Adjusting max size of the Final Course Model

Load in Libraries

```
library(mizer)
library(mizerExperimental)
library(tidyverse)
library(rfishbase)
```

Load in Course Model

```
download.file("https://github.com/gustavdelius/mizerCourse/raw/master/build/cel_model_landing
              destfile = "cel_model_landings.rds")
cel_model_course <- readParams("cel_model_landings.rds")
gear_params(cel_model_course)$yield_observed <- readRDS("celtic_yields.rds")
```

Making a data frame with the new w_max and l_max values

```
cel_model_course <- readParams("cel_model_landings.rds")
params<-species_params(cel_model_course)
saveRDS(params, file = "species_params.rds")
params <- readRDS("species_params.rds")

download.file("https://github.com/gustavdelius/mizerCourse/raw/master/build/species_params_sp
              destfile = "species_params_spence_et_al.rds")
sp_spence <- readRDS("species_params_spence_et_al.rds")
sp <- select(sp_spence, species)
sp$latin_name <- c("Clupea harengus", # Herring
                   "Sprattus sprattus", # Sprat
                   "Gadus morhua", # Cod
```

```
                    "Melanogrammus aeglefinus", # Haddock
                    "Merlangius merlangus", # Whiting
                    "Micromesistius poutassou", # Blue whiting
                    "Trisopterus esmarkii", # Norway Pout
                    "Trisopterus minutus", # Poor Cod
                    "Merluccius merluccius", # European Hake
                    "Lophius piscatorius", # Monkfish
                    "Trachurus trachurus", # Horse Mackerel
                    "Scomber scombrus", # Mackerel
                    "Limanda limanda", # Common Dab
                    "Pleuronectes platessa", # Plaice
                    "Lepidorhombus whiffiagonis", # Megrim
                    "Solea solea", # Sole
                    "Capros aper") # Boarfish
max_size_fishbase <- rfishbase::species(sp$latin_name) |>
    select(latin_name = Species, w_max = Weight, l_max = Length)
```

Joining with `by = join_by(SpecCode)`

```
max_size_fishbase <- left_join(sp, max_size_fishbase, by = "latin_name")
length_weight <- estimate(max_size_fishbase$latin_name, fields = c("Species", "a", "b"))
```

Joining with `by = join_by(SpecCode)`

```
max_size <- max_size_fishbase |>
    left_join(length_weight, by = c("latin_name" = "Species"))
max_size <- max_size |>
    mutate(w_max_calc = a * l_max ^ b)
max_size$w_max[is.na(max_size$w_max)] <- max_size$w_max_calc[is.na(max_size$w_max)]
max_size<-max_size[c("species","w_max","l_max")]
```

```
#new species parameters
max_size
```

```
          species       w_max l_max
1         Herring  1050.00000  45.0
2           Sprat    30.25037  16.0
3             Cod 96000.00000 200.0
4         Haddock 16800.00000 112.0
5         Whiting  3110.00000  91.5
```

```
6      Blue whiting    830.00000  55.5
7      Norway Pout     319.77787  35.0
8         Poor Cod     711.87913  40.0
9    European Hake   15000.00000 140.0
10        Monkfish   57700.00000 200.0
11 Horse Mackerel    2000.00000  70.0
12        Mackerel    3400.00000  60.0
13      Common Dab    1000.00000  40.0
14          Plaice    7000.00000 100.0
15          Megrim    1556.92834  60.0
16            Sole    3000.00000  70.0
17        Boarfish     269.59415  30.0
```

```
# Merge new w_max and l_max values
cel_model_course@species_params <- merge(
  cel_model_course@species_params,
  max_size,
  by = "species",
  suffixes = c("", ".new")
)

# Overwrite old values
cel_model_course@species_params$w_max <- cel_model_course@species_params$w_max.new
cel_model_course@species_params$l_max <- cel_model_course@species_params$l_max.new

# Clean up the merged columns
cel_model_course@species_params <- cel_model_course@species_params[, !grepl(".new$", names(ce

#validate
#cel_model_course <- validParams(cel_model_course)
```

Find an error, due to the changing of w_max, which occured due to the fact the w_max now exceeds the model's maximum grid weight and that now w_max is internally inconsistent with other various slots such as psi, intake_max, etc.

To fix this we first need to do some diagnosis of the problem and check if the new w_max value extends past the weight grid

```
max(cel_model_course@species_params$w_max)
```

```
[1] 96000
```

```
max(cel_model_course@w)
```

```
[1] 42529.41
```

Yes it does extend past the weight grid: w_max is > than w, therefore we need to adjust the weight grid.

```
# Save updated species_params before rebuilding
updated_species_params <- cel_model_course@species_params

# Rebuild MizerParams with updated species_params and same other settings
cel_model_course <- newMultispeciesParams(
  species_params = updated_species_params,
  interaction = cel_model_course@interaction,
  gear_params = cel_model_course@gear_params,
  no_w = 100,  # Or adjust for finer resolution
  min_w = min(cel_model_course@w),
  max_w = max(updated_species_params$w_max) * 1.1  # 10% buffer
)
```

```
Note: Dimnames of interaction matrix do not match the order of species names in the species
```

```
For the following species I will ignore your value for l_mat because it is not consistent wit
For the following species I will ignore your value for l_max because it is not consistent wit
```

```
#validObject(cel_model_course)
saveRDS(cel_model_course, "cel_model_course_updated.rds")
```

Lets check the new model and run to a steady state in tuneParams

```
cel_model_course_updated<-readParams("cel_model_course_updated.rds")
cel_model_course_updated<-tuneParams(cel_model_course_updated)
```

```
Loading required package: shiny
```

```
Warning: package 'shiny' was built under R version 4.4.1
```

```
Listening on http://127.0.0.1:7404
```

Simulation run did not converge after 99 years. Value returned by the distance function was:

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```
saveParams(cel_model_course_updated, "cel_model_course_updated.rds")
```

After clicking steady twice the model does not converge after 99 years and requires an unrealistic erepro greater than 1 for Blue whiting, Boarfish, Cod, Common Dab, European Hake, Haddock, Herring etc... additionally the feeding level is at 1 for all species.