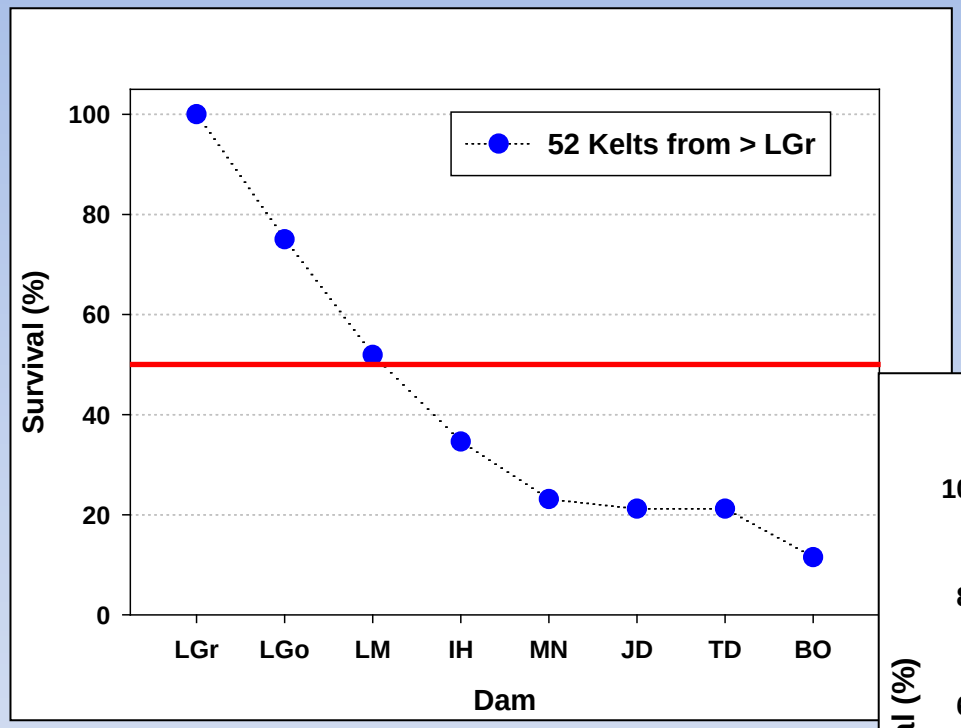


Results: SNR kelt survival

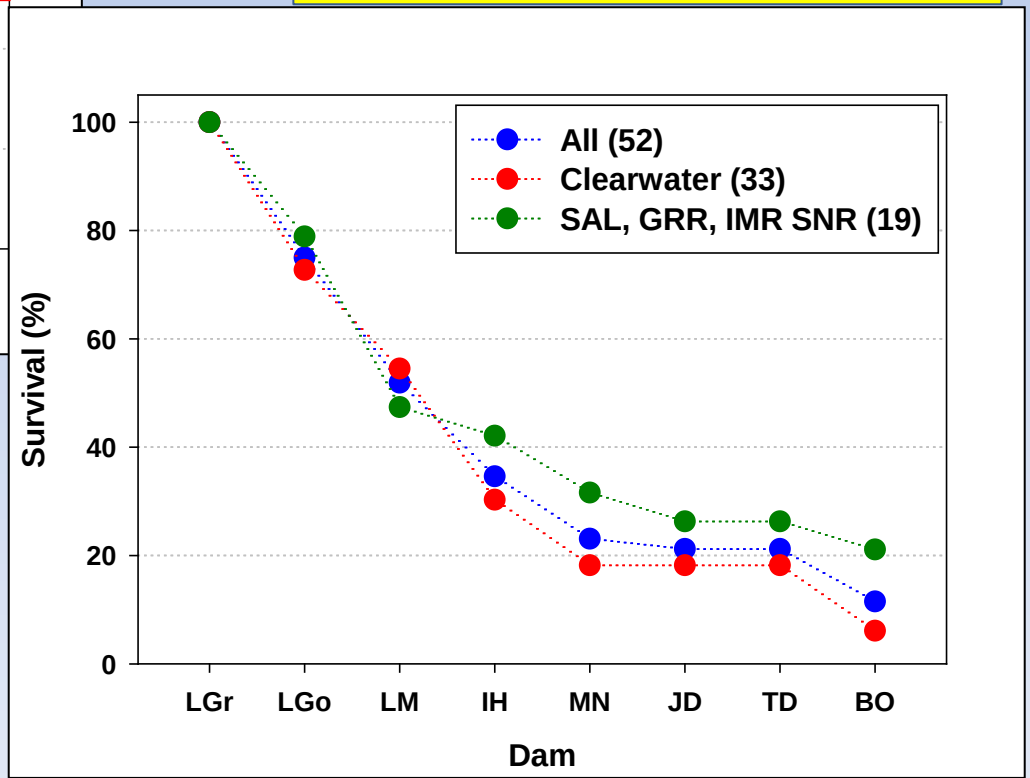
Clearwater:
Mean FL = 76 cm
Mean tag date: 1 Oct

Other SNR groups:
Mean FL = 63 cm
Mean tag date: 12 Sept

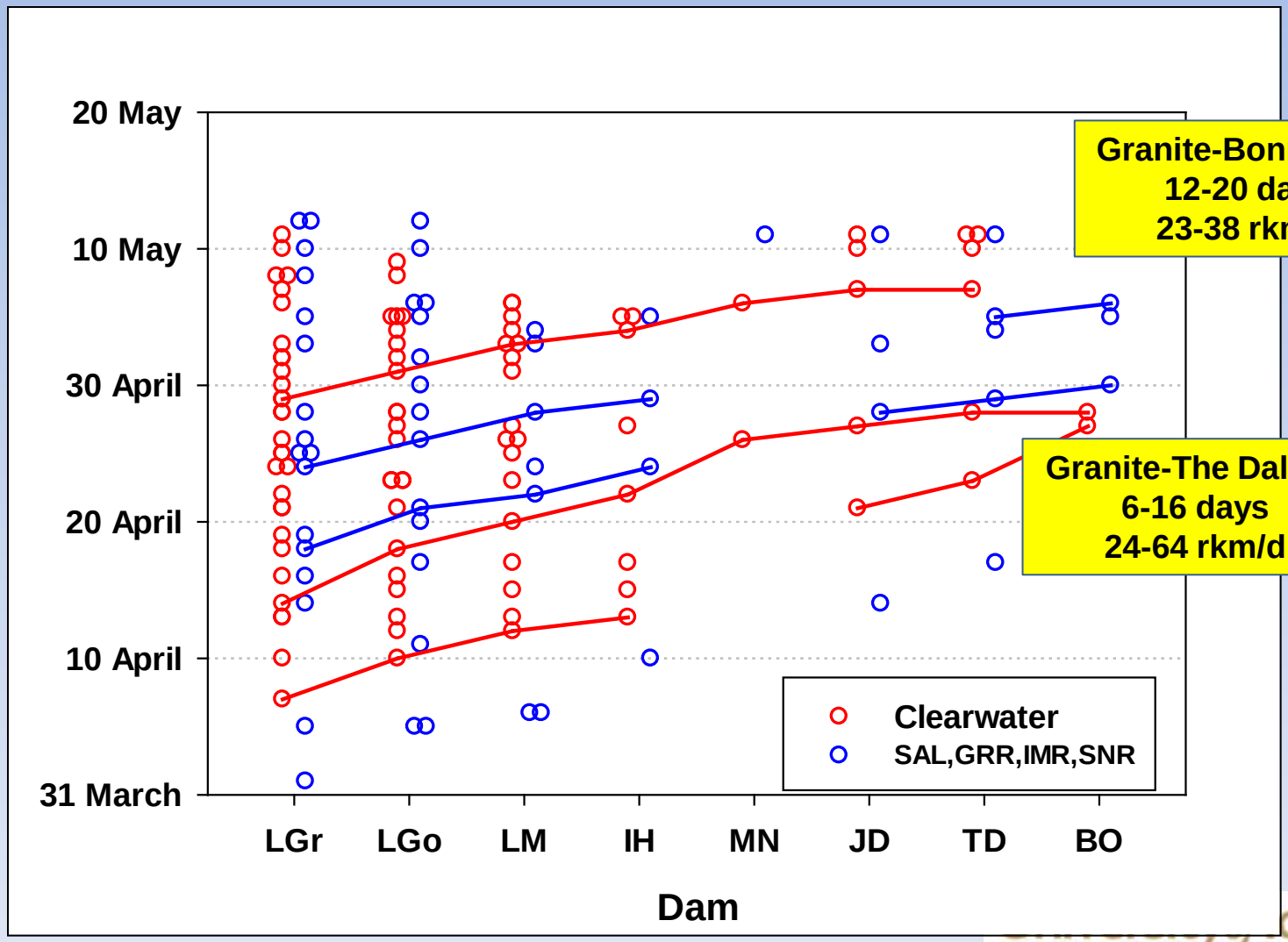
Large kelts have lower survival
Keefer et al. (2008 CJFAS)



No monitoring below BON



Results: SNR kelt fallback timing



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Conclusions

- Overwintering similar to previous studies
  - 8-12% of ‘early’ run
  - 27-33% of ‘late’ run
- Majority of winter sample was Clearwater fish
  - Salmon, John Day, ‘Snake’ (unassigned)
- Overwintering fish had high survival (>90%)
  - Almost no winter harvest

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Conclusions

- Overwintering most common in LGr, LGo pools
- Many fallback events
  - Esp. at The Dalles, McNary during no-spill
  - Some evidence for extended forebay residency
  - Some evidence for fallback-related mortality
- Almost 200 kelt fallbacks in April-May

Conclusions

- Snake River kelts
  - ~10-20% survival to Bonneville
  - 1-3 week travel time for survivors
  - Clearwater kelt survival < other Snake R. fish
- Overall, high attrition in lower Snake River
  - >50% did not reach Ice Harbor

Looking forward

- Additional monitoring winter 2014-2015
  - Earlier start, better coverage at lower Col dams
  - Additional sites at lower Snake dams
  - Spill experiment at McNary
- Final Report: Summer 2015

Questions?

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