From:	Abid, Joseph A
To:	Abid, Joseph A; Bondy, Garret E; Roth, Charles; Chase Fortenberry; Curtis, Emmet F; Draper, Cynthia E; Ellis, Steve; Eric Blischkee; Frank Dillon; Garry Griffith; Glover, Tim; James Lavelle; Saric, James; Jeff Keiser; Canar, John; John Kern; Milt Clark; Patricia White; Paul Bucholtz; Todd King; Tony Gendusa
Subject:	Kalamazoo River Work Group Discussion Items - 5/16/13
Date:	Thursday, May 16, 2013 1:52:02 PM
Attachments:	2013 05 016Split Samples (19992009) Conversion Factor Comparison.pdf 2013 05 016 Smallmouth Bass Fillet Lipid Only.pdf 2013 05 16 ReferenceArea_LipidNorm.pdf 2013 05 16 Area 1 SWACS.pdf 2013 05 16Confidence Limit versus SWAC for Area 1.pdf

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Work Group team,

Attached are items to be discussed during this afternoon's Work Group conference call.

Thank you,

Joe

Joe Abid
Environmental Scientist

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Laboratory Conversion Factors for Lipid, PCBs, and Lipid-Normalized PCBs

	Number of Lab Splits	NEA lipid / MDCH lipid	NEA PCB / MDCH PCB (wet wt basis)	NEA PCB / MDCH PCB (lipid normalized basis)	NEA PCB / MDCH PCB (lipid normalized basis)
1999 Carp	20	0.97 ± 0.27	1.20 ± 0.32	2.68 ± 6.85	1.14 ± 0.22[1]
2009 Carp	30	1.54 ± 0.51	1.65 ± 0.57	1.06 ± 0.20	1.06 ± 0.20
1999 & 2009 Carp	50	1.32 ± 0,51	1.47 ± 0.53	2.06 ± 4.32	1.10 ± 0.20
1999 adult SMB	17	1.21 ± 0.31	1.13 ± 0.29	0.96 ± 0.24	
2009 adult SMB	30	4.75 ± 2.75	4.48 ± 2.66	0.97 ± 0.43	
1999 & 2009 adult SMB	47	3.47 ± 2.38	3.27 ± 2.67	0.97 ± 0.37	
2009 YOY SMB	20	1.83 ± 0.19	2.09 ± 0.27	1.14 ± 0.10	

Notes:

Values reported are mean ± standard deviation

[1] One outlier was removed: SubSample ID FW-034-0-18

Carp samples are fillet without skin

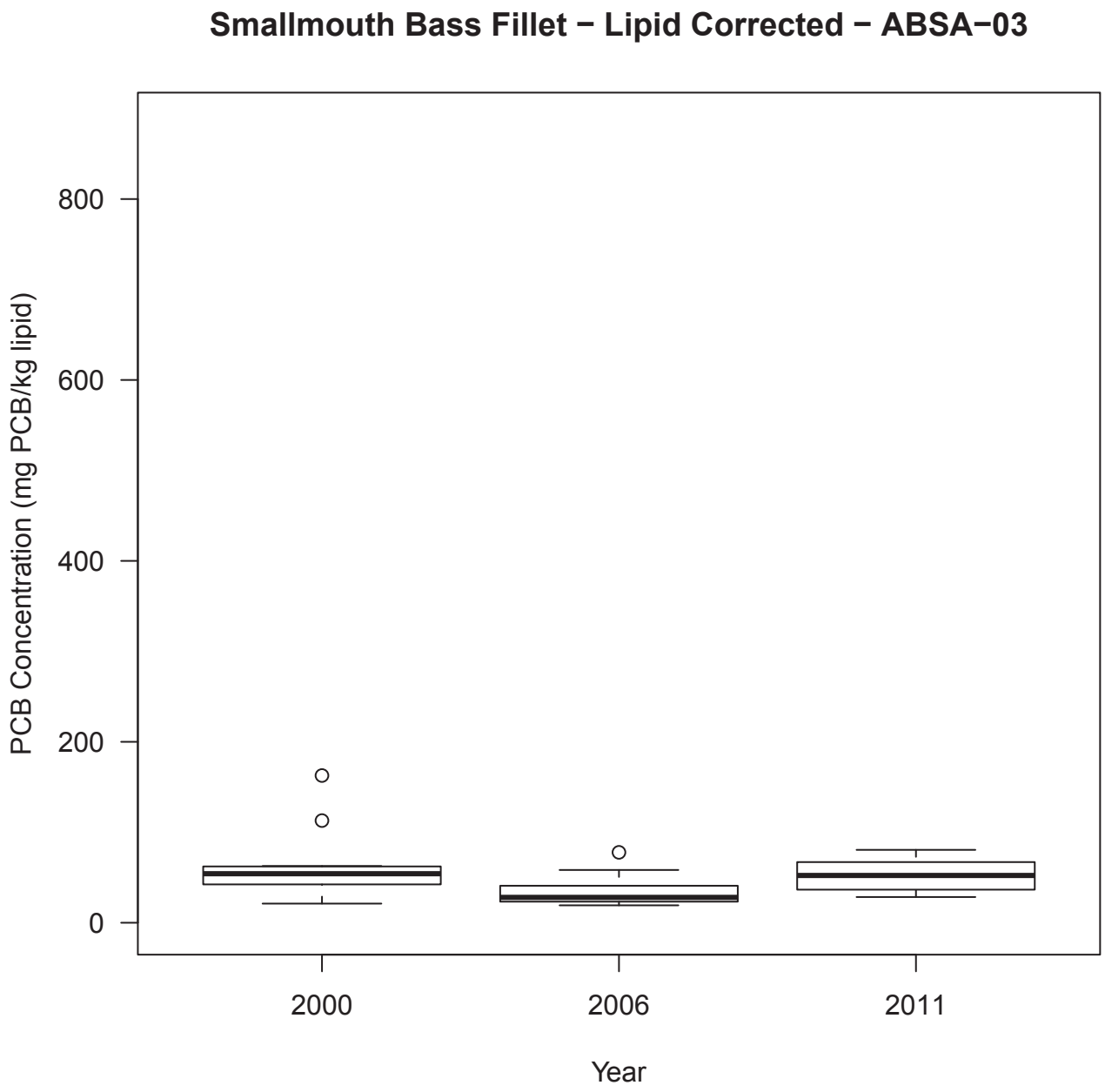
SMB = Smallmouth bass (fillet with skin)

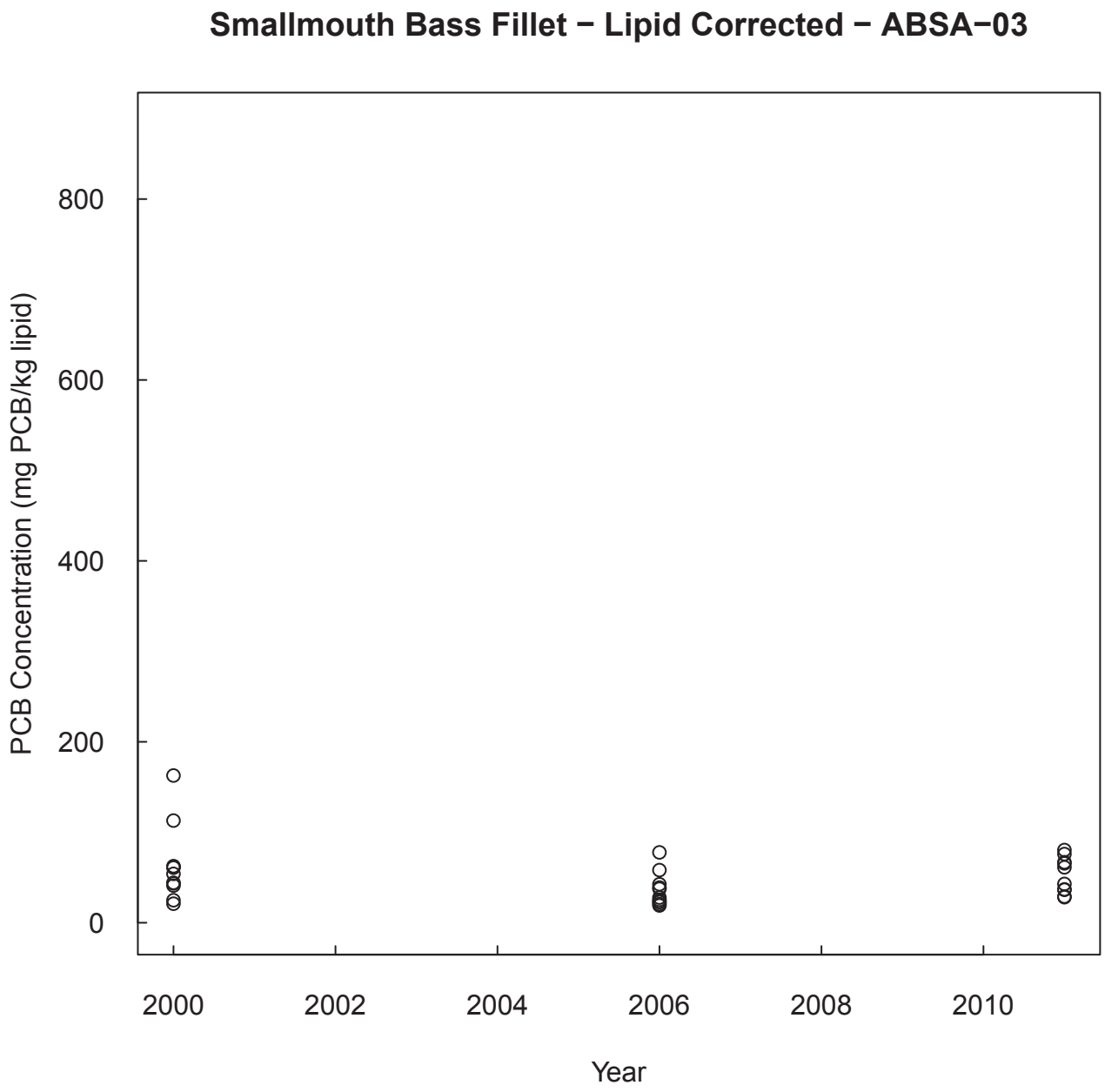
YOY = Young of Year (whole body samples)

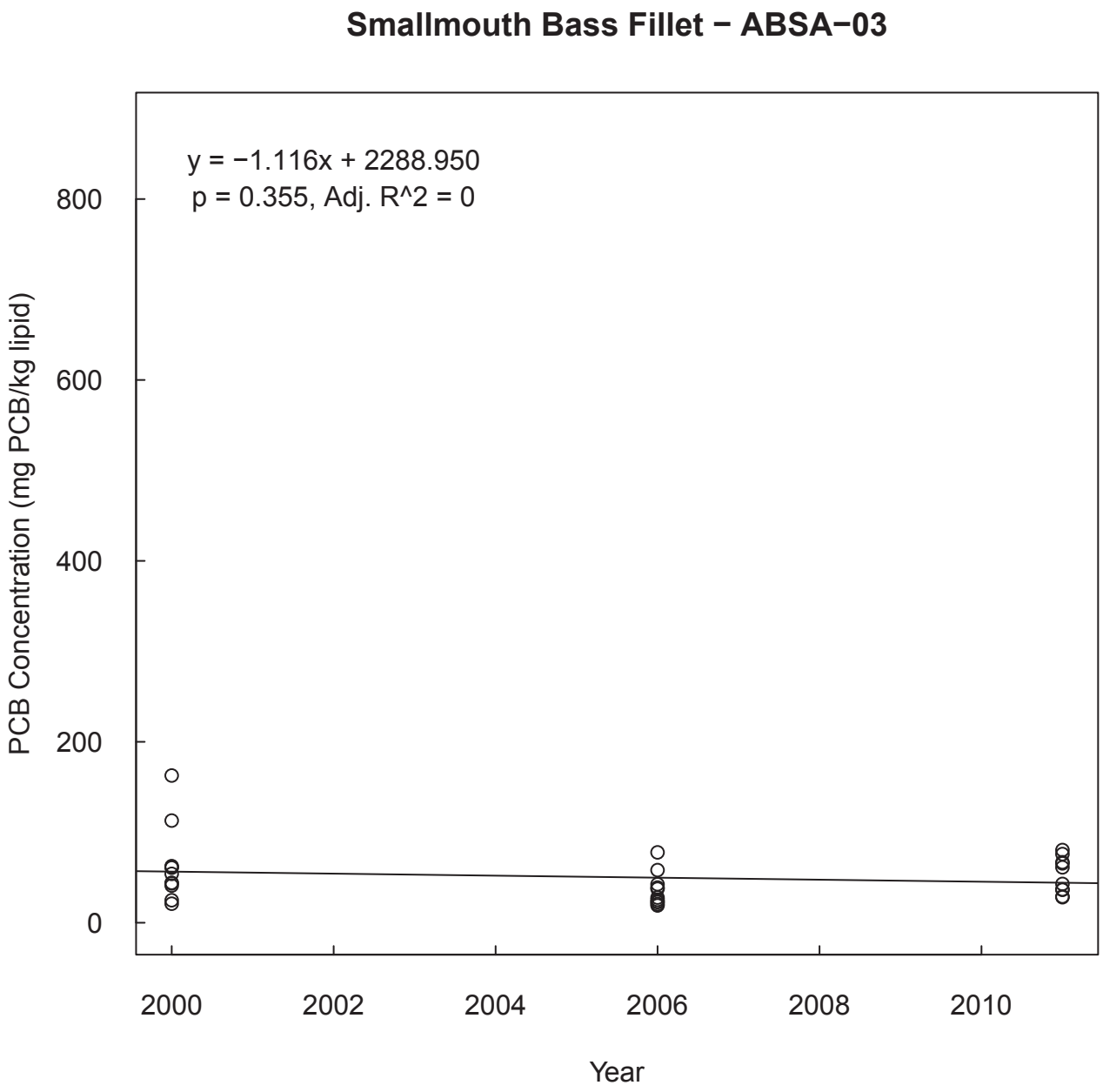
Conversion factor for MDCH lipid normalized PCB data (i.e., (MDCH * CF) adjusts for differences between NEA and MDCH)

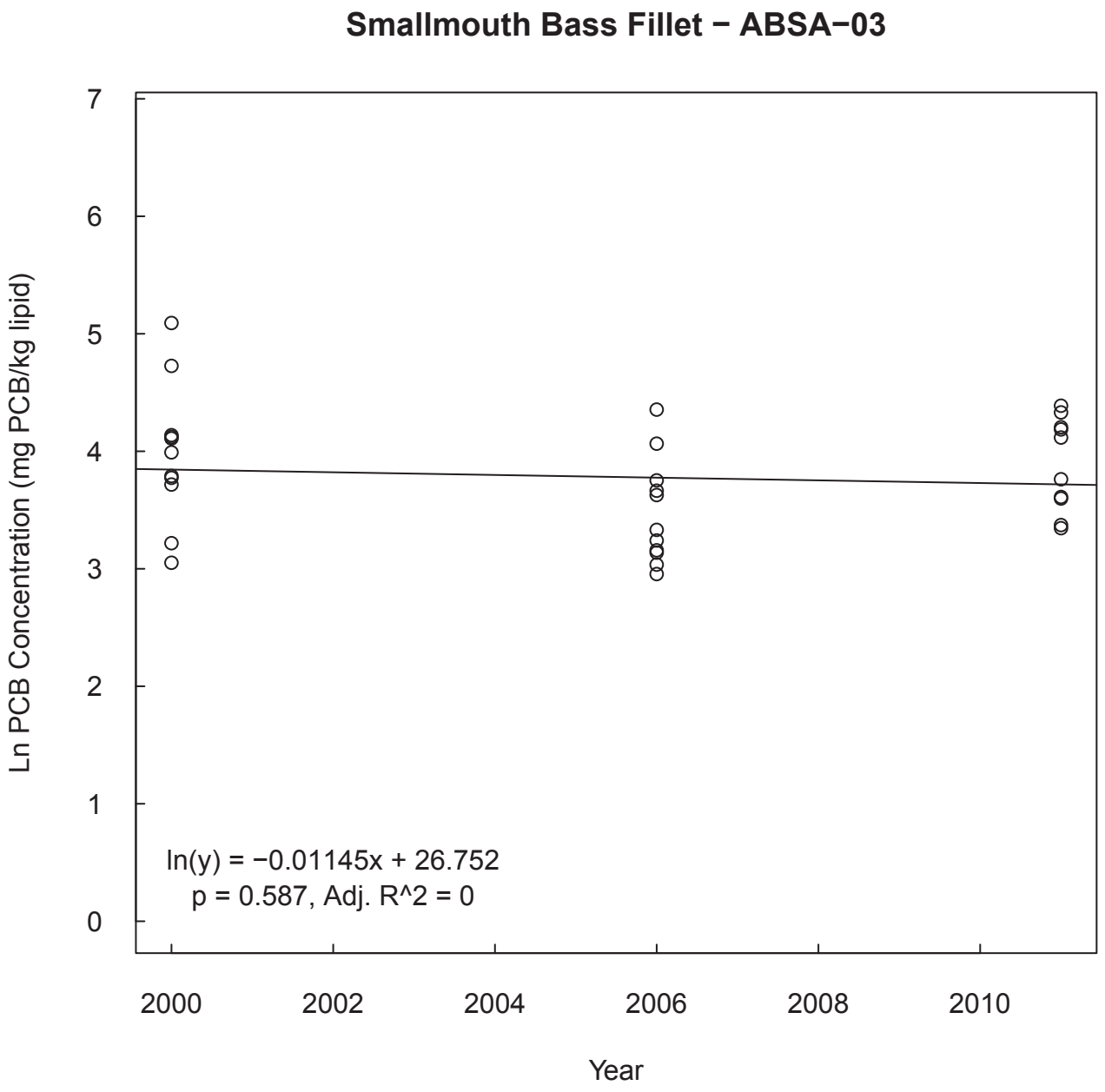
PREPARED/DATE: LAB 5/14/13

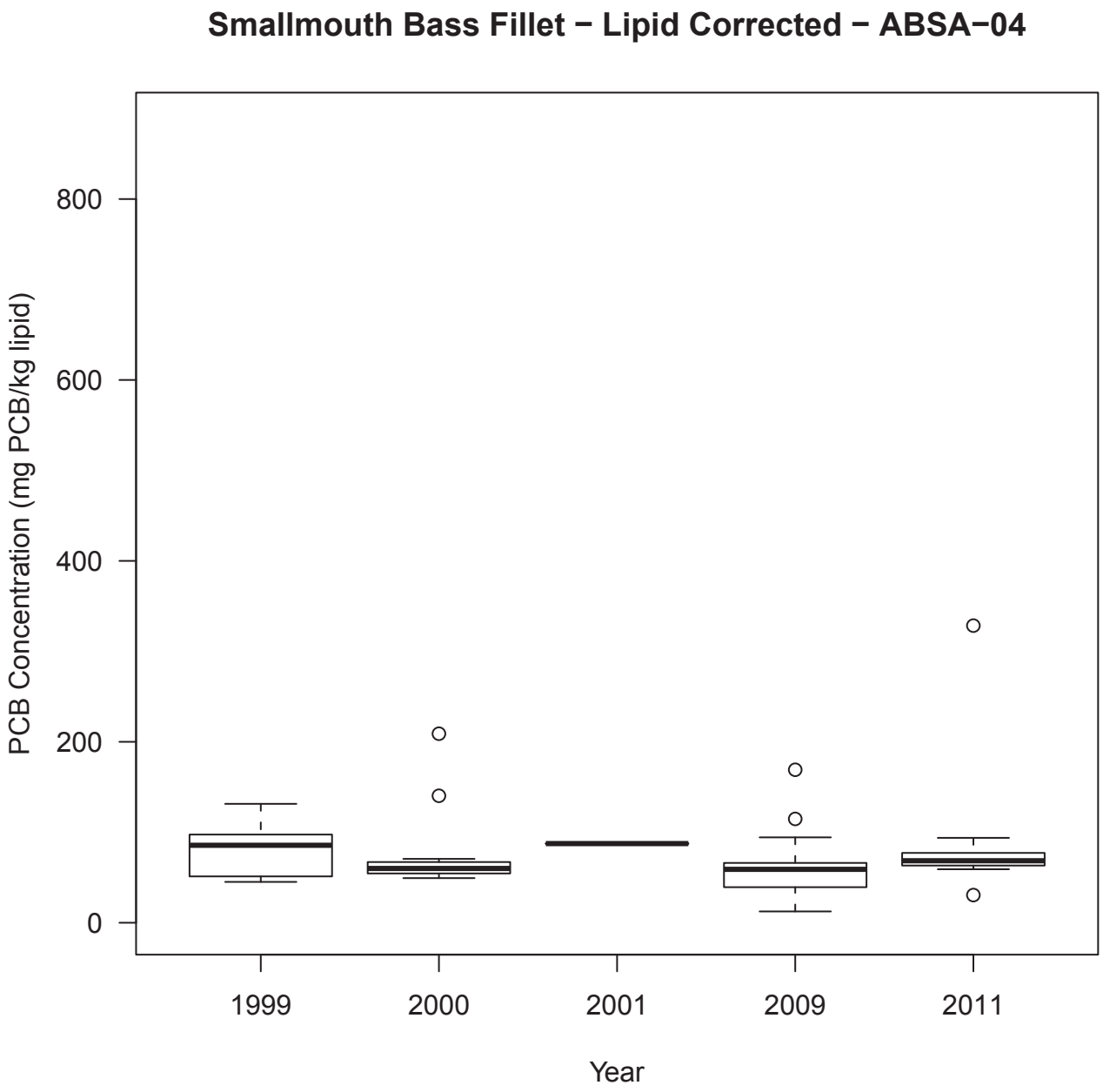
CHECKED/DATE: SGE 5/14/13

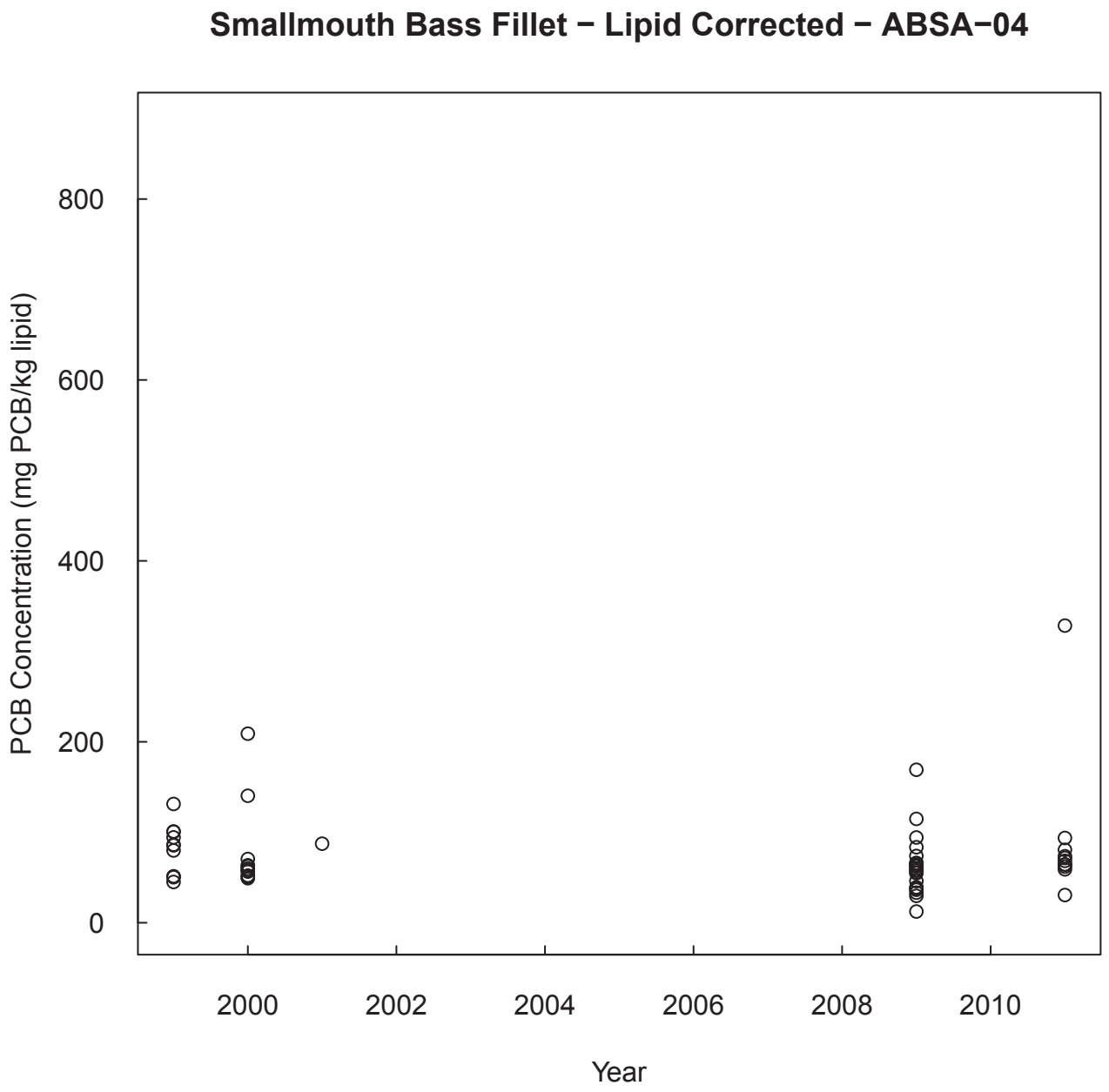

Smallmouth Bass Fillet − Lipid Corrected − ABSA−03
PCB Concentration (mg PCB/kg lipid)
800
600
400
200
0
2000
2006
2011
Year

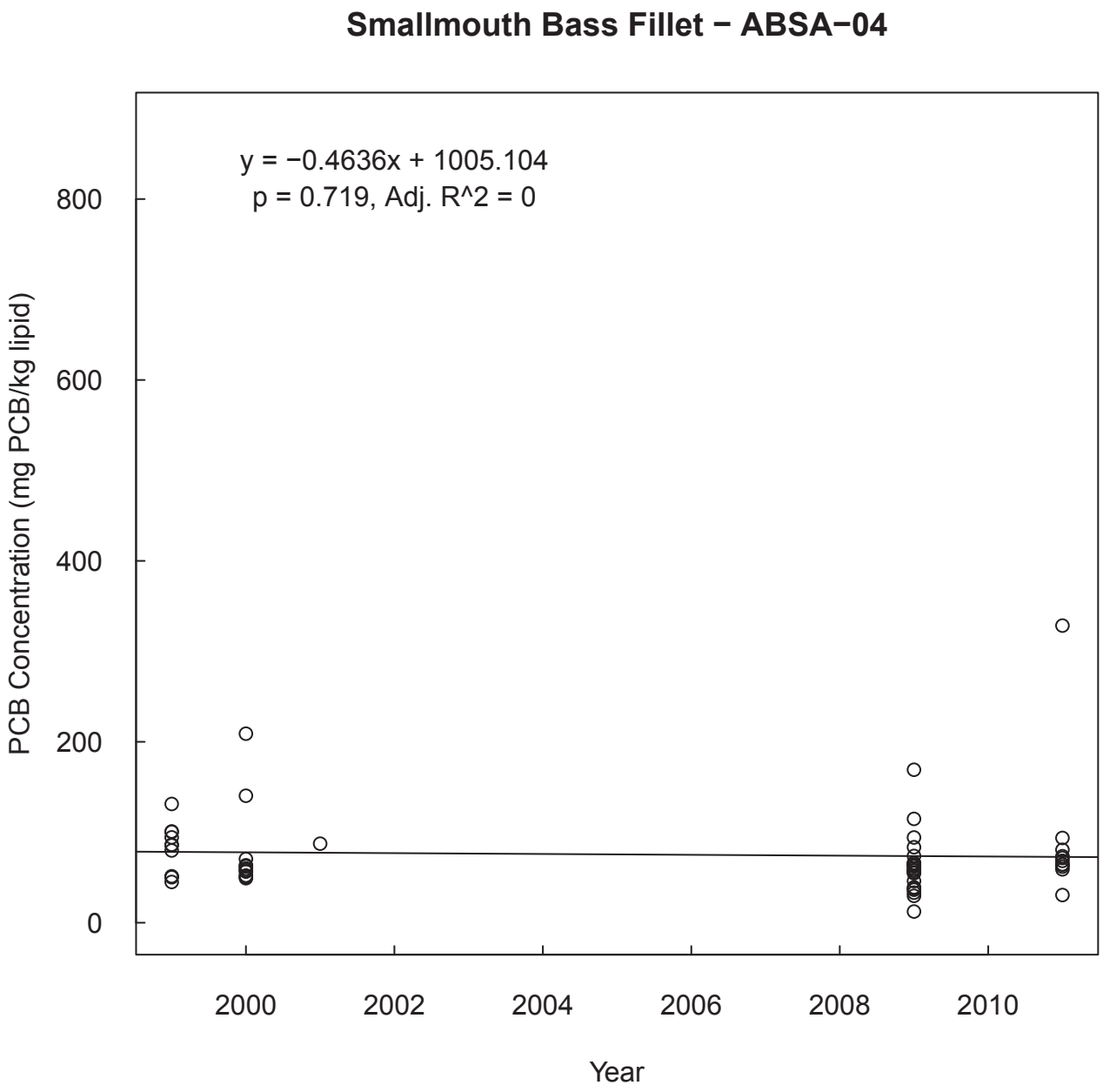

Smallmouth Bass Fillet − Lipid Corrected − ABSA−03
PCB Concentration (mg PCB/kg lipid)
800
600
400
200
0
2000
2002
2004
2006
2008
2010
Year

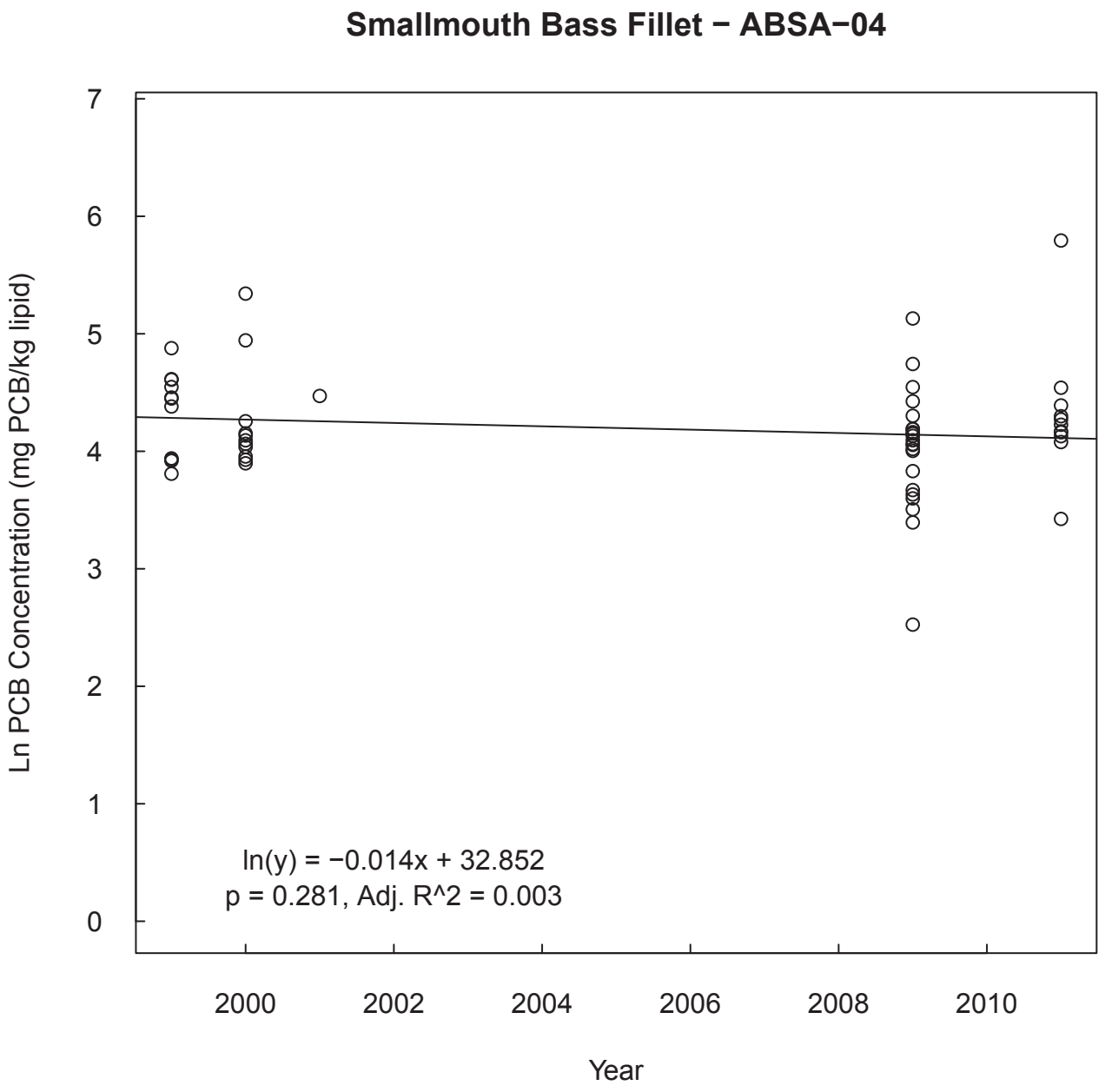

Smallmouth Bass Fillet − ABSA−03
y = −1.116x + 2288.950
p = 0.355, Adj. R^2 = 0
PCB Concentration (mg PCB/kg lipid)
0
200
400
600
800
2000
2002
2004
2006
2008
2010
Year

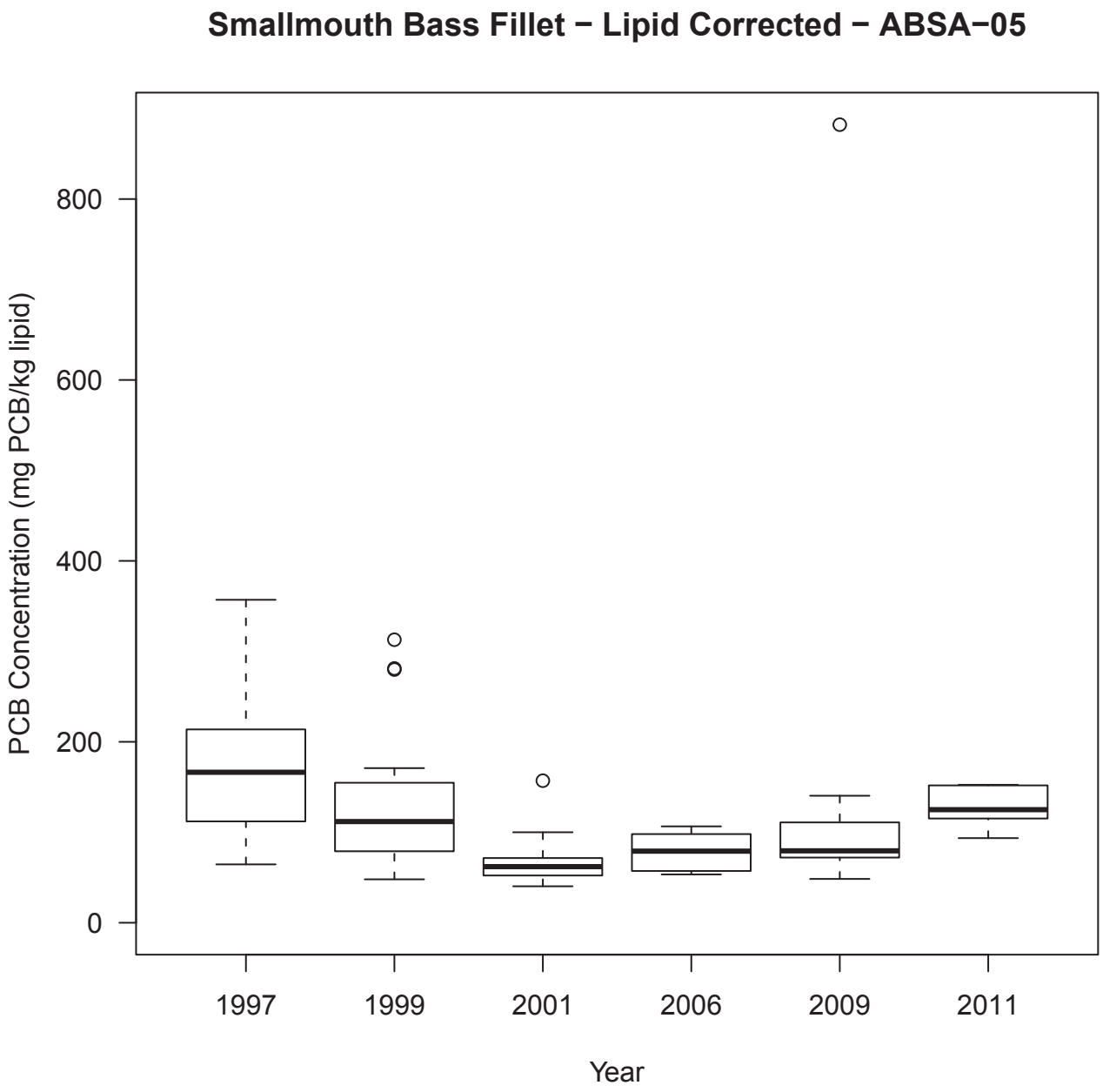

Smallmouth Bass Fillet − ABSA−03
Ln PCB Concentration (mg PCB/kg lipid)
7
6
5
4
3
2
1
0
ln(y) = −0.01145x + 26.752
p = 0.587, Adj. R^2 = 0
2000
2002
2004
2006
2008
2010
Year

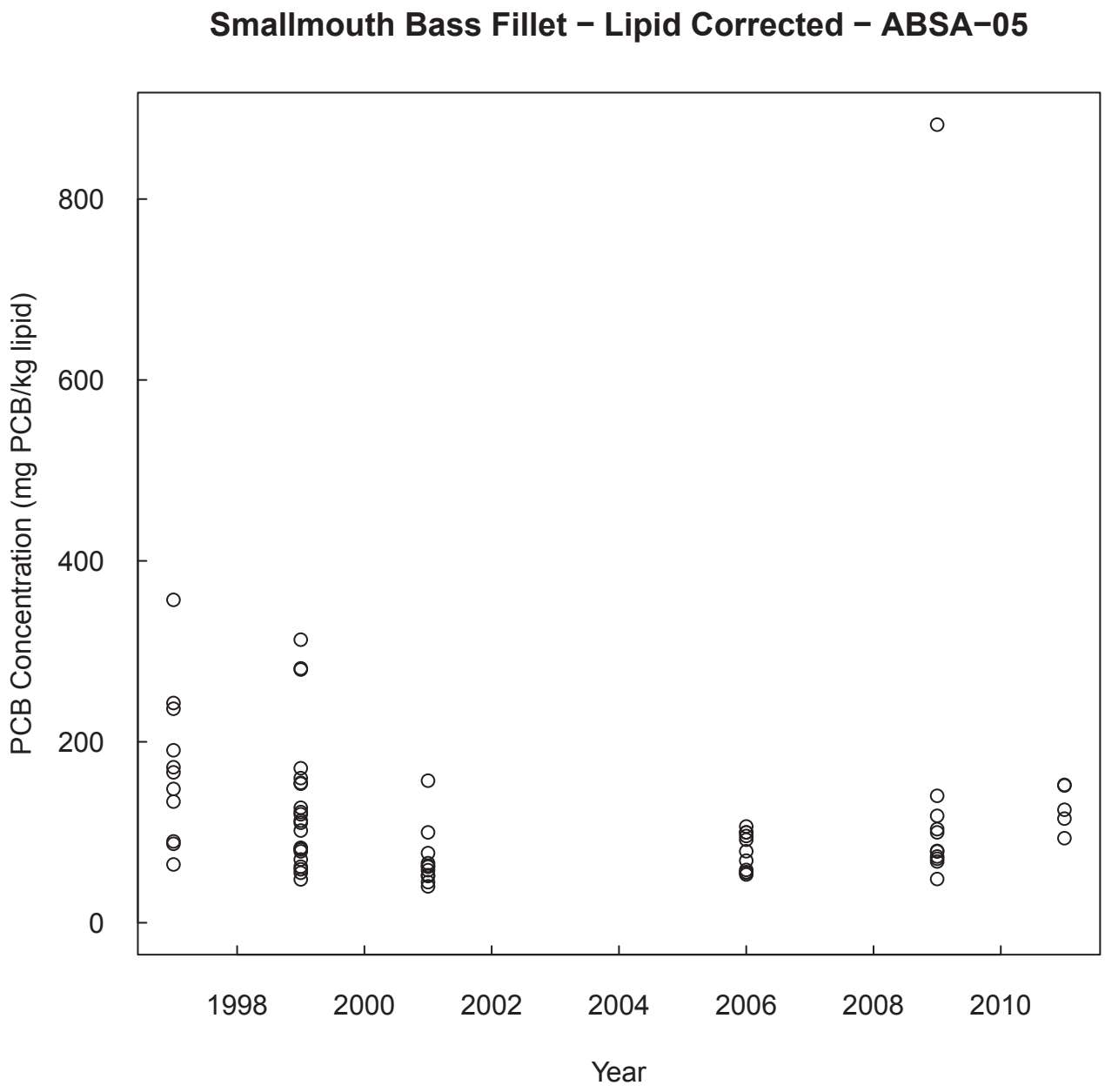

Smallmouth Bass Fillet − Lipid Corrected − ABSA−04
PCB Concentration (mg PCB/kg lipid)
800
600
400
200
0
1999
2000
2001
2009
2011
Year

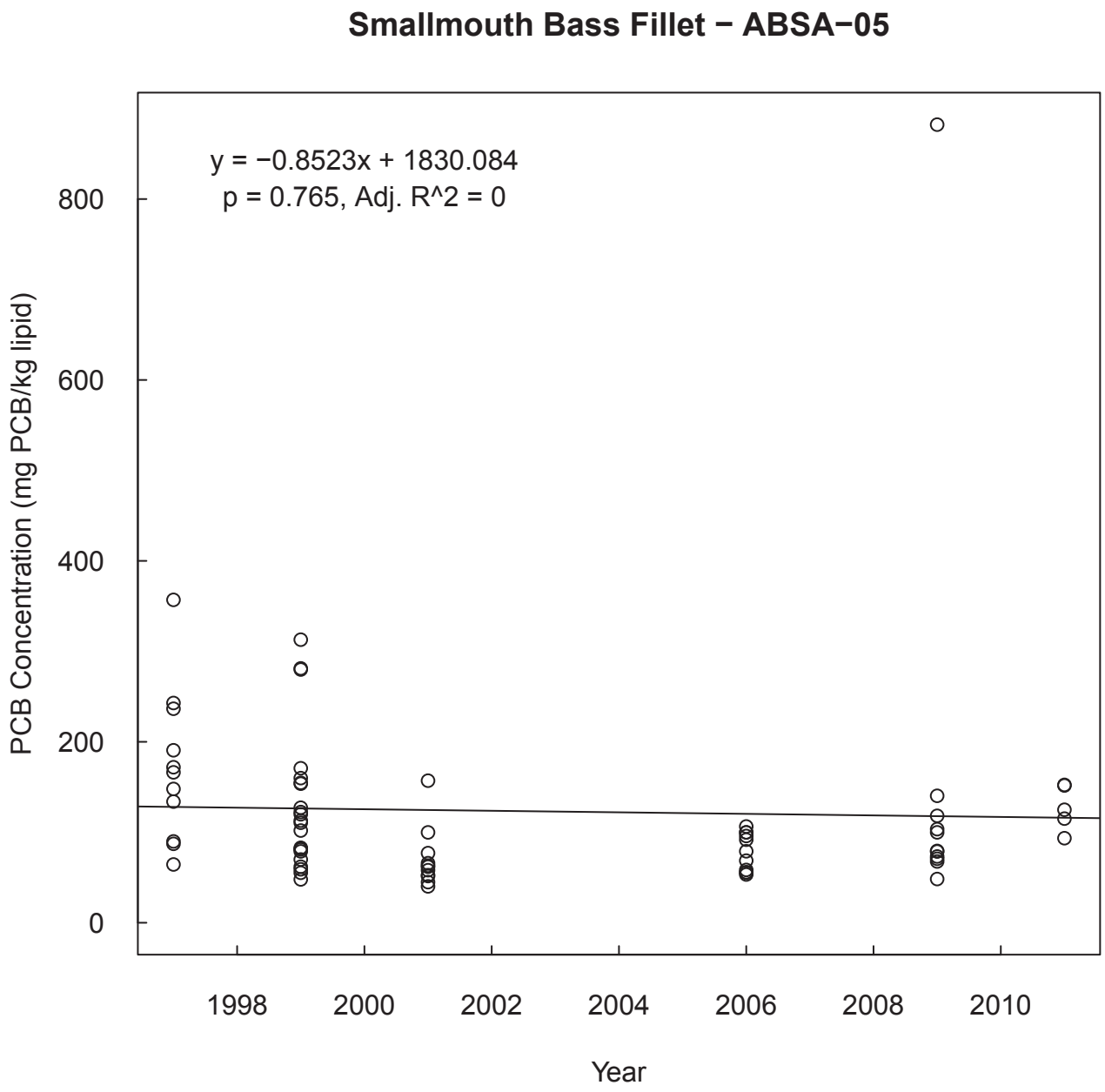

Smallmouth Bass Fillet − Lipid Corrected − ABSA−04
PCB Concentration (mg PCB/kg lipid)
0
200
400
600
800
2000
2002
2004
2006
2008
2010
Year

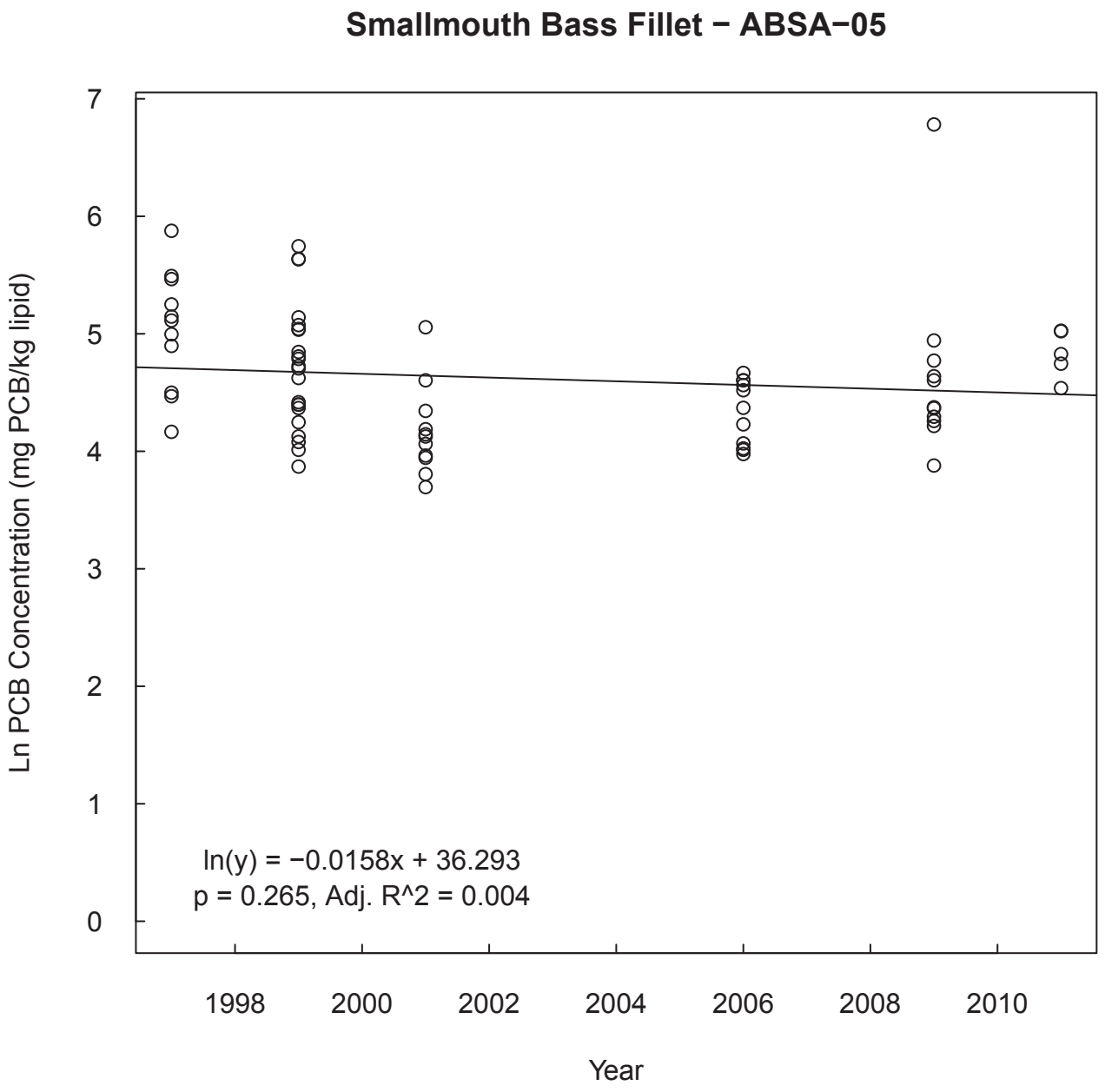

Smallmouth Bass Fillet − ABSA−04
y = −0.4636x + 1005.104
p = 0.719, Adj. R^2 = 0
PCB Concentration (mg PCB/kg lipid)
0
200
400
600
800
2000
2002
2004
2006
2008
2010
Year

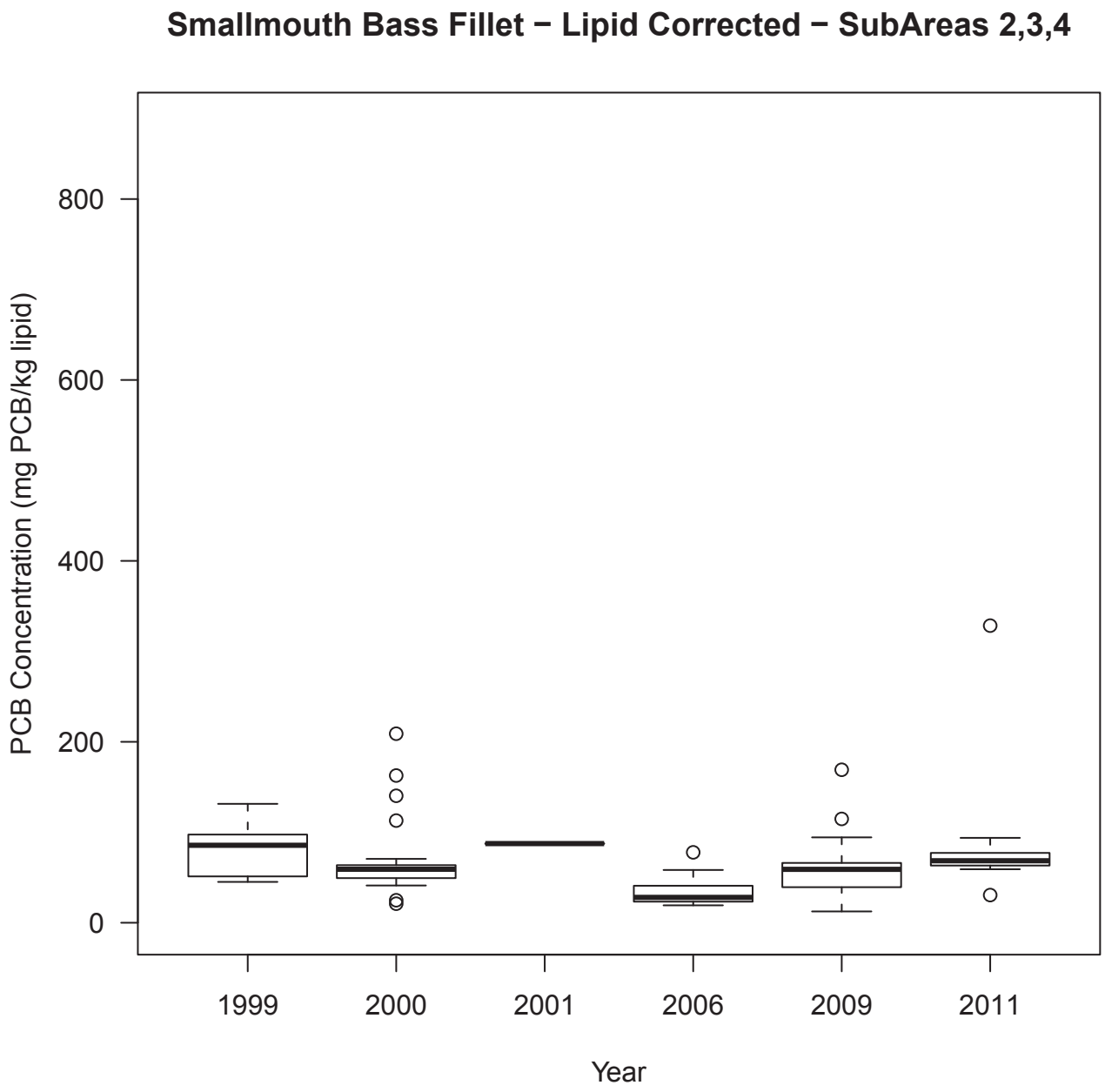

Smallmouth Bass Fillet − ABSA−04
Ln PCB Concentration (mg PCB/kg lipid)
7
6
5
4
3
2
1
0
ln(y) = −0.014x + 32.852
p = 0.281, Adj. R^2 = 0.003
2000
2002
2004
2006
2008
2010
Year

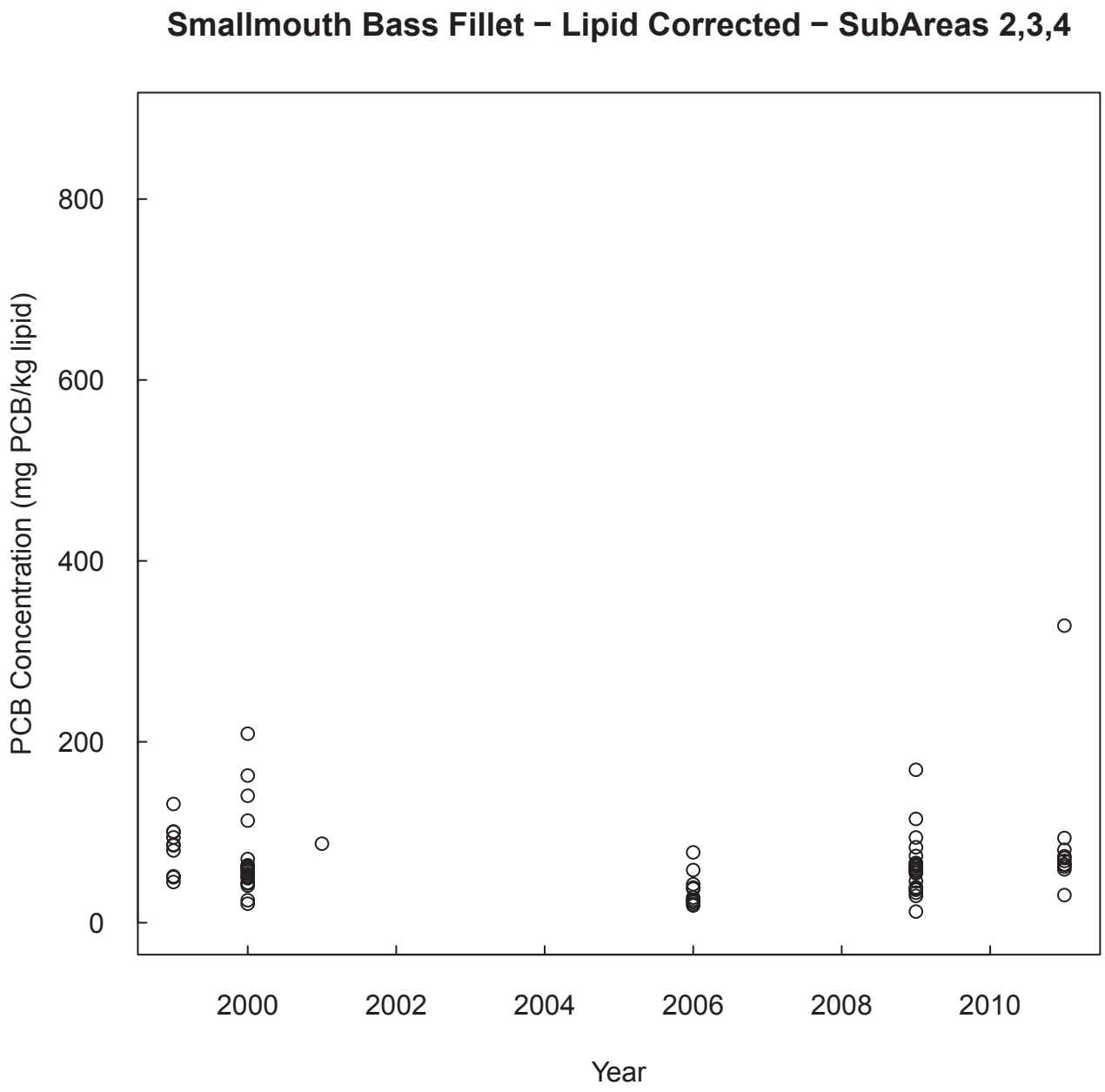

Smallmouth Bass Fillet − Lipid Corrected − ABSA−05
PCB Concentration (mg PCB/kg lipid)
0
200
400
600
800
1997
1999
2001
2006
2009
2011
Year

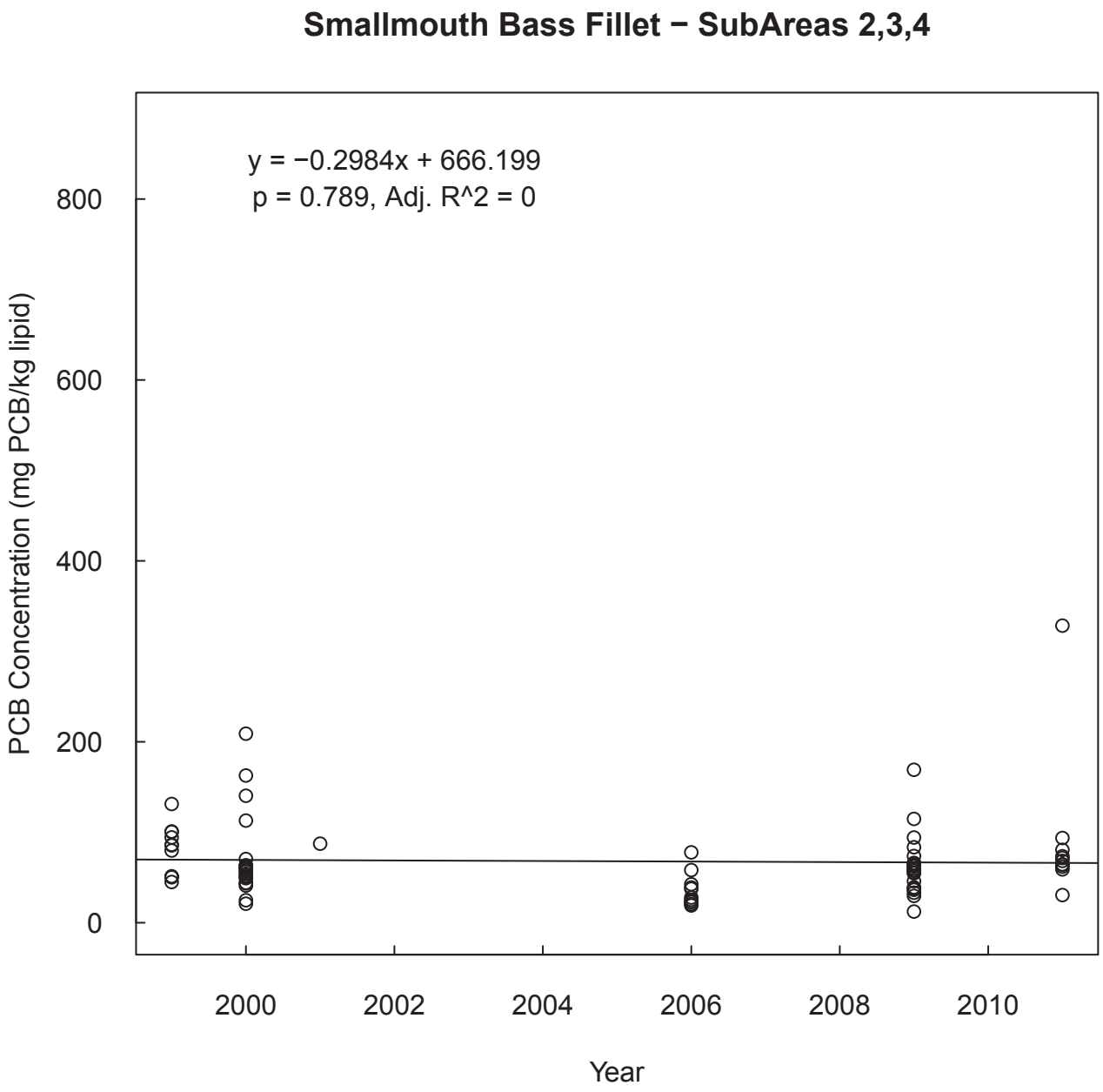

Smallmouth Bass Fillet − Lipid Corrected − ABSA−05
PCB Concentration (mg PCB/kg lipid)
0
200
400
600
800
1998
2000
2002
2004
2006
2008
2010
Year

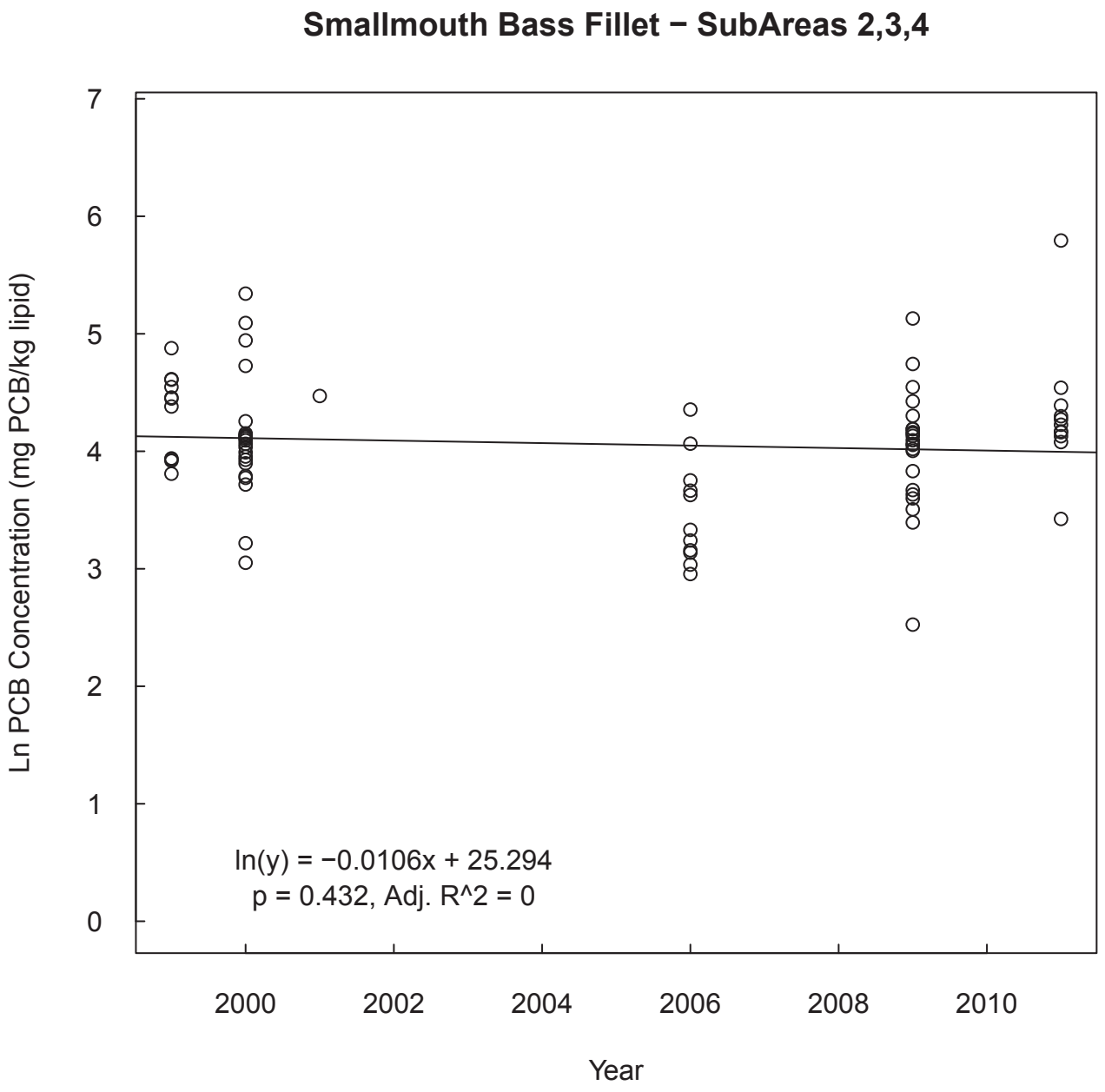

Smallmouth Bass Fillet − ABSA−05
y = −0.8523x + 1830.084
p = 0.765, Adj. R^2 = 0
PCB Concentration (mg PCB/kg lipid)
0
200
400
600
800
1998
2000
2002
2004
2006
2008
2010
Year

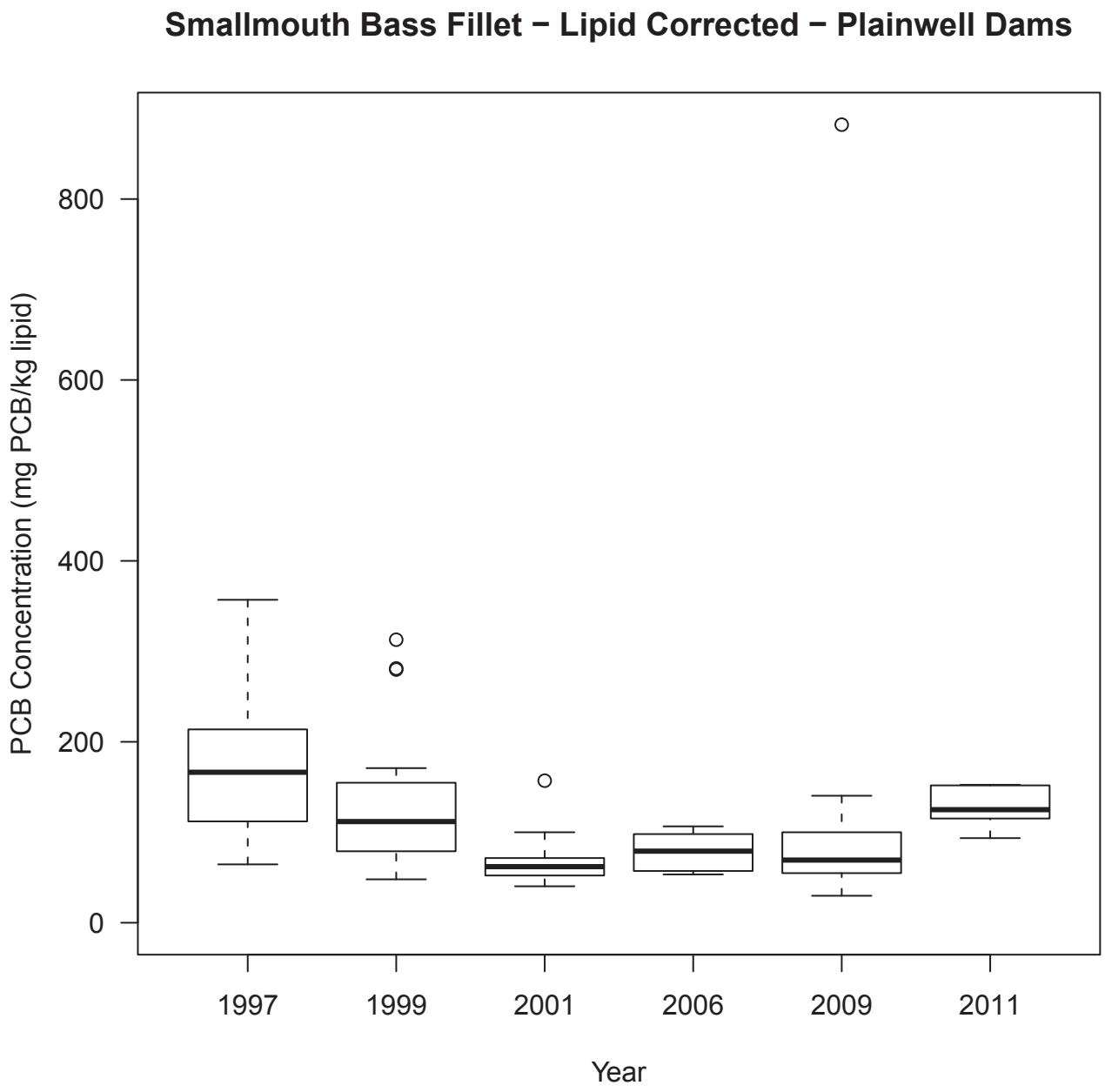

Smallmouth Bass Fillet − ABSA−05
Ln PCB Concentration (mg PCB/kg lipid)
7
6
5
4
3
2
1
0
ln(y) = −0.0158x + 36.293
p = 0.265, Adj. R^2 = 0.004
1998
2000
2002
2004
2006
2008
2010
Year

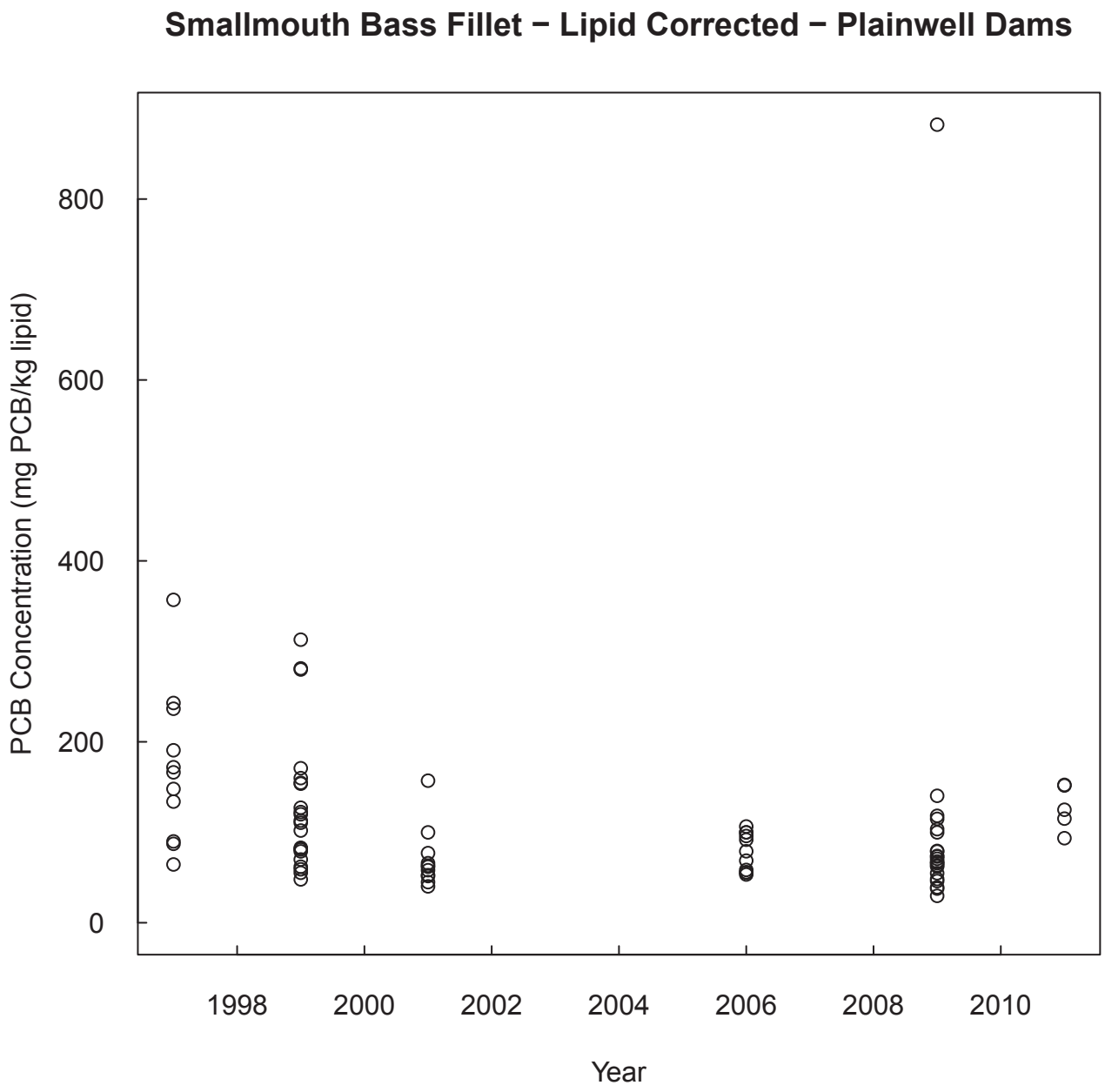

Smallmouth Bass Fillet − Lipid Corrected − SubAreas 2,3,4
PCB Concentration (mg PCB/kg lipid)
800
600
400
200
0
1999
2000
2001
2006
2009
2011
Year

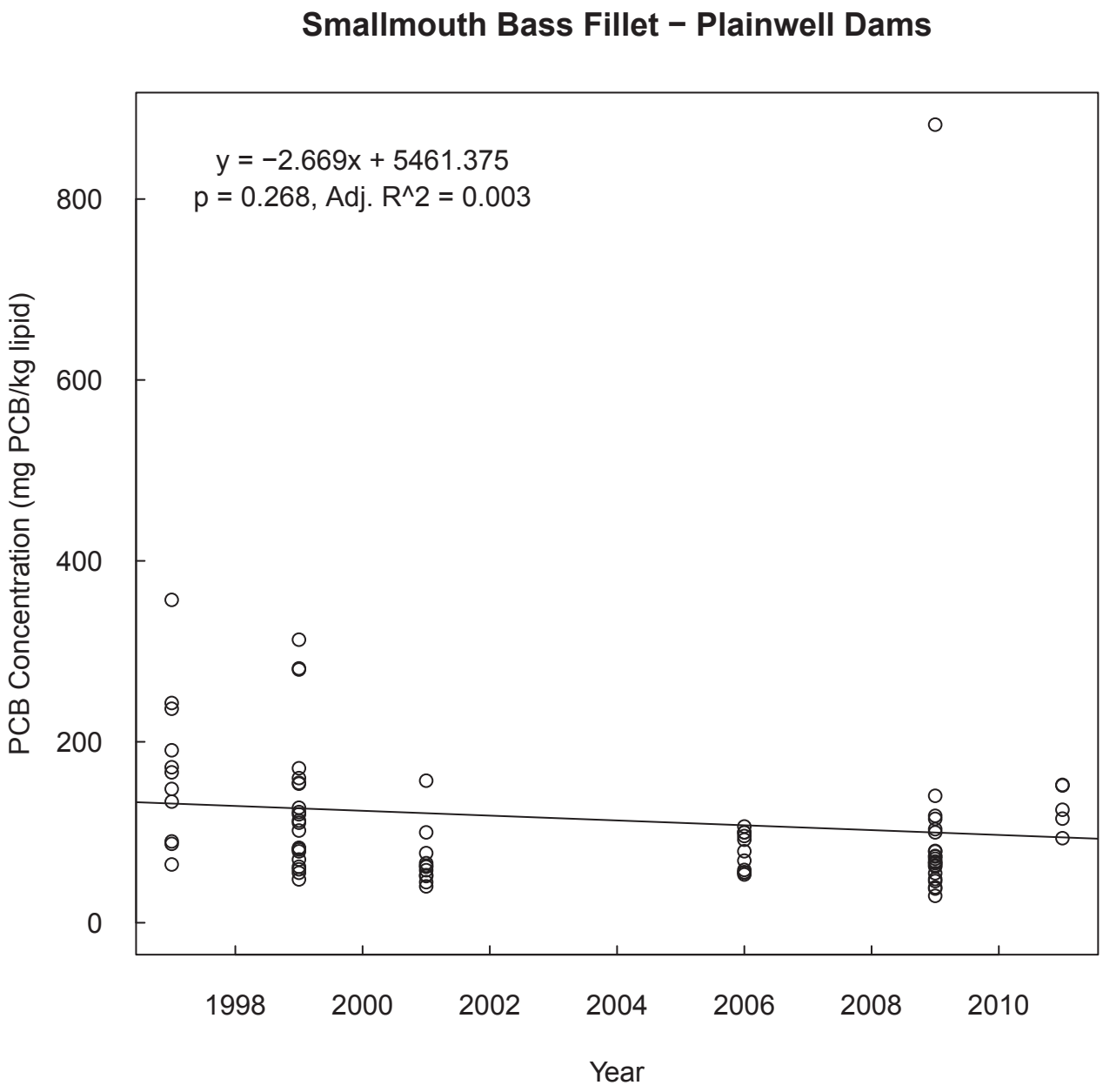

Smallmouth Bass Fillet − Lipid Corrected − SubAreas 2,3,4
PCB Concentration (mg PCB/kg lipid)
0
200
400
600
800
2000
2002
2004
2006
2008
2010
Year

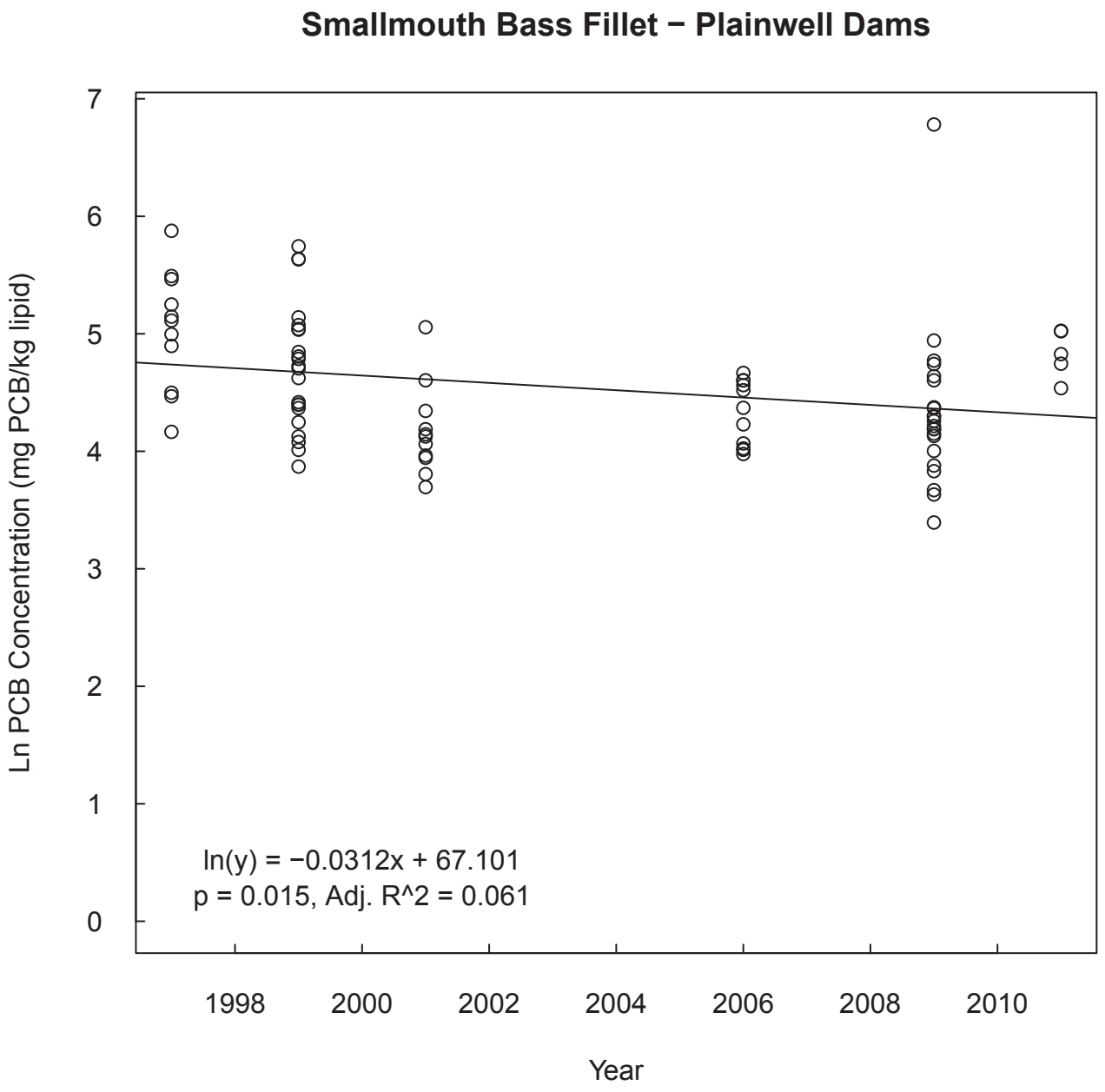

Smallmouth Bass Fillet − SubAreas 2,3,4
y = −0.2984x + 666.199
p = 0.789, Adj. R^2 = 0
PCB Concentration (mg PCB/kg lipid)
0
200
400
600
800
2000
2002
2004
2006
2008
2010
Year


Smallmouth Bass Fillet − SubAreas 2,3,4
Ln PCB Concentration (mg PCB/kg lipid)
7
6
5
4
3
2
1
0
ln(y) = −0.0106x + 25.294
p = 0.432, Adj. R^2 = 0
2000
2002
2004
2006
2008
2010
Year


Smallmouth Bass Fillet − Lipid Corrected − Plainwell Dams
PCB Concentration (mg PCB/kg lipid)
0
200
400
600
800
1997
1999
2001
2006
2009
2011
Year


Smallmouth Bass Fillet − Lipid Corrected − Plainwell Dams
PCB Concentration (mg PCB/kg lipid)
0
200
400
600
800
1998
2000
2002
2004
2006
2008
2010
Year


Smallmouth Bass Fillet − Plainwell Dams
y = −2.669x + 5461.375
p = 0.268, Adj. R^2 = 0.003
PCB Concentration (mg PCB/kg lipid)
0
200
400
600
800
1998
2000
2002
2004
2006
2008
2010
Year

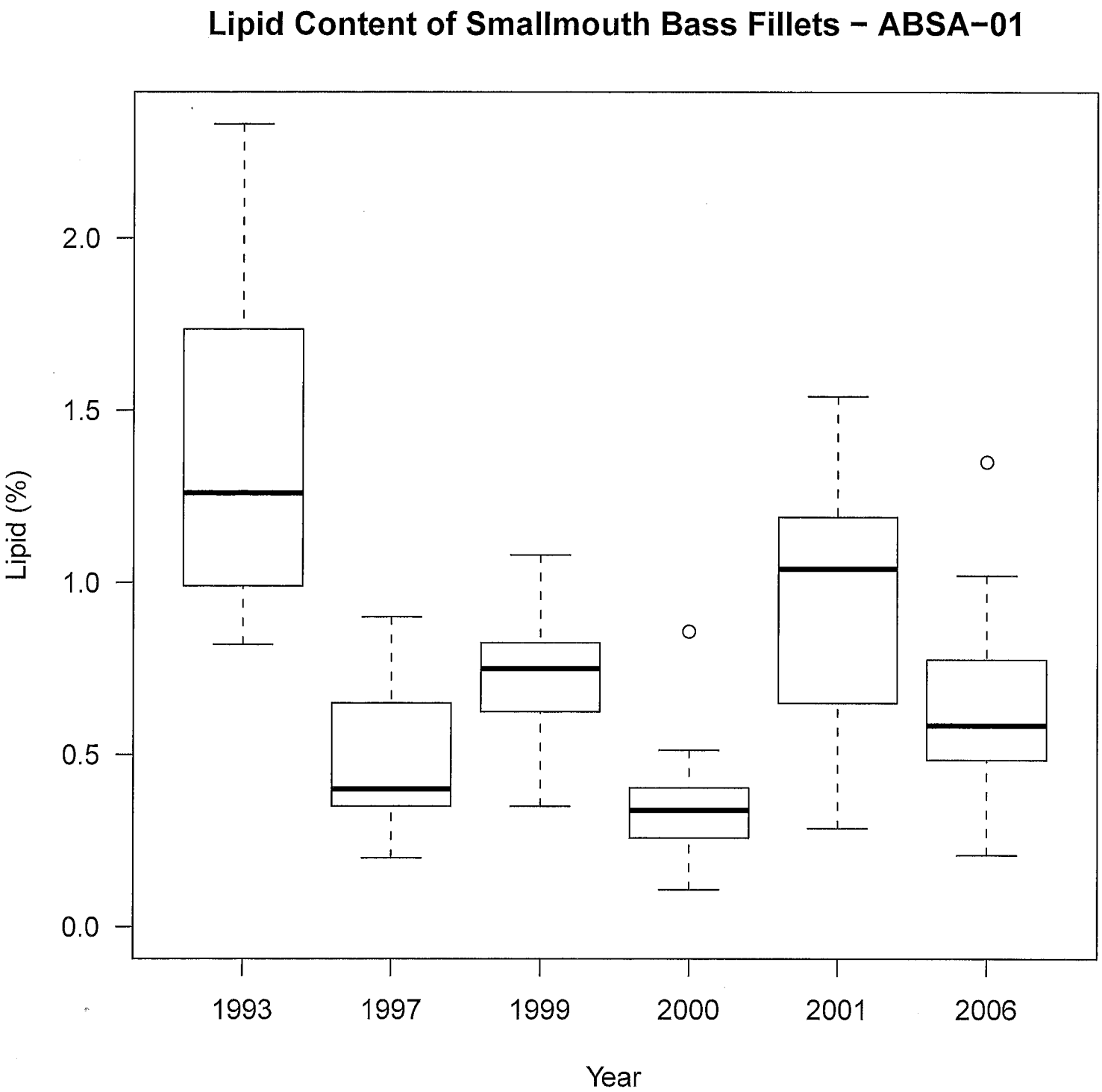

Smallmouth Bass Fillet − Plainwell Dams
Ln PCB Concentration (mg PCB/kg lipid)
7
6
5
4
3
2
1
0
ln(y) = −0.0312x + 67.101
p = 0.015, Adj. R^2 = 0.061
1998
2000
2002
2004
2006
2008
2010
Year

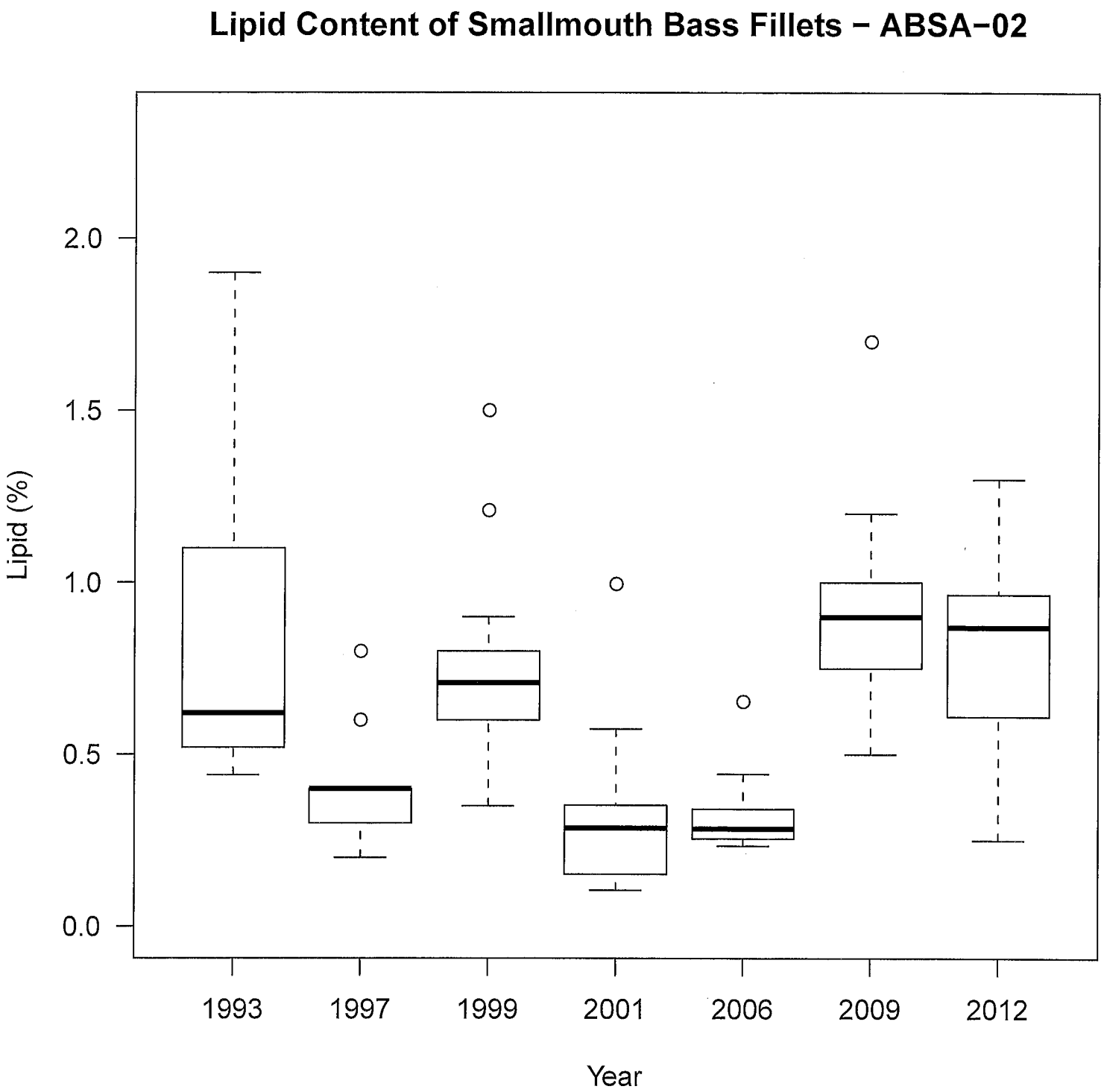
SMB FILLET AVERAGE PROJECTED PERCENT DECLINE FROM 2006 TO 2011

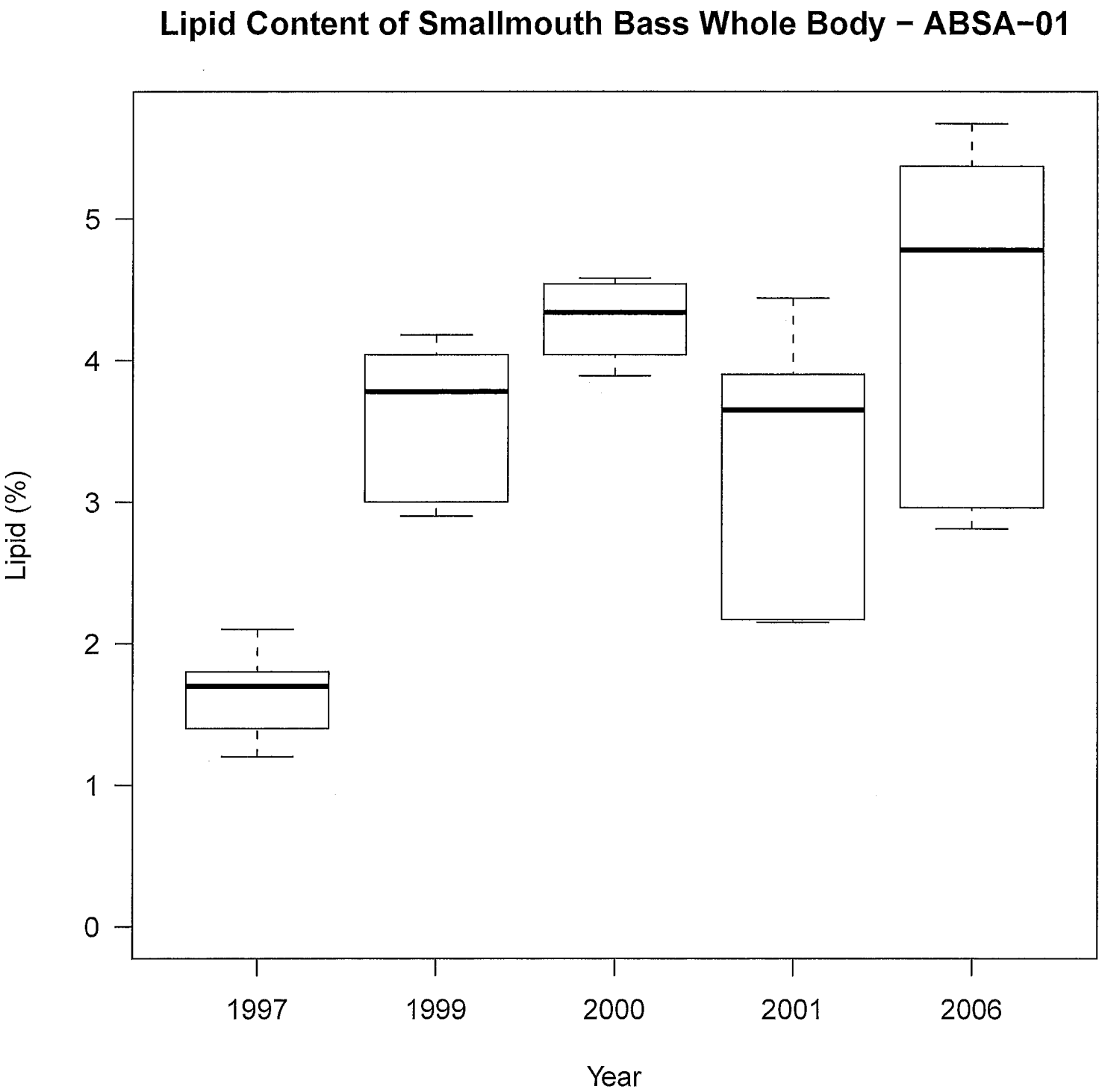
	Lipid Corrected			Length and Lipid Corrected		
	Mixed order	First order	Straight linear	Mixed order	First order	Straight linear
ABSA-03	DNC	1.1%	2.2%	DNC	2.89%	3.94%
ABSA-04	DNC	1.4%	0.6%	DNC	1.09%	0.56%
ABSA-05	DNC	1.5%	0.7%	DNC	1.35%	1.14%
Subareas 2,3,4	DNC	1.0%	0.4%	DNC	1.28%	0.89%
Dams	DNC	2.9%	2.5%	DNC	2.66%	2.68%

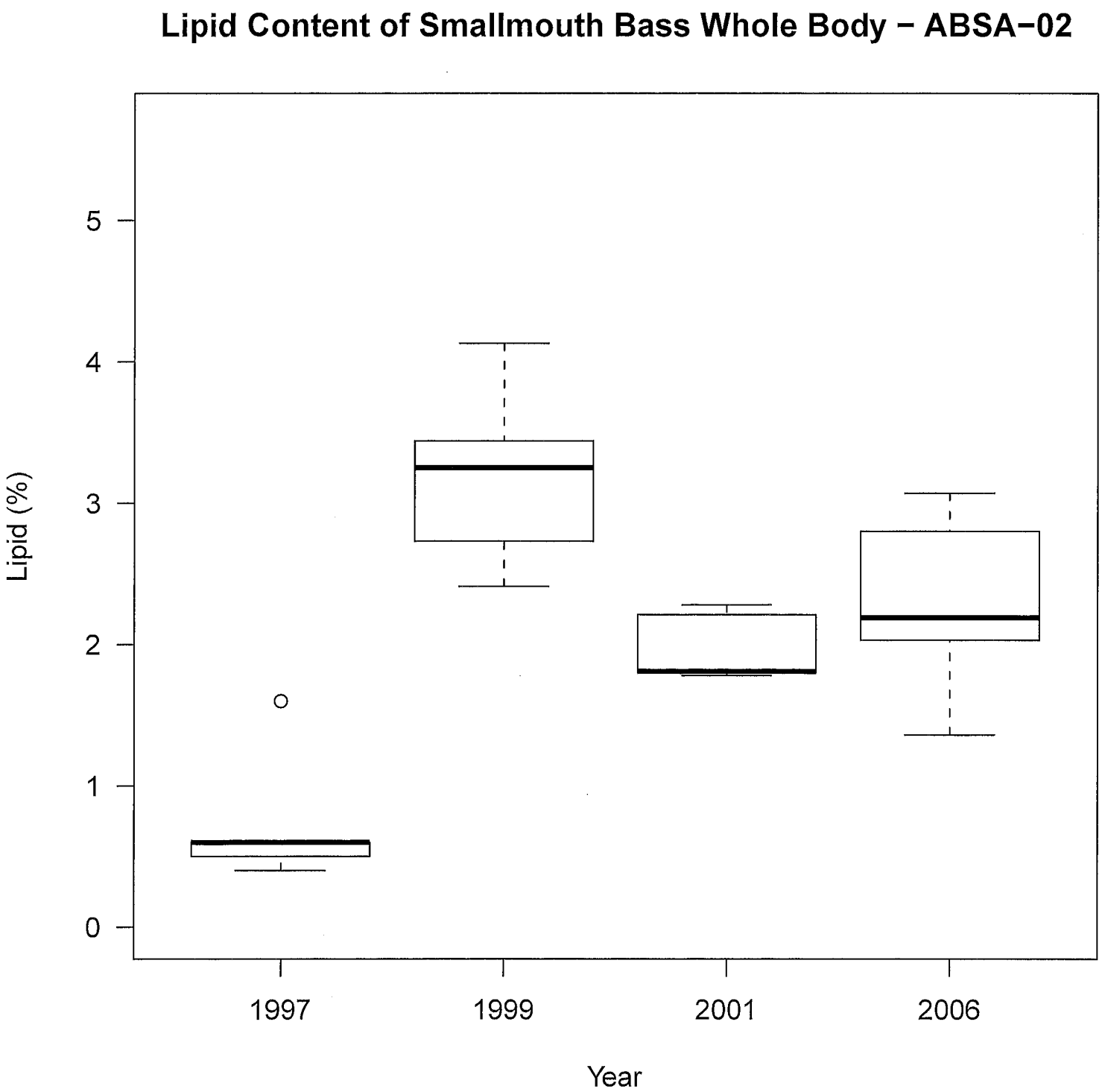
Reference

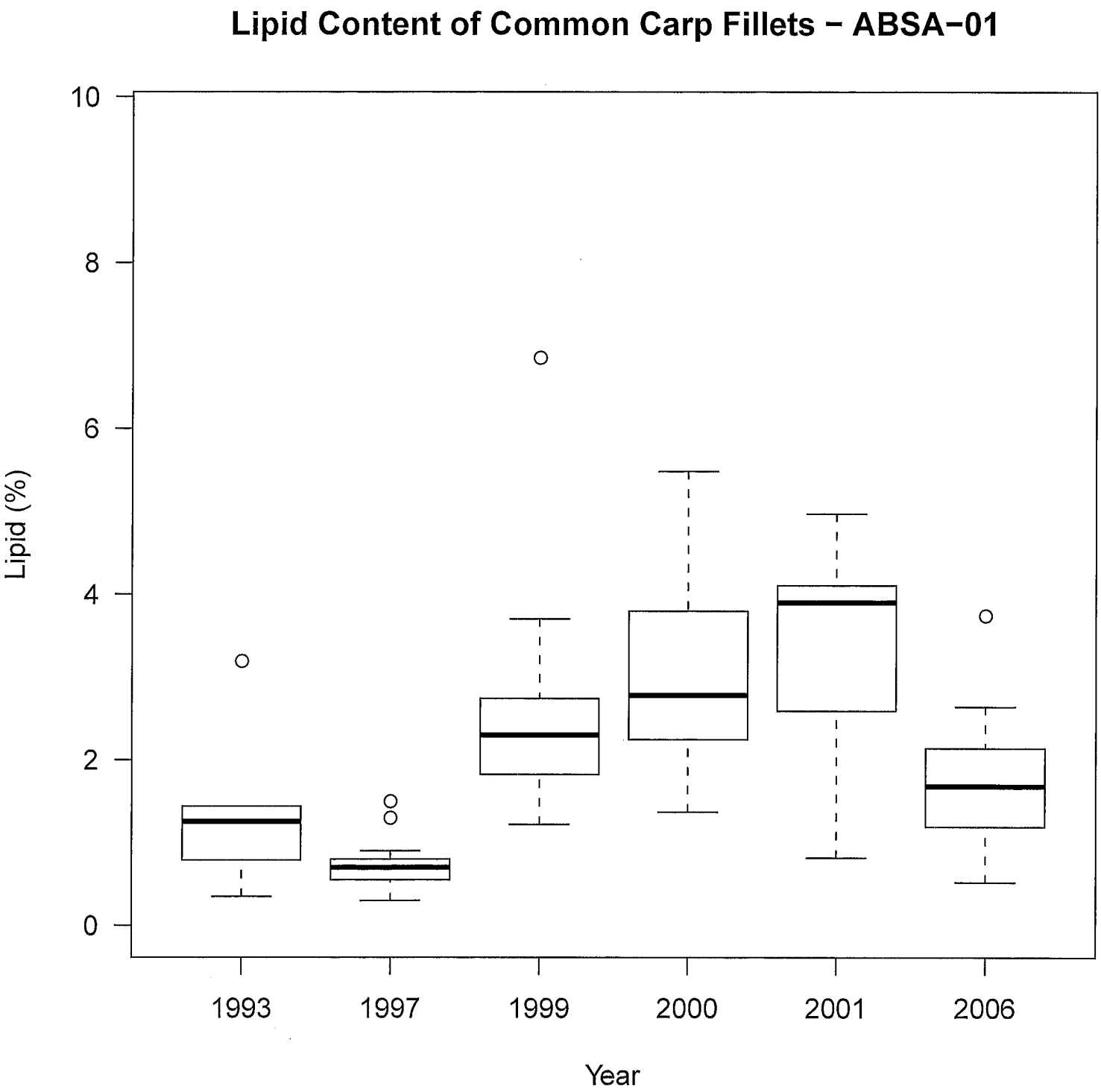
Lipid Normalized

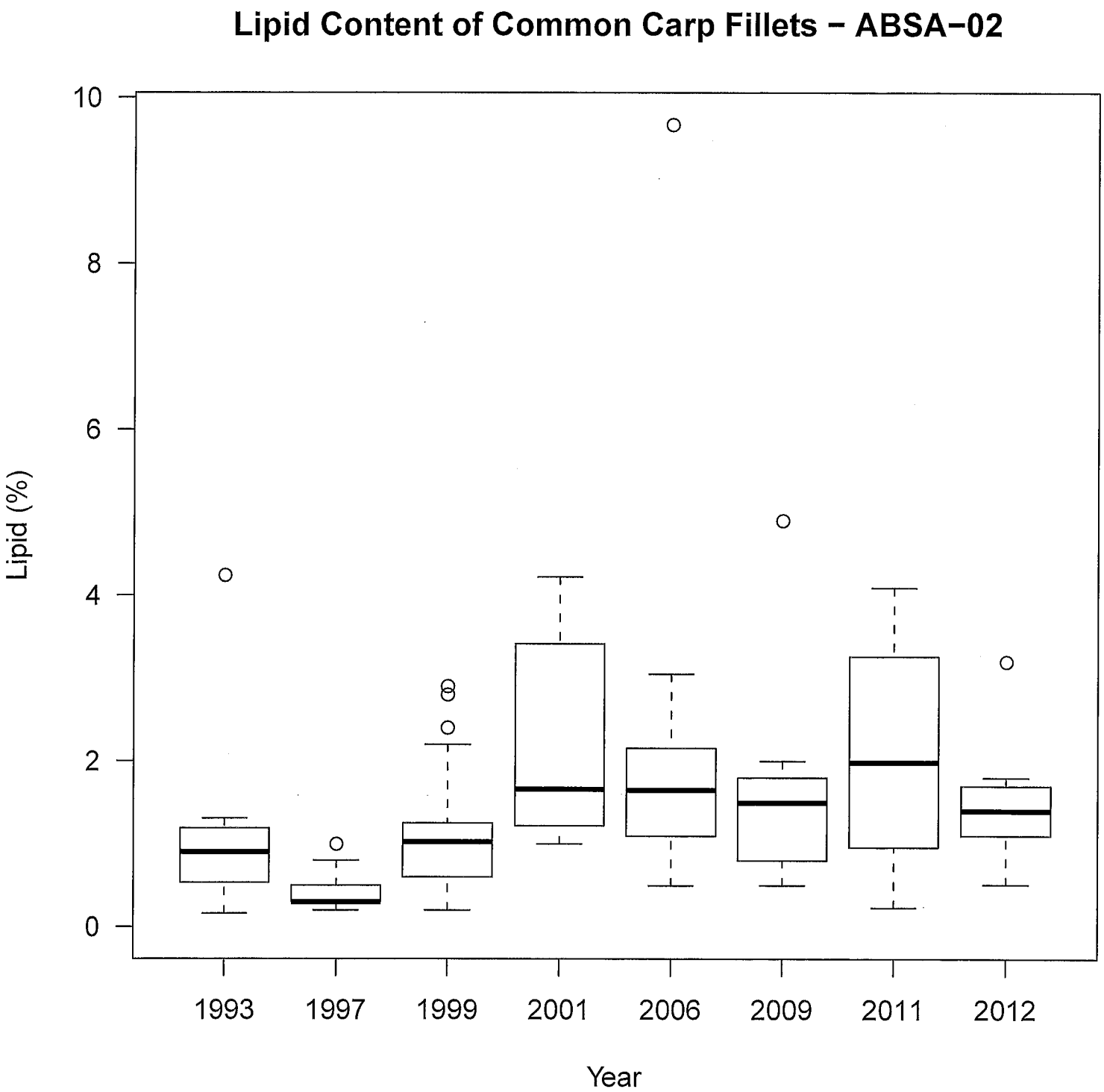

Lipid Content of Smallmouth Bass Fillets – ABSA–01
Lipid (%)
0.0
0.5
1.0
1.5
2.0
1993
1997
1999
2000
2001
2006
Year

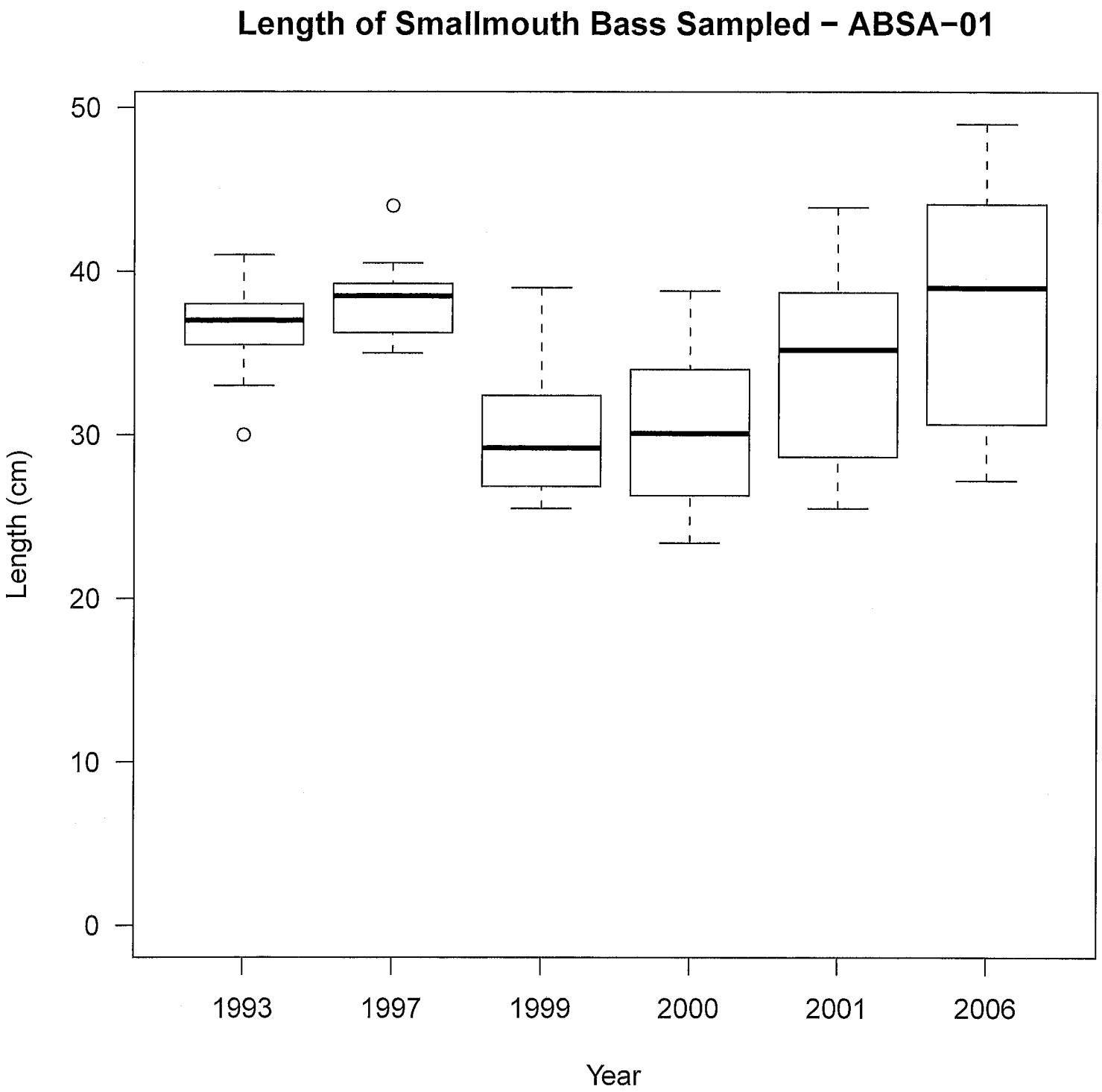

Lipid Content of Smallmouth Bass Fillets – ABSA–02
Lipid (%)
2.0
1.5
1.0
0.5
0.0
1993
1997
1999
2001
2006
2009
2012
Year


Lipid Content of Smallmouth Bass Whole Body − ABSA−01
Lipid (%)
0
1
2
3
4
5
1997
1999
2000
2001
2006
Year

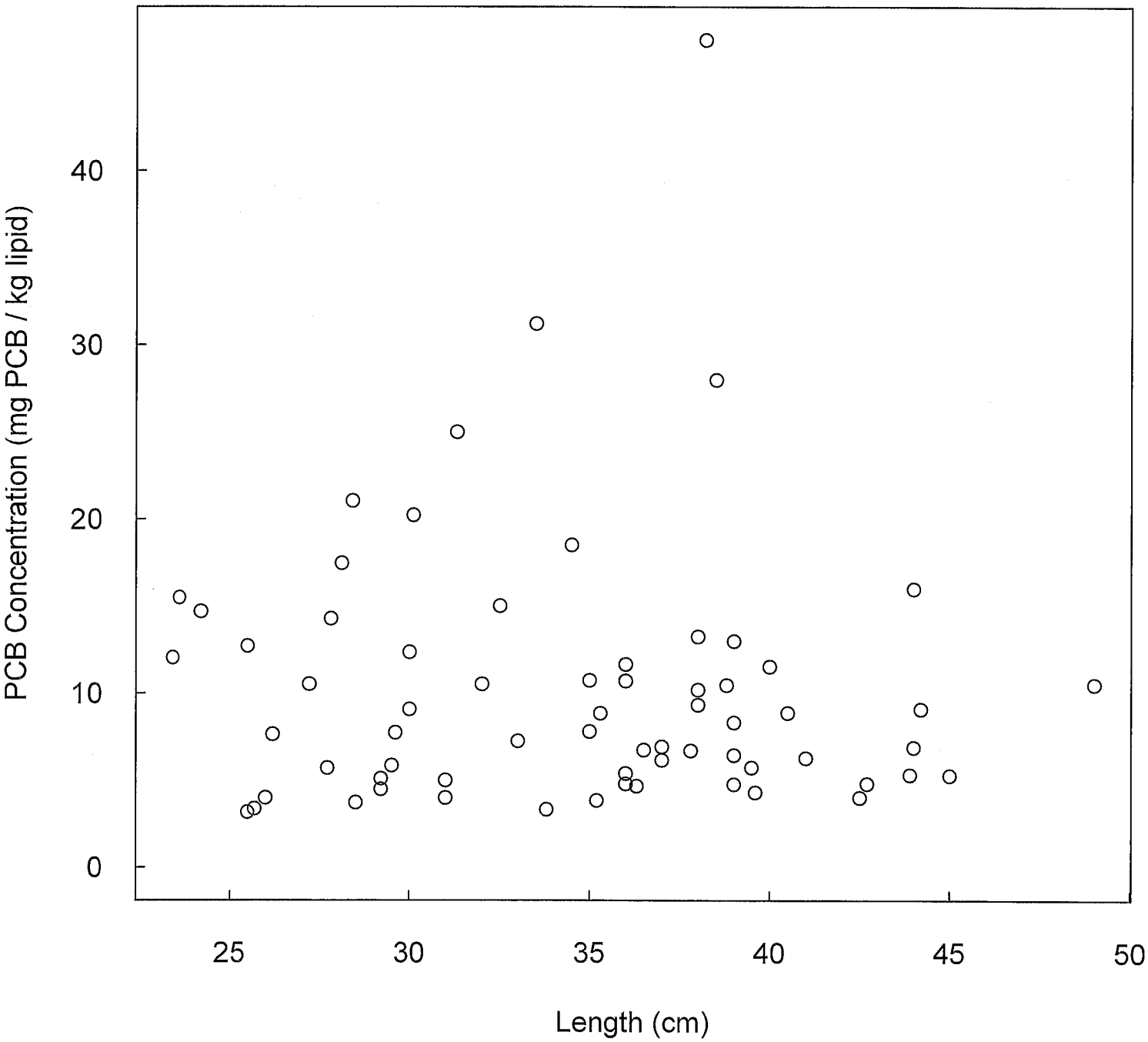

Lipid Content of Smallmouth Bass Whole Body – ABSA–02
Lipid (%)
0
1
2
3
4
5
1997
1999
2001
2006
Year

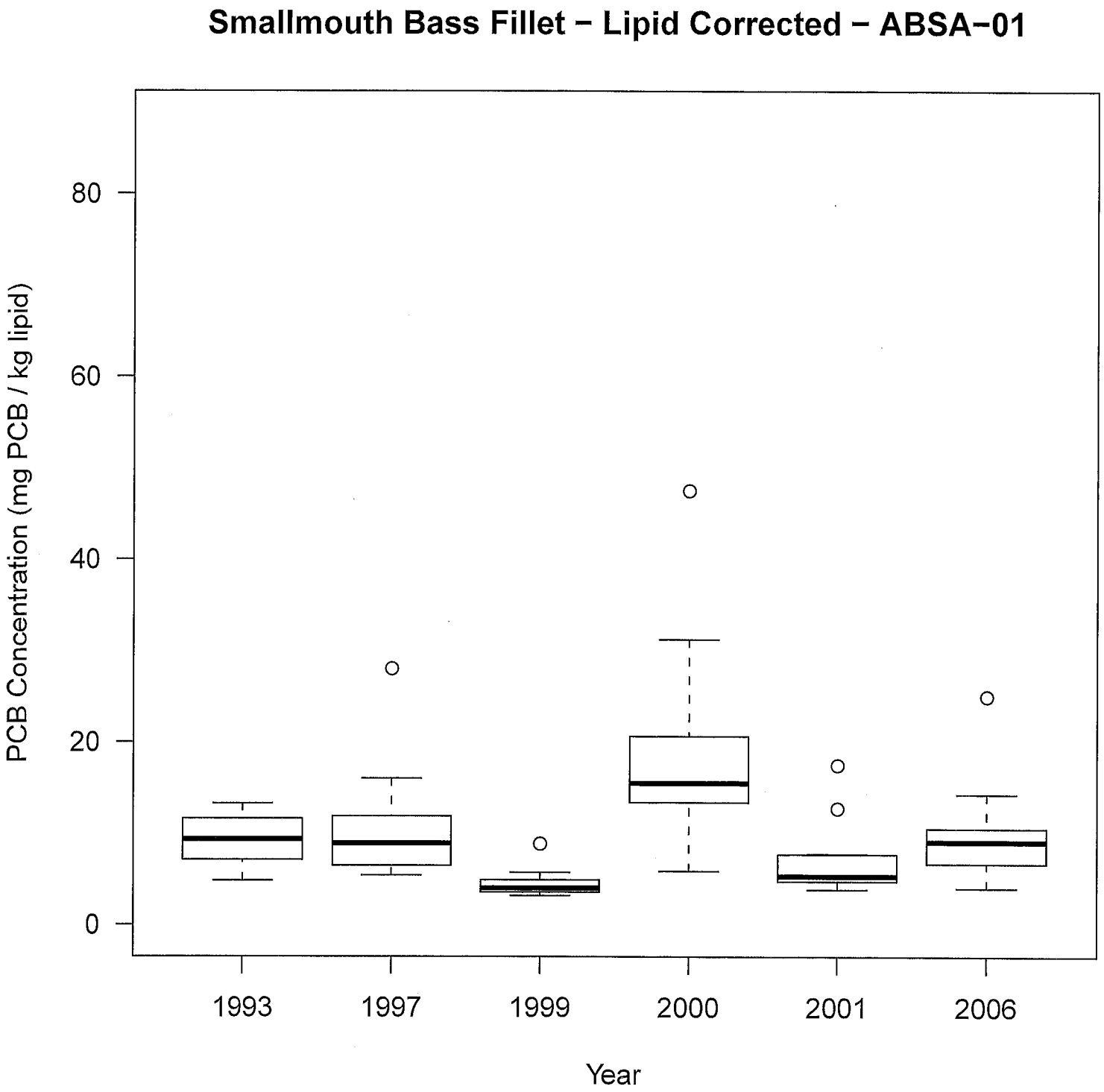

Lipid Content of Common Carp Fillets – ABSA–01
Lipid (%)
10
8
6
4
2
0
1993
1997
1999
2000
2001
2006
Year


Lipid Content of Common Carp Fillets - ABSA-02
Lipid (%)
10
8
6
4
2
0
1993
1997
1999
2001
2006
2009
2011
2012
Year

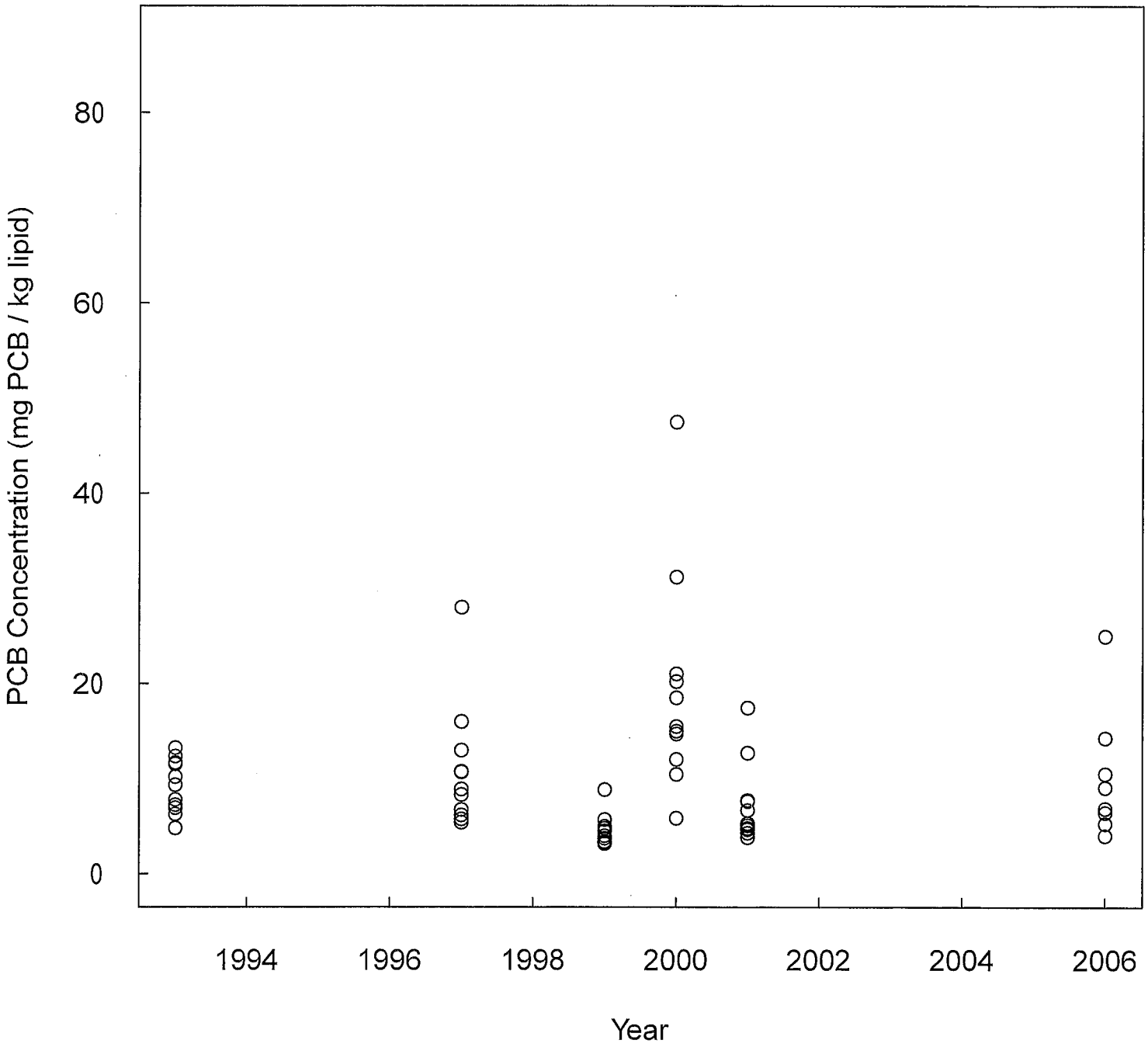

Length of Smallmouth Bass Sampled – ABSA-01
Length (cm)
50
40
30
20
10
0
1993
1997
1999
2000
2001
2006
Year

Lipid Corrected PCB Concentrations in Reference SMB Fillet

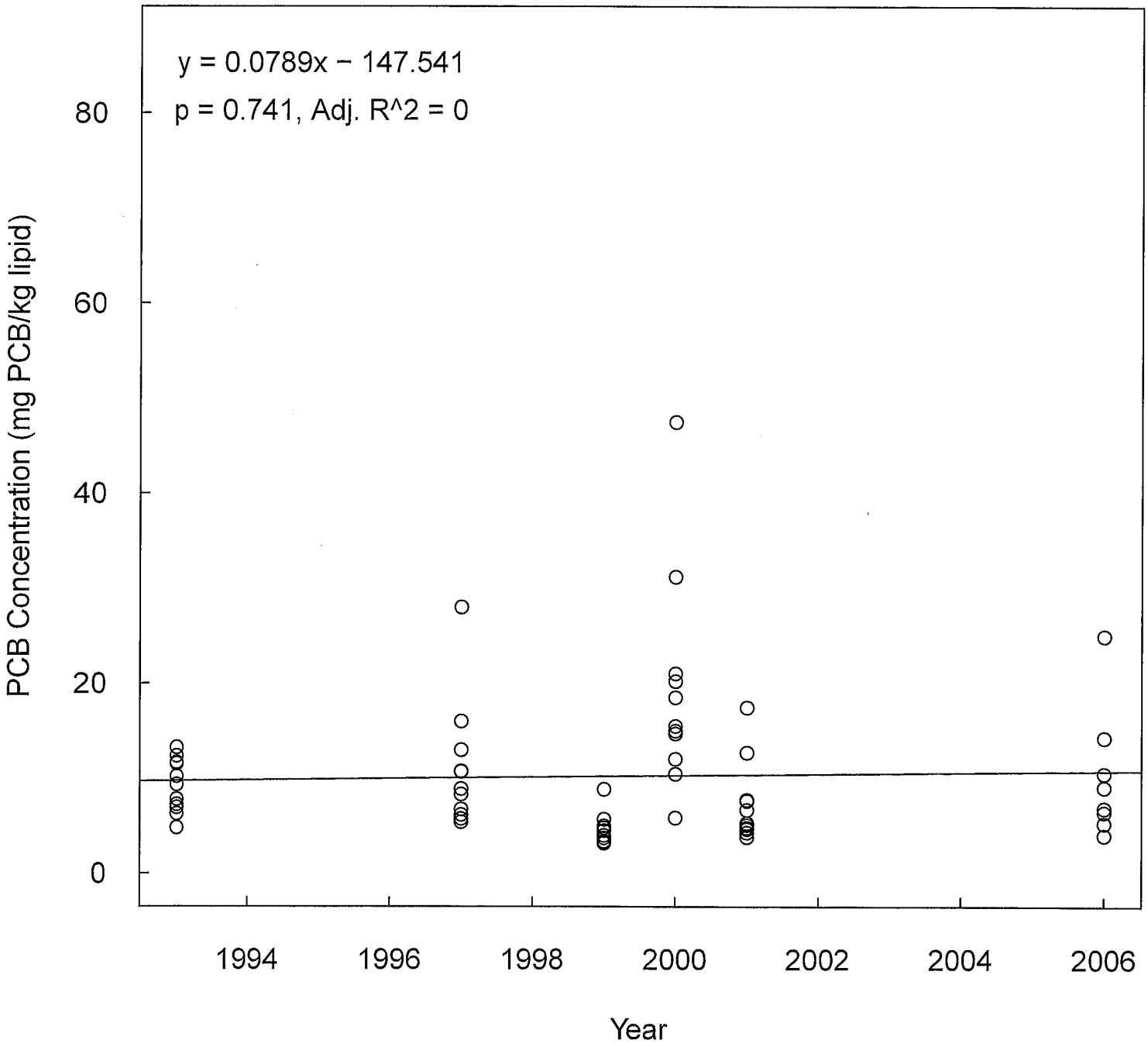



Smallmouth Bass Fillet – Lipid Corrected – ABSA–01
PCB Concentration (mg PCB / kg lipid)
0
20
40
60
80
1993
1997
1999
2000
2001
2006
Year

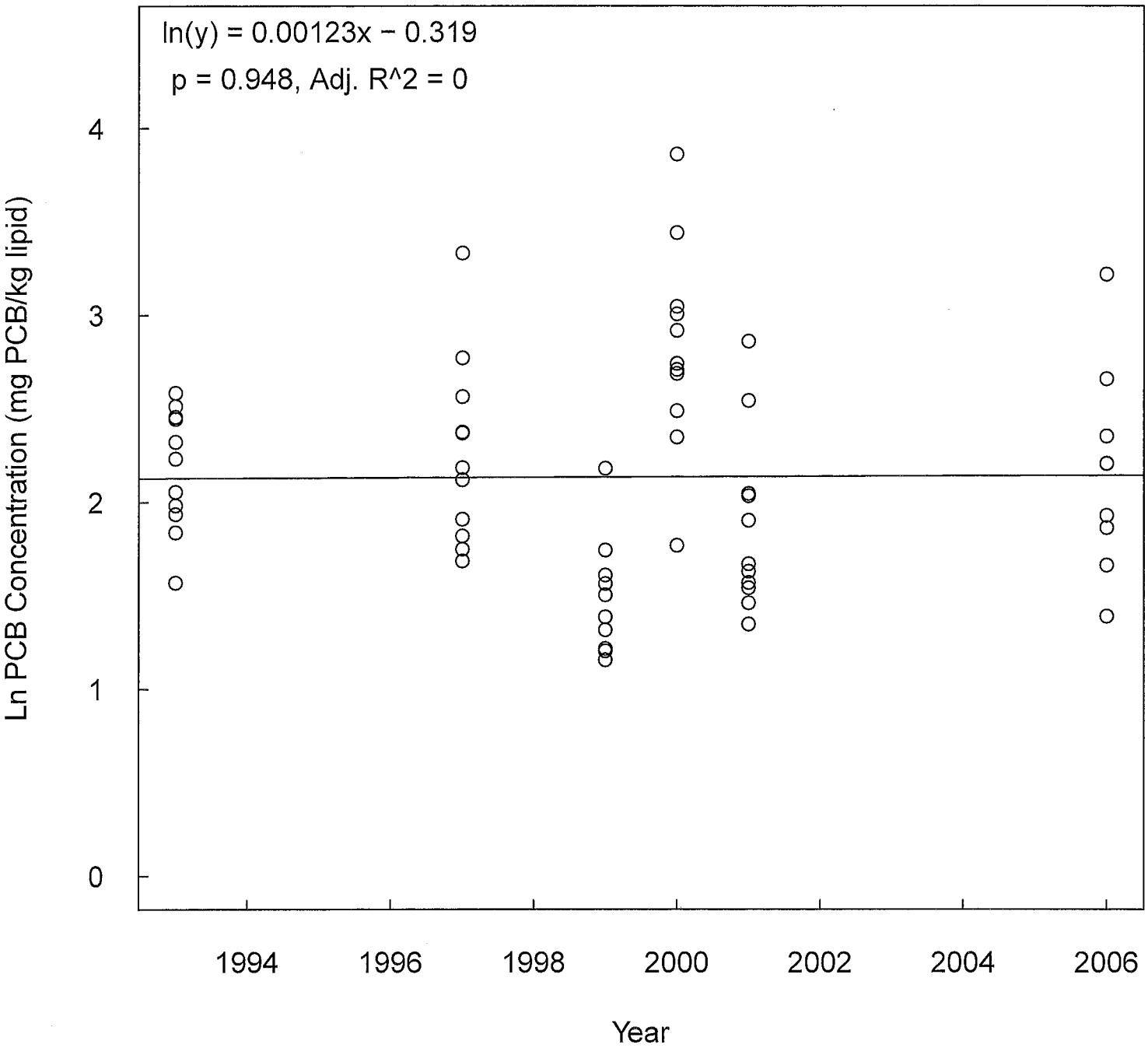
Reference Smallmouth Bass Fillet – Lipid Corrected – ABSA-01

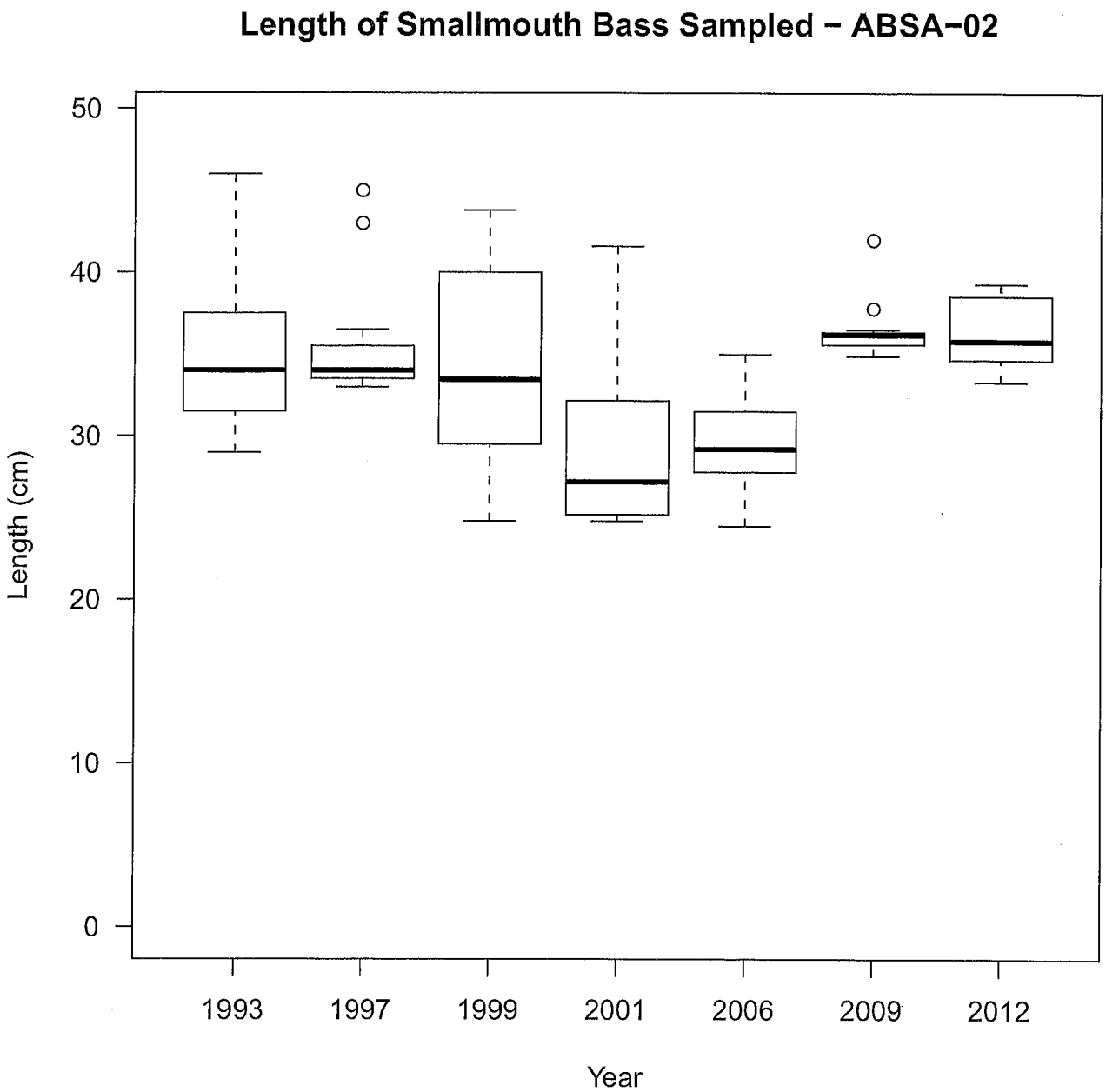


Smallmouth Bass Fillet − Lipid Corrected − ABSA−01

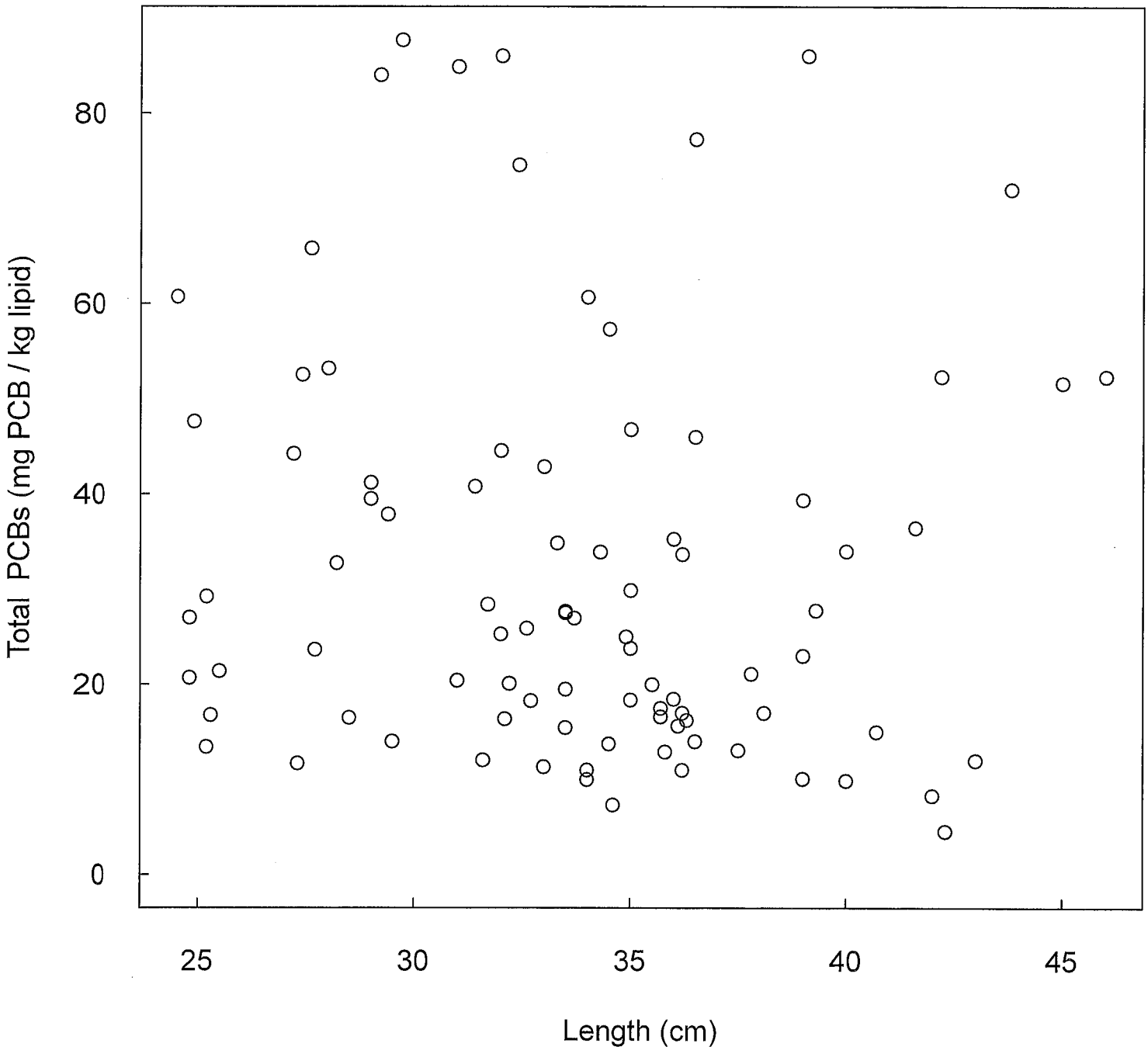


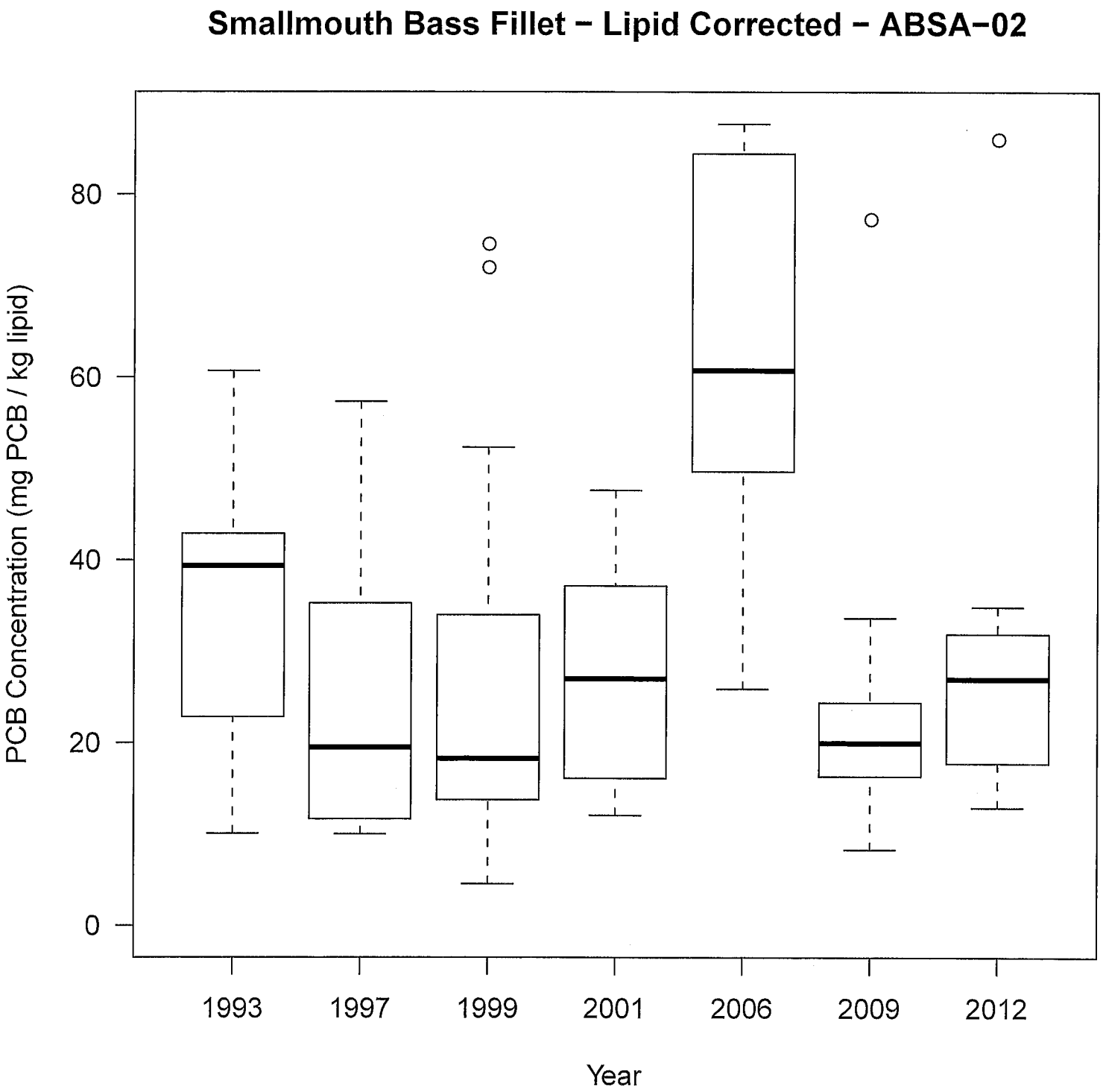
Smallmouth Bass Fillet − Lipid Corrected − ABSA−01



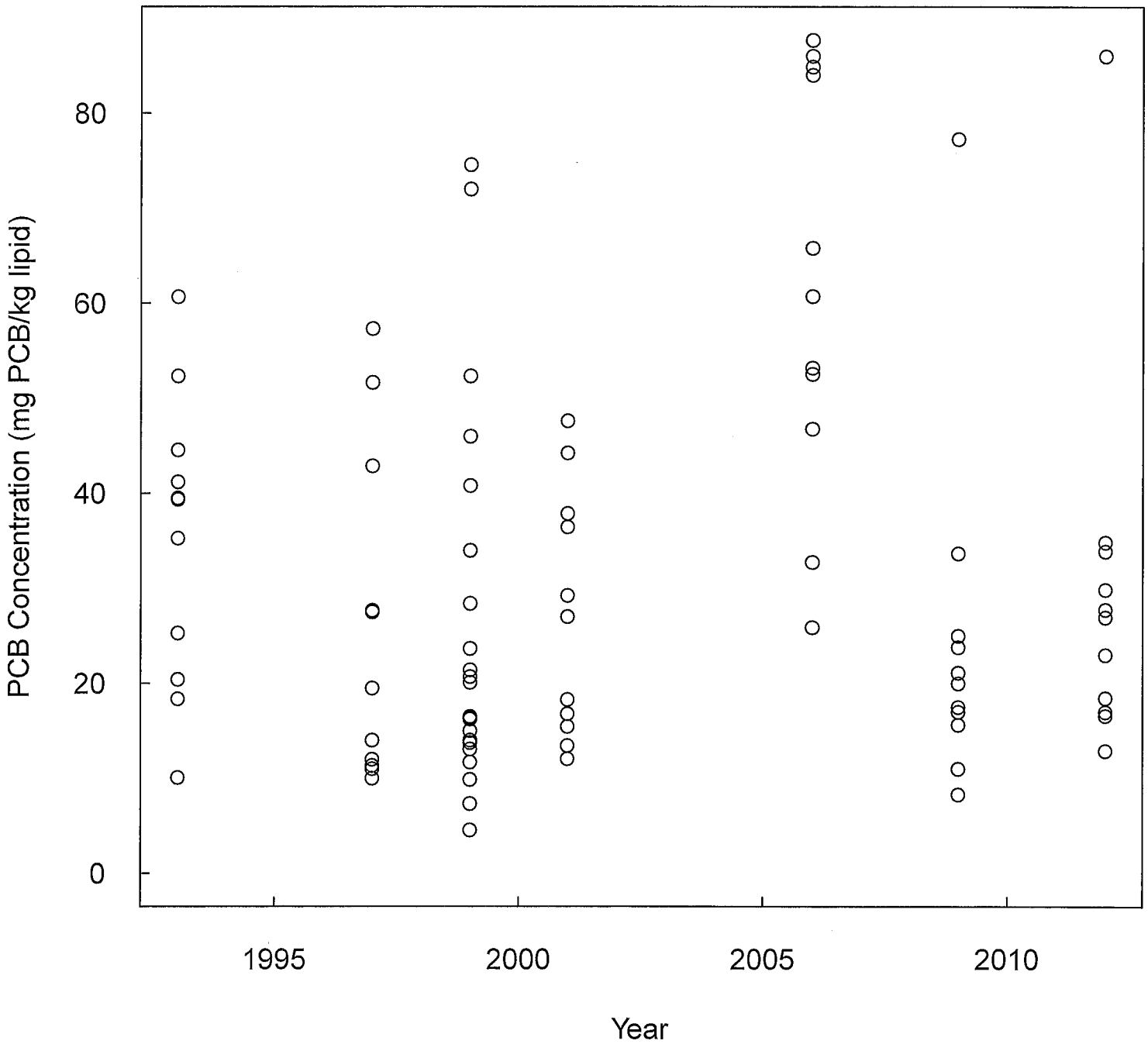

Length of Smallmouth Bass Sampled - ABSA-02
50
40
30
20
10
0
Length (cm)
1993
1997
1999
2001
2006
2009
2012
Year

Lipid Corrected PCB Concentrations in Reference SMB Fillet

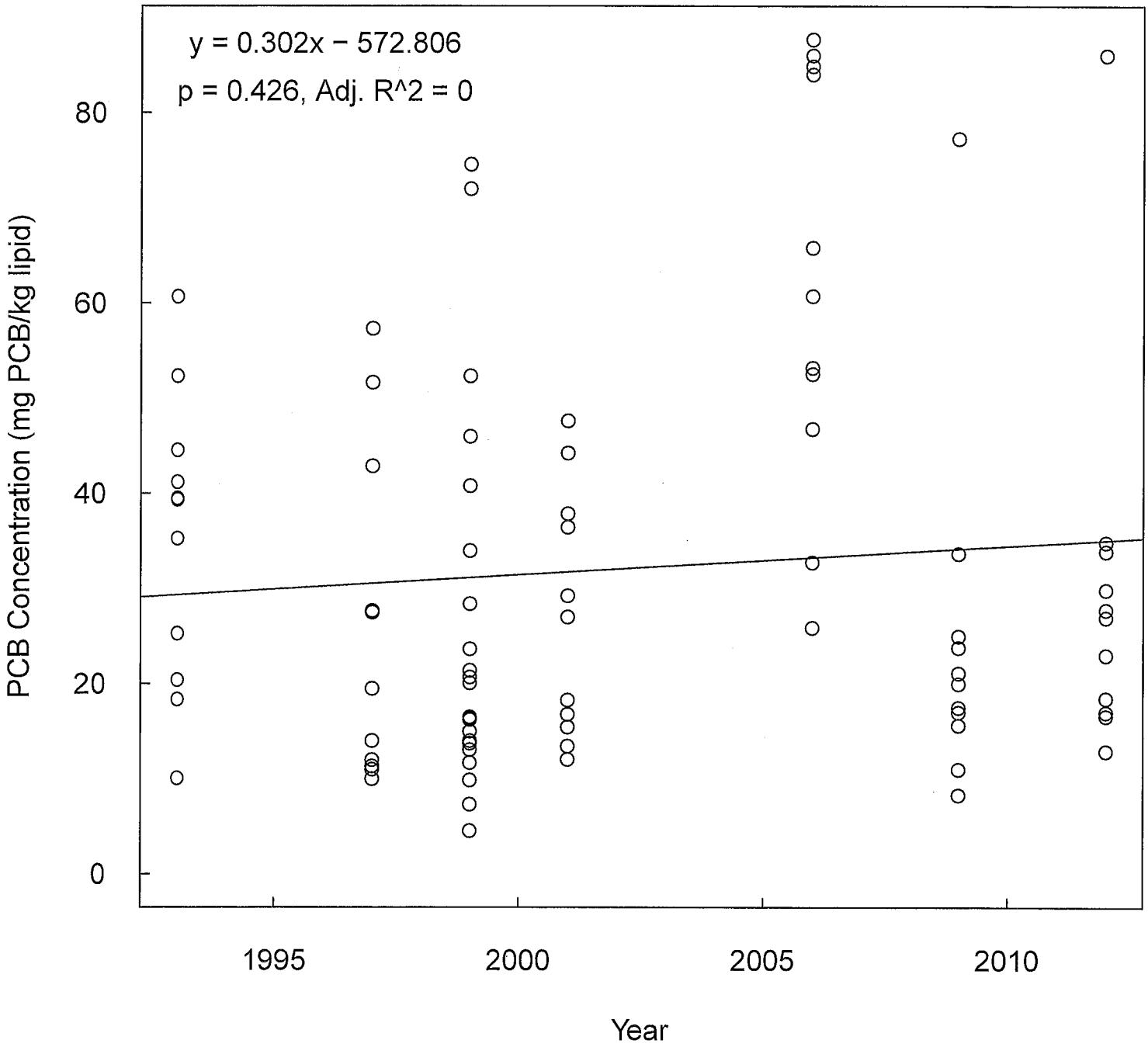


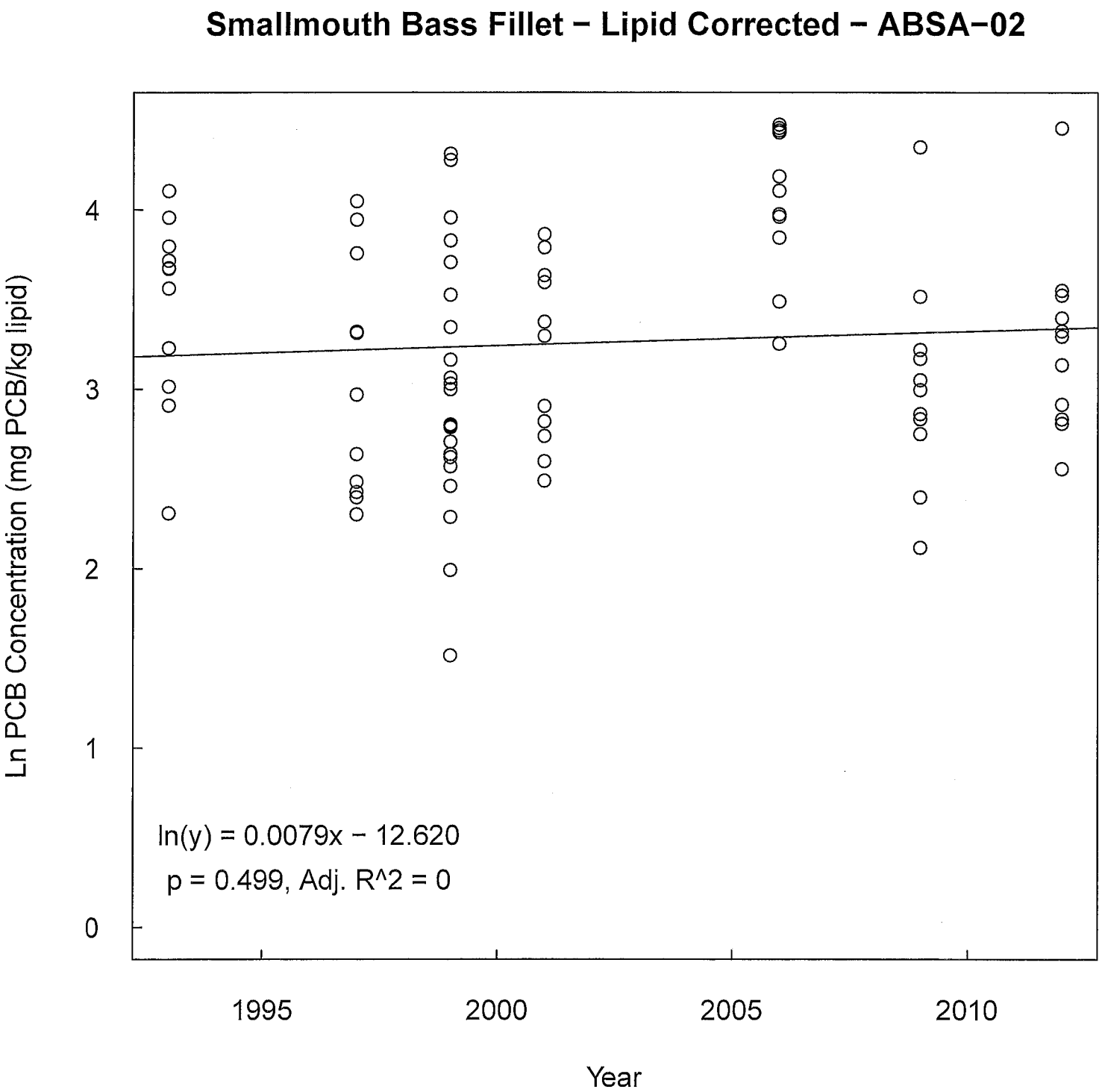

Smallmouth Bass Fillet – Lipid Corrected – ABSA–02
PCB Concentration (mg PCB / kg lipid)
0
20
40
60
80
1993
1997
1999
2001
2006
2009
2012
Year

Reference Smallmouth Bass Fillet − Lipid Corrected ABSA−02

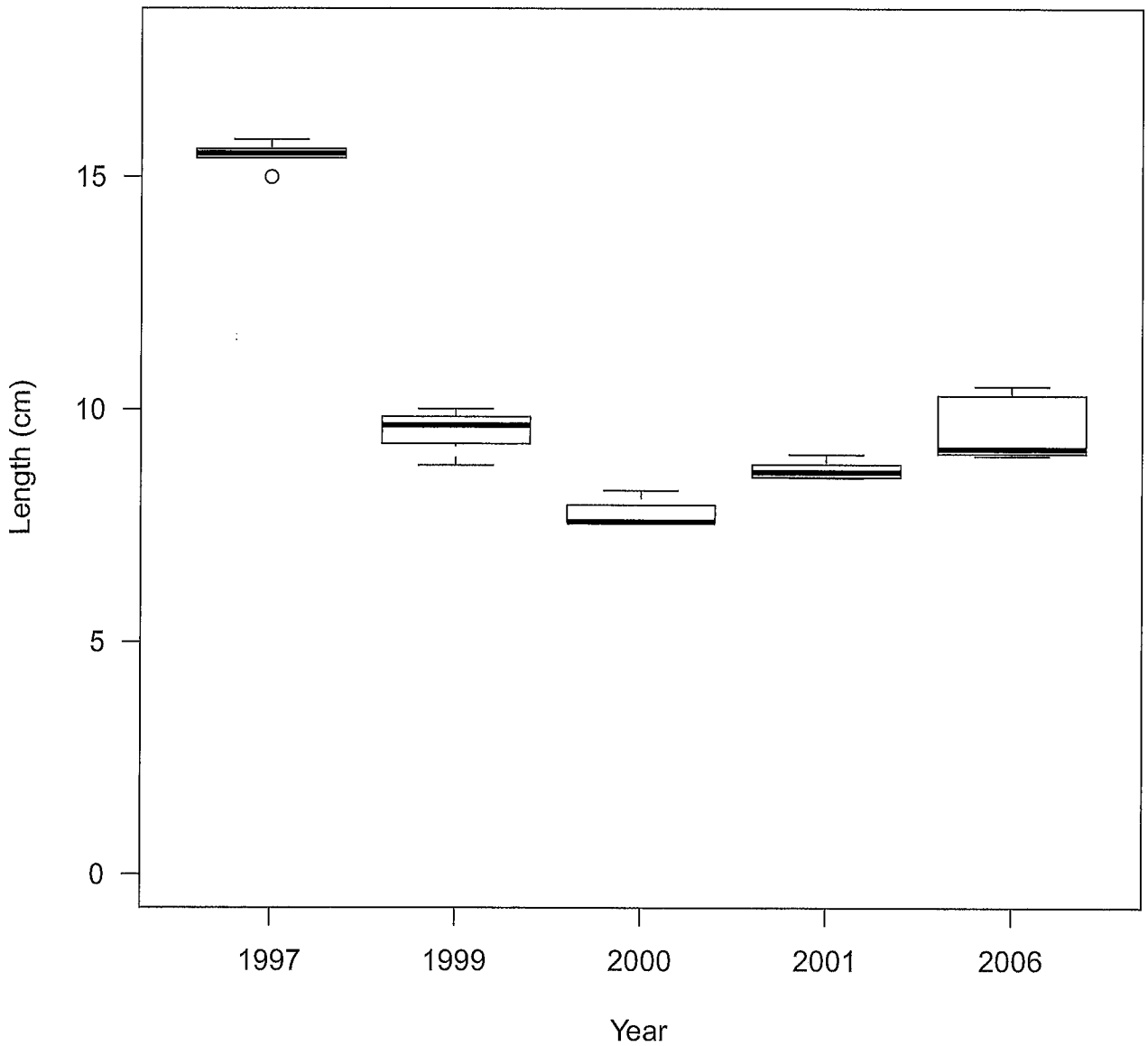


Smallmouth Bass Fillet − Lipid Corrected − ABSA−02

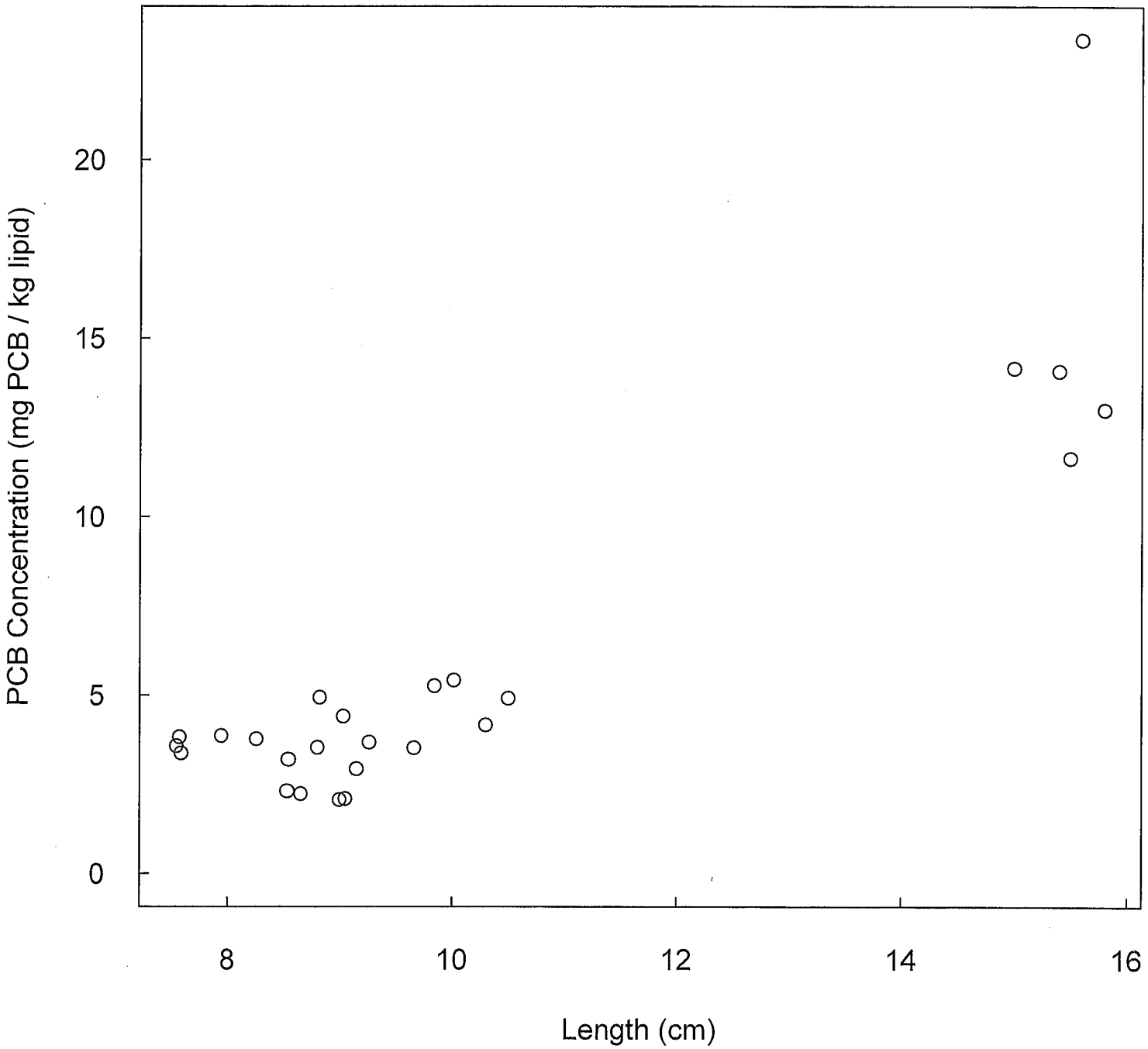


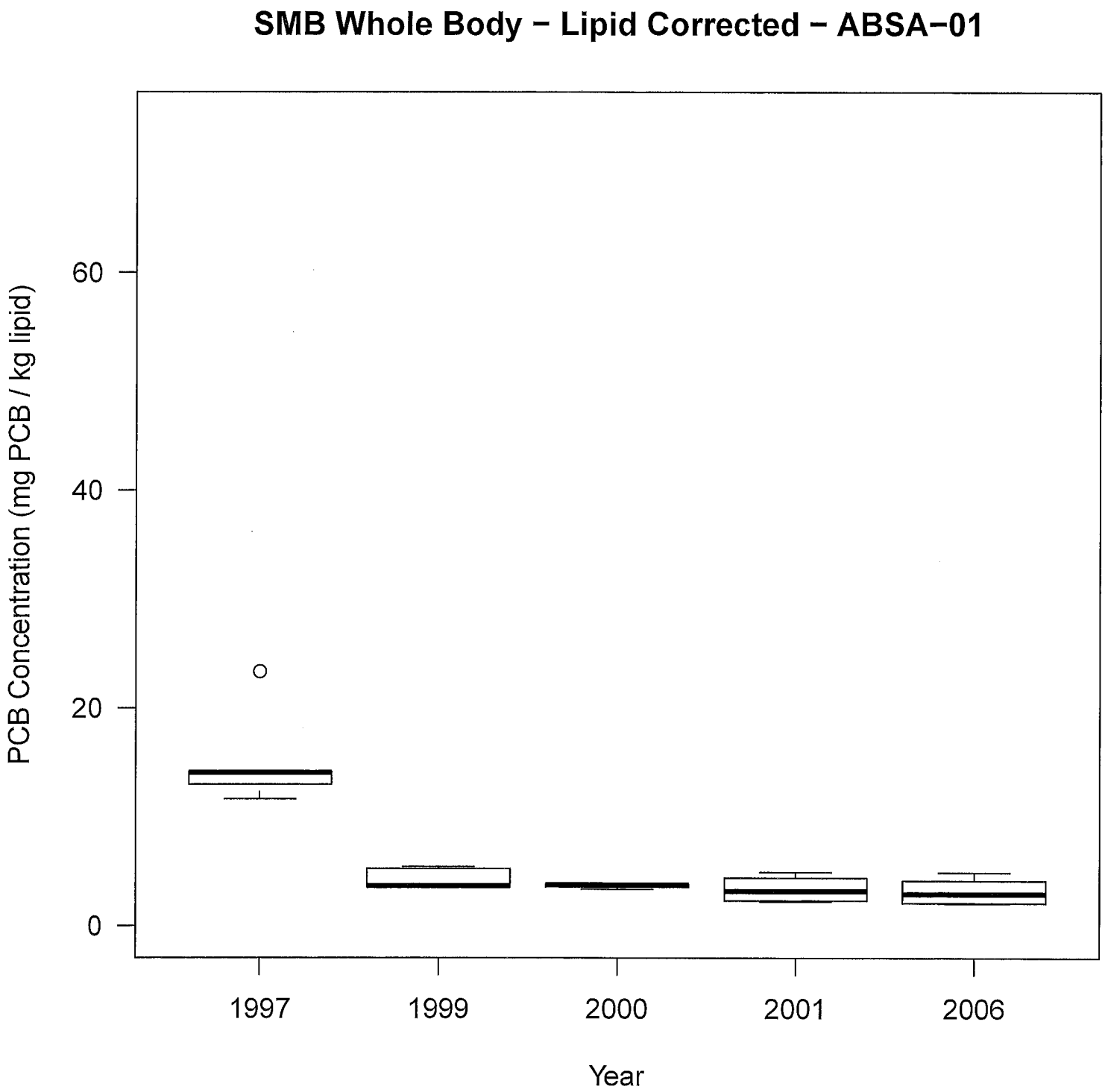

Smallmouth Bass Fillet − Lipid Corrected − ABSA−02
Ln PCB Concentration (mg PCB/kg lipid)
0
1
2
3
4
1995
2000
2005
2010
Year
ln(y) = 0.0079x − 12.620
p = 0.499, Adj. R^2 = 0

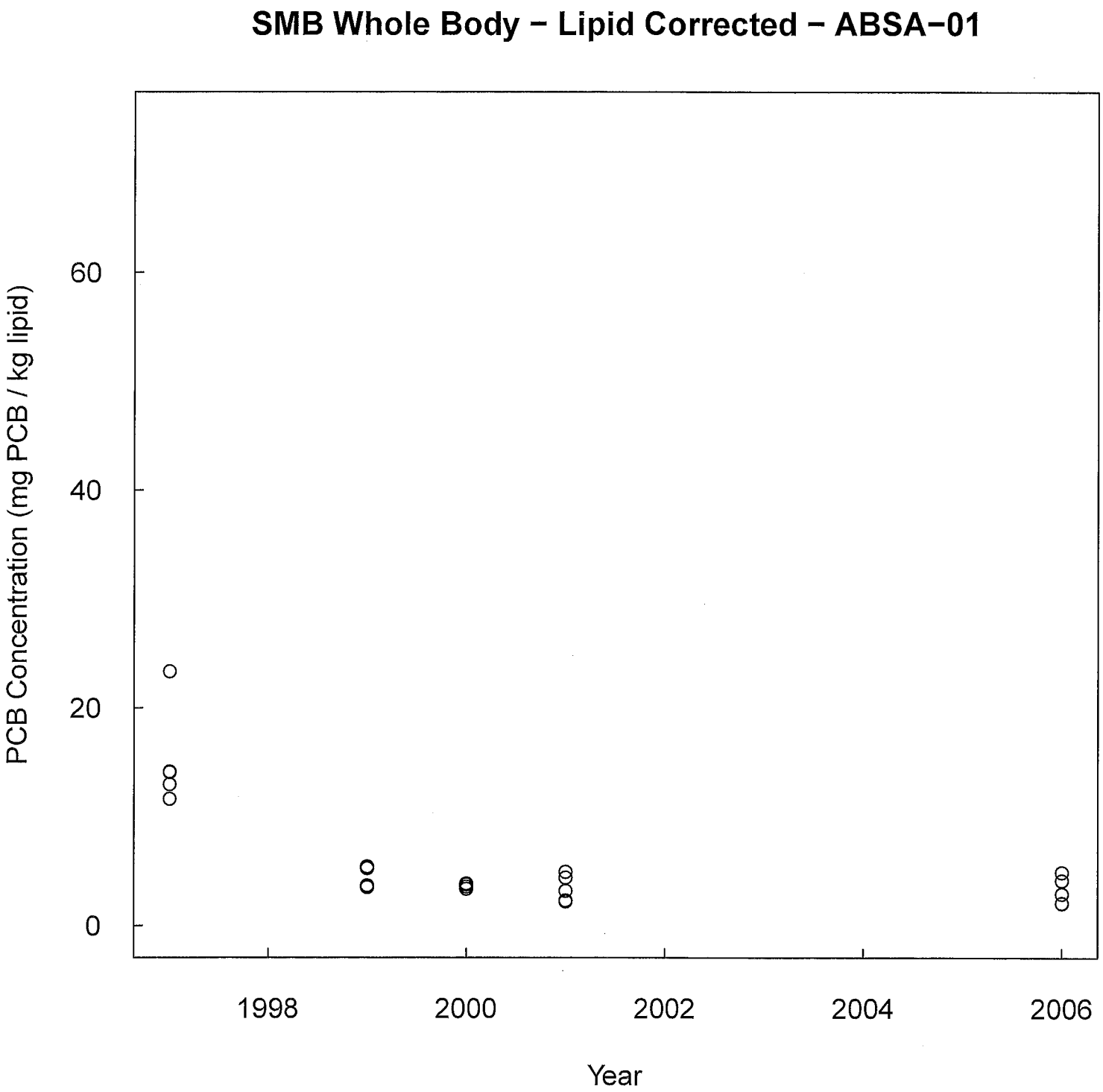
Length of Smallmouth Bass Sampled – ABSA-01

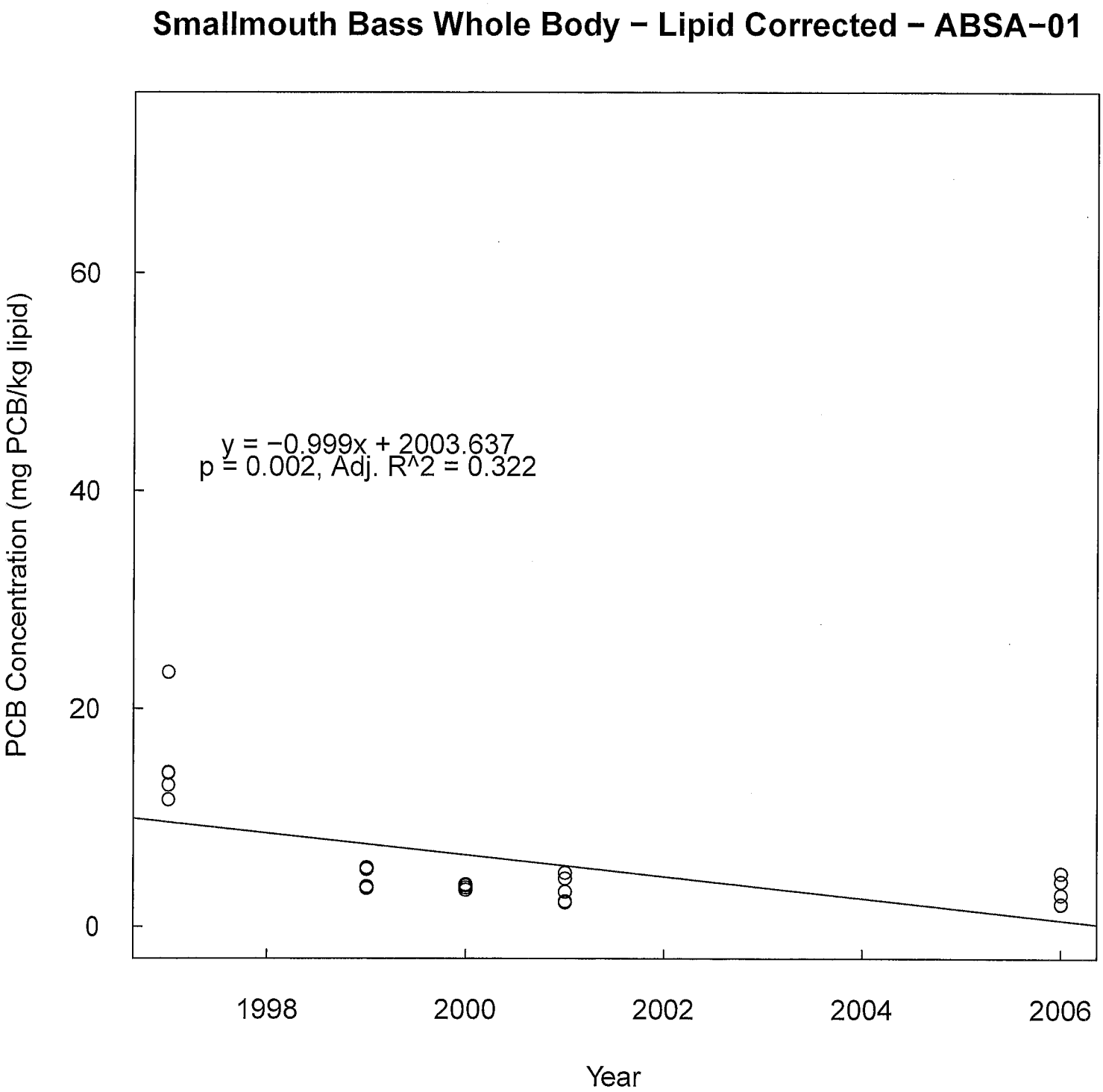


Total PCB Concentrations in Reference SMB WB – Lipid Corrected

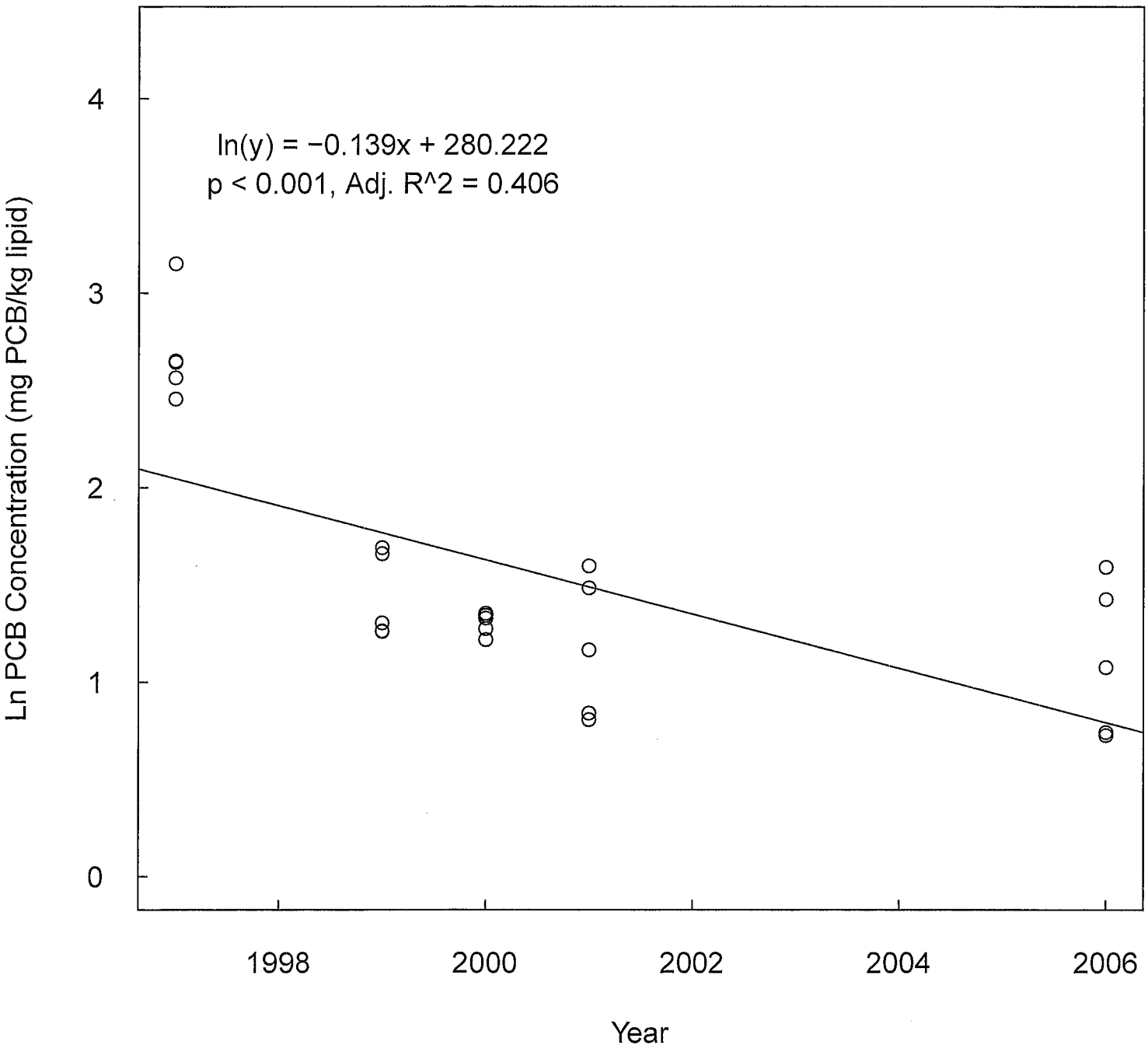


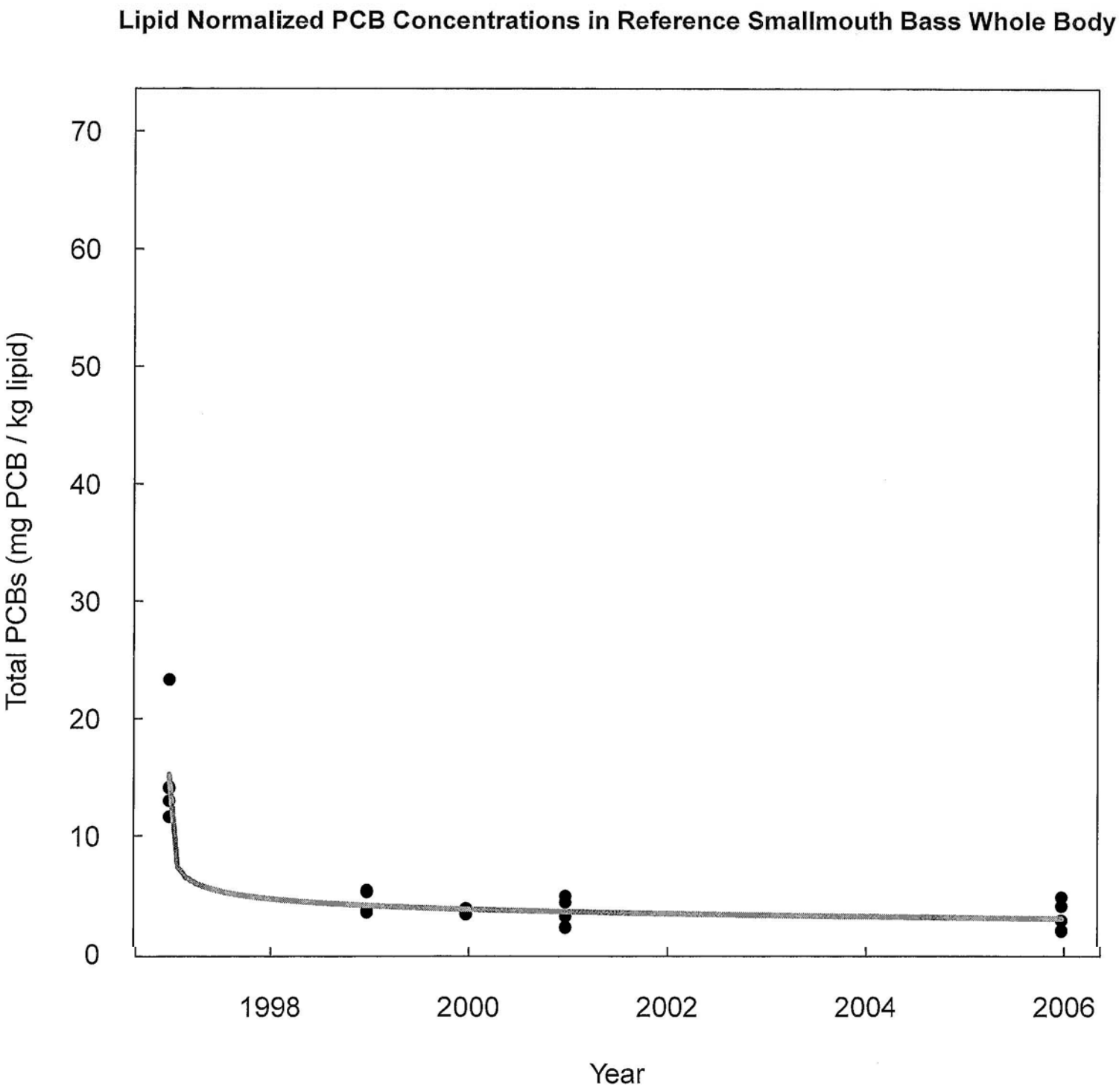

SMB Whole Body – Lipid Corrected – ABSA–01
PCB Concentration (mg PCB / kg lipid)
60
40
20
0
1997
1999
2000
2001
2006
Year


SMB Whole Body − Lipid Corrected − ABSA−01
PCB Concentration (mg PCB / kg lipid)
0
20
40
60
1998
2000
2002
2004
2006
Year

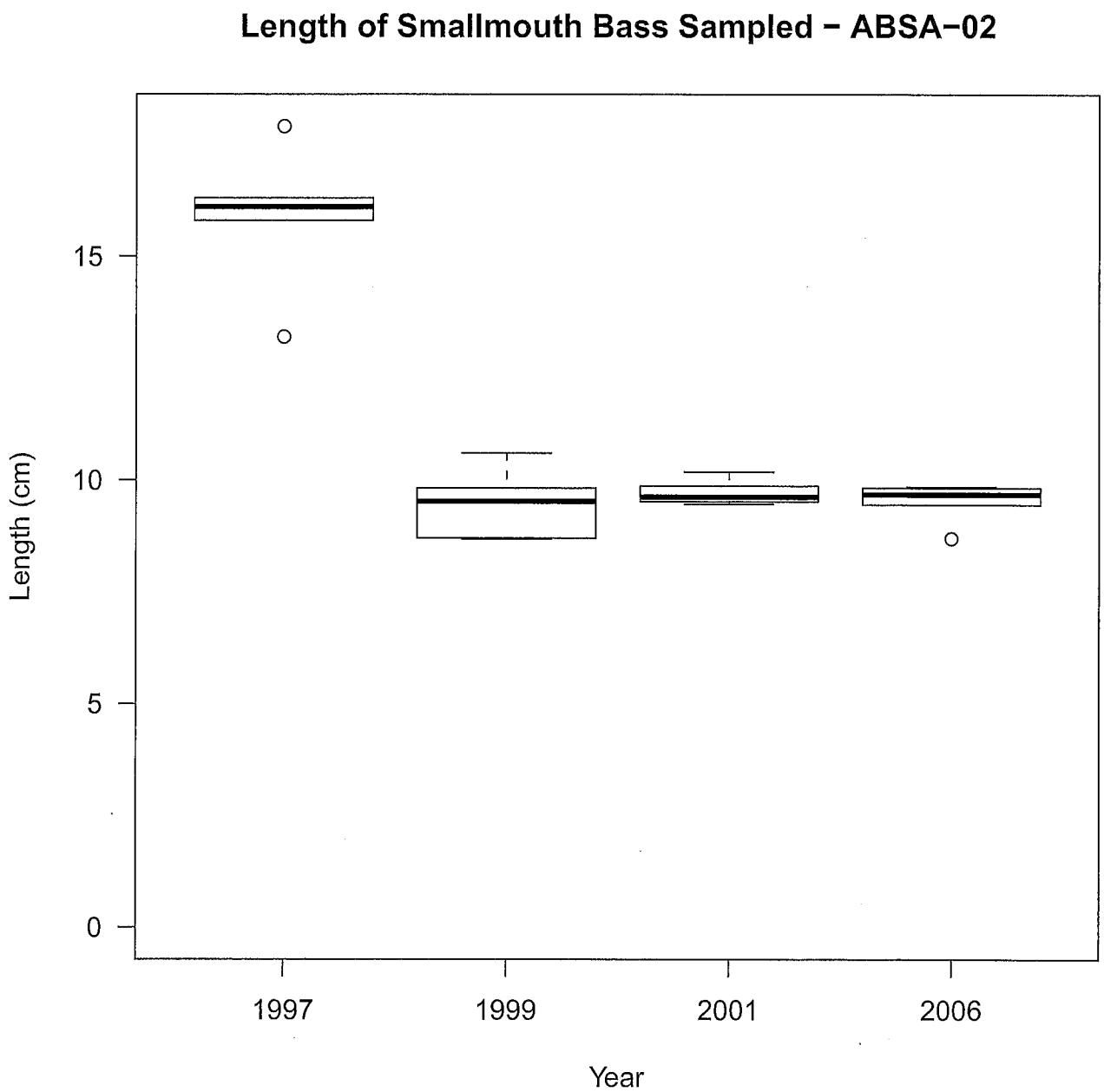

Smallmouth Bass Whole Body − Lipid Corrected − ABSA−01
y = −0.999x + 2003.637
p = 0.002, Adj. R^2 = 0.322
PCB Concentration (mg PCB/kg lipid)
0
20
40
60
1998
2000
2002
2004
2006
Year

Smallmouth Bass Whole Body − Lipid Corrected − ABSA−01

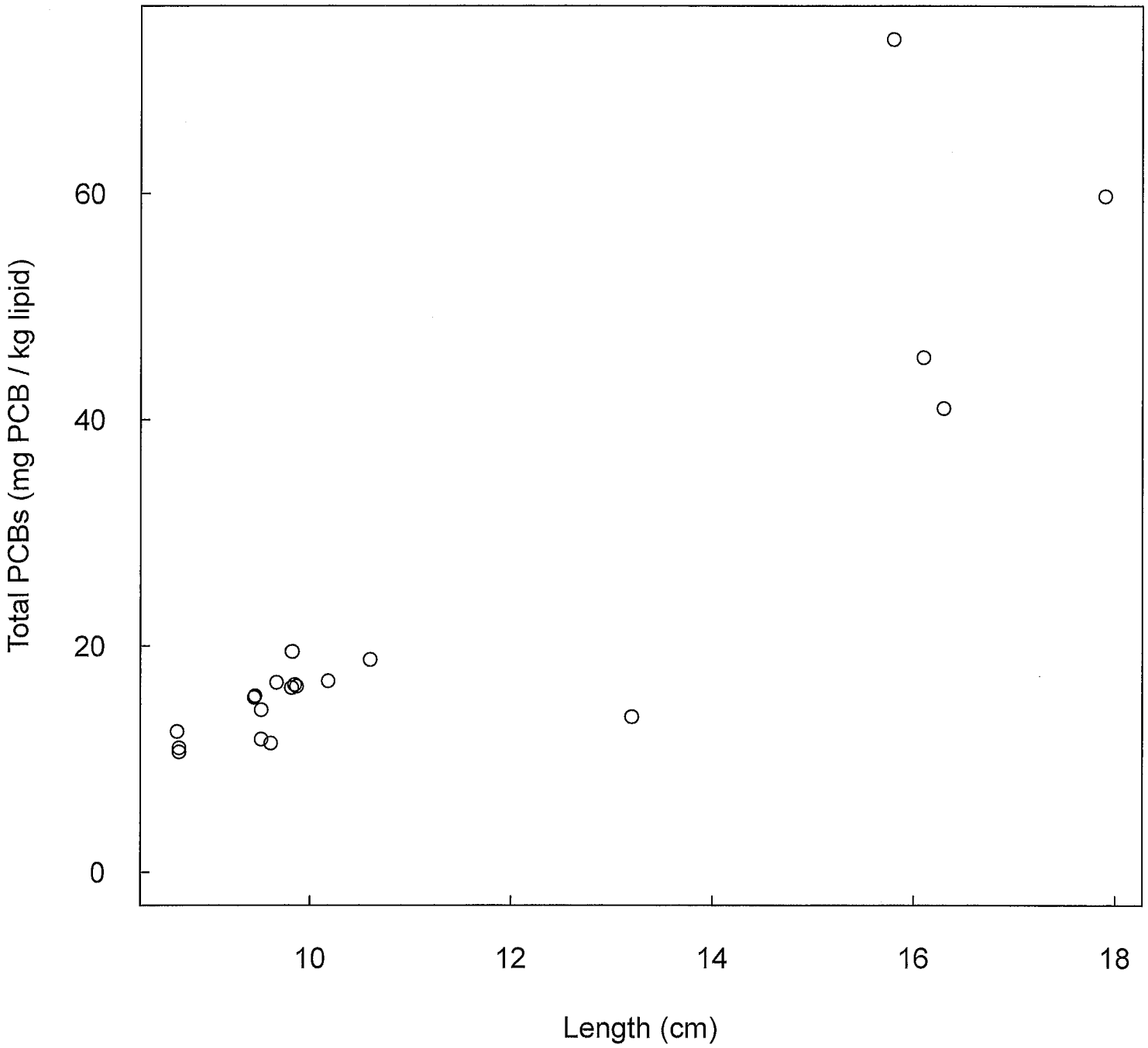


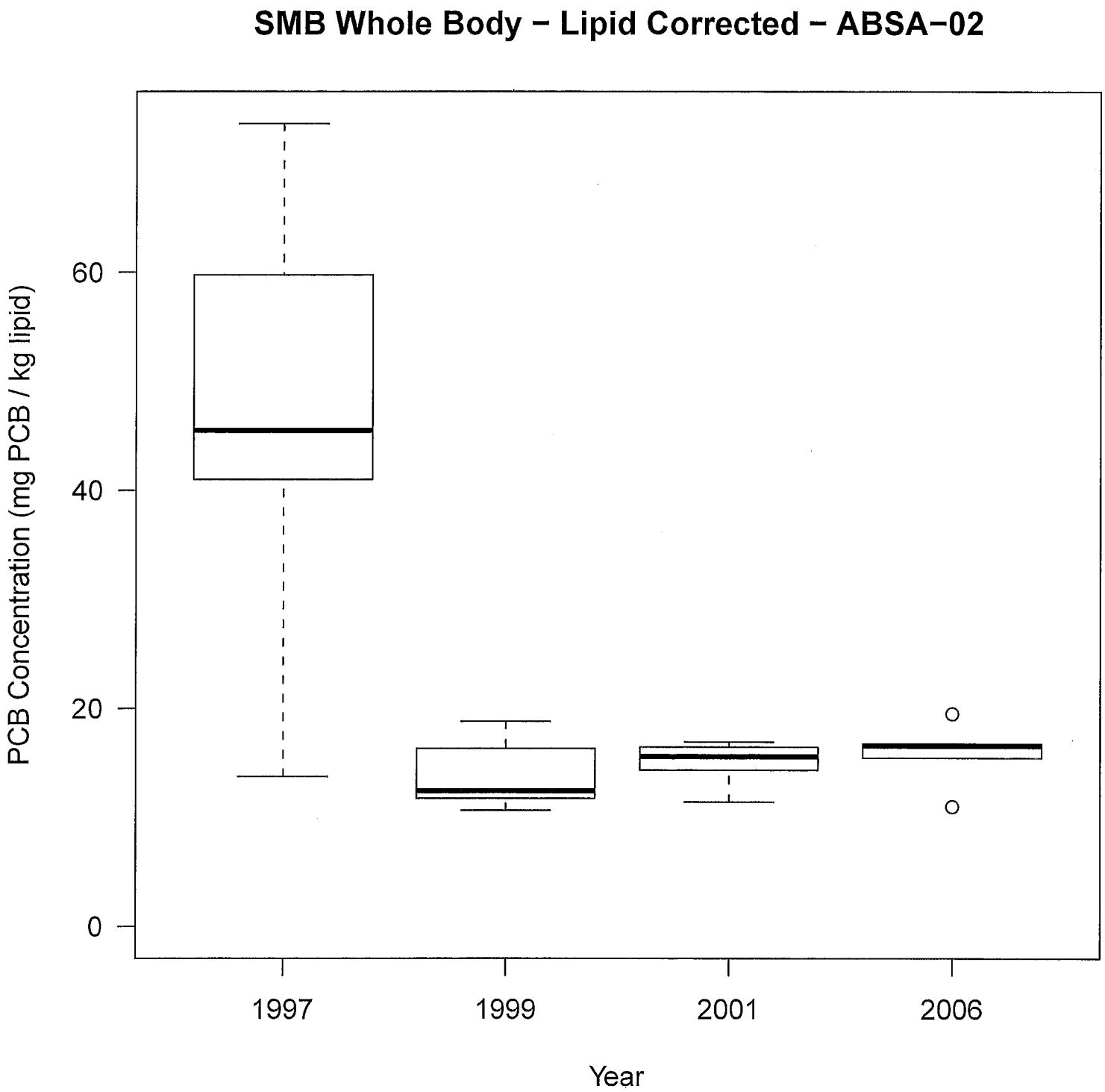


*Decline is 1.7% per year for ABSA-01

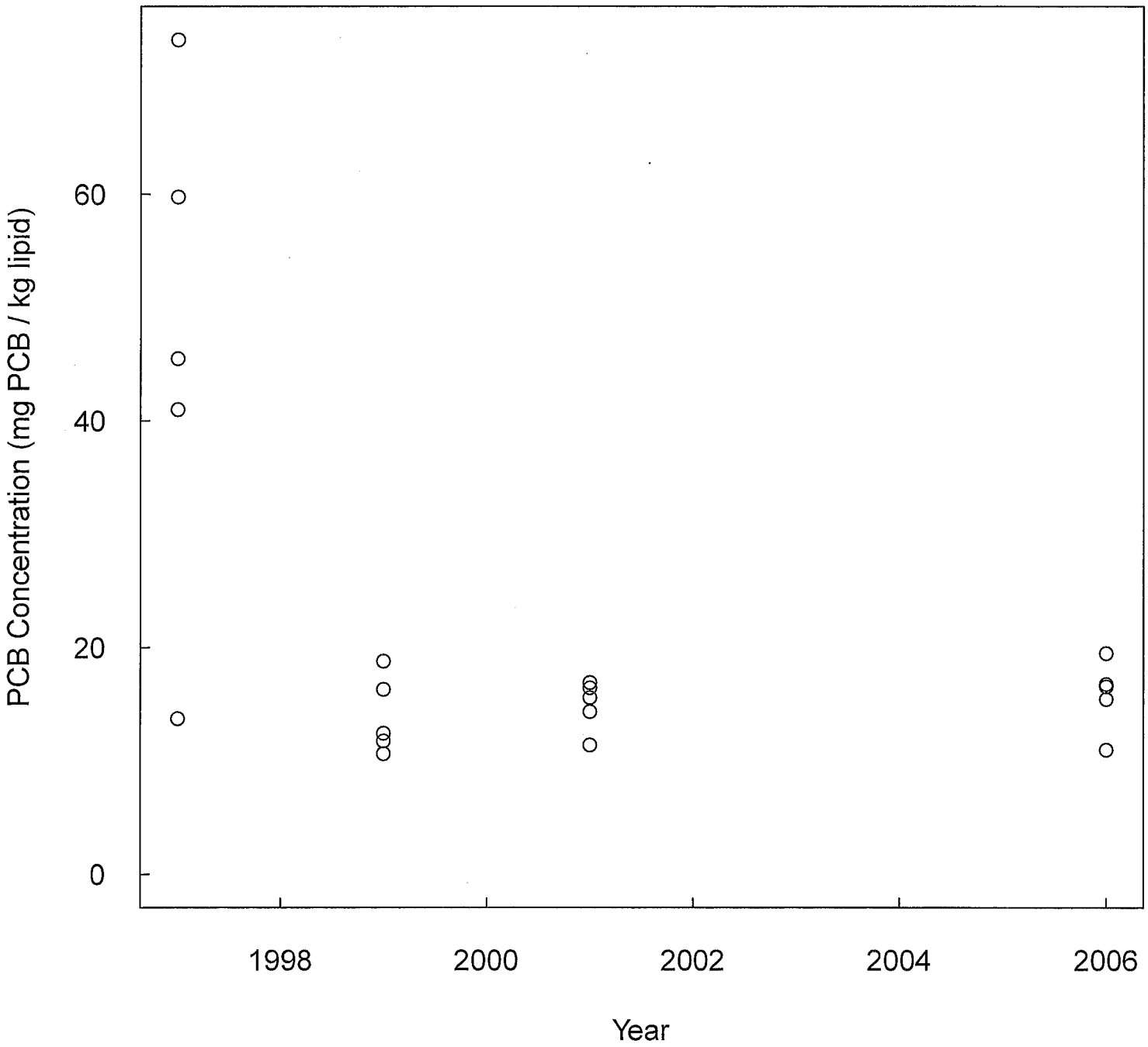

Length of Smallmouth Bass Sampled – ABSA–02
Length (cm)
0
5
10
15
1997
1999
2001
2006
Year

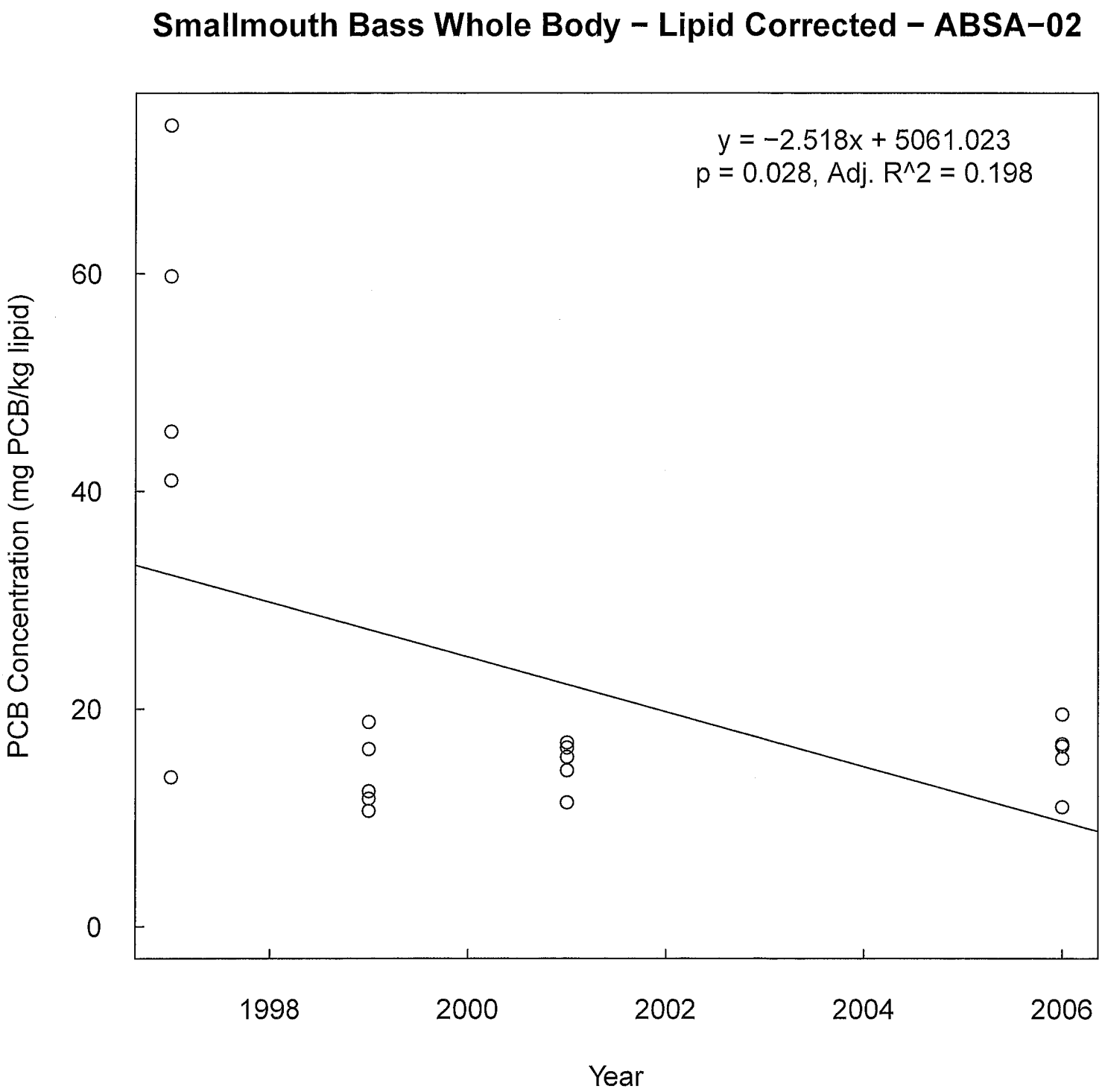
Total PCB Concentrations in Reference SMB WB – Lipid Corrected

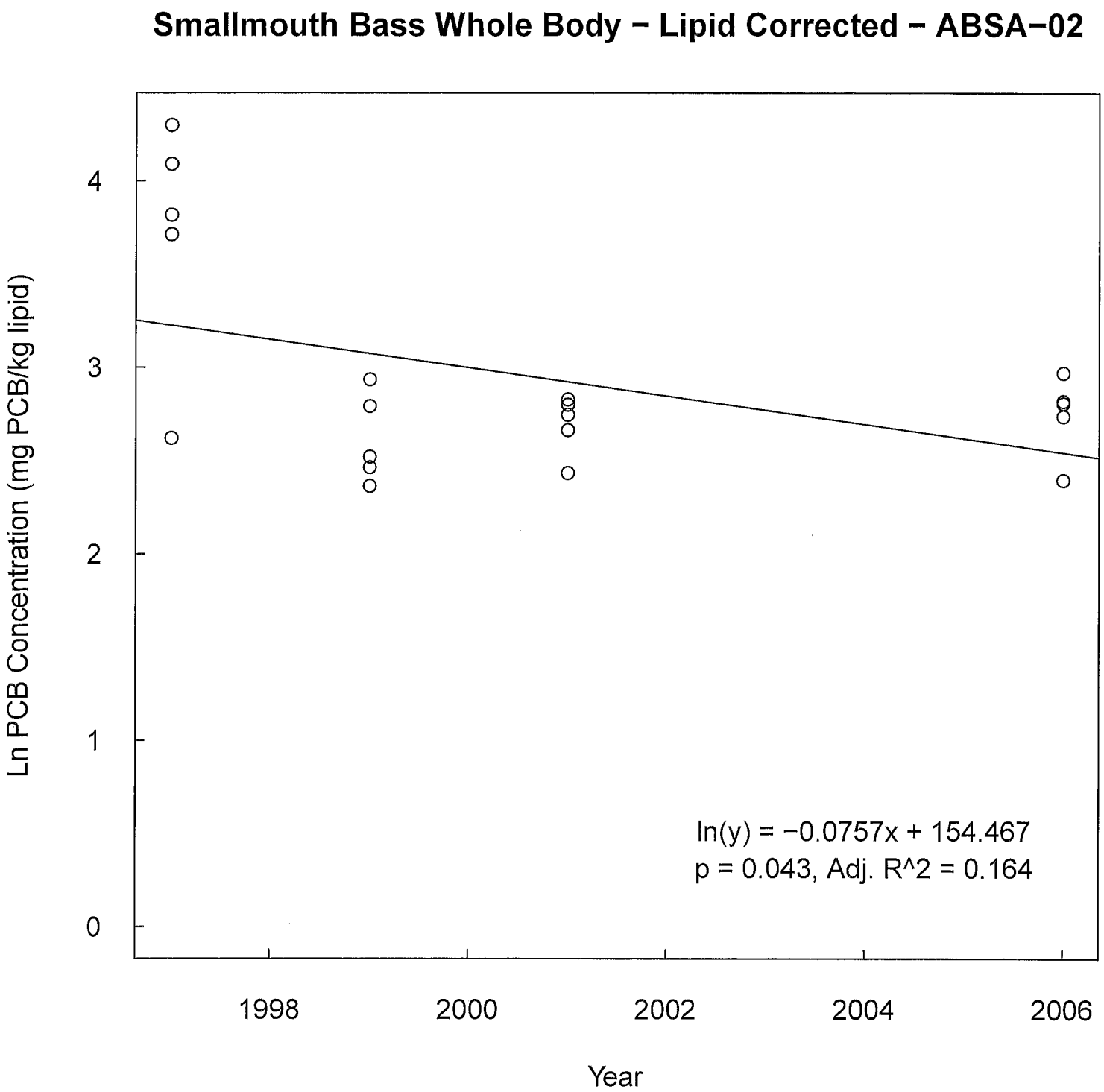


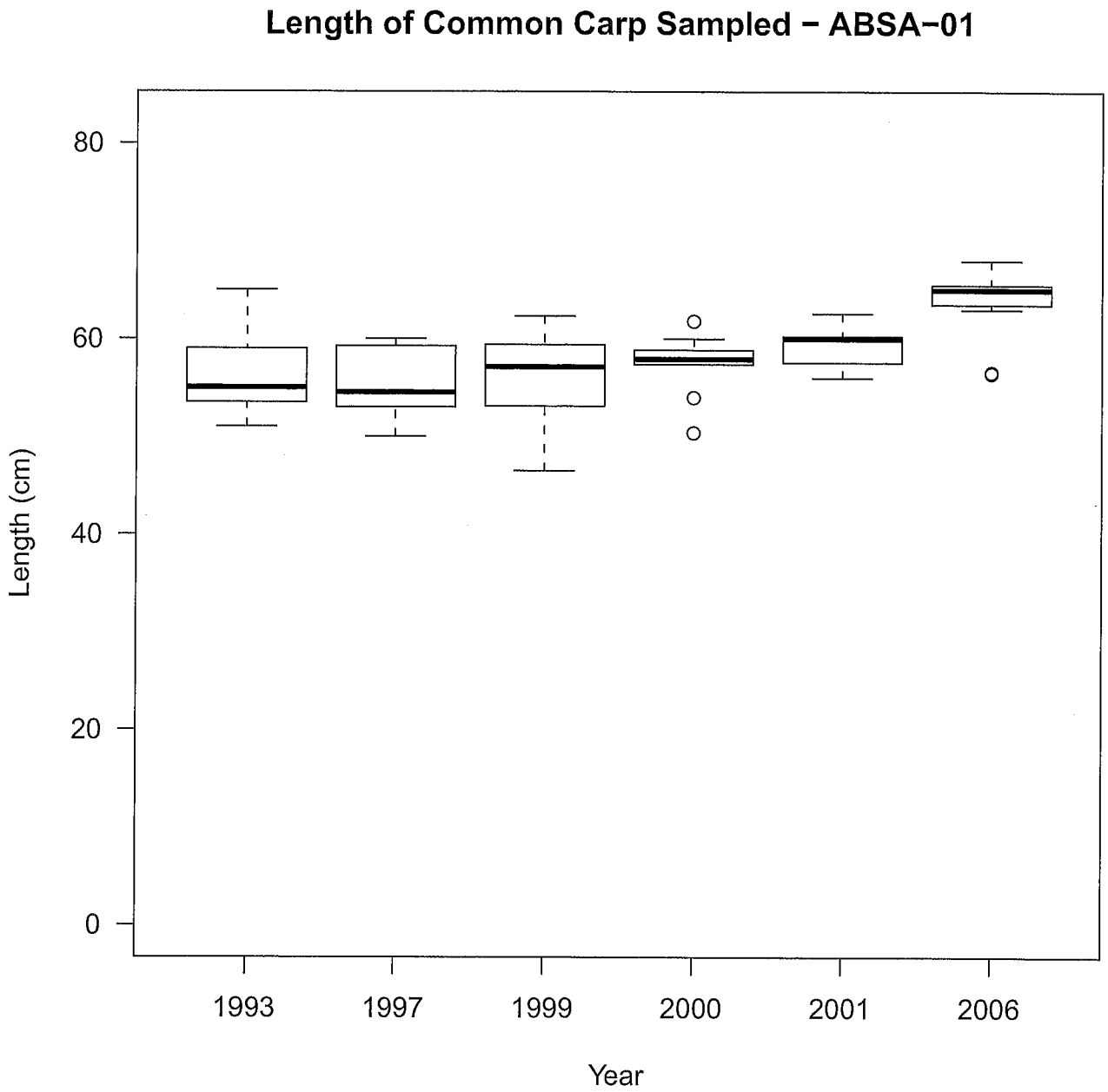

SMB Whole Body − Lipid Corrected − ABSA−02
PCB Concentration (mg PCB / kg lipid)
0
20
40
60
1997
1999
2001
2006
Year

Reference SMB Whole Body − Lipid Corrected − ABSA−02

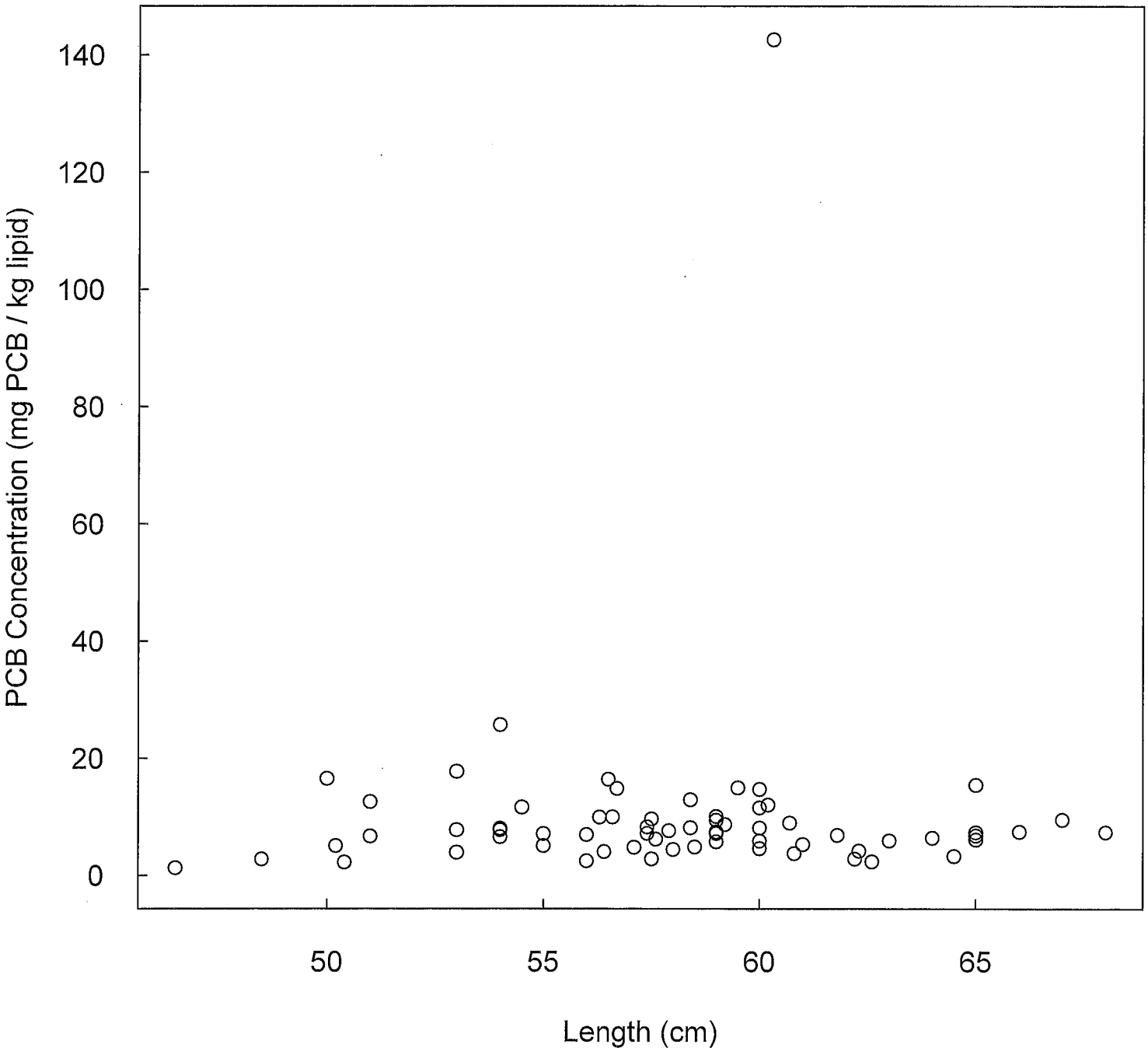



Smallmouth Bass Whole Body − Lipid Corrected − ABSA−02
y = −2.518x + 5061.023
p = 0.028, Adj. R^2 = 0.198
PCB Concentration (mg PCB/kg lipid)
0
20
40
60
1998
2000
2002
2004
2006
Year

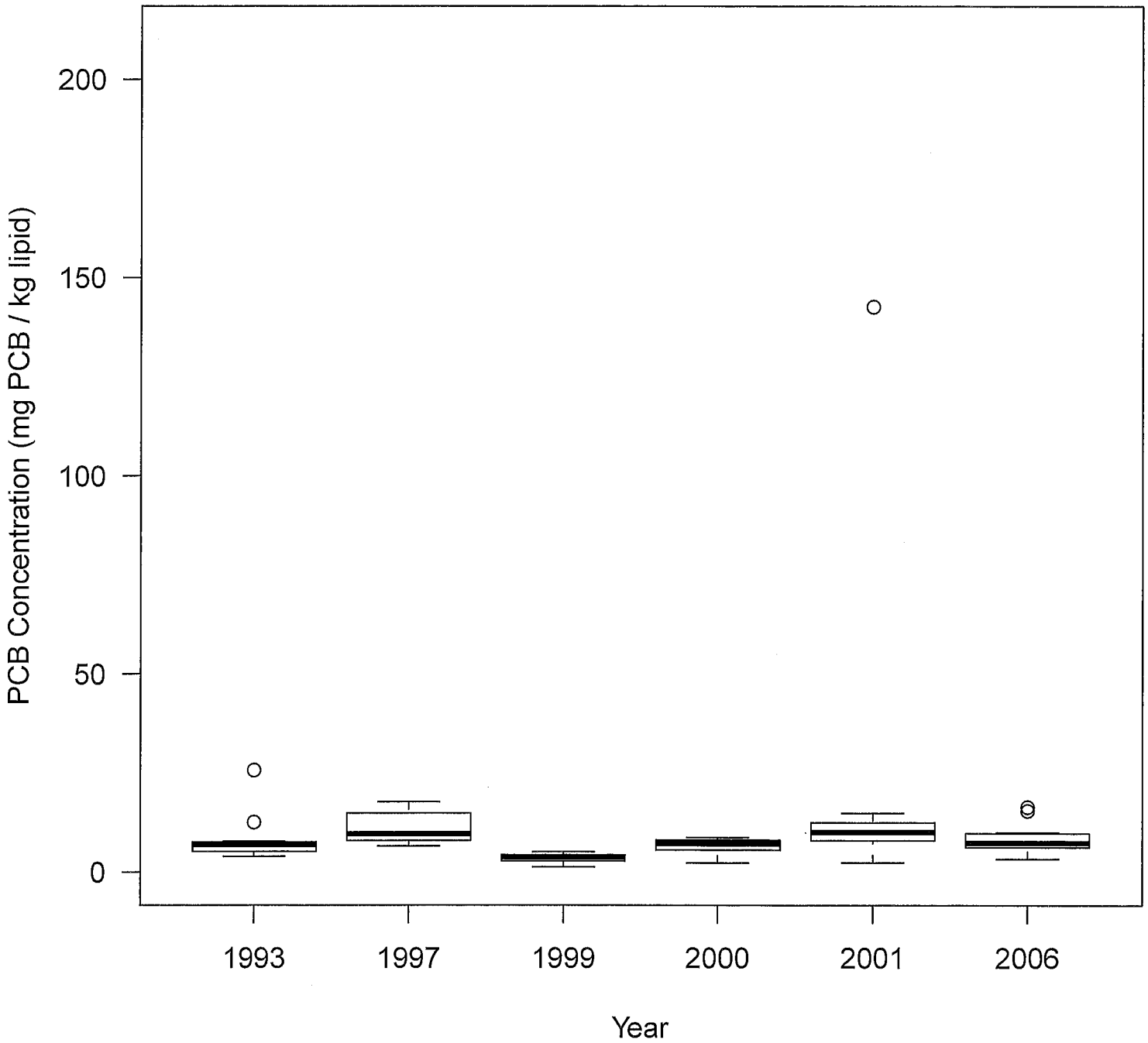

Smallmouth Bass Whole Body − Lipid Corrected − ABSA−02
Ln PCB Concentration (mg PCB/kg lipid)
4
3
2
1
0
1998
2000
2002
2004
2006
Year
ln(y) = −0.0757x + 154.467
p = 0.043, Adj. R^2 = 0.164


Length of Common Carp Sampled – ABSA-01
80
60
40
20
0
Length (cm)
1993
1997
1999
2000
2001
2006
Year

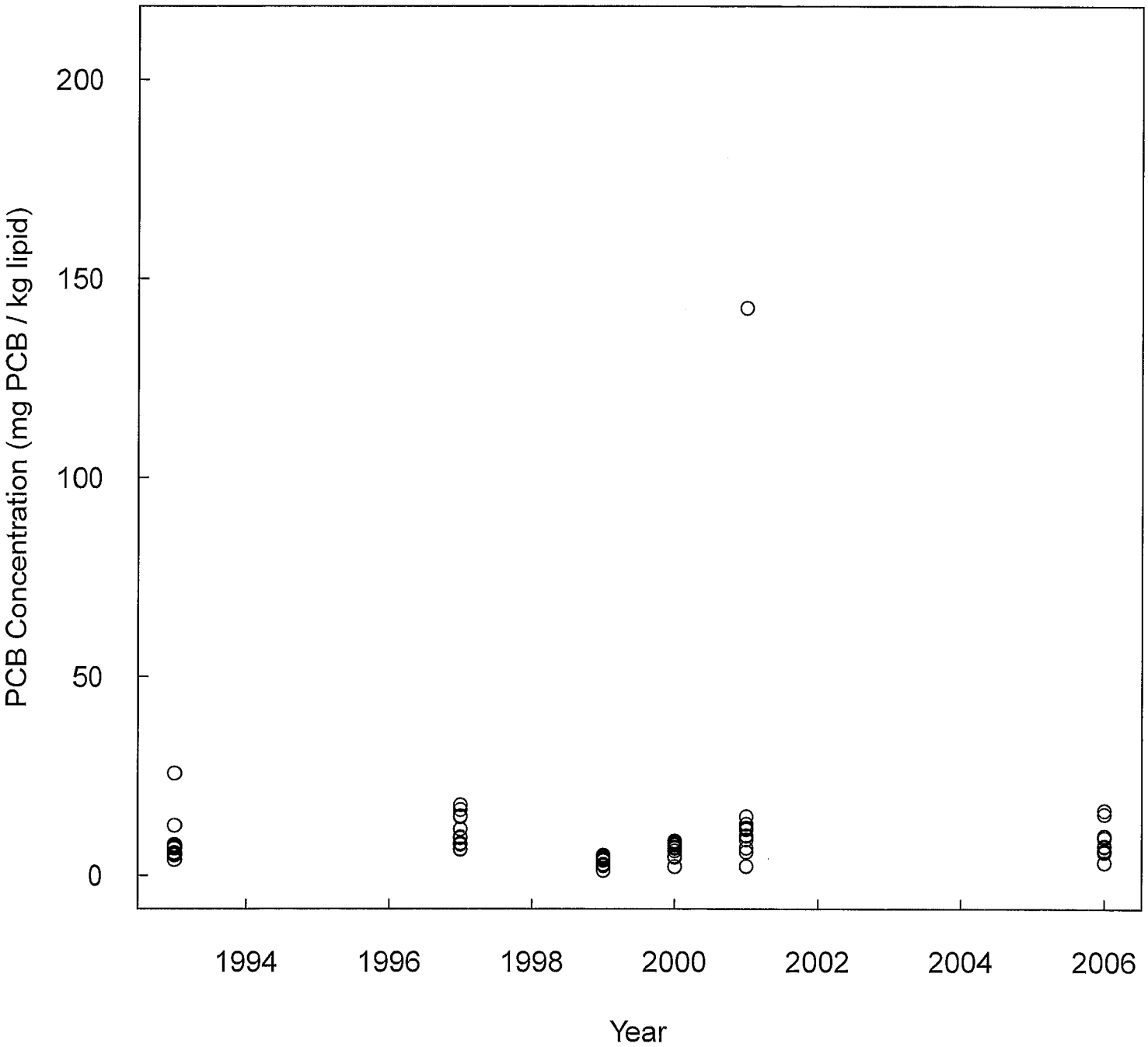
Lipid Corrected PCB Concentrations in Reference Carp Fillet



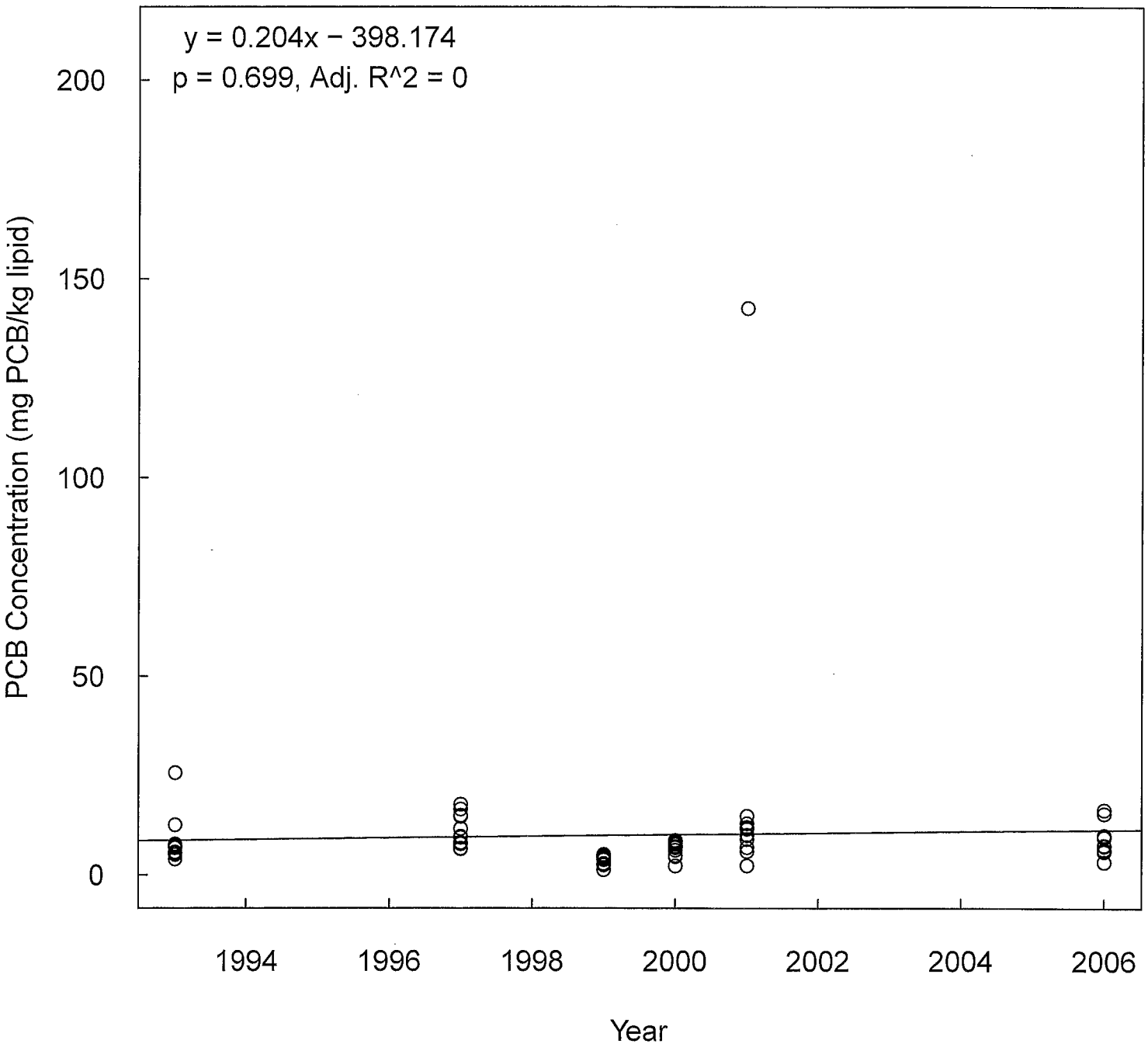
Common Carp Fillet – Lipid Corrected – ABSA-01



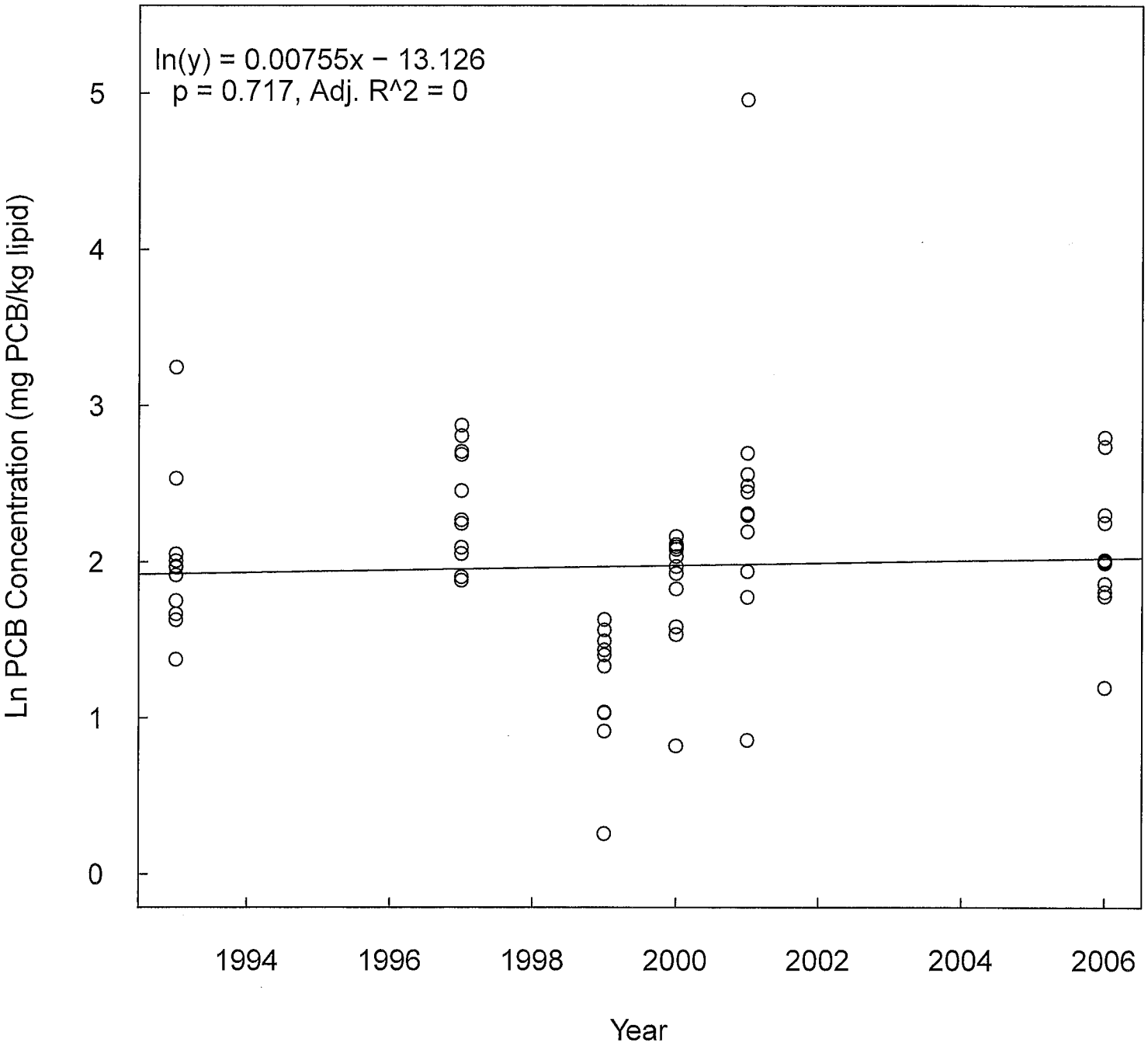
Reference Common Carp Fillet – Lipid Corrected – ABSA–01

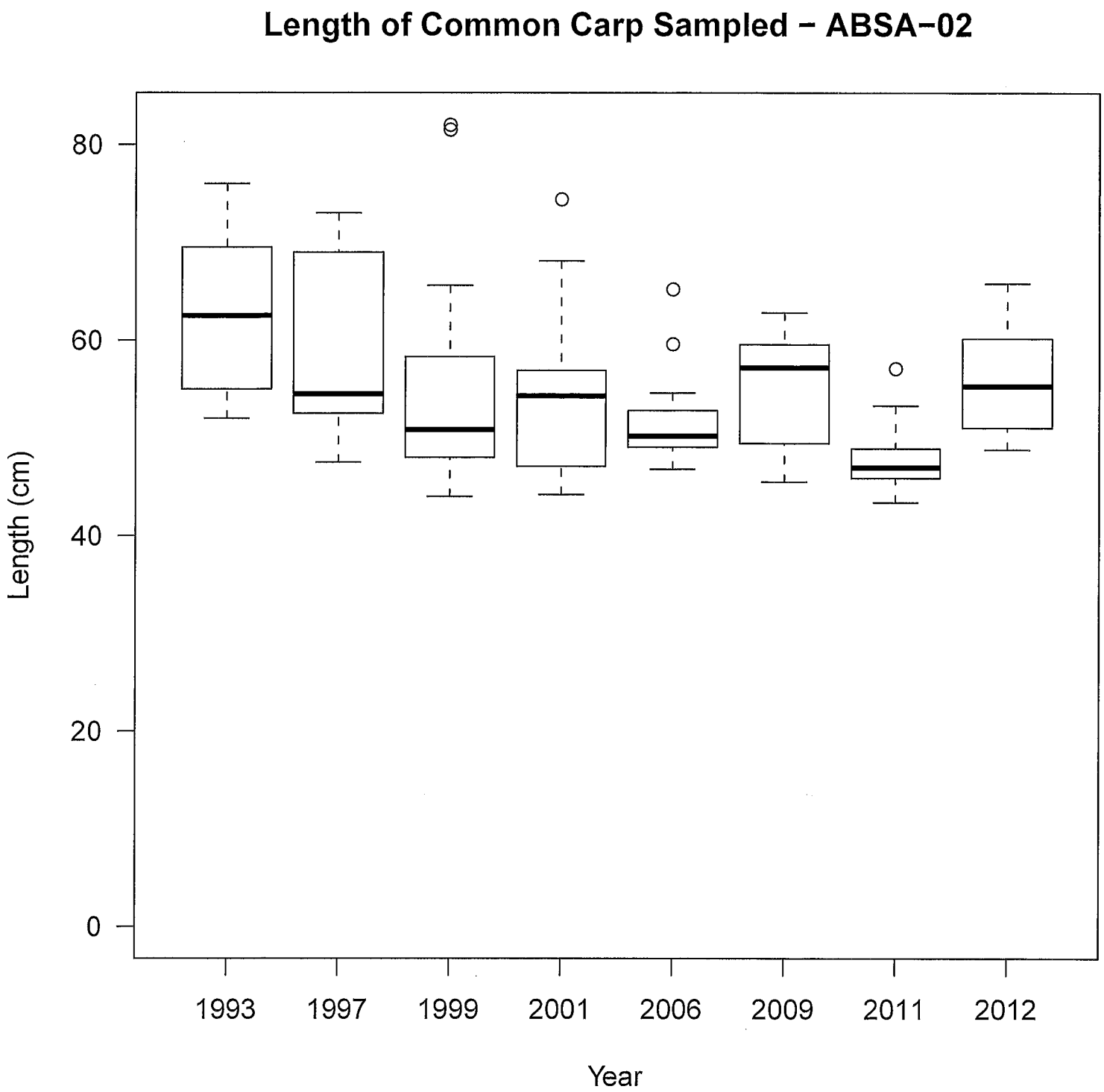


Common Carp Fillet – Lipid Corrected – ABSA–01

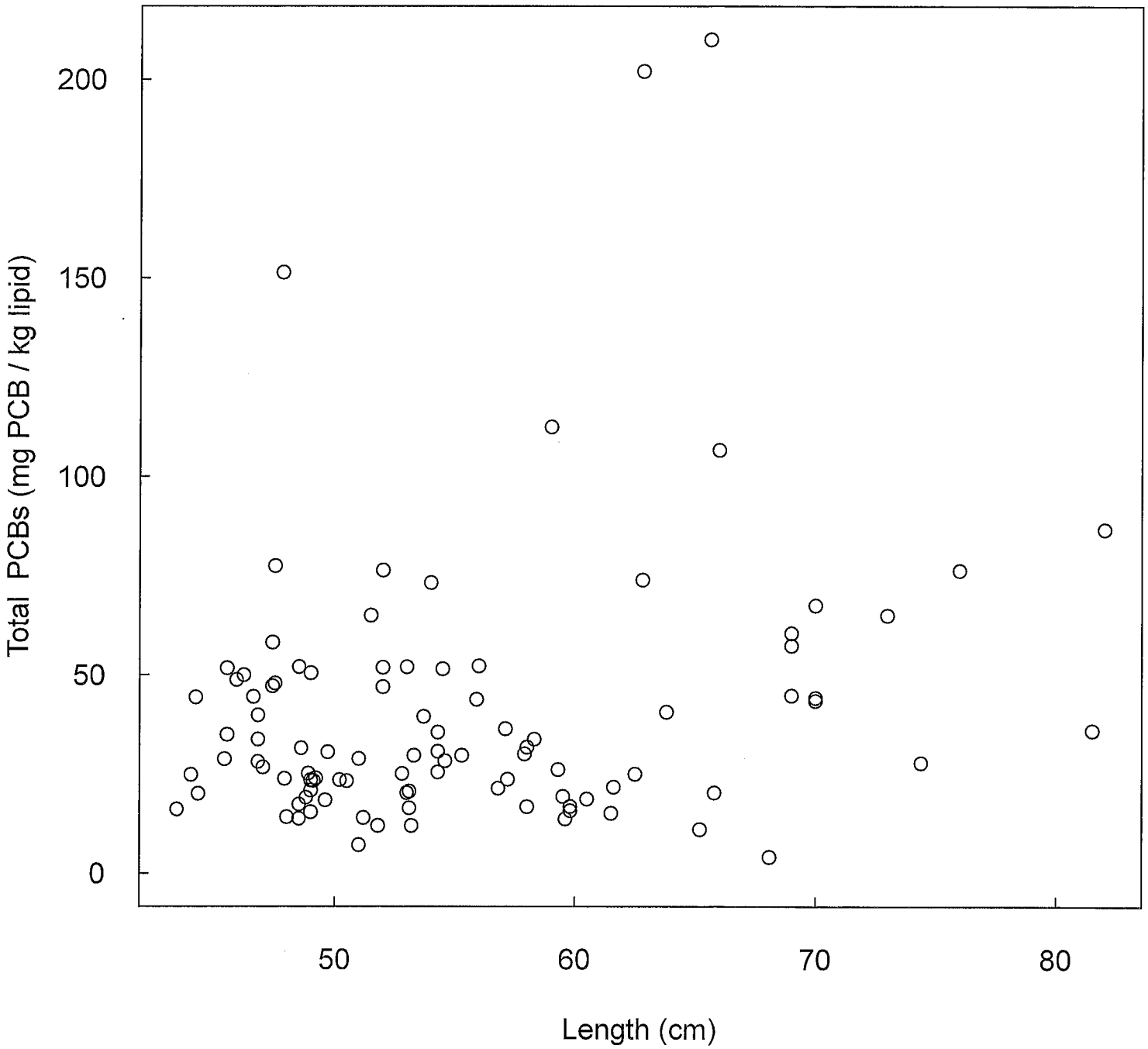


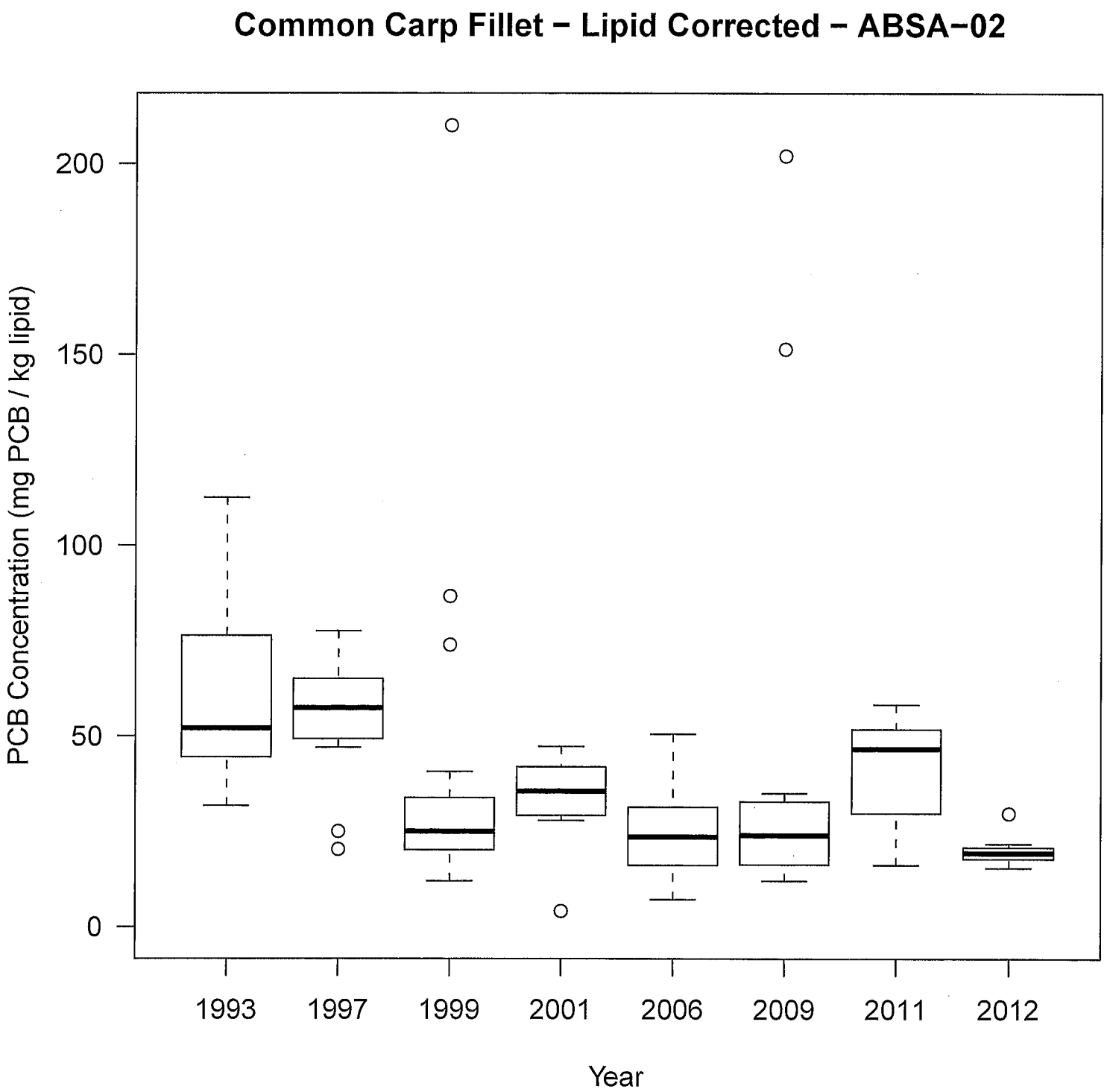
Common Carp Fillet – Lipid Corrected – ABSA-01



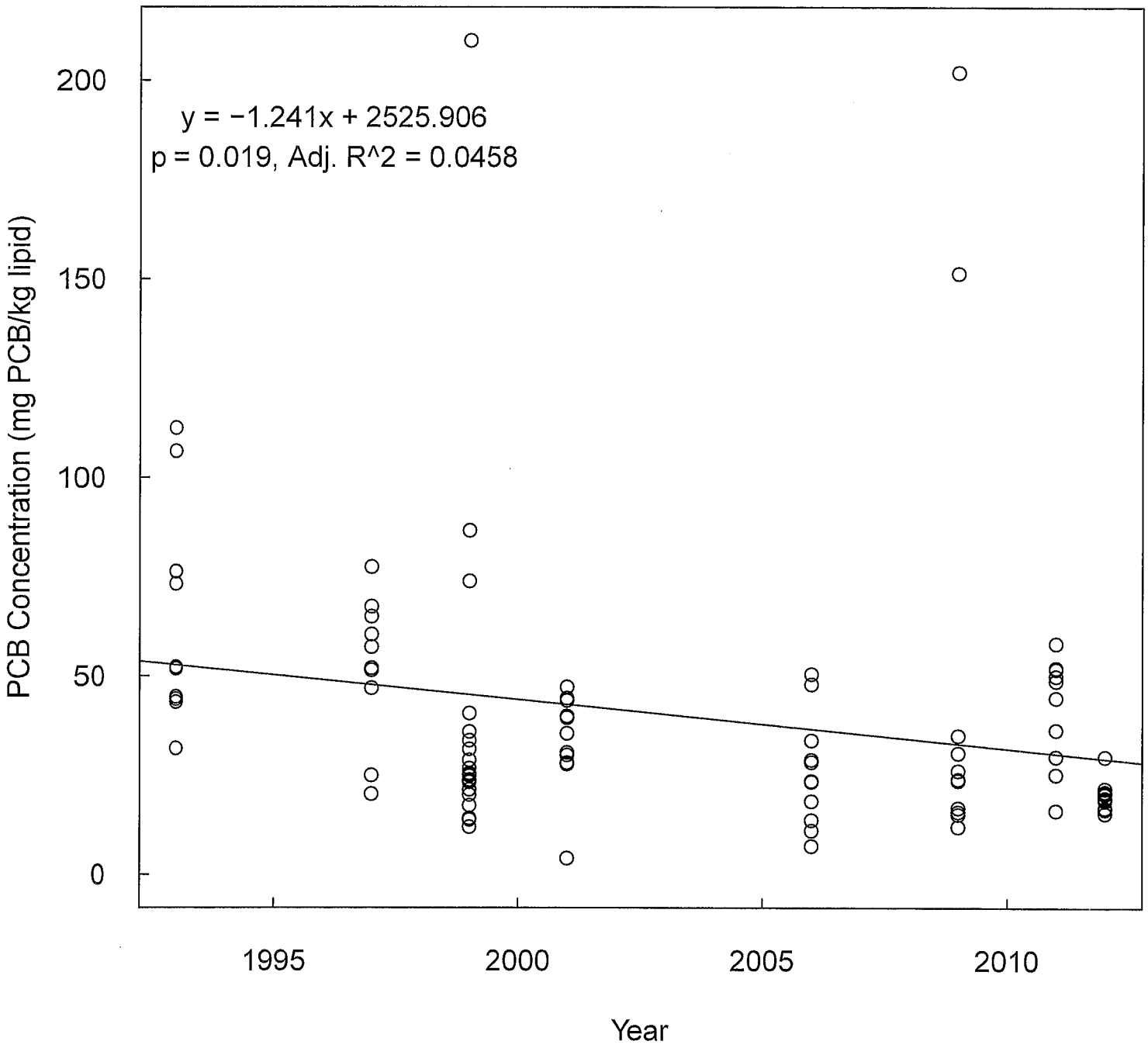

Length of Common Carp Sampled - ABSA-02
Length (cm)
0
20
40
60
80
1993
1997
1999
2001
2006
2009
2011
2012
Year

Lipid Corrected PCB Concentrations in Reference Carp Fillet

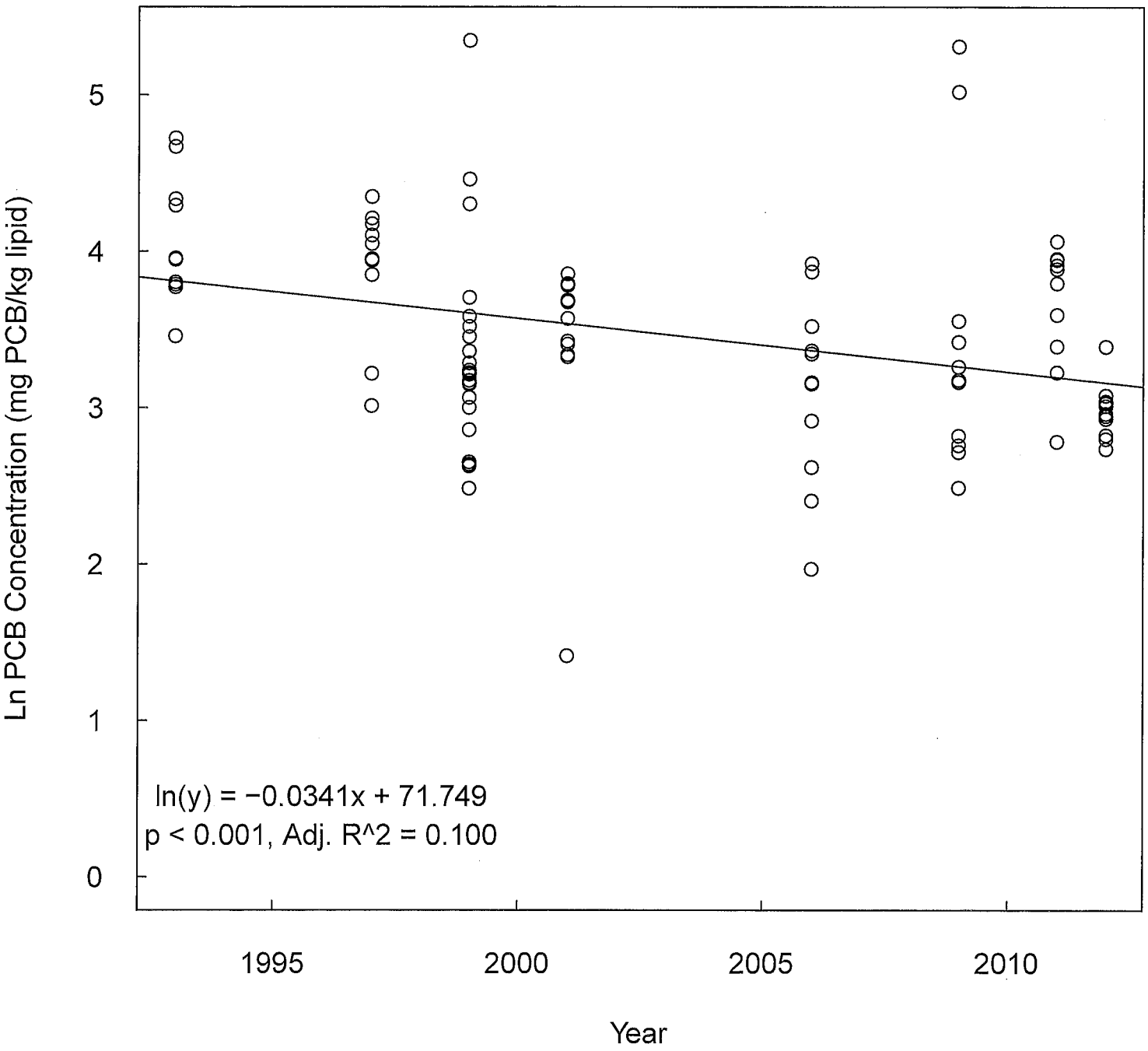



Common Carp Fillet – Lipid Corrected – ABSA-02
PCB Concentration (mg PCB / kg lipid)
0
50
100
150
200
1993
1997
1999
2001
2006
2009
2011
2012
Year

Common Carp Fillet – Lipid Corrected – ABSA–02



Common Carp Fillet – Lipid Corrected – ABSA–02



Average Projected Percent Decline from 2006 to 2011

SMB Fillet

	Lipid Corrected			Lipid & Length Corrected		
	Mixed order	First order	Straight linear	Mixed order	First order	Straight linear
ABSA-01	DNC	-0.12%	-0.74%	DNC	-0.41%	-1.5%
ABSA-02	DNC	-0.81%	-0.91%	DNC	-0.65%	-0.97%

SMB Whole Body

	Lipid Corrected			Lipid & Length Corrected		
	Mixed order	First order	Straight linear	Mixed order	First order	Straight linear
ABSA-01	1.70%	10.0%	155%	1.90%	8.1%	26.1%
ABSA-02	DNC	6.3%	25.4%	DNC	3.0%	6.5%

Carp Fillet

	Lipid Corrected			Lipid & Length Corrected		
	Mixed order	First order	Straight linear	Mixed order	First order	Straight linear
ABSA-01	DNC	-0.77%	-1.9%	DNC	0.22%	-1.0%
ABSA-02	DNC	3.1%	3.4%	DNC	2.5%	2.2%

Notes:

Not Significant

Significant

negative % indicates concentrations increased

Draft Area 1 SWAC Estimates by Reach (Section) and Depth Interval
Kalamazoo River OU 5

Reach 1	SWAC	Area of Reach 1 by interval (sq ft)	Number of Data Points
Interval 1 (0 - 6 inches)	0.11	3549999.263	183
Interval 2 (6 - 12 inches)	0.06	3532407.309	97
Interval 3 (12 - 24 inches)	0.12	2059008.941	81
Reach 1 first three intervals	0.09	9141415.513	361

Reach 2	SWAC	Area of Reach 2 by interval (sq ft)	Number of Data Points
Interval 1 (0 - 6 inches)	0.23	1169773.334	88
Interval 2 (6 - 12 inches)	0.22	1142247.788	46
Interval 3 (12 - 24 inches)	1.05	821898.7671	32
Reach 2 first three intervals	0.44	3133919.889	147

Reach 3	SWAC	Area of Reach 3 by interval (sq ft)	Number of Data Points
Interval 1 (0 - 6 inches)	2.19	1367211.906	68
Interval 2 (6 - 12 inches)	4.25	1335553.362	37
Interval 3 (12 - 24 inches)	18.13	1050106.084	34
Reach 3 first three intervals	7.37	3752871.353	148

Reach 4	SWAC	Area of Reach 4 by interval (sq ft)	Number of Data Points
Interval 1 (0 - 6 inches)	0.42	5996663.061	185
Interval 2 (6 - 12 inches)	0.24	5367821.578	90
Interval 3 (12 - 24 inches)	0.26	3173223.587	55
Reach 4 first three intervals	0.32	14537708.22	300

Reach 5	SWAC	Area of Reach 5 by interval (sq ft)	Number of Data Points
Interval 1 (0 - 6 inches)	0.24	4525977.168	130
Interval 2 (6 - 12 inches)	0.11	4135049.558	65
Interval 3 (12 - 24 inches)	0.09	2035970.487	35
Reach 5 first three intervals	0.16	10696997.21	193

Reach 6	SWAC	Area of Reach 6 by interval (sq ft)	Number of Data Points
Interval 1 (0 - 6 inches)	0.72	1300491.778	99
Interval 2 (6 - 12 inches)	0.31	1002371.862	47
Interval 3 (12 - 24 inches)	0.39	678557.072	42
Reach 6 first three intervals	0.51	2981420.711	189

Reach 7	SWAC	Area of Reach 7 by interval (sq ft)	Number of Data Points
Interval 1 (0 - 6 inches)	0.72	1349200.581	28
Interval 2 (6 - 12 inches)	0.66	879070.349	15
Interval 3 (12 - 24 inches)	0.76	527946.7834	13
Reach 7 first three intervals	0.71	2756217.713	50

Mill Race	SWAC	Area of Mill Race by interval (sq ft)	Number of Data Points
Interval 1 (0 - 6 inches)	0.33	427996.984	35
Interval 2 (6 - 12 inches)	0.21	225613.3357	14
Interval 3 (12 - 24 inches)	0.07	217916.1477	15
Mill Race first three intervals	0.23	871526.4674	76

Reach 8	SWAC	Area of Reach 8 by interval (sq ft)	Number of Data Points
Interval 1 (0 - 6 inches)	1.77	1989659.561	59
Interval 2 (6 - 12 inches)	1.79	1406174.873	24
Interval 3 (12 - 24 inches)	2.97	655215.5027	15
Reach 8 first three intervals	1.97	4051049.936	80

Mean / Confidence Limits Versus SWAC per Reach

Reach (0-6")	Chebychev 5% Lower Confidence Limit on Mean	Median	Geometric Mean	Arithmetic Mean	ProUCL 95% Upper Confidence Limit on Mean	ProUCL Suggested UCL type	Stream Tube SWAC Result (0-6")
reach 1	< DL	0.03	0.056	0.34	0.953	A	0.11
reach 2	0.033	0.0652	0.0853	0.165	0.297	A	0.23
reach 3	< DL	0.247	0.35	1.897	6.324	A	2.19
reach 4	< DL	0.0617	0.128	1.034	3.472	A	0.42
reach 5	< DL	0.0473	0.0843	0.308	0.743	A	0.24
reach 6	< DL	0.162	0.186	1.132	3.672	A	0.72
reach 7	< DL	0.374	0.361	1.052	2.327	B	0.72
Mill Race	< DL	0.277	0.327	0.823	1.522	B	0.33
reach 8	< DL	0.195	0.321	2.264	7.874	A	1.77

Notes:

< DL = Statistical LCL value is near zero for this dataset.

UCL type:

A = 95% Chebyshev (Mean, Sd) UCL;

B = 95% Approximate Gamma UCL

Reach = Section

PREPARED/DATE: NSR 5/15/13

CHECKED/DATE: EFC 5/15/13