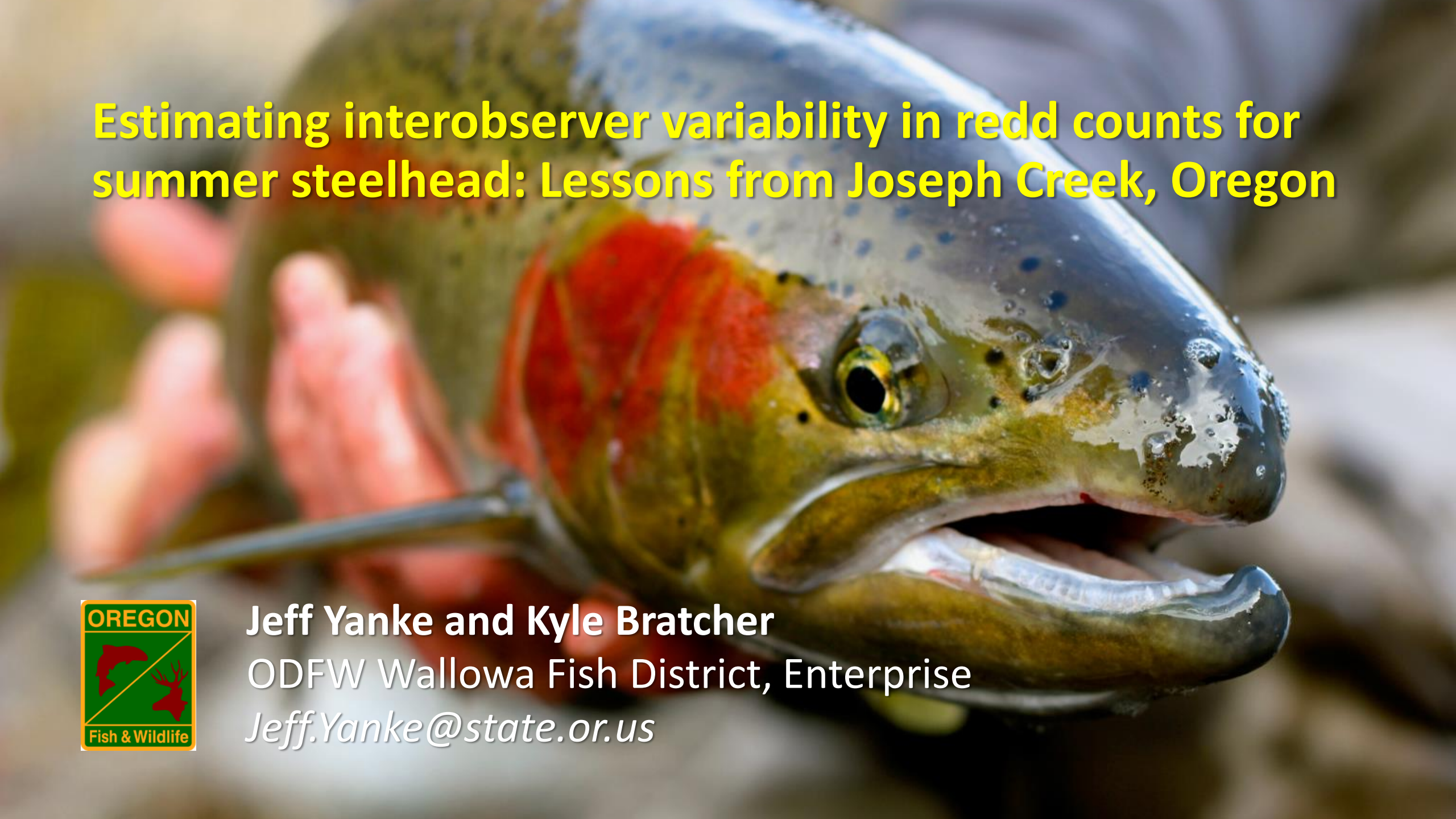
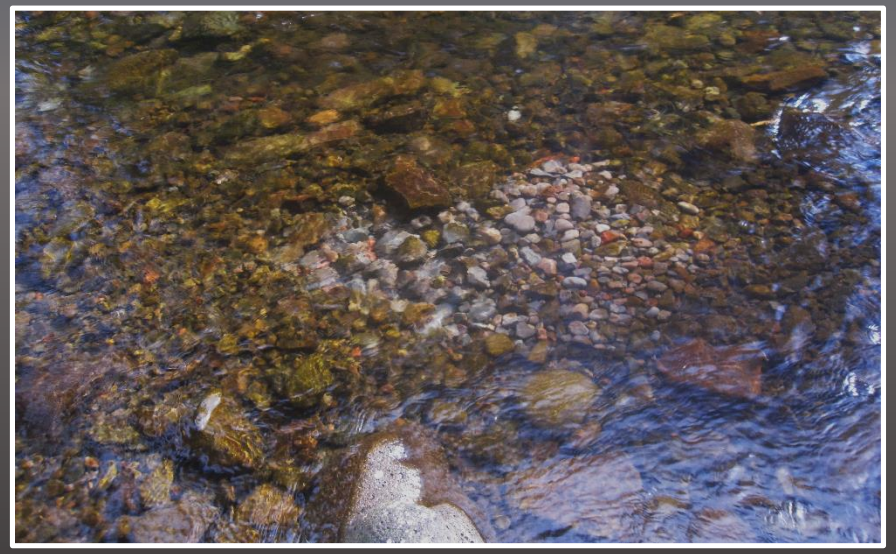
Estimating interobserver variability in redd counts for summer steelhead: Lessons from Joseph Creek, Oregon



Jeff Yanke and Kyle Bratcher
ODFW Wallowa Fish District, Enterprise
Jeff.Yanke@state.or.us

Redd Counts

- Common surrogate for abundance
  - Anadromous and resident nest-building salmonids
- Critical assumption
  - Counts are representative of actual redd numbers
- Varying levels of error documented (compared to best estimate)
  - Dunham (2001): 28-254% - bull trout
  - Muhfield (2006): 78-130% - bull trout
  - Murdoch (2018): 48% (±23%) - steelhead



Redd counts for summer steelhead

- NE Oregon steelhead populations
  - Principal method for monitoring abundance
  - Grande Ronde, Imnaha, John Day basins
- Steelhead redd counts
  - Index surveys
  - Relative abundance (redds per mile)
- Population abundance expansion
  - Fish per redd
  - Proportion of spawning habitat surveyed

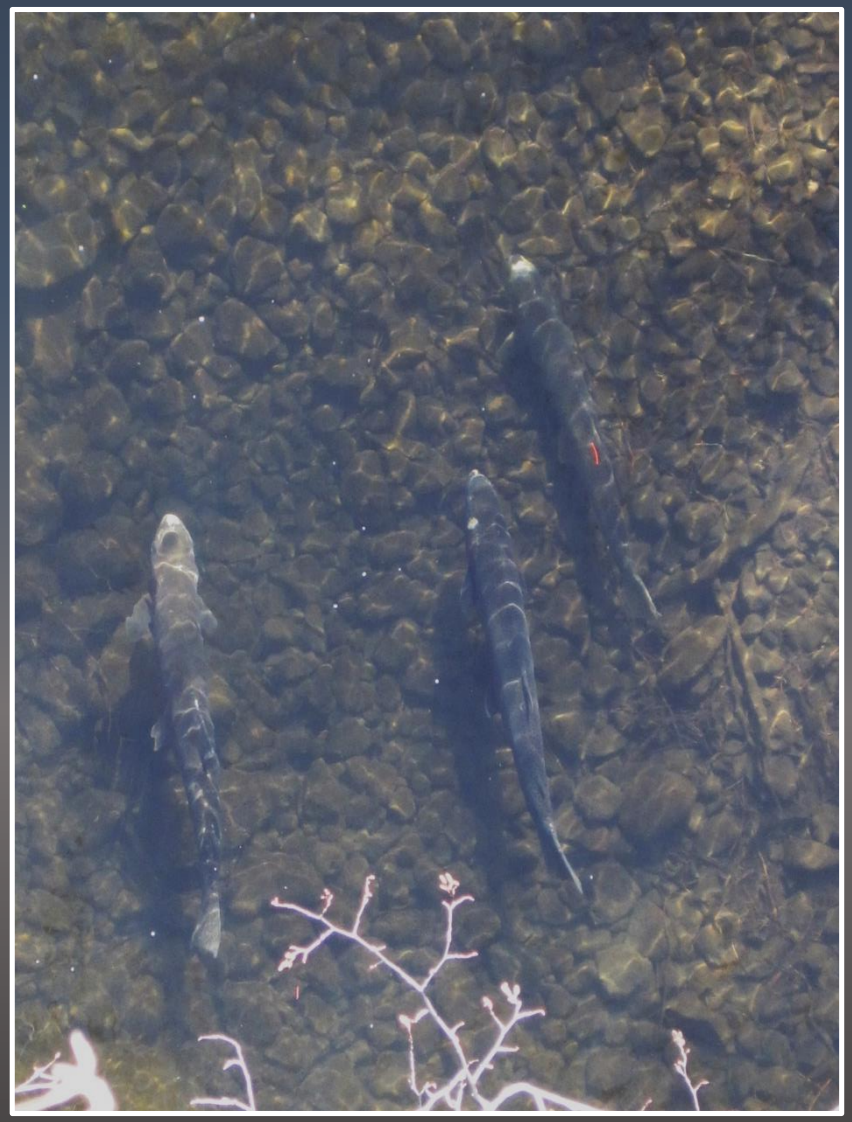
Spring redd count challenges

- Environmental conditions
  - Small headwater tributaries
  - Flows and turbidity
  - Redd morphology and longevity
- Resource limitations
  - Single annual surveys
  - Individual observer
- How do these factors affect redd counts and estimates?

Study objectives

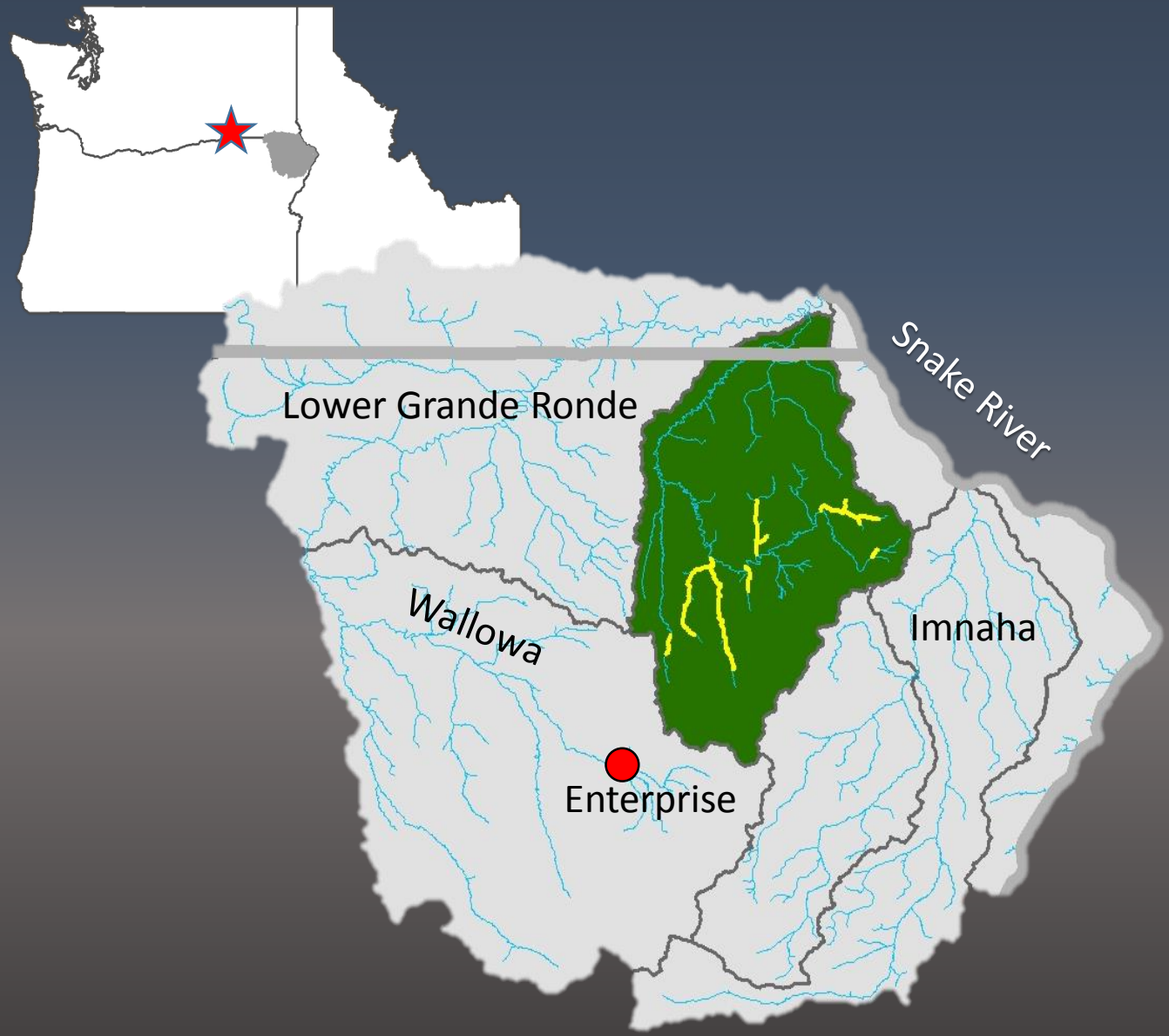
1. Estimate interobserver variability for steelhead redd counts
   a. How precise are redd counts?
   b. Is variability consistent across streams and reaches?

2. Evaluate factors that may influence variability
   a. Are experienced observers more relatively consistent?
   b. Do faster survey rates lead to more variability?

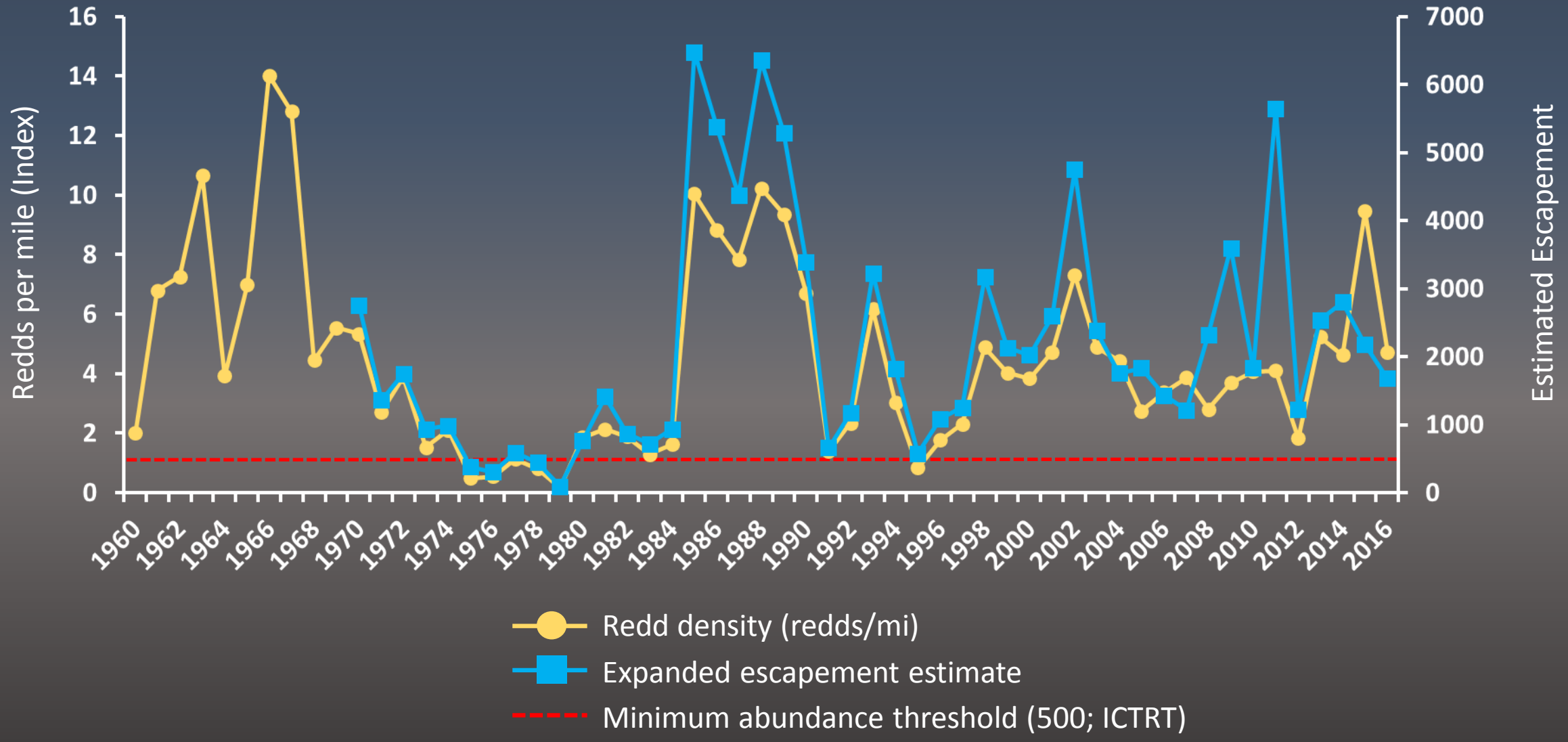


Study Area – Joseph Creek

- Joseph Creek steelhead
  - Grande Ronde River
  - Managed for wild production
  - Population designated as ‘highly viable’
- Spawning
  - Occurs throughout watershed
  - Typically occurs April-May
- Monitoring
  - Long-term dataset (since 1960’s)
  - Focused in Chesnimnus Creek tributaries



Redd counts and escapement – Joseph Creek steelhead

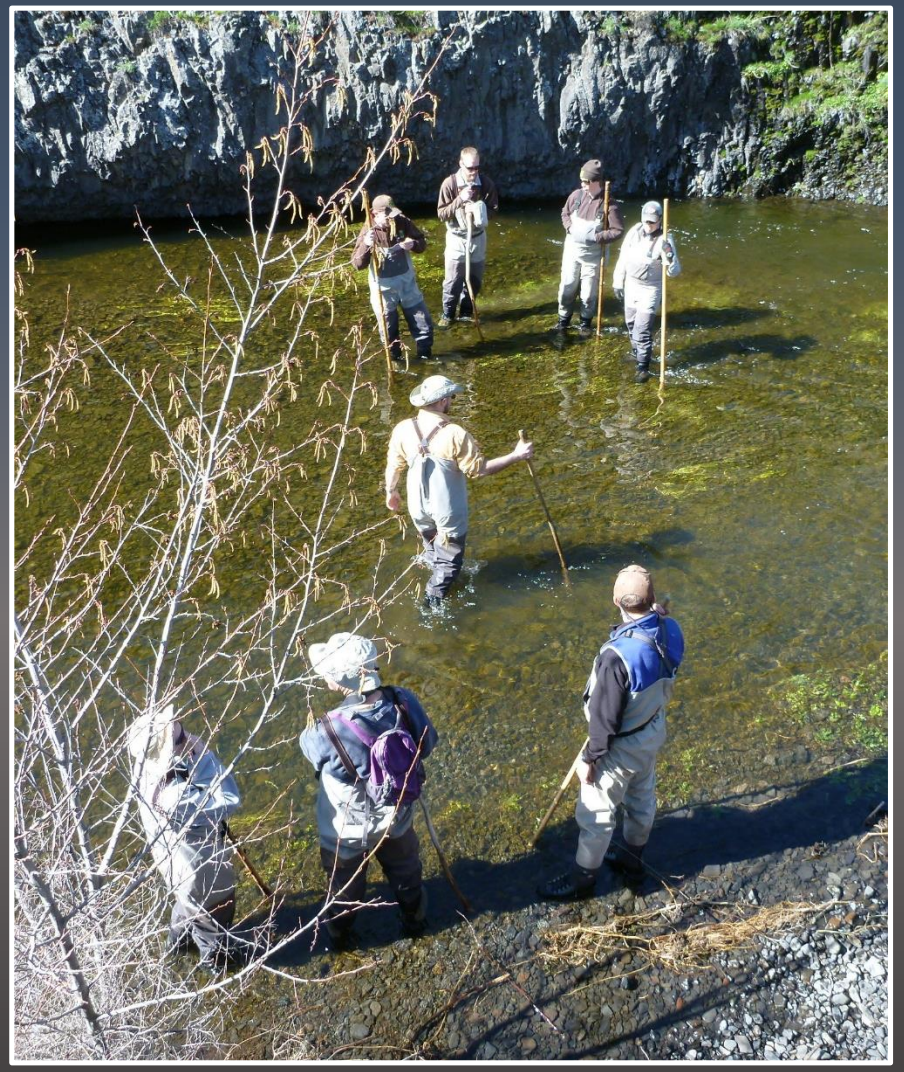


Methods – survey reaches

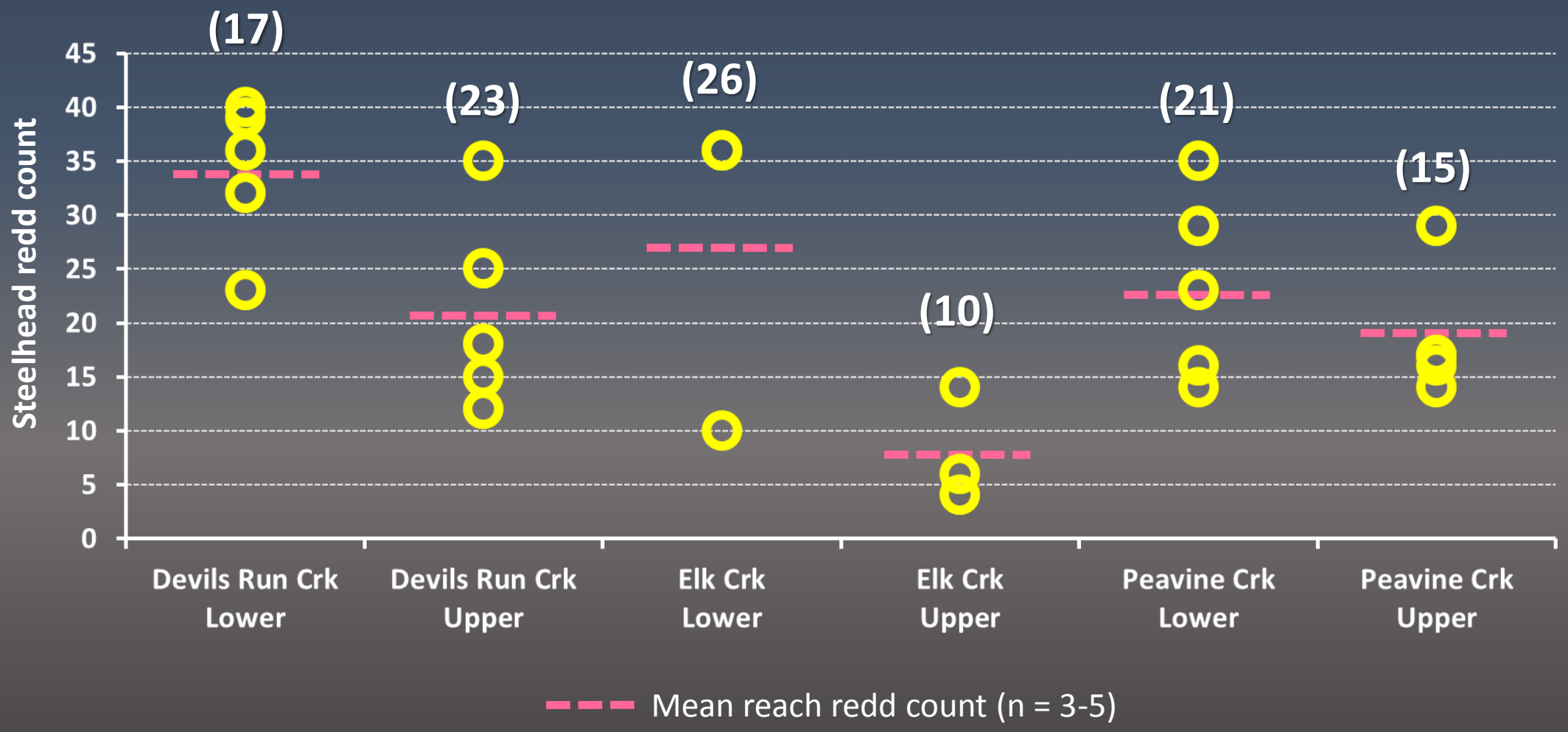
- Survey reaches
  - Elk, Peavine, and Devils Run Creeks
  - Upper and lower reaches
  - Historically similar redd densities
- Observers
  - Eleven observers with varied experience
  - Three to five observers per reach
- Replicate counts
  - Staggered at one-hour intervals on same day (1000-1400)
  - Maintain independence, control for conditions

Methods – data summary and analysis

- Variability
  - Calculated as absolute (+ or -) percent difference from mean count
- Observer experience
  - Factored no. seasons surveyed and frequency of surveys
    - Novice: 1-2 years
    - Intermediate: 3-6 years
    - Experienced: 11-24 years
- Survey rate
  - Time to complete survey divided by total length (km/hr)

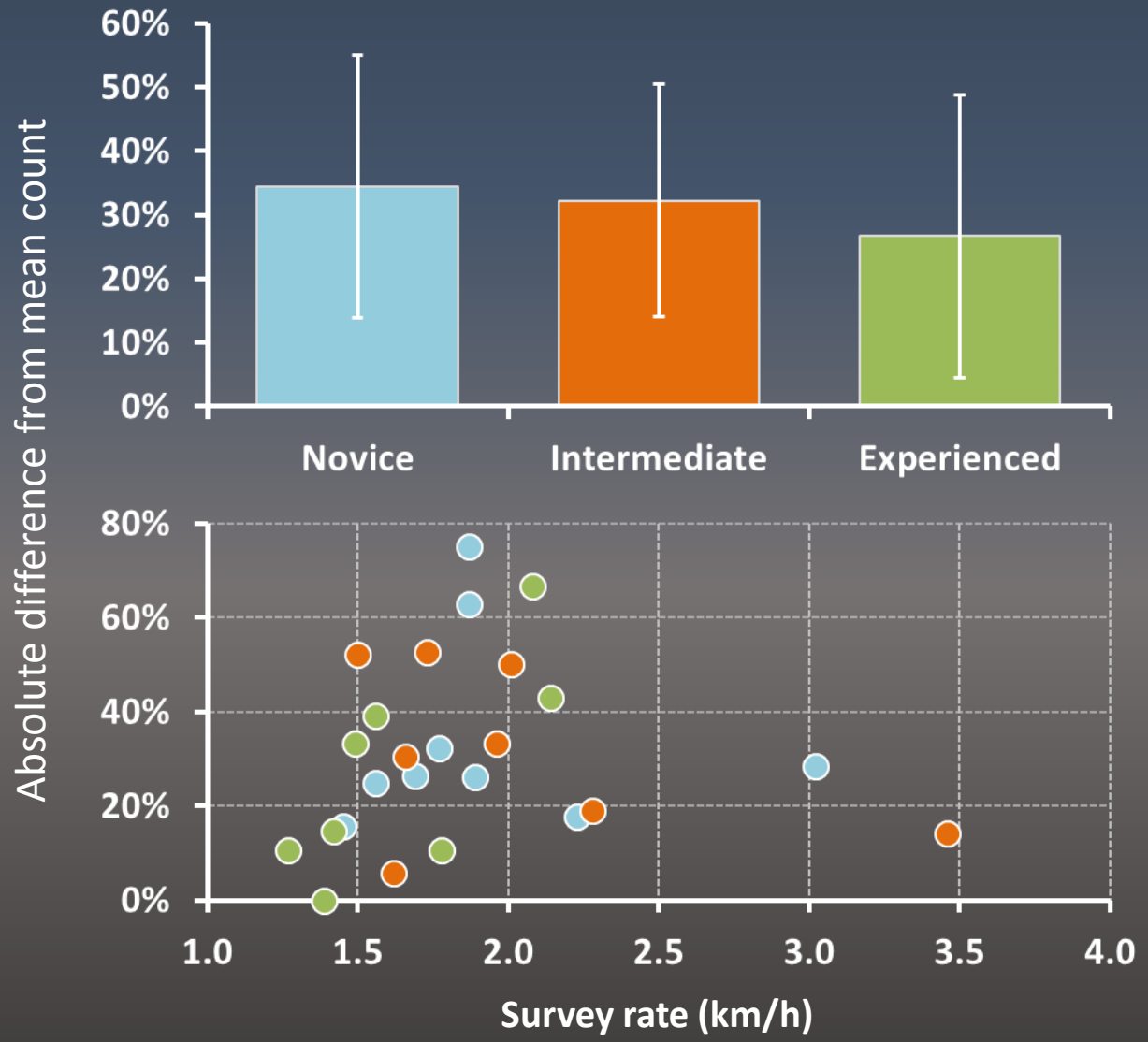


Results - Interobserver variability



Results - Observer experience and survey speed

- Interobserver variability
  - Ranged from 2% to 75% from mean redd count (0% being equal)
  - No differences among streams or reaches
- Observer experience
  - Inexperience did not contribute to higher variability
- Survey rate
  - Most surveys conducted between 1.5 to 2.0 km/hr
  - Faster rates were not correlated with higher variability



Discussion points

- Low precision a potentially large source of error
  - How may this affect population estimates and status assessments?
- Caveats
  - Precision vs. accuracy – requires best estimate of true redd count
  - Volunteers contributed to higher levels of variability
- Implications for Joseph Creek
  - Redd counts discontinued
  - Rely on weir, PIT tag array monitoring

Steelhead redd counts – Lessons learned

- Redd counts remain a useful tool for monitoring
  - Spawning distribution
  - Relative abundance unaffected if error is consistent
  - Environmental conditions always a factor
  - If used to monitor abundance…
- Tools to improve precision
  - Training
  - Well-defined criteria
  - Repeatability
  - Regular calibration
  - Staff continuity

Thanks to:

- **ODFW East Region Research**
  - Jim Ruzycki
  - Mike Flesher
  - Ali Fitzgerald
  - Chris Horn
  - Ian Tattum
  - Marcus Anderson
  - Shannon Skinner
- **ODFW Retired**
  - Tim Unterwegner
- **US Forest Service**
  - Alan Miller