Appendix C-3

SAS-based application of the Harvest Control Model to conduct weakfish stock projections

SAW/SARC 48
June 1-4, 2009
Woods Hole, MA

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*-APPENDIX C-3-------------------------------------------------------------
                                    ----------*
| Run-Specific Macro Variables HARVEST CONTROL MODEL FOR WEAKFISH FIXED M OF
0.25, 1980-2020                                                          |
*-------------------------------------------------------------------------*;
%let MaxAge = 10;                /* Maximum age Considered                 */

%let A = 0.75;                  /* A in Stock Recruitment Relationship-not used
 */
%let B = 1.5;                   /* B in Stock Recruitment Relationship-not used
  */
%let K = 4000;                 /* K in Stock Recruitment Relationship-not used
*/

*-------------------------------------------------------------------------*
| Read in Annual Data:                                                     |
|   |
|             CstF..     Coast     F-     BASED     ON     recent     ADAPT     run
                    |
|                     Juv1..        age        1        recruitment        (REC0)
     |
|
|
     M  .. NATURAL MORTALITY RATE-TIME VARYING
|
*-------------------------------------------------------------------------*;
data YearClas;
  input Year  CstF REC0  ;
  if _n_ = 1 then call symput('FrstYear',put(Year,4.));
*-----------------------------------------------------*
Year BayF  CstF REC0 BayR CstR BayD  CstD  JUV2 JUV3 JUV4  M RECC RECH
*-----------------------------------------------------*;
cards;

1970  0.44 0.44 160    24  24  0.00  0.00  0.7 0.16 . 0.15 . .
1971  0.22 0.72 140     24  24  0.00  0.00  1.8 0.16 . 0.15 . .
1972  0.24 0.64 80     24  24  0.00  0.00  1.5 0.16 . 0.15 . .
1973  0.22 0.82  190    24  24  0.00  0.00 0.3 0.16 . 0.15 . .
1974  0.22 0.82 60     24  24  0.00  0.00  0.9 0.16 . 0.15 . .
1975  0.42 0.42 150     24  24  0.00  0.00  1.3 0.16 . 0.15 . .
1976  0.24 0.74 170     24  24  0.00  0.00  0.7 0.16 . 0.15 . .
1977  0.40 0.90 140     24  24  0.00  0.00  1.8 0.16 . 0.25 . .
1978  0.35 0.95 170    24  24  0.00  0.00  1.8 0.16 . 0.25 . .
1979  1.21 1.21 130     24  24  0.00  0.00  0.3 0.01 . 0.25 . .
1980  1.29  1.29 230    24  24  0.00  0.00  0.9 0.01 . 0.25 . .
1981  1.73  1.73 55.7    12  17  0.00  0.00  1.3  0.01 1393 0.25 56 53
1982  1.40  1.40 18.4    12  17  0.00  0.00  2.1  0.30 2785 0.25 56 11
1983  1.61  1.61 35.0    14  24  0.00  0.00  2.4  0.08 2441 0.25 56 11
1984  2.21  2.21 33.9    14  24  0.00  0.00  2.3  0.73 2964 0.25 59 8
1985  1.35  1.35 18.3    14  24  0.00  0.00  0.3 0.05 2876 0.25 32 0
1986  1.73  1.73 8.0    14  29  0.00  0.00  0.4 0.70 3642 0.25 161 0
1987  2.66  2.66 5.9    14  31  0.00  0.00  2.4  1.03 4740 0.25 82 0
1988  1.81  1.81 7.4    14  33  0.00  0.00  5.0  0.88 5972 0.25 82 0
1989  2.12  2.12 1.9    14  33  0.00  0.00  3.2  2.58 8100 0.25 30 0
1990  2.76  2.76 5.7    18  34  0.00  0.00  2.9  2.50 7342 0.25 171 0.7
1991  0.84  0.84 5.5    18  34  0.00  0.00  0.55 1.18 6790 0.25 243 71
1992  1.03  1.03 43.4    18  34  0.00  0.00  1.7 2.92 8129 0.25 356 92
1993  0.71  0.71 88.6   18  32  0.00  0.00  1.9 4.45 10042 0.25 543 66
1994  0.98  0.98 28.5    18  32  0.00  0.00  2.6  2.40 6391 0.25 664 154
1995  0.32  0.32 10.7    18  29  0.00  0.00  2.4 4.95 7838 0.25 1593 221
```

```
1996  0.53  0.53 17.1  18  29  0.00  0.00  1.3 4.25 7876 0.25 1411 238
1997  2.56  2.56  14.7  18  29  0.00  0.00  3.3 2.53 9105 0.25 1604 144
1998  2.72  2.72  4.6  18  28  0.00  0.00  2.0 3.28 9518 0.25 1132 122
1999  2.67  2.67  17.3  18  28  0.00  0.00  4.0 4.75 6302 0.25 1337 88
2000  2.82  2.82  4.0  18  26  0.00  0.0  0.5 4.4 . 0.25 1120 99
2001  2.04  2.04  9.8 18  26  0.00 0.00 . . . 0.25 1254 52
2002  2.34  2.34  11.7   18  26  0.0  0.00 . . . 0.25 1591 67
2003  2.38  2.38   3.6  18  26 0.0  0.00 . . . 0.25 1666 78
2004  2.06  2.06   4.6  18   26  0.0  0.0 . . . 0.25 1807 63
2005  2.52  2.52   12.0   18  26  0.0  0.0 . . . 0.25 1584 51
2006  2.47  2.47   5.7   18   26  0.0  0.0 . . . 0.25 1266 91
2007  2.13  2.13   21.5   18   26  0.0  0.0 . . . 0.25 . 103
2008  2.20  2.20   8.5   18   26  0.0  0.0 . . . 0.25 . 38
2009  2.20  2.20   13.0     18   26   0.0 0.0 . . . 0.25 .  .
2010  2.20  2.20   13.0     18   26    0.0 0.0 . . . 0.25 . .
2011  2.20  2.20   12.0     18   26   0.0  0.0 . . .  0.25 . .
2012  2.20  2.20   21.0     18   26   0.0  0.0 . . .  0.25 . .
2013  2.20  2.20    9.0    18   26   0.0  0.0 . . .   0.25 . .
2014  2.20  2.20    12.0    18   26   0.0   0.0 . . .   0.25 . .
2015  2.20  2.20    22.0    18   26   0.0   0.0 . . .  0.25 . .
2016   2.2  2.2     22.0    18   26   0.0   0.0  . . .  0.25 . .
2017  2.20  2.20    9.0    18   26   0.0  0.0 . . .   0.25 . .
2018  2.20  2.20    12.0    18   26   0.0   0.0 . . .   0.25 . .
2019  2.20  2.20    22.0    18   26   0.0   0.0 . . .  0.25 . .
2020   2.2  2.2     22.0    18   26   0.0   0.0  . . .  0.25 . .
;
run;

*-------------------------------------------------------------------------*
| Read in Population Parameters:
|   AGE .....AGE GROUP
|   MigR ... Migration Rate (not used in this version)                    |
|   MatR ... Maturation Rate (fraction mature)                            |
|   RcrR ... Partial Rec Rate (fraction recruited to the fishery)
|   PERR .....FRACTION AGES 8+
*-------------------------------------------------------------------------*;
data PopParms;
  input Age MigR MatR rcrbr RCRBbR RCRCR RCRCcR PERR;
*--------------------------------------*
Age    MigR  MatR  RcrBr RCRBbR RCRCR RCRCcR PERR
*--------------------------------------*;
cards;
0    1.00    0.00  0.0    0.0    0.0   0.0   0.0
1    0.00    0.9  0.34   0.16    0.34  0.16   0.0
2    0.0     1.0  0.58   0.47   0.58  0.47   0.0
3    0.0     1.0  0.75   0.73   0.75  0.73   0.0
4    0.0     1.0  1.0    1.0   1.0  1.0  0.0
5    0.0     1.0  1.0    1.0    1.0  1.0  0.0
6    0.0     1.0  1.0    1.0     1.0  1.0  0.0
7    0.0     1.0  1.0    1.0     1.0  1.0  0.0
8    0.0     1.00  1.00   1.0     1.0  1.0  1.0
9    0.0     1.00  1.00   1.0     1.0  1.0   1.0
10   0.0    1.00  1.00   1.0     1.0  1.0   1.0


;
run;

*-------------------------------------------------------------------------*
| Read in Age at Length Data:                                             |
```

```
|   Lgth ... Length (inches)                                                  |
|   Age .... Age (years)                                                      |
*-----------------------------------------------------------------------------*;
data LngthAge;
  input Lgth Age;
  if _n_ = 1 then call symput('MinLngth',put(Lgth,2.));
  else call symput('MaxLngth',put(Lgth,2.));
*--------------------------
Lgth  Age
*--------------------------;
cards;
12   2.0
14   2.5
17   3.2
18   4.0
24   4.9
26   5.7
28   6.8
29   7.2
30   7.5
32   7.3
31   7.1
33   7.7
34   8.1
36   9.0
;
run;

%put;
%put FrstYear = &FrstYear;
%put MaxAge   = &MaxAge;
%put MinLngth = &MinLngth;
%put MaxLngth = &MaxLngth;


*-----------------------------------------------------------------------------*
| The Model                                                                   |
*-----------------------------------------------------------------------------*;
data Model (keep = Year BAYR CSTR M BayF CstF Juv1 BayR CstR JUV2 JUV3 JUV4 REC
RECC RECH
                   LREC JUV5 LREC2 TSSB TBES TCES TN_Bay TN_CST TBAYCAT TBAYLD
TCatch TYIELD STK MT TCOASTYD TCSTCAT WEIGHT Z FZ)
     Debug (keep = Year BAYR CSTR Age Migrate
                   N_Bay ZB1 ZB2 FB1 FB2
                   BayF1 BayF2 BayDeath BayCatch BAYIELD BES
                   N_Cst ZC1 ZC2 FC1 FC2
                   CstF1 CstF2 FPrimeC1 FPrimeC2 CstDeath CstCatch
                   COASTYLD Wt SSB BES CES );


array Mig{0:&MaxAge};                    /* Migration Rate                 */
array Mat{0:&MaxAge};                    /* Maturation Rate                */
array RcrB{0:&MaxAge};                    /* PARTIAL REC BAY               */
array RcrBb{0:&MaxAge};                    /* PARTIAL REC BAY              */
array RcrC{0:&MaxAge};                    /* PARTIAL REC CST               */
array RcrCc{0:&MaxAge};                    /* PARTIAL REC CST              */
ARRAY PER{0:&MAXAGE};
array L_Age{&MinLngth:&MaxLngth};        /* Age-Length Key                 */
array BayPop{0:&MaxAge};                 /* Bay Population Array           */
array CstPop{0:&MaxAge};                 /* Coast Population Array         */
```

```
A=&A; B=&B; K=&K;                          /* Stock Recruitment Params       */

do until (EOP);                            /* Read in PopParms Data Set      */
  set PopParms  end=EOP;
   Mig{Age}=MigR;
  Mat{Age}=MatR;
  RcrB{Age}=RcrBr;
  Rcrbb{Age} = Rcrbbr;
  RcrC{Age}=RcrCr;
  Rcrcc{Age}= Rcrccr;
  PER{AGE} = PERR;

  if Age = &MaxAge then EOP=1;
  end;

do until (EOL);                            /* Read in Age at Length Key      */
  set LngthAge end=EOL;
  L_Age{Lgth}=Age;
  end;

do Age = 0 to &MaxAge;                     /* Nobody home                    */
  BayPop{Age}=0;
  CstPop{Age}=0;
  end;

** ASSUMPTION: REC0 of Age 0 fish at beginning of year 0   ;
**             i.e. before mortality (natural and discard)                 ;

do until (EOY);

  set YearClas end=EOY;                    /* Read a year class obs          */
  if Juv1 = . then Juv1 = 0;
  IF JUV2 = . THEN JUV2 = 0;
  IF JUV3 = . THEN JUV3 =0;
  REC = JUV1;
  LREC = LOG(REC);
  JUV5 = JUV4*0.002;
    LREC2 = LOG(JUV1);
  Disc_Bay = 0.1 * BayD;                   /* Bay Discard Mortality Rate     */
  Disc_Cst = 0.1 * CstD;                   /* Cst Discard Mortality Rate     */
  do Age = 10 to 0 by -1;                  /* COMPUTE F's AND Z's            */

    M_Age = L_Age{BayR};                   /* Mean age at min length (Bay)   */
    D_Age = M_Age - Age;                   /* Delta age                      */
    if 0 < D_Age < 0.5 then do;            /* Sublegal during all or part of */
      Ratio = D_Age / 0.5;                 /*  the first half the the year.  */
      FPrimeB1 = Disc_Bay * Ratio;        /* F prime 1st half the year       */
      FPrimeB2 = 0;                        /* F prime 2nd half the year      */
      BayF1 = BayF*0.5 * (1.0-Ratio);        /* F 1st half the year          */
      BayF2 = BayF*0.5;                      /* F 2nd half the year          */
      end;
    else if D_Age >= 0.5 then do;          /* Sublegal during all or part of */
      if D_Age > 1.0 then D_Age = 1.0;     /*  the second half the the year. */
      Ratio = (D_Age-0.5) / 0.5;
      FPrimeB1 = Disc_Bay;               /* F prime 1st half the year       */
      FPrimeB2 = Disc_Bay * Ratio;        /* F prime 2nd half the year      */
      BayF1 = 0;                           /* F 1st half the year           */
      BayF2 = BayF*0.5 * (1.0-Ratio);      /* F 2nd half the year           */
      end;
```

```
else do;                                /* Legal During whole year        */
  FPrimeB1 = 0;                         /* F prime 1st half the year      */
  FPrimeB2 = 0;                         /* F prime 2nd half the year      */
  BayF1 = BayF*0.5;                        /* F 1st half the year         */
  BayF2 = BayF*0.5;                        /* F 2nd half the year         */
  end;

M_Age = L_Age{CstR};                    /* Mean age at min length (Coast) */
D_Age = M_Age - Age;                    /* Delta age                      */
if 0 < D_Age < 0.5 then do;             /* Sublegal during all or part of */
  Ratio = D_Age / 0.5;                  /*  the first half the the year.  */
  FPrimeC1 = Disc_Cst * Ratio;         /* F prime 1st half the year       */
  FPrimeC2 = 0;                         /* F prime 2nd half the year      */
  CstF1 = CstF*0.5 * (1.0-Ratio);          /* F 1st half the year         */
  CstF2 = CstF*0.5;                        /* F 2nd half the year         */
  end;
else if D_Age >= 0.5 then do;           /* Sublegal during all or part of */
  if D_Age > 1.0 then D_Age = 1.0;      /*  the second half the the year. */
  Ratio = (D_Age-0.5) / 0.5;
  FPrimeC1 = Disc_Cst;                 /* F prime 1st half the year       */
  FPrimeC2 = Disc_Cst * Ratio;         /* F prime 2nd half the year       */
  CstF1 = 0;                            /* F 1st half the year            */
  CstF2 = CstF*0.5 * (1.0-Ratio);          /* F 2nd half the year         */
  end;
else do;                                /* Legal During whole year        */
  FPrimeC1 = 0;                         /* F prime 1st half the year      */
  FPrimeC2 = 0;                         /* F prime 2nd half the year      */
  CstF1 = CstF*0.5;                        /* F 1st half the year         */
  CstF2 = CstF*0.5;                        /* F 2nd half the year         */
  end;

  if year> 1993
  then
FB1 = BayF1*RcrBb{Age} + FPrimeB1*RcrBb{Age}; /* Bay F 1st half of year*/
  else FB1=BAYF1*RCRB{AGE} + FPRIMEB1*RCRB{AGE};
IF YEAR>1993 THEN
FB2 = BayF2*RcrBb{Age} + FPrimeB2*RcrBb{Age}; /* Bay F 2nd half of year*/
  ELSE FB2= BAYF2*RCRB{AGE}+FPRIMEB1*RCRB{AGE};
  IF YEAR> 1993
  THEN
FC1 = CstF1*RcrCc{Age} + FPrimeC1*RcrCc{Age}; /* Cst F 1st half of year*/
  ELSE FC1= CSTF1*RCRC{AGE}+FPRIMEC1*RCRC{AGE};
  IF YEAR>1993
  THEN
FC2 = CstF2*RcrCc{Age} + FPrimeC2*RcrCc{Age}; /* Cst F 2nd half of year*/
  ELSE FC2= CSTF2*RCRC{AGE}+FPRIMEC2*RCRC{AGE};


If AGE < 3 THEN ZB1= (0.10/2)+FB1;
ELSE ZB1 = (M/2) + FB1;
  IF AGE < 3 THEN ZB2 = (0.10/2) + FB2;      /* Bay Z 1st half of year */
ELSE ZB2 = (M/2) + FB2;                      /* Bay Z 2nd half of year */
  IF AGE < 3 THEN ZC1 = (0.10/2) + FC1;
ELSE ZC1 = (M/2) + FC1;                   /* Cst Z 1st half of year   */
  IF AGE < 3 THEN ZC2 = (0.10/2) + FC2;
ELSE ZC2 = (M/2) + FC2;                   /* Cst Z 2nd half of year   */

                                          /* BIRTH, DEATH, MIGRATION  */
```

```
if Age > 0 then BayPop{Age}=BayPop{Age-1}; /* Celebrate Bay Birthday   */
else BayPop{Age} = juv1;                   /* New Year Class          */
Survive = exp(-ZB1*0.5) * BayPop{Age};     /* Bay survivors 1st half  */
Deaths1 = BayPop{Age} - Survive;           /* Deaths 1st half of year */
Catch1  = (BayF1/ZB1) * Deaths1;           /* Catch 1st half of year  */
Migrate = Survive * (1.0-Mig{Age});        /* Nbrs migrate to coast   */
Survive = Survive - Migrate;               /* Bay Surv after migrate  */
BayPop{Age} = exp(-ZB2*0.5) * Survive;     /* Bay Surv at end of year */
Deaths2 = Survive - BayPop{Age};           /* Deaths 2nd half of year */
Catch2  = (BayF2/ZB2) * Deaths2;           /* Catch 2nd half of year  */

BayDeath = Deaths1 + Deaths2;             /* Bay death and destruction */
BayCatch = Catch1  + Catch2;               /* Bay catch               */

if Age > 0 then CstPop{Age}=CstPop{Age-1}; /* Celebrate Coast Birthday */
Survive = exp(-ZC1*0.5) * CstPop{Age};     /* Cst survivors 1st half  */
Deaths1 = CstPop{Age} - Survive;           /* Deaths 1st half of year */
Catch1  = (CstF1/ZC1) * Deaths1;           /* Catch 1st half of year  */
Survive = Survive + Migrate;               /* Cst Surv after immigrate */
CstPop{Age} = exp(-ZC2*0.5) * Survive;     /* Cst Surv at end of year */
Deaths2 = Survive - CstPop{Age};           /* Deaths 2nd half of year */
Catch2  = (CstF2/ZC2) * Deaths2;           /* Catch 2nd half of year  */

                                           /* ACCUMULATE TOTALS       */
CstDeath = Deaths1 + Deaths2;              /* Cst death and destruction*/
CstCatch = Catch1  + Catch2;               /* Cst catch               */
 Catch = BayCatch + CstCatch;               /* Cst & Bay Catch         */

N_Bay = BayPop{Age};                       /* debug                   */
N_Cst = CstPop{Age};                       /* debug                   */

Wt = 9.1*(1-exp(-0.15*(Age-0.68)))**3.0;   /* Weight at Age           */
SSB = (CstPop{Age}+BayPop{Age})*Wt*Mat{Age};/* Spawning stock biomass  */
BES = BAYPOP{AGE}*PER{AGE}*wt;  /*  EXPLOITABLE STOCK BIOMASS */
CES = CSTPOP{AGE}*WT*PER{AGE};  /*  EXPLOIABLE STOCK BIOMASS */
BAYIELD = WT* BAYCATCH;
COASTYLD= WT*CSTCATCH;
YIELD = BAYIELD + COASTYLD;

TSSB + SSB;       /*  Total Spawning Stock Biomass/*

TBES + BES;
TCES + CES;
  STK =TBES+TCES;
TBayCat + BayCatch;
TCstCat + CstCatch;
TCatch + Catch;
TN_Cst + N_Cst;
TN_BAY + N_BAY;
TBAYLD+ BAYIELD;
TCOASTYD+COASTYLD;
TYIELD+YIELD;
MT = 78.31+999.27*TYIELD;
IF TCATCH > 0 THEN
WEIGHT = TYIELD/TCATCH;
  PROP = TCES/TN_CST;
  Z = CSTF+M;
  FZ = CSTF/Z;
output Debug;
```

```
  end;  /* do Age */

  output Model;

  TSSB=0;   TBayCat=0; TBAYLD=0; TYIELD=0;
  TCatch=0; TCstCat=0; TCOASTYD=0;
  TN_Cst =0; TBES=0; TCES=0; TN_BAY=0;

end;  /* do Year */

stop;
run;


*-------------------------------------------------------------------------*
| Print the Results                                                       |
*-------------------------------------------------------------------------*;
title1 " TABLE 1.weakfish PROJECTION (TOTAL STOCK) MODEL FOR coast-wide stock
1980-2020, M IS FIXED";

title2 "Age-Specific Model Parameters";
proc print data=PopParms NOOBS;
  id Age;
run;


title2 "HARVEST CONTROL Summary Statistics, M FIXED, STOCK BASED THE 1970-2008
REC 0";
proc print data=Model NOOBS;
where year > (&frstyear + &maxage-1);
   VAR YEAR CSTF  M Juv1 tssb TN_CST TCES WEIGHT  Z FZ ;
run;


PROC CHART DATA= MODEL;
WHERE YEAR> (&FRSTYEAR + &MAXAGE -1);
VBAR YEAR/DISCRETE SUMVAR = Tssb;
TITLE'FIGURE 1. SIMULATED WEAKFISH SSB UNDER CURRENT MINIMUM SIZE LIMITS';
TITLE2'FROM COASTAL POPULATION UNDER A FIXED M FROM 1980 TO 2020';
RUN;

PROC CHART DATA = MODEL;
WHERE YEAR> (&FRSTYEAR + &MAXAGE -1);
  VBAR YEAR/DISCRETE SUMVAR = TCES;
   TITLE' FIGURE 2.TREND IN PROPORTION OF AGES 8+ WEAKFISH UNDER CURRENT SIZE
LIMITS)';
    TITLE2'FROM THE COASTAL POPULATION UNDER A FIXED M FROM 1980 TO 2020 ';
        RUN;

/*

PROC CHART DATA= MODEL;
WHERE YEAR> (&FRSTYEAR + &MAXAGE -1);
VBAR YEAR/DISCRETE SUMVAR = TBES;
TITLE'FIGURE 1. SIMULATED REC CATCH (#-RELATIVE UNITS) OF PRE-MIGRANT BASS';
TITLE2'FROM UPPER BAY,1982 TO 2004 UNDER TIME VARYING M FROM 1982 TO 2011';
title3' sex ratio of landings assumed to be 80% males';
RUN;

PROC CHART DATA = MODEL;
```

```
WHERE YEAR> (&FRSTYEAR + &MAXAGE -1);
  VBAR YEAR/DISCRETE SUMVAR = TN_BAY;
   TITLE' FIGURE 2.TREND IN TOTAL STRIPER population in number';
    TITLE2'FROM UPPER BAY MARYLAND FROM 1982 TO 2011 ';
  RUN;

PROC NLIN METHOD = MARQUARDT HOUGAARD DATA= MODEL;
WHERE YEAR> (&FRSTYEAR + &MAXAGE-1);
PARMS A = 0.5, B = -0.0000002;
BOUNDS A>0, B<0;
 RJ= A*TSSB*exp(-b*tssb);
MODEL LREC = LOG(RJ);
OUTPUT OUT = SHEP P =PRED R=RESID;
QUIT;
DATA SHEP;
SET SHEP;
RP = EXP(PRED);
PROC PLOT DATA= SHEP;
PLOT rec*TSSB = 'O' RP*TSSB = 'P'/OVERLAY;
QUIT;
PROC MEANS DATA= MODEL;
VAR JUV1 JUV2 JUV3 JUV4 JUV5 REC;
Run;

title2 "Year Class Statistics-BAY";
proc print data=Debug;
  by Year;
  id Age;
  var N_Bay ZB1 ZB2 BAYF1 BAYF2 BayDeath BayCatch Migrate
      BAYIELD BES SSB;
  sum N_Bay BayDeath BayCatch Migrate BAYIELD
      BES CES  SSB;
  format N_Bay BayDeath BayCatch Migrate
         BAYIELD BES  SSB  9.5;
run;

title2 "Year Class Statistics-COAST";
proc print data=Debug;
  by Year;
  id Age;
  var  N_Cst ZC1 ZC2 CSTF1 CSTF2 CstDeath CstCatch COASTYLD CES  SSB ;
  sum  N_Cst CstDeath CstCatch COASTYLD CES  SSB;
  format  N_Cst CstDeath CstCatch COASTYLD CES SSB  9.5;
run;
```