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RESEARCH PERIOD

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FUNDING

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This project is part of the *Herring Research and Monitoring* program. The purpose of this study is to improve predictive models of herring stocks in Prince William Sound through observations and research.



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REPRODUCTIVE MATURITY AMONG AGE COHORTS OF HERRING

BACKGROUND

Pacific herring (*Clupea pallasii*) are expected to begin spawning at three years old, however some individuals don't spawn until they are four or five years of age. Estimation of the total Pacific herring biomass in Prince William Sound, Alaska requires an understanding of the number of herring that do not spawn in a given year. Thus, knowledge of the reproductive maturity schedule of Pacific herring can facilitate more accurate estimates of herring biomass, which informs management decisions.

METHODS

Direct and indirect methods will be used to examine reproductive maturity schedules of Prince William Sound herring. The direct methods rely on several different estimates of gonad development, which include (1) measuring gonads of both male and female herring to determine the ratio of the weight of the gonad to the weight of the whole fish, otherwise known as a gonadosomatic index; (2) visual inspection of the gonads to determine a maturity criteria known as the Hjort scale; and (3) histology of ovaries to determine, at the physiological level, whether there is evidence of past (post-ovulatory follicles) or future (maturation stage of ovarian follicles) spawning. The indirect method relies on differences in annual scale growth to understand the age at which an individual fish begins spawning for the first time. Importantly, by assessing historical scale growth of older individual herring, the scale technique allows for understanding reproductive maturity schedules across the entire population of recruited fish.



Pacific herring collected for lab analysis.

WHAT WE WILL LEARN

We will learn the proportion of immature and mature three, four, and five-year-old herring that are in the spawning stock, as well as other times of the year, and whether these proportions have changed over time. These techniques will be used to ground-truth reproductive maturity estimates derived from the age-structure-assessment model. In addition, these data could be used as inputs into the model to refine biomass estimates.