

**Aspects of the Reproductive Biology of Yellowfin Tuna, *Thunnus albacares*,  
in the Northern Gulf of Mexico**

**Aspectos de la Biología Reproductiva del Aatún Aleta Amarilla, *Thunnus albacares*,  
en el Golfo de México Norte**

**Aspects de la Biologie de la Reproduction du Albacore à Nageoires Juanes, *Thunnus albacares*,  
dans le Nord du Golfe du Mexique**

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**EXTENDED ABSTRACT**

Yellowfin tuna, *Thunnus albacares*, occur world-wide in tropical and subtropical oceans and support major fisheries throughout its range. In the Pacific Ocean, the species is known to spawn every 1.1 - 1.5 days during a four to six month reproductive season (McPherson 1991, Schaefer 1996); the four month reproductive season in the Indian Ocean appears related to the north monsoon (Stéquert et al. 2001). However, although yellowfin tuna are known to frequent the Gulf of Mexico (GOM) (Weng et al. 2009) and support an active recreational fishery, there is no information on the reproductive biology of the species in the region. This study provides the first information on spawning seasonality, sexual maturity, and gonadal development of yellowfin tuna in the northern GOM.

Yellowfin tuna were collected opportunistically at recreational fishing tournaments in the northern GOM from May through September 2000 - 2011. Additional collections from the charter boat fishery were made February 2004 - 2005, March- April 2012 - 2013, and October 2012. Fish were weighed and measured, and gonadal tissues were removed, weighed, preserved and processed following standard histological techniques. Reproductive phases were identified following Brown-Peterson et al. (2011).

Gonadosomatic Index (GSI) values for female and male yellowfin tuna collected from February through October showed elevated values from May through September (Figure 1), suggesting a five month reproductive season in the GOM. While GSI values are low, even for batch spawning species, the values reported are similar to GSI values in the Pacific (McPherson 1991) and Indian (Stéquert et al. 2001) Oceans during the reproductive season.

Histological analysis of gonadal tissues focused on male (n = 94, 702 - 1635 mm FL, 6.4 - 83.8 kg) and female (n = 110, 838 - 1625 mm FL, 11.4 - 66.4 kg) fish captured prior to (February) and during (May - September) the reproductive season. All males examined were sexually mature. The smallest sexually mature female was 685 mm FL, captured in July, while the largest immature female sampled was 935 mm FL in August. This compares favorably with females from the eastern Pacific Ocean, where fish as small as 880 mm FL were found with hydrated oocytes (Schaefer 1996). In contrast, yellowfin tuna females from the Coral Sea reached 50% sexual maturity at 1079 - 1200 mm FL (McPherson 1991).

Yellowfin tuna ovaries from the GOM showed asynchronous oocyte development and indeterminate fecundity, as previously reported for the species (McPherson 1991, Schaefer 1996). Histological analysis of ovarian tissue confirms the May through September spawning season in the GOM (Table 1). Some females began gonadal recrudescence in February, and fish in the actively spawning reproductive sub-phase (ovaries containing hydrated oocytes or oocytes undergoing final maturation) were found in May, June, August and September. Small sample sizes in July likely explain the lack of actively spawning females during that month. Some females entered the regenerating phase as early as June, although fish in the regressing and regenerating phases, indicating cessation of spawning, were more commonly seen in August and September (Table 1).

Yellowfin Tuna in the GOM are clearly batch spawners, as indicated by the presence of postovulatory follicles (POF)  $\leq$  24 hours (h) in ovaries containing large vitellogenic oocytes. Analysis of the 51 females in the spawning capable reproductive phase from May through September showed that 44 had ovaries with POF  $\leq$  24 h. This corresponds to an average spawning frequency of once every 1.16 days. However, there was no histological evidence of daily spawning (i.e., occurrence of POF  $\leq$  24 h and oocytes undergoing final maturation in the same ovary) in any of the fish examined. This estimate for GOM fish agrees closely with previous estimations of spawning frequency of every 1.14 days for Yellowfin Tuna in the eastern Pacific Ocean (Schaefer 1996) and every 1.45 days for fish from the Coral Sea (McPherson 1991), also using the POF method. McPherson (1991) suggested that larger Yellowfin Tuna spawn more frequently than smaller

females; additional samples will be necessary to investigate if this is also the case in GOM Yellowfin Tuna females.

In conclusion, preliminary data indicates that the reproductive biology of Yellowfin Tuna from the northern GOM is similar to previous reports for the species in the Pacific Ocean. Fish from the GOM have a five month spawning season, females can reach sexual maturity as small as 685 mm FL, and females are estimated to spawn as frequently as every 1.16 days although there is no evidence of daily spawning. These data will be important to help develop management plans for Yellowfin Tuna in the northern GOM, where they are actively targeted in the recreational fishery.

**KEY WORDS:** Scombridae, spawning season, spawning frequency

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**LITERATURE CITED**

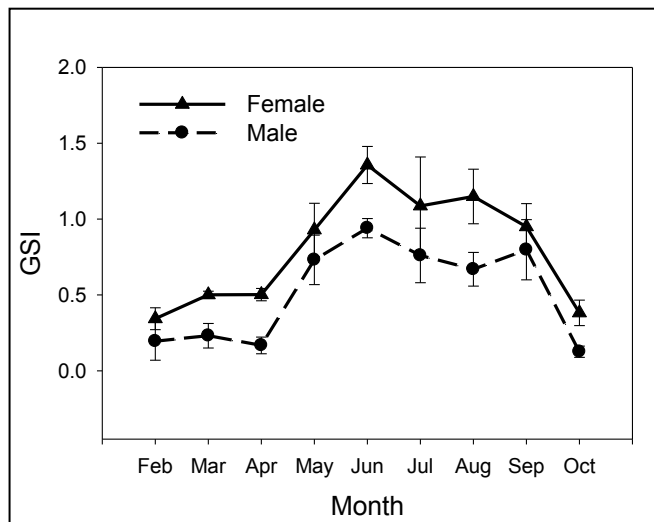
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**Figure 1.** Monthly Gonadosomatic Index (GSI; mean ± SE) of Yellowfin Tuna from the northern Gulf of Mexico. Data represents fish collected from charter boat (Feb 2004 - 2005, Mar - Apr 2012 - 2013, Oct 2012) and tournament (May - Sep 2000 - 2011) recreational fisheries.

**Table I.** Monthly reproductive phases (% of total fish) of female yellowfin tuna captured from 2000 – 2011 in the northern Gulf of Mexico.

| Month     | N  | % Immature | % Regenerating | % Early Developing | % Developing | % Spawning Capable | % Actively Spawning | % Regressing |
|-----------|----|------------|----------------|--------------------|--------------|--------------------|---------------------|--------------|
| February  | 9  | 22         | 66             | 11                 | 0            | 0                  | 0                   | 0            |
| May       | 7  | 0          | 0              | 0                  | 28           | 44                 | 28                  | 0            |
| June      | 42 | 0          | 5              | 5                  | 19           | 55                 | 17                  | 0            |
| July      | 5  | 0          | 0              | 0                  | 40           | 60                 | 0                   | 0            |
| August    | 32 | 4          | 4              | 9                  | 6            | 59                 | 9                   | 9            |
| September | 5  | 0          | 20             | 0                  | 0            | 60                 | 20                  | 0            |