General migration and upstream passage patterns in HD PIT-tagged adult Pacific lamprey

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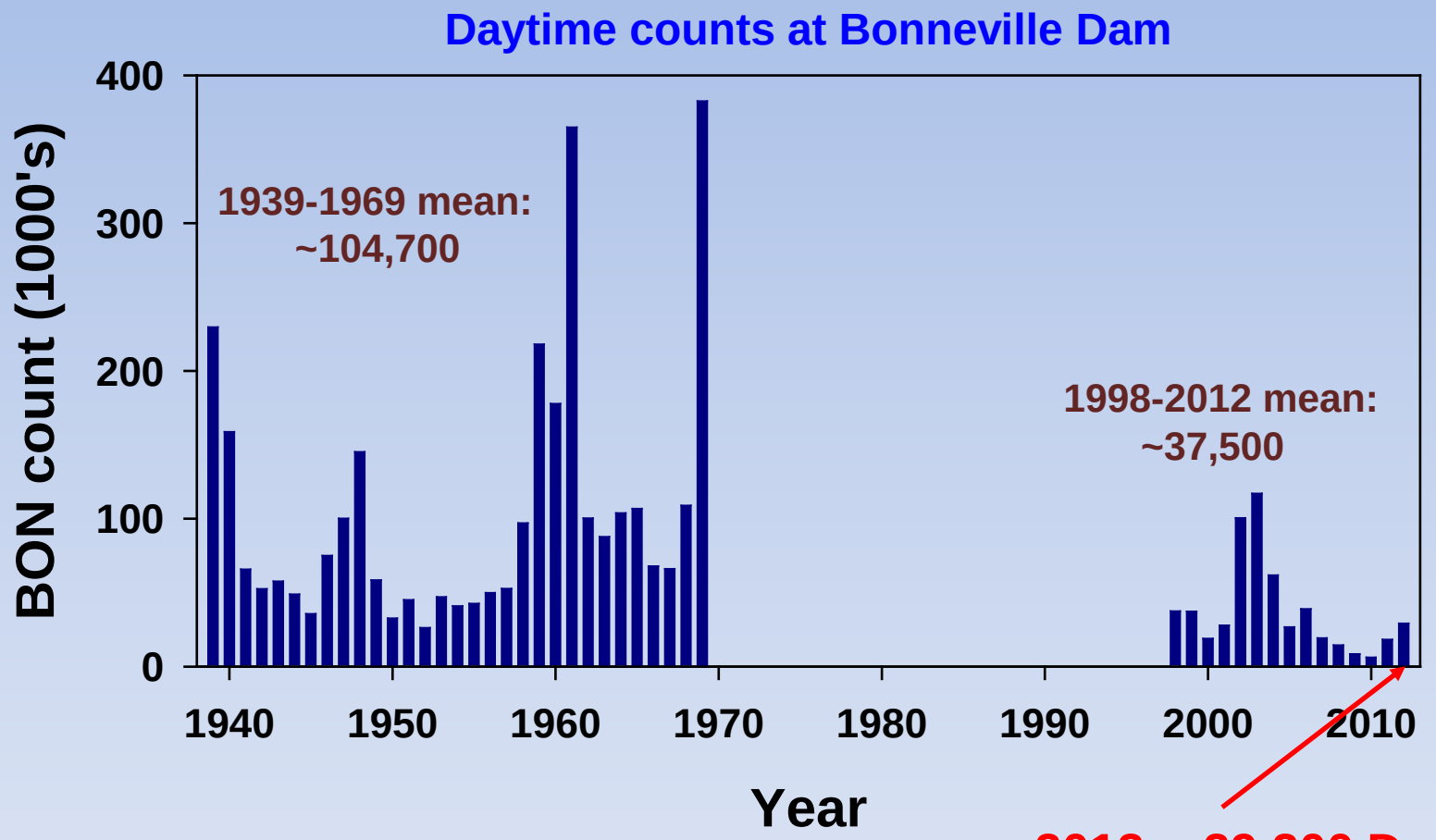
NOAA Fisheries

Presentation objectives

- Introduce the 2012 lamprey run
- Results of the in-season run forecast model
- Summaries for the 2012 HD PIT-tagged sample
  - Reach passage efficiencies
  - Preliminary ‘final’ distribution
- Factors affecting distribution

The 2012 lamprey migration



2012: ~29,200 Day count

Total day count + night count + LPS ~ 93,300

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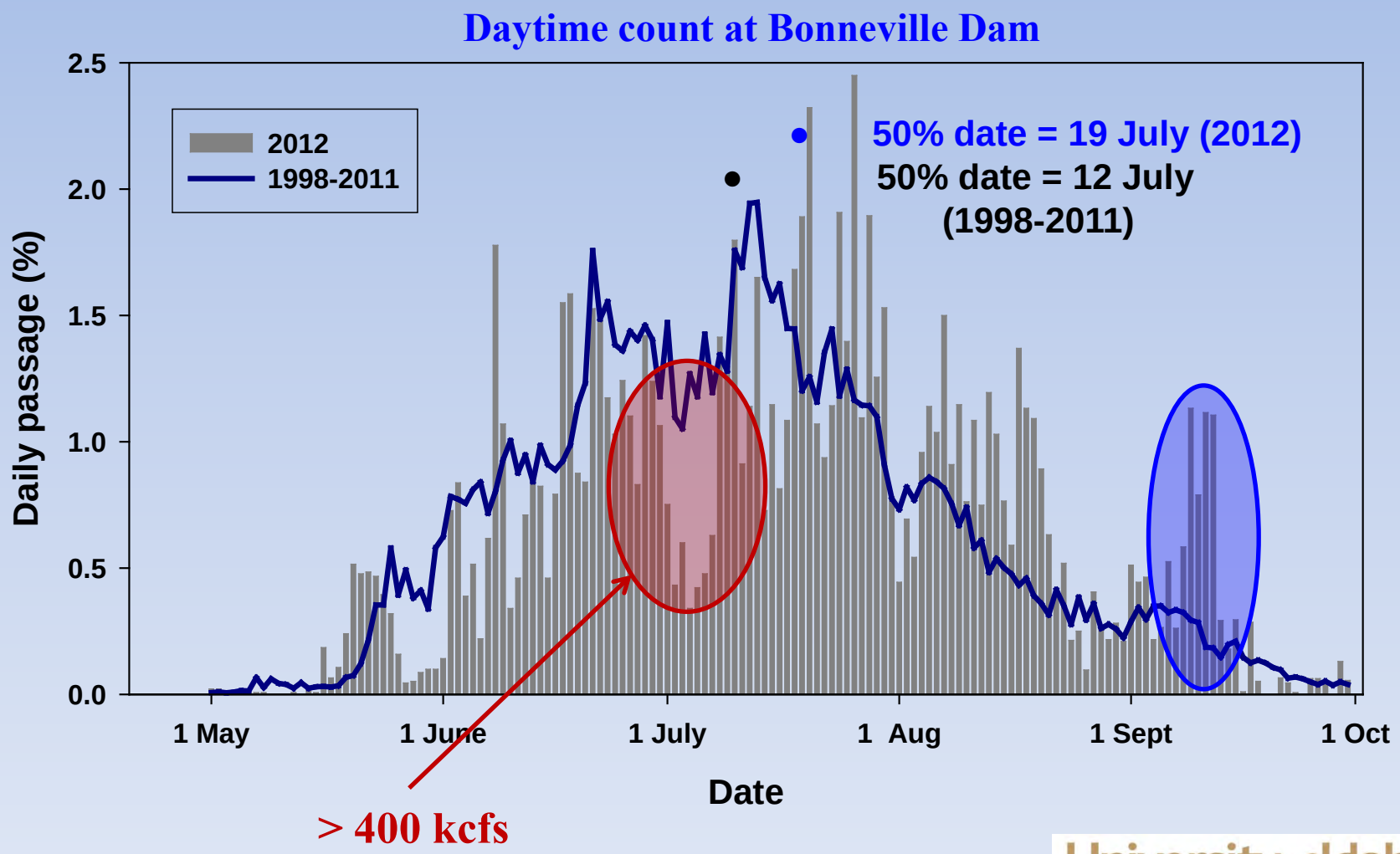
The 2012 lamprey migration



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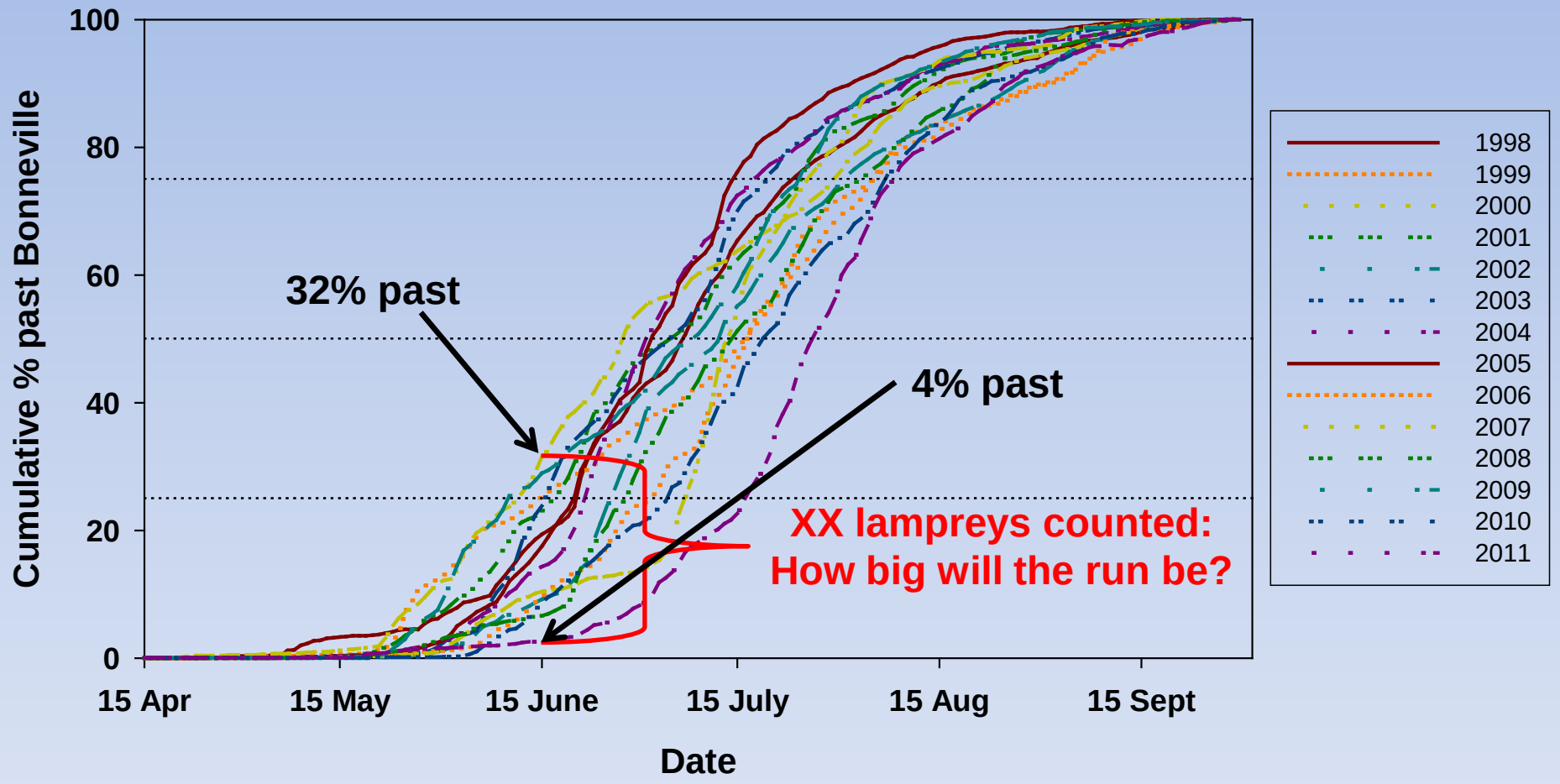
Run timing variability at Bonneville



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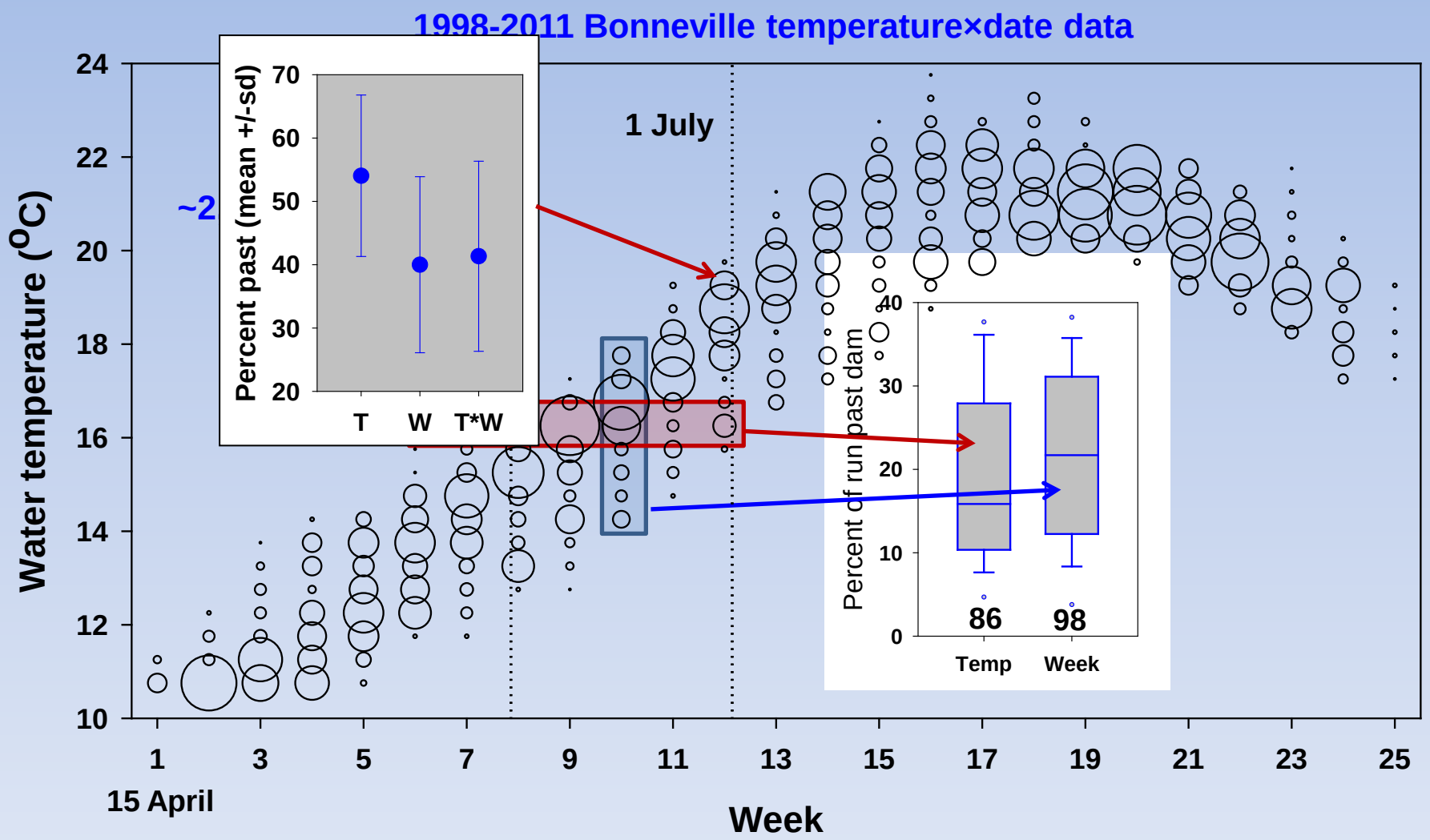
In-season run-timing, run-size model



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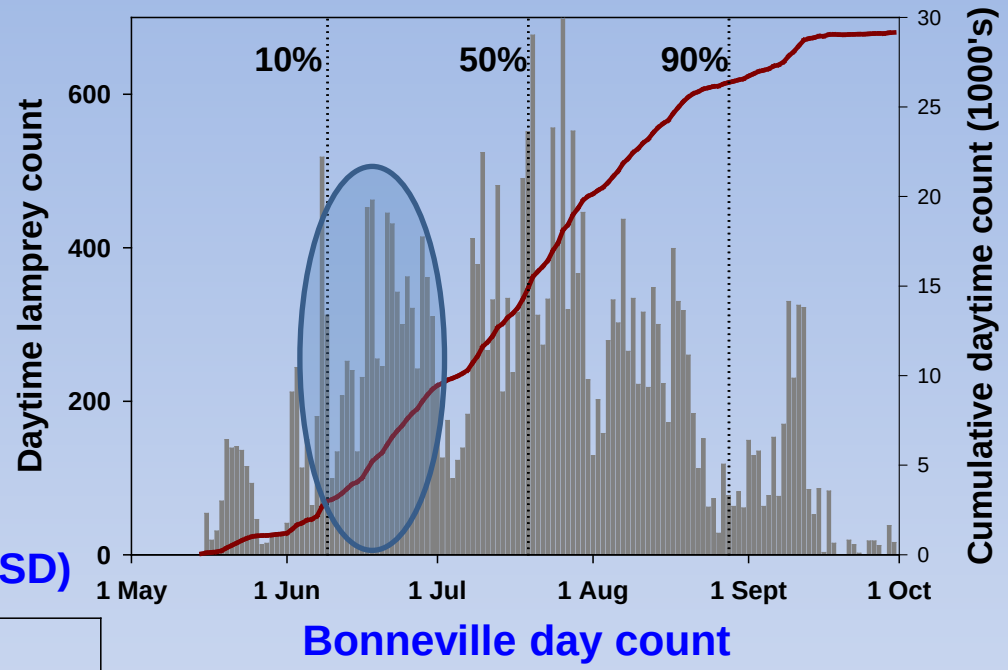
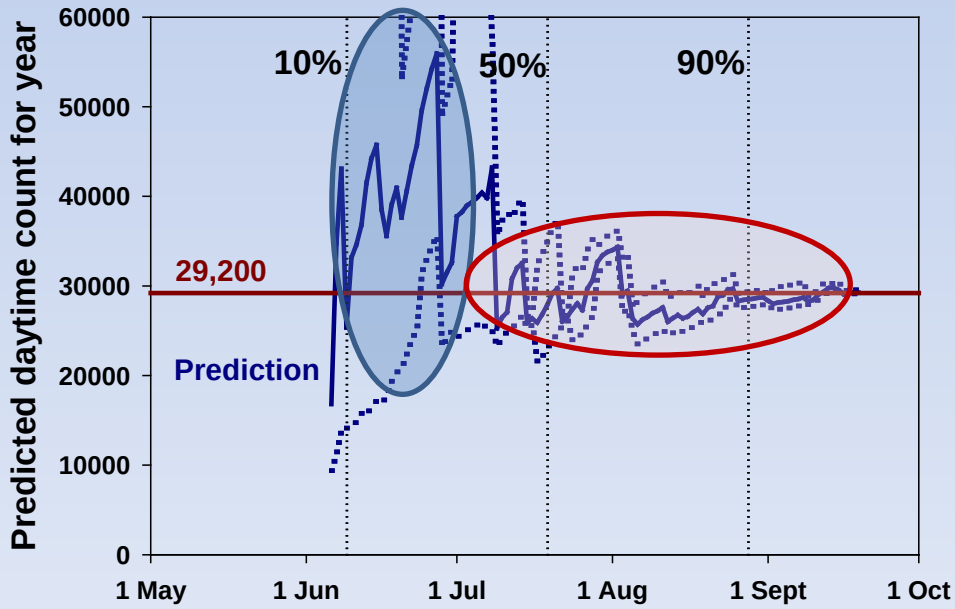
In-season predictions: 2012

Model is least predictive early in the migration



Predicted daytime run size (+/- 1 SD)



Overall ,the 2012 in-season forecast was reasonably good: ~convergence by mid July

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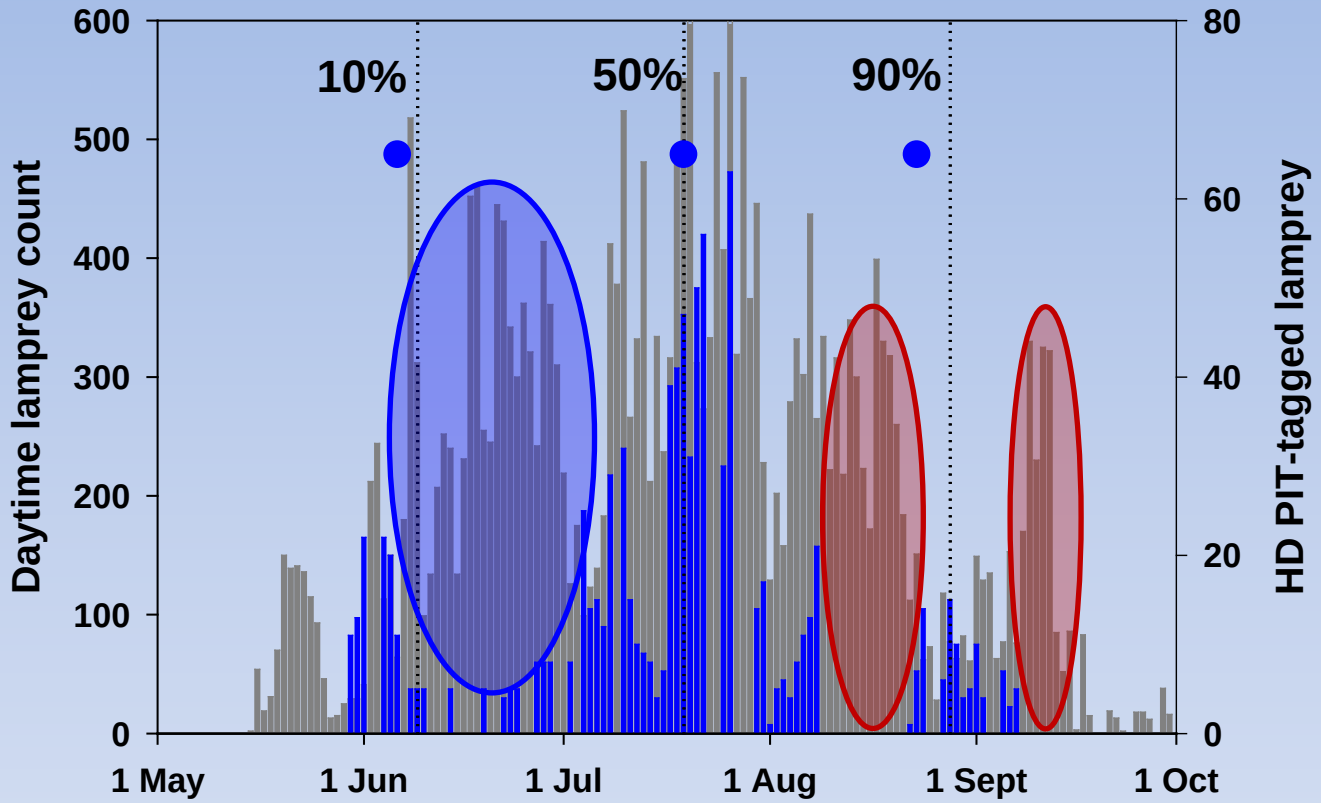
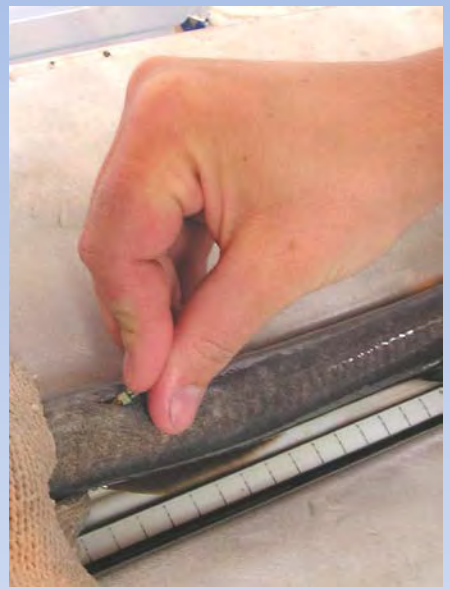
2012 HD PIT tagging





898 HD PIT-tagged (excluding JSATS fish; *Chris Noyes talk*)

3.1% of day count

< 1.0% of day count + night count + LPS count

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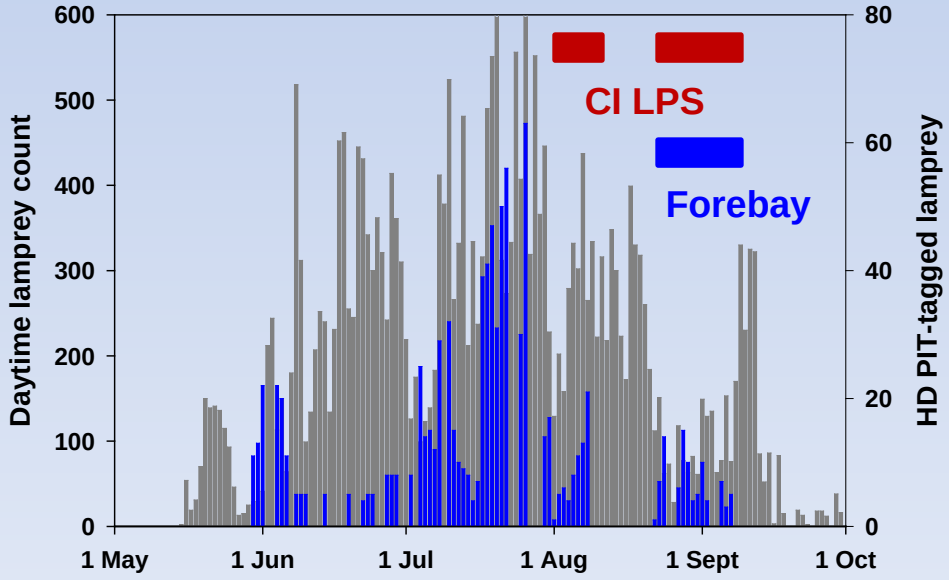
2012 HD PIT tagging

- 823 (92%) released below Bonneville
- 50 (6%) released into Cascades Island LPS
  - *Steve Corbett talk*
- 25 (3%) released into Bonneville forebay



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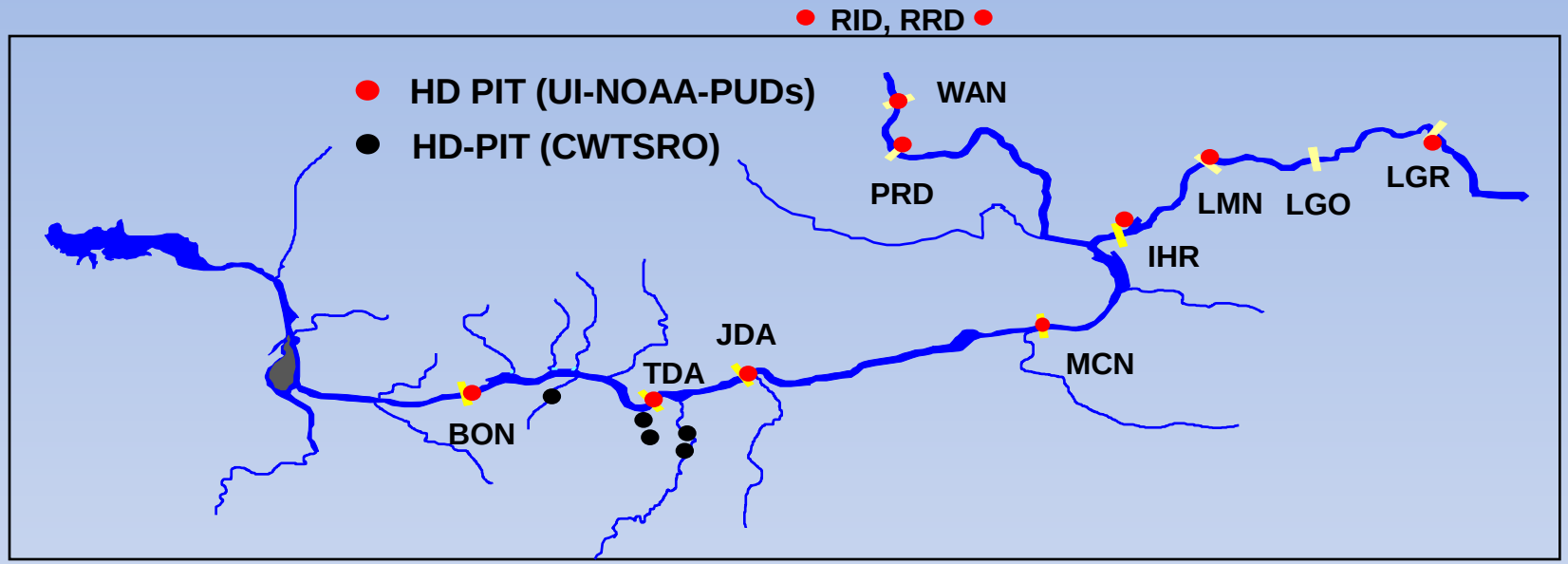
2012 HD PIT monitoring



Half-Duplex PIT antennas

- **Ladder exits**
- **Lamprey passage structures (LPS's)**
- **Additional fishway sites (BON, JDD, MCN, IHR, PRD, WAN, RID, RRD)**
- **Tributaries: Hood River, Fifteenmile & Eightmile creeks, Warm Springs River & Shitike creeks (CTWSRO)**

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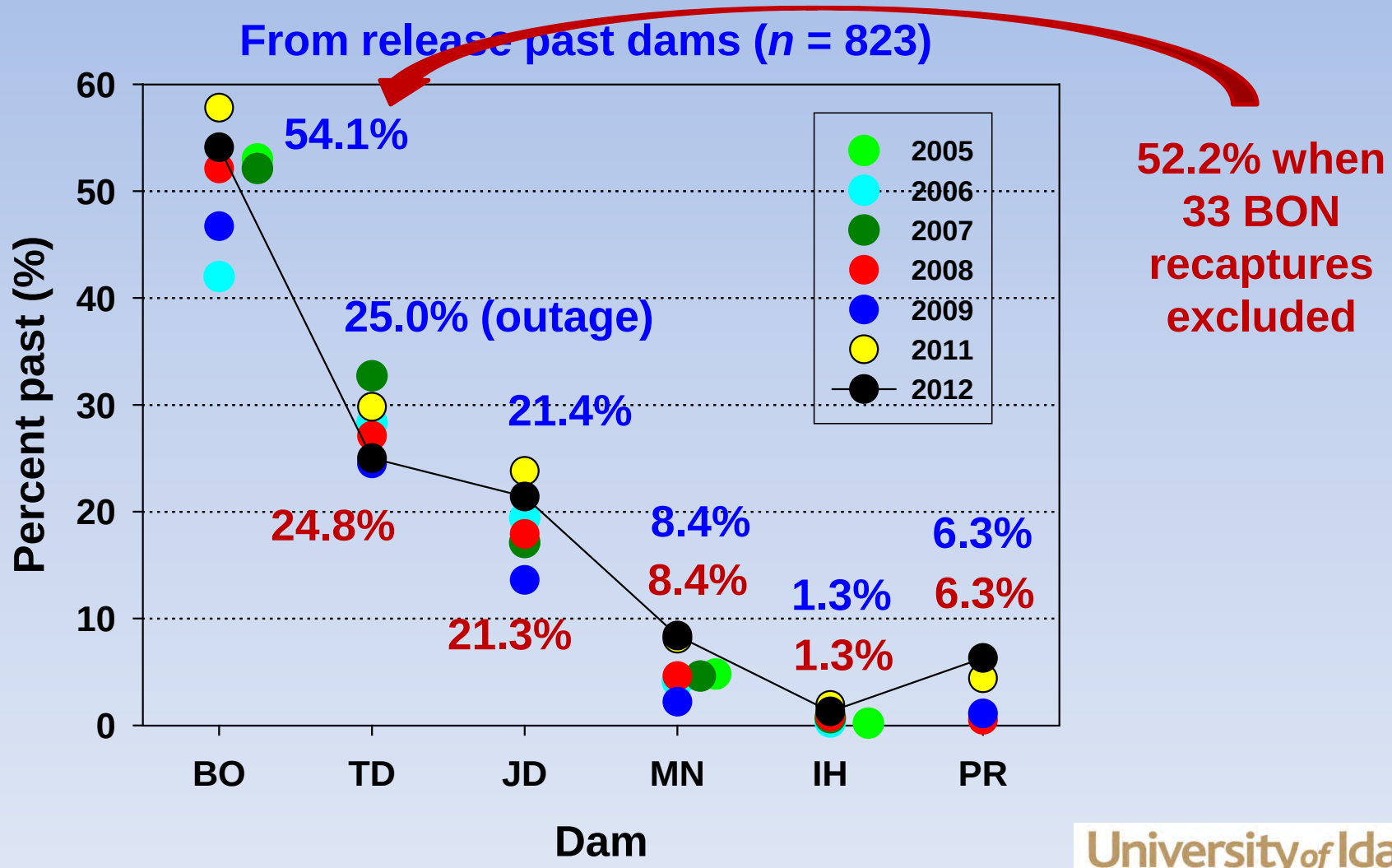
Escapement past dams



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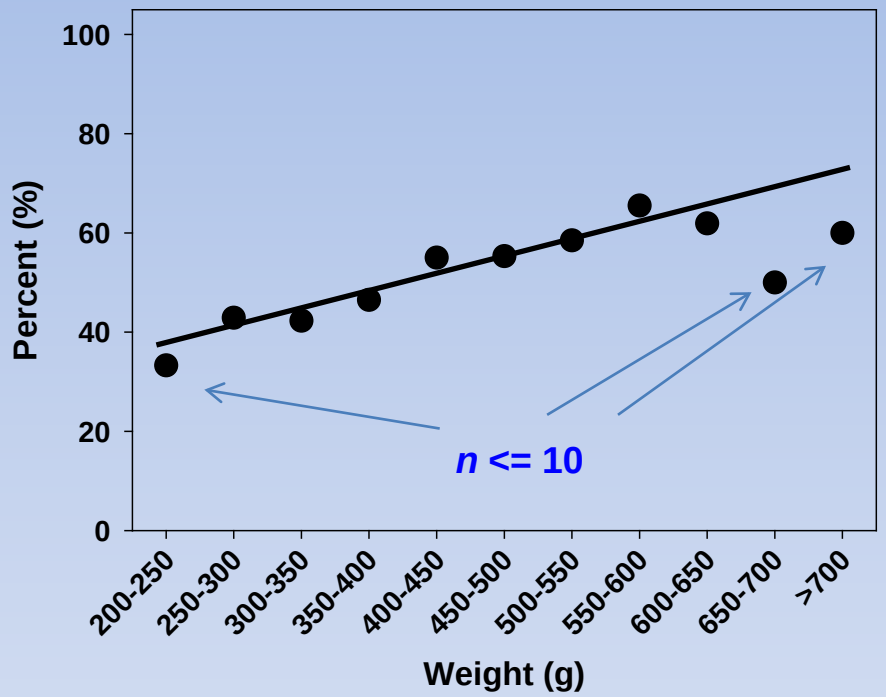
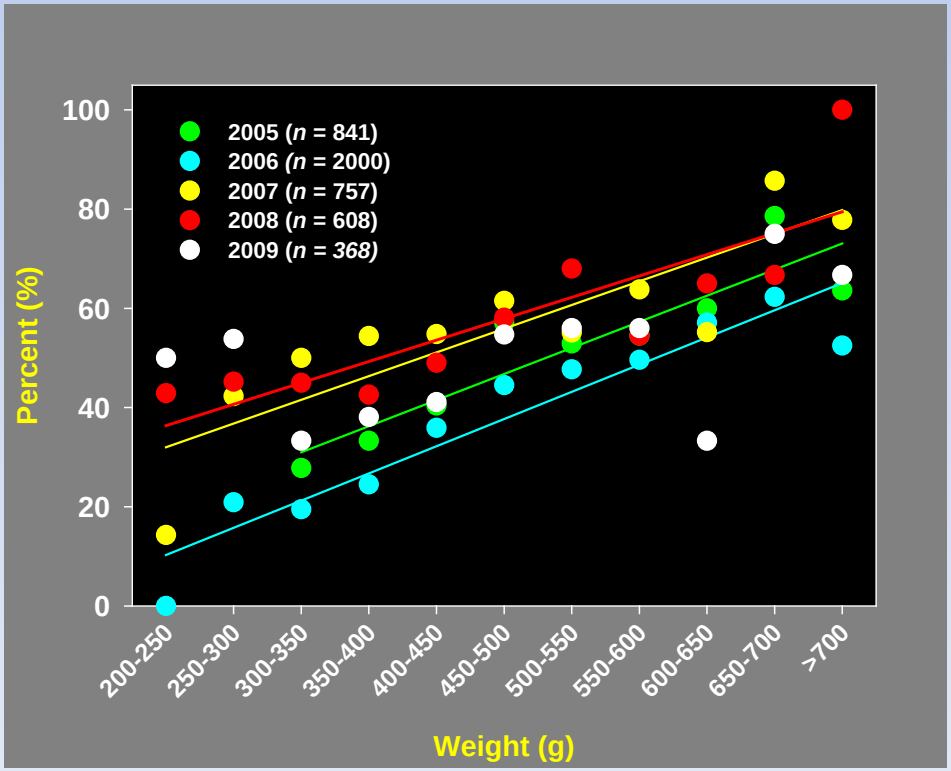
Bonneville passage by lamprey size



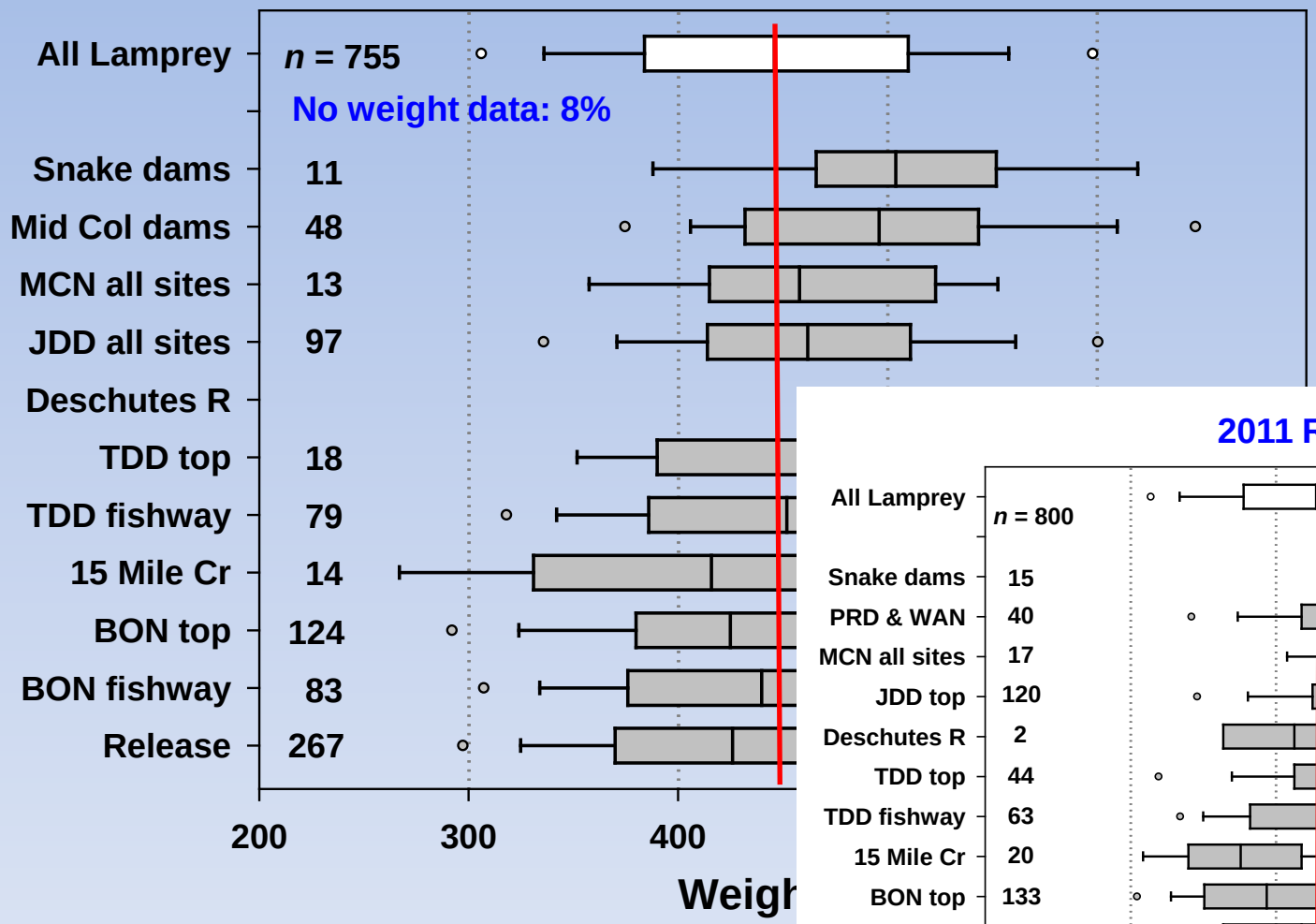
$r^2 = 0.77$, $P < 0.001$

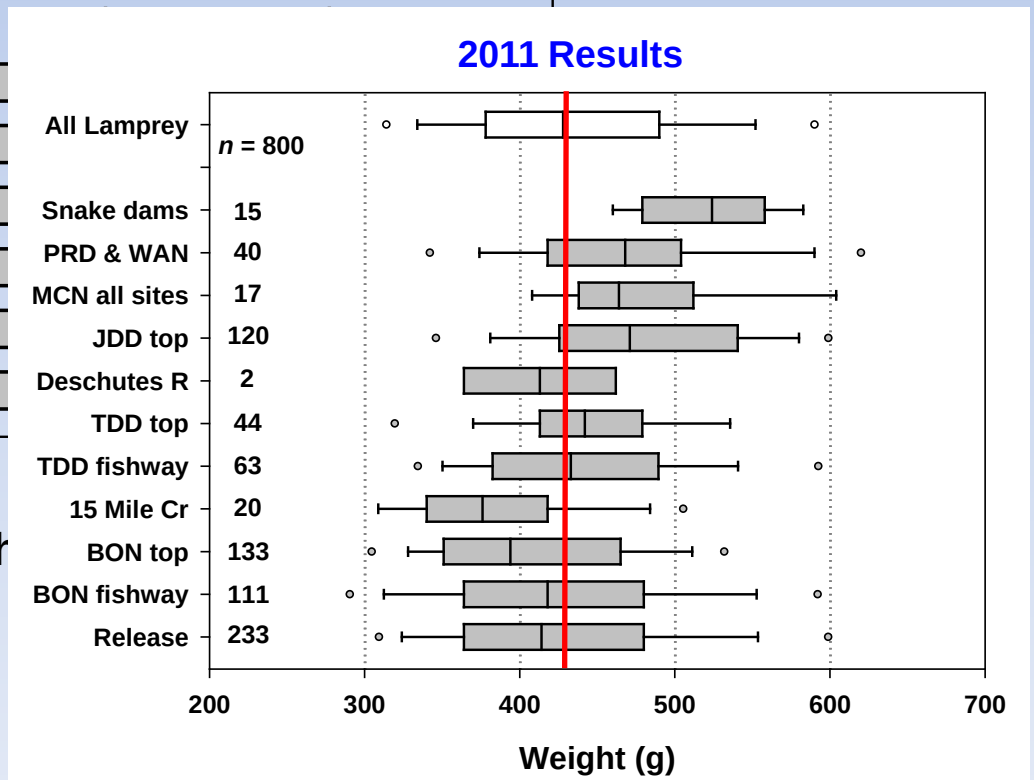
Weighted by # lamprey per bin

2005-2009 Results

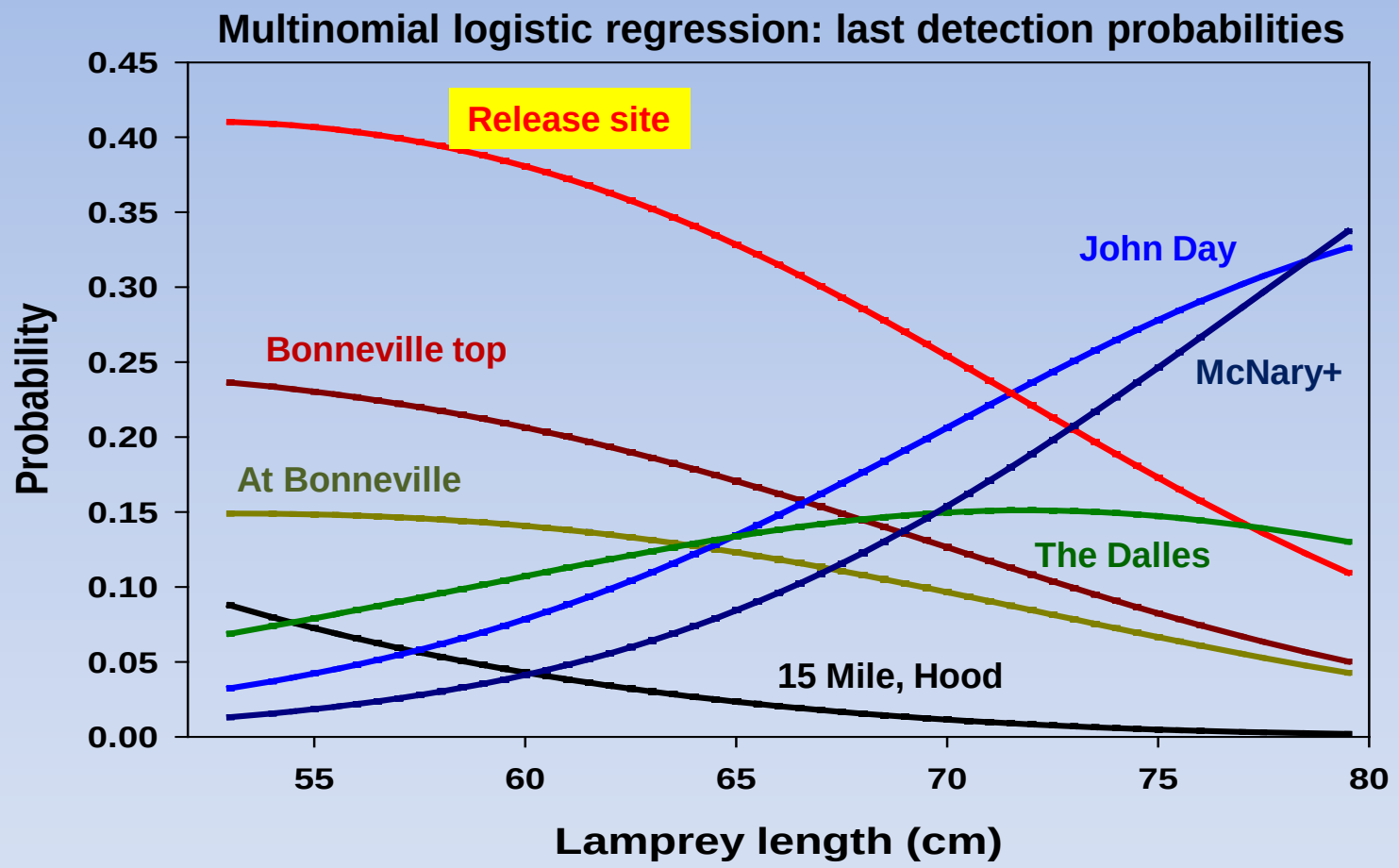


Size × Distance relationship





Distribution model: (2011, 2012)



Multinomial model (*n* = 1,619)

Length: chi-sq = 102.3, *P* < 0.0001

Date not significant by itself or with size metrics

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Distribution model (2011, 2012)

- Lamprey size clearly important
- What is the role of behavior at Bonneville?
  - More specifically, does Bonneville passage time affect lamprey distribution upstream?
  - Hyp: long delay = shorter migration distance

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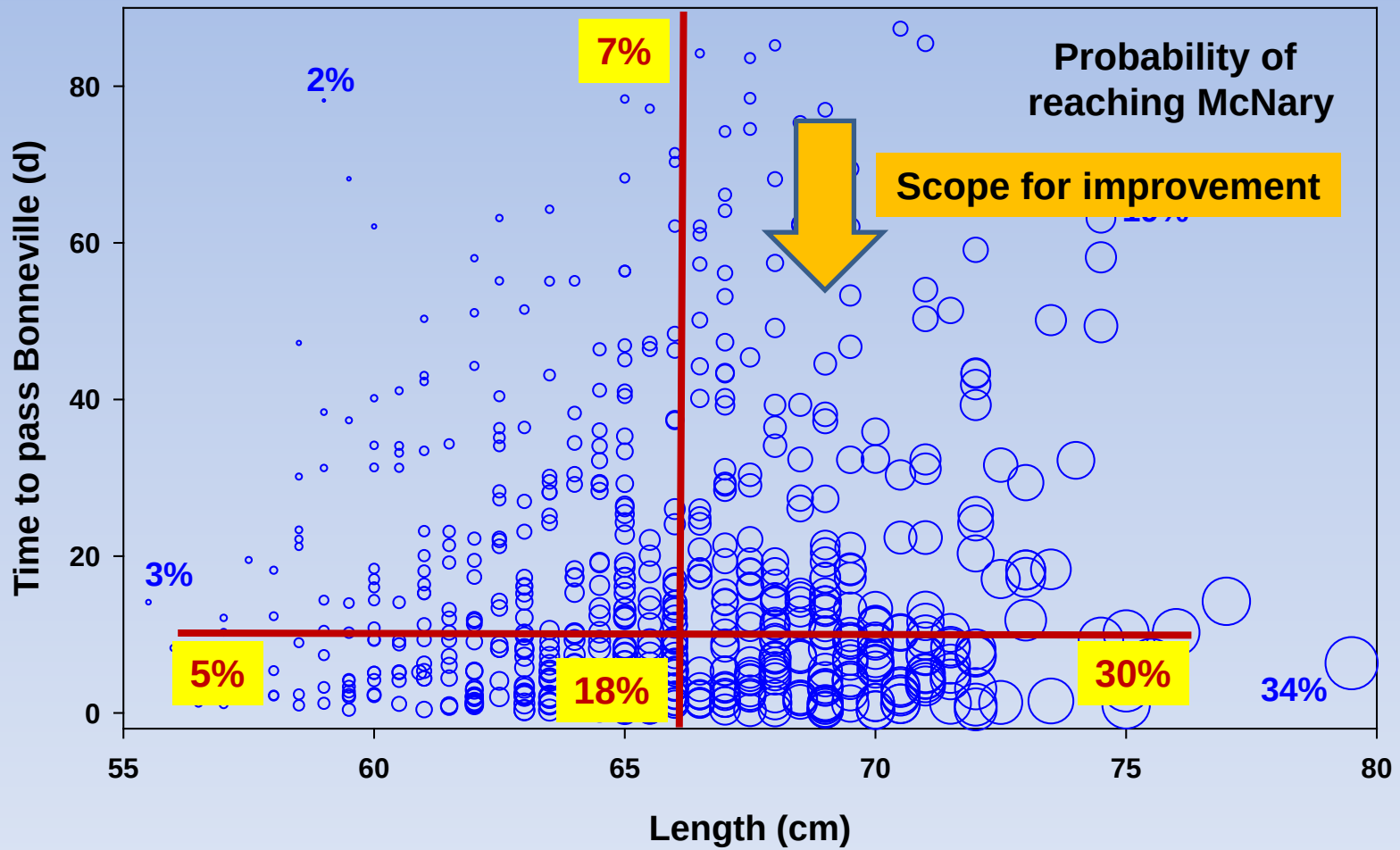
Distribution model (2011, 2012)

Multinomial model: Fate = Lamprey length + Passage time



Length: chi-sq = 63.6, *P* < 0.0001

Passage time: chi-sq = 15.1, *P* = 0.005

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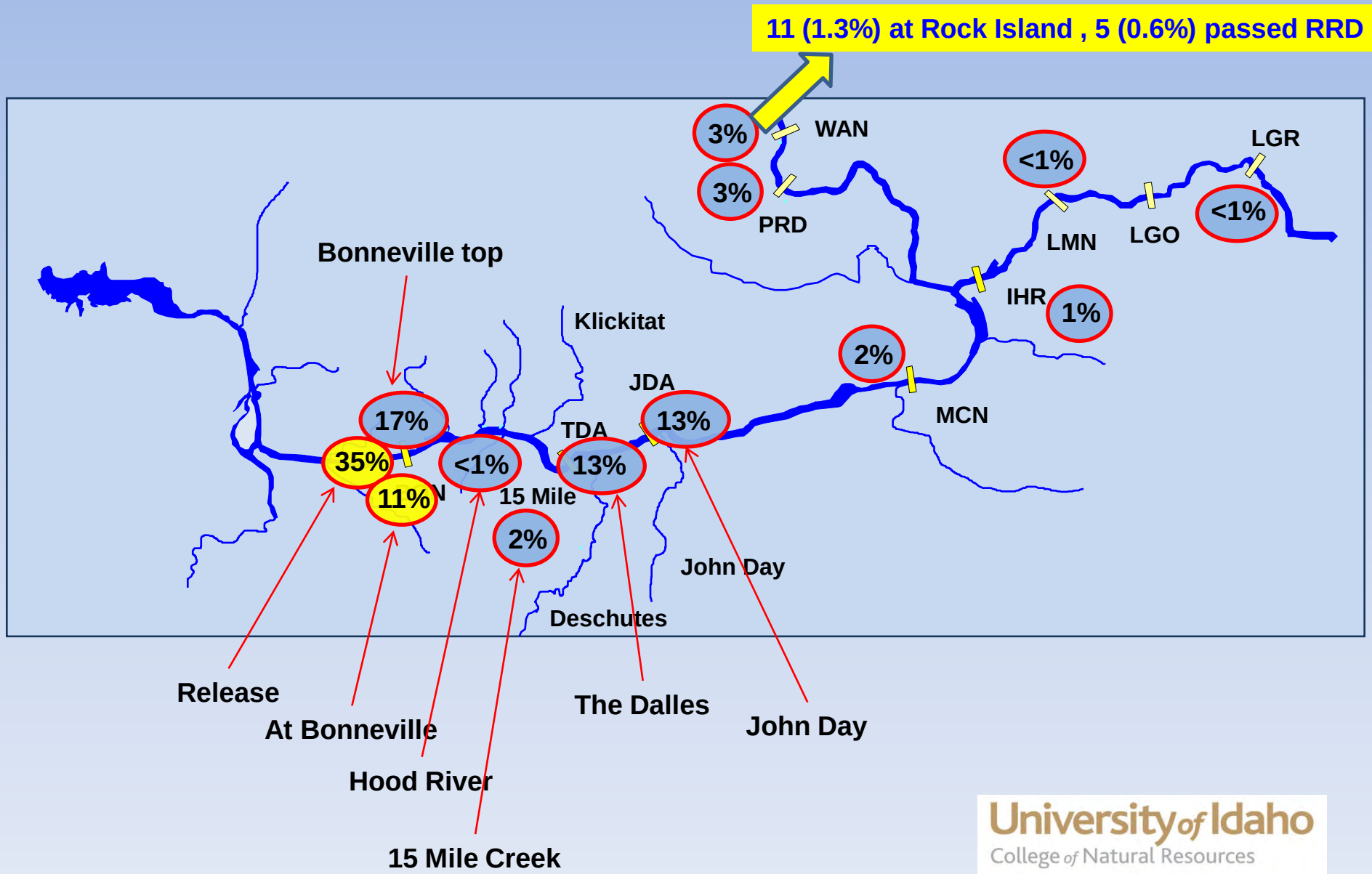
Last detections (preliminary)



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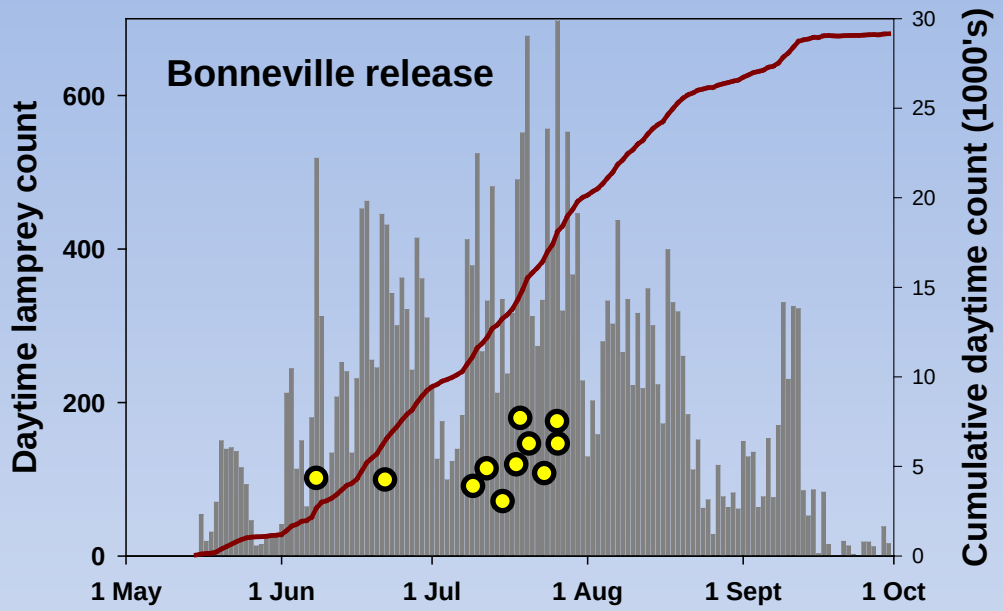
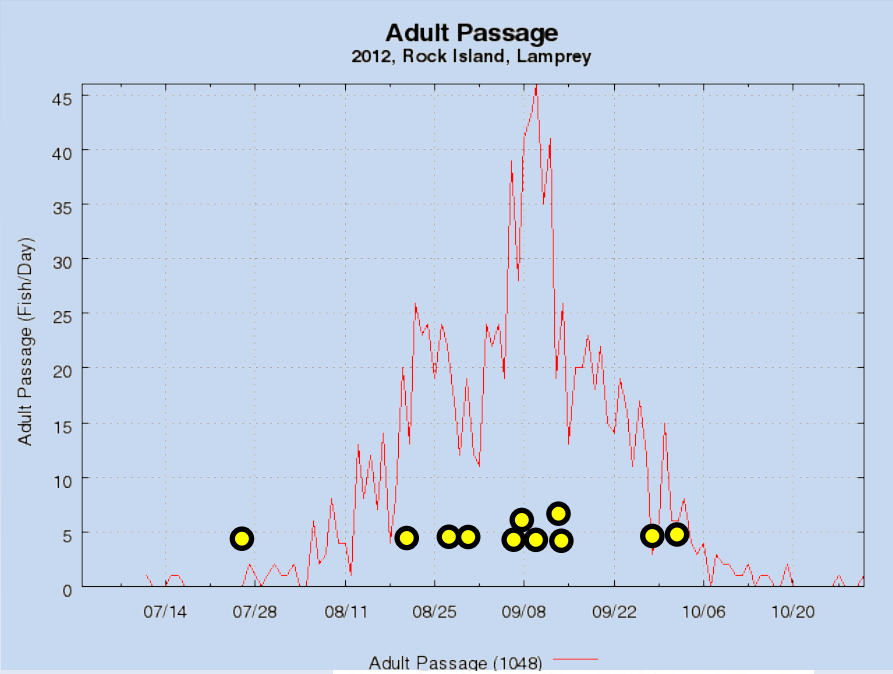
Rock Island lamprey

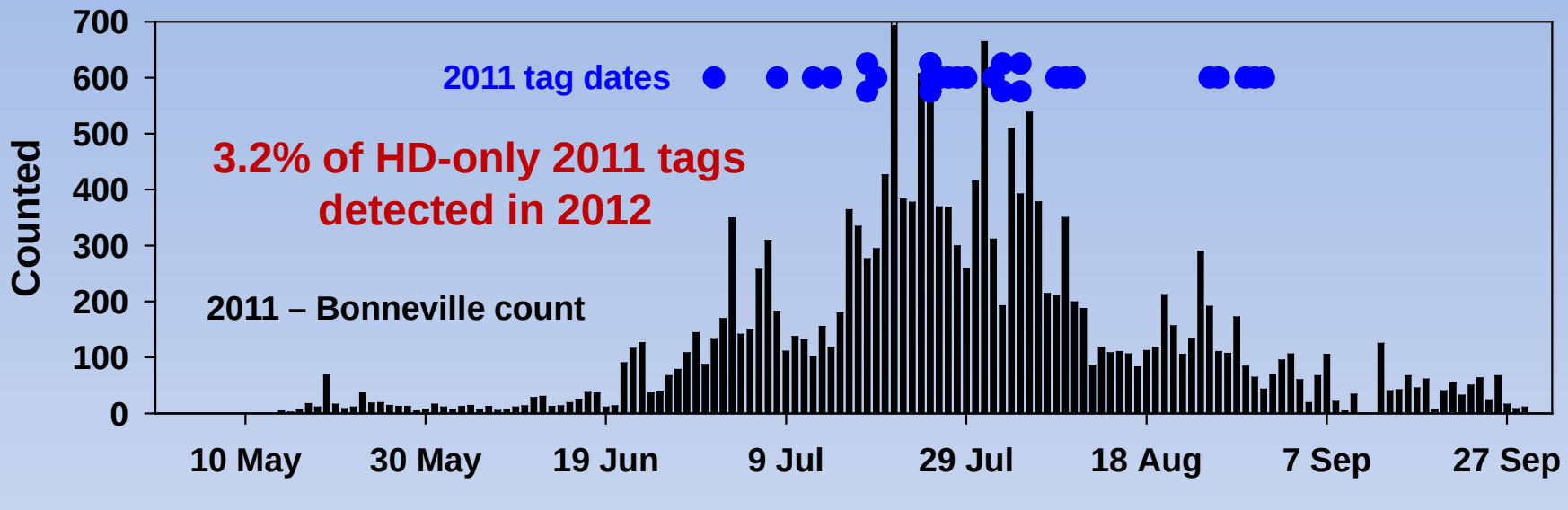


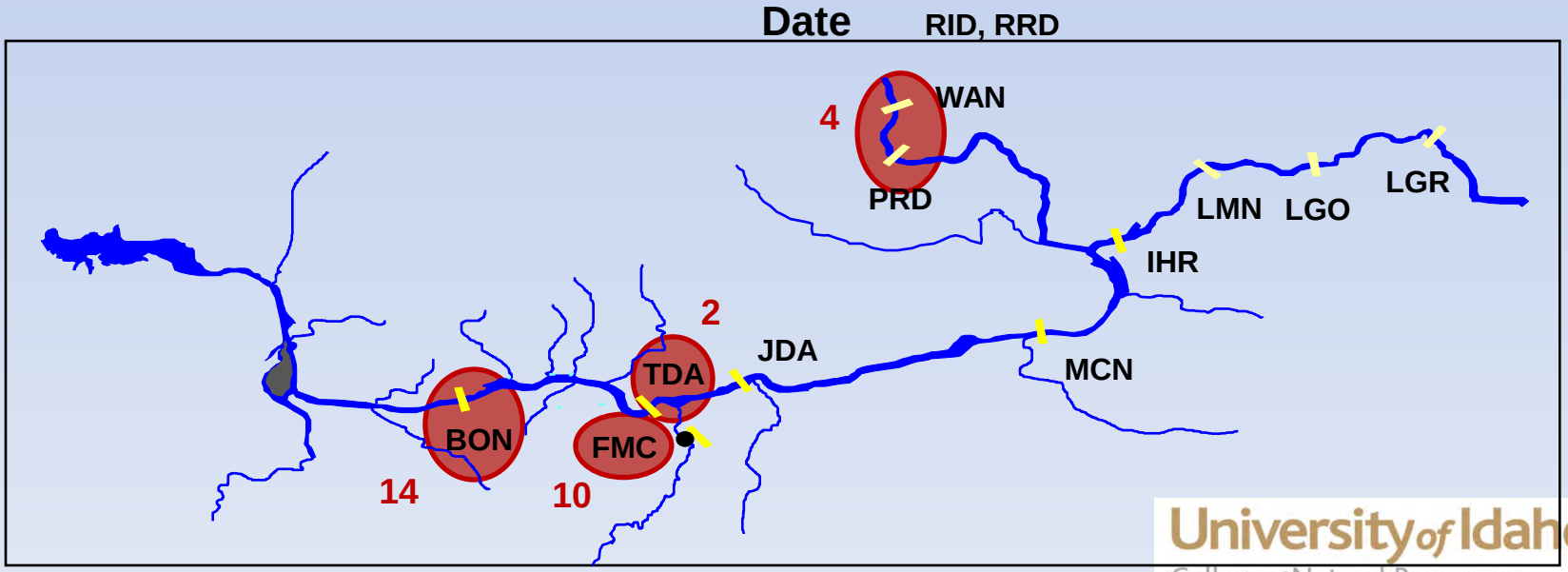
Passage time from release to pass Rock Island Dam
Mean = 55 days
Range = 35-78 days

Rock Island passage



Overwintering: 2011-tagged lamprey





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Conclusions

- Run size, run-timing model performed reasonably well
- HD-PIT monitoring array expanded
  - More tributaries, more fishways
  - Expecting more data

Conclusions

- Lamprey escapement at high end of range
  - 52-54% passed Bonneville
  - More fish at at Mid Columbia projects (>6%) than at Snake River projects (~1%)
- Lamprey size × Migration distance relationship: additional support
- Slow passage at Bonneville affects adult lamprey distribution upstream

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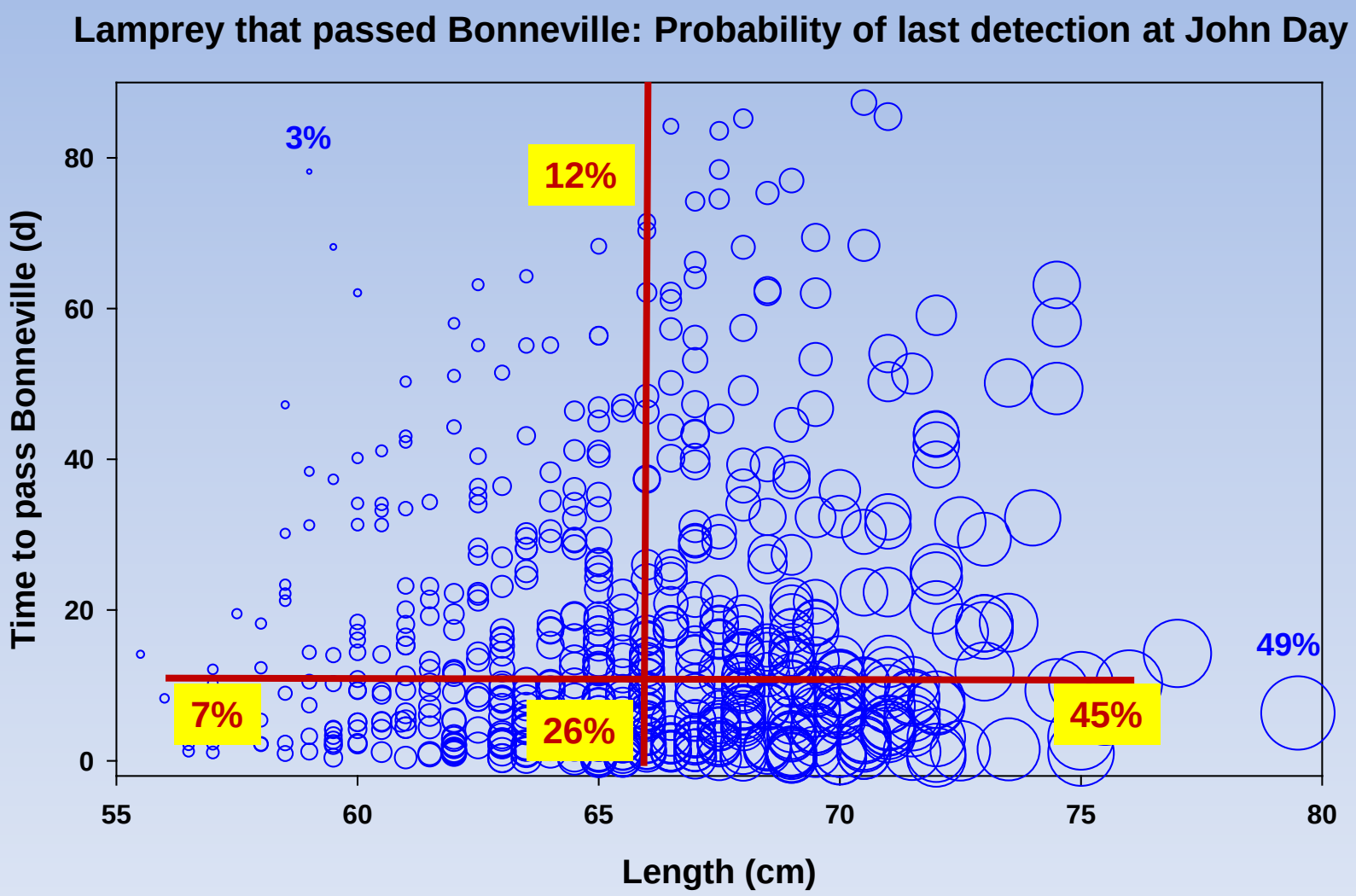
Distribution model (2011, 2012)



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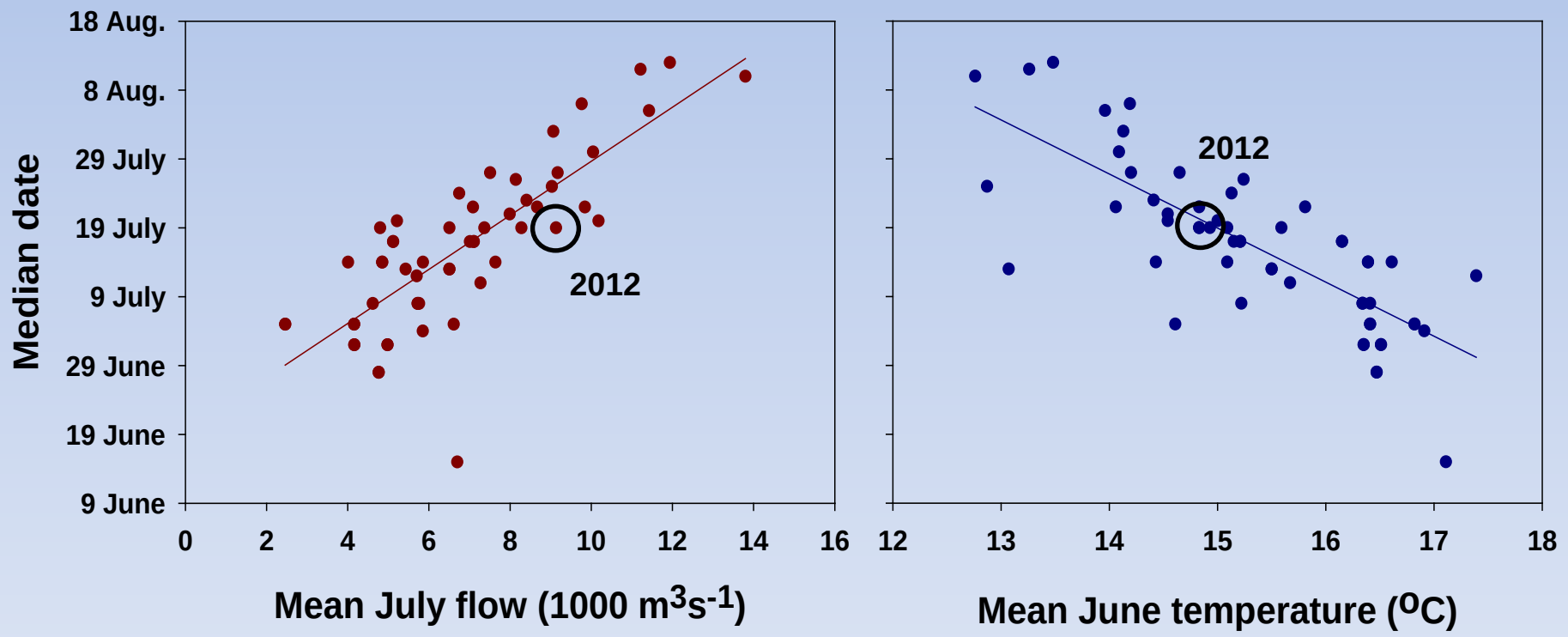
The 2012 lamprey migration

Lamprey run timing is stable in relation to river environment



Keefer et al. 2009 (Env Biol Fish)

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