

# Formato Archivo Control.ss

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# 1 Descripción del repositorio

- Directorio con archivos requeridos para ejecutar GADGET
- Directorio con archivos requeridos para ejecutar SS3
- Directorio con ejecutable SS3 para tres sistemas operativos (windows, linux y mac)
- Códigos Rmarkdown (pdf o html) que permita modificar archivos SS3
  - formato data.ss
  - formato contro.ss
  - formato starter.ss
  - formato forecast.ss

# 2 Descargar archivos requeridos desde repositorio

Tarea pendiente. . . .

# 3 Librerías requeridas

## 3.1 Identificamos los directorio de trabajo

```
dirname.base <- here("10a_anchcadiz")  
#dirname.base <- here("modelos_SS3", "simple")
```

### 3.1.0.1 Creamos un nuevo directorio para la nueva versión del modelo modificado

```
dirname.mod <- here("boqueron_SS3")  
dir.create(path=dirname.mod, showWarnings = TRUE, recursive = TRUE)
```

## 3.2 Leer los archivos de Stock Synthesis con la función SS\_read()

Cada uno de los archivos de entrada se lee en R como una lista.

Use names() para ver todos los componentes de la lista

```
inputs <- r4ss::SS_read(dir = dirname.base)  
names(inputs)  
## [1] "dir"      "path"     "dat"      "ctl"      "start"    "fore"     "wtatage"  
  
#trabajaremos con archivo ctl  
ctl<-inputs$ctl # archivo base  
ctl1<-ctl # archivo modificado
```

## 3.3 Revisamos los nombres de los componentes de la lista del archivo control que deseamos modificar

```
#matrix(names(ctl1),ncol=1)
```

### 3.4 Especificaciones iniciales

```
ctl1$nseas      <- 4
ctl1$N_areas    <- 1
ctl1$Nages      <- 4
ctl1$Nsexes     <- 1
ctl1$Npopbins   <- 44
ctl1$Nfleets    <- 3
ctl1$Do_AgeKey  <- 0
```

### 3.5 Datos de los archivos

```
ctl1$fleetnames <- c("Fishery","PELAGO","ECOCADIZ")
ctl1$Comments<-"#C 2023 Boqueron Cádiz control file MODELO TRIMESTRAL"
ctl1$eof        <- TRUE
```

### 3.6 Especificaciones del crecimiento

Opciones y especificaciones:

- EmpiricalWAA = 0 means do not read wtatage.ss; 1 means read and use wtatage.ss and also read and use growth parameters
- N\_GP = N\_Growth\_Patterns (Growth Patterns, Morphs, Bio Patterns, GP are terms used interchangeably in SS3)
- N\_platoon = N\_platoons\_Within\_GrowthPattern

```
ctl1$EmpiricalWAA <- 0
ctl1$N_GP          <- 1
ctl1$N_platoon     <- 1
```

### 3.7 Distribución del reclutamiento

Opciones y especificaciones:

- recr\_dist\_method = 2=main effects for GP, Area, Settle timing; 3=each Settle entity; 4=none (only when N\_GP $N_{settlepop}=1$ )
- recr\_global\_area = 1=global; 2=by area
- recr\_dist\_read = number of recruitment settlement assignments
- recr\_dist\_inx = unused option
- recr\_dist\_pattern = Matriz que contiene la siguiente información: GPattern, month, area, age (for each settlement assignment)

```
ctl1$recr_dist_method<-3
ctl1$recr_global_area<-1
ctl1$recr_dist_read  <-1
ctl1$recr_dist_inx   <-0
#-----
      recr_pattern<-data.frame(row.names="recr_dist_pattern1",
                                "GPattern" = 1,
                                "month"    = 1,
                                "area"     = 1,
                                "age"      = 0)
ctl1$recr_dist_pattern<-recr_pattern
#-----
```

### 3.8 Bloques

Opciones y especificaciones:

- N\_Block\_Designs =
- blocks\_per\_pattern =
- Block\_Design =

```
ctl1$N_Block_Designs <- 1
ctl1$blocks_per_pattern <- 1
ctl1$Block_Design <- c(1989,1989)
```

### 3.9 Parámetros que varían en el tiempo

Opciones y especificaciones:

- time\_vary\_adjust\_method = controls for all timevary parameters. \_time-vary parm bound check (1=warn relative to base parm bounds; 3=no bound check); Also see env (3) and dev (5) options to constrain with base bounds.
- time\_vary\_auto\_generation = Matriz que contiene la siguiente información: AUTOGEN, autogen: 1st element for biology, 2nd for SR, 3rd for Q, 4th reserved, 5th for selex where: 0 = autogen time-varying parms of this category; 1 = read each time-varying parm line; 2 = read then autogen if parm min=-12345.

```
ctl1$time_vary_adjust_method <- 1
#-----
# arreglo de datos para "time_vary_auto_generation"
time_auto<-data.frame(matrix(rep(1,5),nrow=1,ncol=5))
colnames(time_auto)<-paste("time_vary_auto_generation_",seq(1,5,1),sep="")

ctl1$time_vary_auto_generation<-time_auto
#-----
```

### 3.10 Parámetros biológicos

Opciones y especificaciones:

- natM\_type: 0=1Parm;1=N\_breakpoints;2=Lorenzen;3=agespecific;4=agespec\_withseasinterpolate; 5=BETA: Maunder\_link\_to\_maturity;6=Lorenzen\_rangeno additional input for selected M option; read 1P per morph
- GrowthModel: 1=vonBert with L1&L2; 2=Richards with L1&L2; 3=age\_specific\_K\_incr; 4=age\_specific\_K\_decr; 5=age\_specific\_K\_each; 6=NA; 7=NA; 8=growth cessation
- Growth\_Age\_for\_L1: Age(post-settlement)\_for\_L1;linear growth below this
- Growth\_Age\_for\_L2: 999 to use as Linf
- Exp\_Decay: exponential decay for growth above maxage (value should approx initial Z; -999 replicates 3.24; -998 to not allow growth above maxage)
- Growth\_Placeholder: placeholder for future growth feature
- N\_natMparms:
- SD\_add\_to\_LAA: SD\_add\_to\_LAA (set to 0.1 for SS2 V1.x compatibility)
- CV\_Growth\_Pattern: 0=(CV=f(LAA)); 1=(CV=F(A)); 2=(SD=F(LAA)); 3=(SD=F(A)); 4=(logSD=F(A))
- maturity\_option: 1=length logistic; 2=age logistic; 3=read age-maturity matrix by growth\_pattern; 4=read age-fecundity; 5=disabled; 6=read length-maturity
- First\_Mature\_Age:
- fecundity\_option: (1)eggs=Wt(a+bWt); (2)eggs=aL^b; (3)eggs=aWt^b; (4)eggs=a+bL; (5)eggs=a+bW

- `hermaphroditism_option`: 0=none; 1=female-to-male age-specific fxn; -1=male-to-female age-specific fxn
- `parameter_offset_approach`: 1- direct, no offset\*\*; 2- `male=fem_parmexp(male_parm)`; 3: `male=femaleexp(parm)` then `old=young*exp(parm)`

El siguiente código permite modificar las opciones antes especificadas:

```
ctl1$natM_type      <- 0
ctl1$GrowthModel    <- 1
ctl1$Growth_Age_for_L1 <- 0.1
ctl1$Growth_Age_for_L2 <- 4
ctl1$Exp_Decay      <- -999
ctl1$Growth_Placeholder <- 0
ctl1$N_natMparms    <- 1
ctl1$SD_add_to_LAA  <- 0
ctl1$CV_Growth_Pattern <- 0
ctl1$maturity_option <- 1
ctl1$First_Mature_Age <- 1
ctl1$fecundity_option <- 1
ctl1$hermaphroditism_option <- 0
ctl1$parameter_offset_approach <- 1
```

### 3.10.1 Parámetros biológicos

La función principal del archivo de control es definir los parámetros que utilizará el modelo. A continuación se indican las líneas de parámetros biológicos que serán modificadas:

```
row.names(ctl1$MG_parms)
## [1] "NatM_p_1_Fem_GP_1"      "L_at_Amin_Fem_GP_1"
## [3] "L_at_Amax_Fem_GP_1"     "VonBert_K_Fem_GP_1"
## [5] "CV_young_Fem_GP_1"      "CV_old_Fem_GP_1"
## [7] "Wtlen_1_Fem_GP_1"       "Wtlen_2_Fem_GP_1"
## [9] "Mat50%_Fem_GP_1"       "Mat_slope_Fem_GP_1"
## [11] "Eggs/kg_inter_Fem_GP_1" "Eggs/kg_slope_wt_Fem_GP_1"
## [13] "RecrDist_GP_1_area_1_month_1" "CohortGrowDev"
## [15] "FracFemale_GP_1"
```

La definición de cada línea es la siguiente:

- `NatM_p_1_Fem_GP_1` = Mortalidad natural para el patrón de crecimiento de hembras (Fem) 1, donde el número de parámetros de mortalidad natural depende de la opción seleccionada.
- `L_at_Amin_Fem_GP_1` = Longitud en Amin (unidades en cm) para hembra, patrón de crecimiento 1.
- `L_at_Amax_Fem_GP_1` = Longitud en Amax (unidades en cm) para hembra, patrón de crecimiento 1.
- `VonBert_K_Fem_GP_1` = Coeficiente de crecimiento de von Bertalanffy (las unidades son por año) para las hembras, patrón de crecimiento 1.
- `CV_young_Fem_GP_1` = variabilidad para el tamaño a la edad  $\leq$  Amin para las hembras, patrón de crecimiento 1. Tenga en cuenta que CV no puede variar con el tiempo, por lo que no figure `env-link` o un vector de desviación. Además, las unidades son como CV o como desviación estándar, dependiendo del valor asignado del patrón CV.
- `CV_old_Fem_GP_1` = variabilidad para el tamaño a la edad  $\geq$  Amax para las hembras, patrón de crecimiento 1. Para edades intermedias, haga una interpolación lineal de CV en el tamaño medio a la edad. Tenga en cuenta que las unidades para CV dependerán del patrón CV y del valor del parámetro mortalidad-crecimiento como compensación. El valor del CV no puede variar con el tiempo.
- `Wtlen_1_Fem_GP_1` = coeficiente para convertir la longitud en cm en peso en kg para las hembras.
- `Wtlen_2_Fem_GP_1` = exponente en convertir la longitud a peso para hembras.

- `Mat50%_Fem_GP_1` = inflexión logística de madurez (en cm o años) donde la madurez femenina en logitud (o edad) es una función logística.
- `Mat_slope_Fem_GP_1` = pendiente logística (debe tener valor negativo).
- `Eggs_alpha_Fem_GP_1` = parámetros de fecundidad. El uso depende de la opción de fecundidad seleccionada.
- `Eggs_beta_Fem_GP_1`

Cada línea de parámetro biológicos contiene la siguiente información:

```
names(ctl$MG_parms)
## [1] "LO"          "HI"          "INIT"        "PRIOR"       "PR_SD"
## [6] "PR_type"     "PHASE"       "env_var&link" "dev_link"    "dev_minyr"
## [11] "dev_maxyr"   "dev_PH"      "Block"       "Block_Fxn"   "PType"
```

La definición de cada línea es la siguiente:

- `LO` = un valor mínimo para el parámetro
- `HI` = un valor máximo para el parámetro
- `INIT` = valor inicial para el parámetro. Si la fase (descrita a continuación) para el parámetro es negativa, el parámetro se fija en este valor. Si se lee el archivo `ss.par`, sobrescribe estos valores `INIT`.
- `PRIOR` = valor esperado para el parámetro. Este valor se ignora si el `PR_type` es 0 (no prior) o 1 (symmetric beta). Si `PR_type` es lognormal (descrito a continuación).
- `PR_SD` = desviación standar de la `PRIOR`, utilizado para calcular la likelihood del valor del parámetro actual. Este valor es ignorado si la `PR_type` es 0.
- `PR_type` = tipo de distribución de error del valor esperado:
  - 0 = ninguno
  - 1 = symmetric beta
  - 2 = full beta
  - 3 = lognormal sin ajuste de sesgo
  - 4 = lognormal con ajuste de sesgo
  - 5 = gamma, y
  - 6 = normal.
- `PHASE` = fase en la que se empieza a estimar el parámetro. Un valor negativo hace que el parámetro conserve su valor `INIT` (o valor leído del archivo `ss.par`)
- `env_var&link` = crea un vinculo a una serie temporal ingresada al archivo de datos
- `dev_link` = invoca el uso del vector de desviación en la función linkage
- `dev_minyr`= año de inicio del vector de desviación
- `dev_maxyr`= año final para el vector de desviación
- `dev_PH` = fase de estimación para elementos en el vector de desviación
- `Block` = bloque de tiempo o tendencia a aplicar
- `Block_Fxn`= forma funcional para el desplazamiento de bloques

```
##-----
MG_parms1<-data.frame(row.names="NatM_p_1_Fem_GP_1",
                      "LO"          = 0.05,
                      "HI"          = 1.6,
                      "INIT"        = 0.7,
```

```

        "PRIOR"          = -1.60944,
        "PR_SD"          = 0.1,
        "PR_type"        = 0,
        "PHASE"          = -4,
        "env_var&link"    = 0,
        "dev_link"       = 0,
        "dev_minyr"      = 0,
        "dev_maxyr"      = 0,
        "dev_PH"         = 0,
        "Block"          = 0,
        "Block_Fxn"      = 0)
ctl1$MG_parms[1,] <- MG_parms1
##-----
MG_parms2<-data.frame(row.names="L_at_Amin_Fem_GP_1",
        "LO"            = 0,
        "HI"            = 10,
        "INIT"          = 6,
        "PRIOR"         = 32,
        "PR_SD"         = 99,
        "PR_type"       = 0,
        "PHASE"         = 5,
        "env_var&link"   = 0,
        "dev_link"      = 0,
        "dev_minyr"     = 0,
        "dev_maxyr"     = 0,
        "dev_PH"        = 0,
        "Block"         = 0,
        "Block_Fxn"     = 0)
ctl1$MG_parms[2,]<-MG_parms2
##-----
MG_parms3<-data.frame(row.names="L_at_Amax_Fem_GP_1",
        "LO"            = 5,
        "HI"            = 22,
        "INIT"          = 18,
        "PRIOR"         = 50,
        "PR_SD"         = 99,
        "PR_type"       = 0,
        "PHASE"         = 5,
        "env_var&link"   = 0,
        "dev_link"      = 0,
        "dev_minyr"     = 0,
        "dev_maxyr"     = 0,
        "dev_PH"        = 0,
        "Block"         = 0,
        "Block_Fxn"     = 0)
ctl1$MG_parms[3,]<-MG_parms3
##-----
MG_parms4<-data.frame(row.names="VonBert_K_Fem_GP_1",
        "LO"            = 0.1,
        "HI"            = 2.0,
        "INIT"          = 0.5,
        "PRIOR"         = 0.3,
        "PR_SD"         = 99,

```

```

        "PR_type"      = 0,
        "PHASE"        = 3,
        "env_var&link" = 0,
        "dev_link"     = 0,
        "dev_minyr"    = 0,
        "dev_maxyr"    = 0,
        "dev_PH"       = 0,
        "Block"        = 0,
        "Block_Fxn"    = 0)
ctl1$MG_parms[4,]<-MG_parms4
##-----
MG_parms5<-data.frame(row.names="CV_young_Fem_GP_1",
        "LO"          = 0.03,
        "HI"          = 0.150,
        "INIT"        = 0.066,
        "PRIOR"       = 0.1,
        "PR_SD"       = 99,
        "PR_type"     = 0,
        "PHASE"       = 5,
        "env_var&link" = 0,
        "dev_link"    = 0,
        "dev_minyr"   = 0,
        "dev_maxyr"   = 0,
        "dev_PH"      = 0,
        "Block"       = 0,
        "Block_Fxn"   = 0)
ctl1$MG_parms[5,]<-MG_parms5
##-----
MG_parms6<-data.frame(row.names="CV_old_Fem_GP_1",
        "LO"          = 0.03,
        "HI"          = 0.150,
        "INIT"        = 0.066,
        "PRIOR"       = 0.1,
        "PR_SD"       = 99,
        "PR_type"     = 0,
        "PHASE"       = 5,
        "env_var&link" = 0,
        "dev_link"    = 0,
        "dev_minyr"   = 0,
        "dev_maxyr"   = 0,
        "dev_PH"      = 0,
        "Block"       = 0,
        "Block_Fxn"   = 0)
ctl1$MG_parms[6,]<-MG_parms6
##-----
MG_parms7<-data.frame(row.names="Wtlen_1_Fem_GP_1",
        "LO"          = -3.0,
        "HI"          = 3.0,
        "INIT"        = 0.00563,
        "PRIOR"       = 0.00563,
        "PR_SD"       = 99,
        "PR_type"     = 0,
        "PHASE"       = -50,

```



```

        "env_var&link" = 0,
        "dev_link"     = 0,
        "dev_minyr"    = 0,
        "dev_maxyr"    = 0,
        "dev_PH"       = 0,
        "Block"        = 0,
        "Block_Fxn"    = 0)
ctl1$MG_parms[7,]<-MG_parms7
##-----
MG_parms8<-data.frame(row.names="Wtlen_2_Fem_GP_1",
        "LO"          = -3.0,
        "HI"          = 3.0,
        "INIT"        = 3.1591,
        "PRIOR"       = 3.1591,
        "PR_SD"       = 99,
        "PR_type"     = 0,
        "PHASE"       = -50,
        "env_var&link" = 0,
        "dev_link"     = 0,
        "dev_minyr"    = 0,
        "dev_maxyr"    = 0,
        "dev_PH"       = 0,
        "Block"        = 0,
        "Block_Fxn"    = 0)
ctl1$MG_parms[8,]<-MG_parms8
##-----
MG_parms9<-data.frame(row.names="Wtlen_2_Fem_GP_1",
        "LO"          = -3.0,
        "HI"          = 3.0,
        "INIT"        = 3.1591,
        "PRIOR"       = 3.1591,
        "PR_SD"       = 99,
        "PR_type"     = 0,
        "PHASE"       = -50,
        "env_var&link" = 0,
        "dev_link"     = 0,
        "dev_minyr"    = 0,
        "dev_maxyr"    = 0,
        "dev_PH"       = 0,
        "Block"        = 0,
        "Block_Fxn"    = 0)
ctl1$MG_parms[9,]<-MG_parms9
##-----
MG_parms10<-data.frame(row.names="Mat_slope_Fem_GP_1",
        "LO"          = -3.0,
        "HI"          = 3.0,
        "INIT"        = -0.45,
        "PRIOR"       = -0.45,
        "PR_SD"       = 99,
        "PR_type"     = 0,
        "PHASE"       = -50,
        "env_var&link" = 0,
        "dev_link"     = 0,

```

```

        "dev_minyr"      = 0,
        "dev_maxyr"      = 0,
        "dev_PH"         = 0,
        "Block"          = 0,
        "Block_Fxn"      = 0)
ctl1$MG_parms[10,]<-MG_parms10
##-----
MG_parms11<-data.frame(row.names="Eggs/kg_inter_Fem_GP_1",
        "LO"             = -3.0,
        "HI"             = 3.0,
        "INIT"           = 1,
        "PRIOR"          = 1,
        "PR_SD"          = 99,
        "PR_type"        = 0,
        "PHASE"          = -50,
        "env_var&link"    = 0,
        "dev_link"       = 0,
        "dev_minyr"      = 0,
        "dev_maxyr"      = 0,
        "dev_PH"         = 0,
        "Block"          = 0,
        "Block_Fxn"      = 0)
ctl1$MG_parms[11,]<-MG_parms11
##-----
MG_parms12<-data.frame(row.names="Eggs/kg_slope_wt_Fem_GP_1",
        "LO"             = -3.0,
        "HI"             = 3.0,
        "INIT"           = 1,
        "PRIOR"          = 1,
        "PR_SD"          = 99,
        "PR_type"        = 0,
        "PHASE"          = -50,
        "env_var&link"    = 0,
        "dev_link"       = 0,
        "dev_minyr"      = 0,
        "dev_maxyr"      = 0,
        "dev_PH"         = 0,
        "Block"          = 0,
        "Block_Fxn"      = 0)
ctl1$MG_parms[12,]<-MG_parms12
##-----
MG_parms13<-data.frame(row.names="RecrDist_GP_1_area_1_month_1",
        "LO"             = 0,
        "HI"             = 10,
        "INIT"           = 1,
        "PRIOR"          = 1,
        "PR_SD"          = 99,
        "PR_type"        = 0,
        "PHASE"          = -3,
        "env_var&link"    = 0,
        "dev_link"       = 0,
        "dev_minyr"      = 0,
        "dev_maxyr"      = 0,

```

```

        "dev_PH"      = 0,
        "Block"       = 0,
        "Block_Fxn"   = 0)
ctl1$MG_parms[13,]<-MG_parms13
##-----
MG_parms14<-data.frame(row.names="CohortGrowDev",
        "LO"          = 1,
        "HI"          = 1,
        "INIT"        = 1,
        "PRIOR"       = 1,
        "PR_SD"       = 99,
        "PR_type"     = 0,
        "PHASE"       = -1,
        "env_var&link" = 0,
        "dev_link"    = 0,
        "dev_minyr"   = 0,
        "dev_maxyr"   = 0,
        "dev_PH"      = 0,
        "Block"       = 0,
        "Block_Fxn"   = 0)
ctl1$MG_parms[14,]<-MG_parms14
##-----
MG_parms15<-data.frame(row.names="FracFemale_GP_1",
        "LO"          = 0.000001,
        "HI"          = 0.999999,
        "INIT"        = 0.5,
        "PRIOR"       = 0.5,
        "PR_SD"       = 0.5,
        "PR_type"     = 0,
        "PHASE"       = -99,
        "env_var&link" = 0,
        "dev_link"    = 0,
        "dev_minyr"   = 0,
        "dev_maxyr"   = 0,
        "dev_PH"      = 0,
        "Block"       = 0,
        "Block_Fxn"   = 0)
ctl1$MG_parms[15,]<-MG_parms15
##-----

```

### 3.10.1.0.1 Mortalidad natural Fem GP\_\_1

#### 3.10.1.0.2 seasonal\_effects\_on\_biology\_parms

```

MGparm_seas_effects1<-data.frame(matrix(rep(0,10),nrow=1,ncol=10))
colnames(MGparm_seas_effects1)<-paste("MGparm_seas_effects_",seq(1,10,1),sep="")

ctl1$MGparm_seas_effects<-MGparm_seas_effects1

```

### 3.11 Relación stock recluta

- SR\_function: 1=NA;2=Ricker;3=std\_B-H;4=SCAA;5=Hockey; 6=B-H\_flattop; 7=survival\_3Parm; 8=Shepherd\_3Parm; 9=RickerPower\_3parm
- Use\_steep\_init\_equi: 0/1 to use steepness in initial equ recruitment calculation
- ctl1\$Sigma\_R\_FofCurvature: future feature: 0/1 to make realized sigmaR a function of SR curvature

```
##-----
ctl1$SR_function      <- 4 #SCAA
ctl1$Use_steep_init_equi <- 0
ctl1$Sigma_R_FofCurvature <- 0
##-----
SR_parms1<-data.frame(row.names="SR_LN(R0)",
                      "LO"      = 5,
                      "HI"      = 20,
                      "INIT"     = 13,
                      "PRIOR"    = 0,
                      "PR_SD"    = 0,
                      "PR_type"  = 0,
                      "PHASE"    = 1,
                      "env_var&link" = 0,
                      "dev_link" = 0,
                      "dev_minyr" = 0,
                      "dev_maxyr" = 0,
                      "dev_PH"   = 0,
                      "Block"    = 0,
                      "Block_Fxn" = 0)

ctl1$SR_parms[1,]<-SR_parms1
##-----
SR_parms2<-data.frame(row.names="SR_SCAA_null",
                      "LO"      = 0.2,
                      "HI"      = 1,
                      "INIT"     = 0.88,
                      "PRIOR"    = 0.777,
                      "PR_SD"    = 0.113,
                      "PR_type"  = 2,
                      "PHASE"    = -4,
                      "env_var&link" = 0,
                      "dev_link" = 0,
                      "dev_minyr" = 0,
                      "dev_maxyr" = 0,
                      "dev_PH"   = 0,
                      "Block"    = 0,
                      "Block_Fxn" = 0)

ctl1$SR_parms[2,]<-SR_parms2
##-----
SR_parms3<-data.frame(row.names="SR_sigmaR",
                      "LO"      = 0.3,
                      "HI"      = 1.6,
                      "INIT"     = 0.6,
                      "PRIOR"    = 1.1,
                      "PR_SD"    = 99,
                      "PR_type"  = 0,
                      "PHASE"    = -6,
                      "env_var&link" = 0,
```

```

        "dev_link"      = 0,
        "dev_minyr"     = 0,
        "dev_maxyr"     = 0,
        "dev_PH"        = 0,
        "Block"         = 0,
        "Block_Fxn"     = 0)
ct11$SR_parms[3,] <-SR_parms3
##-----
SR_parms4<-data.frame(row.names="SR_regime",
        "LO"           = -5,
        "HI"           = 5,
        "INIT"         = 0,
        "PRIOR"        = 0,
        "PR_SD"        = 99,
        "PR_type"      = 0,
        "PHASE"        = -50,
        "env_var&link" = 0,
        "dev_link"     = 0,
        "dev_minyr"    = 0,
        "dev_maxyr"    = 0,
        "dev_PH"       = 0,
        "Block"        = 0,
        "Block_Fxn"    = 0)
ct11$SR_parms[4,] <-SR_parms4
##-----
SR_parms5<-data.frame(row.names="SR_autocorr",
        "LO"           = 0,
        "HI"           = 2,
        "INIT"         = 0,
        "PRIOR"        = 1,
        "PR_SD"        = 99,
        "PR_type"      = 0,
        "PHASE"        = -50,
        "env_var&link" = 0,
        "dev_link"     = 0,
        "dev_minyr"    = 0,
        "dev_maxyr"    = 0,
        "dev_PH"       = 0,
        "Block"        = 0,
        "Block_Fxn"    = 0)
ct11$SR_parms[5,] <- SR_parms5

ct11$SR_parms
##          LO    HI  INIT PRIOR  PR_SD PR_type PHASE env_var&link dev_link
## SR_LN(R0)   5.0 20.0 13.00 0.000  0.000      0     1          0         0
## SR_SCAA_null 0.2  1.0  0.88 0.777  0.113      2    -4          0         0
## SR_sigmaR   0.3  1.6  0.60 1.100 99.000      0    -6          0         0
## SR_regime  -5.0  5.0  0.00 0.000 99.000      0   -50          0         0
## SR_autocorr  0.0  2.0  0.00 1.000 99.000      0   -50          0         0
##          dev_minyr dev_maxyr dev_PH Block Block_Fxn PType
## SR_LN(R0)          0          0      0      0          0  5.0
## SR_SCAA_null        0          0      0      0          0  0.2
## SR_sigmaR           0          0      0      0          0  0.3

```

<b>## SR_regime</b>	0	0	0	0	0	-5.0
<b>## SR_autocorr</b>	0	0	0	0	0	0.0

### 3.12 Desvíos de los reclutamientos y sesgo

- **do\_recdev:** 0=none; 1=devvector ( $R=F(SSB)+dev$ ); 2=deviations ( $R=F(SSB)+dev$ ); 3=deviations ( $R=R0*dev$ ;  $dev2=R-f(SSB)$ ); 4=like 3 with  $sum(dev2)$  adding penalty
- **MainRdevYrFirst:** first year of main recr\_devs;early devs can preceed this era
- **MainRdevYrLast:** last year of main recr\_devs; forecast devs start in following year
- **recdev\_phase:**
- **recdev\_adv:** (0/1) to read 13 advanced options
- **recdev\_early\_start:** (0=none; neg value makes relative to recdev\_start)
- **recdev\_early\_phase:**
- **Fcast\_rec\_r\_phase:** (incl. late recr) (0 value resets to maxphase+1)
- **lambda4Fcast\_recr\_like:** lambda for Fcast\_recr\_like occurring before endyr+1
- **last\_early\_yr\_nobias\_adj:** last\_yr\_nobias\_adj\_in\_MPD; begin of ramp
- **first\_yr\_fullbias\_adj:** first\_yr\_fullbias\_adj\_in\_MPD; begin of plateau
- **last\_yr\_fullbias\_adj:** last\_yr\_fullbias\_adj\_in\_MPD
- **first\_recent\_yr\_nobias\_adj:** end\_yr\_for\_ramp\_in\_MPD (can be in forecast to shape ramp, but SS3 sets bias\_adj to 0.0 for fcast yrs)
- **max\_bias\_adj:** max\_bias\_adj\_in\_MPD; (typical ~0.8; -3 sets all years to 0.0; -2 sets all non-forecast yrs w/ estimated recdevs to 1.0; -1 sets biasadj=1.0 for all yrs w/ recdevs).
- **period\_of\_cycles\_in\_rec\_r:** period of cycles in recruitment (N parms read below)
- **min\_rec\_dev:**
- **max\_rec\_dev:**
- **N\_Read\_recdevs:**

```

ctl1$do_recdev <- 1
ctl1$MainRdevYrFirst <- 1989
ctl1$MainRdevYrLast <- 2021
ctl1$recdev_phase <- 1
ctl1$recdev_adv <- 0
ctl1$recdev_early_start <- NULL
ctl1$recdev_early_phase <- NULL
ctl1$Fcast_rec_r_phase <- NULL
ctl1$lambda4Fcast_recr_like <- NULL
ctl1$last_early_yr_nobias_adj <- NULL
ctl1$first_yr_fullbias_adj <- NULL
ctl1$last_yr_fullbias_adj <- NULL
ctl1$first_recent_yr_nobias_adj <- NULL
ctl1$max_bias_adj <- NULL
ctl1$period_of_cycles_in_rec_r <- NULL
ctl1$min_rec_dev <- NULL
ctl1$max_rec_dev <- NULL
ctl1$N_Read_recdevs <- NULL

```

### 3.13 Mortalidad por pesca

- `F_ballpark`: F ballpark value in units of annual `F`
- `F_ballpark_year`: F ballpark year (neg value to disable)
- `F_Method`: 1=Pope midseason rate; 2=F as parameter; 3=F as hybrid; 4=fleet-specific parm/hybrid (#4 is superset of #2 and #3 and is recommended)
- `maxF`: max F (methods 2-4) or harvest fraction (method 1)
- `F_iter`: N iterations for tuning in hybrid mode; recommend 3 (faster) to 5 (more precise if many fleets)

```
#-----
ctl1$F_ballpark      <- 0.1
ctl1$F_ballpark_year <- -1989
ctl1$F_Method        <- 3
ctl1$maxF            <- 4
ctl1$F_iter          <- 3
#-----
```

### 3.14 Capturabilidad

#### 3.14.1 Opciones de capturabilidad por flota (CPUE o CAMPAÑAS)

- `fleet`: number
- `link_type`: (1=simple q, 1 parm; 2=mirror simple q, 1 mirrored parm; 3=q and power, 2 parm; 4=mirror with offset, 2 parm)
- `link_info`: extra input for link, i.e. mirror fleet# or dev index number
- `extra_se`: 0/1 to select extra sd parameter
- `biasadj`: 0/1 for biasadj or not
- `float`: 0/1 to float

```
#-----
Q_options1<-data.frame(row.names="PELAGO",
                        "fleet"      = 2,
                        "link"       = 1,
                        "link_info"  = 0,
                        "extra_se"   = 0,
                        "biasadj"    = 0,
                        "float"      = 0)
ctl1$Q_options[1,]<-Q_options1
#-----
Q_options2<-data.frame(row.names="ECOCADIZ",
                        "fleet"      = 3,
                        "link"       = 1,
                        "link_info"  = 0,
                        "extra_se"   = 0,
                        "biasadj"    = 0,
                        "float"      = 0)
ctl1$Q_options[2,]<-Q_options2
#-----
```

#### 3.14.2 Parámetros

```
#-----
Q_parms1<-data.frame(row.names="LnQ_base_PELAGO(2)",
                      "LO"         = -30,
                      "HI"         = 15,
                      "INIT"       = -0.158817,
#-----
```

```

        "PRIOR"          = 0,
        "PR_SD"          = 1,
        "PR_type"        = 0,
        "PHASE"          = 1,
        "env_var&link"    = 0,
        "dev_link"       = 0,
        "dev_minyr"      = 0,
        "dev_maxyr"      = 0,
        "dev_PH"         = 0,
        "Block"          = 0,
        "Block_Fxn"      = 0)
ctl1$Q_parms[1,]<-Q_parms1
#-----
Q_parms2<-data.frame(row.names="LnQ_base_ECOCADIZ(3)",
        "LO"            = -30,
        "HI"            = 15,
        "INIT"          = 0.08918,
        "PRIOR"          = 0,
        "PR_SD"          = 1,
        "PR_type"        = 0,
        "PHASE"          = 1,
        "env_var&link"    = 0,
        "dev_link"       = 0,
        "dev_minyr"      = 0,
        "dev_maxyr"      = 0,
        "dev_PH"         = 0,
        "Block"          = 0,
        "Block_Fxn"      = 0)
ctl1$Q_parms[2,]<-Q_parms2
#-----

```

## 3.15 Selectividad

### 3.15.1 tipos de selectividad a la talla

- Pattern:\_0; parm=0; selex=1.0 for all sizes
- Pattern:\_1; parm=2; logistic; with 95% width specification
- Pattern:\_5; parm=2; mirror another size selex; PARMS pick the min-max bin to mirror
- Pattern:\_11; parm=2; selex=1.0 for specified min-max population length bin range
- Pattern:\_15; parm=0; mirror another age or length selex
- Pattern:\_6; parm=2+special; non-parm len selex
- Pattern:\_43; parm=2+special+2; like 6, with 2 additional param for scaling (average over bin range)
- Pattern:\_8; parm=8; double\_logistic with smooth transitions and constant above Linf option
- Pattern:\_9; parm=6; simple 4-param double logistic with starting length; parm 5 is first length; parm 6=1 does desc as offset
- Pattern:\_21; parm=2+special; non-parm len selex, read as pairs of size, then selex
- Pattern:\_22; parm=4; double\_normal as in CASAL
- Pattern:\_23; parm=6; double\_normal where final value is directly equal to sp(6) so can be >1.0
- Pattern:\_24; parm=6; double\_normal with sel(minL) and sel(maxL), using joiners
- Pattern:\_2; parm=6; double\_normal with sel(minL) and sel(maxL), using joiners,back compatible version of 24 with 3.30.18 and older
- Pattern:\_25; parm=3; exponential-logistic in length
- Pattern:\_27; parm=special+3;cubic spline in length;parm1==1 resets knots;parm1==2 resets all
- Pattern:\_42; parm=special+3+2;cubic spline;like 27, with 2 additional param for scaling (average over



- bin range)
- discard\_options: \_0=none; \_1=define\_retention; \_2=retention&mortality; \_3=all\_discarded\_dead; \_4=define\_dome-shaped\_retention

```
#-----
size_selex_types1<-data.frame(row.names="Fishery",
                             "Pattern" = 1,
                             "Discard" = 0,
                             "Male"    = 0,
                             "Special" = 0)
ctl1$size_selex_types[1,]<-size_selex_types1
#-----
size_selex_types2<-data.frame(row.names="PELAGO",
                             "Pattern" = 1,
                             "Discard" = 0,
                             "Male"    = 0,
                             "Special" = 0)
ctl1$size_selex_types[2,]<-size_selex_types2
#-----
size_selex_types3<-data.frame(row.names="ECOCADIZ",
                             "Pattern" = 1,
                             "Discard" = 0,
                             "Male"    = 0,
                             "Special" = 0)
ctl1$size_selex_types[3,]<-size_selex_types3
#-----
```

### 3.15.2 tipos de selectividad a la edad

- Pattern: \_0; parm=0; selex=1.0 for ages 0 to maxage
- Pattern: \_10; parm=0; selex=1.0 for ages 1 to maxage
- Pattern: \_11; parm=2; selex=1.0 for specified min-max age
- Pattern: \_12; parm=2; age logistic
- Pattern: \_13; parm=8; age double logistic. Recommend using pattern 18 instead.
- Pattern: \_14; parm=nages+1; age empirical
- Pattern: \_15; parm=0; mirror another age or length selex
- Pattern: \_16; parm=2; Coleraine - Gaussian
- Pattern: \_17; parm=nages+1; empirical as random walk N parameters to read can be overridden by setting special to non-zero
- Pattern: \_41; parm=2+nages+1; // like 17, with 2 additional param for scaling (average over bin range)
- Pattern: \_18; parm=8; double logistic - smooth transition
- Pattern: \_19; parm=6; simple 4-param double logistic with starting age
- Pattern: \_20; parm=6; double\_normal,using joiners
- Pattern: \_26; parm=3; exponential-logistic in age
- Pattern: \_27; parm=3+special; cubic spline in age; parm1==1 resets knots; parm1==2 resets all
- Pattern: \_42; parm=2+special+3; // cubic spline; with 2 additional param for scaling (average over bin range)
- Age patterns entered with value >100 create Min\_selage from first digit and pattern from remainder

```
#-----
age_selex_types1<-data.frame(row.names="Fishery",
                             Pattern = 12,
                             Discard = 0,
                             Male    = 0,
```

```

                                Special = 0)
ctl1$age_selex_types[1,]<-age_selex_types1
#-----
age_selex_types2<-data.frame(row.names="PELAGO",
                                Pattern = 12,
                                Discard = 0,
                                Male    = 0,
                                Special = 0)
ctl1$age_selex_types[2,]<-age_selex_types2
#-----
age_selex_types3<-data.frame(row.names="ECOCADIZ",
                                Pattern = 12,
                                Discard = 0,
                                Male    = 0,
                                Special = 0)
ctl1$age_selex_types[3,]<-age_selex_types3
#-----

```

### 3.15.3 parametros de selectividad a la talla

```

#-----
size_selex_parms1<-data.frame(row.names="SizeSel_P_1_Fishery(1)",
                                "LO"      = -1,
                                "HI"      = 20,
                                "INIT"    = 12,
                                "PRIOR"   = 0,
                                "PR_SD"   = 0,
                                "PR_type" = 0,
                                "PHASE"   = 2,
                                "env_var&link" = 0,
                                "dev_link" = 0,
                                "dev_minyr" = 0,
                                "dev_maxyr" = 0,
                                "dev_PH"   = 0.5,
                                "Block"    = 0,
                                "Block_Fxn" = 0)
ctl1$size_selex_parms[1,]<-size_selex_parms1
#-----
size_selex_parms2<-data.frame(row.names="SizeSel_P_1_Fishery(1)",
                                "LO"      = -1,
                                "HI"      = 20,
                                "INIT"    = 18,
                                "PRIOR"   = 0,
                                "PR_SD"   = 0,
                                "PR_type" = 0,
                                "PHASE"   = 2,
                                "env_var&link" = 0,
                                "dev_link" = 0,
                                "dev_minyr" = 0,
                                "dev_maxyr" = 0,
                                "dev_PH"   = 0.5,
                                "Block"    = 0,
                                "Block_Fxn" = 0)

```

```

ctl1$size_selex_parms[2,]<-size_selex_parms2
#-----
size_selex_parms3<-data.frame(row.names="SizeSel_P_1_PELAGO(2)",
                              "LO"          = -3,
                              "HI"          = 8,
                              "INIT"        = 6,
                              "PRIOR"       = 0,
                              "PR_SD"       = 0,
                              "PR_type"     = 0,
                              "PHASE"       = 3,
                              "env_var&link" = 0,
                              "dev_link"    = 0,
                              "dev_minyr"   = 0,
                              "dev_maxyr"   = 0,
                              "dev_PH"      = 0.5,
                              "Block"       = 0,
                              "Block_Fxn"   = 0)
ctl1$size_selex_parms[3,]<-size_selex_parms3
#-----
size_selex_parms4<-data.frame(row.names="SizeSel_P_2_PELAGO(2)",
                              "LO"          = -3,
                              "HI"          = 16,
                              "INIT"        = 10,
                              "PRIOR"       = 0,
                              "PR_SD"       = 0,
                              "PR_type"     = 0,
                              "PHASE"       = 3,
                              "env_var&link" = 0,
                              "dev_link"    = 0,
                              "dev_minyr"   = 0,
                              "dev_maxyr"   = 0,
                              "dev_PH"      = 0.5,
                              "Block"       = 0,
                              "Block_Fxn"   = 0)
ctl1$size_selex_parms[4,]<-size_selex_parms4
#-----
size_selex_parms5<-data.frame(row.names="SizeSel_P_1_ECOCADIZ(3)",
                              "LO"          = -1,
                              "HI"          = 10,
                              "INIT"        = 8,
                              "PRIOR"       = 0,
                              "PR_SD"       = 0,
                              "PR_type"     = 0,
                              "PHASE"       = 3,
                              "env_var&link" = 0,
                              "dev_link"    = 0,
                              "dev_minyr"   = 0,
                              "dev_maxyr"   = 0,
                              "dev_PH"      = 0.5,
                              "Block"       = 0,
                              "Block_Fxn"   = 0)
ctl1$size_selex_parms[5,]<-size_selex_parms5
#-----

```

```

size_selex_parms6<-data.frame(row.names="SizeSel_P_2_ECOCADIZ(3)",
                              "LO"           = -1,
                              "HI"           = 20.5,
                              "INIT"          = 15,
                              "PRIOR"         = 0,
                              "PR_SD"         = 0,
                              "PR_type"       = 0,
                              "PHASE"         = 3,
                              "env_var&link"  = 0,
                              "dev_link"      = 0,
                              "dev_minyr"     = 0,
                              "dev_maxyr"     = 0,
                              "dev_PH"        = 0.5,
                              "Block"         = 0,
                              "Block_Fxn"     = 0)
ctl1$size_selex_parms[6,]<-size_selex_parms6
#-----

```

#### 3.15.4 parametros de selectividad a la edad

```

#-----
age_selex_parms1<-data.frame(row.names="AgeSel_P_1_Fishery(1)",
                              "LO"           = -2.0,
                              "HI"           = 5.50,
                              "INIT"          = 0.10,
                              "PRIOR"         = 0,
                              "PR_SD"         = 0.01,
                              "PR_type"       = 0,
                              "PHASE"         = -1,
                              "env_var&link"  = 0,
                              "dev_link"      = 0,
                              "dev_minyr"     = 0,
                              "dev_maxyr"     = 0,
                              "dev_PH"        = 0.5,
                              "Block"         = 0,
                              "Block_Fxn"     = 0)
ctl1$age_selex_parms[1,]<-age_selex_parms1
#-----
age_selex_parms2<-data.frame(row.names="AgeSel_P_2_Fishery(1)",
                              "LO"           = -1.0,
                              "HI"           = 5.50,
                              "INIT"          = 5.0,
                              "PRIOR"         = 0,
                              "PR_SD"         = 0.01,
                              "PR_type"       = 0,
                              "PHASE"         = -1,
                              "env_var&link"  = 0,
                              "dev_link"      = 0,
                              "dev_minyr"     = 0,
                              "dev_maxyr"     = 0,
                              "dev_PH"        = 0.5,
                              "Block"         = 0,
                              "Block_Fxn"     = 0)

```

```

ctl1$age_selex_parms[2,]<-age_selex_parms2
#-----
age_selex_parms3<-data.frame(row.names="AgeSel_P_1_PELAGO(2)",
                             "LO"          = -2.0,
                             "HI"          = 5.50,
                             "INIT"        = 0.10,
                             "PRIOR"       = 0,
                             "PR_SD"      = 0.01,
                             "PR_type"     = 0,
                             "PHASE"      = -1,
                             "env_var&link" = 0,
                             "dev_link"    = 0,
                             "dev_minyr"   = 0,
                             "dev_maxyr"   = 0,
                             "dev_PH"      = 0.5,
                             "Block"       = 0,
                             "Block_Fxn"   = 0)
ctl1$age_selex_parms[3,]<-age_selex_parms3
#-----
age_selex_parms4<-data.frame(row.names="AgeSel_P_2_PELAGO(2)",
                             "LO"          = -1.0,
                             "HI"          = 5.50,
                             "INIT"        = 5.00,
                             "PRIOR"       = 0,
                             "PR_SD"      = 0.01,
                             "PR_type"     = 0,
                             "PHASE"      = -1,
                             "env_var&link" = 0,
                             "dev_link"    = 0,
                             "dev_minyr"   = 0,
                             "dev_maxyr"   = 0,
                             "dev_PH"      = 0.5,
                             "Block"       = 0,
                             "Block_Fxn"   = 0)
ctl1$age_selex_parms[4,]<-age_selex_parms4
#-----
age_selex_parms5<-data.frame(row.names="AgeSel_P_1_ECOCADIZ(3)",
                             "LO"          = -2.0,
                             "HI"          = 5.50,
                             "INIT"        = 0.10,
                             "PRIOR"       = 0,
                             "PR_SD"      = 0.01,
                             "PR_type"     = 0,
                             "PHASE"      = -1,
                             "env_var&link" = 0,
                             "dev_link"    = 0,
                             "dev_minyr"   = 0,
                             "dev_maxyr"   = 0,
                             "dev_PH"      = 0.5,
                             "Block"       = 0,
                             "Block_Fxn"   = 0)
ctl1$age_selex_parms[5,]<-age_selex_parms5
#-----

```

```

age_selex_parms6<-data.frame(row.names="AgeSel_P_2_ECOCADIZ(3)",
                             "LO"          = -1.0,
                             "HI"          = 5.50,
                             "INIT"        = 5.00,
                             "PRIOR"       = 0,
                             "PR_SD"       = 0.01,
                             "PR_type"     = 0,
                             "PHASE"       = -1,
                             "env_var&link" = 0,
                             "dev_link"    = 0,
                             "dev_minyr"   = 0,
                             "dev_maxyr"   = 0,
                             "dev_PH"      = 0.5,
                             "Block"       = 0,
                             "Block_Fxn"   = 0)
ctl1$age_selex_parms[6,]<-age_selex_parms6
#-----

```

### 3.15.5 otros parámetros

- Use\_2D\_AR1\_selectivity: use 2D\_AR1 selectivity(0/1)
- TG\_custom: 0=no read and autogen if tag data exist; 1=read
- DoVar\_adjust: 1= add\_to\_survey\_CV; 2=add\_to\_discard\_stddev; 3=add\_to\_bodywt\_CV; 4=mult\_by\_lencomp\_N; 5=mult\_by\_agecomp\_N; 6=mult\_by\_size-at-age\_N; 7=mult\_by\_generalized\_sizecomp
- Variance\_adjustment\_list:
- maxlambdaphase:
- sd\_offset: must be 1 if any growthCV, sigmaR, or survey extraSD is an estimated parameter
- maxlambdaphase:
- sd\_offset:
- lambdas:
- N\_lambdas:
- more\_stddev\_reporting:
- stddev\_reporting\_specs:
- stddev\_reporting\_selex:
- stddev\_reporting\_growth:
- stddev\_reporting\_N\_at\_A:

```

#-----
ctl1$Use_2D_AR1_selectivity<-0
ctl1$TG_custom<-0
ctl1$DoVar_adjust<-1
#-----
varadj1<-data.frame(row.names="Variance_adjustment_list1",
                    "Factor" = 4,
                    "Fleet"  = 1,
                    "Value"  = 0.0045)
ctl1$Variance_adjustment_list[1,]<-varadj1
#-----
varadj2<-data.frame(row.names="Variance_adjustment_list2",
                    "Factor" = 4,
                    "Fleet"  = 2,
                    "Value"  = 0.0051)
ctl1$Variance_adjustment_list[1,]<-varadj2
#-----

```

```

varadj3<-data.frame(row.names="Variance_adjustment_list3",
                    "Factor"  = 4,
                    "Fleet"   = 3,
                    "Value"    = 0.0047)
ctl1$Variance_adjustment_list[1,<-varadj3
#-----
ctl1$maxlambdaphase      <- 1
ctl1$sd_offset           <- 1
ctl1$lambdas             <- NULL
ctl1$N_lambdas           <- 0
ctl1$more_stddev_reporting <- 0
ctl1$stddev_reporting_specs <- NULL
ctl1$stddev_reporting_selex <- NULL
ctl1$stddev_reporting_growth <- NULL
ctl1$stddev_reporting_N_at_A <- NULL
#-----

```

### 3.15.6 Escribir archivo de control modificado con la función SS\_write para el enfoque de modelación SS3

```

#-----
r4ss::SS_writectl(ctl1,
                  outfile=here(dirname.mod,"control.ss"),
                  overwrite = TRUE)
#-----

```