SEDAR1-DW5
Data Collection and Processing of Data for Red Porgy Life History Studies

Sampling

Since 1979, a total of 15,959 red porgy have been sampled with a variety of fishery-independent gear types 1978 from Cape Lookout, NC to Cape Canaveral, FL. Specimens were collected primarily during May through August of each year. In addition, otoliths and gonads have been collected from 1,136 red porgy that were caught by commercial fishermen off of NC and SC during 1997and 1999-2001 to help describe the maturity schedule, collect specimens for fecundity studies and make comparisons between fishery-independent and fishery-dependent caught fish. Fishery-independent data and fishery-independent data are included on the CD in a file entitled "porgylh3". There are excel and asci versions of the file. Fishery-independent and fishery-dependent data can be separated by the project ID. PID = "105" for fishery-independent data and PID = "150" for fishery-dependent data.

From the 1990s through the present, specimens for life history workup were collected from eight geographical areas designated by each whole degree of latitude from 27^0 N to 34^0 N. South of 32^0 N and north of 33^0 N, fifty red porgy of each 1 cm size class were retained from each trip. In mid latitudes, 32^0 N to 33^0 N, ten specimens of each 1 cm size class were retained. In all latitudes, all red porgy larger than 350 mm FL were kept for life history studies. A Limnoterra fish measuring board with a 1-mm resolution (TL, FL, SL) was used to measure red porgy. They were weighed with a triple beam balance to the nearest gram. This system was connected to a computer for life history data storage with a paper output as backup.

Aging of Fish

For specimens collected from 1979-1994, the whole right otolith was immersed in cedar wood oil and examined for increments. After 1994, sagittae were marked through the core along the dorsoventral axis and a transverse section (0.7-1.0 mm thick) was made through the core using a Buehler® Isomet low speed saw. Sections were mounted on glass slides with Accumount® mounting medium and viewed under a dissecting microscope at 20-30 X using reflected light. Increments (one translucent and one opaque zone) were counted independently by two readers without knowledge of specimen length or date of capture. If counts differed, otoliths were reread by both readers simultaneously and discarded from analyses if disagreements persist. A subsample of otoliths was also sent to individuals at other institutions that had experience with age interpretation of red porgy. Since 1979, the primary individuals that have read otolths from red porgy are Bill Roumillat and Pat Harris. Bill Roumillat read otolths from fish that were collected during 1979-1983. Pat has read all otoliths from 1983 through 2001. Pat and Bill both read 1983 otoliths. Second readers on the otoliths were Wayne Waltz, Mark Westendorff and Paulette Powers.

Aging of red porgy is ongoing. For the purposes of the red porgy data assessment workshop, ages are available from 8,536 individuals that were collected during 1979-1994 (fishery-independent). An additional, 5,267 red porgy have been collected during 1995-2001 (fishery-independent) and 769 of these fishes have been aged. Of the fishery-independent caught red porgy that have been aged since 1979, 1,555 were from 33-34^{o}N; 6,809were from 32-33^{o}N; 536 were from 31-32^{o}N and 195 were caught south of 31^{o}N. Red porgy that have been aged were caught at depths ranging from 18-176 m with most fish caught < 90 m.

Of the 1,136 red porgy otoliths that have been obtained from fishery-dependent sources during 1997-2001, 993 have been aged.

Reproduction

A sample from the posterior section of each gonad was taken for histological analysis and preserved in 10% seawater buffered formalin. Whole ovaries for fecundity analysis were collected during 1997-01. Ovaries were weighed to the nearest gram and placed in sample jars containing 10% seawater buffered formalin. Reproductive tissues were processed in a Modular Vacuum Processor®, vacuum infiltrated, blocked in paraffin, and sectioned (7 μm thickness) on a rotary microtome. Three sections from each sample were placed on a glass slide, stained in double-strength Gill hematoxylin and counter-stained with eosin-y.

Sections were viewed under a compound microscope at 40-400 X to determine sex and maturity stages. Two readers independently assigned sex and reproductive stage, and if a difference in maturity assignment occurred, the slide was reread simultaneously by both readers. Bill Roumillat and Oleg Pashuk have been the primary readers of reproductive tissue. Some samples have been examined both individuals. Second readers of reproductive tissue include Wayne Waltz and Dave Wyanski.

Sex and maturity has been determined for ~15,000 red porgy that were caught with fishery independent gear during 1979-2001. This process is ongoing and sex and maturity has not been assigned to all specimens that were caught in 1988 or 2001. These fish were caught at latitudes ranging from 27°55.5 to 34°36.6 N and depths ranging from 10 to 176 m with 414 individuals caught at depth > 90 m. Of the fish that have been sexed, 3,304 were caught north of 33°; 9,974 were taken between 32-33° N; 1,257 were caught between 31-32° N and 624were caught south of 31° N. Most of the fish that have been sexed were caught with hook and line gear (n = 1,972); blackfish trap (n = 1,752); Florida trap (n = 3,084), and chevron trap (n = 7,640). Specimens with developing, ripe, spent, or resting gonads were considered to be sexually mature. Probit analysis is used to determine the size and age at 50% maturity in MARMAP studies.

Sex and maturity have been determined for 970 of the fish caught by commercial fishermen since 1997.

Description of Red Porgy Age, Growth, and Reproduction Data Set

Included on CD, is a data set in ASCI "porgymer79-01" and Excel format that includes MARMAP red porgy life history data that have been collected since 1979. The layout for the data is as follows and can be found in file entitled "PORGYLH.SAS":

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DATA INITIAL; INFILE 'D:\PORGYDATA\PORGYLH3 LRECL = 421;
INPUT PID 1-3 COLL 4-9 GEAR 10-12 SPECIES $13-16 SPNO 17-19 AGE 60-61
TL 72-75 FL 76-79 SL 80-83 WT 86-89 SEX 95 MAT $96 DAY 97-98 MO 99-100 YEAR 101-102
LAT 103-107 LONG 108-112 DEPTH 113-115;
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A description of these data elements follows:
PID = Project identity. "105" - fishery-independent MARMAP data and "150" – fishery dependent data collected by MARMAP.
COLL = Collection Number
GEAR = Gear Code (See Table 1).
SPECIES = Species Code. The species code for red porgy is "A272".
SPNO = Specimen number.
AGE = Age
TL = Total length
FL = Fork Length
SL = Standard length
WT = Weight
SEX = Sex (See Table 2). A sex code of 5 and mat = 6 is a transitional individual. Juveniles undergoing transition are 8A.
MAT = Maturity (Table 3).
DAY = Day
MO = Month
YEAR = Year
LAT = Latitude
LONG = Longitude
DEPTH = Depth in meters

Table 1. Gear codes for gear used by MARMAP during reef fish cruises.

014 HOOK AND LINE – Personal
022 ¾ YANKEE TRAWL
041 MINI ANTILLEAN S-TRAP - BAITED
043 SNAPPER REEL, ELECTRIC OR MANUAL, 2 HOOKS
052 MINI ANTILLEAN S-TRAP - UNBAITED
053 BLACKFISH TRAP - BAITED
054 BLACKFISH TRAP - UNBAITED
055 EXPERIMENTAL LARVAL TRAP
056 MINNOW TRAP - COVERED
057 MINNOW TRAP - UNCOVERED
059 FINE MESH TRAP
060 CUBIAN TRAPEZE - 1 X 2M .947MM MESH
061 VERTICAL LONG LINE
073 EXPERIMENTAL TRAP
074 FLORIDA "ANTILLEAN" TRAP
086 KALI POLE STANDARD (MARMAP)
087 BOTTOM LONGLINE
296 25 MM DIA. FILTER
297 THERMISTOR
298 CTD
299 SURFACE HYDRO SAMPLE
300 NISKIN BOTTLES - STANDARD CAST
301 NISKIN BOTTLES - SURFACE AND BOTTOM
305 XBT
324 CHEVRON TRAP (MARMAP)
501 BOTTOM TRIPOD FIXED TV
502 STAT. TV STATION - HORIZONTAL
503 STAT. TV STATION - VERTICAL
504 DRIFT TV TRANSECT - HORIZONTAL
505 DRIFT TV TRANSECT - VERTICAL
506 TOWED TV TRANSECT - HORIZONTAL
507 TOWED TV TRANSECT - VERTICAL
513 PAN & TILT TV

Table 2. Sex codes (After Waltz et al. 1979). Revised June 1997.

Code	
0	Undifferentiated. Germ cells not yet developing.
1	Gonad entirely testicular (Triangular in cross-section).
2	Gonad entirely ovarian (Round or oval in cross-section).
3	Hermaphrodite (simultaneous). Testicular and ovarian tissue at the same maturity stage.
4	Hermaphroditic male. Gonad functionally testicular with some traces of ovarian tissue.
5	Hermaphroditic female. Gonad functionally ovarian with some traces of testicular tissue.
6	Ovarian tissue, but ovary wall not present in sufficient quantity to determine presence or absence of testicular tissue.
7	Testicular tissue, but insufficient quantity to determine presence or absence of ovarian tissue.
8	Immature ovarian tissue undergoing sexual transition. Used only in combination with reproductive state code = A (see P. pagrus).
9	Unknown.