Population dynamics of razorback sucker in Lake Mohave

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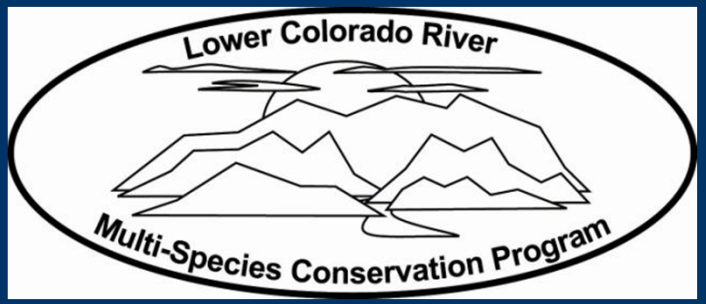
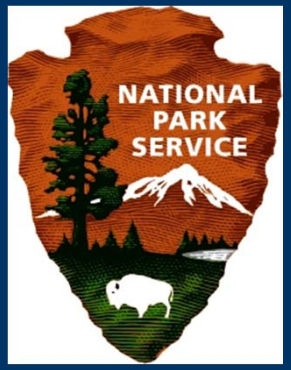
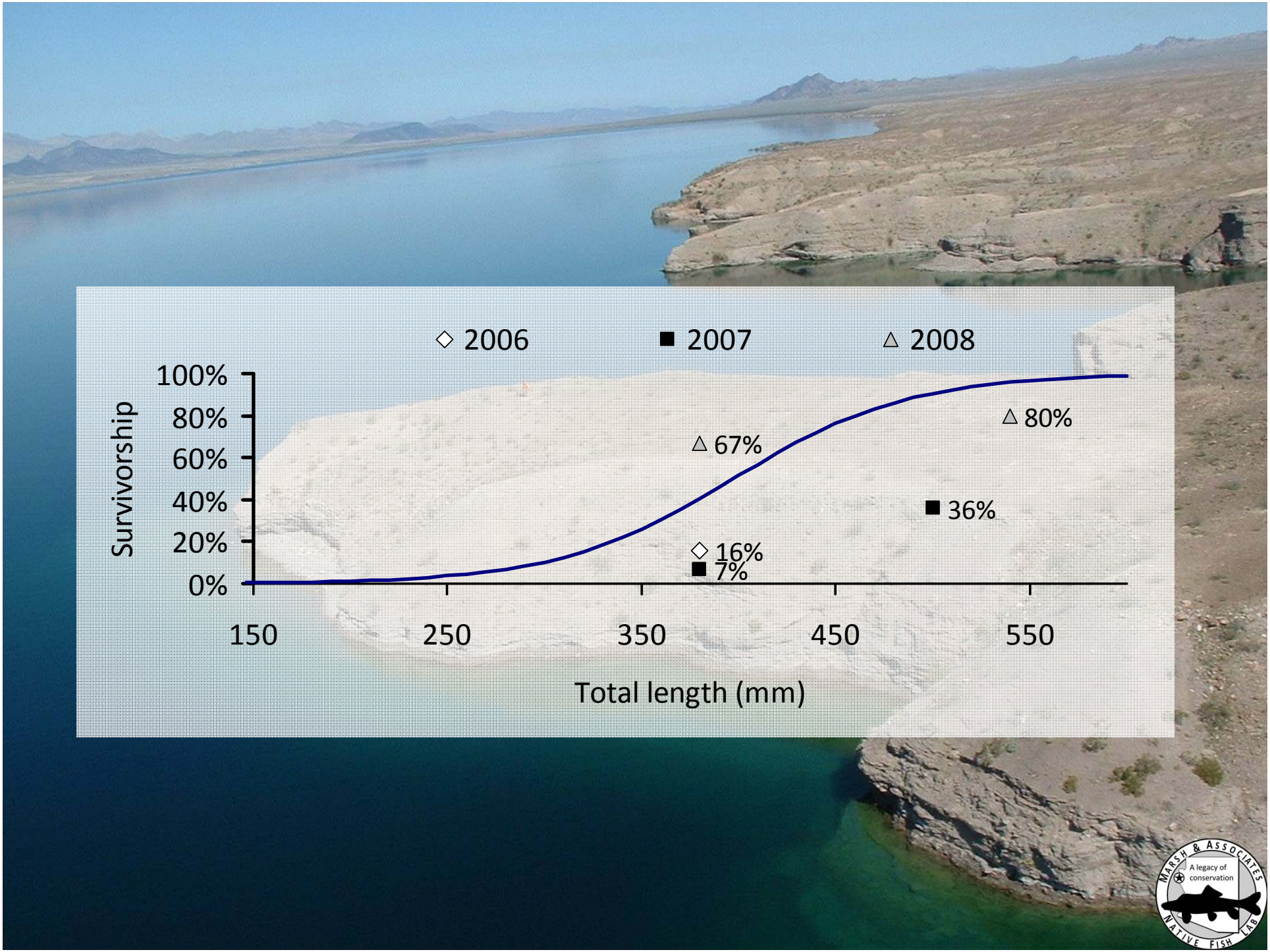
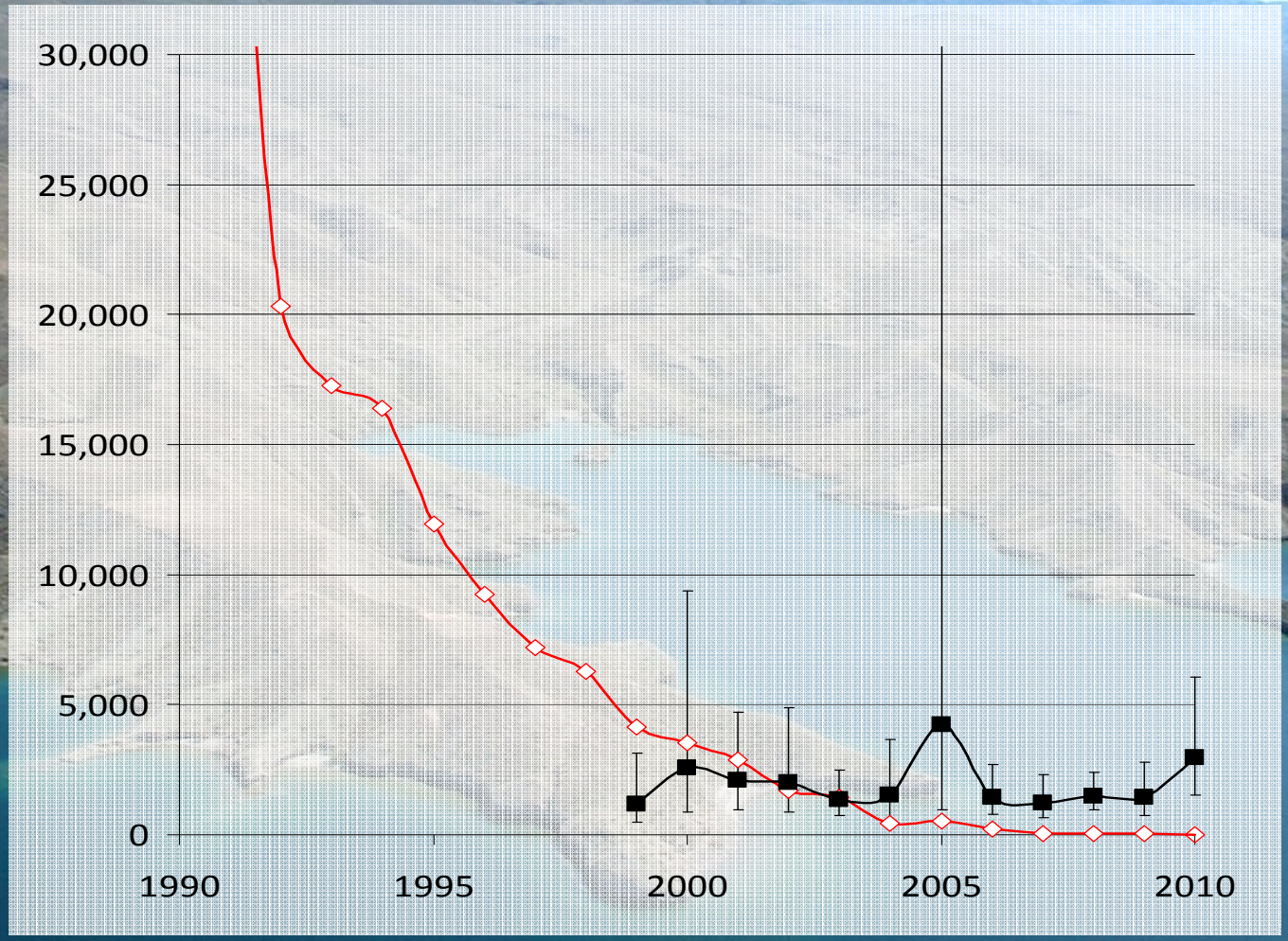
Acknowledgements



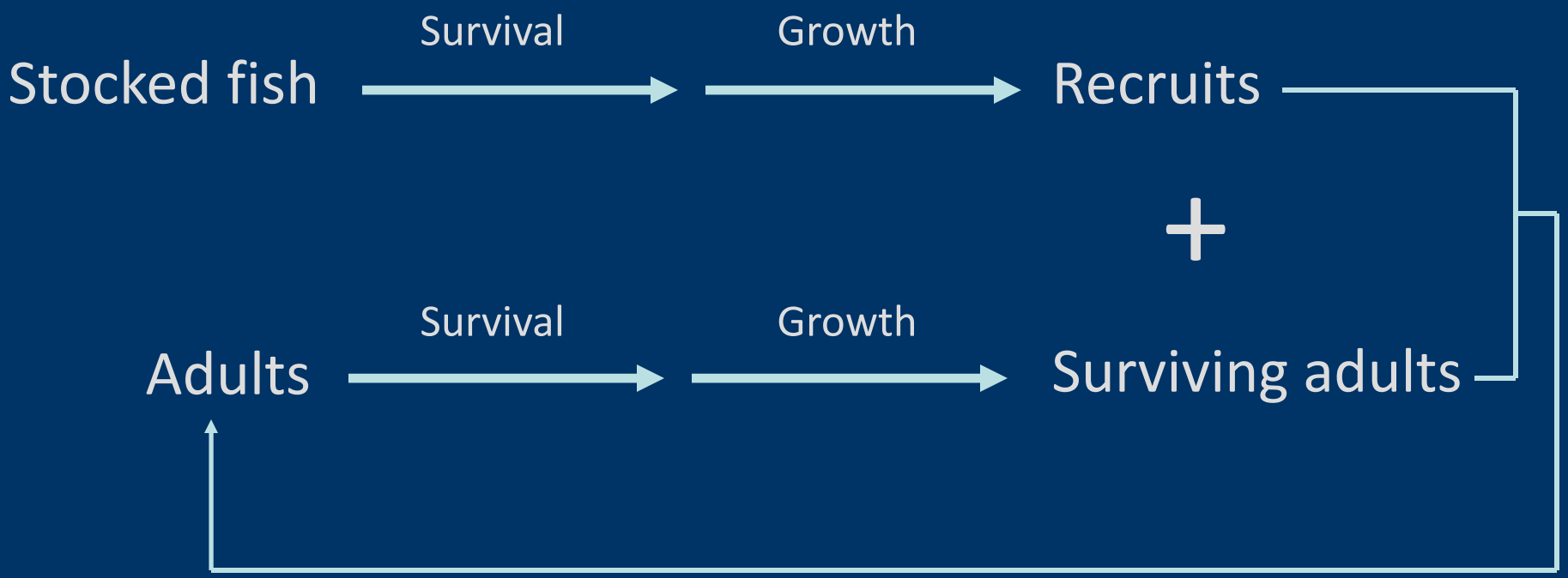



◇ 2006
■ 2007
△ 2008
Survivorship
100%
80%
60%
40%
20%
0%
△ 67%
△ 80%
■ 36%
◇ 16%
■ 7%
150
250
350
450
550
Total length (mm)

NFWG progress



Population dynamics



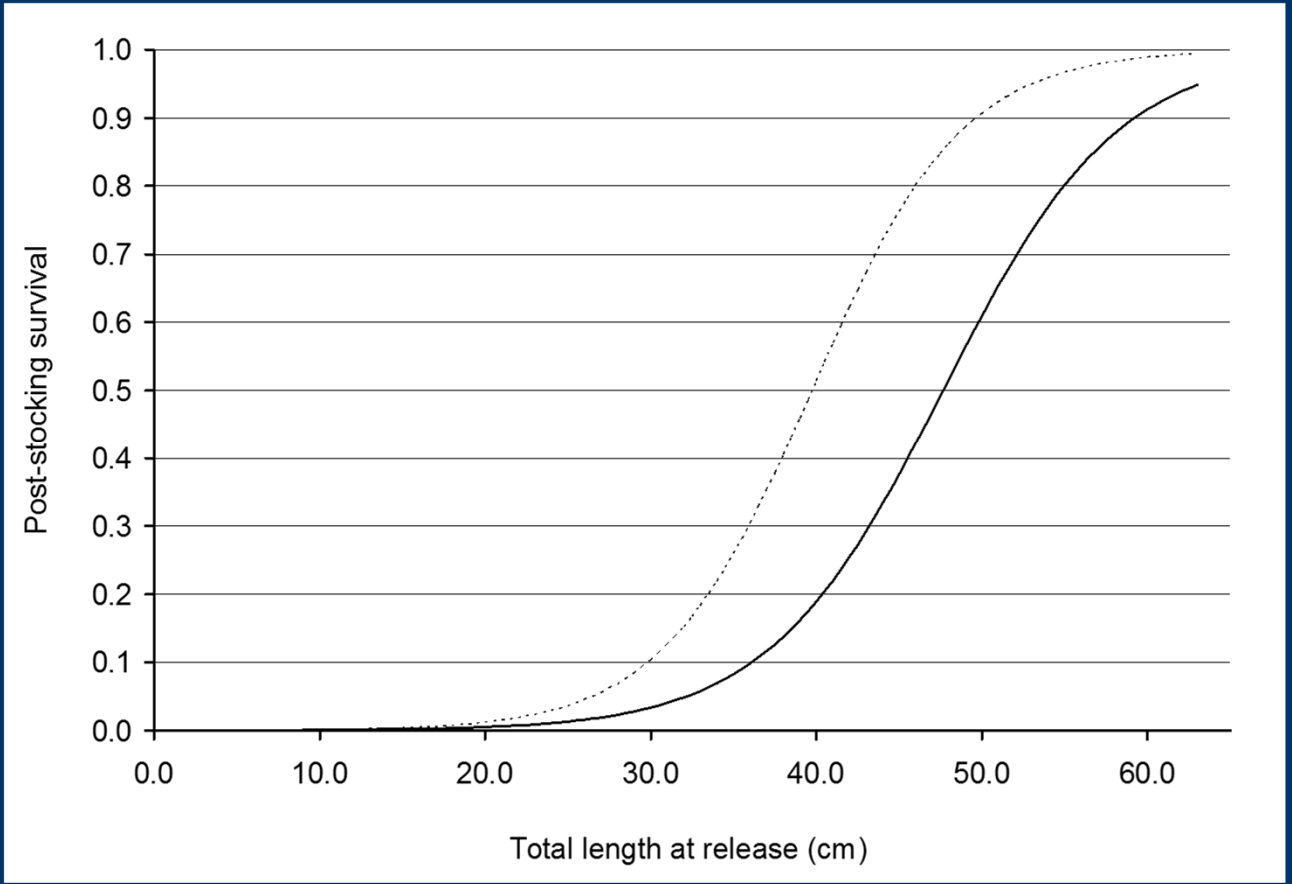
Model structure

Five size class model

- One – 30.0 cm or less
- Two – 30.1 to 35.0 cm
- Three – 35.1 to 40.0 cm
- Four – 40.1 to 45.0 cm
- Five – 45.1 cm or more

Model structure

Post-stocking survival based on size-survival relationship



Model structure

Growth from one size class to another based on NFWG database

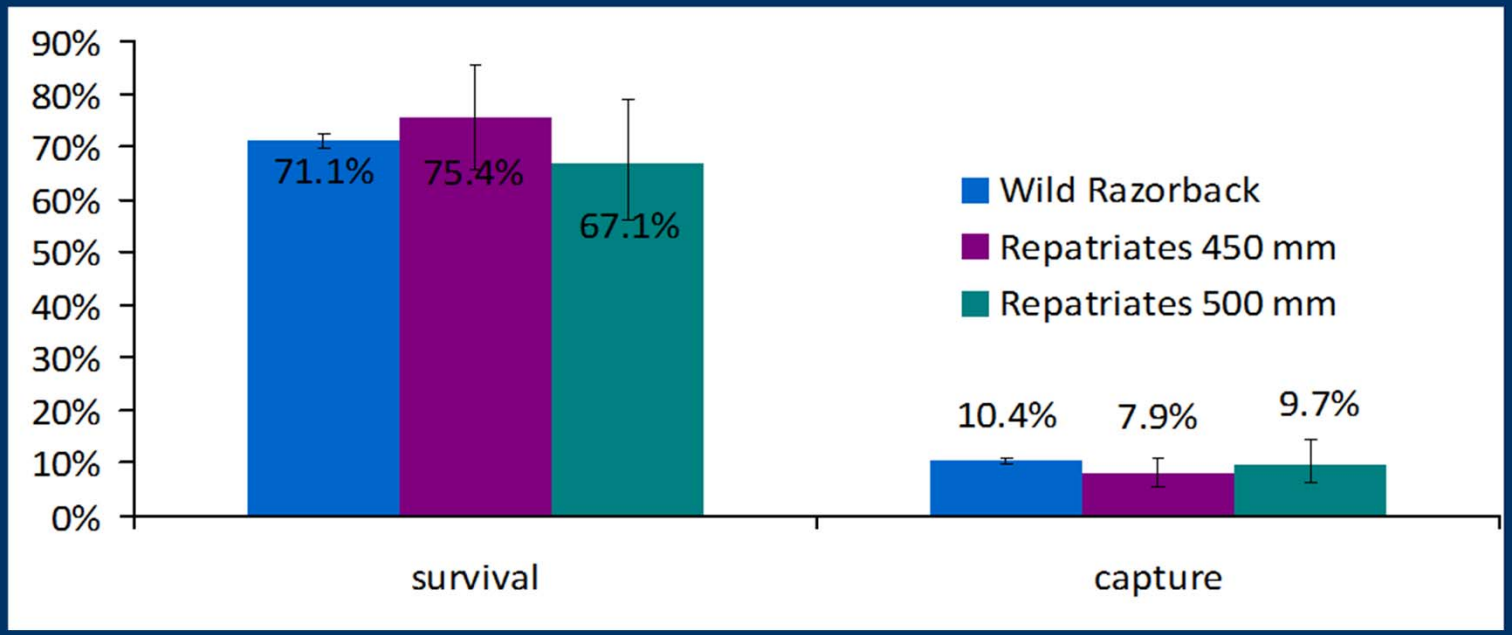
Size Class	One	Two	Three	Four	Five
One	3	1	0	0	0
Two	14	24	0	0	0
Three	4	26	19	1	0
Four	1	4	7	18	0
Five	0	0	2	17	52

Size Class	One	Two	Three	Four	Five
One	0.14	0.02	0.00	0.00	0.00
Two	0.64	0.44	0.00	0.00	0.00
Three	0.18	0.47	0.68	0.03	0.00
Four	0.05	0.07	0.25	0.50	0.00
Five	0.00	0.00	0.07	0.47	1.00

Model structure

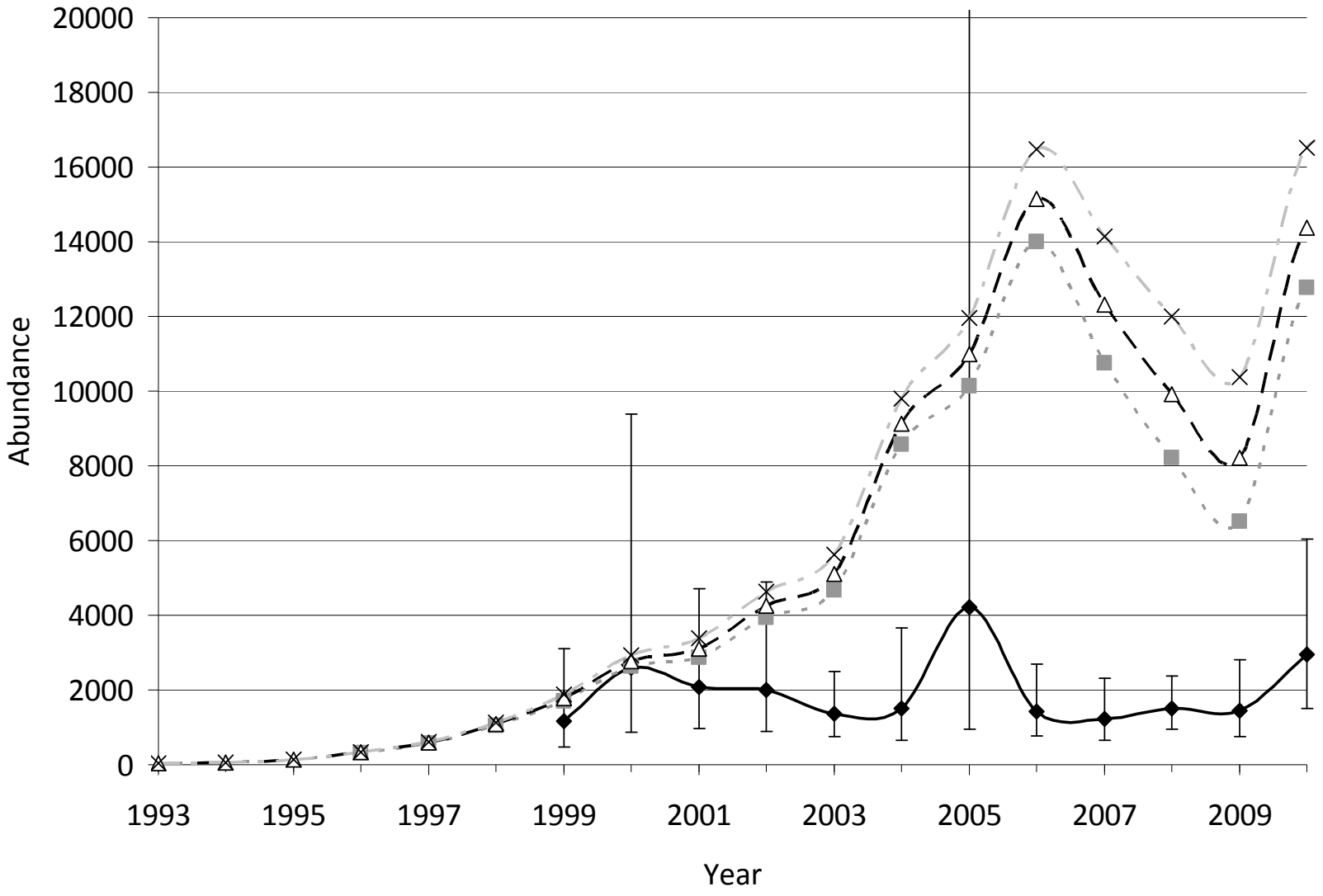
Three values of adult survival were tested

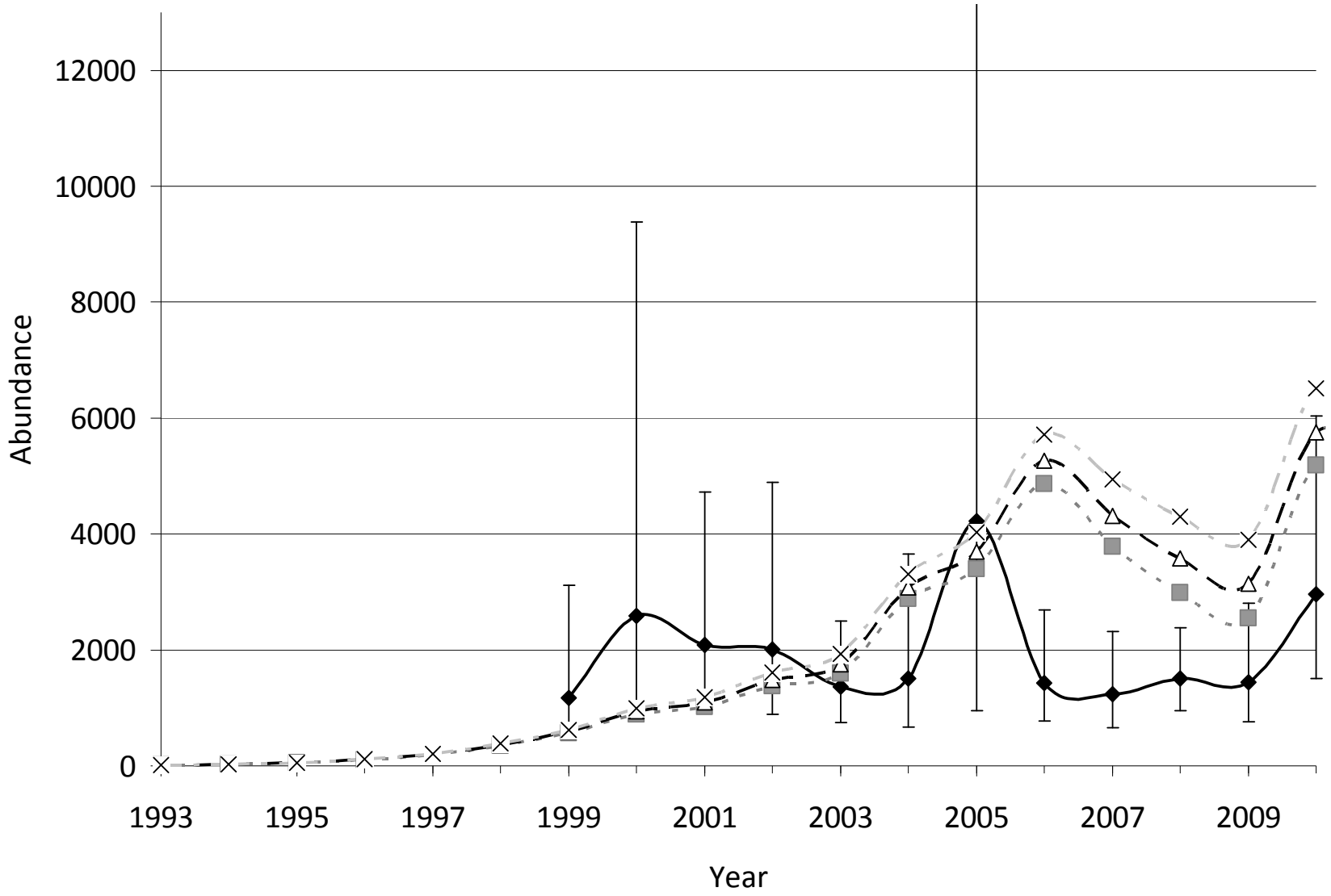
- 70, 75, and 80%



Model assessment

- Stocking records from 1992 – 2010 assigned to the five size classes
- Population size simulated based on model parameters of growth and survival
- Population estimates were not used to constrain the model

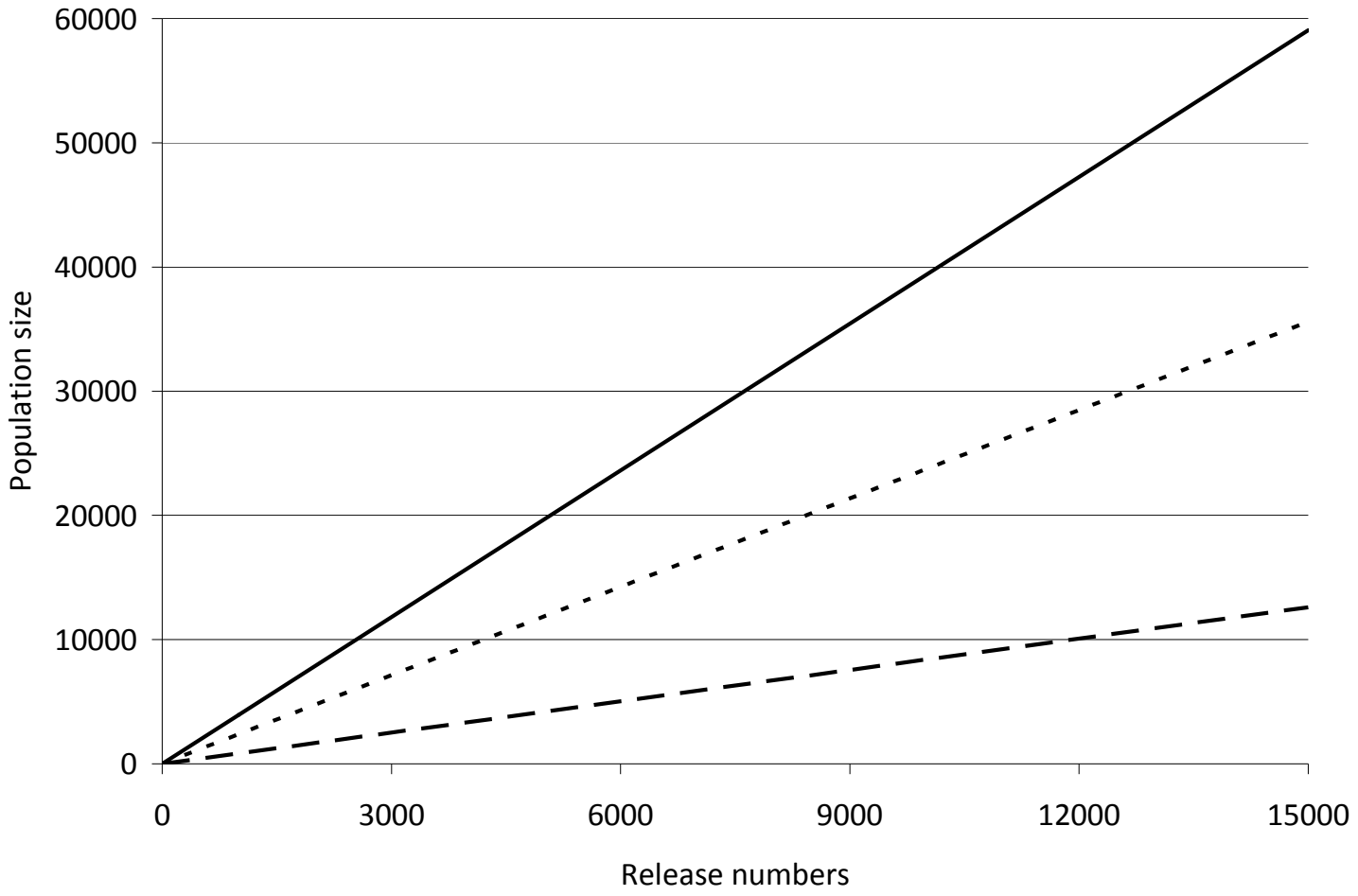

20000
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
Abundance
1993
1995
1997
1999
2001
2003
2005
2007
2009
Year


12000
10000
8000
6000
4000
2000
0
Abundance
1993
1995
1997
1999
2001
2003
2005
2007
2009
Year

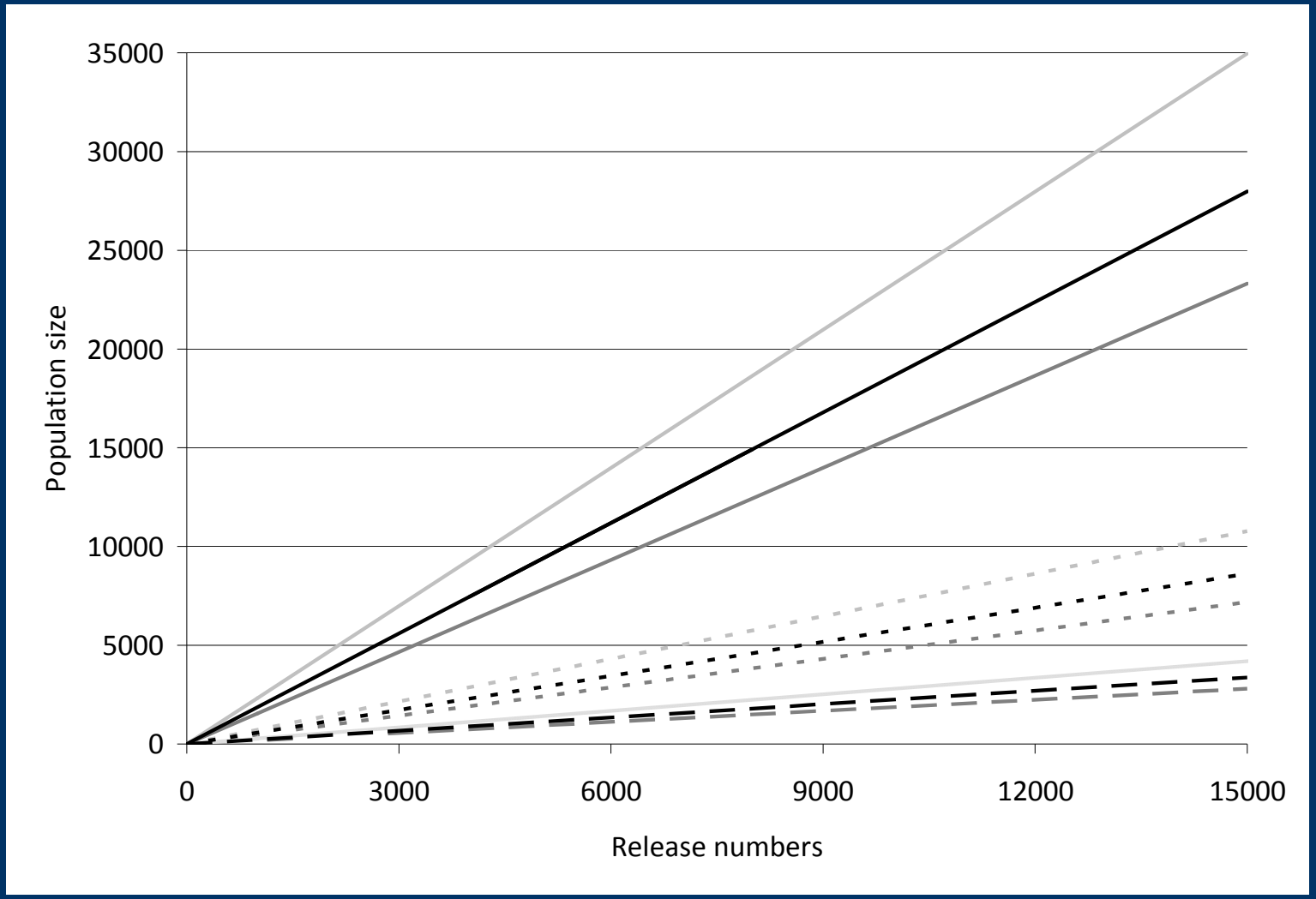
Stocking simulations

- Three different stocking regimes were simulated to estimate long-term stable population size
- Each stocking vector was based on an actual stocking year representing three target release sizes
  - 30 cm - 2002, 56% of razorback sucker stocked into Lake Mohave were larger than 30 cm
  - 35 cm - 2005, 69% of stocked razorback sucker were larger than 35 cm.
  - 50 cm - 2008, 56.5% of 978 fish stocked in 2008 were larger than 45 cm at release

Results


60000
50000
40000
30000
20000
10000
0
Population size
0
3000
6000
9000
12000
15000
Release numbers

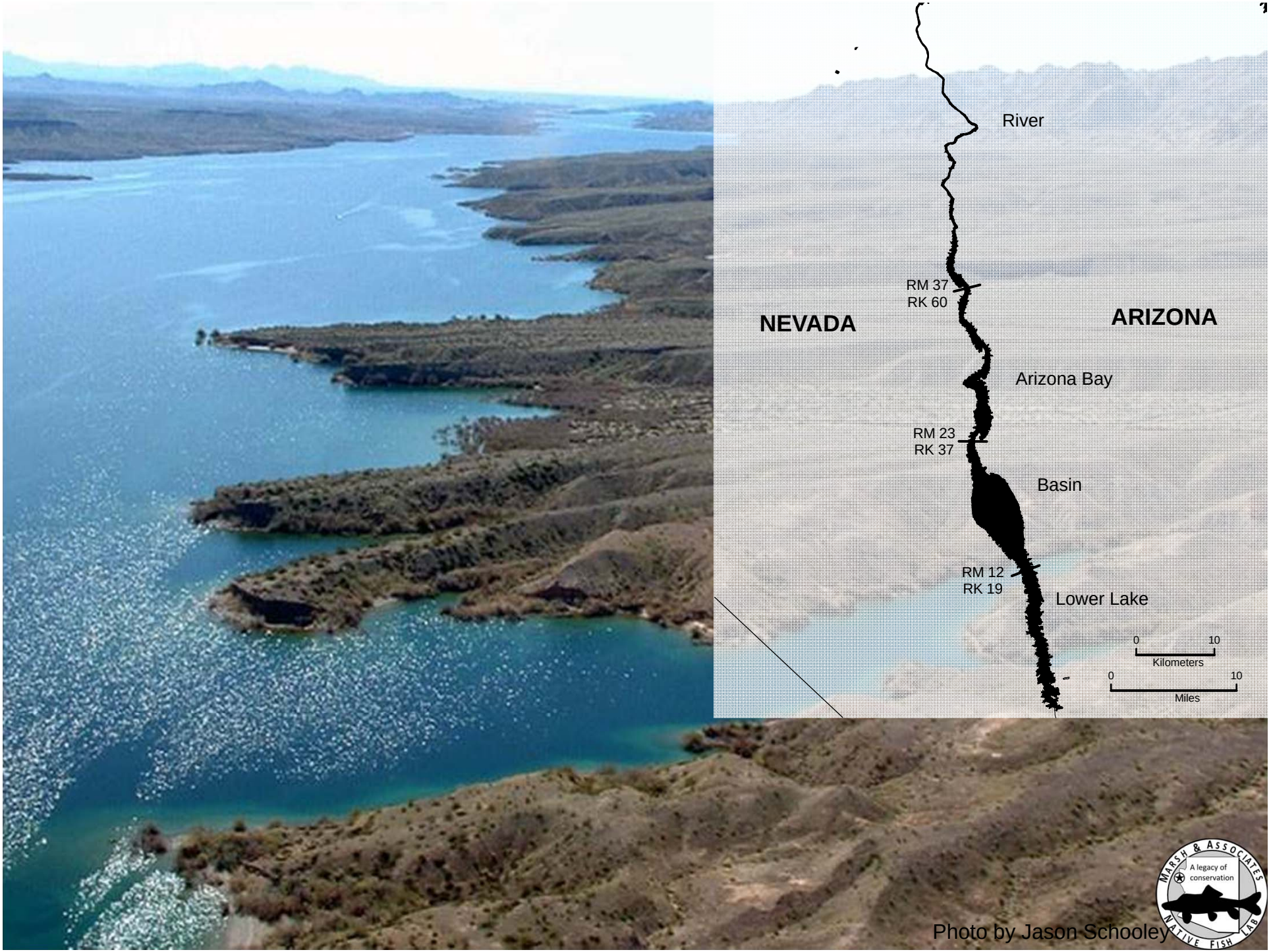
Results


35000
30000
25000
20000
15000
10000
5000
0
Population size
0
3000
6000
9000
12000
15000
Release numbers

Results

Simulations based on the updated size survival relationship the equilibrium population was always **8.3 times greater** for the 50 cm target than for the 30 cm target

Simulations based on the 2005 size-survival relationship the equilibrium for the 50 cm target was **4.7 times greater** than for the 30 cm target, cutting in half the benefit of annually stocking large fish


River
RM 37
RK 60
NEVADA
ARIZONA
Arizona Bay
RM 23
RK 37
Basin
RM 12
RK 19
Lower Lake
0
10
Kilometers
0
10
Miles
Photo by Jason Schooley
MARSH & ASSOCIATES
A legacy of conservation
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Remote sensing 2011