

Spatial scales of inference from stream fish standard sampling protocols

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Introduction

- Stream fish sampling is conducted to estimate species richness, measure fish density, or characterize fish communities.
- The sampling schemes most widely used include patch-based such as run, riffle, or pool units (Fig. 1A) or reach-based such as 40-times the mean wetted width (Fig. 1B).
- We assess the frequency of sampling schemes in stream fish ecology literature to assess how common practices will meet a rising interest in patch-scale information.

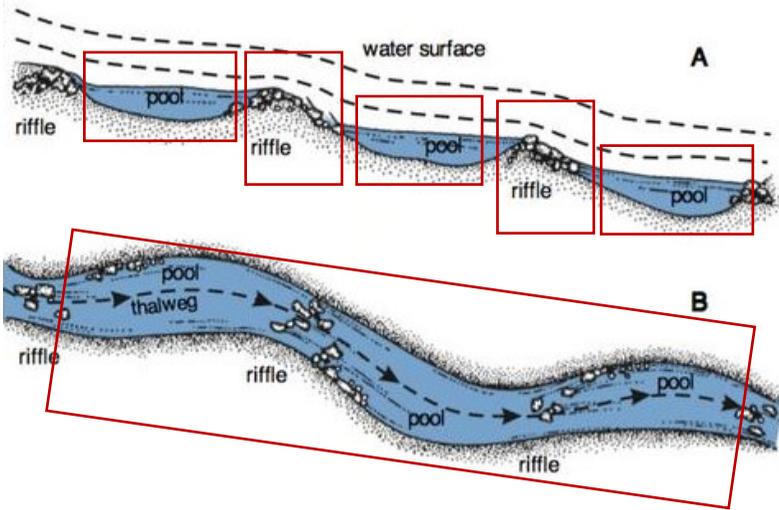


Figure 1. (A) a patch-based sampling scheme in which replicates of patches are sampled (red boxes) versus (B) a reach-based scheme in which patches are ignored while sampling a broader stream reach.

Methods

- We used GoogleScholar to search and review 300 peer-reviewed works on fish sampling.
- We noted study goal, gear type, number of passes, and sampling scheme for each study.
- From these data we created a weighted flow chart and time series of sampling schemes used.

Results

- Forty-six papers had sufficient detail for analysis
- Reach-based sampling schemes were more common regardless of study goal (Fig. 2).
- Patch-based sampling increased during 1990-2010 and then leveled at 25% thereafter (Fig. 3).

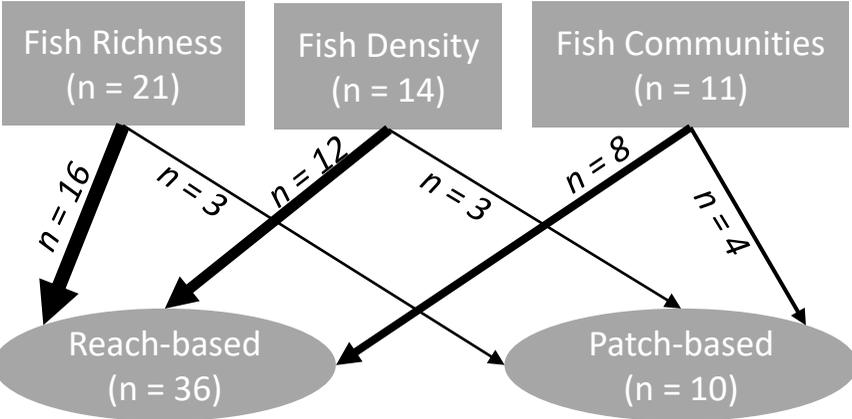


Figure 2. Weighted flow chart with study goals as boxes, sampling schemes as circles, and arrow widths weighted by the number of studies (n).

Results

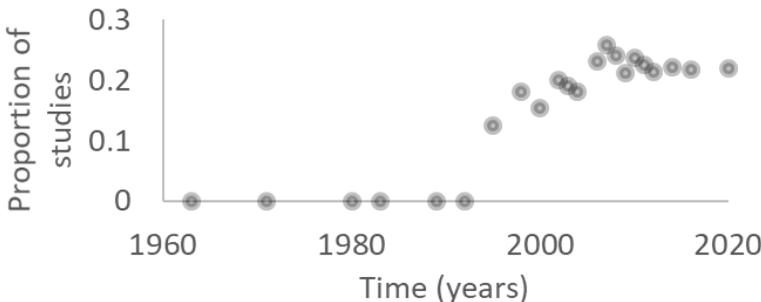


Figure 3. Time series of the proportion of reviewed studies that used patch-based sampling schemes.

Discussion

- Although reach-based sampling is more commonly used, use of patch-based schemes increased during the past three decades.
- Patch-based sampling can be scaled up (i.e., aggregating samples) while simpler and less costly reach-based sampling cannot scale down.

Acknowledgements

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- Jennings G. and Harman W. Stream profile. Raleigh (NC): North Carolina Cooperative Extension; [accessed 2021 Jan 25]. <https://content.ces.ncsu.edu/natural-stream-processes>

