ASSESSING STATUS OF PACIFIC LAMPREY (LAMPETRA TRIDENTATA) IN THE COLUMBIA RIVER BASIN, U.S.A.

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Introduction

Methods for assessing abundance and distribution of Pacific lamprey in the Columbia River Basin are inadequate. Adult lamprey are enumerated as they pass count stations in fishways at hydropower dams (Starke and Dalen, 1995). However, the counting protocols were designed to assess salmonids and do not conform to lamprey migration patterns. We used lamprey-specific assessment methods (trapping, radiotelemetry, and electrofishing for larvae) to examine lamprey distribution and abundance. The results of this work were then used to identify research and monitoring needed to establish Pacific lamprey status in the Columbia River and other drainages in the northwestern United States.

Methods

We trapped lamprey in a fishway at Bonneville Dam (the first dam adult lamprey encounter during their upstream migration in the Columbia River) in 1998 – 2000 and computed catch per unit effort (CPUE, lamprey h^{-1}). CPUE was compared to visual adult lamprey counts made at the same time and in the same fishway. In each year we also surgically implanted uniquely-coded radio transmitters in selected lamprey (as in Moser et al., In Press). Passage of radio-tagged lamprey at the three lower Columbia River hydropower dams (Bonneville RKm 235, The Dalles RKm 308, and John Day RKm 347) was monitored via an extensive network of fixed-site

receivers (Moser et al., In Press). We compared radiotelemetry results to lamprey counts made at the same dams during traditional count periods. For both counts and radiotelemetry data, we determined the proportion of lamprey lost in each reservoir by subtracting the total number of lamprey that passed the count windows at each successive upriver dam from the number that passed the count windows at the previous dam.

In 1999, we electrofished for ammocoetes (larval lamprey) in July – September at stations in nine Columbia River tributaries in northeastern Oregon and southeastern Washington where Pacific lamprey historically occurred (Figure 1). We anaesthetized and measured the ammocoetes and computed length frequencies and densities for each tributary.

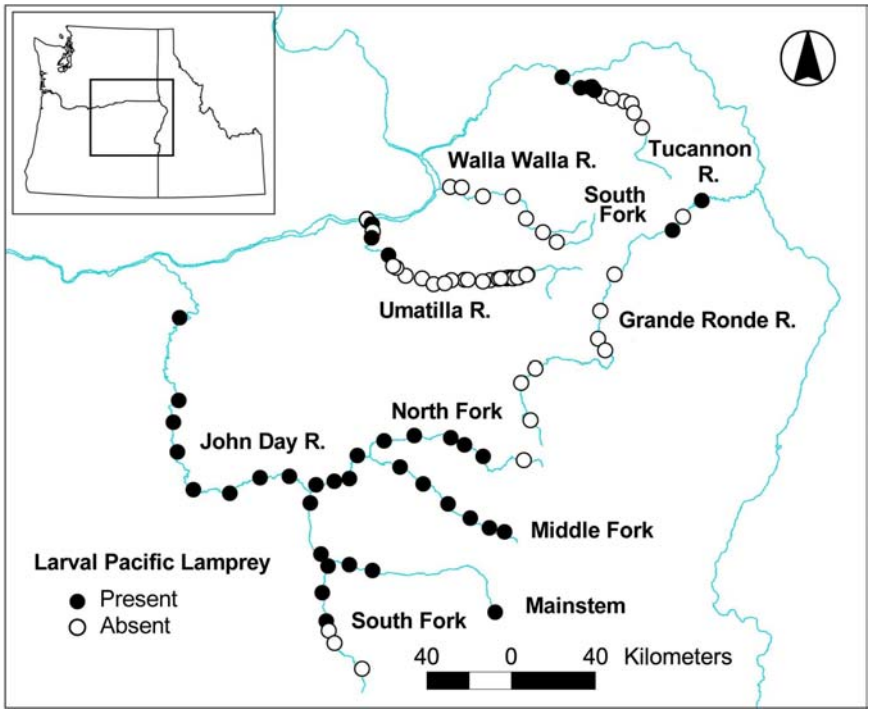

Figure 1. Presence (closed dots) or absence (open dots) of Pacific lamprey ammocoetes at electrofishing stations in tributaries of the Columbia River.

Results

In the fishway where our trap was deployed, lamprey passage (lamprey h^{-1}) based on visual counts was 9.4 in 1998, 12.7 in 1999, and 4.5 in 2000. Trap CPUE (lamprey h^{-1}) in those years was 1.0 in 1998, 0.7 in 1999, and 0.5 in 2000. We found no significant correlation between the mean weekly lamprey abundance obtained using the two methods in 2000 ($P > 0.05$).

In 1998, 1999, and 2000 we released 205, 199, and 299 radio-tagged lamprey below Bonneville Dam. Annual losses for the area from Bonneville Dam to The Dalles Dam were similar for radiotelemetry and count data (Figure 2). However, for the area between The Dalles Dam and John Day Dam, the two methods produced very different results. Intensive tracking of lamprey in 2000 indicated that 67% of the lamprey that passed counting windows at Bonneville Dam would not have been detected because they passed during the night. In addition, 6% of the fish passed over the dam via routes without count stations.

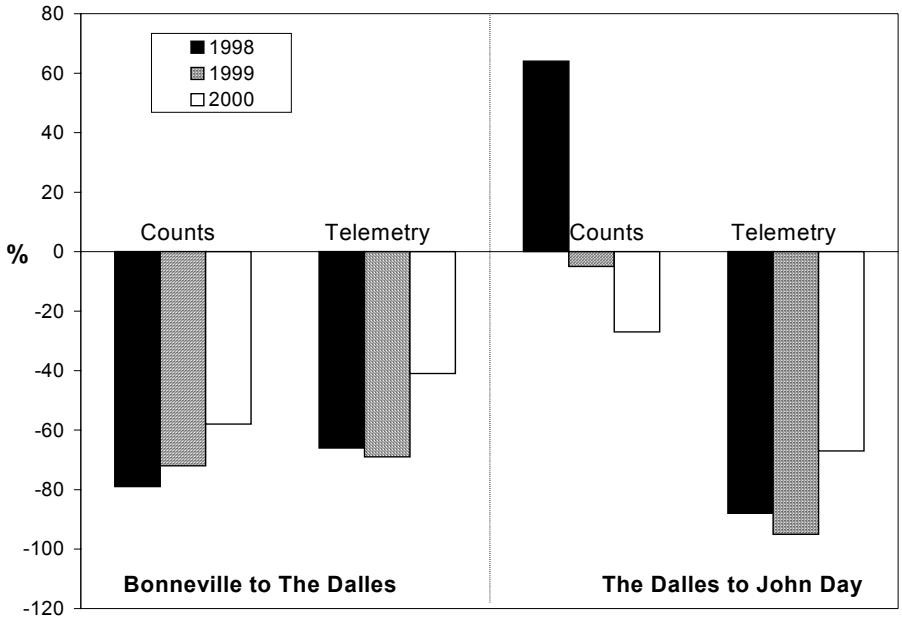

Figure 2. The percentage of lamprey lost in each reach as determined by lamprey counts and radiotelemetry in 1998 – 2000.

Ammocoetes were not found in the upper reaches of tributaries we sampled, nor were they in any of the Walla Walla River samples (Figure 1). Density was highest in the John Day River and its tributaries and lowest in the Grande Ronde River. Mean ammocoete lengths were lowest in the John Day River drainage and highest in the Umatilla and Grande Ronde rivers.

Discussion

Our data indicated that adult lamprey counts at hydropower dams are unreliable and can be misleading. This is not surprising in light of the fact that lamprey are nocturnal and capable of passing the dams via unmonitored routes. While dam counts are problematic, they represent the only historical index of lamprey abundance and should be continued. However, other methods should be used to correct count data or to obtain absolute adult abundance estimates.

Ammocoete abundance was highly variable, but indicated a lack of recent recruitment in the upper reaches of most rivers we sampled. Truncated size frequencies also indicated poor recruitment in recent years. Standardized, basin-wide monitoring of ammocoetes, coupled with habitat delineation is needed to adequately assess ammocoete distribution (Pajos and Weise, 1994).

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