SEDAR1-DW8
Data Documentation for MARMAP CPUE Index Information

Gear types chosen for index

Florida trap, Blackfish trap, chevron trap and hook and line gear have been the dominant gear types used by MARMAP since 1978. Florida trap, blackfish trap, and hook and line gear had been used consistently from 1981-1987. These gear types were used at 12 study areas that included eight live bottom areas ~20 fathoms distributed from Onlsow Bay, NC to Fernandina Beach, FL during 1981-1987. These live bottom areas were sampled with Florida trap, blackfish trap, and hook and line gear. Four shelf edge areas off SC (30 fathoms) were also sampled with Florida trap and hook and line gear during 1983-1987.

All four gear types were fished synoptically from an anchored research vessel during 1988-1989. The MARMAP group decided that these samples should not be used since they represented a methodological change. The group also decided that a modern study should be developed that compares Florida traps and chevron traps. This study should follow the standard procedures used by MARMAP during the 1980's including sites sampled, season, bait used, soak time, etc.

From 1990-2001, chevron traps have been deployed from randomly selected stations from south of Cape Canaveral, FL to Cape Lookout, NC. Trapping and hook and line gear has been used inside of 50 fathoms. Red porgy are commonly caught out to 70-80 fathoms and may extend as far as 200 fathoms. Therefore, gear deployed inside of 50 fathoms does not represent the whole population. Starting in 1998, a vertical longline has been used to sample reef fish in depths of 50 to 100 fathoms. We began using this gear type on deep water reefs off NC in 2000. However, at this point there is not a long time series or large sample size.

The MARMAP group decided to use three CPUE indices of red porgy: (1) 1983-1987 with Florida traps at shelf edge index stations; (2) hook and line gear at 12 inshore index stations 1981-1987 and (2) 1990-2001 with chevron trap at all stations. These three indices represent three different surveys used by MARMAP over the years.

Mean CPUE of fish caught with traps or hook and line gear is calculated for each year by species as:

$$Mean\,CPUE\,(no.\ fish\ per\ trap\text{-}hr.) = \frac{\sum \frac{no.\ fish\ caught}{soak\ time\,(hr.)}}{no.\,samples}$$

CPUE is calculated in a similar manner for hook and line gear with the exception that soak time (duration) is multiplied by three for samples taken before 1988 since three individuals fished on a collection. Only one individual fished on each collection from 1988-2001.

Locations for the shelf edge study areas were: 3215, 7909; 3216, 7909; 3222, 7901 and 3226, 7956. The sites are ~ 50 m deep with a bottom type that consists of rock

outcroppings and 1-2 m of relief. Locations of inshore index stations were: 3140, 8020; 3230, 7943; 3215,7943; 3255, 7908; 3248, 7938; 3317, 7826, 3251, 7814; 3329, 7815; 3318, 7853; 3340, 7843; 3344, 7717; 3355, 7746; 3409, 7647.

Description of the MARMAP monitoring data set

Included on CD, is a data set in ASCI "CPUE" that includes MARMAP monitoring reef fish data since 1978. The SAS program used to calculate CPUE is:

```
OPTIONS MISSING=' '  NODATE ERRORS=2;
DATA INITIAL; INFILE 'C:\PORGYDATA\CPUE' LRECL = 421;
INPUT PID 1-3 COLL 4-9  GEAR $10-12 SPECIES $16-19 EST $29 @23 TOTWGT
6.3NUM 30-34 @35 SUBWGT 5.2 MEAS 40-41 DAY 234-235 MONTH 236-237
YEAR 238-239 VESSEL 244-245 LAT 330-334 LONG 335-339 @287 STRATA
$CHAR4.
DEPTH 367-369 DUR 370-372 CC 377 NAME $385-420
   LEN1 43-45 FR1 46-48 LEN2 49-51 FR2 52-54
   LEN3 55-57 FR3 58-60 LEN4 61-63 FR4 64-66
   LEN5 67-69 FR5 70-72 LEN6 73-75 FR6 76-78

   LEN7 79-81 FR7 82-84 LEN8 85-87 FR8 88-90
   LEN9 91-93 FR9 94-96 LEN10 97-99 FR10 100-102
   LEN11 103-105 FR11 106-108 LEN12 109-111 FR12 112-114

   LEN13 115-117 FR13 118-120 LEN14 121-123 FR14 124-126
   LEN15 127-129 FR15 130-132 LEN16 133-135 FR16 136-138
   LEN17 139-141 FR17 142-144 LEN18 145-147 FR18 148-150

   LEN19 151-153 FR19 154-156 LEN20 157-159 FR20 160-162
   LEN21 163-165 FR21 166-168 LEN22 169-171 FR22 172-174
   LEN23 175-177 FR23 178-180 LEN24 181-183 FR24 184-186

   LEN25 187-189 FR25 190-192 LEN26 193-195 FR26 196-198
   LEN27 199-201 FR27 202-204 LEN28 205-207 FR28 208-210
   LEN29 211-213 FR29 214-216 LEN30 217-219 FR30 220-222 SITE 400;
IF DEPTH > 26 THEN SITE = 1;

* NOTE:  If Hnl before 1988 is used, Duration is times three
        since three people fished on a single collection.;
IF CC > 2 OR CC = 0 THEN DELETE;
 IF GEAR='324';
PROC SORT DATA=INITIAL; BY COLL GEAR;
DATA GL; SET INITIAL; BY COLL GEAR;
DROP SPECIES EST TOTWGT NUM SUBWGT;
IF FIRST.COLL OR FIRST.GEAR;
PROC SORT DATA=GL; BY YEAR SITE GEAR;
PROC MEANS MEAN SUM N STD; BY YEAR SITE GEAR;
 VAR DUR;
OUTPUT OUT=DURATION MEAN = DURMEAN
                     SUM = DURSUM
                       N = DURN
                     STD = DURSTD;
TITLE 'SAMPLING DURATION STATS BY SITE AND GEAR';
PROC SORT DATA=GL; BY GEAR;
```

```
PROC MEANS MEAN SUM N STD; BY GEAR;
 VAR DUR;
OUTPUT OUT=DURAT    MEAN = DURMEAN
                     SUM = DURSUM
                       N = DURN
                     STD = DURSTD;
TITLE 'SAMPLING DURATION STATS BY GEAR';
DATA PA272; SET INITIAL;

IF SPECIES='A272' AND GEAR='074' THEN OUTPUT PA272;
IF SPECIES='A272' AND GEAR='324' THEN OUTPUT PA272;
IF SPECIES='A272' AND GEAR='053' THEN OUTPUT PA272;
PROC SORT DATA=PA272; BY COLL GEAR;
PROC SORT DATA=GL; BY COLL GEAR;
DATA PGA272GL;
MERGE PA272 GL; BY COLL GEAR;
IF SPECIES=' ' THEN TOTWGT=0.0;
IF SPECIES=' ' THEN NUM=0;
IF SPECIES=' ' THEN SPECIES='A272';
IF SITE=. OR SITE=0 THEN DELETE;
MNFWT=TOTWGT / NUM;
WTCPUE = TOTWGT / (DUR / 60);
NUMCPUE = (NUM) / (DUR / 60);
* PROC PRINT;
 TITLE 'FISH INFO A272';
* PROC PRINT;
DATA FISH;SET PGA272GL;
PROC SORT; BY SPECIES SITE;
PROC SORT; BY SITE SPECIES YEAR;
PROC MEANS DATA=FISH MEAN SUM N STD STDERR; BY SITE SPECIES YEAR;
 VAR TOTWGT NUM MNFWT WTCPUE NUMCPUE;
OUTPUT OUT=GOOD1 MEAN = WTMEAN NUMMEAN MNFWTMN WCPUEMN NCPUEMN FLTMN
                  SUM = WTSUM  NUMSUM  MNFWTSUM WCPUSUM NCPUSUM FLTSUM
                    N = WTN    NUMN    MNFWTN   WCPUEN  NCPUEN FLTN
                  STD = WTSTD  NUMSTD  MNFWTSTD WCPUSTD NCPUSTD FLTSTD
               STDERR = WTSERR NUMSERR MNFWTSER WCPUSER NCPUSER FLTSERR;
TITLE 'WEIGHT & NUMBER STATS BY SITE GEAR AND SPECIES';

RUN;
```

Output

The output to the data set is in an excel file called “redporgycpue”. There are multiple sheets in the file that breakdown the data by looking at it (1) all latitudes and depth, (2) greater than 26 m; (3) inshore index stations; (4) shelf edge index stations (5) by latitude zone; (6) by depth zones; (7) without addition of new stations since 1990; (8) only new stations added since 1990.

hlinshore = hook and line CPUE (1981-1987) at eight inshore index stations
hl26 = hook and line CPUE (1981-1987) at depths > 26 m
hlalldepths = hook and line CPUE (1981-1987) calculated for all depths and latitudes
hlalldepthsallyears = hook and line CPUE (1978-2001) calculated for all depths and latitudes

hl26 = hook and line CPUE at depths > 26 m
hl 31 = hook and line CPUE at latitude < 31 N
hl 32 = hook and line CPUE at 31-32 N
hl 33 = hook and line CPUE at 33-34 N
hlnoshelf = hook and line CPUE at all stations except shelf edge index

chvinshore = chevron trap CPUE (1990-2001) at eight inshore index stations
chv26 = chevron trap CPUE (1990-2001) at depths > 26 m and all latitudes
chvalldepths = chevron trap CPUE (1990-2001) at all depths and all latitudes
chvshelfedge = chevron trap CPUE (1990-2001) at four shelf edge stations and all latitudes
chvnew = CPUE with just new random numbers that have been added since 1990
chv1990ran = CPUE with 1990 random numbers
chv31 = chevron CPUE at latitude < 31 N
chv32 = chevron CPUE at 31-32 N
chv33 = chevron CPUE at 33-34 N

fltalldepths = Florida trap CPUE (1981-1987) at all depths and all latitudes
fltinshore = Florida trap CPUE (1981-1987) at eight inshore index stations
fltshelfedge = Florida trap CPUE (1981-1987) at four shelf edge stations and all latitudes
flt26 = Fl trap CPUE (1981-1987) at depths > 26 m and all latitudes
flt31 = Florida trap CPUE at latitude < 31 N
flt32 = Florida trap CPUE at 31-32 N
flt33 = Florida trap CPUE at 33-34 N
fltnoshelf = Florida trap CPUE at all stations except shelf edge index during 1981-1987

The excel output looks like the table below.

2001

Variable	Mean	Sum	N	Std Dev	Std Error
TOTWGT	1.556846	384.541	247	2.920635	0.185836
NUM	2.809717	694	247	5.339703	0.339757
MNFWT	0.581303	64.52468	111	0.173733	0.01649
WTCPUE	0.964039	238.1177	247	1.790164	0.113905
NUMCPUE	1.743287	430.5918	247	3.301444	0.210066

The variables are TOTWGT = total weight of red porgy, NUM = number of red porgy, MNFWT = mean fish weight of red porgy, WTCPUE = the cpue of weight, NUMCPUE = number cpue, N = the number of trap sets. Notice that N is lower for MNFWT since that N represents the number of traps that red porgy occurred in.

The sheet labeled CPUE has the CPUE and standard deviation for all permutations of CPUE in each of the sheets. The columns in the CPUE sheet have headings similar to what is listed above. Data to be used will be hlalldepths (hook and line gear at all depths from 1981-1987; fltshelfedge (Florida trap data from shelf edge index stations collected during 1983-1987); and chvalldepths (chevron trap data collected at all depths from 1990-2001).

A smaller excel file called red porgy3 is included that has fewer sheets (cpue, hlinshore, chvalldepths, and fltshelfedge). These are the CPUE indices that the group decided should be used for the assessment.

Another excel file is included entitled “tl freq by year and gear 78-01”. This file includes a length frequency of the TL (cm) of red porgy by gear and year. Measurements of TL were converted from FL.