GOA rock sole stock assessment models for 2015

Teresa A'mar

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Overview

- Comments
- Data
- Models
- Results

Plan Team comments

"The Team recommended that for 2015 the species composition sampling be weighted not just to the haul level, but also to reflect the total catch and sampling rates within sectors of the fishery*. This may help reduce or explain the high level of variability observed in the ratio of the catches. This should also help explain how comprehensive the observer sampling has been, how many vessels are being sampled from each sector of the fishery, and how the spatial and temporal distribution of the fishery may compare to that of the survey."*

Response: this recommendation will not be addressed in 2015

Plan Team comments

"The Team noted that the predicted variability of length-at-age, especially for smaller rock sole, appeared to be appreciably higher than in the observed data. ***Therefore the Team recommended that adjustment of the Amin value downward should be explored to see if it might alleviate this problem."***

Response: Amin of 2 worked for Nrs and Urs; Amin remains at 3 for Srs

Plan Team comments

"Further, there was a pronounced lack of fit to strong modes in some of the survey length data, particularly the male distributions. The Team identified some descending limb selectivity parameters that appeared to be poorly estimated, and ***recommended these values be re-estimated in 2015****."*

Response: the parameters for the descending limb of fishery and survey selectivity for males were not estimated

Plan Team comments

"The Team noted that for some flatfish species there is a probable relationship between trawl survey catchability and water temperature. ***Therefore, the Team recommended that the authors evaluate similar species and investigate whether this relationship should be considered in the shallow water flatfish assessment and how it might be implemented."***

Response: this recommendation will not be addressed in 2015

Plan Team comments

"***In 2013, the Team recommended that an evaluation of relative trends provided ADF&G survey data.***"

Response: many of the stations in the ADF&G nearshore survey were not surveyed every year, so other methods, including GLMs, may be used to process these data

SSC comments

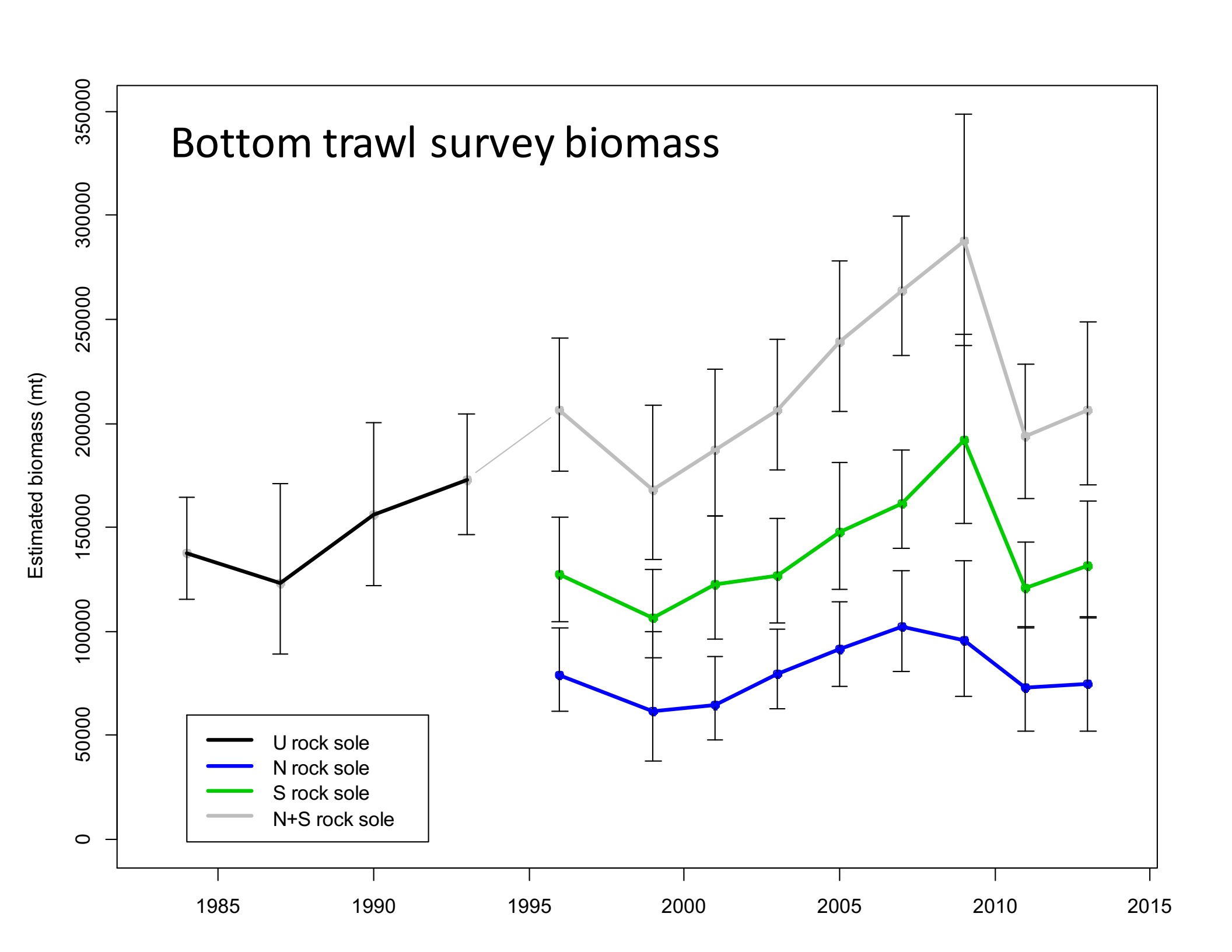
"The SSC recommends that the assessment document be edited to improve specificity and clarity."

Response: Additional details and clarifications will be provided in stock assessment documents

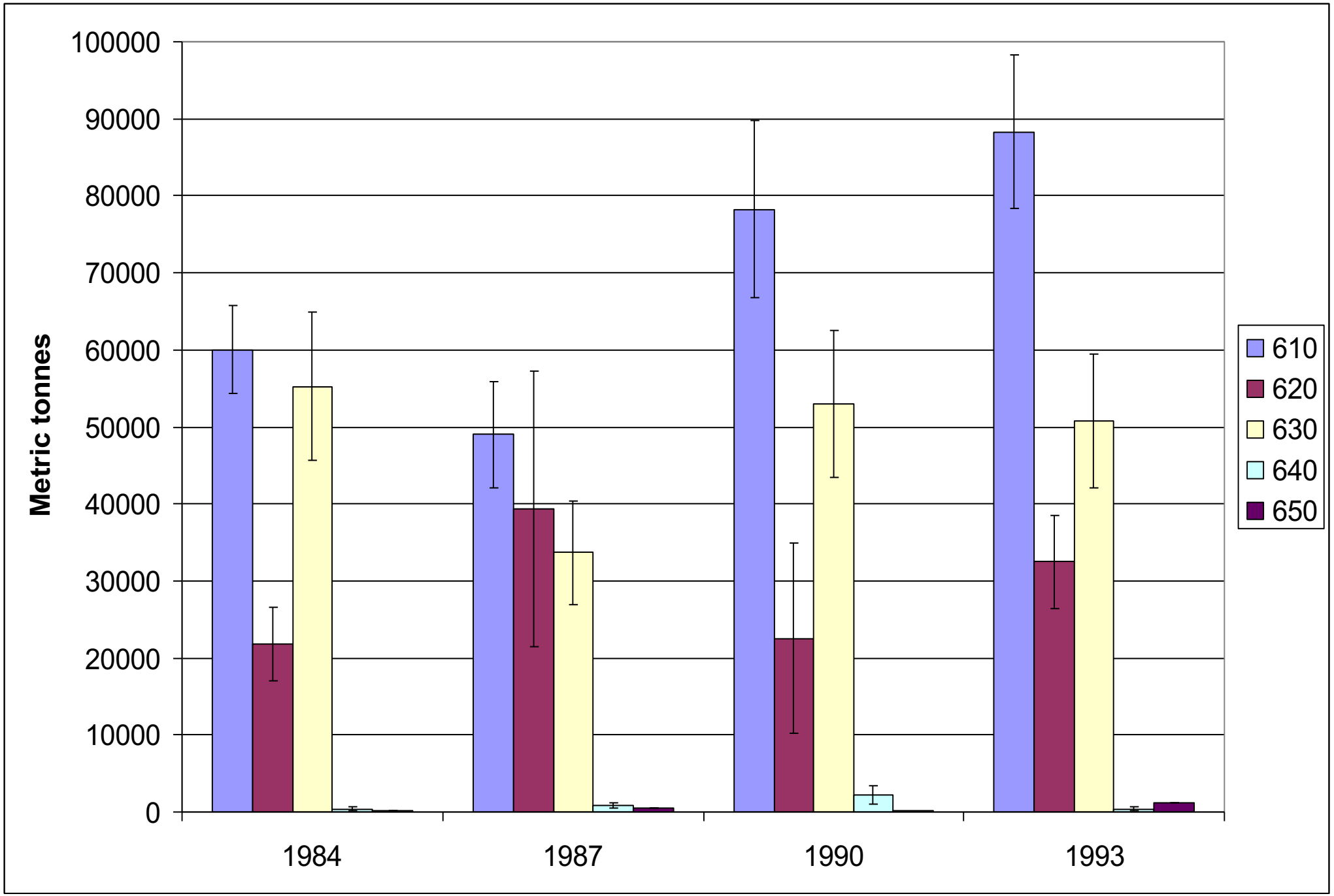
Data

- Fishery catch and length composition data through 2014
- Survey biomass, length and age composition data, and conditional age-at-length data through 2013

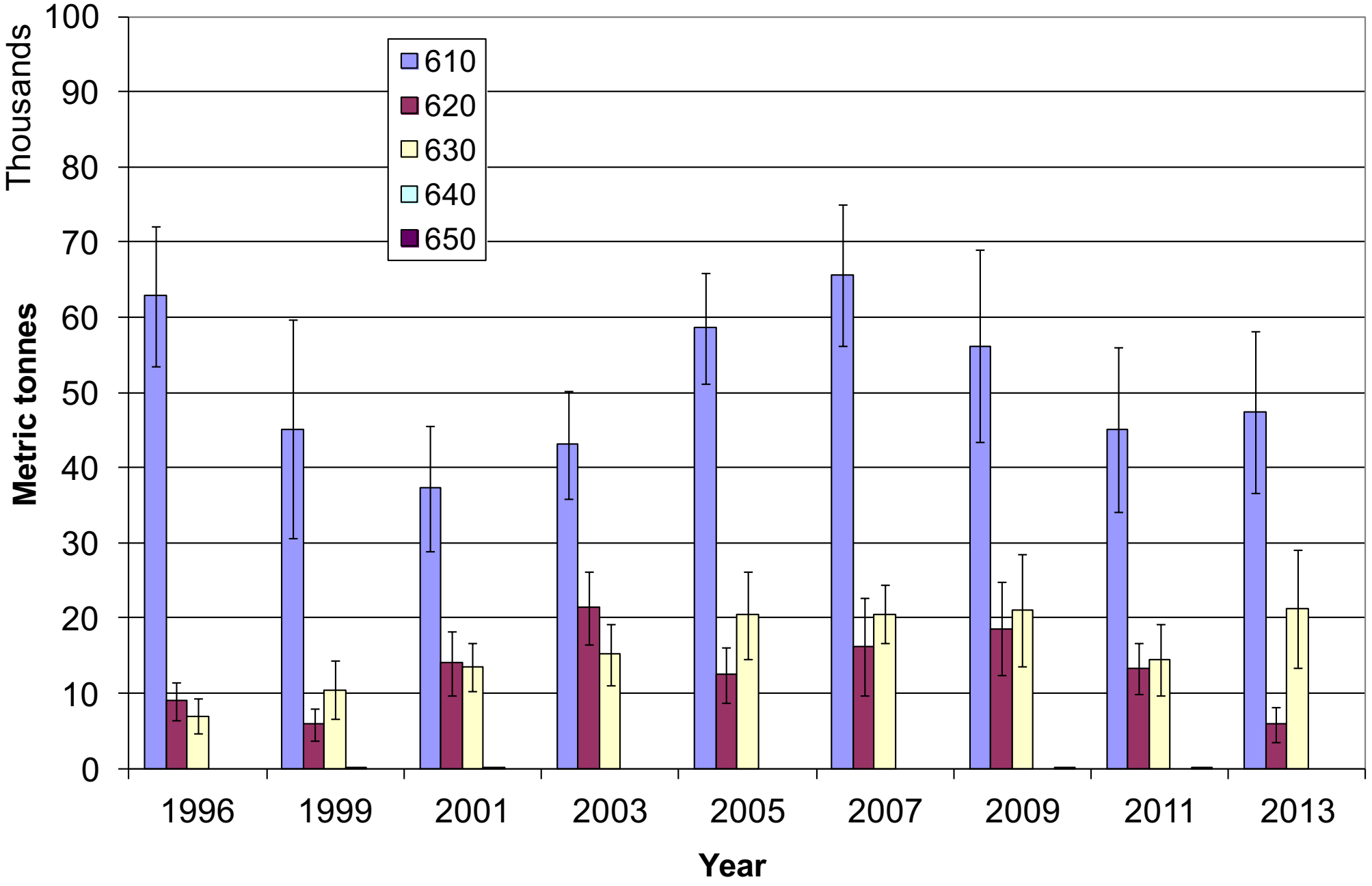
- Species-specific data
  - Survey data start in 1996 (Nrs and Srs)
  - Fishery data start in 1997 (Nrs, Srs, Urs)


Bottom trawl survey biomass
Estimated biomass (mt)
0
50000
100000
150000
200000
250000
300000
350000
1985
1990
1995
2000
2005
2010
2015
U rock sole
N rock sole
S rock sole
N+S rock sole

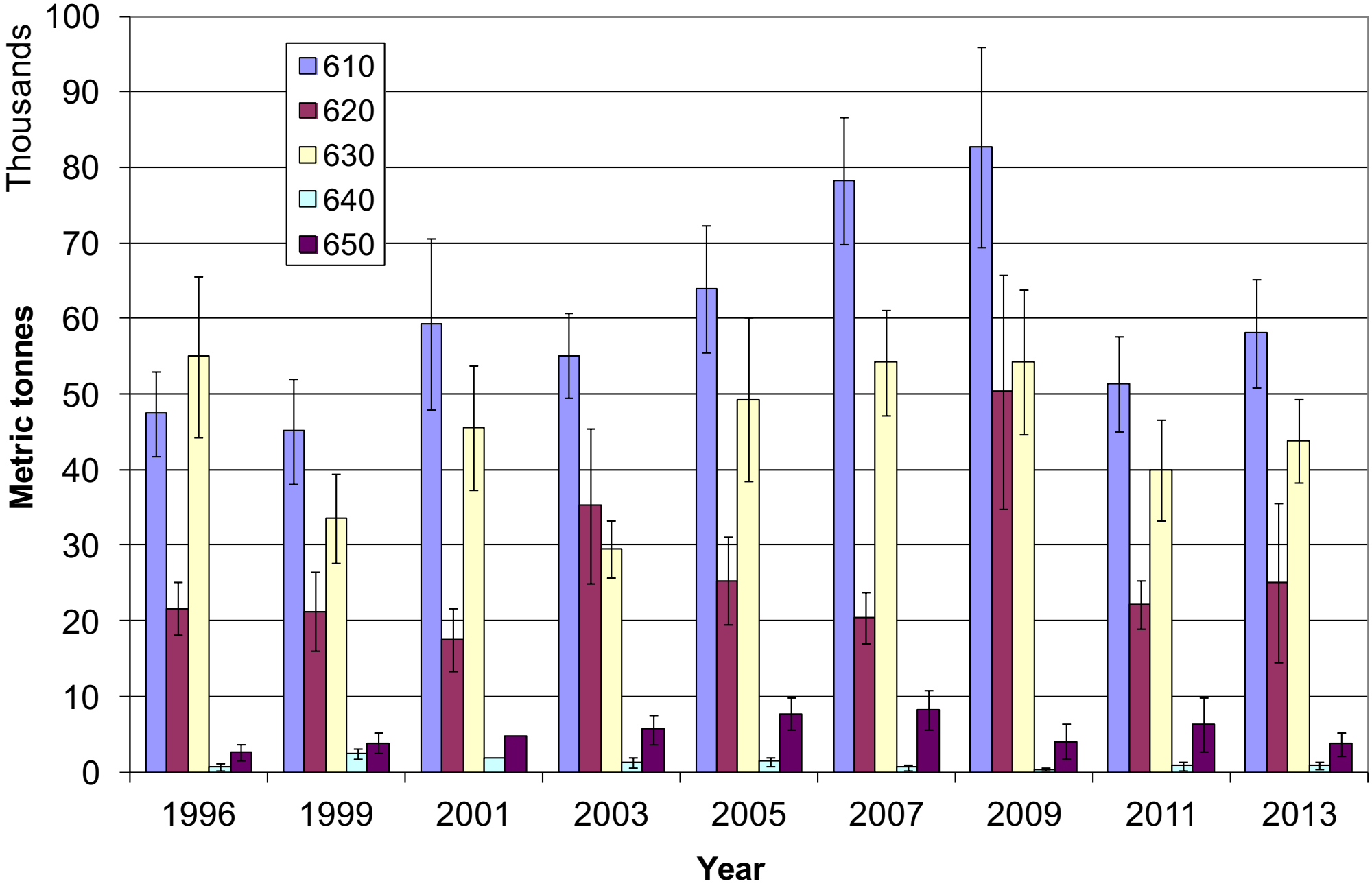
NMFS survey biomass estimates of U rock sole, by area

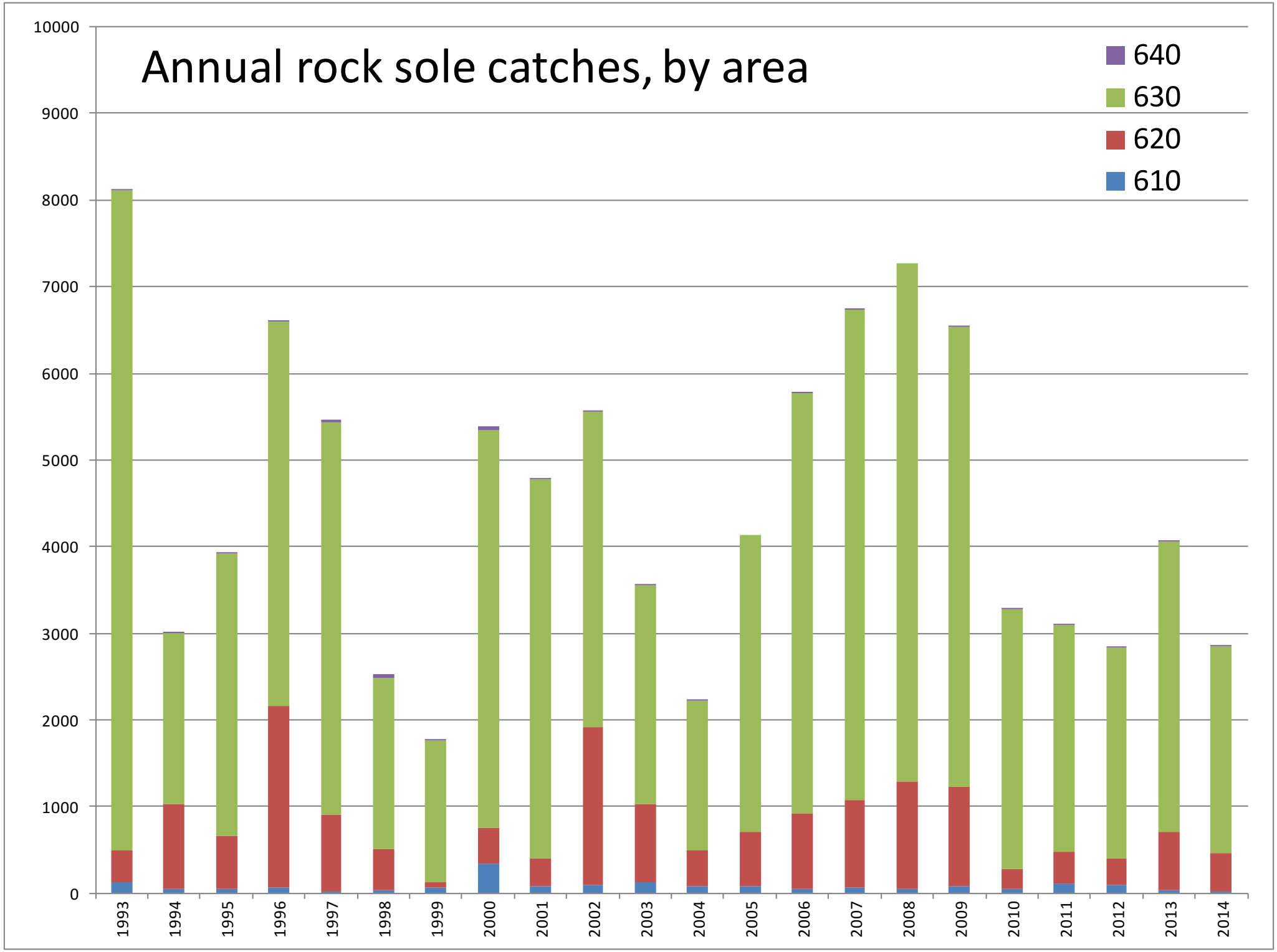


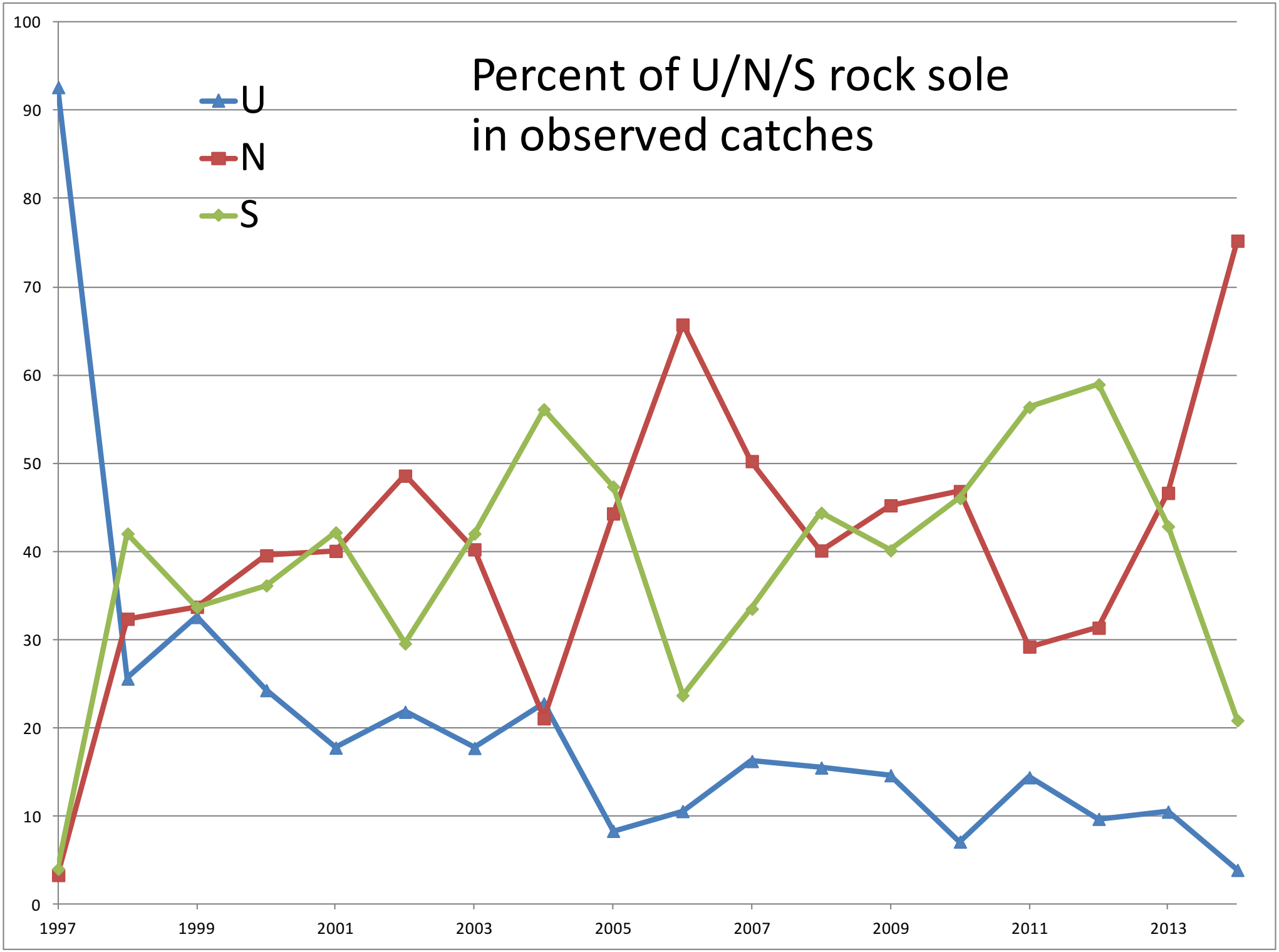
NMFS survey biomass estimates of northern rock sole, by area



NMFS survey biomass estimates of southern rock sole, by area




Annual rock sole catches, by area
640
630
620
610
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014


Percent of U/N/S rock sole in observed catches
U
N
S
100
90
80
70
60
50
40
30
20
10
0
1997
1999
2001
2003
2005
2007
2009
2011
2013

Models

- Nrs and Srs
  - Constant sex-specific double normal fishery selectivity-at-length
  - Constant sex-specific asymptotic double normal survey selectivity
  - Constant sex-specific von Bertalanffy growth
  - Male M estimated
- Urs
  - 3 periods of sex-specific double normal fishery selectivity-at-length
  - 4 periods of sex-specific double normal survey selectivity
  - 3 periods of sex-specific von Bertalanffy growth
  - Male M estimated

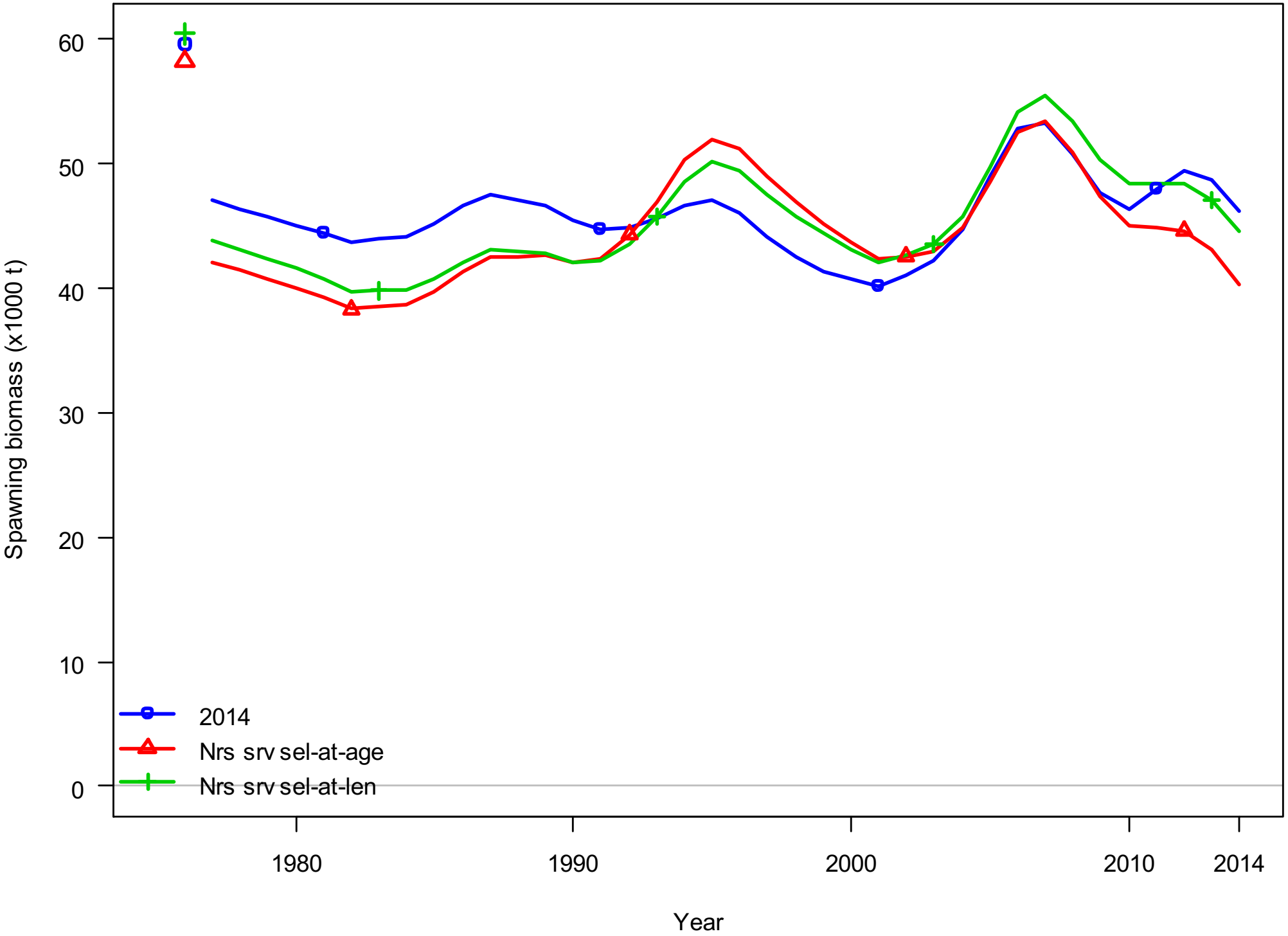
Changes from 2014

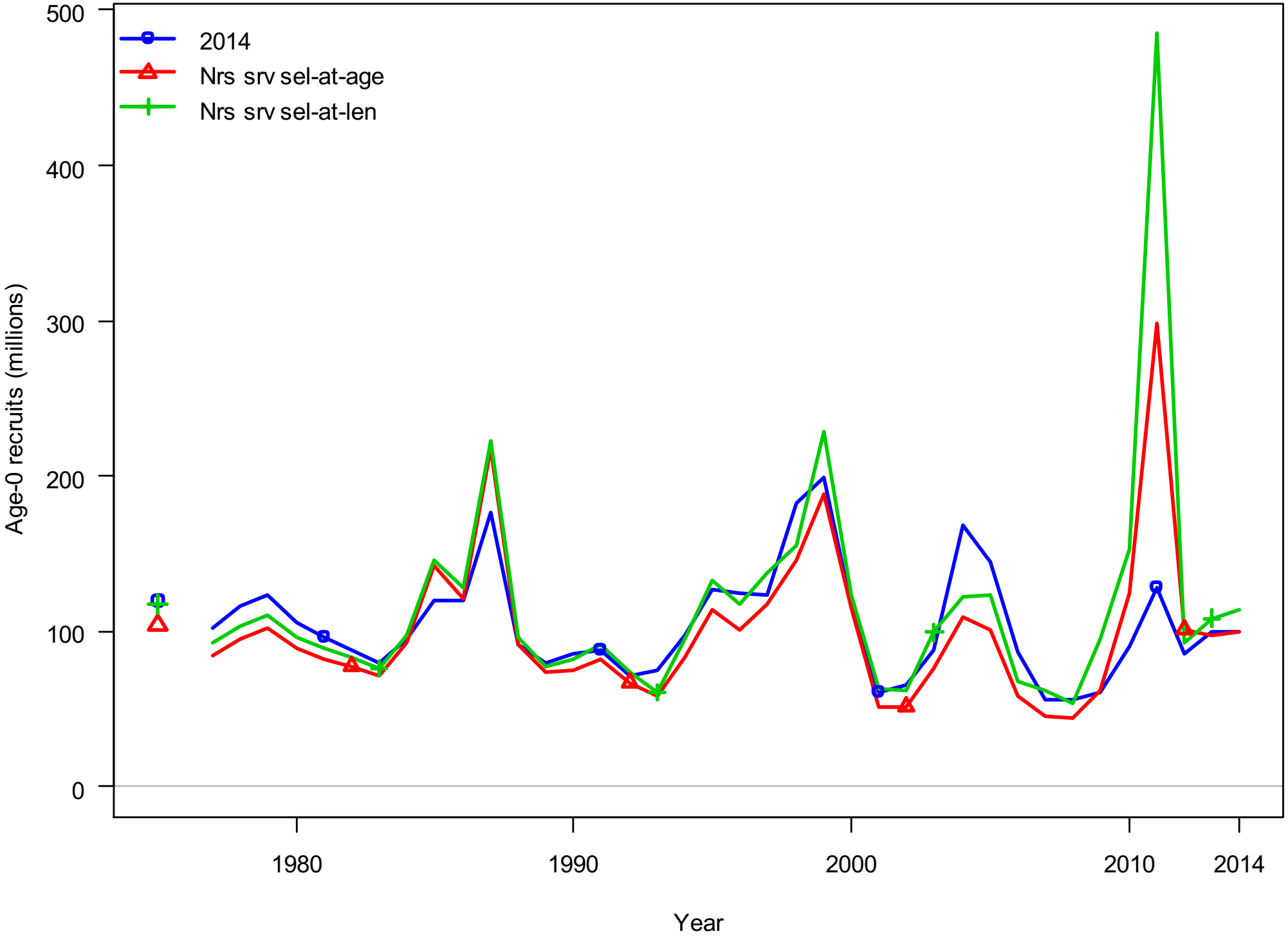
- Descending limb of fishery and survey selectivity not estimated for males
  - Same descending limb as females
- Asymptotic survey selectivity in all years for Nrs and Srs, and for 1990 on for Urs
  - Smaller, younger Urs fish caught in 1984 and 1987
- Amin is 2 for Nrs and Urs; still 3 for Srs
- Survey selectivity-at-length or -at-age

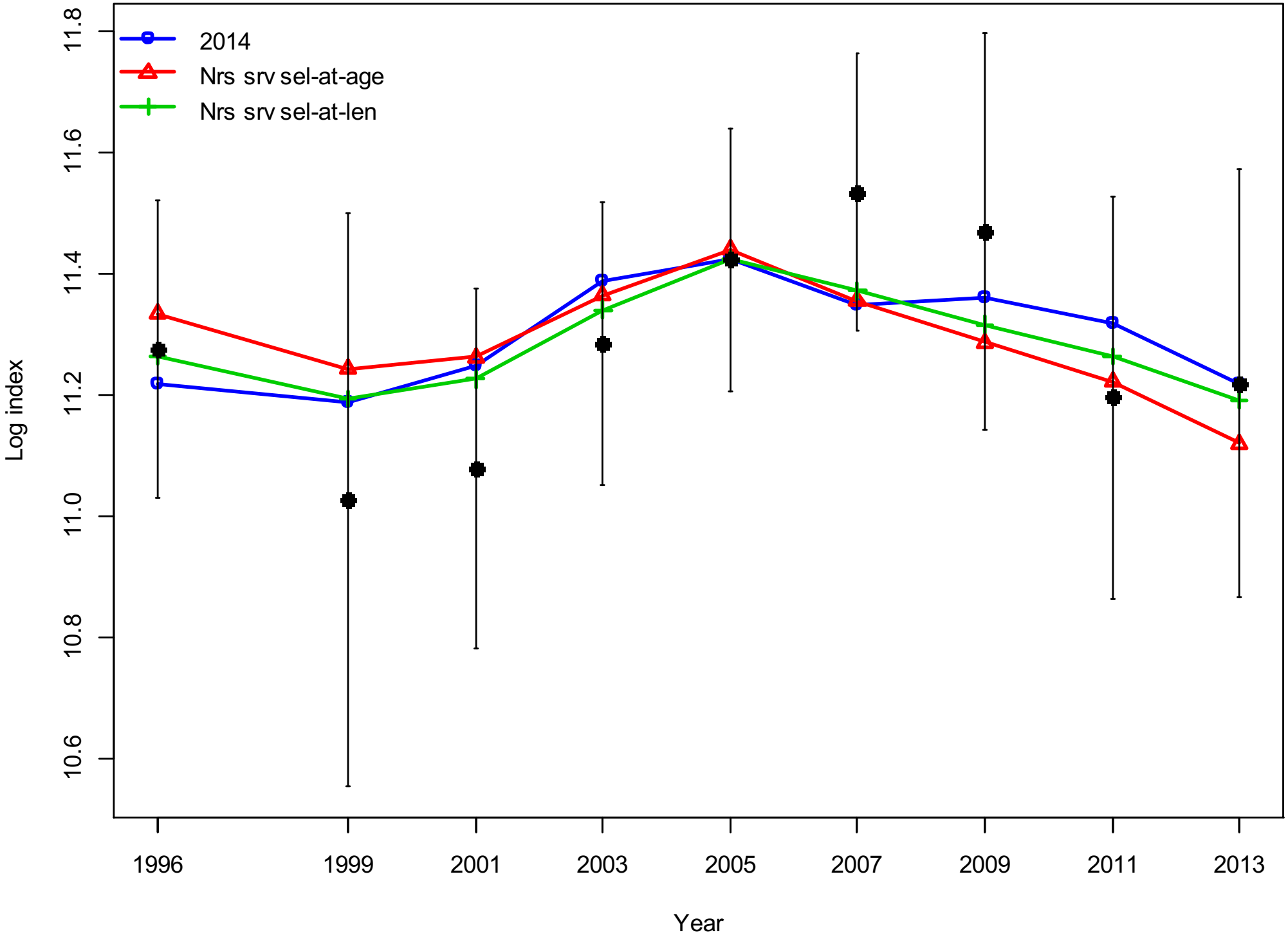
Results

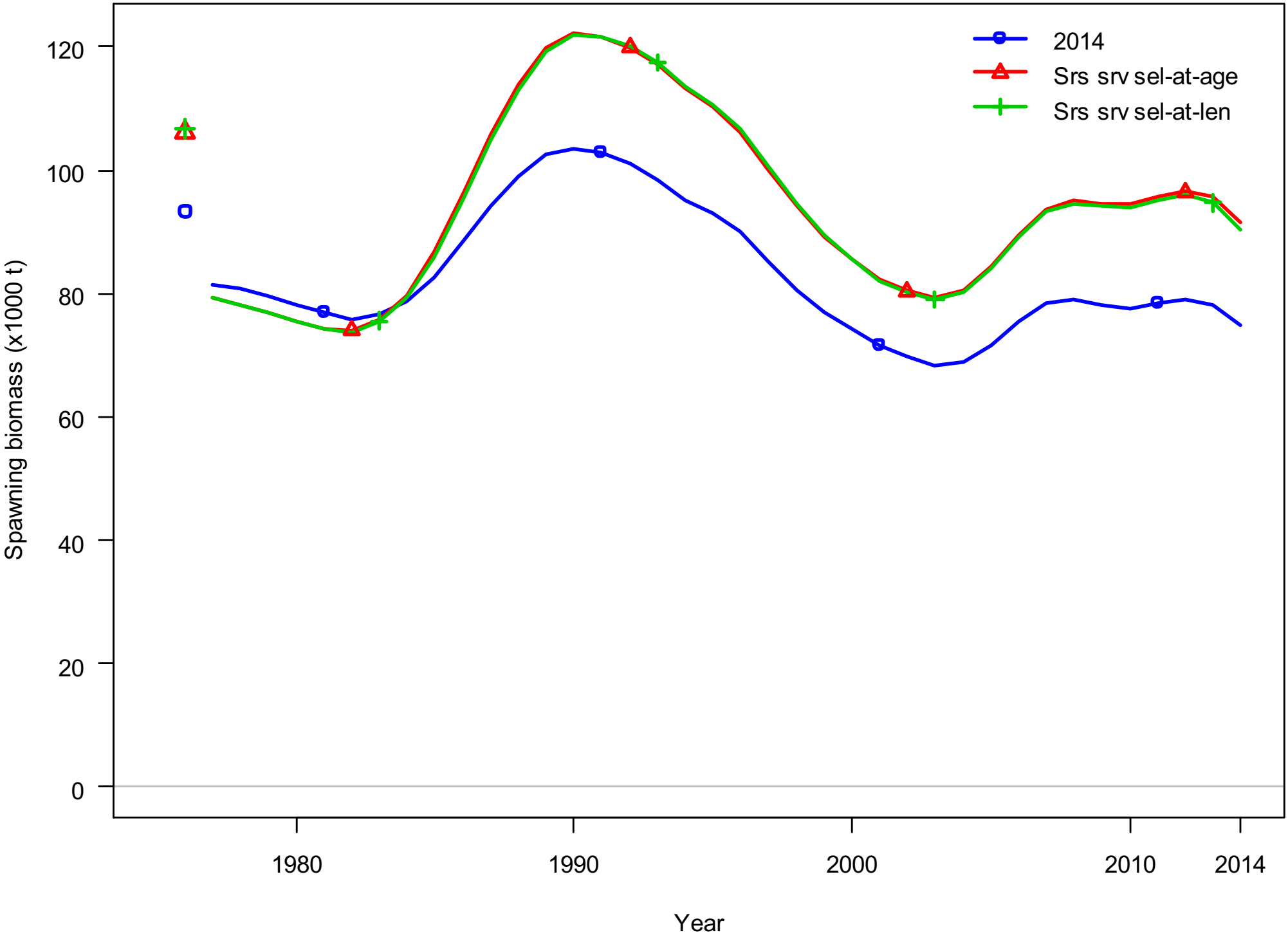
- Survey selectivity-at-age vs. survey selectivity-at-length
  - Nrs had lower NLL with selectivity-at-length
  - Srs had lower NLL with selectivity-at-length
  - Urs had lower NLL with selectivity-at-age

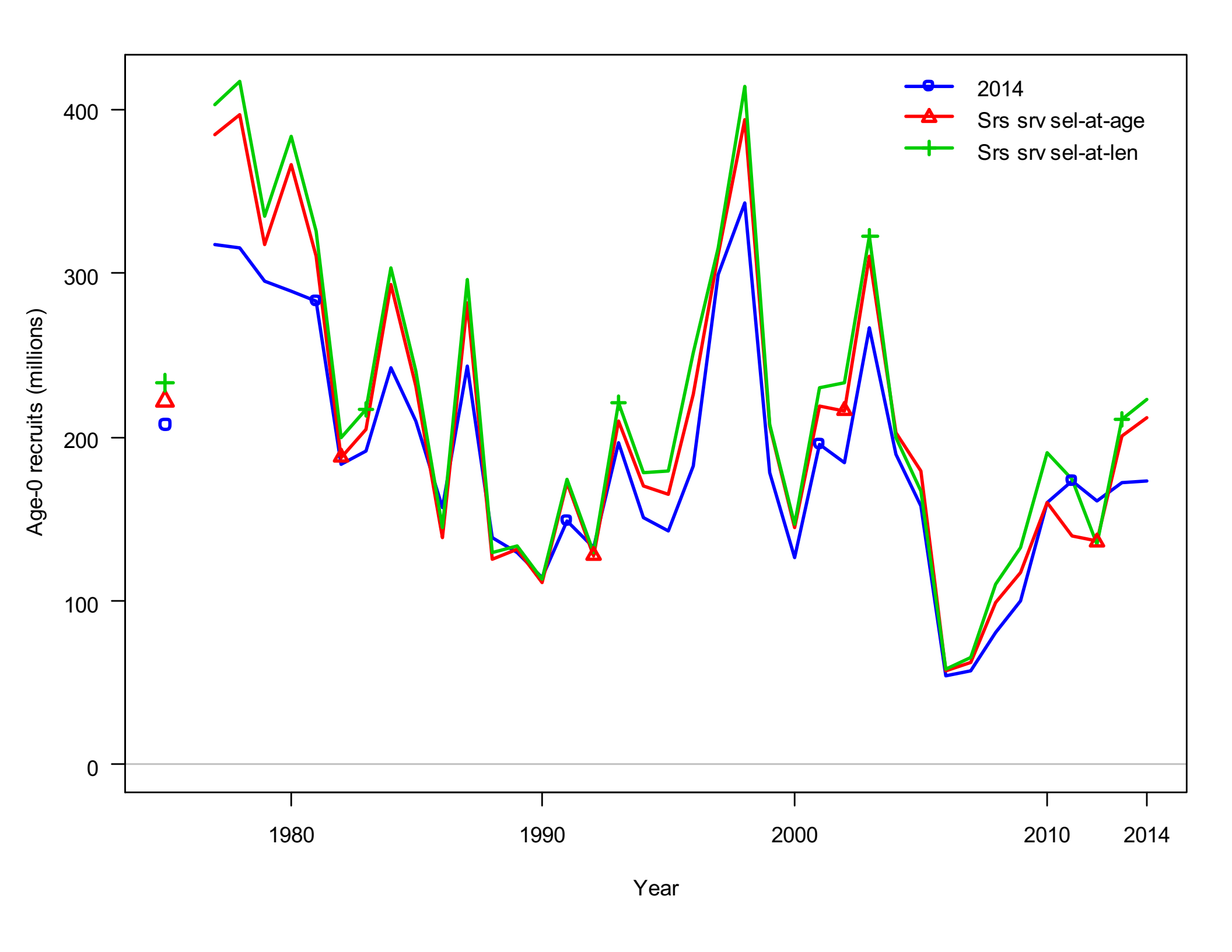
- Tradeoff between fitting to fishery length composition data and fitting to the survey biomass and age data

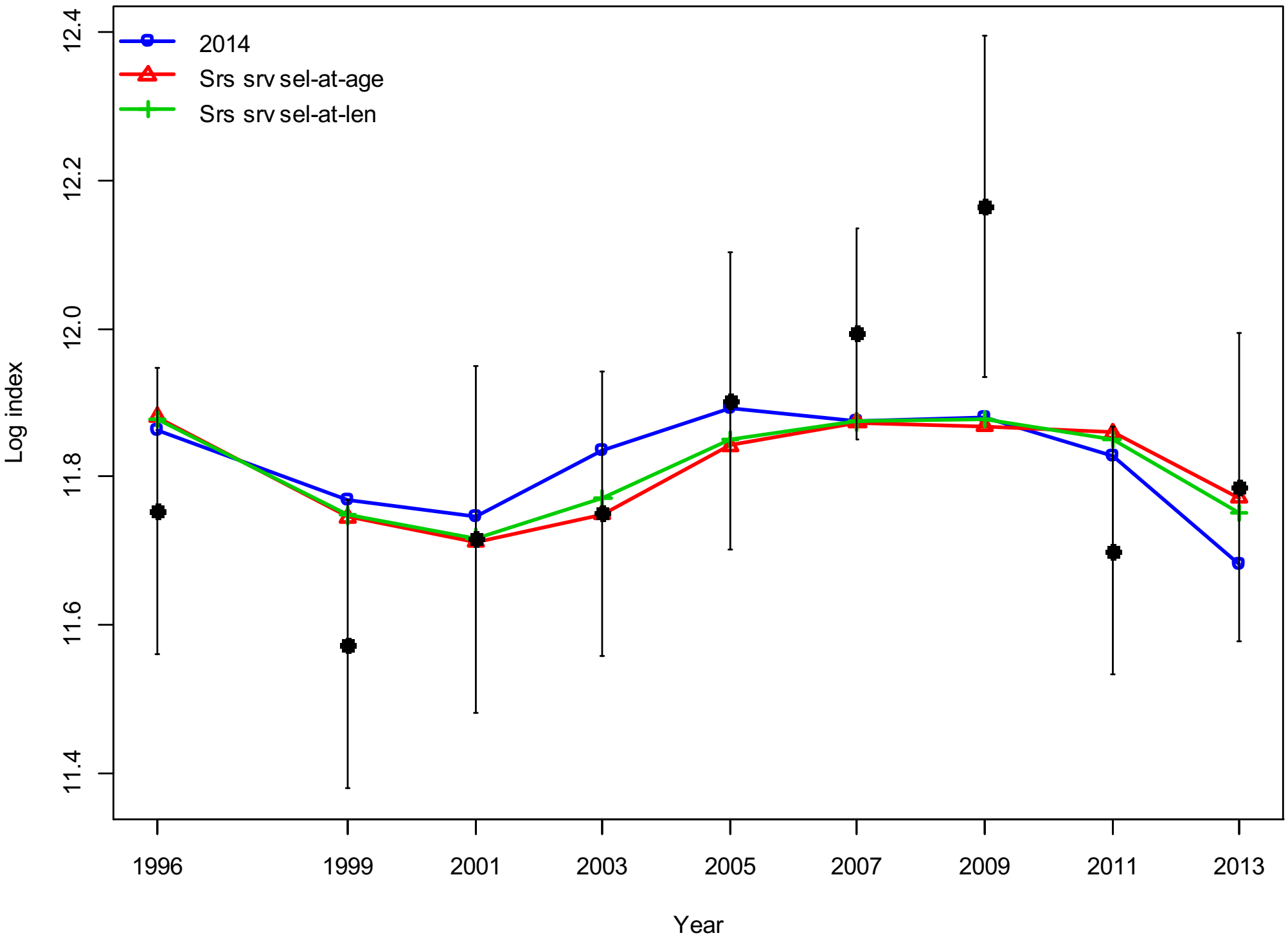

Spawning biomass (x1000 t)
60
50
40
30
20
10
0
1980
1990
2000
2010
2014
Year
2014
Nrs srv sel-at-age
Nrs srv sel-at-len

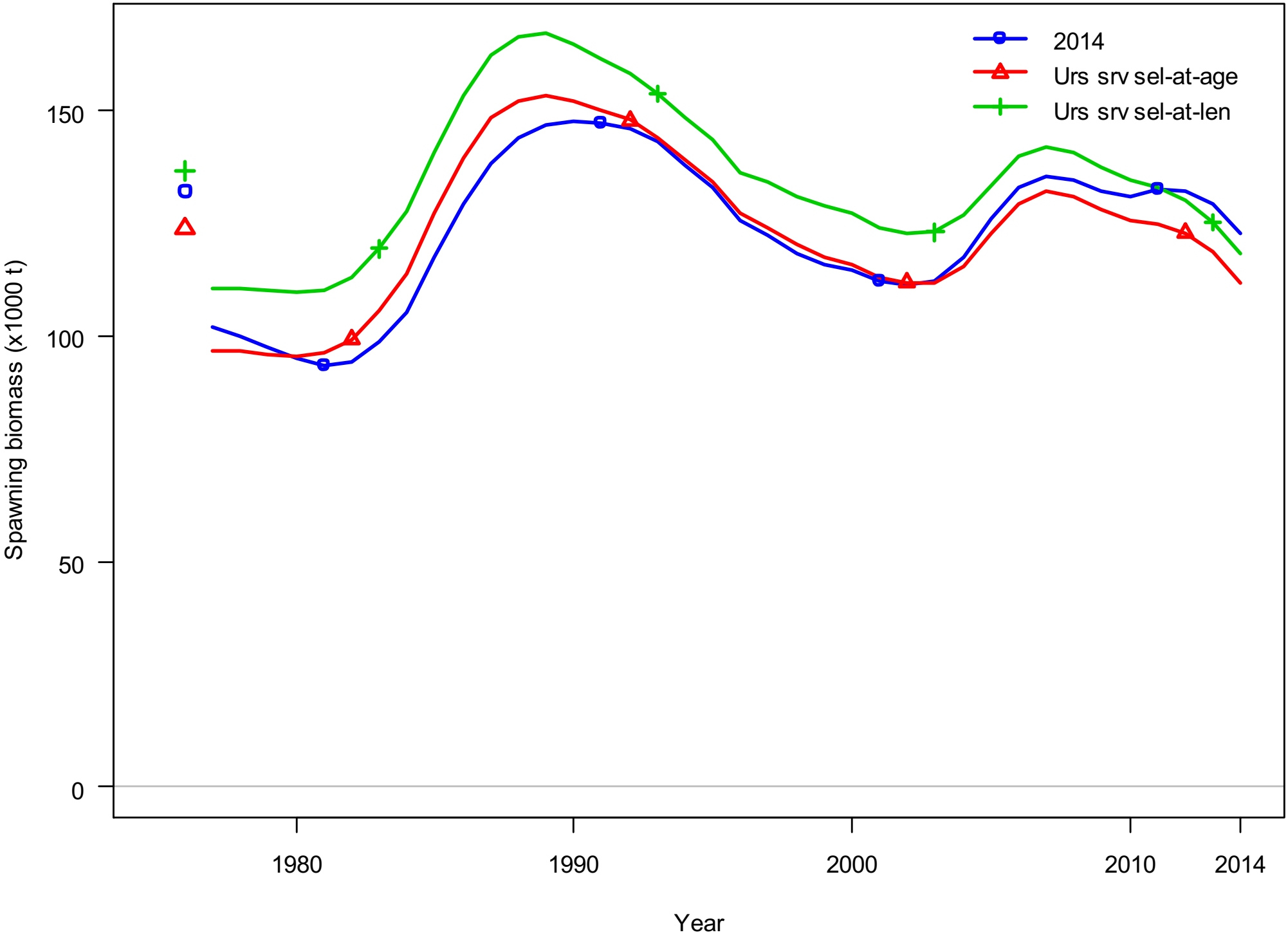

2014
Nrs srv sel-at-age
Nrs srv sel-at-len
Age-0 recruits (millions)
500
400
300
200
100
0
1980
1990
2000
2010
2014
Year

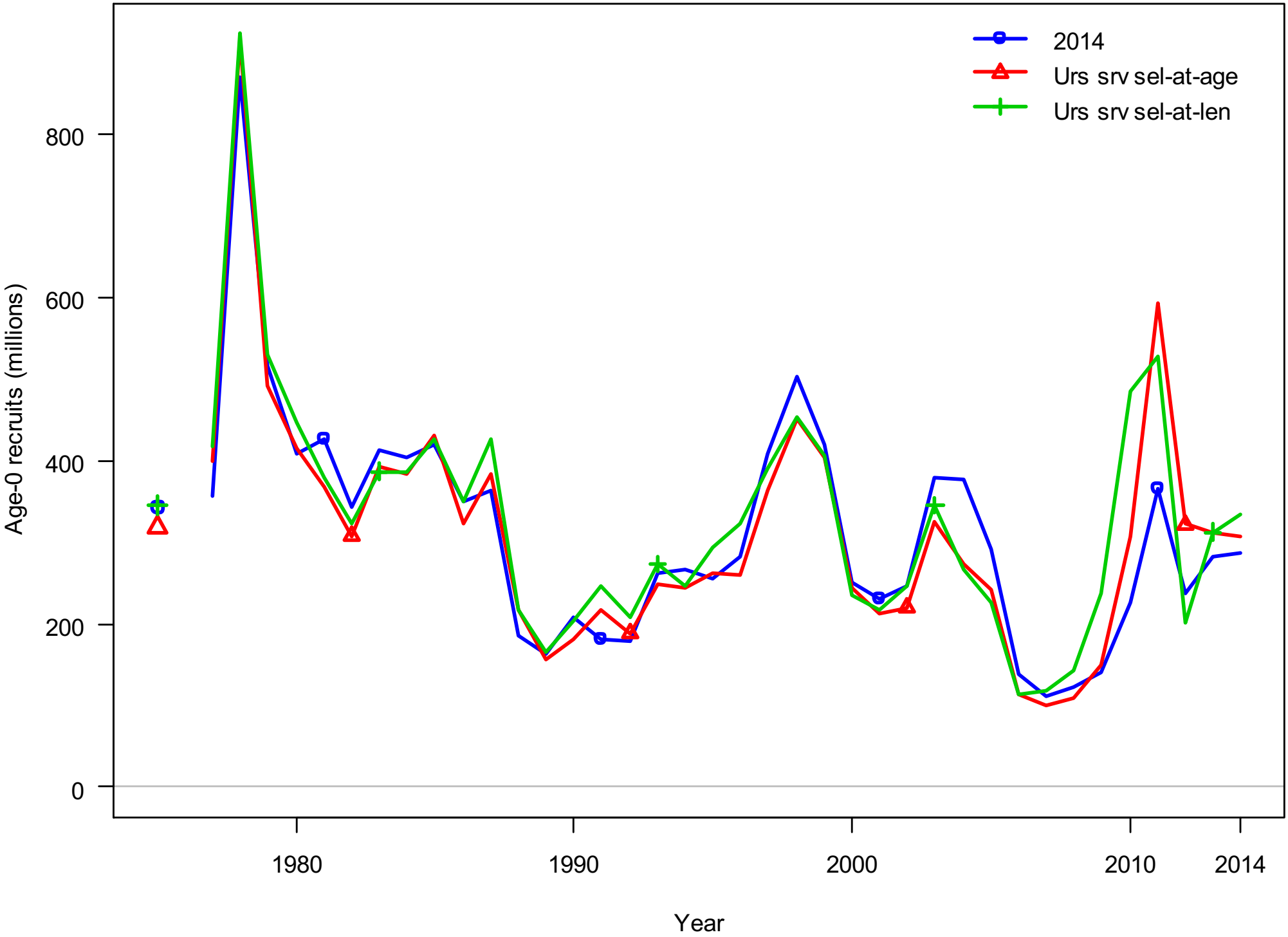

2014
Nrs srv sel-at-age
Nrs srv sel-at-len
Log index
11.8
11.6
11.4
11.2
11.0
10.8
10.6
1996
1999
2001
2003
2005
2007
2009
2011
2013
Year

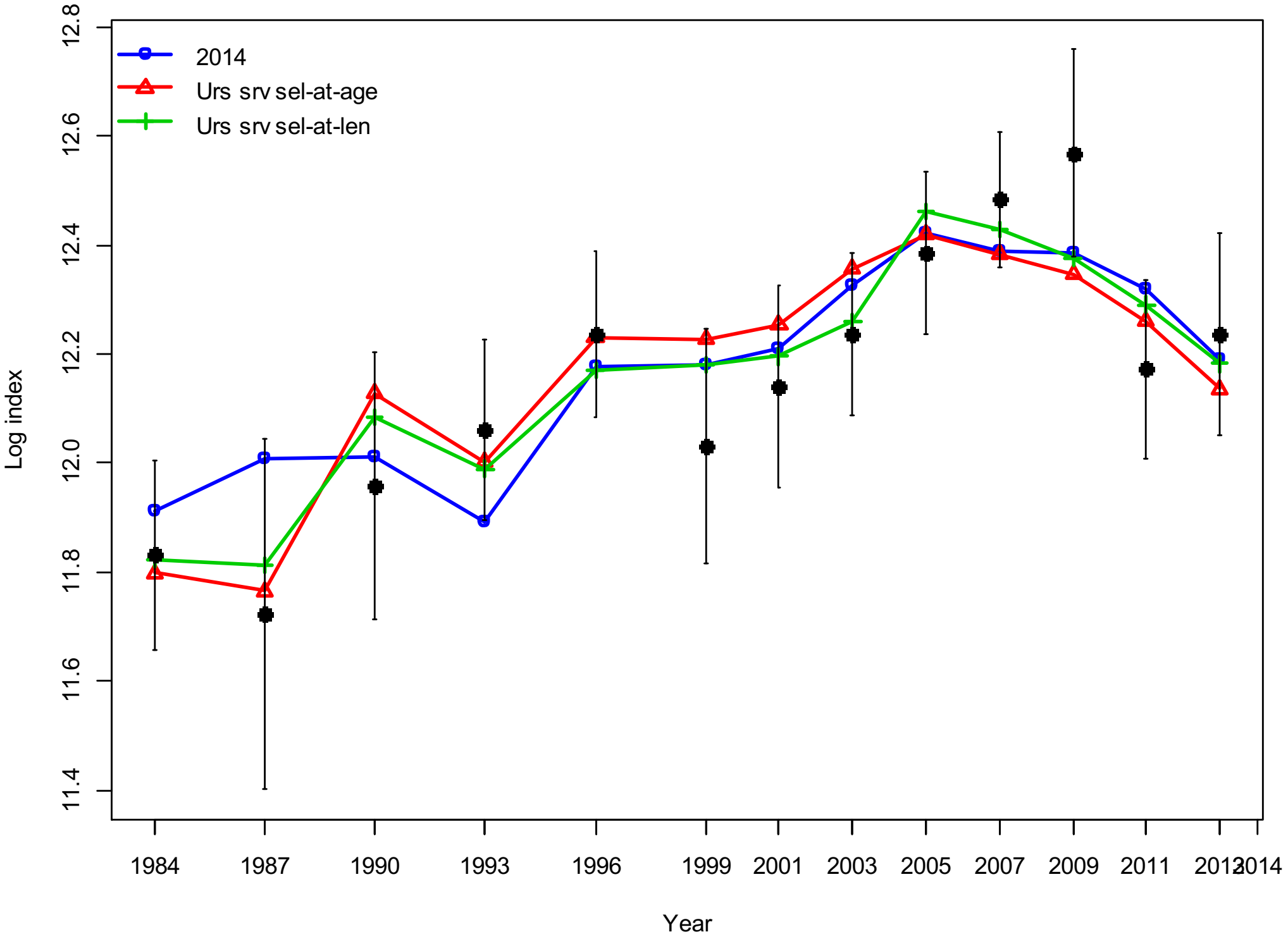

2014
Srs srv sel-at-age
Srs srv sel-at-len
Spawning biomass (x1000 t)
0
20
40
60
80
100
120
1980
1990
2000
2010
2014
Year

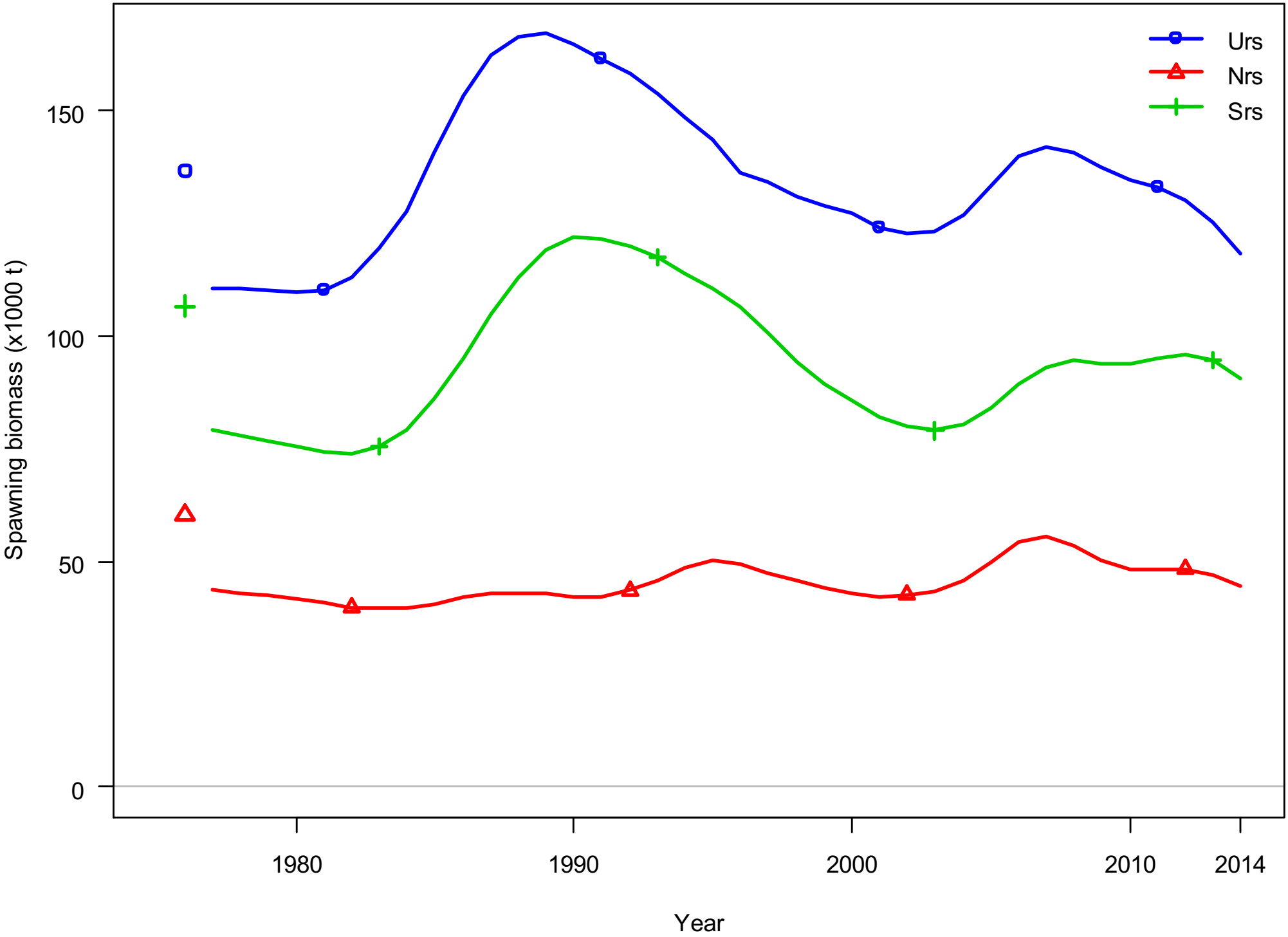

2014
Srs srv sel-at-age
Srs srv sel-at-len
Age-0 recruits (millions)
400
300
200
100
0
1980
1990
2000
2010
2014
Year

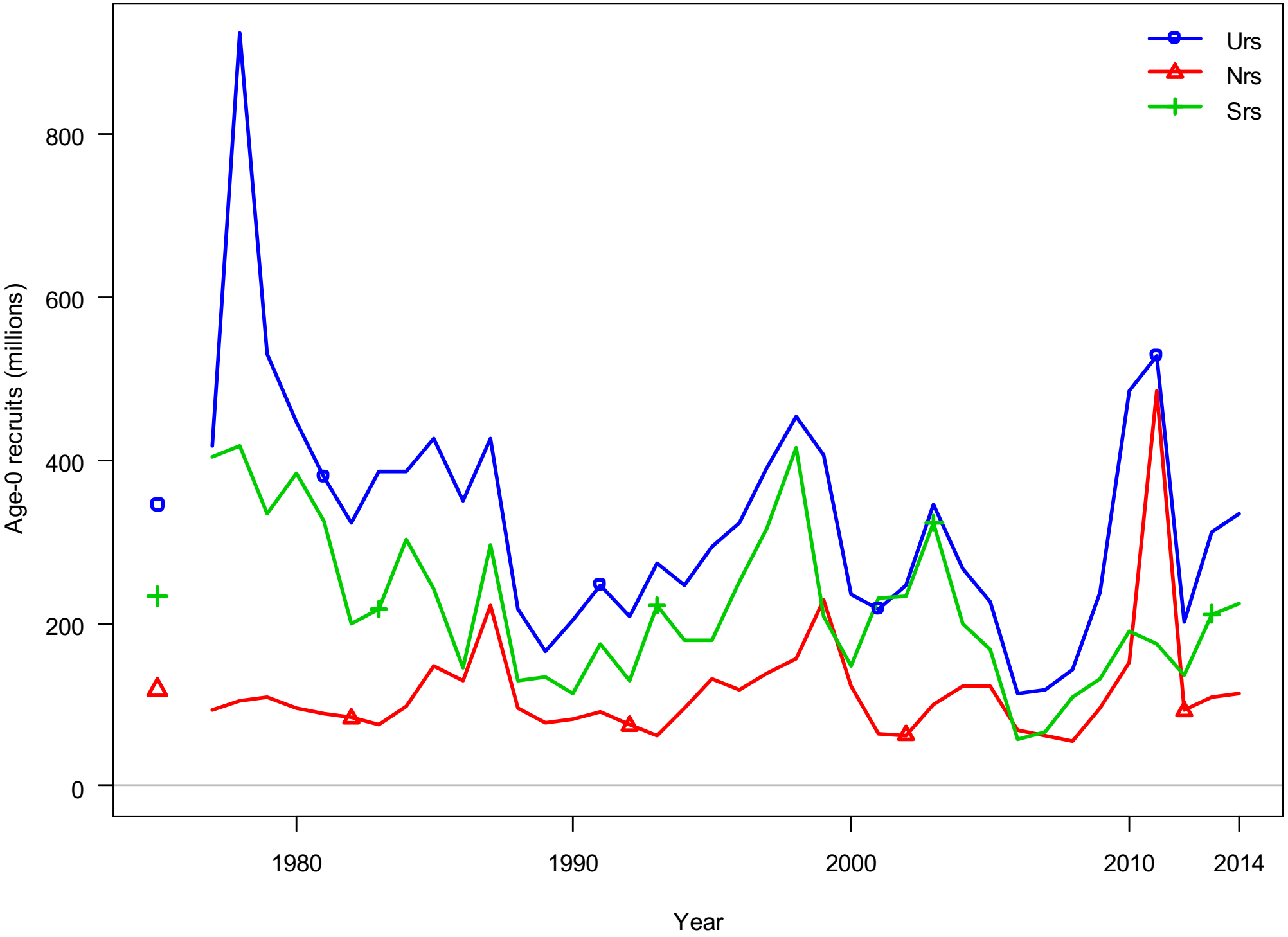

2014
Srs srv sel-at-age
Srs srv sel-at-len
Log index
12.4
12.2
12.0
11.8
11.6
11.4
1996
1999
2001
2003
2005
2007
2009
2011
2013
Year

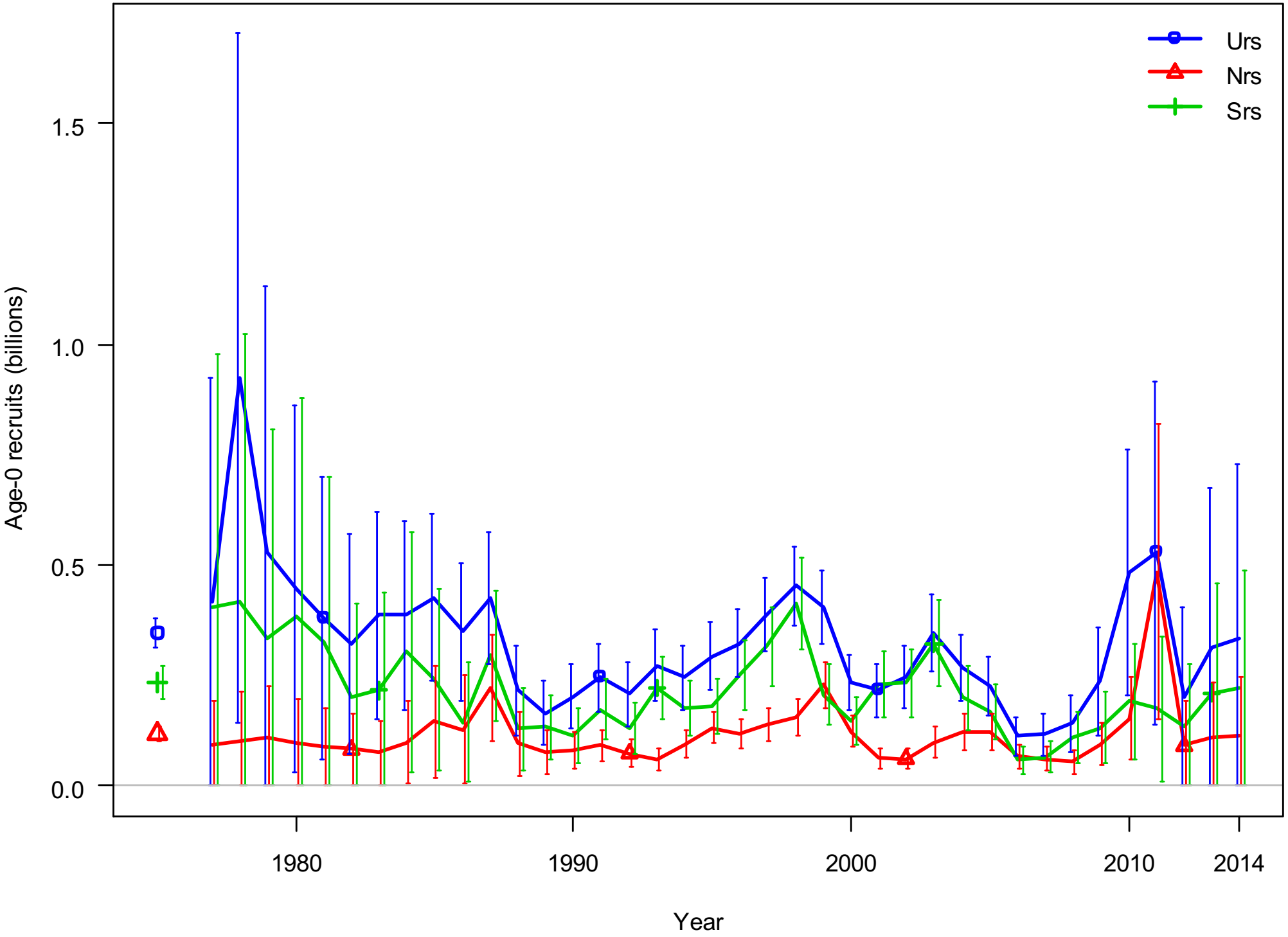

2014
Urs srv sel-at-age
Urs srv sel-at-len
Spawning biomass (x1000 t)
150
100
50
0
1980
1990
2000
2010
2014
Year

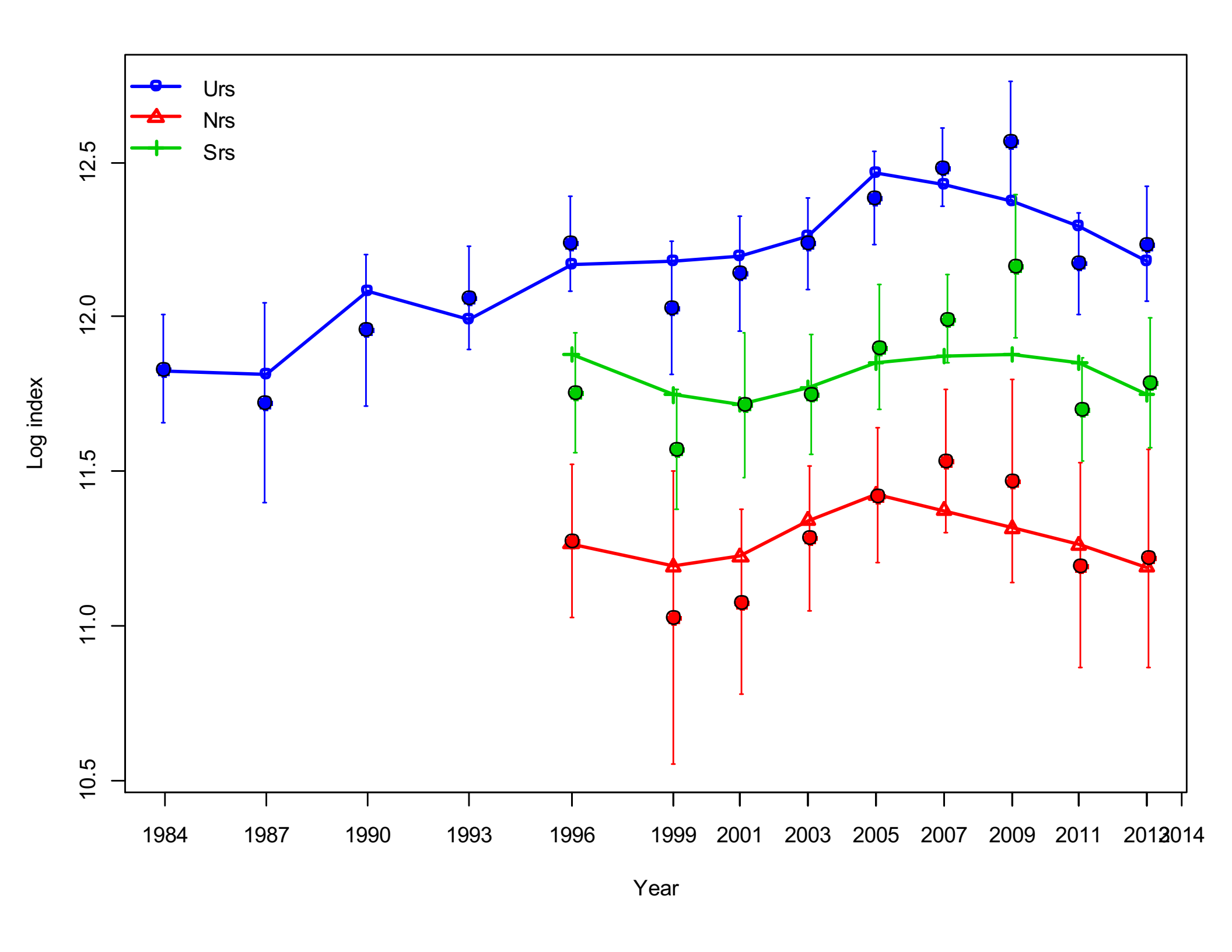

2014
Urs srv sel-at-age
Urs srv sel-at-len
800
600
400
200
0
Age-0 recruits (millions)
1980
1990
2000
2010
2014
Year


2014
Urs srv sel-at-age
Urs srv sel-at-len
Log index
12.8
12.6
12.4
12.2
12.0
11.8
11.6
11.4
1984
1987
1990
1993
1996
1999
2001
2003
2005
2007
2009
2011
2013
2014
Year


Urs
Nrs
Srs
150
100
50
0
Spawning biomass (x1000 t)
1980
1990
2000
2010
2014
Year


Urs
Nrs
Srs
800
600
400
200
0
Age-0 recruits (millions)
1980
1990
2000
2010
2014
Year

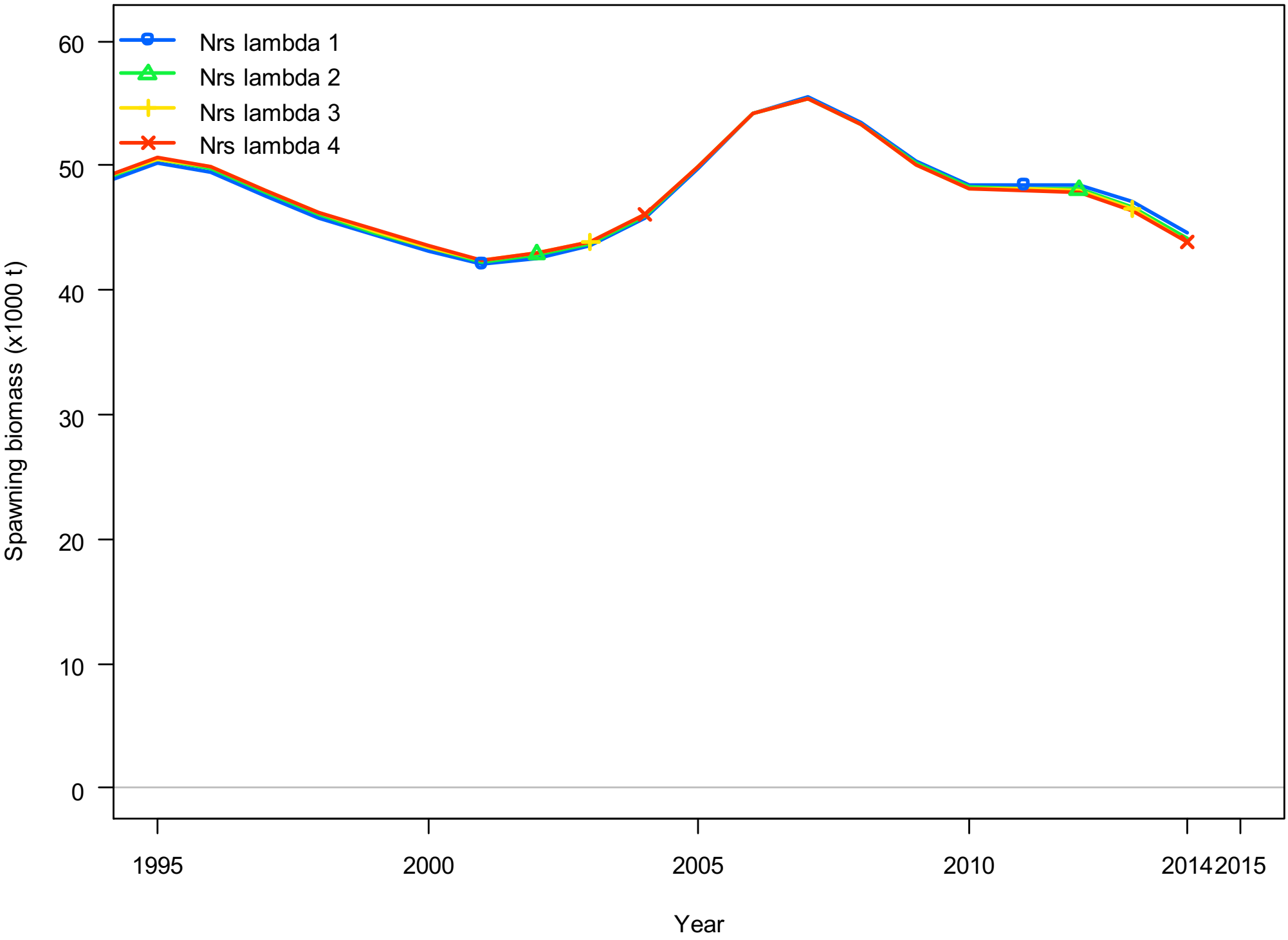

Urs
Nrs
Srs
Age-0 recruits (billions)
0.0
0.5
1.0
1.5
1980
1990
2000
2010
2014
Year

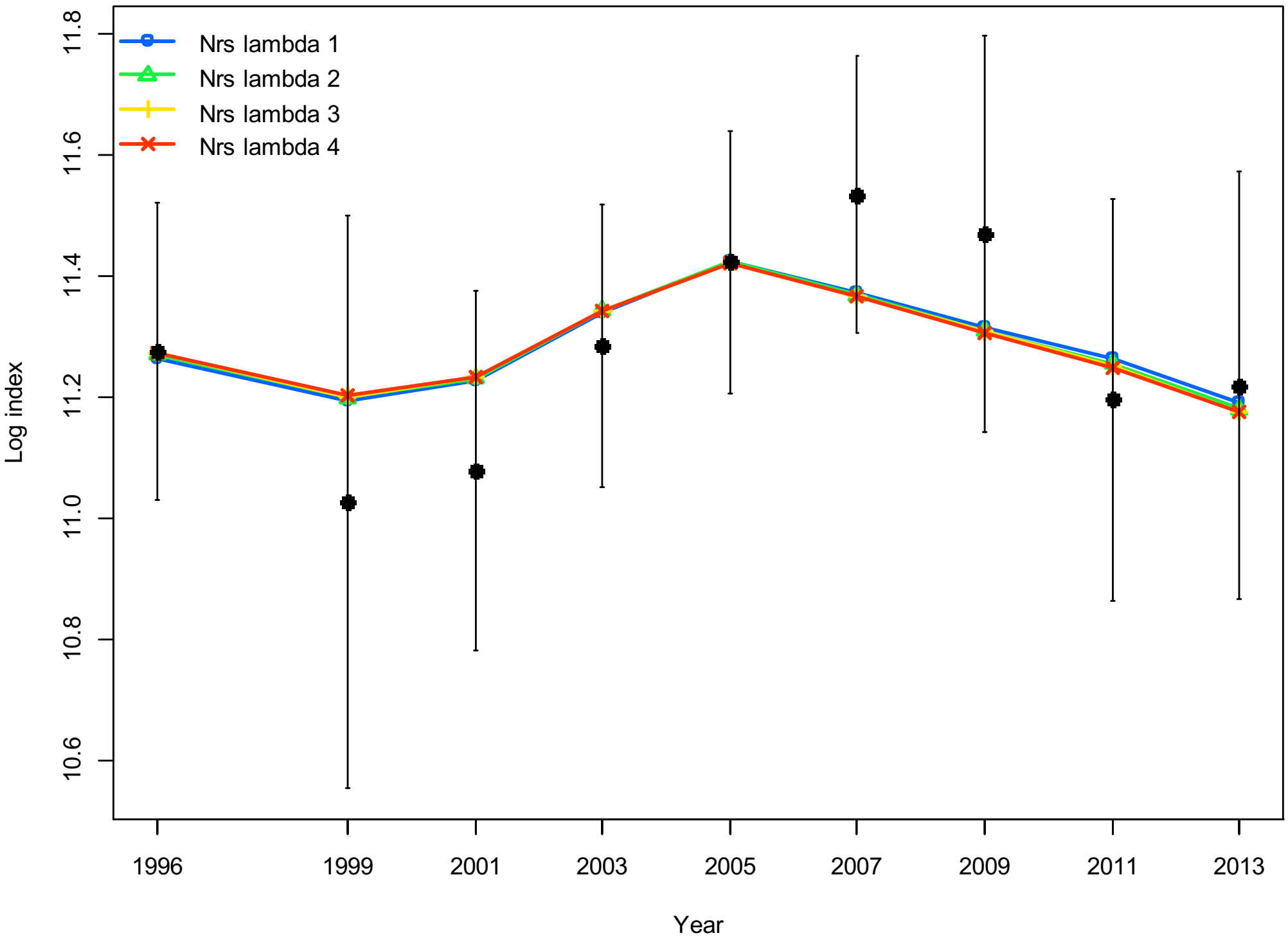

Urs
Nrs
Srs
Log index
12.5
12.0
11.5
11.0
10.5
1984
1987
1990
1993
1996
1999
2001
2003
2005
2007
2009
2011
2013
2014
Year

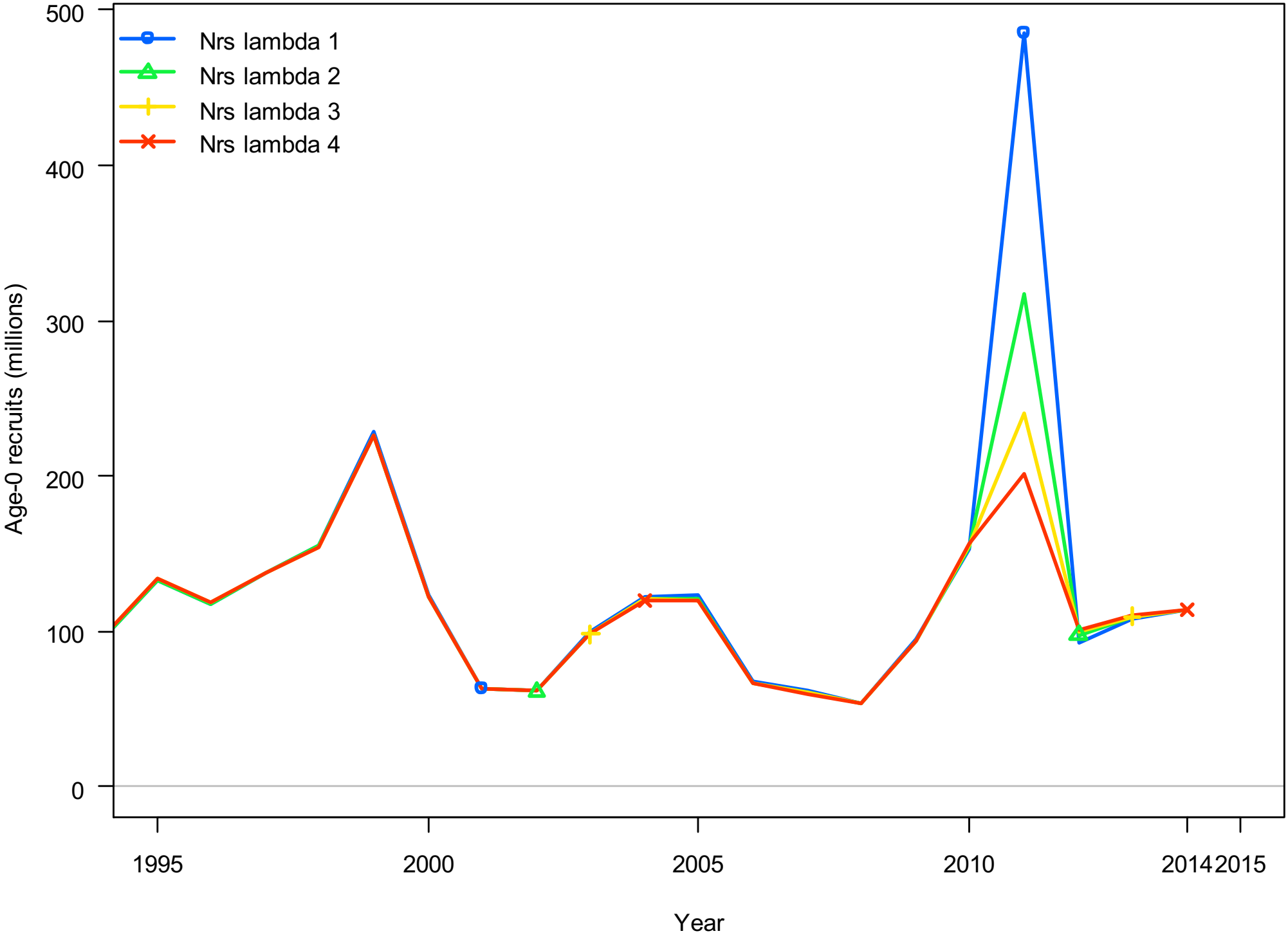
Lambda considerations

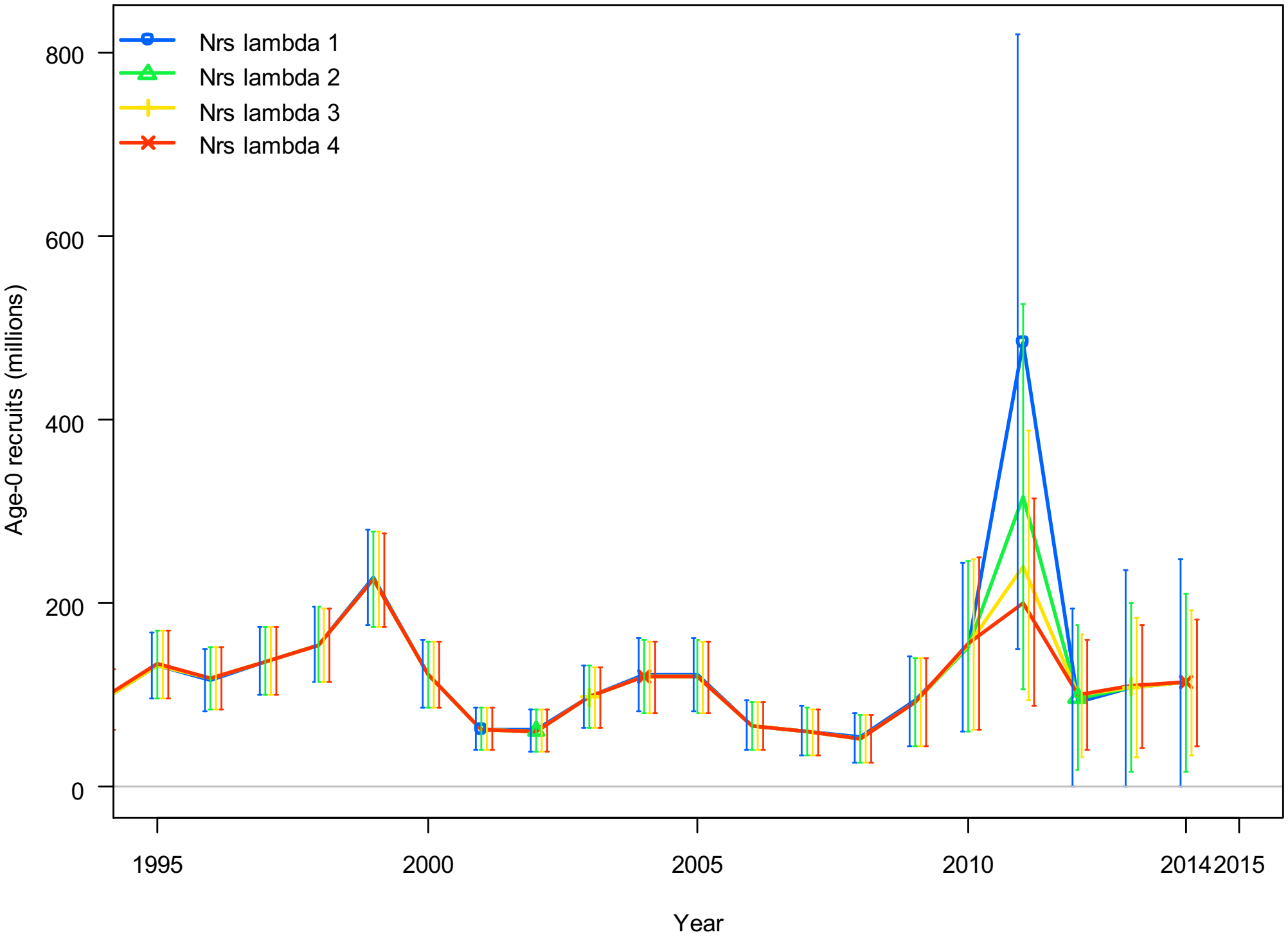
- Nrs
  - Use 3 for the large 2011 year class
- Srs
  - Use 1 or 2 for the 2012 year class
- Urs
  - Use 3 for the large 2011 year class

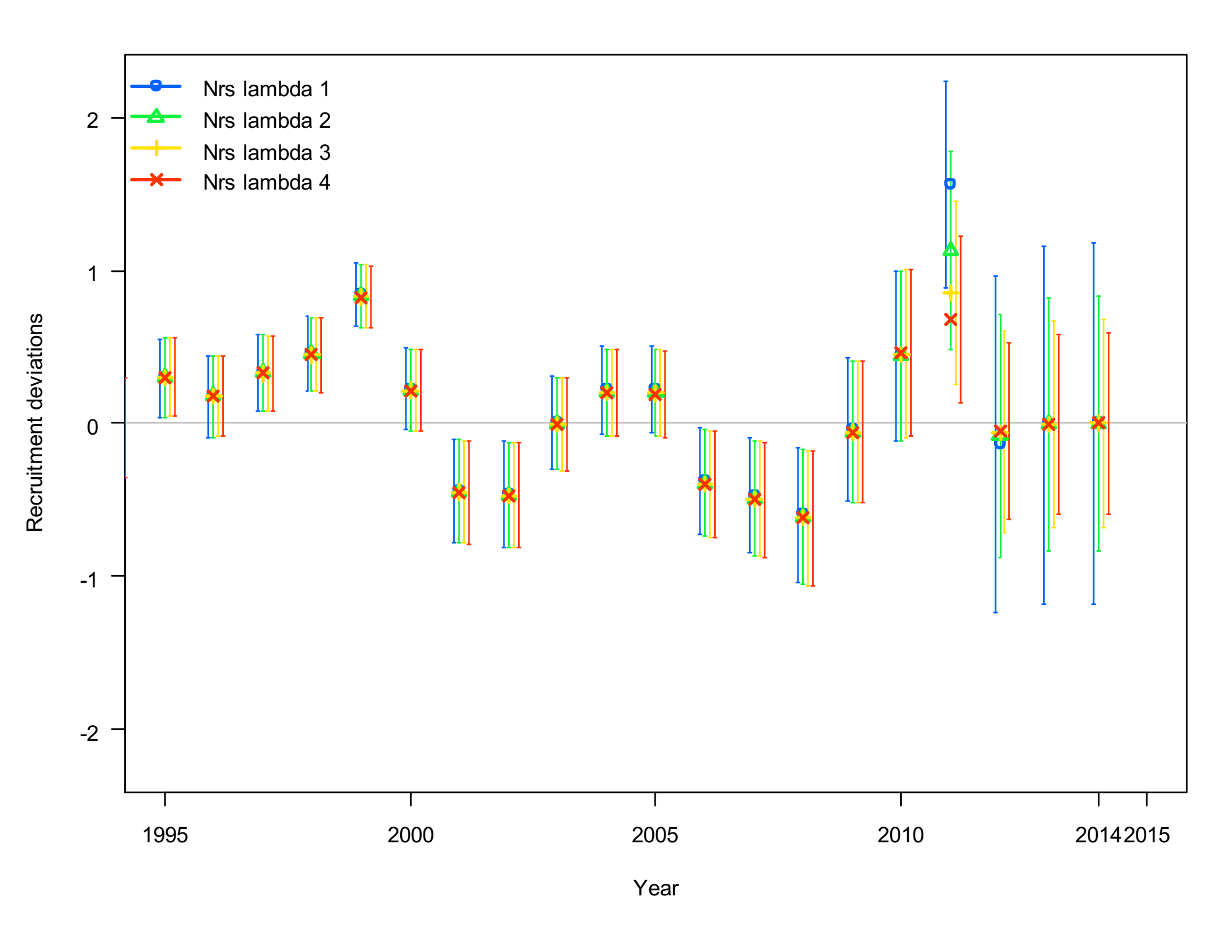
- Lambda value influences projections

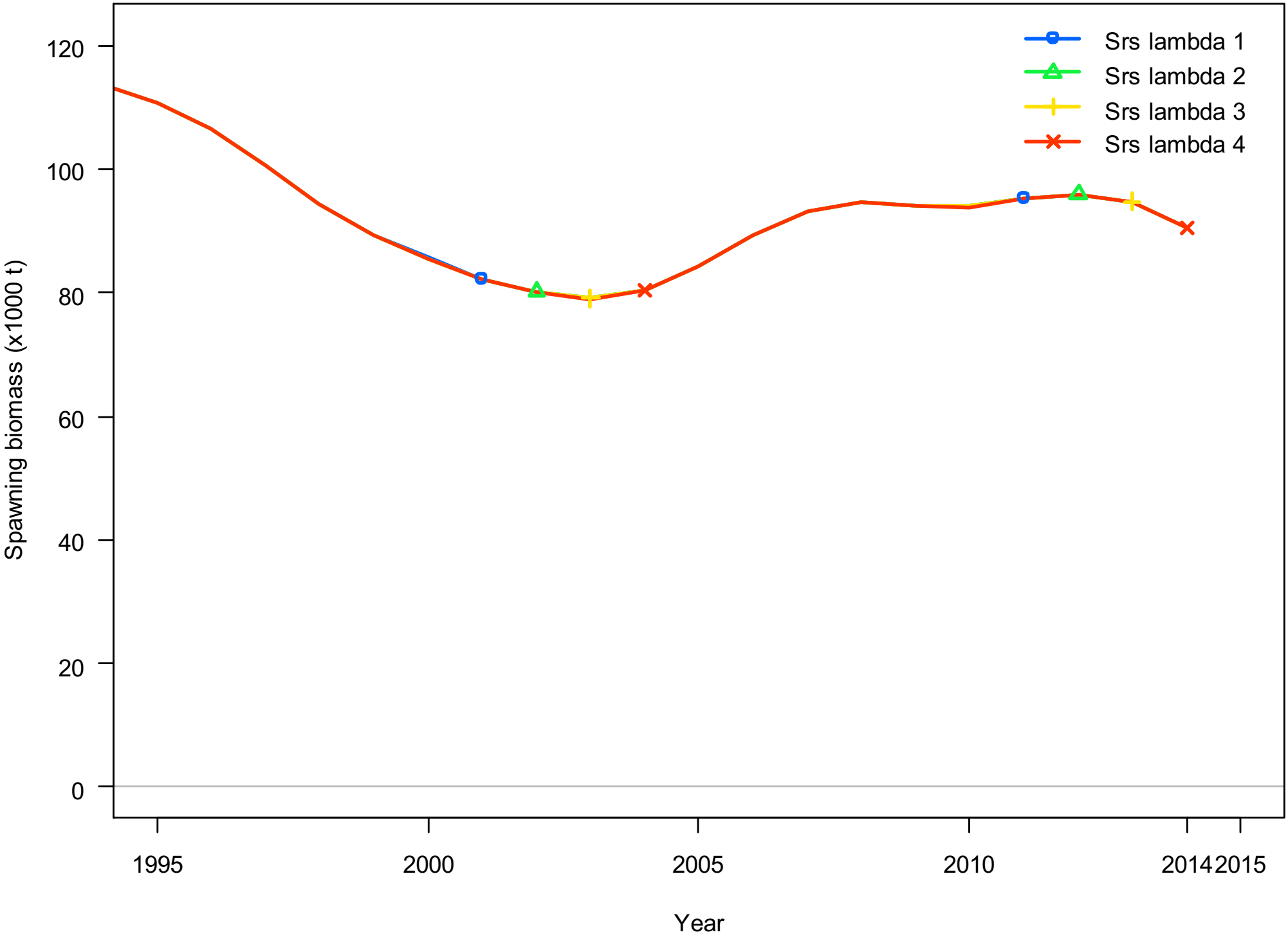

Nrs lambda 1
Nrs lambda 2
Nrs lambda 3
Nrs lambda 4
Spawning biomass (x1000 t)
60
50
40
30
20
10
0
1995
2000
2005
2010
2014
2015
Year

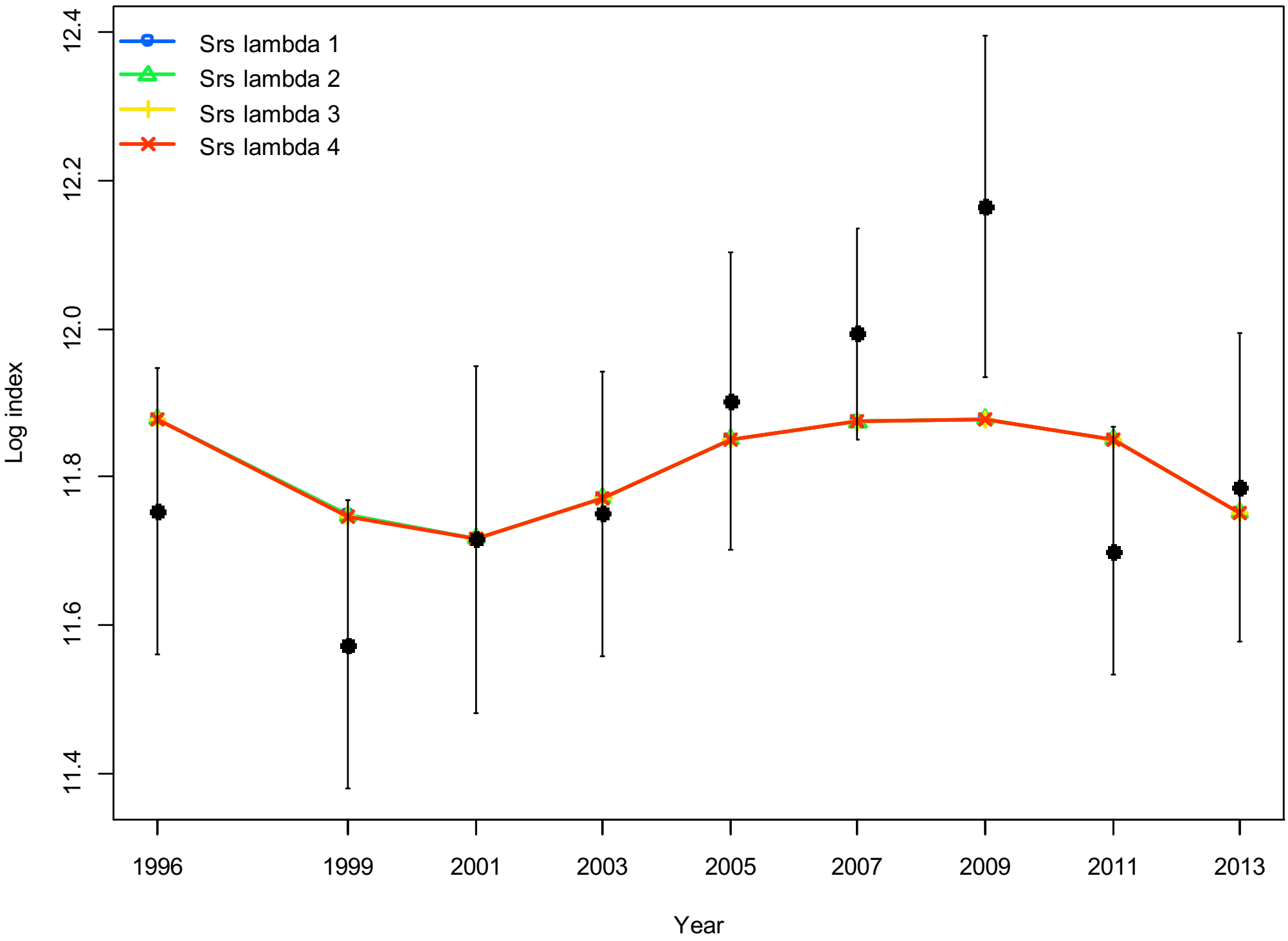

Nrs lambda 1
Nrs lambda 2
Nrs lambda 3
Nrs lambda 4
Log index
10.6
10.8
11.0
11.2
11.4
11.6
11.8
1996
1999
2001
2003
2005
2007
2009
2011
2013
Year

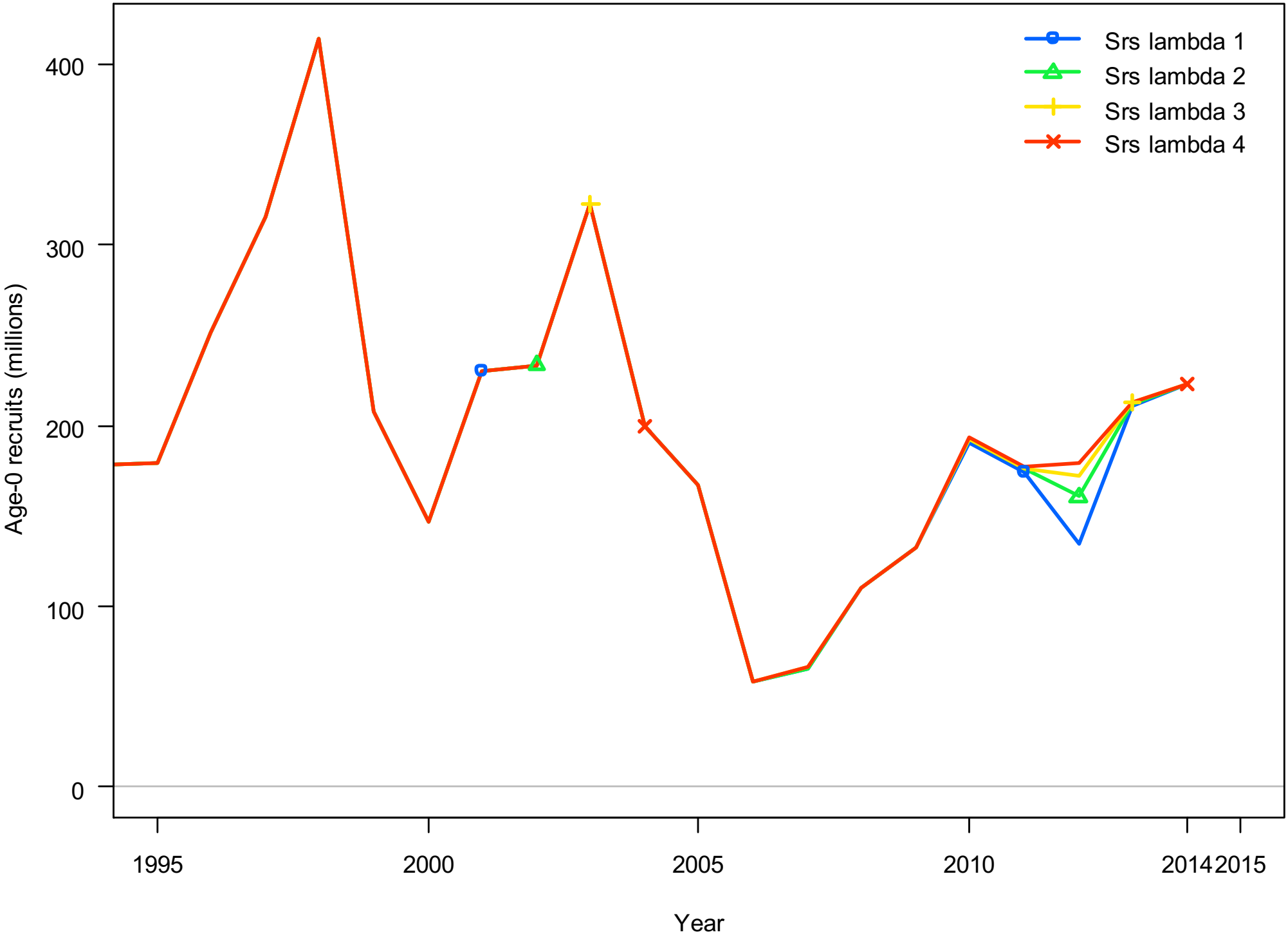

Nrs lambda 1
Nrs lambda 2
Nrs lambda 3
Nrs lambda 4
Age-0 recruits (millions)
500
400
300
200
100
0
1995
2000
2005
2010
2014
2015
Year

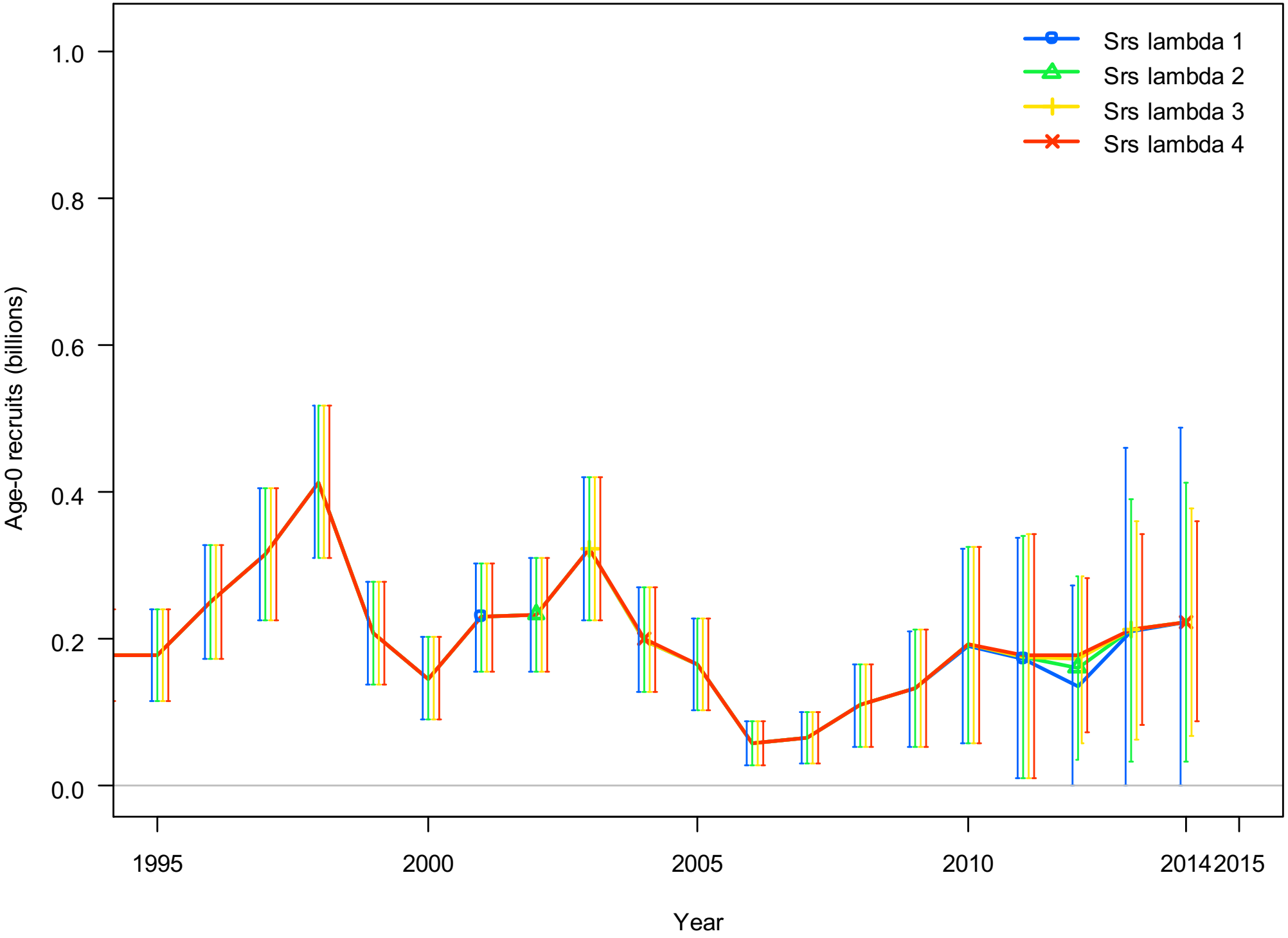

Nrs lambda 1
Nrs lambda 2
Nrs lambda 3
Nrs lambda 4
800
600
400
200
0
Age-0 recruits (millions)
1995
2000
2005
2010
2014
2015
Year

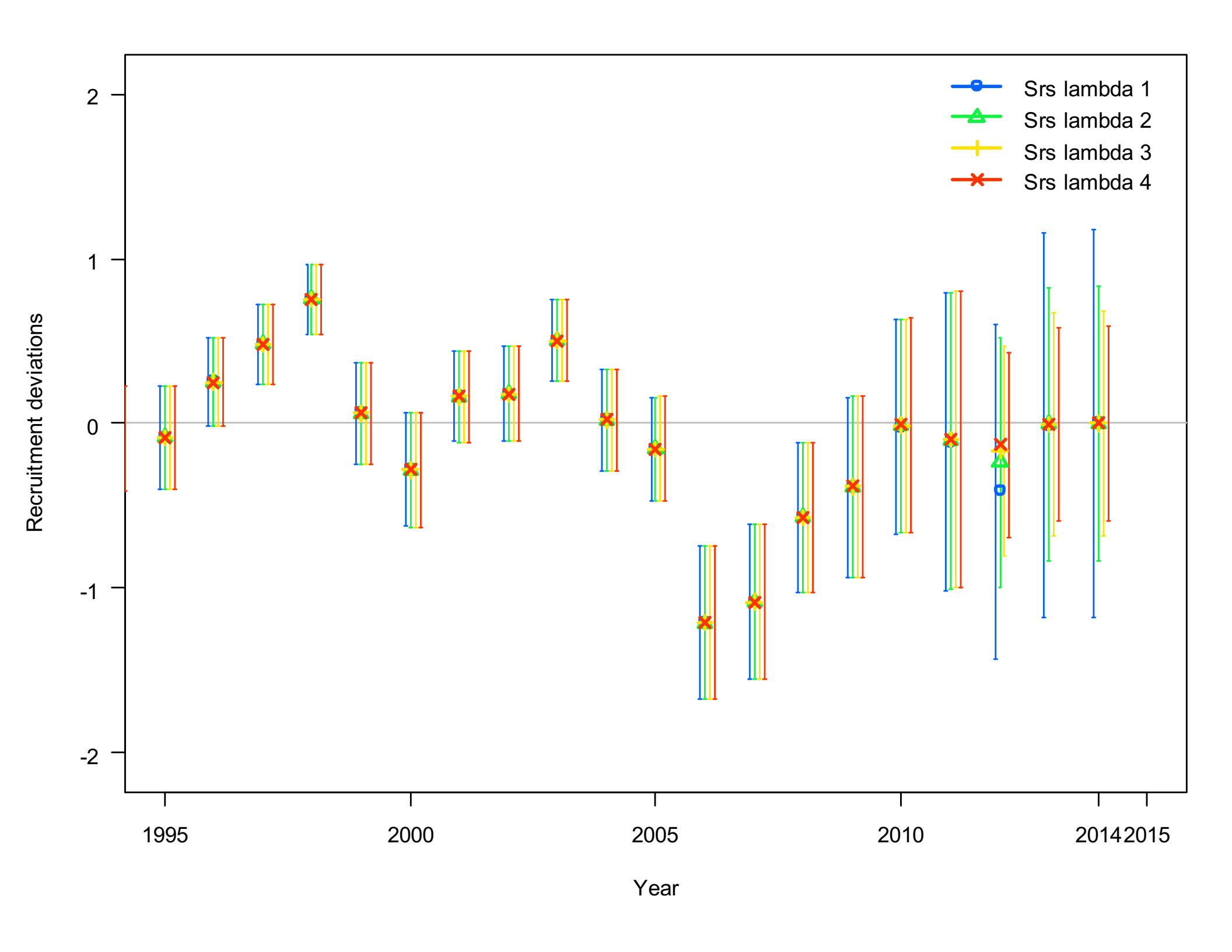

Nrs lambda 1
Nrs lambda 2
Nrs lambda 3
Nrs lambda 4
Recruitment deviations
2
1
0
-1
-2
1995
2000
2005
2010
2014
2015
Year

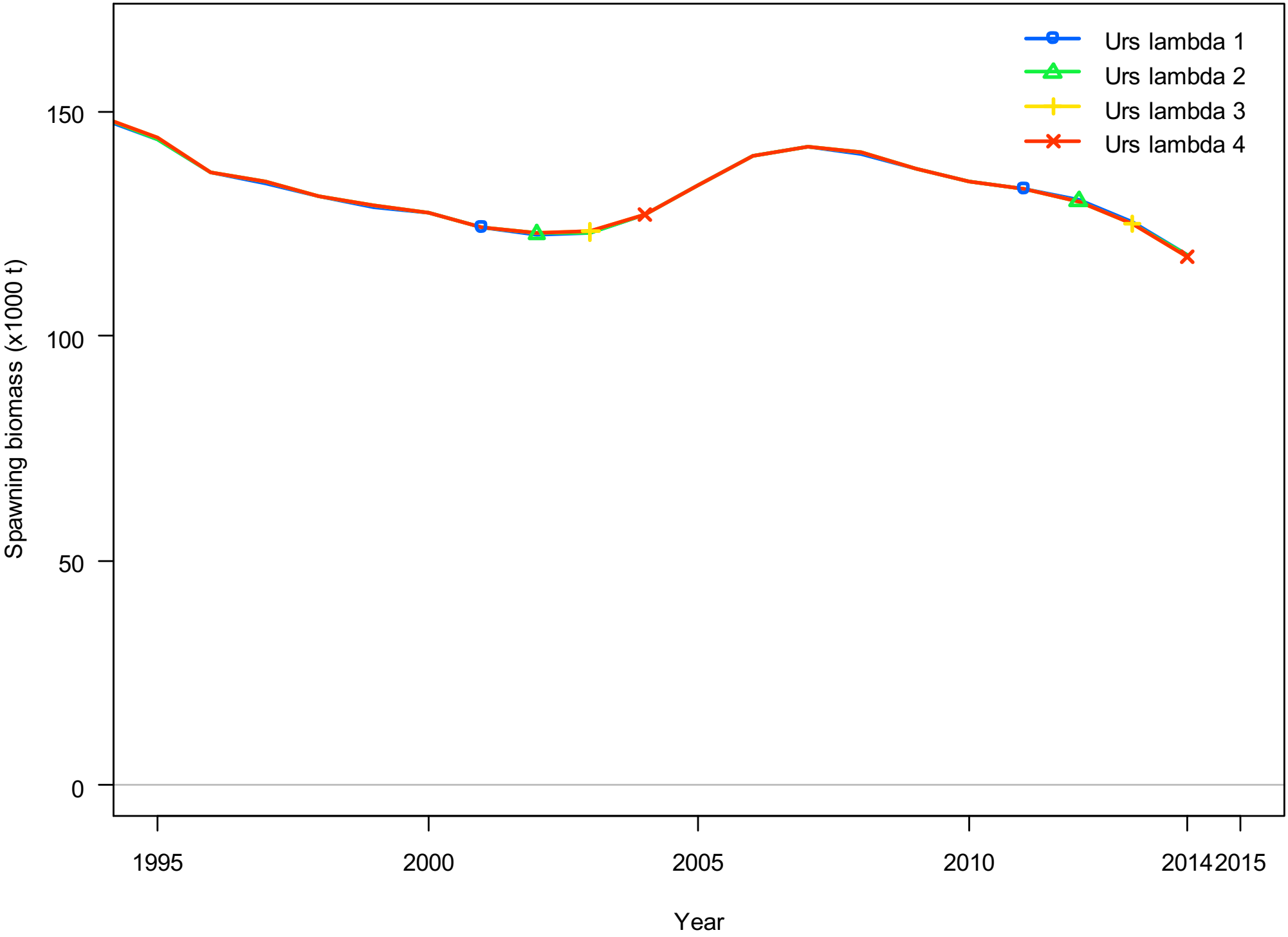

Srs lambda 1
Srs lambda 2
Srs lambda 3
Srs lambda 4
Spawning biomass (x1000 t)
120
100
80
60
40
20
0
1995
2000
2005
2010
2014
2015
Year

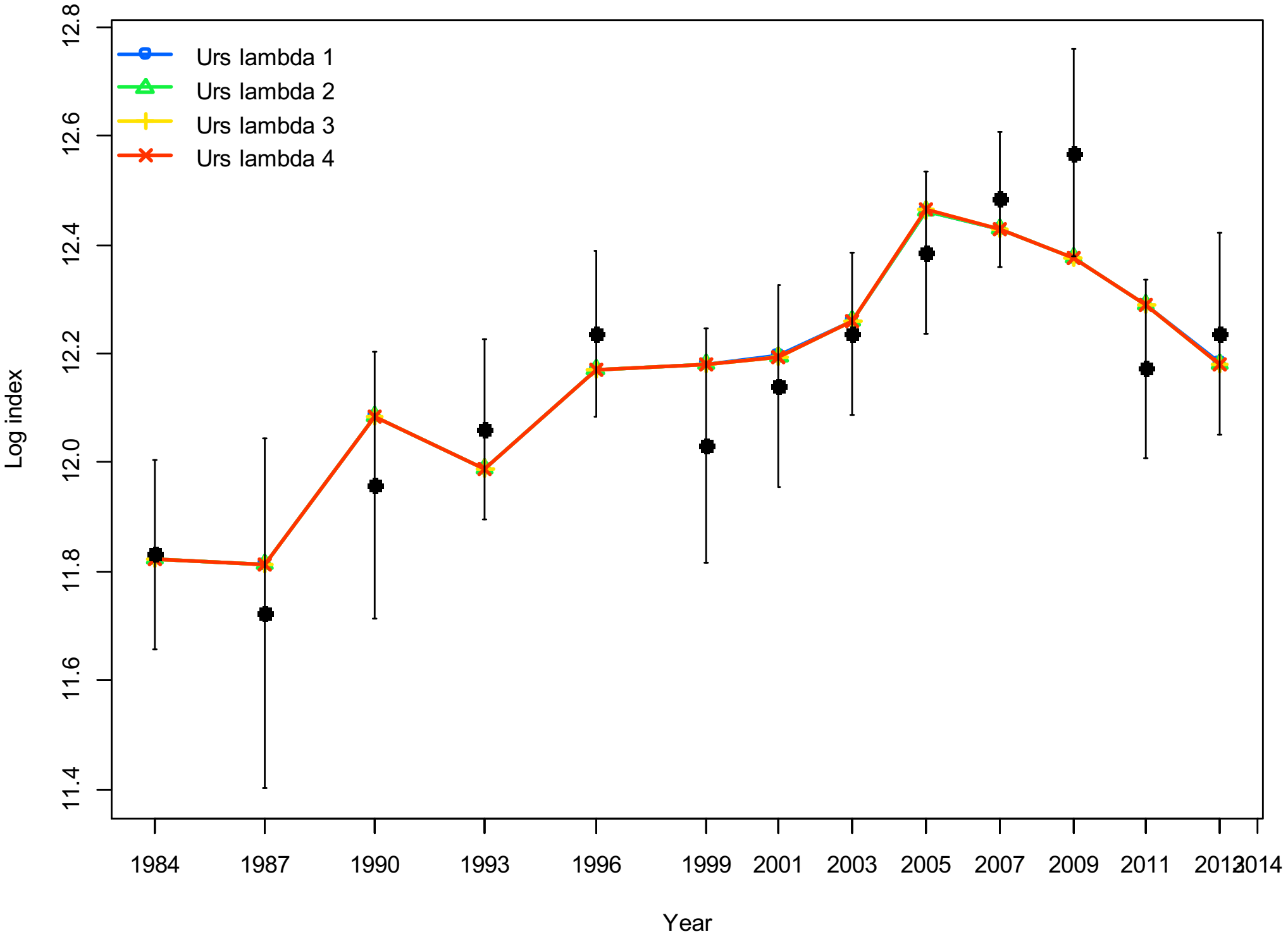

Srs lambda 1
Srs lambda 2
Srs lambda 3
Srs lambda 4
Log index
12.4
12.2
12.0
11.8
11.6
11.4
1996
1999
2001
2003
2005
2007
2009
2011
2013
Year

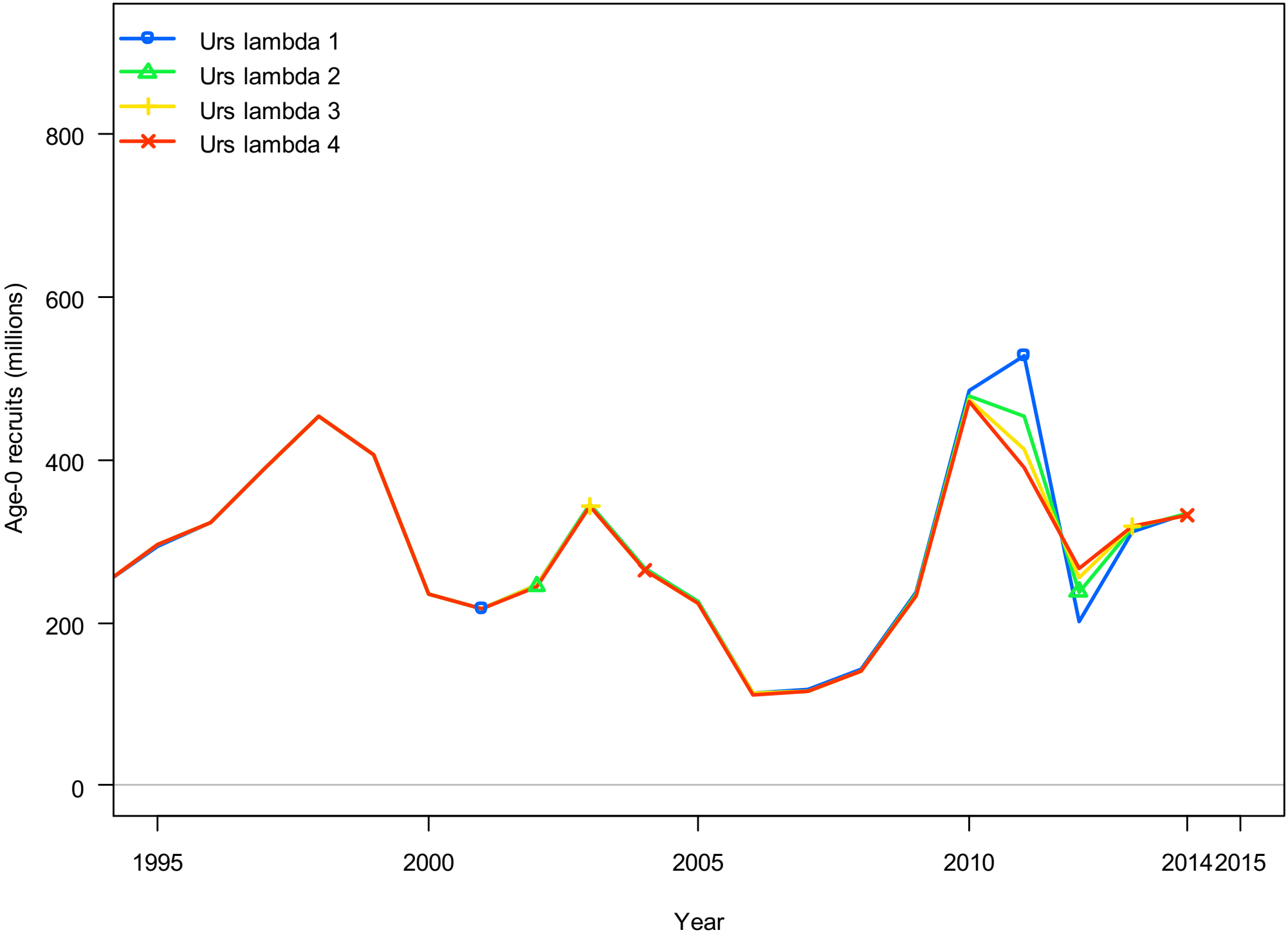

Srs lambda 1
Srs lambda 2
Srs lambda 3
Srs lambda 4
Age-0 recruits (millions)
0
100
200
300
400
1995
2000
2005
2010
2014
2015
Year

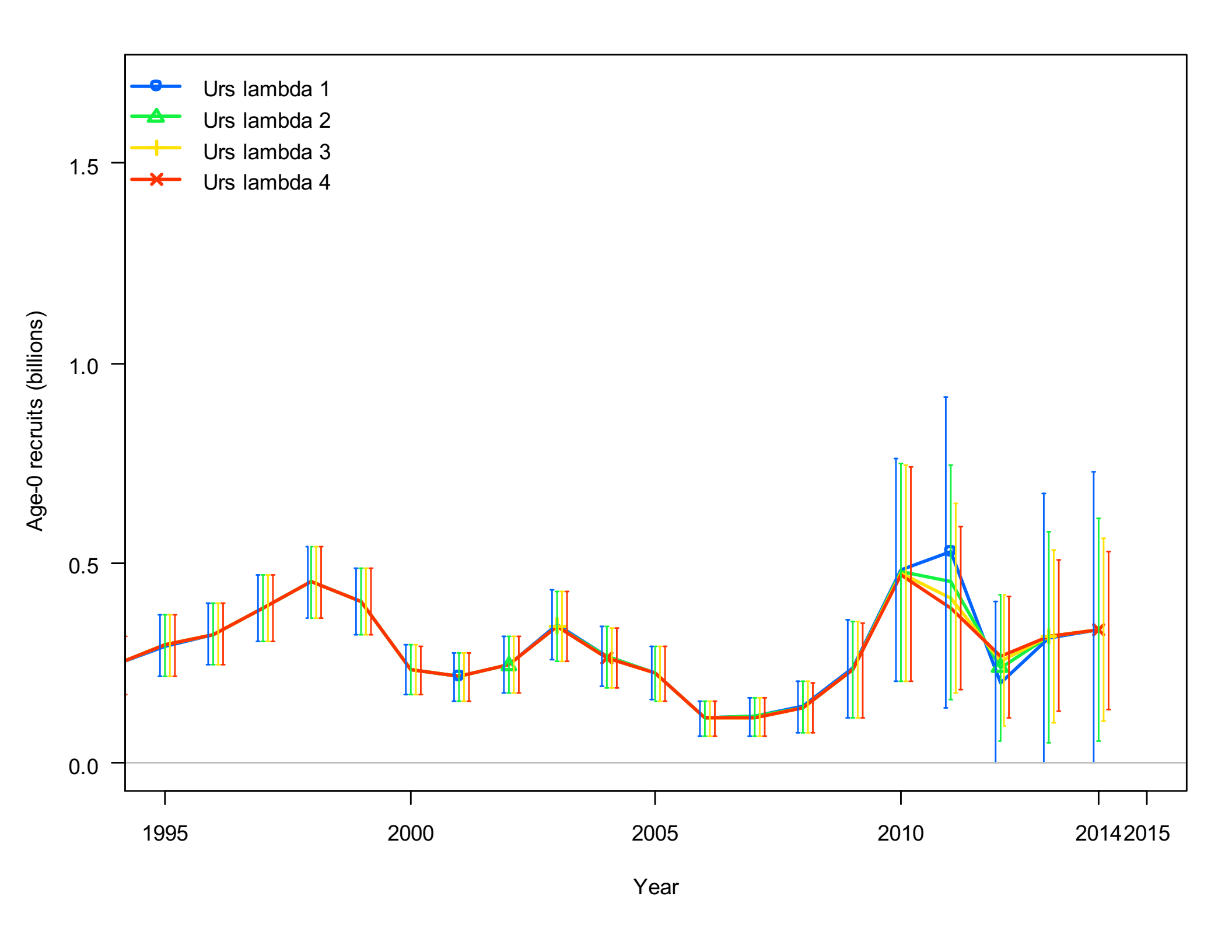

Srs lambda 1
Srs lambda 2
Srs lambda 3
Srs lambda 4
Age-0 recruits (billions)
1.0
0.8
0.6
0.4
0.2
0.0
1995
2000
2005
2010
2014
2015
Year

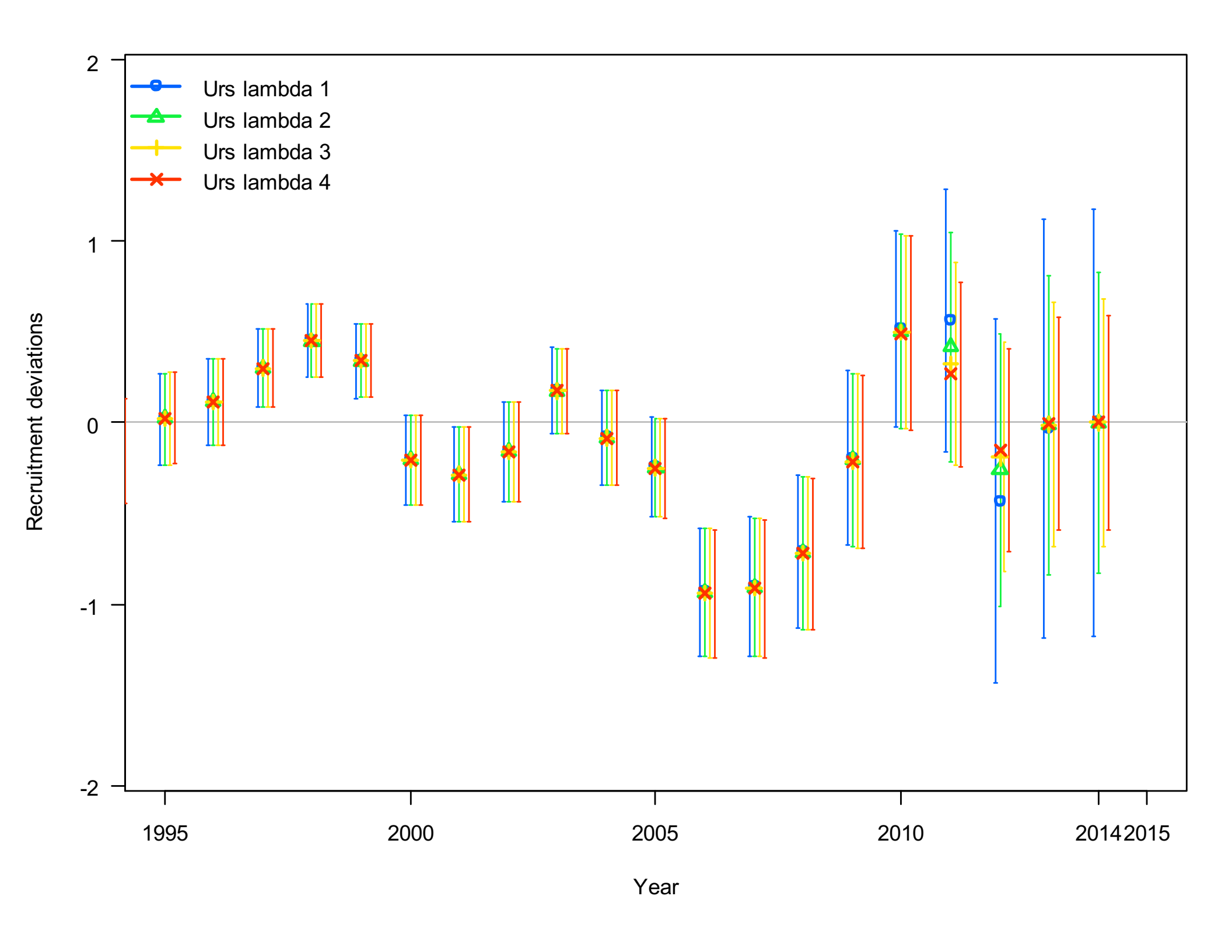

Srs lambda 1
Srs lambda 2
Srs lambda 3
Srs lambda 4
Recruitment deviations
2
1
0
-1
-2
1995
2000
2005
2010
2014
2015
Year


Urs lambda 1
Urs lambda 2
Urs lambda 3
Urs lambda 4
Spawning biomass (x1000 t)
150
100
50
0
1995
2000
2005
2010
2014
2015
Year


Urs lambda 1
Urs lambda 2
Urs lambda 3
Urs lambda 4
Log index
12.8
12.6
12.4
12.2
12.0
11.8
11.6
11.4
1984
1987
1990
1993
1996
1999
2001
2003
2005
2007
2009
2011
2012
2014
Year


Urs lambda 1
Urs lambda 2
Urs lambda 3
Urs lambda 4
800
600
400
200
0
Age-0 recruits (millions)
1995
2000
2005
2010
2014
2015
Year


Urs lambda 1
Urs lambda 2
Urs lambda 3
Urs lambda 4
Age-0 recruits (billions)
0.0
0.5
1.0
1.5
1995
2000
2005
2010
2014
2015
Year


Urs lambda 1
Urs lambda 2
Urs lambda 3
Urs lambda 4
Recruitment deviations
2
1
0
-1
-2
1995
2000
2005
2010
2014
2015
Year

Negative log likelihood

	srv sel-at-age	srv sel-at-len			srv sel-at-age	srv sel-at-len
Nrs				**Srs**		
Total NLL	900.835	898.673		Total NLL	944.967	940.726
Parameters	88	88		Parameters	88	88
Survey	-13.707	-14.827		Survey	-12.064	-12.428
Fsh len comp	192.831	197.855		Fsh len comp	155.250	153.048
Srv age comp	726.364	719.689		Srv age comp	801.165	799.614
Recr	-10.477	-11.090		Recr	-5.602	-5.617
Urs						
Total NLL	1063.940	1100.180				
Parameters	130	130				
Survey	-21. 027	-24.387				
Fsh len comp	198.679	208.916				
Srv len comp	1.863	1.426				
Srv age comp	885.562	916.190				
Recr	-6.432	-7.511				

Growth

	L at A_{min}	L_∞	k			L at A_{min}	L_∞	k	M
Nrs females	10.12	45.48	0.212		Nrs males	9.90	39.29	0.257	0.249
Srs females	11.30	49.73	0.200		Srs males	12.49	40.26	0.241	0.245
Urs females period 1	13.74	44.39	0.209		Urs males period 1	14.81	37.51	0.233	0.244
Urs females period 2	15.10	49.74	0.183		Urs males period 2	14.27	40.96	0.240	-
Urs females period 3	14.18	52.64	0.150		Urs males period 3	13.71	43.22	0.203	-

Discussion