Computing a SPFI

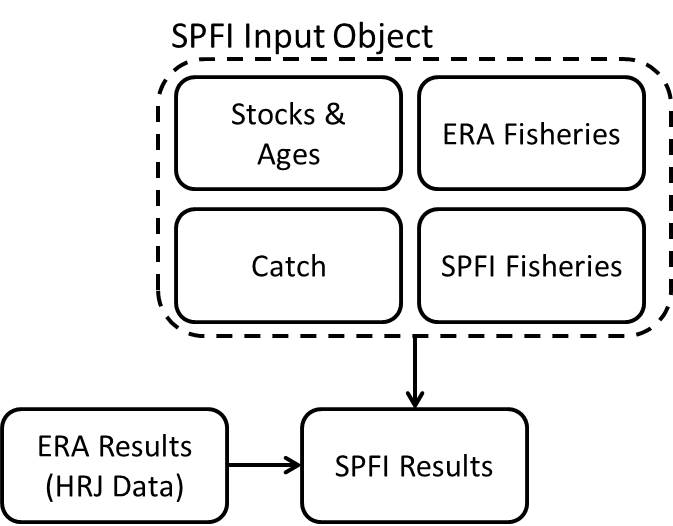
Last updated by Randy Peterson

Last updated on October 2, 2018

# SPFI to FPA Inputs

## Program flow

Note the following order of operations: 1. Read in HRJ data 2. Create a SPFI Input Object a. Stock and ages to include in the index b. Catch time series by SPFI fishery strata c. ERA fisheries that are to be used to compute the SPFI d. Define the SPFI fishery strata



# Step-by-step instructions on how to use the code

## Load functions

The first thing you need to do is load all the functions:

source("Code/GarciaFunLibrary.R")  
source("Code/SPFIFunLibrary.R")  
source("Code/SPFItoFPAfun.R")

## Load HRJ data

The SPFI is computed using output from the CTC’s exploitation rate analysis program CoShak12. The core data needed for SPFI computations are saved in what are called HRJ files. Data from HRJ files can be obtained in one of two ways: from a HRJ database or from the list of HRJ files used to create the HRJ database. For this example I will use the latter, but note that both options are available.

#Read in HRJ files in a directory  
 by=readHRJdir("Data/HRJ/2018", nFisheries=79, straysinescap=TRUE, Age6="include")  
#Convert to CY layout  
 cy=convertHRJ\_BYtoCY(by)  
#Convert HRJ from R to Access format  
 z.cy=convertHRJ\_RtoAccess(cy)  
#add the 'preferred' table to the Access format  
 z.cy = addPTableHRJ(z.cy, hrjclass = "Access")

## Create a SPFI input object

Lastly, to compute a SPFI we will need a SPFI input object.

#SPFI input data is a list object  
 afishery=list()  
#Which fisheries?  
 afishery$erafisheries = 1:3  
#Combine fisheries?  
 afishery$combinefisheries = data.frame(ERAFishery=c(1,2,3), SPFIFishery=c(1,2,1))  
#Stock/age matrix  
 afishery$stockage = data.frame(StockAcronym=factor(c("era stock acronym 1", "era stock acronym 2", "...")), Age2 = c(0,0,0), Age3=c(1,0,0), Age4=c(1,1,0), Age5=c(0,1,0), Age6=c(0,0,0))  
#Catch  
 afishery$catch = data.frame(Year=rep(1979:1982,2), SPFIFishery=c(rep(1,4),rep(2,4)), SPFIFisheryName=factor(c(rep("SPFI Strata 1",4), rep("SPFI Strata 2",4))), Catch=rpois(8,10), Addon=rpois(8,1))   
#Set class  
 class(afishery) = "spfi\_input"

afishery

## $erafisheries  
## [1] 1 2 3  
##   
## $combinefisheries  
## ERAFishery SPFIFishery  
## 1 1 1  
## 2 2 2  
## 3 3 1  
##   
## $stockage  
## StockAcronym Age2 Age3 Age4 Age5 Age6  
## 1 era stock acronym 1 0 1 1 0 0  
## 2 era stock acronym 2 0 0 1 1 0  
## 3 ... 0 0 0 0 0  
##   
## $catch  
## Year SPFIFishery SPFIFisheryName Catch Addon  
## 1 1979 1 SPFI Strata 1 10 0  
## 2 1980 1 SPFI Strata 1 13 1  
## 3 1981 1 SPFI Strata 1 12 0  
## 4 1982 1 SPFI Strata 1 8 0  
## 5 1979 2 SPFI Strata 2 13 0  
## 6 1980 2 SPFI Strata 2 8 1  
## 7 1981 2 SPFI Strata 2 9 1  
## 8 1982 2 SPFI Strata 2 4 0  
##   
## attr(,"class")  
## [1] "spfi\_input"

## Running the program

### Computing the SPFI

All that’s left is actually computing the SPFI, which is easily done via the spfi function:

spfi(spfidat, hrjdat, hrjtype=c("BY","CY","P"), tolerance=.0000001)

where spfidat is a spfi\_input object, hrjdat is HRJ data, hrjtype specifies which HRJ data type to use, and tolerance is the desired accuracy. The spfi program returns a spfi\_output object. By convention, the SPFI program computes the SPFI with the hrjtype=“BY”; however, the most correct thing to do would be to use hrjtype=“P”.

### Summarizing results

summary(x, unit=c("nom cat", "nom tot", "aeq cat", "aeq tot"), baseperiod=1979:1982)

where x is a spfi\_output object, unit specifies the unit the SPFI index should be in, and baseperiod defines what years to define as the base period.

### Missing strata? No problem

If missing strata are present, then the function gauntlet can be used.

gauntlet(x, method="glm", catchcriteria=4000)

where x is a spfi\_output object, method specifies which missing strata correction to use, and catchcriteria is the level of catch that defines the missing strata. The gauntlet

summary(x=gauntlet(x), unit=c("nom cat", "nom tot", "aeq cat", "aeq tot"), baseperiod=1979:1982)

# Example 1: 2018ERA SEAK AABM Troll for CLB9806

## Create the spfi\_input object

#SPFI input data is a list object  
 seak=list()  
#Which fisheries?  
 seak$erafisheries = 1:6  
#Combine fisheries?  
 seak$combinefisheries = data.frame(rbind(c(1,1),c(2,2),c(3,3),c(4,4),c(5,5),c(6,4)))  
 names(seak$combinefisheries) = c("ERAFishery","SPFIFishery")  
#Stock/age matrix  
 seak$stockage = read.delim("Data/9806/seakTroll.STF", header=TRUE)  
#Catch  
 seak$catch = read.csv("Data/2018ERA\_CatchDataforSPFI/seakTroll7916.CAT",header=FALSE)  
 names(seak$catch) = c("Year","SPFIFishery","SPFIFisheryName","Catch","Addon")  
#Set the object class  
 class(seak) = "spfi\_input"

Examine the spfi\_input object to see what stocks and ages are going to be used in the SPFI computations.

seak$stockage

## StockAcronym Age2 Age3 Age4 Age5 Age6  
## 1 AKS 0 0 1 1 1  
## 2 QUI 0 0 1 1 0  
## 3 RBT 0 1 1 1 0  
## 4 SRH 0 0 1 1 0  
## 5 URB 0 0 1 1 0  
## 6 WSH 0 0 1 1 0

Examine the spfi\_input object to see how the SPFI fisheries are defined.

seak$combinefisheries

## ERAFishery SPFIFishery  
## 1 1 1  
## 2 2 2  
## 3 3 3  
## 4 4 4  
## 5 5 5  
## 6 6 4

## Compute the SPFI

Note that I have set the hrjtype=“BY” so that this result can be compared with the SEAK AABM Troll SPFI in the 2018 CLB & ERA report.

seak\_spfi <- spfi(spfidat=seak, hrjdat=z.cy, hrjtype="BY")

## Summarize the results

### AEQ landed catch

summary(x=seak\_spfi, unit="aeq cat")

## Years spfigrand 1 2 3 4 5  
## 1979 0.78 1.20 1.06 0.57 0.70 0.36  
## 1980 1.29 0.63 0.95 1.46 1.57 1.84  
## 1981 1.13 1.21 1.12 0.91 1.10 0.87  
## 1982 0.79 0.96 0.88 1.06 0.63 0.92  
## 1983 0.87 1.04 0.59 0.63 1.26 0.82  
## 1984 0.62 0.36 0.93 1.07 0.53 0.28  
## 1985 0.67 0.45 0.58 0.81 0.83 0.71  
## 1986 0.45 0.44 0.15 0.39 1.26 0.54  
## 1987 0.47 0.59 0.16 0.54 0.62 1.31  
## 1988 0.41 1.37 0.00 0.13 0.64 1.17  
## 1989 0.50 0.84 0.20 0.42 0.54 0.51  
## 1990 0.70 0.63 0.11 0.85 1.16 1.09  
## 1991 0.60 1.35 0.22 0.87 0.79 0.50  
## 1992 0.38 1.02 0.06 0.48 0.40 0.21  
## 1993 0.46 0.73 0.02 0.26 0.92 0.25  
## 1994 0.40 0.65 0.04 0.12 0.66 0.15  
## 1995 0.48 0.46 0.05 0.31 0.79 0.91  
## 1996 0.42 0.56 0.09 0.56 0.55 0.48  
## 1997 0.59 0.63 0.15 0.55 1.47 0.08  
## 1998 0.39 0.80 0.05 0.14 0.95 0.38  
## 1999 0.56 0.81 0.11 0.25 0.96 0.10  
## 2000 0.43 0.88 0.08 0.10 1.42 0.05  
## 2001 0.38 0.53 0.07 0.13 0.64 0.12  
## 2002 0.49 0.39 0.06 0.11 1.10 0.14  
## 2003 0.45 0.68 0.06 0.12 0.85 0.30  
## 2004 0.40 0.81 0.06 0.15 0.95 0.27  
## 2005 0.45 0.90 0.11 0.20 1.21 0.39  
## 2006 0.59 1.50 0.11 0.63 1.36 0.11  
## 2007 0.58 1.23 0.14 0.83 1.16 0.17  
## 2008 0.44 0.82 0.07 0.70 0.68 0.09  
## 2009 0.57 0.72 0.15 0.32 1.08 0.15  
## 2010 0.34 1.14 0.04 0.26 0.74 0.07  
## 2011 0.38 1.03 0.05 0.25 0.82 0.13  
## 2012 0.61 1.62 0.09 0.18 1.15 0.08  
## 2013 0.33 0.80 0.09 0.43 0.49 0.12  
## 2014 0.55 1.25 0.08 0.52 1.03 0.13  
## 2015 0.45 1.15 0.09 1.32 0.72 0.34  
## 2016 0.55 1.50 0.11 0.58 1.04 0.12

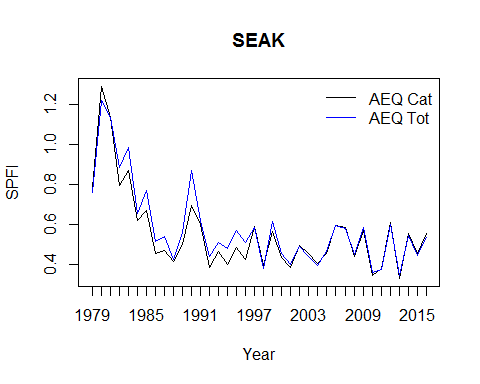
### AEQ total mortality

summary(x=seak\_spfi, unit="aeq tot")

## Years spfigrand 1 2 3 4 5  
## 1979 0.76 1.16 1.05 0.56 0.67 0.36  
## 1980 1.22 0.63 0.91 1.48 1.43 1.75  
## 1981 1.13 1.21 1.15 0.89 1.11 0.82  
## 1982 0.89 1.00 0.89 1.08 0.79 1.07  
## 1983 0.99 1.01 0.60 0.67 1.68 0.75  
## 1984 0.65 0.37 0.92 1.06 0.63 0.43  
## 1985 0.77 0.46 0.56 0.78 1.08 0.69  
## 1986 0.51 0.48 0.15 0.40 1.48 0.62  
## 1987 0.54 0.60 0.16 0.50 0.75 1.73  
## 1988 0.42 1.30 0.01 0.14 0.65 1.26  
## 1989 0.56 0.81 0.20 0.41 0.62 0.58  
## 1990 0.87 0.77 0.12 0.91 1.50 1.07  
## 1991 0.62 1.27 0.20 0.81 0.83 0.63  
## 1992 0.44 0.97 0.06 0.45 0.58 0.22  
## 1993 0.51 0.70 0.02 0.24 1.07 0.25  
## 1994 0.48 0.63 0.04 0.14 0.86 0.20  
## 1995 0.57 0.46 0.05 0.32 0.96 0.93  
## 1996 0.51 0.56 0.10 0.54 0.68 0.51  
## 1997 0.58 0.62 0.15 0.51 1.41 0.10  
## 1998 0.38 0.78 0.05 0.14 0.89 0.34  
## 1999 0.61 0.80 0.11 0.24 1.07 0.14  
## 2000 0.45 0.88 0.09 0.10 1.47 0.08  
## 2001 0.40 0.51 0.07 0.12 0.67 0.15  
## 2002 0.49 0.41 0.06 0.11 1.05 0.16  
## 2003 0.44 0.69 0.06 0.12 0.80 0.27  
## 2004 0.39 0.80 0.06 0.15 0.91 0.27  
## 2005 0.46 0.98 0.11 0.25 1.19 0.36  
## 2006 0.59 1.45 0.11 0.62 1.34 0.12  
## 2007 0.58 1.21 0.13 0.83 1.14 0.16  
## 2008 0.45 0.79 0.08 0.64 0.71 0.11  
## 2009 0.58 0.73 0.14 0.31 1.09 0.17  
## 2010 0.36 1.15 0.04 0.25 0.76 0.08  
## 2011 0.37 1.04 0.05 0.24 0.79 0.12  
## 2012 0.60 1.58 0.09 0.21 1.09 0.11  
## 2013 0.34 0.81 0.09 0.42 0.50 0.20  
## 2014 0.54 1.28 0.08 0.57 0.97 0.12  
## 2015 0.44 1.14 0.09 1.23 0.67 0.36  
## 2016 0.53 1.46 0.11 0.57 0.97 0.13

### Figures

plot(summary(seak\_spfi, unit="aeq cat")$spfi[,1],type="l",xlab="Year",ylab="SPFI",main="SEAK", xaxt="n")  
 lines(summary(seak\_spfi, unit="aeq tot")$spfi[,1],col="blue")  
 legend("topright",c("AEQ Cat", "AEQ Tot"), lty=c(1,1), col=c("black","blue"),bty="n")  
 axis(1,at=1:length(1979:2016),labels=1979:2016)



## 

# Example 2: 2018ERA SEAK AABM Troll for Base Period Calibration

## Create the spfi\_input object

#SPFI input data is a list object  
 seak=list()  
#Which fisheries?  
 seak$erafisheries = 1:6  
#Combine fisheries?  
 seak$combinefisheries = data.frame(rbind(c(1,1),c(2,2),c(3,3),c(4,4),c(5,5),c(6,4)))  
 names(seak$combinefisheries) = c("ERAFishery","SPFIFishery")  
#Stock/age matrix  
 seak$stockage = read.delim("Data/Phase2/seakTrollbpP2.STF", header=TRUE)  
#Catch  
 seak$catch = read.csv("Data/2018ERA\_CatchDataforSPFI/seakTroll7916.CAT",header=FALSE)  
 names(seak$catch) = c("Year","SPFIFishery","SPFIFisheryName","Catch","Addon")  
#Set the object class  
 class(seak) = "spfi\_input"

Examine the spfi\_input object to see what stocks and ages are going to be used in the SPFI computations.

seak$stockage

## StockAcronym Age2 Age3 Age4 Age5 Age6  
## 1 SSA 0 0 1 1 1  
## 2 NSA 0 0 0 1 1  
## 3 QUI 0 0 1 1 0  
## 4 RBT 0 1 1 1 0  
## 5 SRH 0 0 1 1 0  
## 6 URB 0 0 1 1 0  
## 7 WSH 0 0 1 1 0

## Compute the SPFI

Note that I have set the hrjtype=“P”.

seak\_spfi <- spfi(spfidat=seak, hrjdat=z.cy, hrjtype="P")

## Summarize the results

### AEQ landed catch

summary(x=seak\_spfi, unit="aeq cat")

## Years spfigrand 1 2 3 4 5  
## 1979 0.78 1.21 1.07 0.58 0.71 0.37  
## 1980 1.27 0.63 0.95 1.43 1.57 1.81  
## 1981 1.16 1.21 1.12 0.95 1.10 0.92  
## 1982 0.79 0.96 0.87 1.04 0.62 0.90  
## 1983 1.04 1.03 0.62 0.74 1.37 1.05  
## 1984 0.65 0.40 0.95 1.06 0.55 0.25  
## 1985 0.69 0.45 0.58 0.84 0.84 0.72  
## 1986 0.46 0.45 0.15 0.42 1.34 0.59  
## 1987 0.43 0.62 0.16 0.53 0.63 1.22  
## 1988 0.38 1.34 0.00 0.14 0.65 1.24  
## 1989 0.50 0.86 0.20 0.43 0.54 0.51  
## 1990 0.69 0.64 0.11 0.86 1.16 1.10  
## 1991 0.61 1.36 0.21 0.91 0.80 0.54  
## 1992 0.39 1.06 0.06 0.49 0.40 0.21  
## 1993 0.49 0.73 0.02 0.28 0.94 0.28  
## 1994 0.42 0.66 0.04 0.12 0.67 0.16  
## 1995 0.45 0.46 0.04 0.30 0.82 0.86  
## 1996 0.37 0.53 0.08 0.52 0.55 0.43  
## 1997 0.68 0.59 0.15 0.57 1.48 0.09  
## 1998 0.44 0.79 0.05 0.15 0.97 0.40  
## 1999 0.60 0.83 0.11 0.26 0.98 0.10  
## 2000 0.48 0.88 0.08 0.10 1.44 0.05  
## 2001 0.37 0.53 0.07 0.14 0.64 0.13  
## 2002 0.50 0.39 0.07 0.11 1.10 0.14  
## 2003 0.46 0.67 0.07 0.13 0.86 0.31  
## 2004 0.42 0.83 0.08 0.15 0.97 0.26  
## 2005 0.49 0.89 0.12 0.20 1.20 0.38  
## 2006 0.65 1.45 0.12 0.66 1.37 0.11  
## 2007 0.63 1.26 0.13 0.83 1.14 0.17  
## 2008 0.41 0.81 0.07 0.72 0.68 0.09  
## 2009 0.57 0.73 0.15 0.33 1.06 0.15  
## 2010 0.36 1.13 0.04 0.26 0.73 0.08  
## 2011 0.41 1.01 0.06 0.25 0.82 0.13  
## 2012 0.62 1.62 0.09 0.18 1.15 0.08  
## 2013 0.34 0.79 0.09 0.44 0.49 0.12  
## 2014 0.54 1.26 0.08 0.53 1.03 0.13  
## 2015 0.49 1.14 0.10 1.35 0.72 0.34  
## 2016 0.59 1.49 0.11 0.59 1.04 0.12

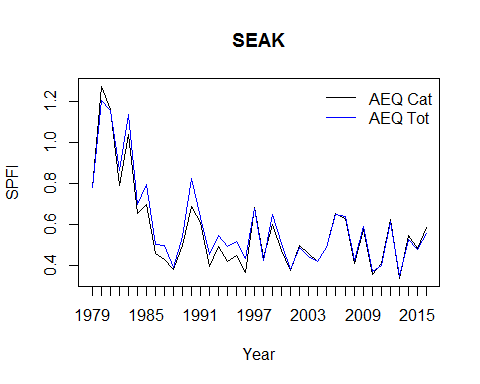
### AEQ total mortality

summary(x=seak\_spfi, unit="aeq tot")

## Years spfigrand 1 2 3 4 5  
## 1979 0.78 1.25 1.10 0.56 0.68 0.36  
## 1980 1.20 0.61 0.91 1.49 1.43 1.74  
## 1981 1.16 1.18 1.12 0.90 1.13 0.87  
## 1982 0.86 0.96 0.88 1.05 0.76 1.03  
## 1983 1.13 1.00 0.60 0.73 1.72 0.99  
## 1984 0.70 0.40 0.95 1.06 0.66 0.39  
## 1985 0.79 0.43 0.58 0.83 1.09 0.68  
## 1986 0.50 0.43 0.15 0.42 1.54 0.62  
## 1987 0.50 0.60 0.16 0.52 0.77 1.61  
## 1988 0.39 1.31 0.00 0.14 0.66 1.34  
## 1989 0.54 0.82 0.19 0.41 0.60 0.59  
## 1990 0.83 0.65 0.11 0.92 1.46 1.13  
## 1991 0.63 1.29 0.21 0.89 0.84 0.67  
## 1992 0.45 1.02 0.06 0.49 0.57 0.22  
## 1993 0.55 0.72 0.02 0.28 1.09 0.29  
## 1994 0.49 0.64 0.04 0.12 0.86 0.18  
## 1995 0.52 0.44 0.04 0.30 0.98 0.87  
## 1996 0.43 0.51 0.08 0.52 0.67 0.47  
## 1997 0.68 0.55 0.15 0.55 1.44 0.09  
## 1998 0.42 0.76 0.05 0.14 0.91 0.36  
## 1999 0.65 0.79 0.11 0.25 1.08 0.14  
## 2000 0.51 0.89 0.09 0.10 1.54 0.08  
## 2001 0.38 0.51 0.07 0.13 0.65 0.16  
## 2002 0.49 0.38 0.07 0.11 1.05 0.15  
## 2003 0.44 0.65 0.06 0.13 0.81 0.29  
## 2004 0.42 0.81 0.08 0.14 0.94 0.26  
## 2005 0.49 0.88 0.12 0.20 1.18 0.37  
## 2006 0.65 1.40 0.11 0.65 1.33 0.12  
## 2007 0.64 1.25 0.13 0.86 1.15 0.17  
## 2008 0.42 0.78 0.07 0.71 0.71 0.11  
## 2009 0.59 0.72 0.15 0.33 1.07 0.18  
## 2010 0.37 1.15 0.04 0.26 0.76 0.08  
## 2011 0.40 0.99 0.05 0.25 0.80 0.13  
## 2012 0.61 1.60 0.09 0.19 1.10 0.11  
## 2013 0.35 0.76 0.09 0.42 0.49 0.22  
## 2014 0.53 1.22 0.08 0.54 0.97 0.13  
## 2015 0.48 1.18 0.09 1.35 0.68 0.36  
## 2016 0.56 1.42 0.11 0.59 0.96 0.12

### Figures

plot(summary(seak\_spfi, unit="aeq cat")$spfi[,1],type="l",xlab="Year",ylab="SPFI",main="SEAK", xaxt="n")  
 lines(summary(seak\_spfi, unit="aeq tot")$spfi[,1],col="blue")  
 legend("topright",c("AEQ Cat", "AEQ Tot"), lty=c(1,1), col=c("black","blue"),bty="n")  
 axis(1,at=1:length(1979:2016),labels=1979:2016)



# Example 3: 2018ERA NBC AABM Troll for Base Period Calibration

## Create the spfi\_input object

#SPFI input data is a list object  
 nbc=list()  
#Which fisheries?  
 nbc$erafisheries = 8  
#Combine fisheries?  
 nbc$combinefisheries = data.frame(rbind(c(8,1)))  
 names(nbc$combinefisheries) = c("ERAFishery","SPFIFishery")  
#Stock/age matrix  
 nbc$stockage = read.delim("Data/Phase2/nbcTrollbpP2.STF", header=TRUE)  
#Catch  
 nbc$catch = read.csv("Data/2018ERA\_CatchDataforSPFI/nbcTroll7916.CAT",header=FALSE)  
 names(nbc$catch) = c("Year","SPFIFishery","SPFIFisheryName","Catch","Addon")  
 nbc$catch$SPFIFisheryName = "AllStrata"  
 nbc$catch$SPFIFisheryName = as.factor(nbc$catch$SPFIFisheryName)  
#Set the object class  
 class(nbc) = "spfi\_input"

Examine the spfi\_input object:

nbc$stockage

## StockAcronym Age2 Age3 Age4 Age5 Age6  
## 1 RBT 0 1 1 1 0  
## 2 SRH 0 0 1 1 0  
## 3 URB 0 0 1 0 0  
## 4 WSH 0 0 1 0 0  
## 5 ELK 0 0 1 0 0  
## 6 QUE 0 0 1 1 0  
## 7 SHU 0 1 1 0 0  
## 8 SUM 0 0 1 1 0

## Compute the SPFI

Note that I have set the hrjtype=“P”.

nbc\_spfi <- spfi(spfidat=nbc, hrjdat=z.cy, hrjtype="P")

## Summarize the results

### AEQ landed catch

summary(x=nbc\_spfi, unit="aeq cat")

## Years spfigrand spfibystrata  
## 1979 0.87 0.87  
## 1980 0.88 0.88  
## 1981 1.25 1.25  
## 1982 1.00 1.00  
## 1983 0.78 0.78  
## 1984 0.97 0.97  
## 1985 1.15 1.15  
## 1986 0.71 0.71  
## 1987 0.62 0.62  
## 1988 0.45 0.45  
## 1989 0.52 0.52  
## 1990 0.53 0.53  
## 1991 0.66 0.66  
## 1992 0.45 0.45  
## 1993 0.54 0.54  
## 1994 0.64 0.64  
## 1995 0.26 0.26  
## 1996 0.00 0.00  
## 1997 0.19 0.19  
## 1998 0.37 0.37  
## 1999 0.24 0.24  
## 2000 0.14 0.14  
## 2001 0.13 0.13  
## 2002 0.62 0.62  
## 2003 0.47 0.47  
## 2004 0.33 0.33  
## 2005 0.46 0.46  
## 2006 0.45 0.45  
## 2007 0.34 0.34  
## 2008 0.37 0.37  
## 2009 0.46 0.46  
## 2010 0.35 0.35  
## 2011 0.32 0.32  
## 2012 0.52 0.52  
## 2013 0.45 0.45  
## 2014 0.37 0.37  
## 2015 0.24 0.24  
## 2016 0.65 0.65

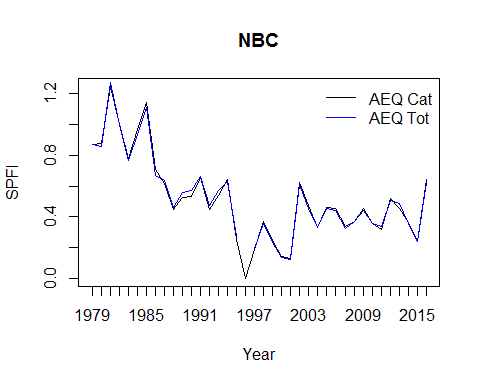
### AEQ total mortality

summary(x=nbc\_spfi, unit="aeq tot")

## Years spfigrand spfibystrata  
## 1979 0.87 0.87  
## 1980 0.86 0.86  
## 1981 1.27 1.27  
## 1982 1.00 1.00  
## 1983 0.77 0.77  
## 1984 0.94 0.94  
## 1985 1.11 1.11  
## 1986 0.67 0.67  
## 1987 0.64 0.64  
## 1988 0.46 0.46  
## 1989 0.56 0.56  
## 1990 0.57 0.57  
## 1991 0.66 0.66  
## 1992 0.48 0.48  
## 1993 0.57 0.57  
## 1994 0.63 0.63  
## 1995 0.27 0.27  
## 1996 NaN NaN  
## 1997 0.19 0.19  
## 1998 0.36 0.36  
## 1999 0.23 0.23  
## 2000 0.13 0.13  
## 2001 0.12 0.12  
## 2002 0.61 0.61  
## 2003 0.46 0.46  
## 2004 0.33 0.33  
## 2005 0.45 0.45  
## 2006 0.44 0.44  
## 2007 0.33 0.33  
## 2008 0.37 0.37  
## 2009 0.44 0.44  
## 2010 0.36 0.36  
## 2011 0.34 0.34  
## 2012 0.50 0.50  
## 2013 0.49 0.49  
## 2014 0.36 0.36  
## 2015 0.24 0.24  
## 2016 0.63 0.63

### Figures

plot(summary(nbc\_spfi, unit="aeq cat")$spfi[,1],type="l",xlab="Year",ylab="SPFI",main="NBC", xaxt="n")  
 lines(summary(nbc\_spfi, unit="aeq tot")$spfi[,1],col="blue")  
 legend("topright",c("AEQ Cat", "AEQ Tot"), lty=c(1,1), col=c("black","blue"),bty="n")  
 axis(1,at=1:length(1979:2016),labels=1979:2016)



# Example 4: 2018ERA WCVI AABM Troll for Base Period Calibration

## Create the spfi\_input object

#SPFI input data is a list object  
 wcvi=list()  
#Which fisheries?  
 wcvi$erafisheries = 10:12  
#Combine fisheries?  
 wcvi$combinefisheries = data.frame(rbind(c(10,1),c(11,2),c(12,3)))  
 names(wcvi$combinefisheries) = c("ERAFishery","SPFIFishery")  
#Stock/age matrix  
 wcvi$stockage = read.delim("Data/Phase2/wcviTrollbpP2.STF", header=TRUE)  
#Catch  
 wcvi$catch = read.csv("Data/2018ERA\_CatchDataforSPFI/wcviTroll7916.CAT",header=FALSE)  
 names(wcvi$catch) = c("Year","SPFIFishery","SPFIFisheryName","Catch","Addon")  
#Set the object class  
 class(wcvi) = "spfi\_input"

Examine the spfi\_input object:

wcvi$stockage

## StockAcronym Age2 Age3 Age4 Age5 Age6  
## 1 GAD 0 1 1 0 0  
## 2 LRH 0 1 1 0 0  
## 3 RBT 0 1 1 0 0  
## 4 SAM 0 1 1 0 0  
## 5 SPR 0 1 1 0 0  
## 6 SPS 0 1 1 0 0  
## 7 SUM 0 0 1 1 0  
## 8 URB 0 0 1 0 0  
## 9 WSH 0 0 1 0 0  
## 10 CHI 0 1 1 0 0  
## 11 ELK 0 0 1 0 0  
## 12 HAR 0 1 1 0 0  
## 13 NIS 0 0 1 0 0  
## 14 SKF 0 0 1 0 0

## Compute the SPFI

Note that I have set the hrjtype=“P”.

wcvi\_spfi <- spfi(spfidat=wcvi, hrjdat=z.cy, hrjtype="P")

## Summarize the results

### AEQ landed catch

Without the missing strata adjusment:

summary(x=wcvi\_spfi, unit="aeq cat")

## Years spfigrand 10 11 12  
## 1979 1.09 1.10 1.19 1.02  
## 1980 1.17 1.16 1.21 1.15  
## 1981 0.84 1.08 0.76 0.83  
## 1982 0.89 0.66 0.83 1.00  
## 1983 1.00 0.80 0.89 1.19  
## 1984 1.41 1.07 0.96 1.74  
## 1985 0.00 NaN 0.58 1.55  
## 1986 0.80 0.09 0.52 1.37  
## 1987 0.00 NaN NaN 1.40  
## 1988 0.00 NaN NaN 1.64  
## 1989 0.00 NaN 0.00 0.92  
## 1990 0.00 NaN 0.05 1.81  
## 1991 0.00 NaN 0.03 1.26  
## 1992 0.00 0.19 NaN 1.77  
## 1993 0.26 0.01 NaN 2.00  
## 1994 0.30 0.01 NaN 1.27  
## 1995 0.00 NaN NaN 0.77  
## 1996 0.00 NaN NaN NaN  
## 1997 0.00 NaN NaN 0.47  
## 1998 0.00 0.02 0.04 NaN  
## 1999 0.00 0.23 NaN NaN  
## 2000 0.00 1.48 0.08 NaN  
## 2001 0.22 0.69 0.37 0.08  
## 2002 0.27 0.40 0.79 0.03  
## 2003 0.65 0.74 0.58 NaN  
## 2004 0.40 1.07 0.46 0.14  
## 2005 0.59 1.81 0.43 0.13  
## 2006 0.42 1.61 0.30 0.19  
## 2007 0.33 1.04 0.77 0.03  
## 2008 0.38 0.31 0.31 0.45  
## 2009 0.13 0.28 0.37 0.03  
## 2010 0.16 0.25 0.49 0.05  
## 2011 0.16 0.12 0.43 0.07  
## 2012 0.18 0.39 0.12 0.21  
## 2013 0.17 0.18 0.32 0.03  
## 2014 0.26 0.25 0.32 0.23  
## 2015 0.06 0.09 0.13 0.03  
## 2016 0.24 0.51 0.45 0.08

With the missing strata adjusment:

summary(x=gauntlet(x=wcvi\_spfi, method="glm", catchcriteria=4000), unit="aeq cat")

## Years spfigrand 10 11 12  
## 1979 1.09 1.10 1.19 1.02  
## 1980 1.17 1.16 1.21 1.15  
## 1981 0.84 1.08 0.76 0.83  
## 1982 0.89 0.66 0.83 1.00  
## 1983 1.00 0.80 0.89 1.19  
## 1984 1.41 1.07 0.96 1.74  
## 1985 1.01 0.00 0.58 1.55  
## 1986 0.80 0.09 0.52 1.37  
## 1987 0.71 0.00 0.00 1.40  
## 1988 0.83 0.00 0.00 1.64  
## 1989 0.47 0.00 0.01 0.92  
## 1990 0.88 0.00 0.05 1.81  
## 1991 0.47 0.00 0.03 1.26  
## 1992 1.13 0.19 0.04 1.77  
## 1993 0.20 0.01 0.00 2.00  
## 1994 0.22 0.01 0.00 1.27  
## 1995 0.39 0.01 0.00 0.77  
## 1996 0.00 0.00 0.00 0.00  
## 1997 0.24 0.00 0.01 0.47  
## 1998 0.01 0.01 0.01 0.00  
## 1999 0.04 0.23 0.00 0.00  
## 2000 0.31 1.48 0.08 0.01  
## 2001 0.22 0.69 0.37 0.08  
## 2002 0.27 0.40 0.79 0.03  
## 2003 0.31 0.74 0.58 0.00  
## 2004 0.40 1.07 0.46 0.14  
## 2005 0.59 1.81 0.43 0.13  
## 2006 0.42 1.61 0.30 0.19  
## 2007 0.33 1.04 0.77 0.03  
## 2008 0.38 0.31 0.31 0.45  
## 2009 0.13 0.28 0.37 0.03  
## 2010 0.16 0.25 0.49 0.05  
## 2011 0.16 0.12 0.43 0.07  
## 2012 0.18 0.39 0.12 0.21  
## 2013 0.14 0.18 0.32 0.02  
## 2014 0.26 0.25 0.32 0.23  
## 2015 0.06 0.09 0.13 0.03  
## 2016 0.24 0.51 0.45 0.08

### AEQ total mortality

Without the missing strata adjusment:

summary(x=wcvi\_spfi, unit="aeq tot")

## Years spfigrand 10 11 12  
## 1979 1.07 1.07 1.16 1.01  
## 1980 1.16 1.15 1.21 1.13  
## 1981 0.85 1.08 0.78 0.84  
## 1982 0.91 0.69 0.85 1.02  
## 1983 0.97 0.77 0.86 1.16  
## 1984 1.41 1.07 0.96 1.75  
## 1985 0.00 NaN 0.57 1.53  
## 1986 0.77 0.08 0.50 1.33  
## 1987 0.00 NaN NaN 1.81  
## 1988 0.00 NaN NaN 1.75  
## 1989 0.00 NaN 0.00 1.05  
## 1990 0.00 NaN 0.05 1.86  
## 1991 0.00 NaN 0.03 1.35  
## 1992 0.00 0.21 NaN 1.96  
## 1993 0.28 0.01 NaN 2.16  
## 1994 0.31 0.01 NaN 1.29  
## 1995 0.00 NaN NaN 0.93  
## 1996 NaN NaN NaN NaN  
## 1997 0.00 NaN NaN 0.55  
## 1998 0.00 0.02 0.04 NaN  
## 1999 0.00 0.21 NaN NaN  
## 2000 0.00 1.39 0.07 NaN  
## 2001 0.21 0.65 0.35 0.07  
## 2002 0.26 0.37 0.74 0.03  
## 2003 0.61 0.70 0.54 NaN  
## 2004 0.37 1.01 0.43 0.13  
## 2005 0.56 1.71 0.40 0.12  
## 2006 0.40 1.51 0.28 0.18  
## 2007 0.31 0.97 0.72 0.03  
## 2008 0.36 0.29 0.29 0.42  
## 2009 0.12 0.26 0.34 0.03  
## 2010 0.15 0.24 0.46 0.04  
## 2011 0.15 0.12 0.40 0.07  
## 2012 0.17 0.36 0.11 0.20  
## 2013 0.16 0.17 0.30 0.03  
## 2014 0.24 0.24 0.30 0.22  
## 2015 0.06 0.08 0.12 0.03  
## 2016 0.23 0.48 0.43 0.08

With the missing strata adjusment:

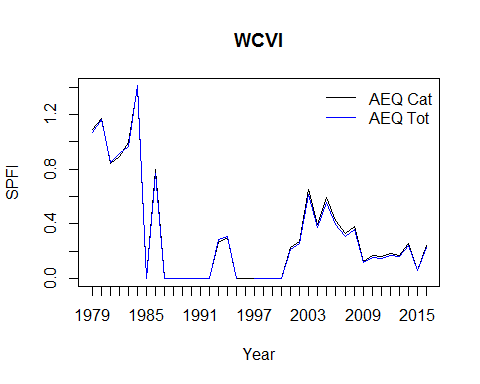
summary(x=gauntlet(x=wcvi\_spfi, method="glm", catchcriteria=4000), unit="aeq tot")

## Years spfigrand 10 11 12  
## 1979 1.07 1.07 1.16 1.01  
## 1980 1.16 1.15 1.21 1.13  
## 1981 0.85 1.08 0.78 0.84  
## 1982 0.91 0.69 0.85 1.02  
## 1983 0.97 0.77 0.86 1.16  
## 1984 1.41 1.07 0.96 1.75  
## 1985 0.99 0.00 0.57 1.53  
## 1986 0.77 0.08 0.50 1.33  
## 1987 0.92 0.00 0.00 1.81  
## 1988 0.89 0.00 0.00 1.75  
## 1989 0.53 0.00 0.01 1.05  
## 1990 0.91 0.00 0.05 1.86  
## 1991 0.50 0.00 0.03 1.35  
## 1992 1.25 0.21 0.04 1.96  
## 1993 0.22 0.01 0.00 2.16  
## 1994 0.22 0.01 0.00 1.29  
## 1995 0.48 0.01 0.00 0.93  
## 1996 0.00 0.00 0.00 0.00  
## 1997 0.28 0.00 0.01 0.55  
## 1998 0.01 0.01 0.01 0.00  
## 1999 0.04 0.21 0.00 0.00  
## 2000 0.29 1.39 0.07 0.01  
## 2001 0.21 0.65 0.35 0.07  
## 2002 0.26 0.37 0.74 0.03  
## 2003 0.30 0.70 0.54 0.00  
## 2004 0.37 1.01 0.43 0.13  
## 2005 0.56 1.71 0.40 0.12  
## 2006 0.40 1.51 0.28 0.18  
## 2007 0.31 0.97 0.72 0.03  
## 2008 0.36 0.29 0.29 0.42  
## 2009 0.12 0.26 0.34 0.03  
## 2010 0.15 0.24 0.46 0.04  
## 2011 0.15 0.12 0.40 0.07  
## 2012 0.17 0.36 0.11 0.20  
## 2013 0.14 0.17 0.30 0.02  
## 2014 0.24 0.24 0.30 0.22  
## 2015 0.06 0.08 0.12 0.03  
## 2016 0.23 0.48 0.43 0.08

### Figures

Without the missing strata adjusment:

plot(summary(wcvi\_spfi, unit="aeq cat")$spfi[,1],type="l",xlab="Year",ylab="SPFI",main="WCVI", xaxt="n")  
 lines(summary(wcvi\_spfi, unit="aeq tot")$spfi[,1],col="blue")  
 legend("topright",c("AEQ Cat", "AEQ Tot"), lty=c(1,1), col=c("black","blue"),bty="n")  
 axis(1,at=1:length(1979:2016),labels=1979:2016)



With the missing strata adjusment:

plot(summary(gauntlet(x=wcvi\_spfi, method="glm", catchcriteria=4000), unit="aeq cat")$spfi[,1],type="l",xlab="Year",ylab="SPFI",main="WCVI", xaxt="n")  
 lines(summary(gauntlet(x=wcvi\_spfi, method="glm", catchcriteria=4000), unit="aeq tot")$spfi[,1],col="blue")  
 legend("topright",c("AEQ Cat", "AEQ Tot"), lty=c(1,1), col=c("black","blue"),bty="n")  
 axis(1,at=1:length(1979:2016),labels=1979:2016)

