

Comisión Interamericana del Atún Tropical  
Inter-American Tropical Tuna Commission



Development of a new benchmark model for yellowfin tuna in the EPO

Carolina Minte-Vera, Mark Maunder, Haikun Xu

# Models assumptions

## North and South

Assumptions	Description
Model dimensions	
Start year	1975
End Year	2018
Time step	Quarter
Min age	0
Plus group	29 quarters (7.25 years)
Sex	Females (1) and males (2)
Population size bins	From 2 to 198+ by 2 cm
Fisheries length frequency data bins	From 20 to 198+ by 2 cm
Survey length frequency data bins	From 20 to 190+ by 10 cm

# Models assumptions

## North and South

Biology		
<b>Growth:</b>		
<b>average length at age</b>	Richard curve fixed at A-Scala estimates (same for females and males)	Maunder and Aires-da-Silva (2009) fit to otoliths data
<b>Variability of size at age</b>	CV as a function of length at age, fixed (same for females and males)	Maunder and Aires-da-Silva (2009)
<b>Weight-length relationship</b>	Fixed, $W = 1.387 \times 10^{-5} L^{3.086}$ (same for females and males)	Wild (1986)
<b>Natural mortality</b>	At age and sex, fixed (see graphs)	Maunder and Watters (2001)

# Models assumptions

## North and South

Biology		
Maturity	Read in vector (total fecundity at age= Batch fecundity at length (exponential) X proportion mature at length (logistic) X spawning frequency (exponential) at length) all transformed to age	From Schaefer (1998) transformed to age using Wild (1986) growth function, see Minte-Vera et al 2019
Recruitment	Age-0, by quarter	
Stock-recruitment relationship	None (Beverton-Holt with steepness of 1)	
sigmaR	0.6 logarithm of the quarterly recruitment deviates is normally distributed, with a standard deviation of 0.6. This assumption is enforced by a penalty function	
Initial conditions		
Recruitment deviates	15 quarters, estimated	
Recruitment offset	estimated	

# Models assumptions

## North

Number of surveys	1
Number of fisheries	10

Initial fishing mortality	Estimated, fleet 16, not fit to equilibrium catch
Index of abundance	
S1-PS_DEL_VAST	Selectivity Length, double-normal, catchability analytical, constant over time, average CV=0.2
Length composition for the index	
S1-PS_DEL_VAST	Data weighting equal to number of wells and Francis weighting

F15-DEL_N	Purse-seine on dolphins, North	Length, Asymptotic
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## South

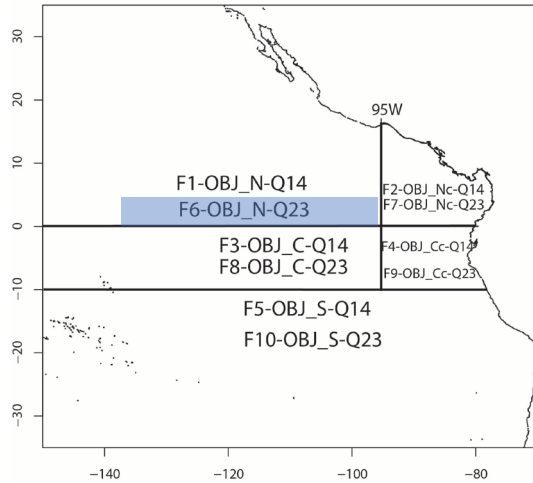
# Fisheries definition of new models

## Purse-seine

## Longline

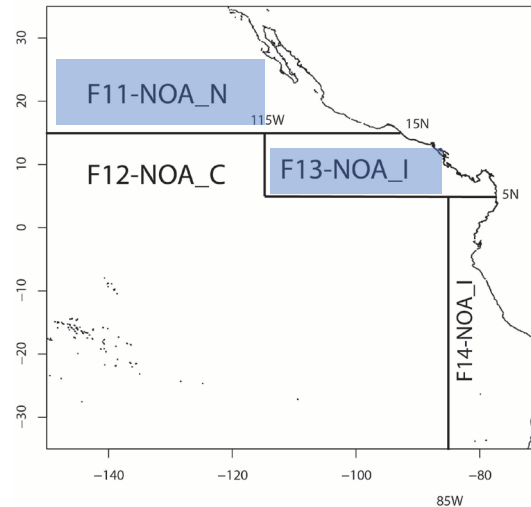
### Floating objects

Purse-seine fisheries sets on floating objects (OBJ)



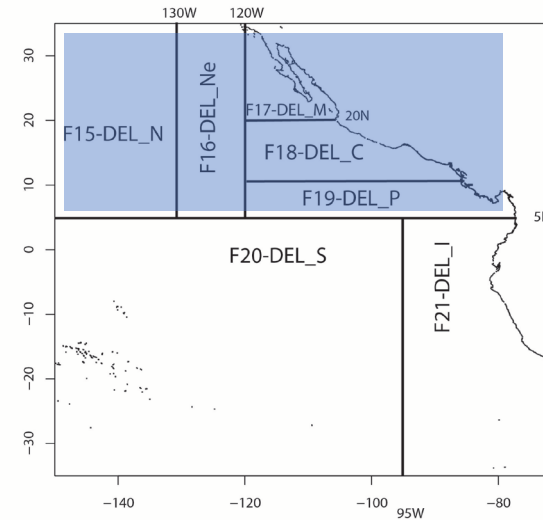
### Free schools

Purse-seine fisheries sets on free schools (NOA)

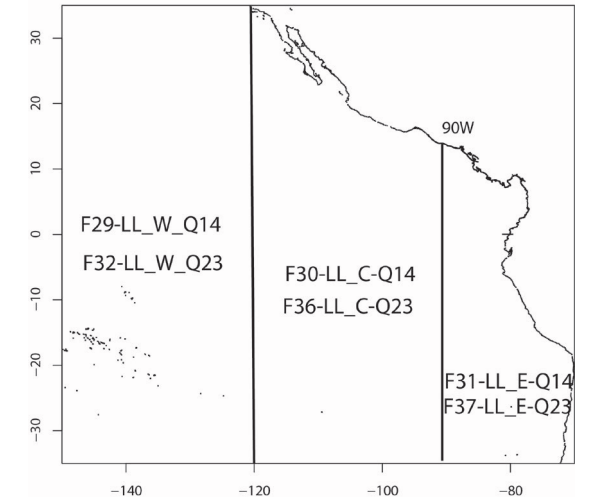


### Dolphins

Fisheries purse-seine sets around dolphins (DEL)



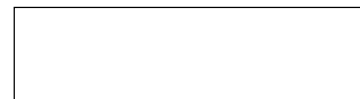
YFT longline fisheries



North reference model

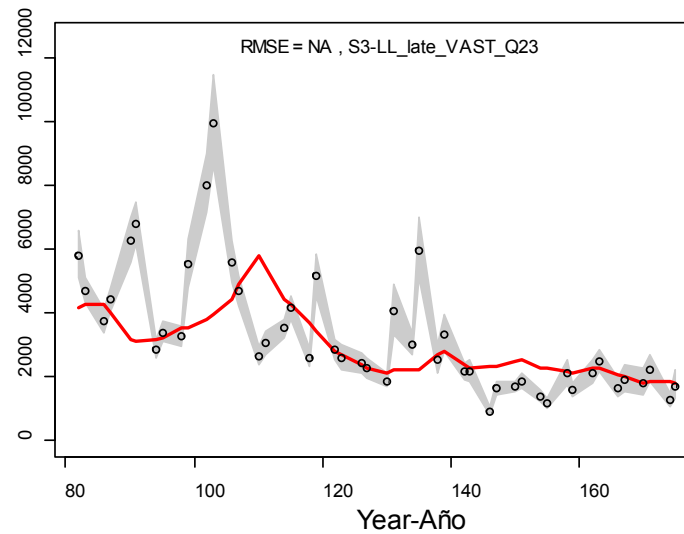
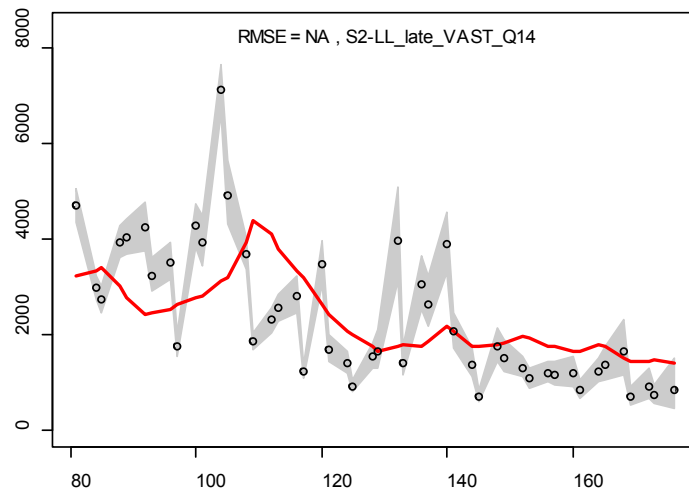
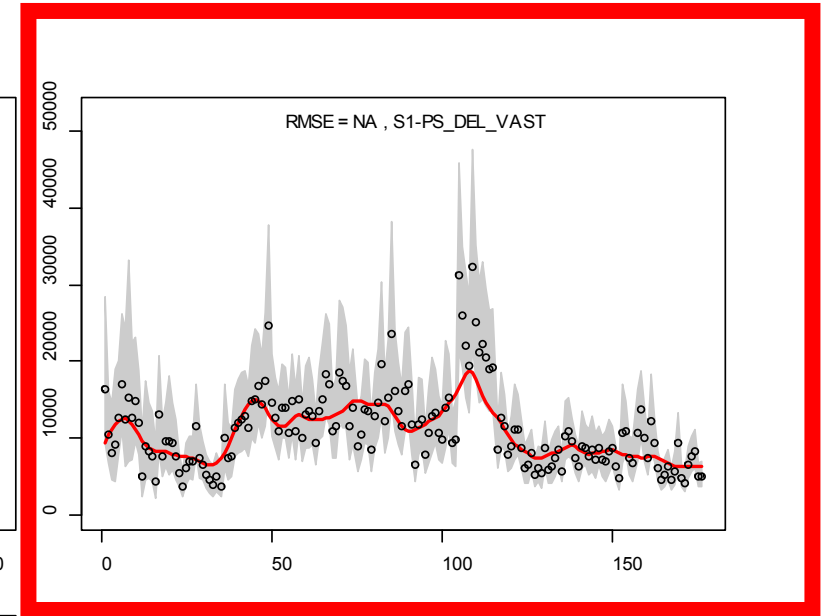
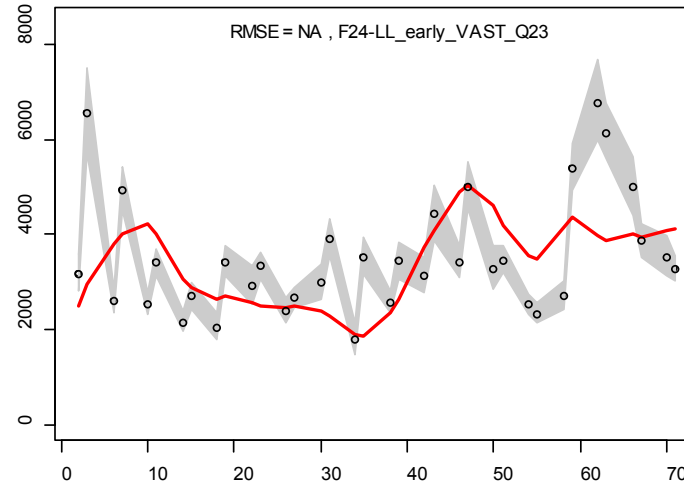
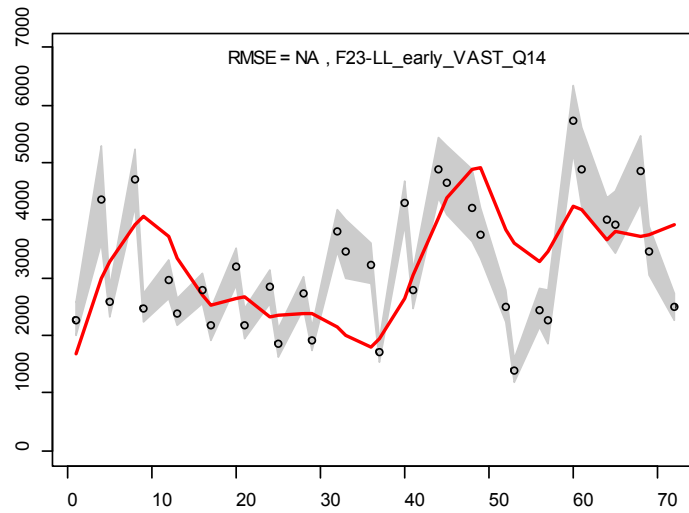


South reference model



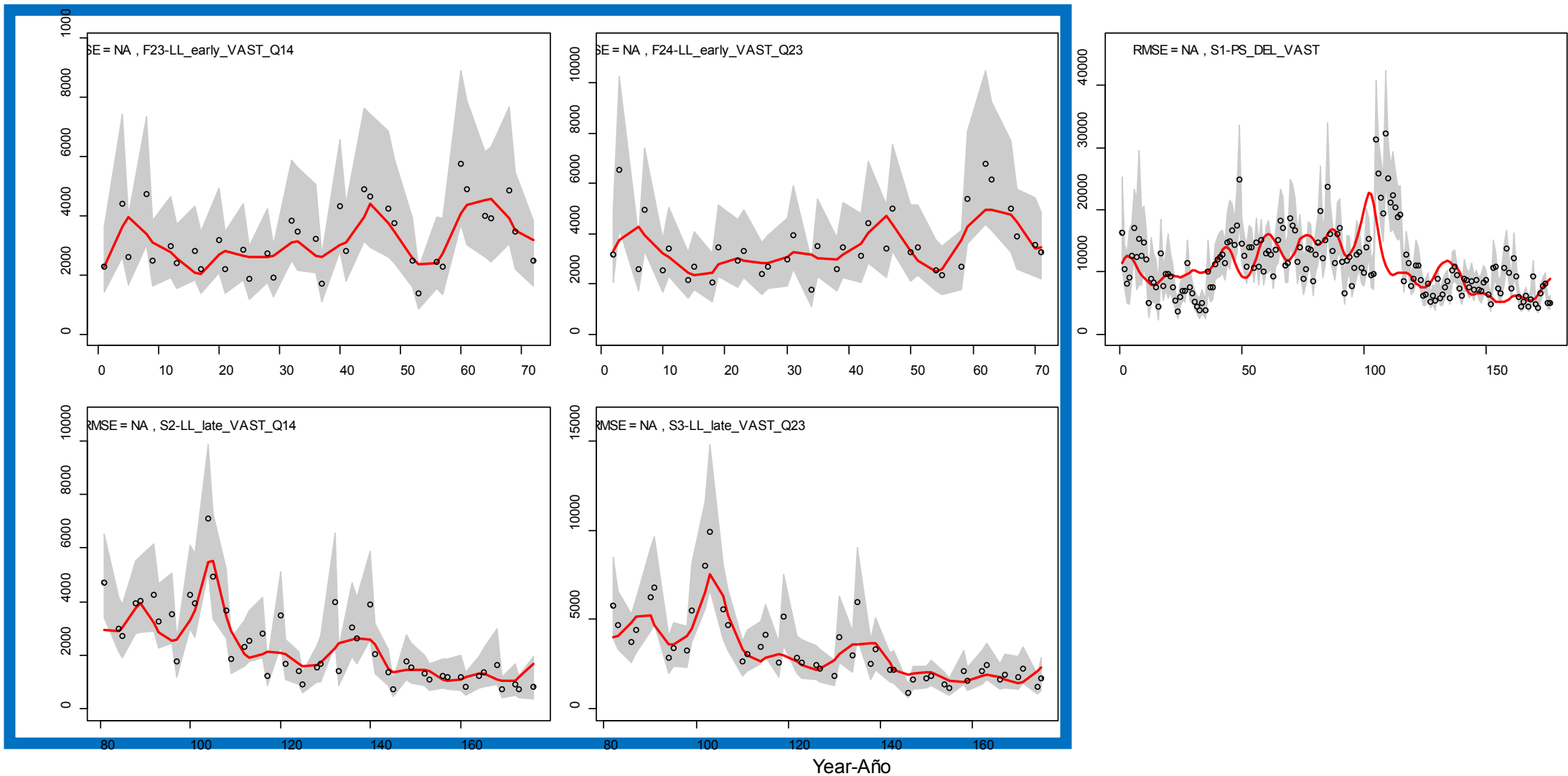
# Models fits

## North



# Models fits

## South

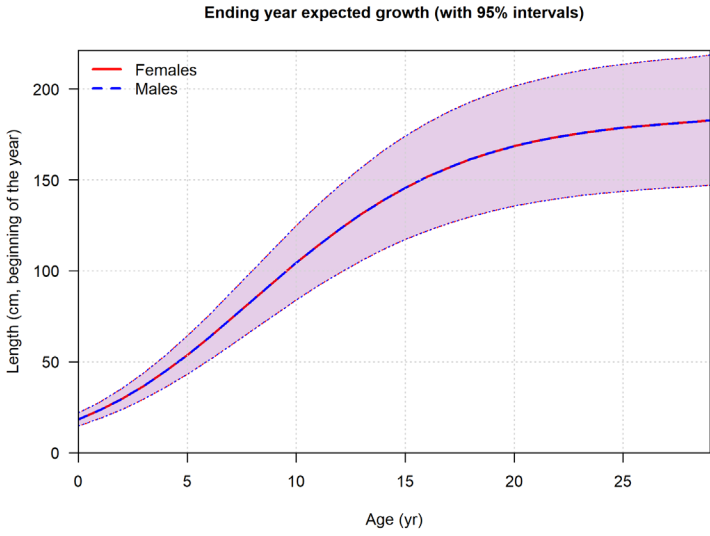




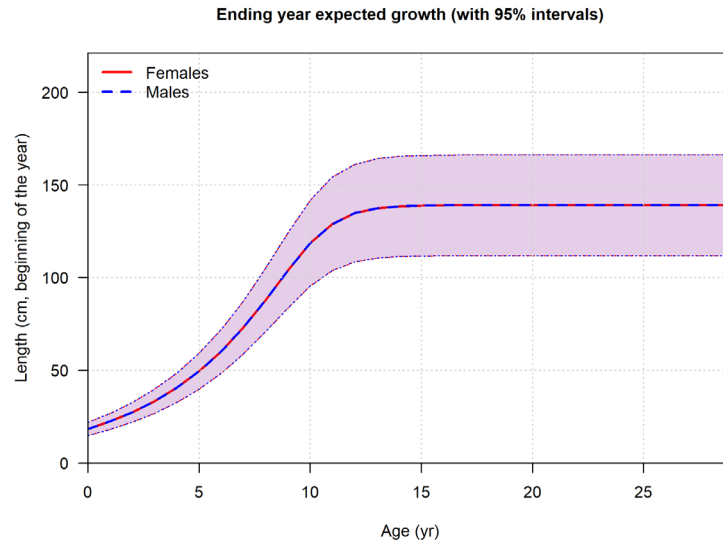


Thank you!

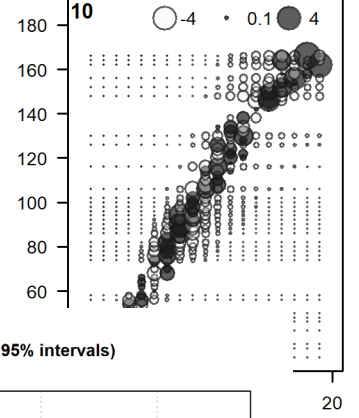
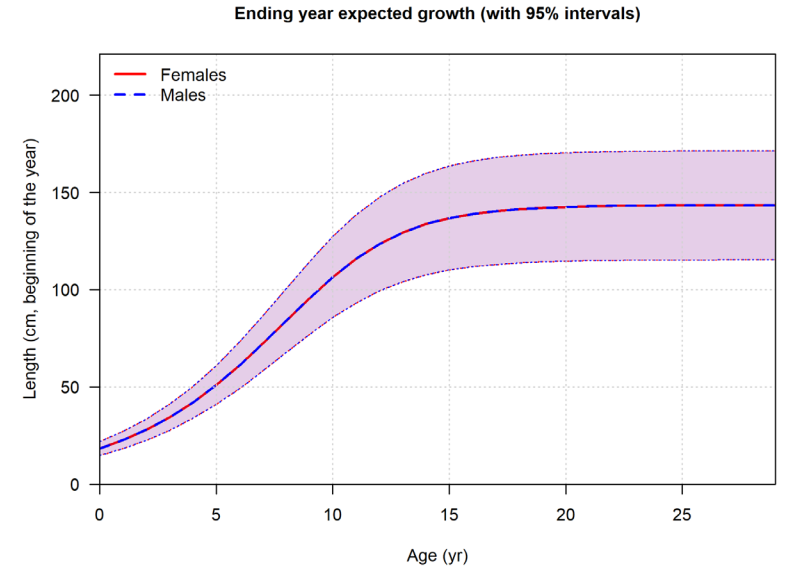
# Reference model



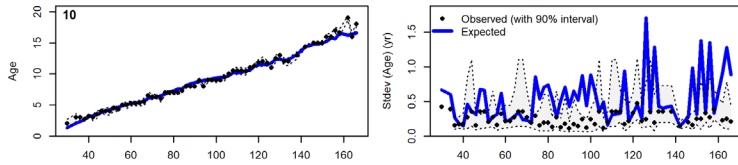
# North



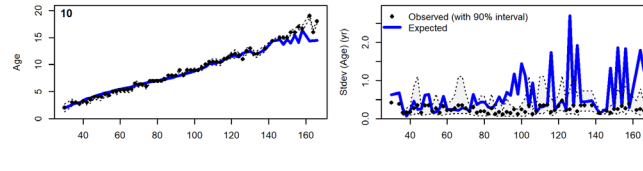
# South

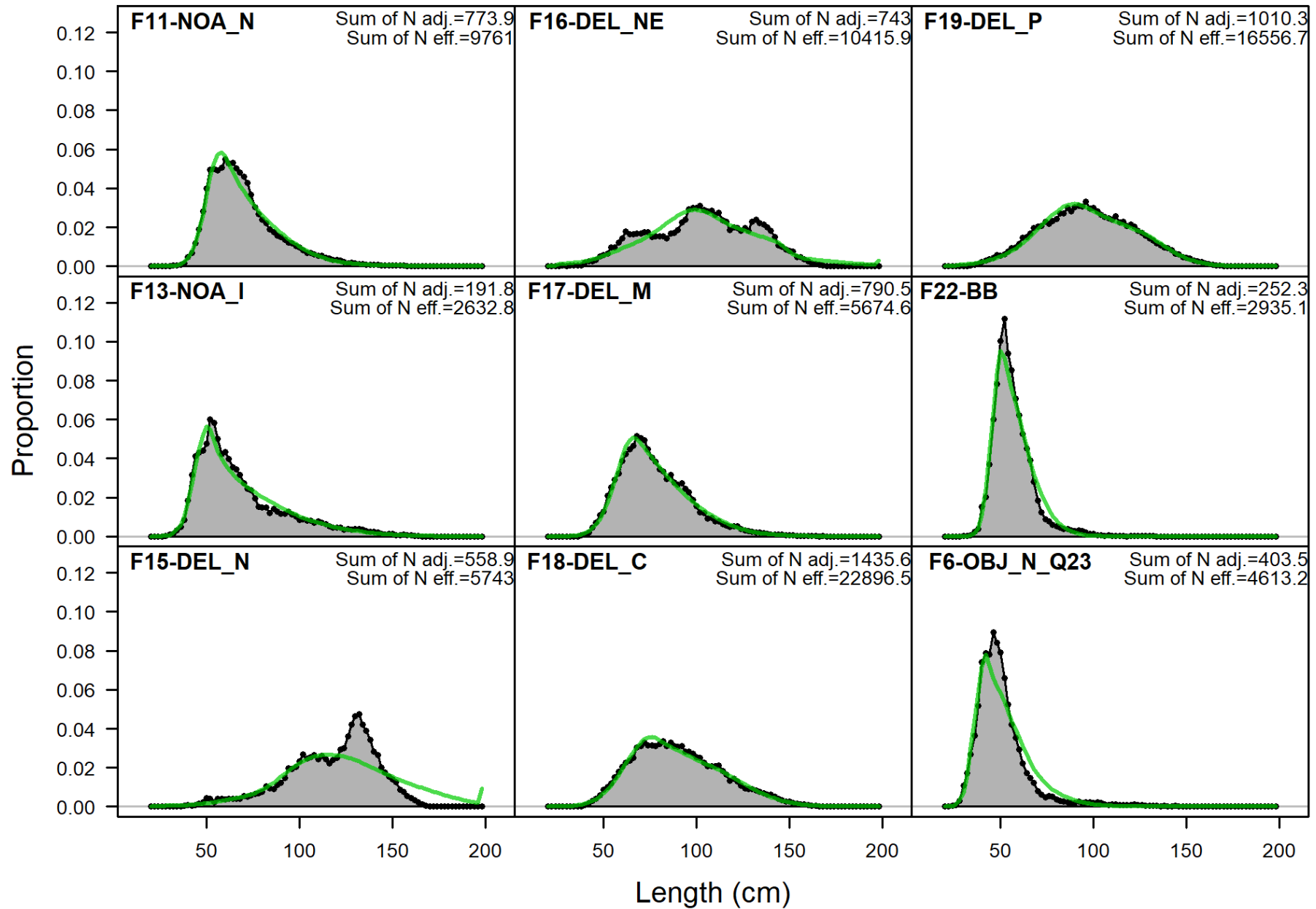


# F5\_OBJ\_S\_Q14`

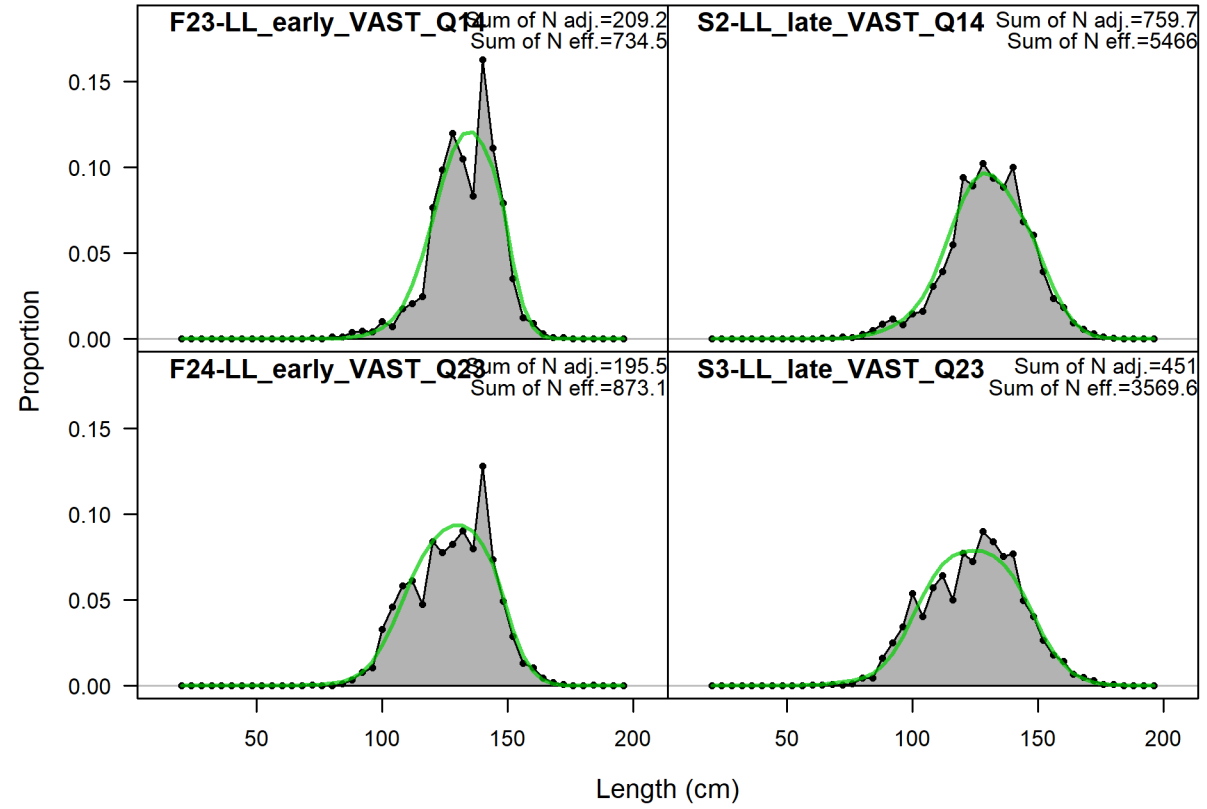


# F15\_DEL\_N





# South



South