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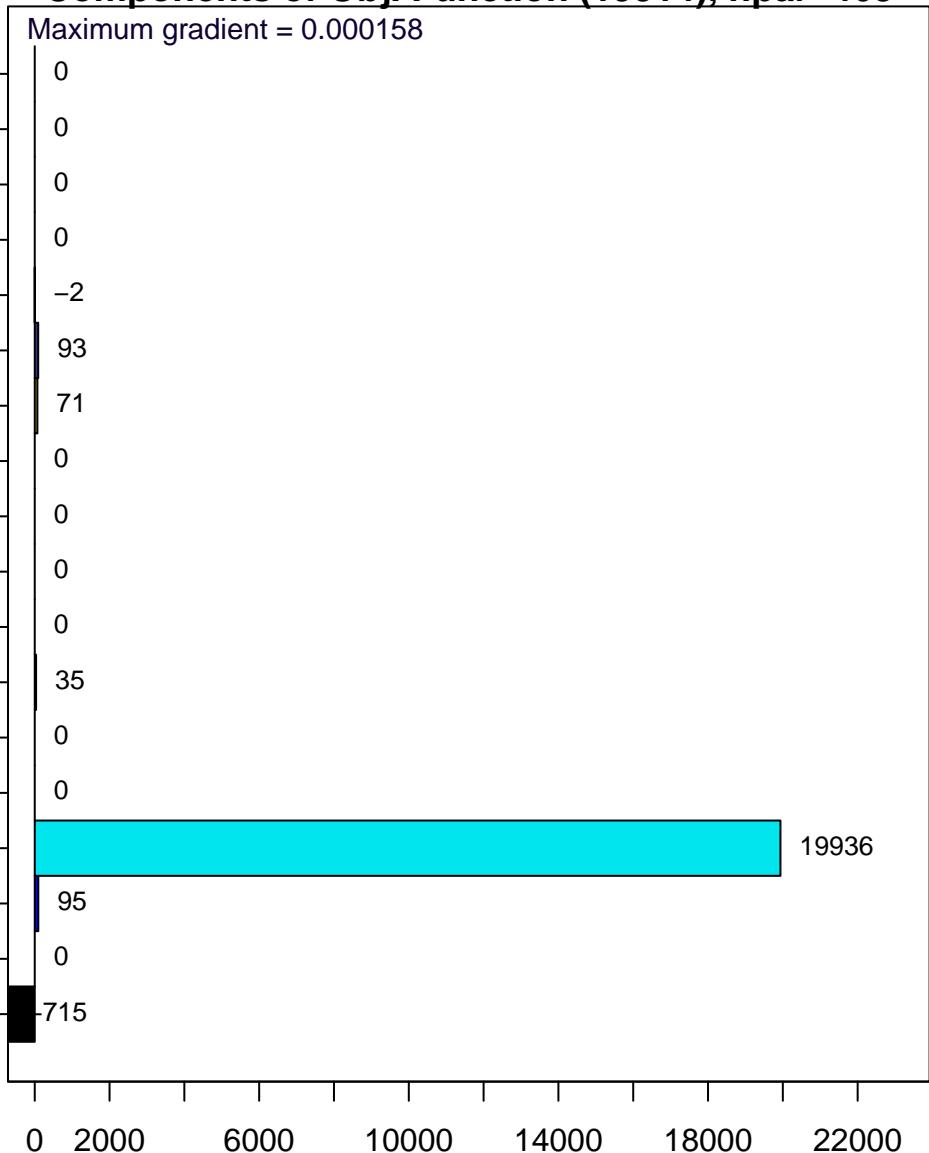
ASAP3 run on Tuesday, 07 Feb 2023 at 10:11:28

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ASAPPplots version = 0.2.18

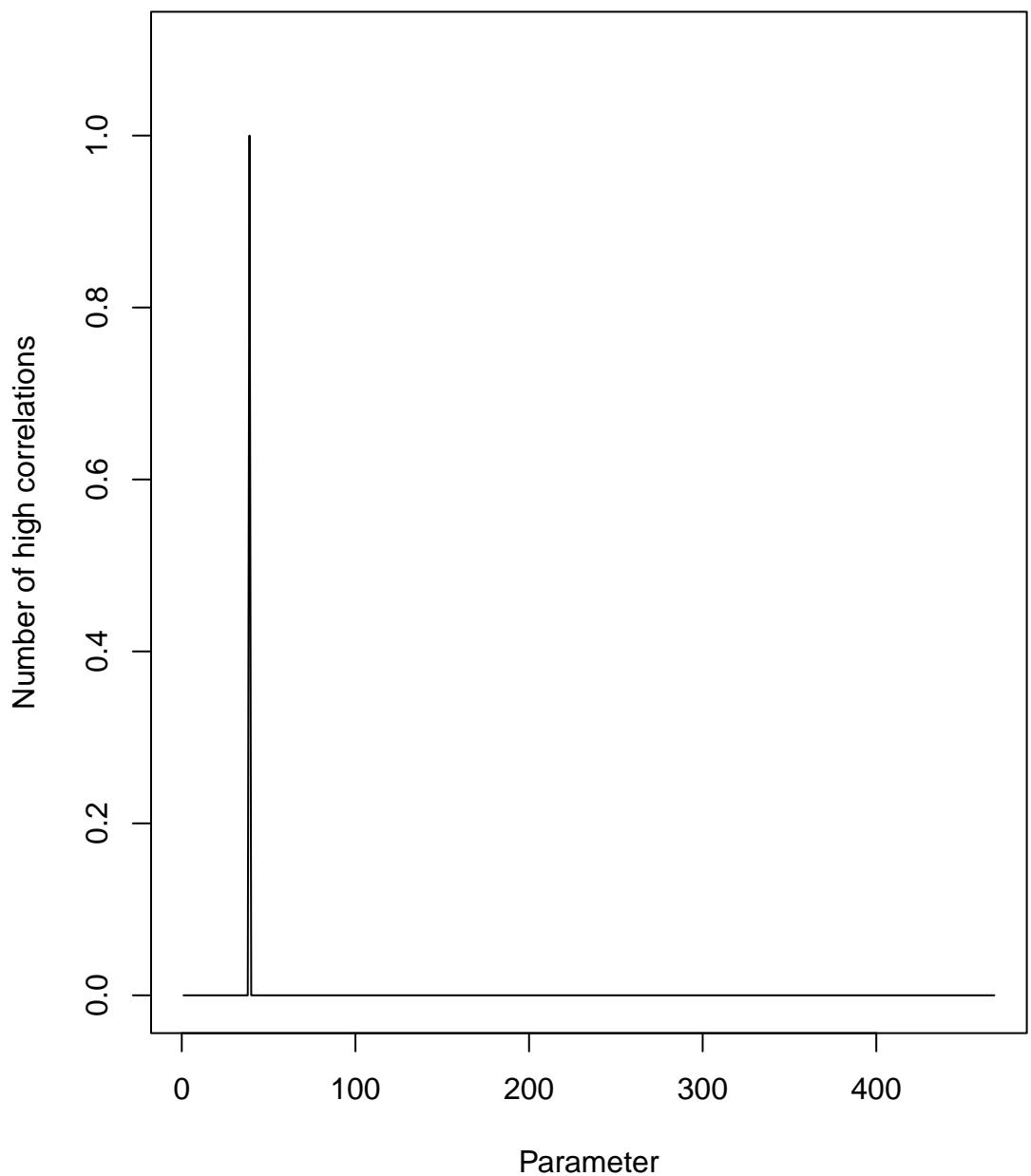
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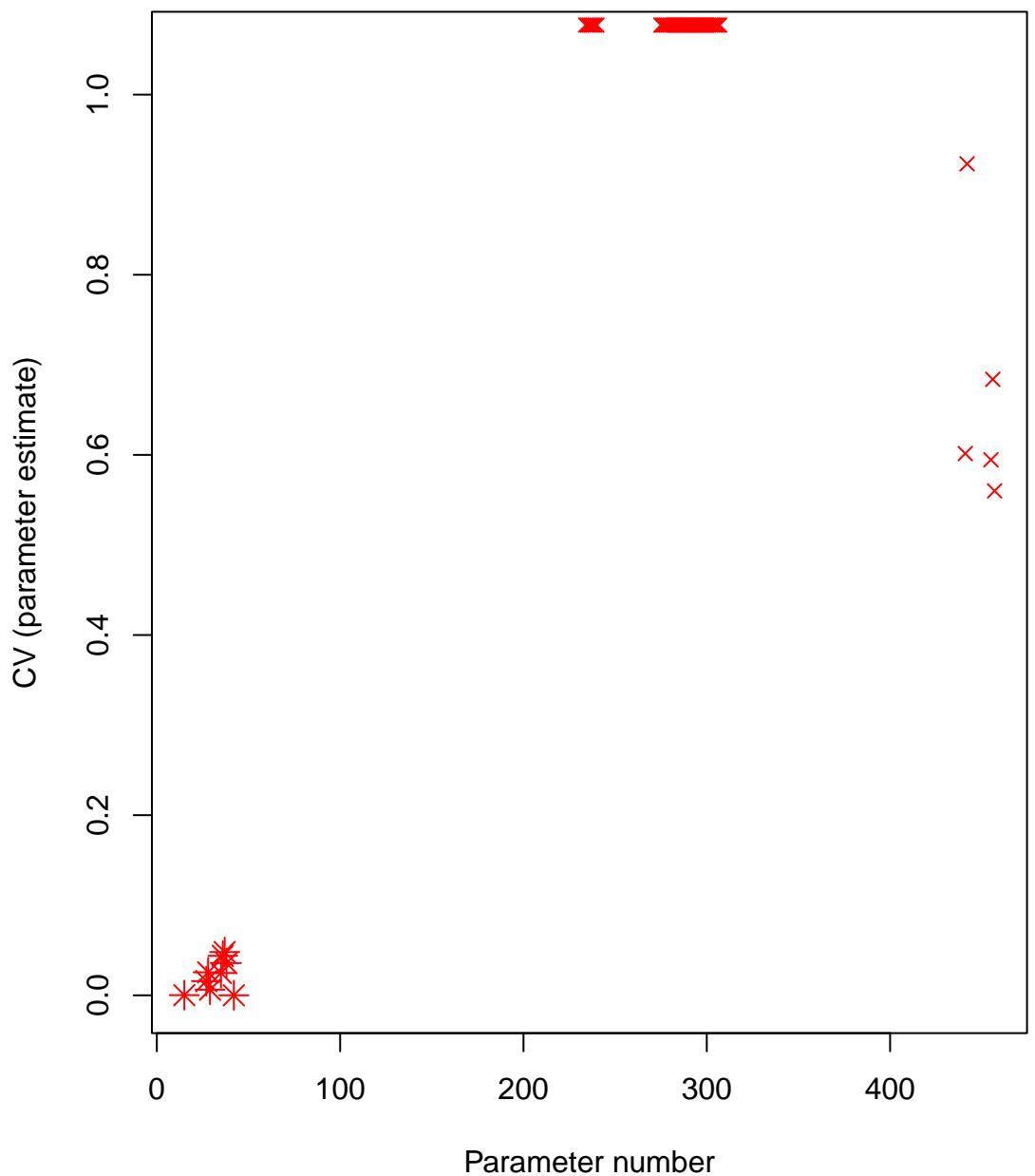
# Components of Obj. Function (19514), npar=468



Likelihood Contribution

Model: 2022EBFT\_ASAP21\_WITH\_FR\_AER1 Tuesday, 07 Feb 2023 at 10

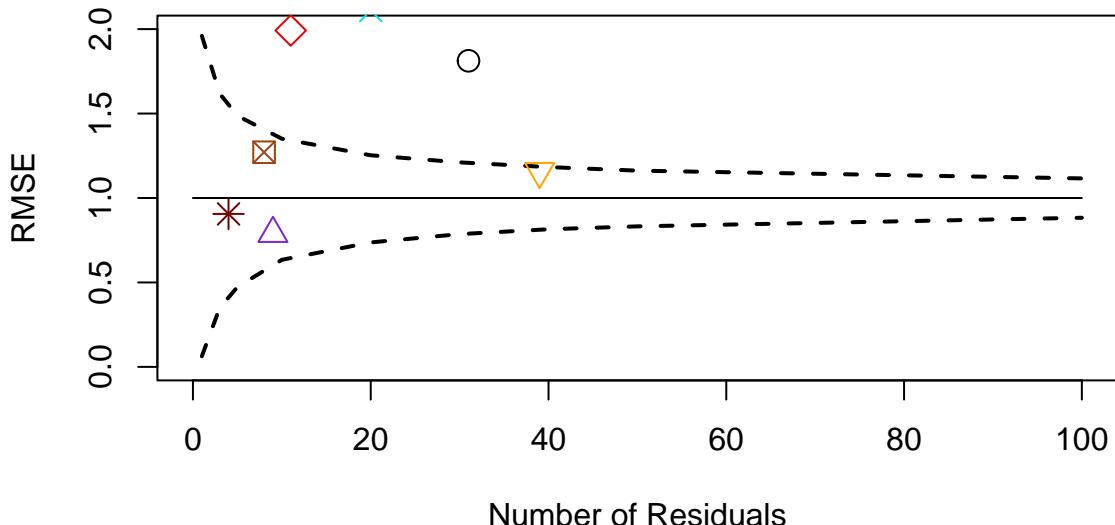




# Root Mean Square Error computed from Standardized Residuals

Component	# resid	RMSE
catch.fleet1	53	0.424
catch.fleet2	53	0.152
catch.fleet3	53	0.235
catch.fleet4	53	0.129
catch.fleet5	53	0.0725
catch.fleet6	53	0.502
catch.tot	318	0.298
discard.fleet1	0	0
discard.fleet2	0	0
discard.fleet3	0	0
discard.fleet4	0	0
discard.fleet5	0	0
discard.fleet6	0	0
discard.tot	0	0
ind01	31	1.81
ind02	9	0.79
ind03	35	2.56
ind04	20	2.11
ind05	11	1.99
ind06	39	1.16
ind07	8	1.27
ind08	4	0.906
ind09	11	2.53
ind10	15	2.48
ind.total	183	1.96
N.year1	15	0.813
Fmult.year1	0	0
Fmult.devs.fleet1	52	0.294
Fmult.devs.fleet2	52	0.627
Fmult.devs.fleet3	52	1.18
Fmult.devs.fleet4	52	0.65
Fmult.devs.fleet5	52	0.33
Fmult.devs.fleet6	52	0.561
Fmult.devs.total	312	0.674
recruit.devs	53	0.679
fleet.sel.params	98	1.35
index.sel.params	0	0
q.year1	0	0
q.devs	0	0
SR.steepness	0	0
SR.scaler	0	0

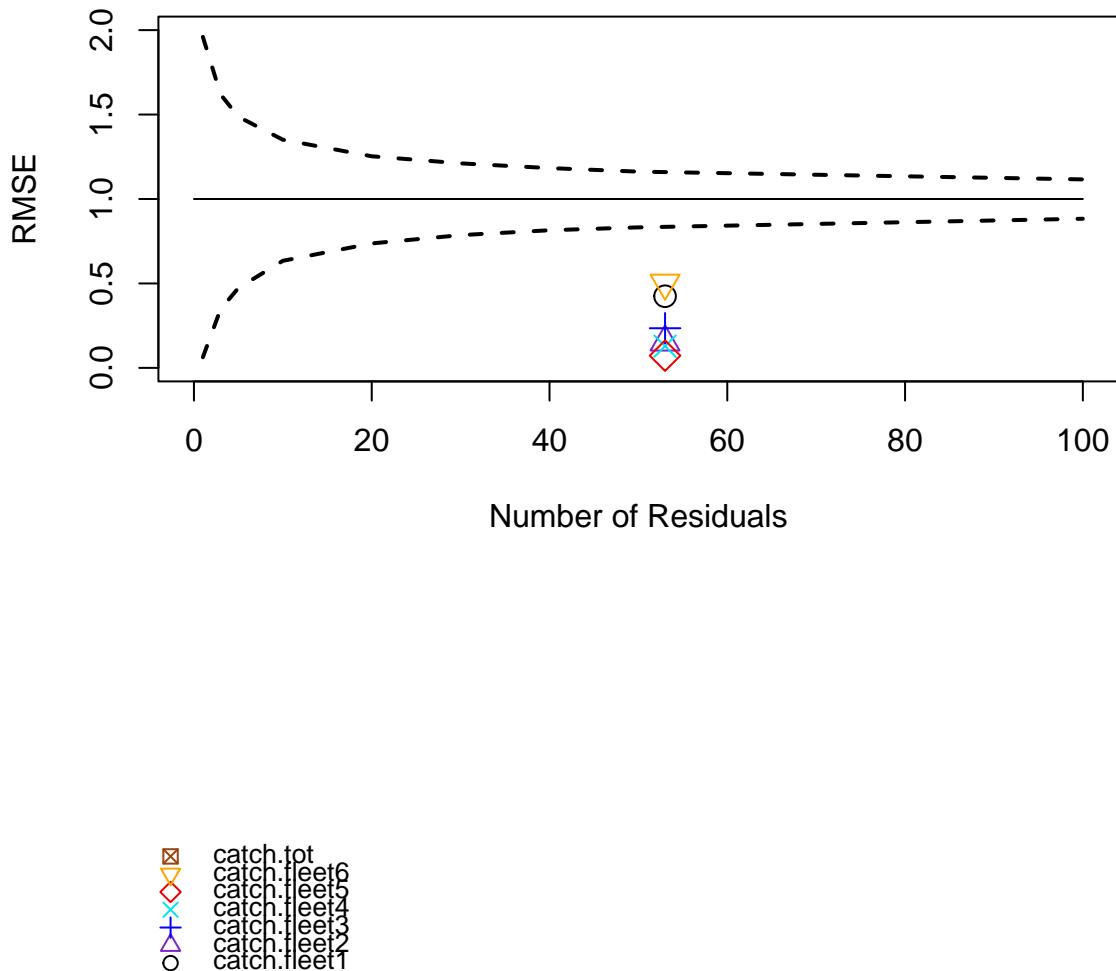
## Root Mean Square Error for Indices



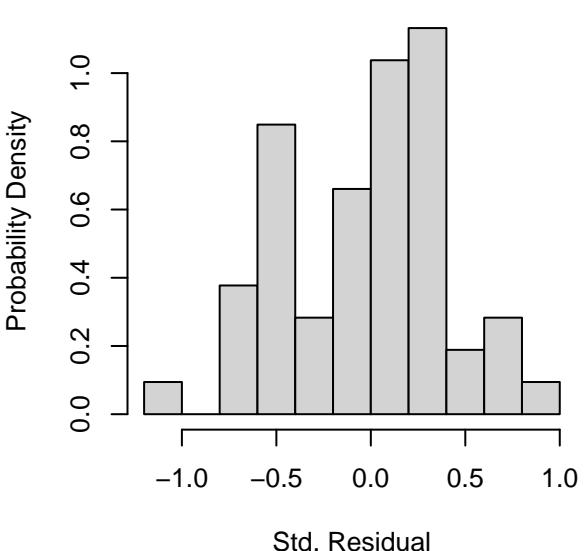
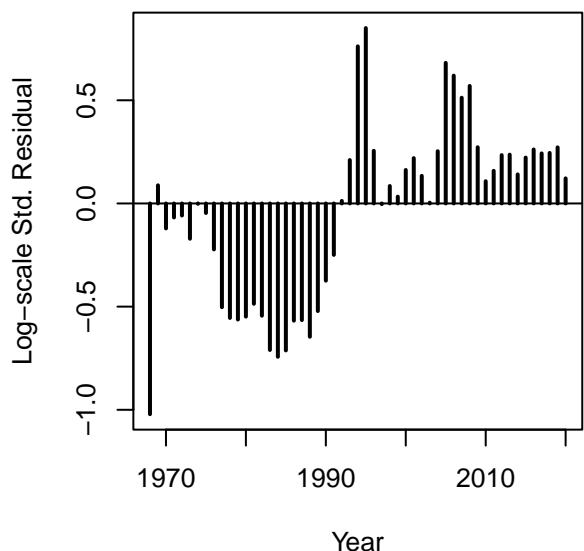
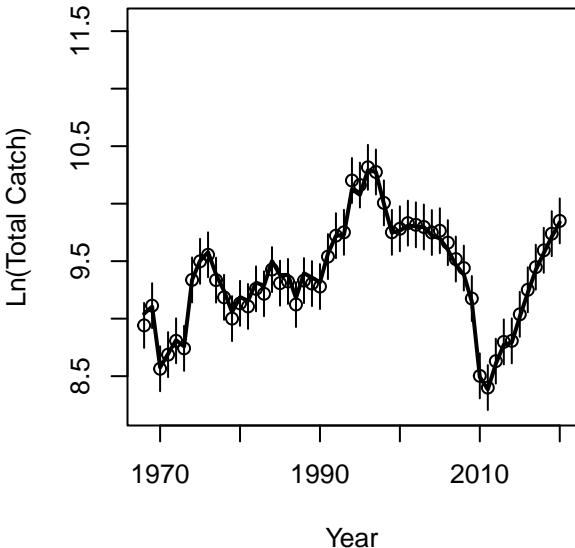
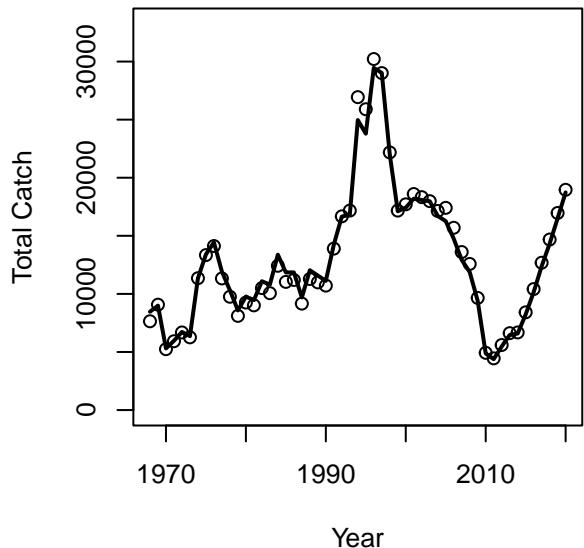
Legend:

- ind\_total
- WMED\_LARV
- FR\_AER2
- FR\_AER1
- SP\_BB2
- SP\_BB1
- JPN\_H2\_NEA
- JPN\_H1\_NEA
- EastAtlMed
- Mor\_POR\_TP
- Mor\_SP\_TP

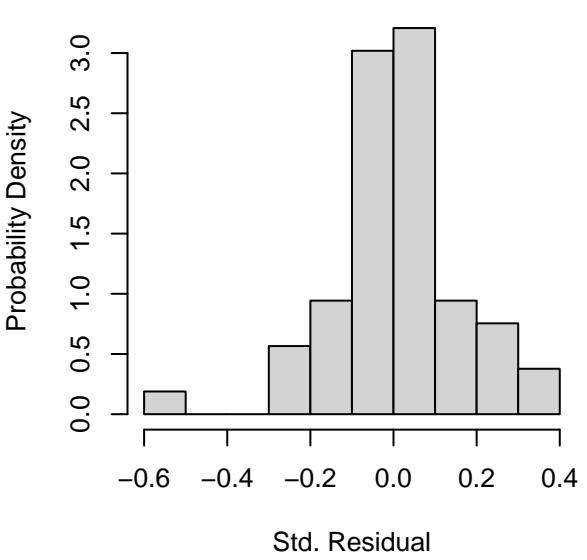
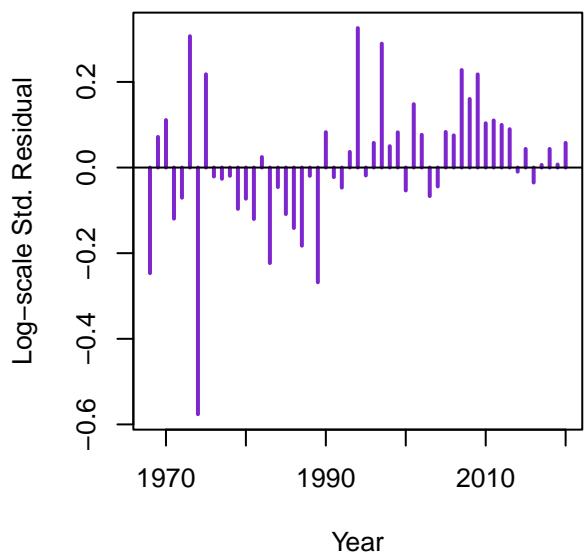
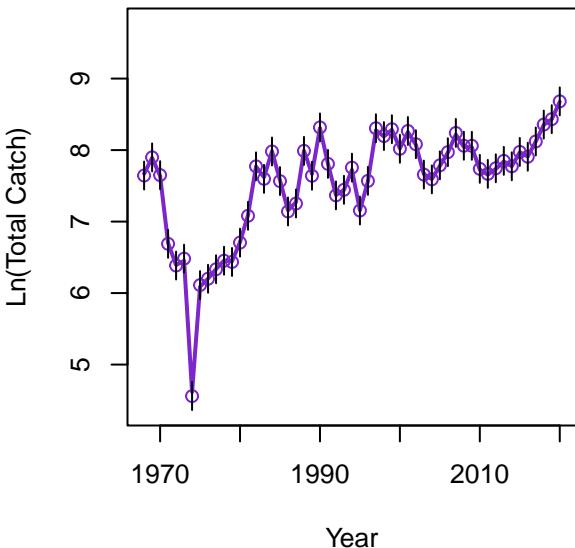
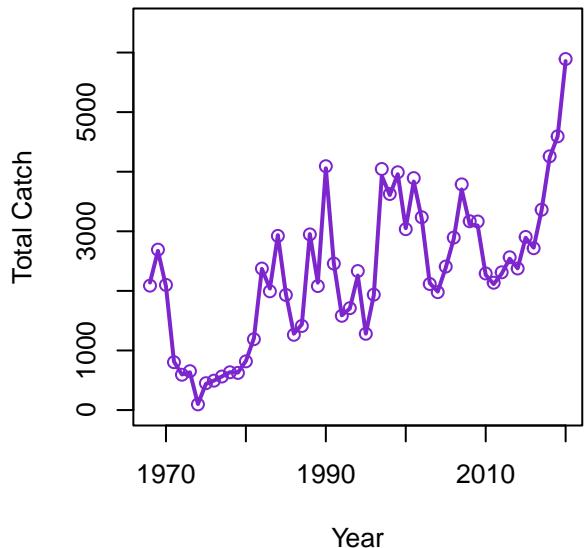
## Root Mean Square Error for Catch



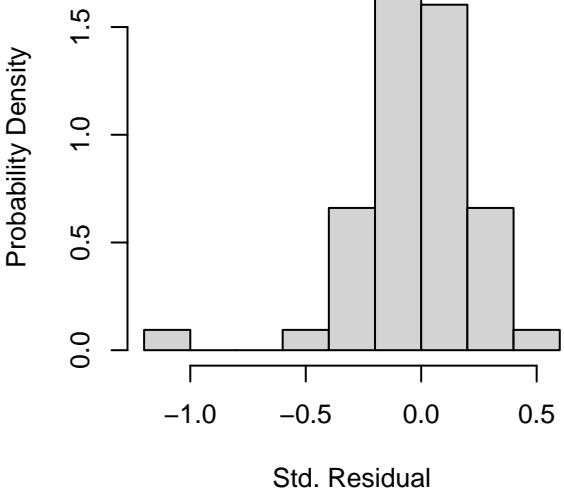
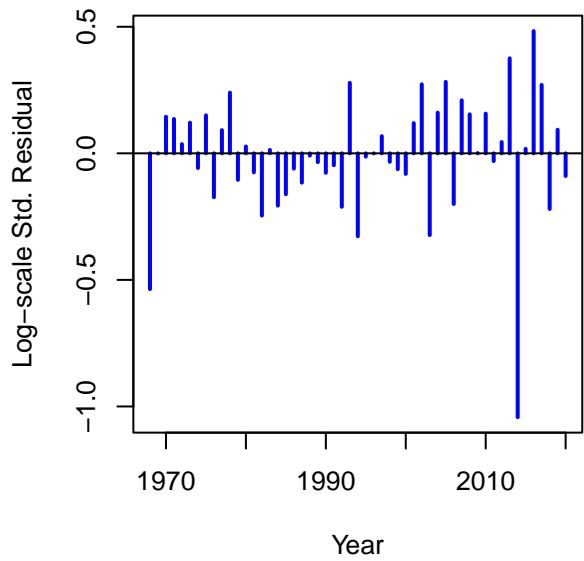
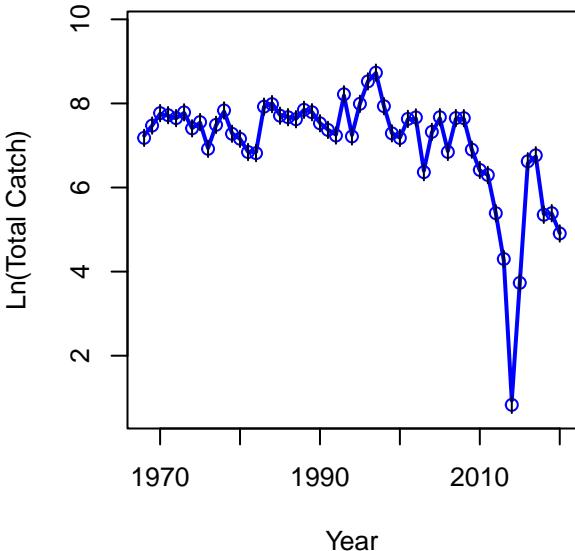
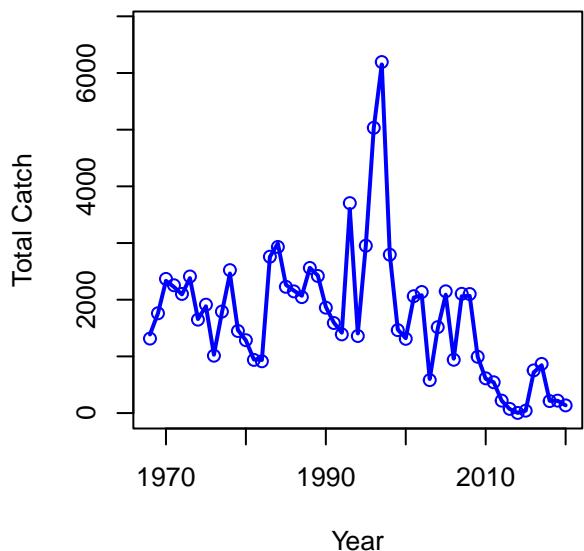
### Fleet 1 Catch (Other)



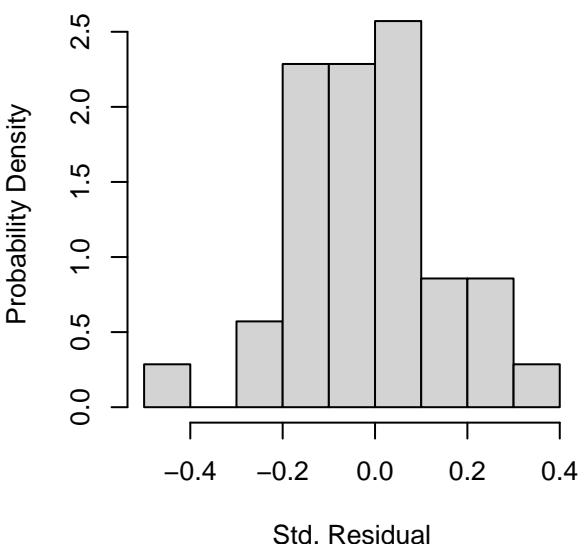
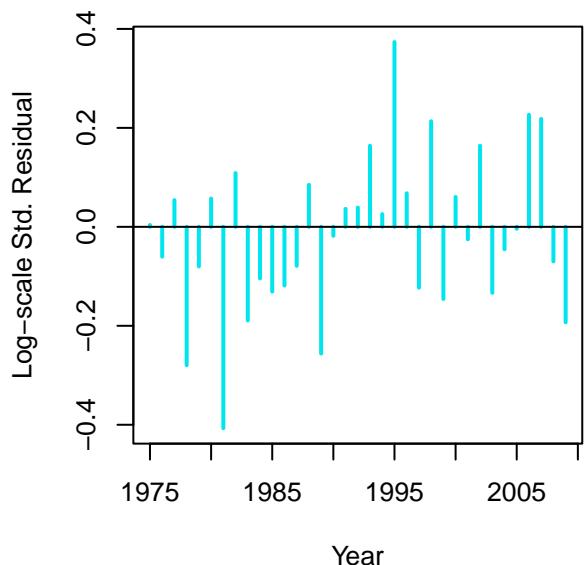
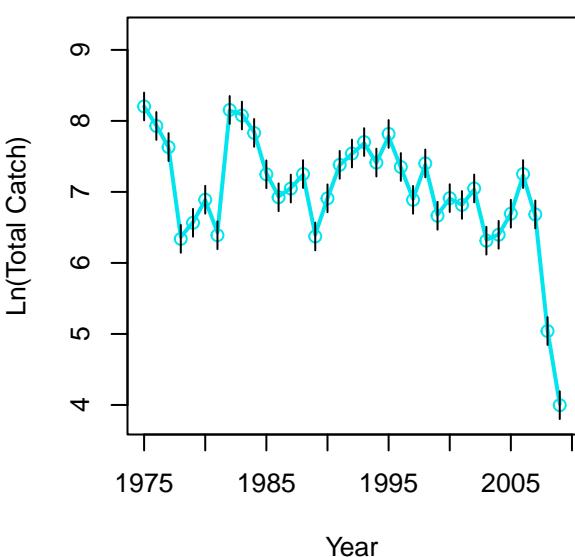
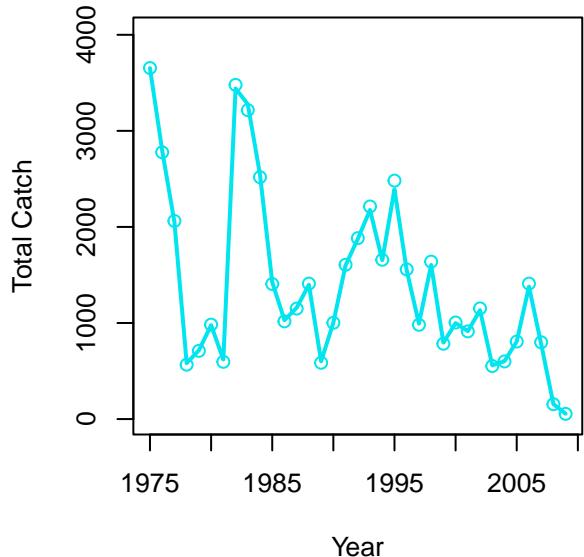
## Fleet 2 Catch (Traps)



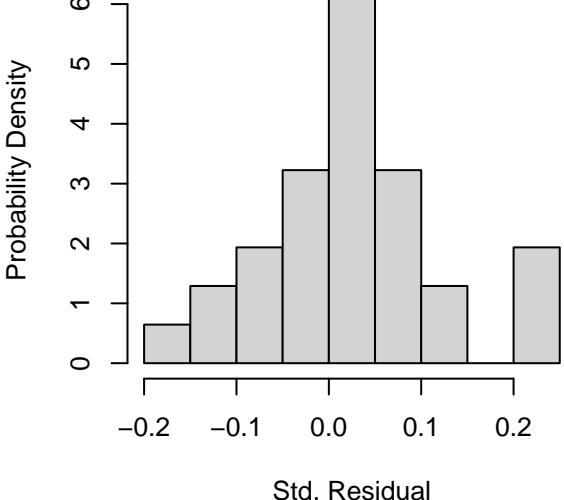
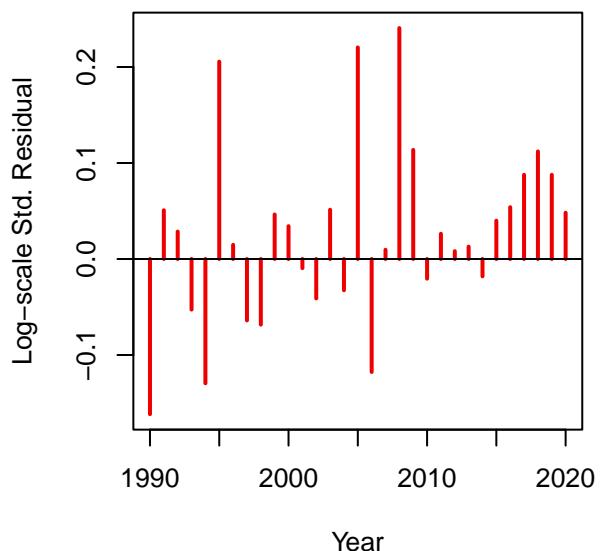
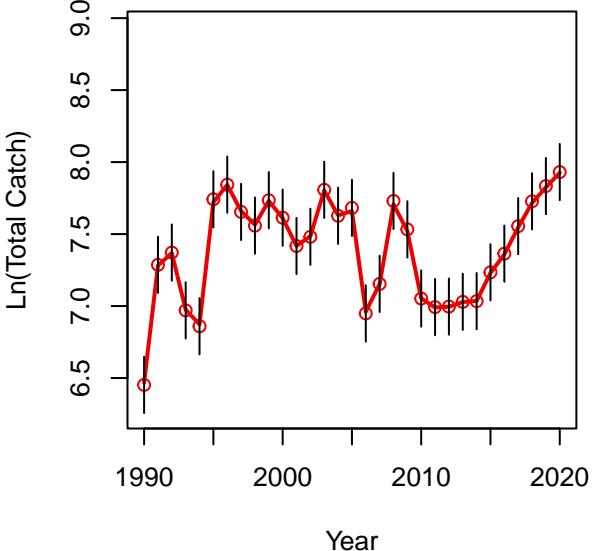
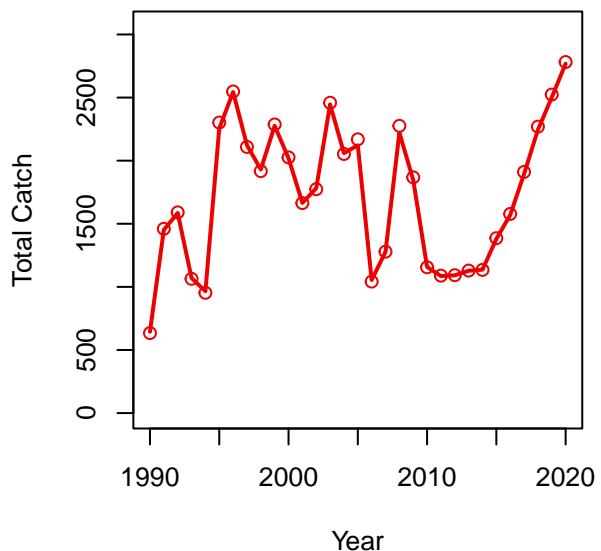
### Fleet 3 Catch (BB)



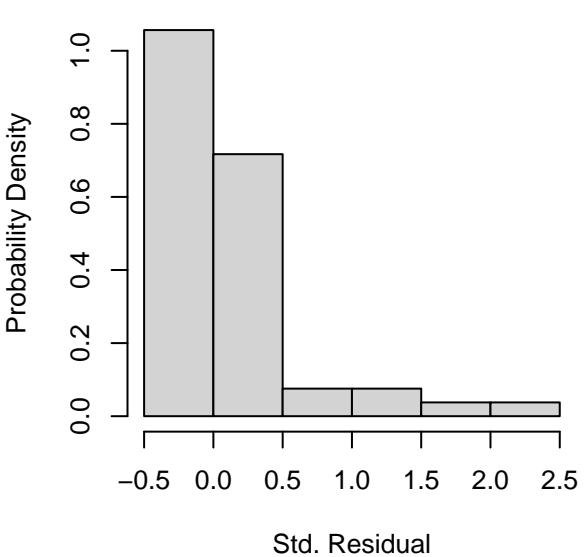
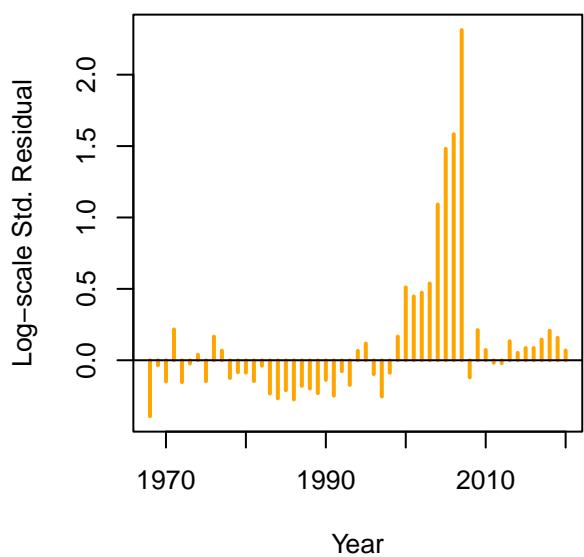
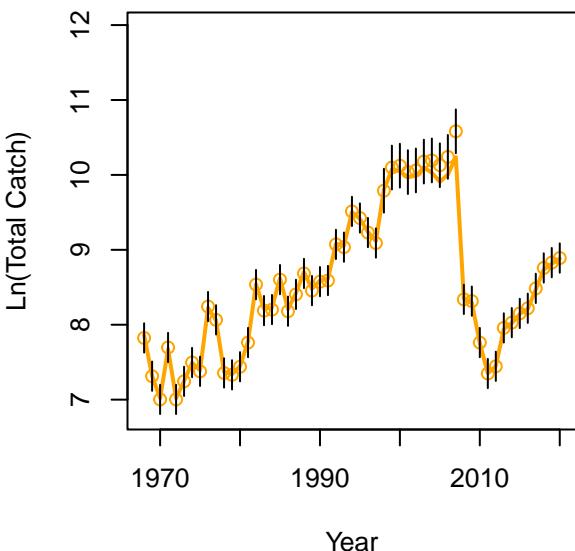
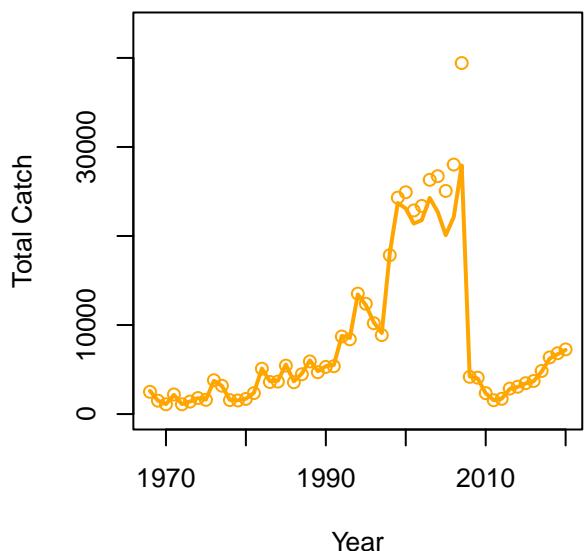
## Fleet 4 Catch (JPN\_LL\_EastMed)



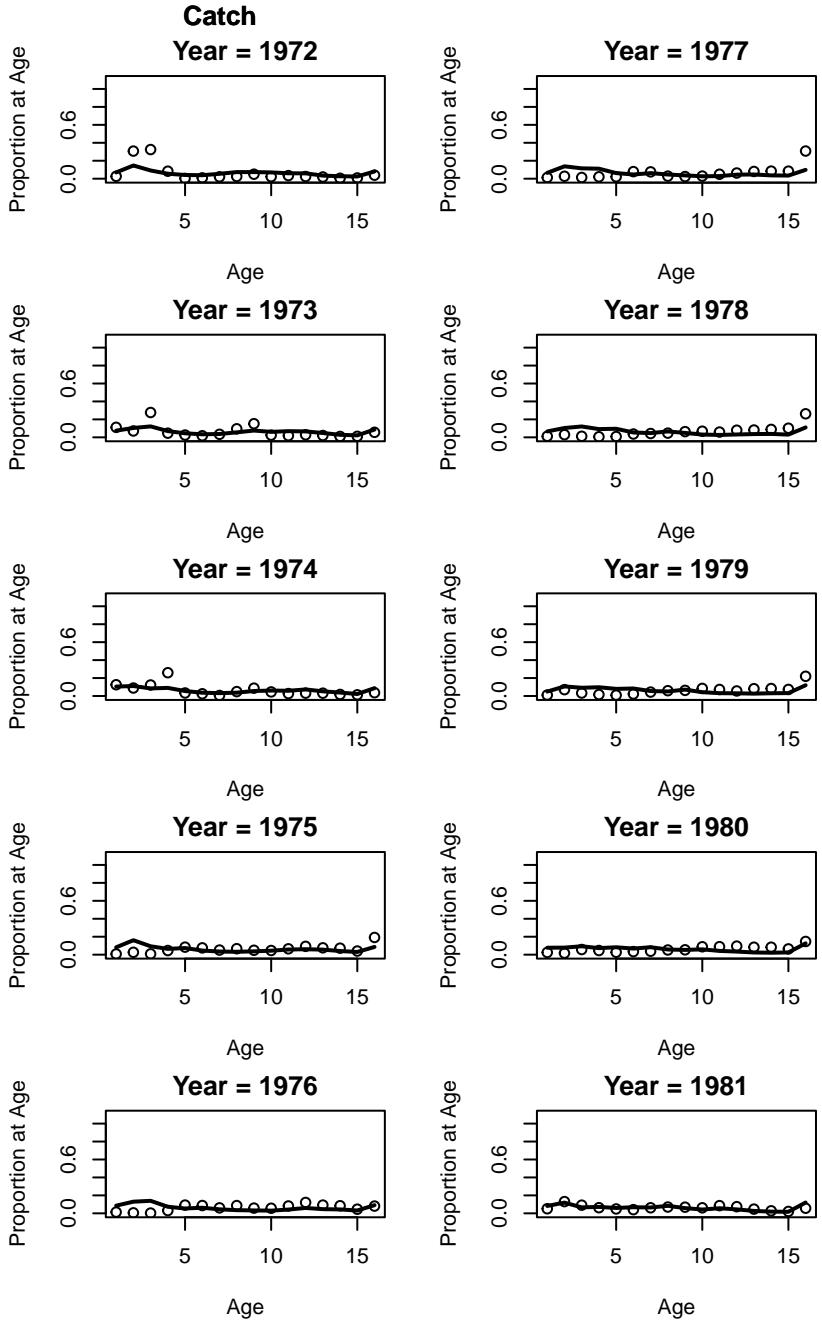
### Fleet 5 Catch (JPN\_LL\_NEA)

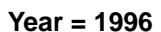
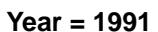
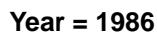
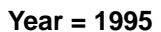
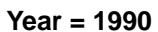
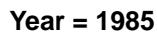
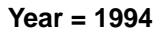
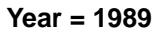
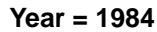
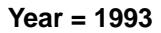
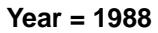
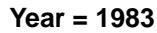
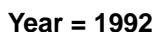
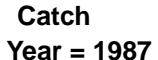
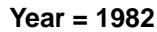


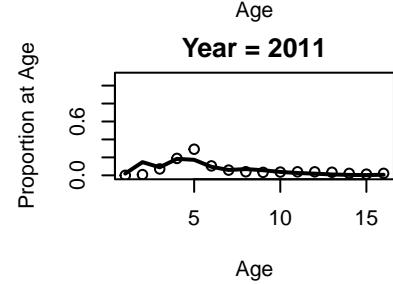
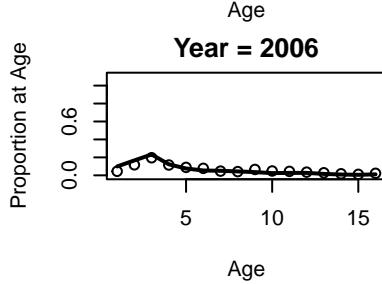
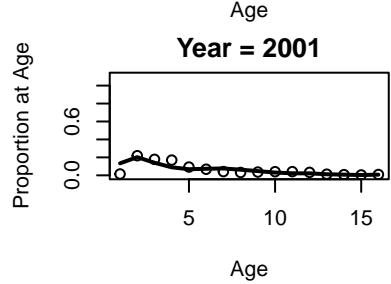
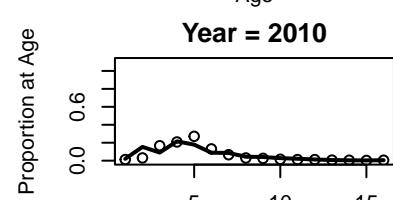
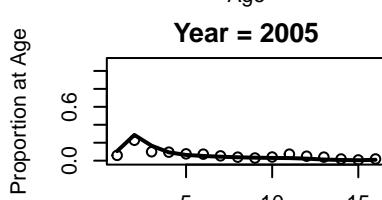
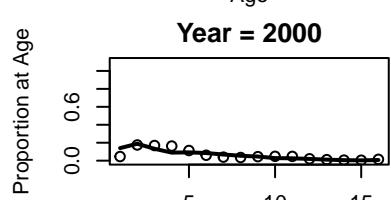
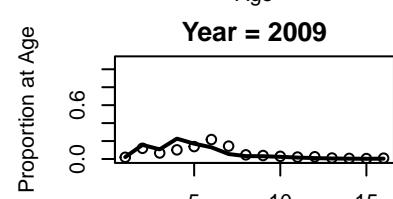
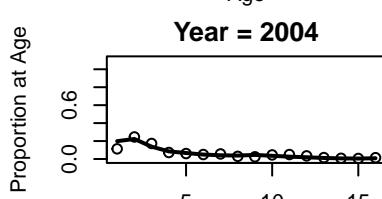
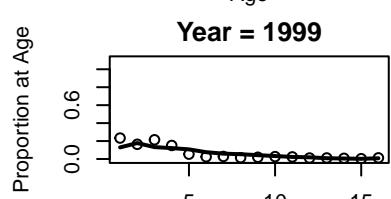
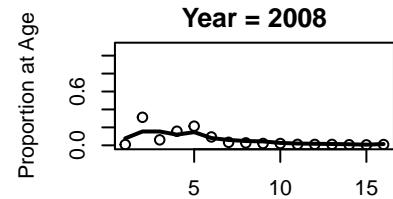
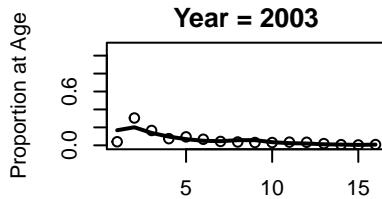
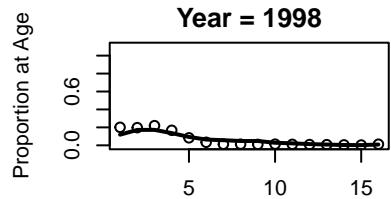
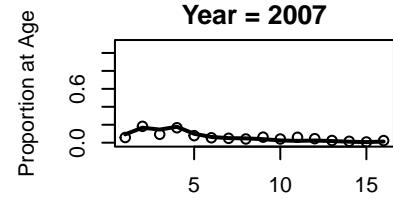
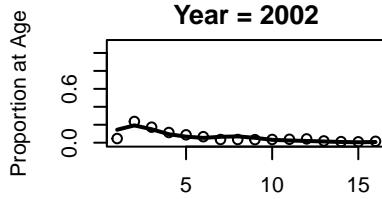
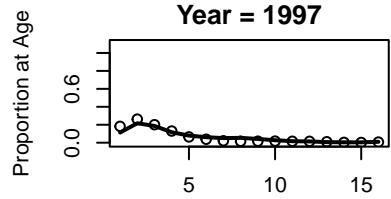
## Fleet 6 Catch (PS\_Med)



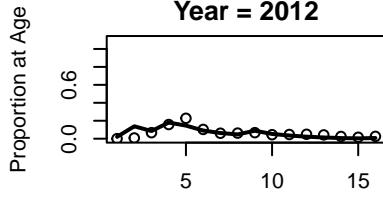
Fleet 1  
Other  
↓



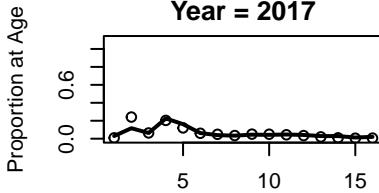




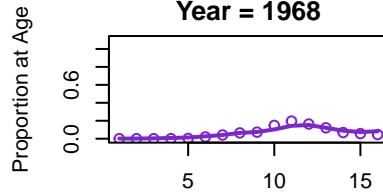
**Year = 2012**



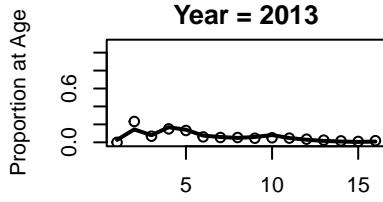
**Catch**  
**Year = 2017**



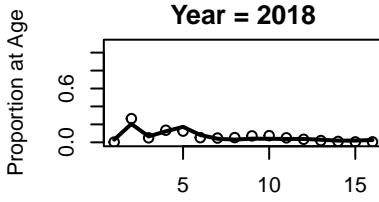
**Year = 1968**



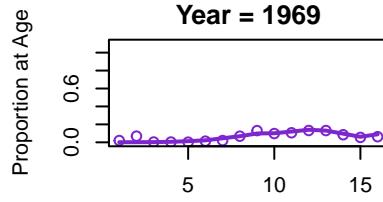
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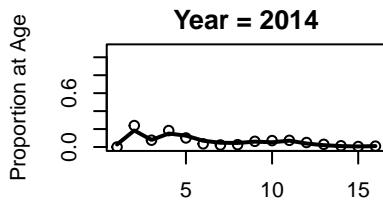
**Year = 2018**



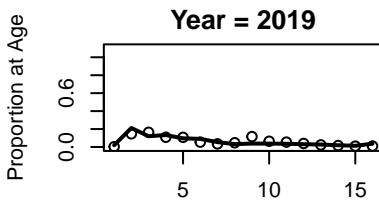
**Year = 1969**



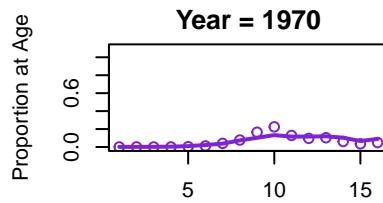
**Year = 2014**



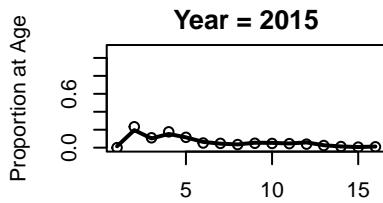
**Year = 2019**



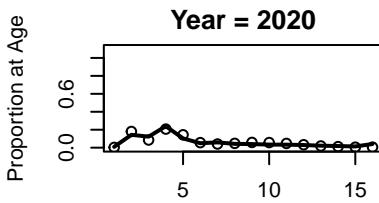
**Year = 1970**



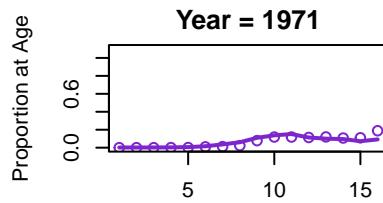
**Year = 2015**



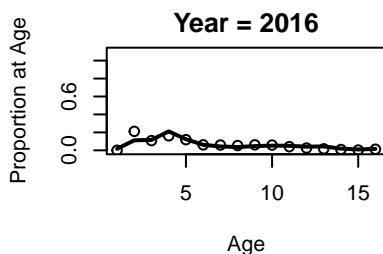
**Year = 2020**



**Year = 1971**



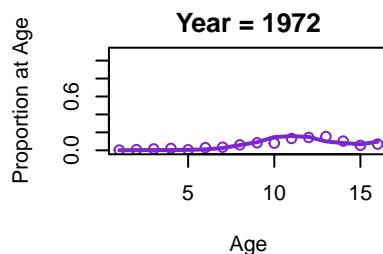
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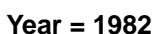
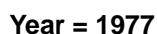
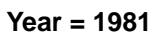
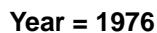
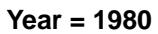
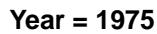
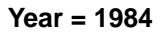
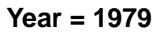
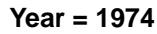
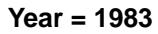
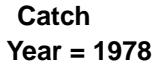
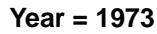


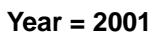
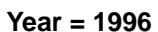
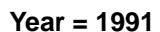
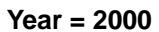
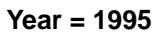
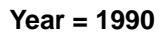
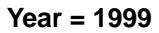
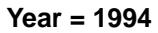
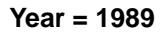
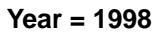
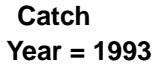
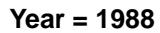
Fleet 2  
Traps

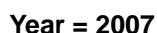
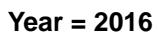
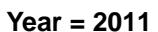
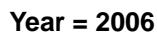
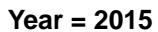
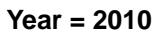
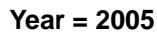
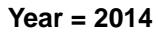
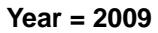
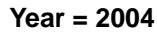
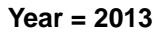
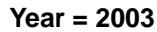


**Year = 1972**

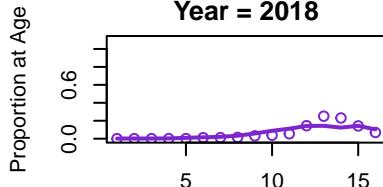




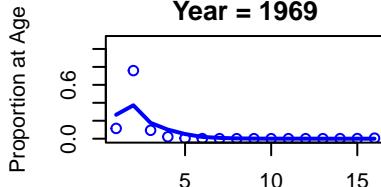




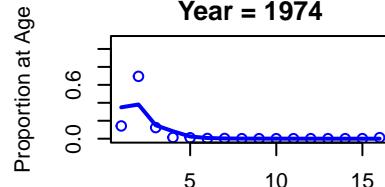
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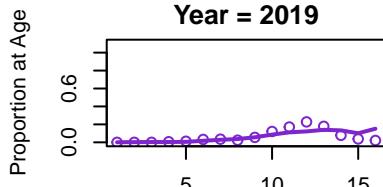
**Catch  
Year = 1969**



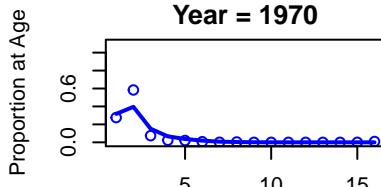
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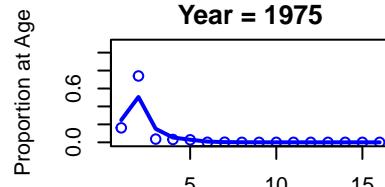
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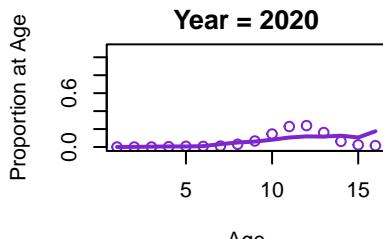
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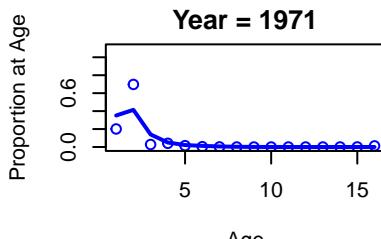
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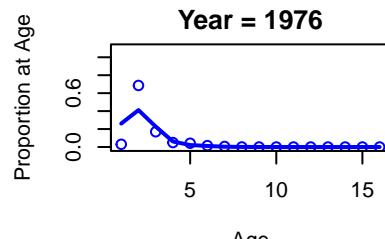
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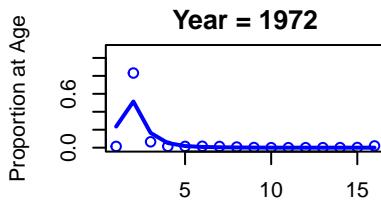
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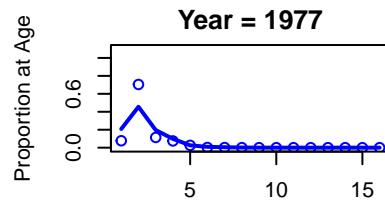
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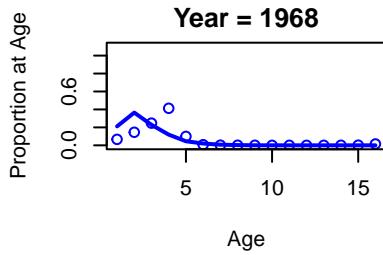
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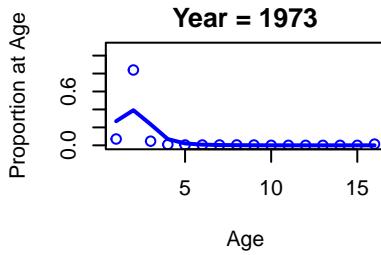
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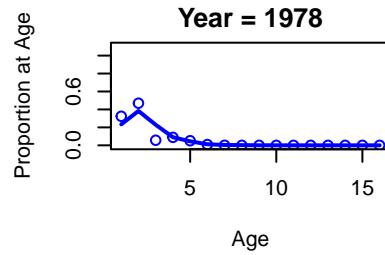
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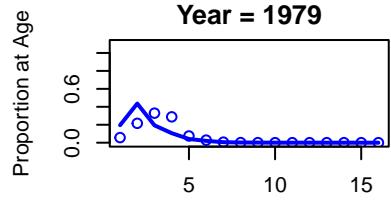
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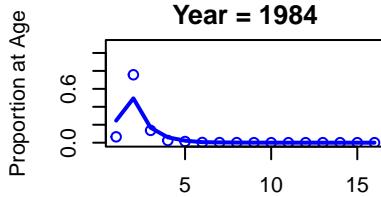
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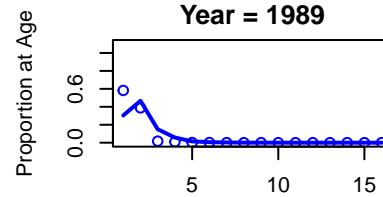
Fleet 3  
BB  
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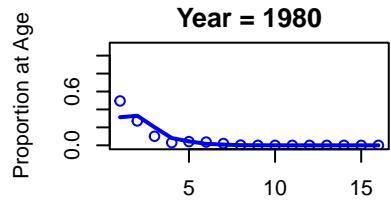
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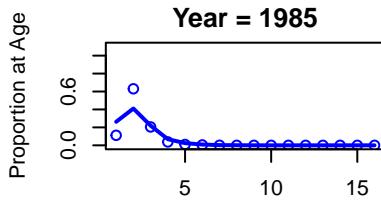
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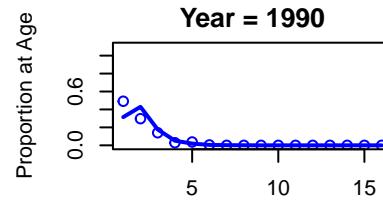
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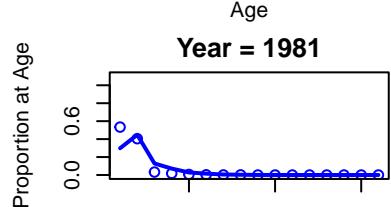
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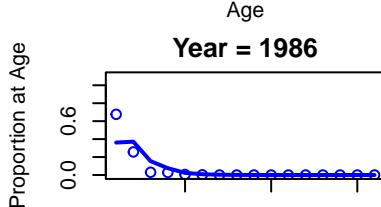
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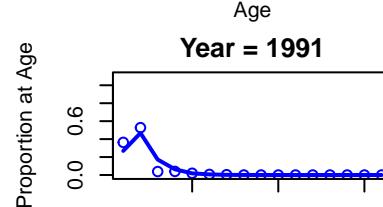
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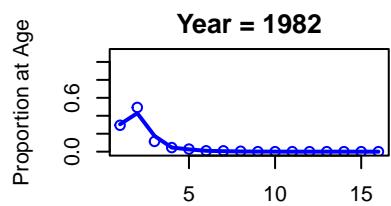
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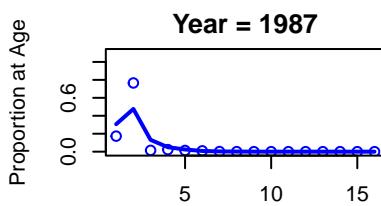
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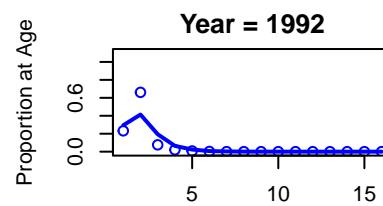
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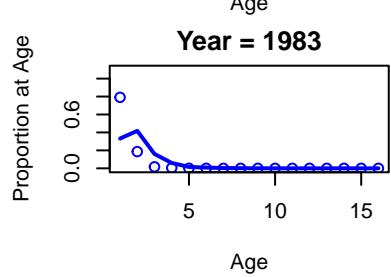
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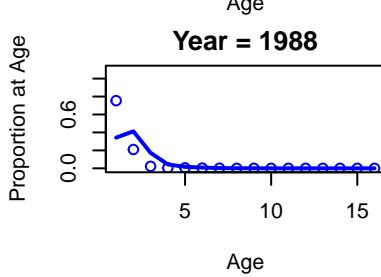
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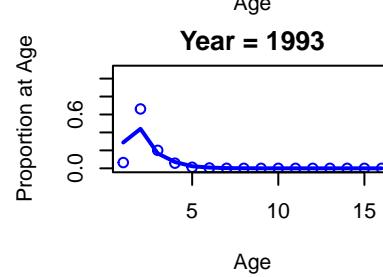
Year = 1992



**Year = 1983**



**Year = 1988**



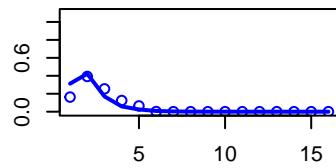
**Year = 1993**

**Year = 1994**

**Catch**  
**Year = 1999**

**Year = 2004**

Proportion at Age

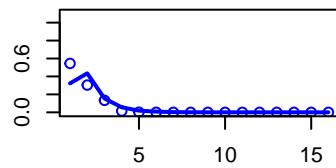


**Year = 1995**

**Year = 2000**

**Year = 2005**

Proportion at Age

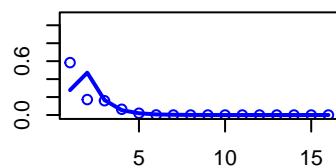


**Year = 1996**

**Year = 2001**

**Year = 2006**

Proportion at Age

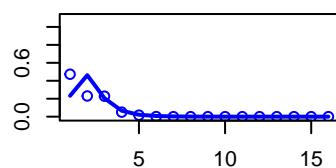


**Year = 1997**

**Year = 2002**

**Year = 2007**

Proportion at Age

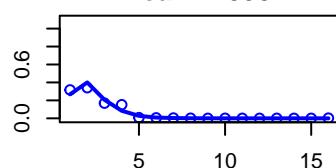


**Year = 1998**

**Year = 2003**

**Year = 2008**

Proportion at Age



Proportion at Age

Proportion at Age

Proportion at Age

Proportion at Age

Age

Proportion at Age

Proportion at Age

Proportion at Age

Proportion at Age

Age

Proportion at Age

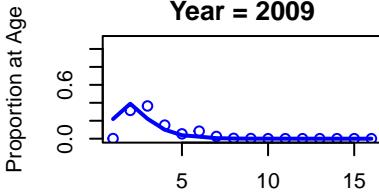
Proportion at Age

Proportion at Age

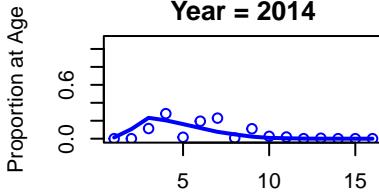
Proportion at Age

Age

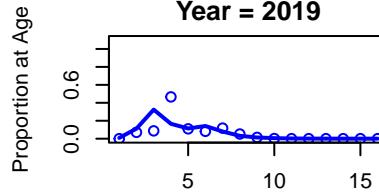
**Year = 2009**



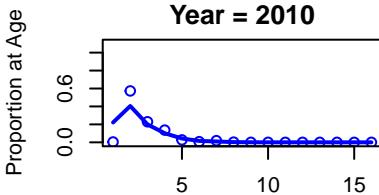
**Catch**  
**Year = 2014**



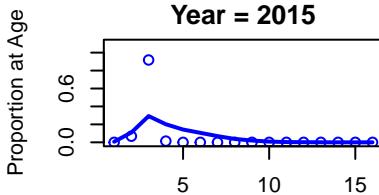
**Year = 2019**



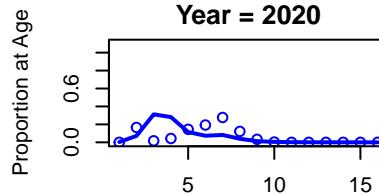
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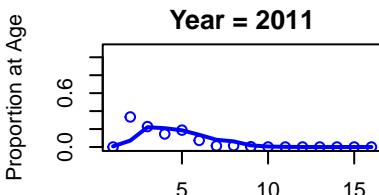
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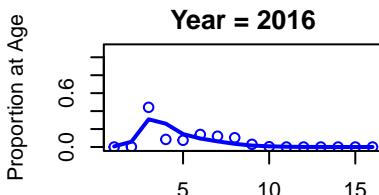
**Year = 2020**



**Year = 2011**

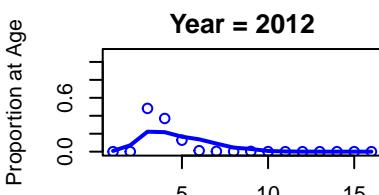


**Year = 2016**

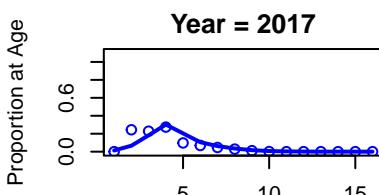


Fleet 4  
JPN\_LL\_EastMed  
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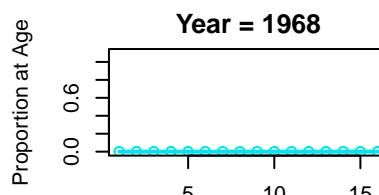
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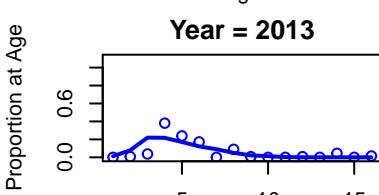
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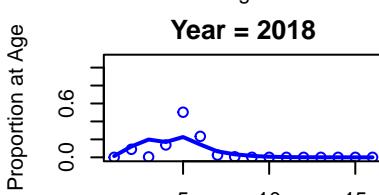
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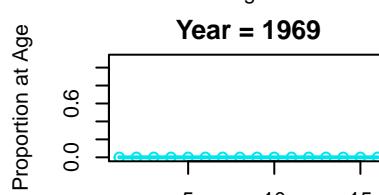
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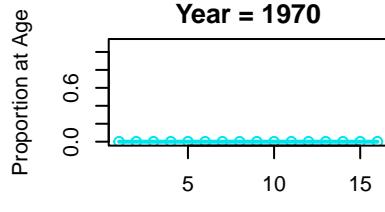
**Year = 2018**



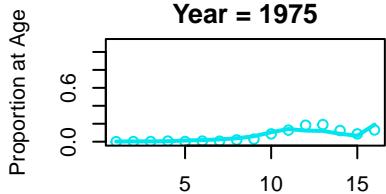
**Year = 1969**



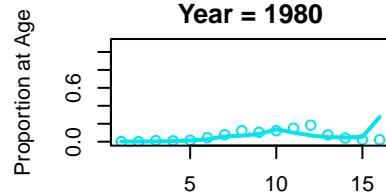
**Year = 1970**



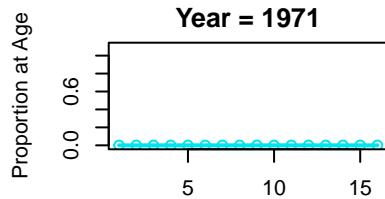
**Catch  
Year = 1975**



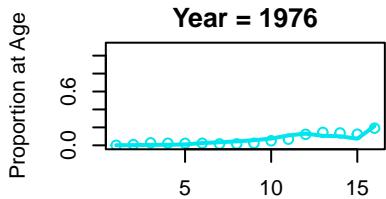
**Year = 1980**



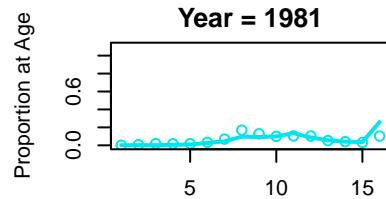
**Year = 1971**



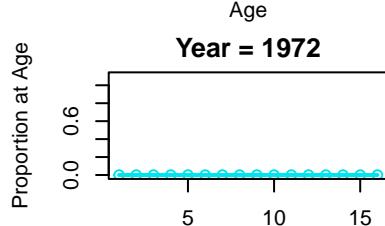
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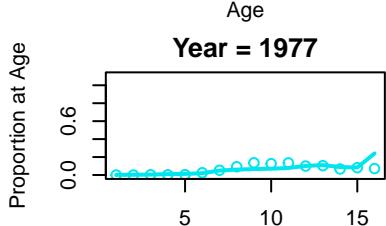
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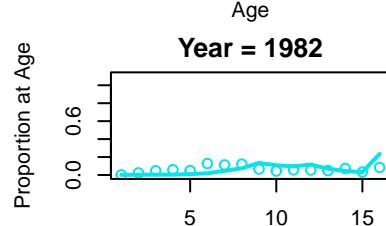
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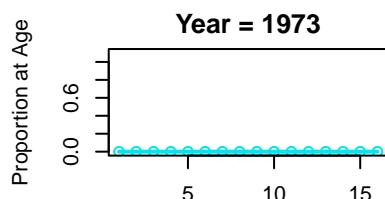
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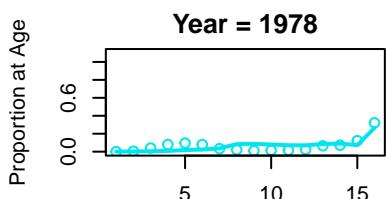
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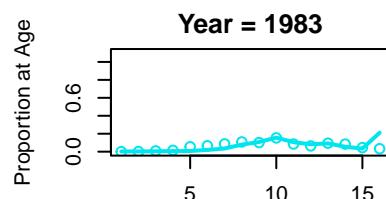
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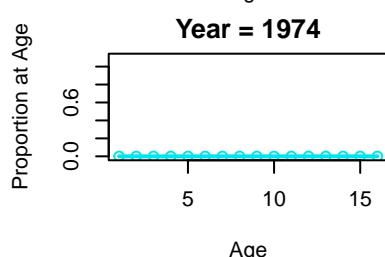
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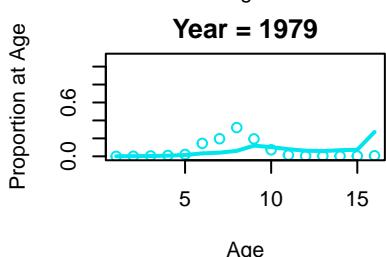
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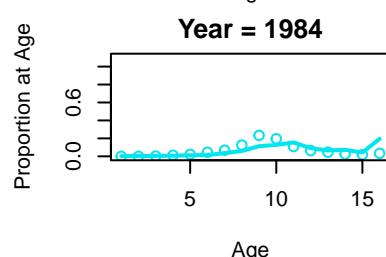
**Year = 1974**



**Year = 1979**



**Year = 1984**

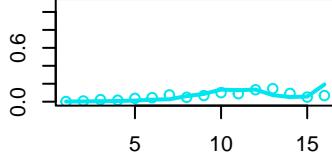


**Year = 1985**

**Catch**  
**Year = 1990**

**Year = 1995**

Proportion at Age



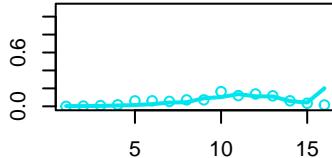
Age

**Year = 1986**

**Year = 1991**

**Year = 1996**

Proportion at Age



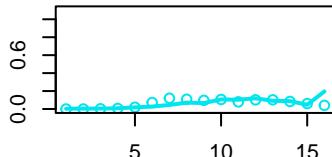
Age

**Year = 1987**

**Year = 1992**

**Year = 1997**

Proportion at Age



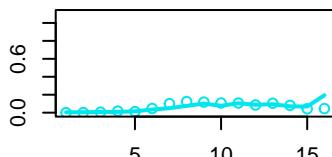
Age

**Year = 1988**

**Year = 1993**

**Year = 1998**

Proportion at Age



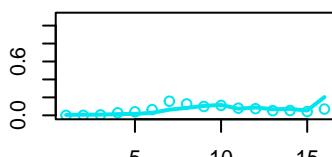
Age

**Year = 1989**

**Year = 1994**

**Year = 1999**

Proportion at Age



Age

Proportion at Age

Age

Proportion at Age

Age

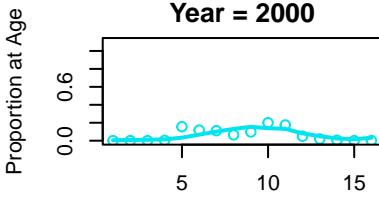
Proportion at Age

Age

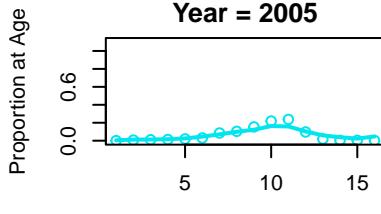
Proportion at Age

Age

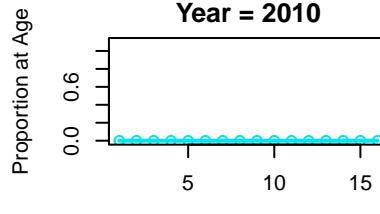
**Year = 2000**



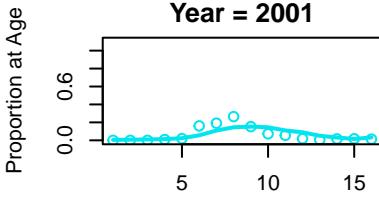
**Catch  
Year = 2005**



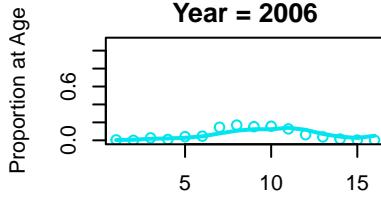
**Year = 2010**



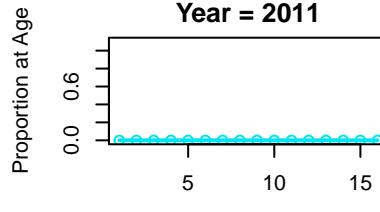
**Year = 2001**



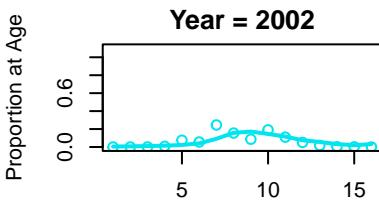
**Year = 2006**



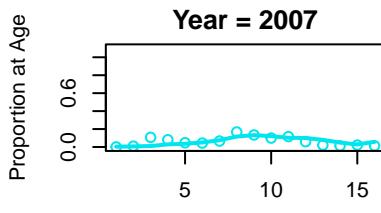
**Year = 2011**



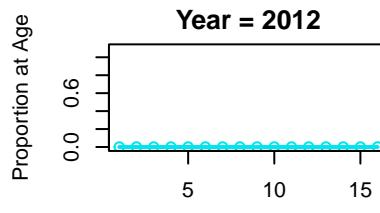
**Year = 2002**



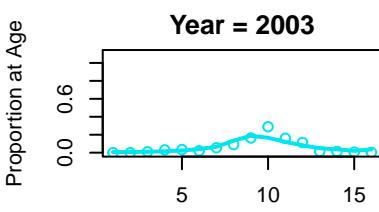
**Year = 2007**



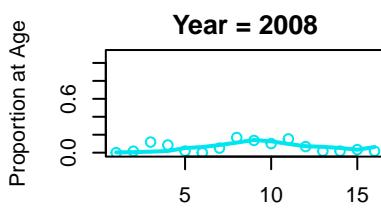
**Year = 2012**



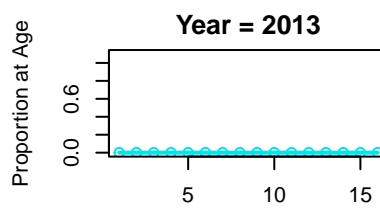
**Year = 2003**



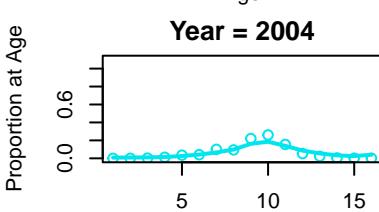
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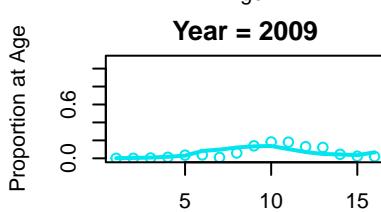
**Year = 2013**



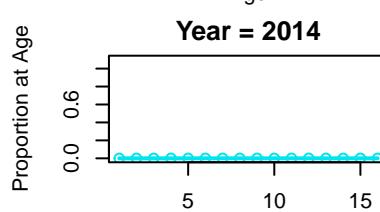
**Year = 2004**



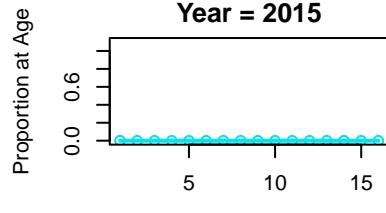
**Year = 2009**



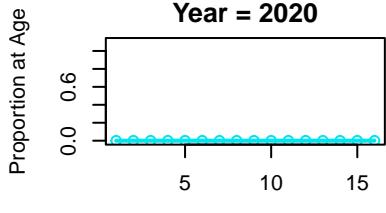
**Year = 2014**



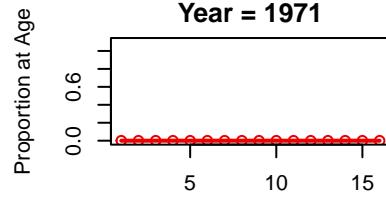
**Year = 2015**



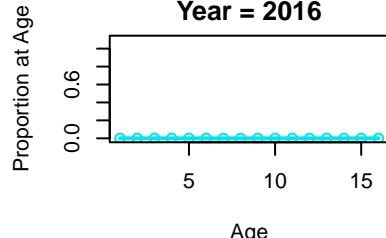
**Catch  
Year = 2020**



**Year = 1971**

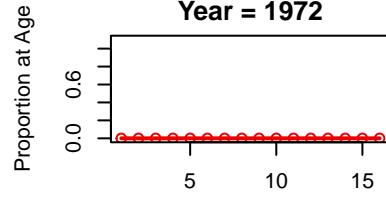


**Year = 2016**

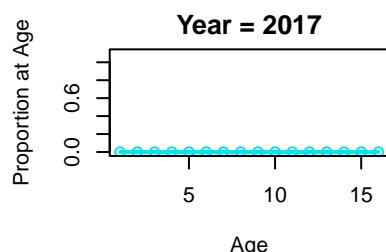


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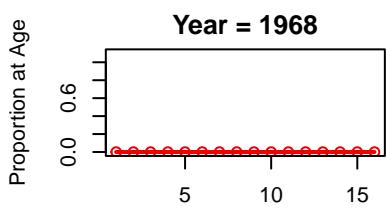
**Year = 1972**



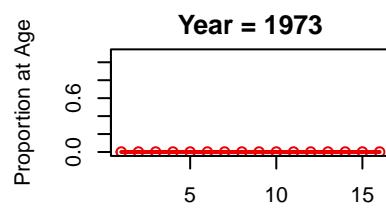
**Year = 2017**



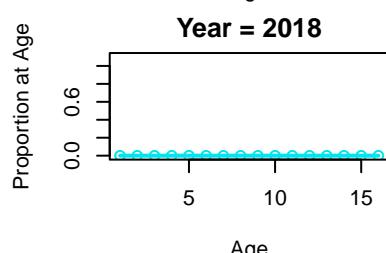
**Year = 1968**



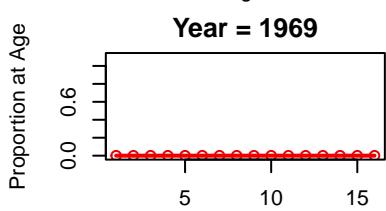
**Year = 1973**



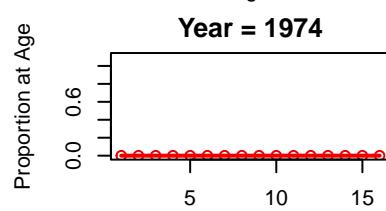
**Year = 2018**



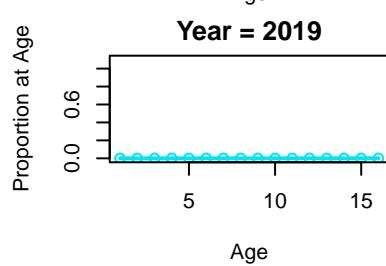
**Year = 1969**



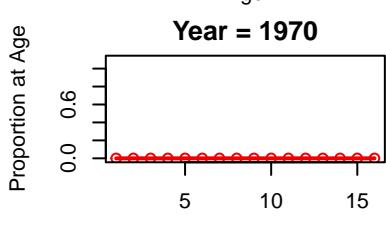
**Year = 1974**



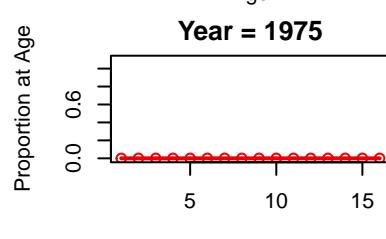
**Year = 2019**



**Year = 1970**



**Year = 1975**

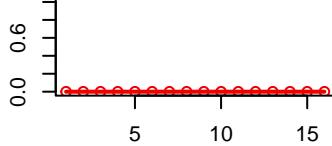


**Year = 1976**

**Catch**  
**Year = 1981**

**Year = 1986**

Proportion at Age



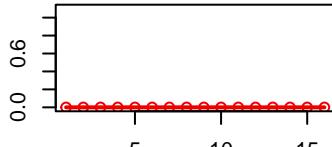
Age

**Year = 1977**

**Year = 1982**

**Year = 1987**

Proportion at Age



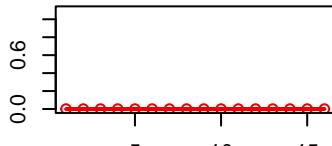
Age

**Year = 1978**

**Year = 1983**

**Year = 1988**

Proportion at Age



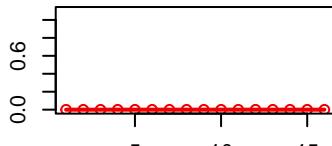
Age

**Year = 1979**

**Year = 1984**

**Year = 1989**

Proportion at Age



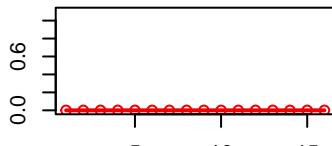
Age

**Year = 1980**

**Year = 1985**

**Year = 1990**

Proportion at Age

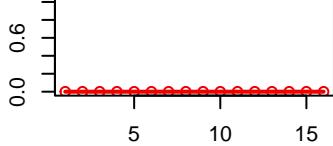


Age

Age

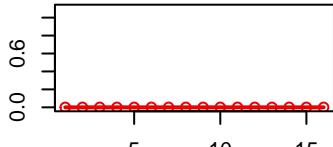
Age

Proportion at Age



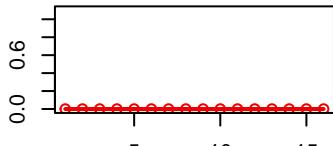
Age

Proportion at Age



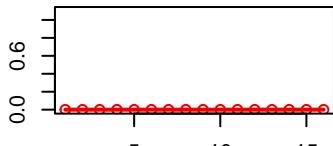
Age

Proportion at Age



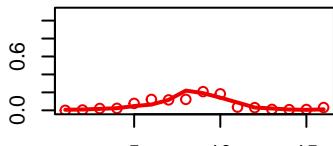
Age

Proportion at Age



Age

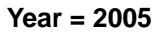
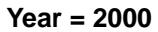
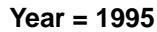
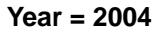
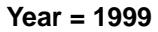
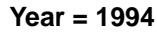
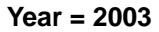
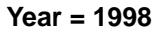
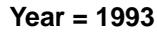
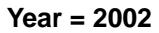
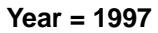
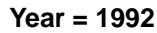
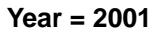
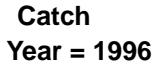
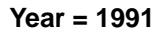
Proportion at Age

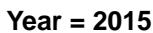
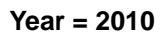
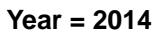
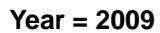
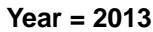
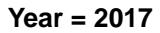
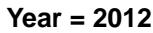
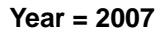
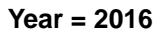
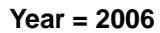


Age

Age

Age





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**Catch**  
**Year = 1972**

**Year = 1968**

**Year = 1969**

**Year = 1970**

**Year = 1971**

**Year = 1973**

**Year = 1974**

**Year = 1975**

**Year = 1976**

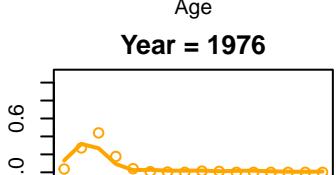
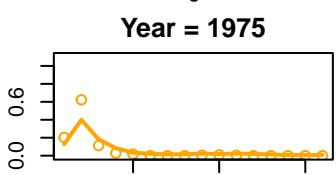
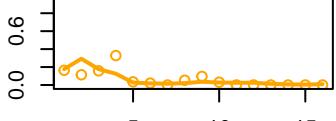
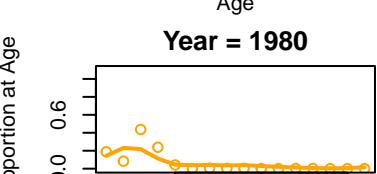
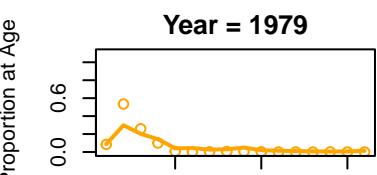
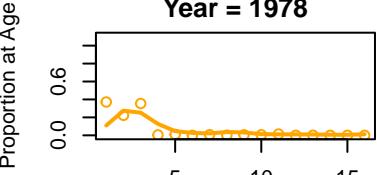
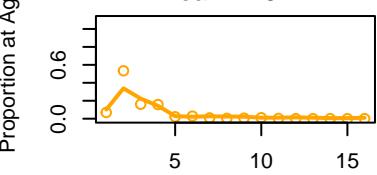
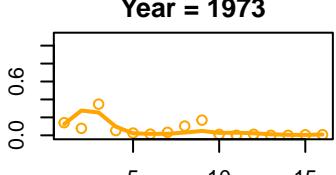
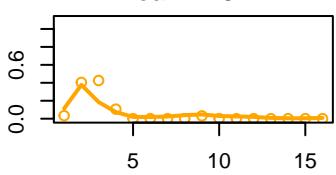
**Year = 1977**

**Year = 1978**

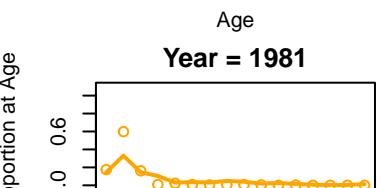
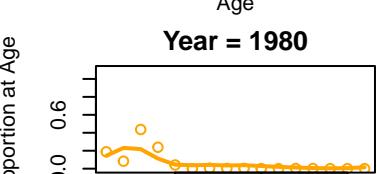
**Year = 1979**

**Year = 1980**

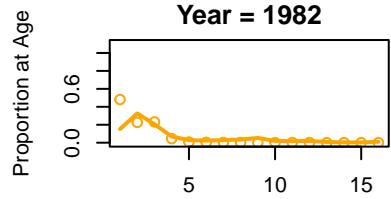
Proportion at Age



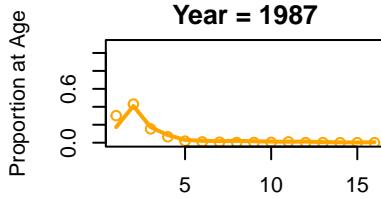
Age



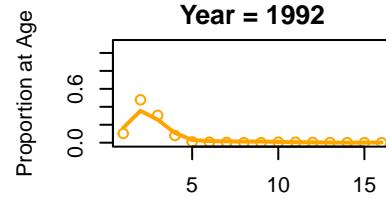
Age



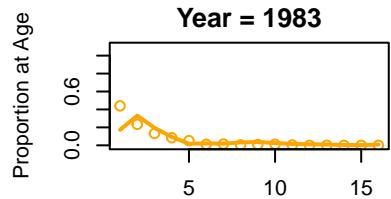
**Year = 1982**



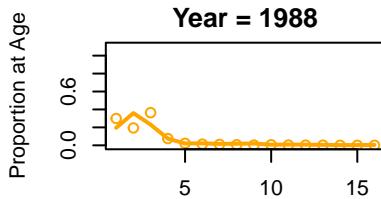
## Catch Year ≡ 1987



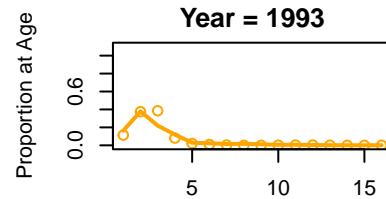
Year = 1992



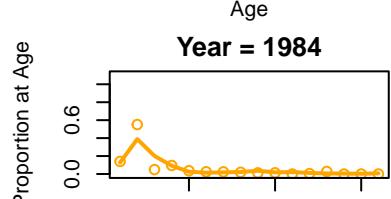
**Year = 1983**



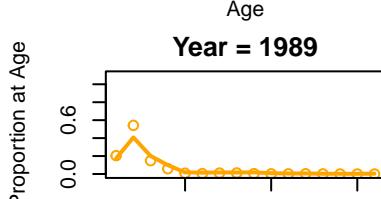
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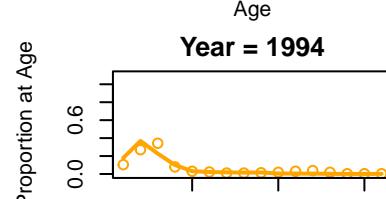
**Year = 1993**



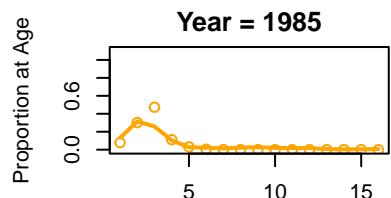
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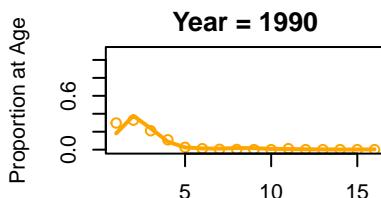
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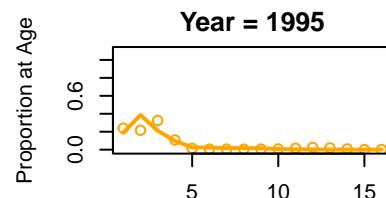
**Year = 1994**



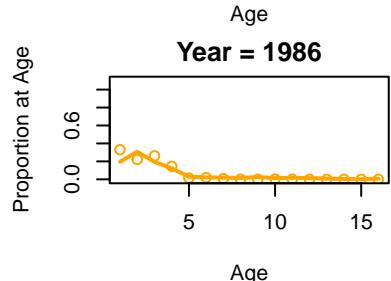
**Year = 1985**



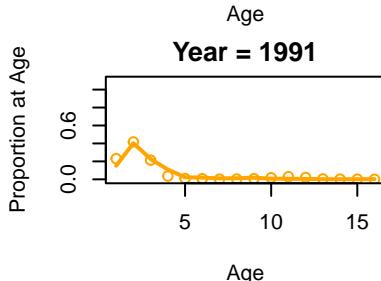
**Year = 1990**



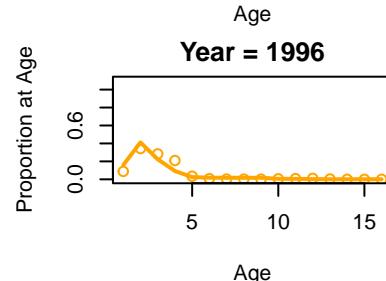
**Year = 1995**



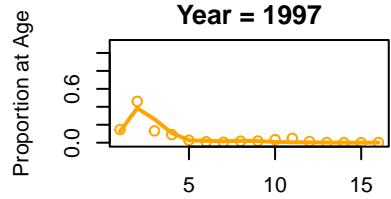
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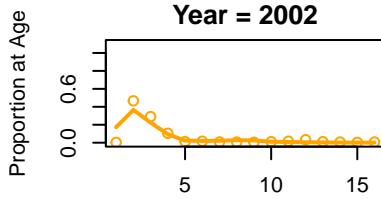
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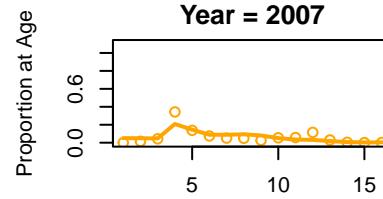
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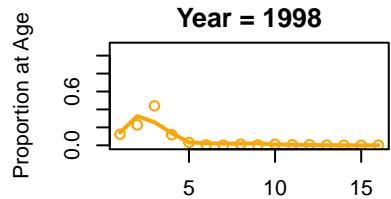
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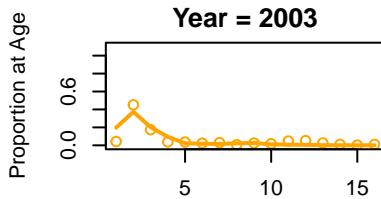
## Catch Year = 2002



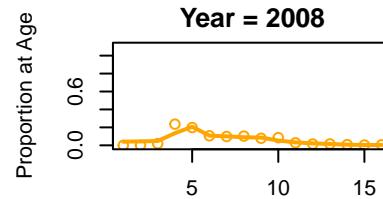
**Year = 2007**



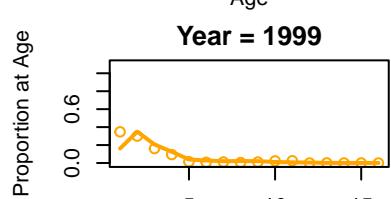
**Year = 1998**



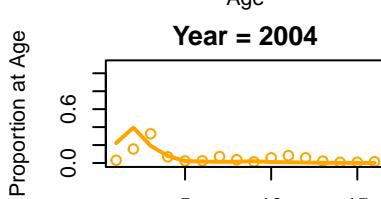
**Year = 2003**



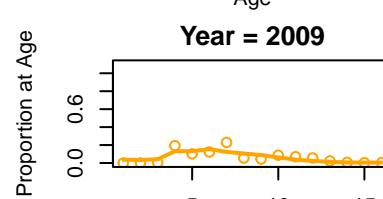
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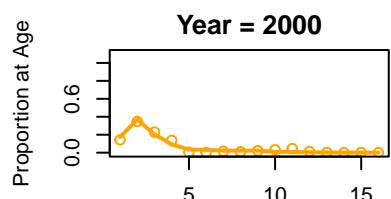
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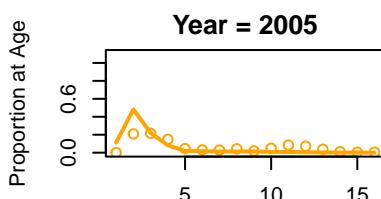
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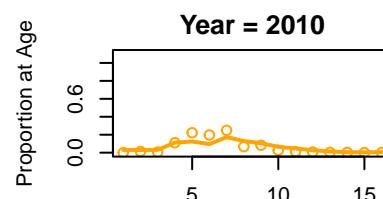
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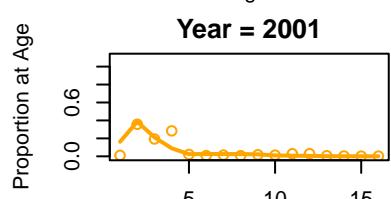
Year = 2000



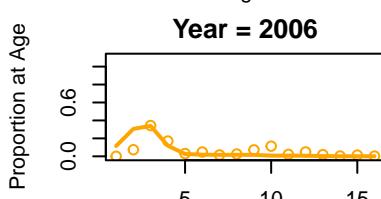
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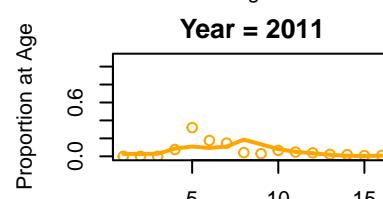
Year = 2010



Year - 2001

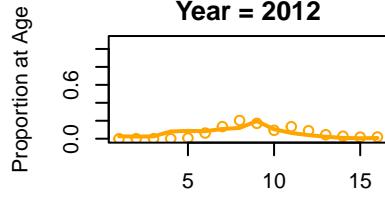


Year - 2006

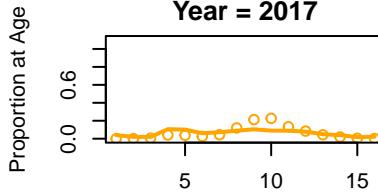


Year - 2011

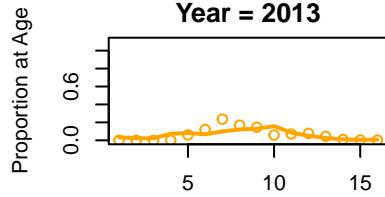
**Year = 2012**



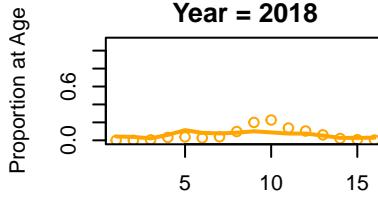
**Catch  
Year = 2017**



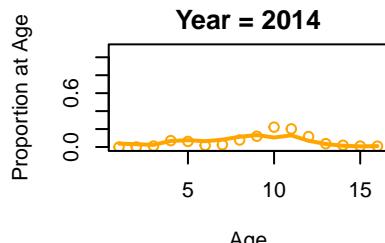
**Year = 2013**



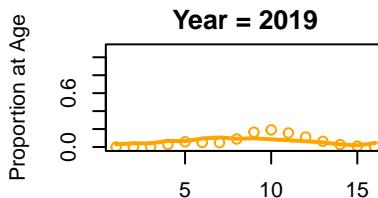
**Year = 2018**



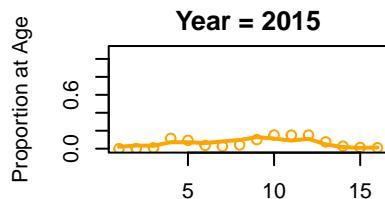
**Year = 2014**



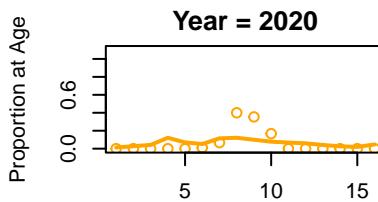
**Year = 2019**



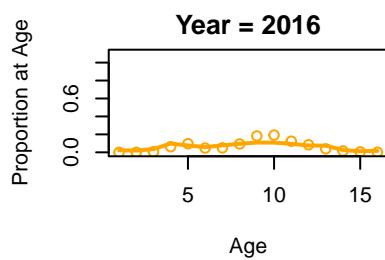
**Year = 2015**



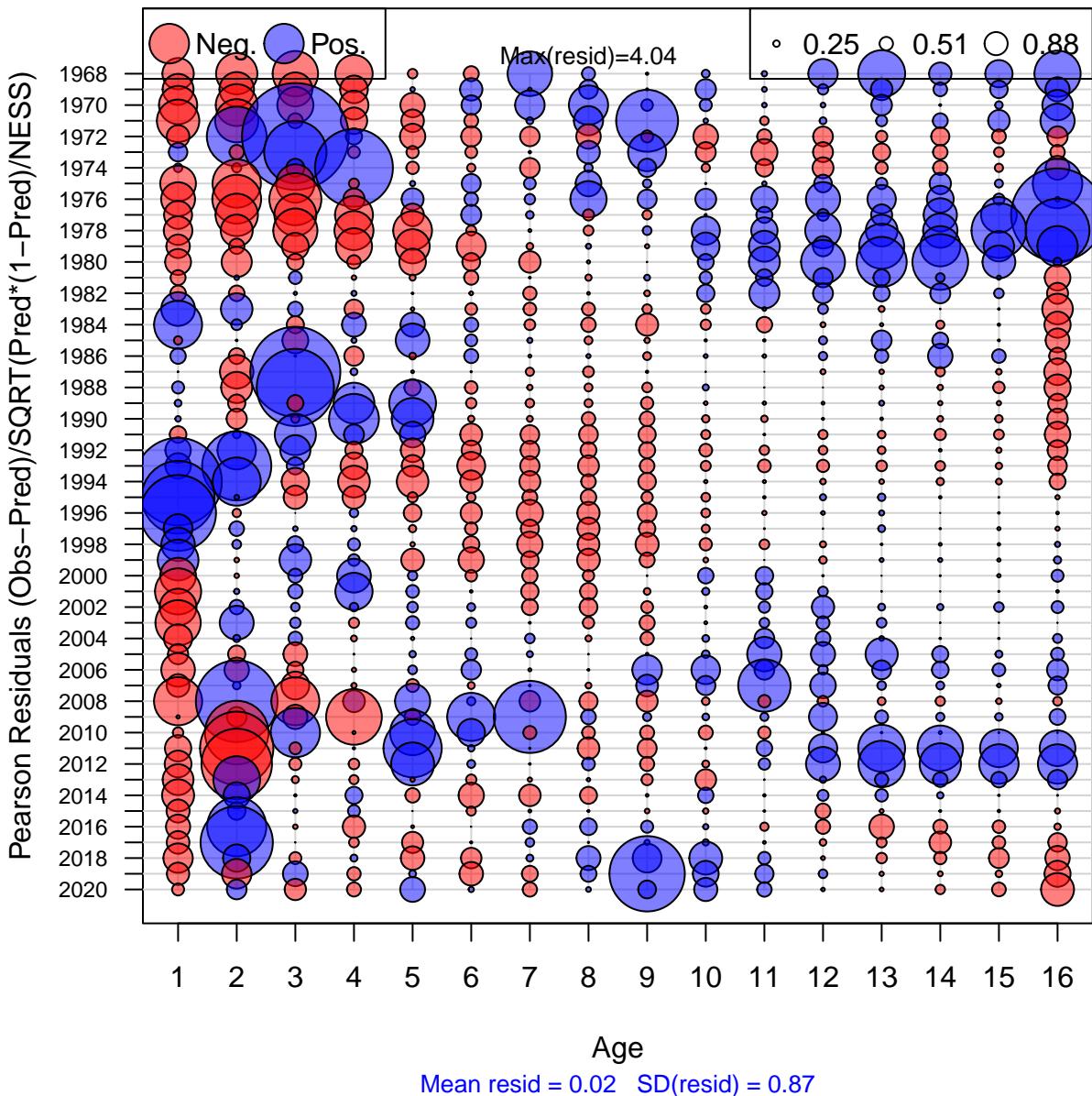
**Year = 2020**



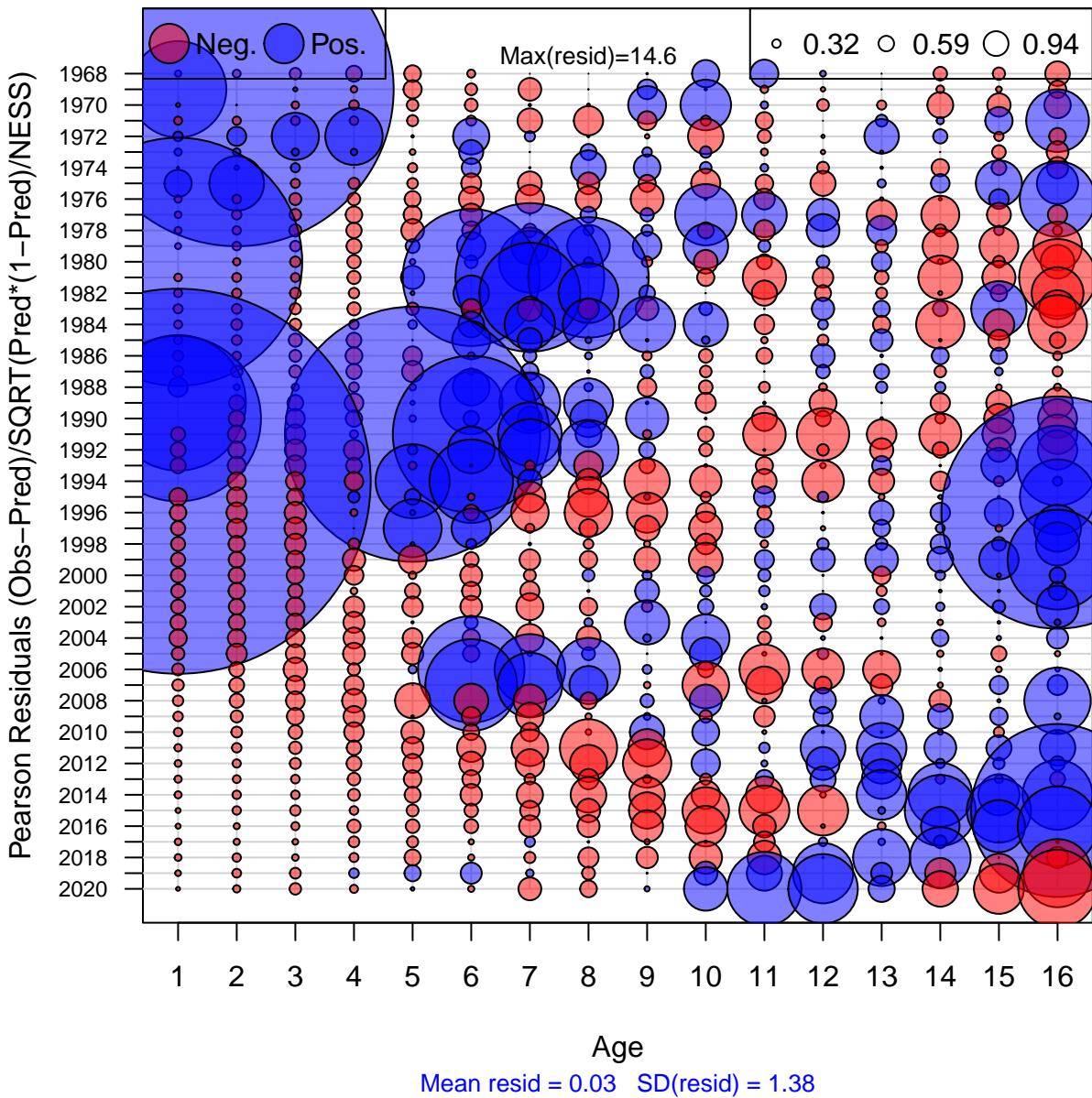
**Year = 2016**



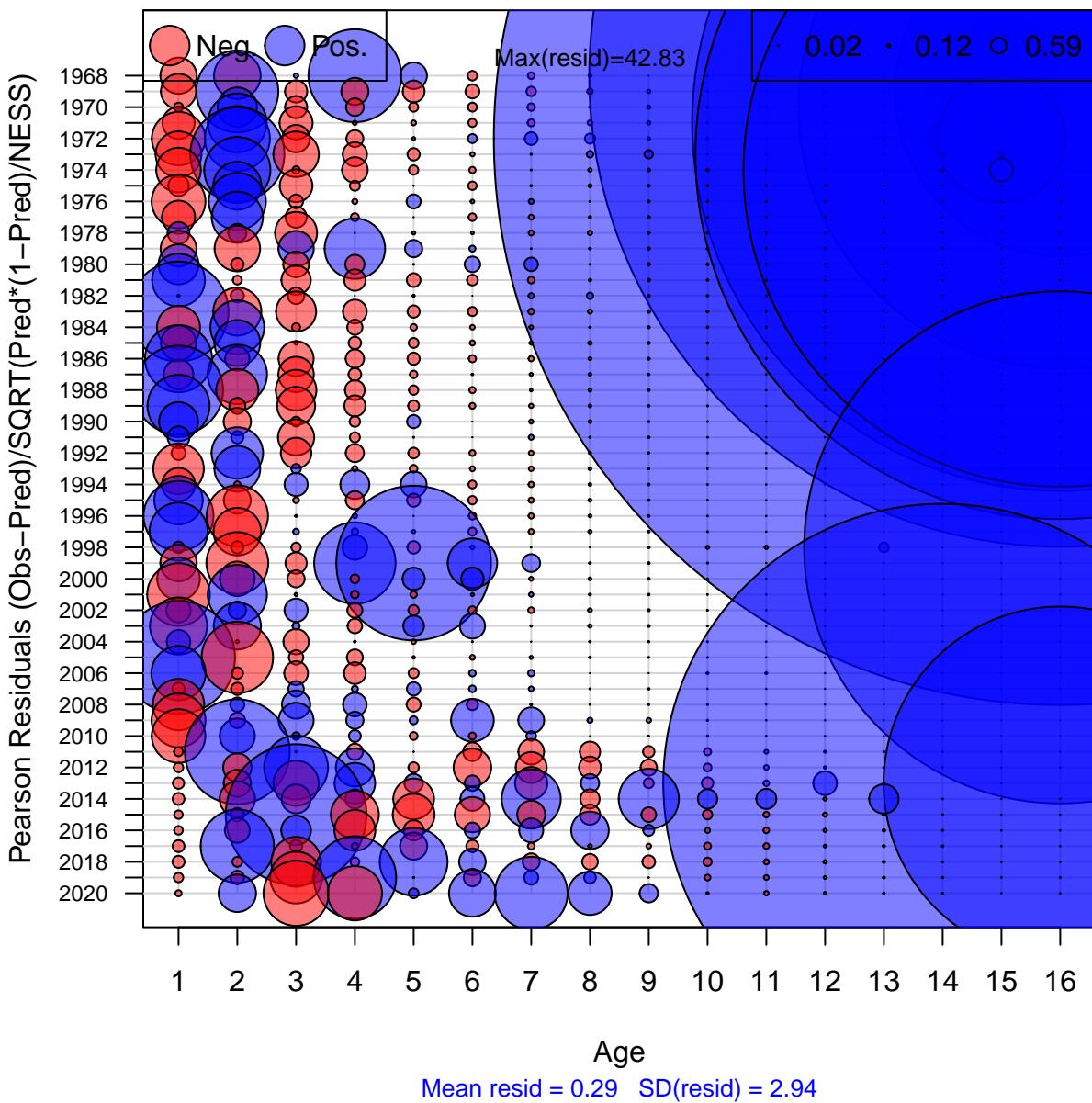
# Age Comp Residuals for Catch by Fleet 1 (Other)



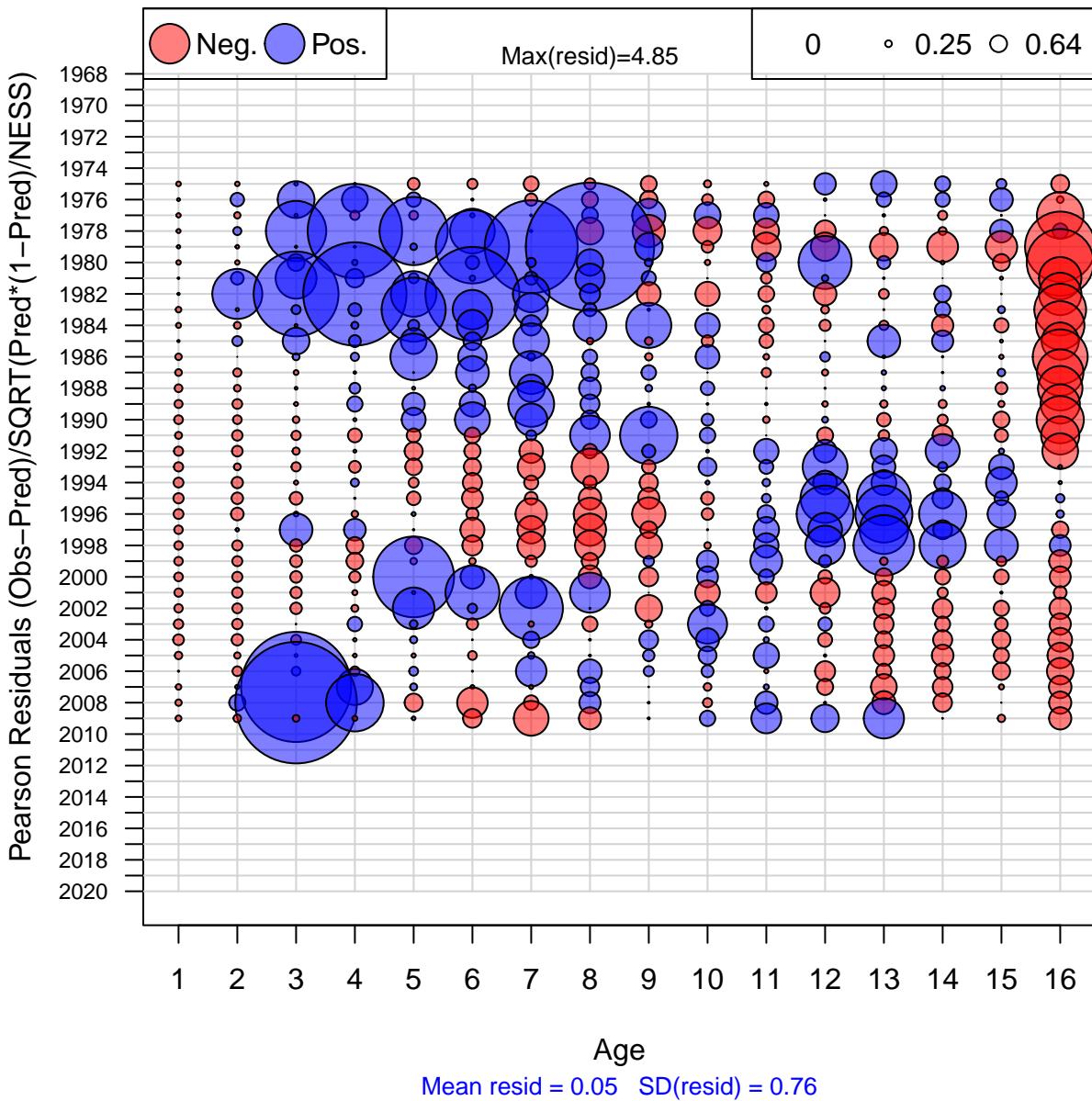
# Age Comp Residuals for Catch by Fleet 2 (Traps)



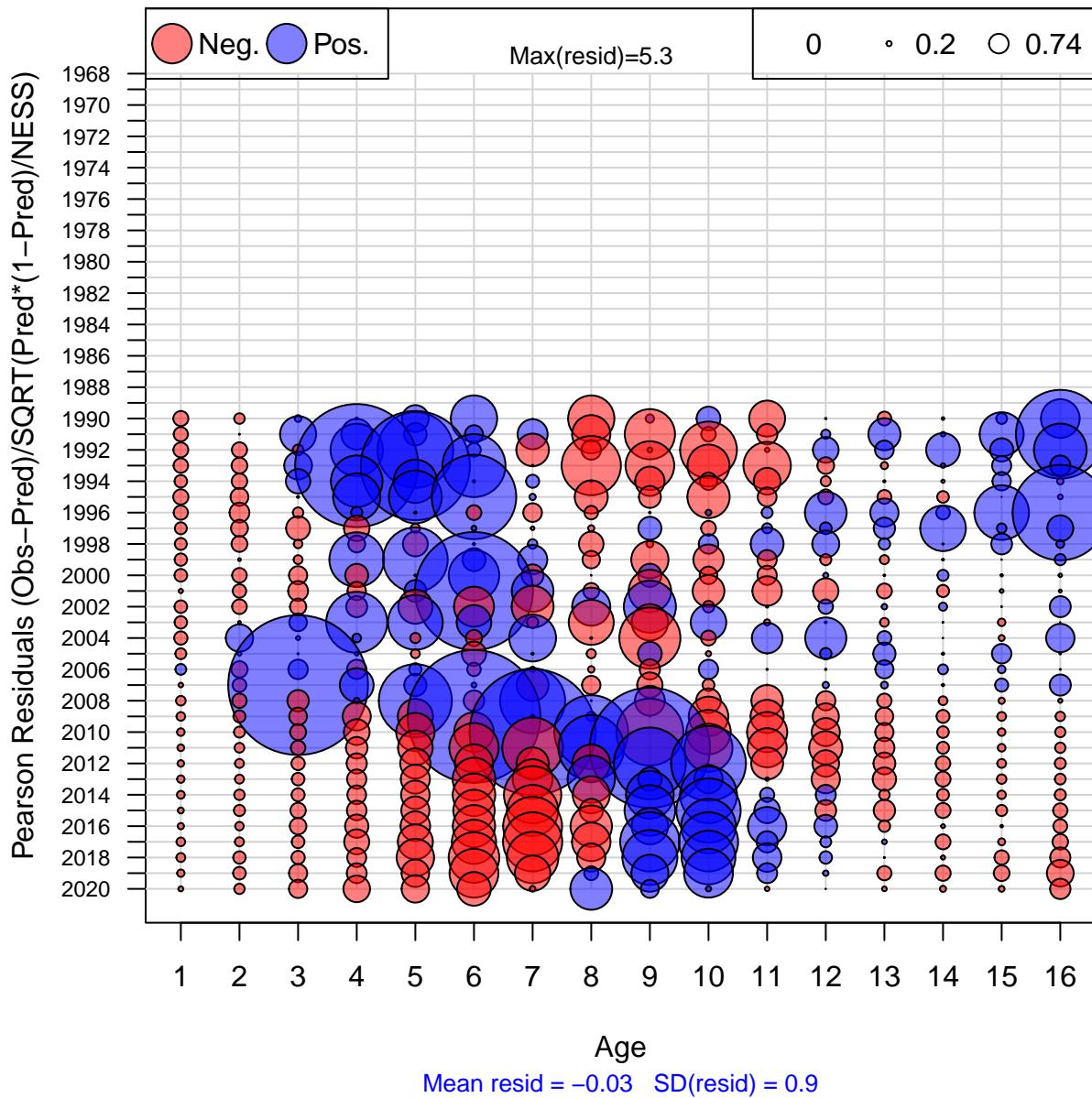
## Age Comp Residuals for Catch by Fleet 3 (BB)



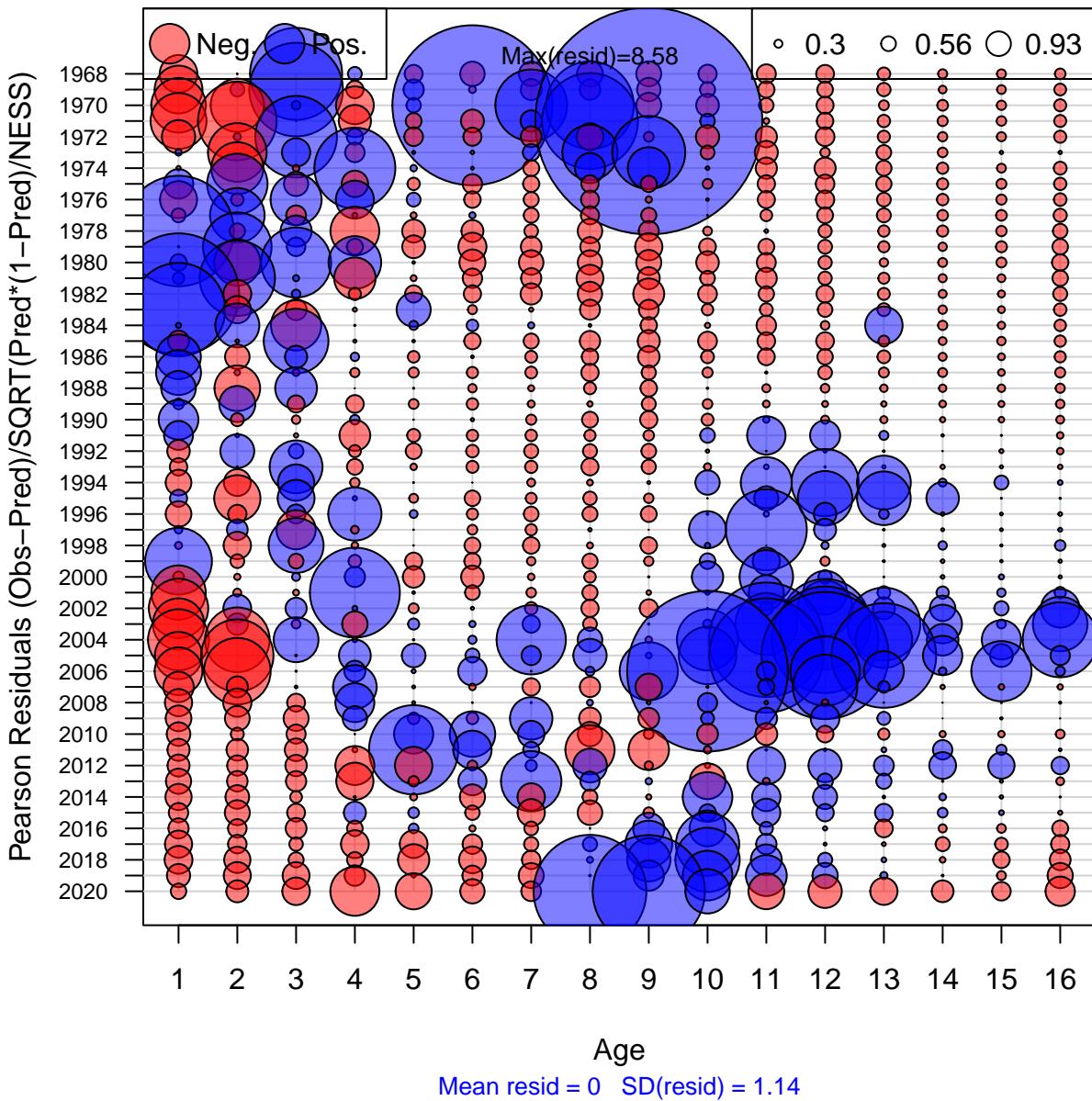
# Age Comp Residuals for Catch by Fleet 4 (JPN\_LL\_EastMed)



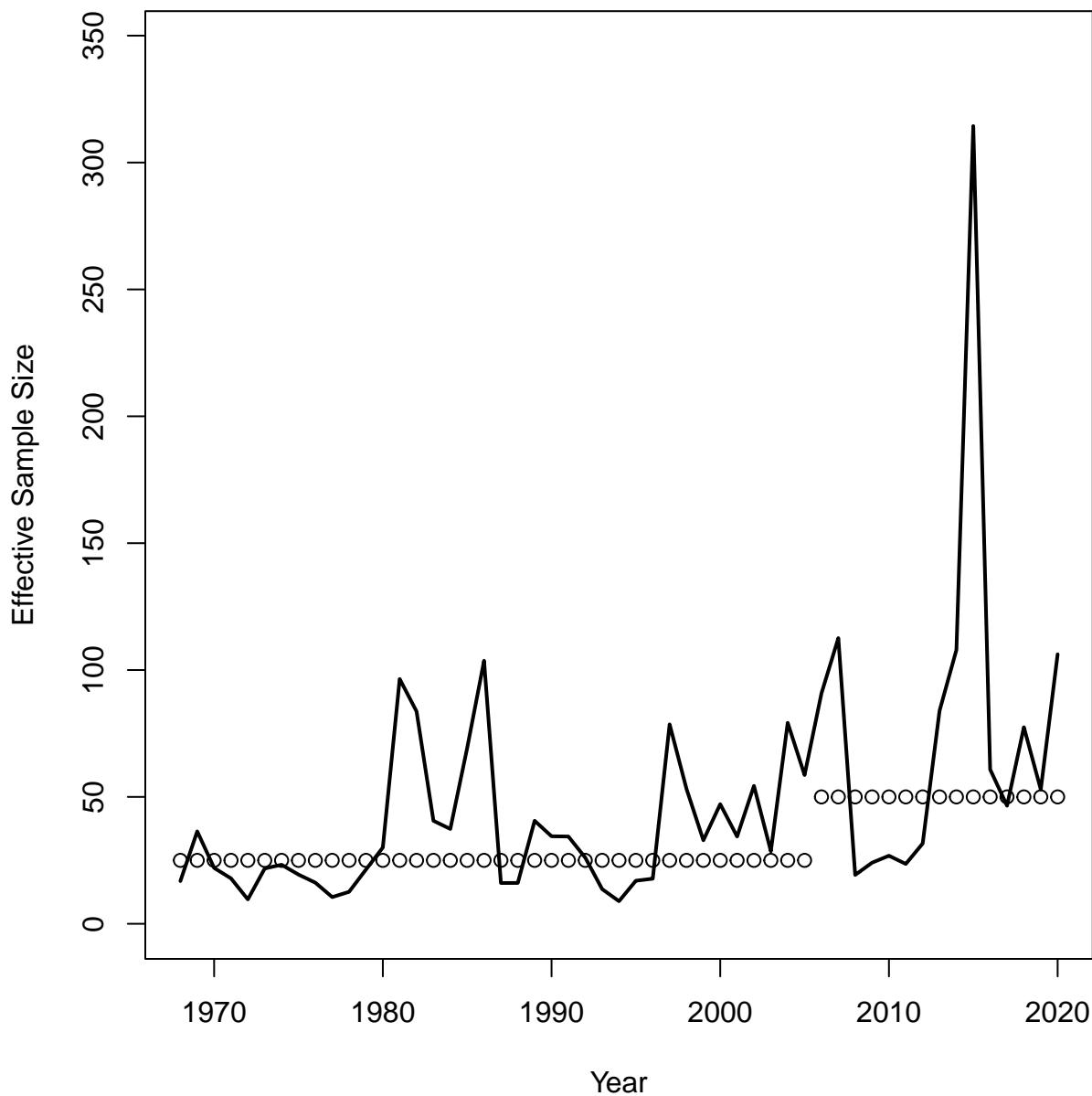
# Age Comp Residuals for Catch by Fleet 5 (JPN\_LL\_NEA)



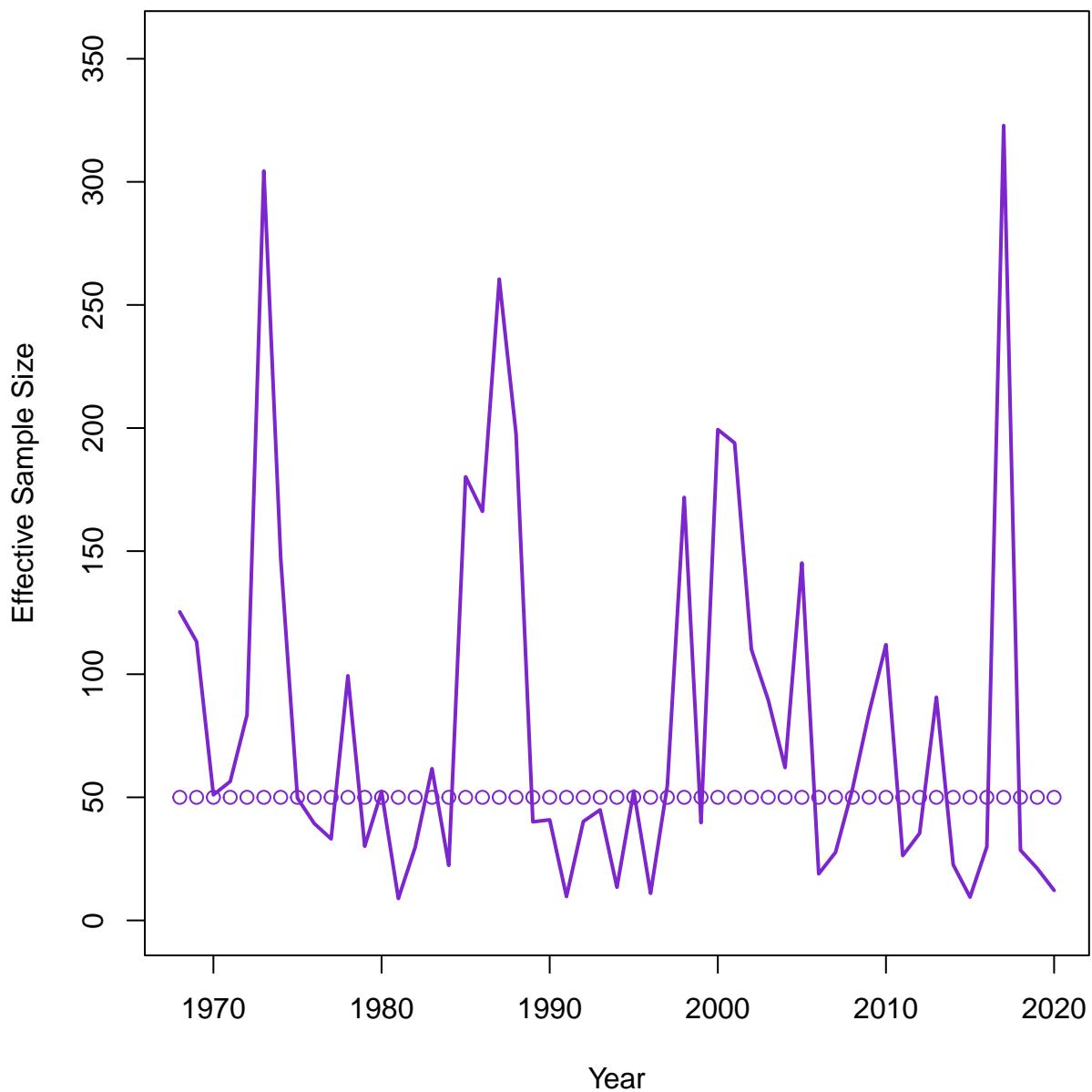
# Age Comp Residuals for Catch by Fleet 6 (PS\_Med)



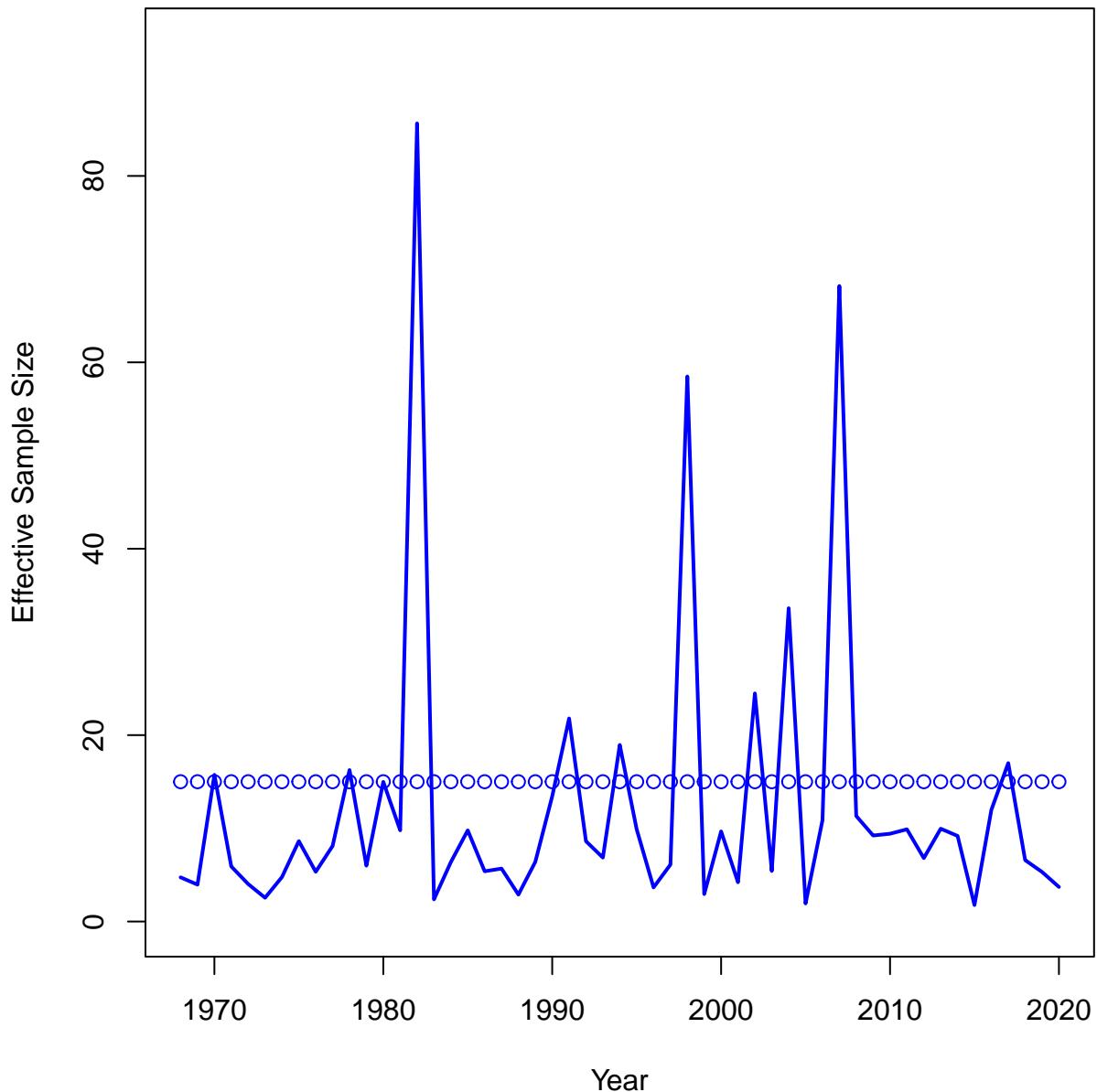
## Catch Neff Fleet 1 (Other)



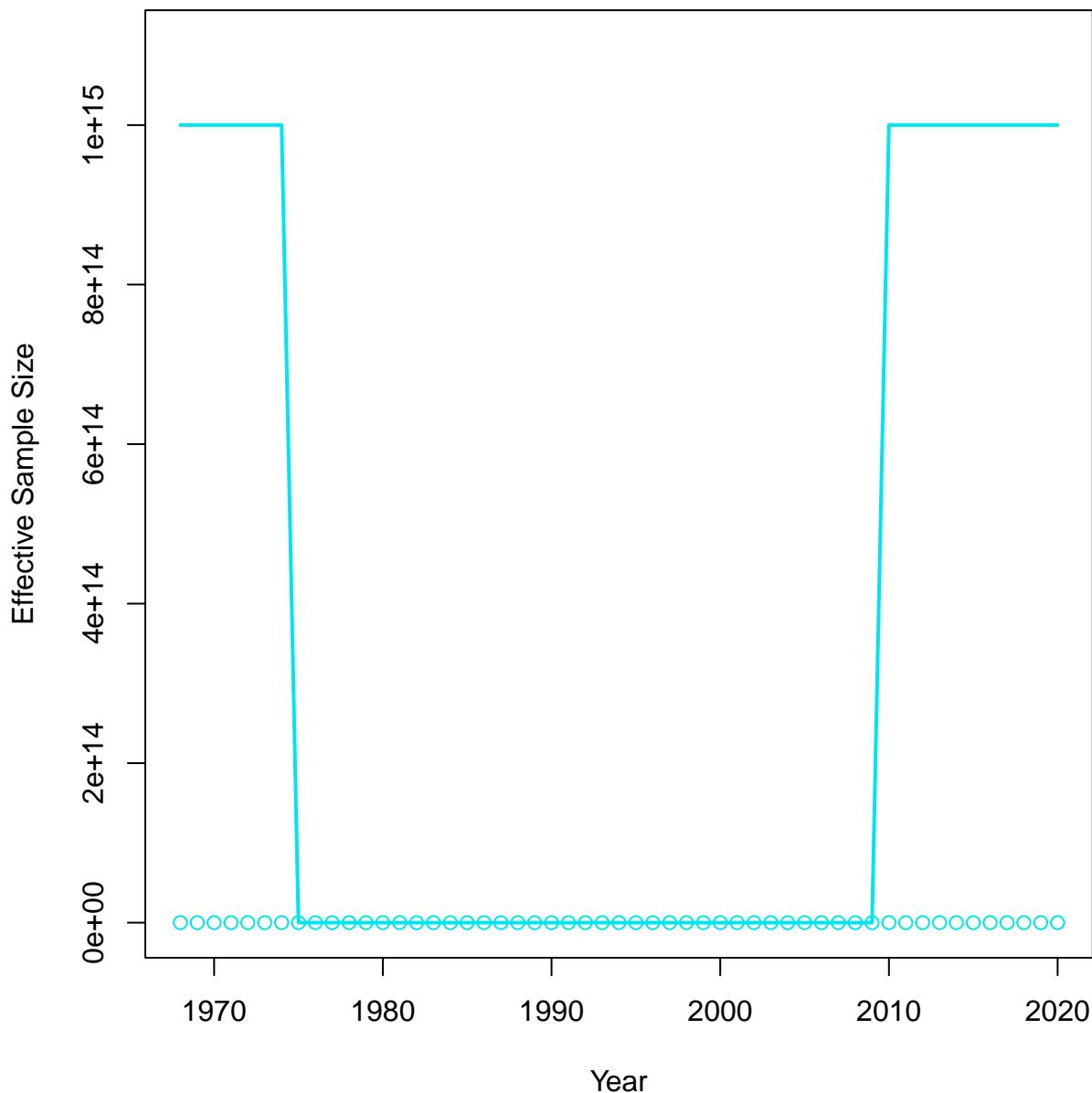
## Catch Neff Fleet 2 (Traps)



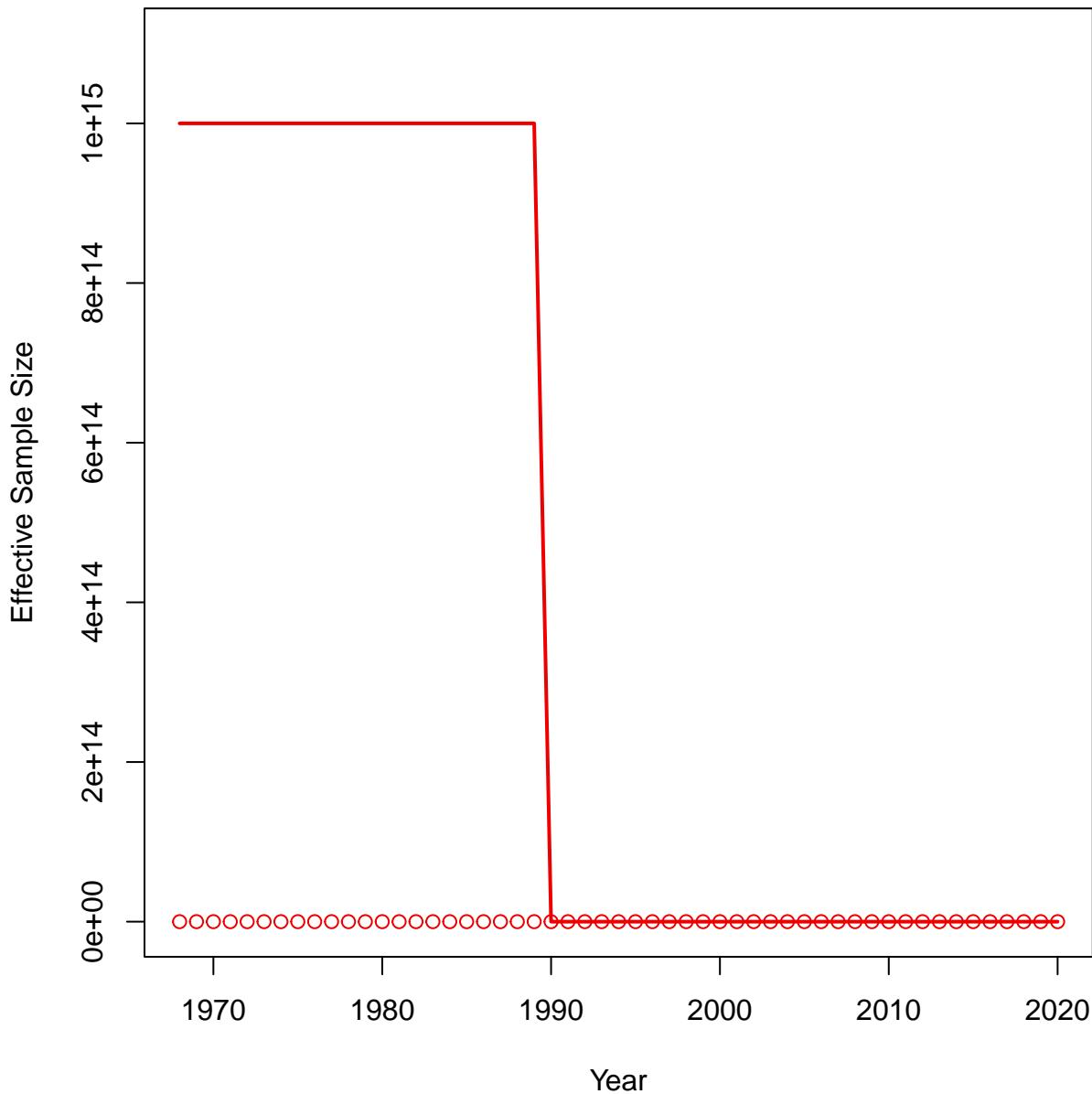
### Catch Neff Fleet 3 (BB)



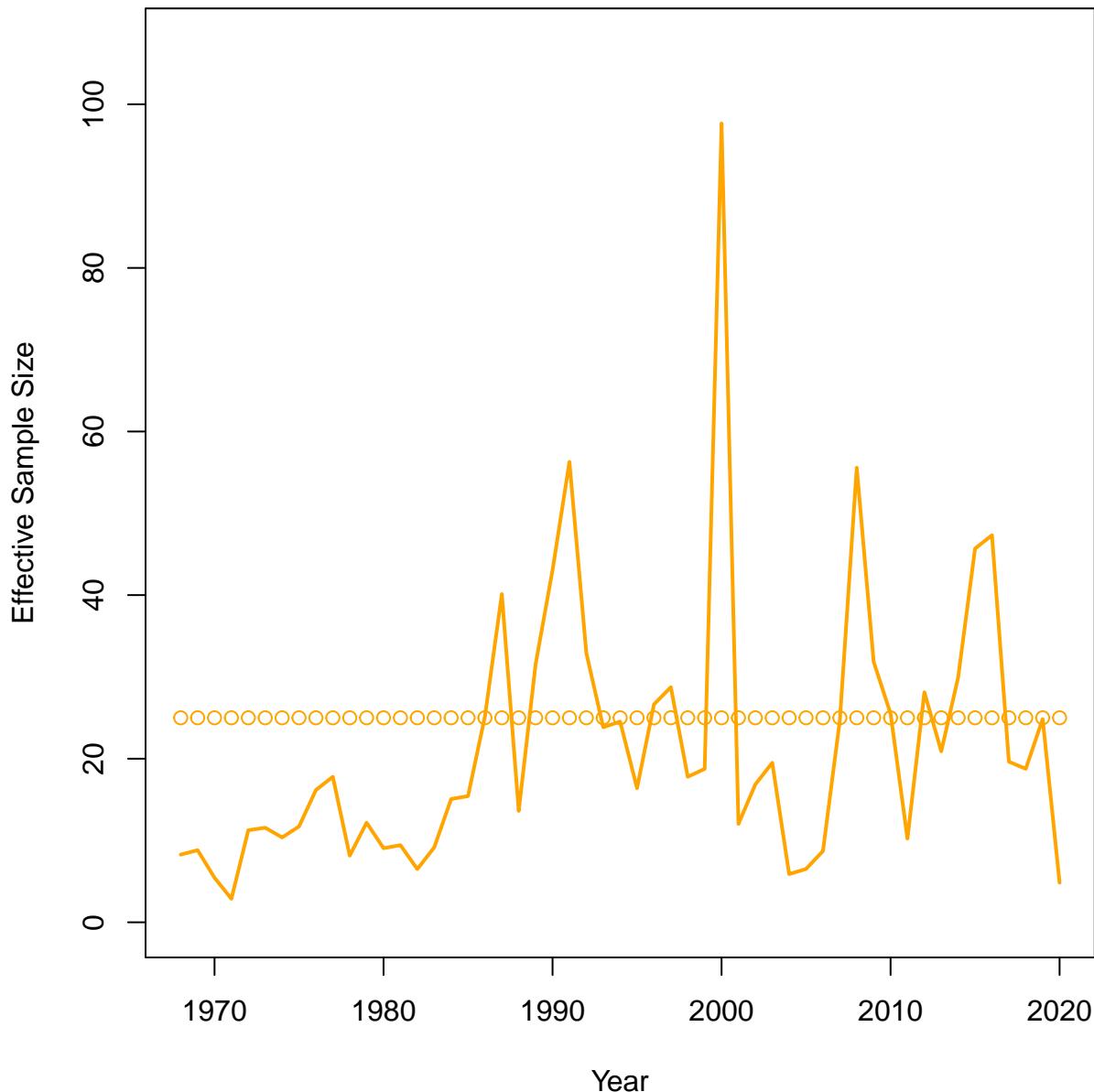
## Catch Neff Fleet 4 (JPN\_LL\_EastMed)



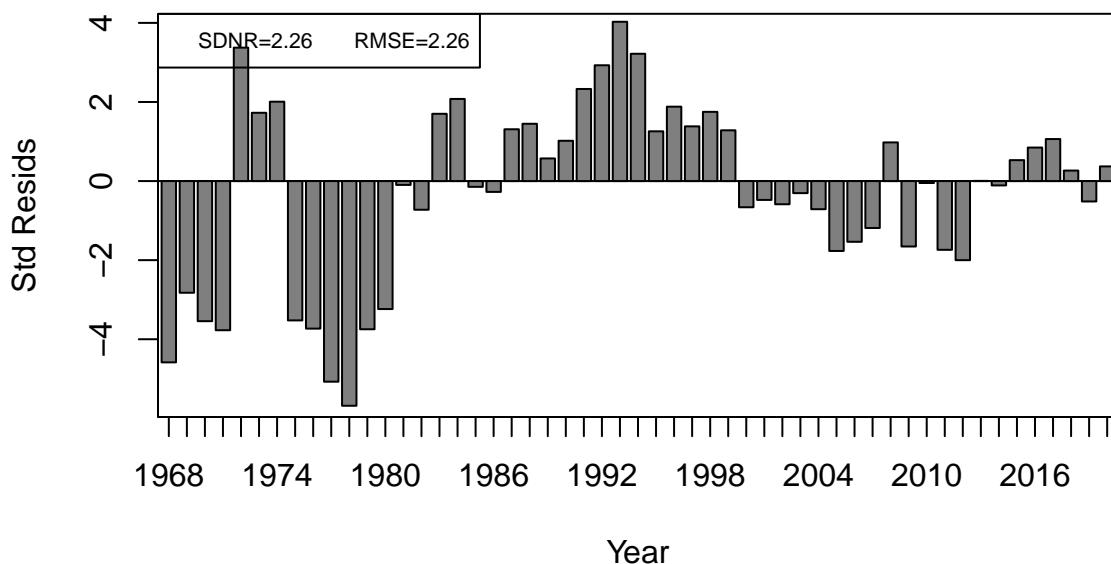
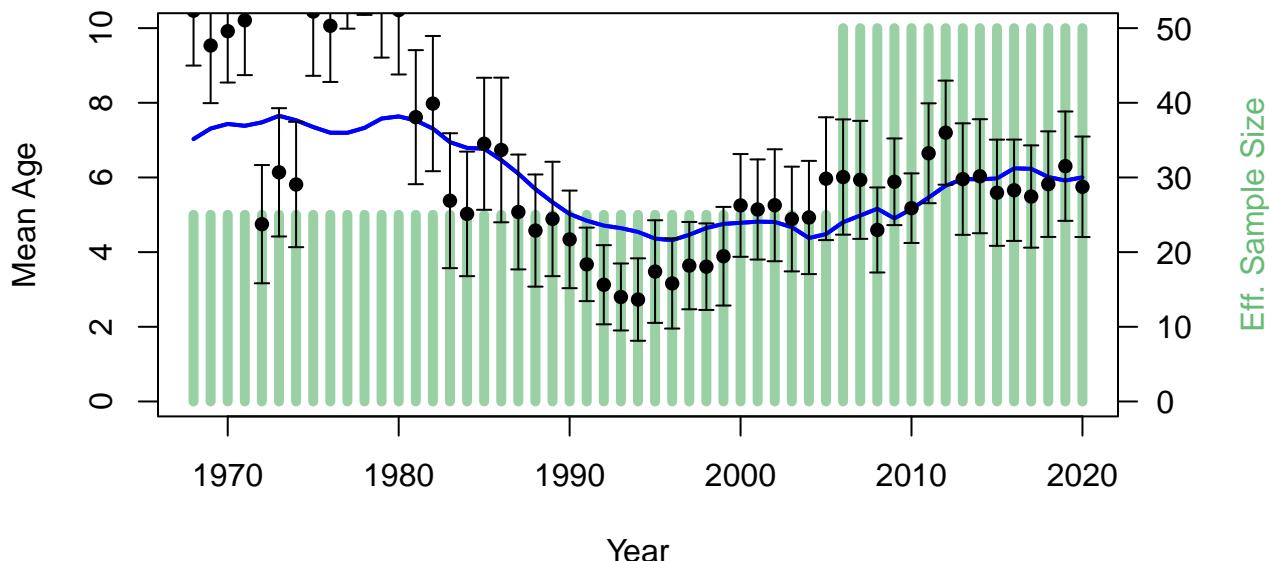
## Catch Neff Fleet 5 (JPN\_LL\_NEA)



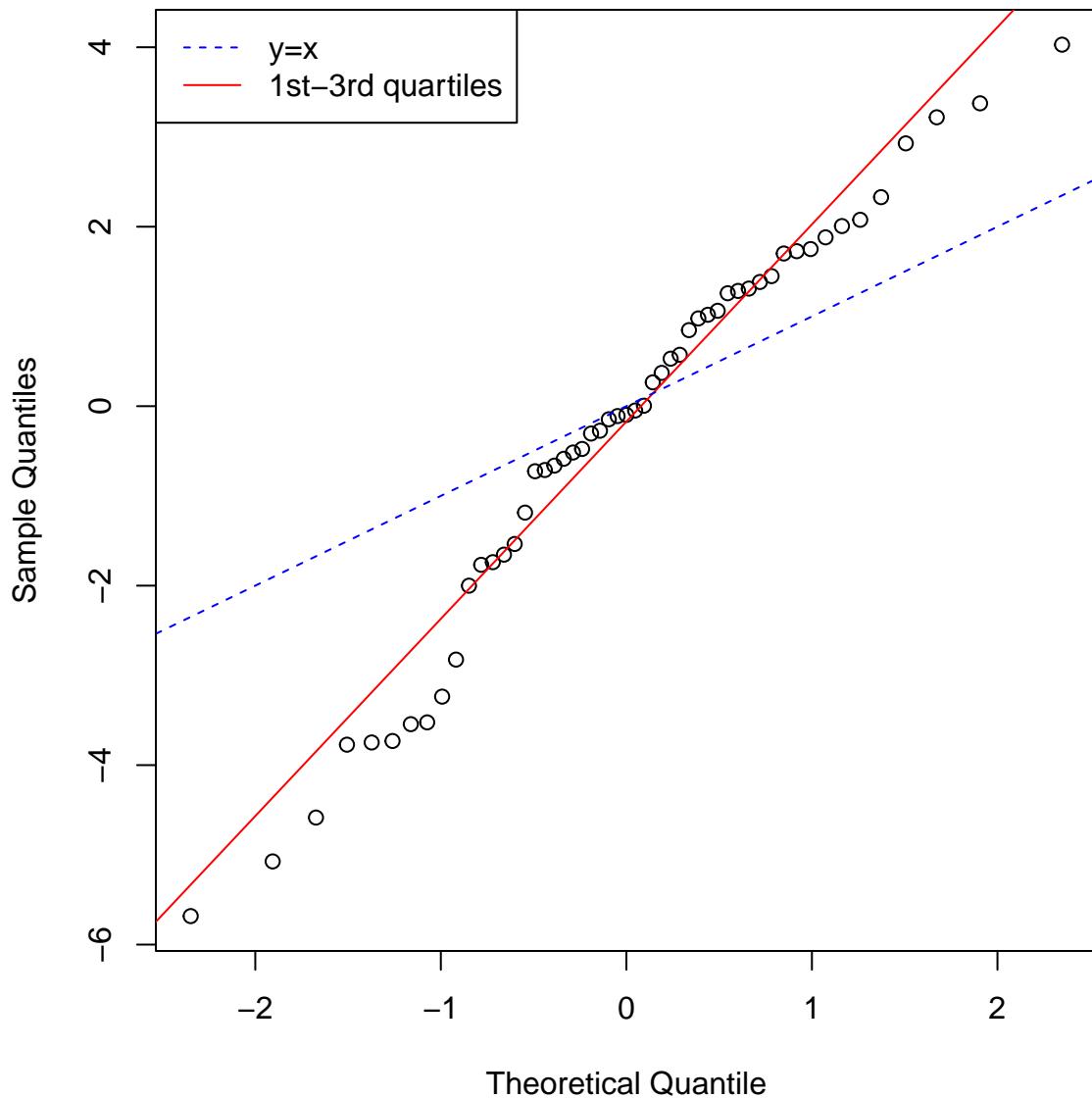
## Catch Neff Fleet 6 (PS\_Med)



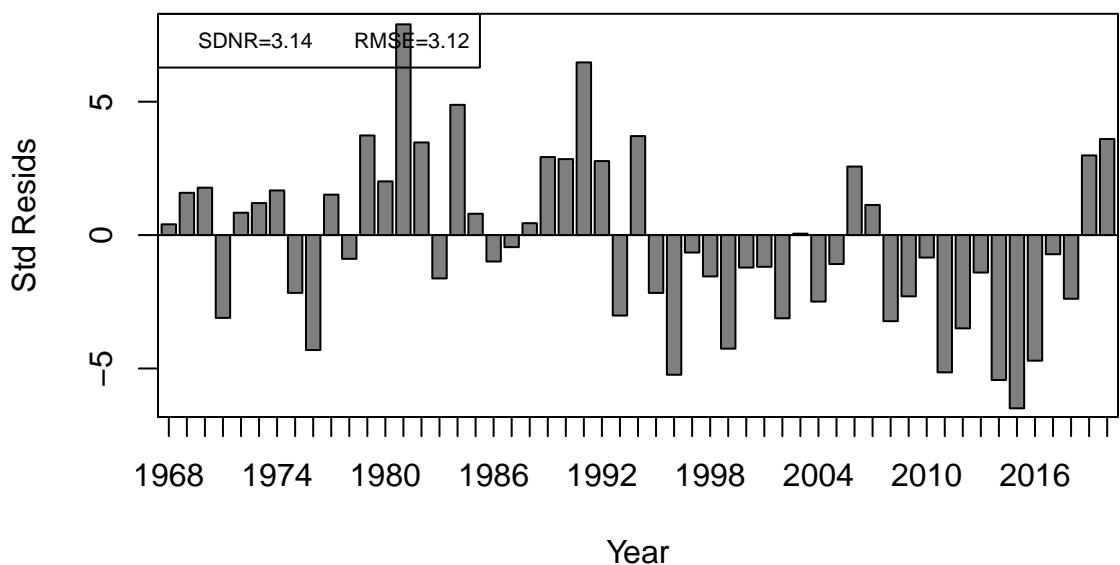
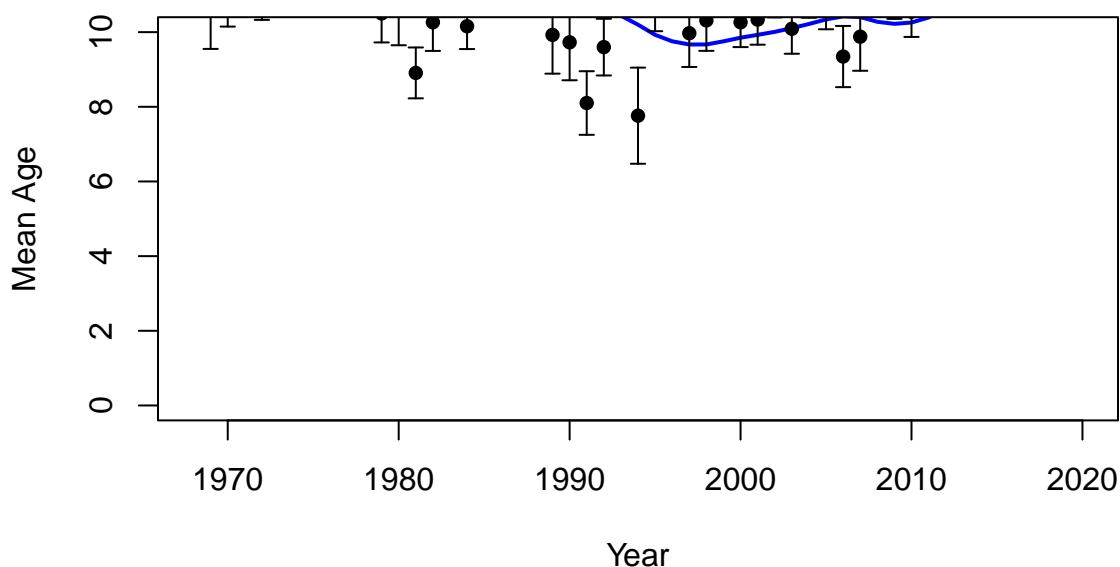
## Catch Fleet 1 (Other)



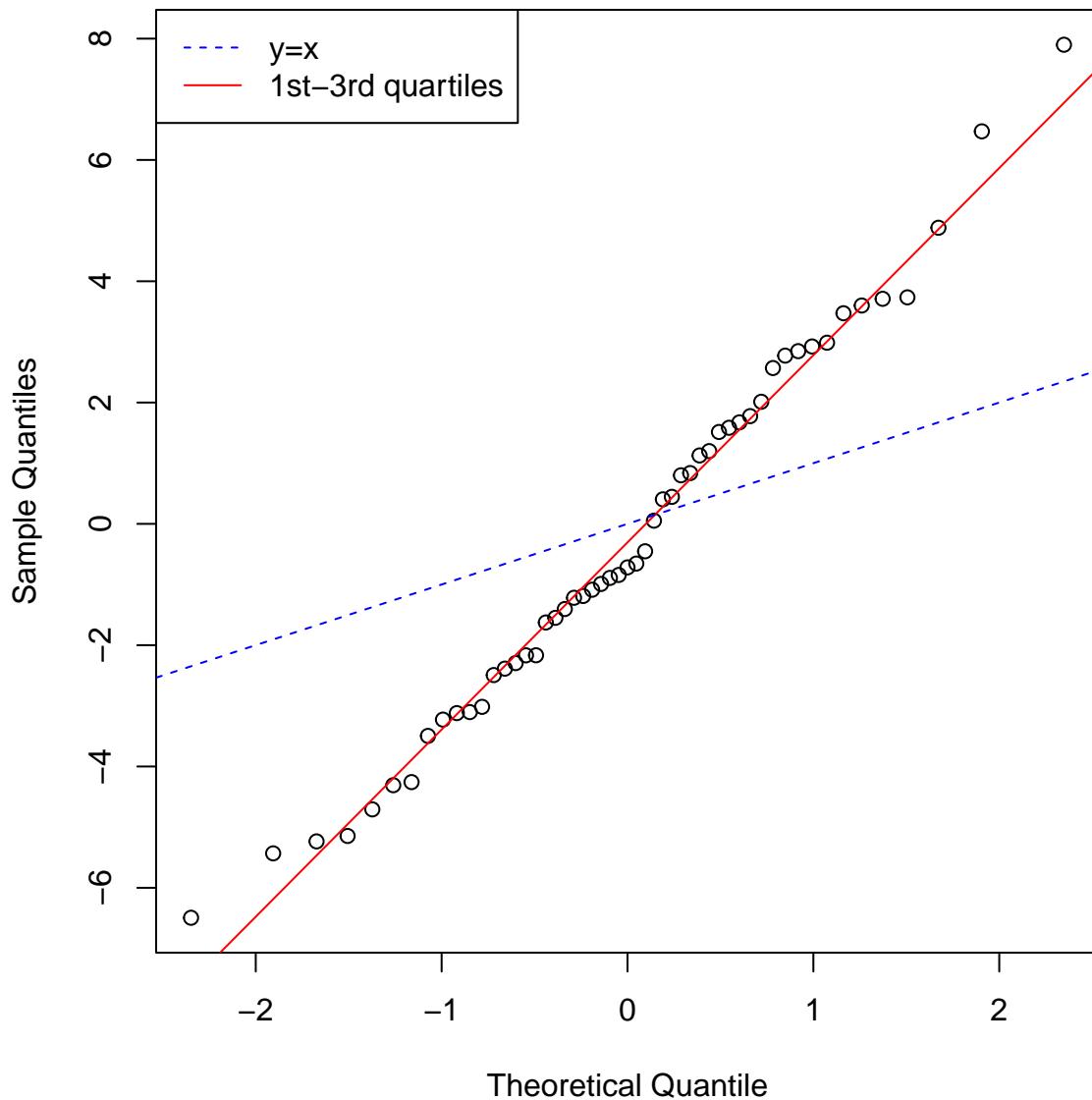
## Catch Fleet 1 (Other)



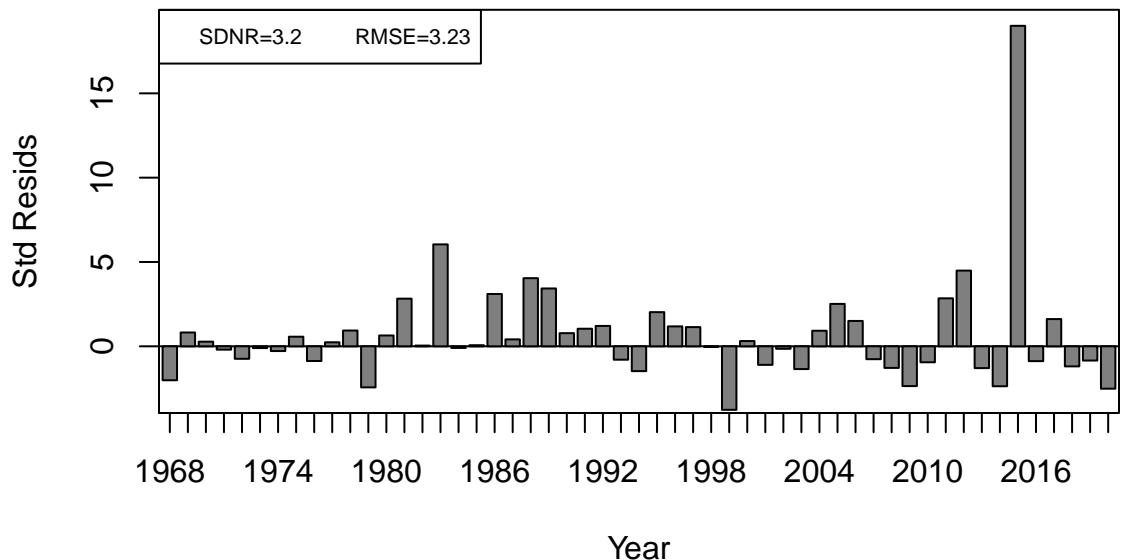
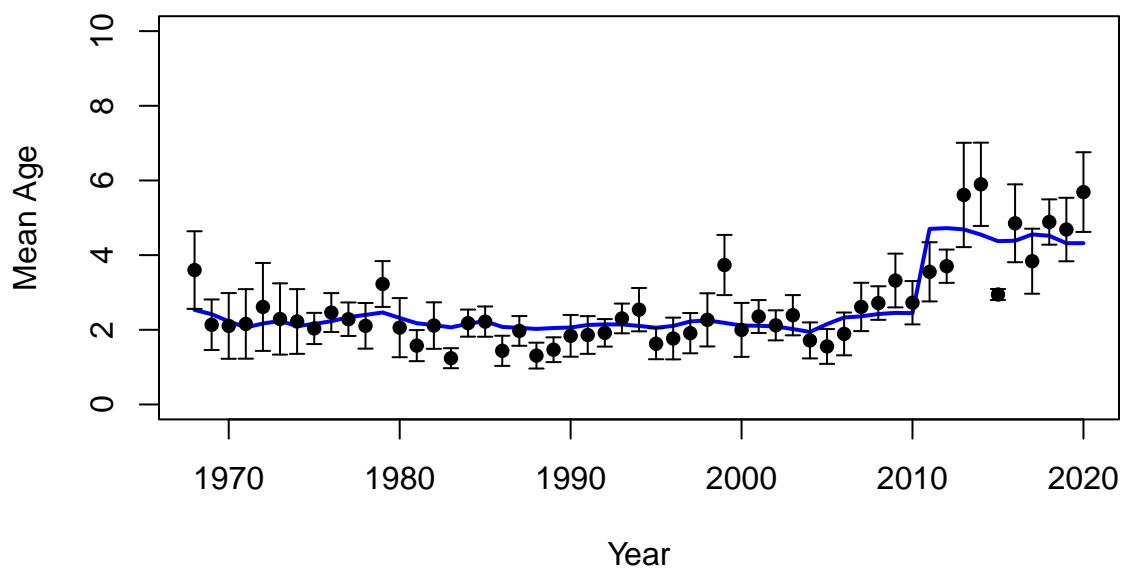
## Catch Fleet 2 (Traps) ESS = 50



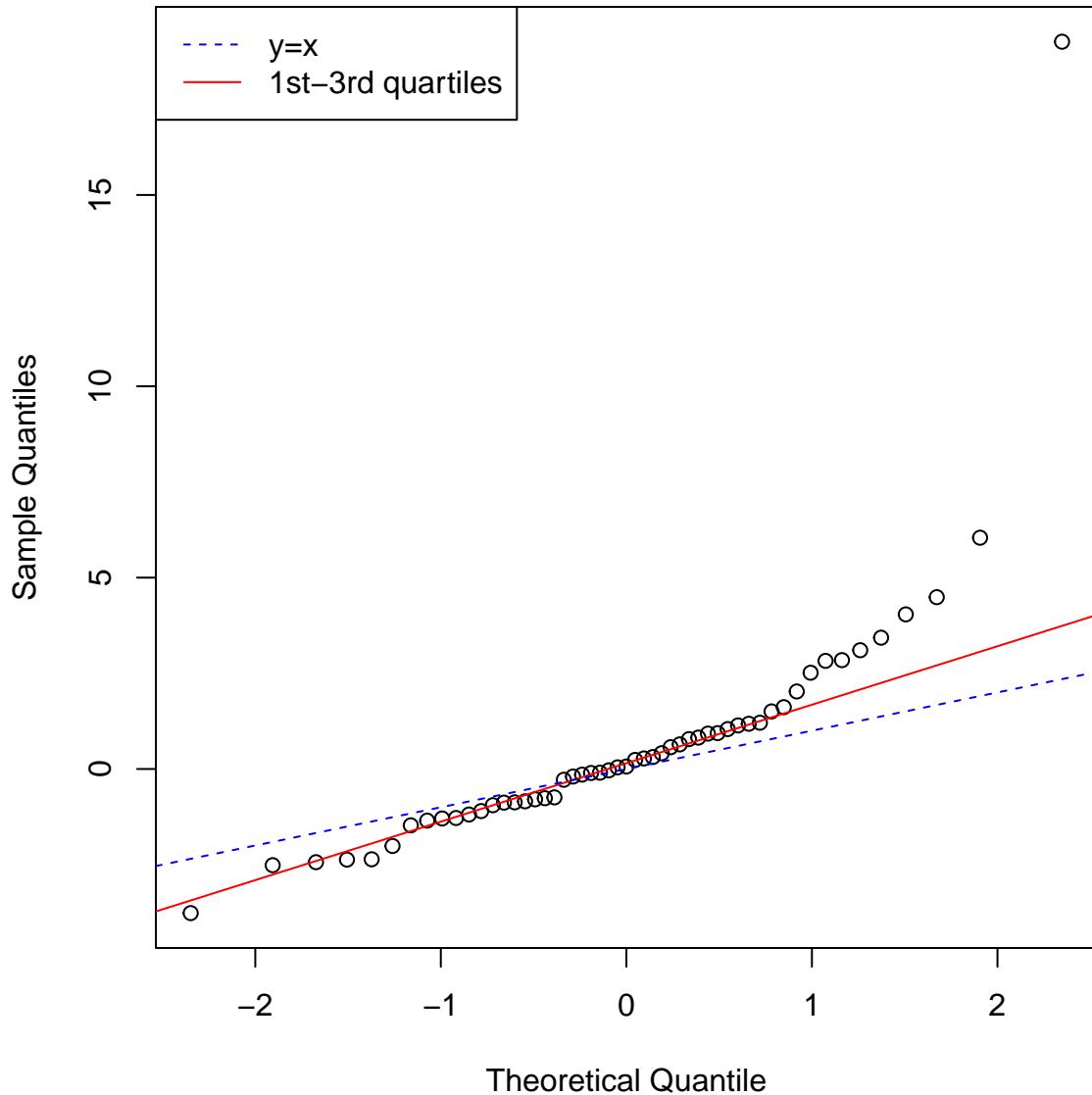
## Catch Fleet 2 (Traps) ESS = 50



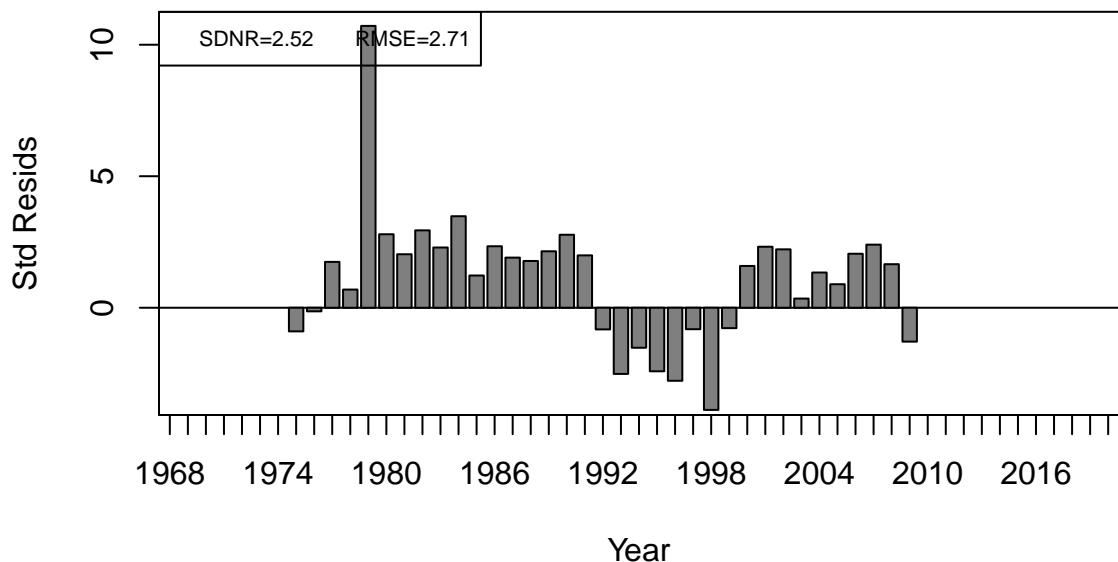
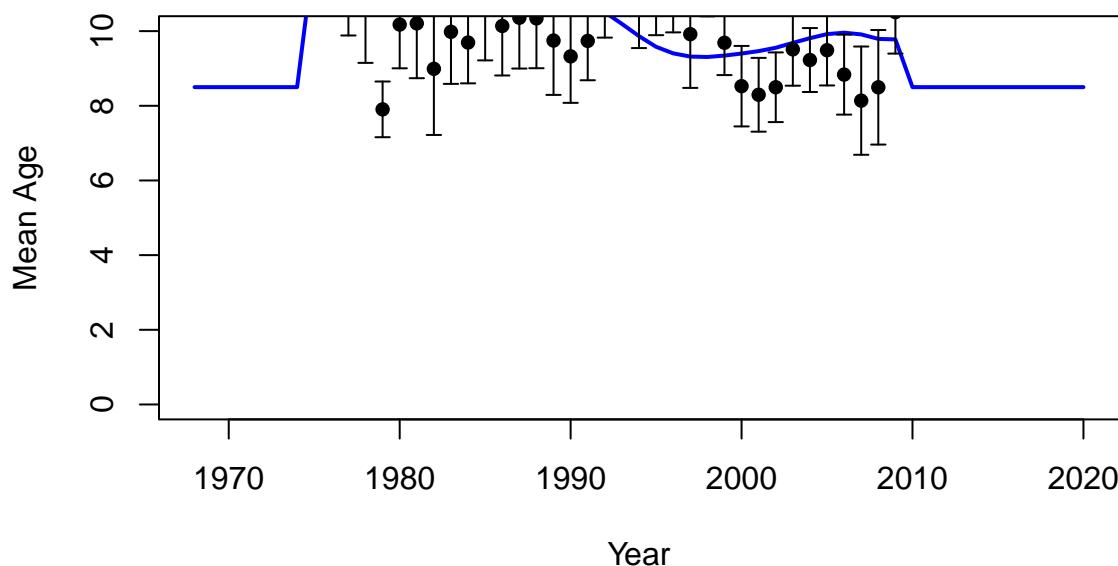
### Catch Fleet 3 (BB) ESS = 15



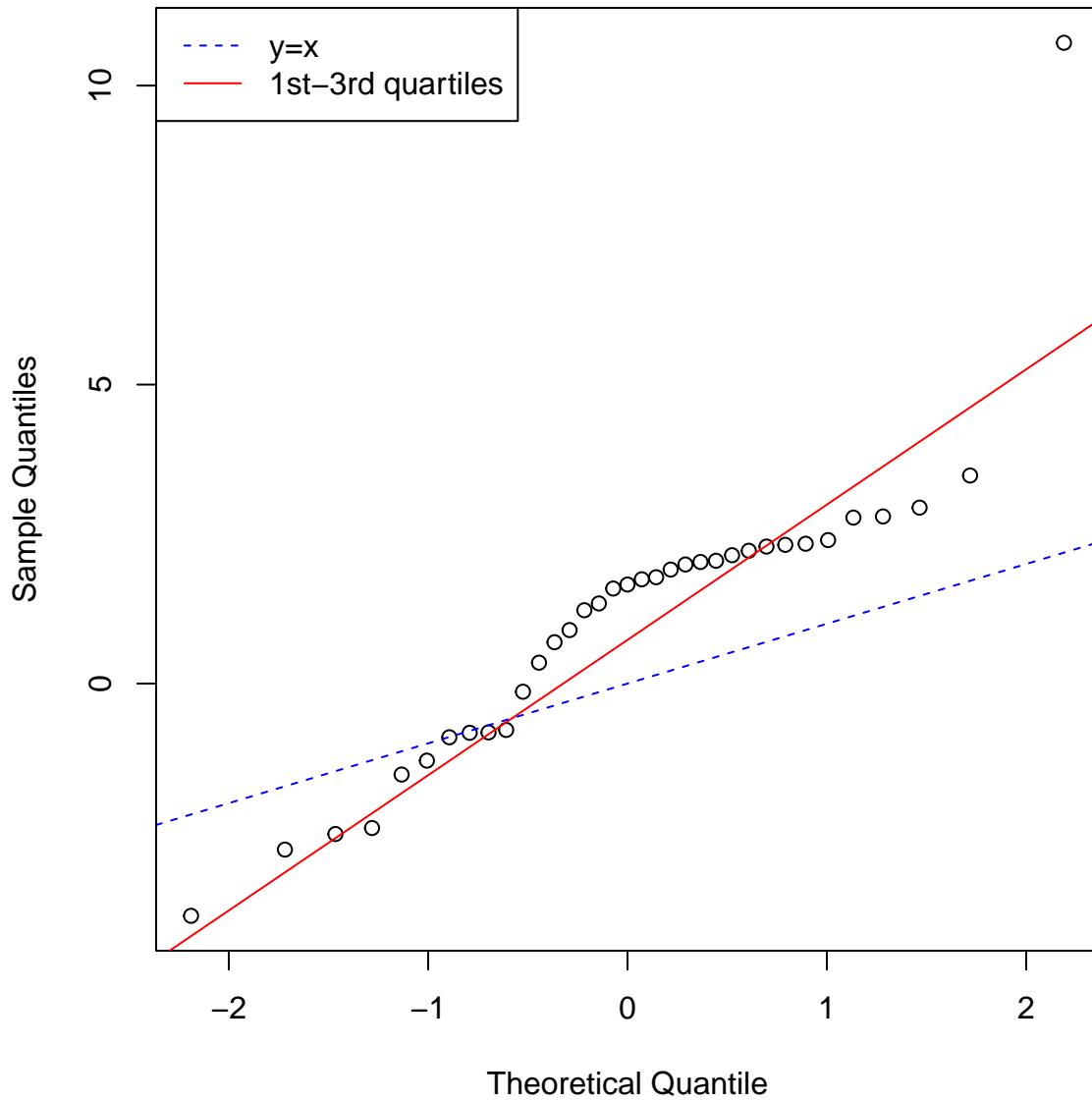
### Catch Fleet 3 (BB) ESS = 15



## Catch Fleet 4 (JPN\_LL\_EastMed) ESS = 20

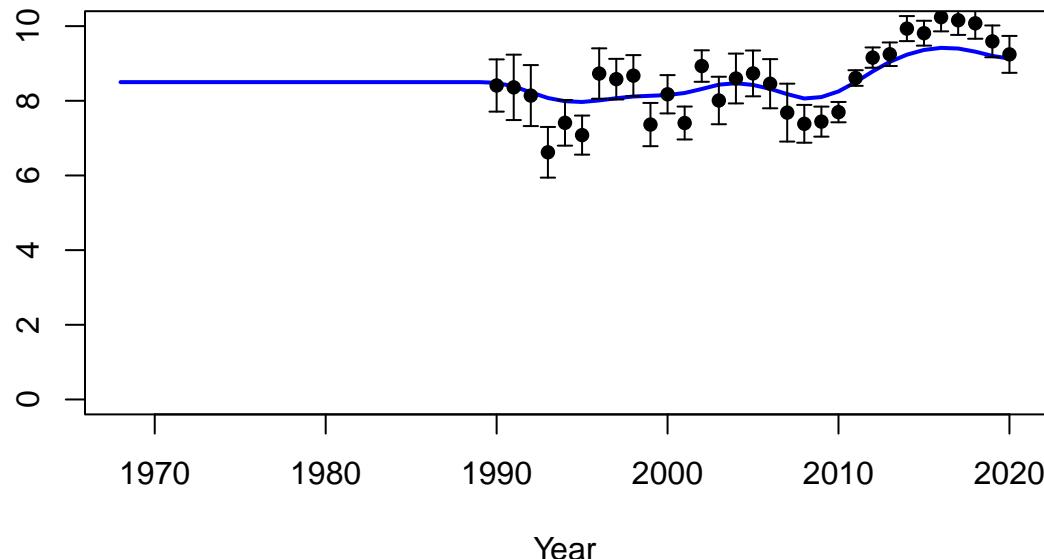


### Catch Fleet 4 (JPN\_LL\_EastMed) ESS = 20



## Catch Fleet 5 (JPN\_LL\_NEA) ESS = 55

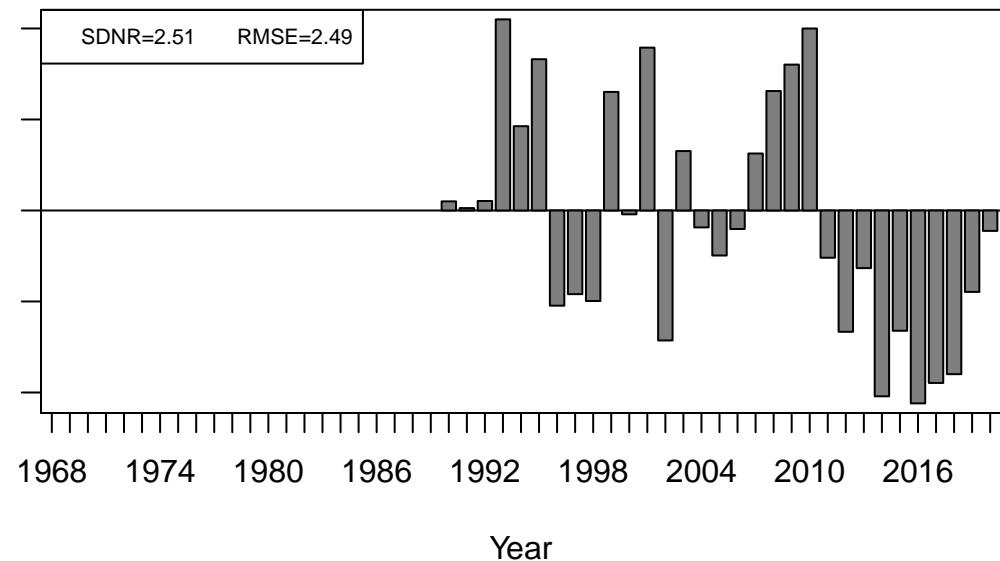
Mean Age



1970 1980 1990 2000 2010 2020

Year

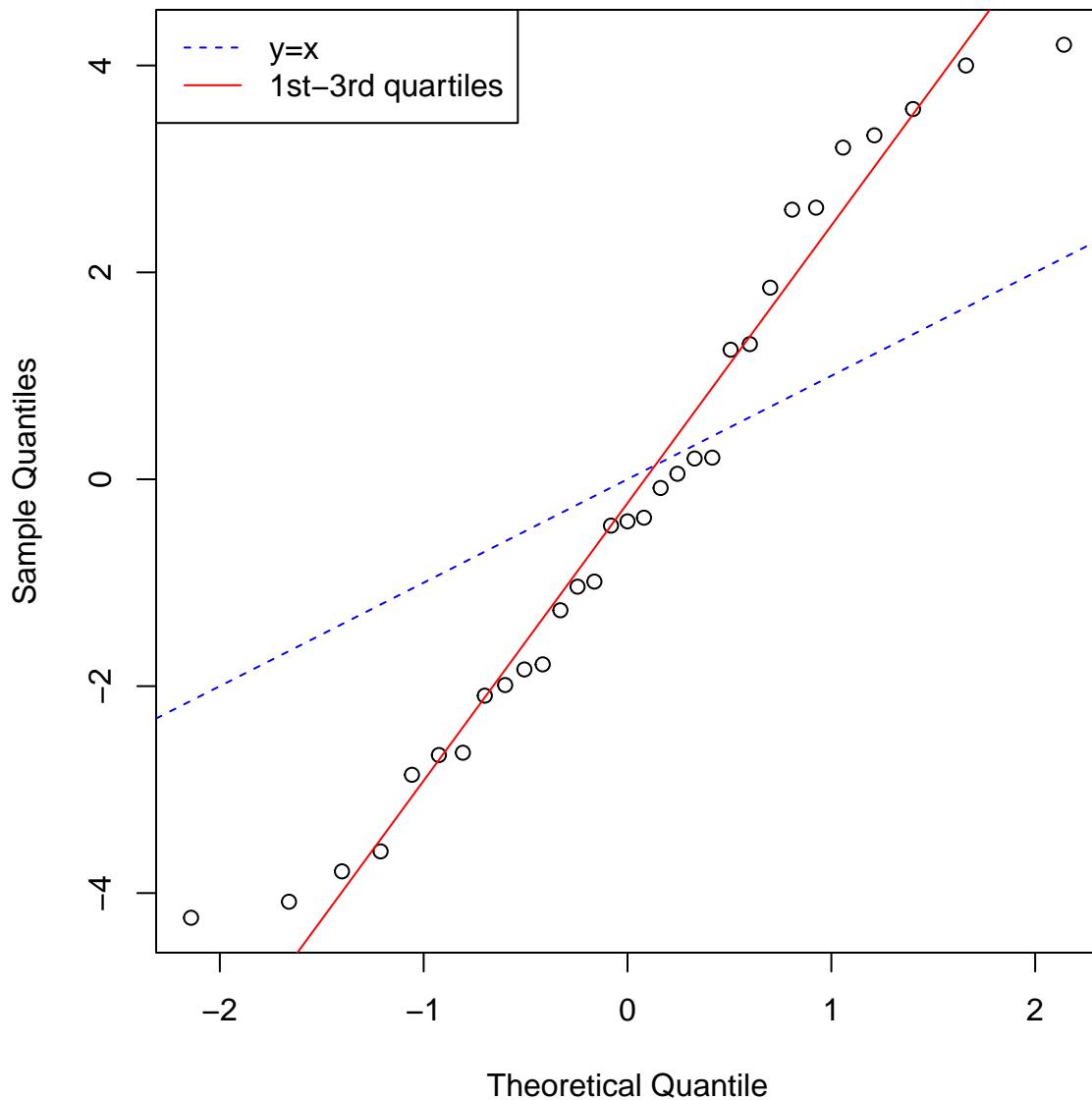
Std Resids



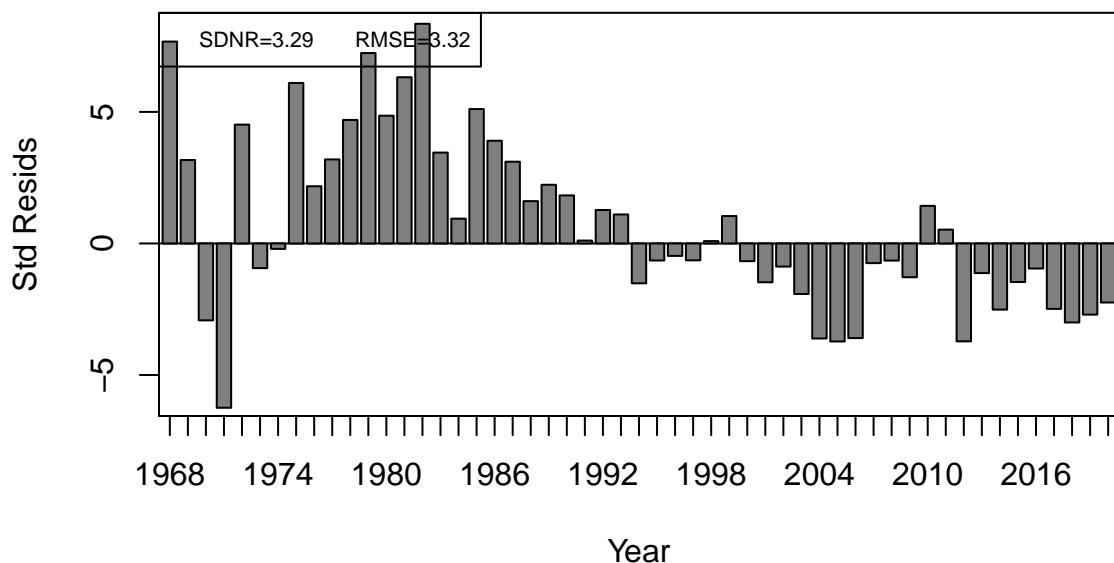
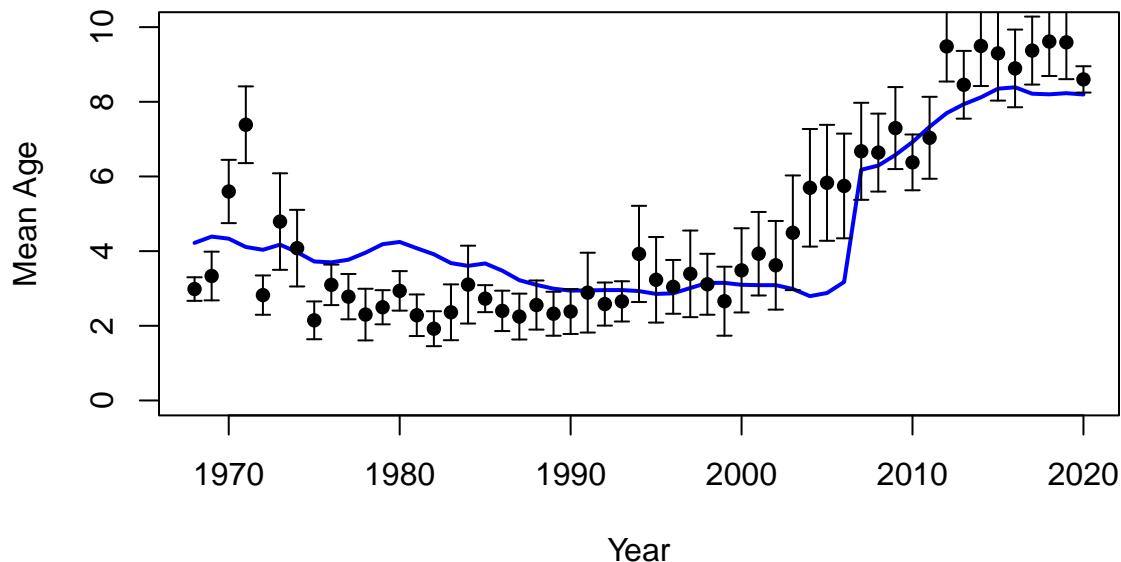
1968 1974 1980 1986 1992 1998 2004 2010 2016

Year

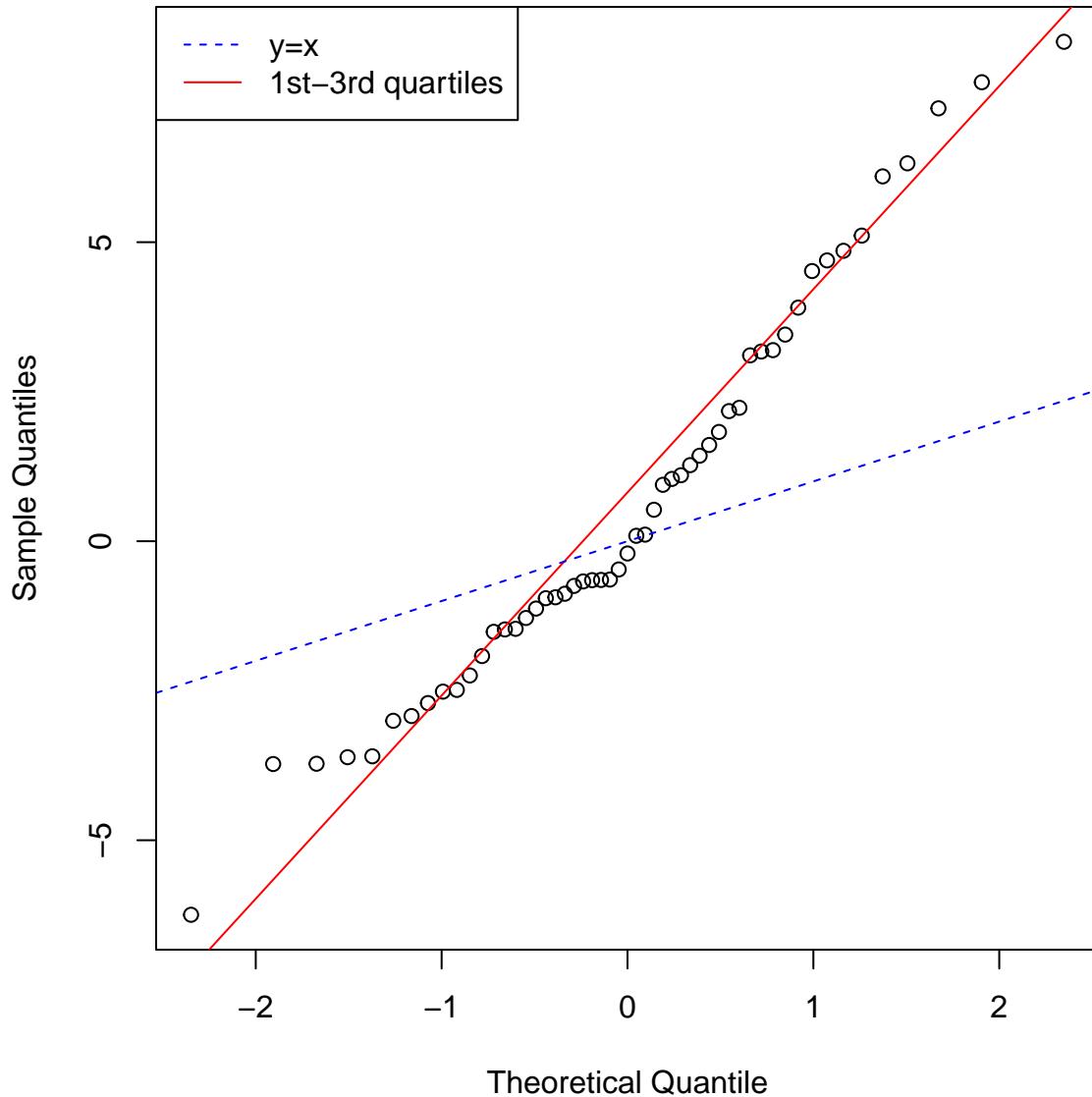
## Catch Fleet 5 (JPN\_LL\_NEA) ESS = 55



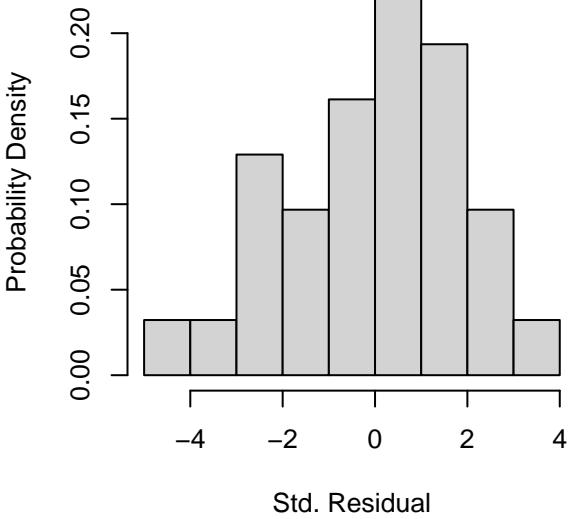
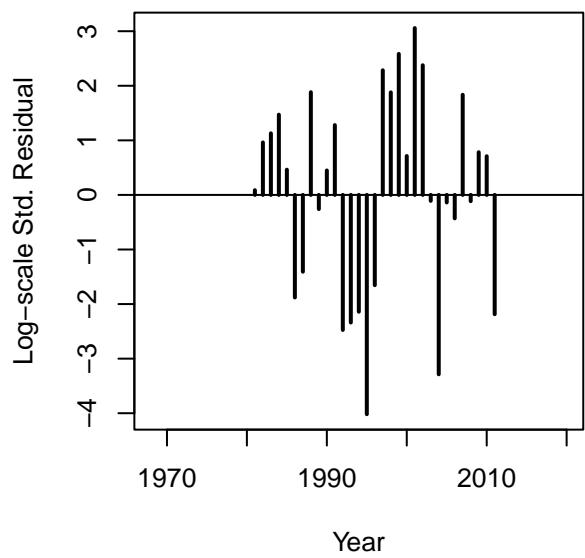
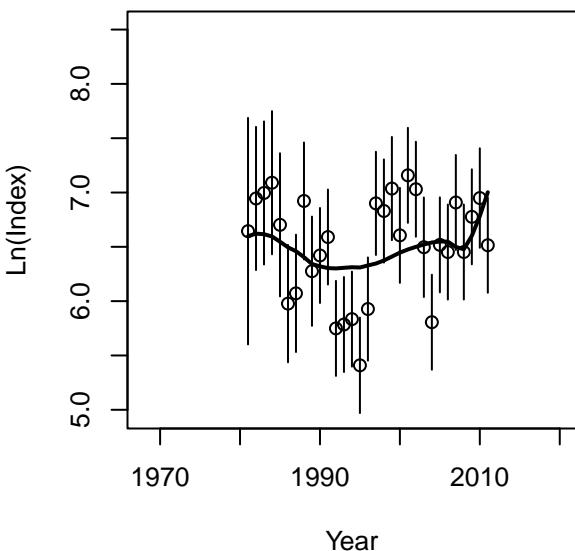
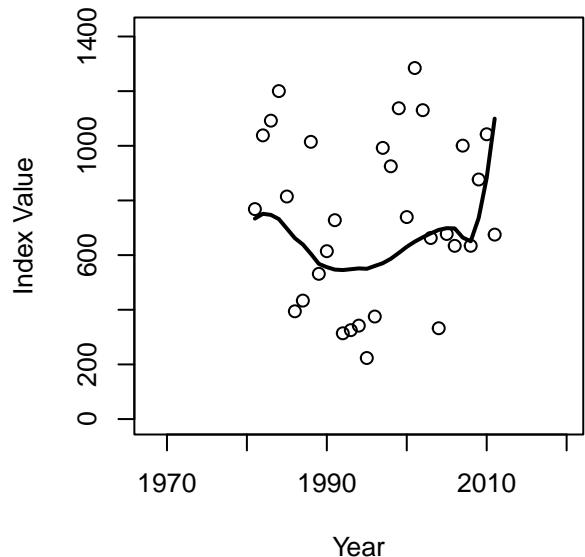
### Catch Fleet 6 (PS\_Med) ESS = 25



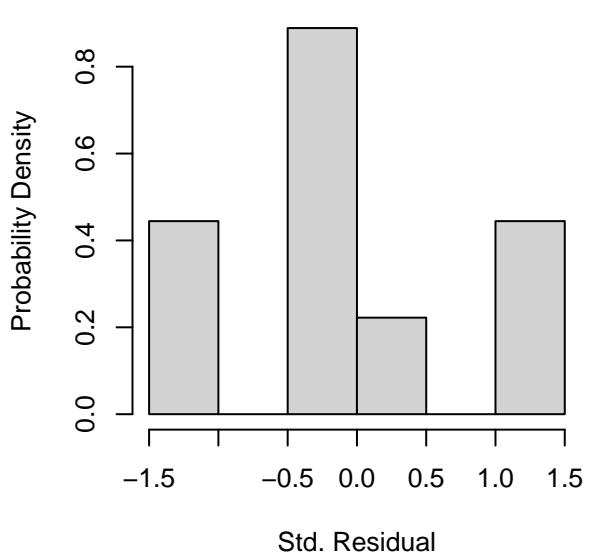
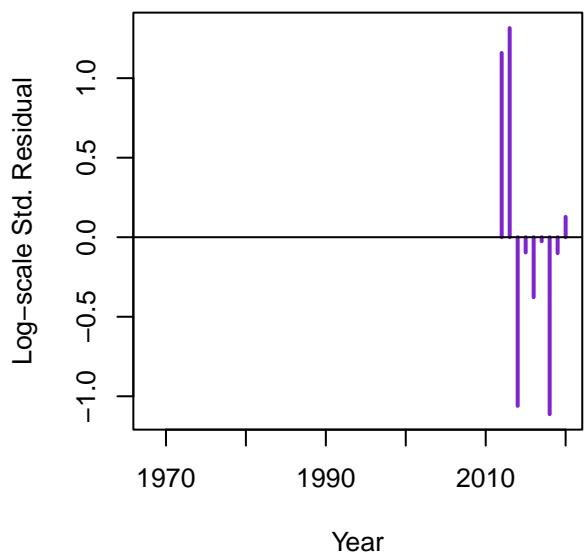
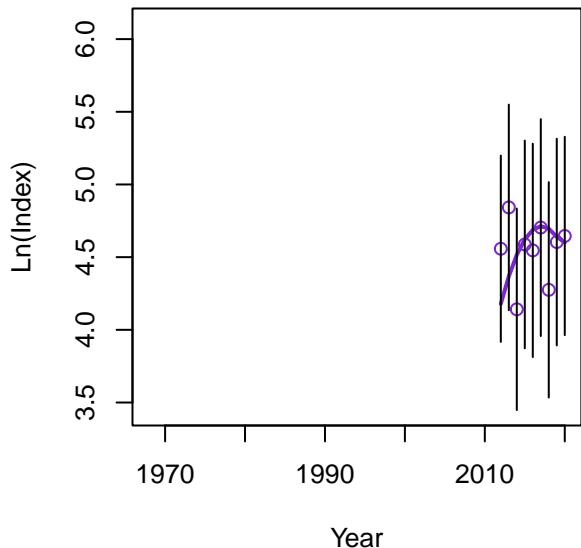
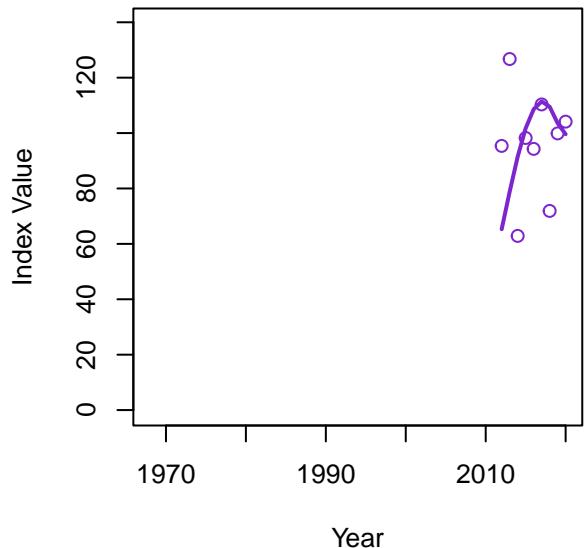
## Catch Fleet 6 (PS\_Med) ESS = 25



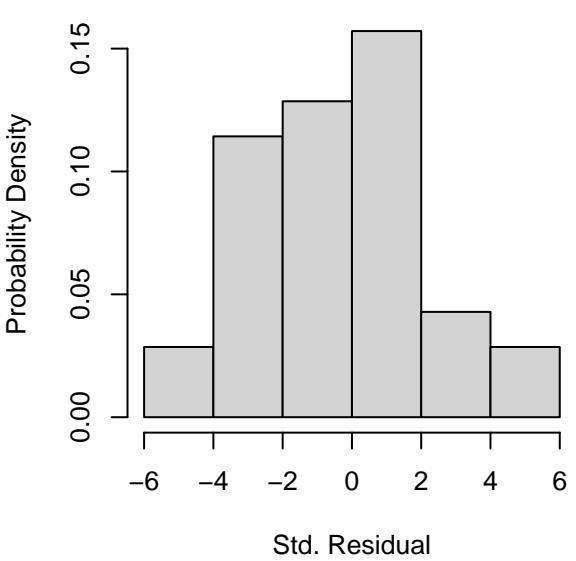
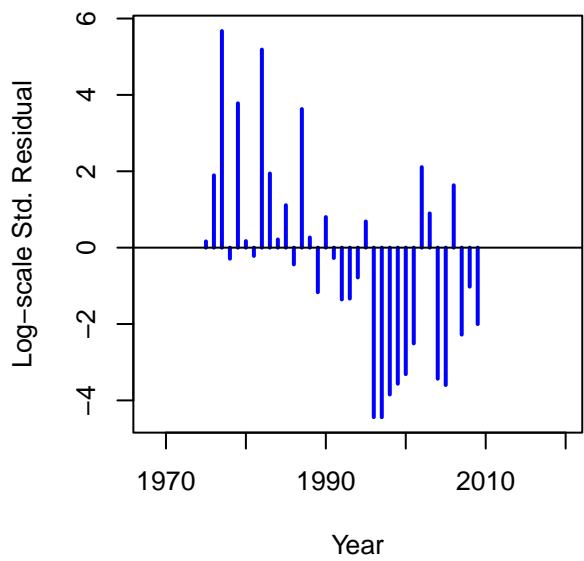
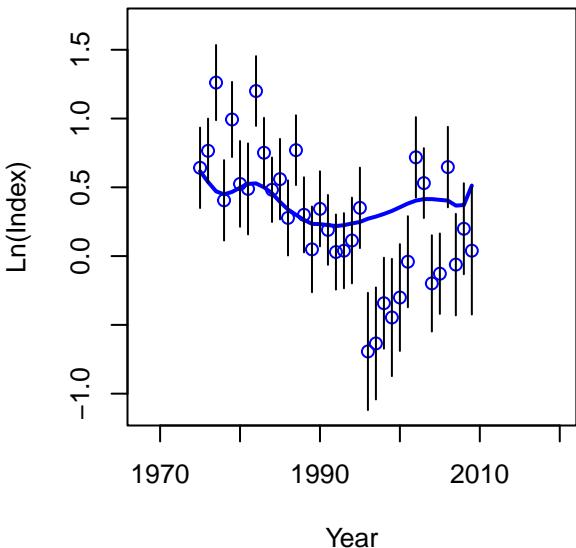
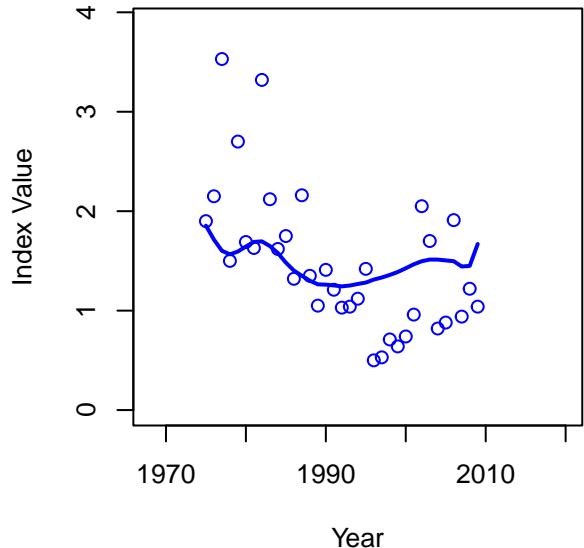
**Index 1 (Mor\_SP\_TP)**



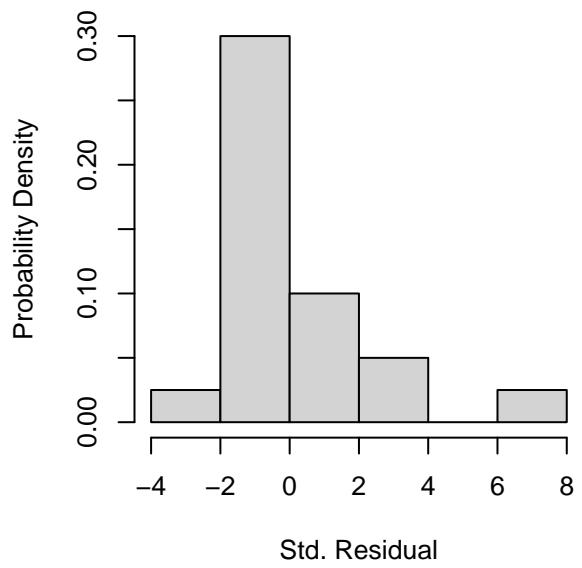
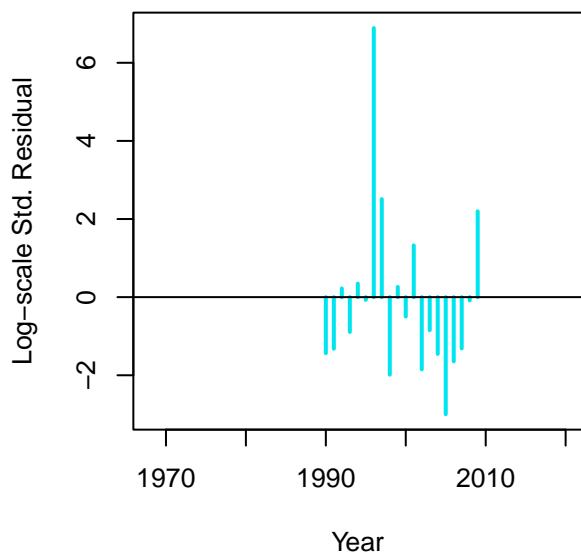
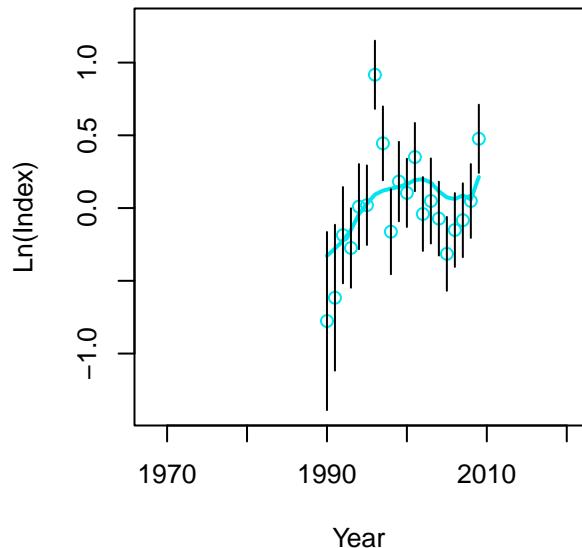
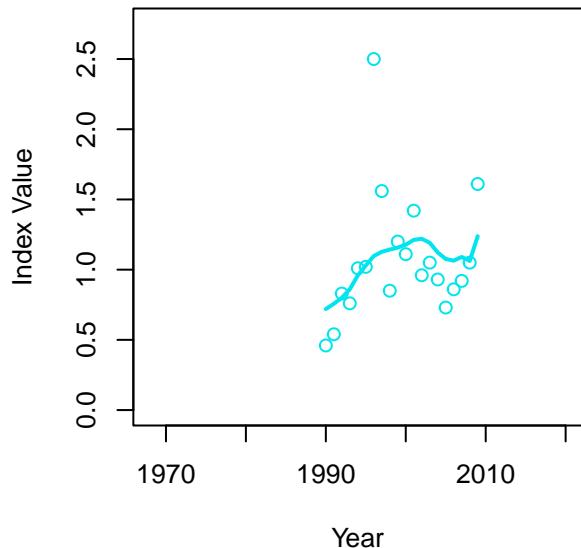
## Index 2 (Mor\_POR\_TP)



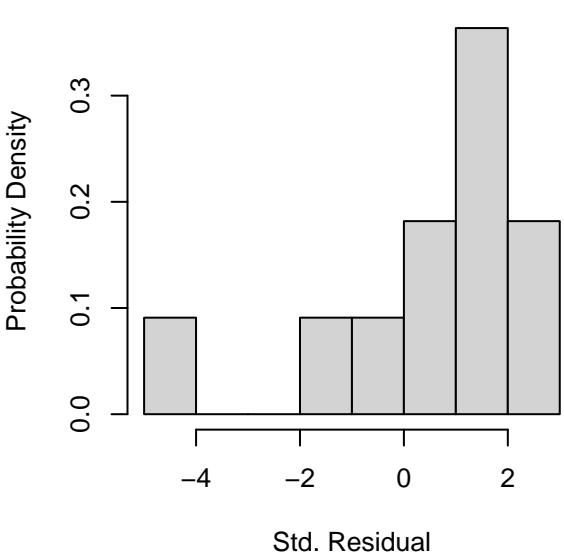
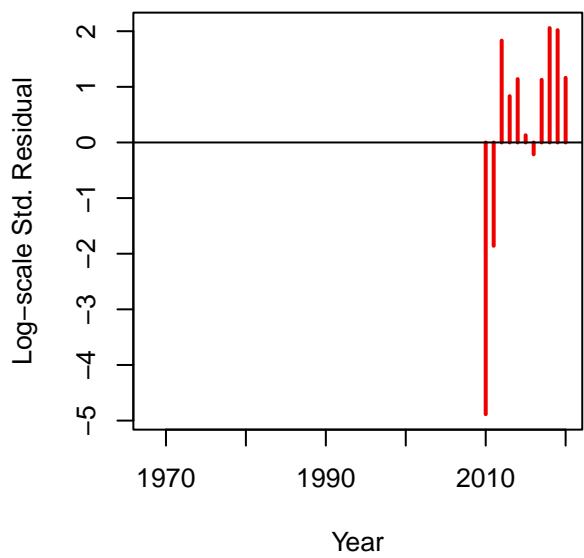
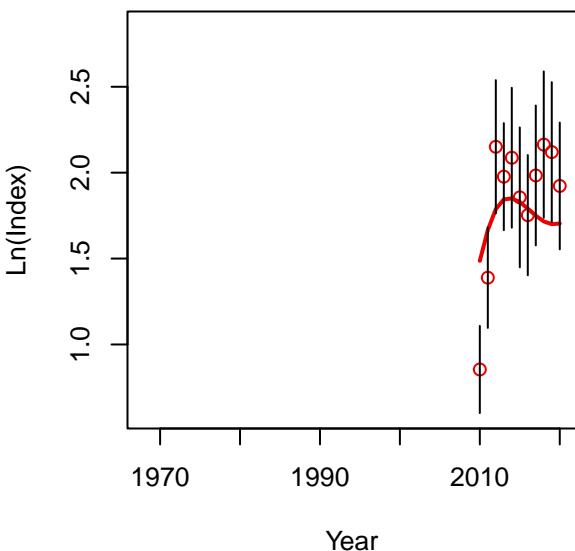
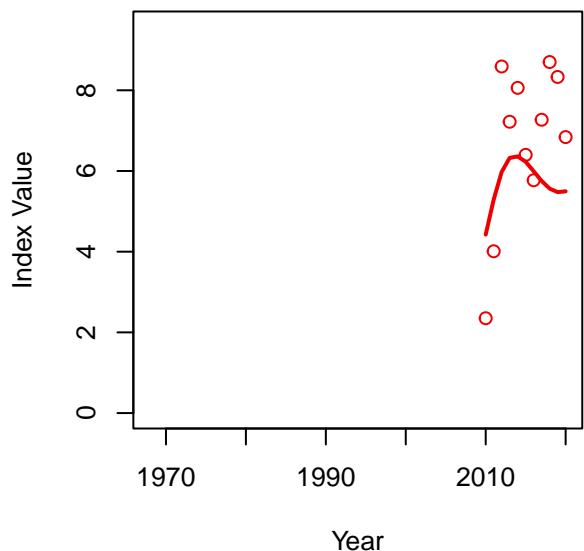
### Index 3 (JPN\_LL\_EastAtlMed)



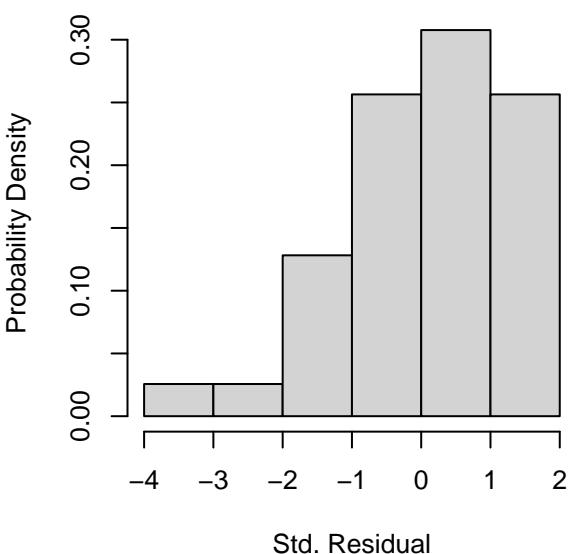
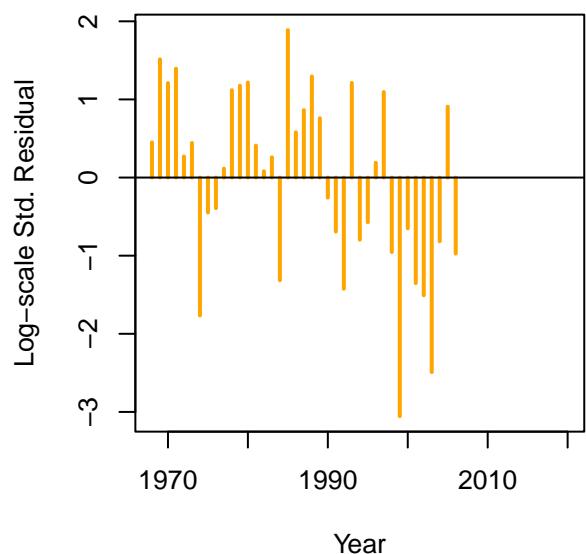
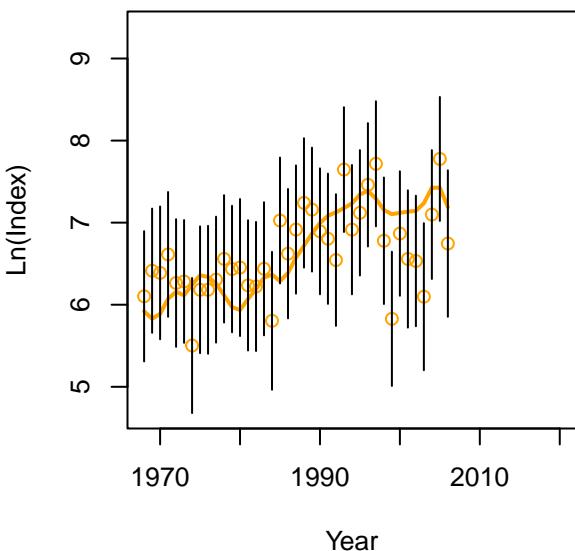
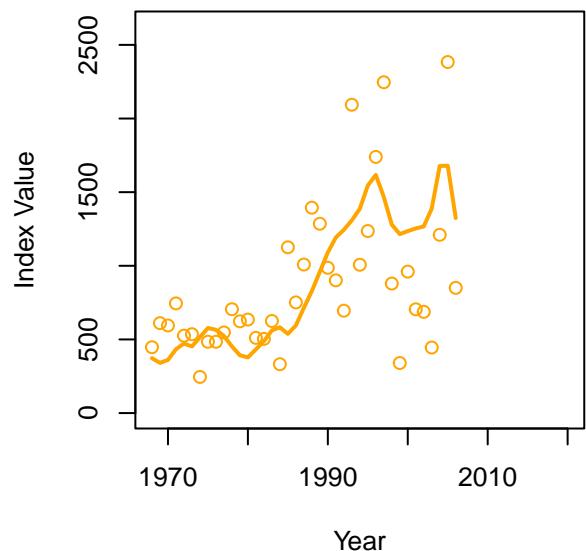
## Index 4 (JPH\_LL1\_NEA)



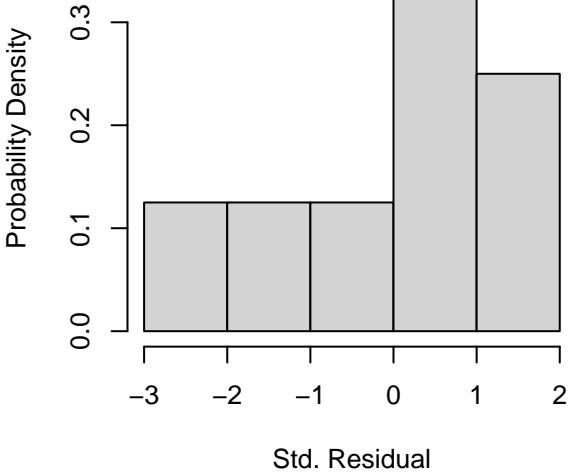
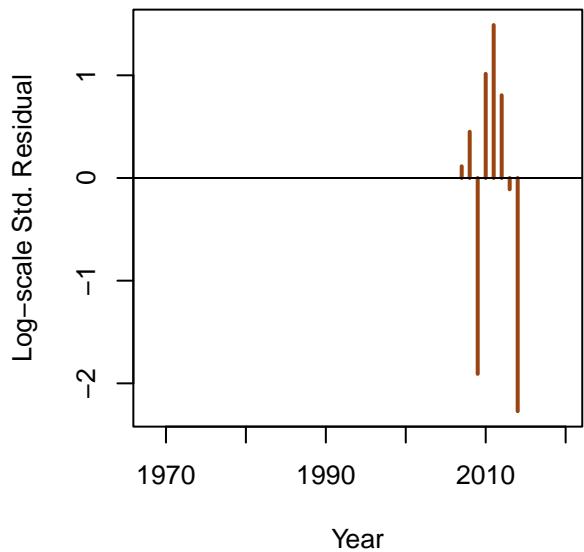
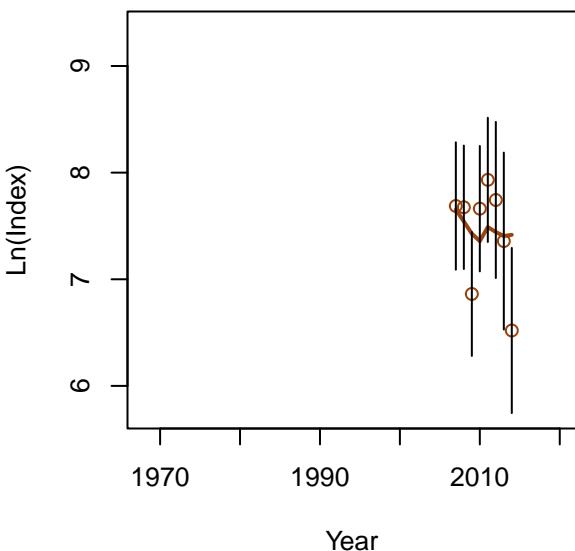
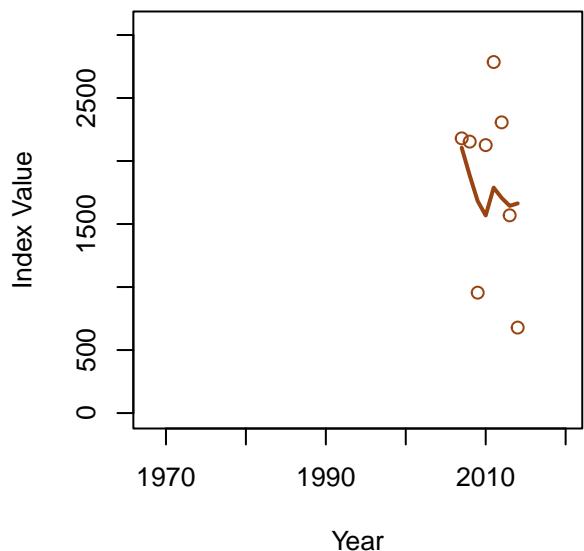
### Index 5 (JPN\_LL2\_NEA)



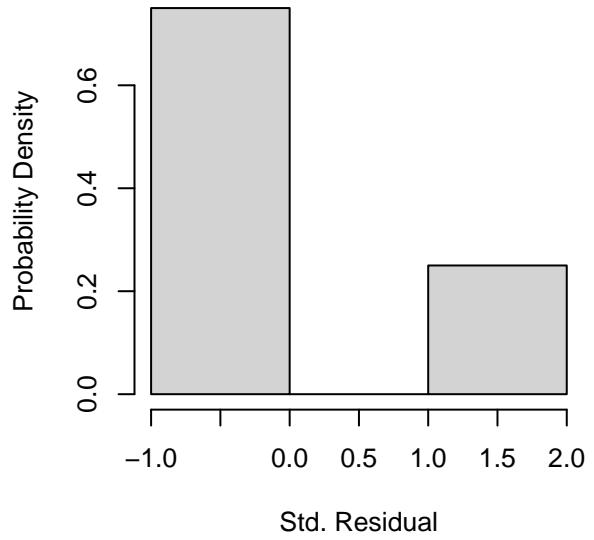
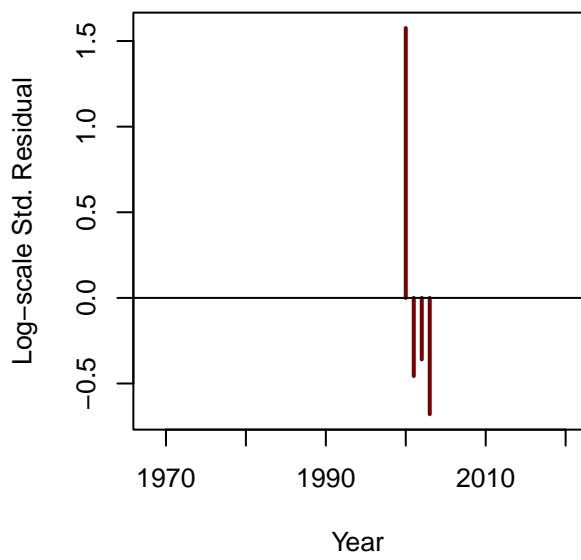
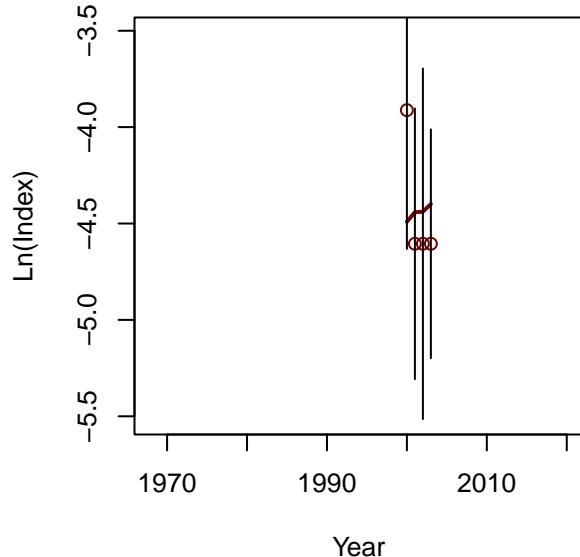
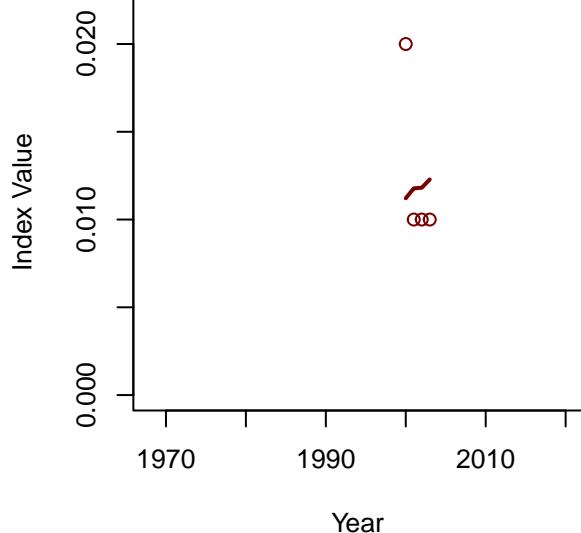
### Index 6 (SP\_BB1)



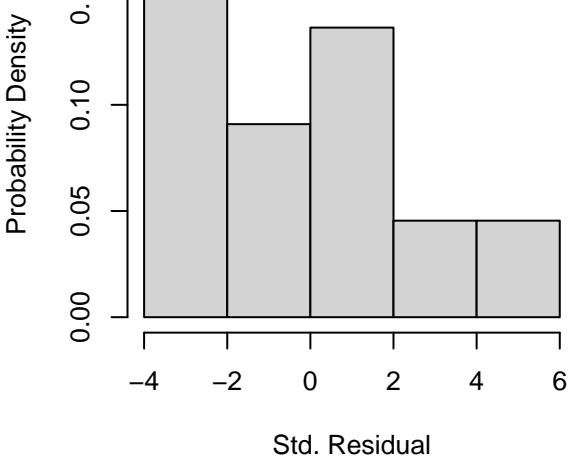
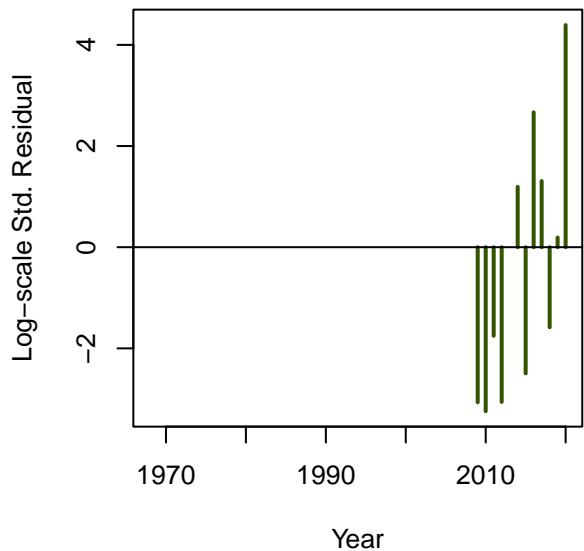
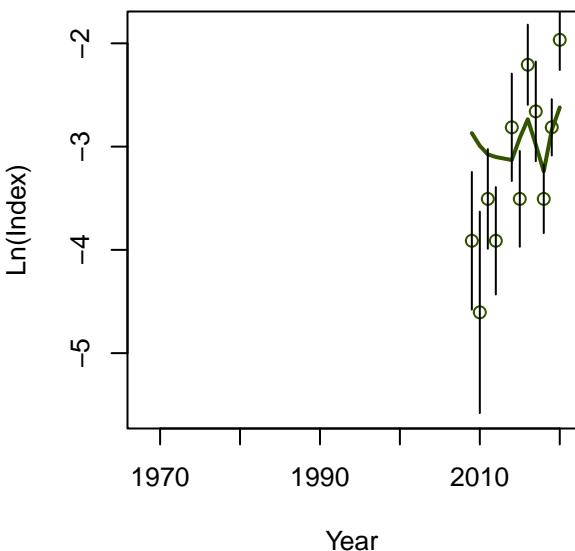
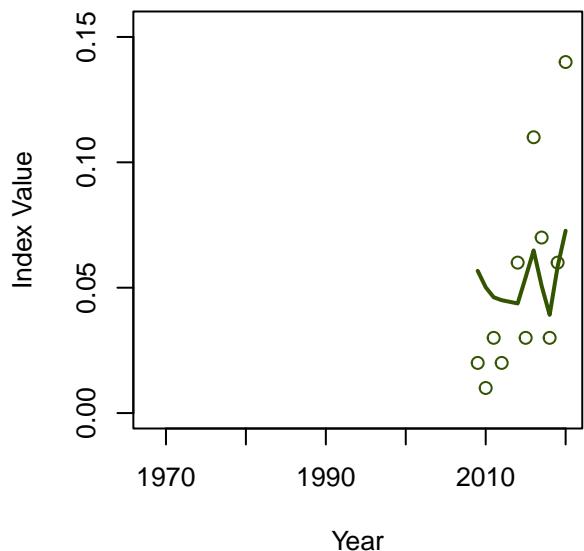
### Index 7 (SP\_BB2)



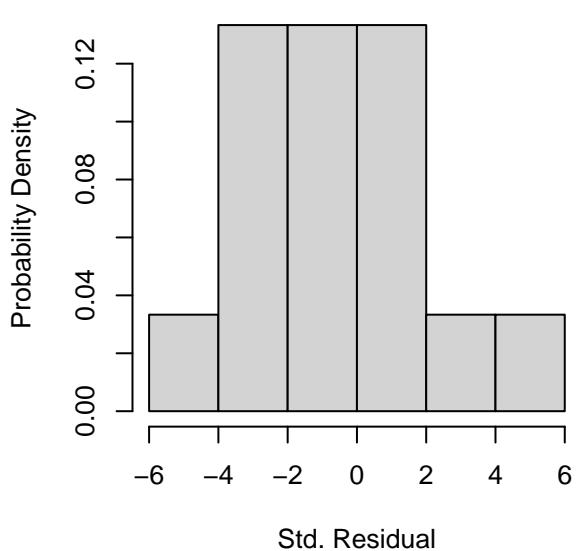
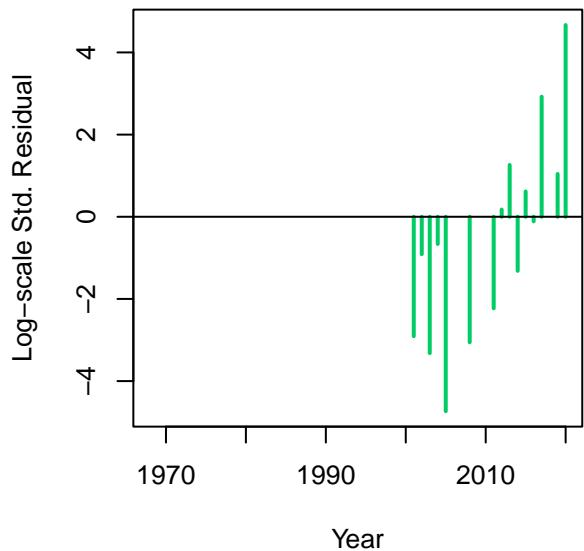
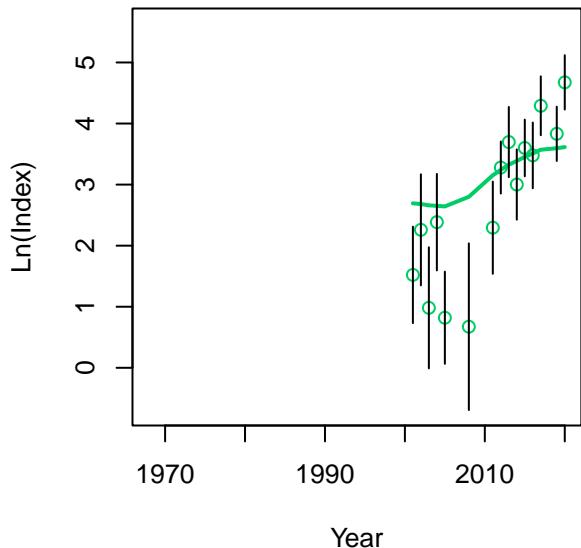
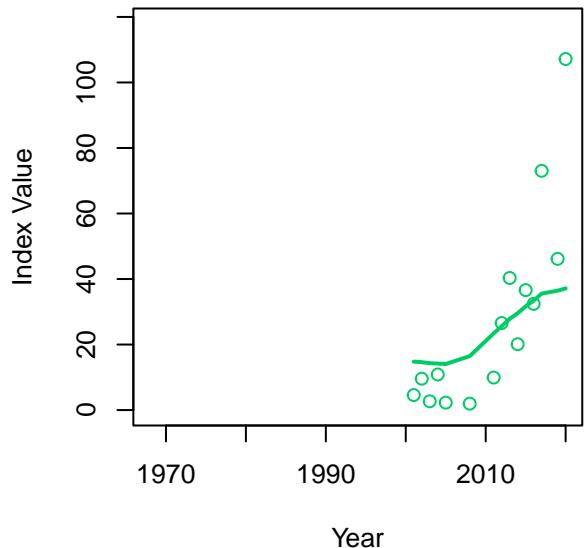
### Index 8 (FR\_AER1)



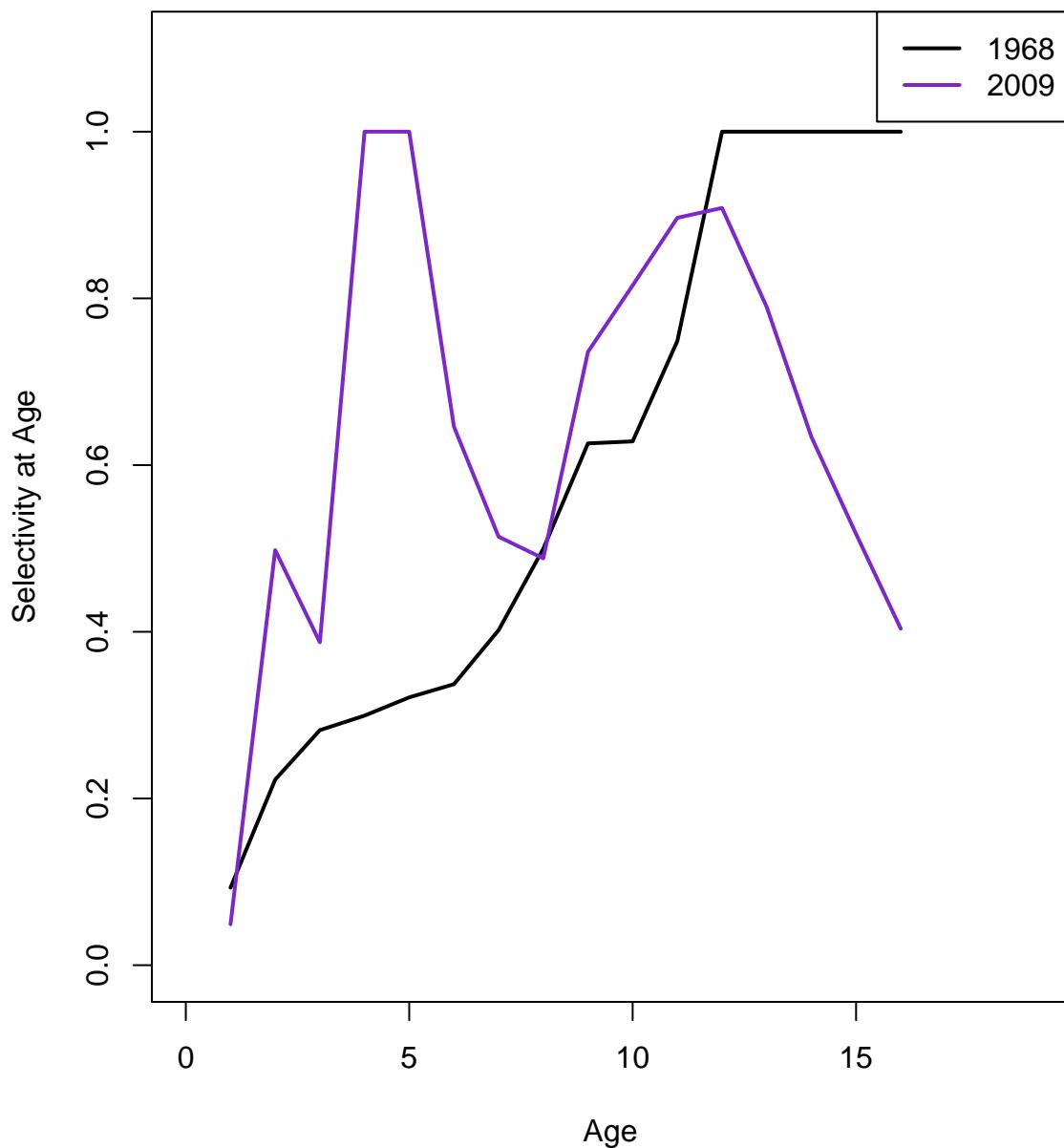
### Index 9 (FR\_AER2)



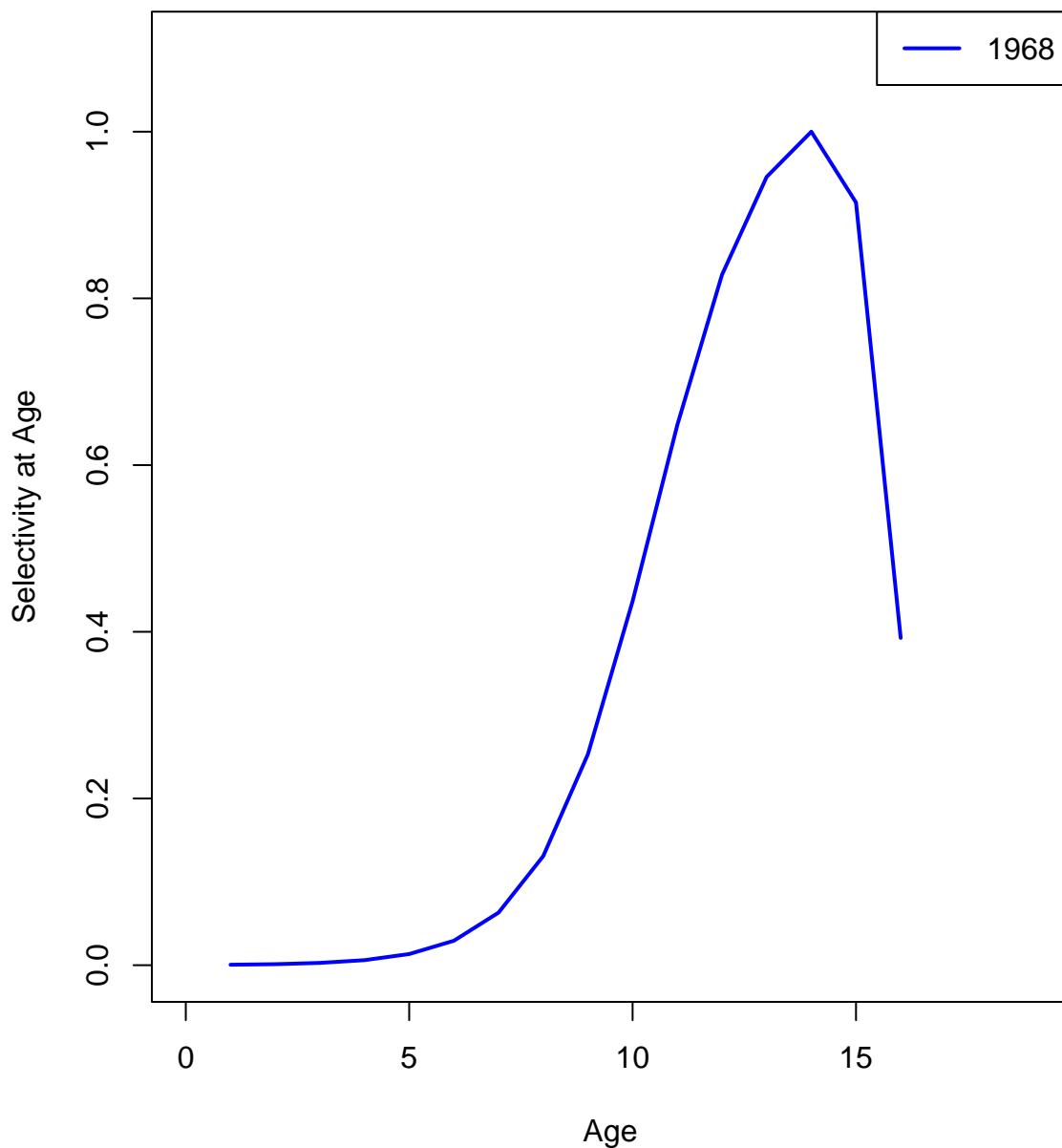
### Index 10 (WMED\_LARV)



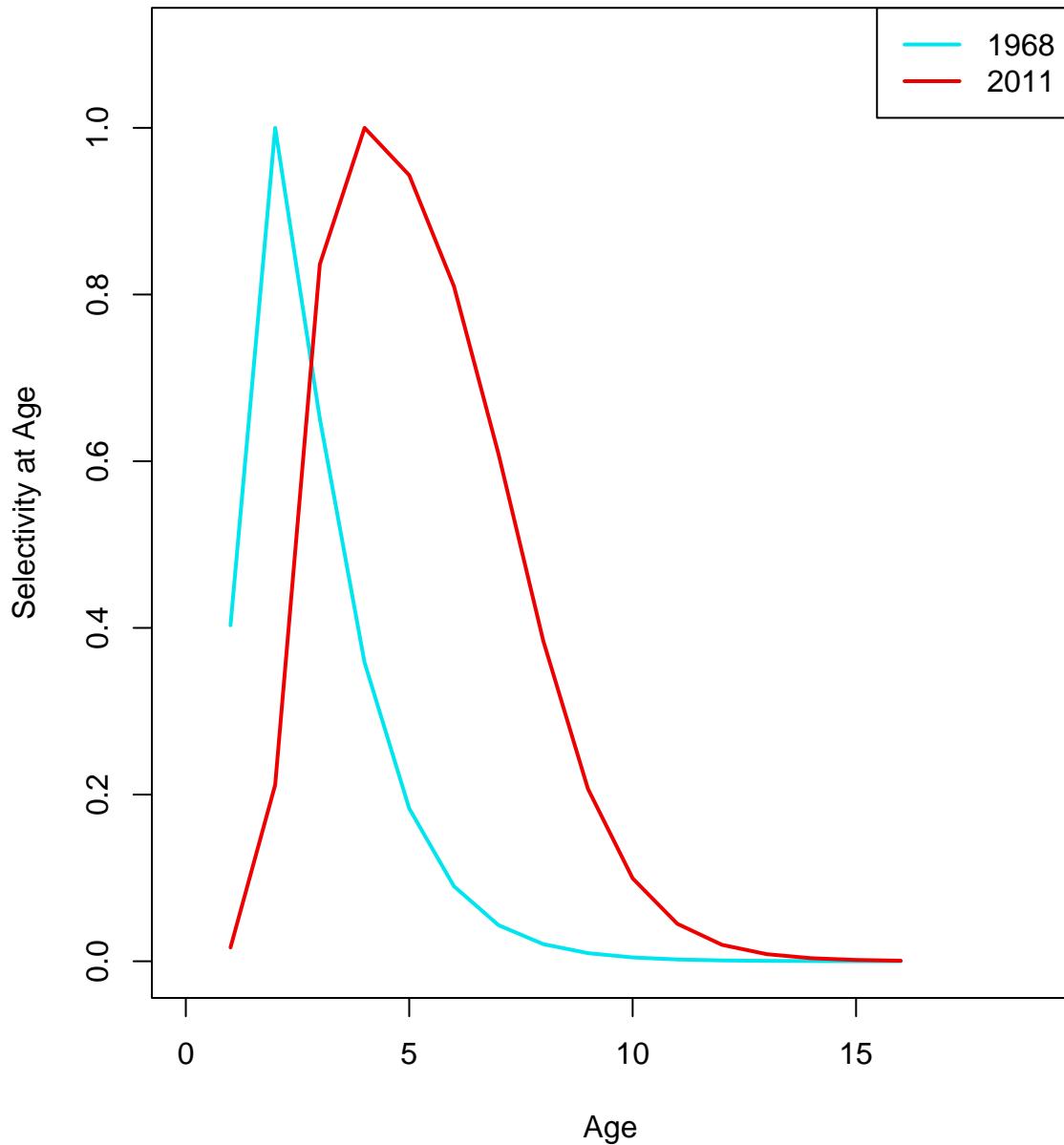
## Fleet 1 (Other)



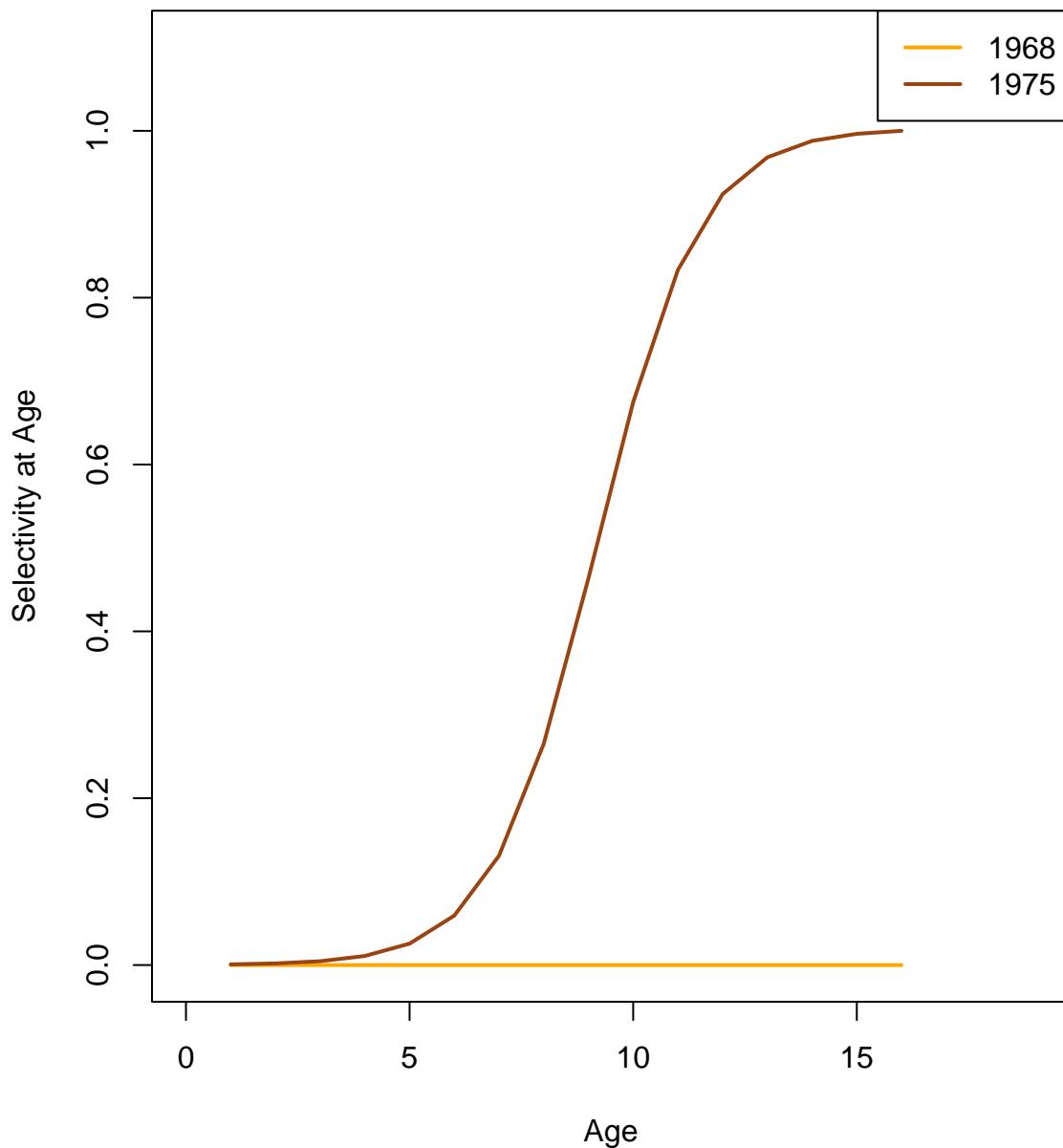
## Fleet 2 (Traps)



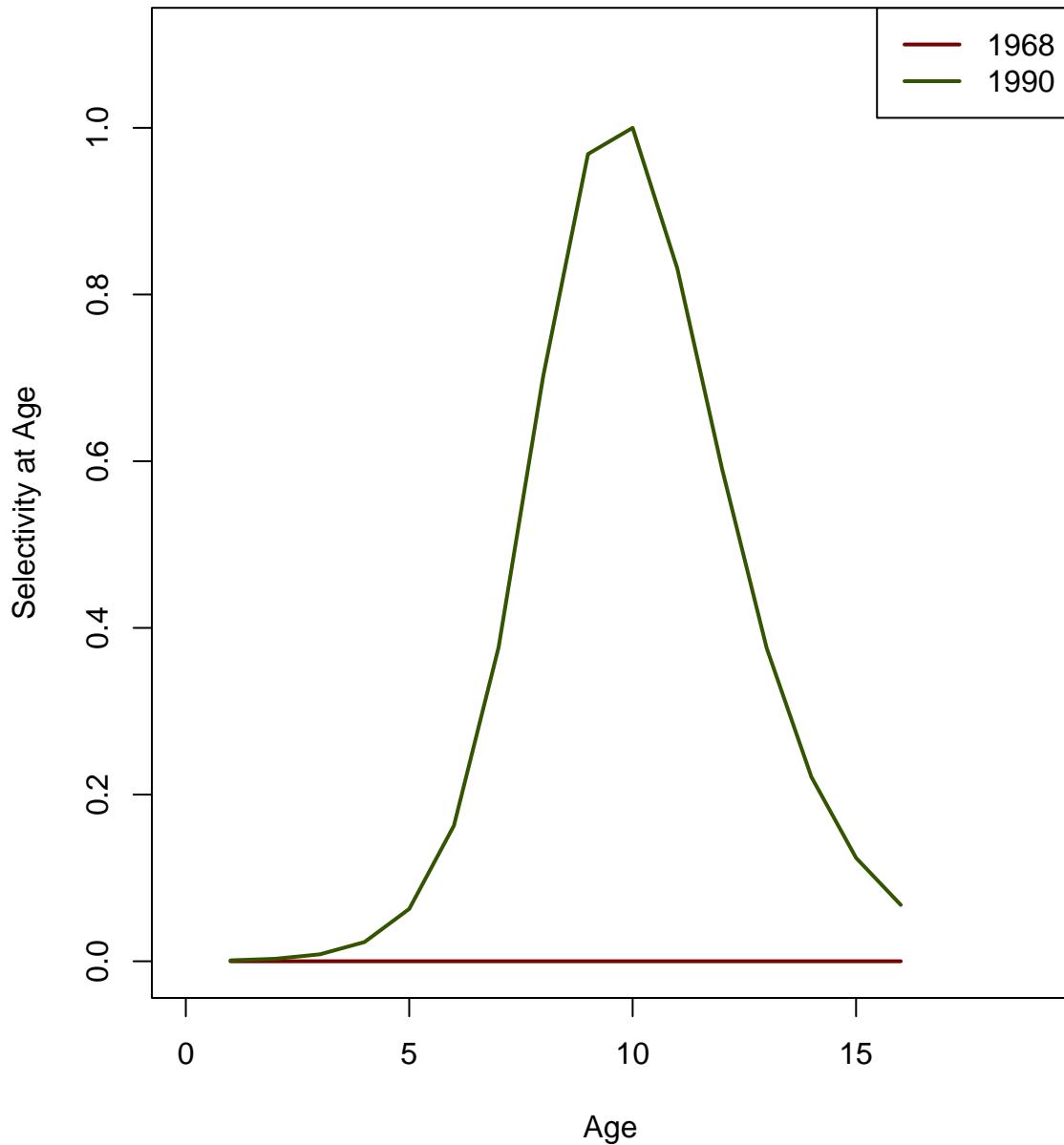
### Fleet 3 (BB)



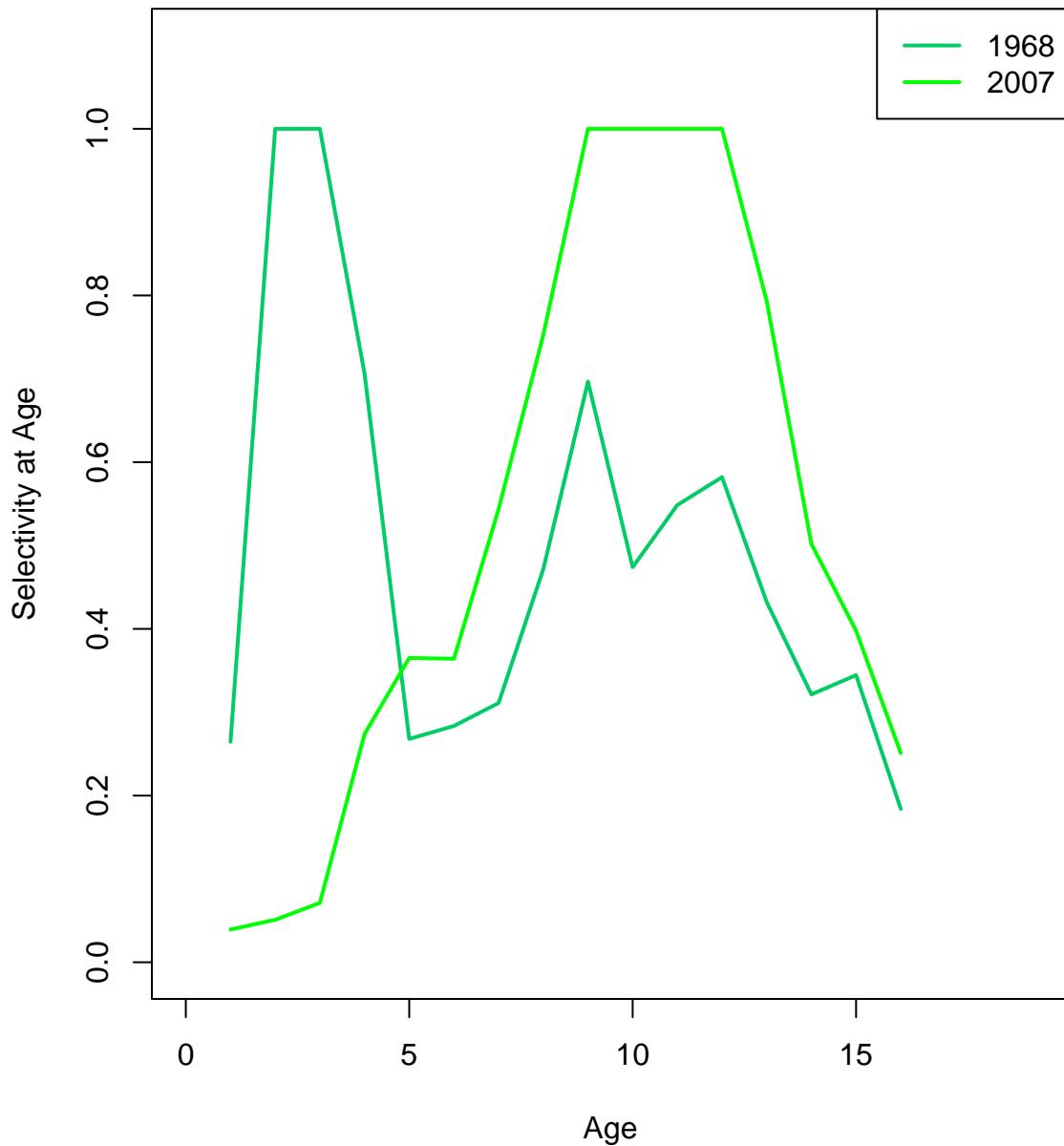
### Fleet 4 (JPN\_LL\_EastMed)

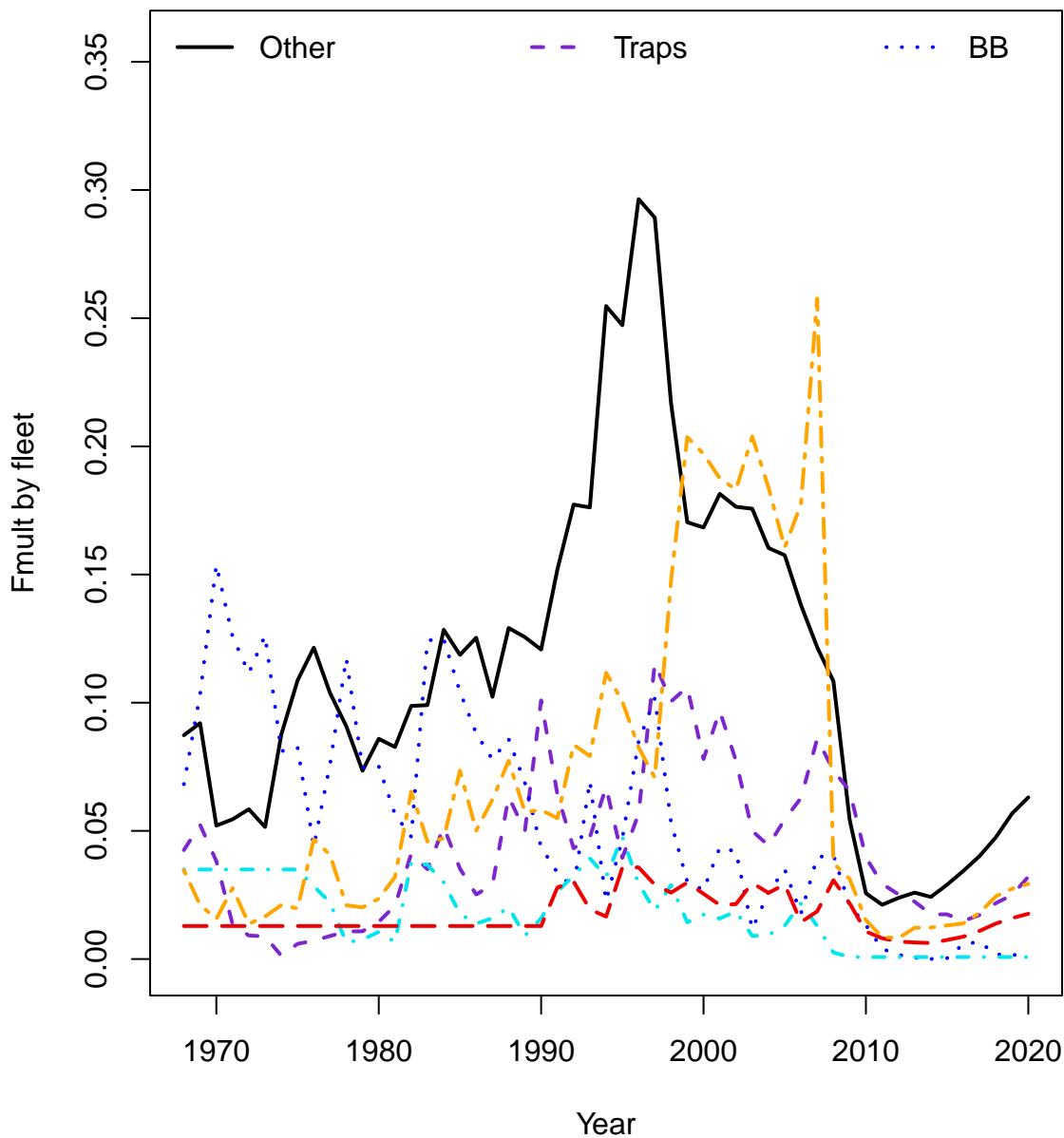


### Fleet 5 (JPN\_LL\_NEA)

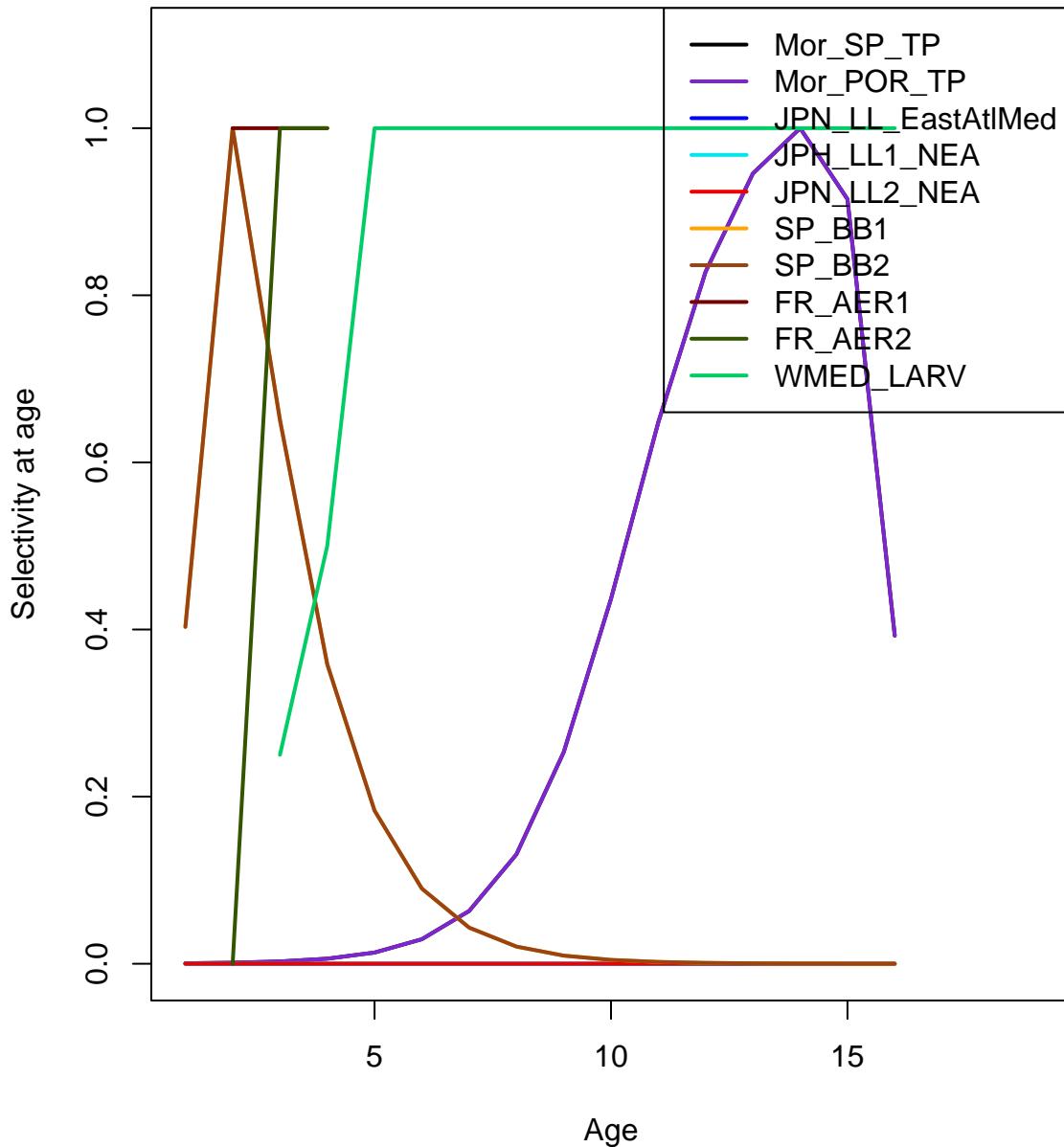


### Fleet 6 (PS\_Med)

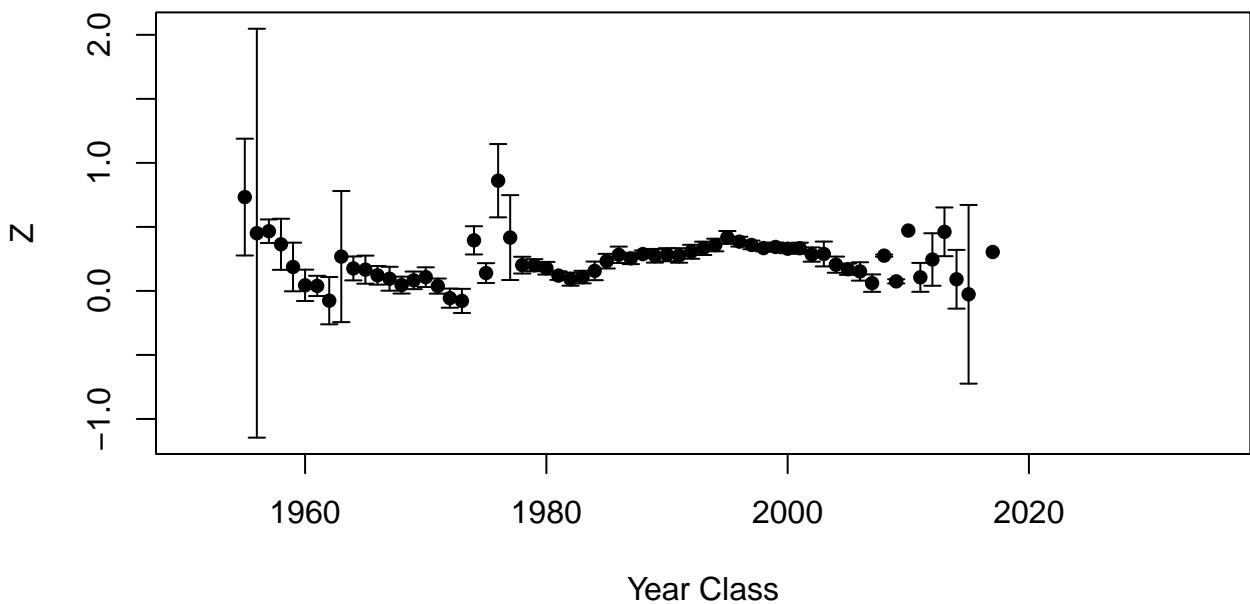
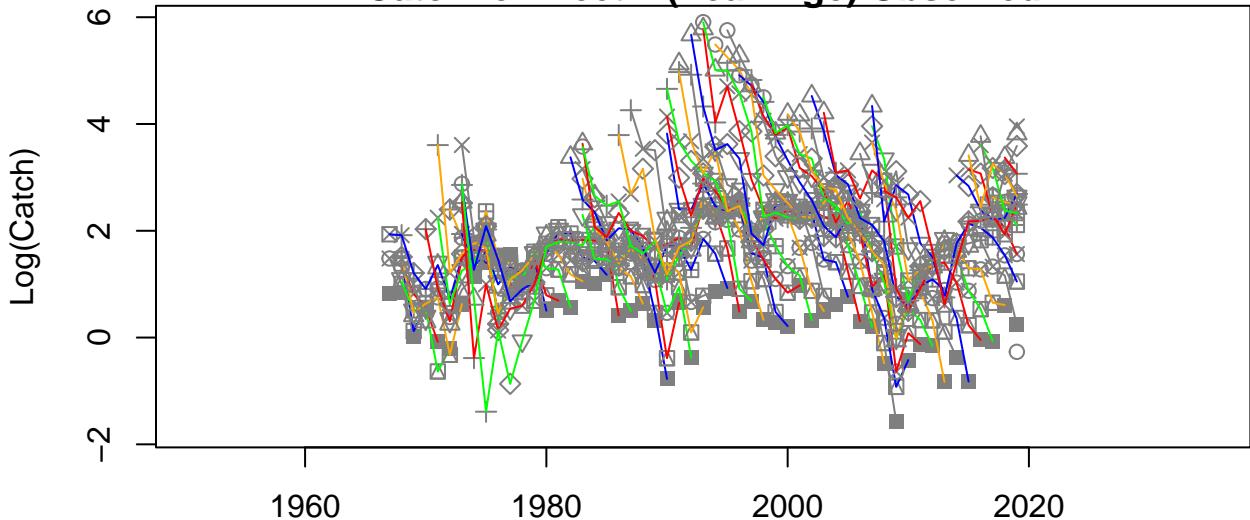




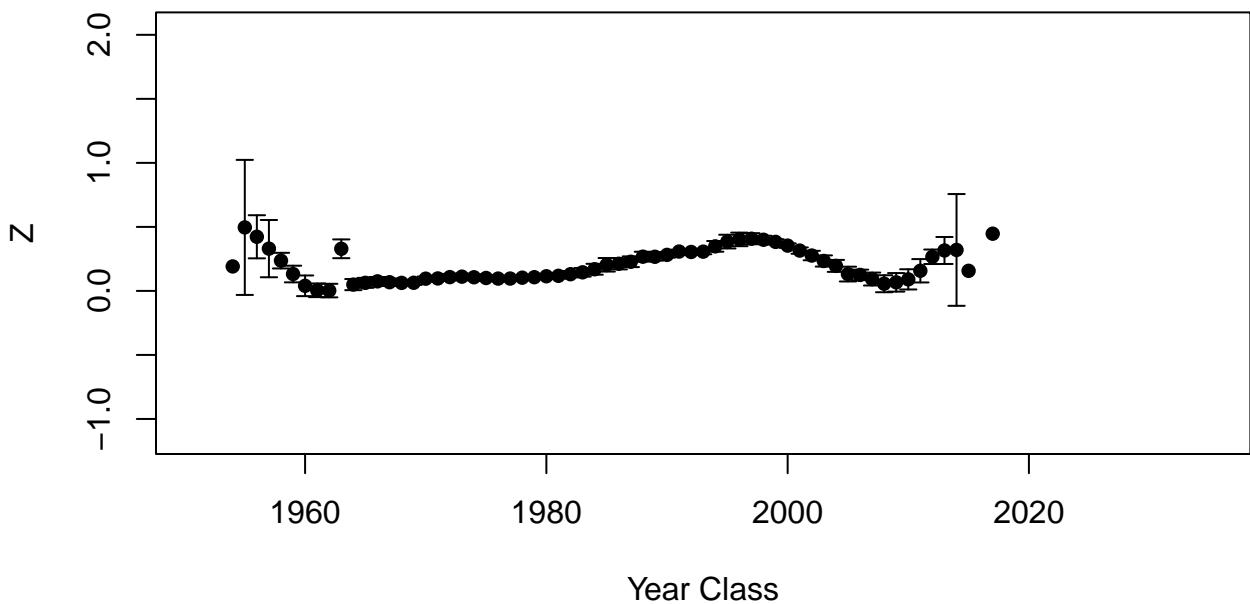
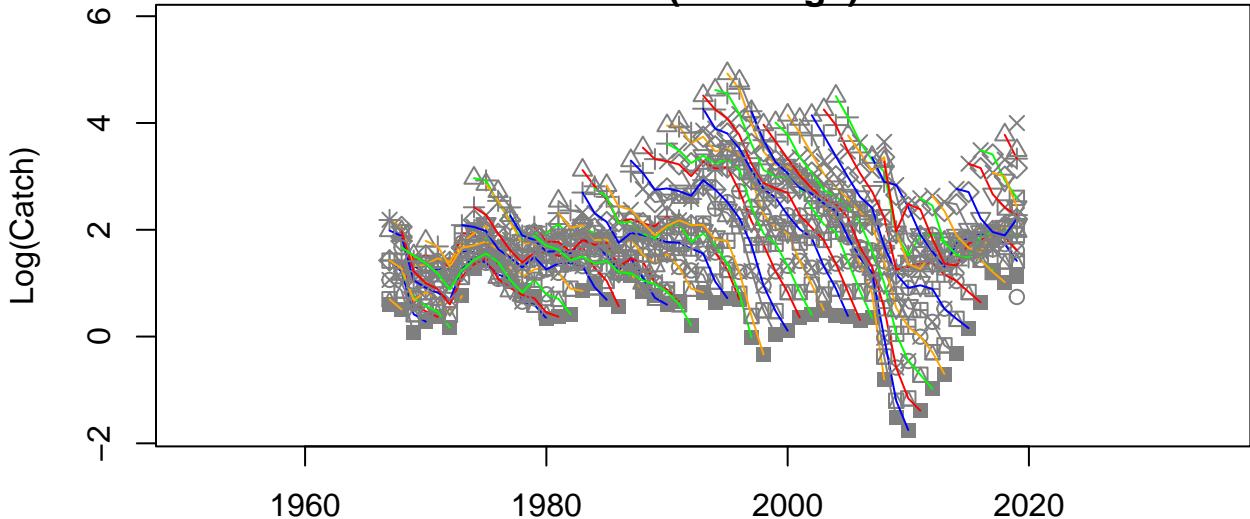
## Indices



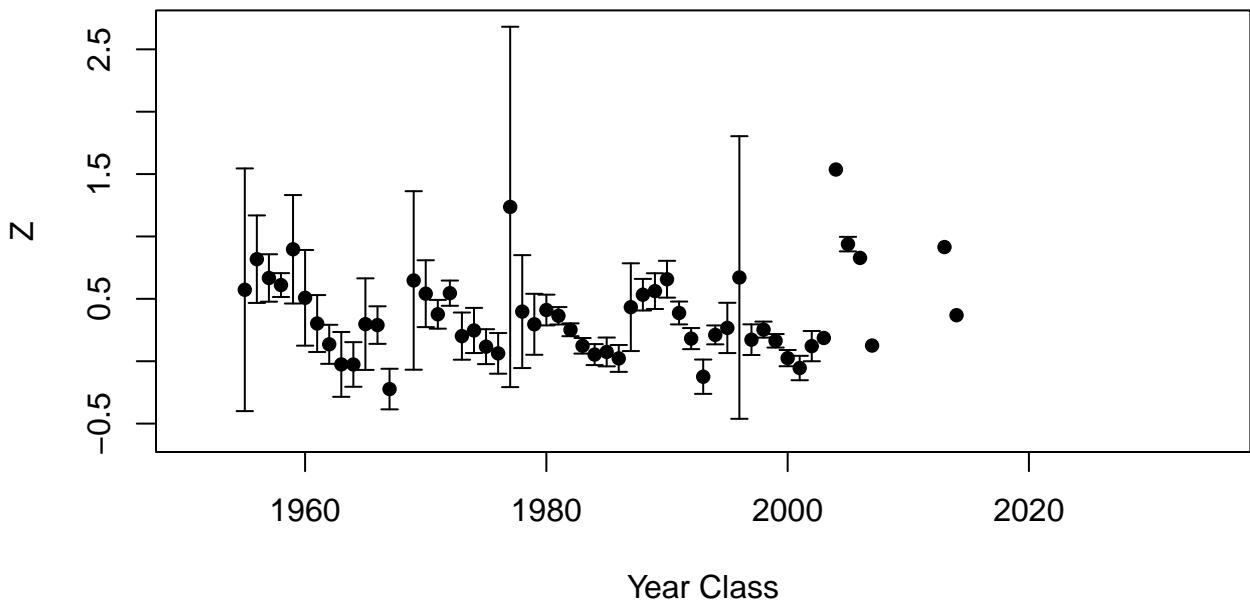
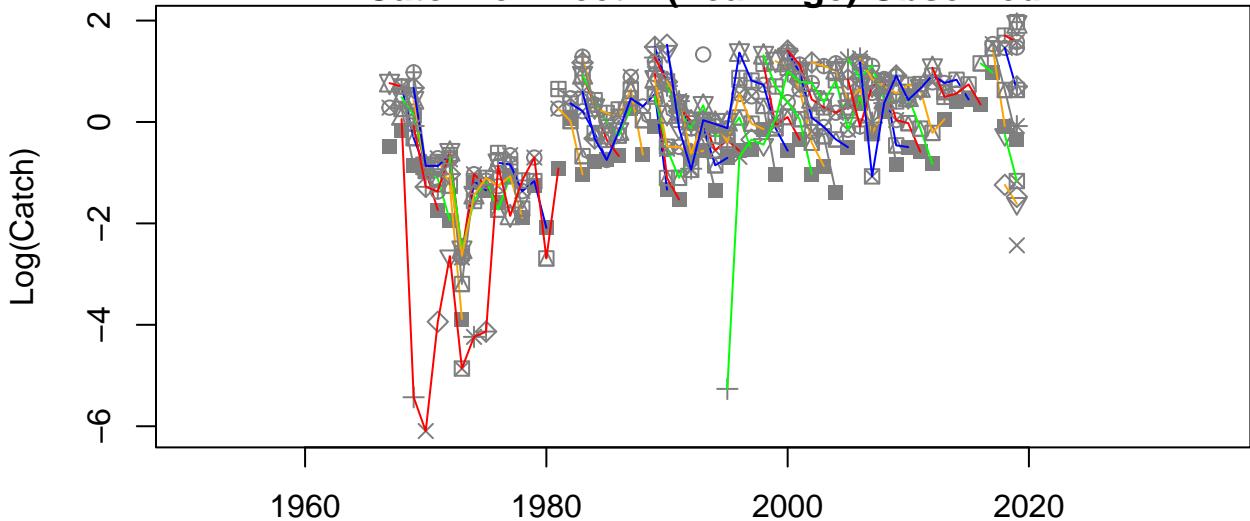
## Catch for Fleet 1 (Peak Age) Observed



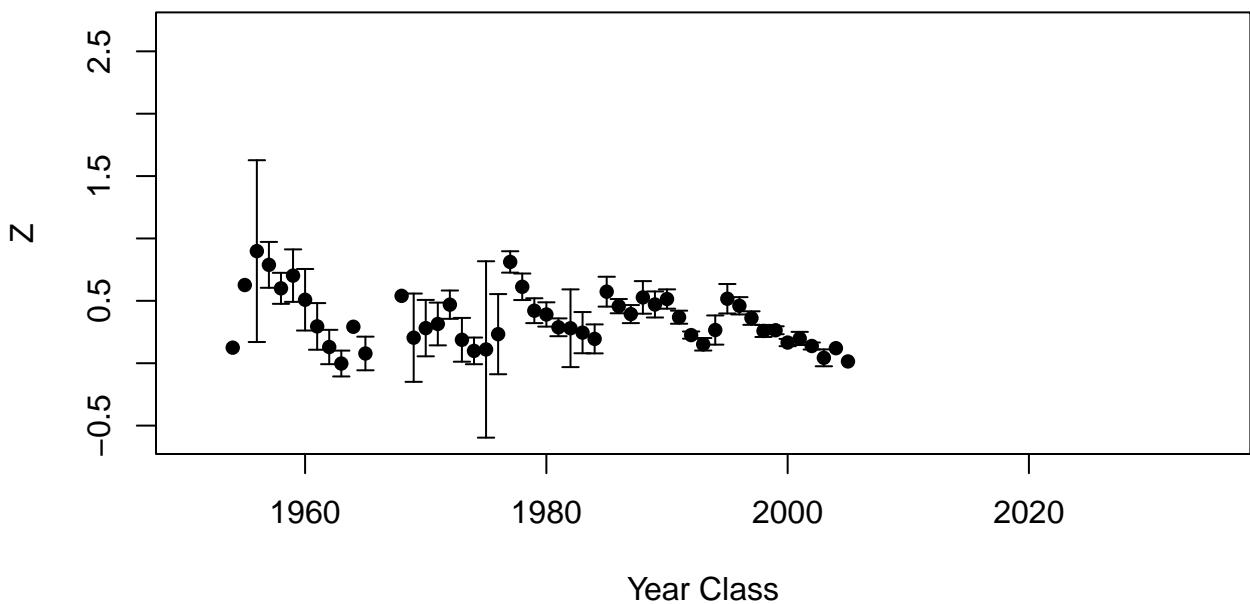
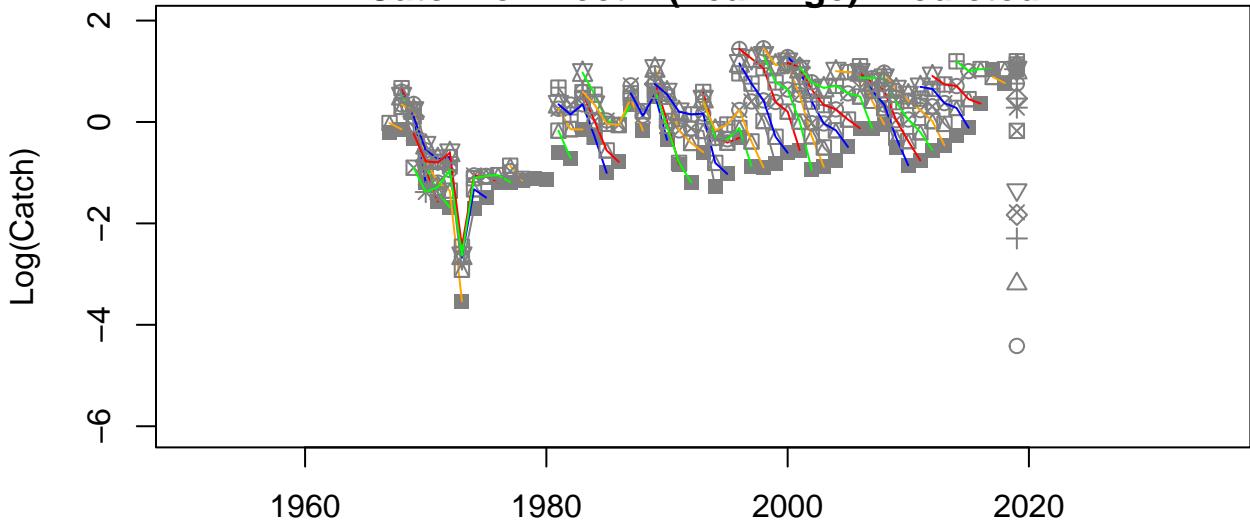
## Catch for Fleet 1 (Peak Age) Predicted



## Catch for Fleet 2 (Peak Age) Observed

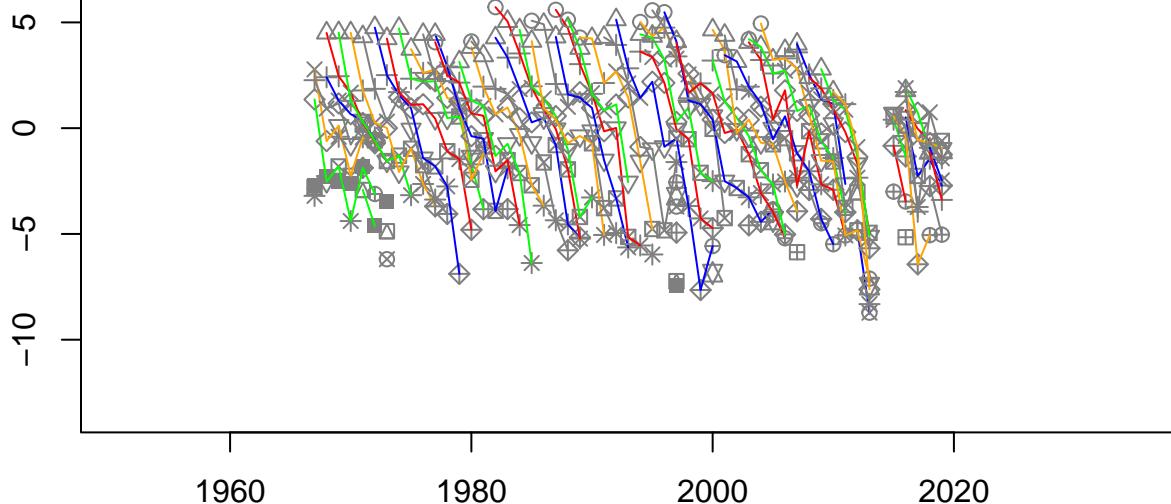


## Catch for Fleet 2 (Peak Age) Predicted



### Catch for Fleet 3 (Peak Age) Observed

Log(Catch)



Z

1960 1980 2000 2020

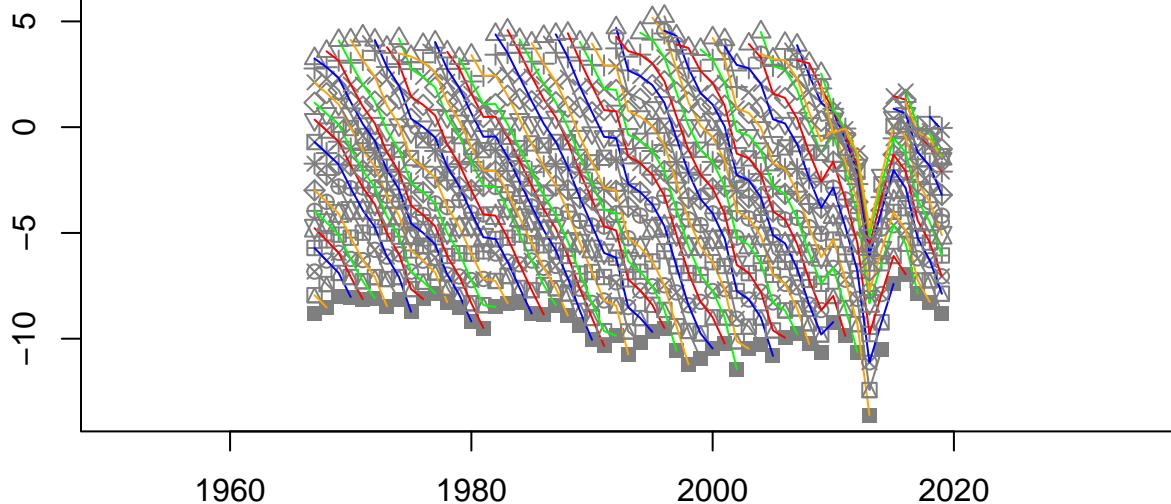
Year Class

1960 1980 2000 2020

1960 1980 2000 2020

### Catch for Fleet 3 (Peak Age) Predicted

Log(Catch)



Z

1960 1980 2000 2020

Year Class

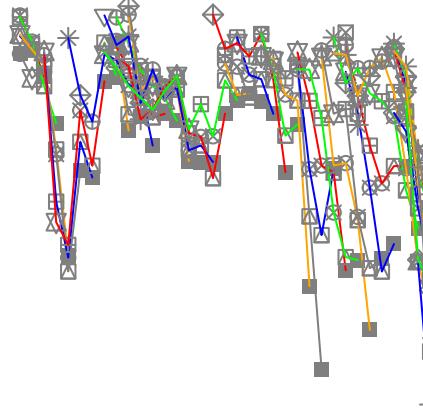
1960 1980 2000 2020

## Catch for Fleet 4 (Peak Age) Observed

Log(Catch)

0  
-2  
-4  
-6

1960 1980 2000 2020

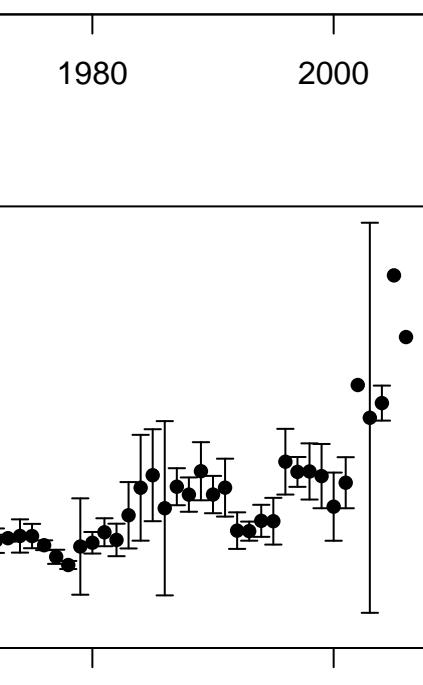


Z

0 1 2 3 4

1960 1980 2000 2020

Year Class

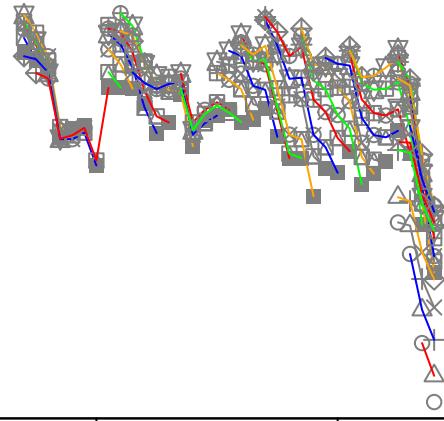


## Catch for Fleet 4 (Peak Age) Predicted

Log(Catch)

0  
-2  
-4  
-6

1960 1980 2000 2020

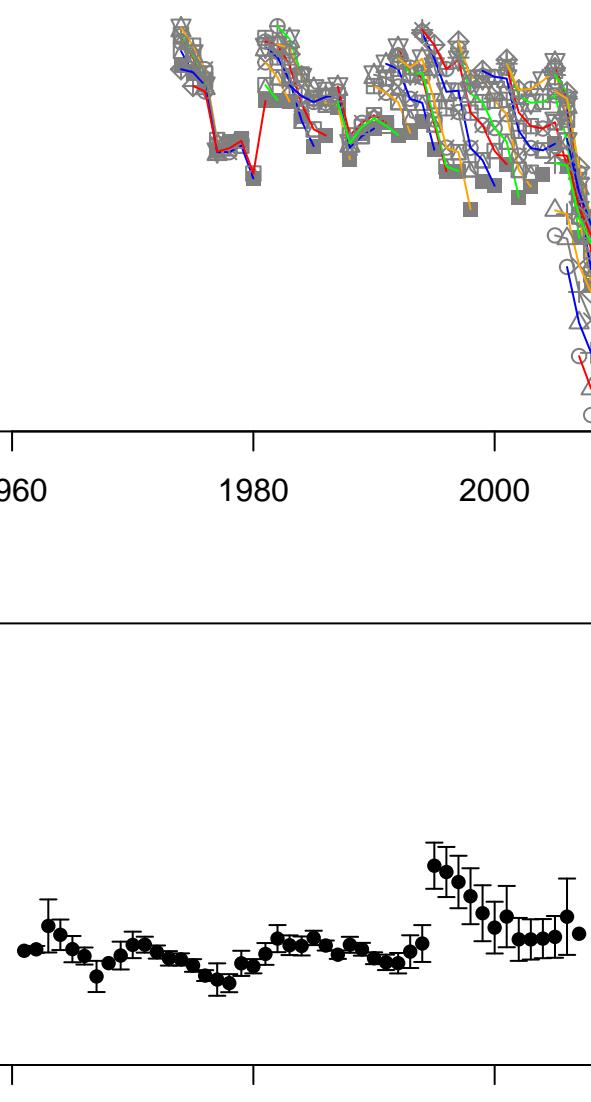


Z

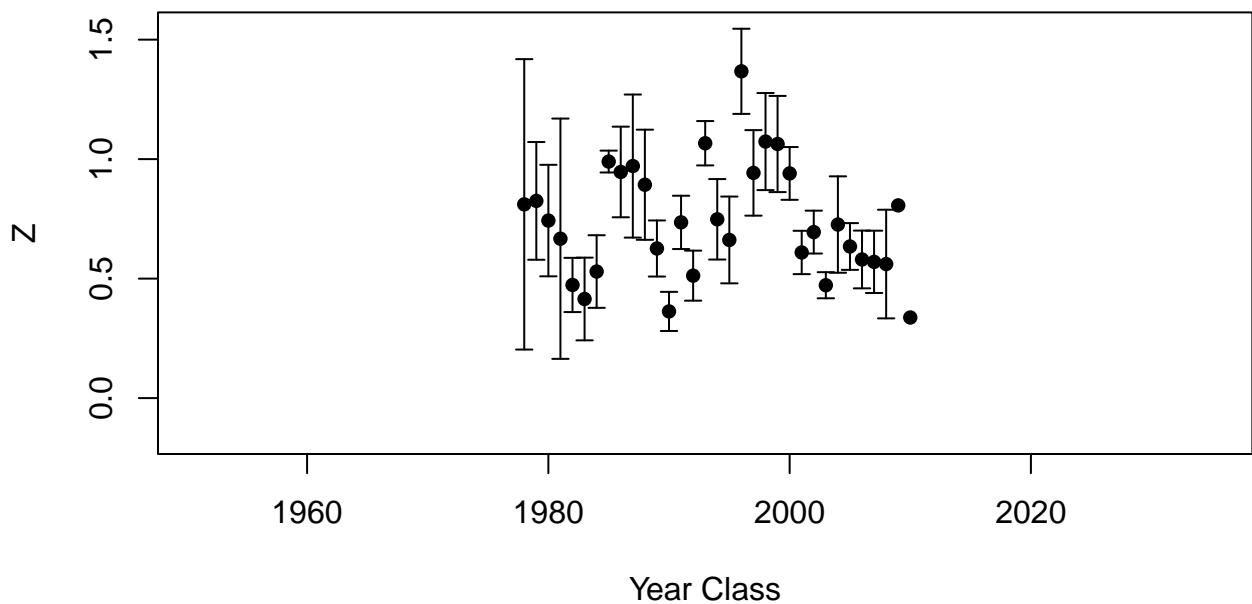
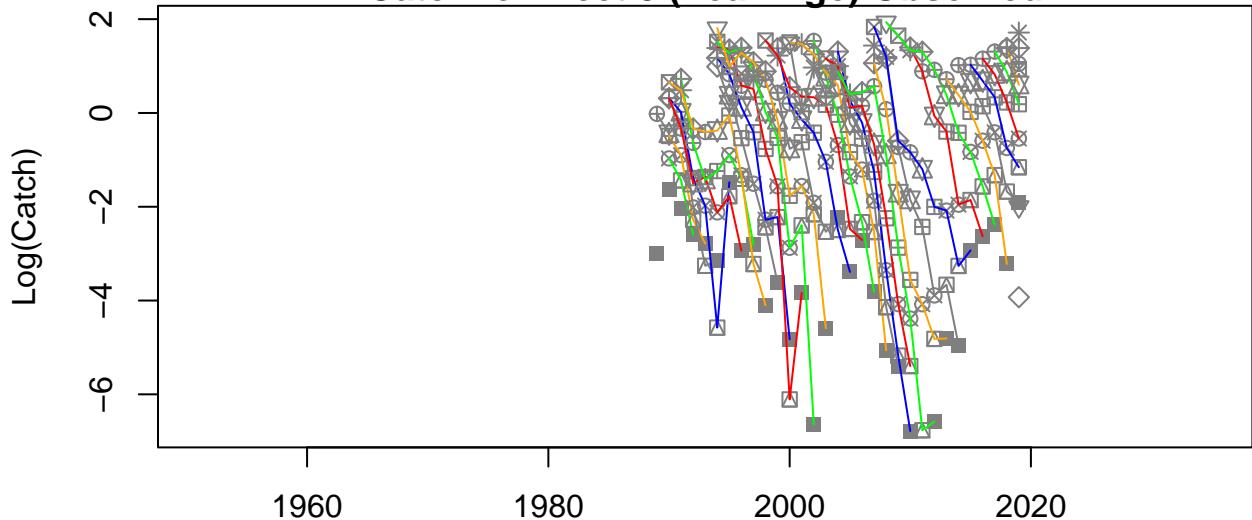
4  
3  
2  
1  
0

1960 1980 2000 2020

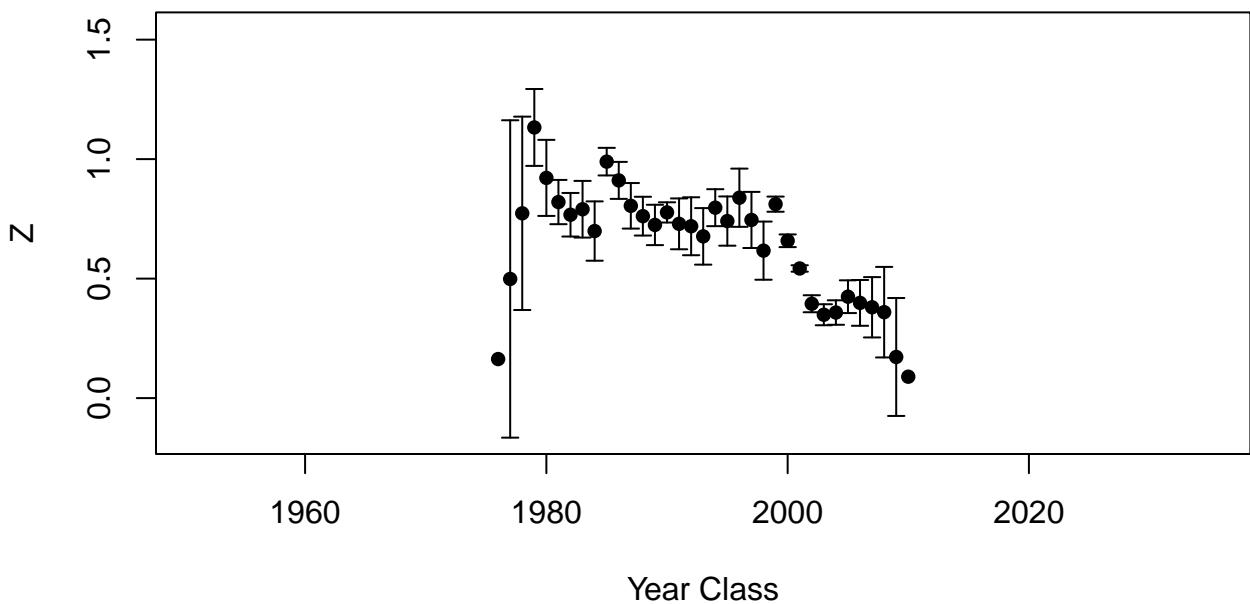
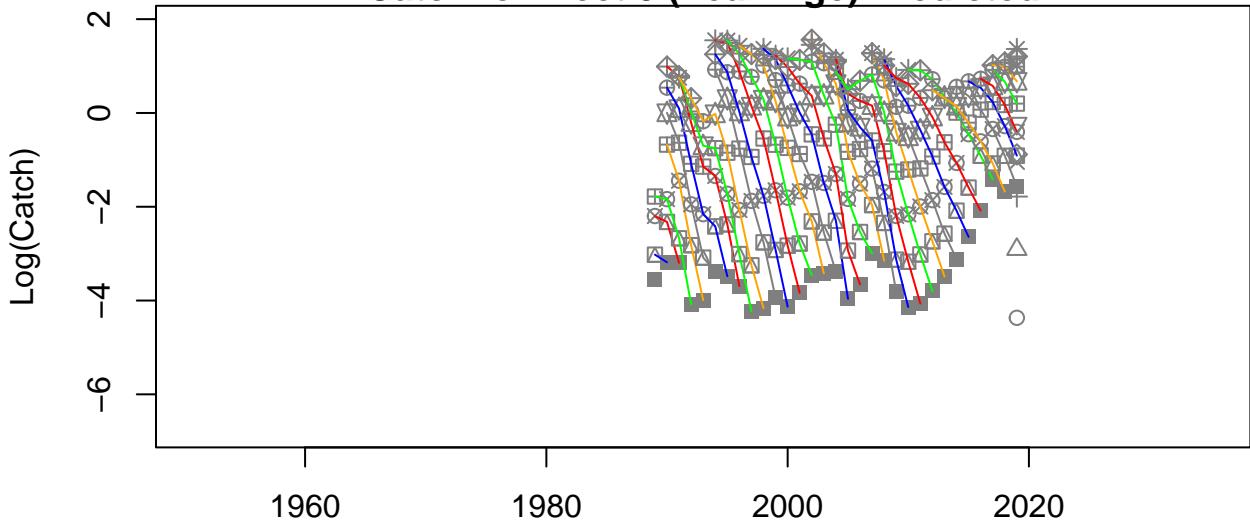
Year Class



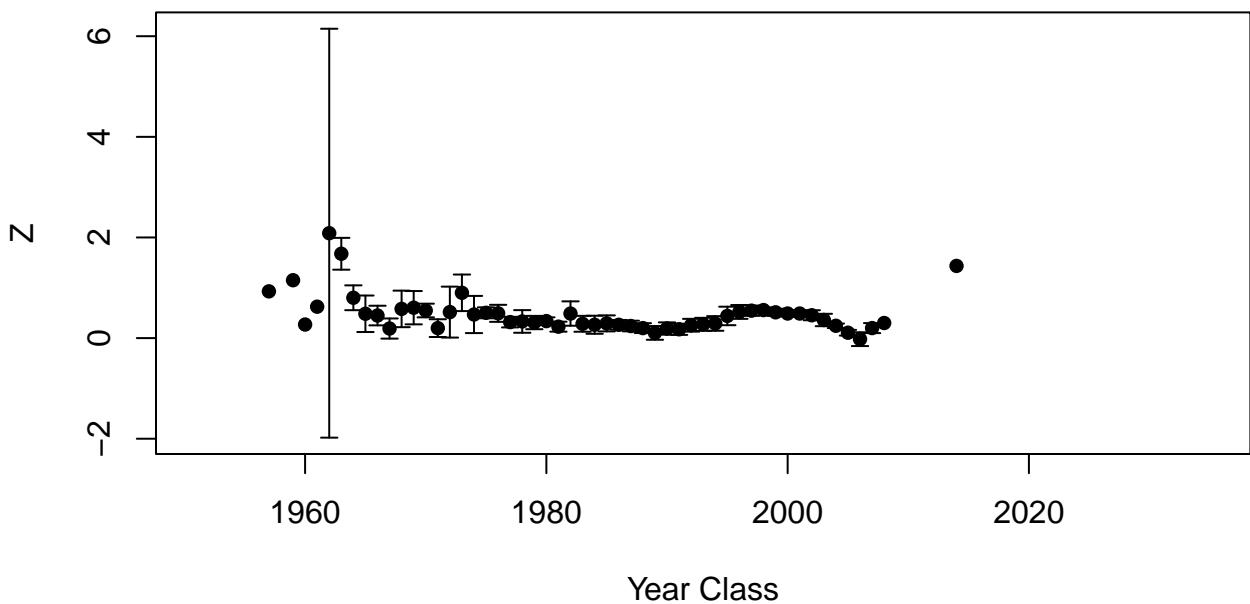
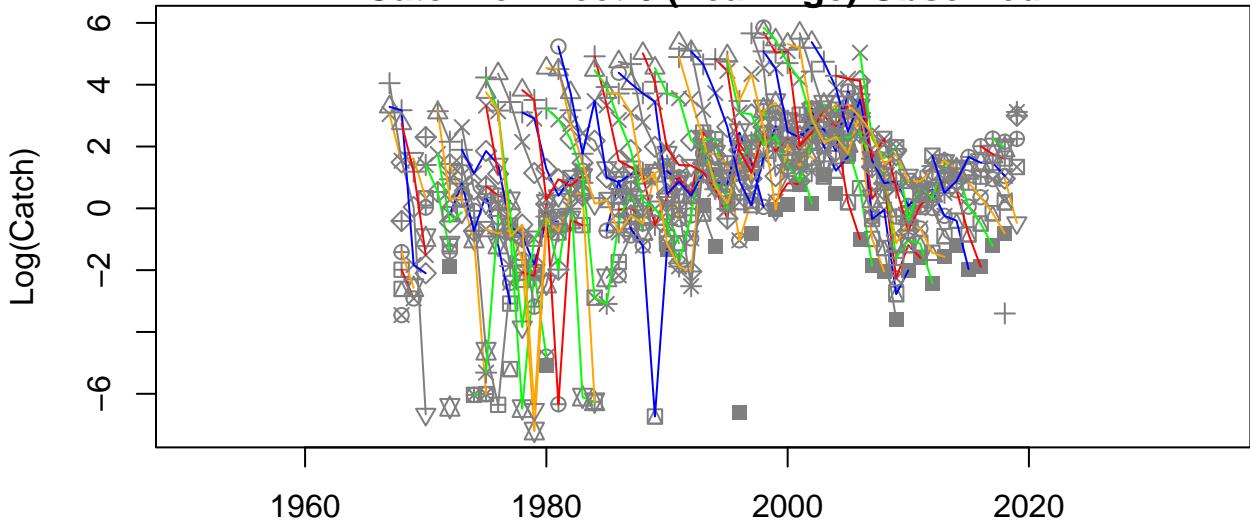
## Catch for Fleet 5 (Peak Age) Observed



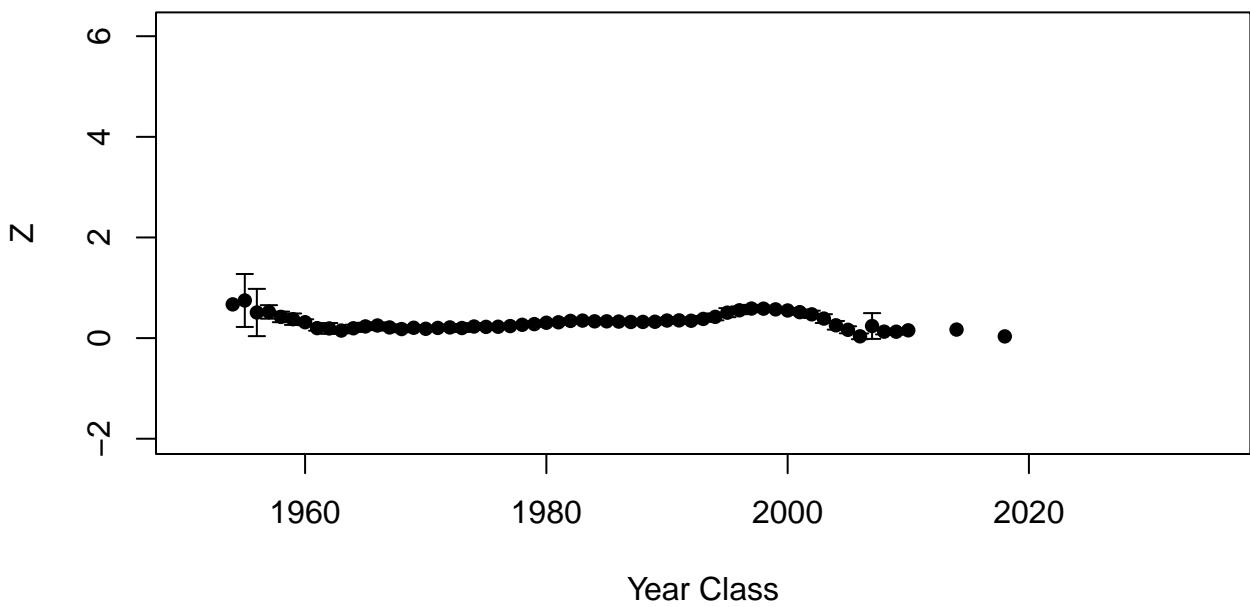
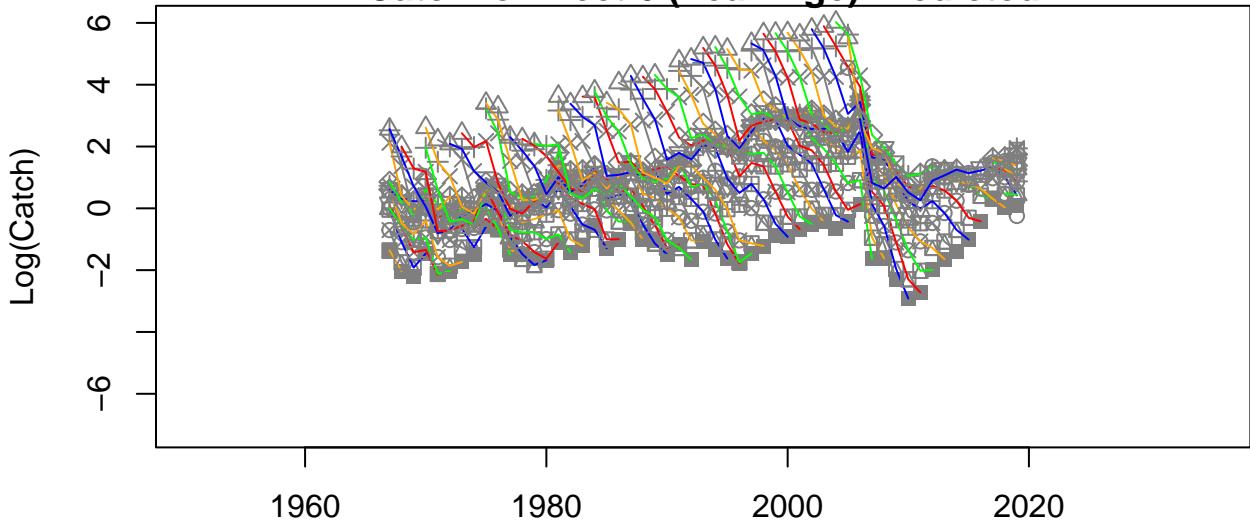
## Catch for Fleet 5 (Peak Age) Predicted



## Catch for Fleet 6 (Peak Age) Observed



## Catch for Fleet 6 (Peak Age) Predicted



## **Catch for Fleet 1 (Other) Observed**

															$je-1$										
														$je-1$	0.67										
													$je-1$	0.60											
												$je-1$	0.62												
												$je-1$	0.40												
												$je-1$	0.26												
												$je-1$	0.65												
												$je-1$	0.45												
												$je-1$	0.17												
												$je-1$	-0.14												
												$je-1$	-0.22												
												$je-1$	-0.03												
												$je-1$	-0.12												
												$je-1$	-0.28												
												$je-1$	-0.34												
												$je-1$	-0.36												
												$je-1$	-0.33												
												$je-1$	-0.30												
												$je-1$	-0.34												
												$je-1$	-0.36												
												$je-1$	-0.33												
												$je-1$	-0.30												
																								$ge-1$	
														$ge-1$	0.67										
													$ge-1$	0.77											
													$ge-1$	0.77											
													$ge-1$	0.62											
													$ge-1$	0.24											
													$ge-1$	-0.15											
													$ge-1$	0.27											
													$ge-1$	-0.23											
													$ge-1$	-0.28											
													$ge-1$	0.26											
													$ge-1$	-0.30											
													$ge-1$	-0.26											
													$ge-1$	-0.22											
													$ge-1$	-0.24											
													$ge-1$	-0.24											
													$ge-1$	-0.27											
													$ge-1$	-0.21											
													$ge-1$	-0.21											

## Catch for Fleet 3 (BB) Observed

## Catch for Fleet 3 (BB) Predicted

													$je-1$	
													$je-1$	0.74
													$je-1$	0.71
													$je-1$	0.67
													$je-1$	0.60
													$je-1$	0.51
													$je-1$	0.46
													$ge-\zeta$	0.44
													$ge-\zeta$	-0.08
													$ge-\zeta$	-0.19
													$ge-\zeta$	0.09
													$ge-\zeta$	0.20
													$ge-\zeta$	0.18
													$ge-\zeta$	0.22
													$ge-\zeta$	0.13
													$ge-\zeta$	0.19
													$ge-\zeta$	0.23
													$ge-\zeta$	0.17
													$ge-\zeta$	0.27
													$ge-\zeta$	0.48
													$ge-\zeta$	0.60
													$ge-\zeta$	0.13
													$ge-\zeta$	0.19
													$ge-\zeta$	0.19
													$ge-\zeta$	0.19
										<img alt				

## Catch for Fleet 4 (JPN\_LL\_EastMed) Observed



## Catch for Fleet 4 (JPN\_LL\_EastMed) Predicted

je-1	0.73														
je-1	0.72	0.35													
je-1	0.69	0.28	0.08												
je-1	0.70	0.18	-0.08	-0.04											
je-1	0.69	0.21	-0.17	-0.18	-0.15										
je-1	0.66	0.19	-0.11	-0.25	-0.26	-0.35									
ge- $\zeta$	0.64	0.18	-0.06	-0.13	-0.26	-0.41	-0.46								
ge- $\zeta$	0.66	0.18	-0.03	-0.09	-0.14	-0.40	-0.51	-0.45							
ge- $\bar{\zeta}$	0.67	0.27	0.03	-0.02	-0.04	-0.20	-0.42	-0.36	-0.46						
ge- $\bar{\zeta}$	0.68	0.29	0.09	0.01	-0.01	-0.13	-0.26	-0.30	-0.38	-0.47					
ge- $\zeta$	0.67	0.33	0.14	0.10	0.05	-0.07	-0.17	-0.14	-0.32	-0.38	-0.50				
ge- $\zeta$	0.71	0.32	0.19	0.16	0.15	0.00	-0.09	-0.06	-0.17	-0.33	-0.42	-0.56			
ge- $\zeta$	0.75	0.42	0.22	0.21	0.21	0.12	0.00	0.07	-0.03	-0.11	-0.30	-0.39	-0.61		
ge- $\zeta$	0.79	0.49	0.28	0.20	0.22	0.14	0.07	0.09	0.04	-0.04	-0.16	-0.35	-0.50	-0.66	
ge-	0.81	0.55	0.36	0.27	0.22	0.16	0.12	0.15	0.05	0.02	-0.11	-0.23	-0.50	-0.63	-0.64

## Catch for Fleet 5 (JPN\_LL\_NEA) Observed



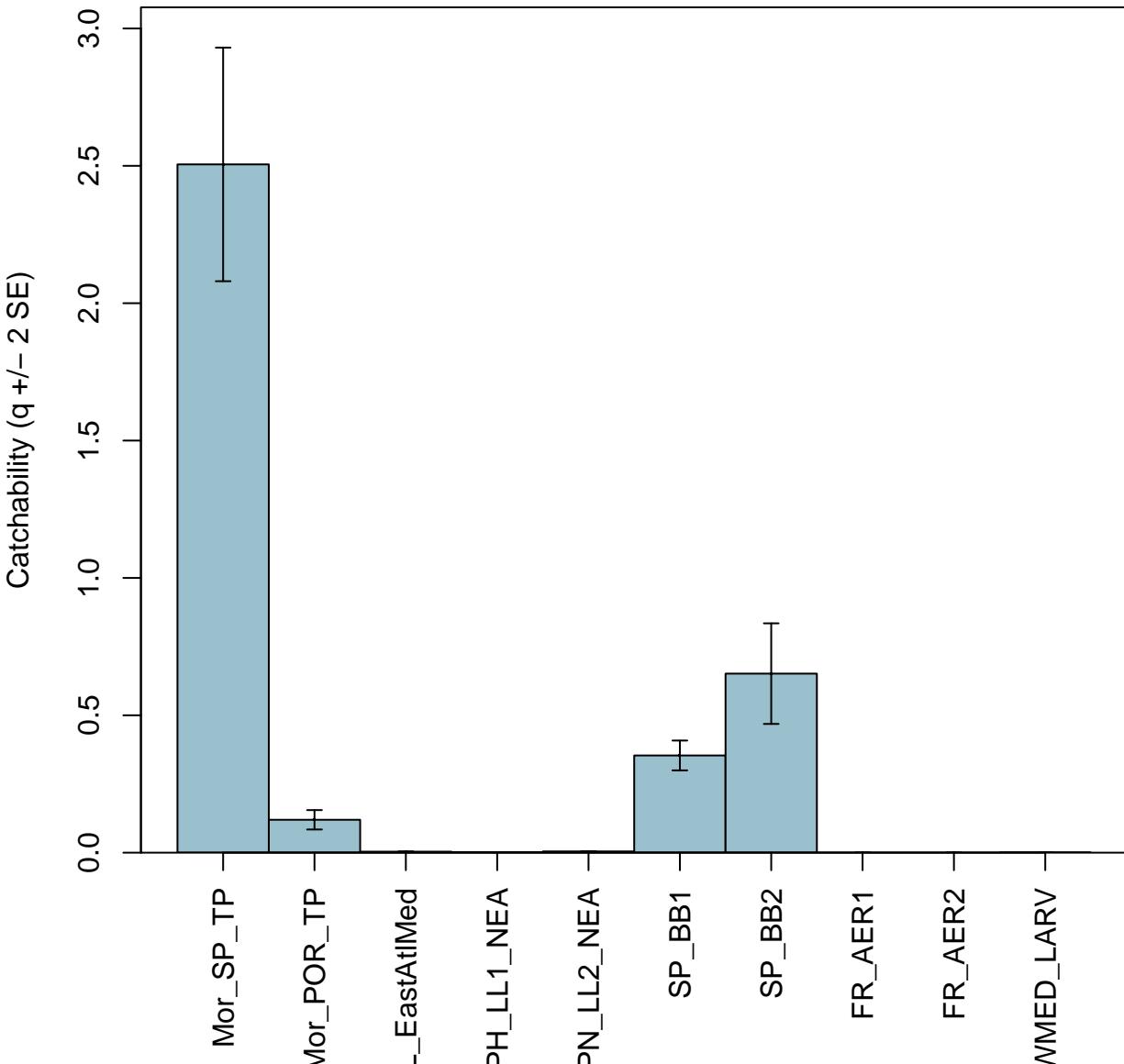
### Catch for Fleet 5 (JPN\_LL\_NEA) Predicted

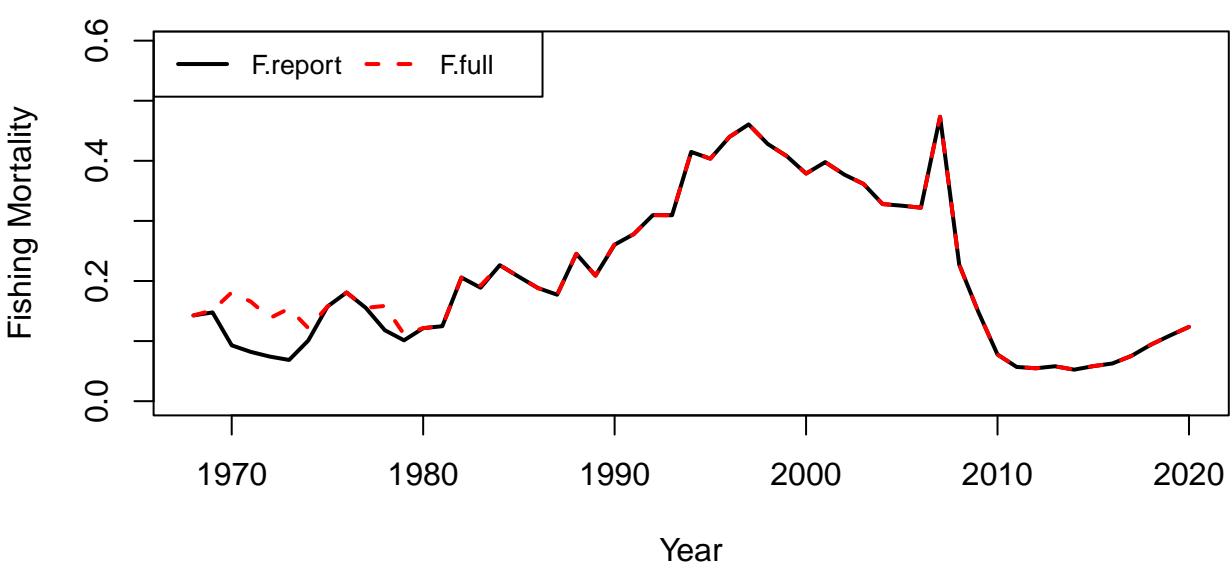
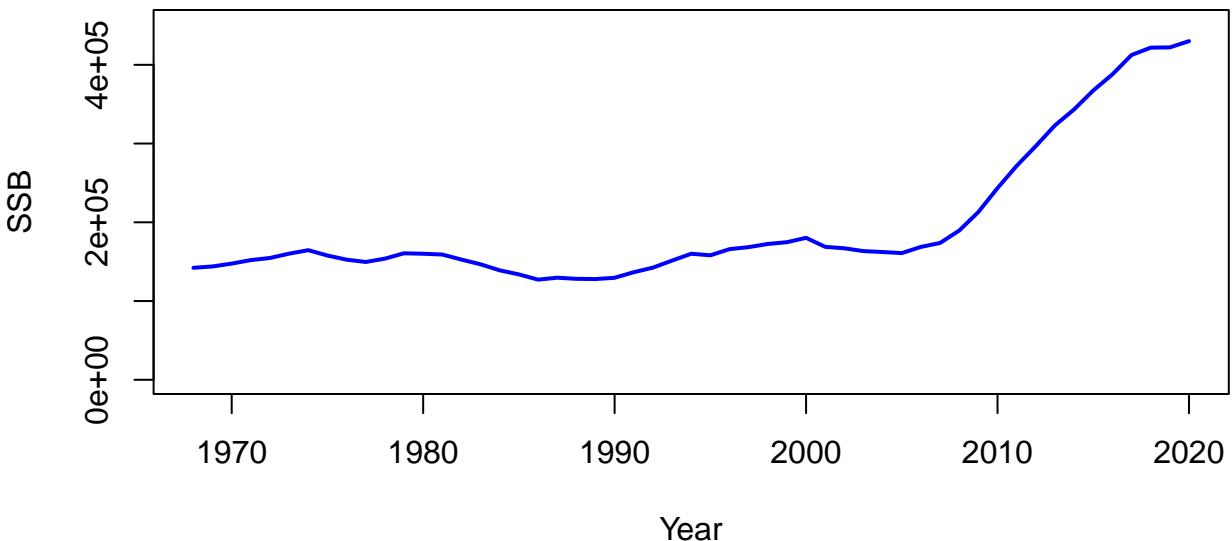
																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										<img alt="Scatter plot 827

## Catch for Fleet 6 (PS\_Med) Observed

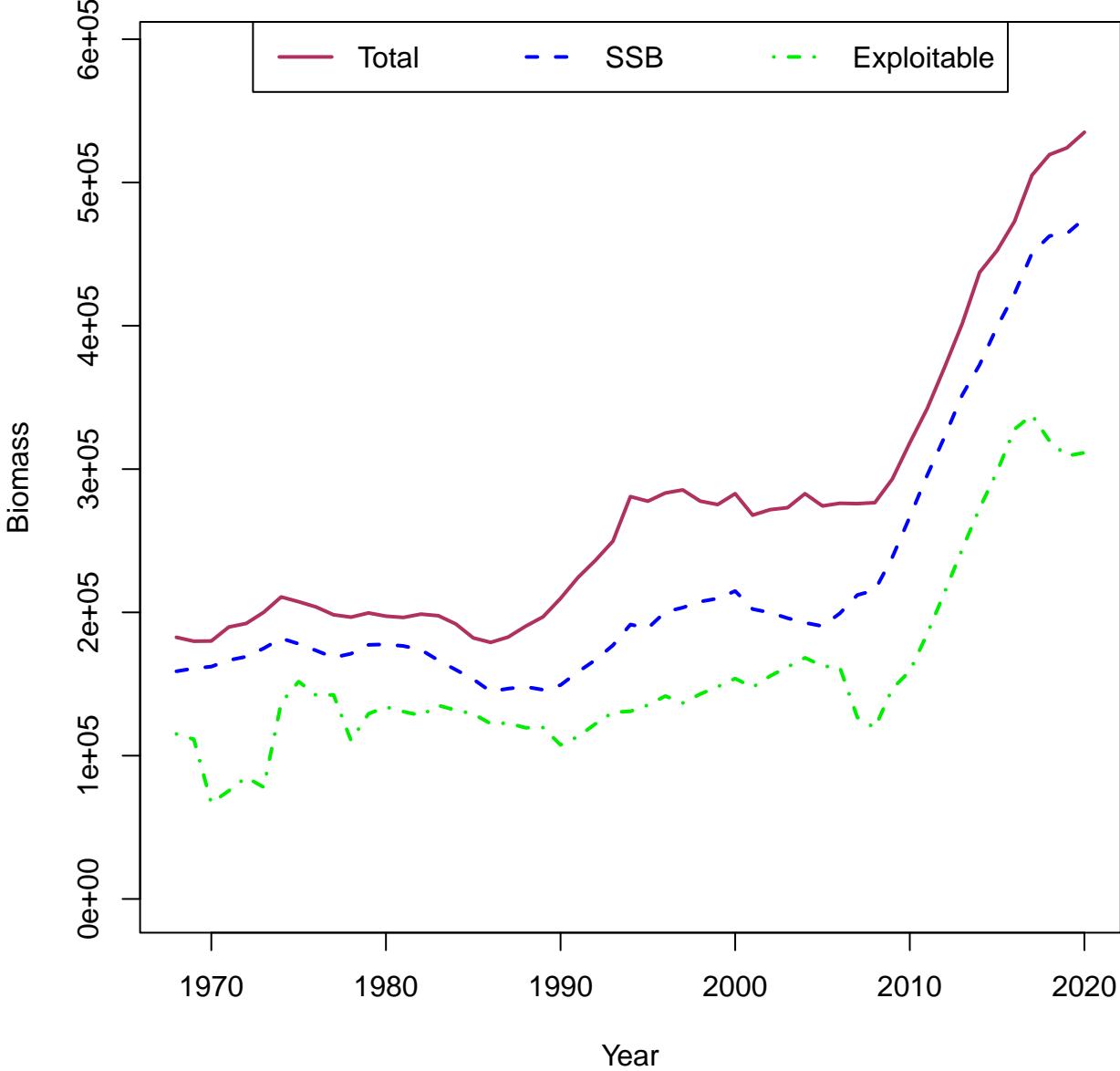
	je-1	ge-1	ge-2	ge-3	ge-4	ge-5	ge-6	ge-7	ge-8
je-1	0.37								
ge-1	0.52	0.62							
ge-2	0.58	0.11	0.54						
ge-3	0.58	0.11	0.54	0.30					
ge-4	0.58	0.11	0.54	0.30	0.58				
ge-5	0.58	0.11	0.54	0.30	0.58	0.44			
ge-6	0.58	0.11	0.54	0.30	0.58	0.44	0.41		
ge-7	0.58	0.11	0.54	0.30	0.58	0.41	0.41	0.69	
ge-8	0.58	0.11	0.54	0.30	0.58	0.41	0.41	0.69	
ge-9	0.52	0.42	0.52	0.43	0.12	0.12	0.12	0.14	
ge-10	0.52	0.42	0.52	0.43	0.12	0.12	0.12	0.14	
ge-11	0.52	0.32	0.28	0.06	-0.11	0.16	0.16	0.03	
ge-12	0.60	0.53	0.40	0.14	0.20	-0.07	0.00	-0.19	
ge-13	0.64	0.47	0.38	0.39	0.25	0.14	-0.11	-0.26	-0.07
ge-14	0.47	0.20	0.11	0.19	0.60	0.50	0.15	-0.29	0.35
ge-15	0.54	0.47	0.23	0.16	0.18	0.48	0.40	0.54	0.18
ge-16	0.57	0.40	0.35	0.04	0.00	0.01	0.28	0.35	0.03
ge-17	0.64	0.45	0.18	0.22	0.12	0.05	0.23	0.16	0.14
ge-18	0.82	0.73	0.42	0.26	0.42	0.27	0.11	0.21	0.42
ge-19	0.70	0.63	0.58	0.37	0.16	0.20	0.36	0.20	0.30

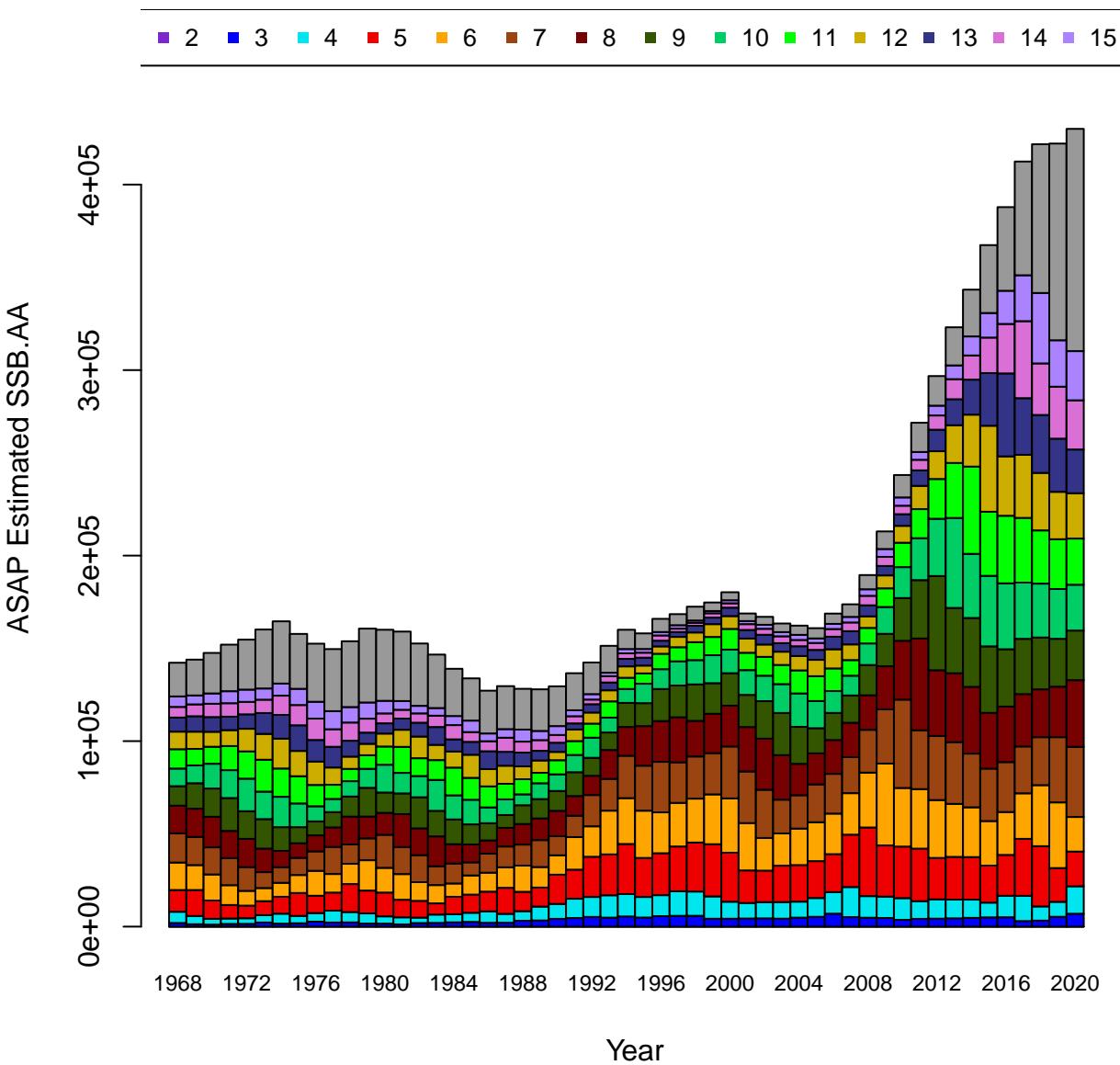
## Catch for Fleet 6 (PS\_Med) Predicted

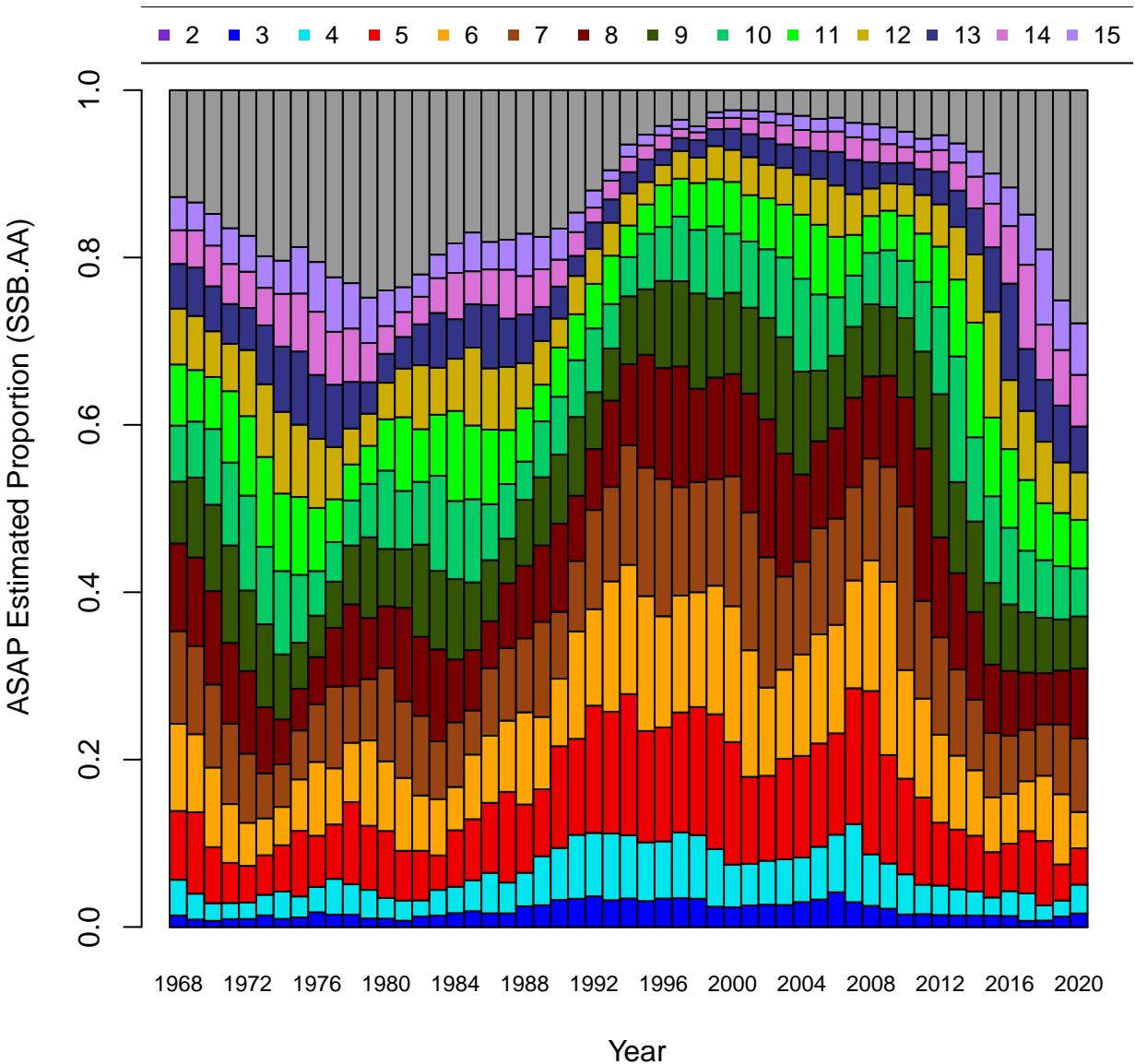


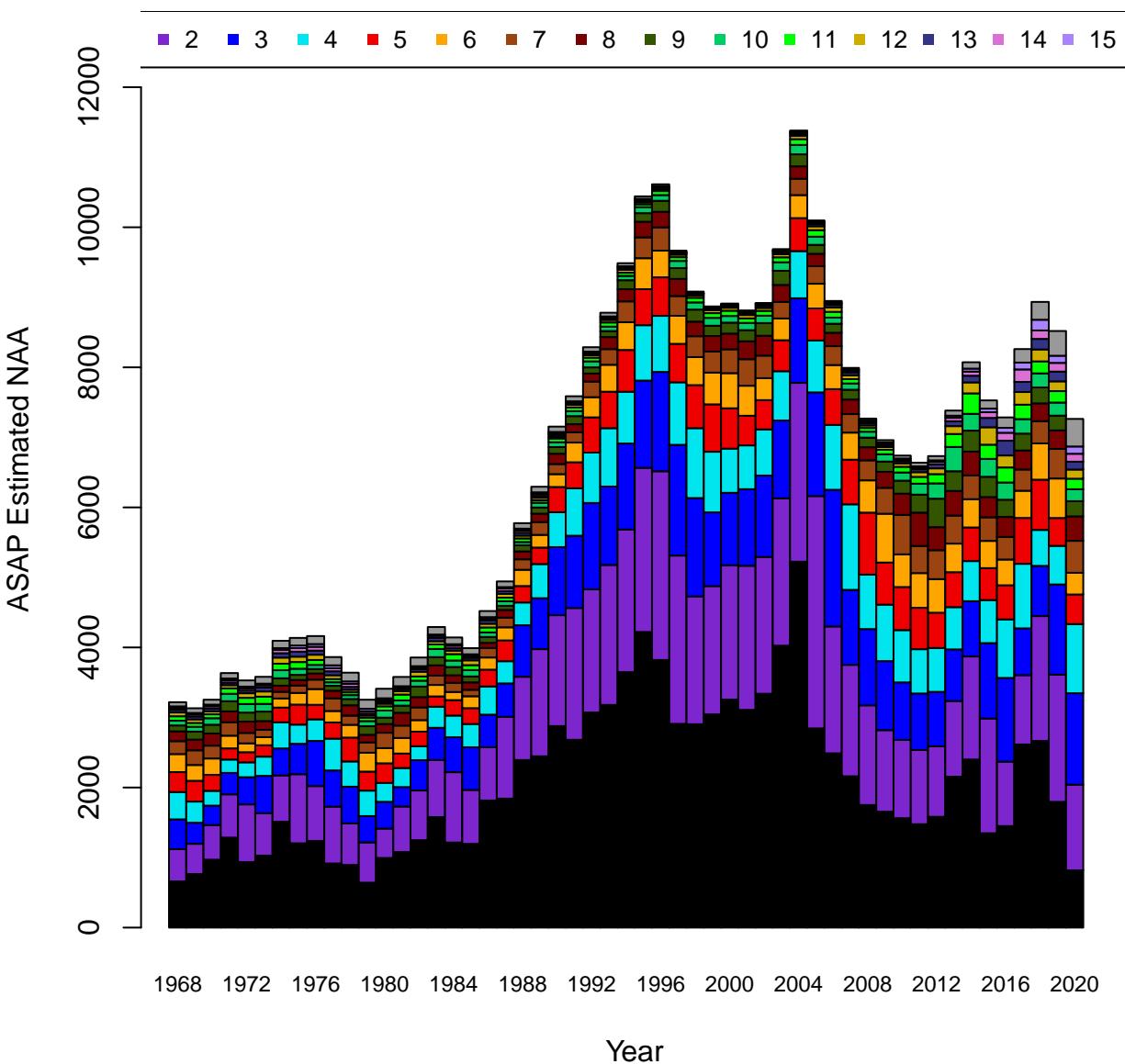


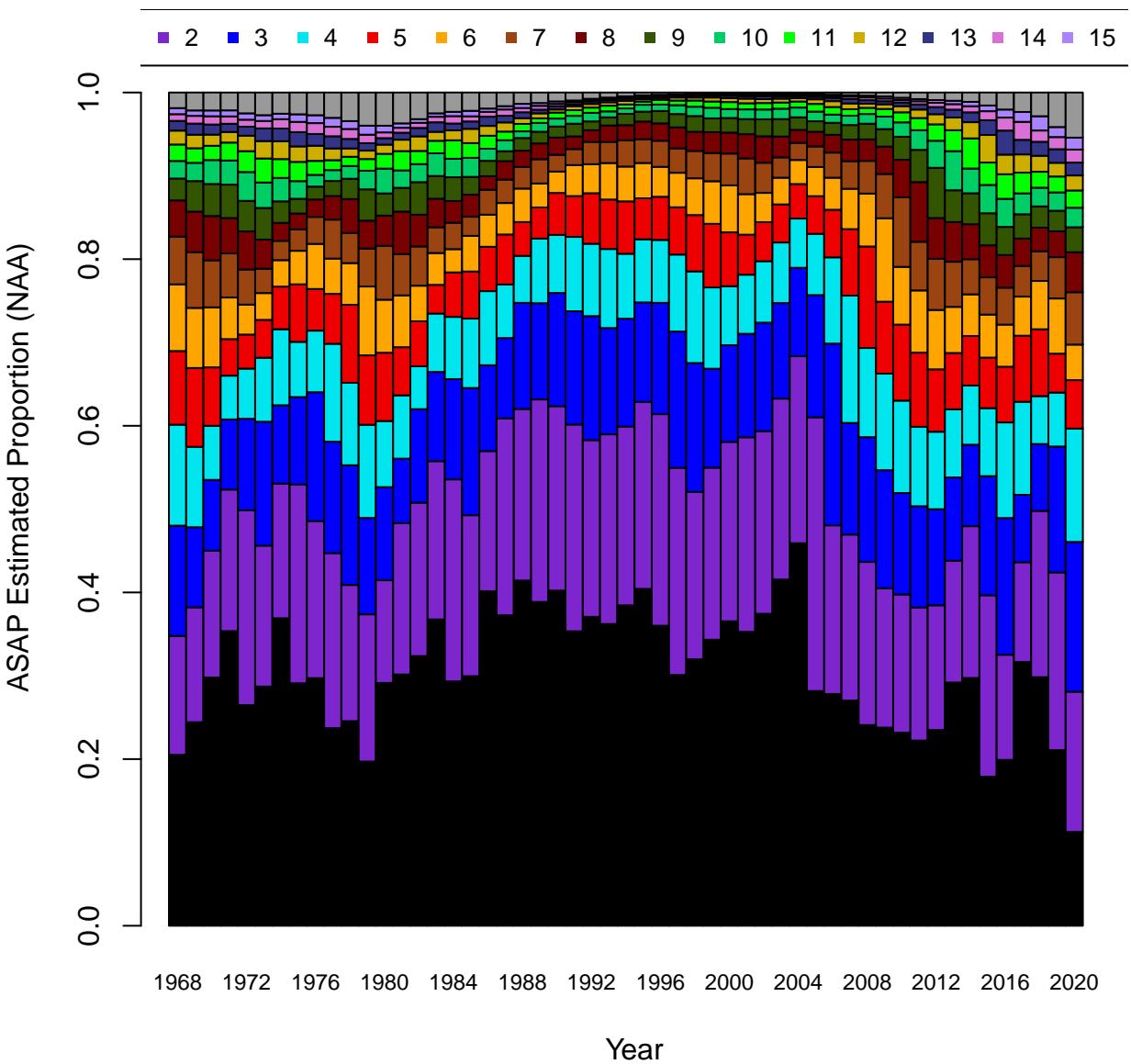
## Comparison of January 1 Biomass

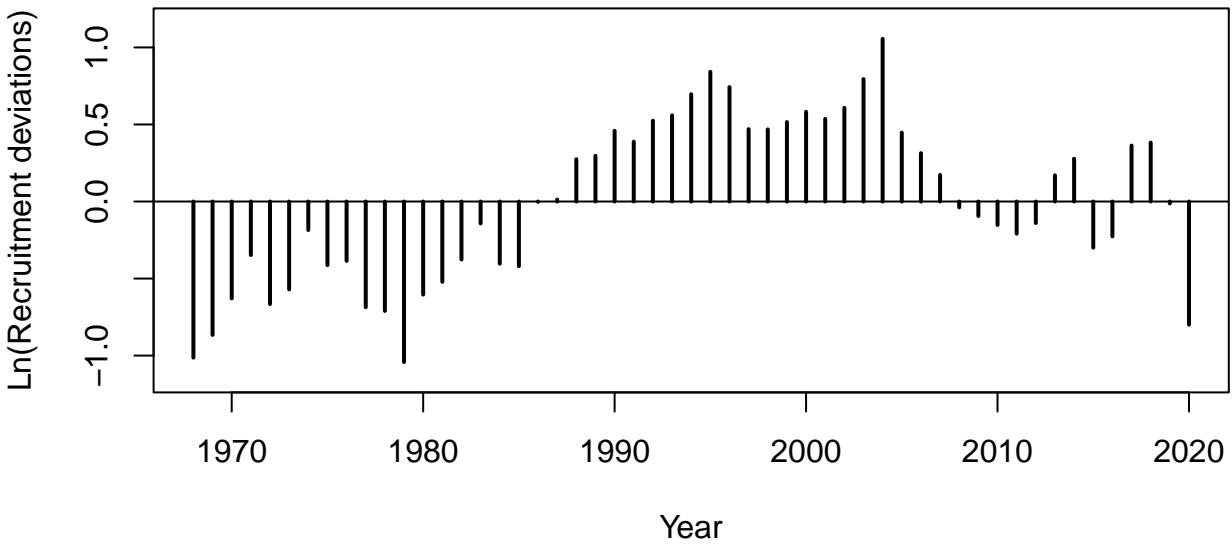
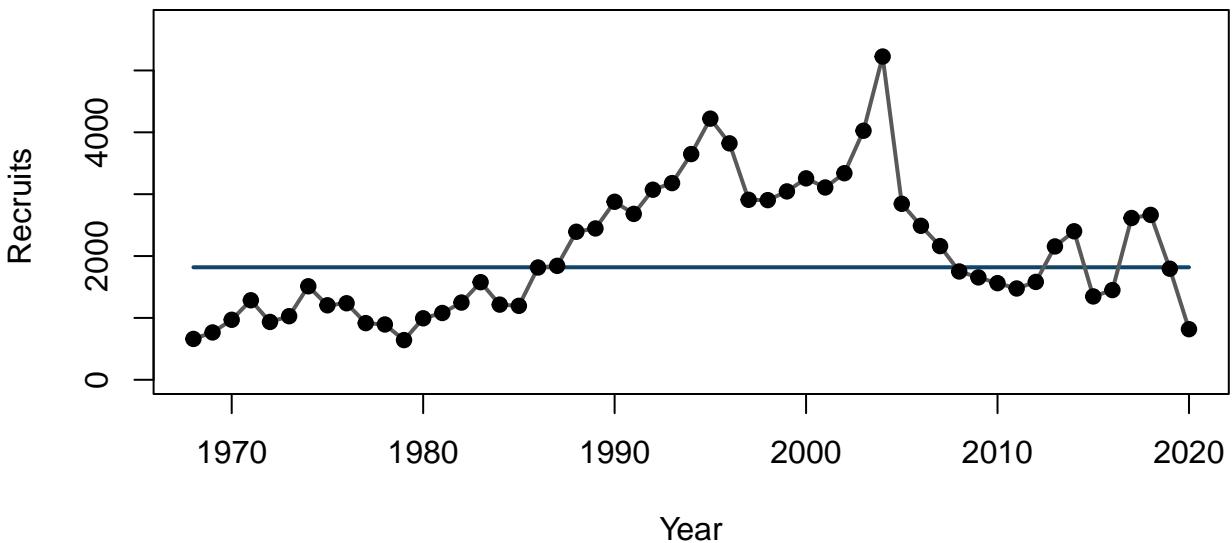


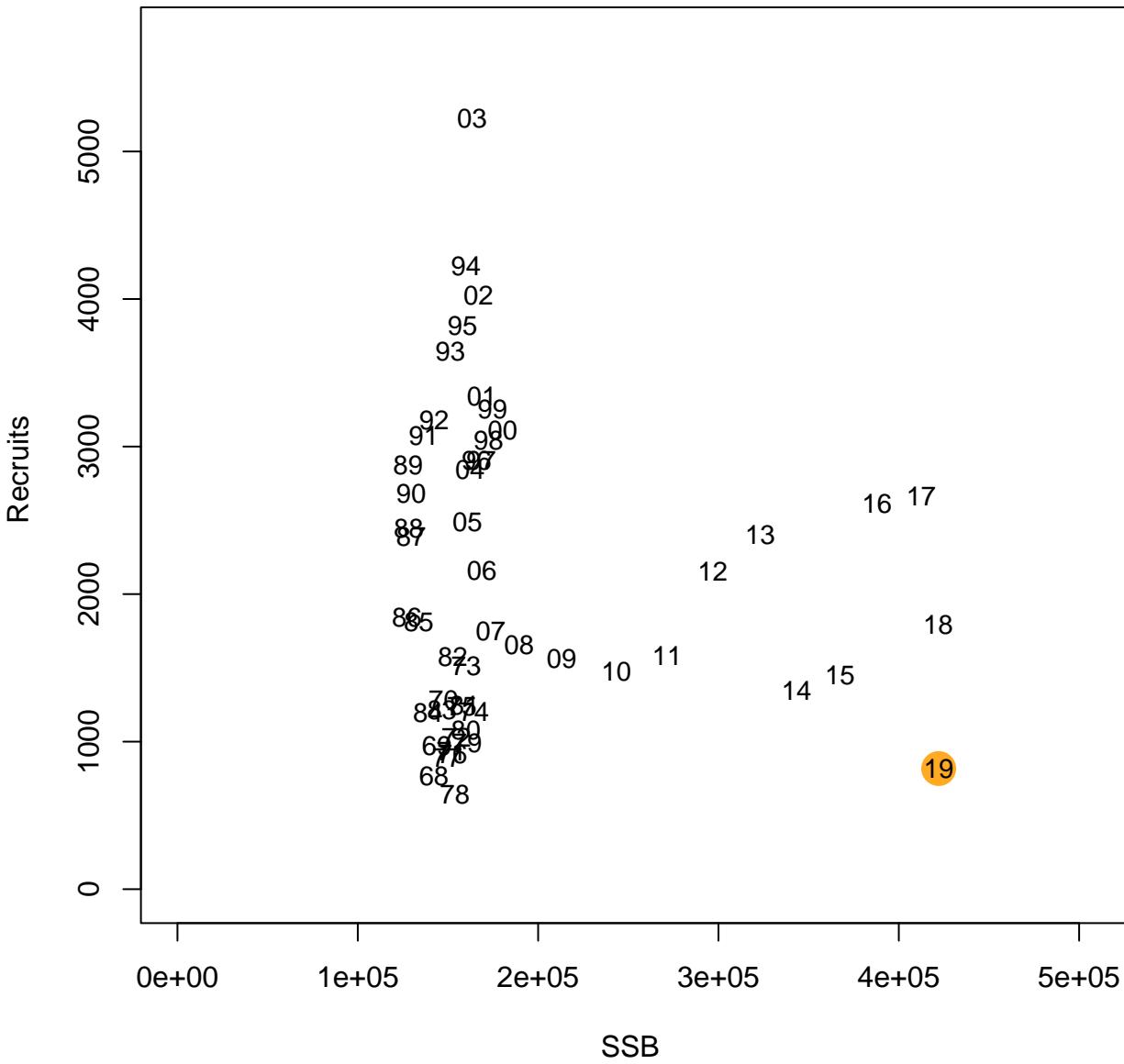


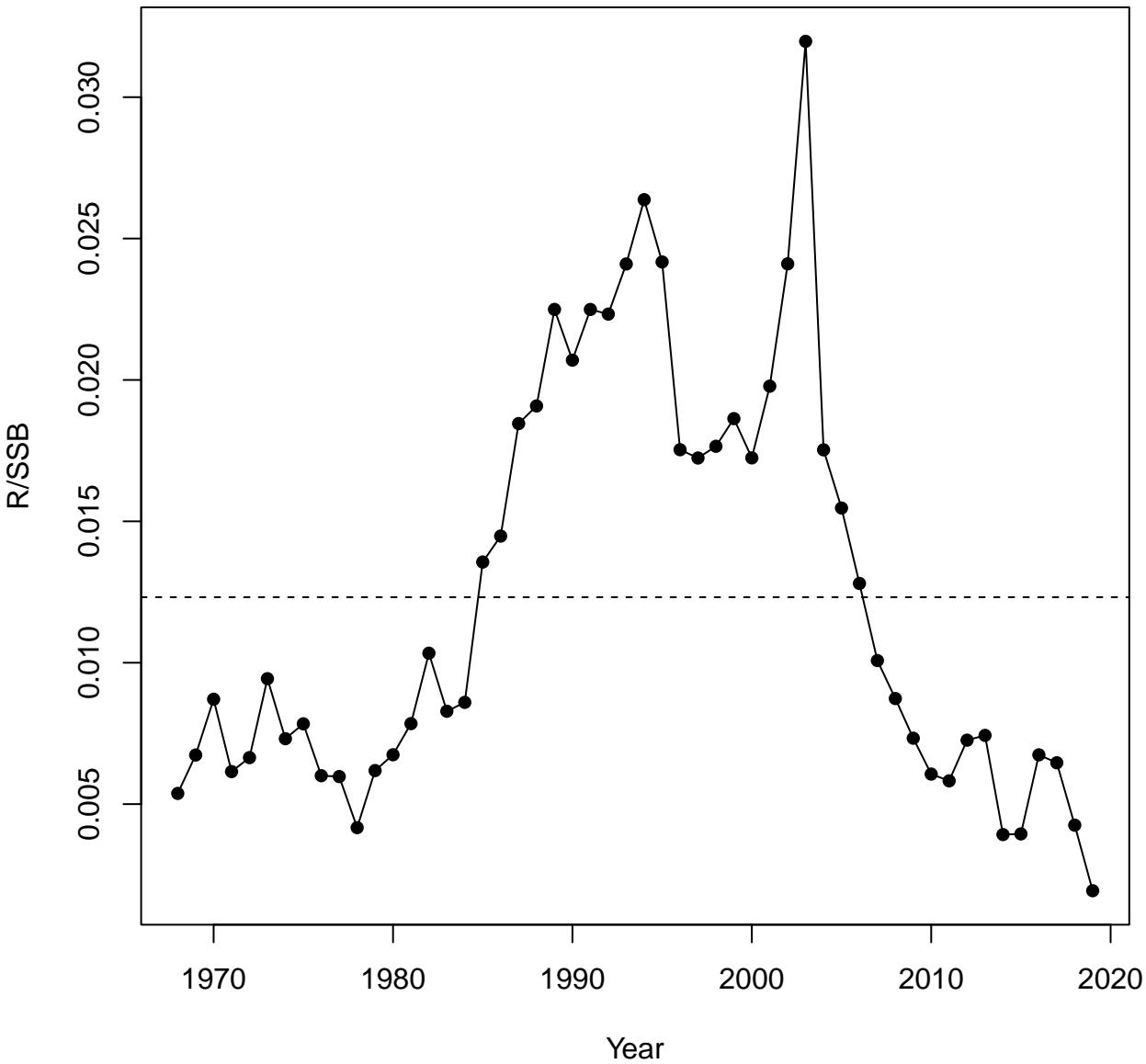


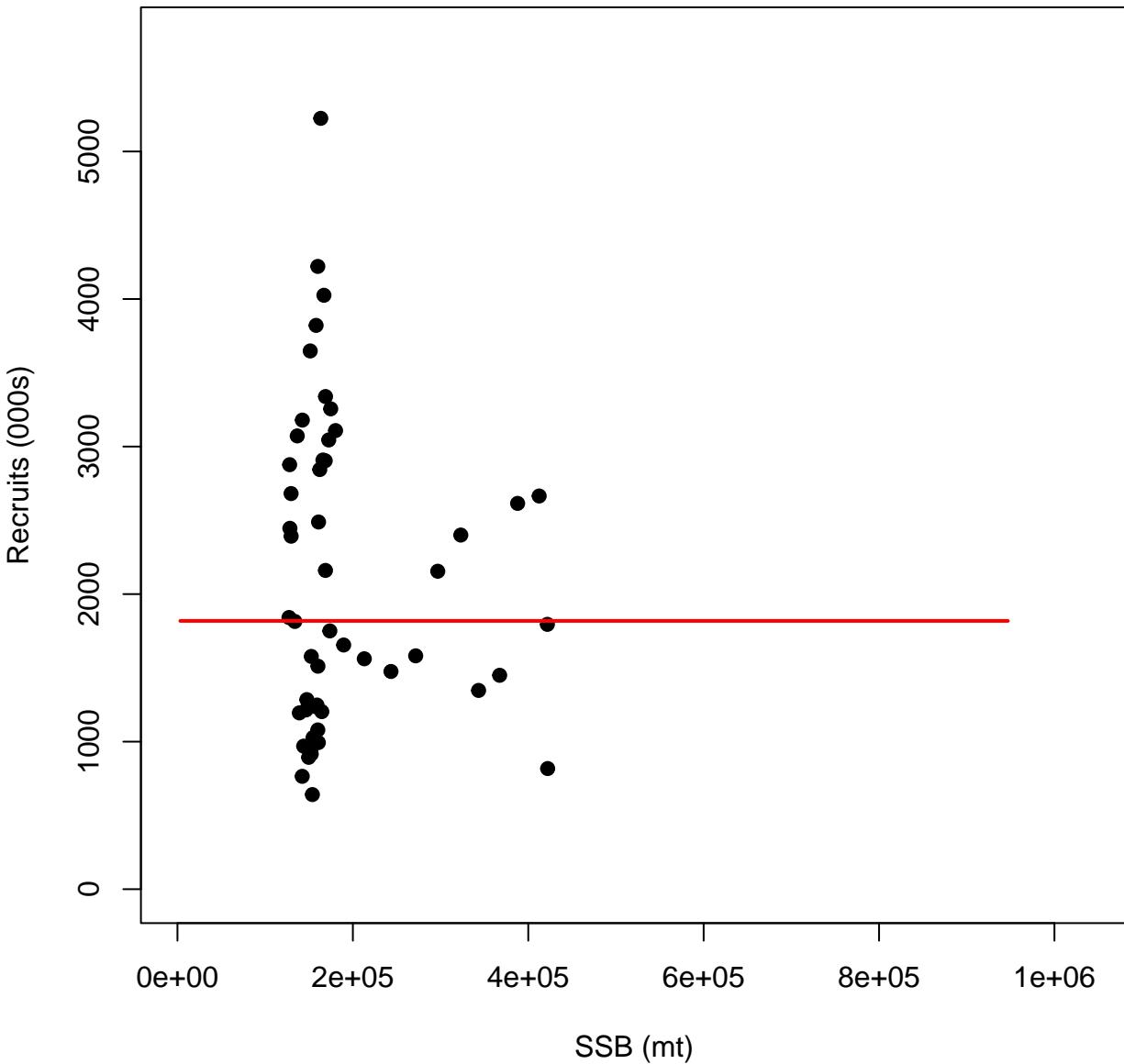


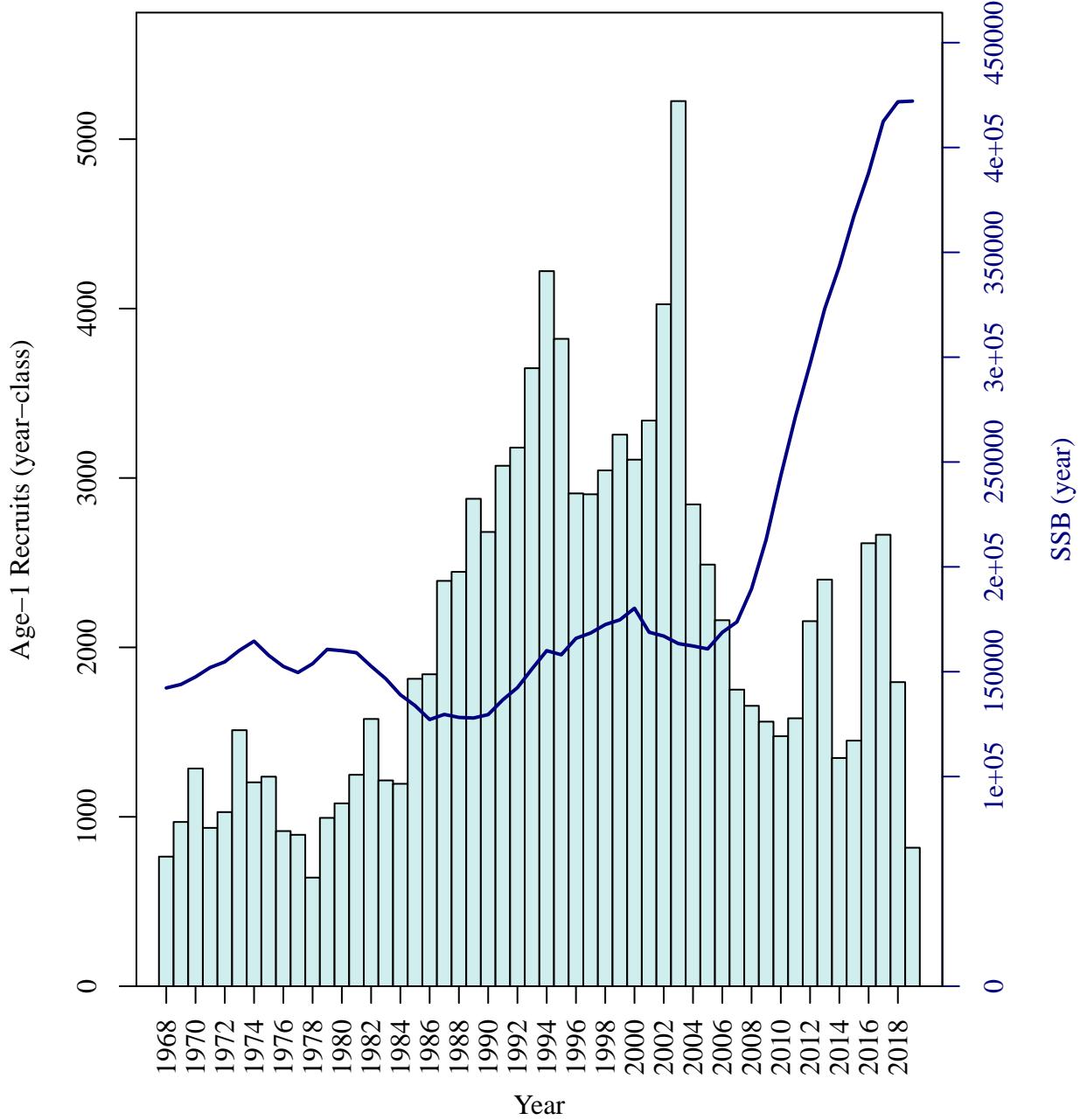


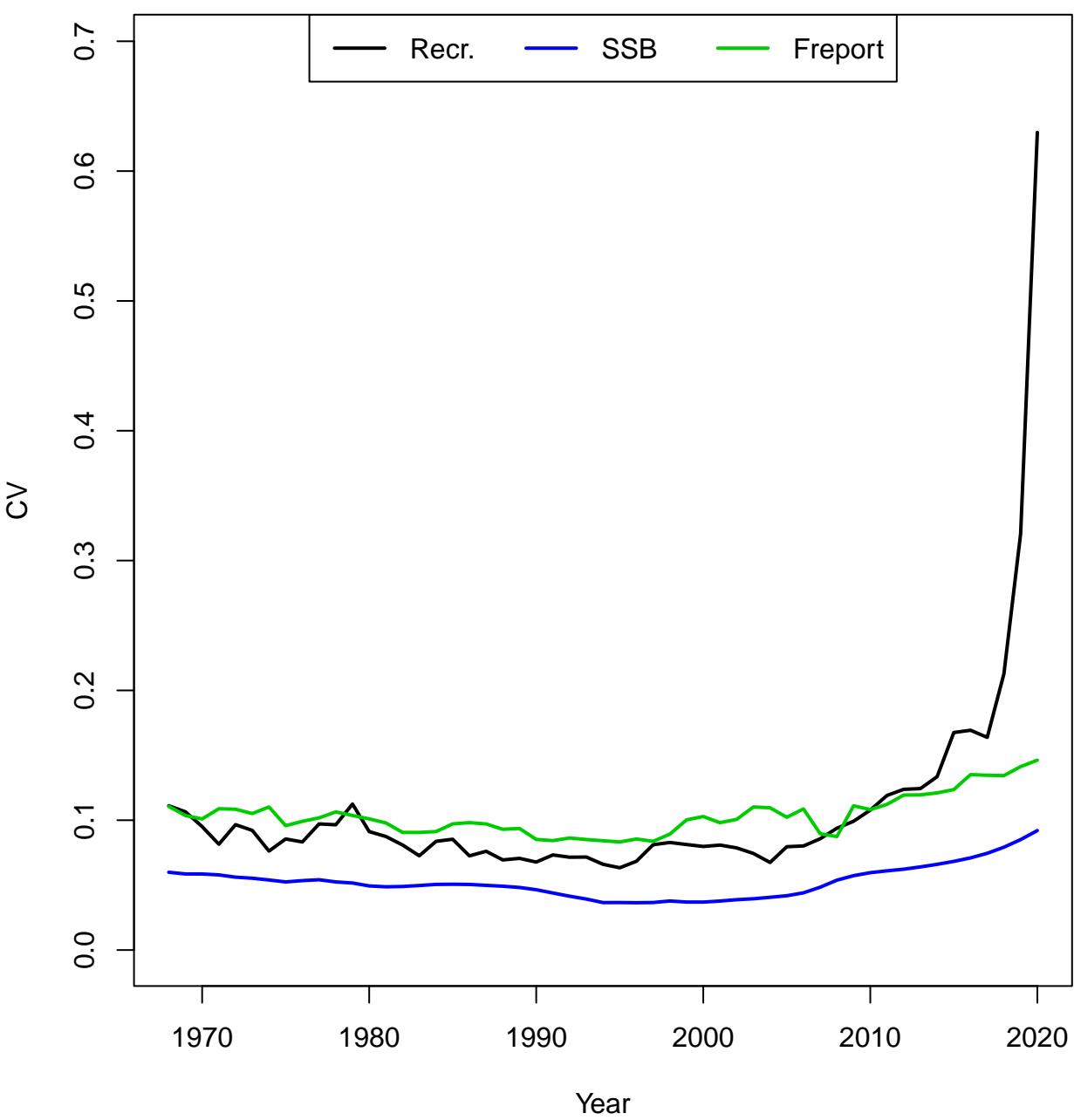




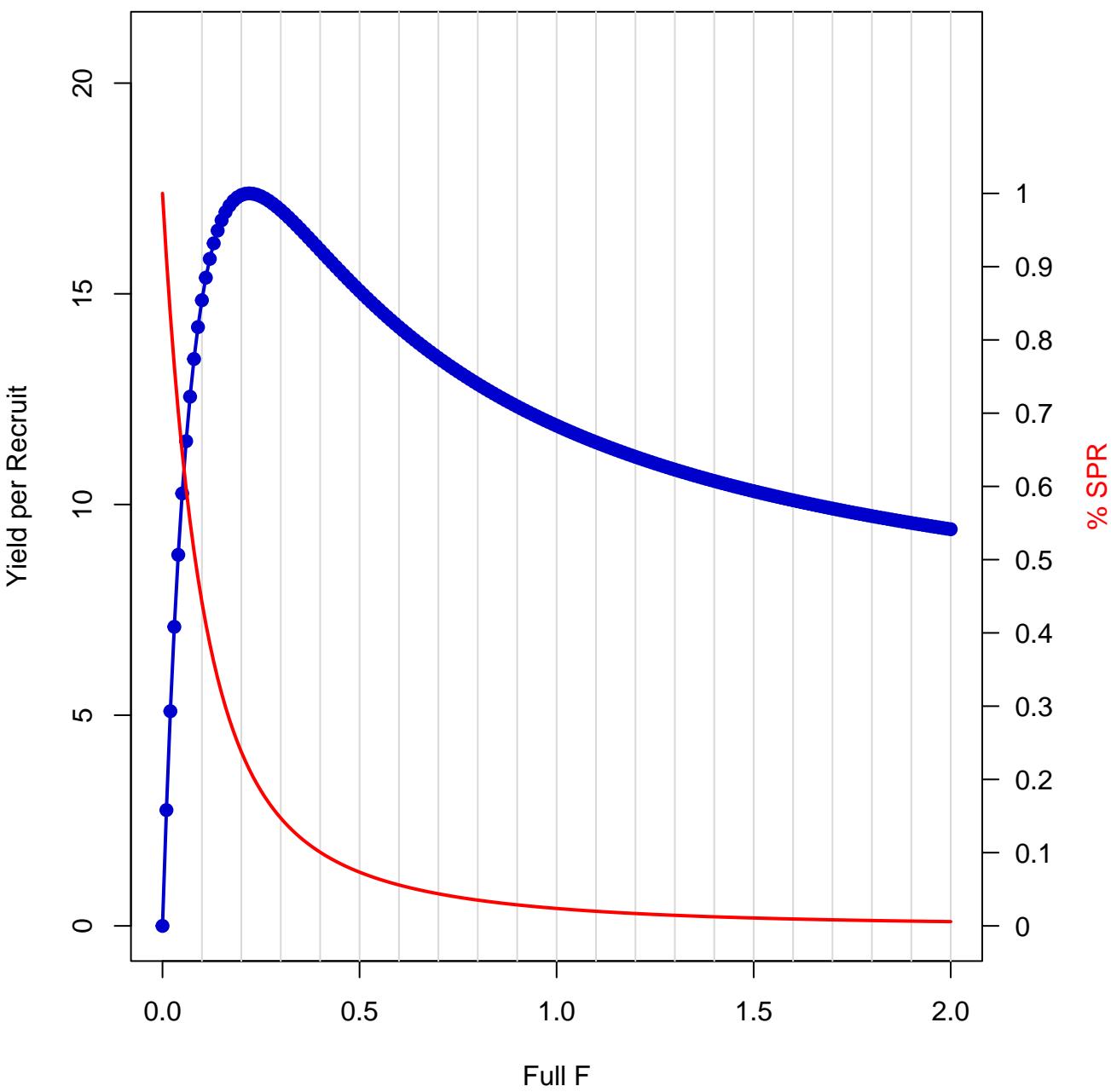








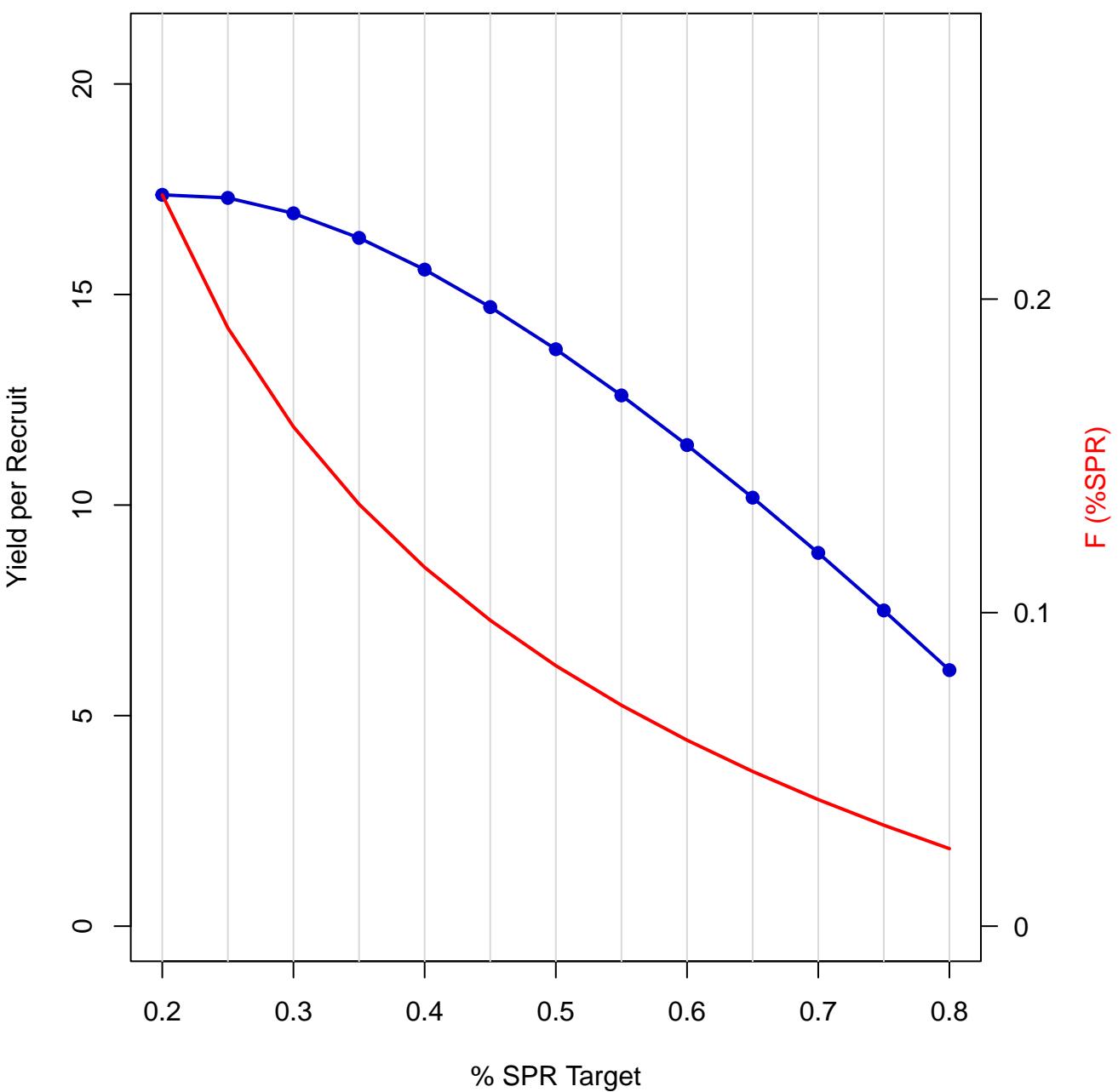
# YPR-SPR Reference Points (Years Avg = 5)



# YPR-SPR Reference Points (Years Avg = 5)

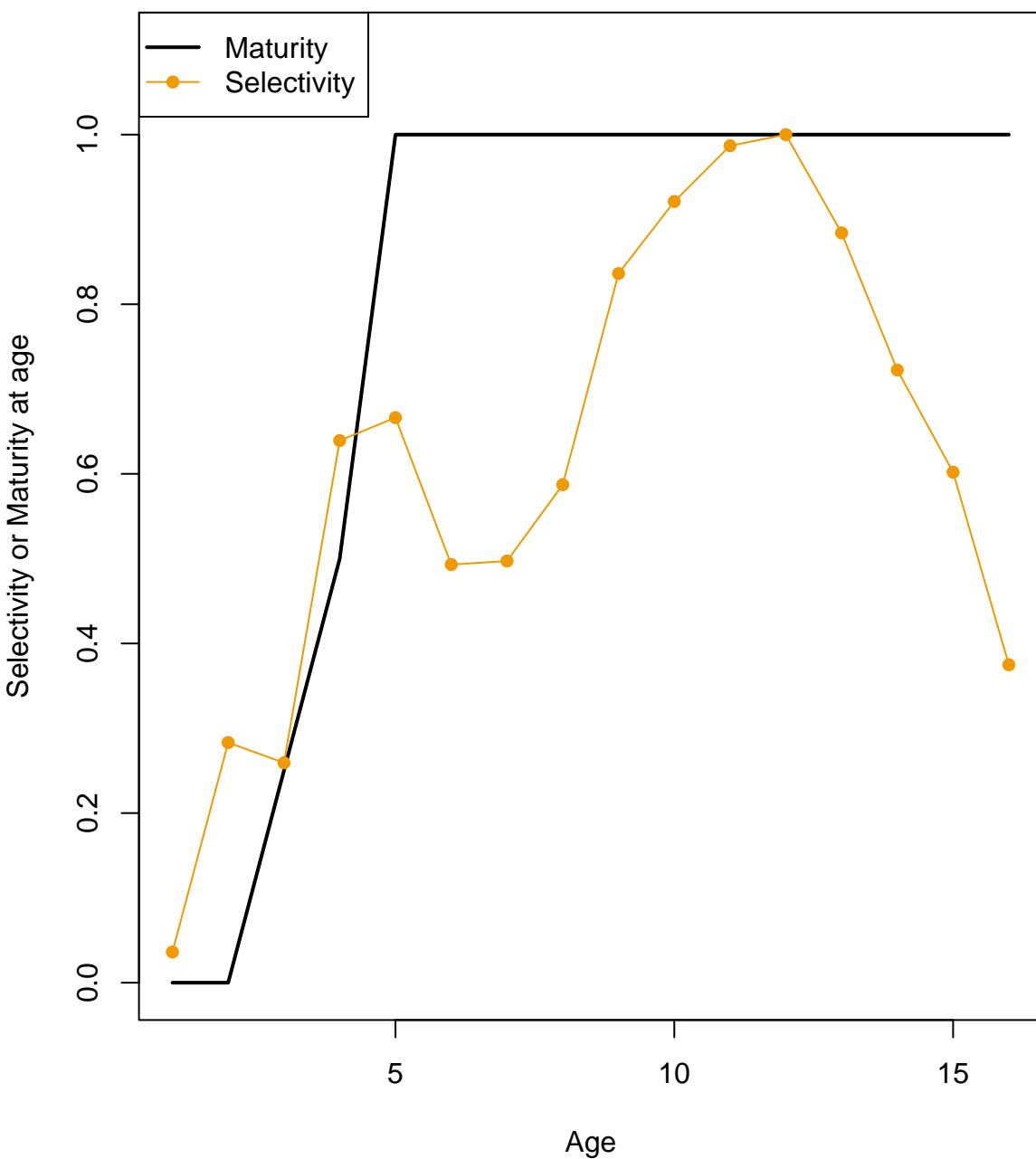
F	YPR	SPR	F	YPR	SPR	F	YPR	SPR
0	0	1	0.35	16.5327	0.1205	0.7	13.4791	0.0439
0.01	2.7488	0.912	0.36	16.4352	0.1161	0.71	13.4123	0.0429
0.02	5.0949	0.8338	0.37	16.3366	0.1119	0.72	13.3465	0.0419
0.03	7.0973	0.7643	0.38	16.2373	0.1079	0.73	13.2818	0.041
0.04	8.8058	0.7022	0.39	16.1375	0.1042	0.74	13.2182	0.0401
0.05	10.2626	0.6466	0.4	16.0376	0.1006	0.75	13.1556	0.0392
0.06	11.5033	0.5968	0.41	15.9378	0.0972	0.76	13.094	0.0384
0.07	12.5581	0.552	0.42	15.8382	0.094	0.77	13.0334	0.0375
0.08	13.453	0.5116	0.43	15.7392	0.091	0.78	12.9737	0.0367
0.09	14.2099	0.4752	0.44	15.6407	0.0881	0.79	12.9151	0.036
0.1	14.8478	0.4422	0.45	15.543	0.0853	0.8	12.8573	0.0352
0.11	15.3828	0.4124	0.46	15.4462	0.0827	0.81	12.8005	0.0345
0.12	15.8289	0.3853	0.47	15.3503	0.0802	0.82	12.7445	0.0338
0.13	16.1981	0.3606	0.48	15.2554	0.0778	0.83	12.6895	0.0331
0.14	16.5007	0.3381	0.49	15.1617	0.0755	0.84	12.6352	0.0324
0.15	16.7457	0.3175	0.5	15.069	0.0734	0.85	12.5819	0.0318
0.16	16.9408	0.2987	0.51	14.9776	0.0713	0.86	12.5293	0.0311
0.17	17.0927	0.2815	0.52	14.8874	0.0693	0.87	12.4776	0.0305
0.18	17.2072	0.2657	0.53	14.7984	0.0673	0.88	12.4267	0.0299
0.19	17.2893	0.2511	0.54	14.7107	0.0655	0.89	12.3765	0.0293
0.2	17.3435	0.2377	0.55	14.6243	0.0637	0.9	12.3271	0.0287
0.21	17.3735	0.2253	0.56	14.5391	0.062	0.91	12.2784	0.0282
0.22	17.3827	0.2139	0.57	14.4553	0.0604	0.92	12.2305	0.0277
0.23	17.3739	0.2033	0.58	14.3727	0.0588	0.93	12.1833	0.0271
0.24	17.3497	0.1935	0.59	14.2915	0.0573	0.94	12.1367	0.0266
0.25	17.3123	0.1843	0.6	14.2115	0.0559	0.95	12.0909	0.0261
0.26	17.2636	0.1759	0.61	14.1327	0.0545	0.96	12.0457	0.0256
0.27	17.2052	0.168	0.62	14.0553	0.0531	0.97	12.0012	0.0252
0.28	17.1386	0.1606	0.63	13.9791	0.0518	0.98	11.9574	0.0247
0.29	17.0652	0.1537	0.64	13.9041	0.0506	0.99	11.9141	0.0242
0.3	16.9859	0.1473	0.65	13.8303	0.0493	1	11.8715	0.0238
0.31	16.9018	0.1412	0.66	13.7577	0.0482	1.01	11.8295	0.0234
0.32	16.8138	0.1356	0.67	13.6864	0.047	1.02	11.7881	0.023
0.33	16.7225	0.1302	0.68	13.6161	0.0459	1.03	11.7472	0.0226
0.34	16.6286	0.1252	0.69	13.5471	0.0449	1.04	11.7069	0.0222

## SPR Target Reference Points (Years Avg = 5)

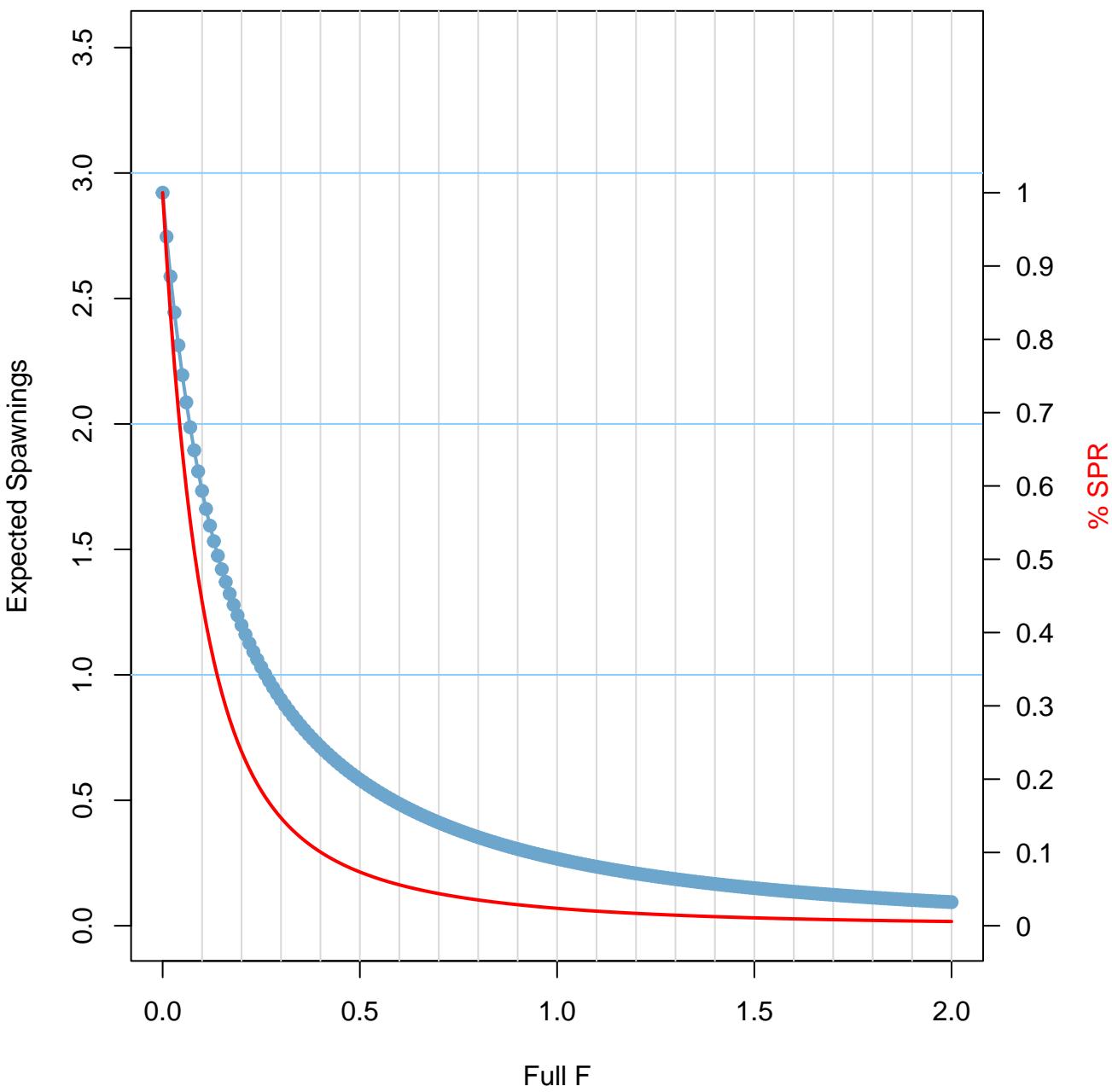


## SPR Target Reference Points (Years Avg = 5)

% SPR	F(%SPR)	YPR
0.2	0.2333	17.3676
0.25	0.1908	17.2946
0.3	0.1593	16.9285
0.35	0.1346	16.3446
0.4	0.1144	15.5914
0.45	0.0976	14.702
0.5	0.0831	13.7001
0.55	0.0705	12.6032
0.6	0.0593	11.4249
0.65	0.0494	10.1757
0.7	0.0404	8.864
0.75	0.0322	7.4968
0.8	0.0247	6.0799



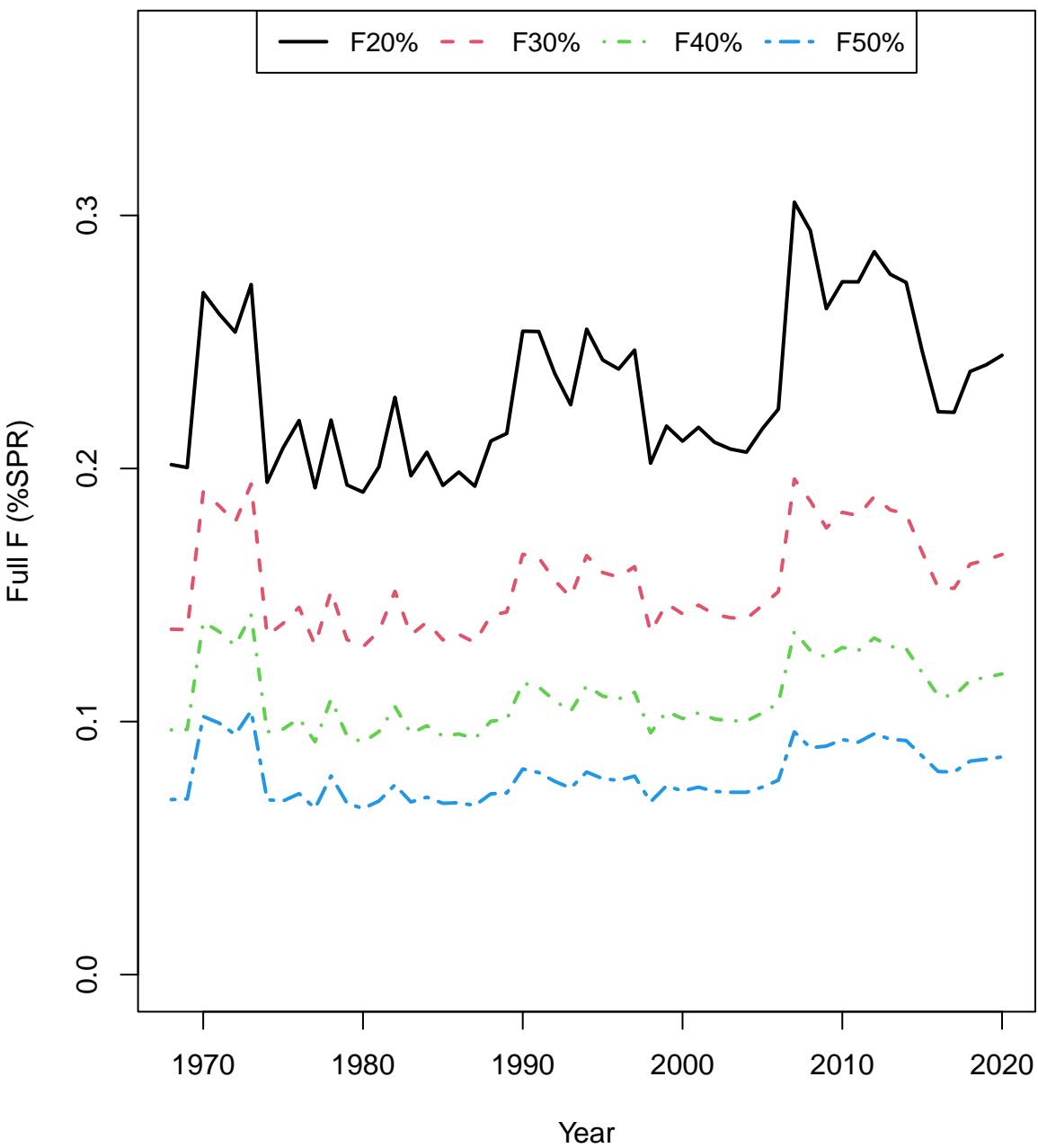
# Expected Spawnings and SPR Reference Points (Years Avg = 5)



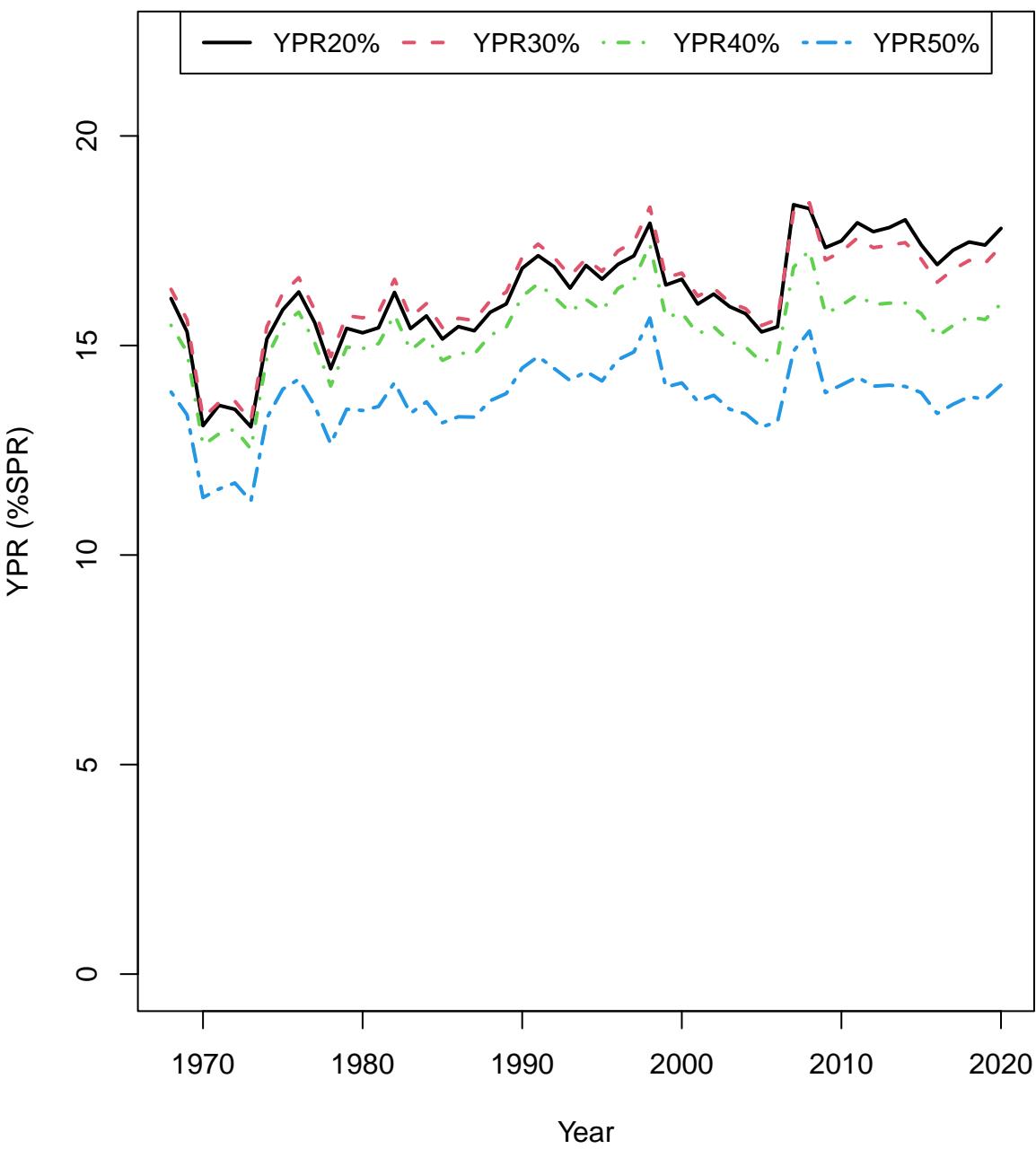
# Expected Spawnings & SPR Reference Points (Years Avg = 5)

F	E[Sp]	SPR	F	E[Sp]	SPR	F	E[Sp]	SPR
0	2.9215	1	0.35	0.7981	0.1205	0.7	0.4116	0.0439
0.01	2.746	0.912	0.36	0.7799	0.1161	0.71	0.4051	0.0429
0.02	2.5875	0.8338	0.37	0.7623	0.1119	0.72	0.3988	0.0419
0.03	2.4439	0.7643	0.38	0.7454	0.1079	0.73	0.3926	0.041
0.04	2.3135	0.7022	0.39	0.7291	0.1042	0.74	0.3865	0.0401
0.05	2.1947	0.6466	0.4	0.7134	0.1006	0.75	0.3806	0.0392
0.06	2.086	0.5968	0.41	0.6983	0.0972	0.76	0.3749	0.0384
0.07	1.9865	0.552	0.42	0.6836	0.094	0.77	0.3692	0.0375
0.08	1.8951	0.5116	0.43	0.6695	0.091	0.78	0.3637	0.0367
0.09	1.8109	0.4752	0.44	0.6558	0.0881	0.79	0.3583	0.036
0.1	1.7332	0.4422	0.45	0.6426	0.0853	0.8	0.353	0.0352
0.11	1.6612	0.4124	0.46	0.6298	0.0827	0.81	0.3478	0.0345
0.12	1.5945	0.3853	0.47	0.6174	0.0802	0.82	0.3427	0.0338
0.13	1.5325	0.3606	0.48	0.6054	0.0778	0.83	0.3378	0.0331
0.14	1.4747	0.3381	0.49	0.5938	0.0755	0.84	0.3329	0.0324
0.15	1.4207	0.3175	0.5	0.5825	0.0734	0.85	0.3282	0.0318
0.16	1.3703	0.2987	0.51	0.5715	0.0713	0.86	0.3235	0.0311
0.17	1.323	0.2815	0.52	0.5609	0.0693	0.87	0.319	0.0305
0.18	1.2786	0.2657	0.53	0.5506	0.0673	0.88	0.3145	0.0299
0.19	1.2369	0.2511	0.54	0.5405	0.0655	0.89	0.3101	0.0293
0.2	1.1976	0.2377	0.55	0.5308	0.0637	0.9	0.3058	0.0287
0.21	1.1605	0.2253	0.56	0.5213	0.062	0.91	0.3016	0.0282
0.22	1.1254	0.2139	0.57	0.512	0.0604	0.92	0.2975	0.0277
0.23	1.0922	0.2033	0.58	0.5031	0.0588	0.93	0.2934	0.0271
0.24	1.0607	0.1935	0.59	0.4943	0.0573	0.94	0.2895	0.0266
0.25	1.0308	0.1843	0.6	0.4858	0.0559	0.95	0.2856	0.0261
0.26	1.0024	0.1759	0.61	0.4775	0.0545	0.96	0.2818	0.0256
0.27	0.9754	0.168	0.62	0.4694	0.0531	0.97	0.278	0.0252
0.28	0.9496	0.1606	0.63	0.4616	0.0518	0.98	0.2744	0.0247
0.29	0.925	0.1537	0.64	0.4539	0.0506	0.99	0.2708	0.0242
0.3	0.9015	0.1473	0.65	0.4464	0.0493	1	0.2672	0.0238
0.31	0.879	0.1412	0.66	0.4391	0.0482	1.01	0.2638	0.0234
0.32	0.8575	0.1356	0.67	0.432	0.047	1.02	0.2604	0.023
0.33	0.8369	0.1302	0.68	0.425	0.0459	1.03	0.257	0.0226
0.34	0.8171	0.1252	0.69	0.4182	0.0449	1.04	0.2538	0.0222

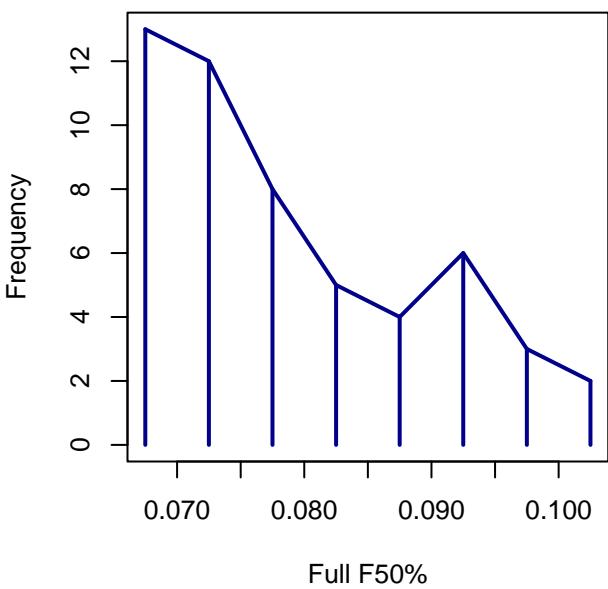
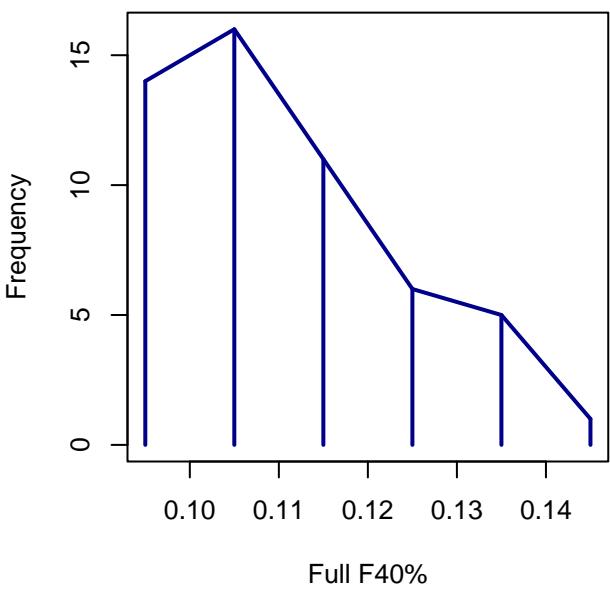
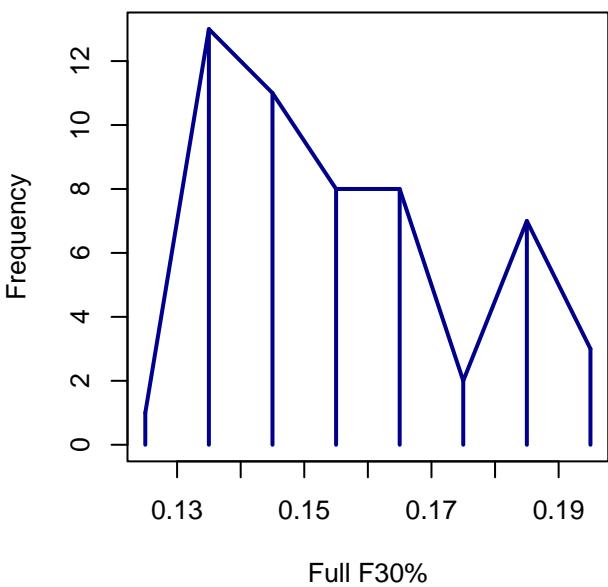
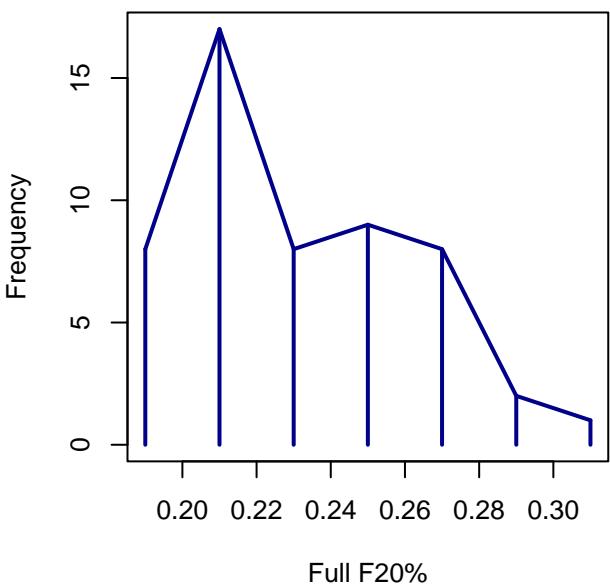
# Annual F(%SPR) Reference Points



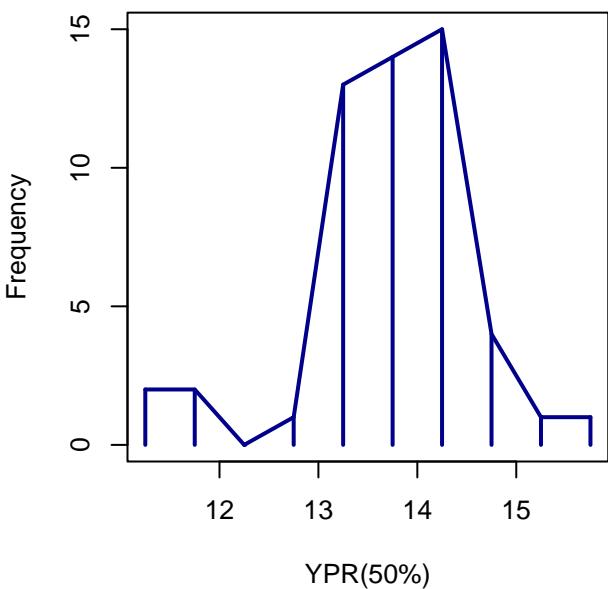
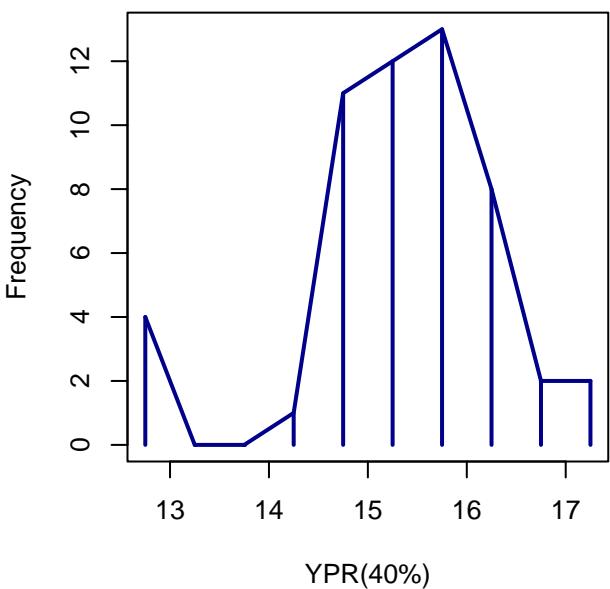
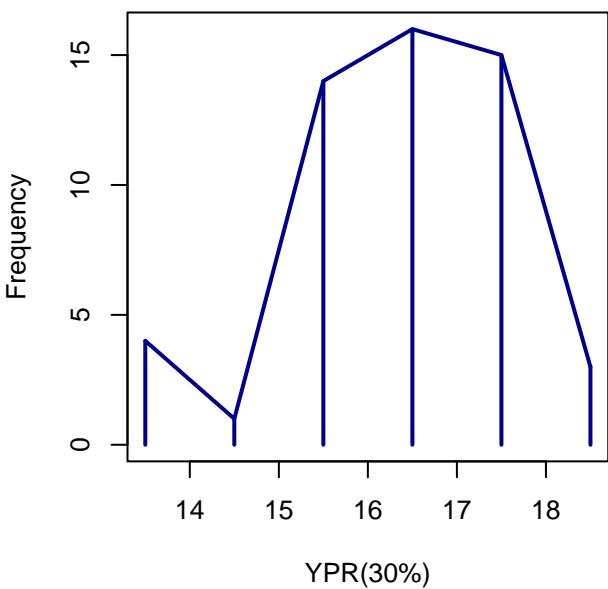
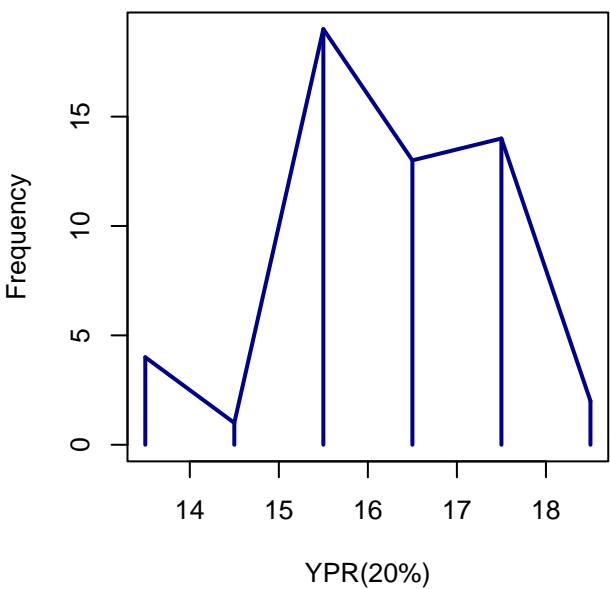
# Annual YPR(%SPR) Reference Points

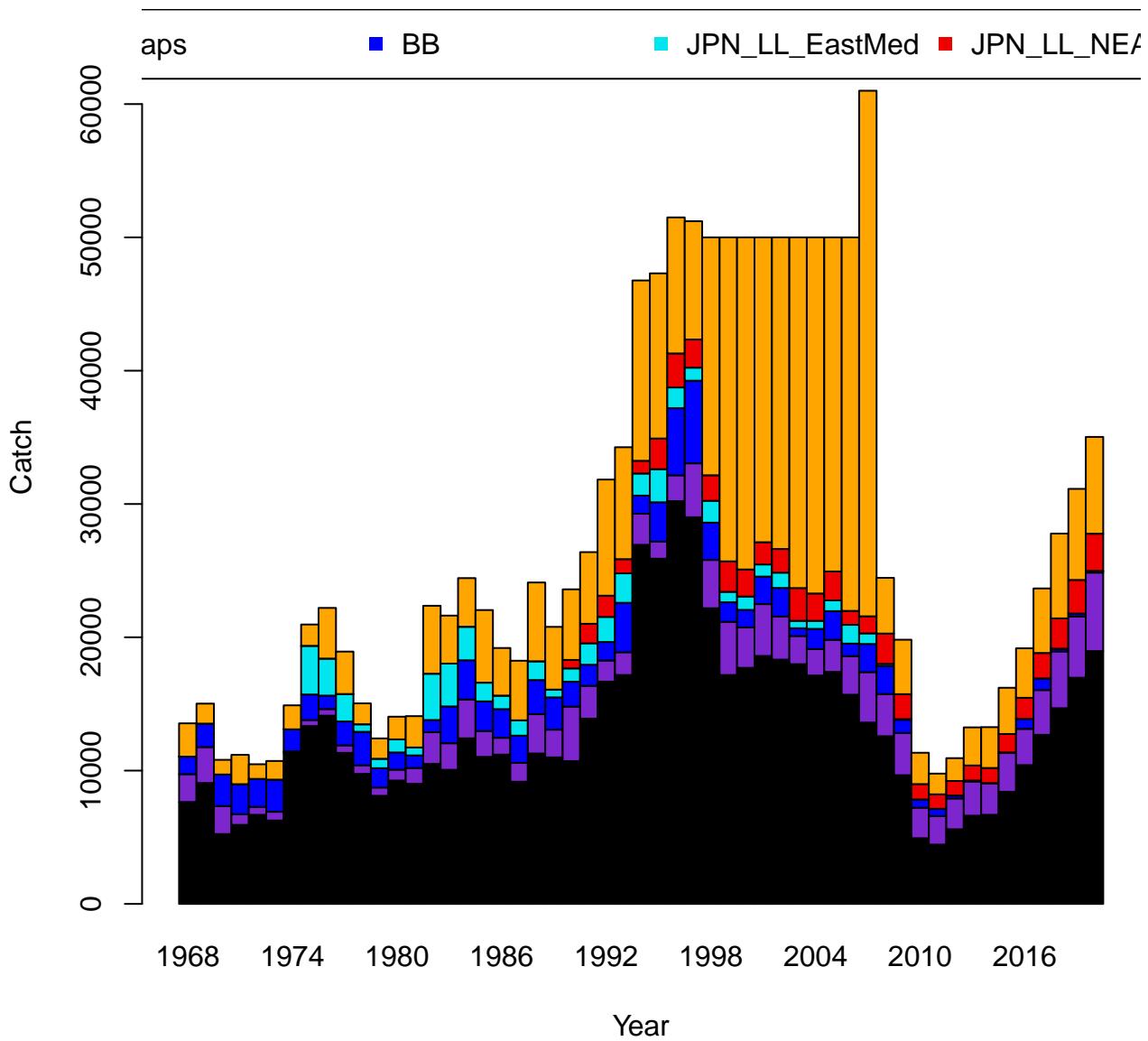


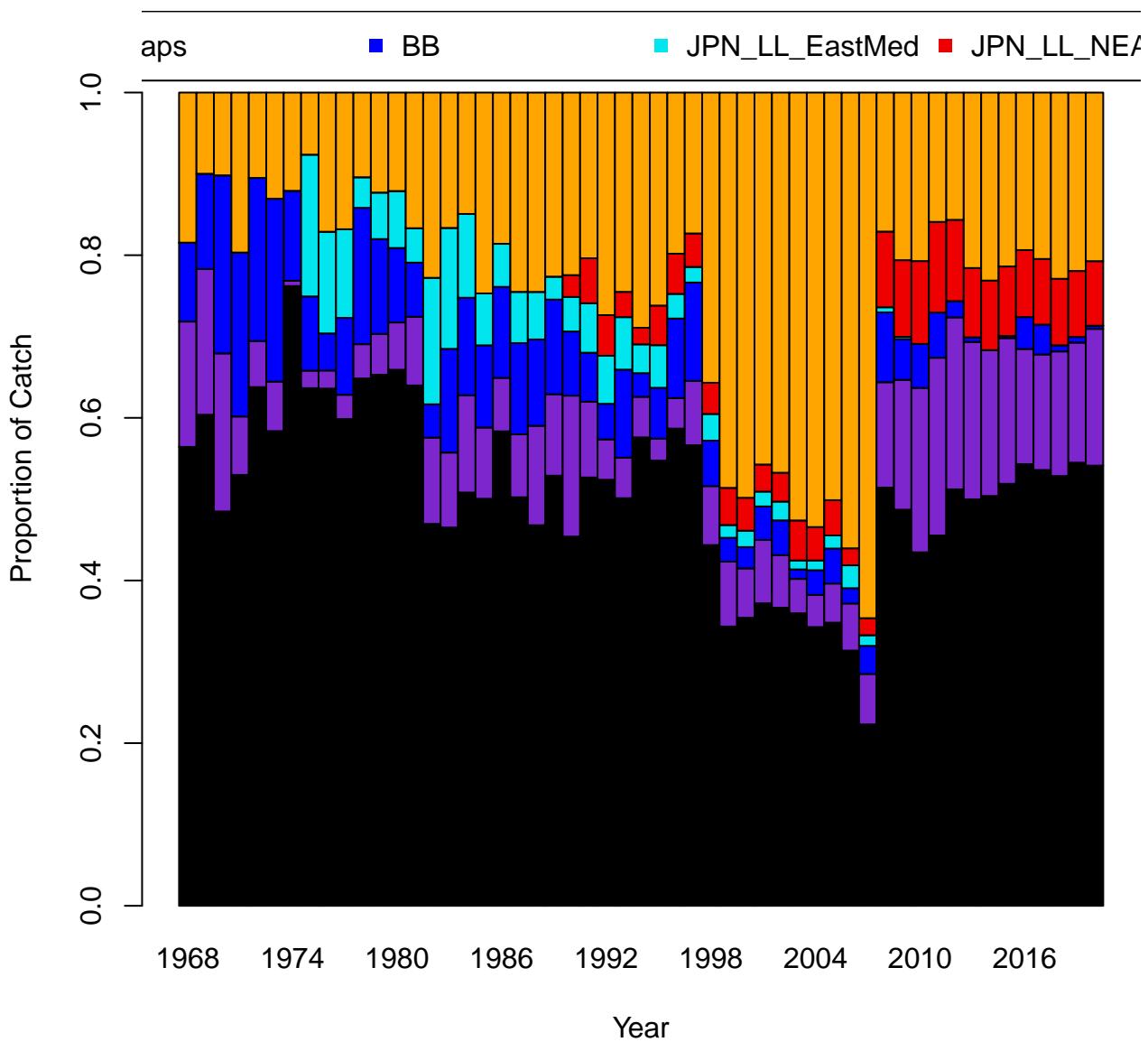
### Annual F (%SPR) Reference Points



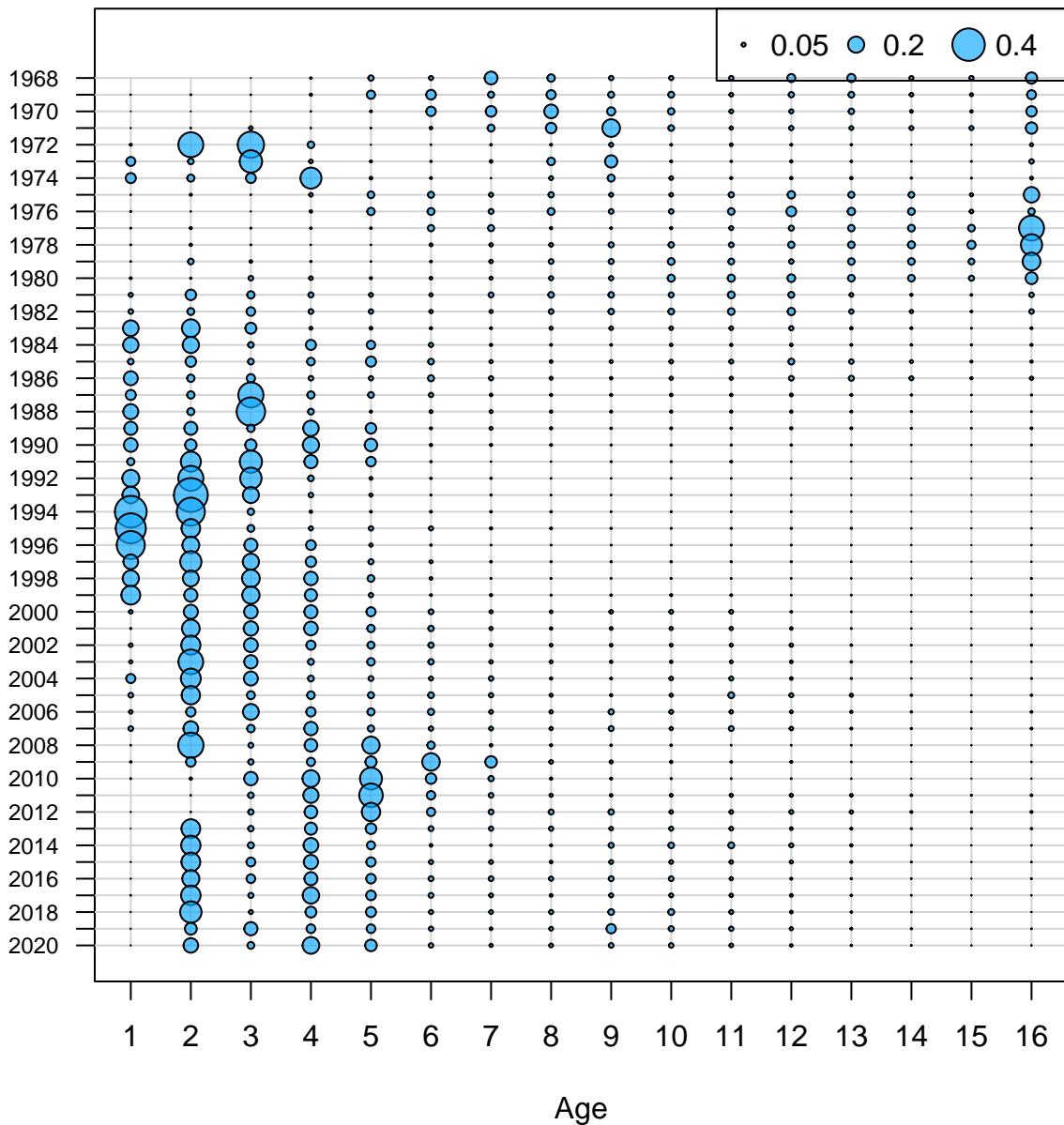
### Annual YPR (%SPR) Reference Points



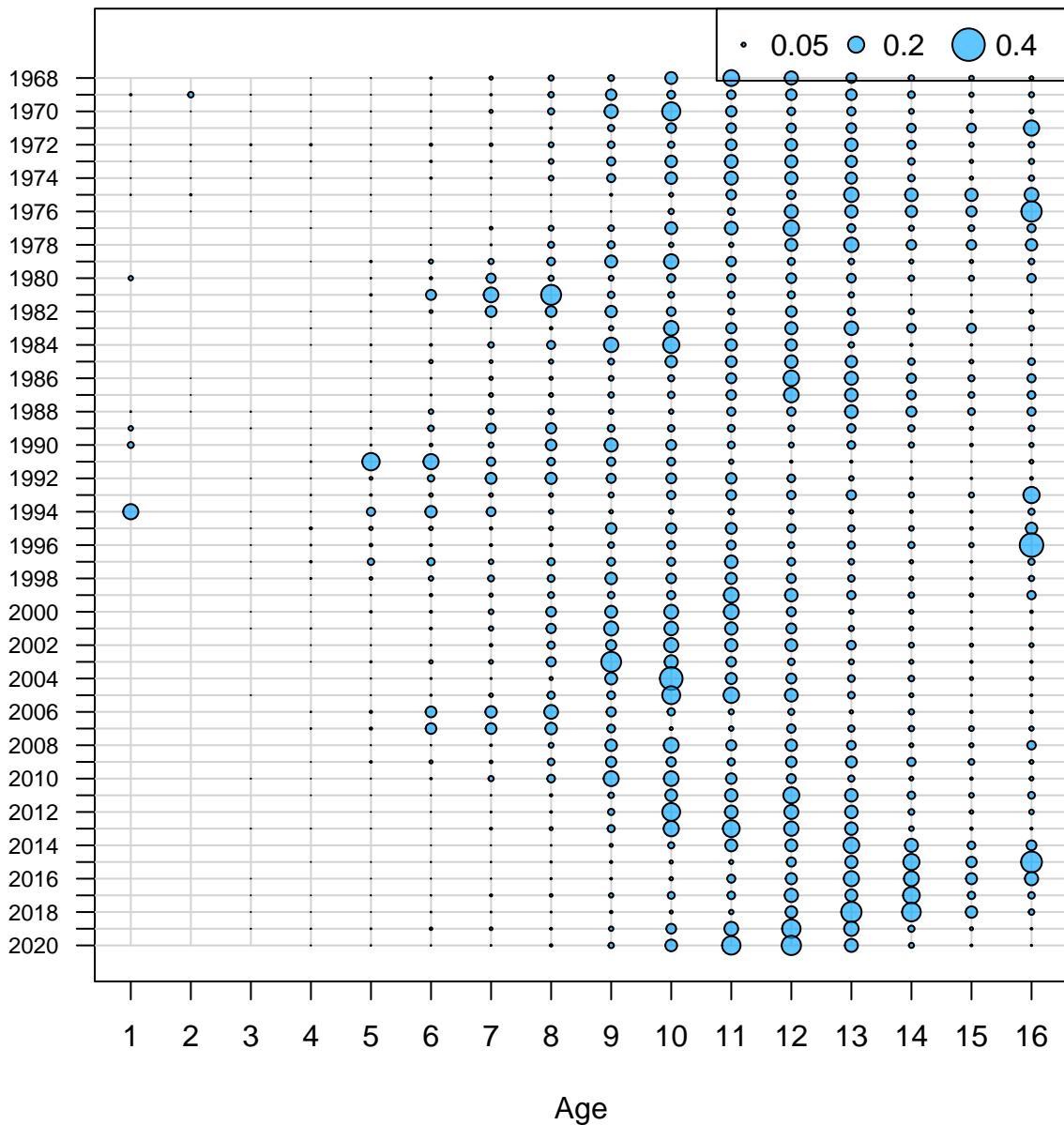




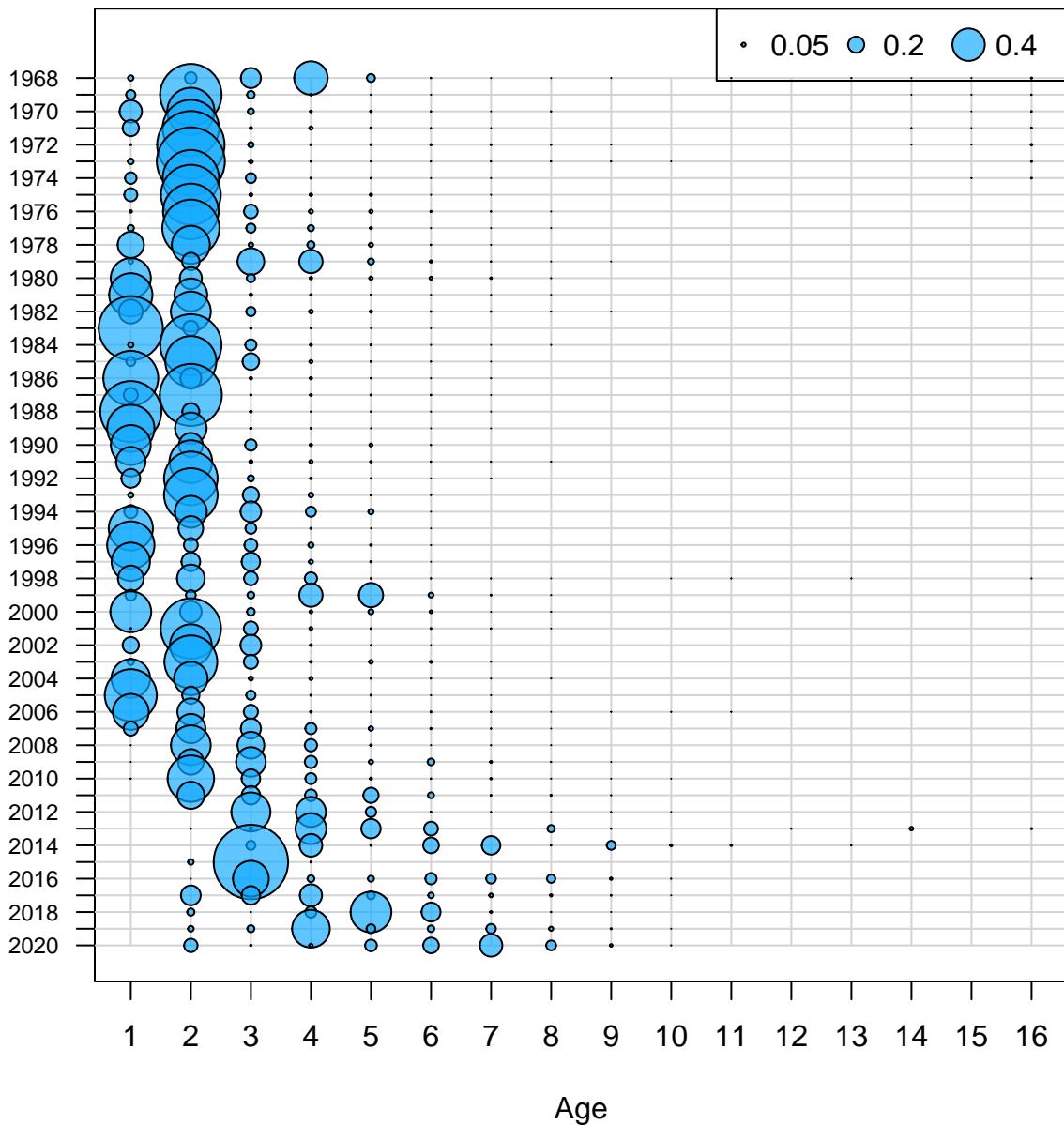
## Age Comps for Catch by Fleet 1 (Other)



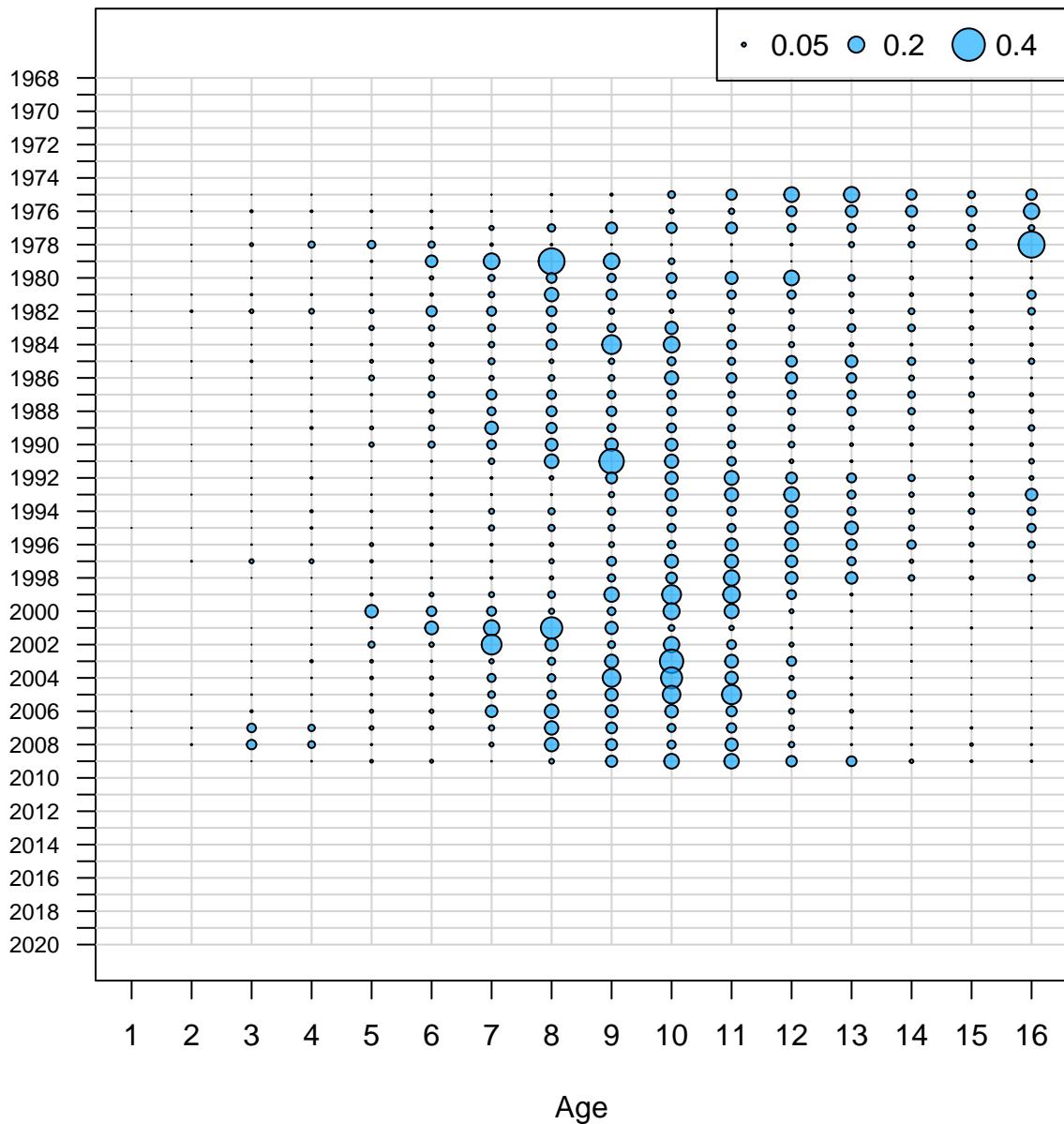
## **Age Comps for Catch by Fleet 2 (Traps)**



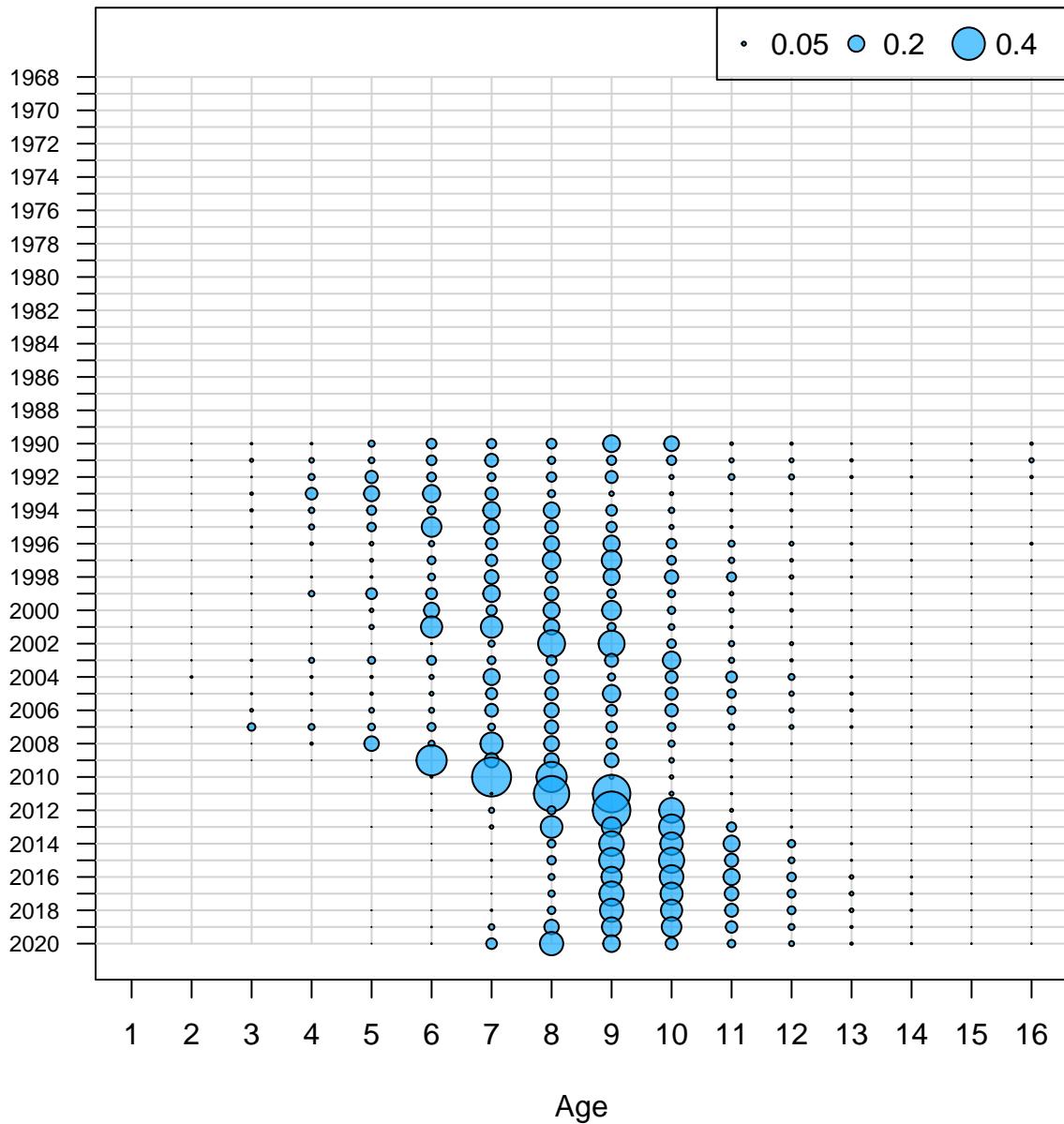
## Age Comps for Catch by Fleet 3 (BB)



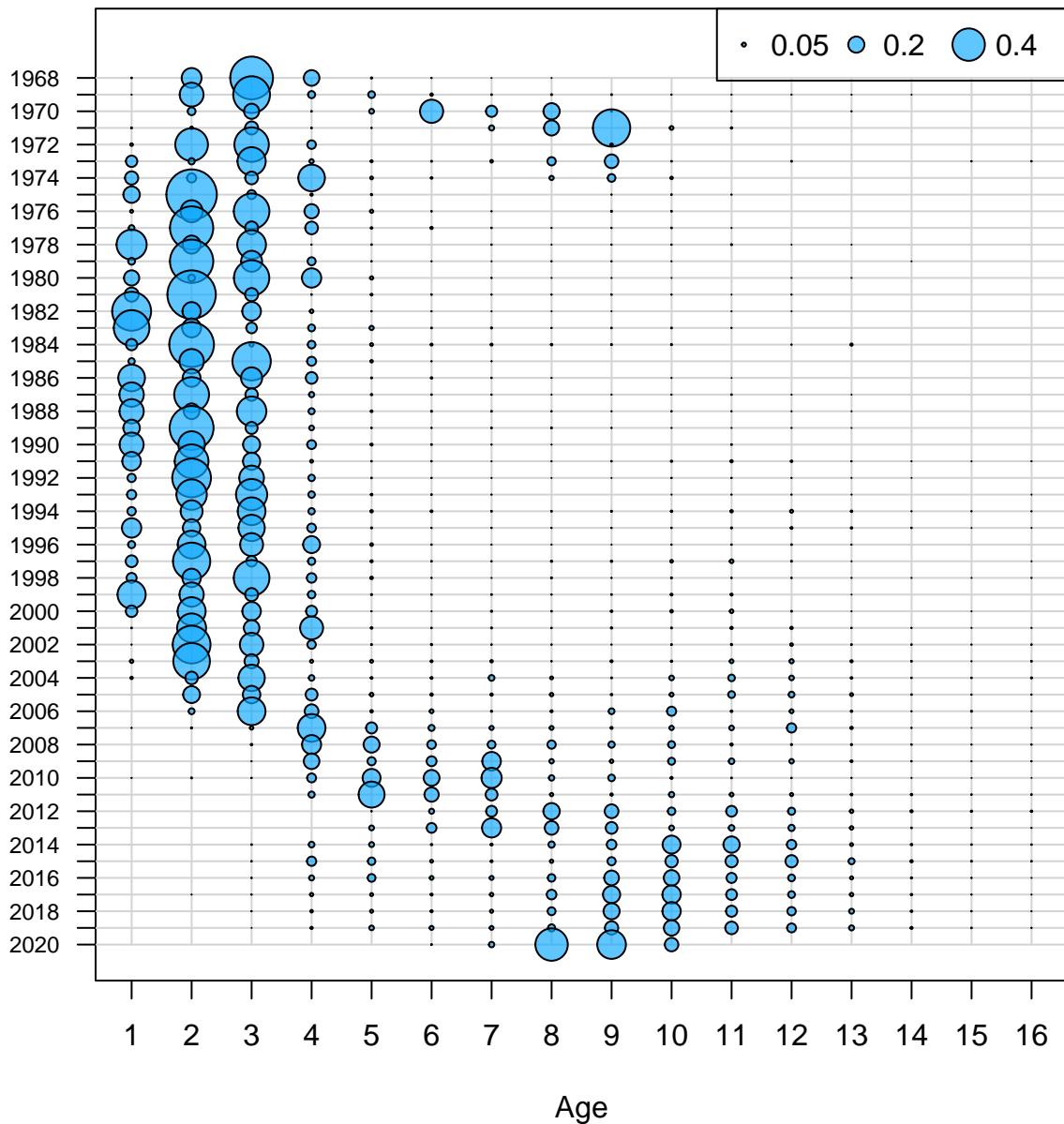
## **Age Comps for Catch by Fleet 4 (JPN\_LL\_EastMed)**

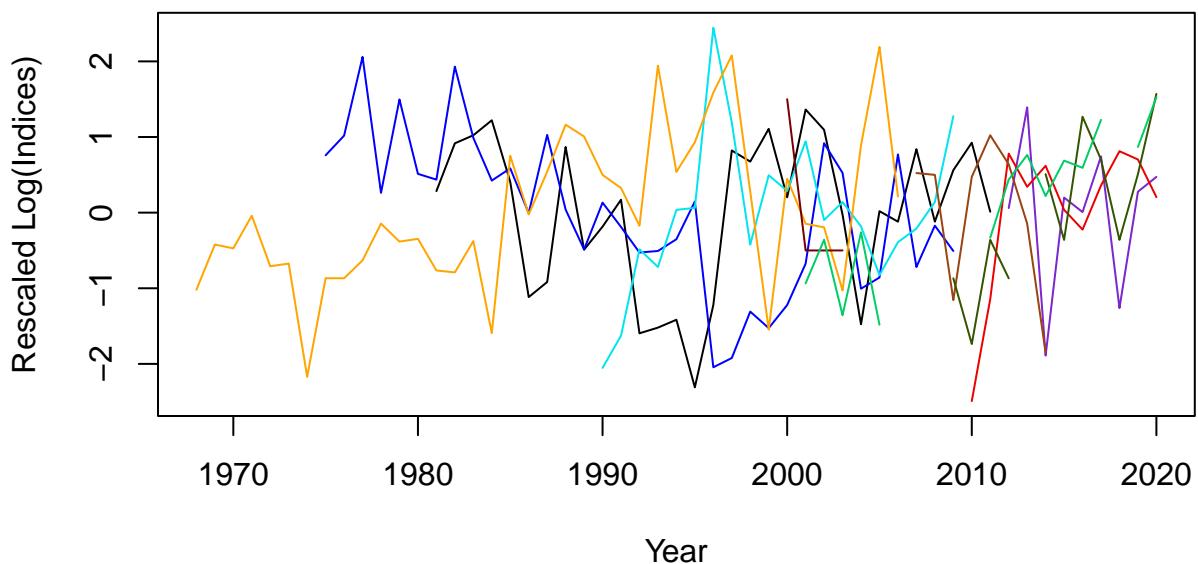
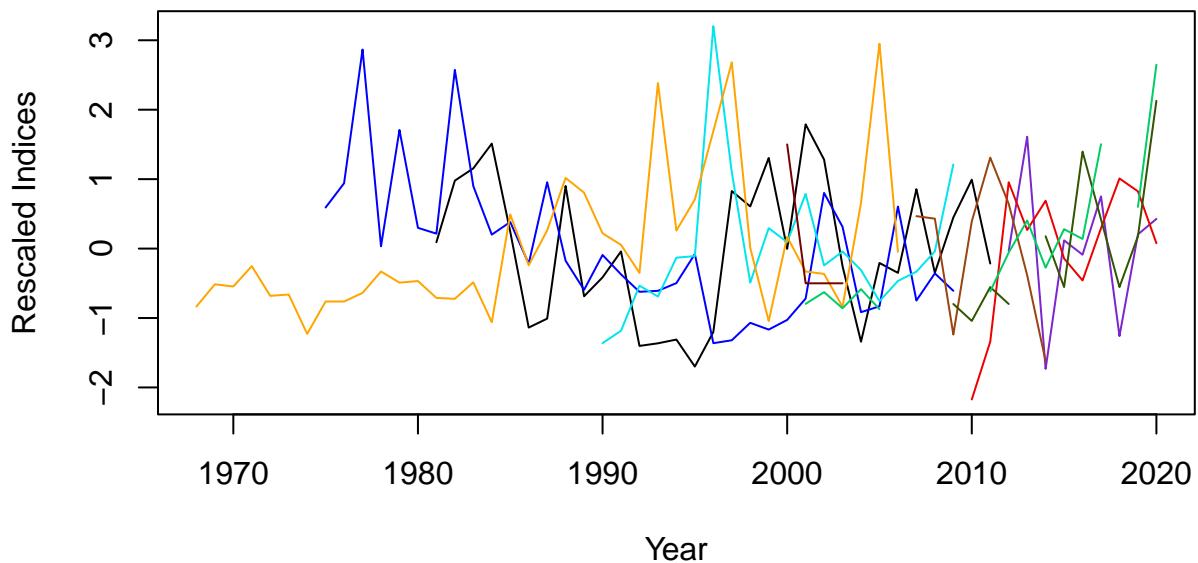


## Age Comps for Catch by Fleet 5 (JPN\_LL\_NEA)

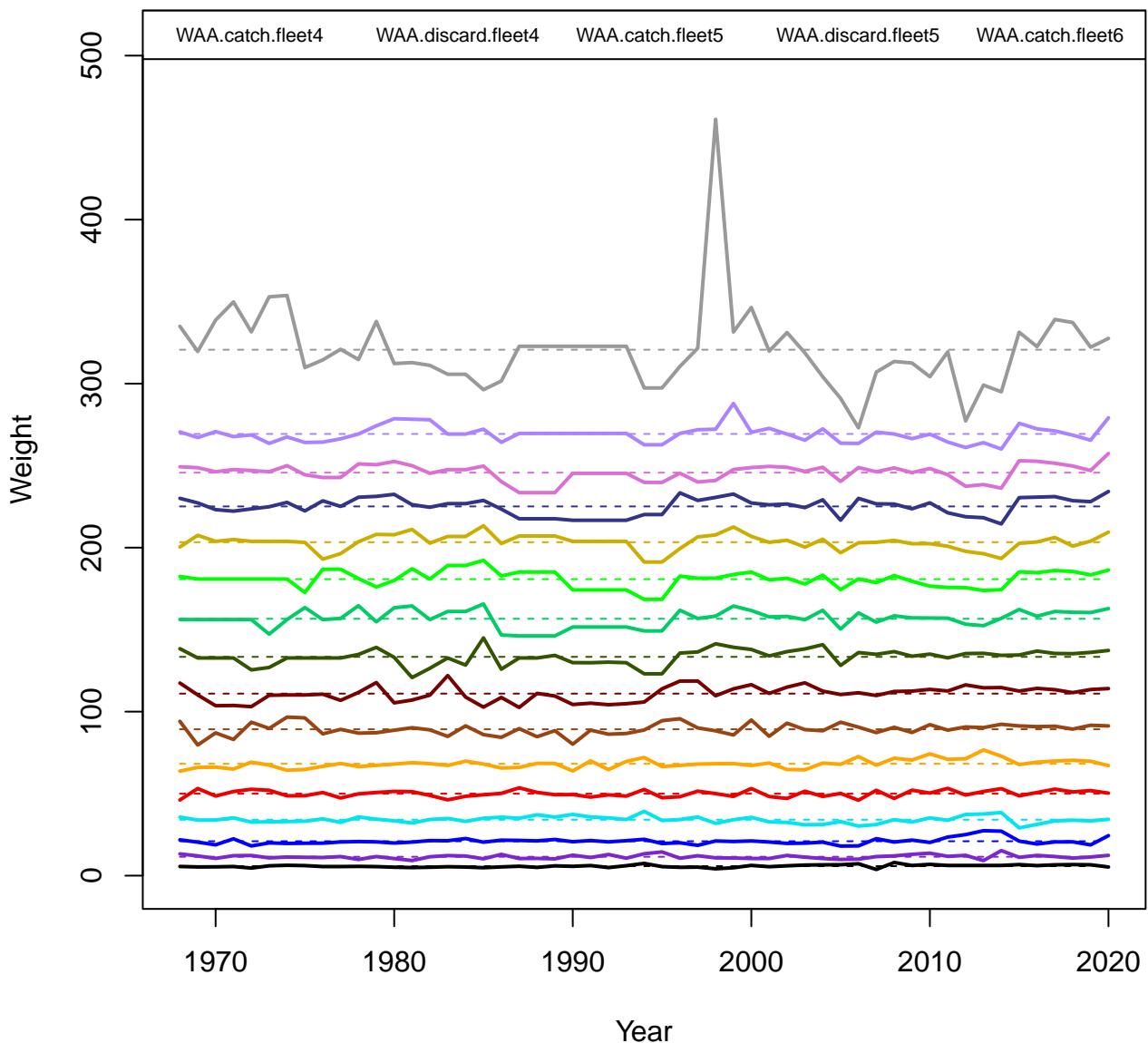


## Age Comps for Catch by Fleet 6 (PS\_Med)





## WAA matrix 1



**M**

Natural Mortality Rate

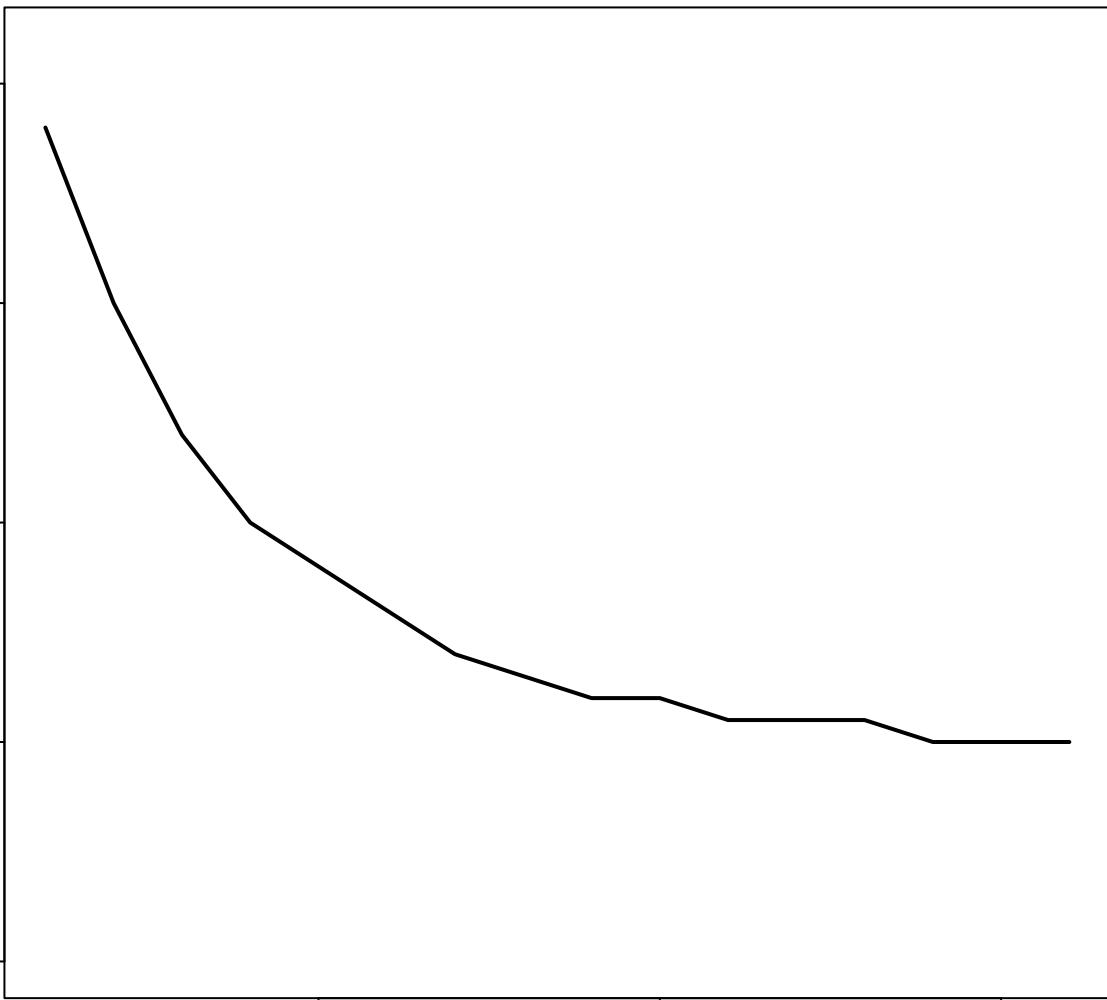
0.4  
0.3  
0.2  
0.1  
0.0

5

10

15

Age



## Maturity

