FLife

WKLIFE Life History Relationships

19 agosto, 2017

FLife package

```
library(ggplot2)
library(FLife)
library(plyr)
library(reshape)
```

Life history parameters

```
data(wklife)
```

```
wklife
```

```
                       name           common          area    stock sex
1          Clupea harengus          Herring    Celtic Seas  her-nis   F
2      Pollachius pollachius          Pollack     North Sea pol-nsea   C
3               Molva molva             Ling        Widely lin-comb   C
4        Sebastes norvegicus        Rose fish      Northern  smn-con   C
5          Mullus surmuletus       Red mullet    Celtic Seas mut-comb   F
6        Scopthalmus maximus           Turbot     North Sea tur-nsea   F
7           Microstomus kitt      Lemon sole     North Sea lem-nsea   C
8  Lepidorhombus whiffiagonis           Megrim     North Sea meg-4a6a   C
9             Ammodytes spp.         Sandeels     North Sea  san-ns4   C
10     Pleuronectes platessa           Plaice    Celtic Seas ple-celt   F
11       Merlangius merlangus          Whiting    Celtic Seas  whg-7e-k   F
12   Melanogrammus aeglefinus          Haddock    Celtic Seas had-iris   C
13      Lophius piscatorius White anglerfish    Celtic Seas ang-78ab   C
14      Lophius piscatorius White anglerfish      North Sea ang-ivvi   C
15                 Nephrops        Shellfish Biscay-Iberia nep-2829   F
         a    b lmax  linf  l50 a50    t0     k
1  0.00480 3.20   NA  33.0 23.0  NA    NA 0.606
2  0.00760 3.07   NA  85.6 47.1  NA    NA 0.190
3  0.00360 3.11   NA 119.0 74.0 7.2    NA 0.140
4  0.01780 2.97   NA  50.2 40.3  NA  0.08 0.110
5  0.00570 3.24   NA  47.5 16.9  NA    NA 0.210
6  0.01490 3.08   NA  66.7 34.2 2.2  0.29 0.320
7  0.01230 2.97   NA  37.0 27.0  NA    NA 0.420
8  0.00220 3.34   NA  54.0 23.0 3.0    NA 0.120
9  0.00490 2.78   NA  24.0 12.0  NA    NA 1.000
10 0.01100 2.96   NA  48.0 22.9  NA    NA 0.230
11 0.01030 2.40   NA  38.0 28.0  NA -1.01 0.380
12 0.01130 2.96   NA  79.9   NA 2.0 -0.36 0.200
13 0.01980 2.90  133 105.6 73.0  NA -0.38 0.180
14 0.02970 2.84   NA 106.0 61.0  NA    NA 0.180
```
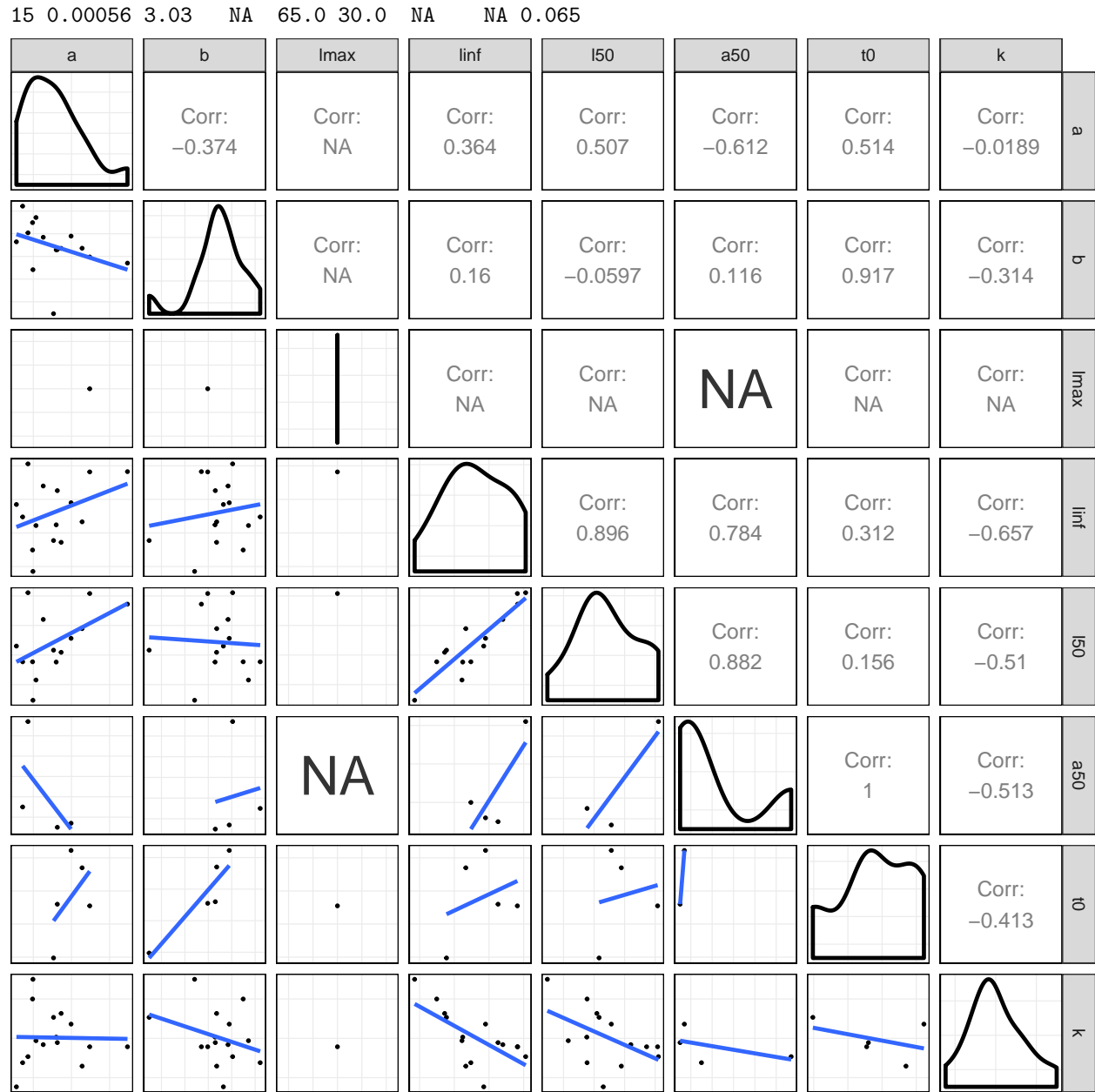
15 0.00056 3.03   NA 65.0 30.0 NA   NA 0.065

Figure 1 Pairwise scatter plots of life history parameters.

	a	b	lmax	linf	l50	a50	t0	k
a		Corr: −0.374	Corr: NA	Corr: 0.364	Corr: 0.507	Corr: −0.612	Corr: 0.514	Corr: −0.0189
b			Corr: NA	Corr: 0.16	Corr: −0.0597	Corr: 0.116	Corr: 0.917	Corr: −0.314
lmax				Corr: NA	Corr: NA	NA	Corr: NA	Corr: NA
linf					Corr: 0.896	Corr: 0.784	Corr: 0.312	Corr: −0.657
l50						Corr: 0.882	Corr: 0.156	Corr: −0.51
a50		NA					Corr: 1	Corr: −0.513
t0								Corr: −0.413
k								

Equilibrium Dynamics

Create an `FLPar`

```
wkpar=as(wklife[,6:13],"FLPar")
attributes(wkpar)[names(wklife)[1:5]]=wklife[,1:5]
```

Then use life history relationships to estimate missing values

```
par=lhPar(wkpar)
```

and then to derive vectors for processses such as natural mortality

```
library(FLBRP)

eql=lhEql(par)

ggplot(FLQuants(eql,"m","catch.sel","mat","catch.wt"))+
  geom_line(aes(age,data,col=attributes(wkpar)$name[iter]))+
  facet_wrap(~qname,scale="free")+
  scale_x_continuous(limits=c(0,15))+
  guides(colour=guide_legend(title="Species",title.position="top"))
```
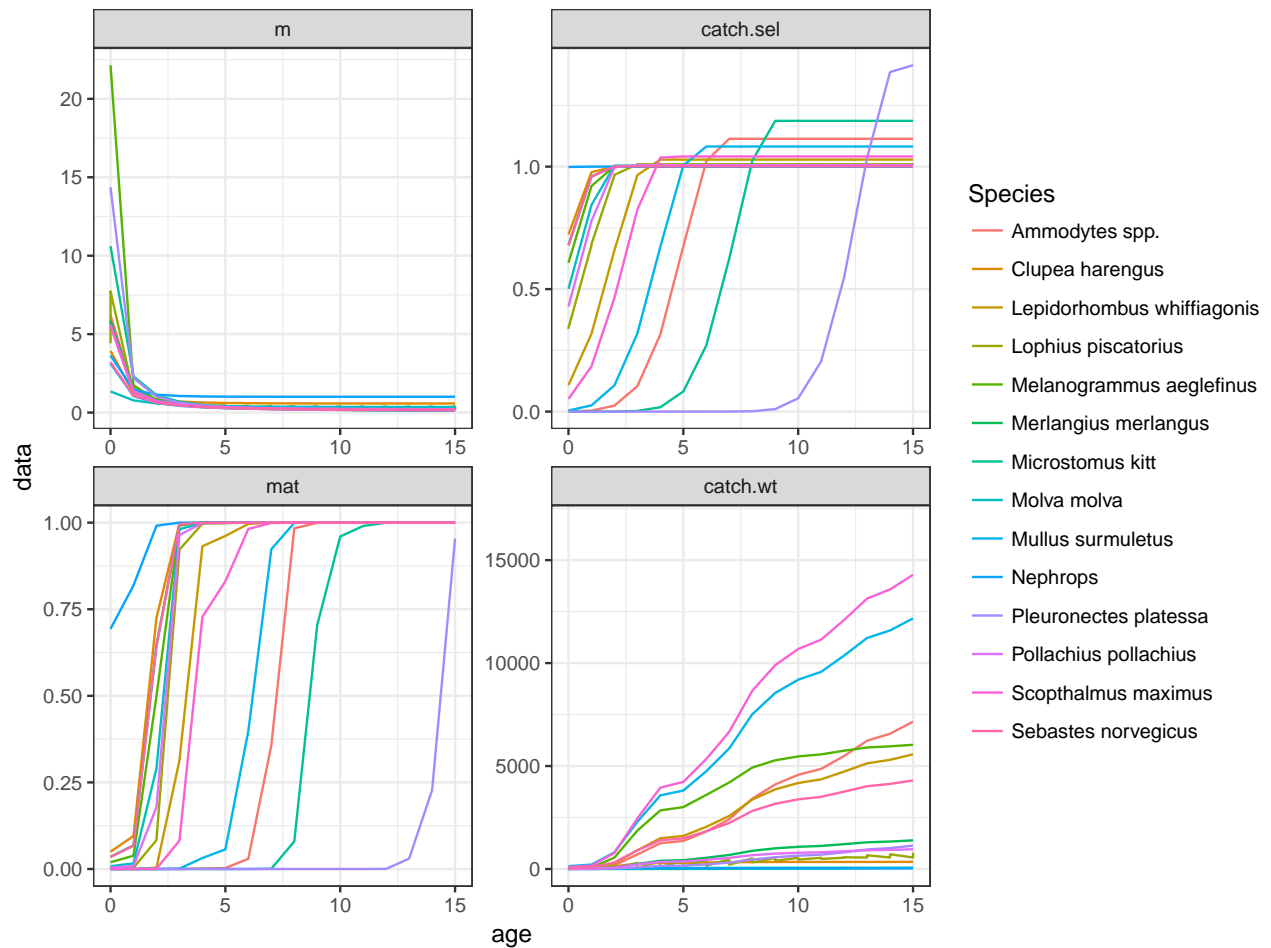

Figure 2 Vectors of m, selection pattern, maturity and weight-at-age.

and estimate equilibrium dynamics and reference points, e.g. for lemon sole
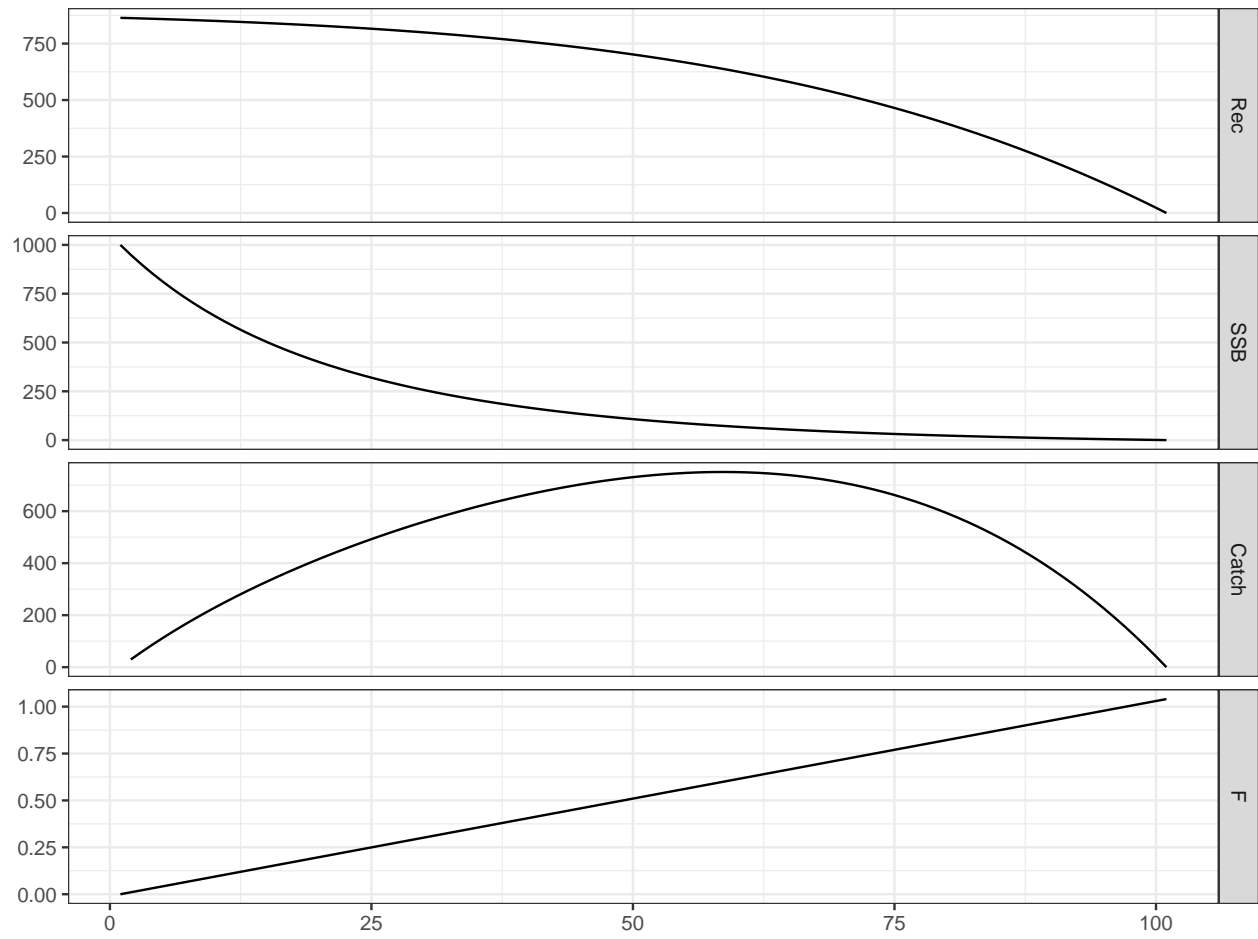
```
plot(iter(eql,7))
```
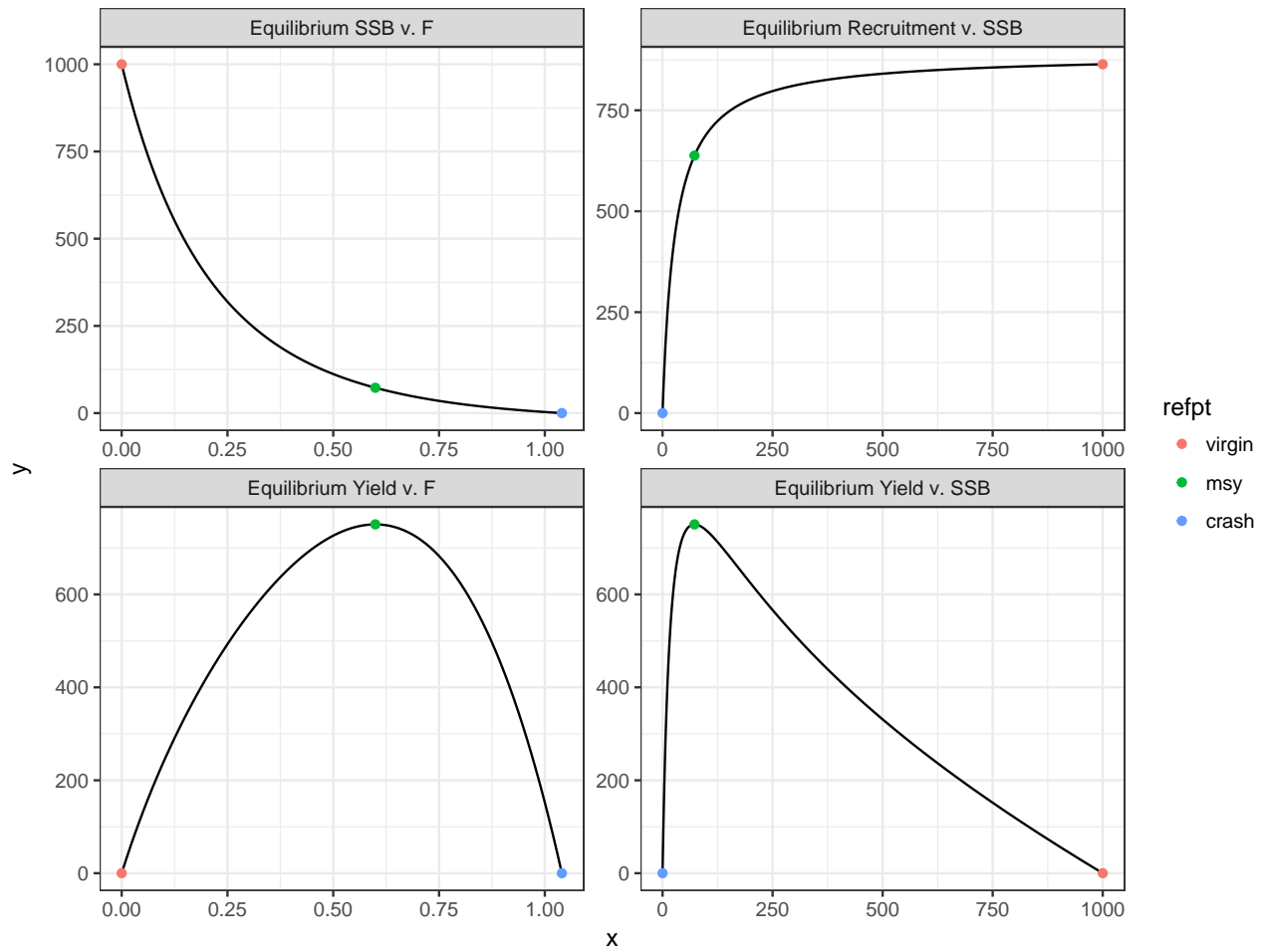
Figure 3 Equilibrium curves for lemon sole.

Simulation

Create a forward projection, i.e. an `FLStock` from an equilibrium object

```
lmsl=as(iter(eql,7),"FLStock")

plot(lmsl)
```

Figure 4 Simulate a stock with increasing F