Division of Statistics

Master's Thesis Defense

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A Discussion and Analysis of Four Constant Fractional Marking Alternatives for California's Central Valley Salmon Hatcheries

ABSTRACT

Hatchery chinook salmon are typically marked by clipping the adipose fin and tagged with a coded-wire tag for later identification. However, all juveniles released from a hatchery are not always marked and tagged, and tagging levels may vary each year. A constant fractional marking program is described where a certain percentage of juvenile hatchery fish are marked and tagged every year allowing for the estimation of natural production. Four marking alternatives where all of the hatchery fish were either marked or some were left unmarked, applied in combination to selective and non-selective fisheries, were considered. Estimation routines for these alternatives were derived using sampling theory and method of moments, and bootstrapping methods to estimate the variance of these estimators is discussed. An analysis using a factorial design was done to determine the effects of marking levels and sampling rates on the precision of the natural production estimates for each alternative. An increase in escapement sampling rate showed the most significant increase in precision for all alternatives, but when some hatchery fish were left unmarked, the constant fractional marking rate was also an important factor.