Coastwide Sablefish Maturity

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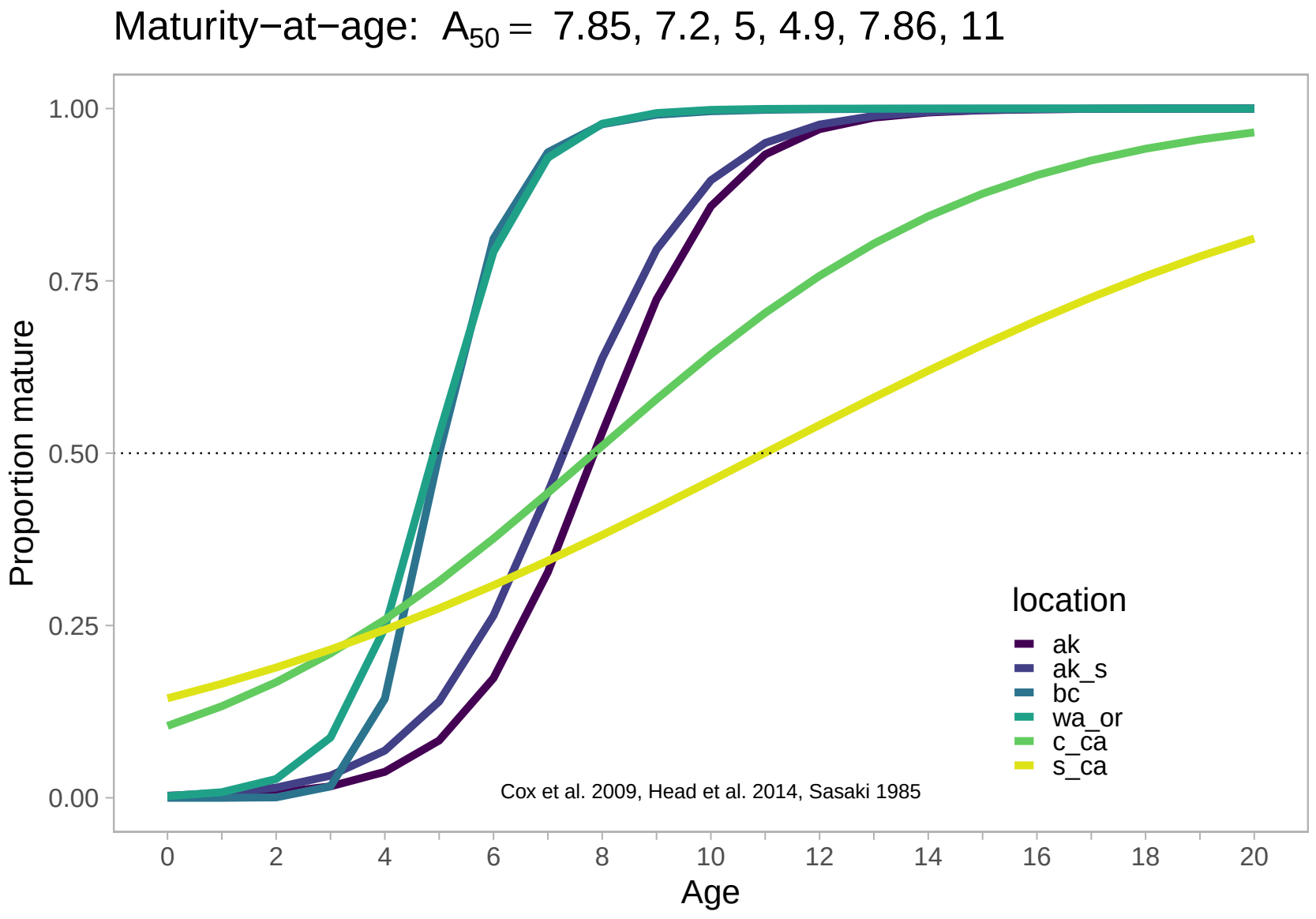
Goal

Provide maturity-at-age for a suite of potential OMs

Current status



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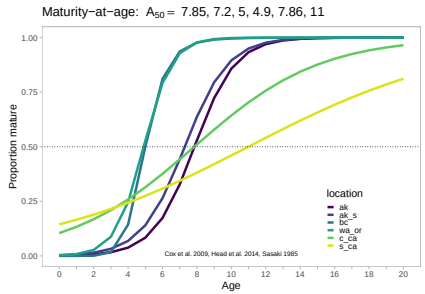
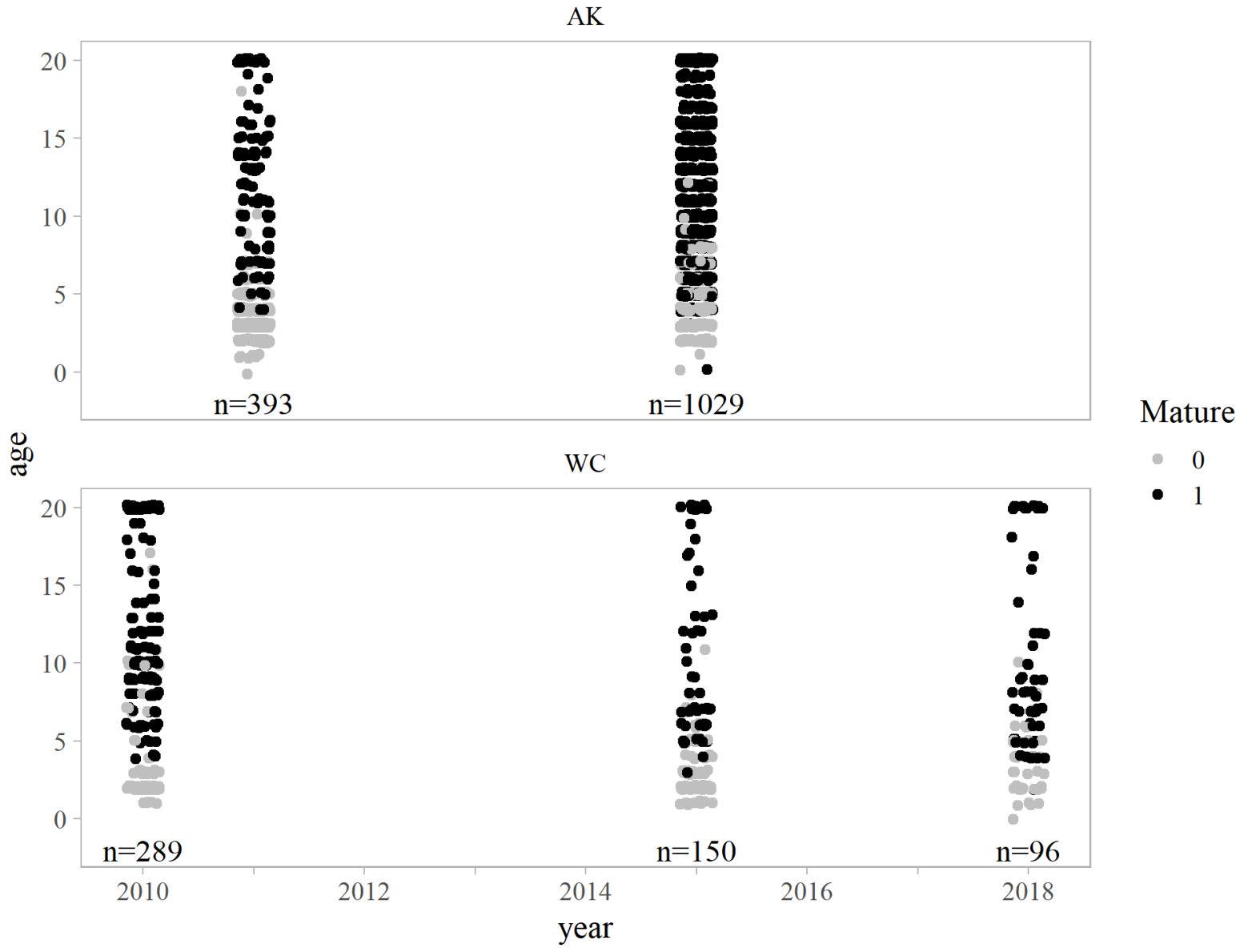
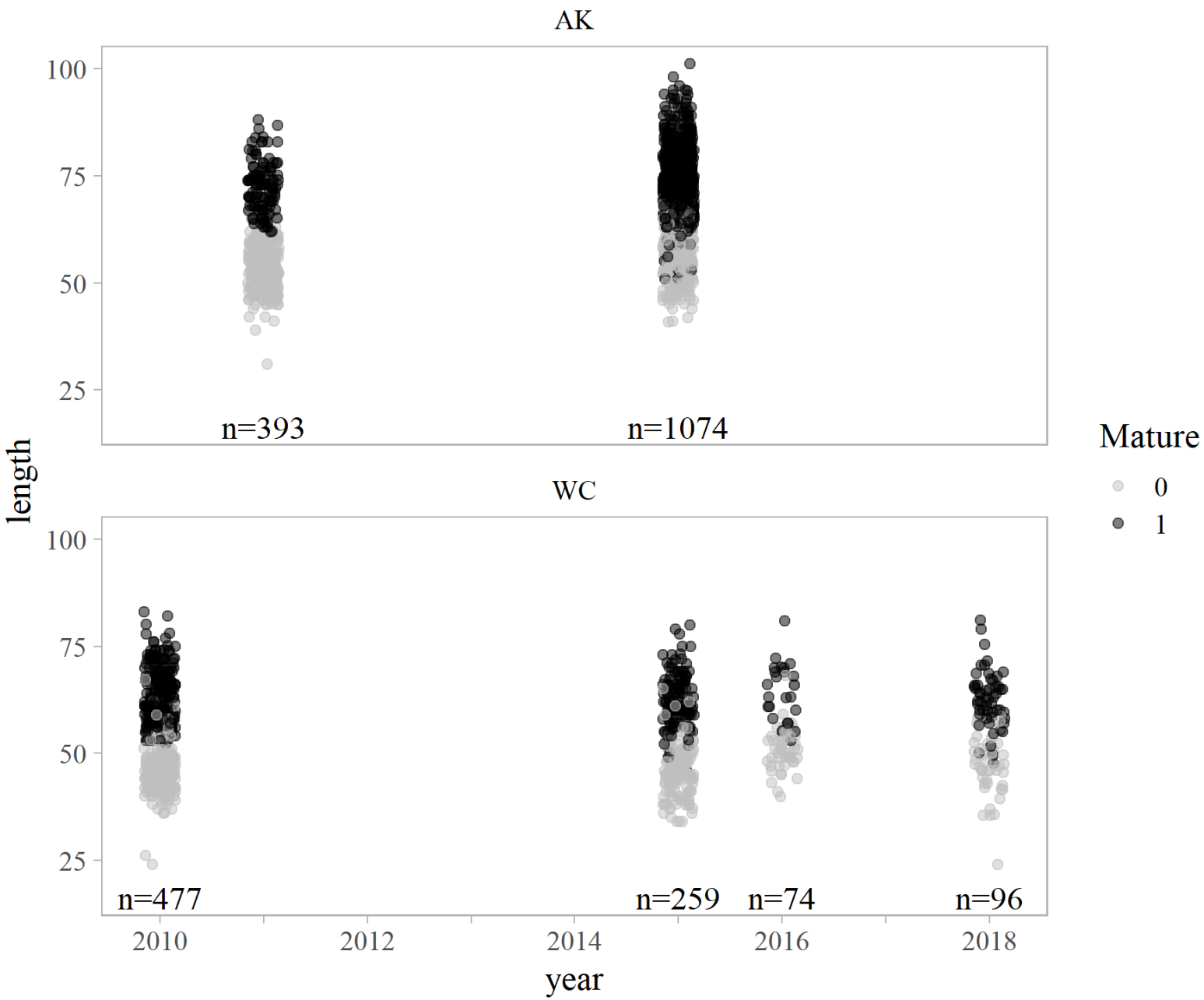


some of these are conversions from length to age - simply using for comparison

Exploratory data analysis - histology



Exploratory data analysis - histology



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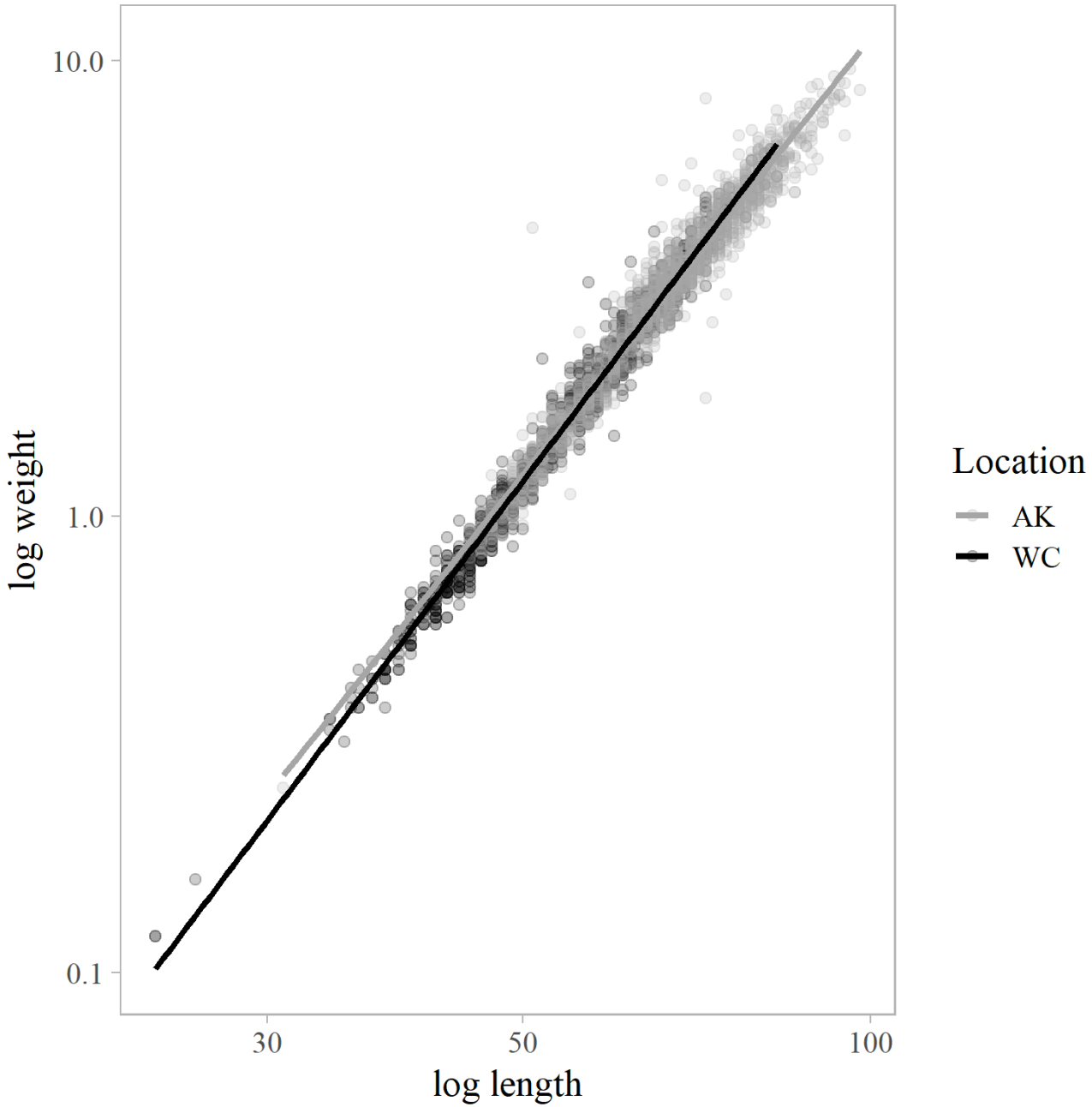

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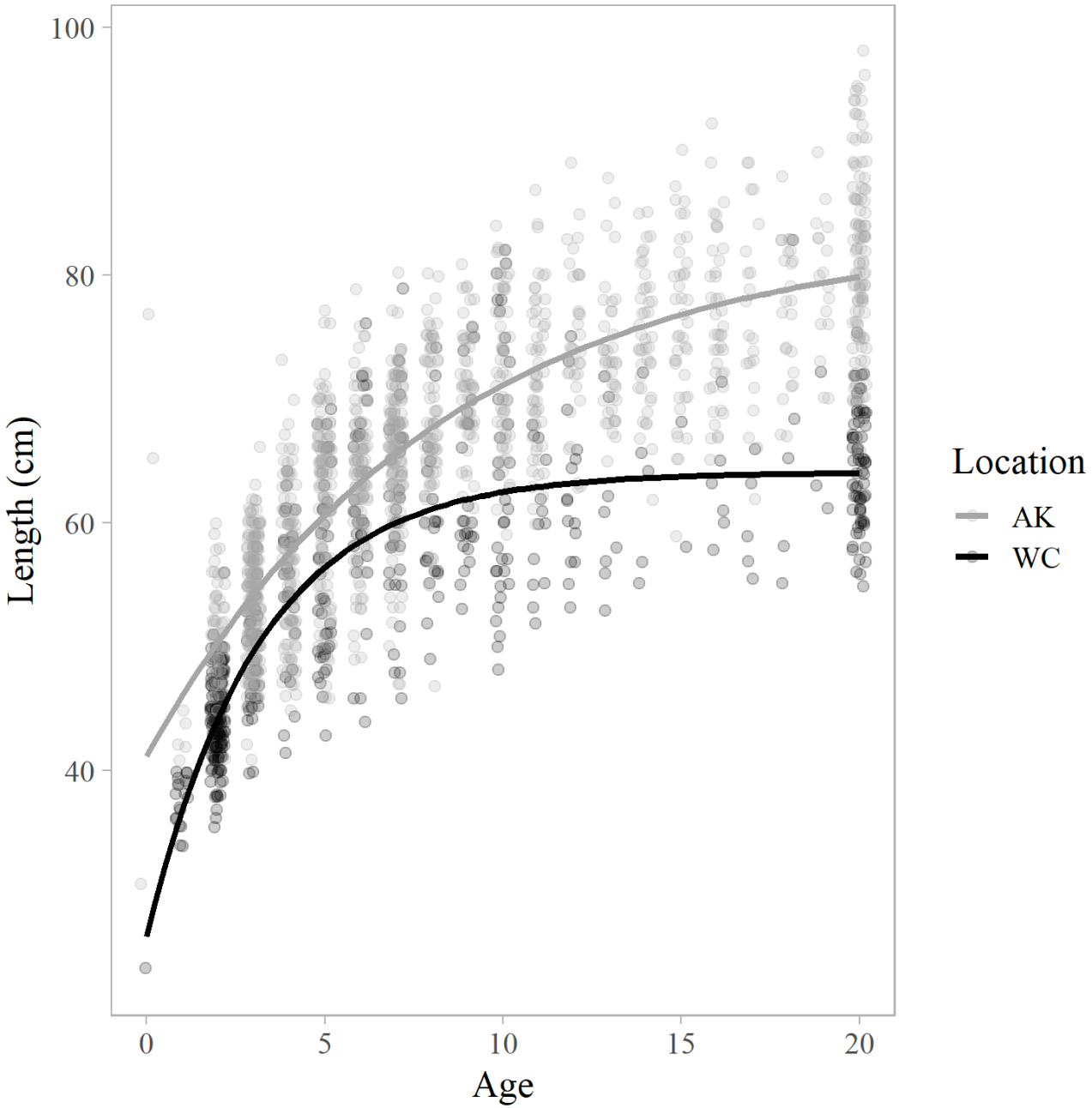

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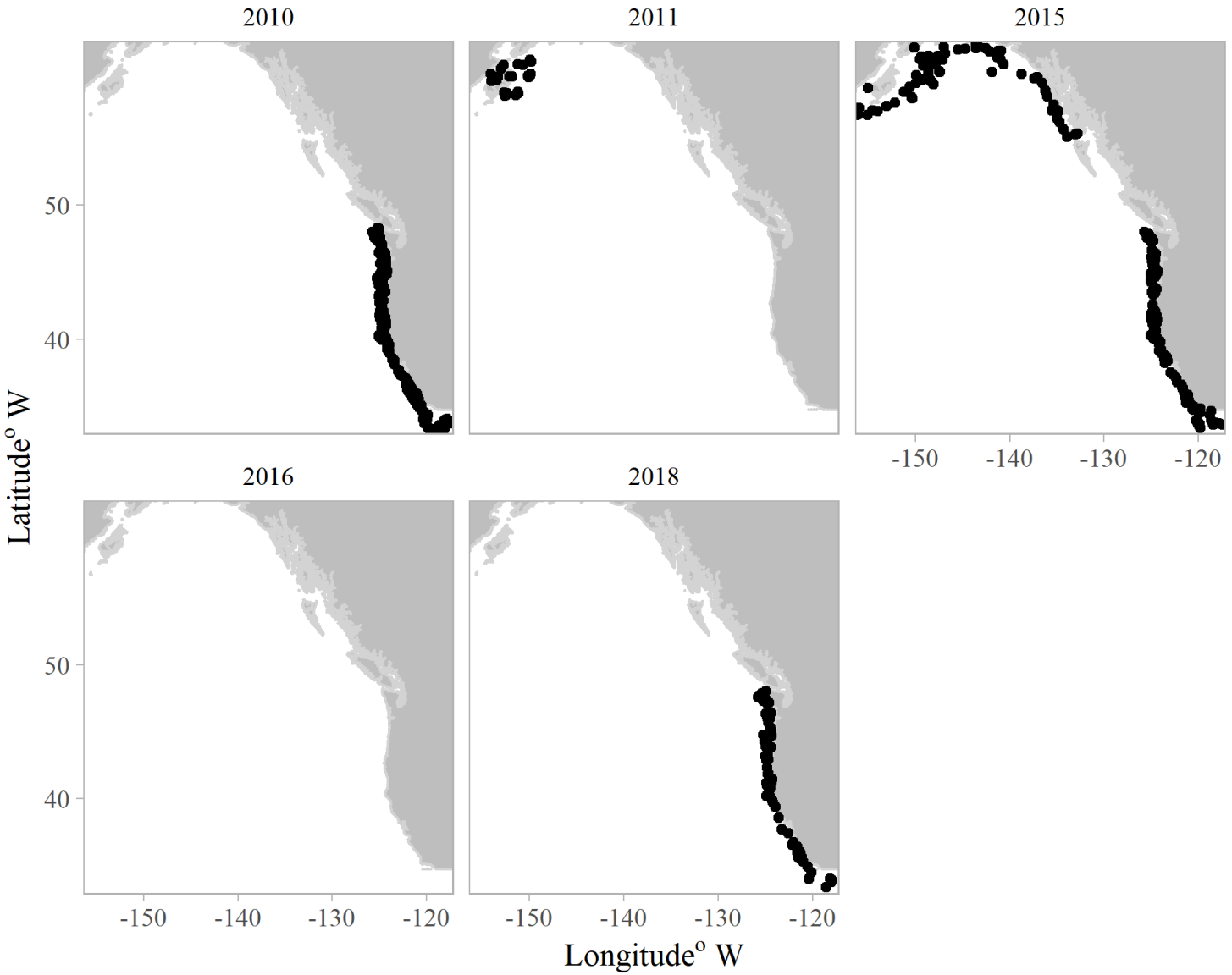
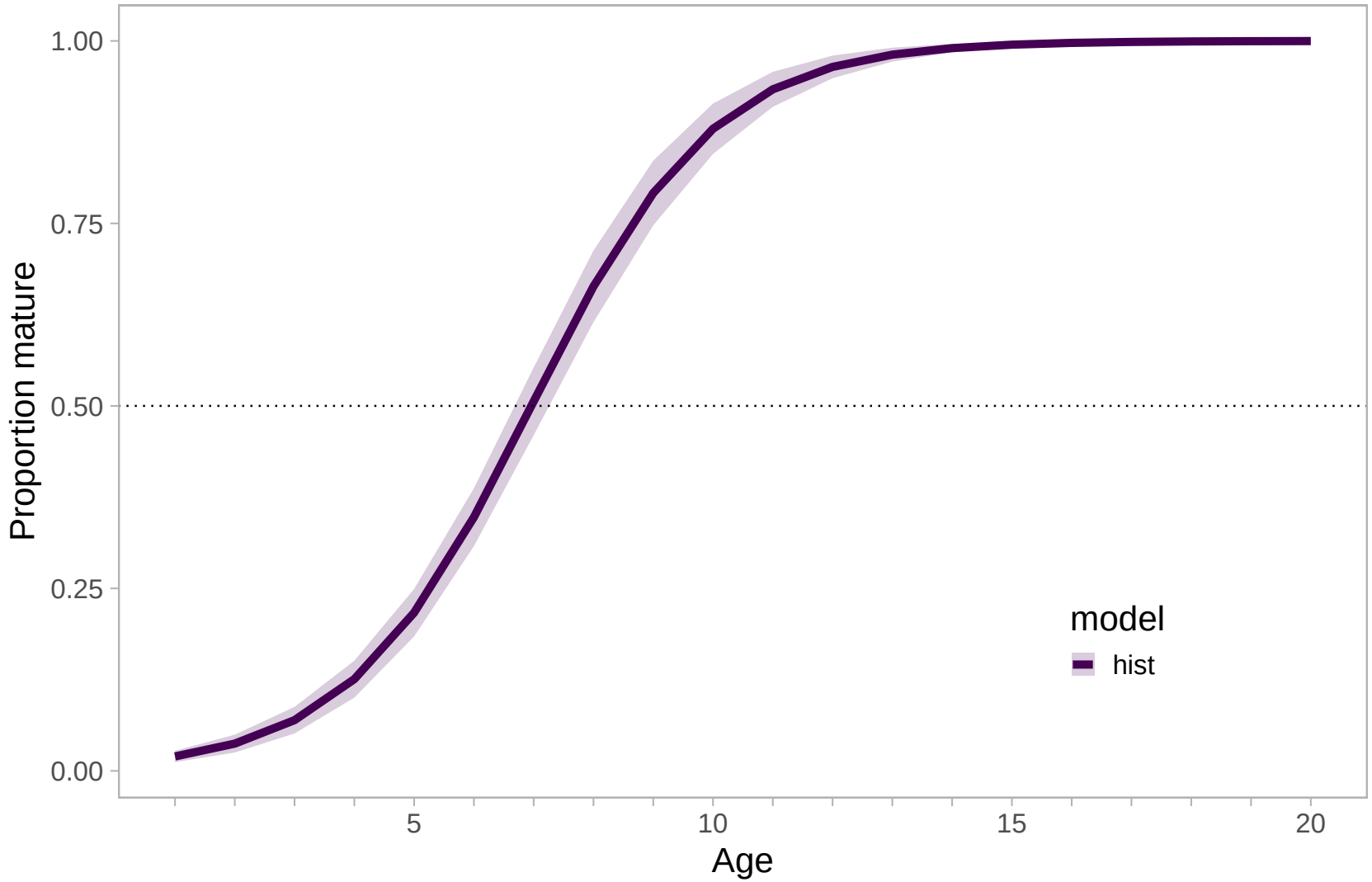


Basic model - histological only

$$Mature \sim age$$

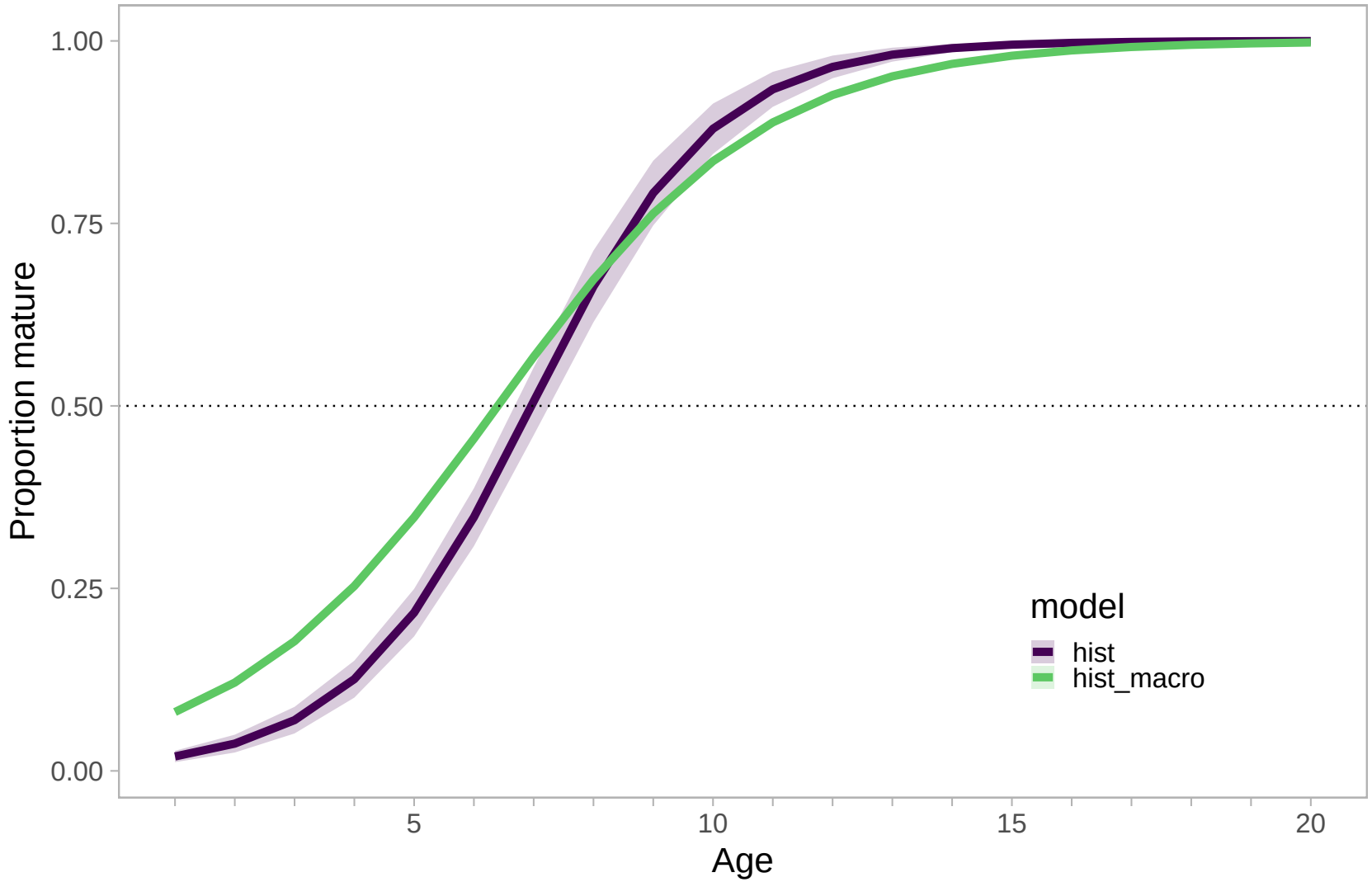
$A_{50} = 6.96$



Basic model - histological & macroscopic

fit1 = *Mature* ~ *age*

$A_{50} = 6.4, 6.96$



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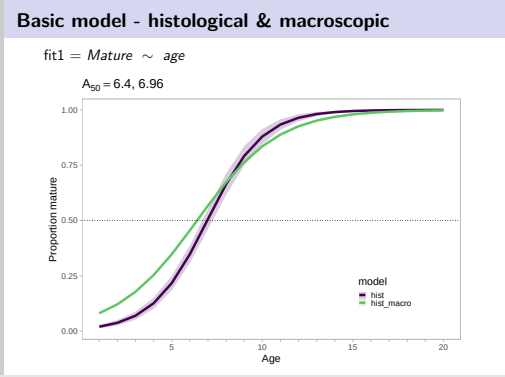
Basic model - histological & macroscopic

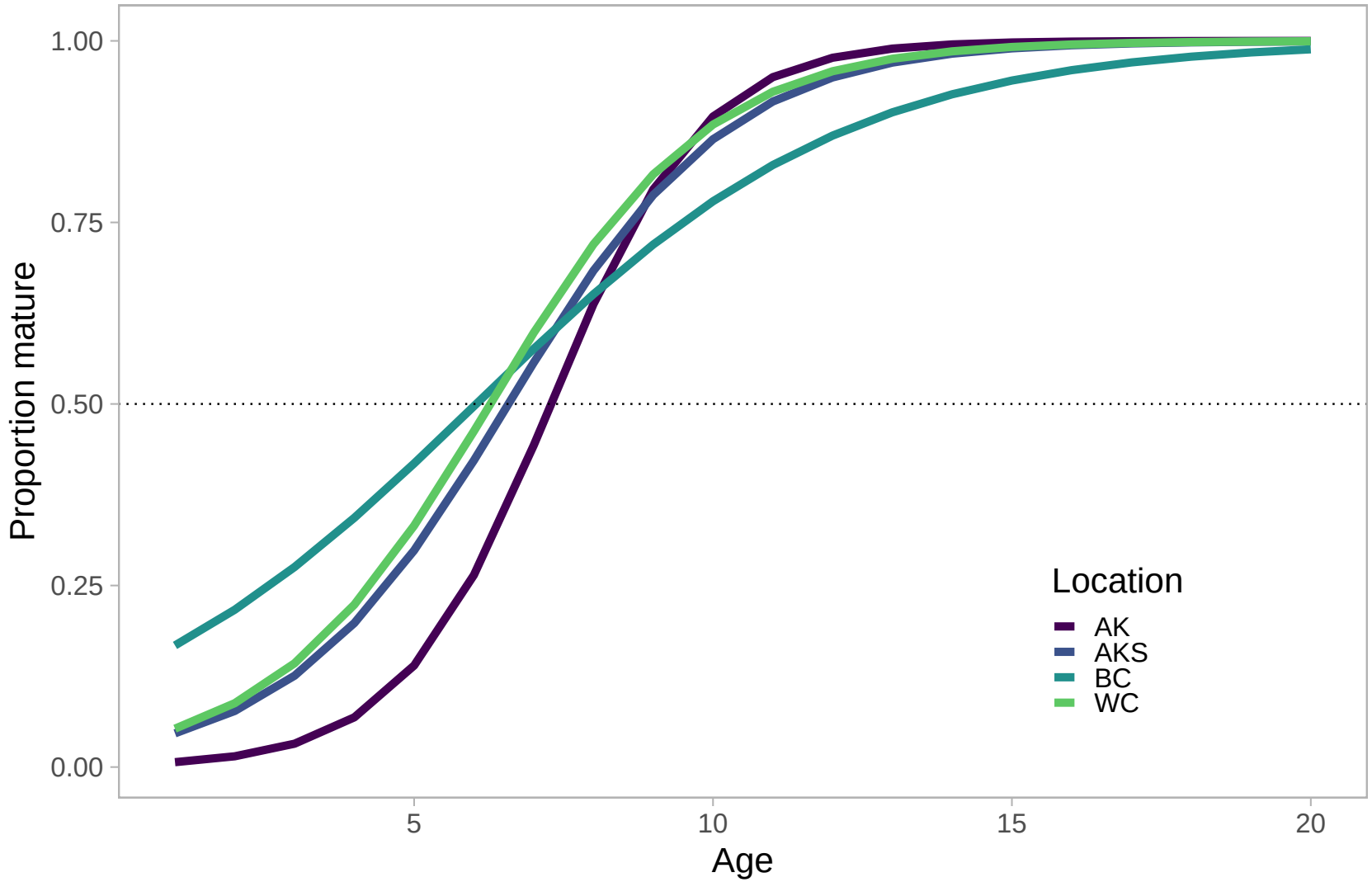


dfo data 2010-2017; excluded earlier years deemed unreliable ak-state macro data 1988-2019

Basic model - Location

$$\text{fit2} = \textit{Mature} \sim \textit{age} * \textit{Location}$$

$A_{50} = 7.3, 6.6, 6.3, 6$



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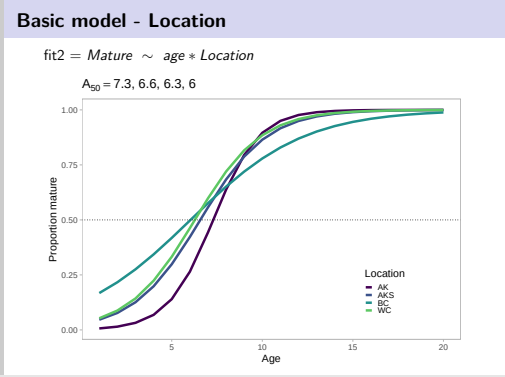
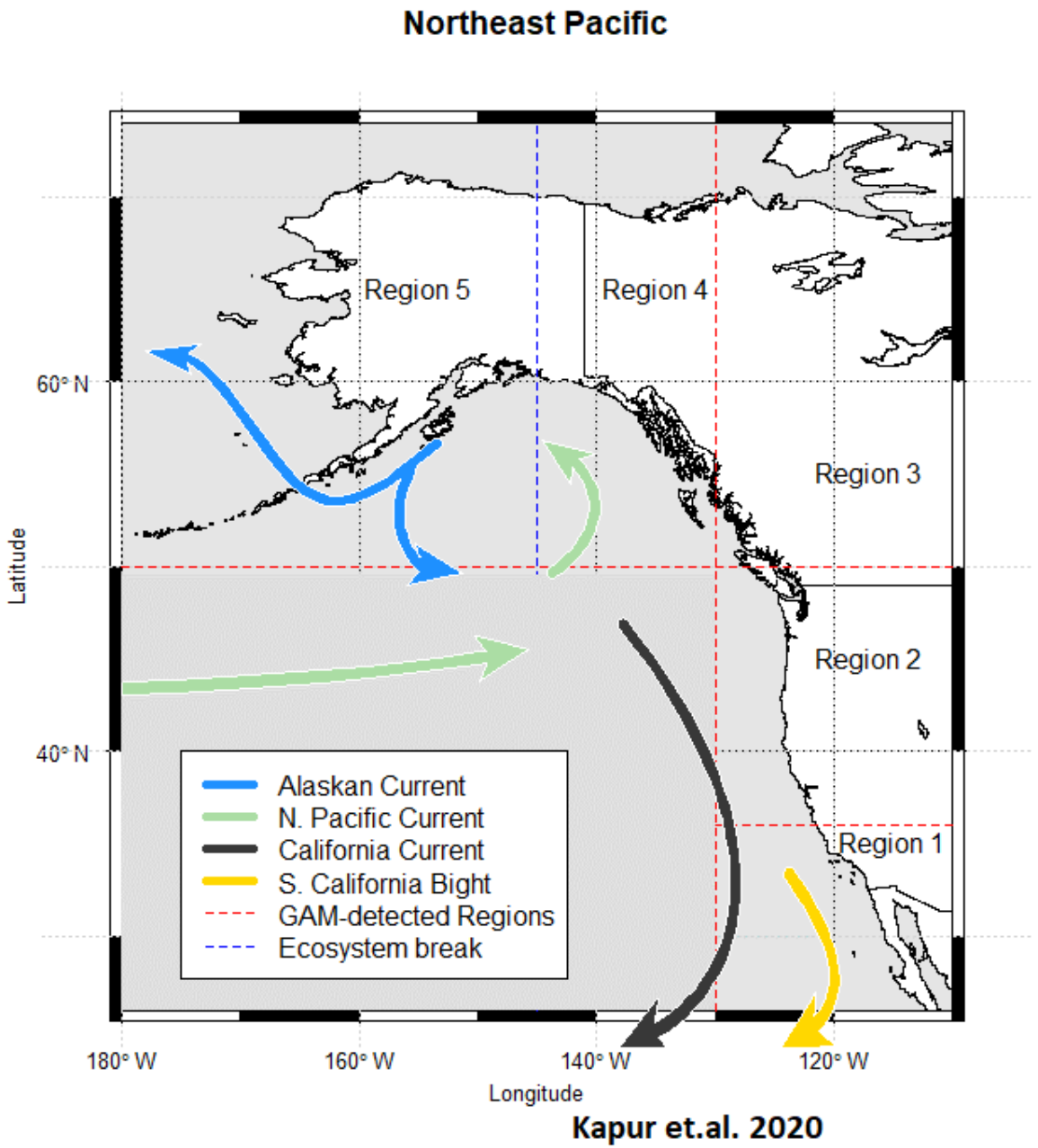
Basic model - Location



looking at these data on the management/region scale

Basic model - Breaks



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Basic model - Breaks

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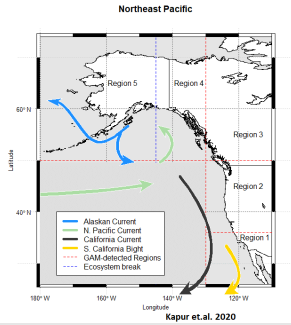
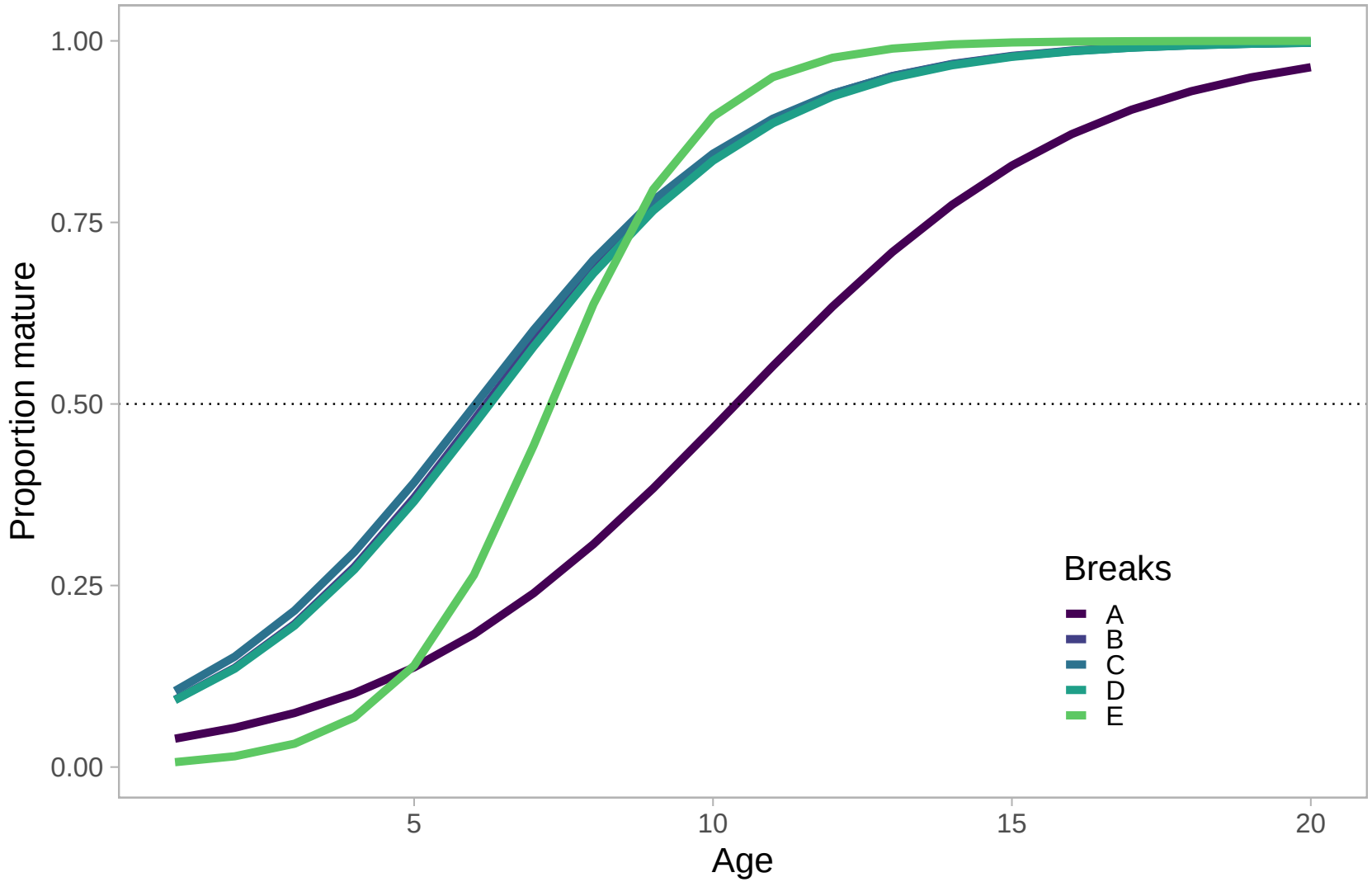


These are the breaks from Kapur et al. 2020 based upon lengths They used the first derivative of a gam I tried to replicate with maturity information, but found the data too limited Region 1-5 are code as A-E

Basic model - Breaks

$$\text{fit3} = \textit{Mature} \sim \textit{age} * \textit{Breaks}$$

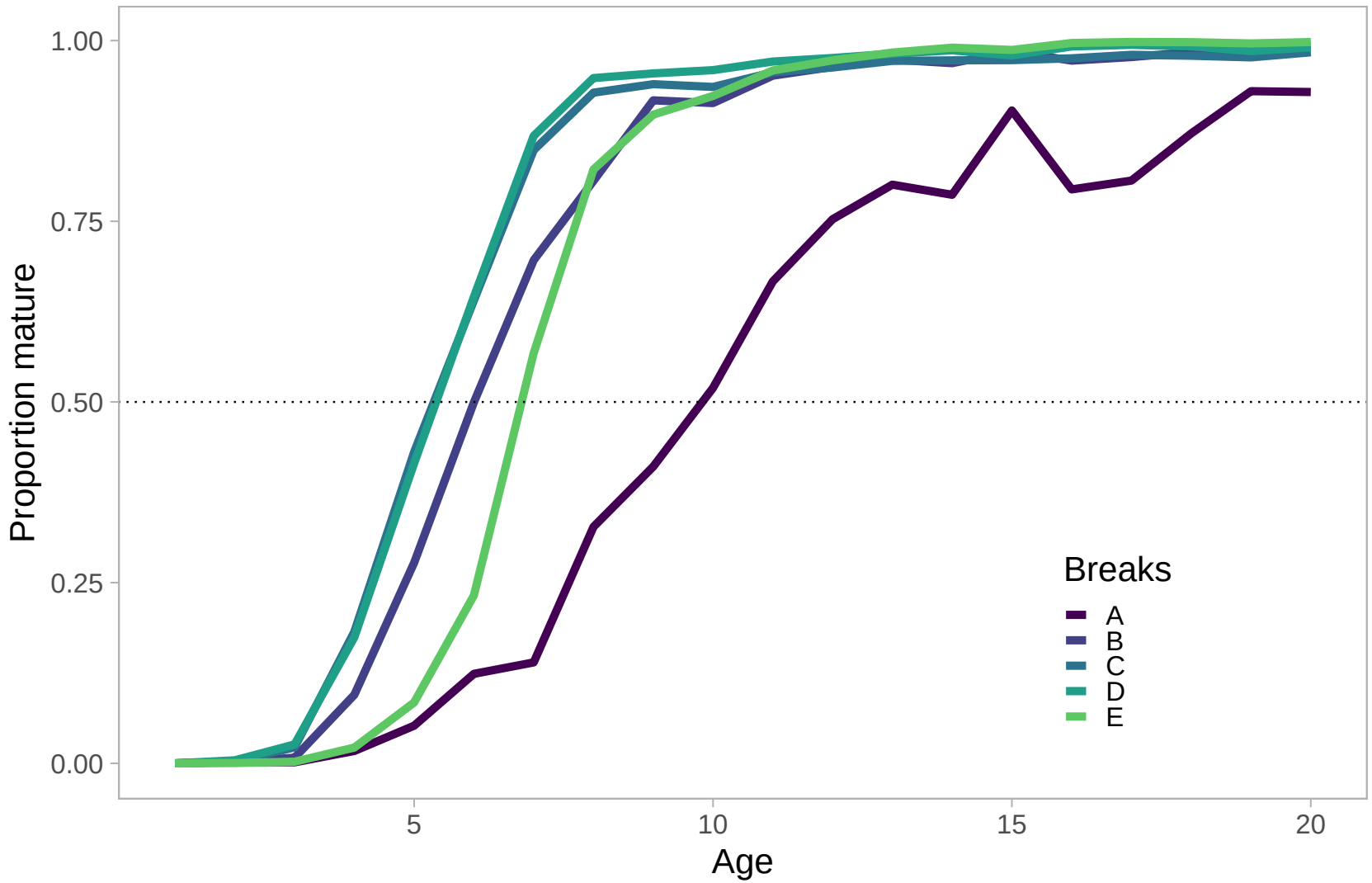
$A_{50} = 10.4, 6, 6.2, 6.3, 7.3$



GAM - Breaks

$$\text{fit4} = Mature \sim s(length, by = Age) + s(age) + Breaks$$

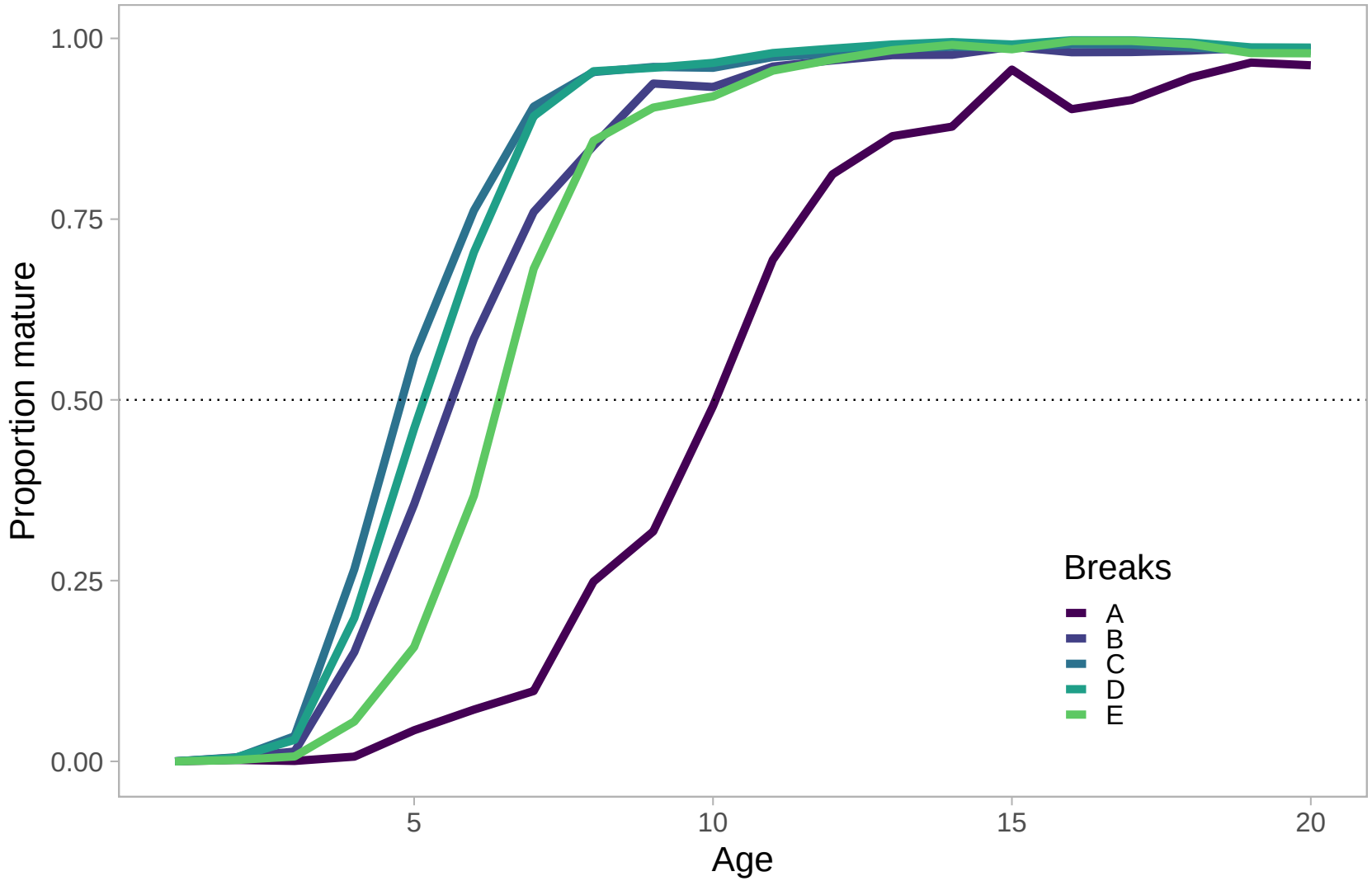
$A_{50} = 10, 6, 5.4, 5.4, 6.7$



GAM - Breaks/depth

$$\text{fit5} = Mature \sim s(length, by = Age) + s(depth) + s(age) + Breaks$$

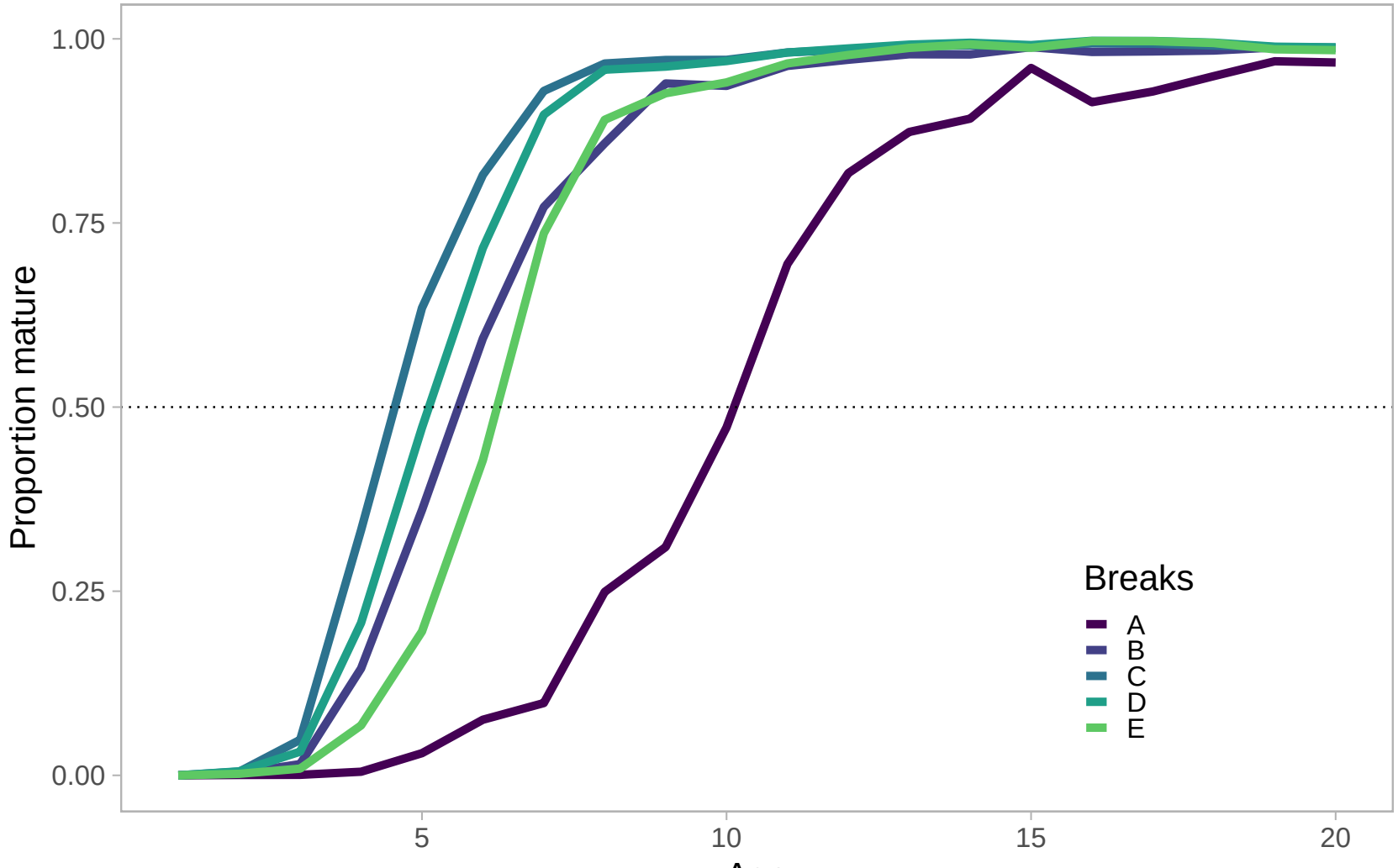
$A_{50} = 10.0, 5.5, 4.8, 5.5, 6.5$



GAM - Breaks/depth/location

$$\text{fit6} = Mature \sim s(length, by = Age) + s(depth) + s(age) + te(location) + Breaks$$

$A_{50} = 10.1, 5.5, 4.5, 5.2, 6.3$



AIC

model	df	AIC	delta	dev_explained
fit6	55.4	6959.9	0.0	61.1
fit5	46.7	7052.2	92.2	60.4
fit4	43.2	7147.9	188.0	60.0
fit2	8.0	10606.1	3646.2	39.9
fit3	10.0	10737.0	3777.0	39.2
fit1	2.0	10871.5	3911.6	38.3

General Observations

- "dome" shaped maturity-at-age across the range
- WA/BC appear as "hot spot"
- depth effect is relevant (observed in other analyses)
- rather limited data

Potential explorations

- obs are not scaled to biomass
- gulf-wide directed maturity study (NPRB)

OM Scenarios - 1 Panmictic maturity

A50 $\sim$ 6.5

Not recommended

OM Scenarios - 2 AK/WC maturity split (BC=?)

AK $\sim$ 7
WC $\sim$ 6

Not preferred

OM Scenarios - 3 Management Regions

AK $\sim$ 7.3
AK-state $\sim$ 6.6
BC $\sim$ 6.3
WC $\sim$ 6

Not preferred - workable w/mods

OM Scenarios - 4 Length Breaks

A $\sim$ S_CA $\sim$ 10
B $\sim$ WC $\sim$ 6
C/D $\sim$ BC/SEAK $\sim$ 5.4
E $\sim$ AK $\sim$ 6.7

preferred - or one of the variants (include depth, etc)