LINGCOD: SEX-SPECIFIC OTOLITH AGE-READING ERROR

INVESTIGATION OF SEX-SPECIFIC OTOLITH AGE-READING ERROR IN LINGCOD (Ophiodon elongatus)

by
Kristen M. Munk
Alaska Department of Fish and Game
Box 3526
Juneau, Alaska 99802 USA

ABSTRACT

Diverse otolith age patterns, possibly resulting from spatial and temporal segregation of lingcod (Ophiodon elongatus) populations into female and male components, suggest that error in reproducing age estimates from otolith growth patterns may be partitioned into "female age-reading error" versus "male age-reading error". Otolith ages from 99 lingcod – 68 female and 31 male – were determined using the "cleaned" and "break n' burn" techniques, and using lingcod otolith pattern interpretation criteria established at the Alaska Department of Fish and Game, CWT & Otolith Processing Lab's Age Determination Unit. All specimens were second-read by the initial reader to assess within-reader precision. Pooled by sex, within-reader precision was measured to be: average percent error (APE)= 6.63% and coefficient of variation (CV)= 9.38%, %agreement 34.34%, and mean sample variance= 2.03. Sex-specific precision was partitioned as: male APE = 5.39%, male CV = 7.62%, %agreement=45.99%, mean male sample variance= 4.723, and female APE = 7.19%, female CV = 10.17%, female %agreement= 41.94%, mean female sample variance= 2.279. The age ranges were (first read/second read): for males age 6/6 to 17/21 (mean age = 10.9/10.65), and females age 6/6 to 19/21 (mean age = 10.33/10.4).

Error in repeating an age estimate is thought to increase for females because winter zones are speculated to be wider with more checks, or "noize", which requires banding for the annulus. If this noise were not banded, and instead was split out, an older estimate would result. Such an ambiguous pattern would result in dramatically different age-reading situations, for example an age 7 versus age 12. The latter difference produces relatively high average-percent error, coefficient of variation, and variance. Males are speculated to have more consolidated winter zones – less noisy, which obviates a decision on "banding" vs "splitting". Error in reading these patterns might result from estimates of age 7 vs 8, but not an extreme of 12. Statistical error would be commensurately smaller.

General speculation as to what instigates differences in these patterns is inherent in evaluating age patterns, so repeatability tests are conducted to estimate this error. An important assumption is that error is random across the entire population. If error is not reflective of the entire population – that is if it could be partitioned by a parameter of the population – then defining this partitioning becomes necessary to more accurately depict the population.

Age-reading is described as an "art" and not a "science", therefore age pattern interpretation methods are generally limited to subjective characterization and recognition of differences in the patterns. These patterns are inherently variable, however a typical lingcod otolith growth pattern is generally "fast growth" with the early years showing relatively large growth up to approximately age 6, followed by moderate slowing through age 12. Up through age 12, growth events – checks, or rings – are often "banded" to make up one annulus when reading a surface transect out the anterior rostrum. After approximately age 12, growth may slow, sometimes with necessary banding, sometimes simply counting each check, known as "splitting".