TITLE: Precision Metrics Summarized from 20+ years of Fish Age Estimation Studies

ABSTRACT:

Age estimation of fish is necessary for the assessment of fish population dynamics and stock structure. Precision is the consistency or repeatability of age estimates among multiple readings from calcified structures. Three common measures of age precision are percent agreement, average percent error (APE), and average coefficient of variation (ACV). Campana (2001) reviewed the use of these precision measures in the fisheries literature, suggested that the ACV should be used in most instances, and indicated that ACV values less than the modal observed ACV of 5% indicated adequate ageing precision. We analyzed 313 age precision studies published since 1983. Our objective was to determine if recent papers primarily used ACV, to reassess the modal observed ACV value, and to determine if these items differed based on number of readings, range of observed ages, class of fish, and type of calcified structure. The ACV was used in two-thirds of reviewed studies published after 2001. Usage of ACV did not differ between type of comparison (between- or within-readers) or class of fish studied (Actinopterii or Elasmobranchii), but did differ among number of repeated readings, range of observed ages, and calcified structure used. Median ACV was lower when only two repeated readings were made, lower when more than 10 ages were estimated, and lower for otoliths than spines, fin rays, and vertebrae, which had a lower median ACV than scales. The overall median ACV was 9.3%, with a modal ACV of 9-10%. These results suggest that the ACV is higher than what Campana reported in 2001 and varies among aspects of the analyses. Our results provide a modern perspective on the questions raised by Campana and allow for more focused comparisons of age precision results.