Pacific Lamprey Spawner Estimates from Winter Steelhead Monitoring across Western Oregon

Eric Brown*, Matt Weeber, Mark Lewis, Benjamin Clemens
Oregon Department of Fish & Wildlife

Background

The Oregon Department of Fish and Wildlife have comprehensively monitored adult winter Steelhead (Oncorhnchus mykiss) populations in the Oregon Coast since 2003, with consistent monitoring in some Lower Columbia tributaries (Astoria to Hood River) since 2012. Spatially balanced, randomly selected surveys are walked or boated, once every 7 to 14 days from February through May, to enumerate steelhead redds. Throughout the history of this monitoring, counts of Pacific lamprey (*Entosphenus tridentatus*) redds have also been captured. In 2017, ODFW generated an eight year (2009-2016) time series of estimates of adult Pacific lamprey spawner abundance within the Oregon Coast (OC) and Lower Columbia (LC) This poster summarizes some of that information.

Methods

Field Methods

- Randomly selected and spatially balanced (GRTS) site draw on Steelhead Frame.
- Survey targets per scale:
  - Population (30 sites per population).
  - DPS (50 sites per monitoring area).
- Sites visited on a 14-day rotation.
- Lamprey redds tallied as peak counts.
- Sites are attempted from February – May.

Analysis Methods

1. Check on survey visit frequency:
   - No gaps of 21 or more days.
   - No more than 1 gap of 15 to 20 days.
2. Calculate avg. peak Redds/Mile, by population or Monitoring Area.
3. Lamprey per redd ratios gleaned from peer reviewed literature (more detail below)
4. Calculate Estimate: Abundance Index = (Avg. Peak Lamprey Redds per Mile) * (Frame Miles) * (Lamprey per Redd)

For "Lamprey per redd", we used mean, minimum, and maximum numbers to bracket the range and mean of fish per redd. For mean lamprey per redd, we used Whitlock et al. (2017; 0.48 lamprey per redd). This number is quite similar to the 0.462 lamprey per redd estimate from Farlinger and Beamish (1984) for Pacific Lamprey in a river system in British Columbia. For minimum lamprey per redd, we used Brumo et al. (2009; 0.125 lamprey per redd). For maximum lamprey per redd, we used Whitlock et al. (2017; 0.88 upper 95% confidence interval).

Sampling Scale

Figure 1. Area Monitored, including Dependent Population Segments (DPS)

Figure 2. The Comparison of miles in the steelhead and Pacific lamprey sampling frames in the Oregon coast for each scale of estimation. The Lower Columbia is shown as a whole for comparison. Labels depict the avg. number of sites successfully conducted in these areas per year.

Results

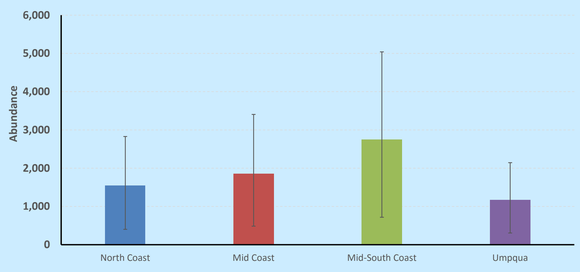

Figure 3. Average, min, and max Pacific lamprey abundance index by strata within the Oregon Coast, 2007 -2017

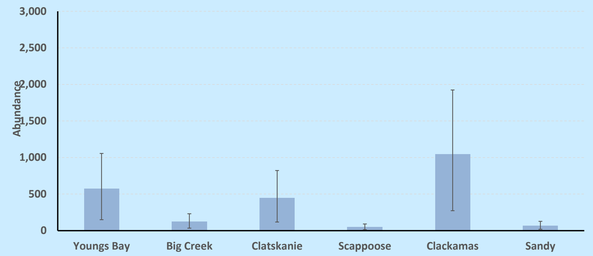

Figure 4. Average, min, and max Pacific lamprey abundance index by StW population area within the Lower Columbia .2007 -2017

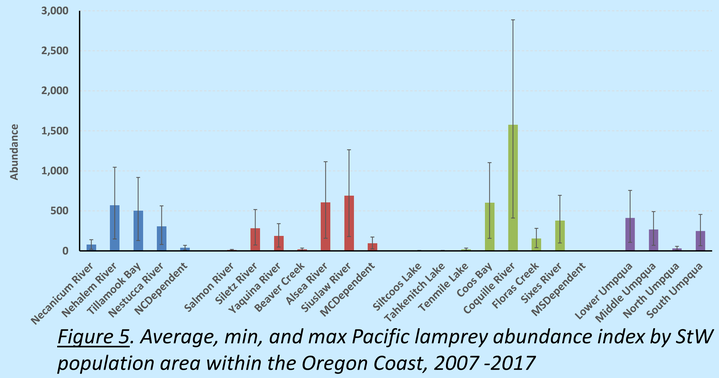

Figure 5. Average, min, and max Pacific lamprey abundance index by StW population area within the Oregon Coast, 2007 -2017

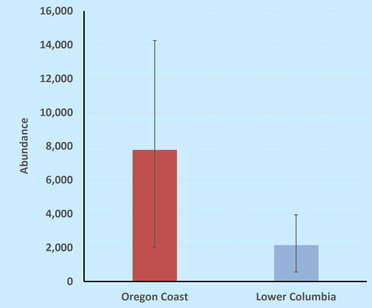

Figure 6. Average, min, and max Pacific lamprey abundance index totals for the OC DPS and LC ESU

Caveats

To the degree that the below are true, negative biases are assumed.

- *Spatial* - These data are based on a random sample from the steelhead spawning distribution, and the number of lamprey spawning in areas outside of the steelhead distribution is unknown.
- *Temporal* - Lamprey spawn activity after May is not accounted for in these data (fig 7).
- *Peak Redd Count* - Peak redd count is the maximum number of redds observed on a single survey date, not the total number of redds created over the entire spawning season. The ratio of total redds to peak count of redds is unknown.

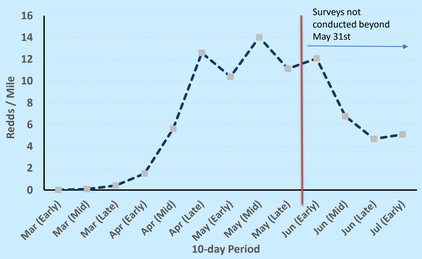

Figure 7. Pacific lamprey average peak redd timing in OC surveys, 2010-2017. Red line indicates the end of the data period included in index abundance estimates

Conclusions

- Estimates require no additional funding, and minimal effort beyond that of existing steelhead monitoring.
- These indexes have improved management process like federal risk assessment reviews.
- The utility of these data have added value to the steelhead monitoring program.

References

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Farlinger, S. P., and R. J. Beamish. 1984. Recent colonization of a major salmon-producing lake in British Columbia by the Pacific Lamprey (*Lampetra tridentata*). Canadian Journal of Fisheries and Aquatic Sciences 41:278–285.

Whitlock, S. L., L. D. Schultz, C. B. Schreck, and J. E. Hess. 2017. Using genetic pedigree reconstruction to estimate effective spawner abundance from redd surveys: an example involving Pacific lamprey *Entosphenus tridnetatus*. Canadian Journal of Fisheries and Aquatic Sciences January 2017, 10.1139/cjfas-2016-0154.

ODFW, Corvallis Research Office
28655 Hwy 34
Corvallis, OR 97333
eric.brown@oregonstate.edu