

Red Lake Adaptive Management

Working with what we knew
and
Learning from what we did

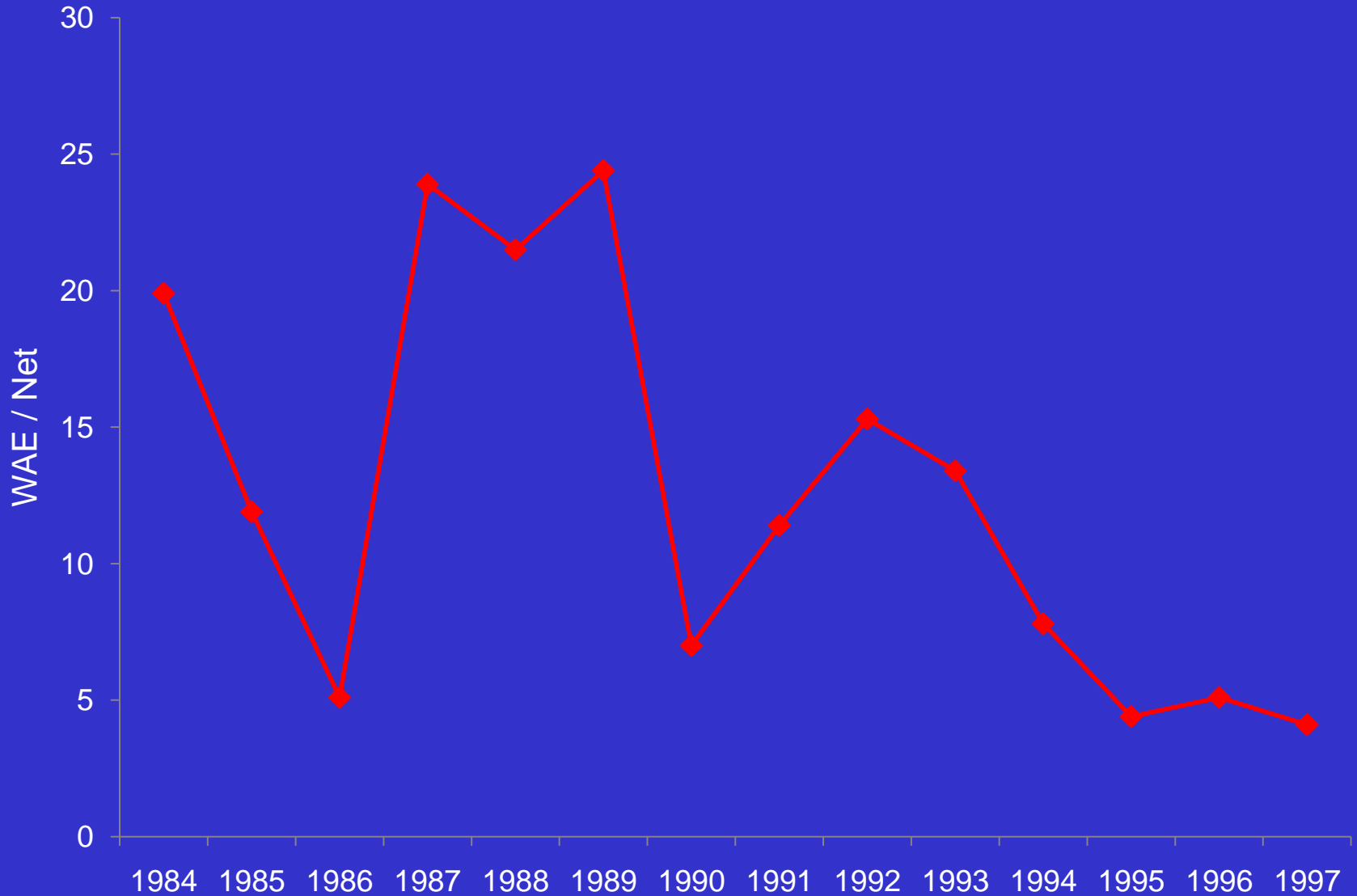
Red Lakes Walleye Recovery

- Highly publicized components
 - Closed walleye fishery
 - Stocking success
- Lesser known parts
 - Use of gill net selectivity model (q_{abg}) for estimating spawning stock biomass (SSB)
 - OTC fry marking for estimating wild fry production
 - Calibration of the model to predict wild fry production

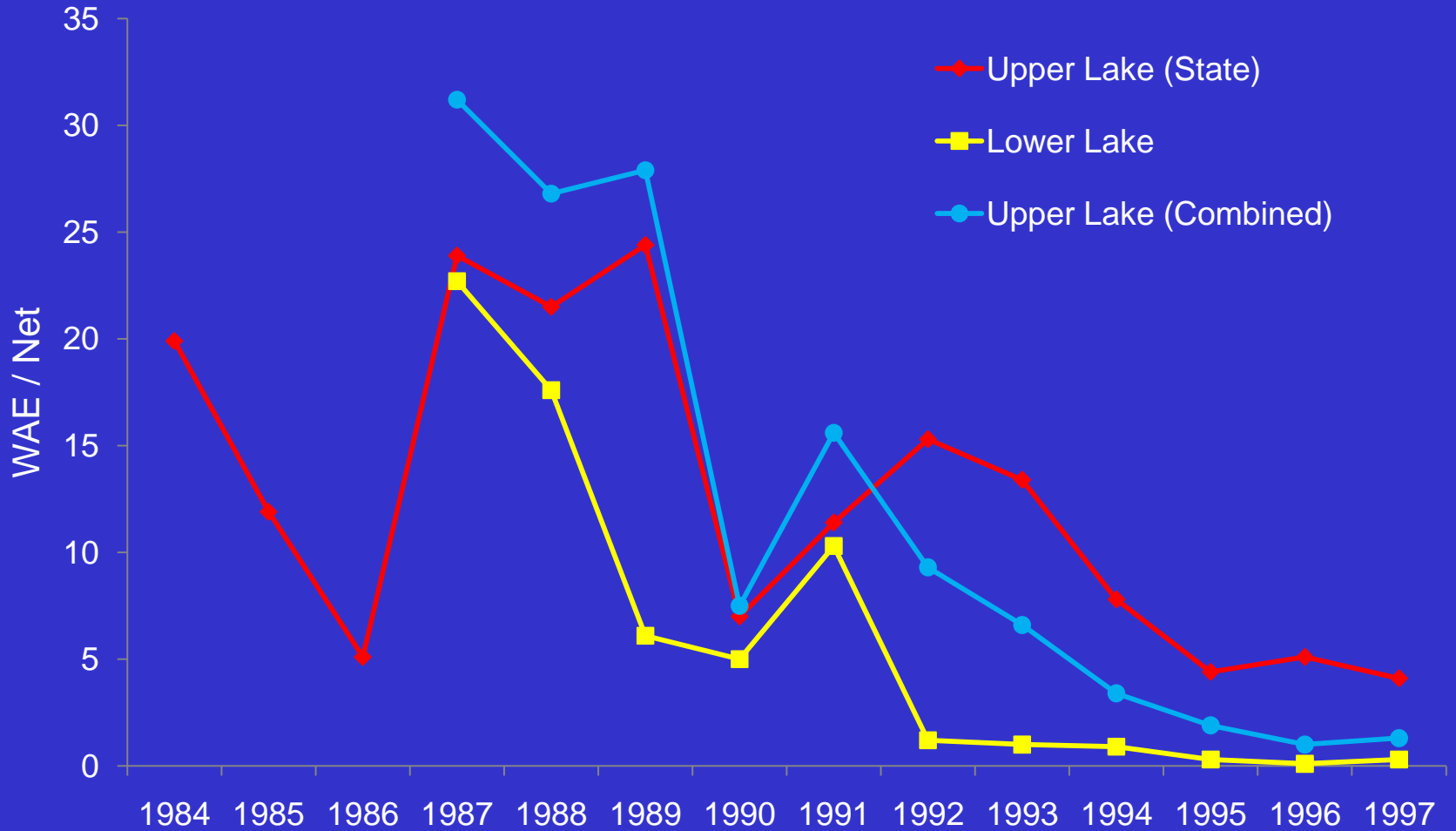
Brief Background

- Commercial harvest on the Red Lakes since 1917
- Closed reservation - jurisdiction over 83% of SA
- State waters - 48,000 acres - 17% of SA
- Large Lake sampling initiated on state waters - 1984
- Similar program initiated by Red Lake Band - 1987
- Walleye population already heavily exploited
- No cooperative management agreement in place

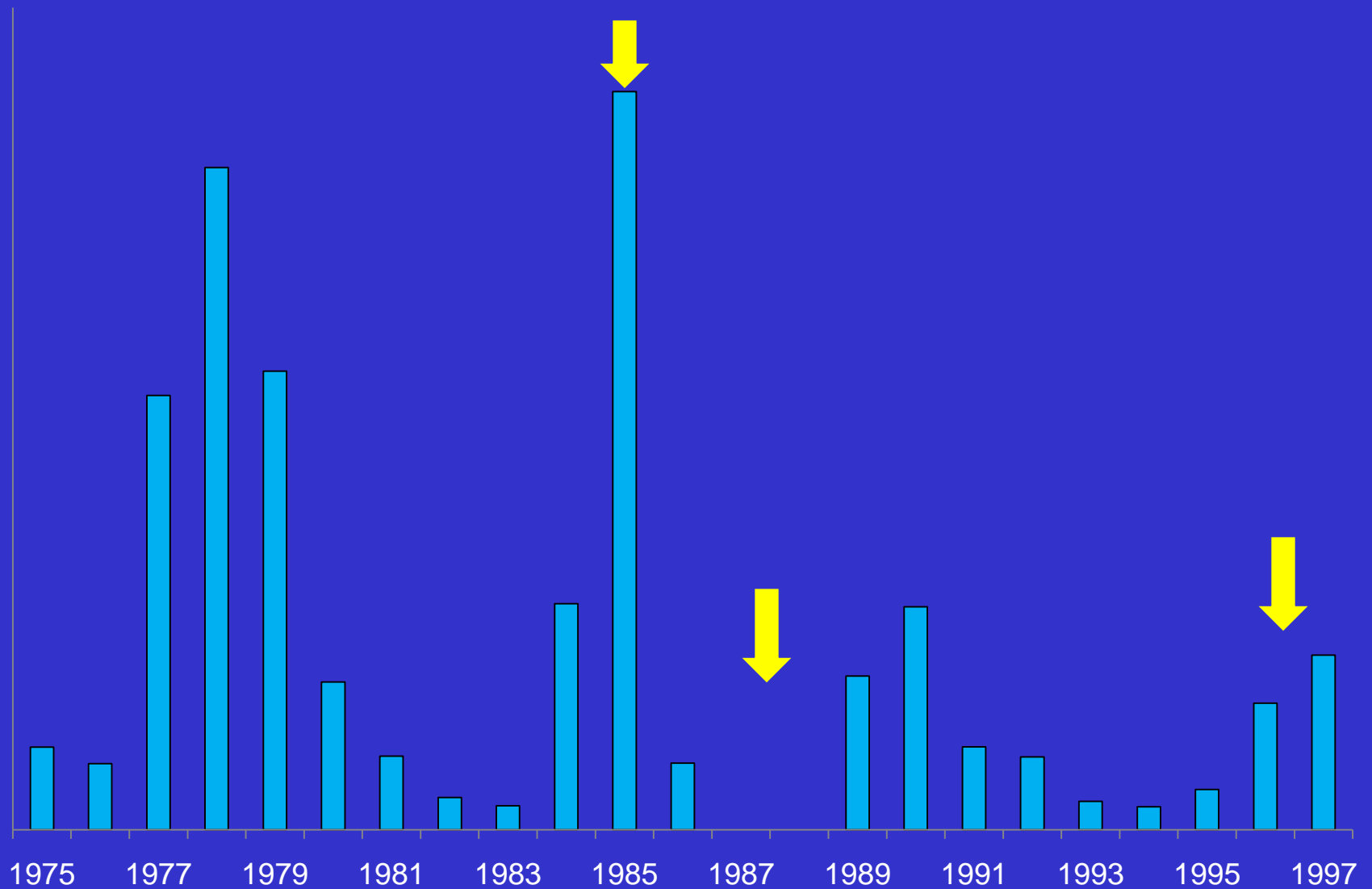
Gill Net Catch - State Waters (8 GN sets)



Gill Net Catch - All Waters



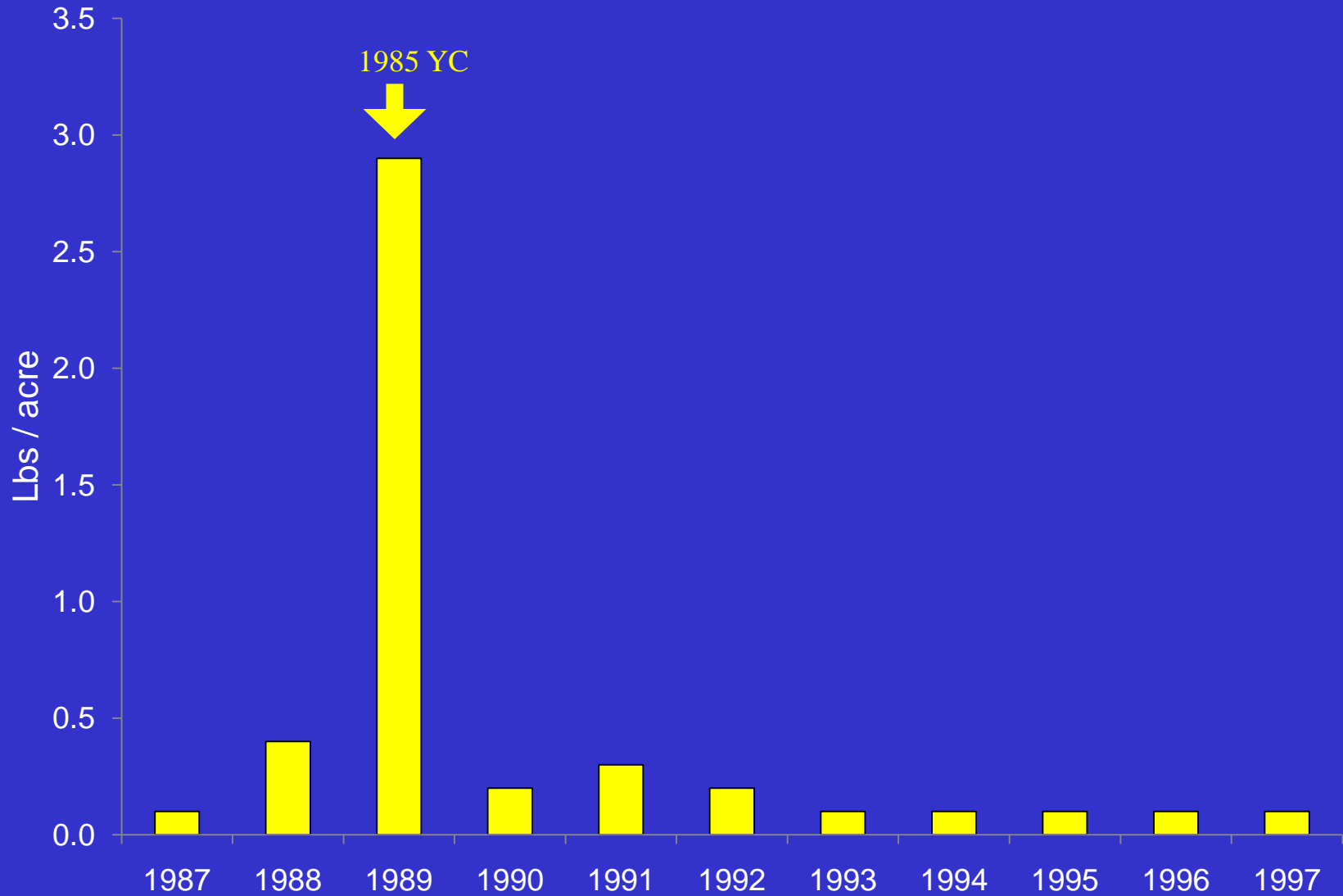
Year Class Strength - State Waters



Was spawning stock limiting recruitment?

- Q_{abg} developed for Mille Lacs Lake
- Uses gill net selectivity to estimate total population from gill net sample
- Q_{abg} estimates were similar to Mark/recap estimate for Red Lakes
- Adapted to estimate only mature females (subsample)

Spawning Stock Biomass – All waters



Stocking questions?

- Was wild fry production so low that stocking might speed recovery? (significant impact)
- Was a suitable genetic strain available?
- Were eggs available in adequate quantity?
- Was mass marking logistically possible to quantify results? (evaluate effectiveness)

Estimating Fry Production

- Total SSB (lbs) x fecundity (25,000 eggs/lb) = egg production (potential).
- Egg production x **hatch rate** = wild fry production.
- Natural hatch rate literature search range: 0.5 – 5%*

*deposited eggs, not potential

Fry Scenarios

- Red Lakes ~ 79,000 LA / 285,000 SA (28%)
- SSB 0.1 pound/SA @ 5% hatch rate ~ 450/LA
- SSB 0.1 pound/SA @ 0.5% hatch rate ~ 45/LA

Initial 1999 Fry Scenario

- Fall 1998 SSB = 0.15 pounds/SA
- Optimistic hatch rate of 2%
 - 21 Million wild fry or 270/LA
- Requested up to 500 qts Pike River Eggs
 - 40-45 Million hatchery fry
- Total Fry Target ~ 65 Million or ~ 825/LA

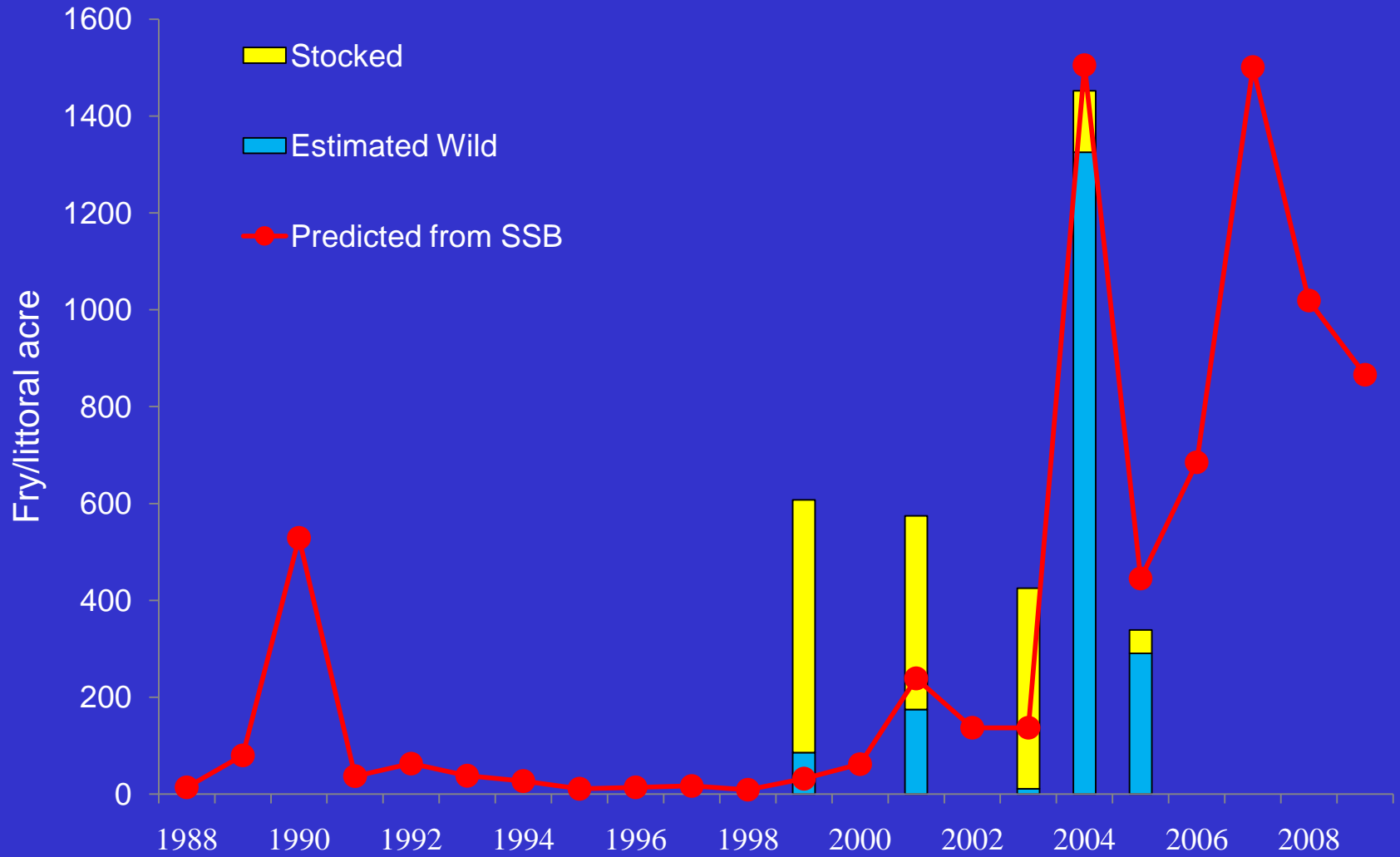
Actual 1999 Results

- 41.1 M fry stocked (favorable conditions)
- 360 YOY examined
- 86% marked
- Total Fry 47.9 M or ~ 600 fry/LA
- Wild fry 6.8 M or ~ 85 fry/LA
- Natural hatch rate of ~ 0.6%

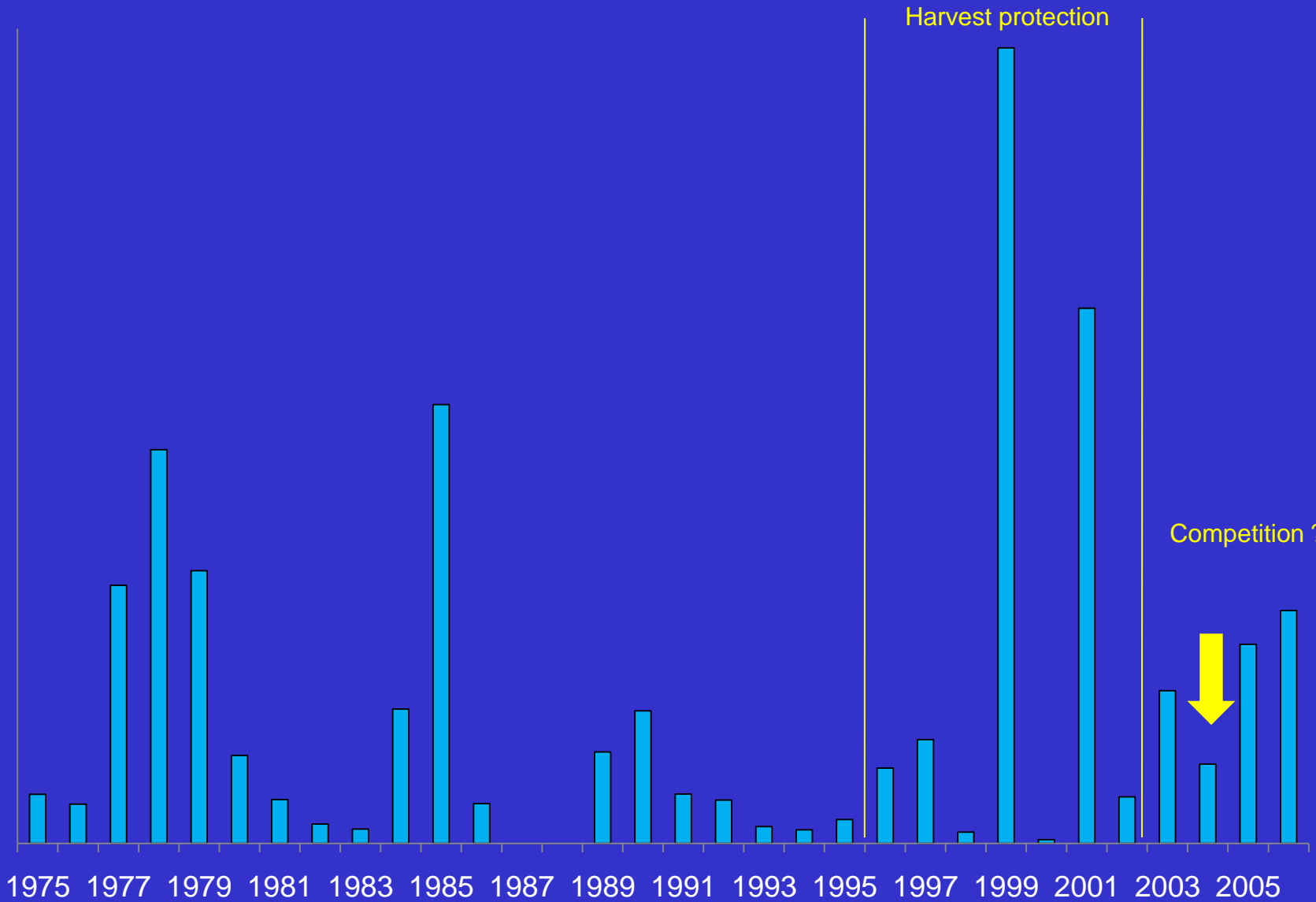
Fry estimates (in millions)

Year	Stocked	Wild	Total	% Marked	Hatch rate (%)	Average Hatch rate
1999	41.1	6.8	47.9	86	0.60	-
2001	31.5	13.8	45.3	70	0.16	0.38
2003	32.6	0.9	33.5	97	0.02	0.26
2004	10.0	104.5	114.5	9	0.18	0.24
2005	3.8	22.9	26.7	13	0.14	0.22

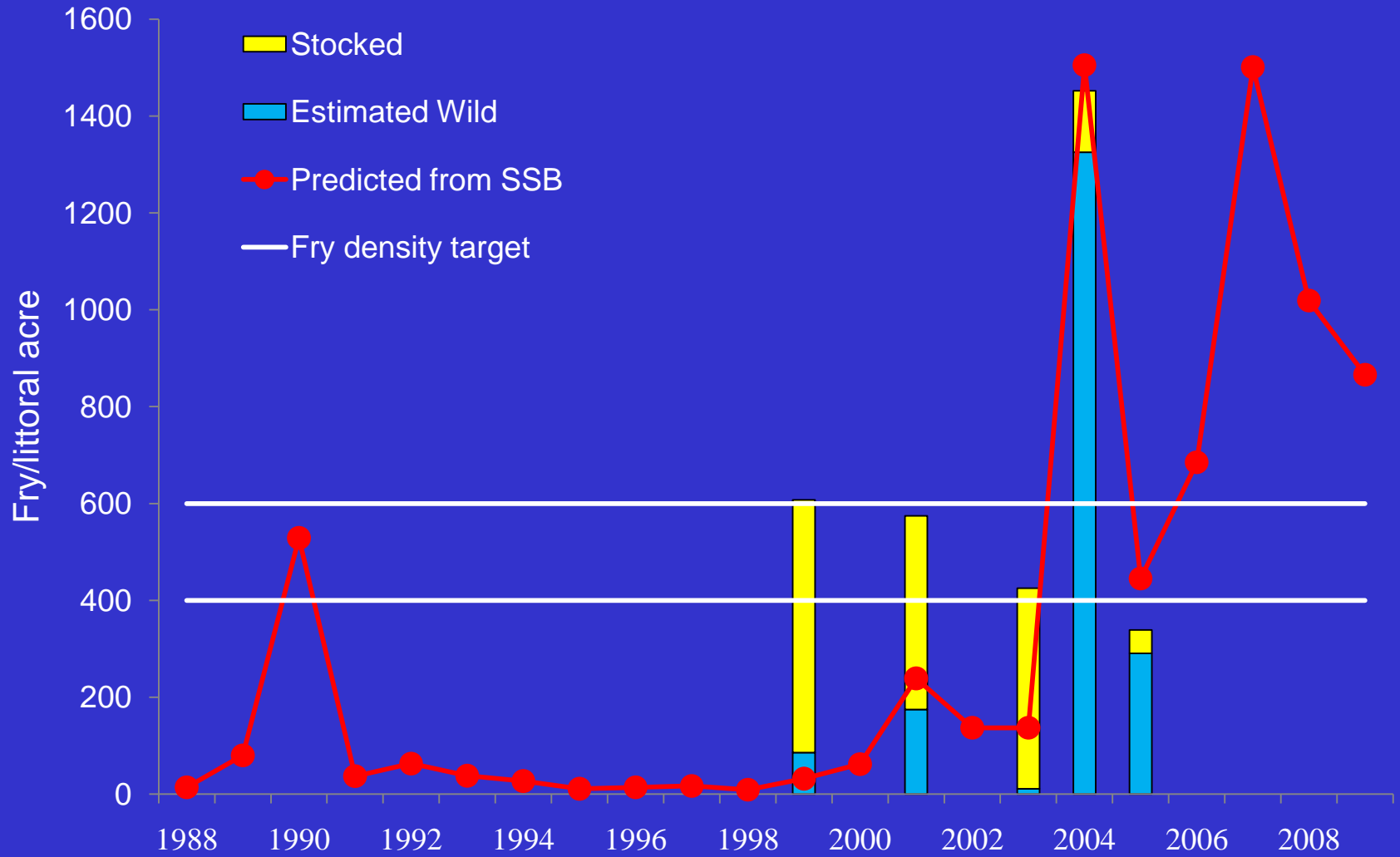
Fry Estimates



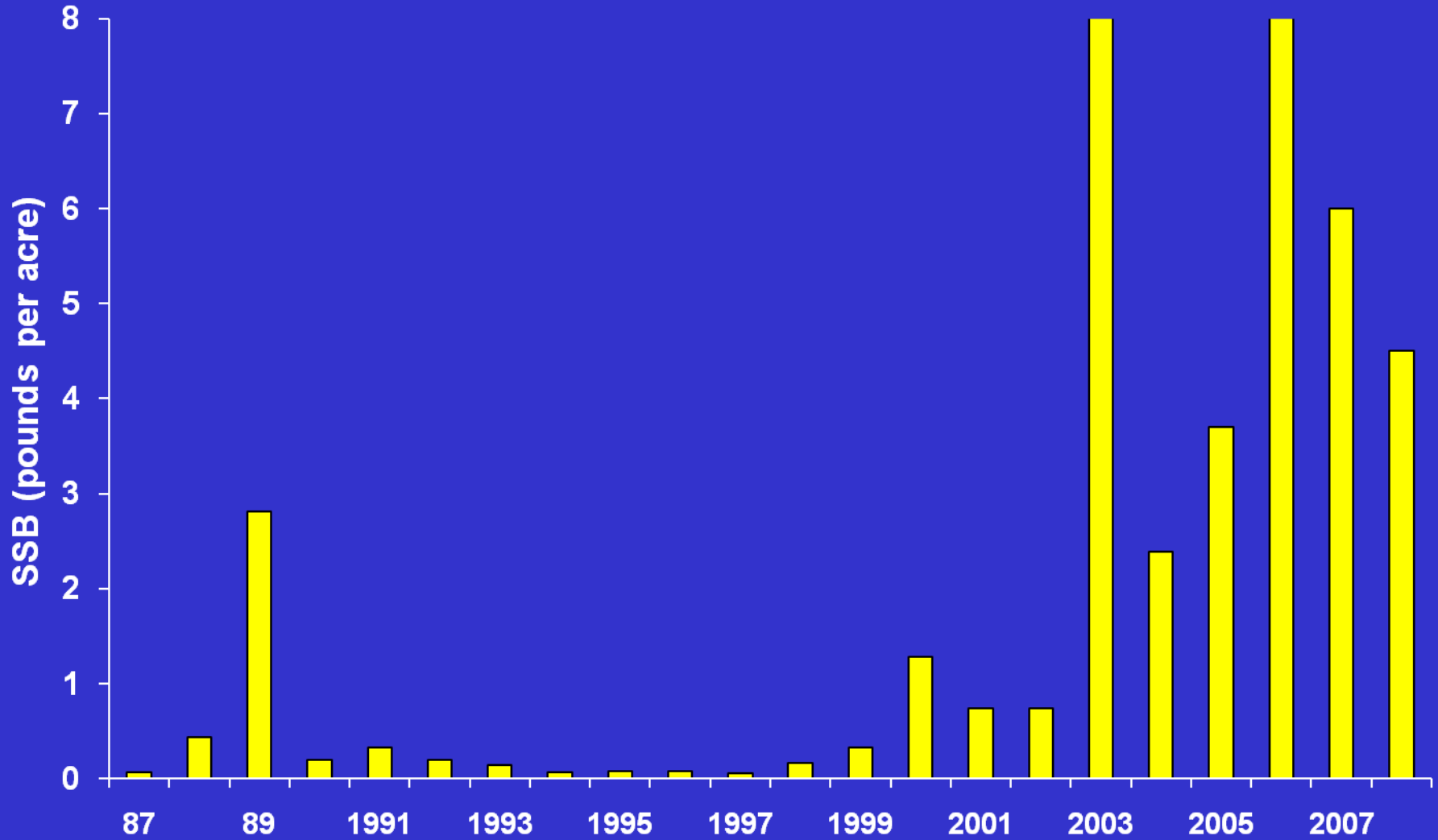
Fry density does not guarantee Year Class Strength



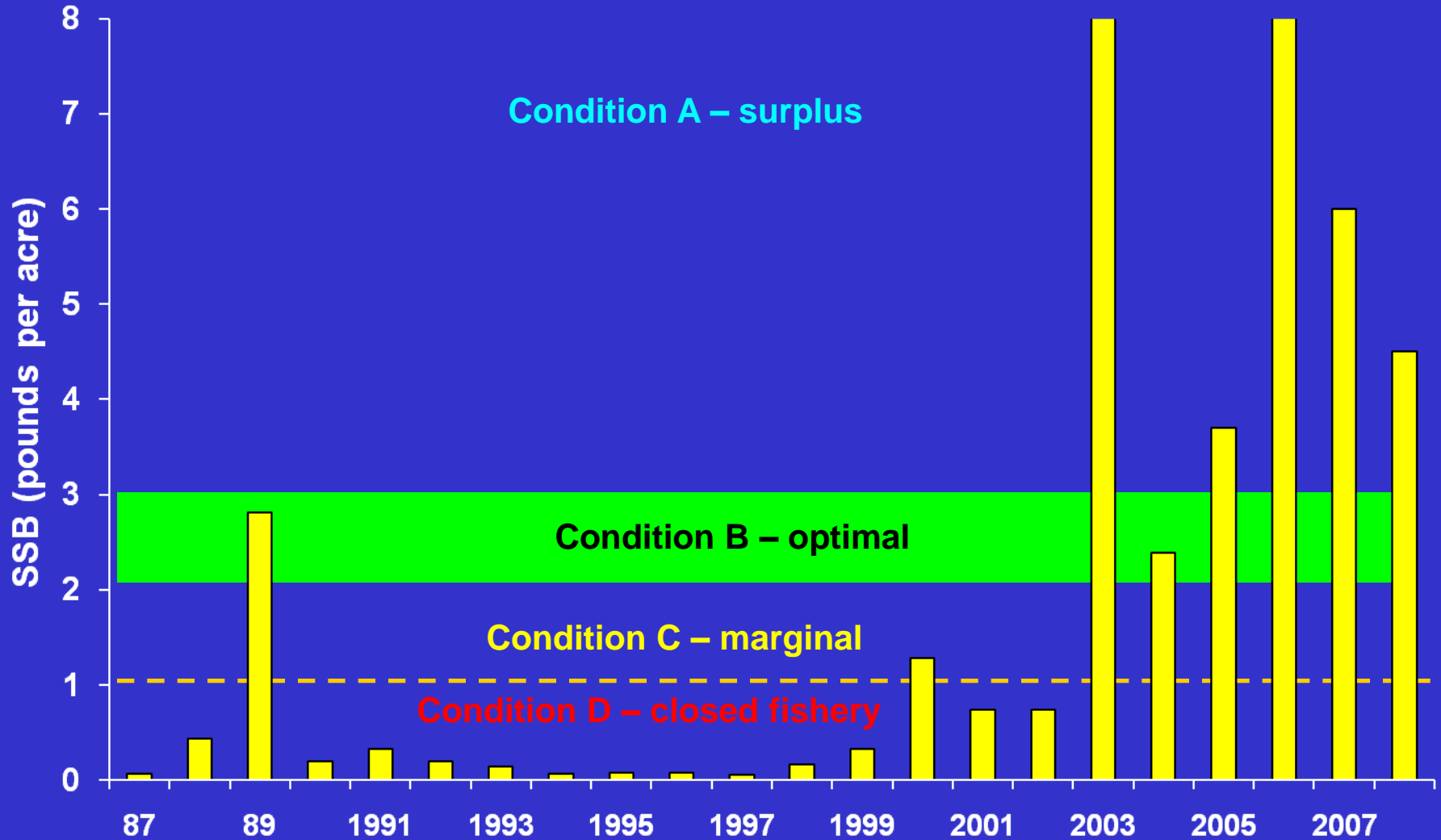
Fry Estimates



SSB – Annual Estimates



SSB – Annual Estimates



Gill Net Catch - All Waters

