MRE and CYER Program Description

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What you will learn

- A little about git and github
- A little about R
- How to compute CYER's in R
- How to compute MRE's in R

CTC github website

https://github.com/CTC-PSC

Downloading requisite files directly from github

https://github.com/CTC-PSC/GarciaExampleMay2018

Downloading requisite files from github via R, first option

library(repmis)

source_data("https: //raw.githubusercontent.com/CTC-PSC/GarciaExampleMay2018/ master/Data/2018ERA%20MRE%20Data.Rdata")

Downloading requisite files from github via R, second option

download.file("https://raw.githubusercontent.com/CTC-PSC/GarciaExampleMay2018/master/Data/2018ERA%20MRE%20Data.Rdata", "2018ERA MRE Data.Rdata")

Load Functions into R

The first we need to do is load all of the functions. This project utilizes three 'classes' of data:

- ERA
- CYER
- MRE

```r
source("Code/GarciaFunLibrary.R")
```
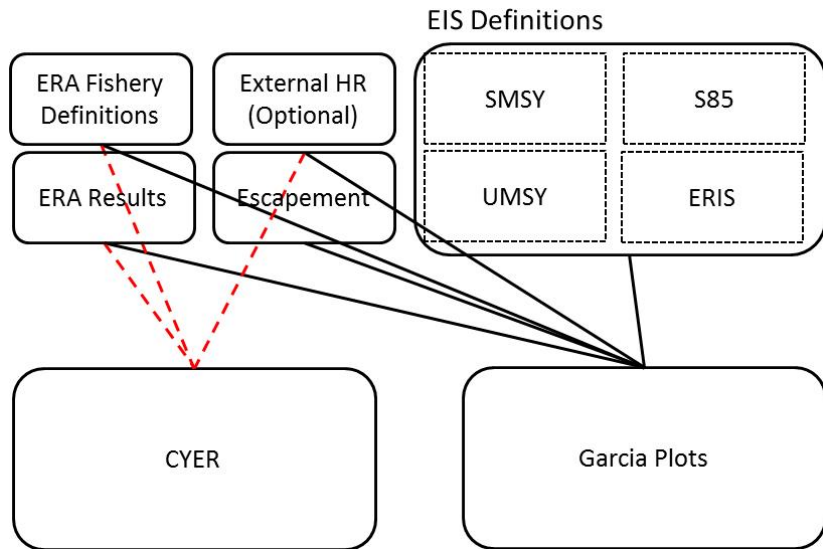
Data inputs

Figure 1: Program inputs

Read HRJ Functions

```
readHRJdir <- function(userDir=choose.dir(), ...)
convertHRJ_BYtoCY(x)
convertHRJ_RtoAccess(x, writeCSV=FALSE, userDir=NULL)
addPTableHRJ(x, hrjclass=c("R","Access"))
```

Where "..." are values passed onto the function readHRJ:

- nFisheries=69
- straysinescap=TRUE
- Age6=c("DNE","ignore","include")

Read ERA output into R

```
#Read in HRJ files in a directory
 by=readHRJdir(userDir="Data/", nFisheries=79,
               straysinescap=TRUE, Age6="include")
```

```
## Reading 1 HRJ File of 4 : LYFB1.HRJ
## Reading 2 HRJ File of 4 : LYFC1.HRJ
## Reading 3 HRJ File of 4 : SRHB1.HRJ
## Reading 4 HRJ File of 4 : SRHC1.HRJ
```

```
#Convert to CY layout
 cy=convertHRJ_BYtoCY(x=by)
#Convert HRJ from R to Access format
 z.cy=convertHRJ_RtoAccess(x=cy, writeCSV=FALSE, userDir=
#add the 'preferred' table to the Access format
 z.cy = addPTableHRJ(x=z.cy, hrjclass = "Access")
```

Load ERA Fishery Definitions into R

FisheryNumber	FisheryName	Gear	Term_PreTerm	Jurisdi
1	AK W/S T	Troll	Preterm	SEAK
2	AK JNO T	Troll	Preterm	SEAK
3	AK JNI T	Troll	Preterm	SEAK
4	AK JLO T	Troll	Preterm	SEAK
5	AK JLI T	Troll	Preterm	SEAK
6	AK FALL T	Troll	Preterm	SEAK
7	TAK TERM T	Troll	Term	SEAK
8	NORTH T	Troll	Preterm	Canad
9	CENTRL T	Troll	Preterm	Canad
10	WCVI F/W T	Troll	Preterm	Canad
11	WCVI SPR T	Troll	Preterm	Canad
12	WCVI SUM T	Troll	Preterm	Canad
13	N FALCON T	Troll	Preterm	SUS
14	S FALCON T	Troll	Preterm	SUS
15	TOR TERM T	Troll	Term	SUS
16	GEO ST T	Troll	Preterm	Canad
17	ALASKA N	Net	Term	SEAK

Load Escapement Data into R

Year	YrLab	Period	Situk	Alsek	Taku	Stikine	Chilkat	K
1975	75	1975-84	NA	NA	12920	7571	NA	
1976	76	1975-84	1421	5282	24582	5723	NA	
1977	77	1975-84	1732	12706	29497	11445	NA	
1978	78	1975-84	808	12034	17124	6835	NA	
1979	79	1975-84	1284	17354	21617	12610	NA	
1980	80	1975-84	905	10718	39239	30573	NA	
1981	81	1975-84	702	8587	49559	36057	NA	
1982	82	1975-84	434	9584	23848	40488	NA	
1983	83	1975-84	592	10344	9794	6424	NA	
1984	84	1975-84	1726	7213	20778	13995	NA	
1985	85	1985-98	1521	6087	35916	16037	NA	
1986	86	1985-98	2067	11069	38111	14889	NA	
1987	87	1985-98	1379	11276	28935	24632	NA	
1988	88	1985-98	868	8852	44524	37554	NA	
1989	89	1985-98	637	10178	40329	24282	NA	
1990	90	1985-98	628	8775	52142	22619	NA	
1991	91	1985-98	889	11667	51645	23206	5883	

Load External HR Data into R

CY	X76
1979	0.0492914
1980	0.0887186
1981	0.0440704
1982	0.0664970
1983	0.0625658
1984	0.0648975
1985	0.0423897
1986	0.1032377
1987	0.1285429
1988	0.1297936
1989	0.1060298
1990	0.1687867
1991	0.2091650
1992	0.1909712
1993	0.3436861
1994	0.2297112
1995	0.3027348

Load Externally Computed MRE Data into R

Year	SitukAux	ChilkatAux	UnukAux	ChickaminAux	AlsekAux	
1975	NA	NA	NA	NA	NA	
1976	0.390	NA	NA	NA	0.088	
1977	0.369	NA	NA	NA	0.099	
1978	0.368	NA	NA	NA	0.169	
1979	0.432	NA	NA	NA	0.127	
1980	0.466	NA	NA	NA	0.114	
1981	0.502	NA	NA	NA	0.083	
1982	0.314	NA	NA	NA	0.053	
1983	0.308	NA	NA	0.371	0.009	
1984	0.246	NA	NA	0.277	0.008	
1985	0.243	NA	NA	0.281	0.034	
1986	0.098	NA	NA	0.398	0.042	
1987	0.389	NA	NA	0.436	0.030	
1988	0.273	NA	NA	0.313	0.025	
1989	0.375	NA	NA	0.364	0.022	
1990	0.313	NA	NA	0.346	0.009	
1991	0.452	NA	NA	0.392	0.009	

Load EIS Definitions into R

StockNum	Stock	EIS_StockName	RateType	Smsy	S85
1	Nehalem	Nehalem	1	6989	5940.65
2	Nehalem	Nehalem	1	6989	5940.65
3	Siletz	Siletz	1	2944	2502.40
4	Siletz	Siletz	1	2944	2502.40
5	Siuslaw	Siuslaw	1	12925	10986.25
6	Siuslaw	Siuslaw	1	12925	10986.25

Relationships between input files

- EIS Definition File specifies which ERIS to reference by *NAME*
- External MRE Estimates are referenced by the EIS Definition File by *NAME*
- External HR file references ERA fishery to modify by *NUMBER*
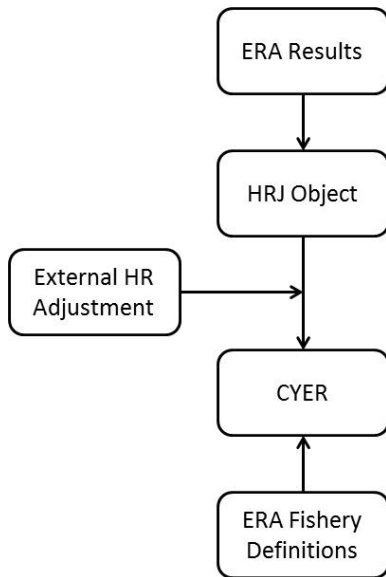
CYER computation flow

Figure 2

CYER Functions

```
cyer(hrj, esc, fmap, type=c("AEQCat","AEQTot","NomCat","Nor
print.CYER(x, digits=1, type="percent", prop=FALSE, yearsto
summary.CYER(x, yearranges=list(1979:1984,1985:1995,1996:19
print.summary.CYER(x, digits=1, type="percent", prop=FALSE)
```

Finding your stock

```
#stock List
z.cy$stknames
```

```
## [1] "LYF" "SRH"
```

Print command

```
cyer(hrj=subset(z.cy$HRJ_P,stock==1), esc=subset(z.cy$ESC
```

## CatchYear	Ages	Recoveries	US.AABM	CAN.AABM	CAN.ISBM
## 1986	2	335	1.2	11.6	12.5
## 1987	3	753	1.7	24.8	4.6
## 1988	2,4	773	3.4	26.4	0.9
## 1989	2,3,5	395	1.5	25.6	3.0
## 1990	2,3,4	545	2.9	20.6	0.6
## 1991	2,3,4,5	354	4.2	15.5	1.1
## 1992	3,4,5	264	1.9	24.6	0.0
## 1993	4,5	229	7.0	24.5	1.3
## 1994	5	105	13.3	8.6	1.9
## 1995		NA	NA	NA	NA
## 1996	2	30	6.7	6.7	0.0
## 1997	3	41	4.9	0.0	4.9
## 1998	4	159	15.1	11.3	3.1

CYER Example: LYF (2/4)

Summary command

```
summary(cyer(hrj=subset(z.cy$HRJ_P,stock==1), esc=subset(
```

```
## Years Recoveries US.AABM CAN.AABM CAN.ISBM US.ISBM OTH
## 79-84       NaN      NA       NA       NA       NA    N
## 85-95       375     4.1     20.2      2.9     32.0
## 96-98        77     8.9      6.0      2.7     12.7
## 99-08      1061     5.4      3.6      0.4     15.1
## 09-17      1821     3.6      8.4      0.7     39.3
```

CYER Example: LYF (3/4)

Print command

```
cyer(hrj=subset(z.cy$HRJ_P,stock==1), esc=subset(z.cy$ESC
```

```
## CatchYear Ages Recoveries US.AABM CAN.AABM CAN.ISBM US.
##      1986                NA      NA       NA       NA
##      1987    3      753     1.7     24.8      4.6
##      1988    4      671     3.4     26.7      0.7
##      1989    3      292     0.3     28.1      3.8
##      1990  3,4      521     3.1     21.1      0.4
##      1991  3,4       99     7.1     13.1      0.0
##      1992  3,4      264     1.9     24.6      0.0
##      1993    4      228     7.0     24.6      1.3
##      1994                NA      NA       NA       NA
##      1995                NA      NA       NA       NA
##      1996                NA      NA       NA       NA
##      1997    3       41     4.9      0.0      4.9
##      1998    4      159    15.1     11.3      3.1
```

CYER Example: LYF (4/4)

Summary command

```
summary(cyer(hrj=subset(z.cy$HRJ_P,stock==1), esc=subset(
```

```
## Years Recoveries US.AABM CAN.AABM CAN.ISBM US.ISBM OTHE
## 79-84        NaN      NA       NA       NA       NA       N
## 85-95        283     3.5     23.3      1.6     33.2
## 96-98         67    10.0      5.7      4.0     19.0
## 99-08        699     2.0      6.5      0.4     20.0
## 09-17       1288     3.7     10.3      0.8     43.8
```

CYER Example: SRH

```r
summary(cyer(hrj=subset(z.cy$HRJ_P,stock==2),
esc=subset(z.cy$ESC_CY,stock==2),
fmap=flookup,
type="AEQTot",
strays="separate",
ages=2:6))
```

```
## Years Recoveries US.AABM CAN.AABM CAN.ISBM US.ISBM OTHE
## 79-84        706    19.3     24.5      2.8    19.2
## 85-95       2028    16.5     20.5      1.4    22.7
## 96-98       3325    19.9      5.8      1.1    32.3
## 99-08       3326    20.0     12.0      0.1    27.2
## 09-17       6587    13.4     12.2      0.4    27.7
```

CYER Example: Nehalem

```
externalHRadjustment(x, hrt, hrjstk, type=c("tm","lc"), new
```

```
#apply external hr adjustment
z.cy = externalHRadjustment(z.cy, hrt=hrt.nehalem, hrjstk='
#look at what we did
z.cy$stknames
```

```
## [1] "LYF"      "SRH"      "nehalem"
```

```
  summary(cyer(hrj=subset(z.cy$HRJ_P,stock==3), esc=subset(
```

```
##   Years Recoveries US.AABM CAN.AABM CAN.ISBM US.ISBM OTH
##   79-84        706    19.3     24.5      2.8     5.1
##   85-95       2028    16.5     20.5      1.4    12.8
##   96-98       3325    19.9      5.8      1.1    17.9
##   99-08       3326    20.0     12.0      0.1    14.5
##   09-17       6587    13.4     12.2      0.4    16.1
```
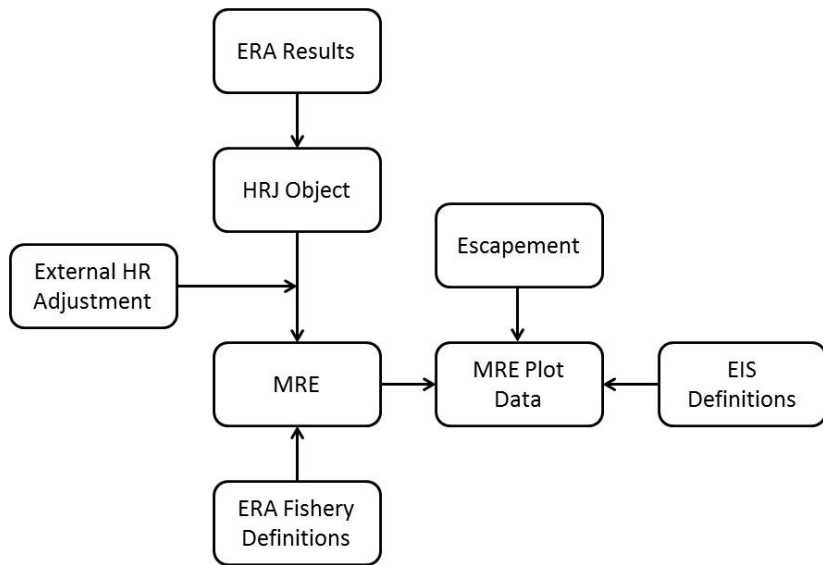
MRE computation flow

Figure 3

MRE Functions

```
calcMRE(HRJ, ESC, fisheryinfotable, stknum, mre_startage="g
calcMREAll <- function(HRJ, ESC, fisheryinfotable, mre_sta
MRE2Plot(esc, mre, smap, stknames, mrecriteria, auxdata=NUL
plotGarciaAll(Garcia, outdir, outtype, pdffilename = NULL)
plotGarcia(Garcia)
MRE2Excel(x, stknames, filename="mre calcs.xlsx")
```

MRE Calcs Step 1, Data Manipulation

```
HRJ=convertHRJtoMRE(z.cy$HRJ_P , datatype="fishery")
ESC=convertHRJtoMRE(z.cy$ESC_CY, datatype="escapement")
```

MRE Calcs Step 2, Compute MREs

```
MRE=calcMREAll(HRJ=HRJ, ESC=ESC, fisheryinfotable=flookup
```

```
## calc 1 of 3 for hrj stock number 1
## calc 2 of 3 for hrj stock number 2
## calc 3 of 3 for hrj stock number 3
```

MRE Calcs Step 3, Create Plot File

```
garciaplotdata=MRE2Plot(esc=Escap,
                        mre=MRE,
                        smap=slookup_orc[1:2,],
                        stknames=z.cy$stknames,
                        mrecriteria=TRUE,
                        auxdata=NULL)
```

```
head(garciaplotdata)
```

```
##    EISStock Year YrLab  Period Escapement StockNum  Sto
## 1   Nehalem 1975    75 1975-84       5197        1 Nehal
## 3   Nehalem 1976    76 1975-84       9807        1 Nehal
## 5   Nehalem 1977    77 1975-84      11478        1 Nehal
## 7   Nehalem 1978    78 1975-84      12059        1 Nehal
## 9   Nehalem 1979    79 1975-84      12205        1 Nehal
## 11  Nehalem 1980    80 1975-84       5555        1 Nehal
##        S85     Umsy ERIS ERIS_RunTiming ERIS_StartAge M
## 1  5940.65 0.6921181  SRH           Fall             2
```
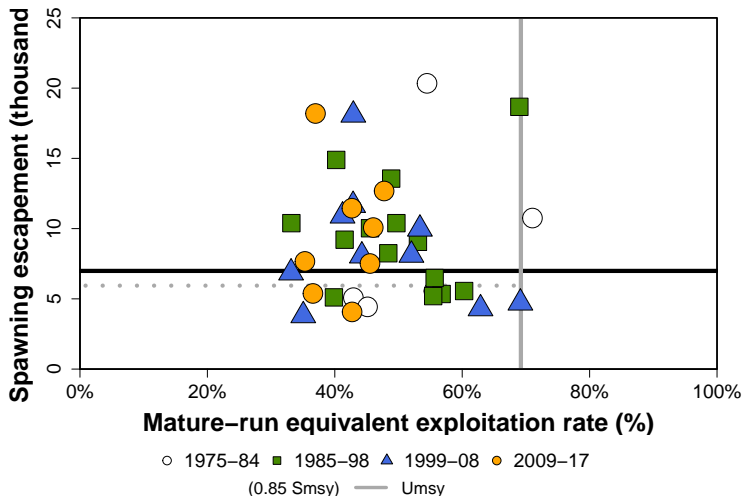
MRE Calcs Step 4, Plot! Nehalem::SRH

```
plotGarcia(subset(garciaplotdata,StockNum==1))
```
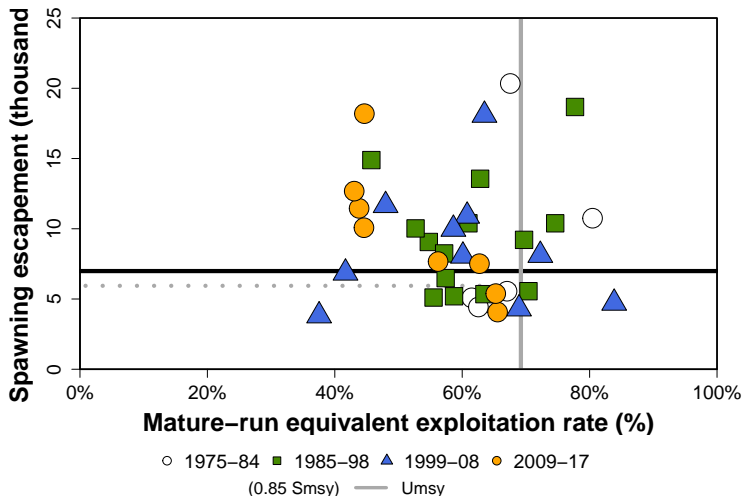
MRE Calcs Step 4, Plot! Nehalem::SRH w/Term HR Adjustment

```
plotGarcia(subset(garciaplotdata,StockNum==2))
```

Diagnostics

- MRE2Excel