Brill life-history parameters for MYAS project

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MYDAS

The MYDAS project https://github.com/laurieKell/mydas requires realistic life-history parameters for each of the case-study stocks. By default these are obtained from http://www.fishbase.org but the quality of these parameters is difficult to judge. For Pollack the MI has a reasonable amount of data available from surveys, observer trips and port sampling. Age data are available for the landings data for 2016 and 2017 and for a number of surveys.
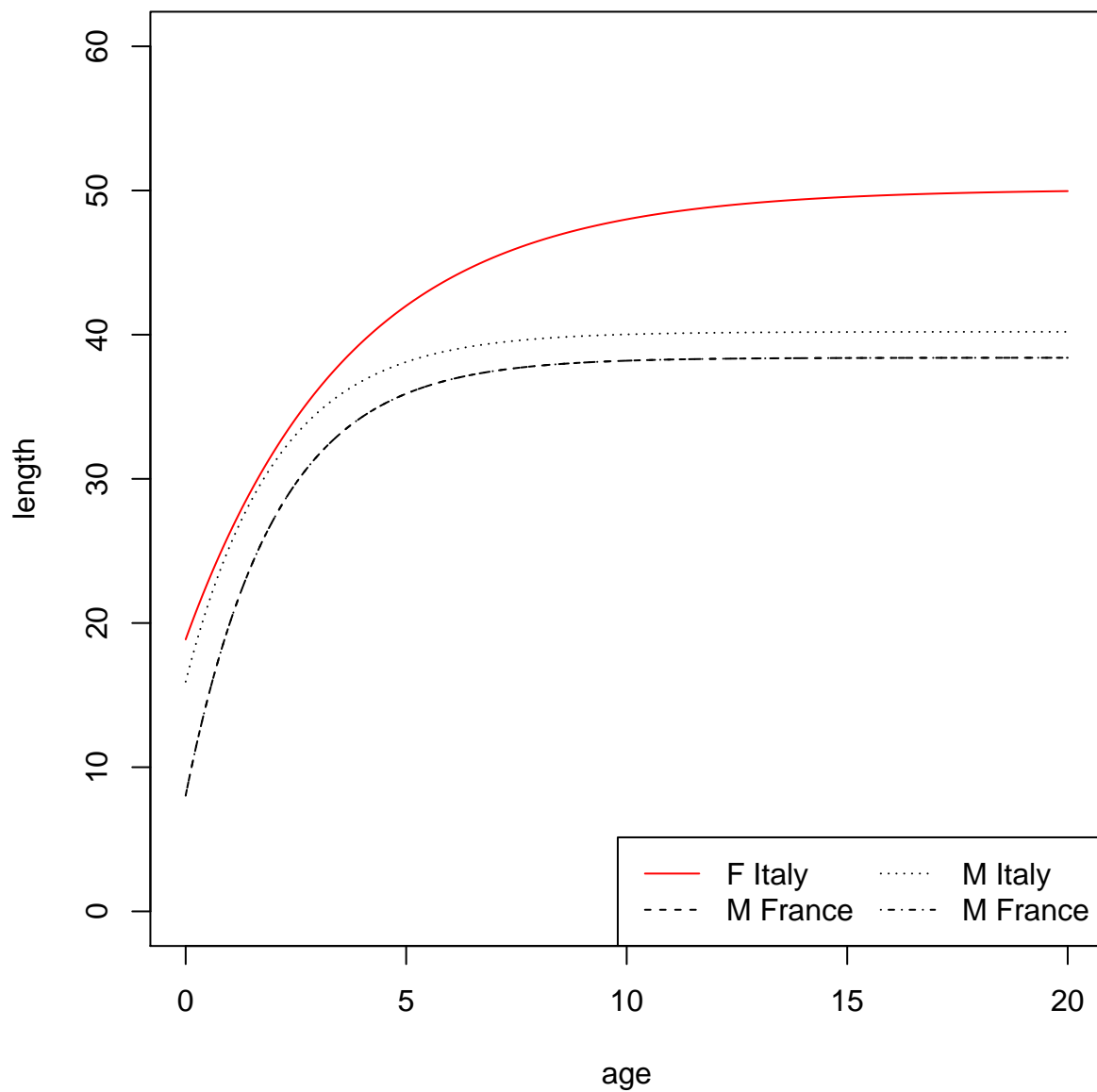
Data extraction

First load the required libraries

Fishbase

```
##     linf        k       t0        a       b     a50      l50
## 41.77500  0.44000 -0.93000  0.02225 2.92000     NaN 25.00000
```

Growth

The MI have no age data for turbot. The fishbase data are quite limited. Females seem to grow faster and longer, which is similar to other flatfish.
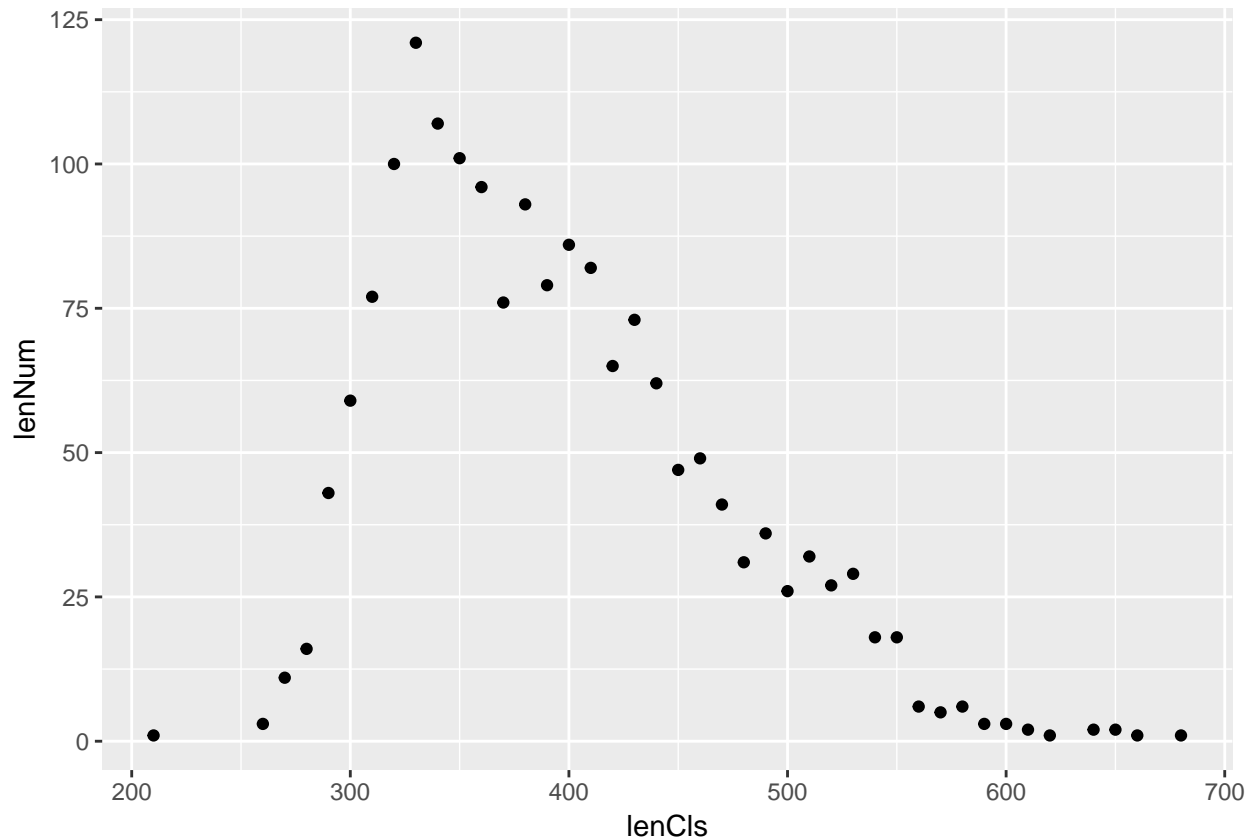
This looks as good as it gets. The mean growth parameters of the remaining data are: Linf = 41.8, k = 0.44 and t0 = -0.9.

If we want sex-specific growth parameters, the female means are: Linf = 50.1, k = 0.27 and t0 = -1.8.

And the males: Linf = 39.3, k = 0.5 and t0 = -0.8.

Length frequency of the landings

The largest fish is 68 cm. That can tell us something about Linf. If growth levels off in the older fish, you would expect the largest fish to be a couple of standard deviations above Linf, so you wouldnt expect Linf to be less than, say 50cm for females and 35 for males.


Biological data

The MI has no age data but quite a few observations of sex, maturity and individual weight:

```
## # A tibble: 13 x 7
## # Groups:    dataType [?]
##    dataType dataSource total  aged   sex   mat    wt
##    <fct>    <fct>      <int> <int> <int> <int> <int>
##  1 Survey   IAMS2016      15     0    15    15    15
##  2 Survey   IAMS2017       5     0     5     5     5
##  3 Survey   IBES2016       3     0     3     3     3
##  4 Survey   IBES2017       7     0     7     7     7
##  5 Survey   IGFS2009      45     0    42    45    45
##  6 Survey   IGFS2010      44     0    44    44    44
##  7 Survey   IGFS2011      39     0    39    39    39
##  8 Survey   IGFS2012      41     0    41    41    41
##  9 Survey   IGFS2013      48     0    48    48    48
## 10 Survey   IGFS2014      63     0    62    63    63
## 11 Survey   IGFS2015      70     0    70    70    70
## 12 Survey   IGFS2016      57     0    57    57    57
```

```
## 13 Survey   IGFS2017      27     0     27     27     27
```

Growth by sex

We have no age data but might be worth looking at sex to see if they grow/die at different rates
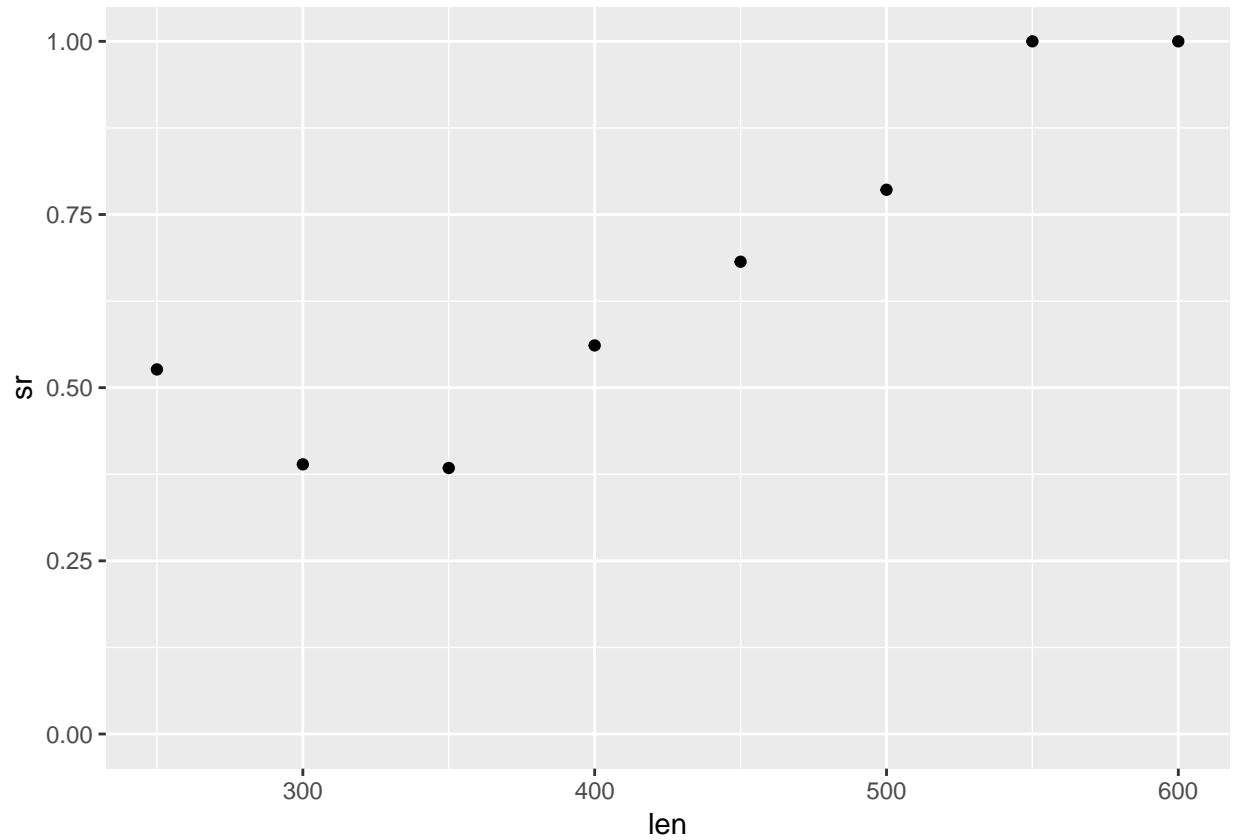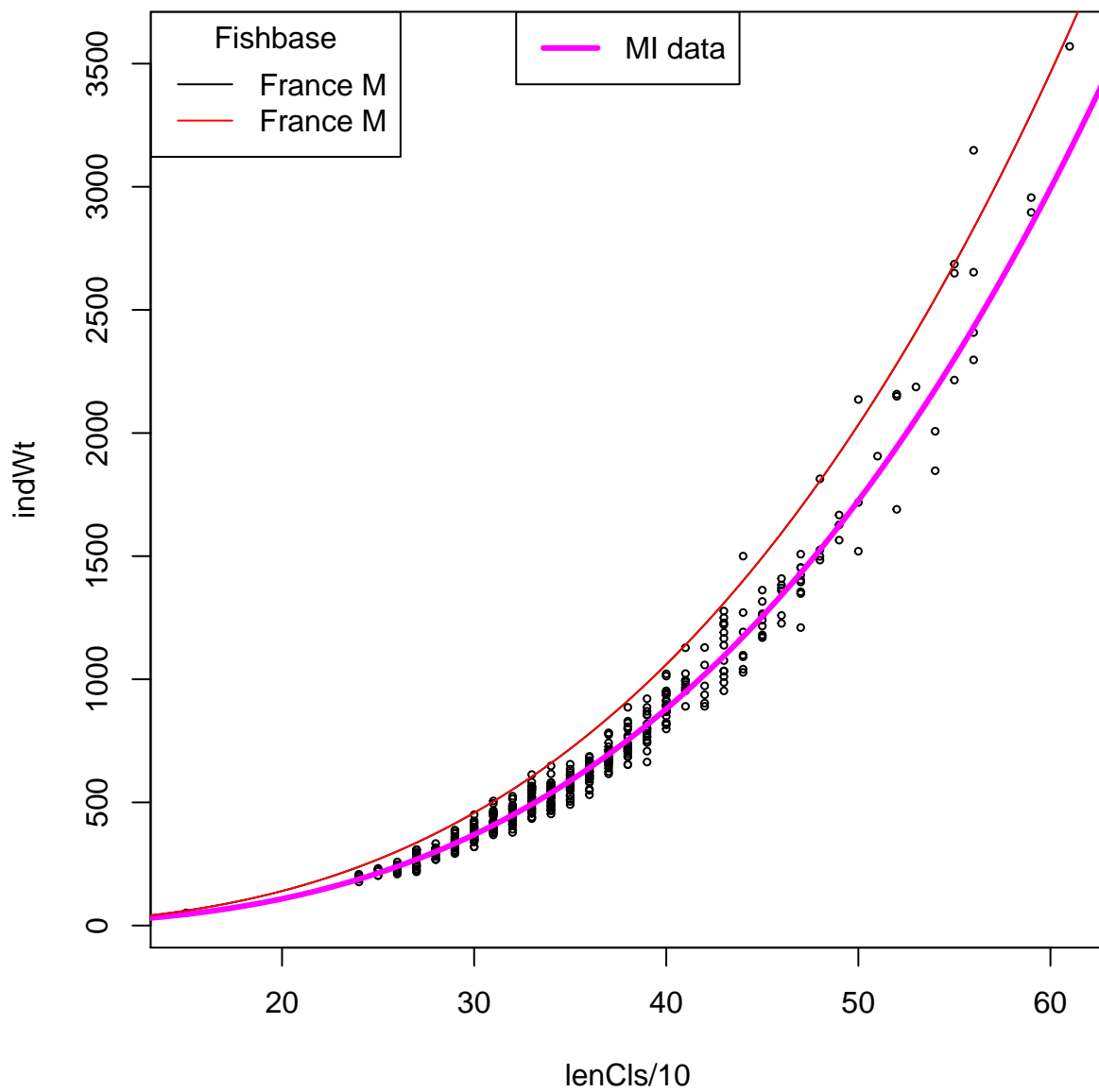

Yes. All large turbot are females, that means that either the males die before they get big or that they grow slower or stop growing sooner.

Length-weight

Fit a linear model

```
##
## Call:
## lm(formula = log(indWt) ~ log(lenCls/10))
##
## Coefficients:
##    (Intercept)  log(lenCls/10)
##         -4.359           3.019
```
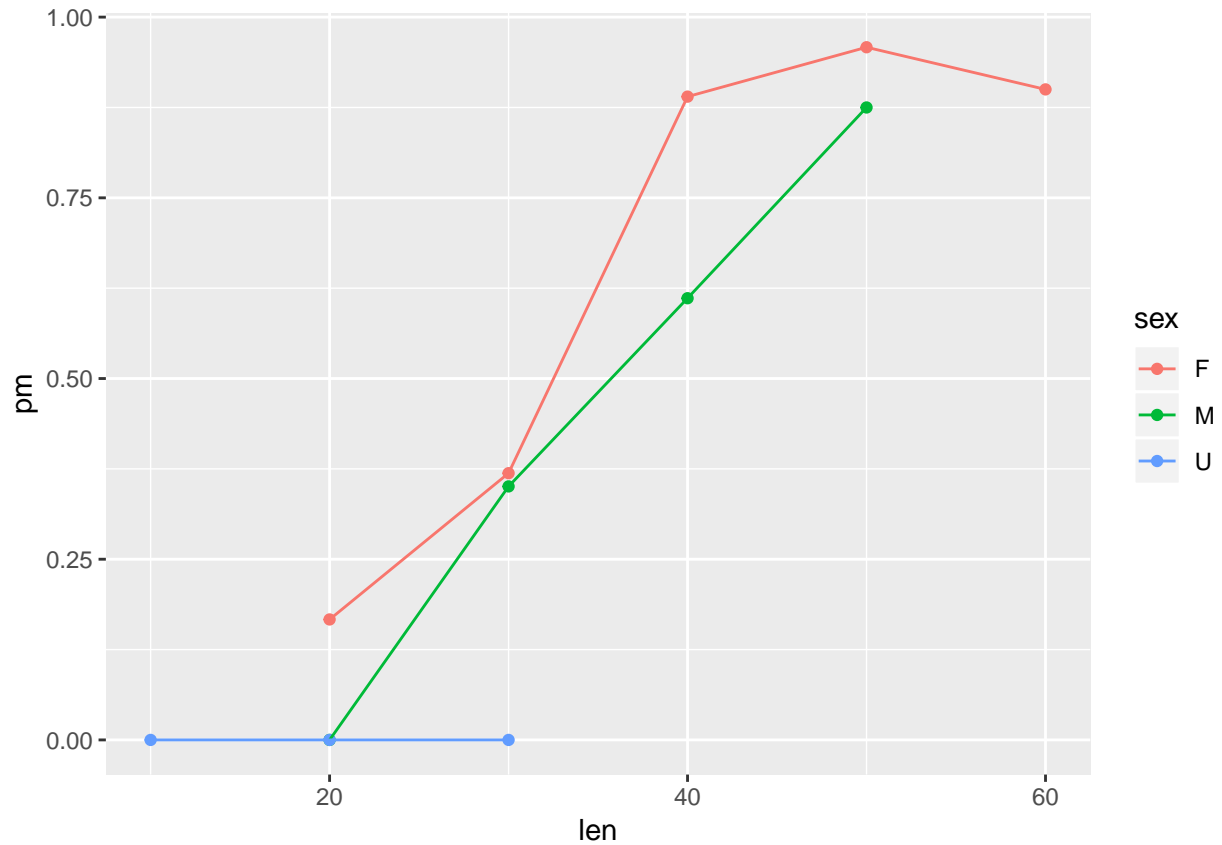
Compare this to fishbase

French data dont look so good. Lets just use the MI data.

Conclusion: the suggested final length-weight parameters are: a = 0.0128; b = 3.02
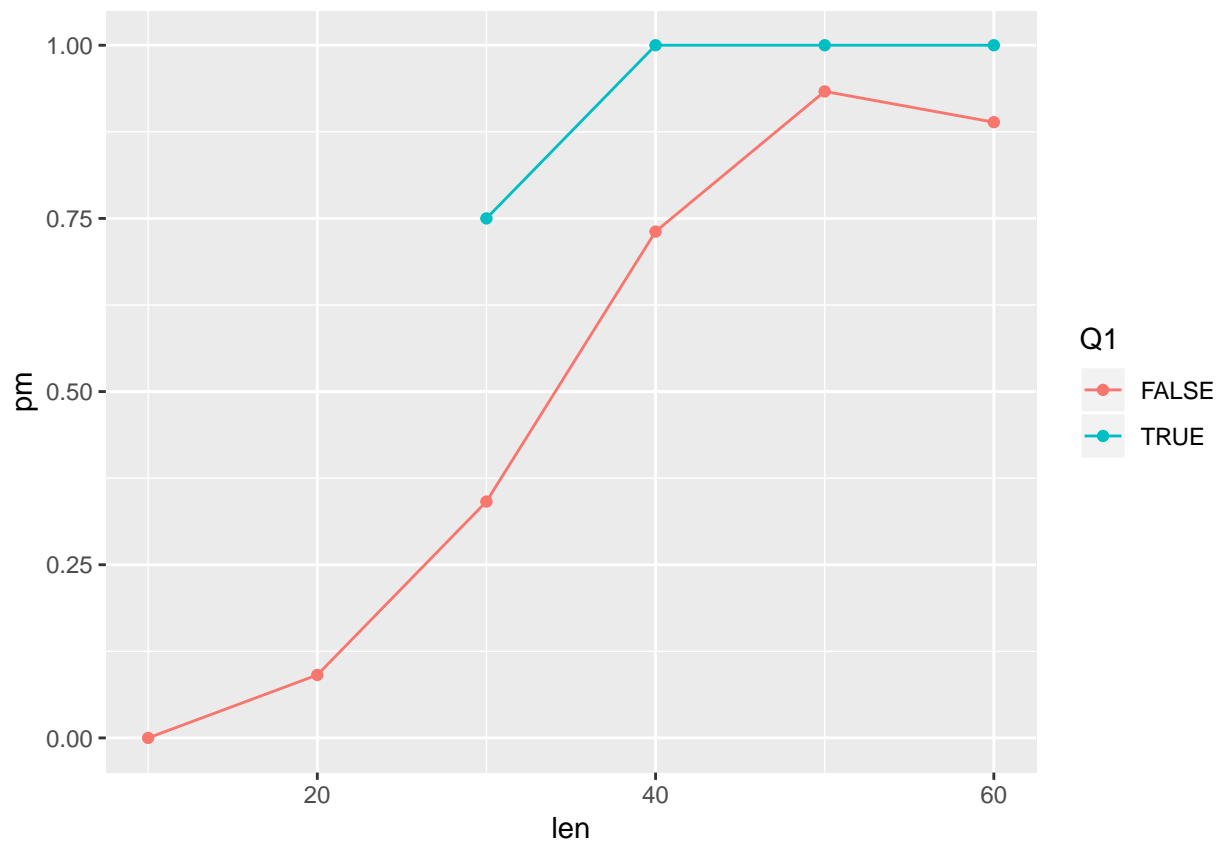
Maturity

All data

You get different results in spring, compared to Q4, it is probably only possible to tell the difference between virgin and spent in spring. But not much data. Best guess: L50 around 25cm. Maybe best just to use fishbase

```
## # A tibble: 4 x 4
## # Groups:   len [4]
##     len Q1        pm count
##   <dbl> <lgl> <dbl> <int>
## 1    30 TRUE   0.75     8
## 2    40 TRUE   1       19
## 3    50 TRUE   1        2
## 4    60 TRUE   1        1
```

Summary

Growth parameters: Average from fishbase seems reasonable after removing outliers and data from Med and Baltic but note difference between male and female.

Both sexes: Linf = 41.8, k = 0.44 and t0 = -0.9.

Female only: Linf = 50.1, k = 0.27 and t0 = -1.8.

Male only: Linf = 39.3, k = 0.5 and t0 = -0.8.

Length-weight parameters: a = 0.0128; b = 3.02

Maturity: 25cm? Fishbase is probably better.