

## **Partial stratification in two-sample capture-recapture experiments.**

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**Abstract:** Capture heterogeneity is known to cause bias in estimates of abundance in two-sample capture-recapture (Lincoln-Petersen) experiments. Often this heterogeneity is related to observable fixed characteristics of the animals such as sex or size. If this information can be observed for each handled animal at both sample times, then it is straightforward to stratify (e.g. by sex) and obtain stratum-specific estimates. In many fishery experiments, it is more difficult, for example to sex all captured fish. In these cases, a sub-sample of the captured fish at each sampling occasion is selected and further, more costly, measurements (e.g. sex determination through sacrificing the fish) are made. Our data now consists of three parts – animals whose stratification variable is unknown, and sub-samples at each occasion where stratification variables are determined.

In this talk we develop and apply new methods for these types of experiments. Furthermore, given the relative costs of sampling for a simple capture and for processing the sub-sample, optimal allocation of effort for a given cost can be determined. We also develop methods to account for additional information (e.g. prior information about the sex ratio) and for supplemental continuous covariates such as length. These methods are applied to a problem of estimating the size of the walleye population in MilleLacs, MN.