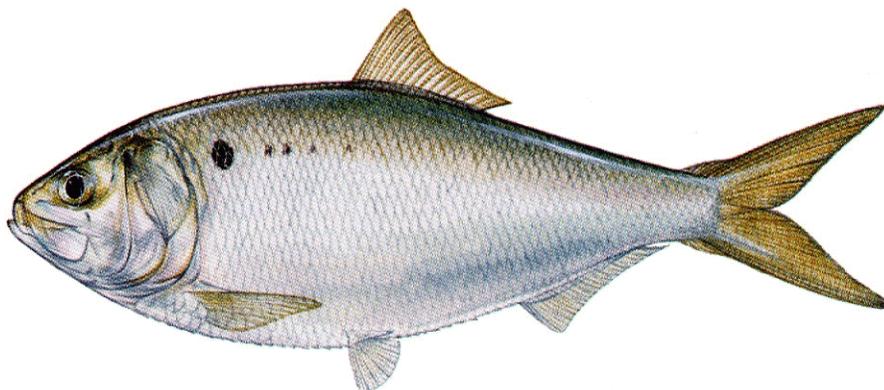


5.17 Gulf Menhaden *Brevoortia patronus*



Highlights

- Scales are used to age gulf menhaden.
- Scale rings are generally easy to discern.
- Sagittal otoliths are small and fragile; it is impractical to extract, process and read large numbers of whole or sectioned otoliths from gulf menhaden.
- Approximately 95% of gulf menhaden in the purse-seine catch for reduction are age-1 and age-2 fish combined.

Scale Description

The NOAA Fisheries Service laboratory at Beaufort, NC, has monitored the gulf menhaden purse-seine fishery for size and age composition of the catch since 1964 (Nicholson 1978). From the outset, program managers realized it was impractical to utilize otoliths to age gulf menhaden because; 1) sagittae were so small and fragile, and 2) large amounts of time and effort would be required to extract, process, and read whole or sectioned otoliths. Moreover, large numbers of ageing parts (around 10,000 or more) would be required to adequately characterize the fishery with annual landings of several hundred thousand metric tons. Thus, scales were selected as the ageing part of choice for gulf menhaden.

Chapoton (1967) determined that scale development on gulf menhaden began on larval specimens at around 21 mm FL and was complete in specimens > 27 mm FL. Gulf menhaden scales are generally thin and translucent.

Unlike most herrings, the posterior margin of gulf menhaden scales are pectinate (Figure 5.125). The anterior field is embedded in the integument. The entire scale is sculptured with fine circuli, which roughly parallel the anterior margin. The largest and most symmetrical (nearly rectangular) scales occur in a median

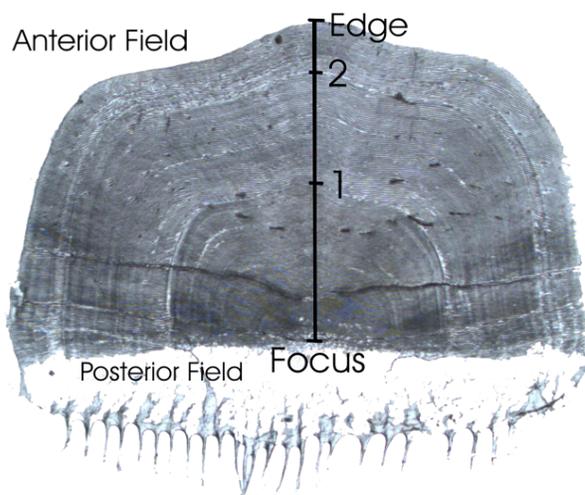


Figure 5.125 Scale from an age-2 gulf menhaden (188 mm FL, 142 g), showing the focus, scale edge, and first and second age rings.

lateral band above the lateral line and below the dorsal fin (Figure 5.126). Scale samples for ageing are removed from this area.

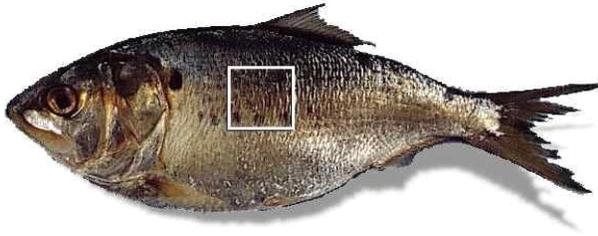


Figure 5.126 Area from which scale patch is removed for ageing gulf menhaden.

Scale Removal

A scale patch from gulf menhaden is removed with a blunt-edged scalpel. First, the scalpel is passed several times across the surface of the scales in the patch area (in an anterior to posterior direction) to remove excess slime and moisture. The scalpel is wiped clean, and inserted under the scales slightly posterior from where the patch will be taken (Figure 5.127). With a gradual move forward, several rows of scales are lifted from the body by pressing scales between the thumb and the scalpel (a scale patch of 20-30 scales).

The scale patch is placed in a small vial of water. A few drops of dishwashing detergent in the wash bottle, used to fill the vials, helps degrade residual slime on the scales.

Scale Processing

The scale patch is removed from the vial with recurved forceps and blotted dry on a paper towel. Scales are rubbed between the thumb and forefinger and/or middle finger to remove any residual integument. Individual scales are pulled from between the thumb and fingers, then mounted between two glass microscope slides. Ten scales (two rows of five) are placed on the first slide with pectinations pointing up, then they are covered



Figure 5.127 Scale patch ready to be removed with a scalpel from the flank of a gulf menhaden.

with the second slide. Slides are fastened together on the ends with short lengths of transparent tape. The cover slide is labeled with a unique port and specimen number combination (Figure 5.128).



Figure 5.128 Gulf menhaden scales from a single fish pressed between two microscope slides.

Age Determination

Nicholson and Schaaf (1978) found that ageing gulf menhaden with scales was problematic. They determined that most fish had well-defined scale rings, but others had no rings, or rings that were oddly spaced. Their criteria for scale ageing were based on appearance of the scales, number and spacing of the rings, and fish fork length at time of capture. Although admitting some subjectivity, they determined that fish with one or two scale rings displayed true annuli. For fish with oddly-spaced rings, it was possible to separate out age classes by ring location. Finally, for

Gulf menhaden spawn between October and April, with peak activity from December through March (Turner 1969, Fore and Baxter 1972). Scale annuli form in winter, and by convention the birth date for gulf menhaden is January 1 (Figure 5.130). Since the purse-seine fishery operates April through October, advancing ages because of calendar date (and unformed rings) is not an issue relative to the industrial fishery statistics.