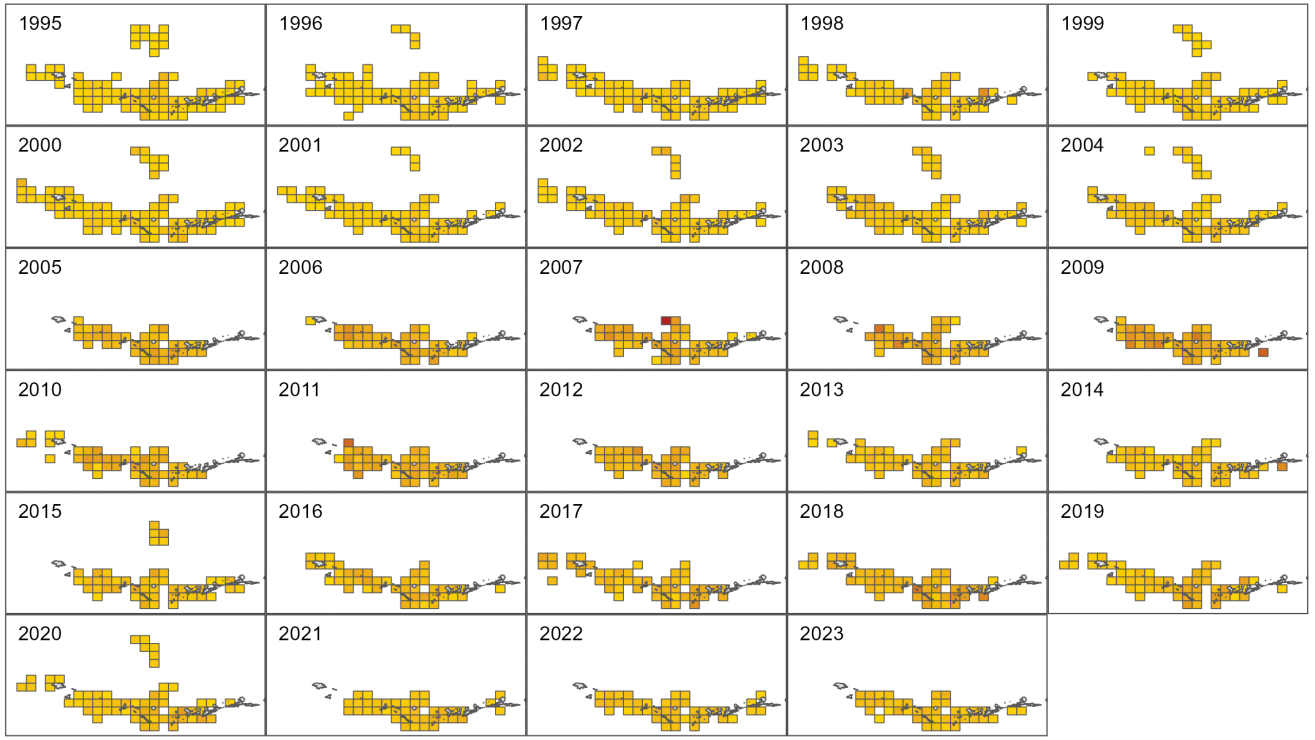
Ruminations on AIGKC CPUE

2025 CPT modelling Workshop

WAG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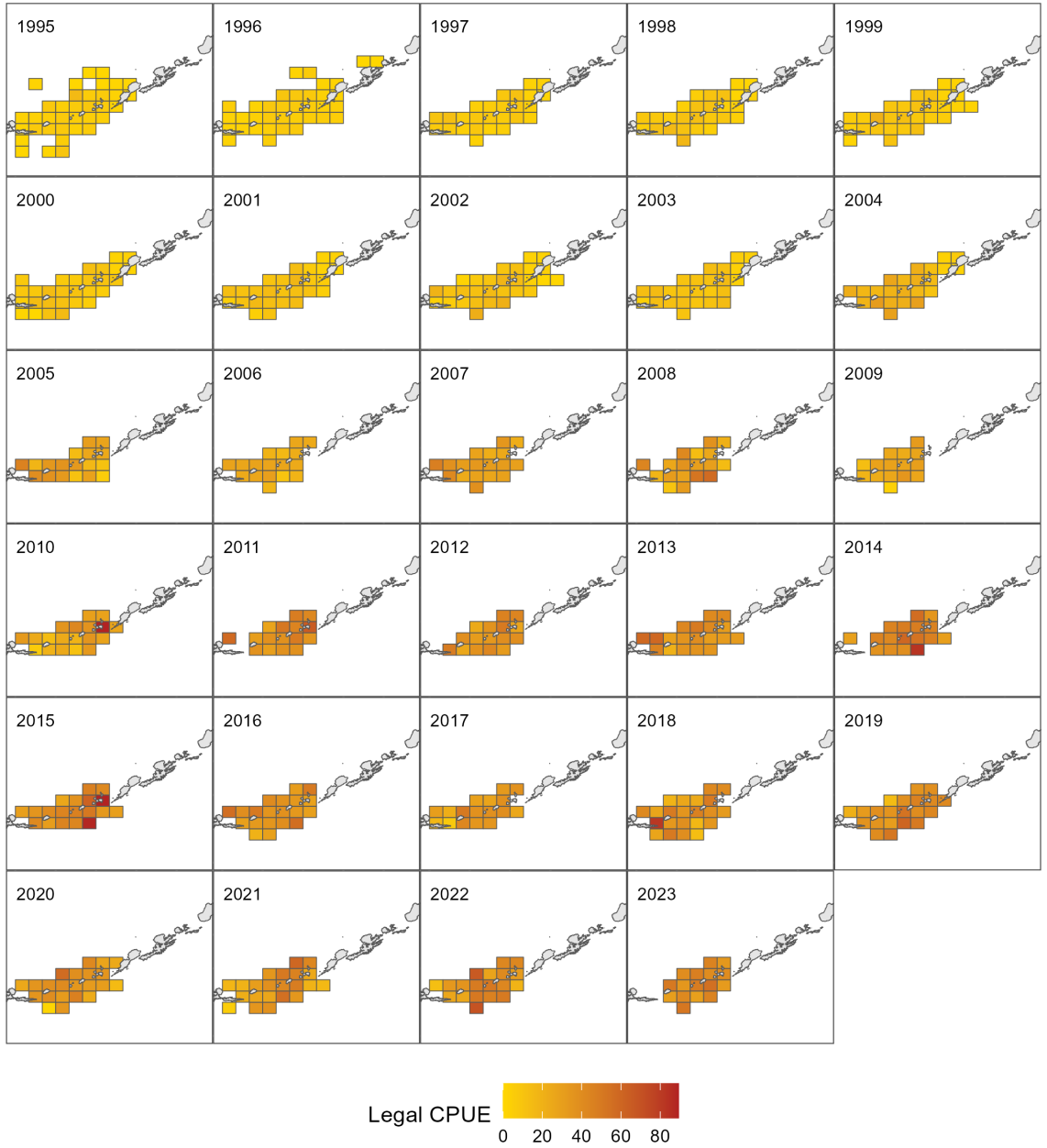
2023
Legal CPUE
0 25 50 75

EAG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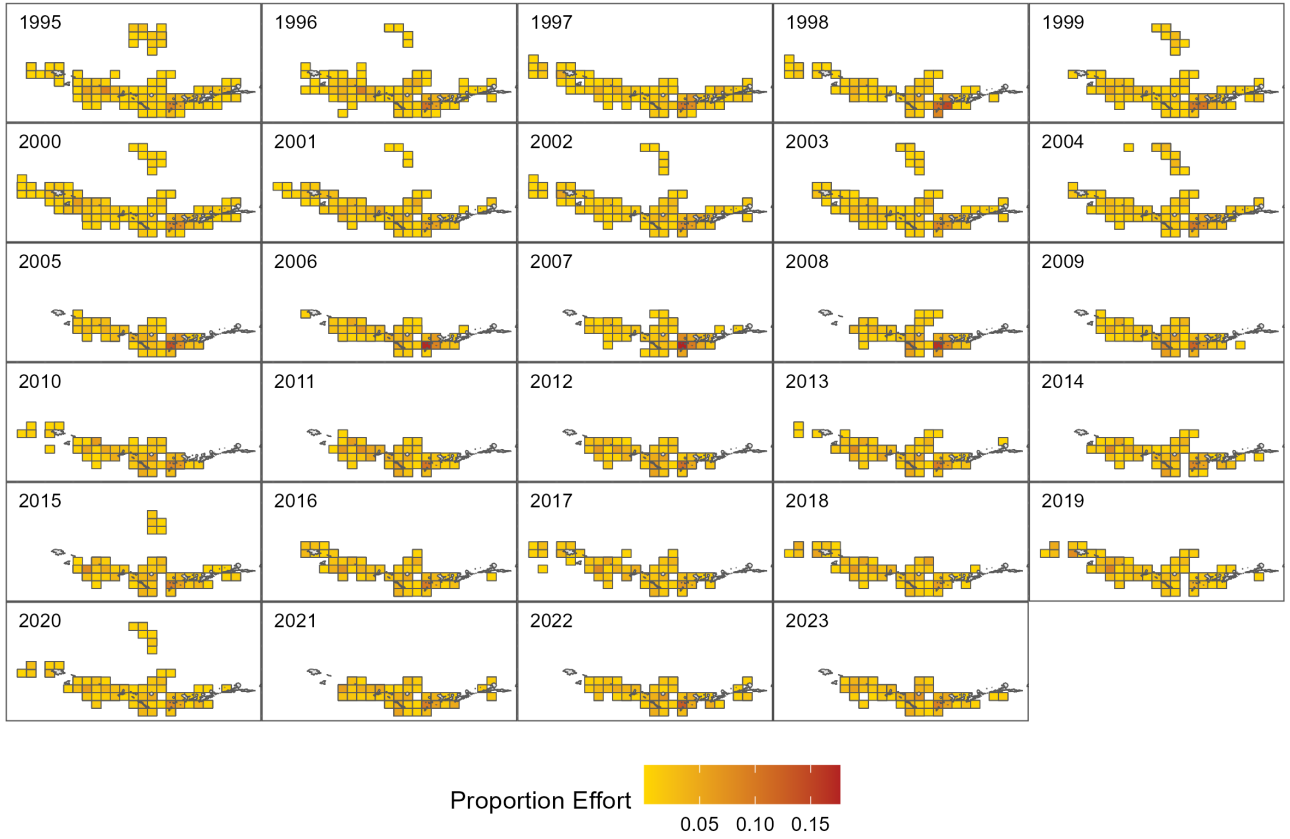
Legal CPUE
0 20 40 60 80

WAG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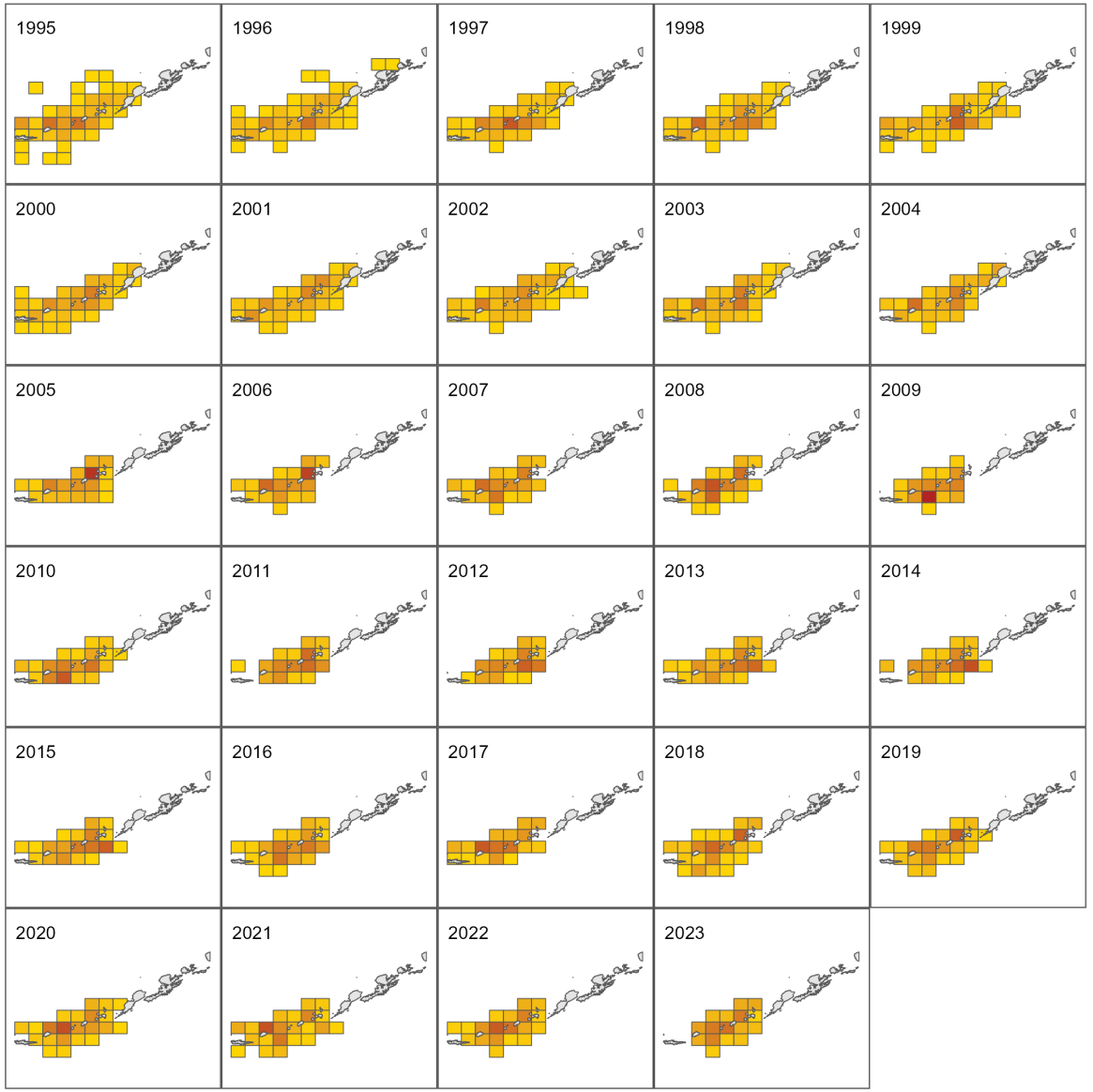
2023
Proportion Effort
0.05 0.10 0.15

EAG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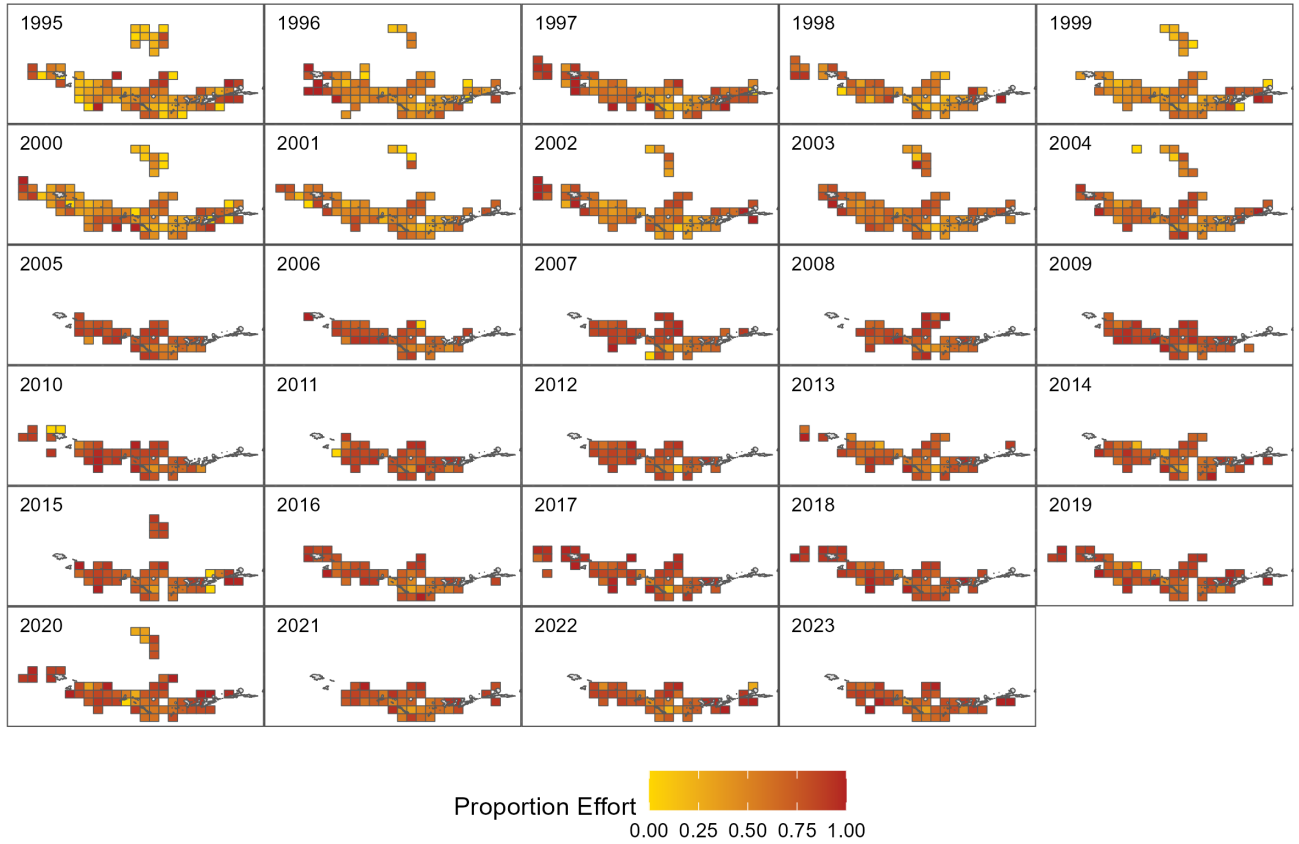
2022
2023
Proportion Effort
0.05 0.10 0.15 0.20

WAG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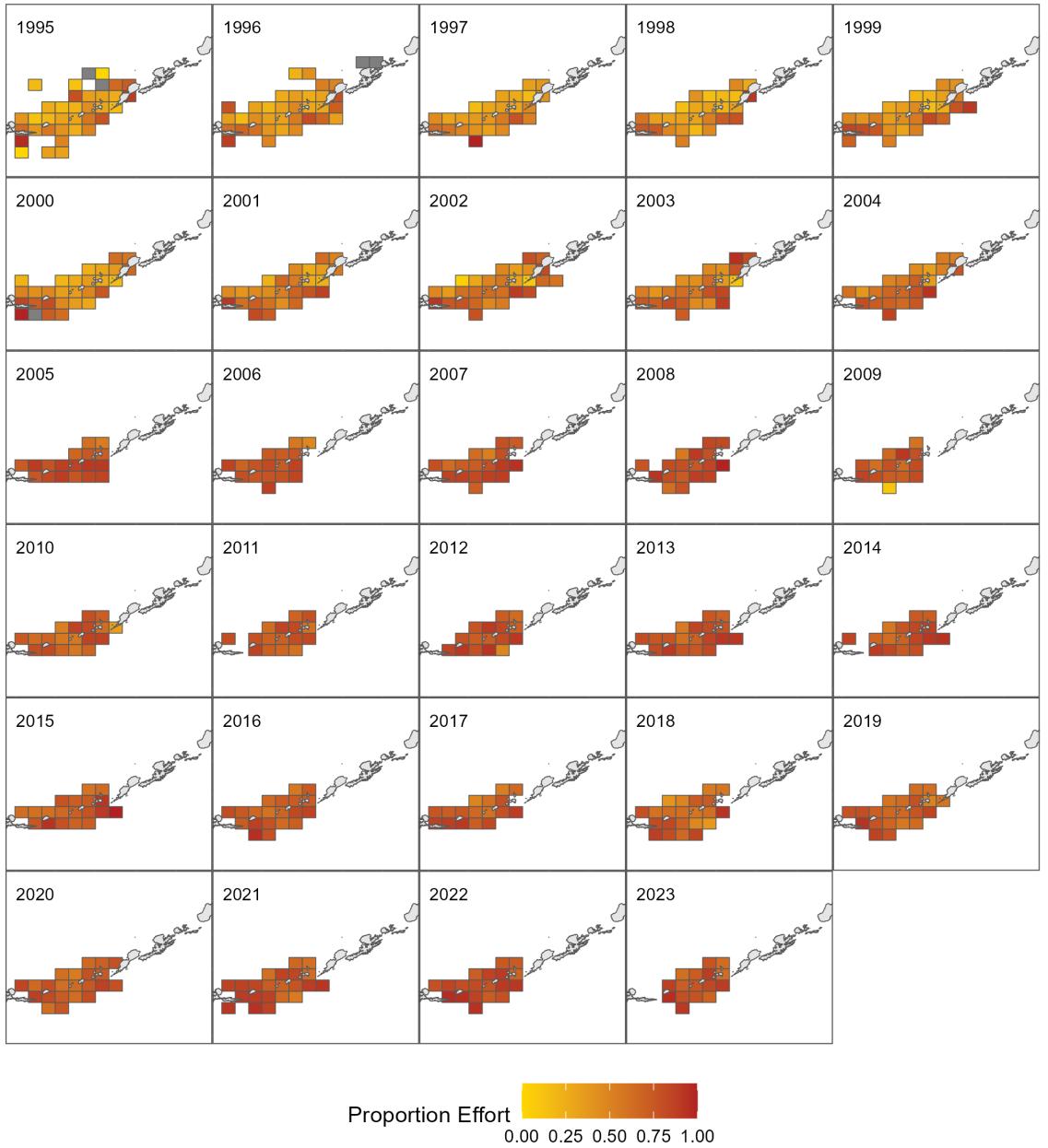
2021
2022
2023
Proportion Effort
0.00 0.25 0.50 0.75 1.00

EAG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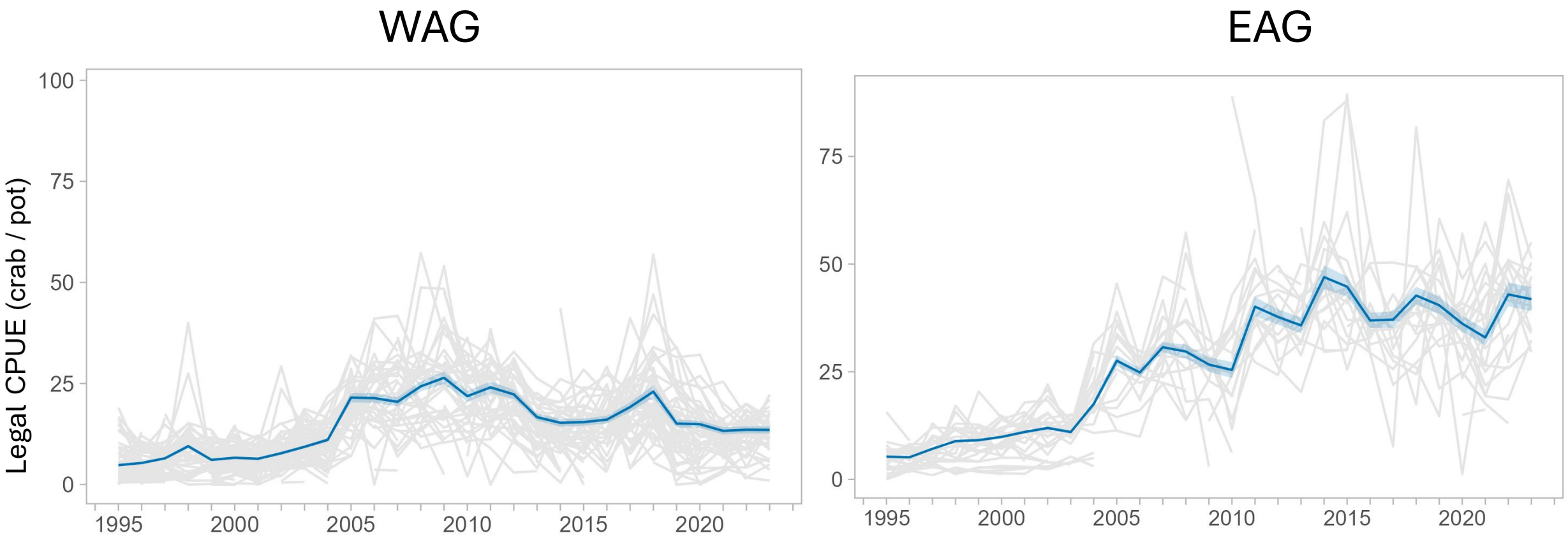
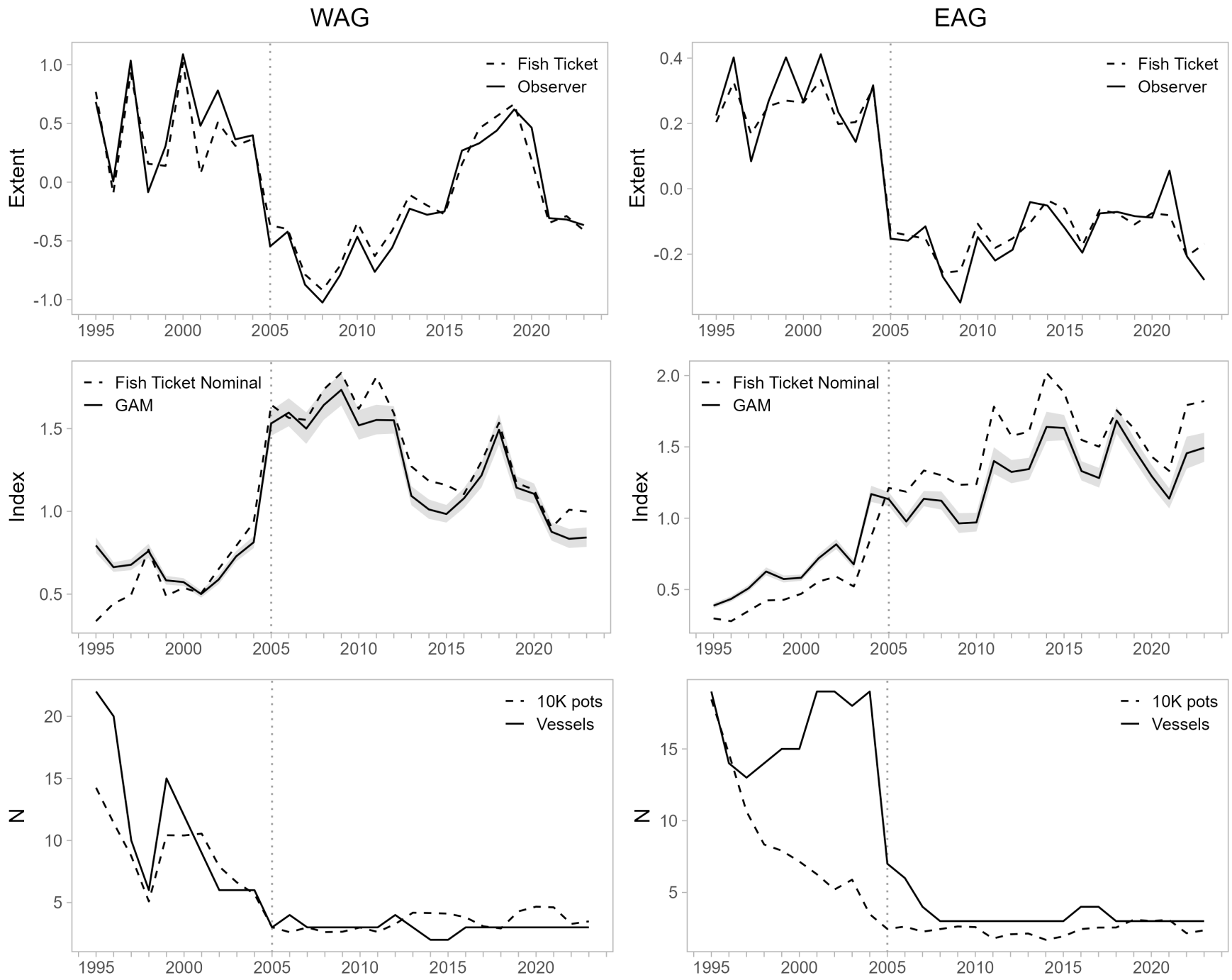
2022
2023
Proportion Effort
0.00 0.25 0.50 0.75 1.00


WAG
EAG
Legal CPUE (crab / pot)
100
75
50
25
0
1995
2000
2005
2010
2015
2020


WAG
EAG
Extent
Index
N
Fish Ticket
Observer
Fish Ticket Nominal
GAM
10K pots
Vessels
1995
2000
2005
2010
2015
2020

Spatiotemporal CPUE Standardization

- sdmTMB
- Use full time series
- Total male CPUE as response – ***maybe not great idea*

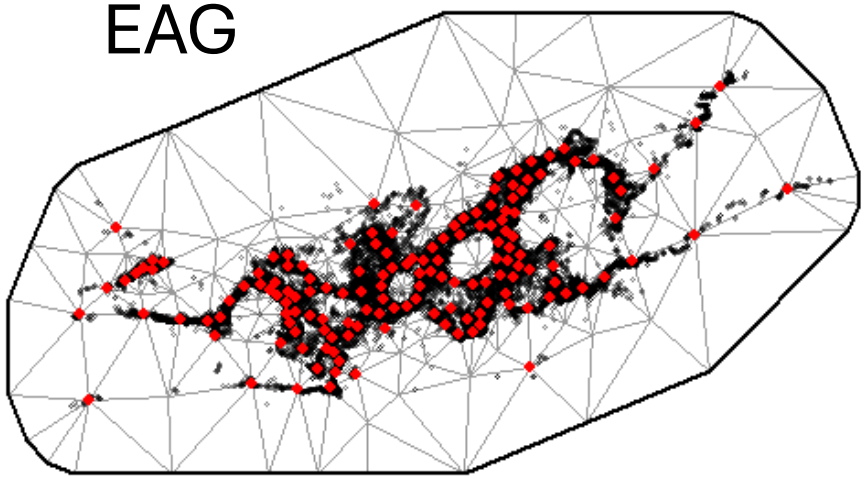
- Spatiotemporal random fields as AR1 and iid process
- Tweedie error
- Null model = CPUE ~ Year
- Full model = CPUE ~ Year + s(soak time) + s(depth) + gear + (1 | vessel)

Mesh

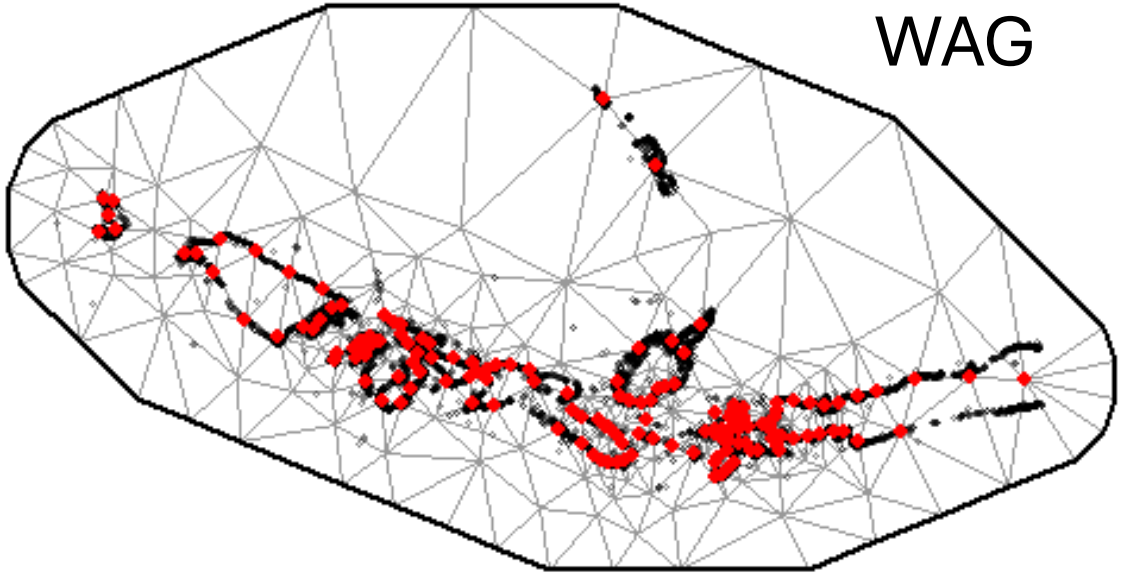
- Used kmeans method with 150 knots
- Islands as barrier to spatial correlation

- *Did not develop this rigorously, differed number of knots until vertices seemed OK*

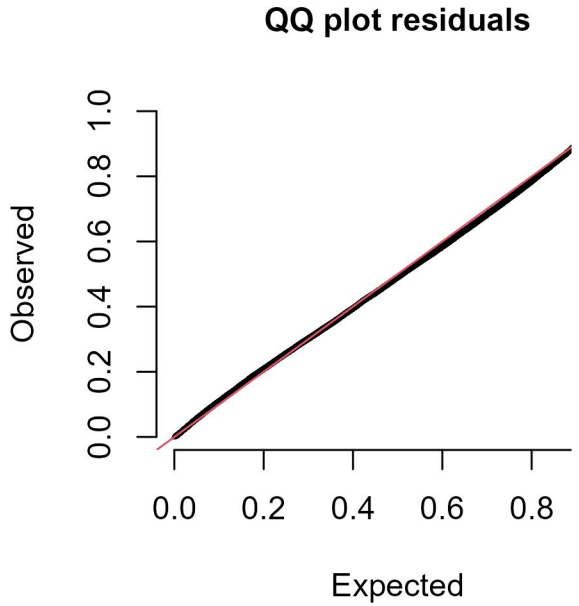
EAG

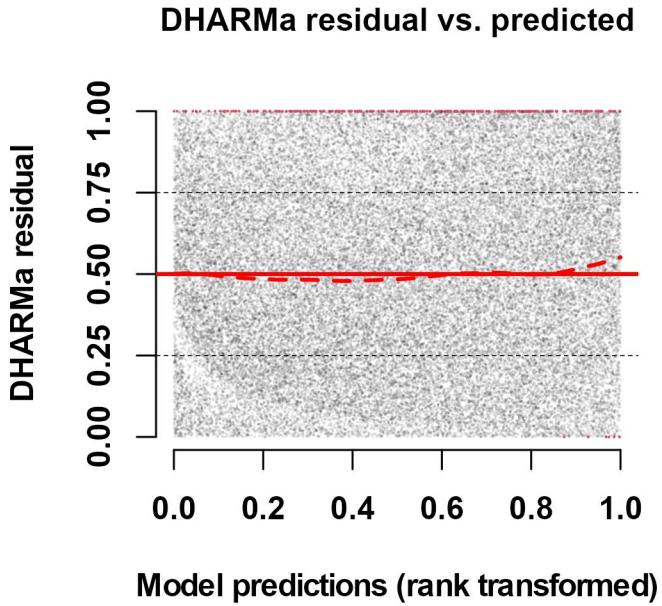


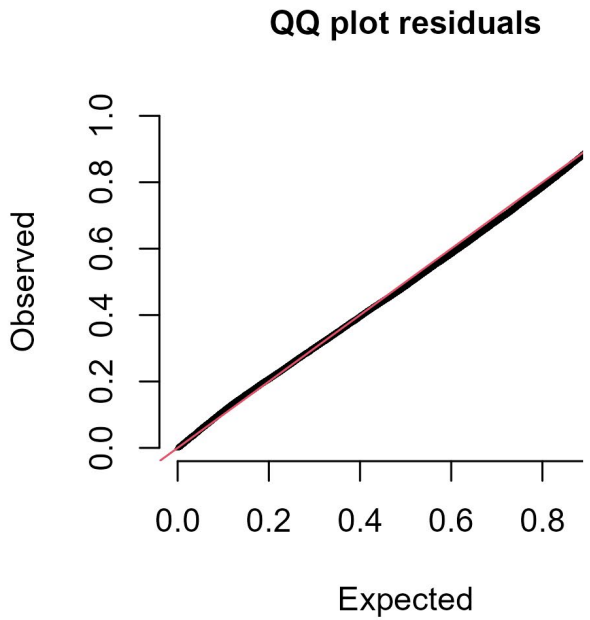
WAG

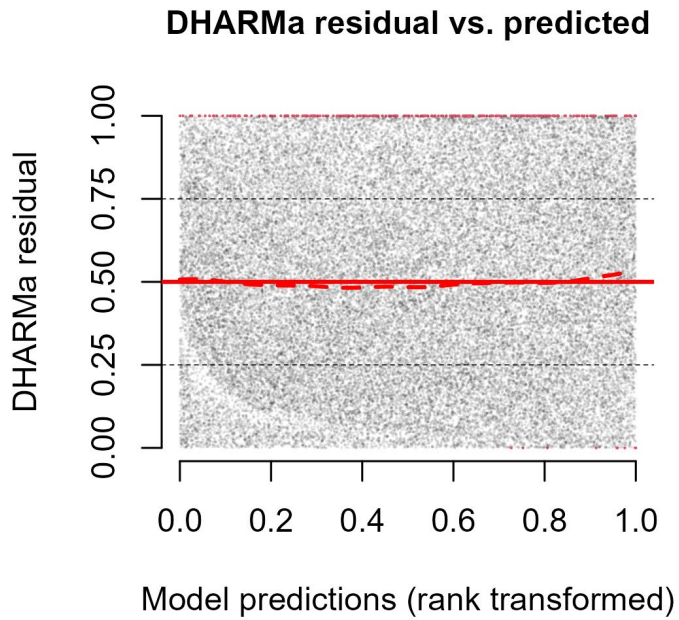


- Models pass sdmTMB “sanity” checks
- Little diagnostic difference between AR1 and iid models
- AR1 $\rho = 0.66, 0.52$

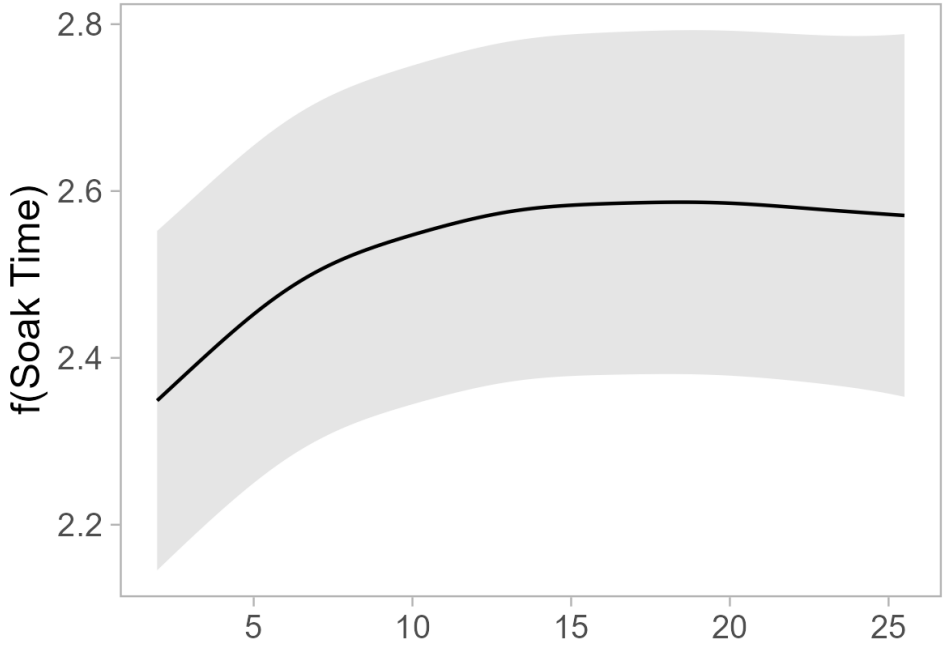




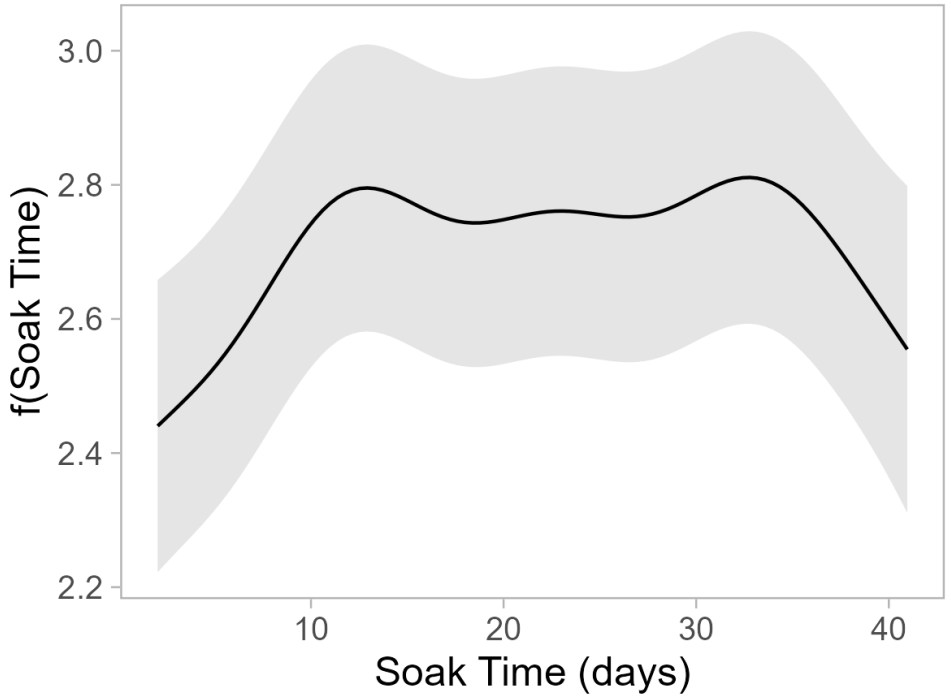


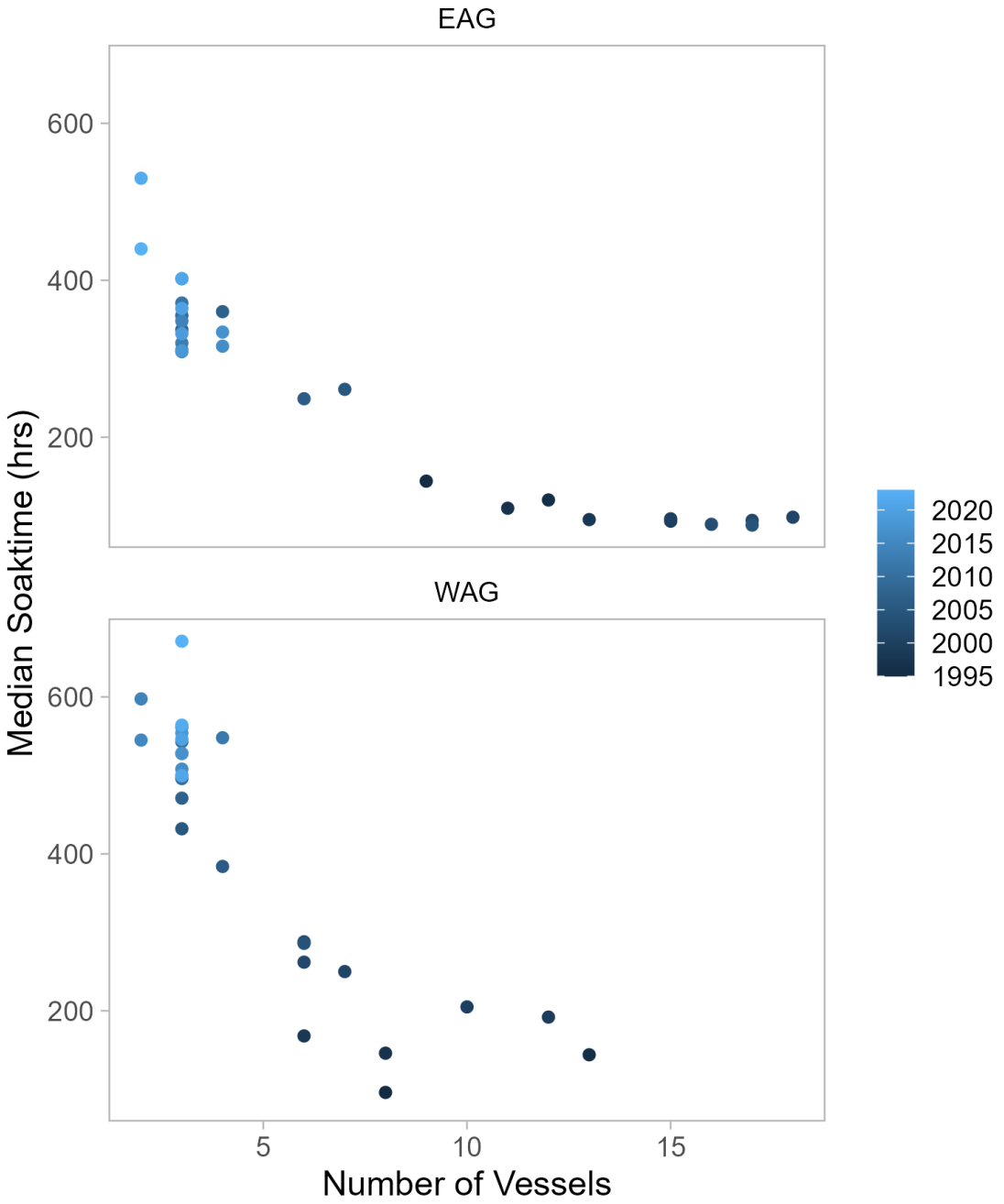


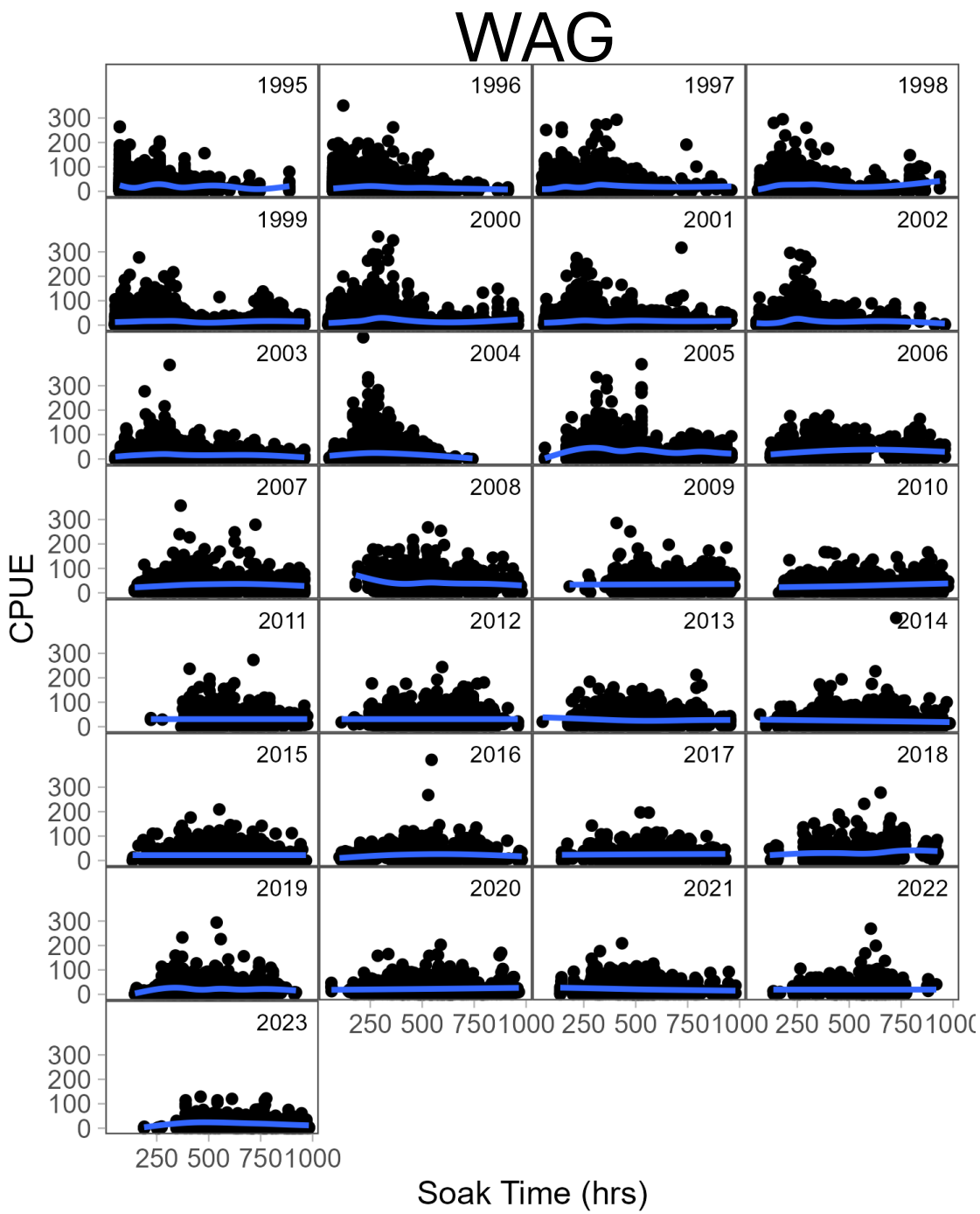
EAG


2.8
2.6
2.4
2.2
f(Soak Time)
5
10
15
20
25

WAG


3.0
2.8
2.6
2.4
2.2
f(Soak Time)
10
20
30
40
Soak Time (days)


EAG
WAG
Median Soaktime (hrs)
600
400
200
5
10
15
Number of Vessels
2020
2015
2010
2005
2000
1995


WAG
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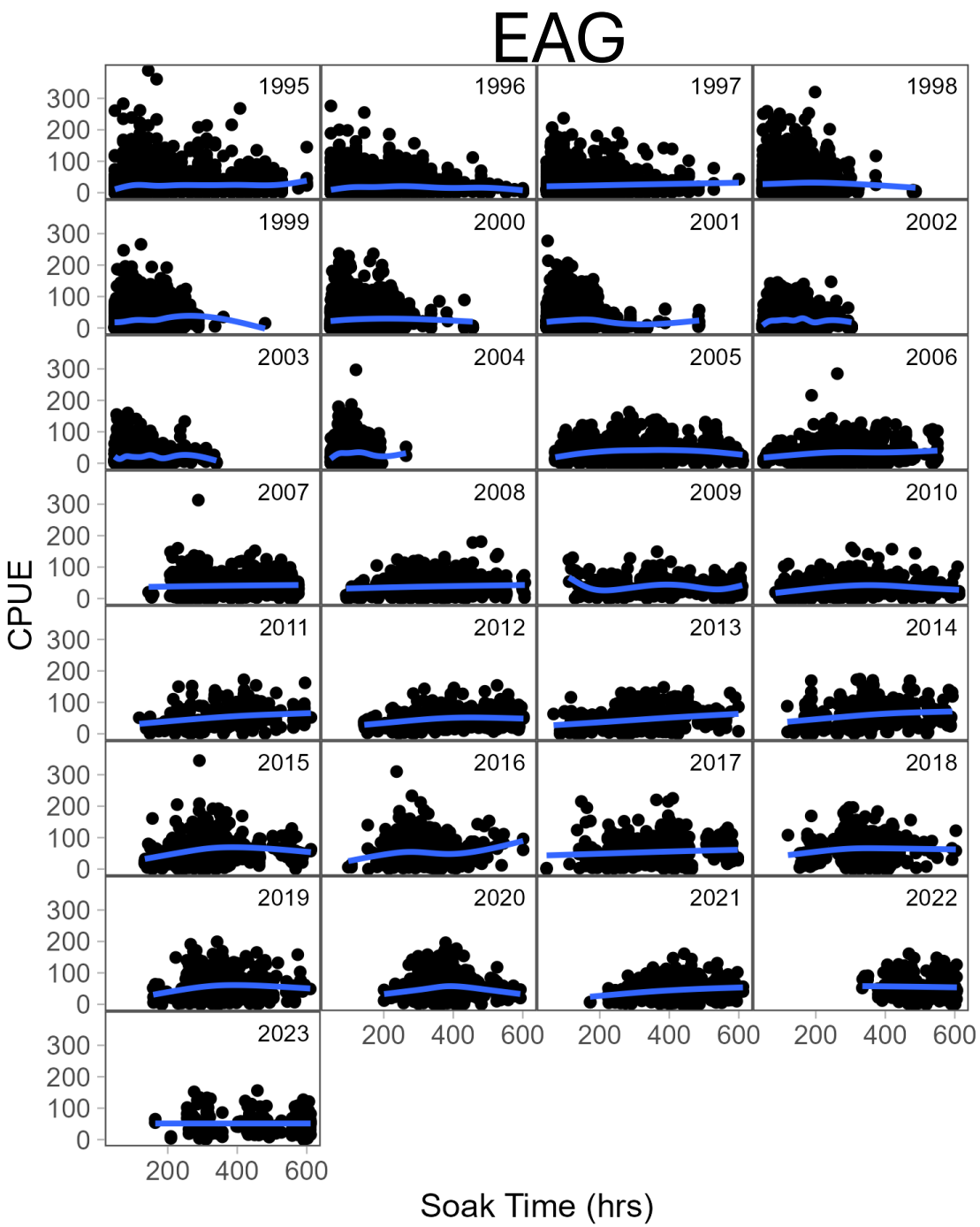
2022
2023
CPUE
Soak Time (hrs)


EAG
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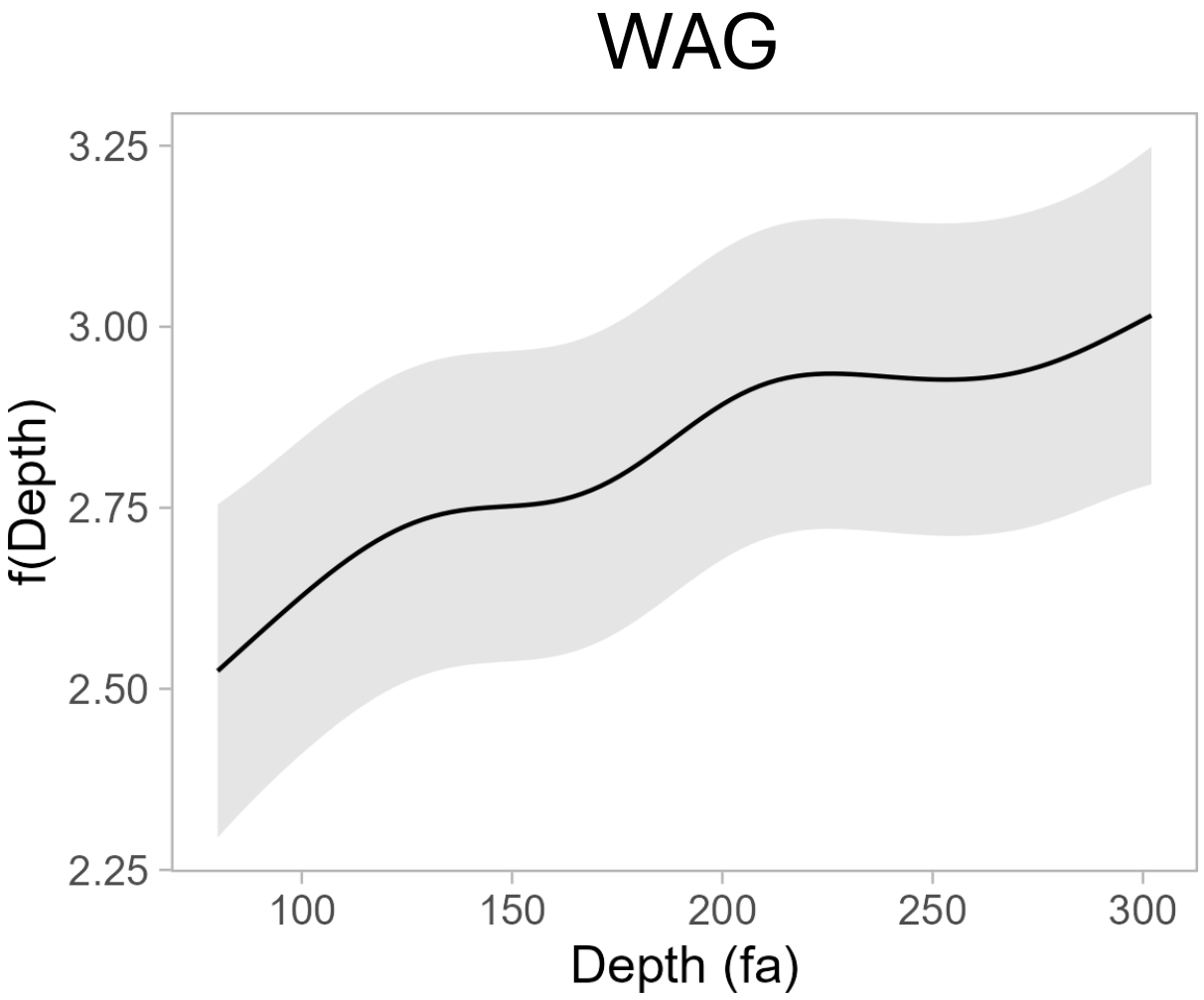
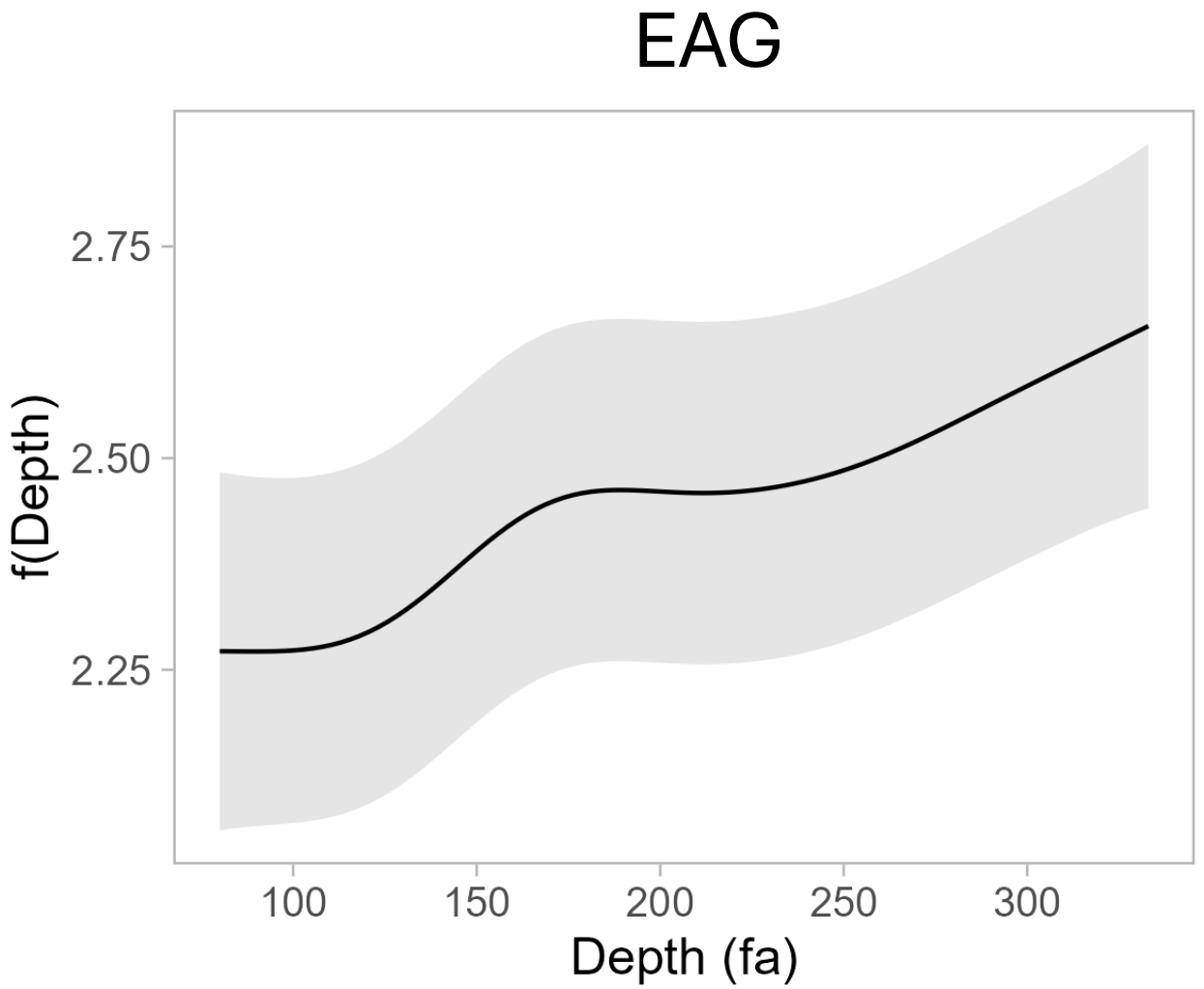
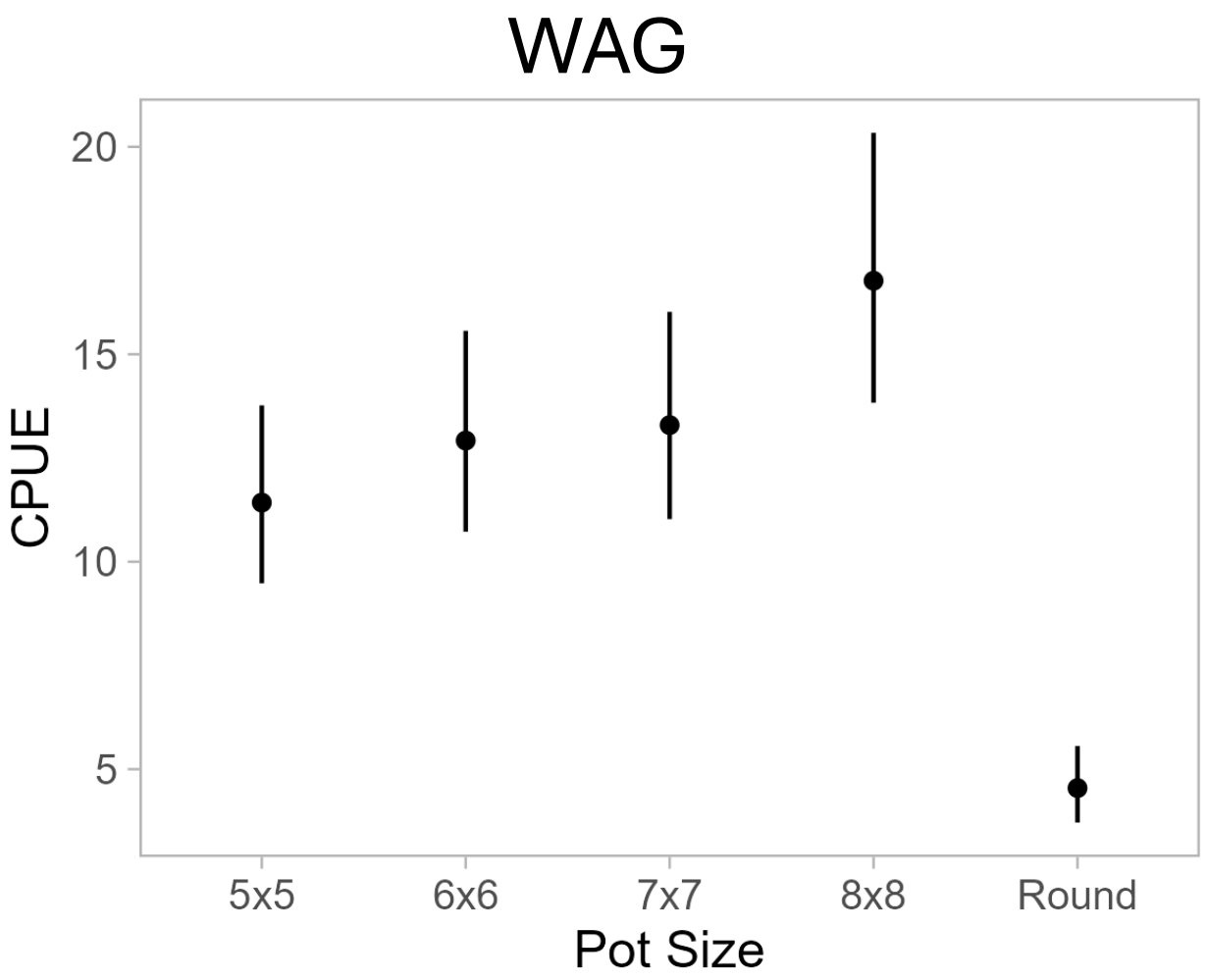
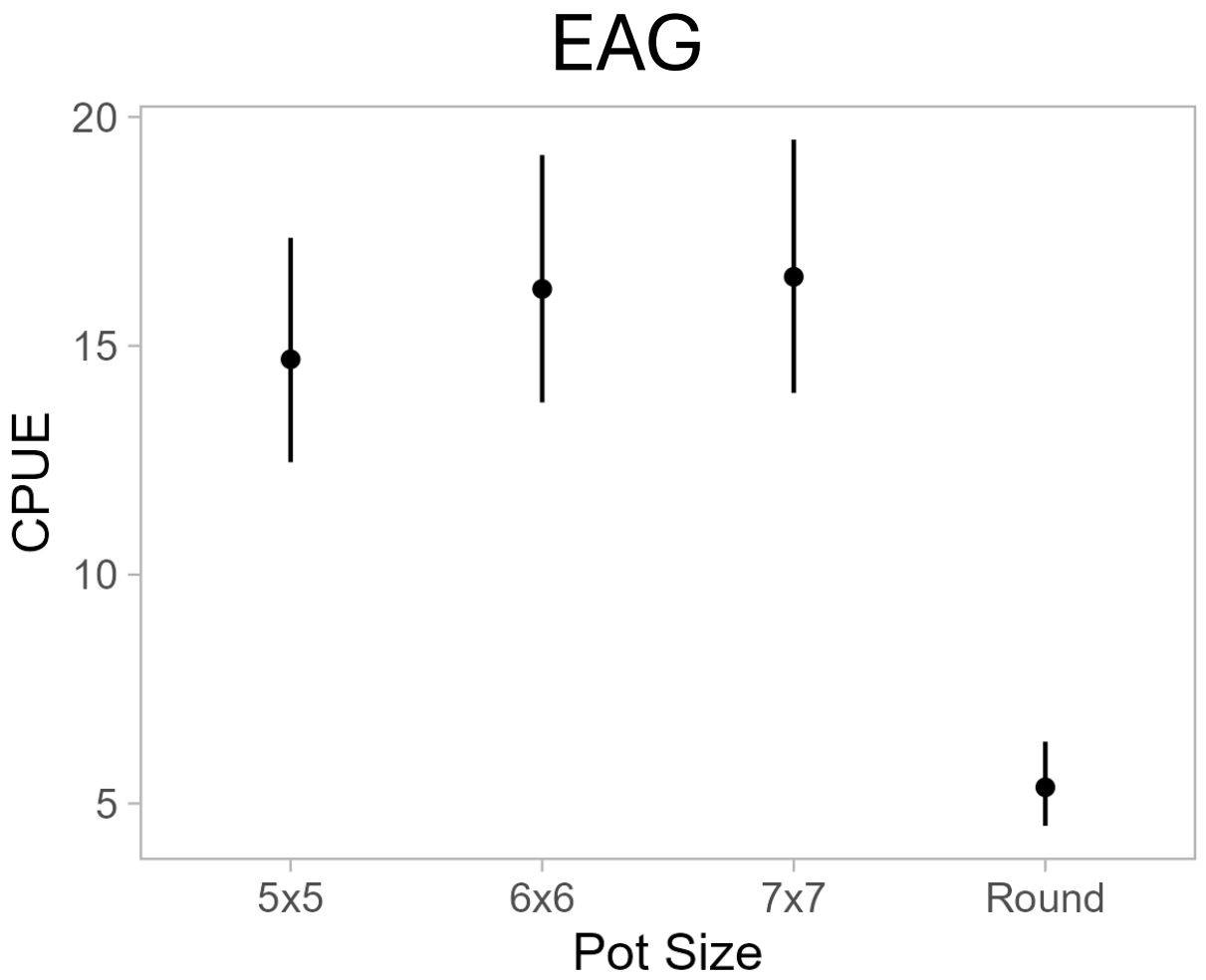
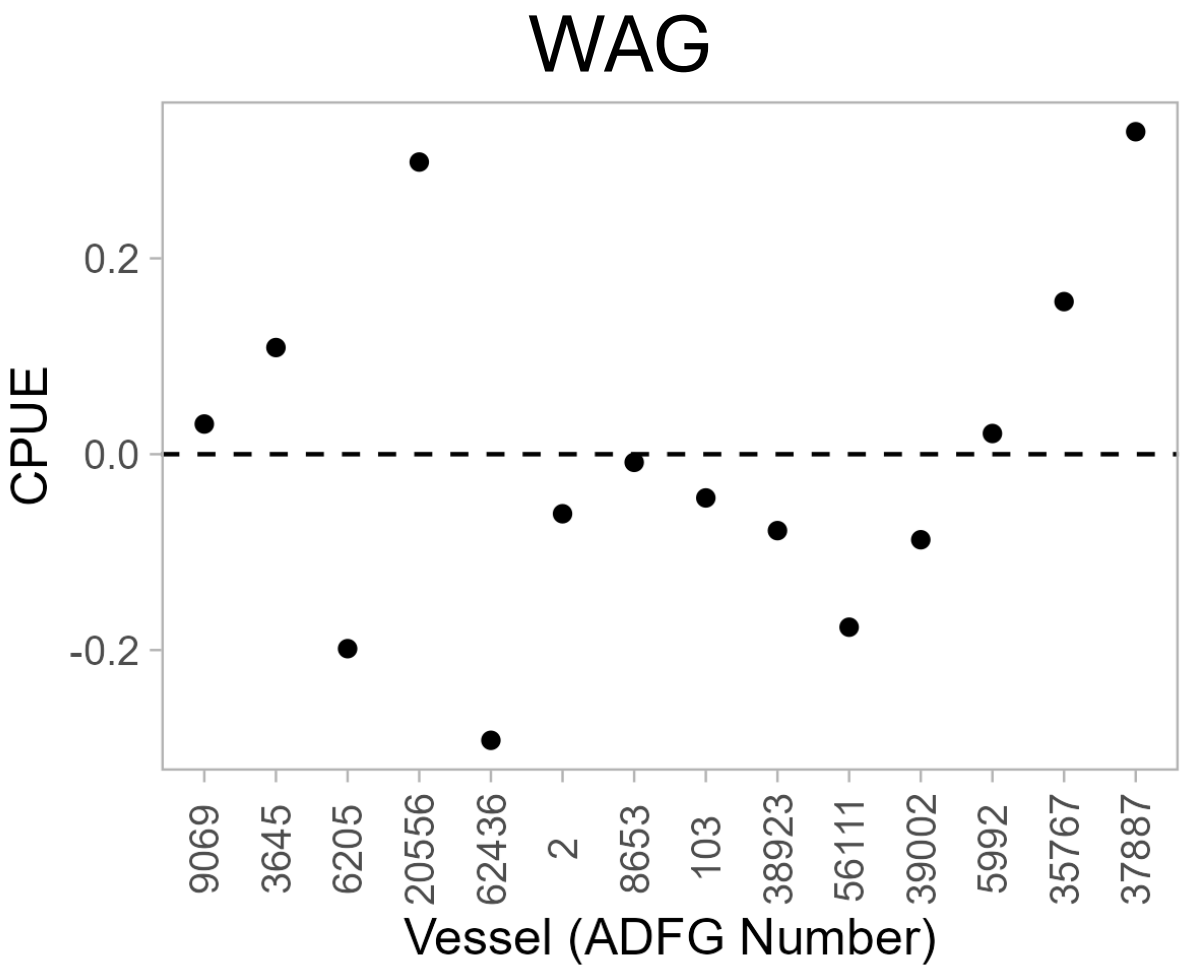
2021
2022
2023
CPUE
Soak Time (hrs)

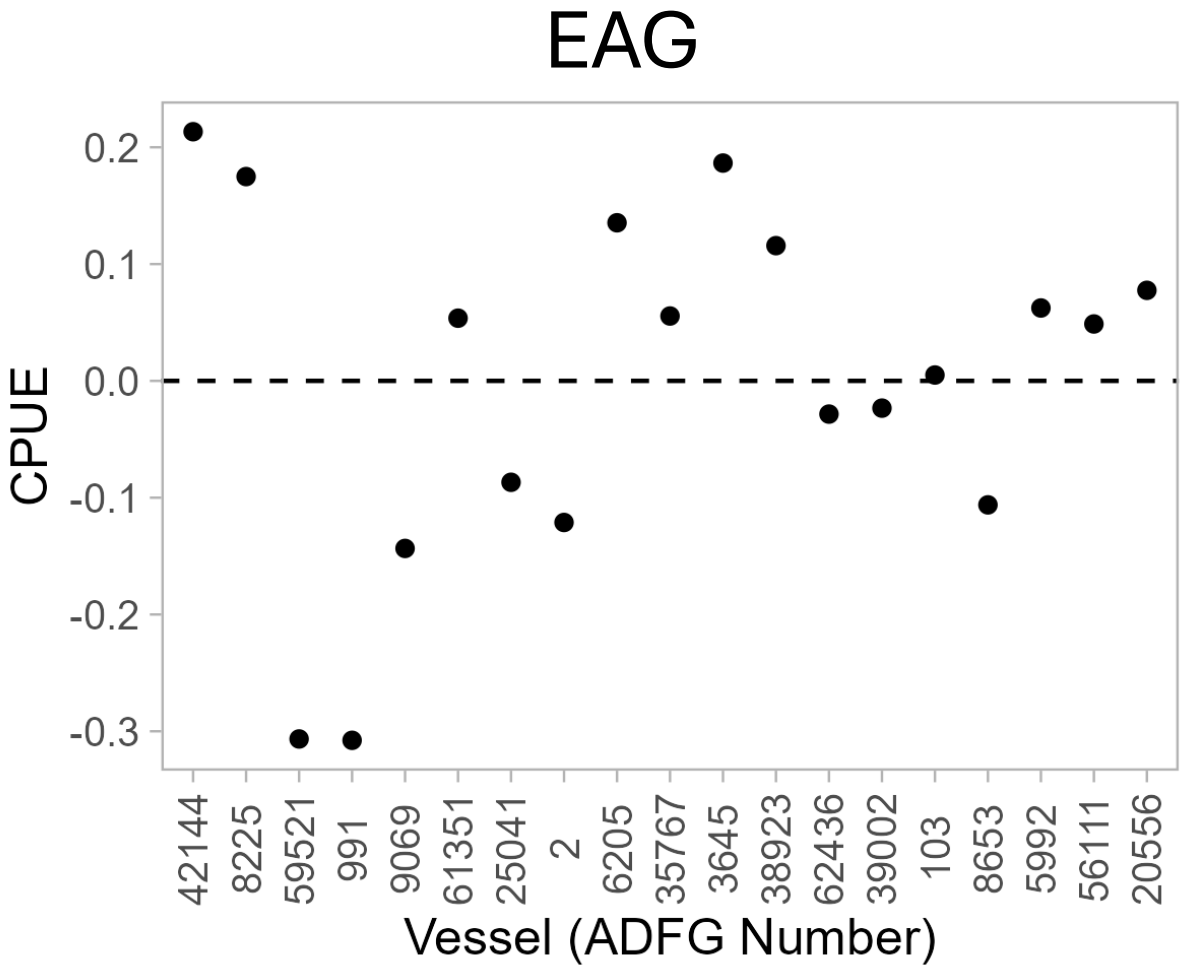

WAG
3.25
3.00
2.75
2.50
2.25
f(Depth)
100
150
200
250
300
Depth (fa)


EAG
2.75
2.50
2.25
f(Depth)
100
150
200
250
300
Depth (fa)


WAG
20
15
10
5
CPUE
5x5
6x6
7x7
8x8
Round
Pot Size


EAG
20
15
10
5
CPUE
5x5
6x6
7x7
Round
Pot Size


WAG
CPUE
0.2
0.0
-0.2
9069
3645
6205
20556
62436
2
8653
103
38923
56111
39002
5992
35767
37887
Vessel (ADFG Number)


EAG
CPUE
0.2
0.1
0.0
-0.1
-0.2
-0.3
42144
8225
59521
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9069
61351
25041
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6205
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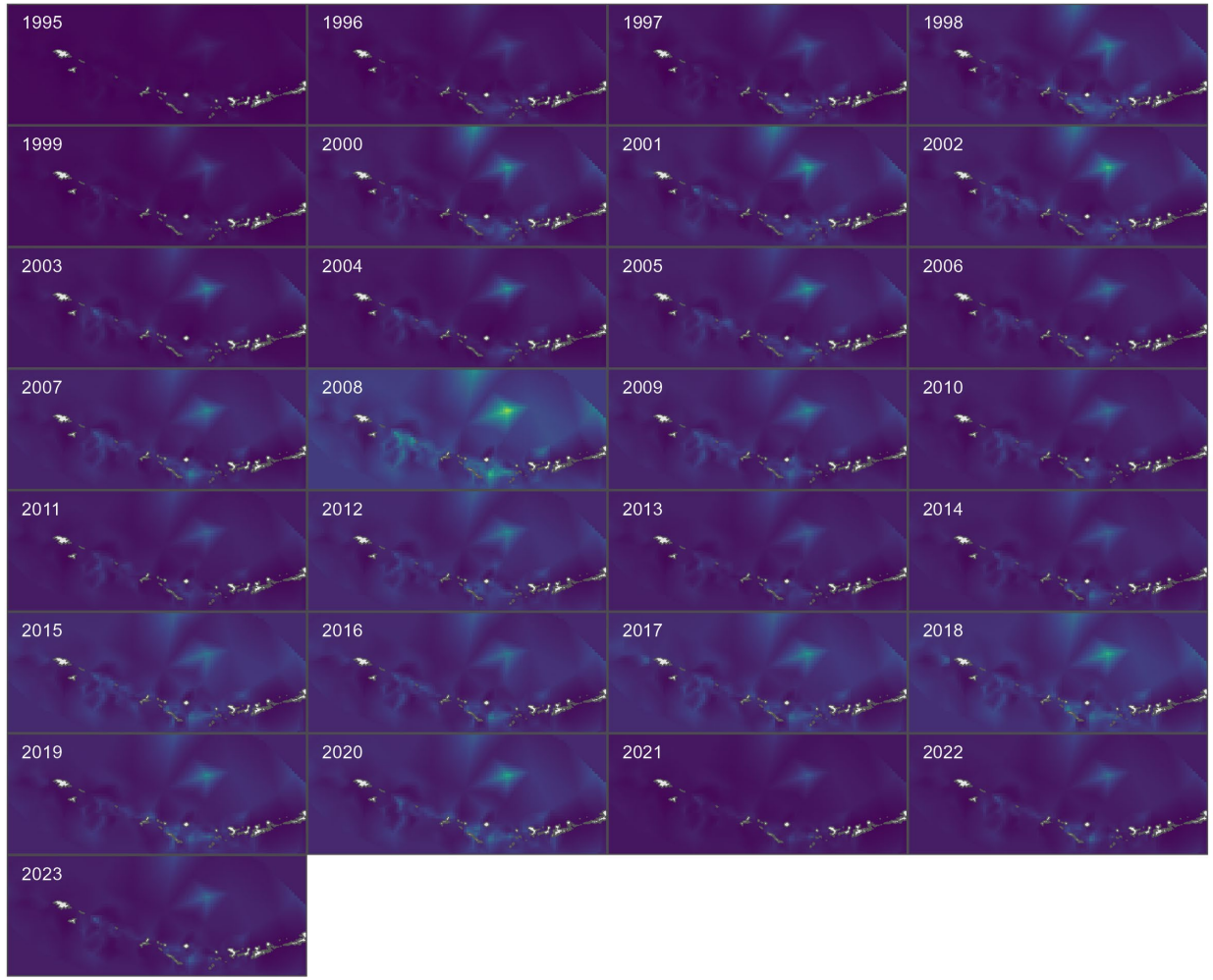
38923
62436
39002
103
8653
5992
56111
20556
Vessel (ADFG Number)

WAG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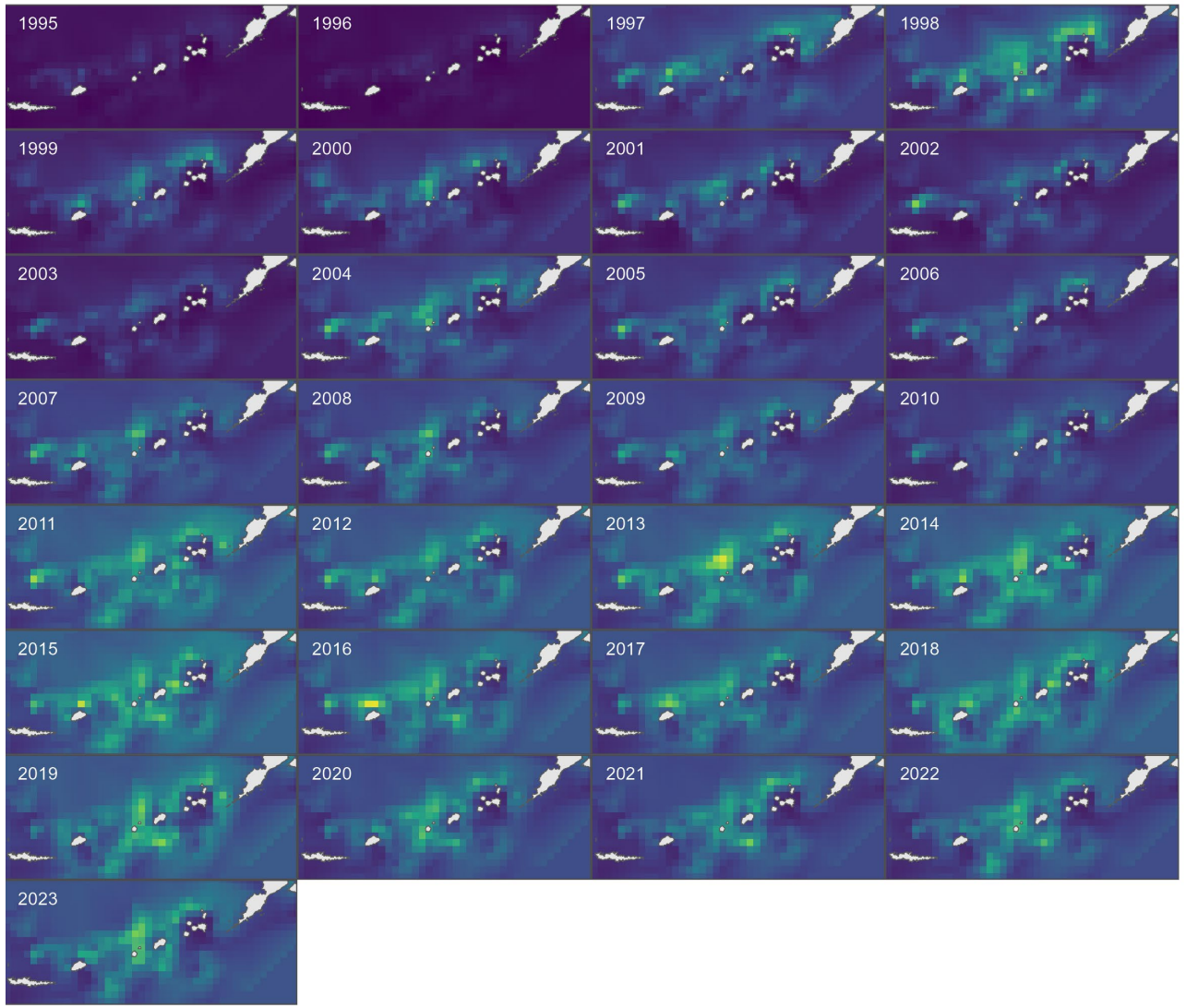
2023
exp(est)
50 100 150 200

EAG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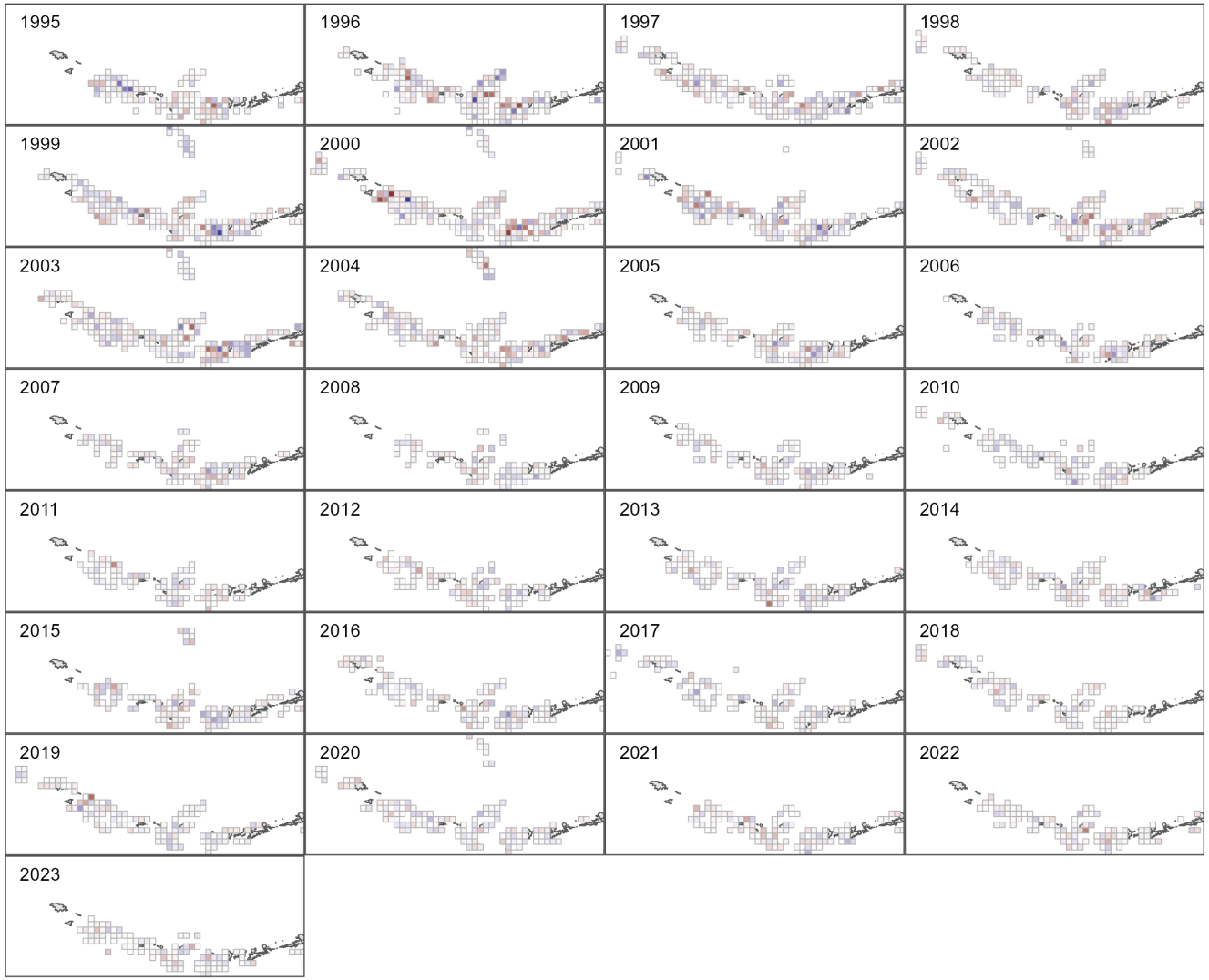
exp(est)
30 60 90

WAG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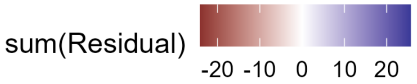
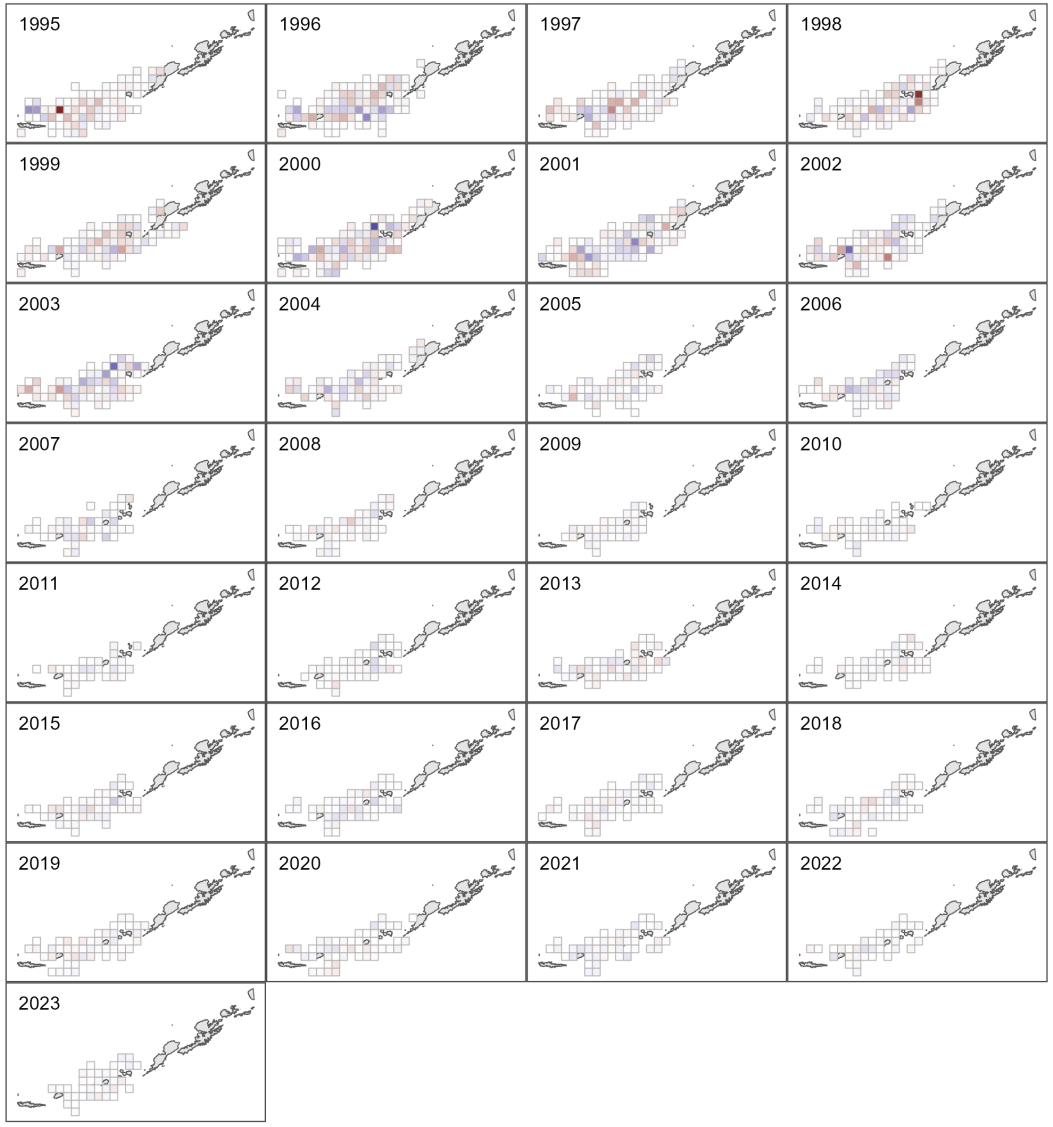

sum(Residual)
-20 -10 0 10 20

EAG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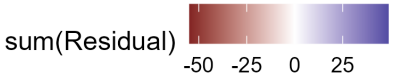
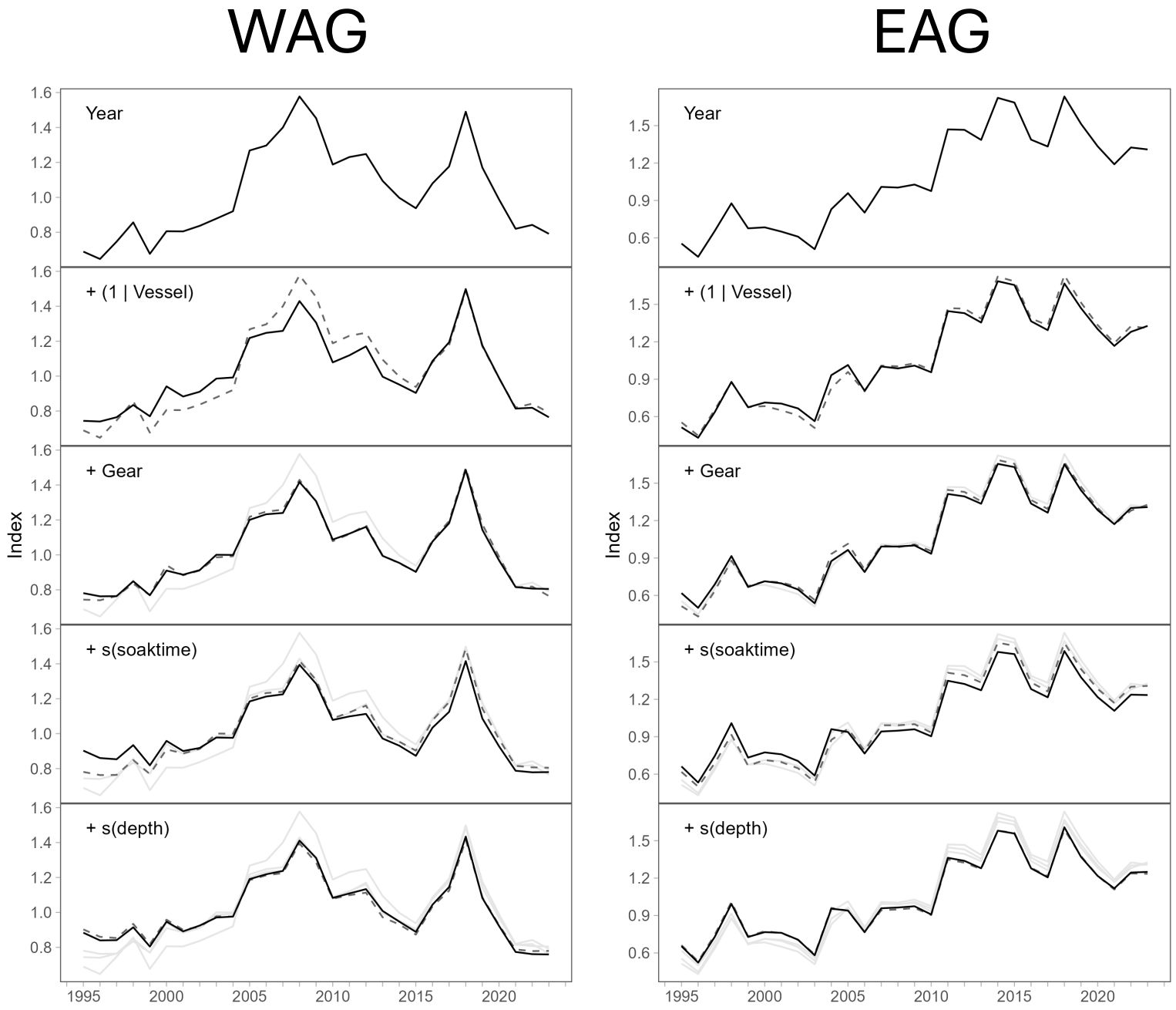
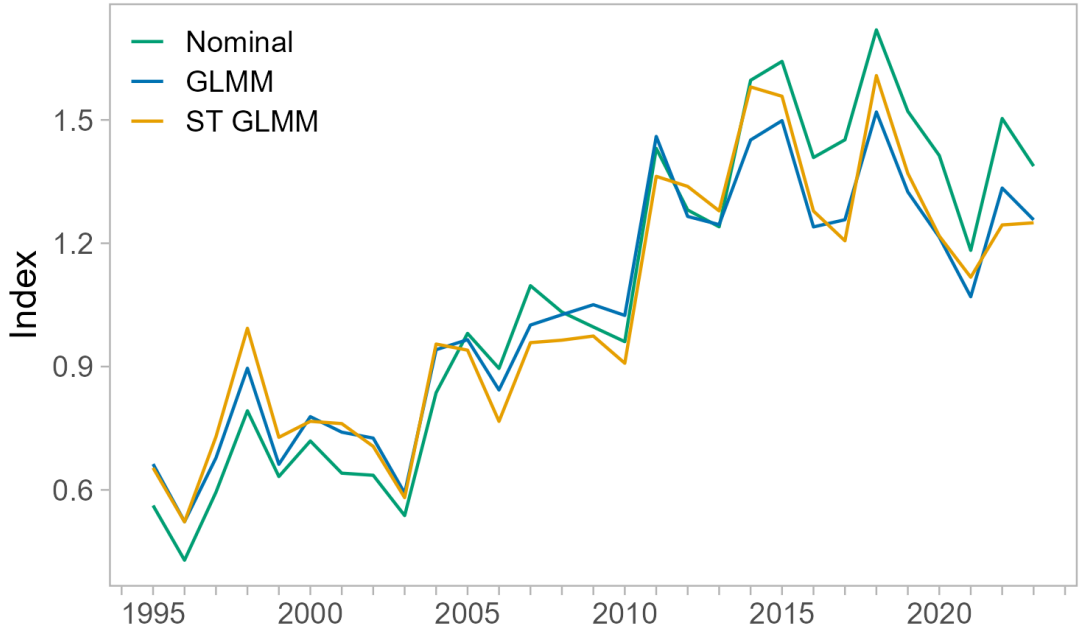

sum(Residual)
-50 -25 0 25

Index

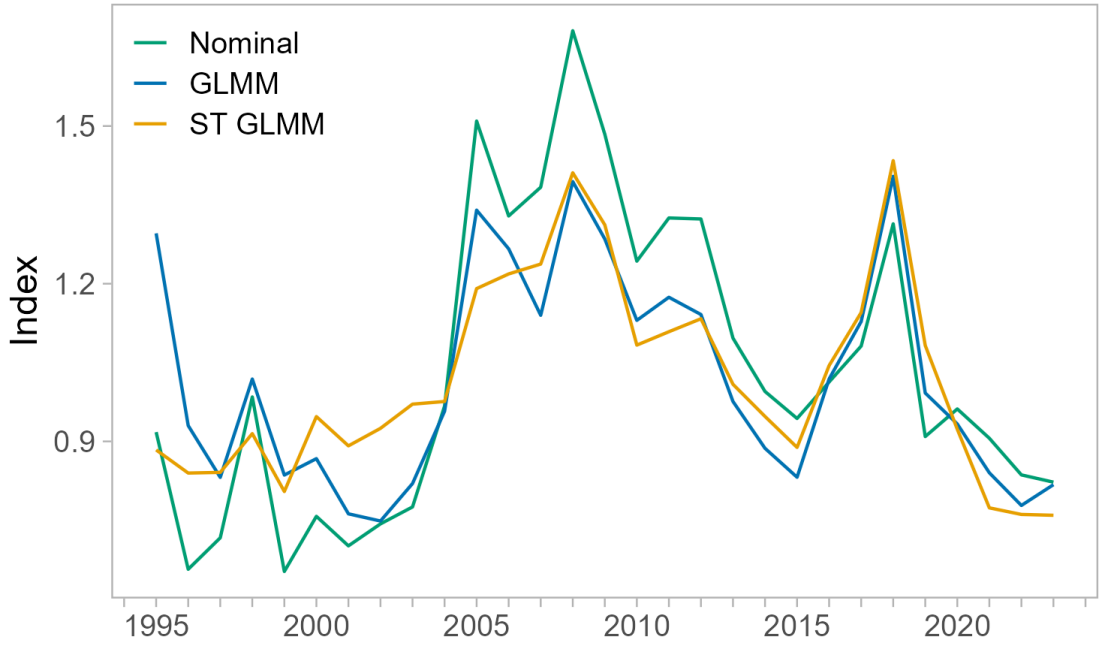
- Use mesh as prediction grid
- Mode for vessel and gear
- Mean depth and soak time



EAG


Nominal
GLMM
ST GLMM
Index
1.5
1.2
0.9
0.6
1995
2000
2005
2010
2015
2020

WAG


Nominal
GLMM
ST GLMM
Index
1.5
1.2
0.9
1995
2000
2005
2010
2015
2020

Feedback?

- Don’t think this is on the table for May, would be a different model scenario