# Dredge output summary

#### South Coast Model selection

Full Model

OtoWidth ~ s(Ages) + SST\_South\_Months\_Jun + FinSouthSST\_AnnEsts +

FSLdat\_Autumn + FSL\_months\_Jan + FSL\_months\_Apr + FSL\_months\_May +

FSL\_months\_Oct + FinFSLdat\_AnnEsts + FinFSLdat\_SummerDat +

FinFSLdat\_SpringDat

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Intercept | df | logLik | AICc | delta | weight |
| 1016 | 13.77889 | 13 | -2249.314822 | 4525.045643 | 0 | 0.140486446 |
| 1024 | 6.157636 | 14 | -2248.639945 | 4525.760438 | 0.714795115 | 0.098269476 |
| 2040 | 9.422976 | 14 | -2249.094089 | 4526.668727 | 1.6230838 | 0.062400239 |
| 952 | 13.80007 | 12 | -2251.624166 | 4527.604496 | 2.558852808 | 0.039082884 |
| 984 | 13.72698 | 12 | -2251.633689 | 4527.623542 | 2.577898548 | 0.038712469 |
| 2048 | 4.489016 | 15 | -2248.6316 | 4527.813027 | 2.767384094 | 0.035213128 |
| 992 | 5.451138 | 13 | -2250.846553 | 4528.109106 | 3.063462679 | 0.030367704 |
| 1000 | 13.35923 | 12 | -2251.908347 | 4528.172858 | 3.127214156 | 0.029414976 |
| 960 | 6.192509 | 13 | -2250.949758 | 4528.315516 | 3.269872958 | 0.027389906 |
| 1008 | 5.454766 | 13 | -2251.182292 | 4528.780584 | 3.734940211 | 0.021707133 |

|  |  |
| --- | --- |
|  | x |
| FinFSLdat\_AnnEsts | 1 |
| FinFSLdat\_SpringDat | 2 |
| FinFSLdat\_SummerDat | 3 |
| FinSouthSST\_AnnEsts | 4 |
| FSL\_months\_Apr | 5 |
| FSL\_months\_Jan | 6 |
| FSL\_months\_May | 7 |
| FSL\_months\_Oct | 8 |
| FSLdat\_Autumn | 9 |
| s(Ages) | 10 |
| SST\_South\_Months\_Jun | 11 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Model Description | df | logLik | AICc | Delta | Weight |
| 1/2/3/5/6/7/8/9/10 | 13 | -2249.31 | 4525.046 | 0 | 0.155682 |
| 1/2/3/4/5/6/7/8/9/10 | 14 | -2248.64 | 4525.76 | 0.714795 | 0.108899 |
| 1/2/3/5/6/7/8/9/10/11 | 14 | -2249.09 | 4526.669 | 1.623084 | 0.06915 |
| 1/2/3/5/6/8/9/10 | 12 | -2251.62 | 4527.604 | 2.558853 | 0.04331 |
| 1/2/3/5/7/8/9/10 | 12 | -2251.63 | 4527.624 | 2.577899 | 0.0429 |
| 1/2/3/4/5/6/7/8/9/10/11 | 15 | -2248.63 | 4527.813 | 2.767384 | 0.039022 |
| 1/2/3/4/5/7/8/9/10 | 13 | -2250.85 | 4528.109 | 3.063463 | 0.033652 |
| 1/2/3/6/7/8/9/10 | 12 | -2251.91 | 4528.173 | 3.127214 | 0.032597 |
| 1/2/3/4/5/6/8/9/10 | 13 | -2250.95 | 4528.316 | 3.269873 | 0.030353 |
| 1/2/3/4/6/7/8/9/10 | 13 | -2251.18 | 4528.781 | 3.73494 | 0.024055 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Estimate | Std. Error | Adjusted SE | Lower CI | Upper CI |
| (Intercept) | 9.592838 | 6.49262 | 6.49854 | -3.14407 | 22.32974 |
| FinFSLdat\_AnnEsts | 10.67145 | 5.392762 | 5.399581 | 0.088467 | 21.25444 |
| FinFSLdat\_SpringDat | -1.74487 | 2.245597 | 2.248602 | -6.15205 | 2.662305 |
| FinFSLdat\_SummerDat | 3.832708 | 3.831207 | 3.83621 | -3.68613 | 11.35154 |
| FSL\_months\_Apr | 2.793408 | 3.949153 | 3.954475 | -4.95722 | 10.54404 |
| FSL\_months\_Jan | -1.5671 | 3.177882 | 3.181902 | -7.80352 | 4.66931 |
| FSL\_months\_May | -0.55474 | 3.896439 | 3.901643 | -8.20182 | 7.092342 |
| FSL\_months\_Oct | -4.12948 | 3.492429 | 3.497183 | -10.9838 | 2.724872 |
| FSLdat\_Autumn | -4.55976 | 7.284956 | 7.294482 | -18.8567 | 9.737162 |
| s(Ages).1 | 9.287207 | 1.220236 | 1.221929 | 6.892271 | 11.68214 |
| s(Ages).2 | -13.1347 | 3.017681 | 3.02187 | -19.0575 | -7.21194 |
| s(Ages).3 | -7.81222 | 0.988776 | 0.990147 | -9.75287 | -5.87157 |
| s(Ages).4 | 8.203442 | 2.126316 | 2.129268 | 4.030154 | 12.37673 |
| s(Ages).5 | 6.36822 | 1.055251 | 1.056714 | 4.297098 | 8.439342 |
| s(Ages).6 | -7.54738 | 1.929301 | 1.931979 | -11.334 | -3.76077 |
| s(Ages).7 | 5.346713 | 1.204502 | 1.206174 | 2.982655 | 7.710771 |
| s(Ages).8 | -20.4197 | 6.277833 | 6.286548 | -32.7411 | -8.09828 |
| s(Ages).9 | -9.14745 | 2.165826 | 2.168833 | -13.3983 | -4.89662 |
| FinSouthSST\_AnnEsts | 0.466964 | 0.447634 | 0.448247 | -0.41158 | 1.345512 |
| SST\_South\_Months\_Jun | 0.291511 | 0.287079 | 0.287468 | -0.27192 | 0.854939 |

|  |  |
| --- | --- |
|  | x |
| (Intercept) | 9.592838 |
| FinFSLdat\_AnnEsts | 10.67145 |
| FinFSLdat\_SpringDat | -1.74487 |
| FinFSLdat\_SummerDat | 3.497001 |
| FSL\_months\_Apr | 2.365203 |
| FSL\_months\_Jan | -1.2754 |
| FSL\_months\_May | -0.44744 |
| FSL\_months\_Oct | -3.70307 |
| FSLdat\_Autumn | -4.20726 |
| s(Ages).1 | 9.287207 |
| s(Ages).2 | -13.1347 |
| s(Ages).3 | -7.81222 |
| s(Ages).4 | 8.203442 |
| s(Ages).5 | 6.36822 |
| s(Ages).6 | -7.54738 |
| s(Ages).7 | 5.346713 |
| s(Ages).8 | -20.4197 |
| s(Ages).9 | -9.14745 |
| FinSouthSST\_AnnEsts | 0.186698 |
| SST\_South\_Months\_Jun | 0.081426 |

summary(aa)

Call:

model.avg.model.selection(object = a, subset = delta <= 8)

Component models:

df logLik AICc Delta Weight

1/2/3/5/6/7/8/9/10 13 -2249.31 4525.05 0.00 0.16

1/2/3/4/5/6/7/8/9/10 14 -2248.64 4525.76 0.71 0.11

1/2/3/5/6/7/8/9/10/11 14 -2249.09 4526.67 1.62 0.07

1/2/3/5/6/8/9/10 12 -2251.62 4527.60 2.56 0.04

1/2/3/5/7/8/9/10 12 -2251.63 4527.62 2.58 0.04

1/2/3/4/5/6/7/8/9/10/11 15 -2248.63 4527.81 2.77 0.04

1/2/3/4/5/7/8/9/10 13 -2250.85 4528.11 3.06 0.03

1/2/3/6/7/8/9/10 12 -2251.91 4528.17 3.13 0.03

1/2/3/4/5/6/8/9/10 13 -2250.95 4528.32 3.27 0.03

1/2/3/4/6/7/8/9/10 13 -2251.18 4528.78 3.73 0.02

1/2/3/5/6/7/9/10 12 -2252.31 4528.97 3.92 0.02

1/2/5/6/7/8/9/10 12 -2252.33 4529.02 3.98 0.02

1/2/3/5/7/8/9/10/11 13 -2251.33 4529.07 4.03 0.02

1/2/3/5/6/8/9/10/11 13 -2251.41 4529.24 4.20 0.02

1/2/4/5/6/7/8/9/10 13 -2251.45 4529.32 4.28 0.02

1/2/3/5/6/7/8/10 12 -2252.50 4529.36 4.32 0.02

1/2/3/4/5/6/7/9/10 13 -2251.60 4529.62 4.57 0.02

1/2/3/6/7/8/9/10/11 13 -2251.65 4529.71 4.66 0.02

1/2/3/5/6/7/9/10/11 13 -2251.75 4529.92 4.87 0.01

1/2/3/4/5/6/7/8/10 13 -2251.80 4530.02 4.97 0.01

1/2/3/4/5/7/8/9/10/11 14 -2250.81 4530.11 5.06 0.01

1/2/3/5/8/9/10 11 -2253.94 4530.18 5.13 0.01

1/2/5/6/7/8/9/10/11 13 -2251.90 4530.22 5.17 0.01

1/2/3/4/5/6/8/9/10/11 14 -2250.95 4530.38 5.33 0.01

1/2/3/4/5/8/9/10 12 -2253.15 4530.65 5.61 0.01

1/2/3/6/8/9/10 11 -2254.18 4530.66 5.61 0.01

1/2/3/4/6/7/8/9/10/11 14 -2251.16 4530.79 5.75 0.01

1/2/3/7/8/9/10 11 -2254.26 4530.83 5.78 0.01

1/2/3/6/7/8/10 11 -2254.39 4531.09 6.04 0.01

1/2/3/4/5/6/7/9/10/11 14 -2251.33 4531.15 6.10 0.01

1/2/3/4/7/8/9/10 12 -2253.41 4531.17 6.12 0.01

1/2/4/5/6/7/8/9/10/11 14 -2251.35 4531.18 6.13 0.01

1/2/3/5/6/7/8/10/11 13 -2252.41 4531.23 6.18 0.01

1/2/3/4/6/8/9/10 12 -2253.44 4531.24 6.19 0.01

1/2/3/5/7/9/10 11 -2254.52 4531.35 6.30 0.01

1/2/3/5/6/9/10 11 -2254.62 4531.54 6.49 0.01

1/2/5/6/8/9/10 11 -2254.66 4531.62 6.57 0.01

1/2/3/5/8/9/10/11 12 -2253.63 4531.62 6.58 0.01

1/2/3/4/6/7/8/10 12 -2253.67 4531.69 6.65 0.01

1/2/3/5/6/8/10 11 -2254.70 4531.70 6.65 0.01

1/2/3/4/5/7/9/10 12 -2253.74 4531.83 6.78 0.01

1/2/4/5/6/8/9/10 12 -2253.77 4531.90 6.85 0.01

1/2/3/5/7/8/10 11 -2254.81 4531.92 6.87 0.01

1/2/3/6/8/9/10/11 12 -2253.87 4532.09 7.04 0.00

1/2/3/7/8/9/10/11 12 -2253.90 4532.16 7.12 0.00

1/2/3/5/7/9/10/11 12 -2253.90 4532.17 7.12 0.00

1/2/3/4/5/6/9/10 12 -2253.91 4532.19 7.14 0.00

1/2/3/4/5/6/7/8/10/11 14 -2251.89 4532.26 7.22 0.00

1/2/3/4/5/6/8/10 12 -2253.96 4532.28 7.23 0.00

1/2/6/7/8/9/10 11 -2255.01 4532.33 7.28 0.00

1/2/3/4/5/7/8/10 12 -2254.00 4532.35 7.30 0.00

1/2/3/6/7/9/10 11 -2255.03 4532.37 7.32 0.00

1/2/4/6/7/8/9/10 12 -2254.05 4532.45 7.41 0.00

1/2/3/5/6/9/10/11 12 -2254.07 4532.49 7.44 0.00

1/2/5/6/7/9/10 11 -2255.11 4532.53 7.49 0.00

1/2/3/4/5/8/9/10/11 13 -2253.12 4532.65 7.60 0.00

1/2/5/6/8/9/10/11 12 -2254.21 4532.77 7.72 0.00

1/2/4/5/6/7/9/10 12 -2254.24 4532.84 7.79 0.00

1/2/3/4/6/7/9/10 12 -2254.26 4532.87 7.83 0.00

1/2/3/6/7/8/10/11 12 -2254.27 4532.90 7.85 0.00

Term codes:

FinFSLdat\_AnnEsts FinFSLdat\_SpringDat FinFSLdat\_SummerDat FinSouthSST\_AnnEsts FSL\_months\_Apr

1 2 3 4 5

FSL\_months\_Jan FSL\_months\_May FSL\_months\_Oct FSLdat\_Autumn s(Ages)

6 7 8 9 10

SST\_South\_Months\_Jun

11

Model-averaged coefficients:

Estimate Std. Error Adjusted SE z value Pr(>|z|)

(Intercept) 9.5928 6.4926 6.4985 1.476 0.139903

FinFSLdat\_AnnEsts 10.6715 5.3928 5.3996 1.976 0.048115

FinFSLdat\_SpringDat -1.7449 2.2456 2.2486 0.776 0.437760

FinFSLdat\_SummerDat 3.8327 3.8312 3.8362 0.999 0.317752

FSL\_months\_Apr 2.7934 3.9492 3.9545 0.706 0.479945

FSL\_months\_Jan -1.5671 3.1779 3.1819 0.493 0.622362

FSL\_months\_May -0.5547 3.8964 3.9016 0.142 0.886937

FSL\_months\_Oct -4.1295 3.4924 3.4972 1.181 0.237681

FSLdat\_Autumn -4.5598 7.2850 7.2945 0.625 0.531907

s(Ages).1 9.2872 1.2202 1.2219 7.600 < 2e-16

s(Ages).2 -13.1347 3.0177 3.0219 4.347 1.38e-05

s(Ages).3 -7.8122 0.9888 0.9901 7.890 < 2e-16

s(Ages).4 8.2034 2.1263 2.1293 3.853 0.000117

s(Ages).5 6.3682 1.0553 1.0567 6.026 < 2e-16

s(Ages).6 -7.5474 1.9293 1.9320 3.907 9.36e-05

s(Ages).7 5.3467 1.2045 1.2062 4.433 9.30e-06

s(Ages).8 -20.4197 6.2778 6.2865 3.248 0.001162

s(Ages).9 -9.1474 2.1658 2.1688 4.218 2.47e-05

FinSouthSST\_AnnEsts 0.4670 0.4476 0.4482 1.042 0.297525

SST\_South\_Months\_Jun 0.2915 0.2871 0.2875 1.014 0.310553

Full model-averaged coefficients (with shrinkage):

Estimate Std. Error Adjusted SE z value Pr(>|z|)

(Intercept) 9.59284 6.49262 6.49854 1.476 0.139903

FinFSLdat\_AnnEsts 10.67145 5.39276 5.39958 1.976 0.048115 \*

FinFSLdat\_SpringDat -1.74487 2.24560 2.24860 0.776 0.437760

FinFSLdat\_SummerDat 3.49700 3.81660 3.82119 0.915 0.360107

FSL\_months\_Apr 2.36520 3.77066 3.77538 0.626 0.531000

FSL\_months\_Jan -1.27540 2.93106 2.93461 0.435 0.663848

FSL\_months\_May -0.44744 3.50623 3.51090 0.127 0.898590

FSL\_months\_Oct -3.70307 3.53788 3.54209 1.045 0.295817

FSLdat\_Autumn -4.20726 7.10288 7.11189 0.592 0.554132

s(Ages).1 9.28721 1.22024 1.22193 7.600 < 2e-16 \*\*\*

s(Ages).2 -13.13470 3.01768 3.02187 4.347 1.38e-05 \*\*\*

s(Ages).3 -7.81222 0.98878 0.99015 7.890 < 2e-16 \*\*\*

s(Ages).4 8.20344 2.12632 2.12927 3.853 0.000117 \*\*\*

s(Ages).5 6.36822 1.05525 1.05671 6.026 < 2e-16 \*\*\*

s(Ages).6 -7.54738 1.92930 1.93198 3.907 9.36e-05 \*\*\*

s(Ages).7 5.34671 1.20450 1.20617 4.433 9.30e-06 \*\*\*

s(Ages).8 -20.41969 6.27783 6.28655 3.248 0.001162 \*\*

s(Ages).9 -9.14745 2.16583 2.16883 4.218 2.47e-05 \*\*\*

FinSouthSST\_AnnEsts 0.18670 0.36392 0.36422 0.513 0.608235

SST\_South\_Months\_Jun 0.08143 0.20032 0.20047 0.406 0.684617

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Relative variable importance:

FinFSLdat\_AnnEsts FinFSLdat\_SpringDat s(Ages) FSLdat\_Autumn FinFSLdat\_SummerDat FSL\_months\_Oct

Importance: 1.00 1.00 1.00 0.92 0.91 0.90

N containing models: 60 60 49 27 43 44

FSL\_months\_Apr FSL\_months\_Jan FSL\_months\_May FinSouthSST\_AnnEsts SST\_South\_Months\_Jun

Importance: 0.85 0.81 0.81 0.40 0.28

N containing models: 41 46 49 60 22

head(aa[[1]])

df logLik AICc Delta Weight

1/2/3/5/6/7/8/9/10 13 -2249.315 4525.046 0.0000000 0.15568204

1/2/3/4/5/6/7/8/9/10 14 -2248.640 4525.760 0.7147951 0.10889871

1/2/3/5/6/7/8/9/10/11 14 -2249.094 4526.669 1.6230838 0.06914971

1/2/3/5/6/8/9/10 12 -2251.624 4527.604 2.5588528 0.04331025

1/2/3/5/7/8/9/10 12 -2251.634 4527.624 2.5778985 0.04289977

1/2/3/4/5/6/7/8/9/10/11 15 -2248.632 4527.813 2.7673841 0.03902193

> aa[[2]]

FinFSLdat\_AnnEsts FinFSLdat\_SpringDat FinFSLdat\_SummerDat FinSouthSST\_AnnEsts FSL\_months\_Apr

1 2 3 4 5

FSL\_months\_Jan FSL\_months\_May FSL\_months\_Oct FSLdat\_Autumn s(Ages)

6 7 8 9 10

SST\_South\_Months\_Jun

11

> head(aa[[3]])

Estimate Std. Error Adjusted SE Lower CI Upper CI

(Intercept) 9.592838 6.492620 6.498540 -3.14406696 22.329742

FinFSLdat\_AnnEsts 10.671452 5.392762 5.399581 0.08846739 21.254438

FinFSLdat\_SpringDat -1.744873 2.245597 2.248602 -6.15205082 2.662305

FinFSLdat\_SummerDat 3.832708 3.831207 3.836210 -3.68612624 11.351542

FSL\_months\_Apr 2.793408 3.949153 3.954475 -4.95722126 10.544037

FSL\_months\_Jan -1.567104 3.177882 3.181902 -7.80351716 4.669310

> aa[[4]]

(Intercept) FinFSLdat\_AnnEsts FinFSLdat\_SpringDat FinFSLdat\_SummerDat FSL\_months\_Apr

9.59283767 10.67145246 -1.74487273 3.49700056 2.36520323

FSL\_months\_Jan FSL\_months\_May FSL\_months\_Oct FSLdat\_Autumn s(Ages).1

-1.27540038 -0.44744039 -3.70306689 -4.20725657 9.28720732

s(Ages).2 s(Ages).3 s(Ages).4 s(Ages).5 s(Ages).6

-13.13469892 -7.81221994 8.20344156 6.36821955 -7.54738029

s(Ages).7 s(Ages).8 s(Ages).9 FinSouthSST\_AnnEsts SST\_South\_Months\_Jun

5.34671323 -20.41968601 -9.14744987 0.18669845 0.08142603

> aa[[6]]

FinFSLdat\_AnnEsts FinFSLdat\_SpringDat s(Ages) FSLdat\_Autumn FinFSLdat\_SummerDat

1.0000000 1.0000000 1.0000000 0.9226926 0.9124099

FSL\_months\_Oct FSL\_months\_Apr FSL\_months\_Jan FSL\_months\_May FinSouthSST\_AnnEsts

0.8967391 0.8467089 0.8138583 0.8065791 0.3998138

SST\_South\_Months\_Jun

0.2793241

attr(,"n.models")

FinFSLdat\_AnnEsts FinFSLdat\_SpringDat FinFSLdat\_SummerDat FinSouthSST\_AnnEsts FSL\_months\_Apr

60 60 49 27 43

FSL\_months\_Jan FSL\_months\_May FSL\_months\_Oct FSLdat\_Autumn s(Ages)

44 41 46 49 60

SST\_South\_Months\_Jun

22

attr(,"class")

[1] "importance" "numeric"

> aa[[7]]

[1] FALSE

> aa[[8]]

[1] "(Intercept)" "FinFSLdat\_AnnEsts" "FinFSLdat\_SpringDat" "FinFSLdat\_SummerDat" "FSL\_months\_Apr"

[6] "FSL\_months\_Jan" "FSL\_months\_May" "FSL\_months\_Oct" "FSLdat\_Autumn" "s(Ages).1"

[11] "s(Ages).2" "s(Ages).3" "s(Ages).4" "s(Ages).5" "s(Ages).6"

[16] "s(Ages).7" "s(Ages).8" "s(Ages).9" "FinSouthSST\_AnnEsts" "SST\_South\_Months\_Jun"

> aa[[9]]

NULL

> head(aa[[10]])

NULL

> head(aa[[11]])

OtoWidth ~ s(Ages) + SST\_South\_Months\_Jun + FinSouthSST\_AnnEsts +

FSLdat\_Autumn + FSL\_months\_Jan + FSL\_months\_Apr + FSL\_months\_May +

FSL\_months\_Oct + FinFSLdat\_AnnEsts + FinFSLdat\_SummerDat +

FinFSLdat\_SpringDat

> head(aa[[12]])

model.avg.model.selection(object = a, subset = delta <= 8)

> head(aa[[13]])

Estimate Std. Error Adjusted SE z value Pr(>|z|)

(Intercept) 9.592838 6.492620 6.498540 1.4761527 0.1399029

FinFSLdat\_AnnEsts 10.671452 5.392762 5.399581 1.9763481 0.0481154

FinFSLdat\_SpringDat -1.744873 2.245597 2.248602 0.7759813 0.4377600

FinFSLdat\_SummerDat 3.832708 3.831207 3.836210 0.9990870 0.3177525

FSL\_months\_Apr 2.793408 3.949153 3.954475 0.7063915 0.4799447

FSL\_months\_Jan -1.567104 3.177882 3.181902 0.4925053 0.6223621

> head(aa[[14]])

Estimate Std. Error Adjusted SE z value Pr(>|z|)

(Intercept) 9.592838 6.492620 6.498540 1.4761527 0.1399029

FinFSLdat\_AnnEsts 10.671452 5.392762 5.399581 1.9763481 0.0481154

FinFSLdat\_SpringDat -1.744873 2.245597 2.248602 0.7759813 0.4377600

FinFSLdat\_SummerDat 3.497001 3.816603 3.821185 0.9151612 0.3601070

FSL\_months\_Apr 2.365203 3.770663 3.775383 0.6264803 0.5309999

FSL\_months\_Jan -1.275400 2.931065 2.934612 0.4346061 0.6638483

> aa[[15]]

(Intercept) FinFSLdat\_AnnEsts FinFSLdat\_SpringDat FinFSLdat\_SummerDat FSL\_months\_Apr

60 60 60 49 43

FSL\_months\_Jan FSL\_months\_May FSL\_months\_Oct FSLdat\_Autumn s(Ages).1

44 41 46 49 60

s(Ages).2 s(Ages).3 s(Ages).4 s(Ages).5 s(Ages).6

60 60 60 60 60

s(Ages).7 s(Ages).8 s(Ages).9 FinSouthSST\_AnnEsts SST\_South\_Months\_Jun

60 60 60 27 22

#### West Coast Model selection

bb[[11]]

OtoWidth ~ s(Ages) + WestSST\_Winter + WestSST\_Spring + SST\_West\_Months\_Jun +

SST\_West\_Months\_Jul + SST\_West\_Months\_Sep + SST\_West\_Months\_Oct +

FinWestSST\_AnnEsts + FinWestSST\_SummerDat + FSLdat\_Spring +

FSL\_months\_Apr + FinFSLdat\_AnnEsts

summary(bb)

Call:

model.avg.model.selection(object = b, subset = delta <= 8)

Component models:

df logLik AICc Delta Weight

1/2/4/5/6/10/11 11 -3291.65 6605.52 0.00 0.06

1/2/4/5/6/9/10/11 12 -3290.96 6606.19 0.67 0.04

1/2/4/5/6/11 10 -3293.23 6606.64 1.12 0.03

1/2/3/4/5/6/10/11 12 -3291.51 6607.29 1.77 0.02

1/2/4/5/6/10/11/12 12 -3291.54 6607.35 1.83 0.02

1/2/4/5/6 9 -3294.60 6607.36 1.83 0.02

1/2/4/5/6/7/10/11/12 13 -3290.75 6607.81 2.29 0.02

1/2/3/4/5/6/9/10/11 13 -3290.79 6607.89 2.37 0.02

1/2/4/5/6/7/10/11 12 -3291.84 6607.95 2.43 0.02

1/2/3/4/5/6/11 11 -3292.91 6608.05 2.52 0.02

1/2/4/5/6/9/10/11/12 13 -3290.88 6608.08 2.55 0.02

1/2/4/5/6/8/10/11 12 -3291.95 6608.17 2.64 0.02

1/2/4/5/6/7/8/10/11/12 14 -3289.98 6608.32 2.80 0.01

1/2/4/5/6/9/11 11 -3293.09 6608.42 2.89 0.01

1/2/4/5/6/7/9/10/11/12 14 -3290.05 6608.47 2.95 0.01

1/2/4/5/6/7/9/10/11 13 -3291.08 6608.48 2.95 0.01

1/2/4/5/6/7/11 11 -3293.13 6608.49 2.96 0.01

1/2/4/5/6/11/12 11 -3293.18 6608.59 3.07 0.01

1/2/4/5/6/7/12 11 -3293.23 6608.69 3.16 0.01

1/2/4/5/6/8/9/10/11 13 -3291.27 6608.86 3.33 0.01

1/2/4/5/6/7 10 -3294.38 6608.95 3.42 0.01

1/2/4/5/6/7/8/10/12 13 -3291.36 6609.03 3.50 0.01

1/2/4/5/6/7/10/12 12 -3292.40 6609.07 3.55 0.01

1/2/3/4/5/6/10/11/12 13 -3291.42 6609.15 3.63 0.01

1/2/4/5/6/7/11/12 12 -3292.45 6609.17 3.65 0.01

1/2/4/5/6/7/8/9/10/11/12 15 -3289.38 6609.19 3.66 0.01

1/2/4/5/6/8/10/11/12 13 -3291.48 6609.27 3.75 0.01

1/2/4/5/6/7/8/12 12 -3292.50 6609.28 3.76 0.01

1/2/4/5/6/10 10 -3294.62 6609.43 3.91 0.01

1/2/3/4/5/6/7/10/11/12 14 -3290.54 6609.44 3.92 0.01

1/2/3/4/5/6 10 -3294.66 6609.51 3.98 0.01

1/2/4/5/6/9 10 -3294.68 6609.55 4.03 0.01

1/2/4/5/6/12 10 -3294.69 6609.57 4.04 0.01

1/2/3/4/5/6/7/10/11 13 -3291.65 6609.61 4.09 0.01

1/2/4/5/6/8/11 11 -3293.70 6609.64 4.11 0.01

1/2/3/4/5/6/7/11 12 -3292.73 6609.73 4.21 0.01

1/2/3/4/5/6/9/11 12 -3292.73 6609.74 4.21 0.01

1/2/3/4/5/6/9/10/11/12 14 -3290.71 6609.79 4.27 0.01

1/2/3/4/5/6/7/8/10/11/12 15 -3289.71 6609.84 4.31 0.01

1/2/4/5/6/8/9/10/11/12 14 -3290.75 6609.86 4.33 0.01

1/2/4/5/6/7/8/11/12 13 -3291.81 6609.93 4.41 0.01

1/2/3/4/5/6/8/10/11 13 -3291.83 6609.97 4.45 0.01

1/2/3/4/5/6/11/12 12 -3292.85 6609.98 4.45 0.01

1/2/4/5/6/7/9/11 12 -3292.85 6609.98 4.46 0.01

1/2/3/4/5/6/7/9/10/11/12 15 -3289.79 6610.00 4.47 0.01

1/2/3/4/5/6/7/9/10/11 14 -3290.83 6610.03 4.51 0.01

1/2/4/5/6/8 10 -3294.97 6610.14 4.62 0.01

1/2/3/4/5/6/7/12 12 -3292.95 6610.18 4.66 0.01

1/2/4/5/6/9/11/12 12 -3292.96 6610.19 4.66 0.01

1/4/5/6/7/10/12 11 -3294.04 6610.31 4.78 0.01

1/2/3/4/5/6/7/11/12 13 -3292.01 6610.33 4.81 0.01

1/2/5/6/10/11 10 -3295.08 6610.35 4.83 0.01

1/2/4/5/6/7/8/10/11 13 -3292.03 6610.37 4.85 0.01

1/2/4/5/6/8/11/12 12 -3293.09 6610.45 4.93 0.01

1/2/3/4/5/6/7/8/12 13 -3292.09 6610.50 4.98 0.01

1/2/5/6 8 -3297.21 6610.54 5.01 0.00

1/2/3/4/5/6/8/9/10/11 14 -3291.11 6610.59 5.07 0.00

1/2/3/4/5/6/7/8/9/10/11/12 16 -3289.07 6610.62 5.10 0.00

1/2/3/4/5/6/7/8/10/12 14 -3291.17 6610.70 5.18 0.00

1/4/5/6/7/8/10/12 12 -3293.22 6610.72 5.19 0.00

1/2/4/5/6/7/9/11/12 13 -3292.21 6610.75 5.22 0.00

1/2/4/5/6/7/8/9/10/11 14 -3291.26 6610.88 5.36 0.00

1/2/5/6/9/10/11 11 -3294.33 6610.89 5.37 0.00

1/2/3/4/5/6/7/10/12 13 -3292.30 6610.92 5.40 0.00

1/2/3/4/5/6/7/8/11/12 14 -3291.29 6610.95 5.43 0.00

1/2/3/4/5/6/7 11 -3294.37 6610.97 5.44 0.00

1/2/4/5/6/8/12 11 -3294.38 6610.99 5.46 0.00

1/2/4/6/10/11 10 -3295.41 6611.01 5.48 0.00

1/2/3/4/5/6/8/11 12 -3293.39 6611.05 5.52 0.00

1/2/3/4/5/6/8/10/11/12 14 -3291.35 6611.06 5.53 0.00

1/2/3/4/5/6/7/9/11 13 -3292.37 6611.06 5.54 0.00

1/2/4/5/6/10/12 11 -3294.45 6611.13 5.61 0.00

1/2/4/5/6/7/10 11 -3294.46 6611.14 5.62 0.00

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1/2/4/6/11 9 -3296.52 6611.19 5.67 0.00

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1/2/5/6/7 9 -3296.70 6611.55 6.02 0.00

1/2/3/4/5/6/8/9/10/11/12 15 -3290.57 6611.55 6.03 0.00

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1/2/3/4/5/6/12 11 -3294.73 6611.70 6.18 0.00

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1/2/3/5/6/11 10 -3295.83 6611.85 6.33 0.00

1/3/4/5/6/7/10/12 12 -3293.81 6611.89 6.37 0.00

1/2/5/6/7/10/12 11 -3294.86 6611.95 6.43 0.00

1/2/4/5/6/8/9/11/12 13 -3292.82 6611.96 6.43 0.00

1/4/5/6/7/8/10/11/12 13 -3292.83 6611.99 6.46 0.00

1/2/5/6/7/10/11/12 12 -3293.88 6612.03 6.50 0.00

1/2/3/5/6 9 -3296.94 6612.04 6.52 0.00

1/2/3/4/5/6/7/8/10/11 14 -3291.84 6612.05 6.53 0.00

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1/2/5/6/7/12 10 -3295.94 6612.08 6.55 0.00

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1/4/5/6/7/12 10 -3296.13 6612.45 6.93 0.00

1/2/3/4/5/6/7/8/9/10/11 15 -3291.02 6612.45 6.93 0.00

1/2/4/5/6/8/9 11 -3295.12 6612.46 6.94 0.00

1/2/5/6/7/9/10/11/12 13 -3293.09 6612.49 6.96 0.00

1/2/3/4/5/6/7/8/9/11/12 15 -3291.04 6612.50 6.98 0.00

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1/2/3/4/5/6/8/9/11 13 -3293.20 6612.72 7.20 0.00

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1/4/5/6/7/10 10 -3296.27 6612.73 7.21 0.00

1/2/3/4/6/9/10/11 12 -3294.25 6612.77 7.24 0.00

1/2/4/5/6/7/8/9/11 13 -3293.23 6612.78 7.26 0.00

1/2/5/6/12 9 -3297.32 6612.80 7.28 0.00

1/2/4/6/7/11 10 -3296.31 6612.80 7.28 0.00

1/3/4/5/6/7 10 -3296.31 6612.82 7.30 0.00

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1/2/3/5/6/7/11 11 -3295.30 6612.83 7.30 0.00

1/4/5/6/10 9 -3297.34 6612.84 7.31 0.00

1/2/5/6/7/8/10/11/12 13 -3293.26 6612.85 7.32 0.00

1/2/4/6/7/10/11/12 12 -3294.31 6612.89 7.37 0.00

1/2/4/6/9/11 10 -3296.35 6612.90 7.38 0.00

1/3/4/5/6/7/12 11 -3295.34 6612.91 7.39 0.00

1/2/4/6/10/11/12 11 -3295.34 6612.92 7.39 0.00

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1/4/5/6/7/8/9/10/12 13 -3293.32 6612.95 7.43 0.00

1/2/4/5/6/9/10/12 12 -3294.36 6612.98 7.46 0.00

1/2/3/4/5/6/7/8 12 -3294.36 6612.99 7.47 0.00

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1/2/3/5/6/7/10/11 12 -3294.38 6613.03 7.51 0.00

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1/2/3/5/6/7 10 -3296.43 6613.05 7.52 0.00

1/2/3/4/5/6/7/8/9/12 14 -3292.35 6613.06 7.54 0.00

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1/2/4/6/7/10/11 11 -3295.48 6613.18 7.66 0.00

1/2/3/4/5/6/8/9/11/12 14 -3292.41 6613.19 7.66 0.00

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1/2/5/6/7/11/12 11 -3295.49 6613.22 7.69 0.00

1/2/3/4/5/6/7/8/9/10/12 15 -3291.40 6613.23 7.70 0.00

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1/2/3/5/6/7/8/12 12 -3294.50 6613.26 7.74 0.00

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1/2/4/5/6/7/9/10 12 -3294.52 6613.32 7.79 0.00

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1/2/3/5/6/7/8/10/11/12 14 -3292.48 6613.33 7.80 0.00

1/2/5/6/9 9 -3297.59 6613.34 7.82 0.00

1/2/3/4/5/6/10/12 12 -3294.53 6613.34 7.82 0.00

1/2/5/6/9/11 10 -3296.59 6613.38 7.85 0.00

1/2/4/5/6/8/9/12 12 -3294.56 6613.39 7.86 0.00

1/4/5/6/7/8/9/10/11/12 14 -3292.52 6613.40 7.88 0.00

1/3/4/5/6/7/10/11/12 13 -3293.54 6613.40 7.88 0.00

1/2/4/6/7/8/10/12 12 -3294.57 6613.41 7.88 0.00

1/2/3/5/6/7/8/10/12 13 -3293.55 6613.41 7.89 0.00

1/2/3/4/5/6/9/10 12 -3294.58 6613.42 7.90 0.00

1/2/3/4/5/6/7/9/10/12 14 -3292.53 6613.42 7.90 0.00

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1/2/3/5/6/9/11 11 -3295.62 6613.46 7.94 0.00

1/2/5/6/8/9/10/11 12 -3294.61 6613.49 7.96 0.00

1/2/3/4/6/7/11 11 -3295.64 6613.50 7.98 0.00

1/2/4/5/6/8/9/10 12 -3294.62 6613.51 7.98 0.00

Term codes:

FinFSLdat\_AnnEsts FinWestSST\_AnnEsts FinWestSST\_SummerDat FSL\_months\_Apr FSLdat\_Spring

1 2 3 4 5

s(Ages) SST\_West\_Months\_Jul SST\_West\_Months\_Jun SST\_West\_Months\_Oct SST\_West\_Months\_Sep

6 7 8 9 10

WestSST\_Spring WestSST\_Winter

11 12

Model-averaged coefficients:

Estimate Std. Error Adjusted SE z value Pr(>|z|)

(Intercept) -9.0542 8.9776 8.9854 1.008 0.31362

FinFSLdat\_AnnEsts -6.1646 5.9869 5.9924 1.029 0.30361

FinWestSST\_AnnEsts 1.7193 0.7786 0.7792 2.206 0.02735

FSL\_months\_Apr 3.5294 2.4371 2.4395 1.447 0.14795

FSLdat\_Spring 5.8391 4.3321 4.3364 1.347 0.17813

SST\_West\_Months\_Sep 0.7637 0.4938 0.4942 1.545 0.12230

WestSST\_Spring -1.3625 0.9707 0.9714 1.403 0.16072

s(Ages).1 16.6302 1.5467 1.5483 10.741 < 2e-16

s(Ages).2 -18.8603 4.2191 4.2236 4.465 8.00e-06

s(Ages).3 -12.2548 1.3282 1.3296 9.217 < 2e-16

s(Ages).4 12.5250 2.9844 2.9876 4.192 2.76e-05

s(Ages).5 11.1612 1.4215 1.4230 7.843 < 2e-16

s(Ages).6 -10.3485 2.6562 2.6590 3.892 9.95e-05

s(Ages).7 10.0877 1.7525 1.7543 5.750 < 2e-16

s(Ages).8 -26.6978 9.0669 9.0765 2.941 0.00327

s(Ages).9 -14.7872 2.7858 2.7888 5.302 1.00e-07

SST\_West\_Months\_Oct 0.3341 0.4677 0.4681 0.714 0.47537

FinWestSST\_SummerDat 0.3091 0.3493 0.3497 0.884 0.37669

WestSST\_Winter -0.7871 1.2707 1.2714 0.619 0.53587

SST\_West\_Months\_Jul 0.6796 0.6634 0.6638 1.024 0.30591

SST\_West\_Months\_Jun 0.1458 0.5923 0.5927 0.246 0.80565

Full model-averaged coefficients (with shrinkage):

Estimate Std. Error Adjusted SE z value Pr(>|z|)

(Intercept) -9.0542 8.9776 8.9854 1.008 0.31362

FinFSLdat\_AnnEsts -6.1646 5.9869 5.9924 1.029 0.30361

FinWestSST\_AnnEsts 1.6414 0.8406 0.8411 1.951 0.05101 .

FSL\_months\_Apr 3.2145 2.5341 2.5362 1.267 0.20499

FSLdat\_Spring 5.6169 4.3933 4.3974 1.277 0.20149

SST\_West\_Months\_Sep 0.4492 0.5336 0.5338 0.842 0.40006

WestSST\_Spring -0.9738 1.0256 1.0261 0.949 0.34260

s(Ages).1 16.6302 1.5467 1.5483 10.741 < 2e-16 \*\*\*

s(Ages).2 -18.8603 4.2191 4.2236 4.465 8.00e-06 \*\*\*

s(Ages).3 -12.2548 1.3282 1.3296 9.217 < 2e-16 \*\*\*

s(Ages).4 12.5250 2.9844 2.9876 4.192 2.76e-05 \*\*\*

s(Ages).5 11.1612 1.4215 1.4230 7.843 < 2e-16 \*\*\*

s(Ages).6 -10.3485 2.6562 2.6590 3.892 9.95e-05 \*\*\*

s(Ages).7 10.0877 1.7525 1.7543 5.750 < 2e-16 \*\*\*

s(Ages).8 -26.6978 9.0669 9.0765 2.941 0.00327 \*\*

s(Ages).9 -14.7872 2.7858 2.7888 5.302 1.00e-07 \*\*\*

SST\_West\_Months\_Oct 0.1053 0.3050 0.3052 0.345 0.73012

FinWestSST\_SummerDat 0.0921 0.2374 0.2375 0.388 0.69821

WestSST\_Winter -0.3428 0.9249 0.9254 0.370 0.71107

SST\_West\_Months\_Jul 0.2932 0.5506 0.5508 0.532 0.59451

SST\_West\_Months\_Jun 0.0380 0.3091 0.3093 0.123 0.90220

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Relative variable importance:

FinFSLdat\_AnnEsts s(Ages) FSLdat\_Spring FinWestSST\_AnnEsts FSL\_months\_Apr WestSST\_Spring

Importance: 1.00 1.00 0.96 0.95 0.91 0.71

N containing models: 199 177 79 153 178 199

SST\_West\_Months\_Sep WestSST\_Winter SST\_West\_Months\_Jul SST\_West\_Months\_Oct FinWestSST\_SummerDat

Importance: 0.59 0.44 0.43 0.32 0.30

N containing models: 114 71 70 105 115

SST\_West\_Months\_Jun

Importance: 0.26

N containing models: 107

head(bb[[1]])

df logLik AICc Delta Weight

1/2/4/5/6/10/11 11 -3291.647 6605.524 0.0000000 0.06044670

1/2/4/5/6/9/10/11 12 -3290.959 6606.189 0.6651055 0.04334578

1/2/4/5/6/11 10 -3293.226 6606.643 1.1191036 0.03454318

1/2/3/4/5/6/10/11 12 -3291.510 6607.292 1.7675782 0.02497744

1/2/4/5/6/10/11/12 12 -3291.540 6607.353 1.8282788 0.02423075

1/2/4/5/6 9 -3294.600 6607.356 1.8314194 0.02419273

> bb[[2]]

FinFSLdat\_AnnEsts FinWestSST\_AnnEsts FinWestSST\_SummerDat FSL\_months\_Apr FSLdat\_Spring

1 2 3 4 5

s(Ages) SST\_West\_Months\_Jul SST\_West\_Months\_Jun SST\_West\_Months\_Oct SST\_West\_Months\_Sep

6 7 8 9 10

WestSST\_Spring WestSST\_Winter

11 12

> head(bb[[3]])

Estimate Std. Error Adjusted SE Lower CI Upper CI

(Intercept) -9.0542205 8.9776434 8.9854410 -26.6653612 8.556920

FinFSLdat\_AnnEsts -6.1645705 5.9868675 5.9924016 -17.9094618 5.580321

FinWestSST\_AnnEsts 1.7192969 0.7786433 0.7792233 0.1920472 3.246547

FSL\_months\_Apr 3.5294381 2.4371091 2.4394577 -1.2518112 8.310687

FSLdat\_Spring 5.8390688 4.3321114 4.3364076 -2.6601339 14.338272

SST\_West\_Months\_Sep 0.7636871 0.4937799 0.4942282 -0.2049825 1.732357

> bb[[4]]

(Intercept) FinFSLdat\_AnnEsts FinWestSST\_AnnEsts FSL\_months\_Apr FSLdat\_Spring

-9.05422047 -6.16457049 1.64140012 3.21454199 5.61685535

SST\_West\_Months\_Sep WestSST\_Spring s(Ages).1 s(Ages).2 s(Ages).3

0.44920411 -0.97379998 16.63021935 -18.86032436 -12.25479571

s(Ages).4 s(Ages).5 s(Ages).6 s(Ages).7 s(Ages).8

12.52504090 11.16118071 -10.34849201 10.08770581 -26.69781267

s(Ages).9 SST\_West\_Months\_Oct FinWestSST\_SummerDat WestSST\_Winter SST\_West\_Months\_Jul

-14.78719362 0.10526874 0.09209948 -0.34277157 0.29320369

SST\_West\_Months\_Jun

0.03800327

> bb[[6]]

FinFSLdat\_AnnEsts s(Ages) FSLdat\_Spring FinWestSST\_AnnEsts FSL\_months\_Apr

1.0000000 1.0000000 0.9619437 0.9546926 0.9107801

WestSST\_Spring SST\_West\_Months\_Sep WestSST\_Winter SST\_West\_Months\_Jul SST\_West\_Months\_Oct

0.7147351 0.5882044 0.4354796 0.4314210 0.3150834

FinWestSST\_SummerDat SST\_West\_Months\_Jun

0.2979245 0.2605895

attr(,"n.models")

FinFSLdat\_AnnEsts FinWestSST\_AnnEsts FinWestSST\_SummerDat FSL\_months\_Apr FSLdat\_Spring

199 177 79 153 178

s(Ages) SST\_West\_Months\_Jul SST\_West\_Months\_Jun SST\_West\_Months\_Oct SST\_West\_Months\_Sep

199 114 71 70 105

WestSST\_Spring WestSST\_Winter

115 107

attr(,"class")

[1] "importance" "numeric"

> bb[[7]]

[1] FALSE

> bb[[8]]

[1] "(Intercept)" "FinFSLdat\_AnnEsts" "FinWestSST\_AnnEsts" "FSL\_months\_Apr" "FSLdat\_Spring"

[6] "SST\_West\_Months\_Sep" "WestSST\_Spring" "s(Ages).1" "s(Ages).2" "s(Ages).3"

[11] "s(Ages).4" "s(Ages).5" "s(Ages).6" "s(Ages).7" "s(Ages).8"

[16] "s(Ages).9" "SST\_West\_Months\_Oct" "FinWestSST\_SummerDat" "WestSST\_Winter" "SST\_West\_Months\_Jul"

[21] "SST\_West\_Months\_Jun"

> bb[[9]]

NULL

> head(bb[[10]])

NULL

> head(bb[[11]])

OtoWidth ~ s(Ages) + WestSST\_Winter + WestSST\_Spring + SST\_West\_Months\_Jun +

SST\_West\_Months\_Jul + SST\_West\_Months\_Sep + SST\_West\_Months\_Oct +

FinWestSST\_AnnEsts + FinWestSST\_SummerDat + FSLdat\_Spring +

FSL\_months\_Apr + FinFSLdat\_AnnEsts

> head(bb[[12]])

model.avg.model.selection(object = b, subset = delta <= 8)

> head(bb[[13]])

Estimate Std. Error Adjusted SE z value Pr(>|z|)

(Intercept) -9.0542205 8.9776434 8.9854410 1.007655 0.3136203

FinFSLdat\_AnnEsts -6.1645705 5.9868675 5.9924016 1.028731 0.3036060

FinWestSST\_AnnEsts 1.7192969 0.7786433 0.7792233 2.206424 0.0273543

FSL\_months\_Apr 3.5294381 2.4371091 2.4394577 1.446813 0.1479494

FSLdat\_Spring 5.8390688 4.3321114 4.3364076 1.346522 0.1781342

SST\_West\_Months\_Sep 0.7636871 0.4937799 0.4942282 1.545211 0.1222952

> head(bb[[14]])

Estimate Std. Error Adjusted SE z value Pr(>|z|)

(Intercept) -9.0542205 8.9776434 8.9854410 1.0076545 0.3136203

FinFSLdat\_AnnEsts -6.1645705 5.9868675 5.9924016 1.0287312 0.3036060

FinWestSST\_AnnEsts 1.6414001 0.8406402 0.8411532 1.9513688 0.0510132

FSL\_months\_Apr 3.2145420 2.5341322 2.5361895 1.2674692 0.2049876

FSLdat\_Spring 5.6168553 4.3933040 4.3973793 1.2773188 0.2014897

SST\_West\_Months\_Sep 0.4492041 0.5335562 0.5338003 0.8415209 0.4000562

> bb[[15]]

(Intercept) FinFSLdat\_AnnEsts FinWestSST\_AnnEsts FSL\_months\_Apr FSLdat\_Spring

199 199 177 153 178

SST\_West\_Months\_Sep WestSST\_Spring s(Ages).1 s(Ages).2 s(Ages).3

105 115 199 199 199

s(Ages).4 s(Ages).5 s(Ages).6 s(Ages).7 s(Ages).8

199 199 199 199 199

s(Ages).9 SST\_West\_Months\_Oct FinWestSST\_SummerDat WestSST\_Winter SST\_West\_Months\_Jul

199 70 79 107 114

SST\_West\_Months\_Jun

71

DrSouth = uGamm(OtoWidth ~ s(Ages) +

FSLdat\_Autumn +

FSL\_months\_Jan+

FSL\_months\_Apr +

FSL\_months\_May +

FSL\_months\_Oct +

FinFSLdat\_AnnEsts +

FinFSLdat\_SummerDat +

FinFSLdat\_SpringDat, random = ~(1|FishName), data = South)

> DrSouth$gam

Family: gaussian

Link function: identity

Formula:

OtoWidth ~ s(Ages) + FSLdat\_Autumn + FSL\_months\_Jan + FSL\_months\_Apr +

FSL\_months\_May + FSL\_months\_Oct + FinFSLdat\_AnnEsts + FinFSLdat\_SummerDat +

FinFSLdat\_SpringDat

Estimated degrees of freedom:

7.53 total = 16.53

lmer.REML score: 4498.63

> summary(DrSouth$gam)

Family: gaussian

Link function: identity

Formula:

OtoWidth ~ s(Ages) + FSLdat\_Autumn + FSL\_months\_Jan + FSL\_months\_Apr +

FSL\_months\_May + FSL\_months\_Oct + FinFSLdat\_AnnEsts + FinFSLdat\_SummerDat +

FinFSLdat\_SpringDat

Parametric coefficients:

Estimate Std. Error t value Pr(>|t|)

(Intercept) 13.7789 2.0814 6.620 6.27e-11 \*\*\*

FSLdat\_Autumn -4.9923 7.9514 -0.628 0.5303

FSL\_months\_Jan -2.2437 3.1431 -0.714 0.4755

FSL\_months\_Apr 2.9868 4.0861 0.731 0.4650

FSL\_months\_May -0.1225 4.0158 -0.030 0.9757

FSL\_months\_Oct -4.4482 3.4376 -1.294 0.1960

FinFSLdat\_AnnEsts 11.6857 5.2899 2.209 0.0274 \*

FinFSLdat\_SummerDat 4.7791 4.0136 1.191 0.2341

FinFSLdat\_SpringDat -1.7407 2.2431 -0.776 0.4379

> DrSouth$gam

Family: gaussian

Link function: identity

Formula:

OtoWidth ~ s(Ages) + FinFSLdat\_AnnEsts

Estimated degrees of freedom:

7.64 total = 9.64

lmer.REML score: 4691.49

> summary(DrSouth$gam)

Family: gaussian

Link function: identity

Formula:

OtoWidth ~ s(Ages) + FinFSLdat\_AnnEsts

Parametric coefficients:

Estimate Std. Error t value Pr(>|t|)

(Intercept) 15.156 1.551 9.773 <2e-16 \*\*\*

FinFSLdat\_AnnEsts 4.549 2.006 2.268 0.0236 \*

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Approximate significance of smooth terms:

edf Ref.df F p-value

s(Ages) 7.644 7.644 55.42 <2e-16 \*\*\*

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

R-sq.(adj) = 0.242lmer.REML score = 4691.5 Scale est. = 9.0664 n = 912

> DrSouth$mer

Linear mixed model fit by REML ['lmerMod']

REML criterion at convergence: 4691.49

Random effects:

Groups Name Std.Dev.

FishName (Intercept) 2.316

Xr s(Ages) 151.218

Residual 3.011

Number of obs: 912, groups: FishName, 23; Xr, 8

Fixed Effects:

X(Intercept) XFinFSLdat\_AnnEsts Xs(Ages)Fx1

15.156 4.549 -9.956

> summary(DrSouth$mer)

Linear mixed model fit by REML ['lmerMod']

REML criterion at convergence: 4691.5

Scaled residuals:

Min 1Q Median 3Q Max

-2.8774 -0.5689 -0.0557 0.4886 5.4862

Random effects:

Groups Name Variance Std.Dev.

FishName (Intercept) 5.362 2.316

Xr s(Ages) 22866.835 151.218

Residual 9.066 3.011

Number of obs: 912, groups: FishName, 23; Xr, 8

Fixed effects:

Estimate Std. Error t value

X(Intercept) 15.156 1.551 9.773

XFinFSLdat\_AnnEsts 4.549 2.006 2.268

Xs(Ages)Fx1 -9.956 2.266 -4.393

Correlation of Fixed Effects:

X(Int) XFFSL\_

XFnFSLdt\_AE -0.948

Xs(Ages)Fx1 -0.008 0.009

DrWest = uGamm(OtoWidth ~ s(Ages) +

WestSST\_Winter +

WestSST\_Spring +

SST\_West\_Months\_Jun +

SST\_West\_Months\_Jul +

SST\_West\_Months\_Sep +

SST\_West\_Months\_Oct +

FinWestSST\_AnnEsts +

FinWestSST\_SummerDat +

FSLdat\_Spring +

FSL\_months\_Apr + FinFSLdat\_AnnEsts, random = ~(1|FishName), data = West)

DrWest$gam

Family: gaussian

Link function: identity

Formula:

OtoWidth ~ s(Ages) + WestSST\_Winter + WestSST\_Spring + SST\_West\_Months\_Jun +

SST\_West\_Months\_Jul + SST\_West\_Months\_Sep + SST\_West\_Months\_Oct +

FinWestSST\_AnnEsts + FinWestSST\_SummerDat + FSLdat\_Spring +

FSL\_months\_Apr + FinFSLdat\_AnnEsts

Estimated degrees of freedom:

7.91 total = 19.91

lmer.REML score: 6578.149

summary(DrWest$gam)

Family: gaussian

Link function: identity

Formula:

OtoWidth ~ s(Ages) + WestSST\_Winter + WestSST\_Spring + SST\_West\_Months\_Jun +

SST\_West\_Months\_Jul + SST\_West\_Months\_Sep + SST\_West\_Months\_Oct +

FinWestSST\_AnnEsts + FinWestSST\_SummerDat + FSLdat\_Spring +

FSL\_months\_Apr + FinFSLdat\_AnnEsts

Parametric coefficients:

Estimate Std. Error t value Pr(>|t|)

(Intercept) -11.8226 9.4274 -1.254 0.2101

WestSST\_Winter -1.6896 1.6809 -1.005 0.3150

WestSST\_Spring -1.7710 1.0860 -1.631 0.1032

SST\_West\_Months\_Jun 0.4298 0.6587 0.652 0.5142

SST\_West\_Months\_Jul 1.0196 0.8233 1.239 0.2158

SST\_West\_Months\_Sep 0.9318 0.4989 1.868 0.0621 .

SST\_West\_Months\_Oct 0.4561 0.4384 1.040 0.2984

FinWestSST\_AnnEsts 1.7387 0.7858 2.213 0.0271 \*

FinWestSST\_SummerDat 0.3284 0.3498 0.939 0.3479

FSLdat\_Spring 5.4322 4.3755 1.242 0.2147

FSL\_months\_Apr 3.2023 2.5097 1.276 0.2022

FinFSLdat\_AnnEsts -6.6176 5.9929 -1.104 0.2697

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Approximate significance of smooth terms:

edf Ref.df F p-value

s(Ages) 7.911 7.911 56.42 <2e-16 \*\*\*

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

R-sq.(adj) = 0.311lmer.REML score = 6578.1 Scale est. = 15.488 n = 1161

DrWest$mer

Linear mixed model fit by REML ['lmerMod']

REML criterion at convergence: 6578.149

Random effects:

Groups Name Std.Dev.

FishName (Intercept) 3.710

Xr s(Ages) 263.468

Residual 3.935

Number of obs: 1161, groups: FishName, 28; Xr, 8

Fixed Effects:

X(Intercept) XWestSST\_Winter XWestSST\_Spring XSST\_West\_Months\_Jun

-11.8226 -1.6896 -1.7710 0.4298

XSST\_West\_Months\_Jul XSST\_West\_Months\_Sep XSST\_West\_Months\_Oct XFinWestSST\_AnnEsts

1.0196 0.9318 0.4561 1.7387

XFinWestSST\_SummerDat XFSLdat\_Spring XFSL\_months\_Apr XFinFSLdat\_AnnEsts

0.3284 5.4322 3.2023 -6.6176

Xs(Ages)Fx1

-14.7854

summary(DrWest$mer)

Linear mixed model fit by REML ['lmerMod']

REML criterion at convergence: 6578.1

Scaled residuals:

Min 1Q Median 3Q Max

-4.8751 -0.4972 -0.0197 0.4065 10.5128

Random effects:

Groups Name Variance Std.Dev.

FishName (Intercept) 13.77 3.710

Xr s(Ages) 69415.45 263.468

Residual 15.49 3.935

Number of obs: 1161, groups: FishName, 28; Xr, 8

Fixed effects:

Estimate Std. Error t value

X(Intercept) -11.8226 9.4274 -1.254

XWestSST\_Winter -1.6896 1.6809 -1.005

XWestSST\_Spring -1.7710 1.0860 -1.631

XSST\_West\_Months\_Jun 0.4298 0.6587 0.652

XSST\_West\_Months\_Jul 1.0196 0.8233 1.239

XSST\_West\_Months\_Sep 0.9318 0.4989 1.868

XSST\_West\_Months\_Oct 0.4561 0.4384 1.040

XFinWestSST\_AnnEsts 1.7387 0.7858 2.213

XFinWestSST\_SummerDat 0.3284 0.3498 0.939

XFSLdat\_Spring 5.4322 4.3755 1.242

XFSL\_months\_Apr 3.2023 2.5097 1.276

XFinFSLdat\_AnnEsts -6.6176 5.9929 -1.104

Xs(Ages)Fx1 -14.7854 2.7942 -5.291

Correlation of Fixed Effects:

X(Int) XWSST\_W XWSST\_S XSST\_Wst\_Mnths\_Jn XSST\_Wst\_Mnths\_Jl XSST\_W\_M\_S XSST\_W\_M\_O XFWSST\_A

XWstSST\_Wnt -0.175

XWstSST\_Spr 0.239 -0.382

XSST\_Wst\_Mnths\_Jn 0.075 -0.914 0.279

XSST\_Wst\_Mnths\_Jl 0.151 -0.923 0.396 0.803

XSST\_Ws\_M\_S 0.033 -0.144 -0.437 0.049 0.055

XSST\_Ws\_M\_O -0.041 0.164 -0.705 -0.154 -0.105 0.240

XFnWsSST\_AE -0.567 0.238 -0.607 -0.113 -0.385 0.101 0.147

XFnWsSST\_SD -0.495 -0.076 -0.082 0.076 0.118 -0.129 0.042 -0.008

XFSLdt\_Sprn -0.085 0.076 -0.111 -0.063 -0.138 0.213 -0.003 0.265

XFSL\_mnth\_A 0.048 -0.087 -0.124 0.114 -0.024 0.063 -0.084 0.350

XFnFSLdt\_AE 0.202 0.085 0.088 -0.141 0.016 -0.187 0.071 -0.417

Xs(Ages)Fx1 -0.008 -0.033 0.041 0.016 0.016 0.027 -0.025 -0.015

XFWSST\_S XFSL\_S XFSL\_\_ XFFSL\_

XWstSST\_Wnt

XWstSST\_Spr

XSST\_Wst\_Mnths\_Jn

XSST\_Wst\_Mnths\_Jl

XSST\_Ws\_M\_S

XSST\_Ws\_M\_O

XFnWsSST\_AE

XFnWsSST\_SD

XFSLdt\_Sprn -0.249

XFSL\_mnth\_A -0.314 -0.021

XFnFSLdt\_AE 0.200 -0.812 -0.298

Xs(Ages)Fx1 0.006 -0.015 -0.002 0.008

DrWest$gam

Family: gaussian

Link function: identity

Formula:

OtoWidth ~ s(Ages) + FinWestSST\_AnnEsts

Estimated degrees of freedom:

7.93 total = 9.93

lmer.REML score: 7005.114

> summary(DrWest$gam)

Family: gaussian

Link function: identity

Formula:

OtoWidth ~ s(Ages) + FinWestSST\_AnnEsts

Parametric coefficients:

Estimate Std. Error t value Pr(>|t|)

(Intercept) -4.0106 7.0089 -0.572 0.567286

FinWestSST\_AnnEsts 1.1794 0.3456 3.413 0.000663 \*\*\*

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Approximate significance of smooth terms:

edf Ref.df F p-value

s(Ages) 7.933 7.933 83.94 <2e-16 \*\*\*

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

R-sq.(adj) = 0.317lmer.REML score = 7005.1 Scale est. = 15.745 n = 1229

> DrWest$mer

Linear mixed model fit by REML ['lmerMod']

REML criterion at convergence: 7005.114

Random effects:

Groups Name Std.Dev.

FishName (Intercept) 3.865

Xr s(Ages) 288.811

Residual 3.968

Number of obs: 1229, groups: FishName, 28; Xr, 8

Fixed Effects:

X(Intercept) XFinWestSST\_AnnEsts Xs(Ages)Fx1

-4.011 1.179 -14.849

> summary(DrWest$mer)

Linear mixed model fit by REML ['lmerMod']

REML criterion at convergence: 7005.1

Scaled residuals:

Min 1Q Median 3Q Max

-4.9365 -0.5058 -0.0159 0.4284 10.5292

Random effects:

Groups Name Variance Std.Dev.

FishName (Intercept) 14.94 3.865

Xr s(Ages) 83411.91 288.811

Residual 15.74 3.968

Number of obs: 1229, groups: FishName, 28; Xr, 8

Fixed effects:

Estimate Std. Error t value

X(Intercept) -4.0106 7.0089 -0.572

XFinWestSST\_AnnEsts 1.1794 0.3456 3.413

Xs(Ages)Fx1 -14.8486 2.7994 -5.304

Correlation of Fixed Effects:

X(Int) XFWSST

XFnWsSST\_AE -0.994

Xs(Ages)Fx1 -0.033 0.033

Backwards model selection manual