nwfscSurvey Vignette

2025-01-23

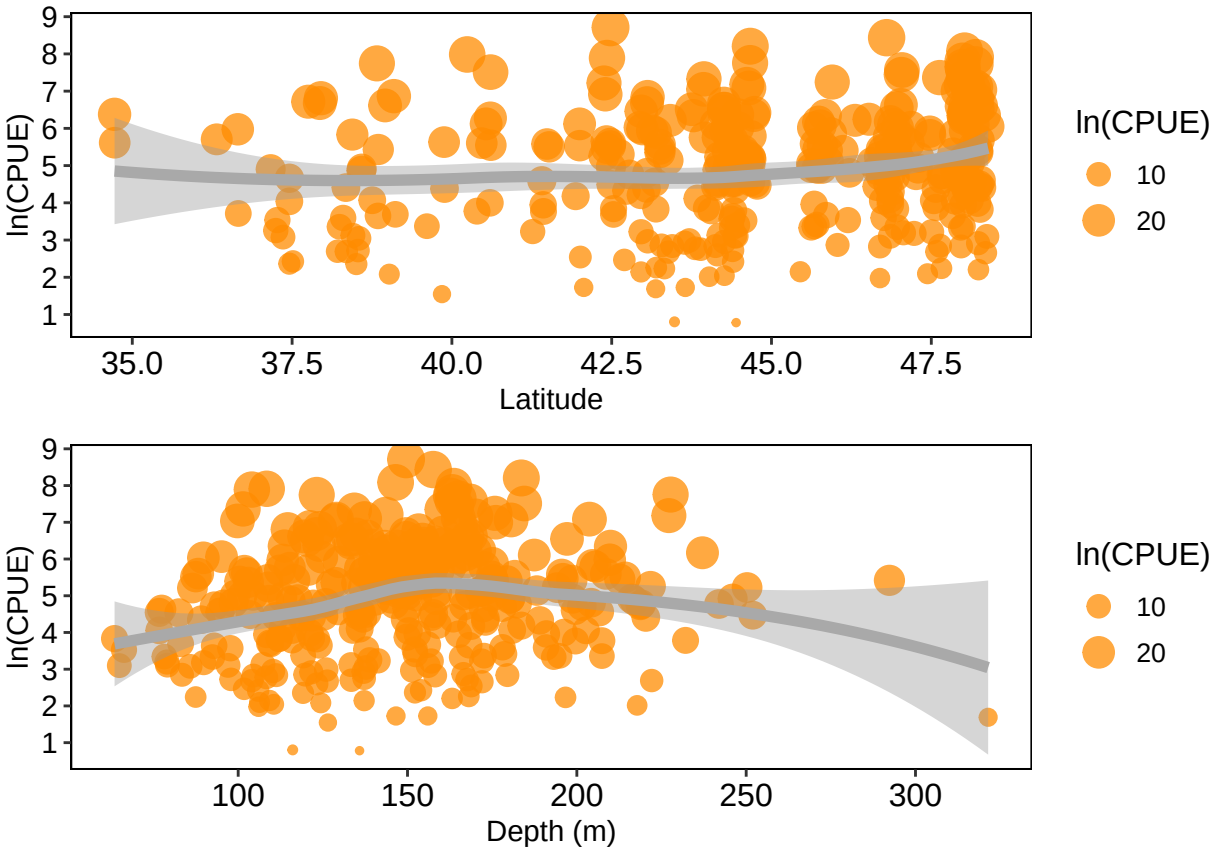
Set up: The first set of code is for the Bottom trawl survey The second set of code is for the triennial survey

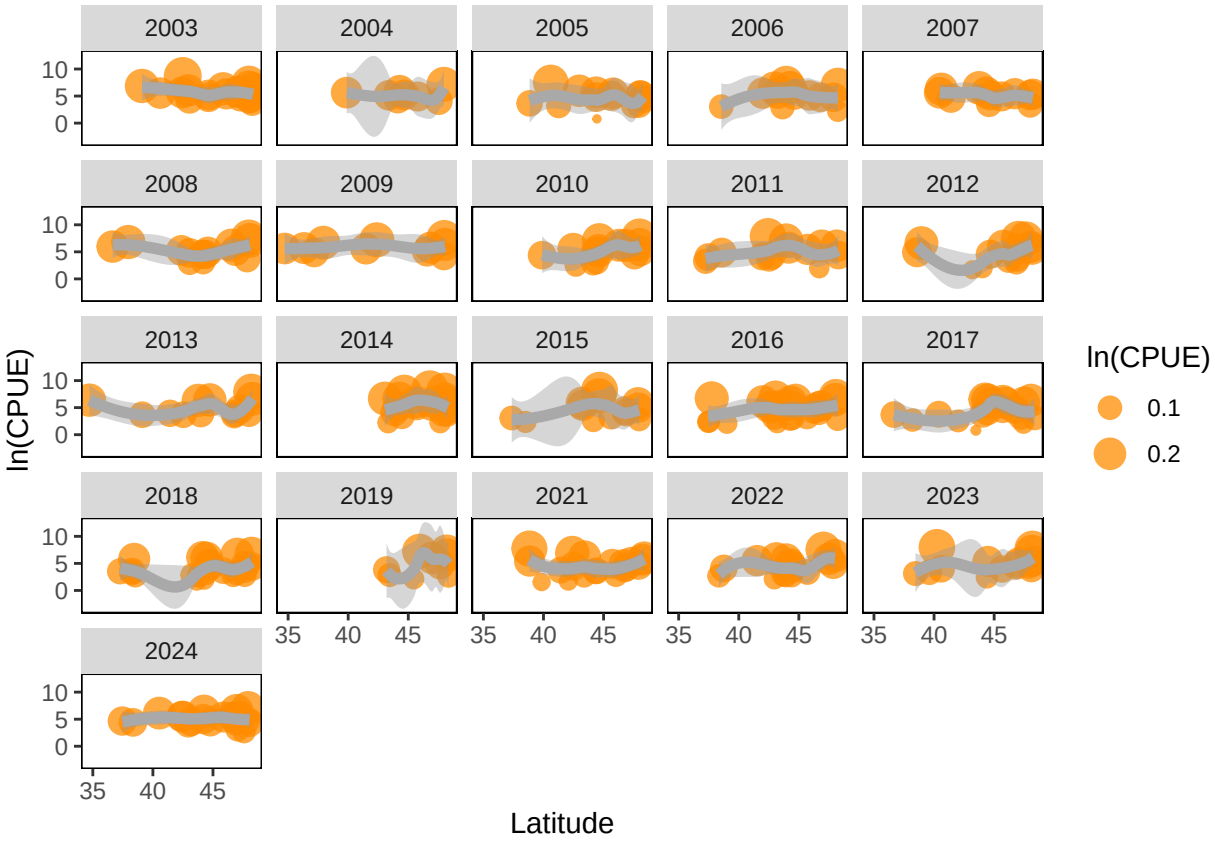
Questions: is this a two area model as in WA/OR + CA? or WA + OR only? Is California a whole different assessment model? If we are seeing catches in CA, what is the strata doing again?

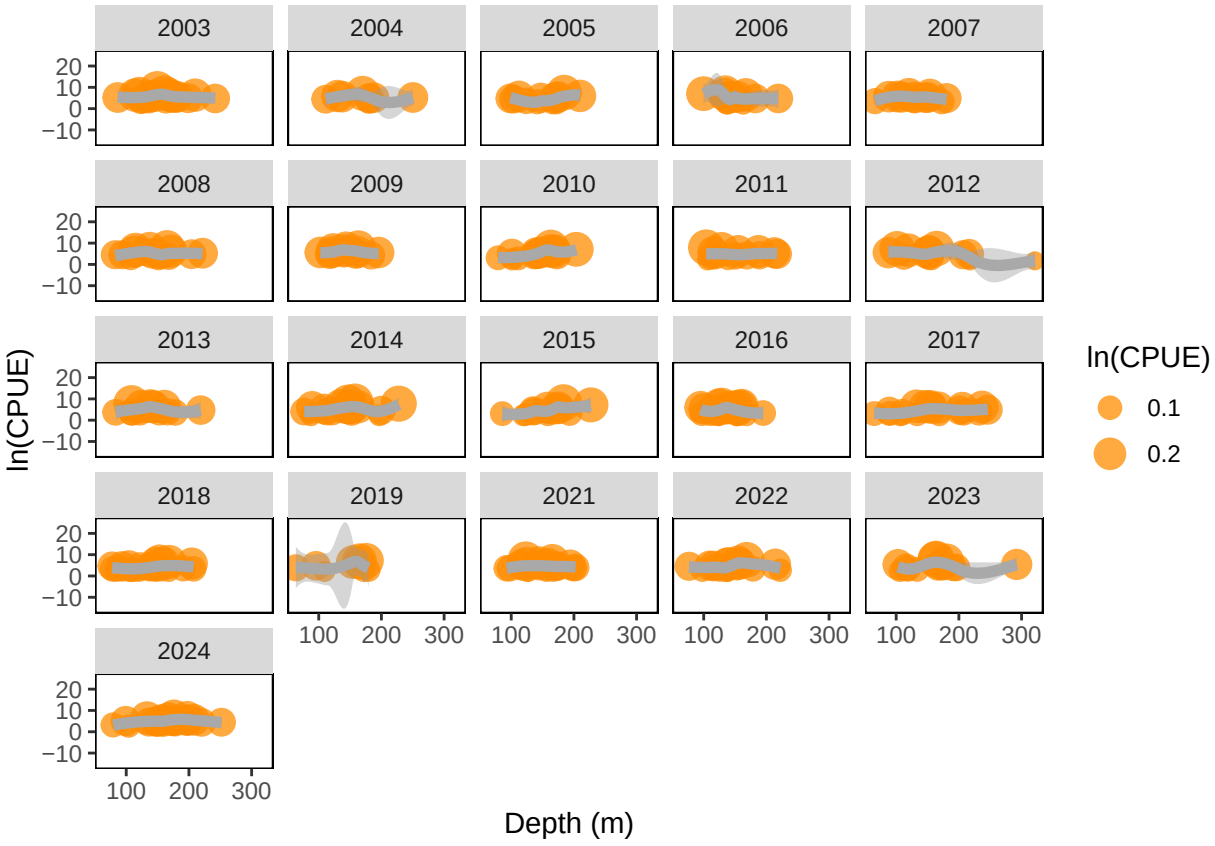
NWFSC.Combo Data

Initial pull and plotting of data: WCGBTS

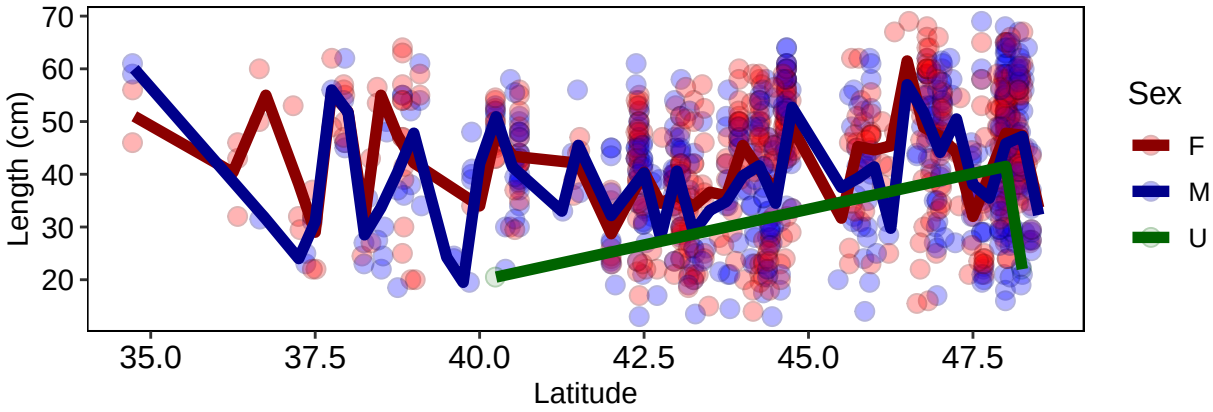
```
catch = pull_catch(
  common_name = "yelloweye rockfish",
  survey = "NWFSC.Combo")

bio = pull_bio(
  common_name = "yelloweye rockfish",
  survey = "NWFSC.Combo")

plot_cpue(
  catch = catch)
```

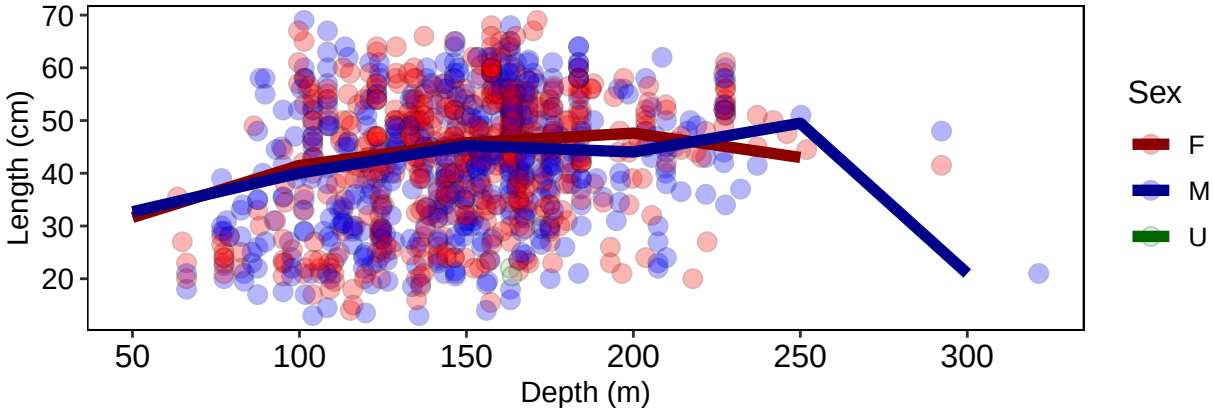

ln(CPUE)
9
8
7
6
5
4
3
2
1
35.0
37.5
40.0
42.5
45.0
47.5
Latitude
ln(CPUE)
10
20
ln(CPUE)
9
8
7
6
5
4
3
2
1
100
150
200
250
300
Depth (m)
ln(CPUE)
10
20

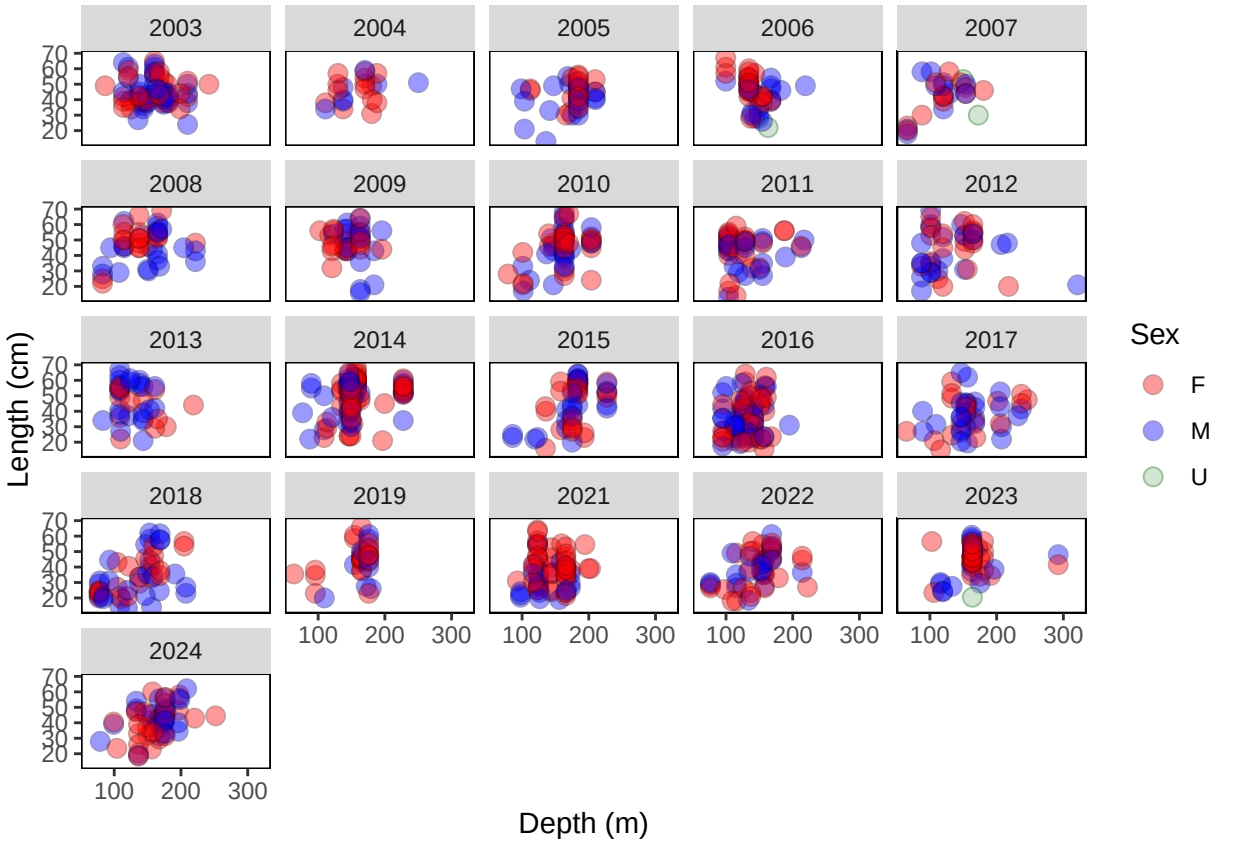

2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2021
2022
2023
2024
ln(CPUE)
10
5
0
35
40
45
Latitude
ln(CPUE)
0.1
0.2

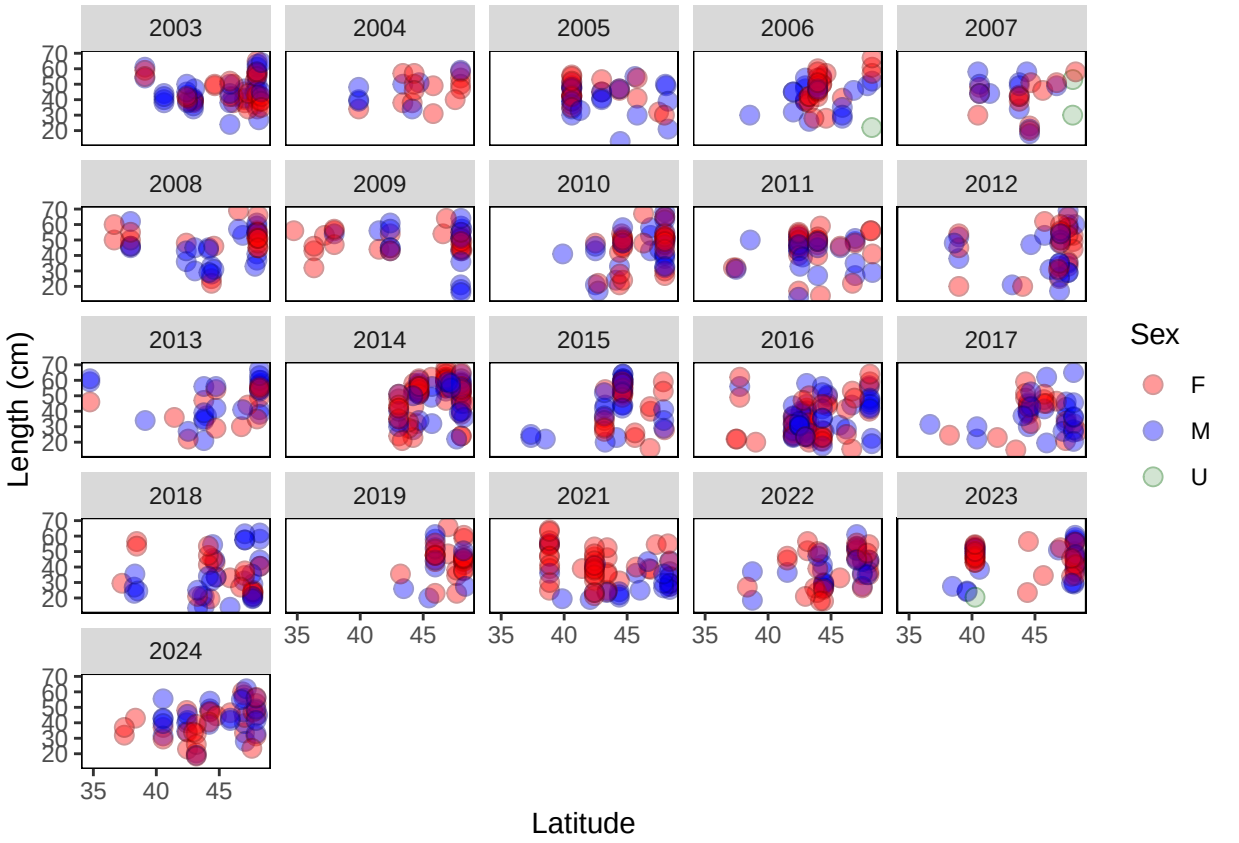



```
plot_bio_patterns(
  bio = bio,
  col_name = "Length_cm")
```


Length (cm)
70
60
50
40
30
20
35.0
37.5
40.0
42.5
45.0
47.5
Latitude
Sex
F
M
U


Length (cm)
70
60
50
40
30
20
50
100
150
200
250
300
Depth (m)
Sex
F
M
U


2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2021
2022
2023
2024
Length (cm)
Depth (m)
Sex
F
M
U




```
wh_plot_proportion(
  data_catch = catch,
  data_bio = bio
)
```

```
## [1] "C:/Users/elizabeth.gugliotti/Documents/github_repos/Sebastes_ruberrimus_2025/Rcode/plots/presen
## [2] "C:/Users/elizabeth.gugliotti/Documents/github_repos/Sebastes_ruberrimus_2025/Rcode/plots/presen
## [3] "C:/Users/elizabeth.gugliotti/Documents/github_repos/Sebastes_ruberrimus_2025/Rcode/plots/sex_by
## [4] "C:/Users/elizabeth.gugliotti/Documents/github_repos/Sebastes_ruberrimus_2025/Rcode/plots/sex_by
```

Define the strata

```
WCGBTS_strata <- CreateStrataDF.fn(
  names = c("shallow_OR", "deep_OR", "shallow_WA", "deep_WA"),
  depths.shallow = c(55, 183, 55, 183),
  depths.deep    = c(183, 350, 183, 350),
  lats.south     = c(42, 42, 46, 46),
  lats.north     = c(46, 46, 49, 49)
)
```

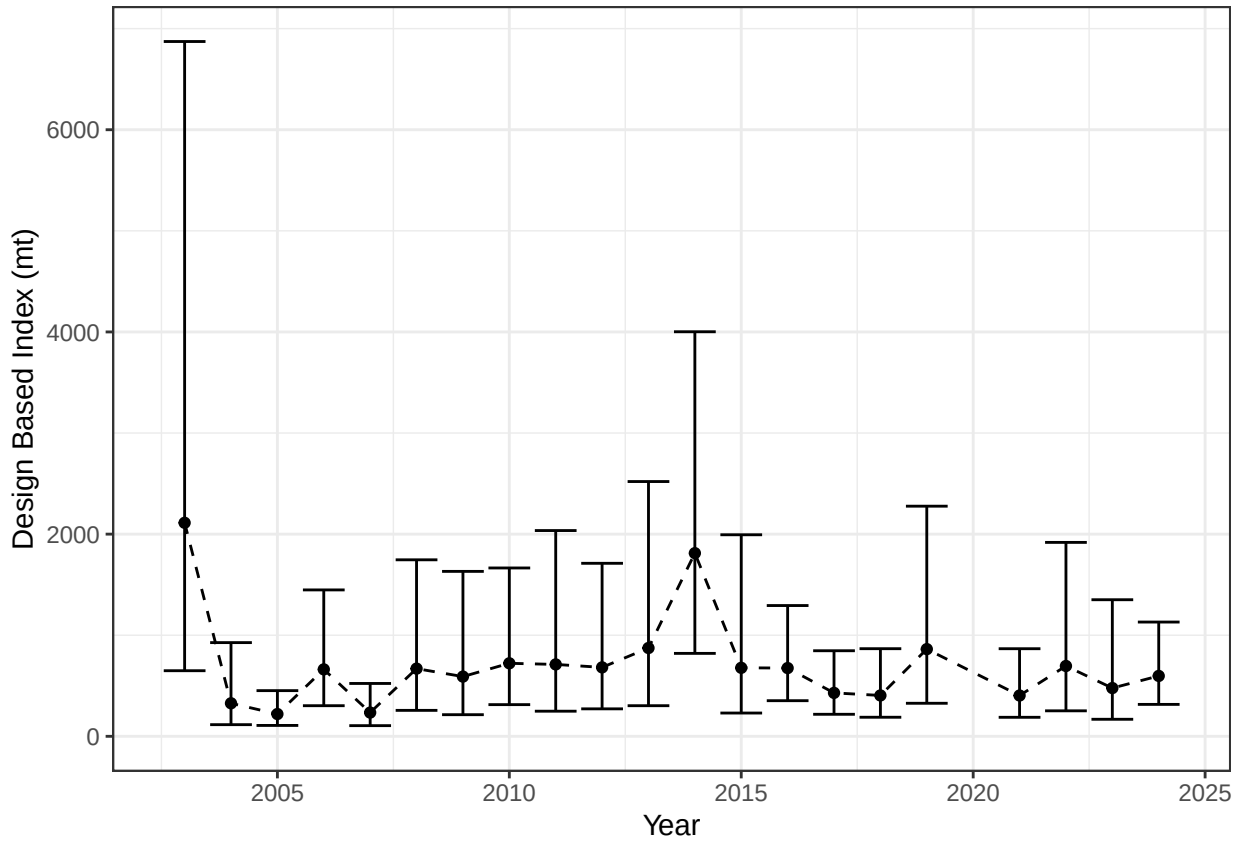
Calculate designed based index of abundance

```
biomass = get_design_based(
  data = catch,
  strata = WCGBTS_strata,
  dir = file.path(dirname(getwd()), "Data", "NWFSC.Combo_and_Tri_design_based_indices"),
  printfolder = "")
```

```
## [1] TRUE
```

Plot coastwide

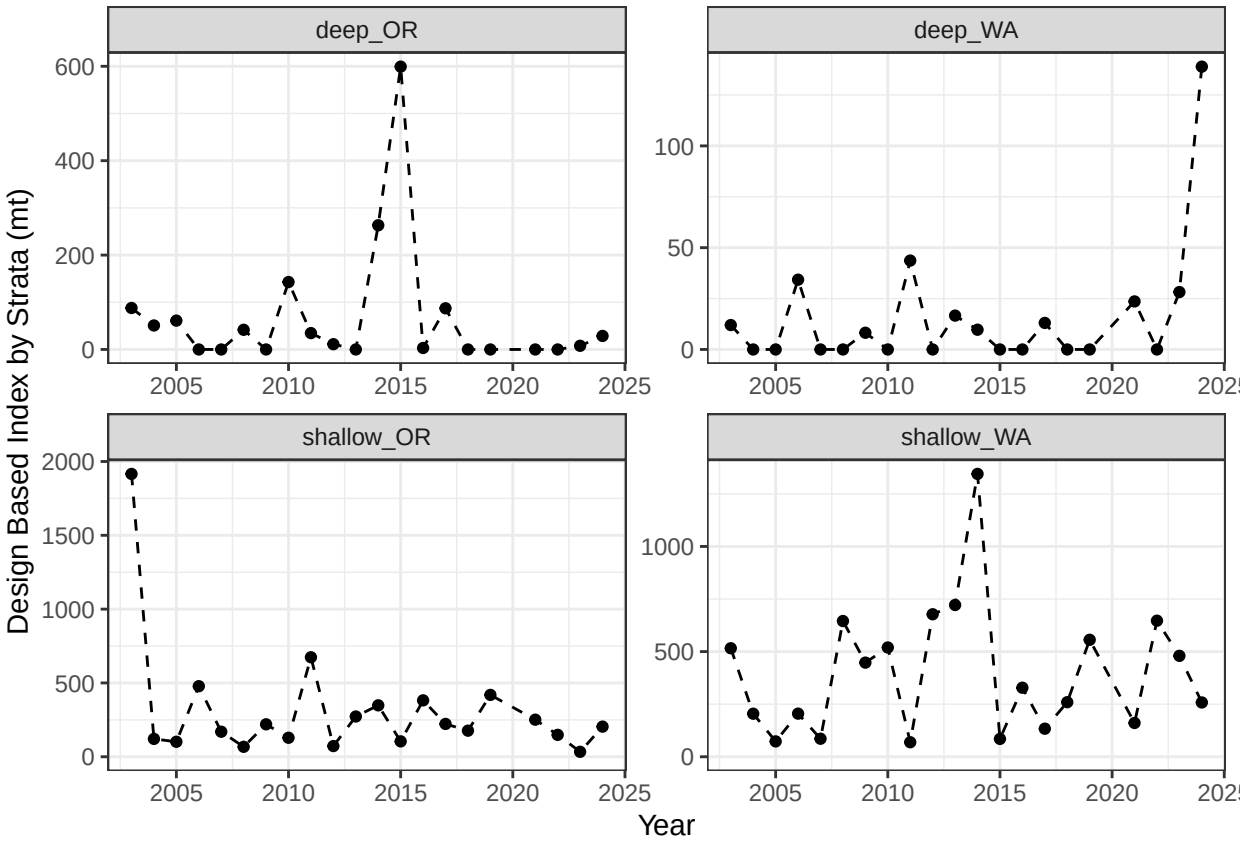
```
plot_index(
  data = biomass,
  plot = 1)
```




```
# thats only about a maximum of 200,500 fish.... very few...
```

Plot index for each strata

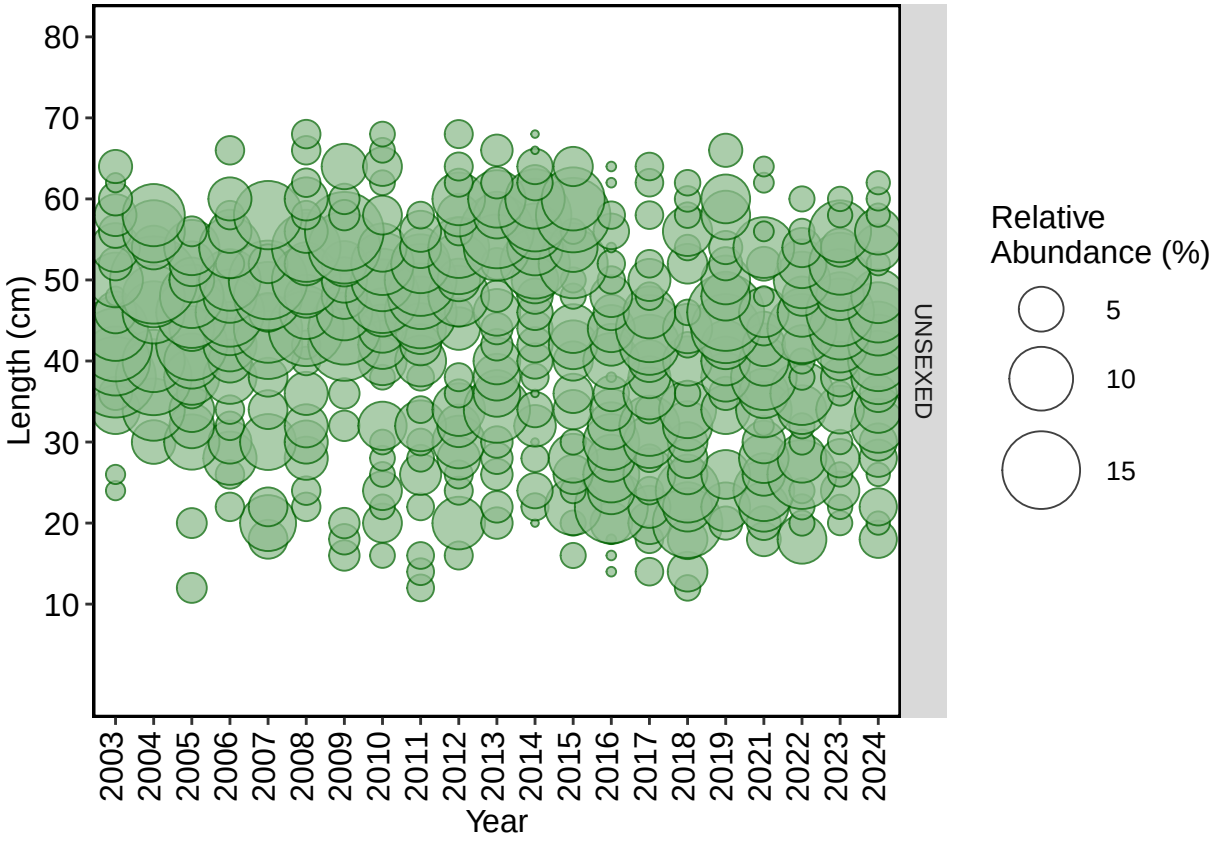
```
plot_index(
  data = biomass,
  plot = 2)
```

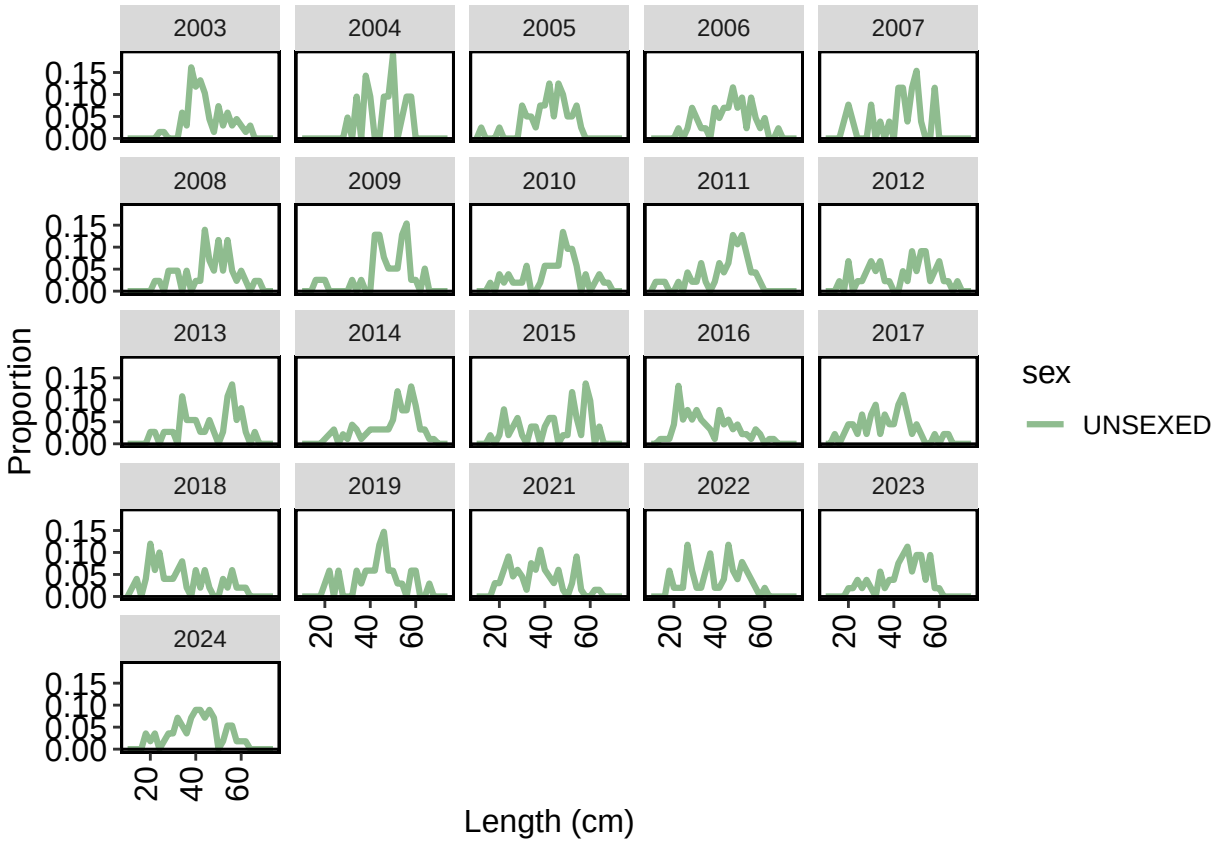


Length composition data

```
# Expanded length comps are not used for the yelloweye assessment
# length_comps <- get_expanded_comps(
#     bio_data = bio,
#     catch_data = catch,
#     comp_bins = seq(10, 74, 2),
#     strata = WCGBTS_strata,
#     comp_column_name = "length_cm",
#     output = "full_expansion_ss3_format",
#     two_sex_comps = FALSE, #single sex model
#     input_n_method = "stewart_hamel")
#
# plot_comps(
#   data = length_comps)

# Use raw length comps, you can tell this is what was used in the previous assessment because whole num
raw_length_comps <- get_raw_comps(
    data = bio,
    comp_bins = seq(10, 74, 2),
    comp_column_name = "length_cm",
    dir = getwd(),
    printfolder = "",
    two_sex_comps = FALSE) #single sex model

plot_comps(
  data = raw_length_comps
```

```
)
```


Length (cm)
80
70
60
50
40
30
20
10
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2021
2022
2023
2024
Year
UNSEXED
Relative Abundance (%)
5
10
15




```
## [1] TRUE
```

```
## [1] TRUE
```

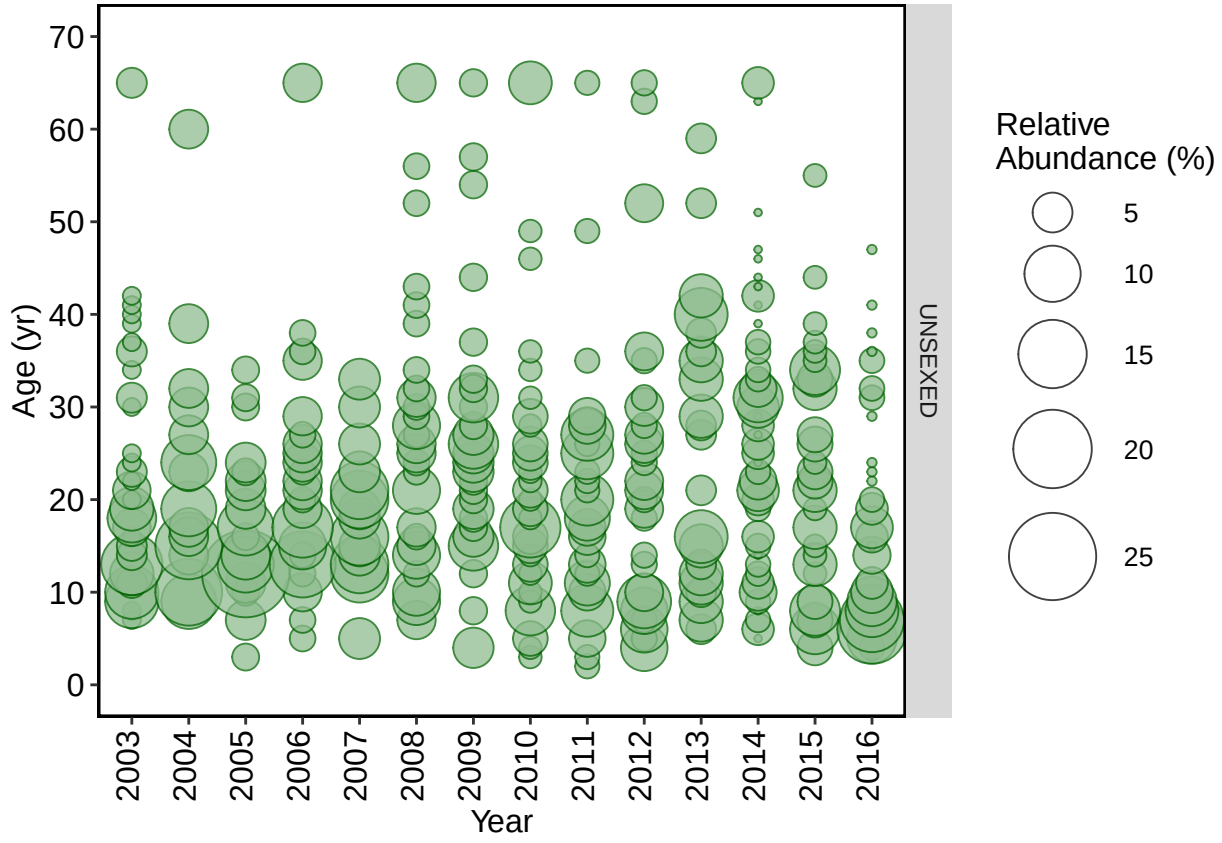
```
## [1] TRUE
```

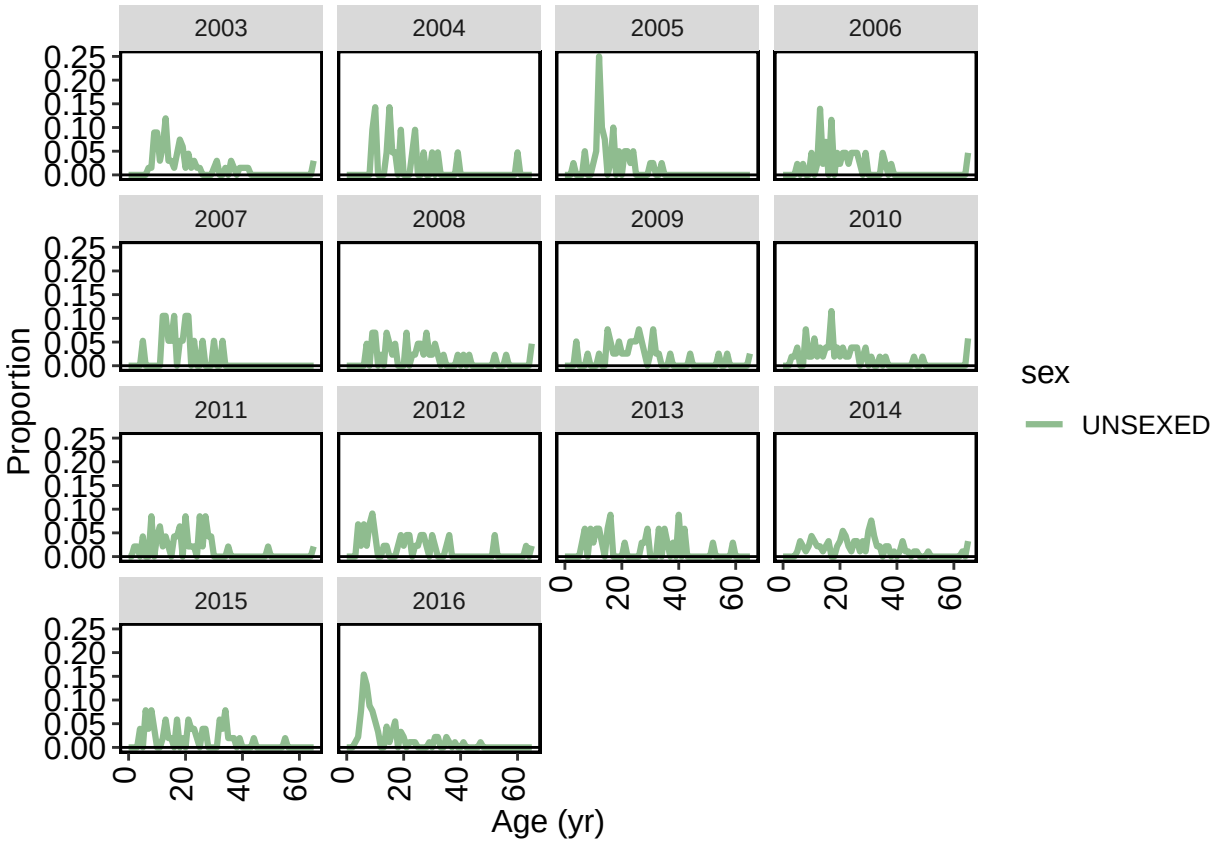
```
## [1] TRUE
```

Marginal age composition data

```
# Expanded age comps are not used in the yelloweye assessment
# age_comps <- get_expanded_comps(
#     bio_data = bio,
#     catch_data = catch,
#     comp_bins = 0:65,
#     strata = WCGBTS_strata,
#     comp_column_name = "age",
#     output = "full_expansion_ss3_format",
#     two_sex_comps = FALSE, #single sex model
#     input_n_method = "stewart_hamel")
#
# plot_comps(
#   data = age_comps)

raw_age_comps <- get_raw_comps(
    data = bio,
    comp_bins = 0:65,
    comp_column_name = "age",
    dir = getwd(),
```

```
    printfolder = "",
    two_sex_comps = FALSE) #single sex model

plot_comps(
  data = raw_age_comps)
```






```
## [1] TRUE
```

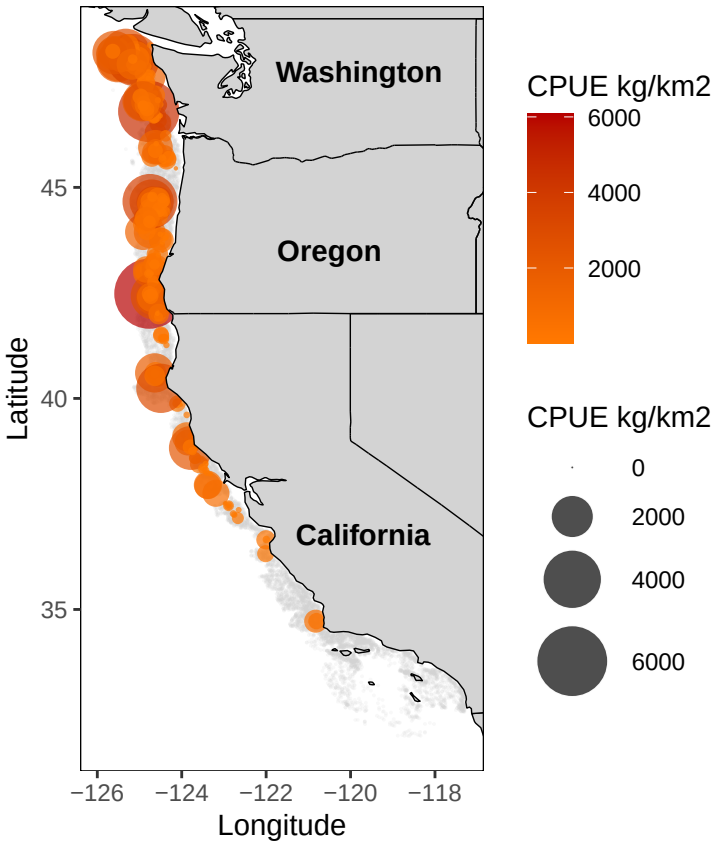
```
## [1] TRUE
```

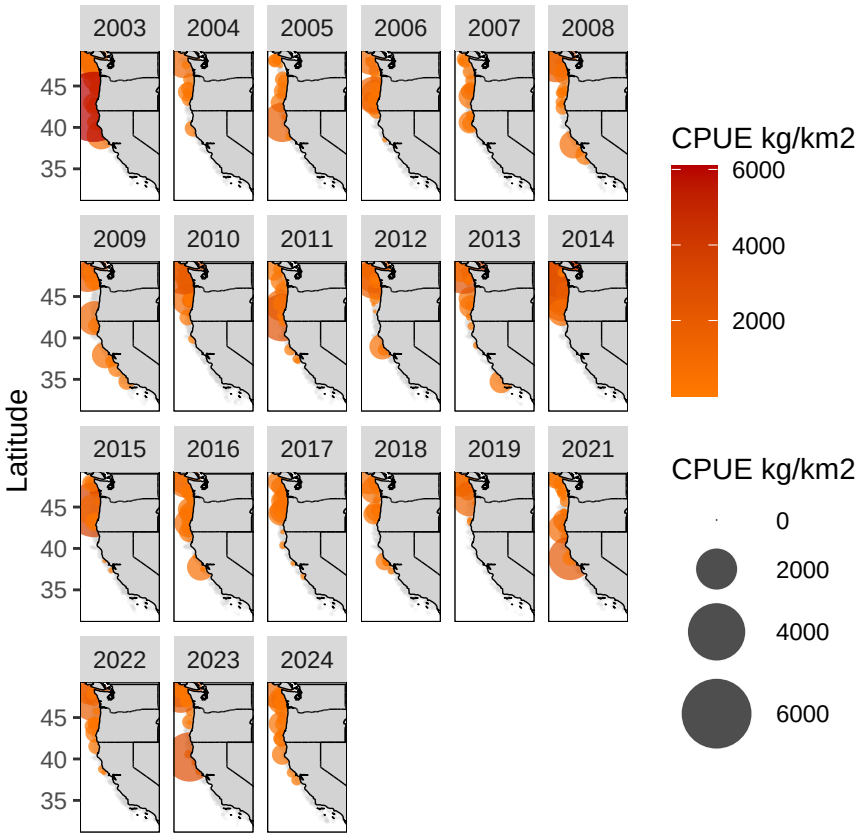
```
## [1] TRUE
```

```
## [1] TRUE
```

Conditional age-at-length data

```
caal <- SurveyAgeAtLen.fn(
  datAL = bio,
  datTows = catch,
  strat.df = WCGBTS_strata,
  lgthBins = seq(10, 74, 2),
  ageBins = 0:65,
  dir = file.path(dirname(getwd()), "Data", "NWFSC.Combo_CAAL"),
  printfolder = "")

PlotMap.fn(
  dat = catch)
```

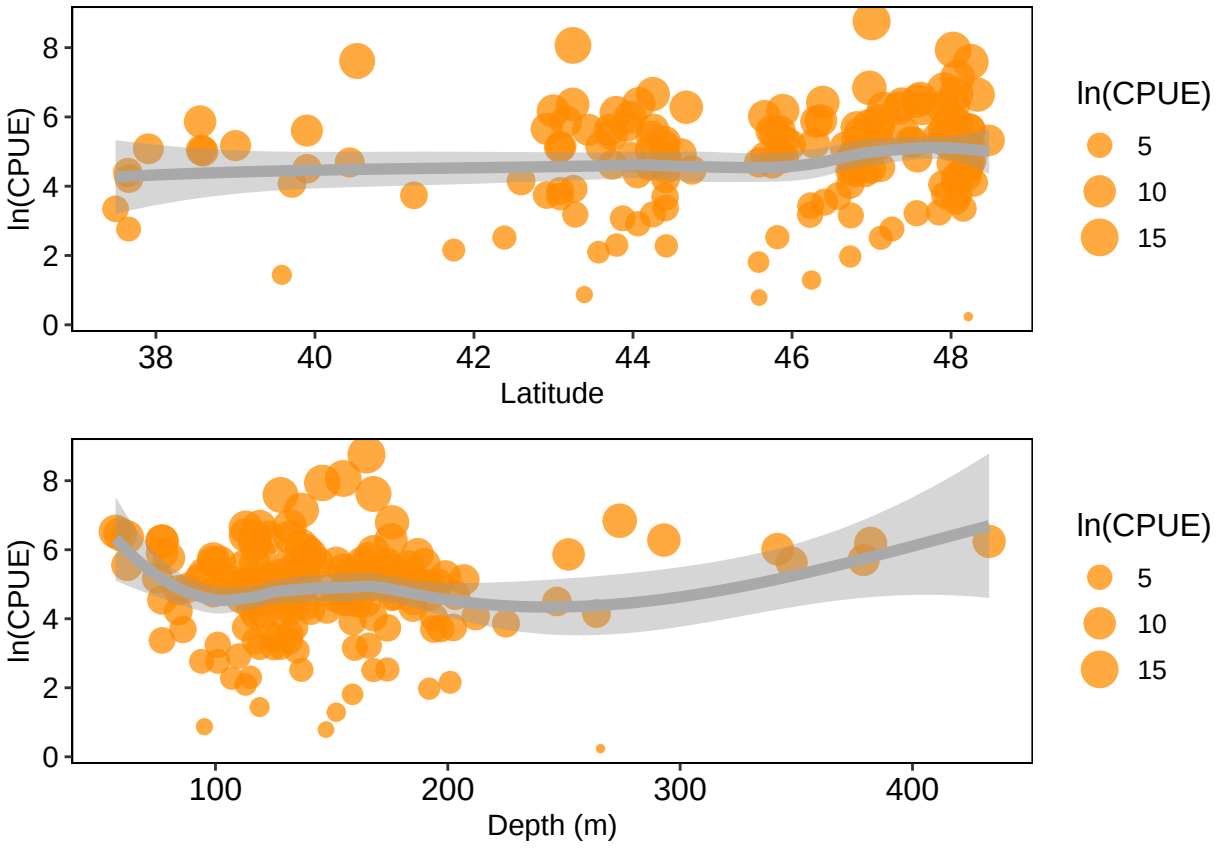

Washington
Oregon
California
45
40
35
Latitude
−126
−124
−122
−120
−118
Longitude
CPUE kg/km2
6000
4000
2000
CPUE kg/km2
0
2000
4000
6000

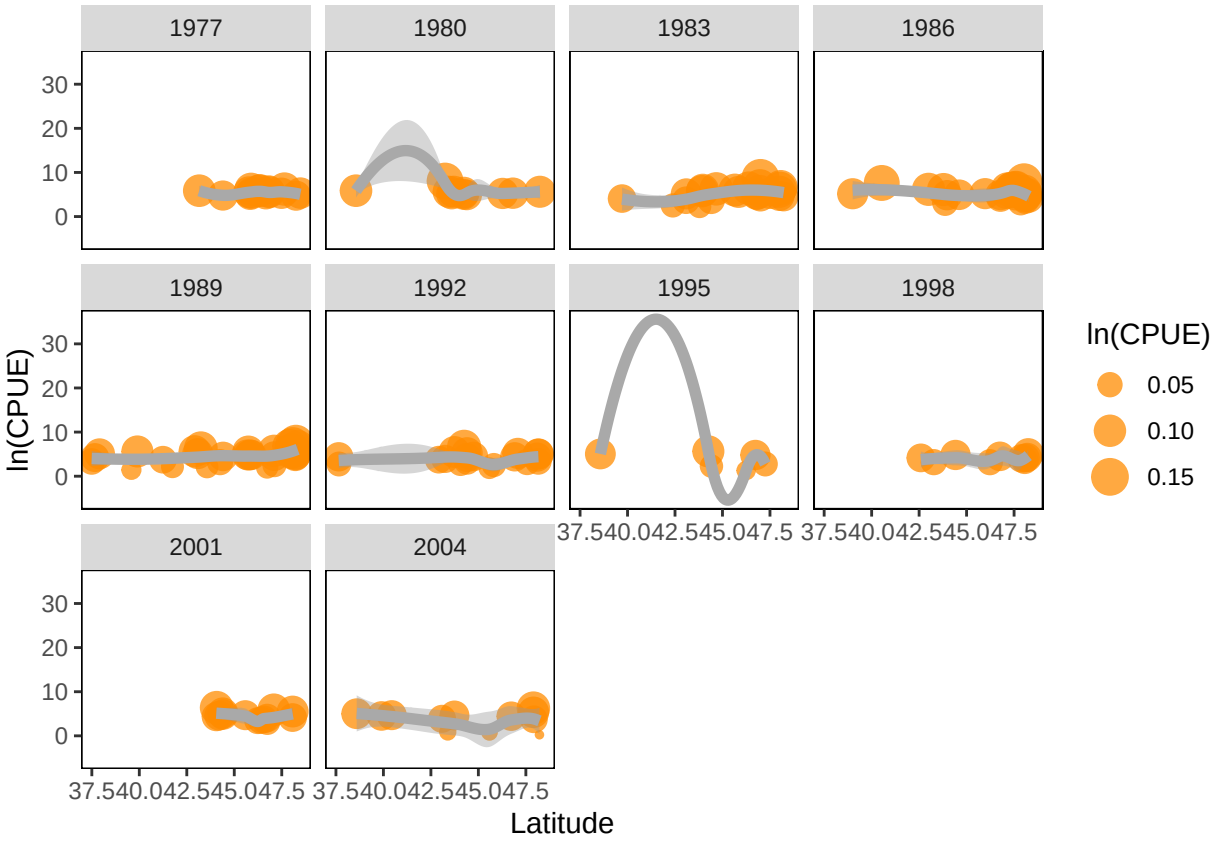


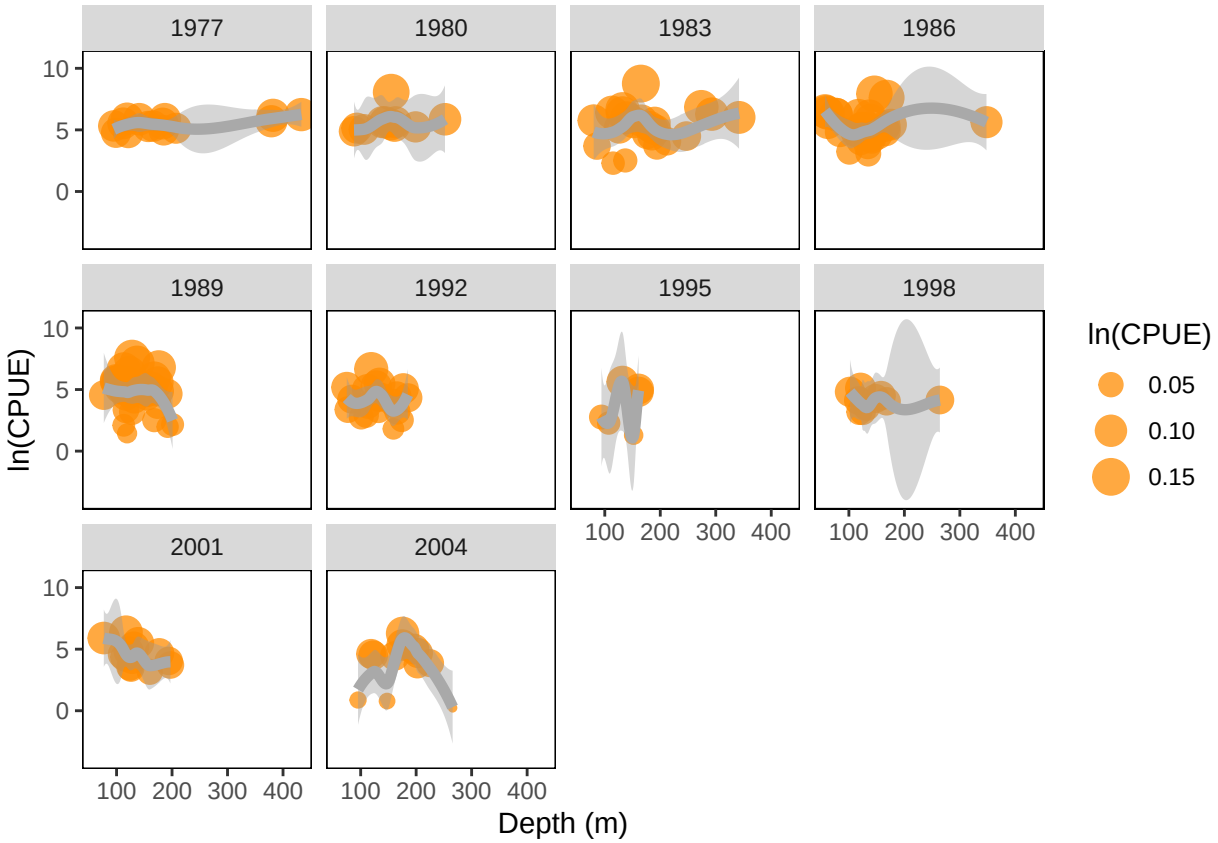
Triennial Data

Initial pull and plotting of data: Triennial

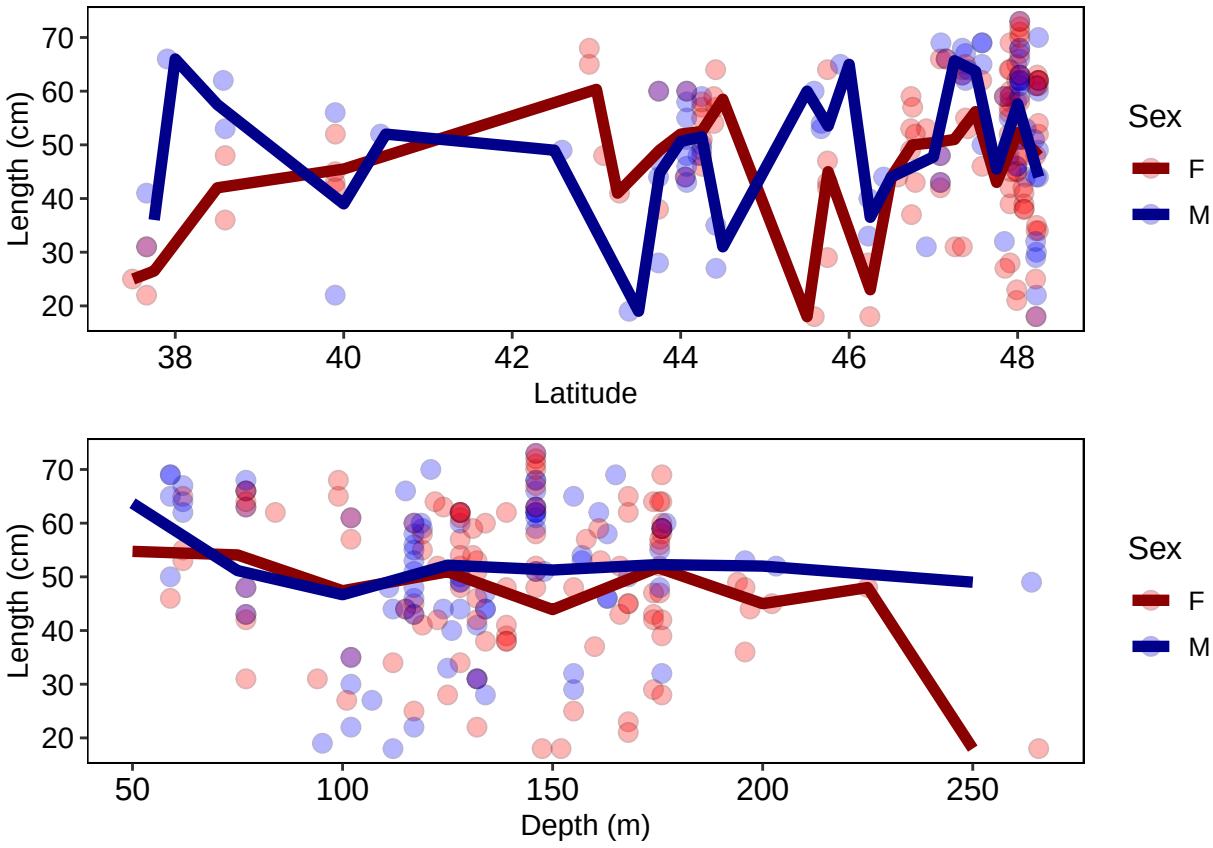
```
catchT = pull_catch(
  common_name = "yelloweye rockfish",
  survey = "Triennial")

#this is creating a list, just use $age_data
bioT = pull_bio(
  common_name = "yelloweye rockfish",
  survey = "Triennial")

bioT <- bioT$length_data # Ian said to use length data

plot_cpue(
  catch = catchT)
```

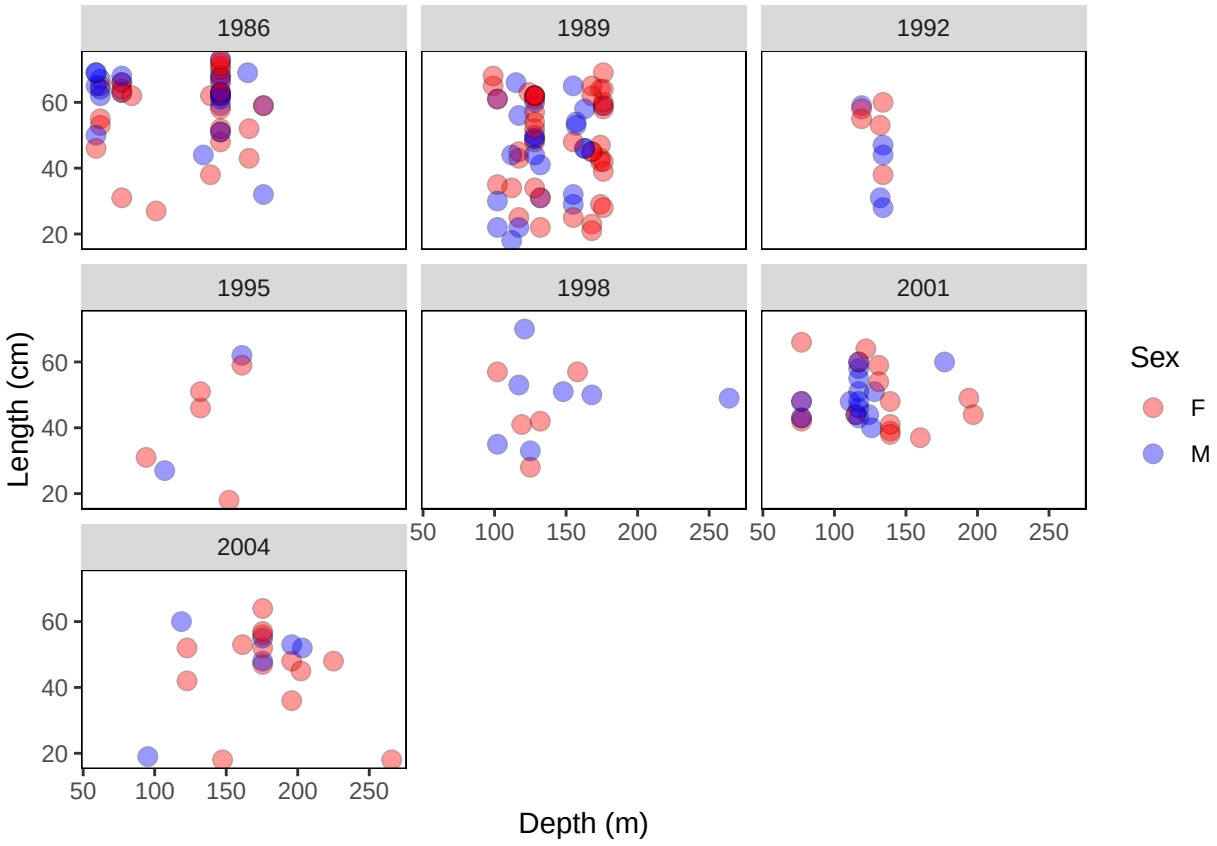

ln(CPUE)
8
6
4
2
0
38
40
42
44
46
48
Latitude
ln(CPUE)
5
10
15
ln(CPUE)
8
6
4
2
0
100
200
300
400
Depth (m)
ln(CPUE)
5
10
15

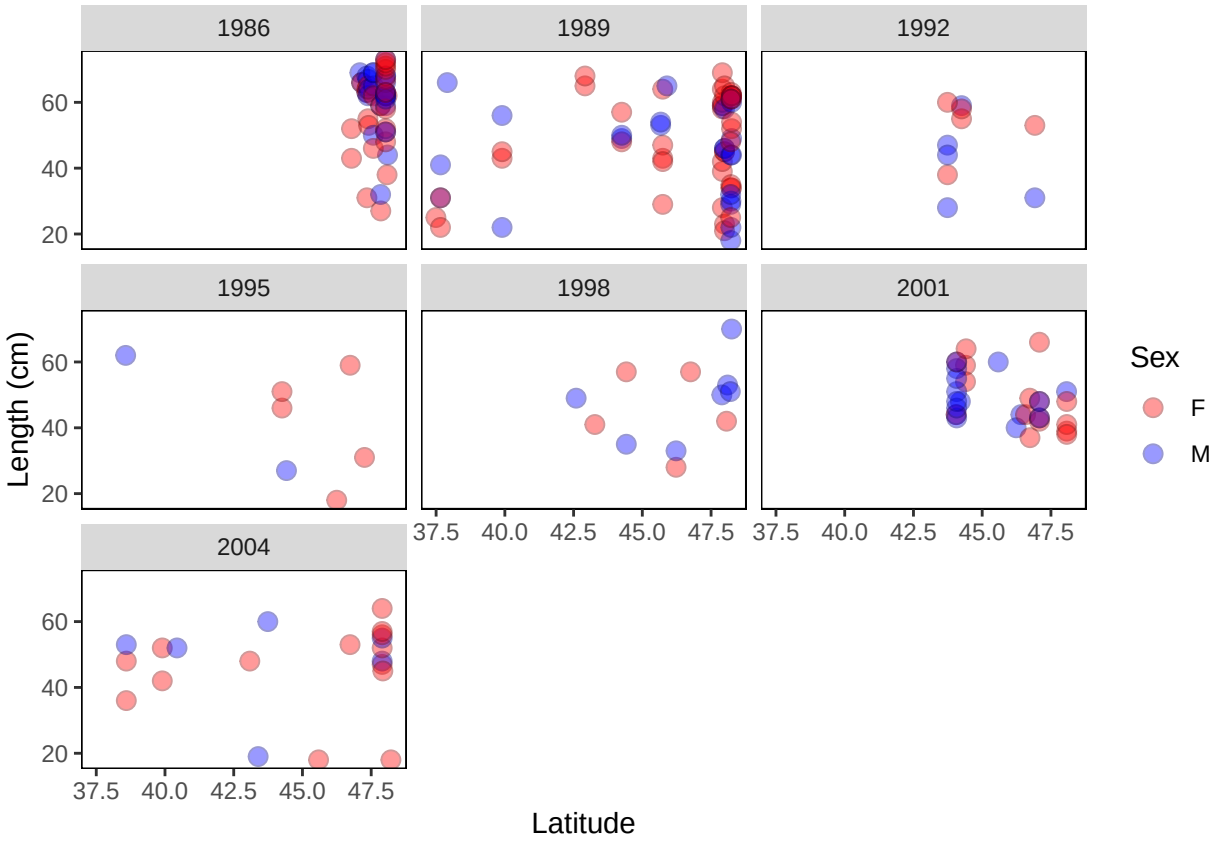

1977
1980
1983
1986
1989
1992
1995
1998
2001
2004
ln(CPUE)
30
20
10
0
37.540.042.545.047.5
Latitude
ln(CPUE)
0.05
0.10
0.15




```
plot_bio_patterns(
  bio = bioT,
  col_name = "Length_cm")
```


Length (cm)
70
60
50
40
30
20
38
40
42
44
46
48
Latitude
Sex
F
M
Length (cm)
70
60
50
40
30
20
50
100
150
200
250
Depth (m)
Sex
F
M


1986
1989
1992
1995
1998
2001
2004
Length (cm)
Depth (m)
Sex
F
M




```
wh_plot_proportion(
  data_catch = catchT,
  data_bio = bioT
)
```

```
## [1] "C:/Users/elizabeth.gugliotti/Documents/github_repos/Sebastes_ruberrimus_2025/Rcode/plots/presen
## [2] "C:/Users/elizabeth.gugliotti/Documents/github_repos/Sebastes_ruberrimus_2025/Rcode/plots/presen
## [3] "C:/Users/elizabeth.gugliotti/Documents/github_repos/Sebastes_ruberrimus_2025/Rcode/plots/sex_by
## [4] "C:/Users/elizabeth.gugliotti/Documents/github_repos/Sebastes_ruberrimus_2025/Rcode/plots/sex_by
```

Define the strata

```
Triennial_strata = CreateStrataDF.fn(names=c("OR", "WA"),
                           depths.shallow = c(55, 55),
                           depths.deep    = c(350, 350),
                           lats.south     = c(42, 46),
                           lats.north     = c(46, 49))
```

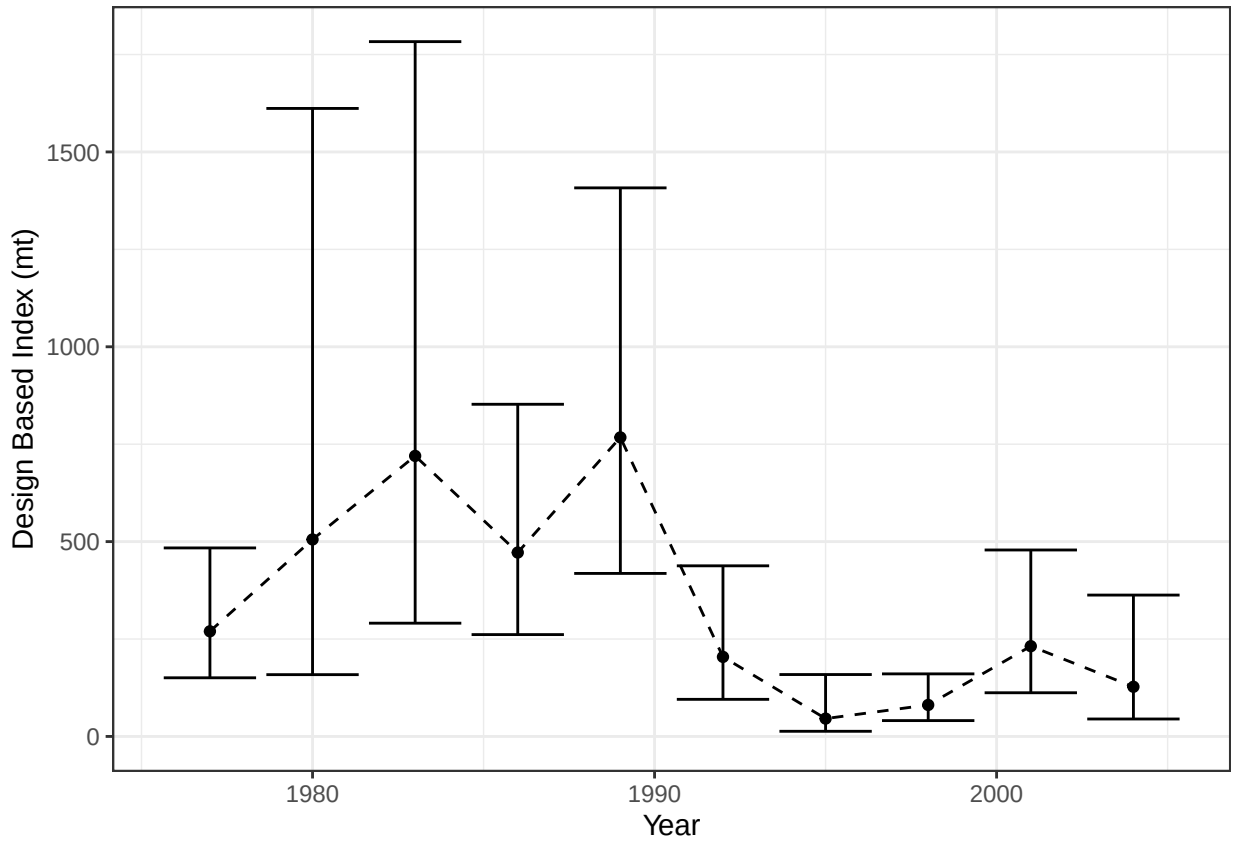
Calculate designed based index of abundance

```
biomassT = get_design_based(
  data = catchT,
  strata = Triennial_strata,
  dir = file.path(dirname(getwd()), "Data", "NWFSC.Combo_and_Tri_design_based_indices"),
  printfolder = "")
```

```
## [1] TRUE
```

Plot coastwide

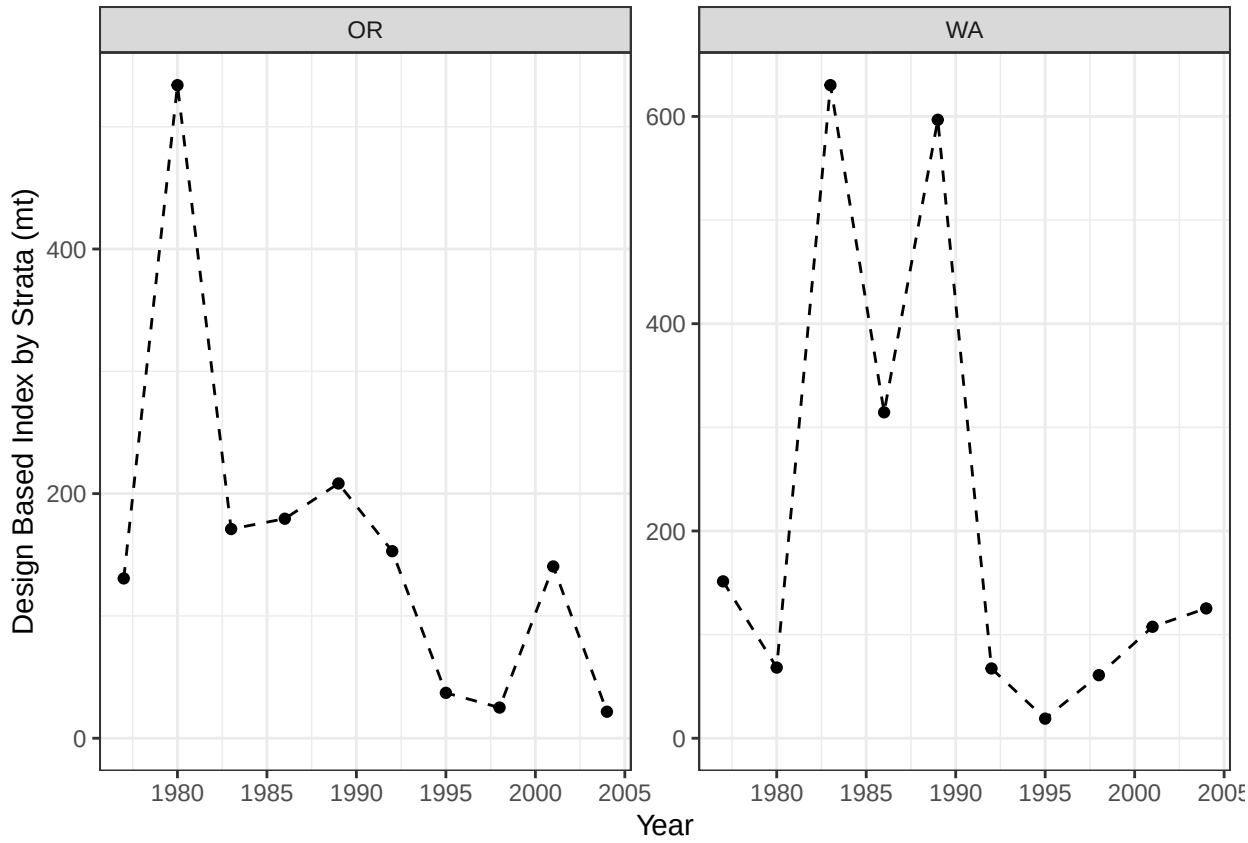
```
plot_index(
  data = biomassT,
  plot = 1)
```




```
# not a lot of fish...
```

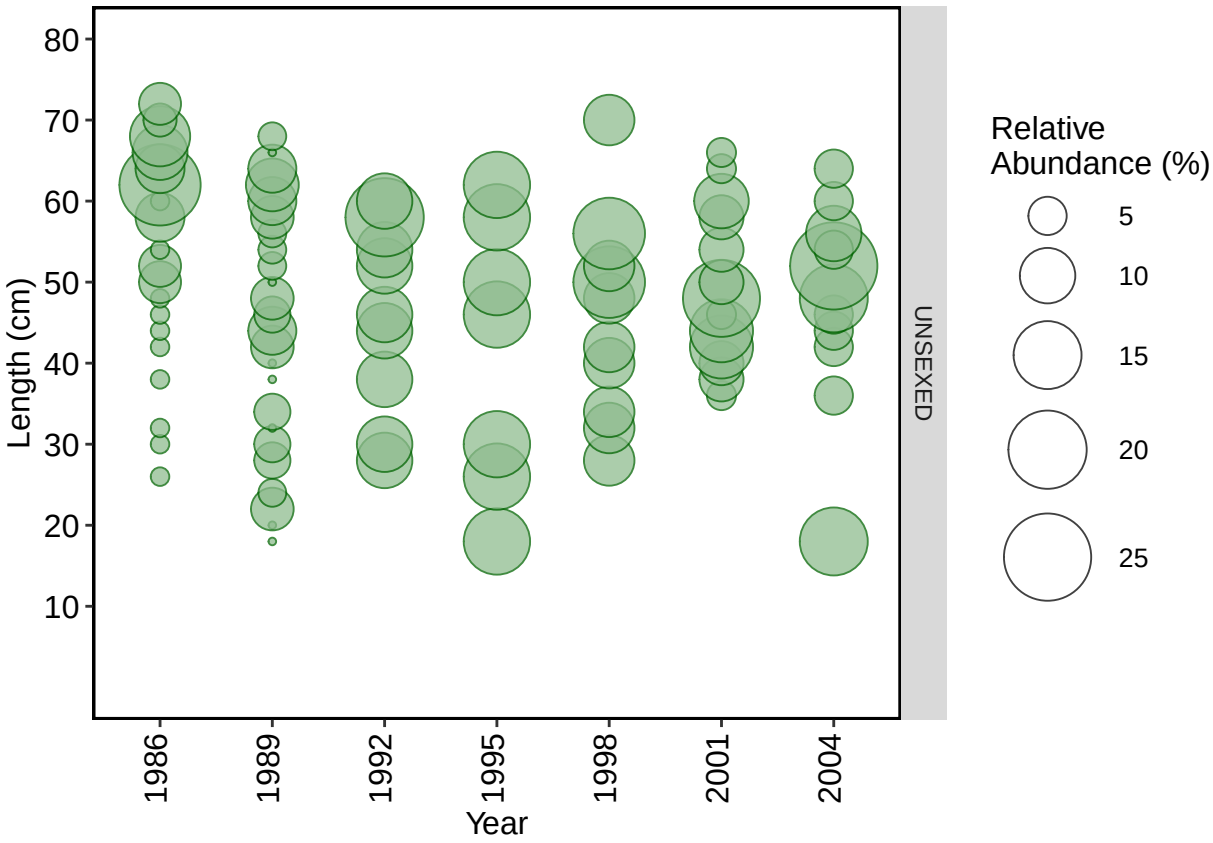
Plot index for each strata

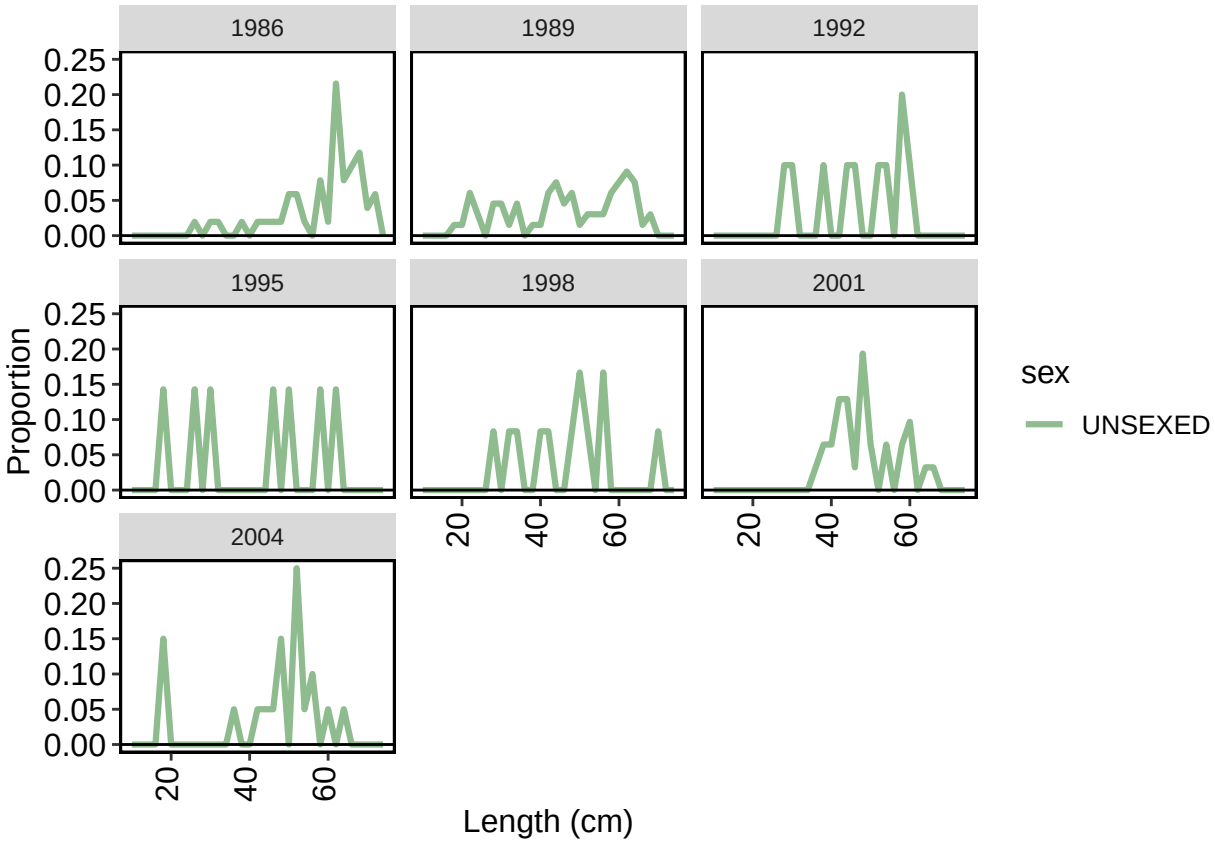
```
plot_index(
  data = biomassT,
  plot = 2)
```



Length composition data

```
# Expanded length comps are not used for the yelloweye assessment
# length_compsT <- get_expanded_comps(
#     bio_data = bioT,
#     catch_data = catchT,
#     comp_bins = seq(10, 74, 2),
#     strata = Triennial_strata,
#     comp_column_name = "length_cm",
#     output = "full_expansion_ss3_format",
#     two_sex_comps = FALSE, #single sex model
#     input_n_method = "stewart_hamel")
#
# plot_comps(
#   data = length_compsT)

raw_length_compsT <- get_raw_comps(
    data = bioT,
    comp_bins = seq(10, 74, 2),
    comp_column_name = "length_cm",
    dir = getwd(),
    printfolder = "",
    two_sex_comps = FALSE) #single sex model

plot_comps(
  data = raw_length_compsT)
```


Length (cm)
80
70
60
50
40
30
20
10
1986
1989
1992
1995
1998
2001
2004
Year
UNSEXED
Relative
Abundance (%)
5
10
15
20
25




```
## [1] TRUE
```

```
## [1] TRUE
```

```
## [1] TRUE
```

```
## [1] TRUE
```

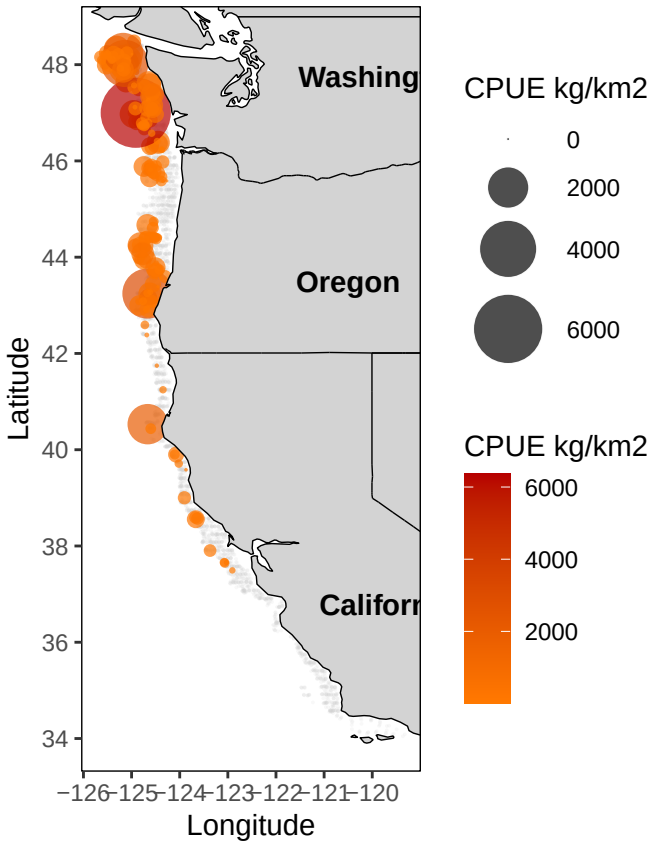
No marginal age composition data for triennial survey

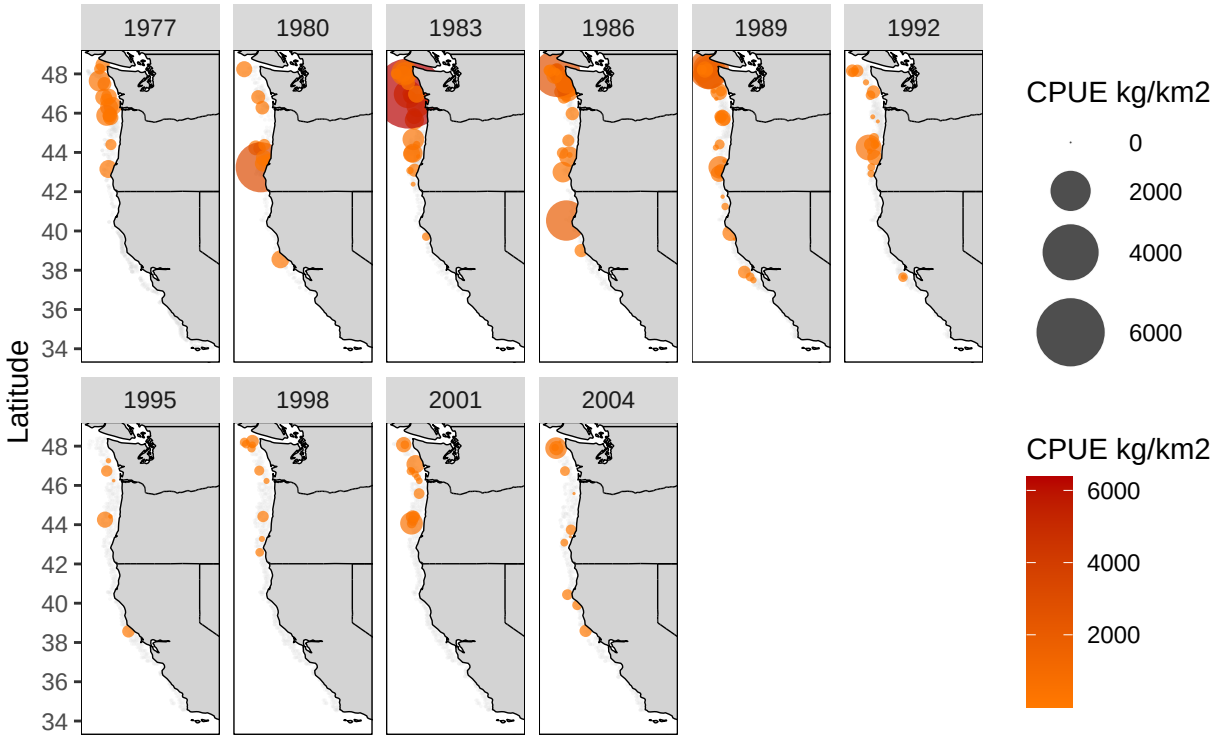
```
#no age data from Triennial survey?

#age_compsT <- get_expanded_comps(
#    bio_data = bioT,
#    catch_data = catchT,
#    comp_bins = 0:65,
#    strata = Triennial_strata,
#    comp_column_name = "age",
#    output = "full_expansion_ss3_format",
#    two_sex_comps = FALSE, #single sex model
#    input_n_method = "stewart_hamel")

#plot_comps(
#  data = age_compsT)

#raw_age_compsT <- get_raw_comps(
#    data = bioT,
#    comp_bins = 0:65,
#    comp_column_name = "age",
```

```
#    two_sex_comps = FALSE) #single sex model
```

No conditional age-at-length data for triennial survey

```
#no age data from Triennial survey?

#caalT <- SurveyAgeAtLen.fn(
#  datAL = bioT,
#  datTows = catchT,
#  strat.df = Triennial_strata,
#  lgthBins = seq(10, 74, 2),
#  ageBins = 0:65)

PlotMap.fn(
  dat = catchT)
```





Weight-Length Relationship

```
# Ian said we can just use the nwfsc.combo data and don't need to filter by the same latitudes as the i
wt_len_est <- estimate_weight_length(
  bio,
  col_length = "Length_cm",
  col_weight = "Weight_kg",
  verbose = FALSE
)

wt_len_est
```

```
##      sex median_intercept         SD            A        B
## 1 female     7.027898e-06 0.11126214 7.071533e-06 3.254269
## 2   male     7.328479e-06 0.09047821 7.358537e-06 3.233642
## 3    all     7.094611e-06 0.10339147 7.132633e-06 3.247382
```

```
plot_weight_length(
  bio,
  dir = getwd(),
  estimates = wt_len_est,
  col_length = "length_cm",
  col_weight = "weight_kg",
  two_sex = FALSE,
  add_save_name = NULL,
  height = 7,
```

```
  width = 7,
  dpi = 300
)
```

WCGOP Fisheries Discards

```
gemm_data <- pull_gemm("yelloweye rockfish",
                       dir = file.path(dirname(getwd()), "Data"),
                       verbose = TRUE)

head(gemm_data, n = 20)
```

```
##          cv           grouping                     sector            species
## 29       NA Yelloweye rockfish             At-Sea Hake CP Yelloweye Rockfish
## 166      NA Yelloweye rockfish           At-Sea Hake MSCV Yelloweye Rockfish
## 239      NA Yelloweye rockfish    California Recreational Yelloweye Rockfish
## 371      NA Yelloweye rockfish          CS - Bottom Trawl Yelloweye Rockfish
## 639      NA Yelloweye rockfish       CS EM - Bottom Trawl Yelloweye Rockfish
## 804      NA Yelloweye rockfish                CS EM - Pot Yelloweye Rockfish
## 933      NA Yelloweye rockfish                 Incidental Yelloweye Rockfish
## 1226 0.2010 Yelloweye rockfish  LE Sablefish - Hook & Line Yelloweye Rockfish
## 1313 0.7071 Yelloweye rockfish         LE Sablefish - Pot Yelloweye Rockfish
## 1393     NA Yelloweye rockfish             Midwater Hake Yelloweye Rockfish
## 1451     NA Yelloweye rockfish          Midwater Rockfish Yelloweye Rockfish
## 1648 0.1962 Yelloweye rockfish                  Nearshore Yelloweye Rockfish
## 1953 0.4029 Yelloweye rockfish OA Fixed Gear - Hook & Line Yelloweye Rockfish
## 2064     NA Yelloweye rockfish        Oregon Recreational Yelloweye Rockfish
## 2297     NA Yelloweye rockfish                  Research Yelloweye Rockfish
## 2411     NA Yelloweye rockfish           Tribal Shoreside Yelloweye Rockfish
## 2449     NA Yelloweye rockfish    Washington Recreational Yelloweye Rockfish
## 2734     NA Yelloweye rockfish    California Recreational Yelloweye Rockfish
## 2828     NA Yelloweye rockfish          CS - Bottom Trawl Yelloweye Rockfish
## 3133     NA Yelloweye rockfish       CS EM - Bottom Trawl Yelloweye Rockfish
##      total_discard_and_landings_mt total_discard_mt
## 29                     0.008090189      0.008090189
## 166                    0.005692350      0.001974691
## 239                   23.110335868     22.226033249
## 371                    0.331968730      0.032594694
## 639                    0.079833076      0.000000000
## 804                    0.000907194      0.000000000
## 933                    0.056699628      0.000000000
## 1226                   4.959751182      4.957029600
## 1313                   0.013064238      0.005353089
## 1393                   0.009554114      0.000028577
## 1451                   0.013154508      0.000000195
## 1648                   3.823393417      3.823393417
## 1953                   4.541011780      4.536022212
## 2064                  15.252869152     15.002164320
## 2297                   2.547652171      0.000000000
## 2411                   8.510387372      0.000000000
## 2449                   6.134381586      5.936130949
## 2734                  11.444385043     10.392699488
## 2828                   0.736515570      0.013035885
```

```
## 3133                   0.027669418      0.000000000
##      total_discard_with_mort_rates_applied_and_landings_mt
## 29                                               0.008090189
## 166                                              0.005692350
## 239                                              9.588233406
## 371                                              0.331968730
## 639                                              0.079833076
## 804                                              0.000907194
## 933                                              0.056699628
## 1226                                             4.959751182
## 1313                                             0.013064238
## 1393                                             0.009554114
## 1451                                             0.013154508
## 1648                                             1.785947257
## 1953                                             4.541011780
## 2064                                             3.903488643
## 2297                                             2.547652171
## 2411                                             8.510387372
## 2449                                             0.198250637
## 2734                                             3.801367438
## 2828                                             0.736515570
## 3133                                             0.027669418
##      total_discard_with_mort_rates_applied_mt total_landings_mt       type year
## 29                                0.008090189       0.000000000 groundfish 2023
## 166                               0.001974691       0.003717658 groundfish 2023
## 239                               8.703930788       0.884302619 groundfish 2023
## 371                               0.032594694       0.299374036 groundfish 2023
## 639                               0.000000000       0.079833076 groundfish 2023
## 804                               0.000000000       0.000907194 groundfish 2023
## 933                               0.000000000       0.056699628 groundfish 2023
## 1226                              4.957029600       0.002721582 groundfish 2023
## 1313                              0.005353089       0.007711149 groundfish 2023
## 1393                              0.000028577       0.009525538 groundfish 2023
## 1451                              0.000000195       0.013154314 groundfish 2023
## 1648                              1.785947257       0.000000000 groundfish 2023
## 1953                              4.536022212       0.004989567 groundfish 2023
## 2064                              3.652783811       0.250704832 groundfish 2023
## 2297                              0.000000000       0.000000000 groundfish 2023
## 2411                              0.000000000       8.510387372 groundfish 2023
## 2449                              0.000000000       0.198250637 groundfish 2023
## 2734                              2.749681884       1.051685555 groundfish 2022
## 2828                              0.013035885       0.723479685 groundfish 2022
## 3133                              0.000000000       0.027669418 groundfish 2022
```