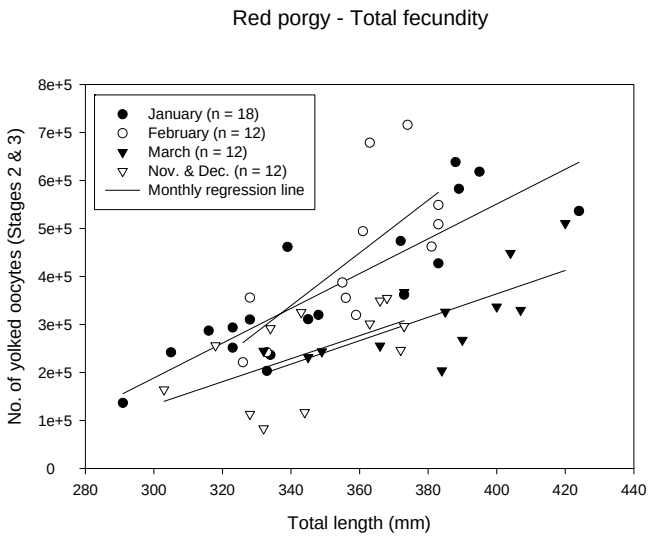
SEDAR1-DW3

Red Porgy Fecundity Data

Definitions of potential annual fecundity, determinate fecundity, and indeterminate fecundity follow Hunter et al. (1992). One definition from Hunter et al. (1992) was modified: Total fecundity - standing stock of all oocytes with significant yolk deposition - stage-2 and stage-3. Two stages of yolked oocytes, migratory nucleus oocytes, hydrated oocytes, and atretic oocytes, were identified in samples from formalin-preserved gonads (*sensu* Hunter et al. 1992).

Densities of stage-2 and stage-3 from six locations in the ovaries of 13 fish were compared to determine if oocyte stages were randomly distributed. Samples weighed approximately 30 mg and consisted of 150-600 stage-2 and stage-3 oocytes. The effects of location and individual fish on density were assessed with a two-factor ANOVA. There was no difference in oocyte density among the six locations, which indicated that samples for estimating total fecundity and batch fecundity could be taken from any location without bias.



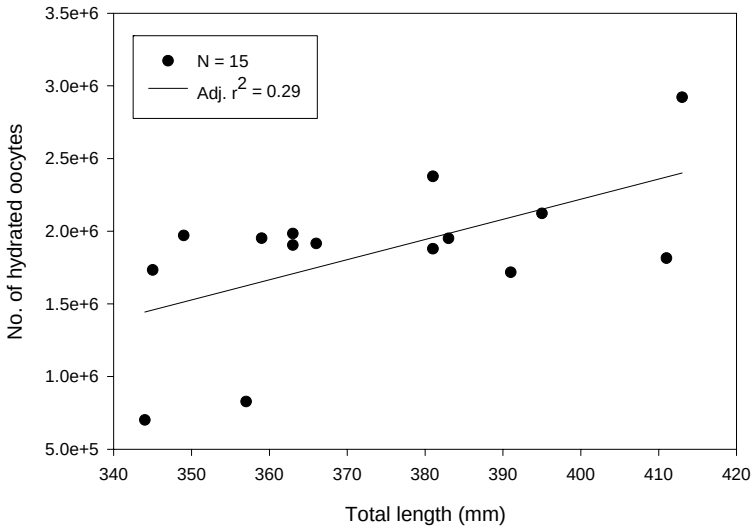
To estimate total fecundity, two 25-35 mg samples were taken from random locations in the ovaries of 56 fish, and stage-2 and stage-3 yolked oocytes were counted. Monthly regression equations were computed to describe the relationship between total fecundity and fish length. An analysis of covariance (ANCOVA) was performed to examine the effect of month on total fecundity. If total fecundity decreases each month then red porgy fecundity is fixed prior to the spawning season. The interaction term in an ANCOVA showed that the slopes of the equations were not significantly different. However, there were differences in elevation, though not until the end of the spawning season. Atretic oocytes were not prevalent. The lack of a change in elevation between January and February indicated that spawning is indeterminate (not fixed prior to the spawning) and new eggs are recruited throughout the spawning season. The percentage of stage-3 yolked oocytes did not progressively decrease over time further indicating that spawning was indeterminate.

As red porgy exhibited indeterminate fecundity, estimates of batch fecundity and spawning frequency were be used to calculate annual fecundity. To estimate batch fecundity, two 25-35 mg samples were taken from random samples in the ovaries, and hydrated oocytes were counted. The estimate of spawning frequency was based on the occurrence of hydrated oocytes and less than 24 h old postovulatory follicles in fish caught with fishery-dependent gear (MARMAP does not sample during the red porgy spawning season). It was estimated that red porgy females produce 52 egg batches during the spawning season (Nov. 15 – Mar. 15; Table 1). This spawning frequency was multiplied by batch size to determine annual fecundity. The relationship between annual fecundity and total length (mm), fork length (mm), whole weight (g), ovary-free weight (g), and age is provided in Table 2. Data sets and programs used to calculate total fecundity, batch fecundity, and spawning frequency are included on the CD.

Table 1. Proportion of red porgy with: 1) hydrated oocytes (HO) or migratory-nucleus oocytes (MNO), and 2) postovulatory follicles (POFs) <24 h old relative to total number of mature females with vitellogenic oocytes in samples caught with hook and line on commercial vessels. The proportions were averaged and then used to estimate spawning frequency.

Month	No. with MNO or HO	No. mature females	No. with POFs	No. mature females
Nov	11	47	8	47
Dec	25	54	5	54
Jan	24	72	38	72
Feb	68	113	32	113
Mar	37	56	10	6
Total	165	342	93	342
Proportion of total	0.207		0.368	
Average proportion		0.288		

Red porgy - Annual fecundity vs. TL



Red porgy - Annual fecundity vs. whole weight

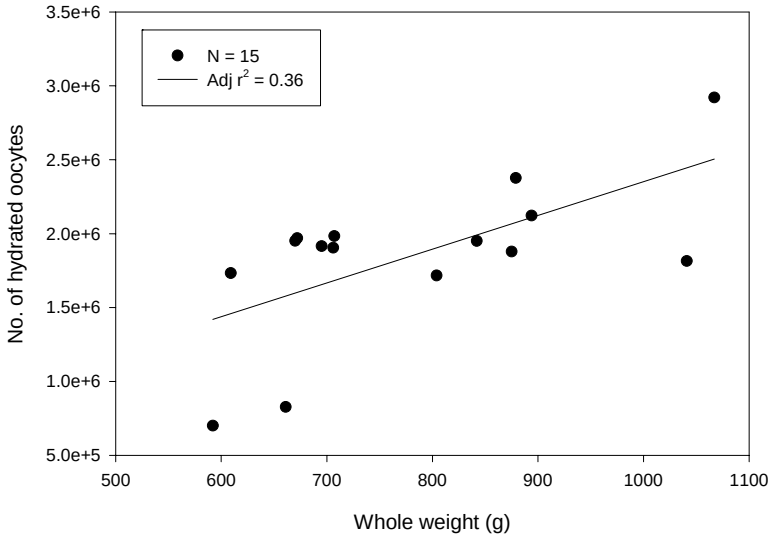


Table 2. Linear regression coefficients for the relationship between annual fecundity (AF; number of hydrated oocytes) and total length (mm), fork length (mm), whole weight (g), ovary-free weight (g), and age in red porgy, *Pagrus pagrus*. Specimens were collected during November through March of 1997-2000 from fishery-dependent sources. AF = batch fecundity * 52 batches per spawning season (Nov. 15 – Mar. 15).

Linear equation AF = a + bX								
X	a	95% CI	b	95% CI	Adjusted r^2	F	N	Range
Total length	-3.332e+06	4.335e+06	13879.0	11590.9	0.29	6.69	15	344-413 mm
Fork length	-3.412e+06	3.918e+06	16375.0	12167.8	0.35	8.45	15	296-360 mm
Whole weight	68040	1.317e+06	2283.1	1658.8	0.36	8.84	15	592-1067 g
Ovary-free wt.	116240	1.345e+06	2310.3	1761.5	0.33	8.03	15	578-1029 g
Age	928283	1.221e+06	246828.0	348342.4	0.10	2.38	14	2-5 yr

Hunter, J.R., B.J. Macewicz, N.C.H. Lo, and C.A. Kimbrell. 1992. Fecundity, spawning, and maturity of female Dover sole *Microstomus pacificus*, with an evaluation of assumptions and precision. Fish. Bull., U.S. 90:101-128.