White Sturgeon Status and Trends

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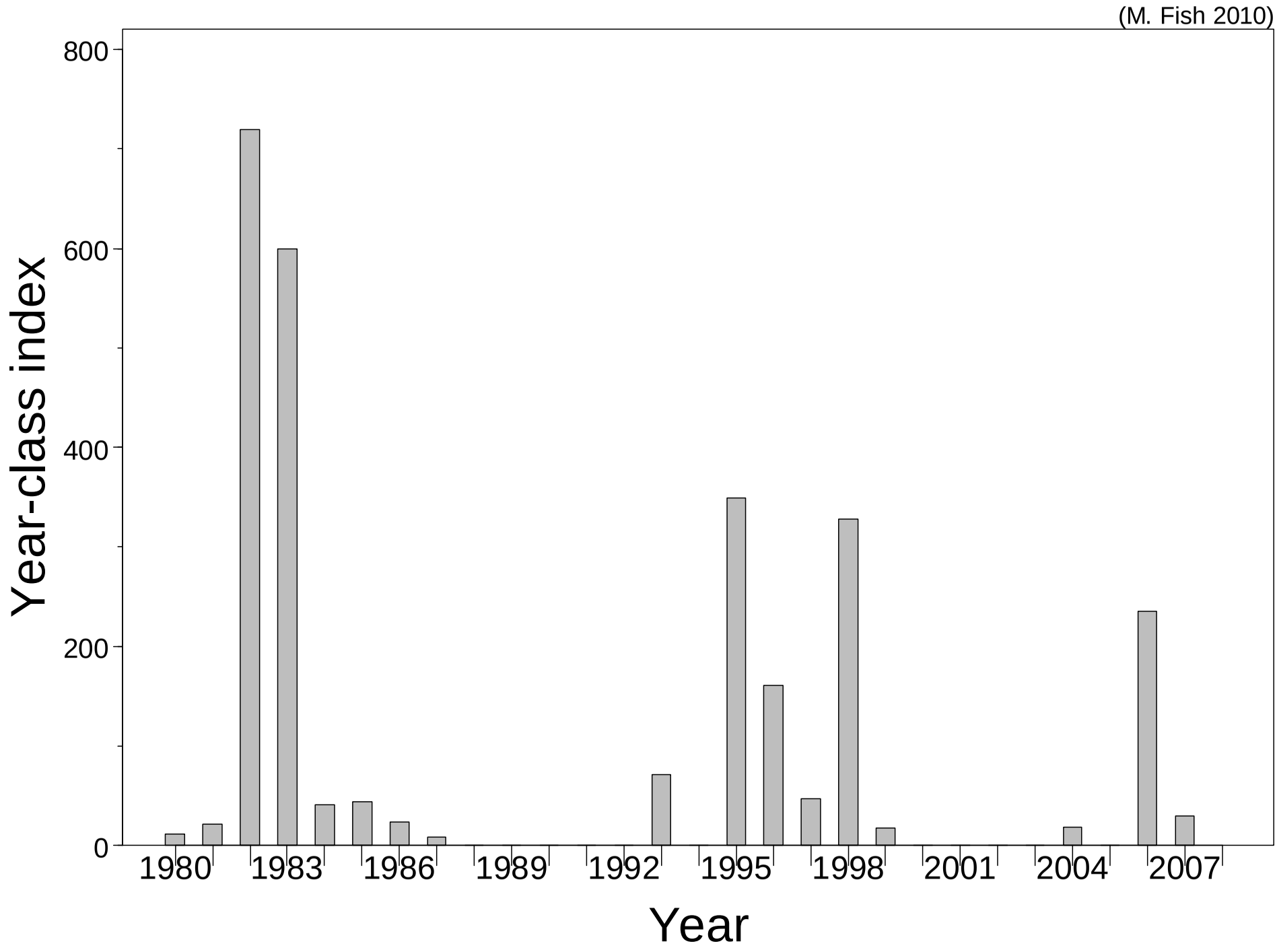
Overview

- Fish and Game Population Study
  - Components of fishery independent data and fishery dependent data
- Mark-recapture (tagging) study
- Estimates from mark-recapture data
- Fishery dependent data
- Improvements

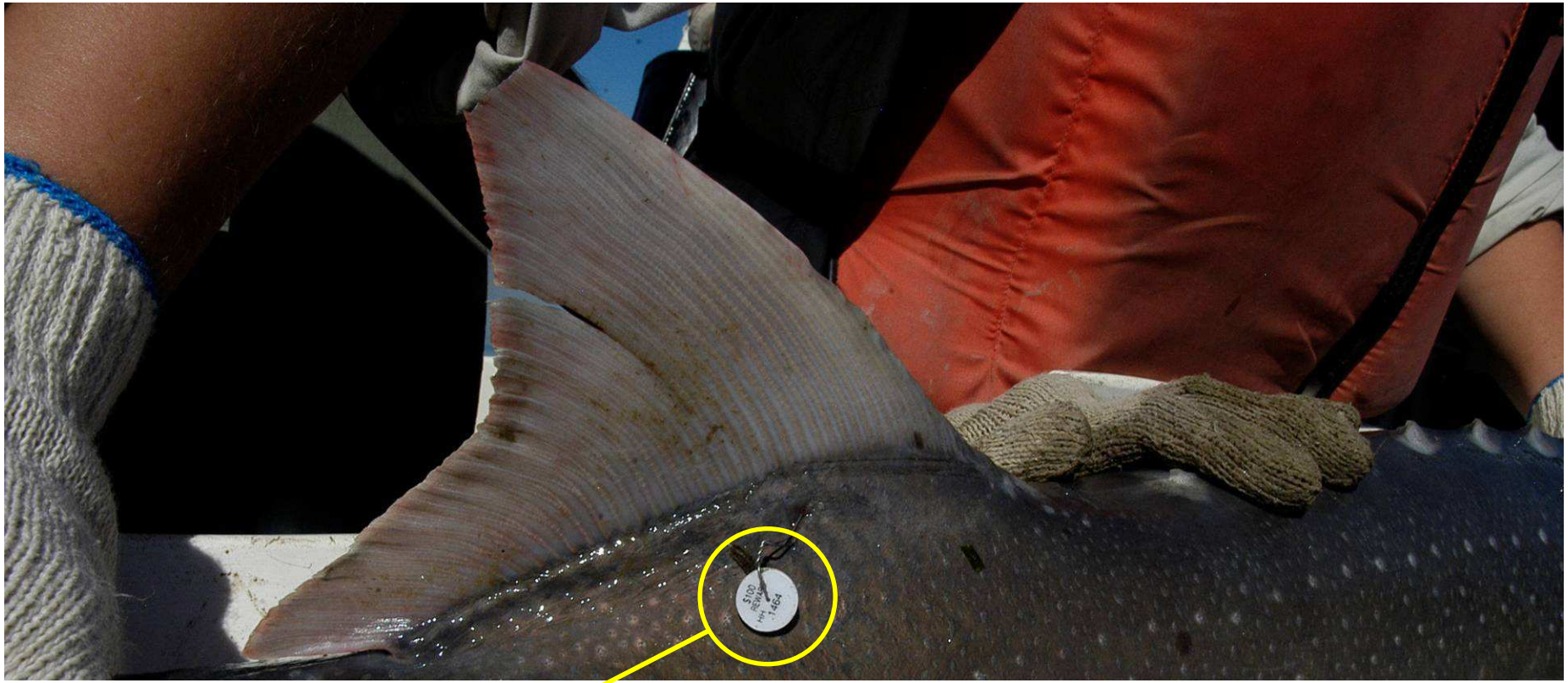

(M. Fish 2010)
Year-class index
800
600
400
200
0
1980
1983
1986
1989
1992
1995
1998
2001
2004
2007
Year

Sturgeon
Mark-Recapture Study

- Ongoing since 1954
- Provide estimates
  - Absolute abundance
  - Rates of harvest and survival
- Use trammel nets
- San Pablo and Suisun bays

Sturgeon
Mark-Recapture Study

- Tag: Petersen disc tag
- Record total length (cm) and condition
- Tag during Fall season
- Tag as many as possible
- Recaptures
  - Subsequent tagging seasons
  - From anglers



- Applied on right-side, below dorsal fin
- Applied to fish 100 to ~200 cm TL
- Reward tags of $20, $50, or $100

ATTENTION ANGLERS

Tagged striped bass and sturgeon have been released in this area.

Return tags for recognition and possible dollar reward!

When returning a tag, here's the information DFG needs:

Angler name _____
Angler full mailing address _____
Angler phone number _____

Date fish was caught _____
Time Day/Night fish was caught _____
Place fish was caught _____
Where fish caught from (private boat, shore, party boat) _____

Fish length _____
Tag number _____
Did you keep or release the fish? _____

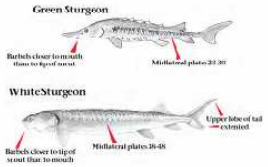
Return all tags to:
Department of Fish and Game
Tagging Program
4001 N. Wilson Way
Stockton, CA 95205
(209) 948-7800

Catch and release with care

Be prepared to catch and release before you catch that fish!

- Keep the fish in the water.
- Wet your hands or wear wet cotton gloves to handle the fish.
- Remove the hook quickly.
- Don't play the fish to exhaustion.
- Hold the fish upright and facing the current until it is able to swim away.
- Hold the fish horizontally for pictures - not by its gills.

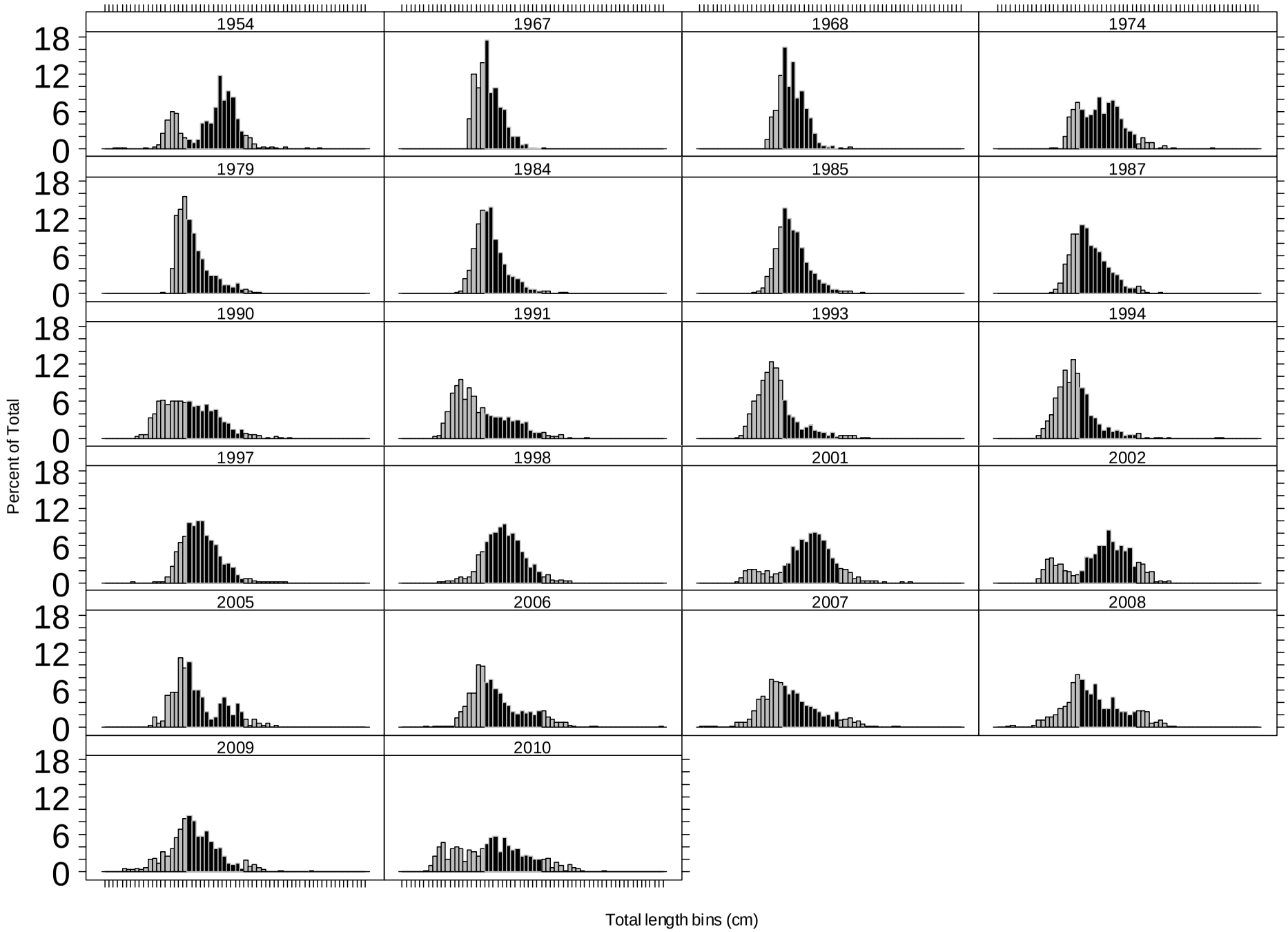
Is it green or white?

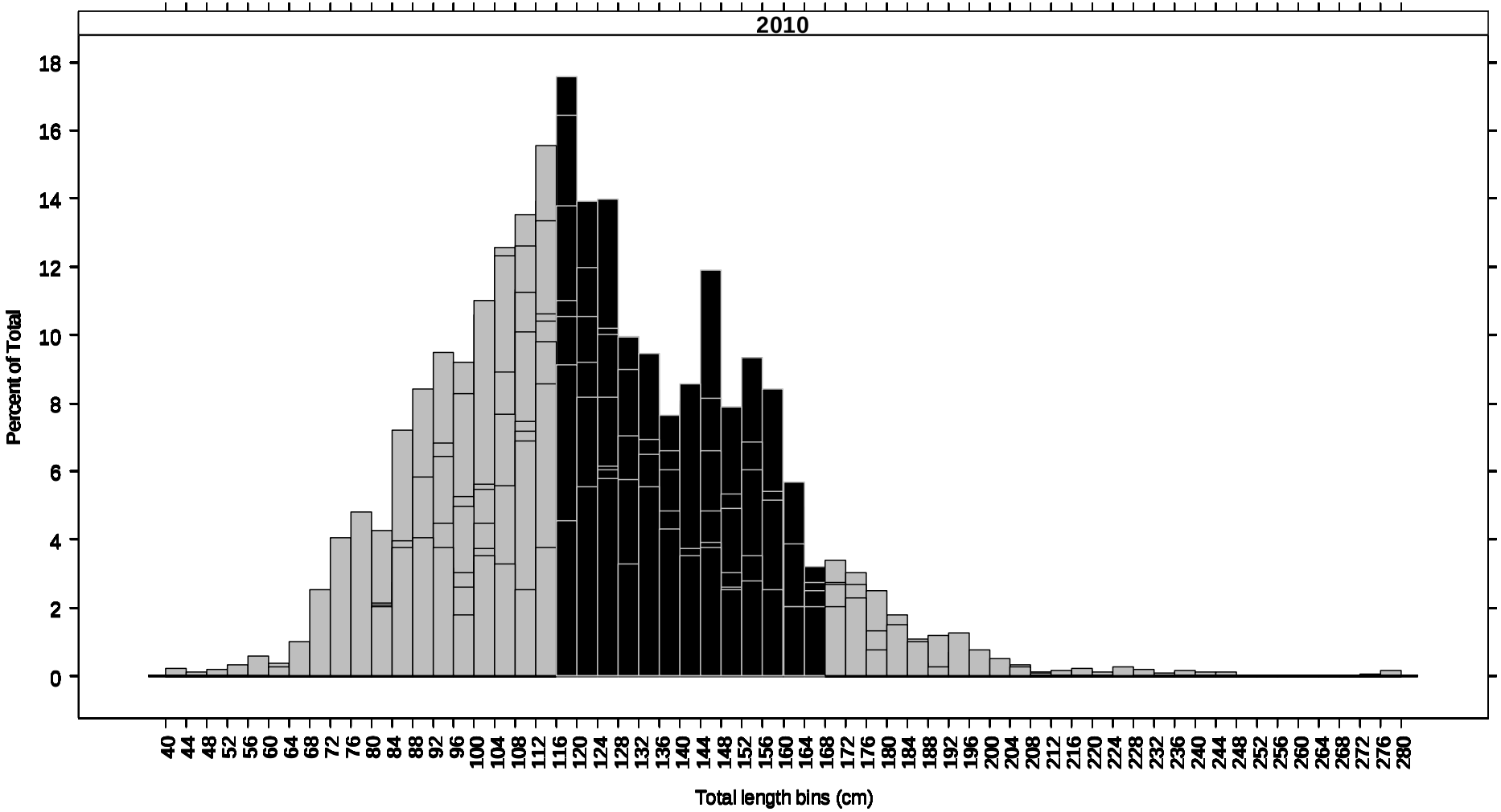


White sturgeon are gray with a uniform pale belly. They are caught much more often than green sturgeon.

Green sturgeon are olive green with a dark stripe on belly. Their scutes are more prominent than white sturgeon scutes.

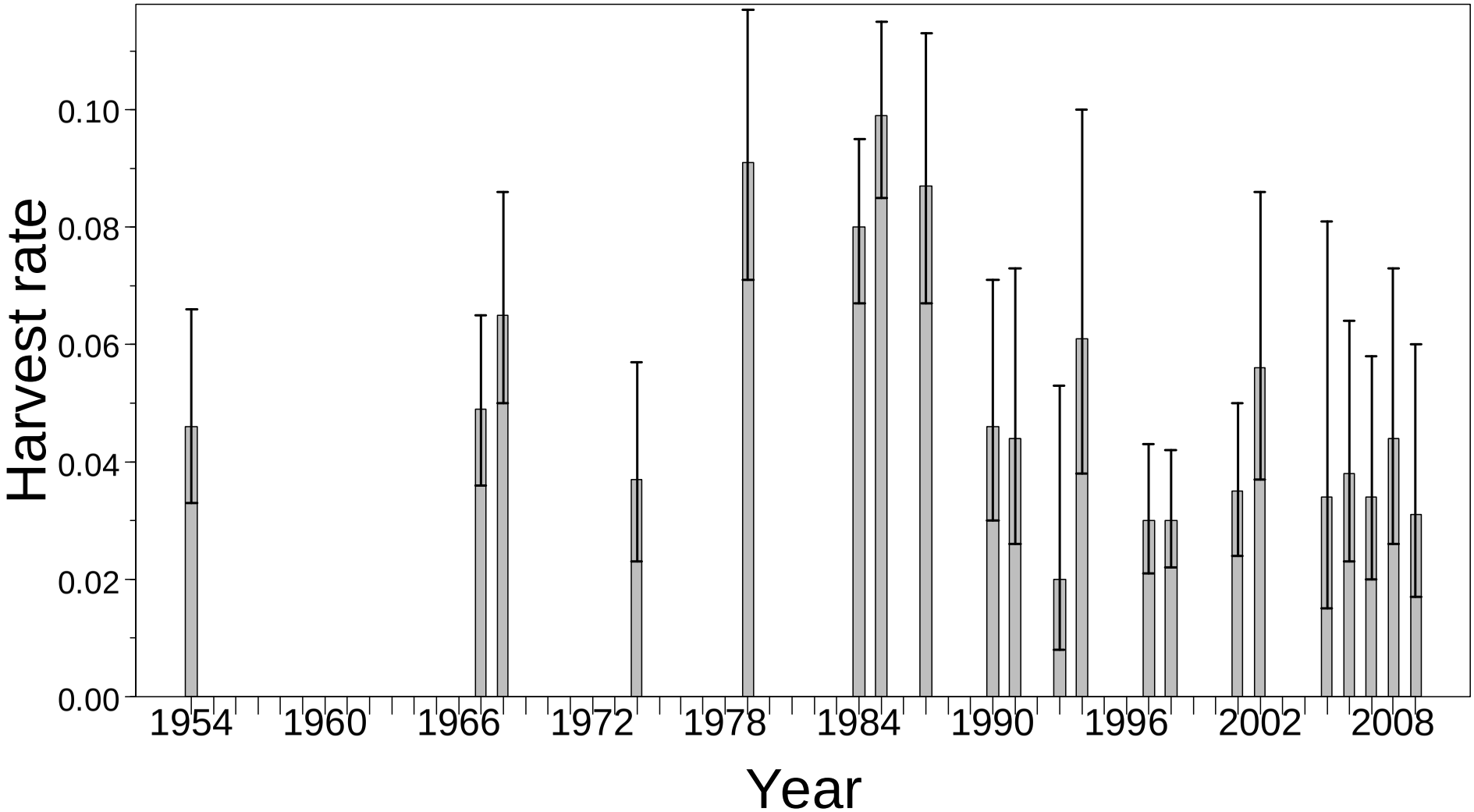
Left: Green sturgeon Right: White sturgeon


1954
1967
1968
1974
1979
1984
1985
1987
1990
1991
1993
1994
1997
1998
2001
2002
2005
2006
2007
2008
2009
2010
0
6
12
18
Percent of Total
Total length bins (cm)

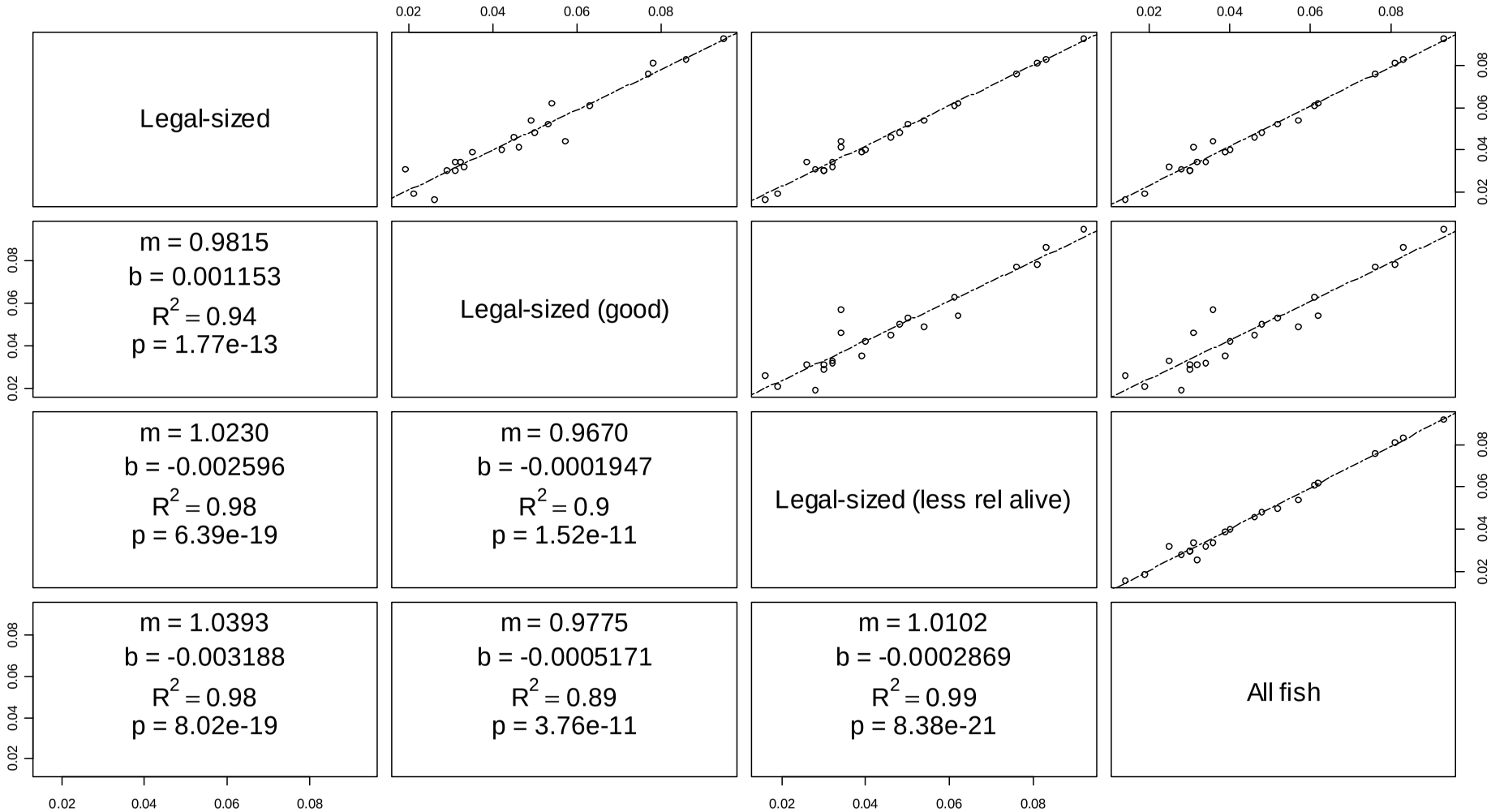

2010
Percent of Total
0
2
4
6
8
10
12
14
16
18
40 44 48 52 56 60 64 68 72 76 80 84 88 92 96 100 104 108 112 116 120 124 128 132 136 140 144 148 152 156 160 164 168 172 176 180 184 188 192 196 200 204 208 212 216 220 224 228 232 236 240 244 248 252 256 260 264 268 272 276 280
Total length bins (cm)

$$\hat{\mu} = \frac{R_{FY}}{M}$$

Harvest rate estimates of fish 46 to 66 inches total length



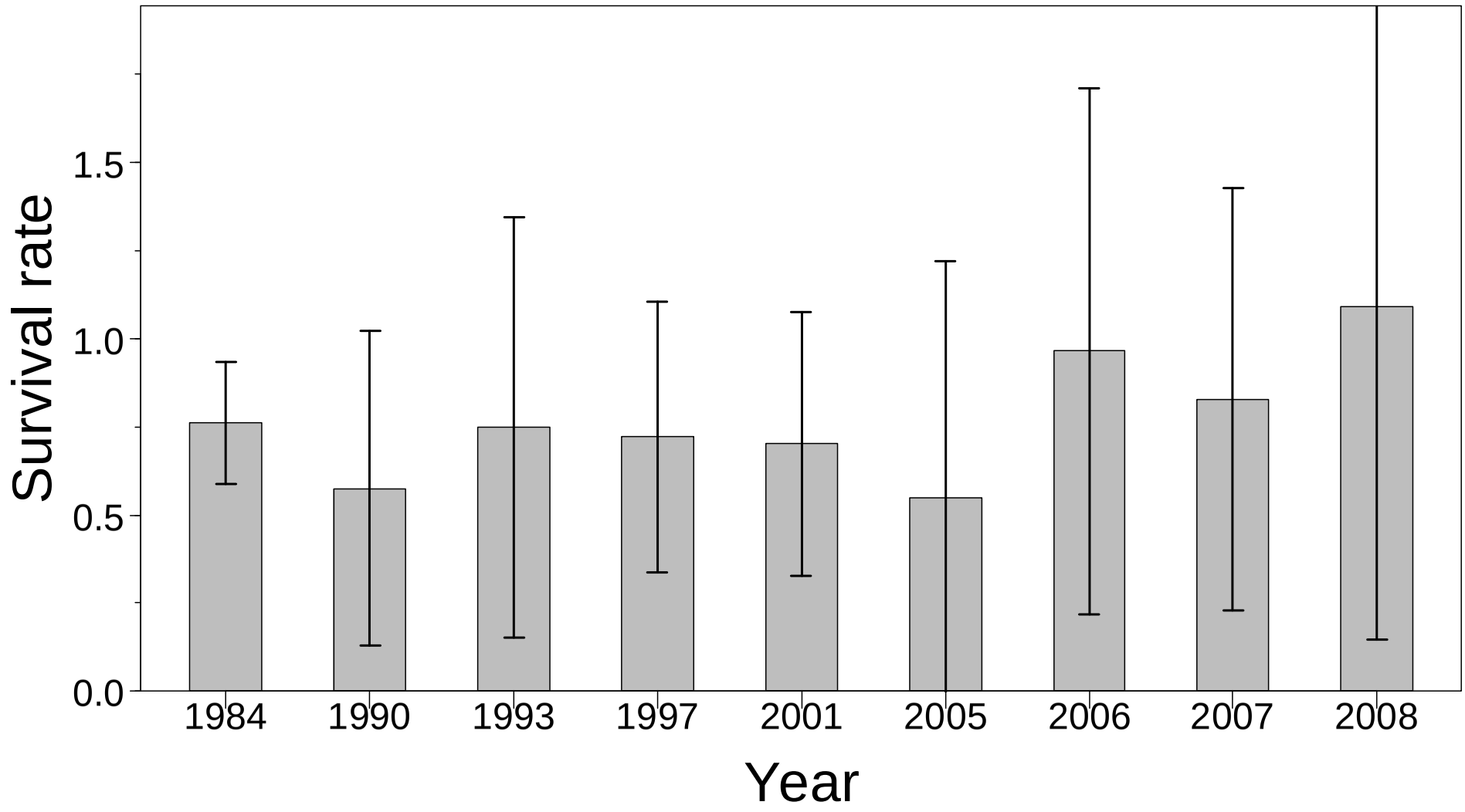
Harvest rate estimates: comparing various methods



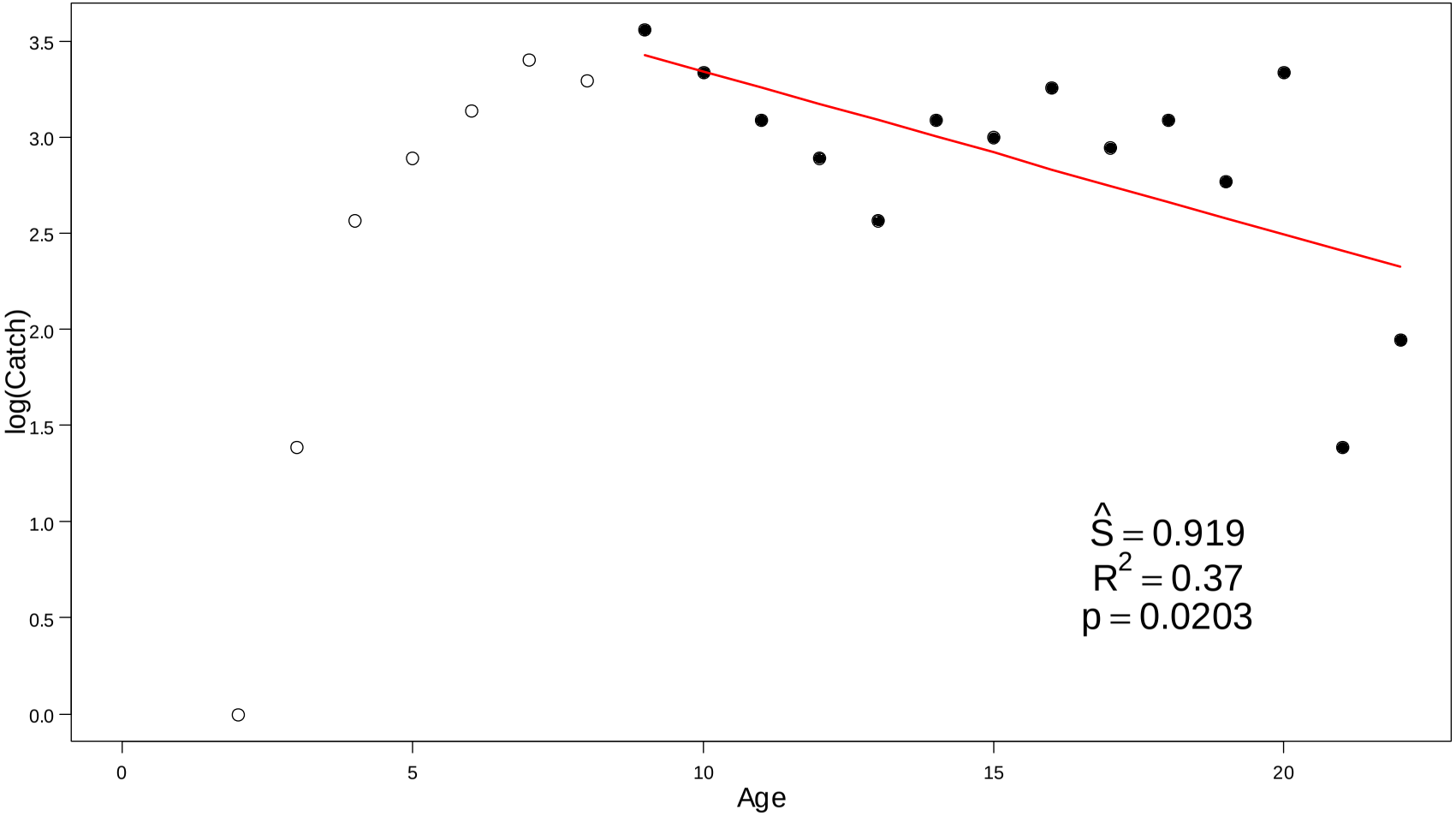
$$\hat{S} = \frac{(R_{12}) \times (M_2)}{(M_1) \times (R_{22})}$$

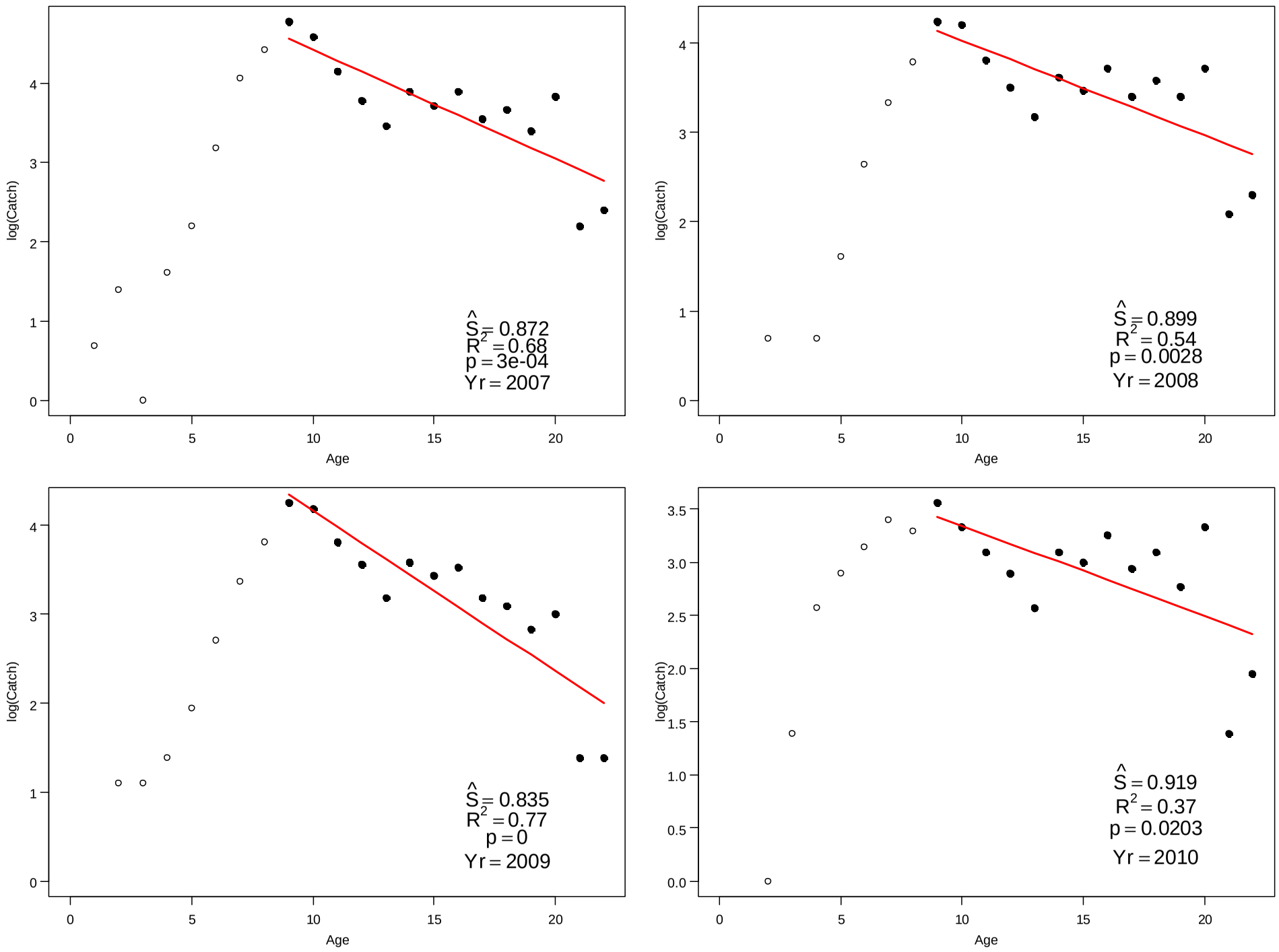
Ricker's (1975)
Equation 5.1

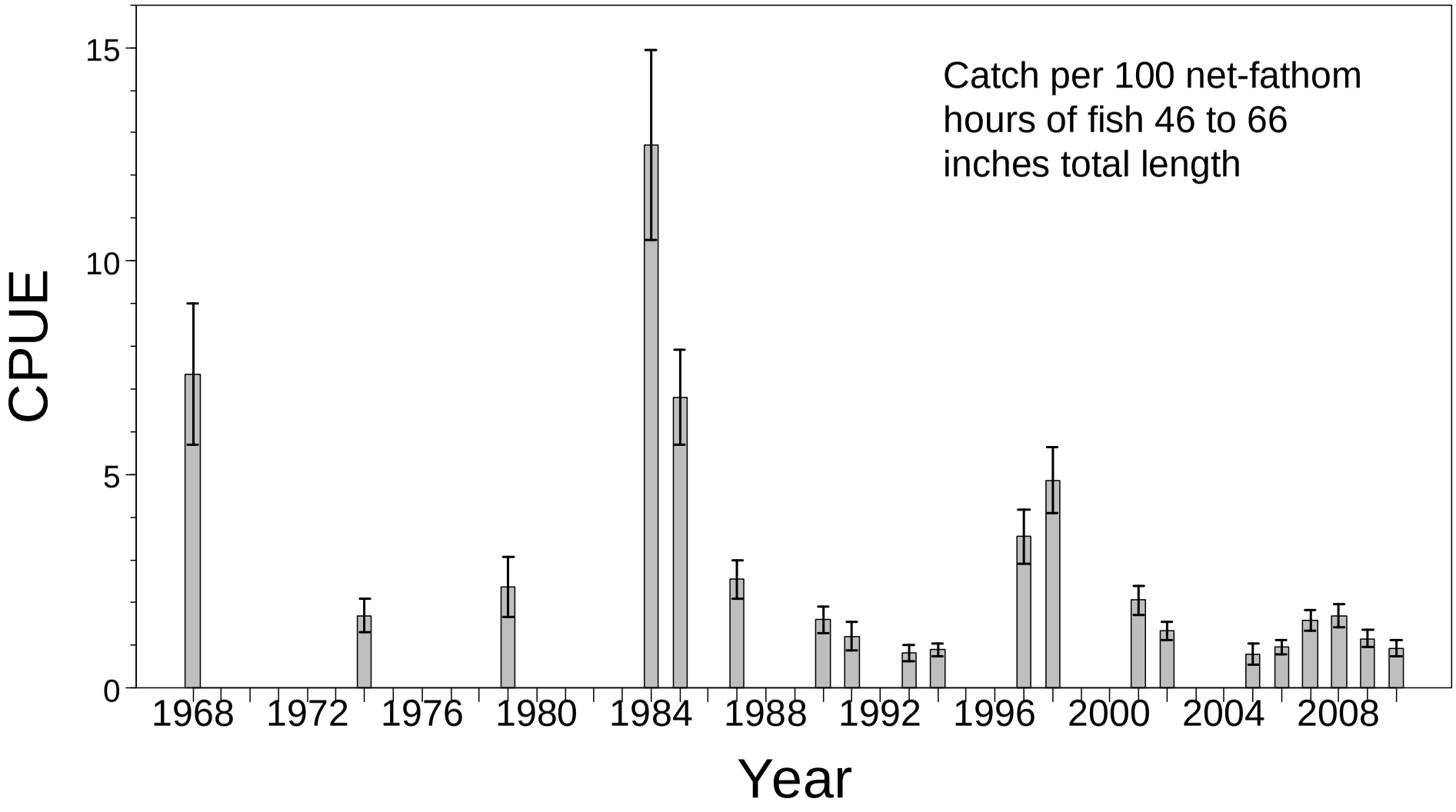
Survival rate estimates of fish
46 to 66 inches total length



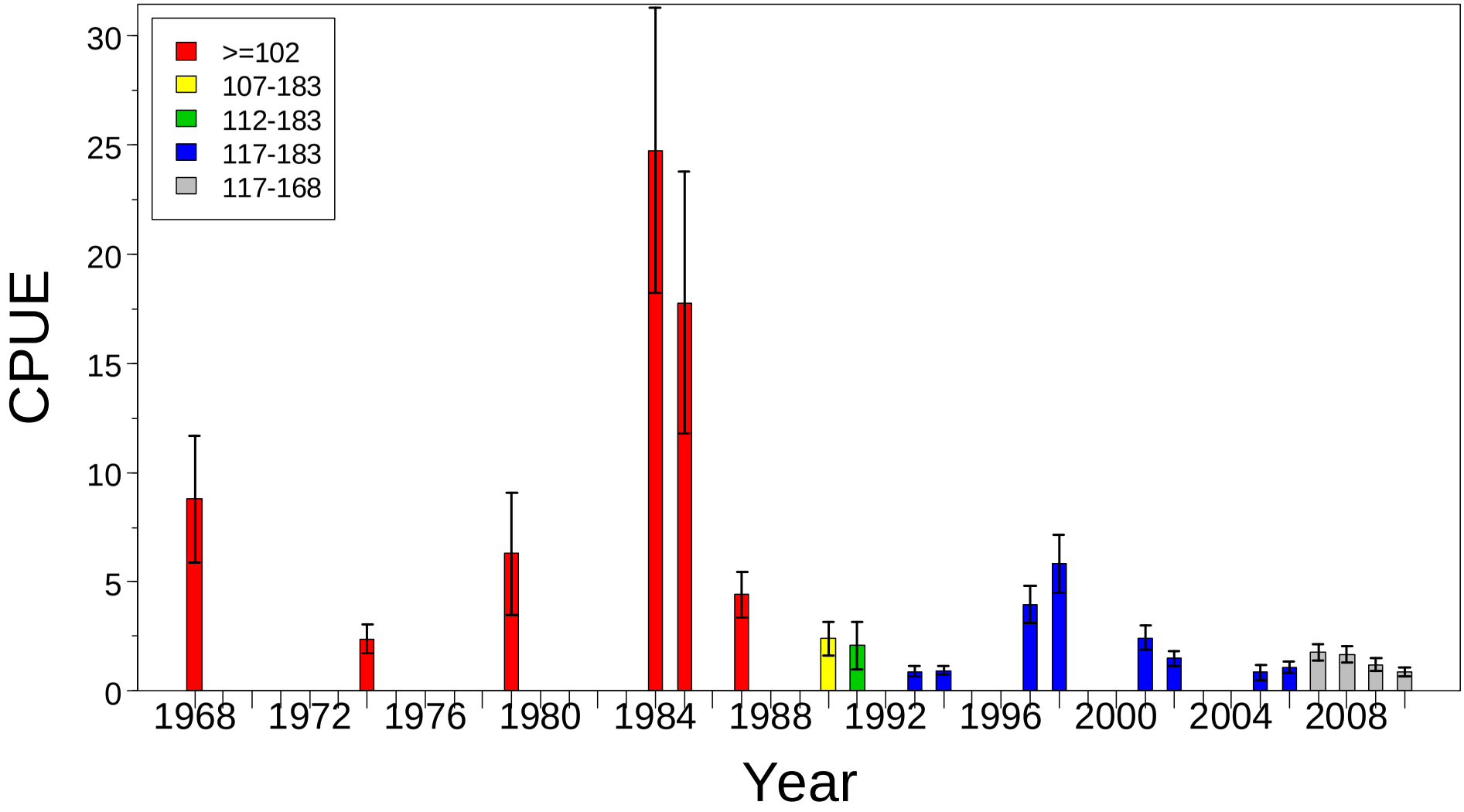
2010 White Sturgeon Fish and Game Tagging Data



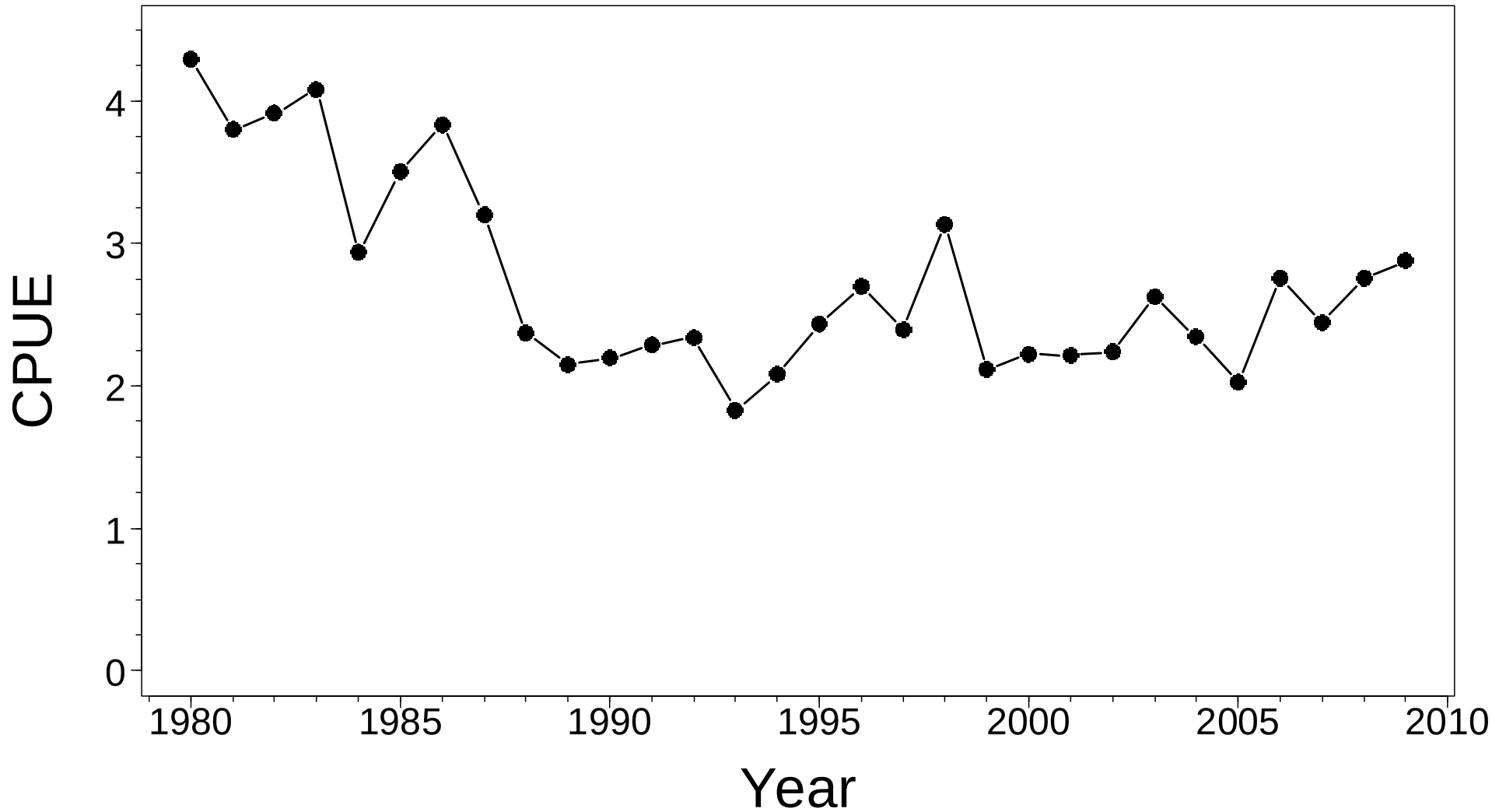

log(Catch)
Age
$\hat{S} = 0.872$
$R^2 = 0.68$
p = 3e-04
Yr = 2007
$\hat{S} = 0.899$
$R^2 = 0.54$
p = 0.0028
Yr = 2008
$\hat{S} = 0.835$
$R^2 = 0.77$
p = 0
Yr = 2009
$\hat{S} = 0.919$
$R^2 = 0.37$
p = 0.0203
Yr = 2010

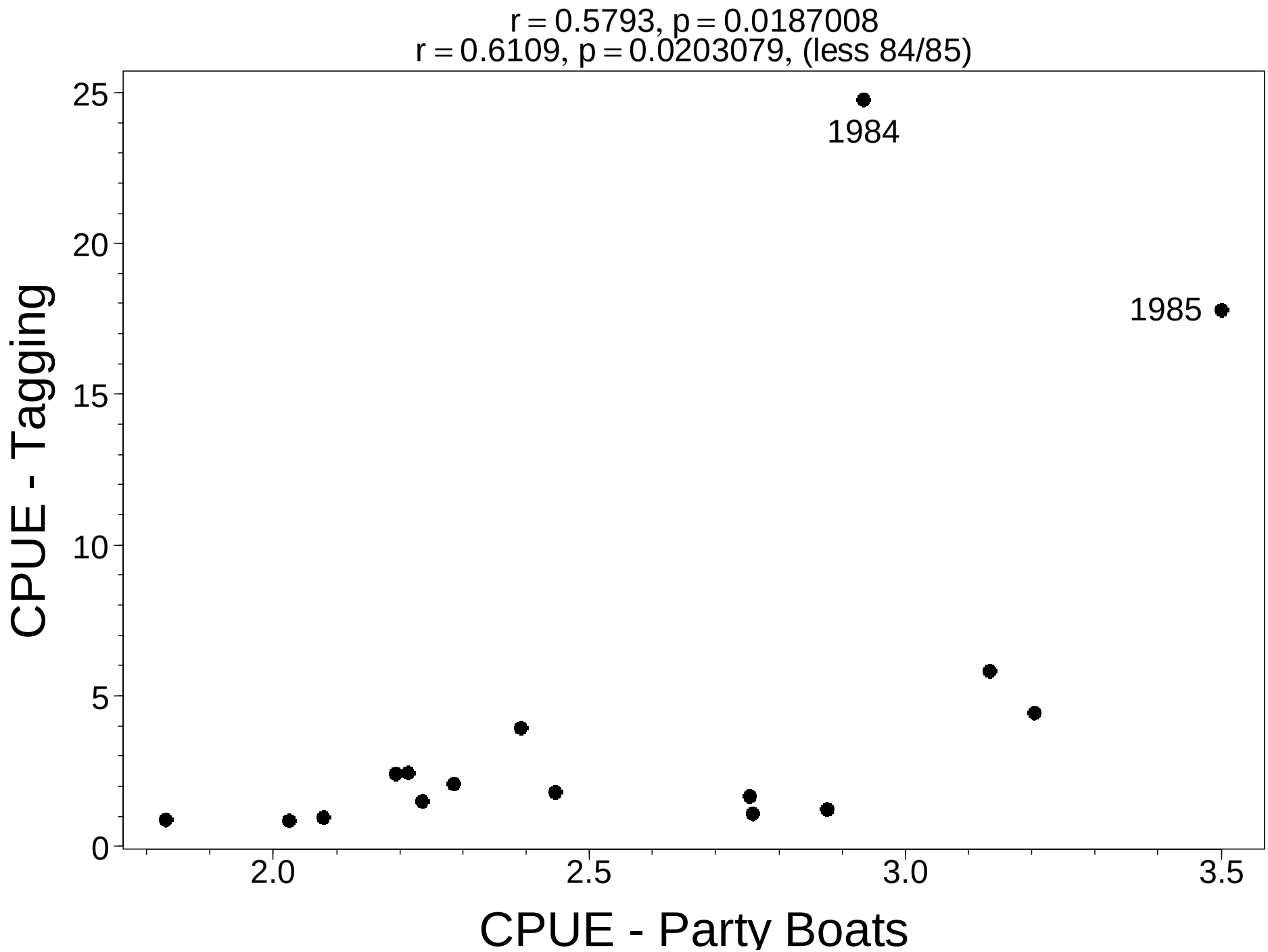

Catch per 100 net-fathom hours of fish 46 to 66 inches total length
CPUE
0
5
10
15
1968
1972
1976
1980
1984
1988
1992
1996
2000
2004
2008
Year

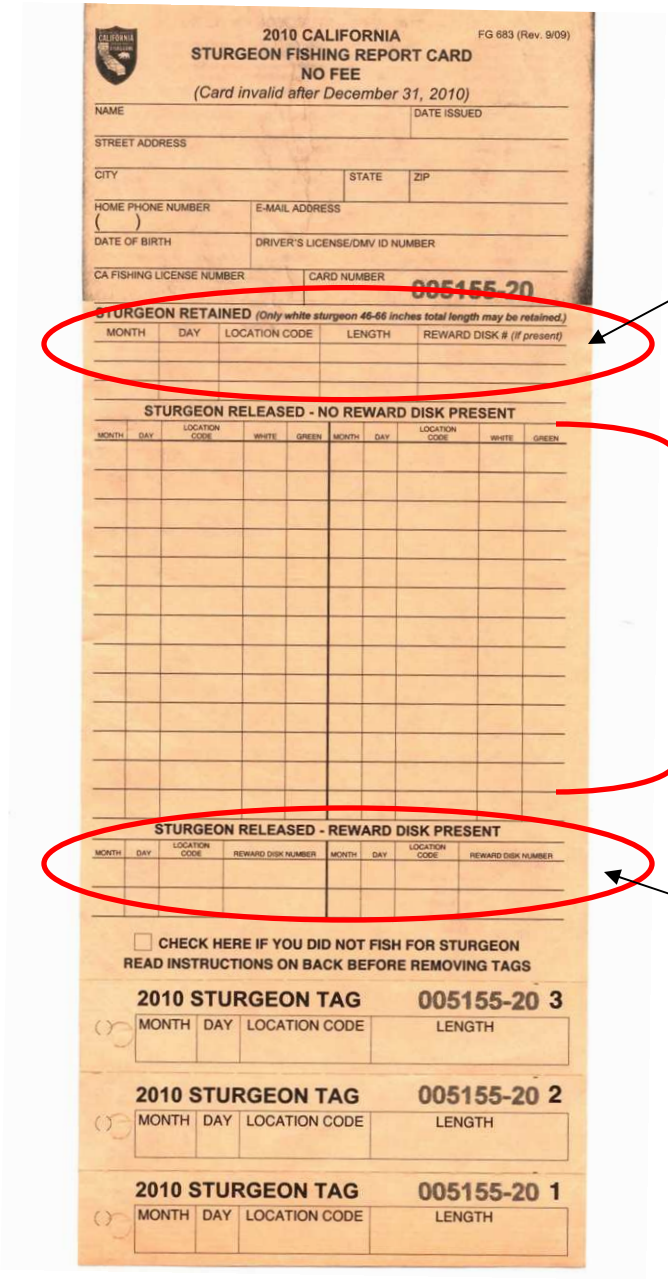
$$\text{CPUE} = \text{average}\left[\left(\frac{\sum_{\text{boat day}} \text{Legal WST}}{\sum_{\text{boat day}} \text{Net Fathom Hours}}\right)\times 100\right]$$



$$\text{Annual CPUE} = \left[\left(\frac{\sum_{\text{kept}>0} \text{Sturgeon}}{\sum_{\text{kept}>0} \text{Angler hours}} \right) \times 100 \right]$$




r = 0.5793, p = 0.0187008
r = 0.6109, p = 0.0203079, (less 84/85)
1984
1985
CPUE - Tagging
CPUE - Party Boats
0
5
10
15
20
25
2.0
2.5
3.0
3.5



2010 CALIFORNIA
STURGEON FISHING REPORT CARD
NO FEE
(Card invalid after December 31, 2010)

FG 683 (Rev. 9/09)

NAME | DATE ISSUED
STREET ADDRESS
CITY | STATE | ZIP
HOME PHONE NUMBER ( ) | E-MAIL ADDRESS
DATE OF BIRTH | DRIVER'S LICENSE/DMV ID NUMBER
CA FISHING LICENSE NUMBER | CARD NUMBER 005155-20

STURGEON RETAINED (Only white sturgeon 46-66 inches total length may be retained.)

MONTH	DAY	LOCATION CODE	LENGTH	REWARD DISK # (if present)

STURGEON RELEASED - NO REWARD DISK PRESENT

MONTH	DAY	LOCATION CODE	WHITE	GREEN	MONTH	DAY	LOCATION CODE	WHITE	GREEN

STURGEON RELEASED - REWARD DISK PRESENT

MONTH	DAY	LOCATION CODE	REWARD DISK NUMBER	MONTH	DAY	LOCATION CODE	REWARD DISK NUMBER

☐ CHECK HERE IF YOU DID NOT FISH FOR STURGEON
READ INSTRUCTIONS ON BACK BEFORE REMOVING TAGS

2010 STURGEON TAG 005155-20 3

MONTH	DAY	LOCATION CODE	LENGTH

2010 STURGEON TAG 005155-20 2

MONTH	DAY	LOCATION CODE	LENGTH

2010 STURGEON TAG 005155-20 1

MONTH	DAY	LOCATION CODE	LENGTH

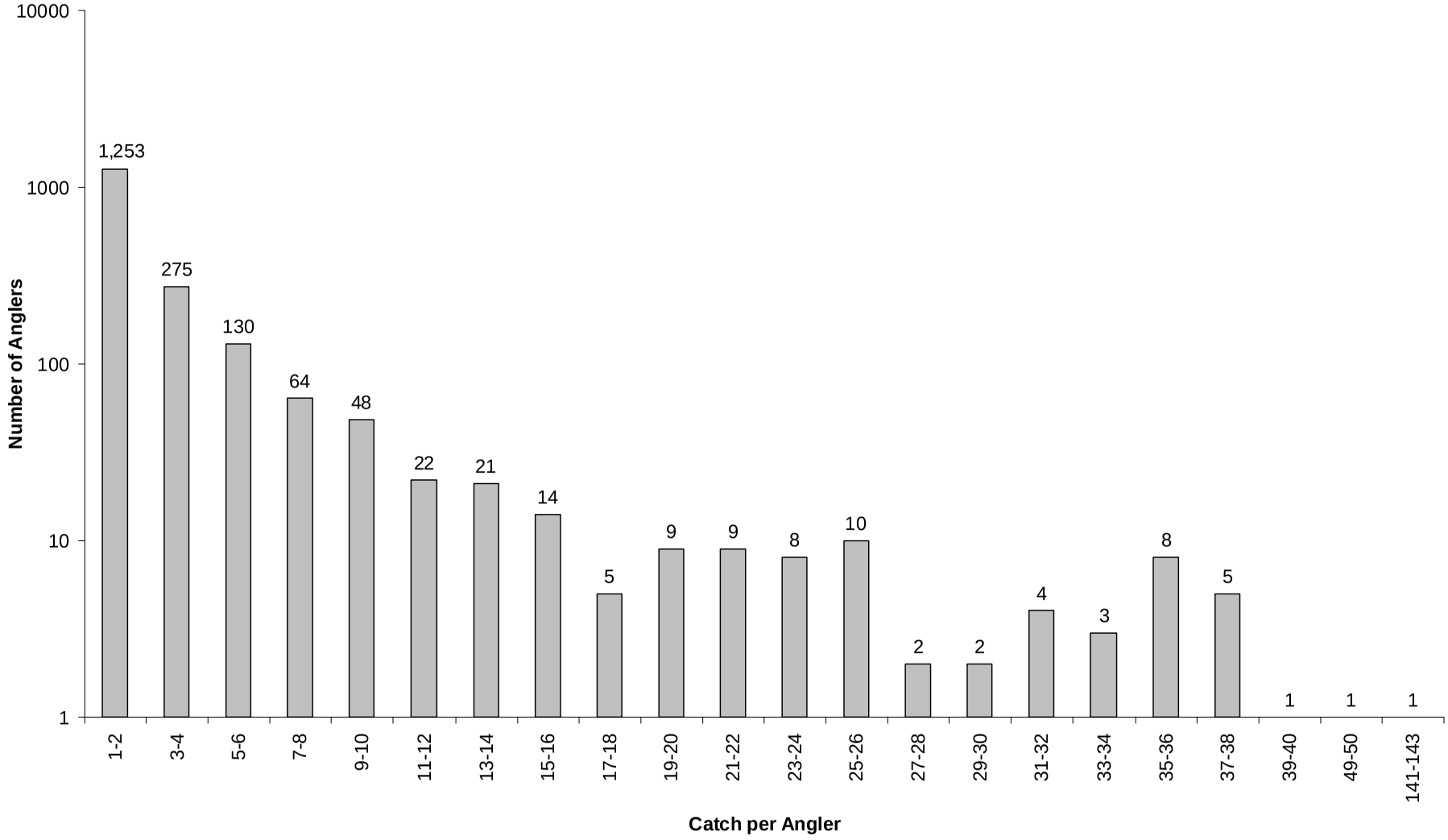
Kept white sturgeon with or without disc tag

Released sturgeon without disc tag

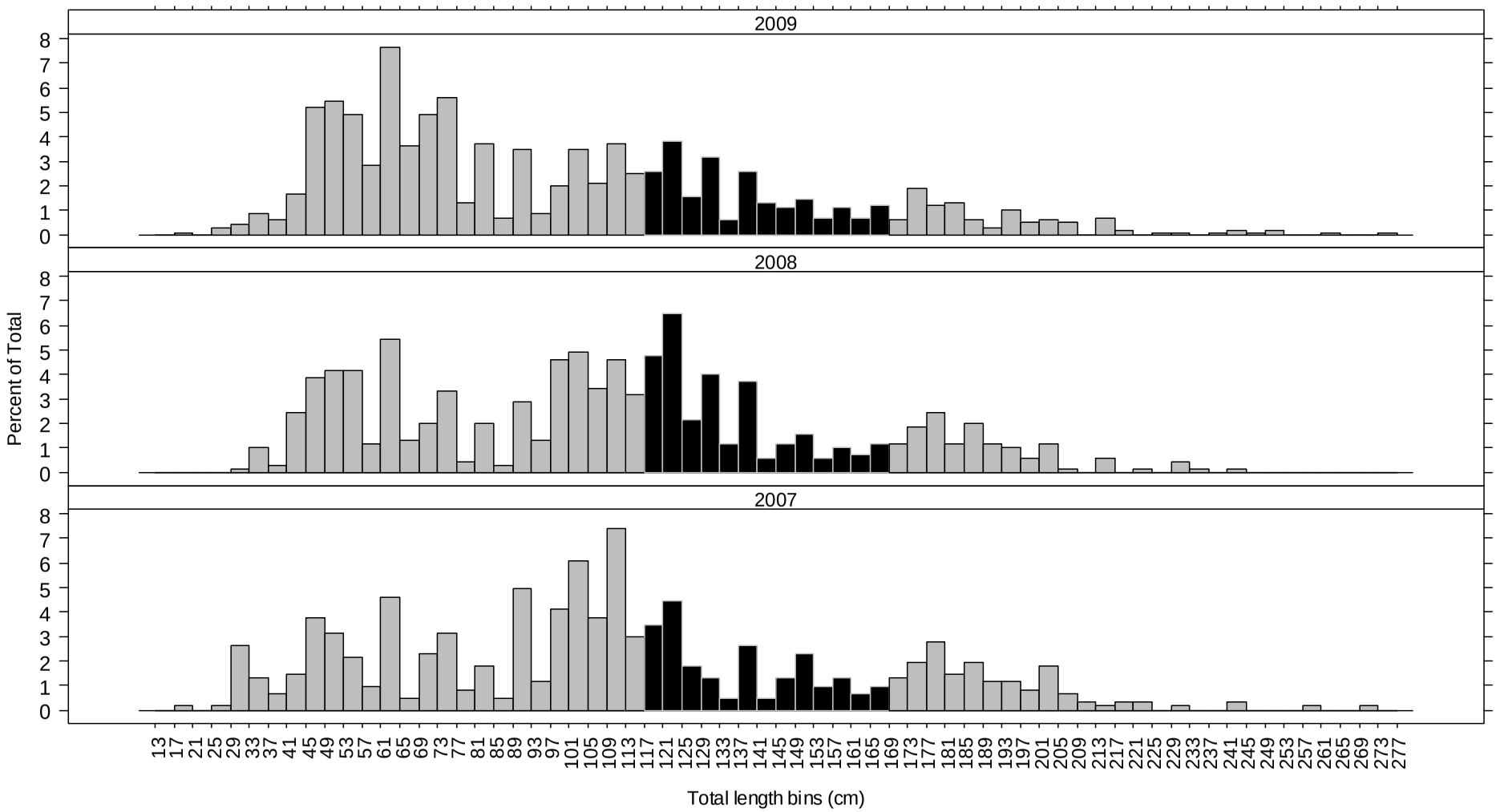
Released sturgeon with disc tag

Year	Issued	Returned	Percent
2007	41,000	6,573	16%
2008	57,000	4,843	8%
2009	57,000	5,478	10%

Year	Kept	Released
2007	1,426	4,654
2008	1,783	5,093
2009	1,849	5,755


10000
1000
100
10
1
Number of Anglers
1,253
275
130
64
48
22
21
14
5
9
9
8
10
2
2
4
3
8
5
1
1
1
1-2
3-4
5-6
7-8
9-10
11-12
13-14
15-16
17-18
19-20
21-22
23-24
25-26
27-28
29-30
31-32
33-34
35-36
37-38
39-40
49-50
141-143
Catch per Angler

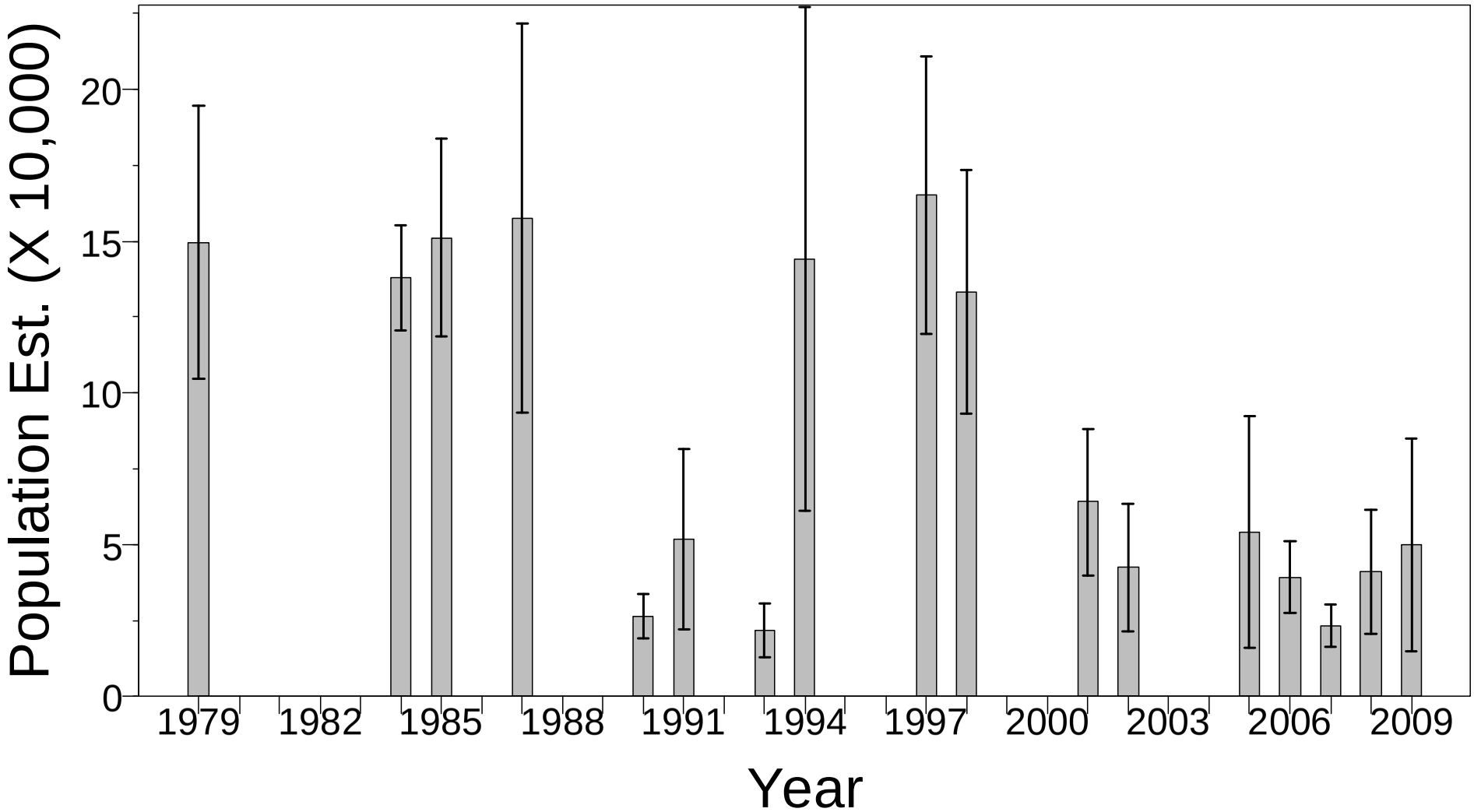
Length frequency distribution from Report Card data

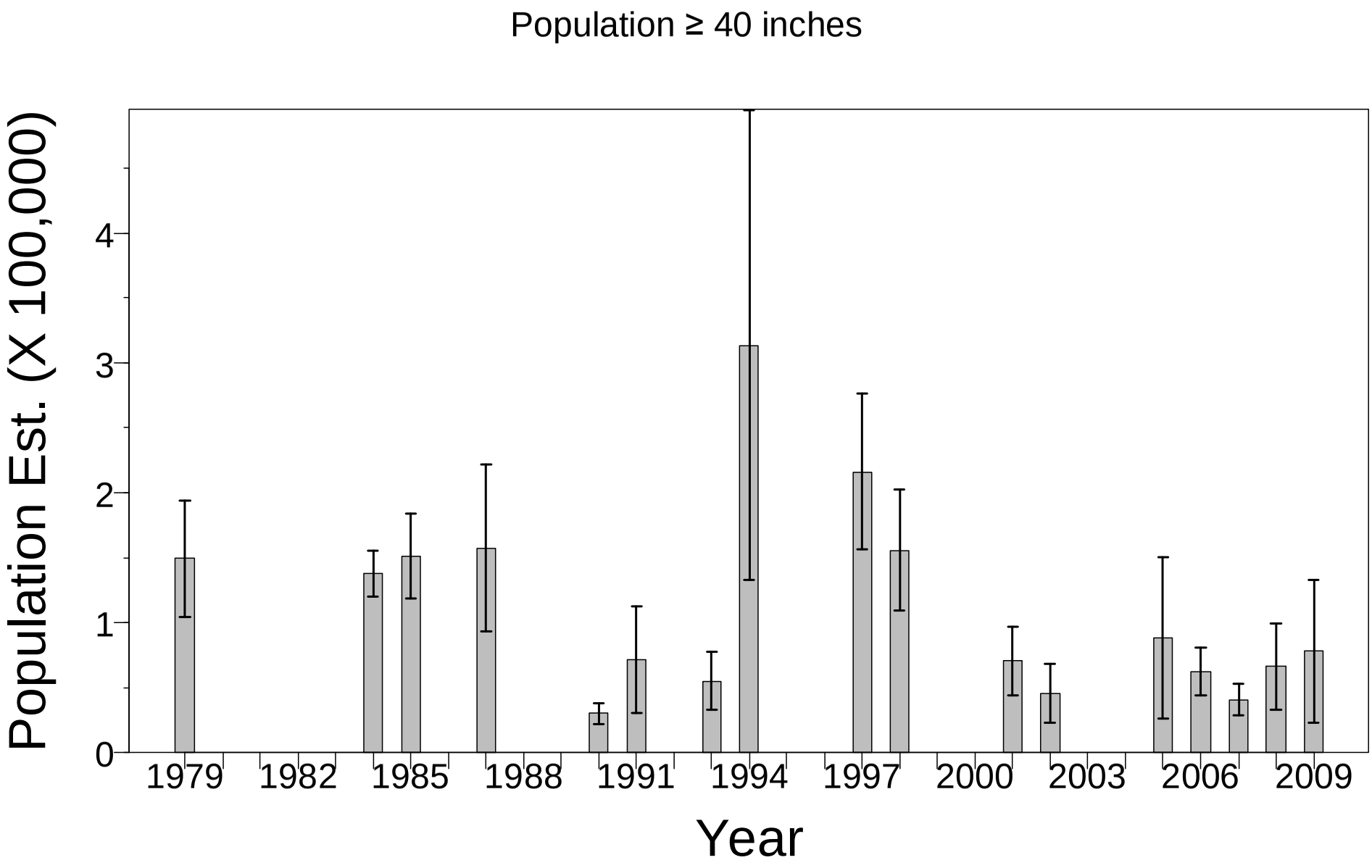


$$N = \frac{(M(C+1))}{(R+1)}$$

Ricker's (1975)
Equation 3.9

Legal-sized at tagging



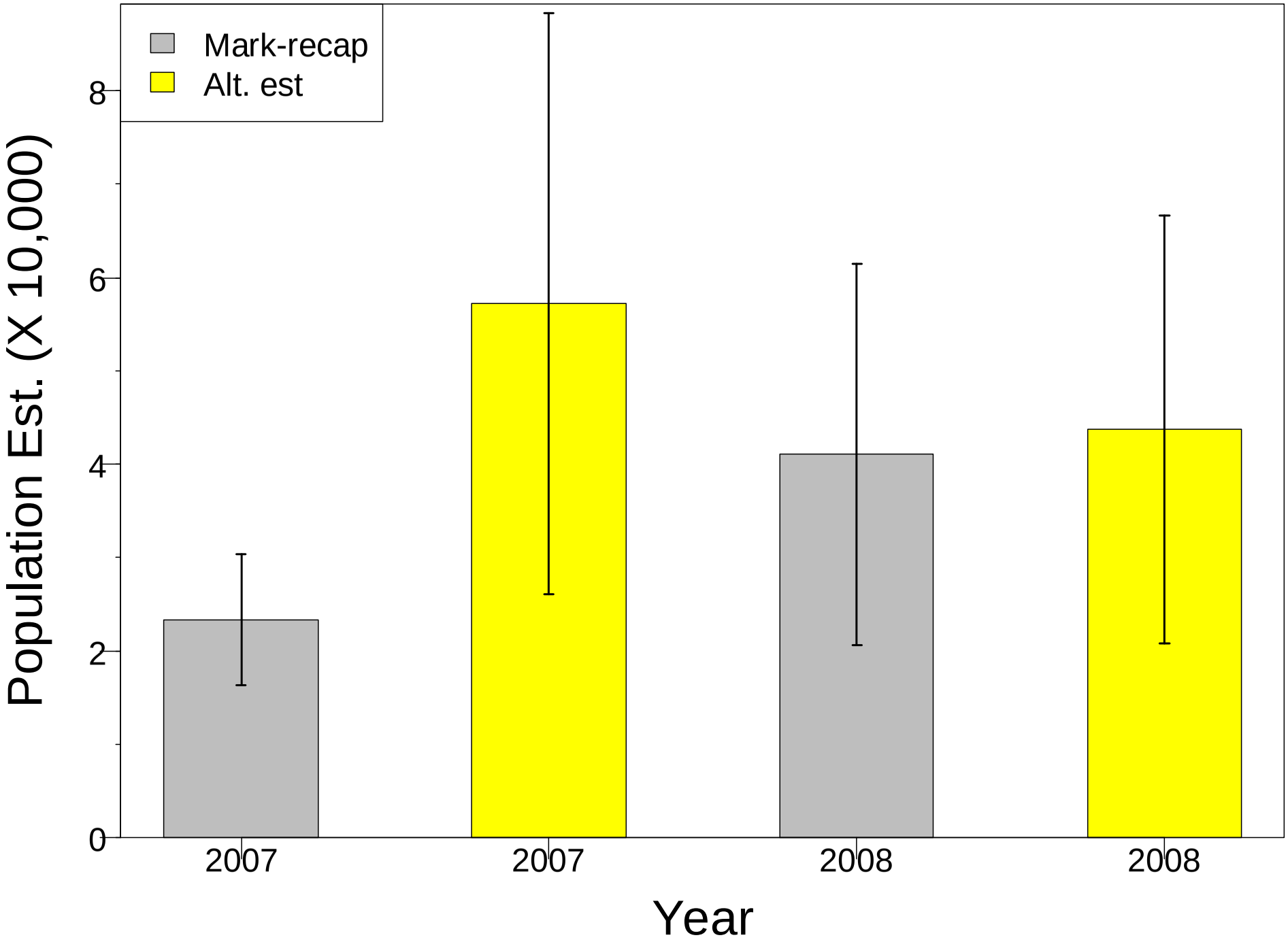

Population ≥ 40 inches
Population Est. (X 100,000)
0
1
2
3
4
1979
1982
1985
1988
1991
1994
1997
2000
2003
2006
2009
Year

$$\text{Abund Est}_x = \frac{\sum_{\sim t} \text{Fish kept}_{RC}}{\text{Harvest Rate Est}_t}$$

where x = year
t = period of time
RC = Report Card

$$\text{SE(Abund Est)} = \frac{\text{Harvest}}{\sqrt{\text{Harvest Rate}^3 \times \text{Number of tags released}}}$$

$$\text{Abundance} \pm 2\text{SE(Abund Est)}$$


Mark-recap
Alt. est
Population Est. (X 10,000)
0
2
4
6
8
2007
2007
2008
2008
Year

Conclusion

- Challenging to manage
- Examine all available fishery dependent and independent data
- Improvements
- Cohorts of late 1990’s and 2006
- Estimates for legal-sized and fish ≥ 40 inches

Acknowledgments

- Interagency Ecological Program
- Sport Fish Restoration Act
- Bay Delta Sport Fishing Enhancement Stamp Fund
- Michael D. Harris, Tim Matt, Dan Fidler, Katie Smith, Gary Webb, Brian Delano, Ken Flowers, David Hull, Ramiro Soto, Mike Silva (retired), and many others