Longline CPUE standardization: IATTC 2006

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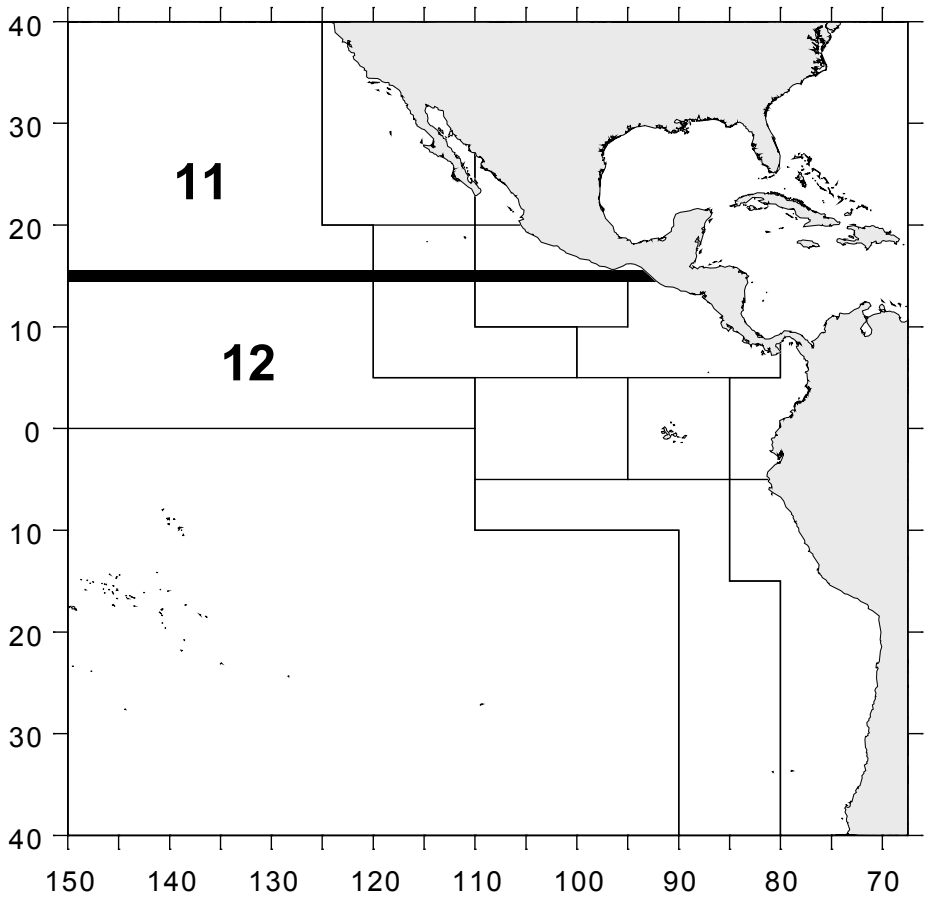
Introduction

- Longline fisheries
- Indices of abundance
- Statistical methods
- Results & discussion
  - Model selection
  - Diagnostics
  - CPUE indices
  - Compare with last year
  - Parameter estimates

Longline fisheries

Northern

Southern



Indices of abundance

- Standardized CPUE assumed proportional to abundance
- Japanese longline data, 1975 – 2004
  - Provided by SPC
- Catch in numbers, effort in hooks
- Methods
  - 2005 – delta gamma GLM
  - 2003-2004 – neural networks
  - 1999-2002 – regression trees

Statistical methods

- Strata defined as 5º square / HBF category
  - Only strata with at least 5 non-zero catches are included
- Delta lognormal model

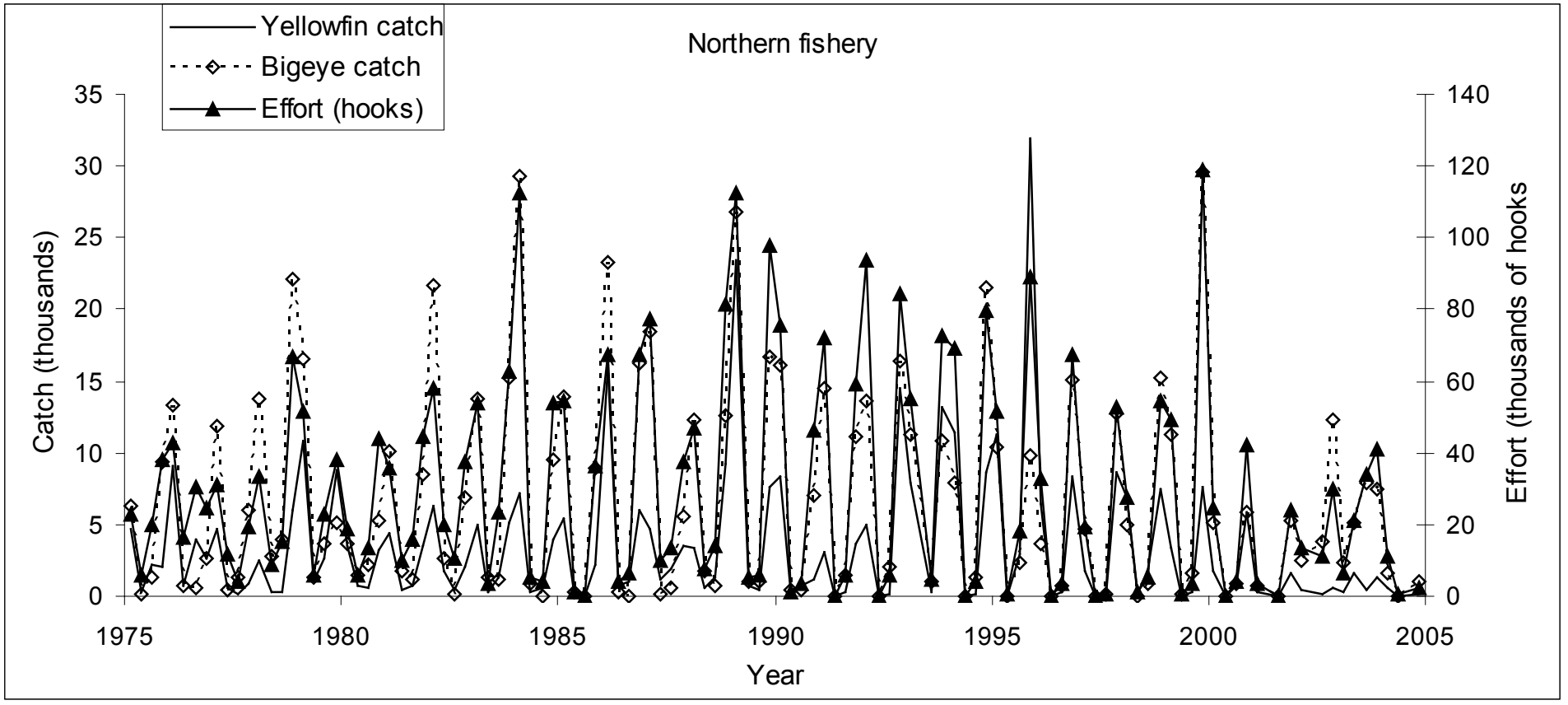
$$\Pr(Y = y) = \begin{cases} w, & y = 0, \\ (1 - w) f(y) & \text{otherwise} \end{cases}$$

- w = g(Year.qtr, Lat.Long, HBF, effort)
- $f(y)$ = h(Year.qtr, Lat.Long, HBF)

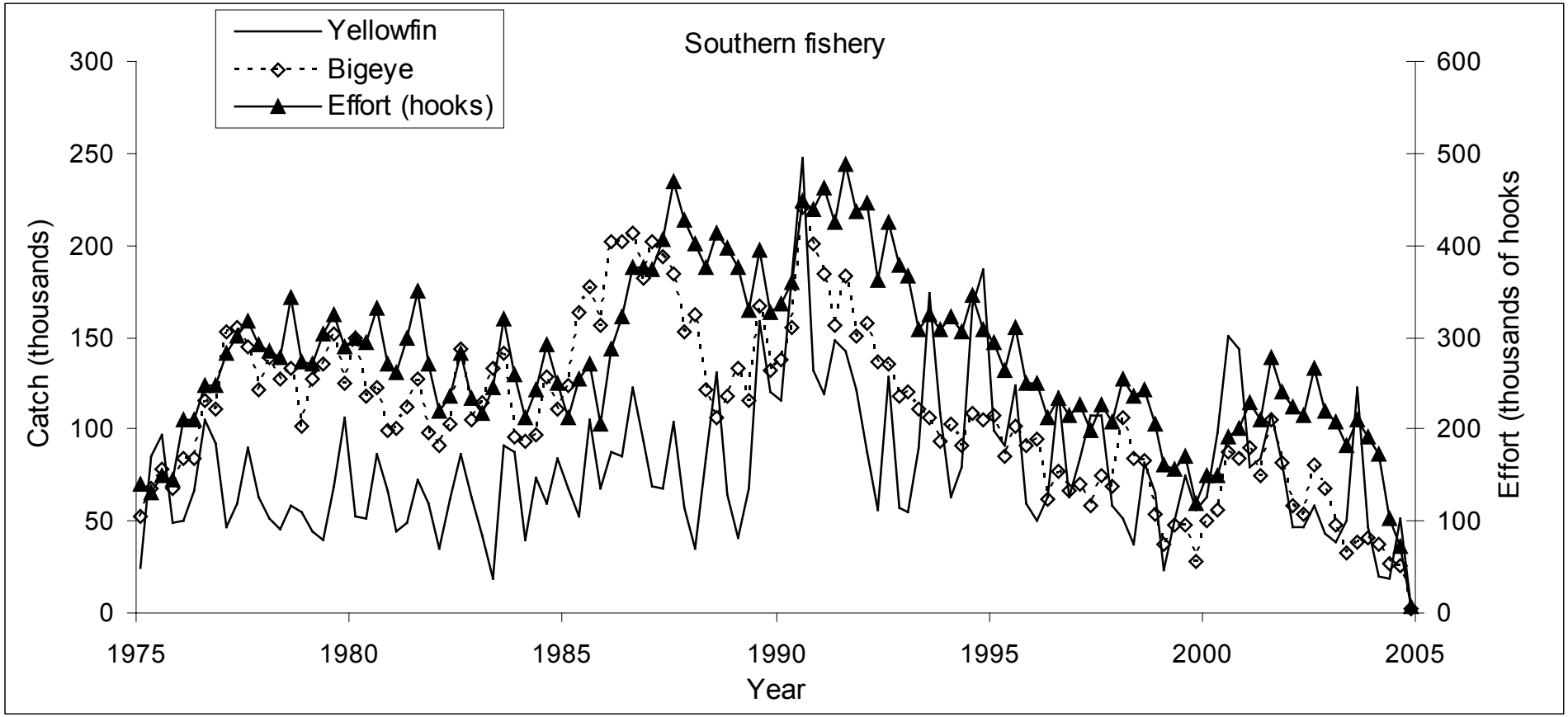
Change from last year

- In 2005
  - Used delta gamma model
  - Didn't include effort in delta component of GLM
- Delta lognormal fit the data better (AIC)
- Change makes very little difference to results

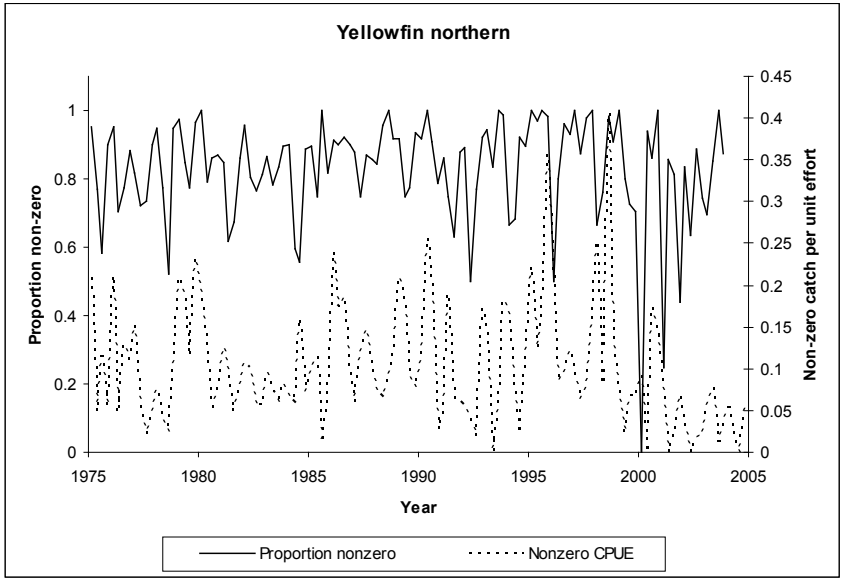
Catch and effort (northern)

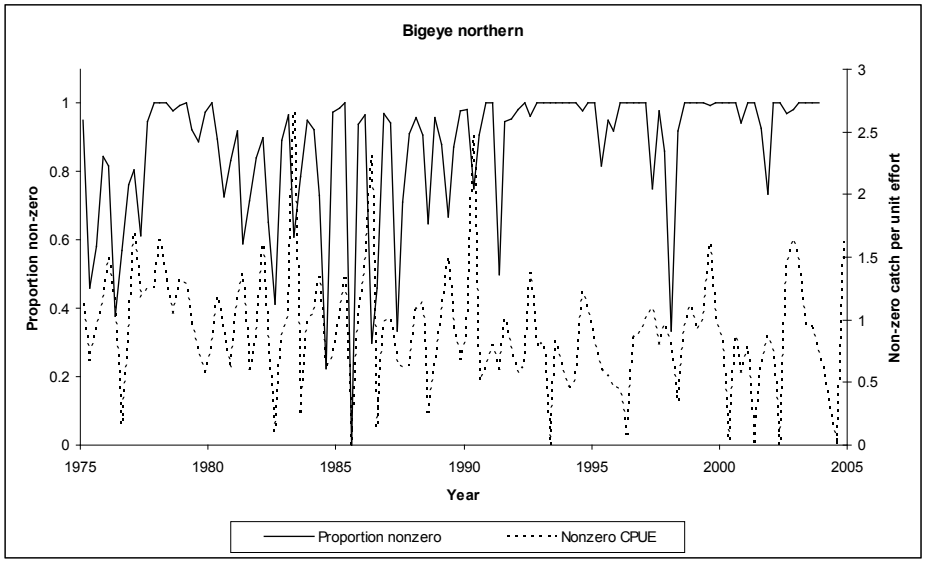


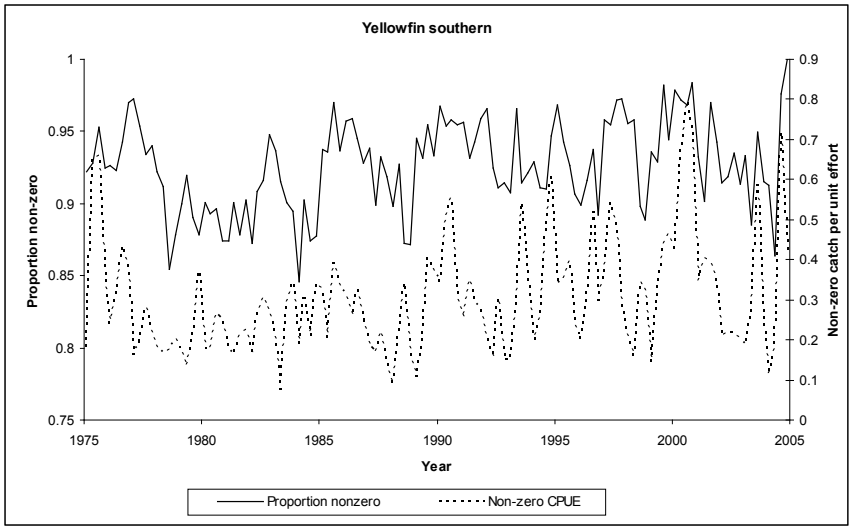
Catch and effort (southern)

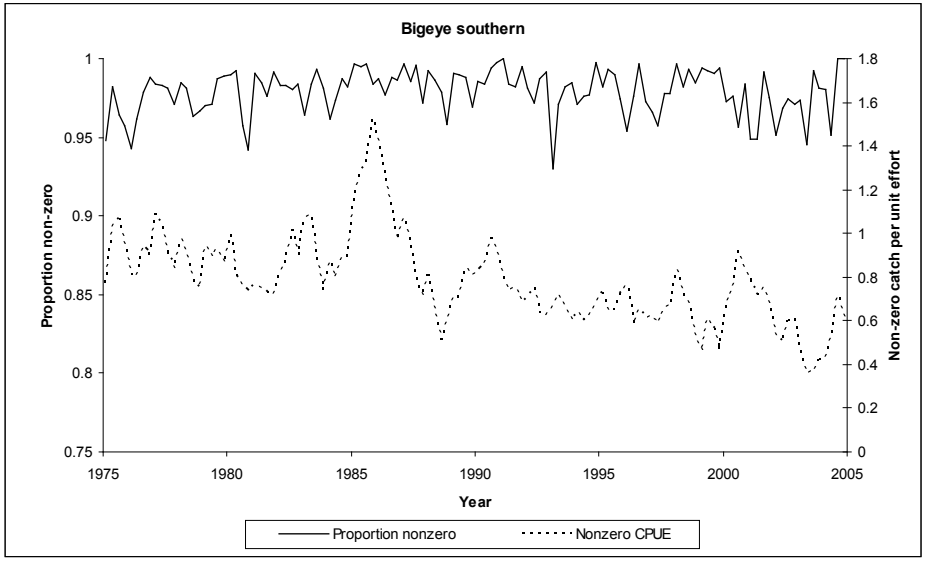


Un-standardized data – proportion zero & nonzero CPUE





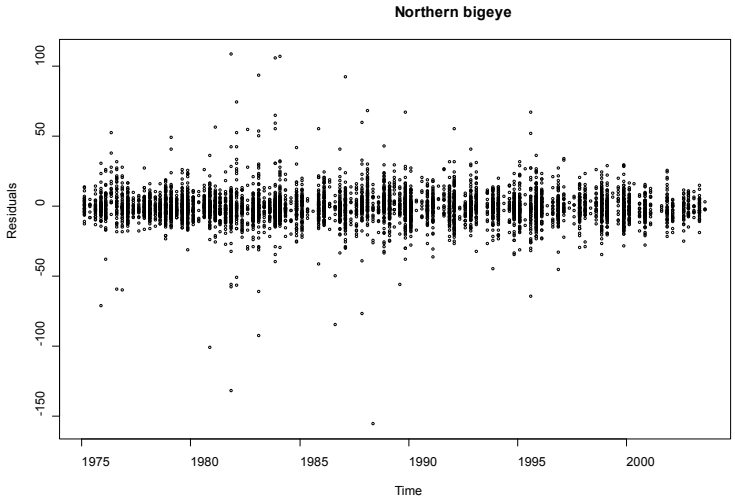


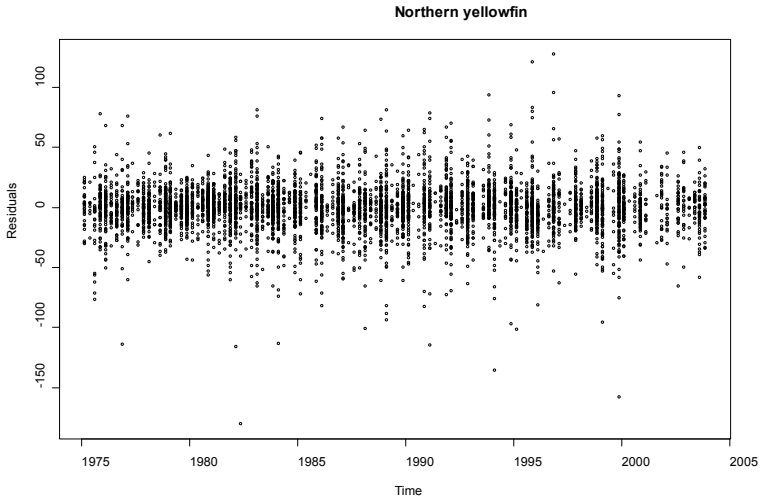


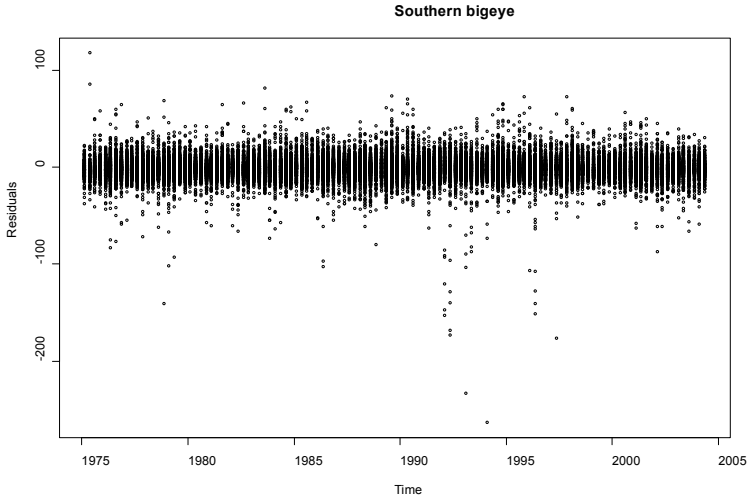
Model selection

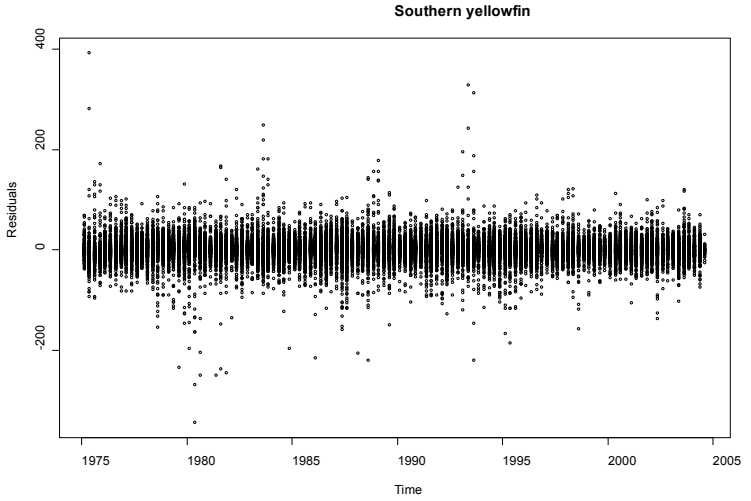
Fishery	Model	Δ AIC
BET N	yrqtr.latlong.hbf / lognormal	0
	- hbf	118
	- latlong	6,080
BET S	yrqtr.latlong.hbf / lognormal	0
	- hbf	817
	- latlong	13,575
	gamma	94,592
YFT N	yrqtr.latlong.hbf / lognormal	0
	- hbf	30
	- latlong	1,237
	gamma	18,745
YFT S	yrqtr.latlong.hbf / lognormal	0
	- hbf	336
	- latlong	32,936
	gamma	136,784

Residuals for non-zero component through time

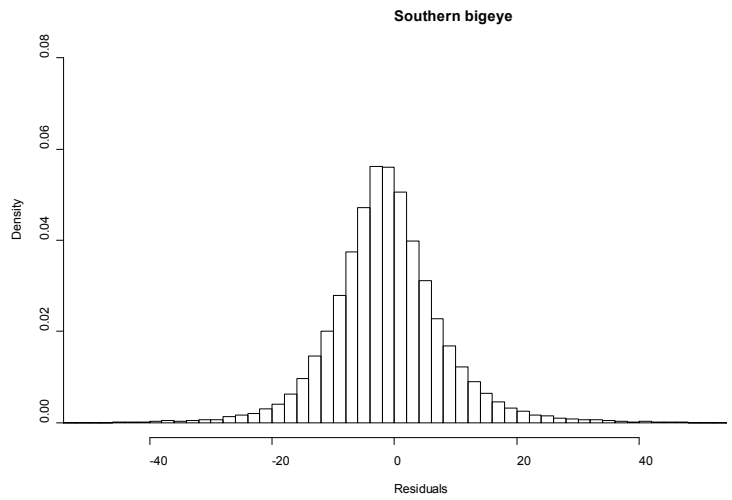


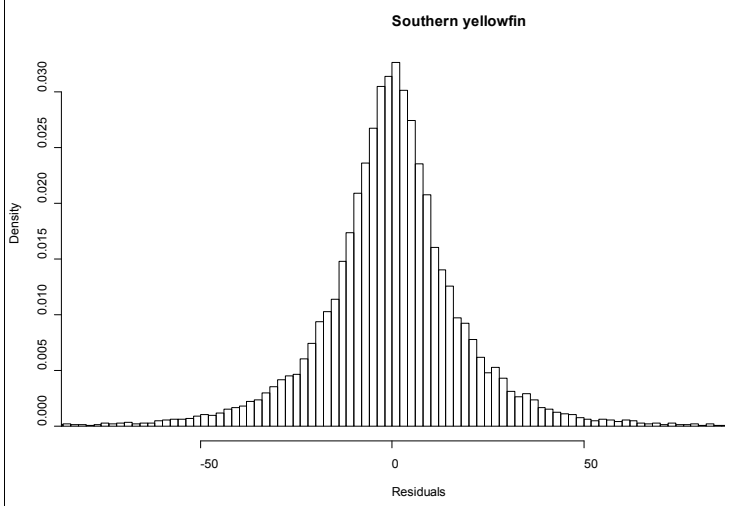


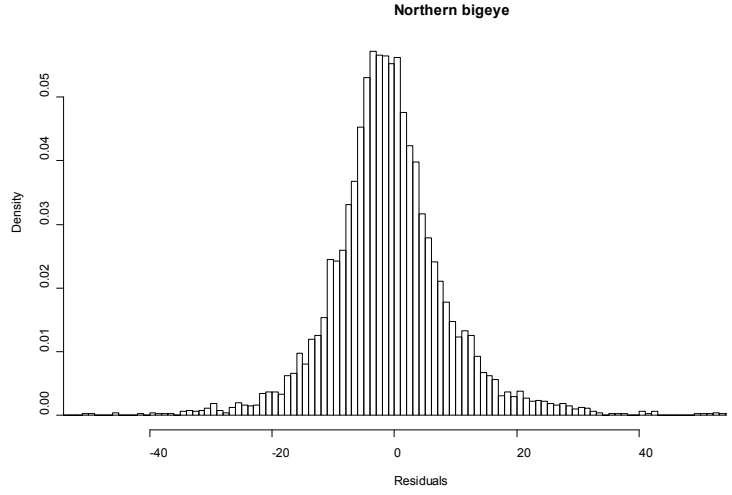


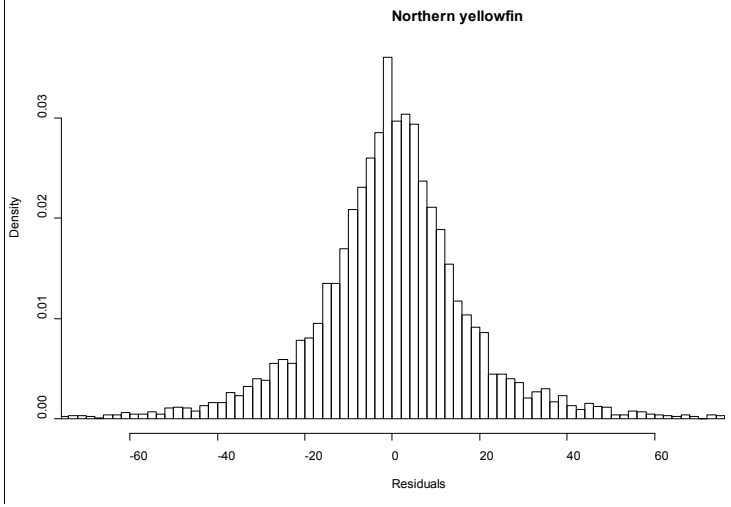


Residuals for non-zero component

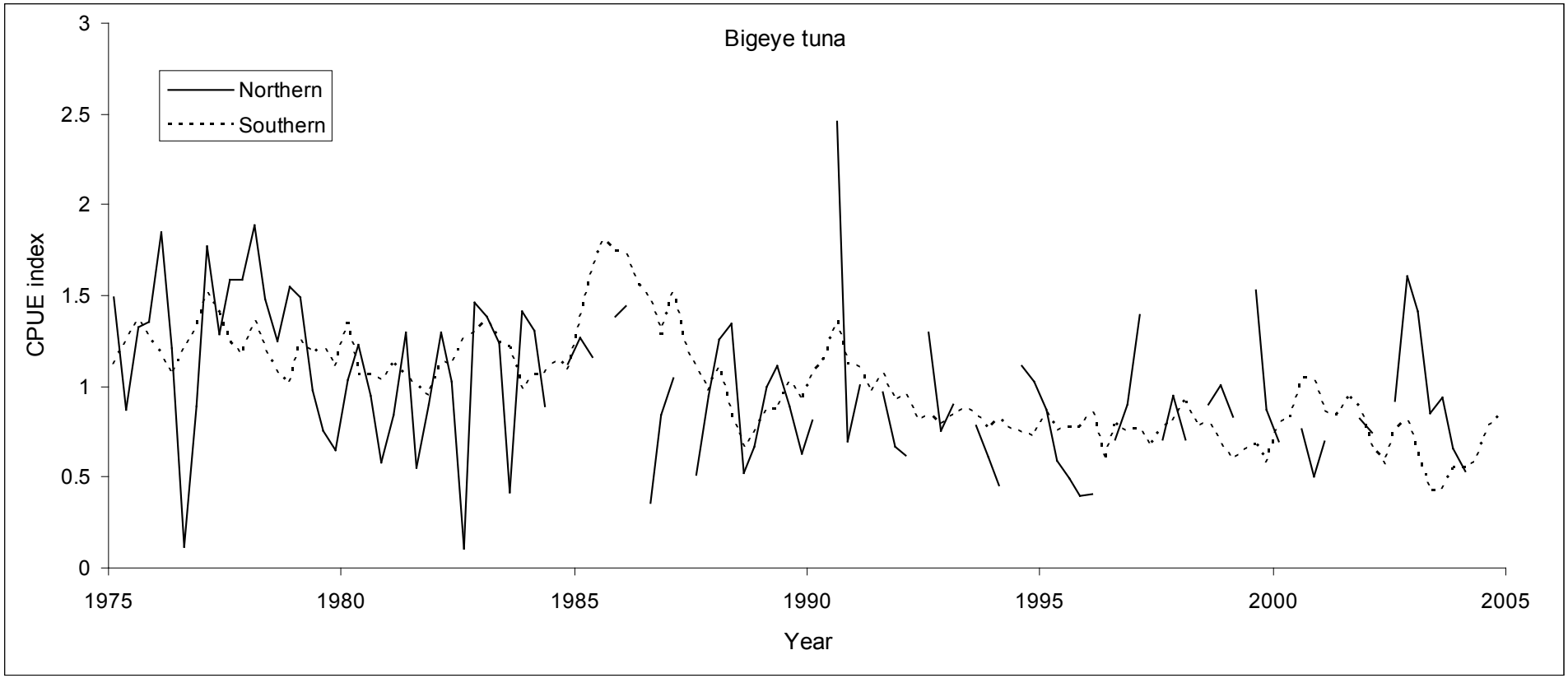




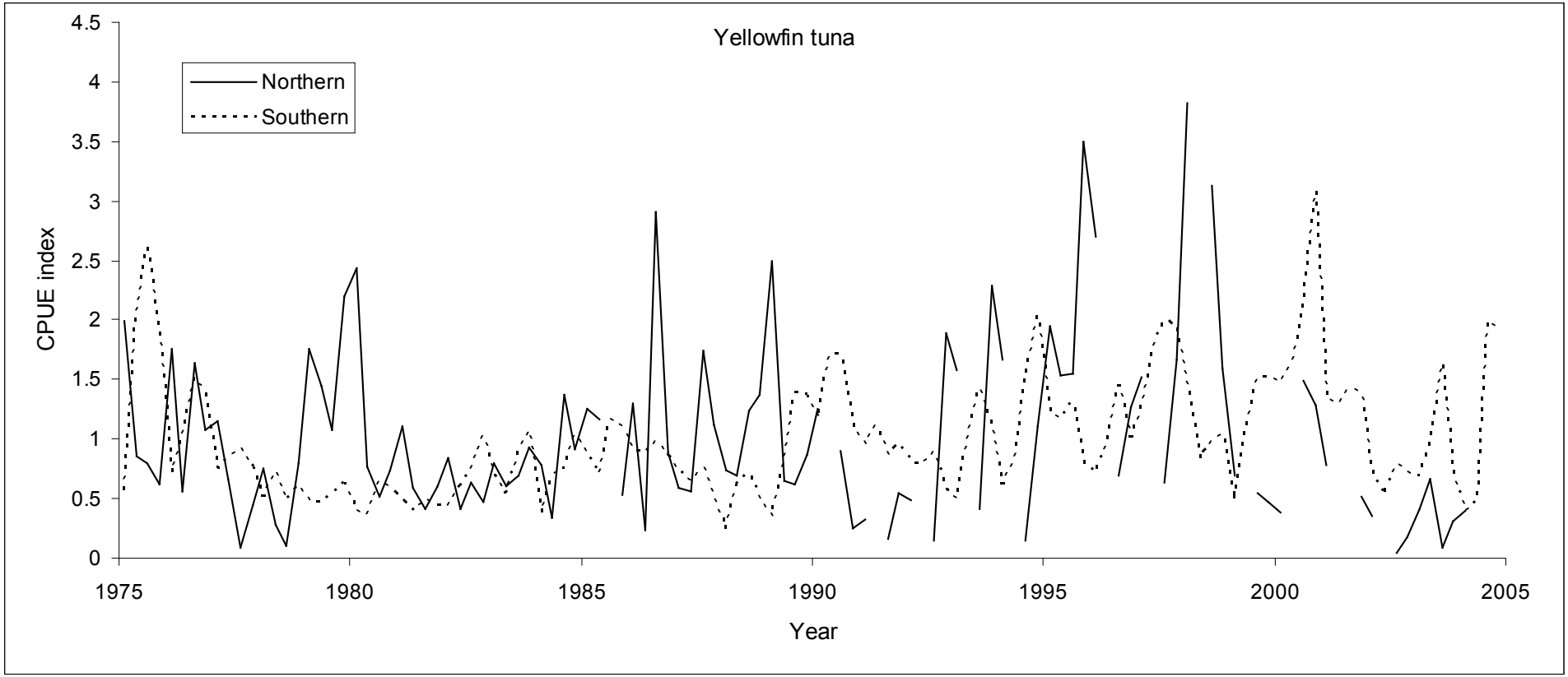




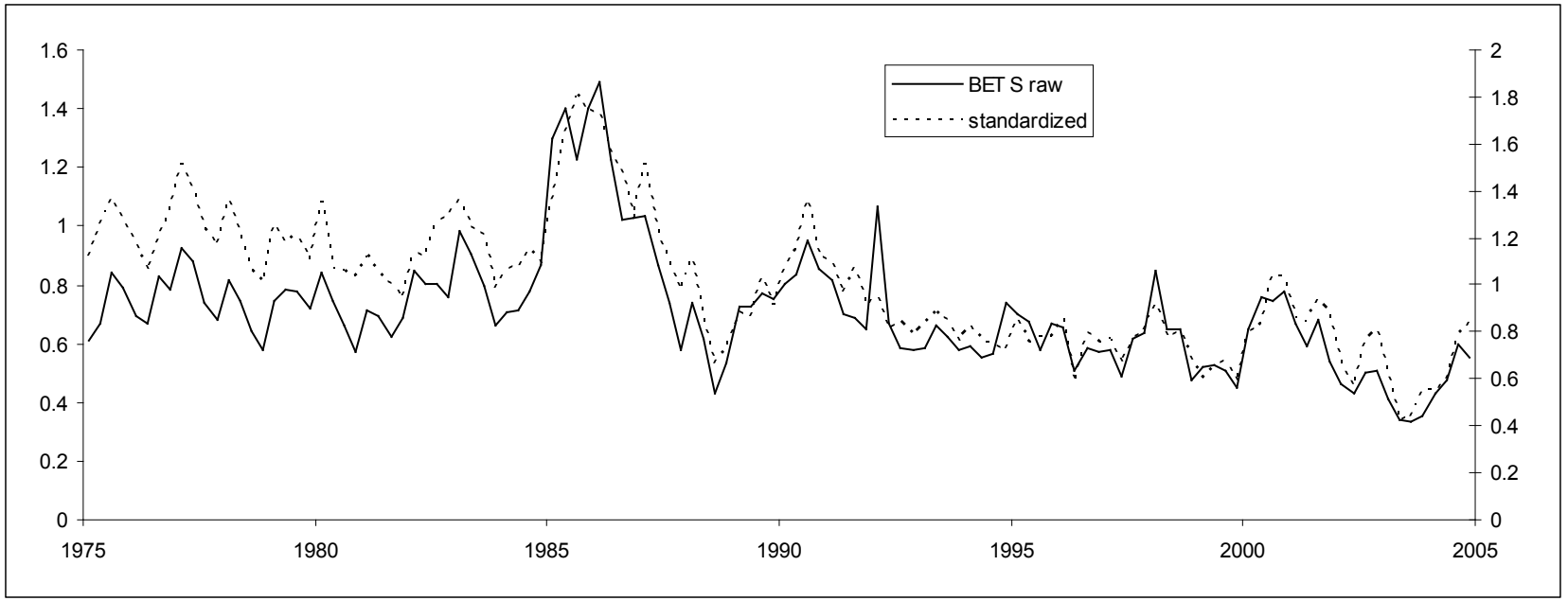
Standardized CPUE - bigeye

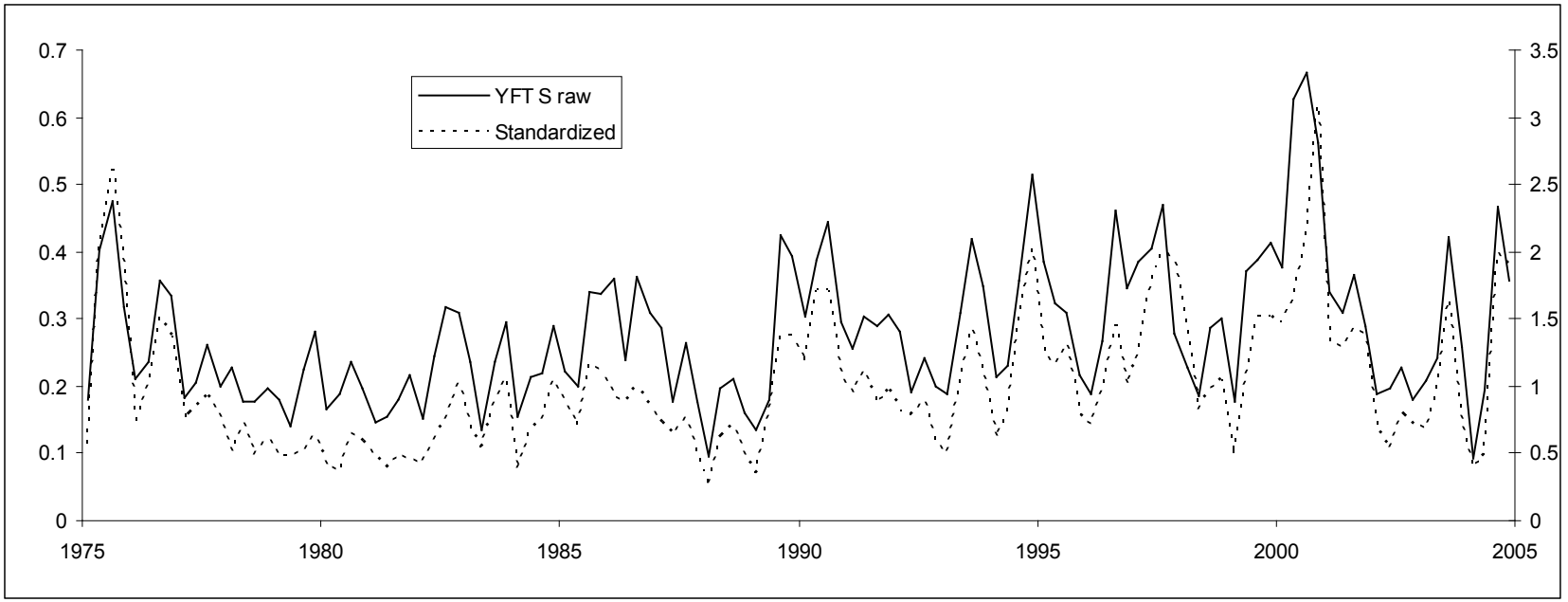


Standardized CPUE - yellowfin

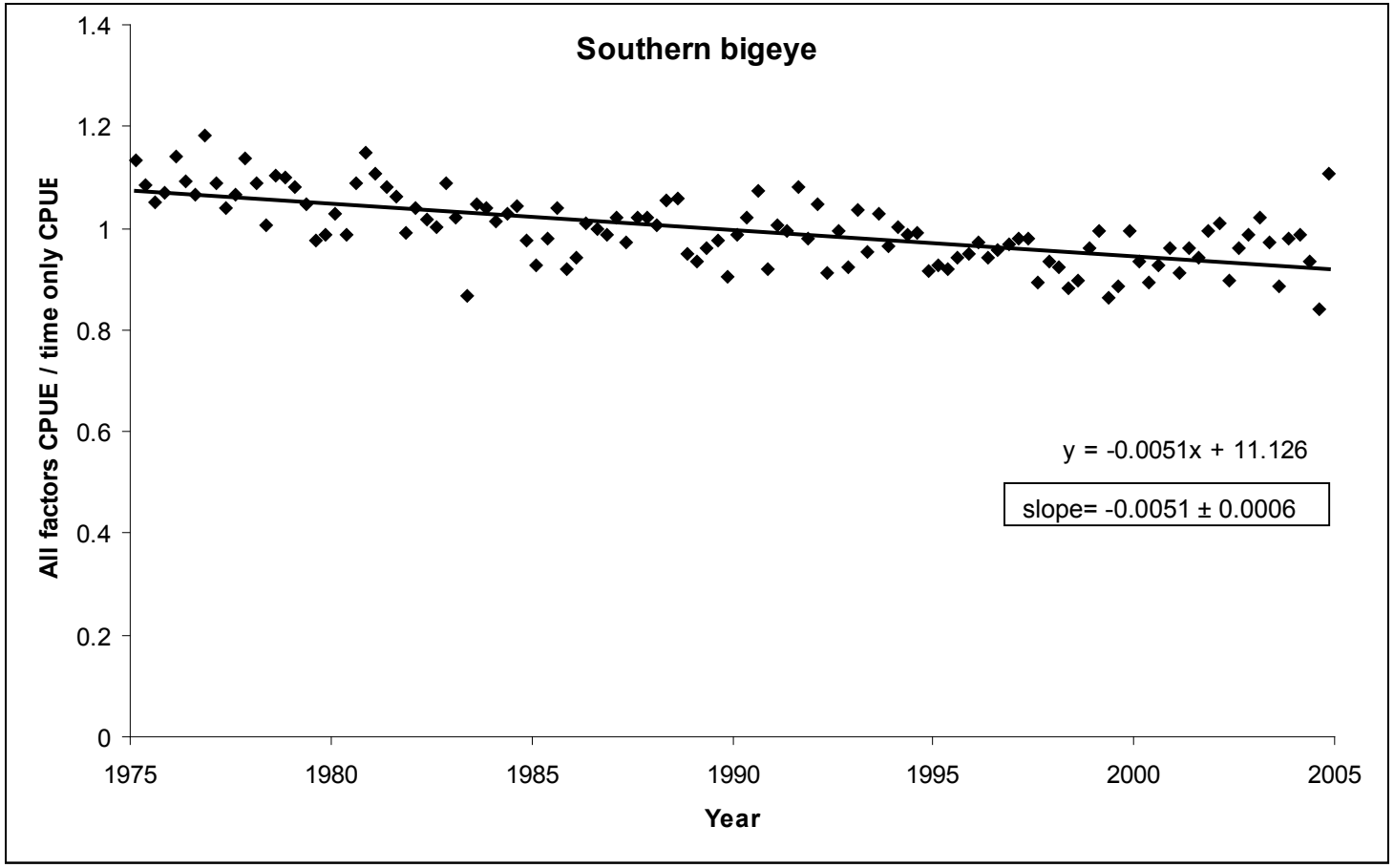


Raw vs standardized CPUE





Standardized CPUE / CPUE standardized by time only



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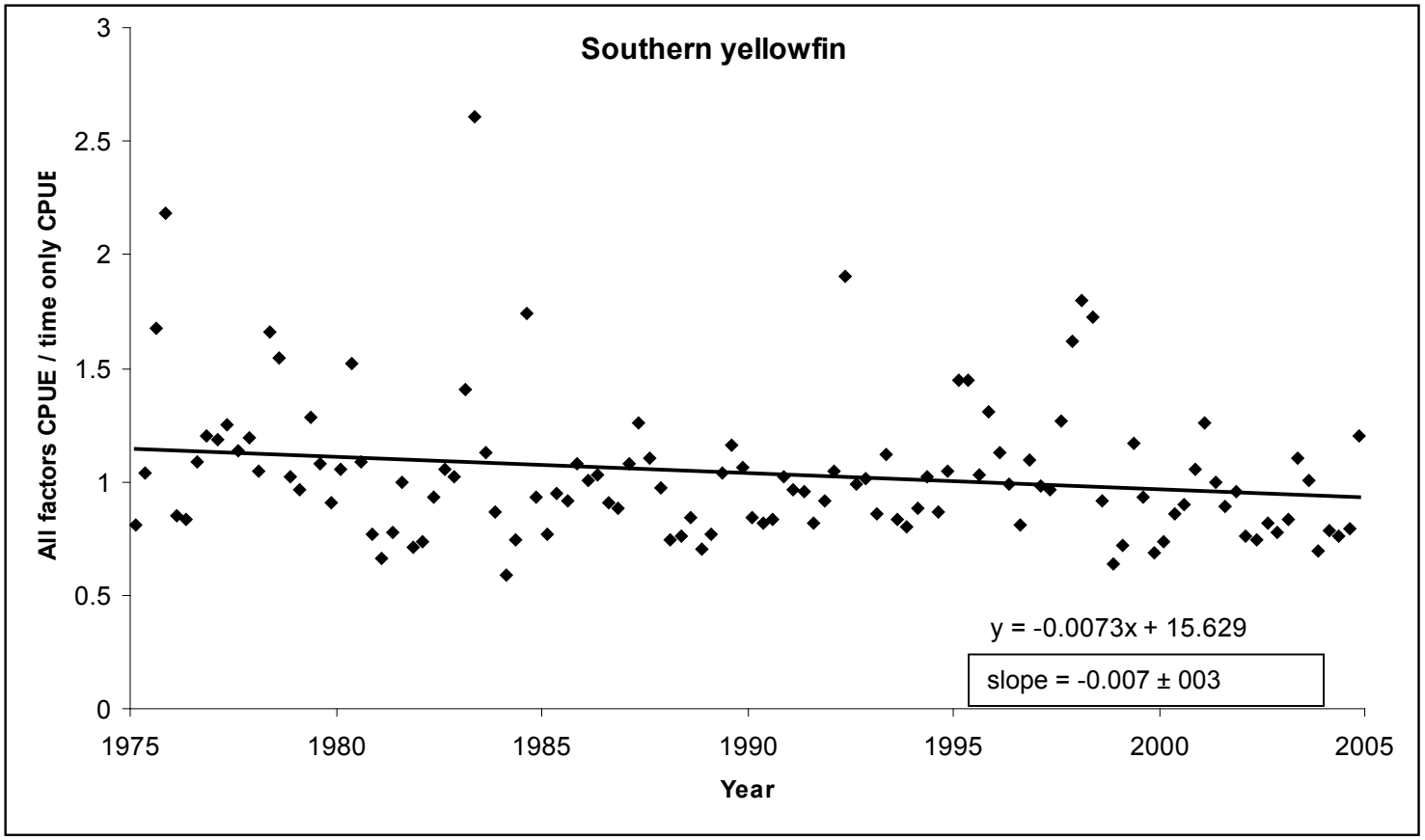
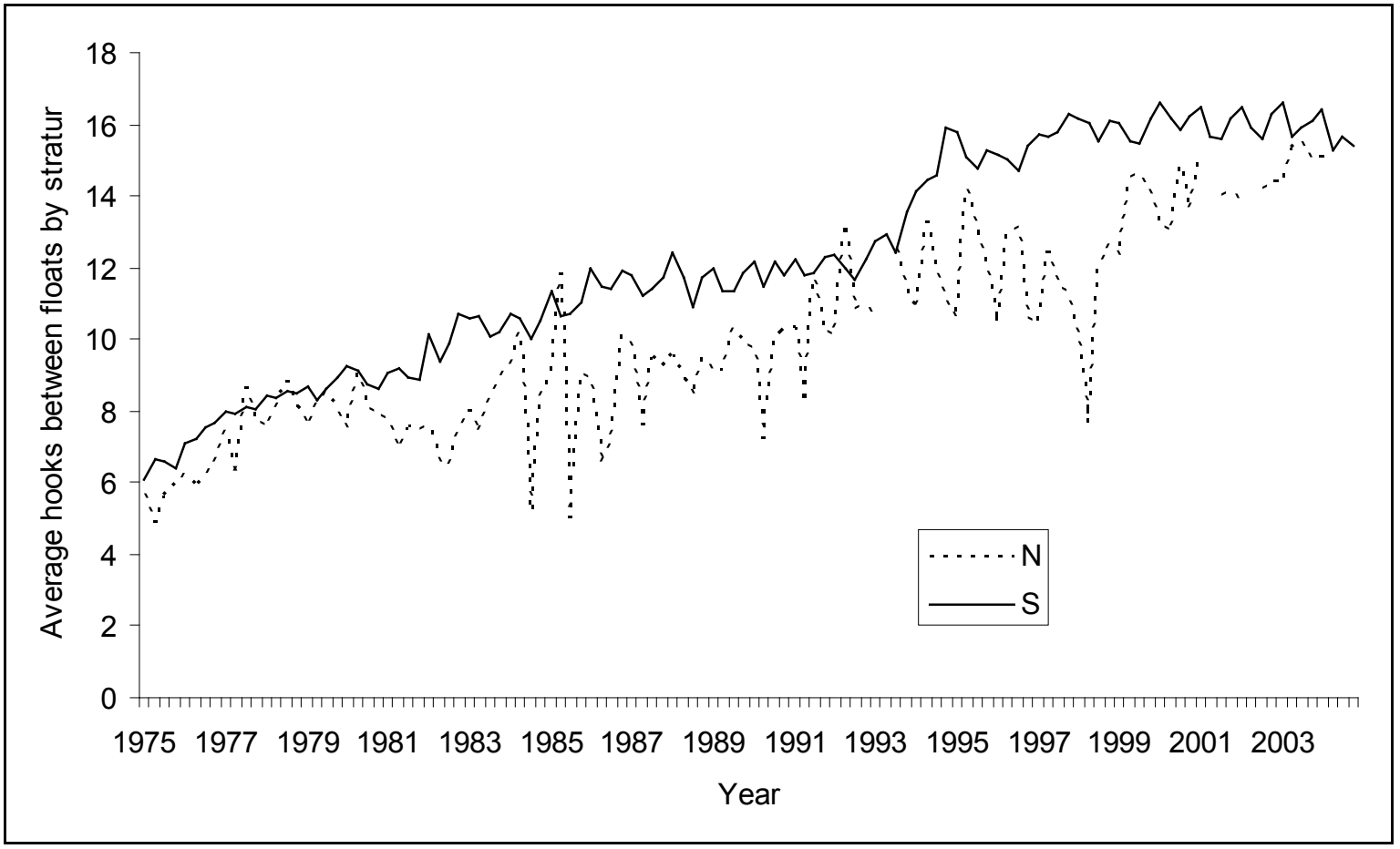
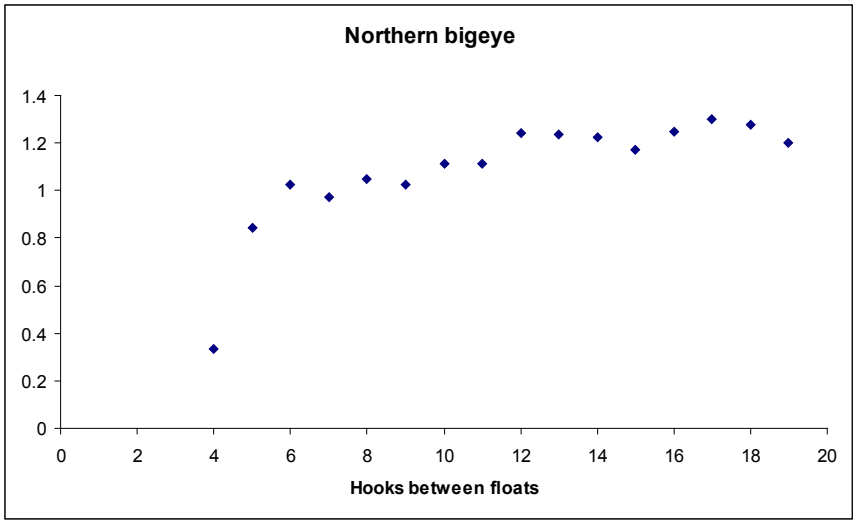
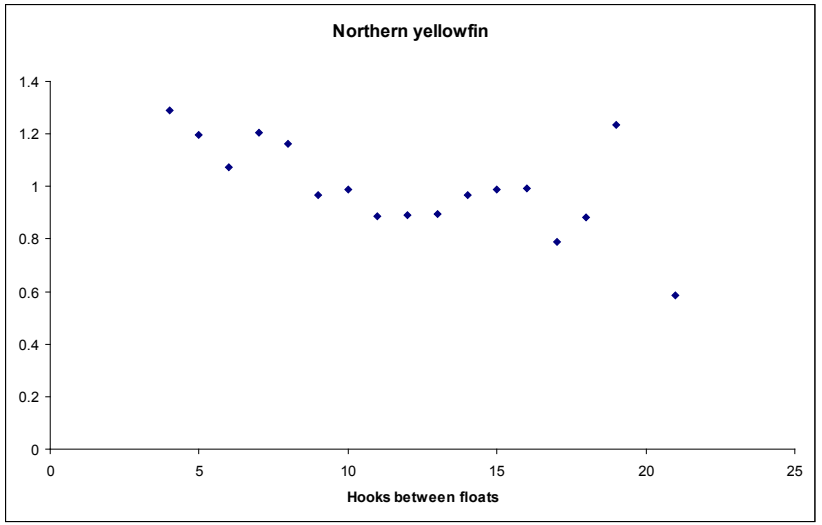


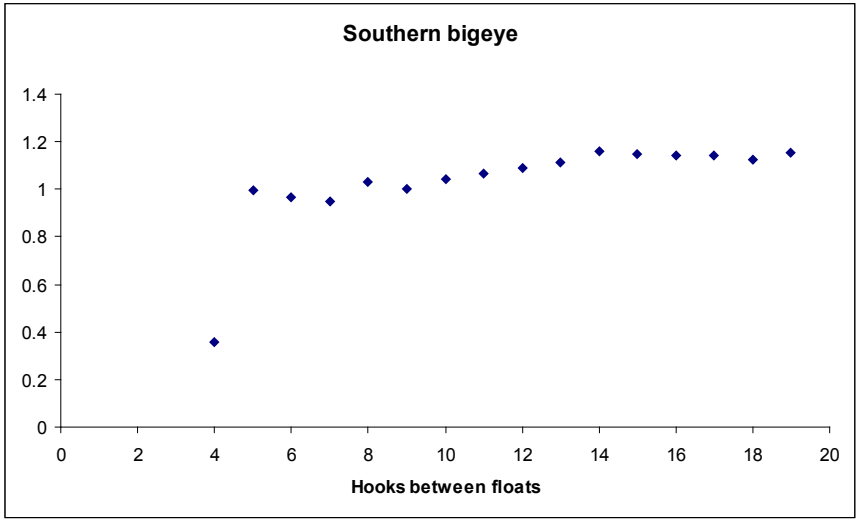
Average HBF through time

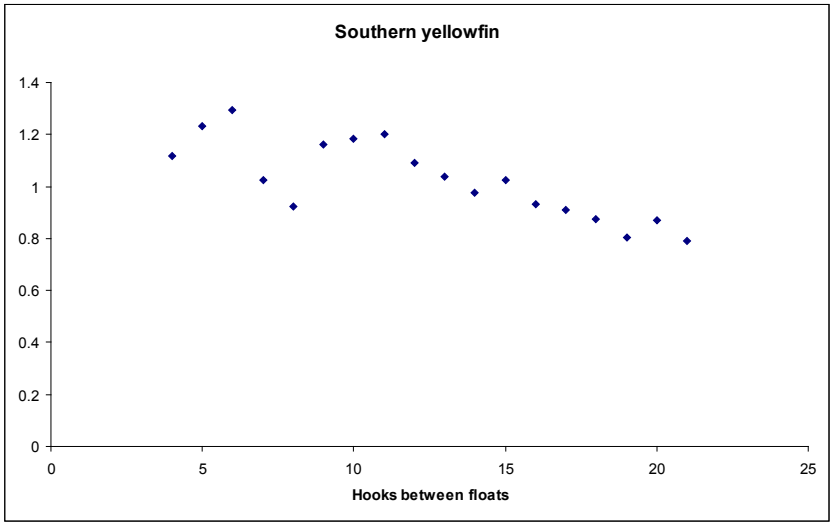


HBF parameters

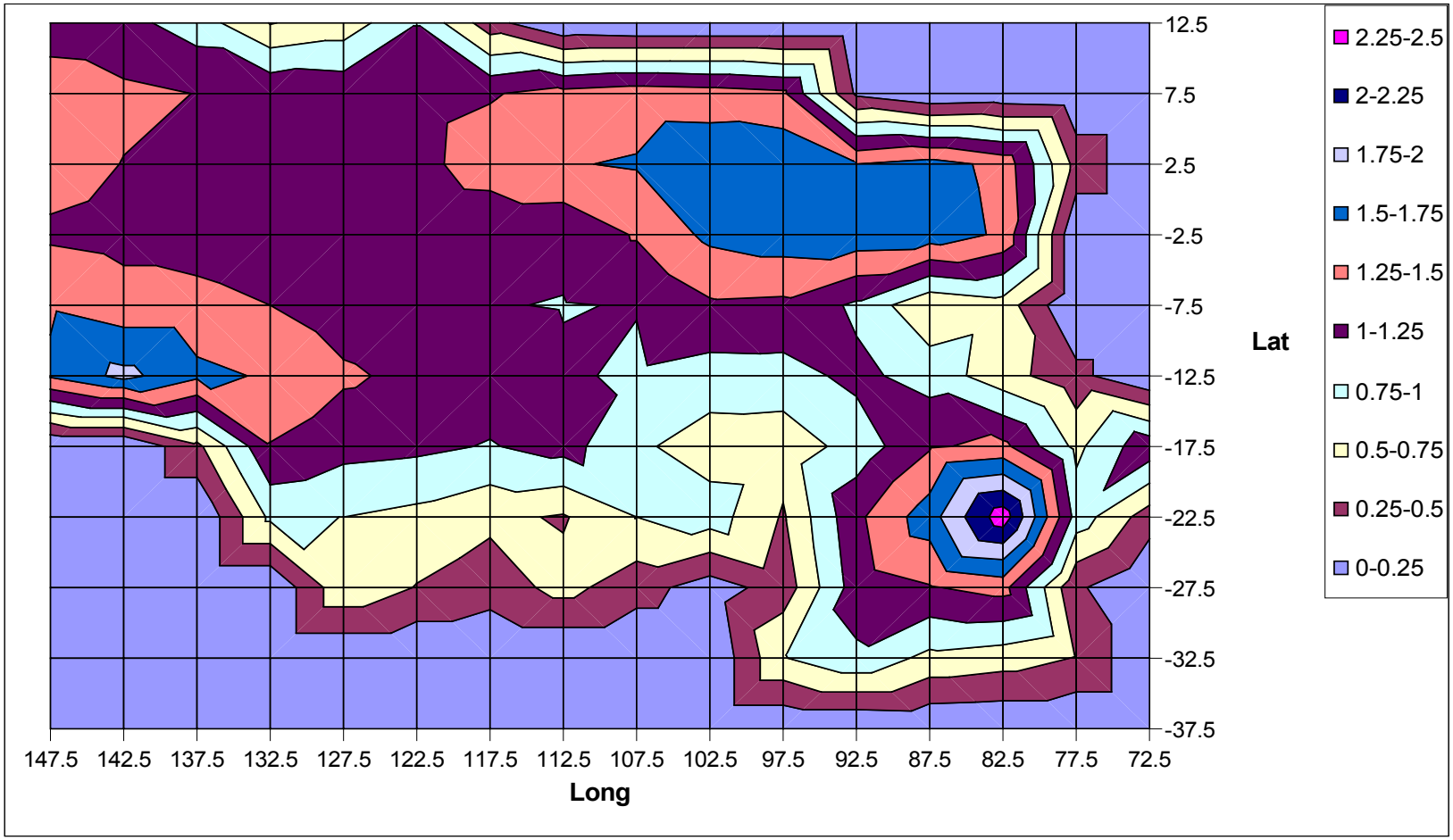








Bigeye south



Yellowfin south