

Table 3. Histological criteria developed by MARMAP (Charleston, SC) to determine reproductive state in red porgy, *Pagrus pagrus* (see D'Ancona 1949,1950; Wallace and Selman 1981; Alekseev 1982; Alekseev 1983; Hunter et al. 1986; Sadovy and Shapiro 1987; Matsuyama et al.1988; West 1990; Roumillat and Waltz 1993). June 1997.

Reproductive state	Male	Female
0 Uncertain maturity	Inactive testes; unable to assess maturity - state=1 or 5.	Inactive ovaries; previtellogenic oocytes only; unable to assess maturity - state=1 or 5.
1 Immature (virgin)	No primary males found. Juveniles were either females or, infrequently, simultaneous or transitional (see below).	Previtellogenic oocytes only, no evidence of atresia. In comparison to resting female, most previtellogenic oocytes < 80 µm, area of transverse section of ovary is smaller, lamellae lack muscle and connective tissue bundles and are not as elongate, germinal epithelium along margin of lamellae is thicker, ovarian wall is thinner.  See next page.
2 Developing	Development of cysts containing primary and secondary spermatocytes through some accumulation of spermatozoa in lobular lumina and dorsomedial sinuses.	Completion of yolk coalescence and hydration in most advanced oocytes. Zona radiata becomes thin. Postovulatory follicles sometimes present.  See next page.
3 Running Ripe	Predominance of spermatozoa in lobules and dorsomedial sinuses; little or no occurrence of spermatogenesis.	More than 50% of vitellogenic oocytes with alpha- or beta-stage atresia .
7 Developing, recent spawn	Not assessed.	Previtellogenic oocytes only; traces of atresia. In comparison to immature female, most previtellogenic oocytes > 80 µm, area of transverse section of ovary is larger, lamellae have muscle and connective tissue bundles, lamellae are more elongate and convoluted, germinal epithelium along margin of lamellae is thinner, ovarian wall is thicker.
4 Spent	No spermatogenesis; some residual spermatozoa in lobules and sinuses.	Mature, but inadequate quantity of tissue or postmortem histolysis prevent further assessment of reproductive state.
5 Resting	Little or no spermatocyte development; empty lobules and sinuses.	Postmortem histolysis or inadequate quantity of tissue prevent assessment of reproductive state.
8 Mature specimen, state unknown	Mature, but inadequate quantity of tissue or postmortem histolysis prevent further assessment of reproductive state.	
9 Unknown	Postmortem histolysis or inadequate quantity of tissue prevent assessment of reproductive state.	

Simultaneous (bisexual)

Presence of distinct ovarian and testicular regions in approximately equal amounts and of the same reproductive state. This gonad structure was infrequently observed in both juvenile and adult fish.

Transitional (reproductive state = 6 (adult) or A (juvenile))

Ventrolateral proliferation of active testicular tissue (spermatogonia through spermatozoa) along the outer surface of the ovarian wall in spent/resting ovary (functional protogyny) or immature ovary (juvenile protogyny). As testicular tissue envelopes regressing ovary, ovary collapses laterally and sperm sinuses form within former ovarian wall.

B Developing,  
recent spawn

Hunter et al. 1986). Formerly state=7.

Vitellogenic oocytes and postovulatory follicles > 24 h old (sensu Hunter et al. 1986). Formerly state=7.

C Developing,  
recent spawn

Most advanced oocytes in cortical-alveoli stage. Formerly state=2.

D Developing,  
recent spawn

Most advanced oocytes in yolk-granule or yolk-globule stage. Formerly state=2.

E Early developing,  
cortical alveoli

Most advanced oocytes in migratory-nucleus stage; partial coalescence of yolk globules possible. Formerly state=2.

F Developing,  
vitellogenesis

G Final oocyte maturation

Vitellogenic oocytes and postovulatory follicles < 12 h old (sensu Hunter et al. 1986). Formerly state=7.

Vitellogenic oocytes and postovulatory follicles 12-24 h old (sensu