# 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

```
source("Code/GarciaFunLibrary.R")
```

# Data inputs

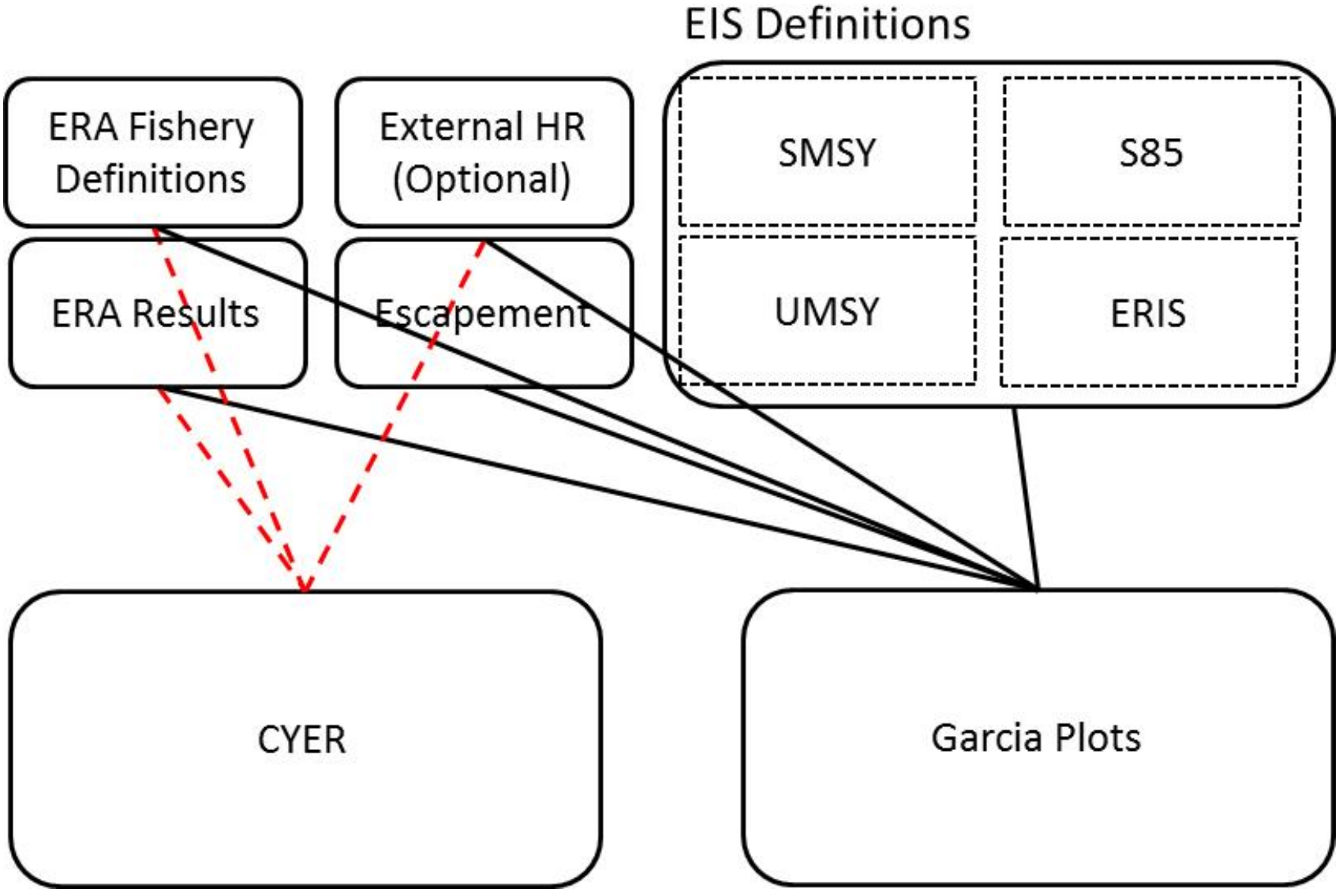



Figure 1: Program inputs

# 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=N
#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 | 880 | 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 | 0.3903894 | NA | NA | NA | 0.088367 |
| 1977 | 0.3693391 | NA | NA | NA | 0.099376 |
| 1978 | 0.3679083 | NA | NA | NA | 0.168635 |
| 1979 | 0.4321787 | NA | NA | NA | 0.127018 |
| 1980 | 0.4660830 | NA | NA | NA | 0.114214 |
| 1981 | 0.5022689 | NA | NA | NA | 0.083173 |
| 1982 | 0.3139545 | NA | NA | NA | 0.052590 |
| 1983 | 0.3075839 | NA | NA | 0.370613 | 0.009005 |
| 1984 | 0.2463554 | NA | NA | 0.277070 | 0.008249 |
| 1985 | 0.2428771 | NA | NA | 0.280672 | 0.033809 |
| 1986 | 0.0975070 | NA | NA | 0.397885 | 0.041645 |
| 1987 | 0.3888488 | NA | NA | 0.435829 | 0.029854 |
| 1988 | 0.2731889 | NA | NA | 0.312810 | 0.024573 |
| 1989 | 0.3753003 | NA | NA | 0.364250 | 0.021910 |
| 1990 | 0.3134111 | NA | NA | 0.345846 | 0.008810 |
| 1991 | 0.4522632 | NA | NA | 0.392097 | 0.008751 |

# 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

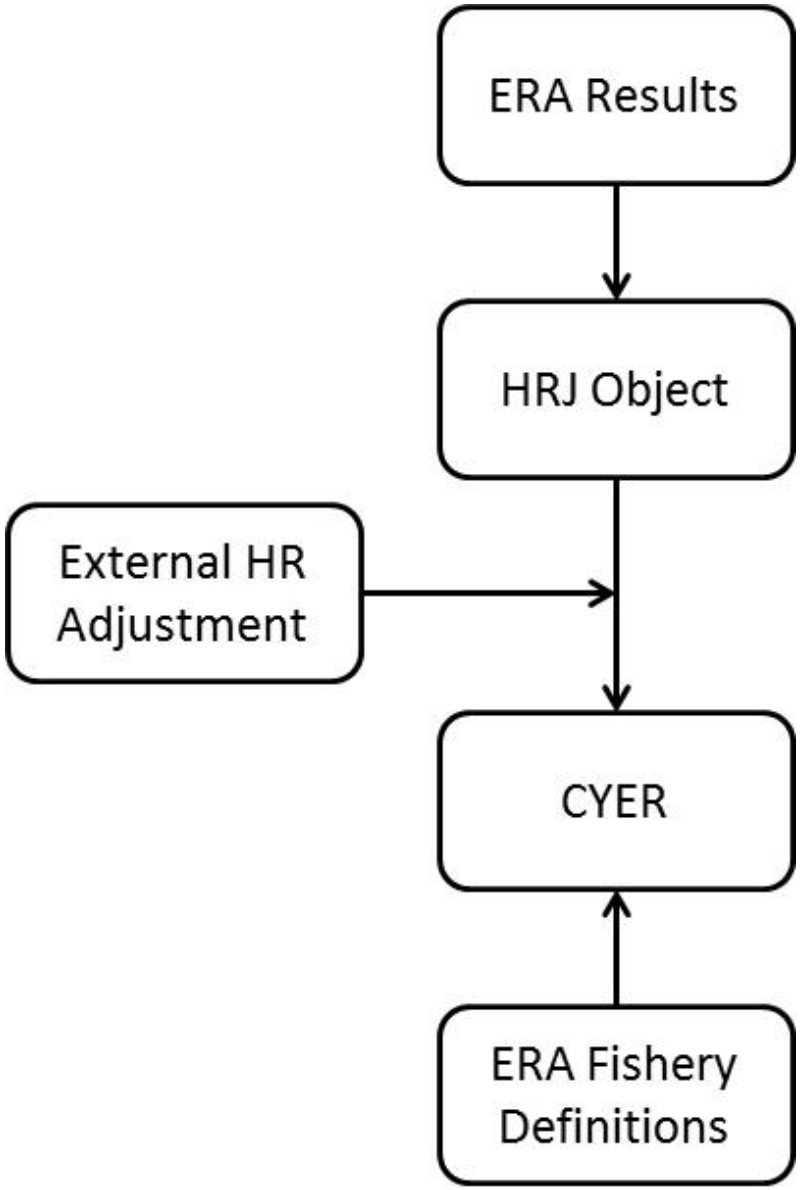



Figure 2

# CYER Functions

```
cyer(hrj, esc, fmap, type=c("AEQCat","AEQTot","NomCat","Nom
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"
```

# CYER Example: LYF (1/4)

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
##       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 OTH
##   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

```
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 OTH
##   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

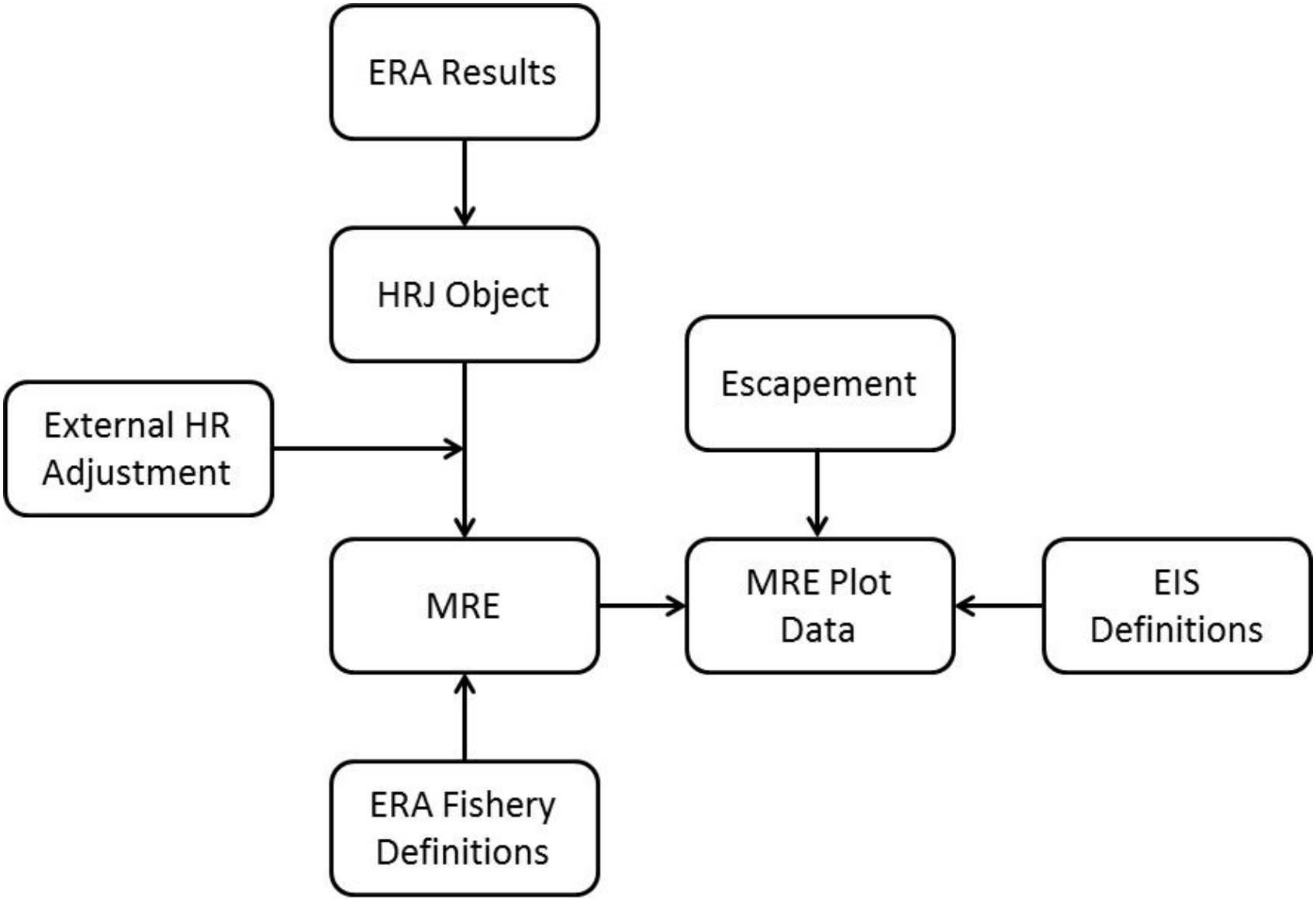



Figure 3

# 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=flooku
```

```
## 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

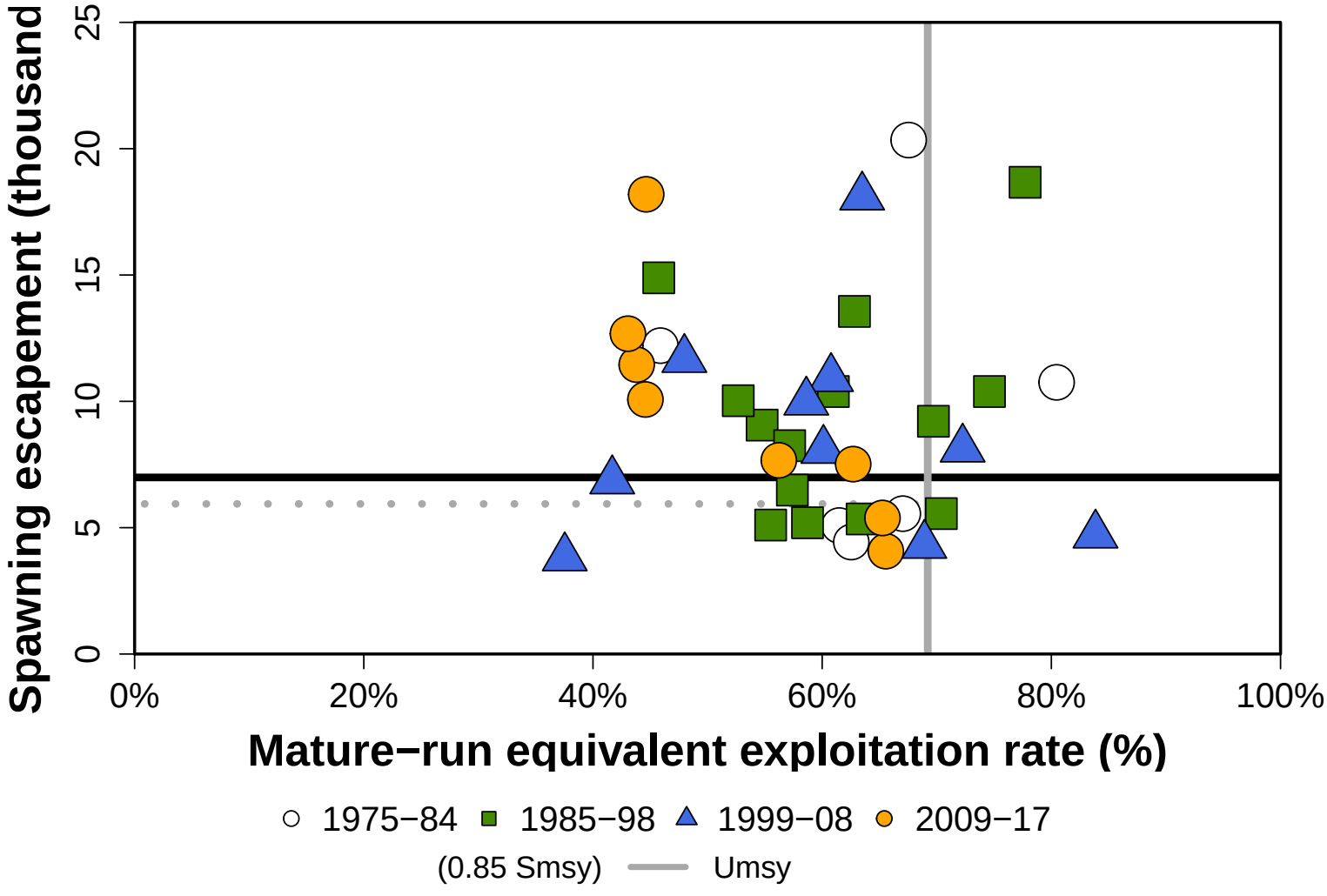
```
garciaplotdata=MRE2Plot(esc=Escap,
                        mre=MRE,
                        smap=slookup_orc[1:2,],
                        stknames=z.cy$stknames,
                        mrecriteria=TRUE,
                        auxdata=NULL)
```

```
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 N
## 1  5940.65 0.6921181  SRH           Fall             2
```

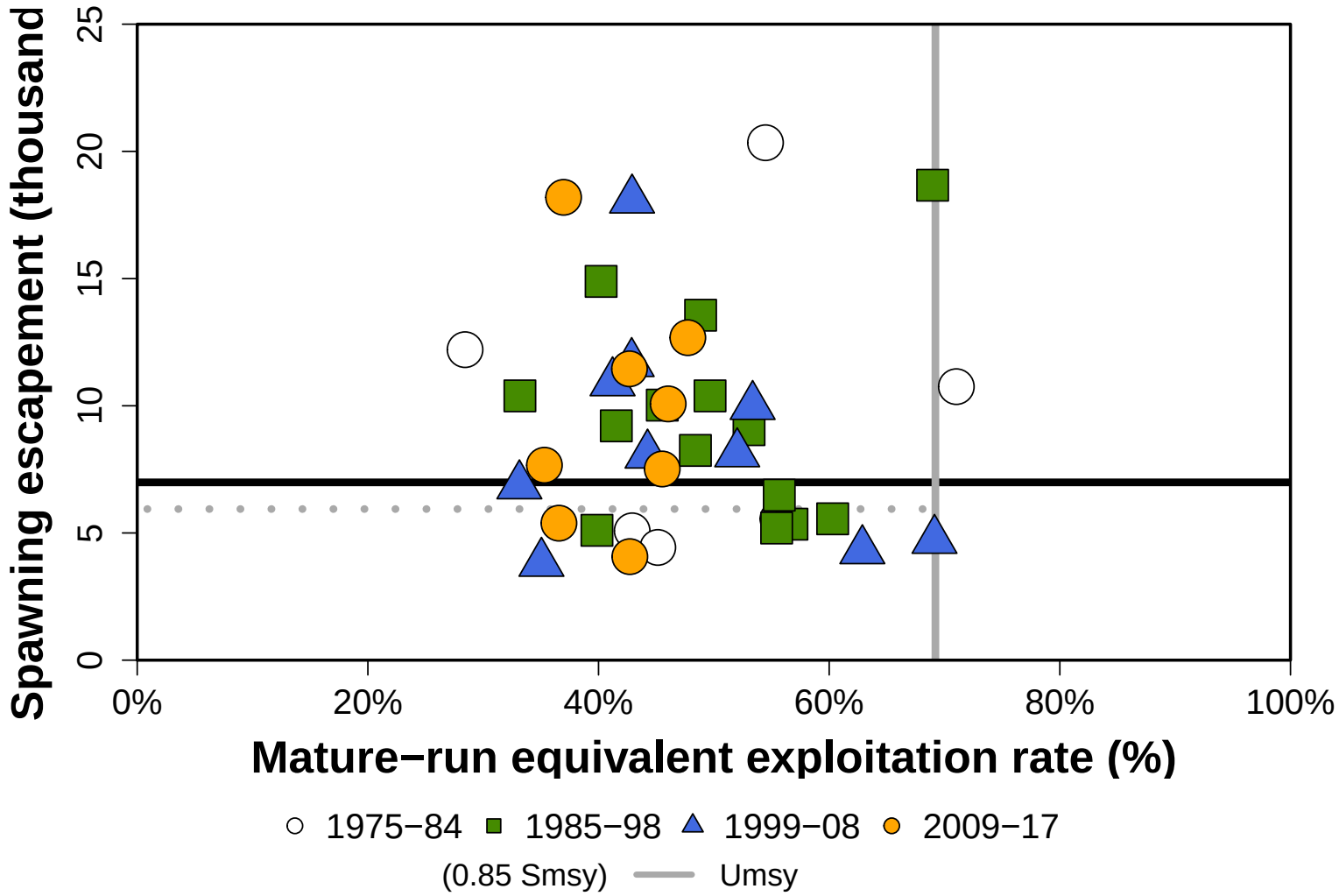
# MRE Calcs Step 4, Plot! Nehalem::SRH

```
plotGarcia(subset(garciaplotdata,StockNum==1))
```



# MRE Calcs Step 4, Plot! Nehalem::SRH w/Term HR Adjustment

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



# Diagnostics

- MRE2Excel