

Pre-recruit lake trout surveys in Lake Superior and application in stock assessments



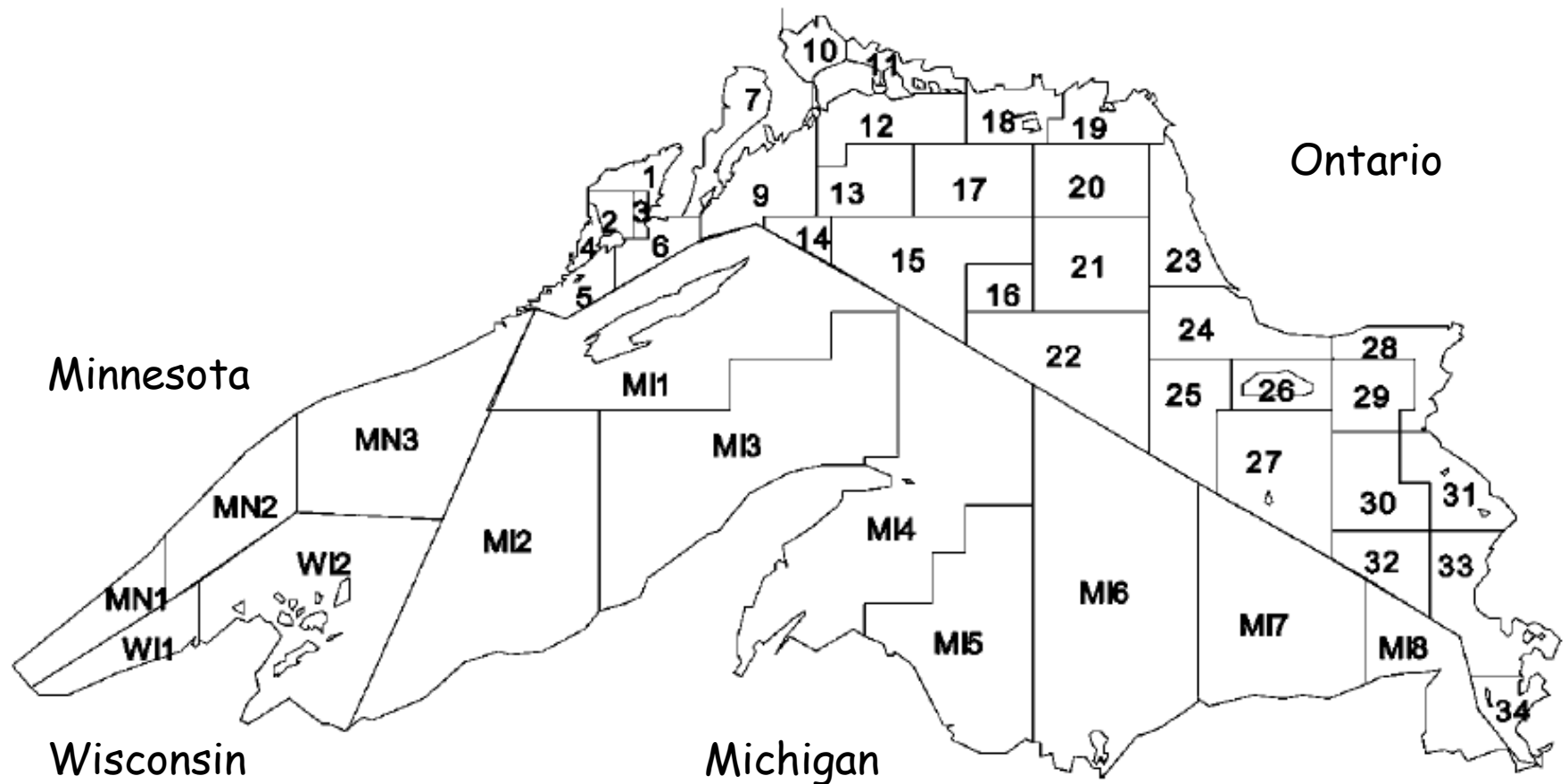
Shawn Sitar
Marquette Fisheries Research station
Michigan Department of Natural Resources

Outline

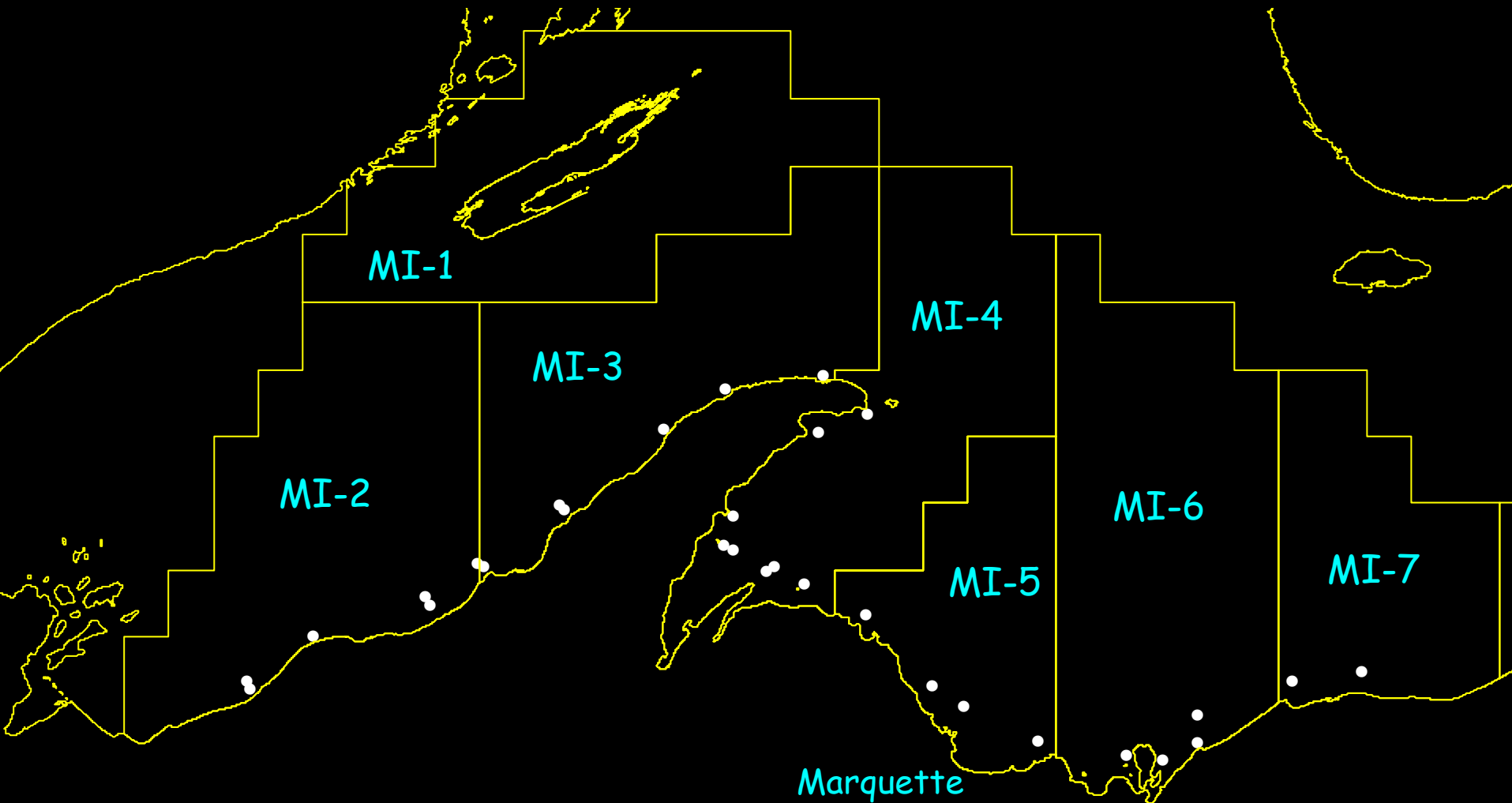
- History/design/description
- Comparison of pre-recruit and adult lake trout survey
- Describe application in stock assessment models
- Issues / considerations of prs

Lake trout gill net surveys in Lake Superior

Lake Superior lake trout management units



MIDNR Pre-recruit lake trout sampling stations



Lake Superior pre-recruit survey

Objective: to index relative abundance of pre-recruit or juvenile lean lake trout

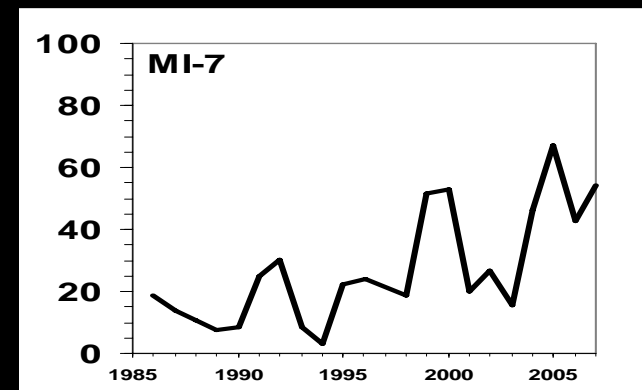
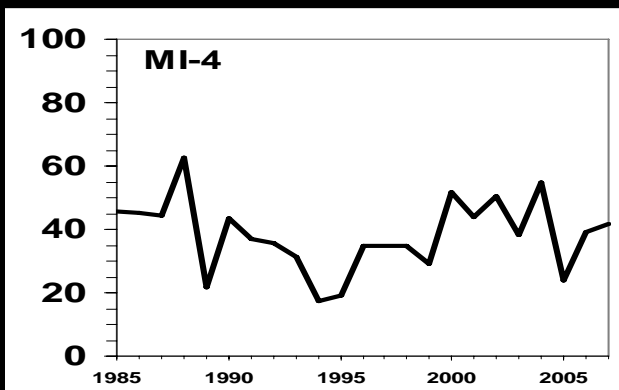
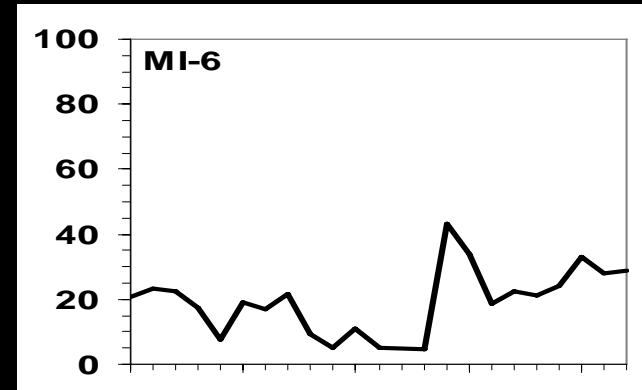
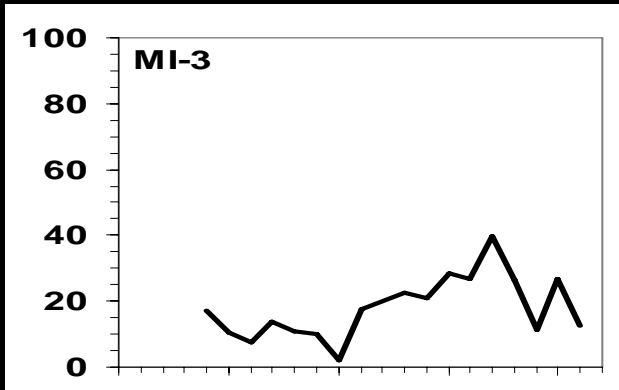
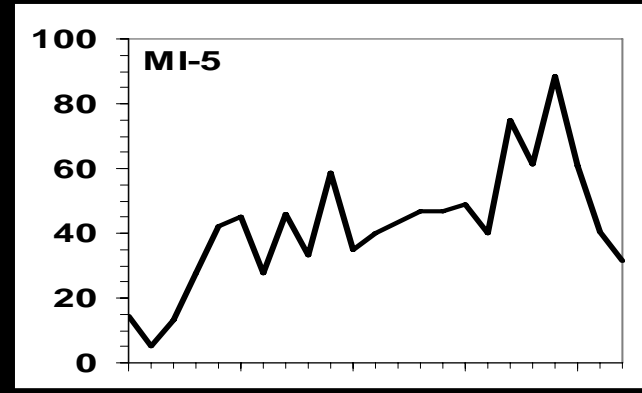
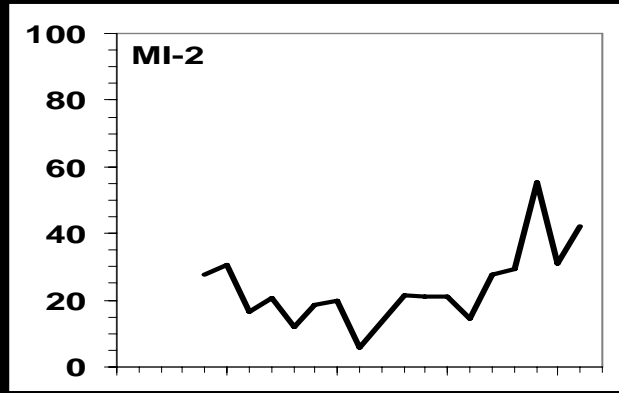
historically defined as < 432 mm

(aka: what we don't see in spring survey)

- Age structure
- Mortality
- Growth
- Diet
- Maturation

Index of pre-recruit abundance

CPUE



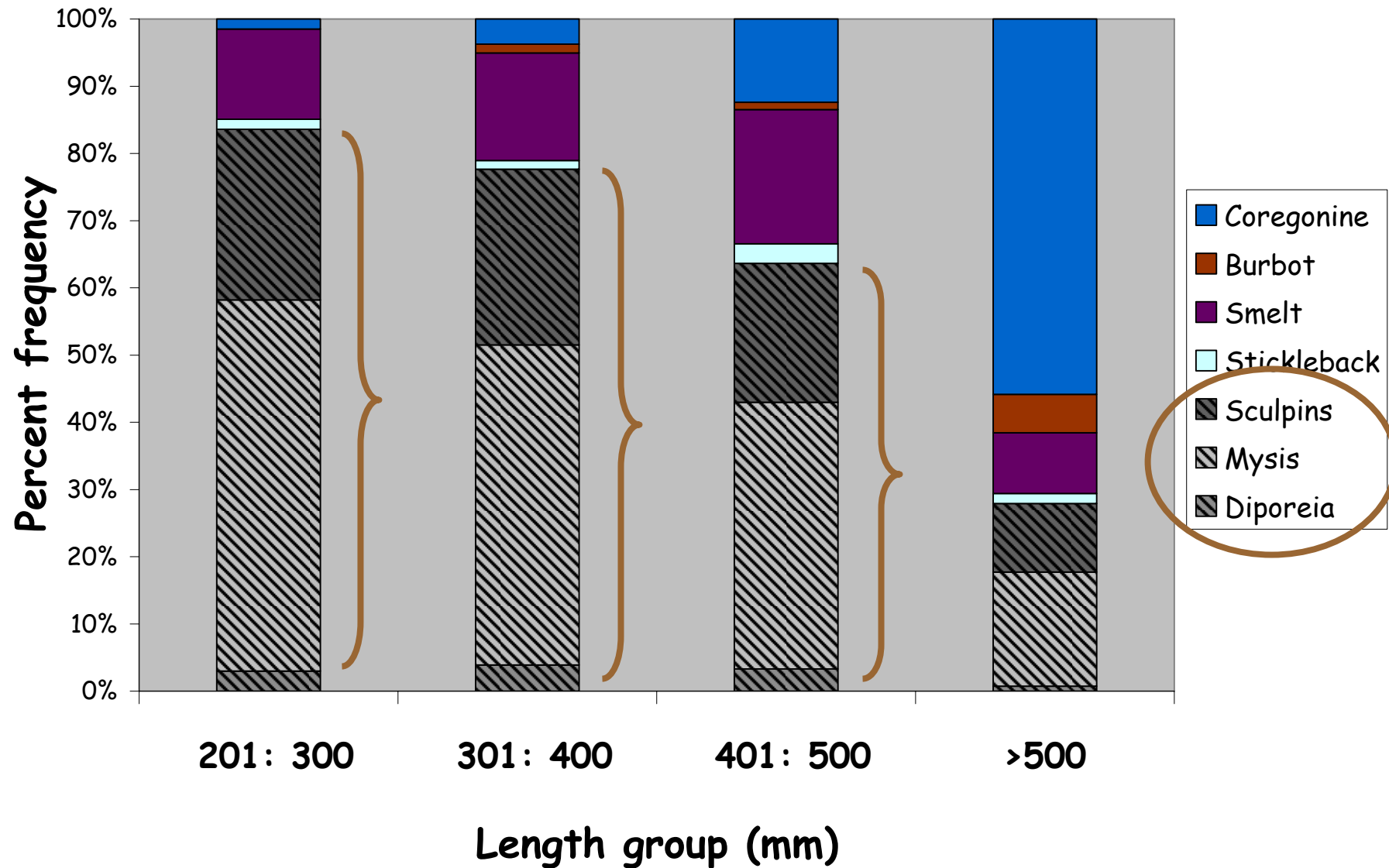
Year

Survey history and design

- Started by USFWS in 1975 as tri-annual survey. MIDNR took over survey in 1985 and conducted annually.
- Conducted late July through early September when
 - adults dispersed
 - juveniles demersal



Summer lake trout diet



Survey history and design (cont.)

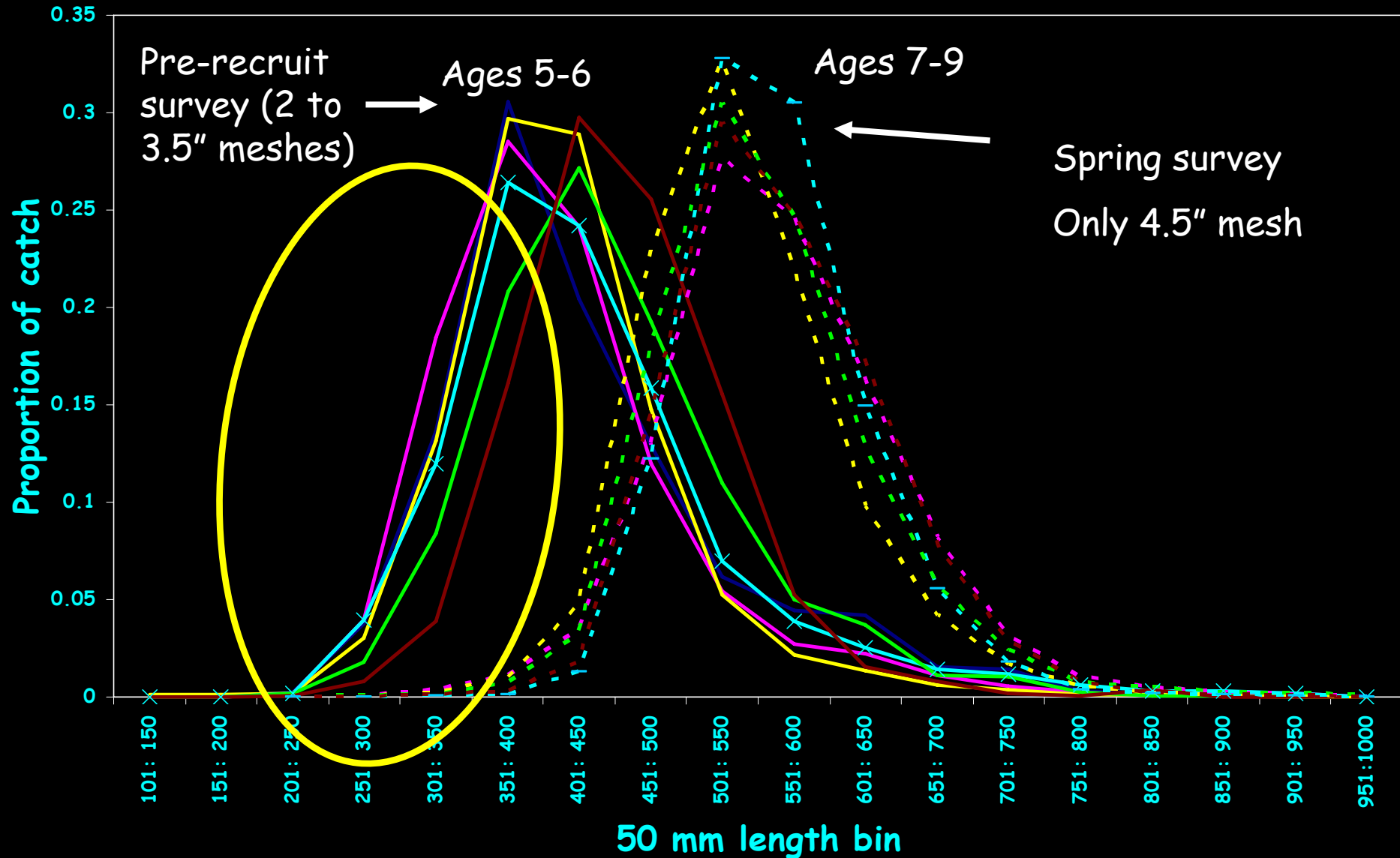
- Fixed station
- Gill net: bottom, multi-mesh, multifilament, 2" to 3" in $\frac{1}{4}$ " increments, + 3.5"
- Target: small lean lake trout, < 432 mm
- Target depth range: 27-73 m (90-240 ft)



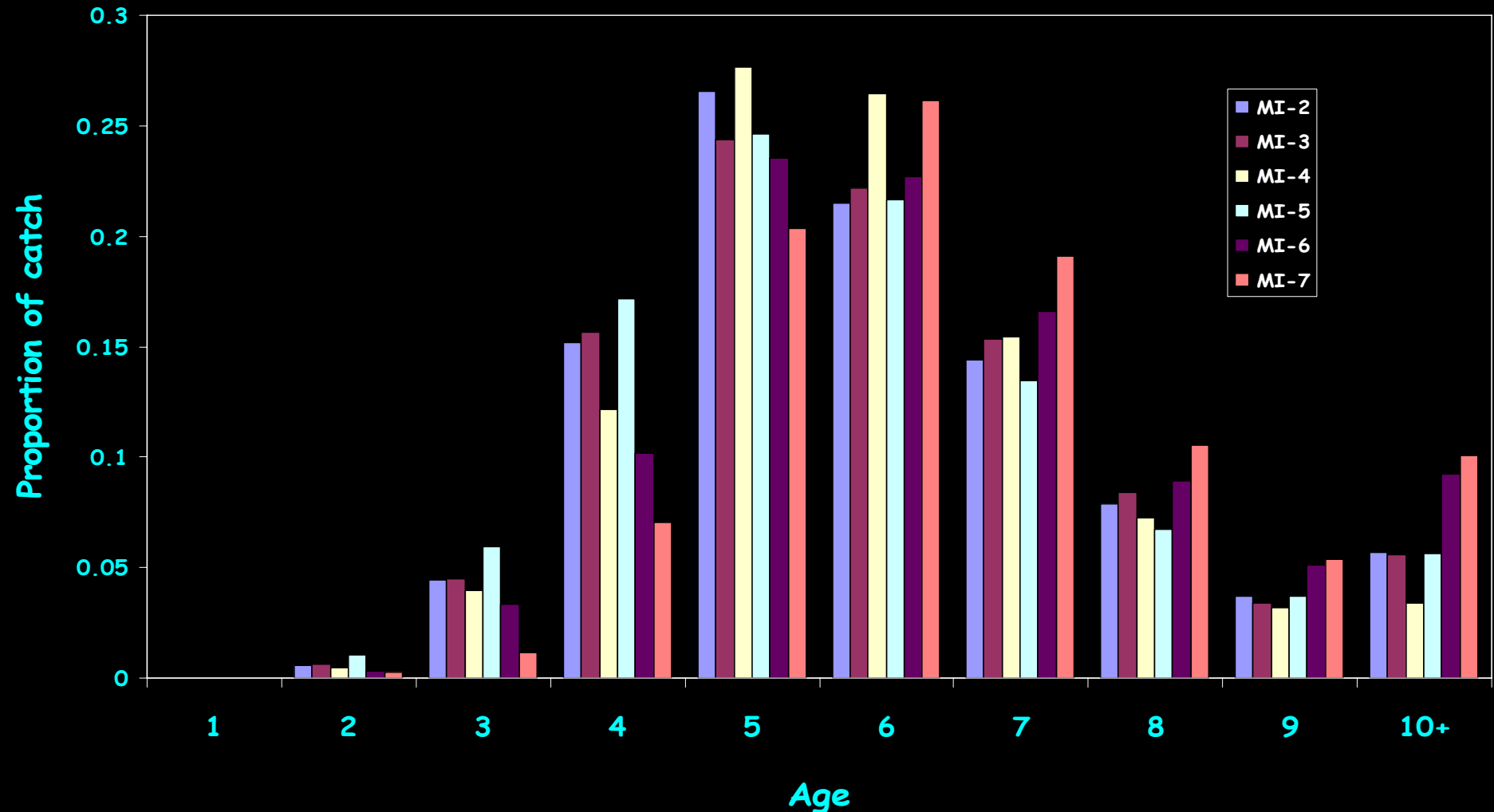
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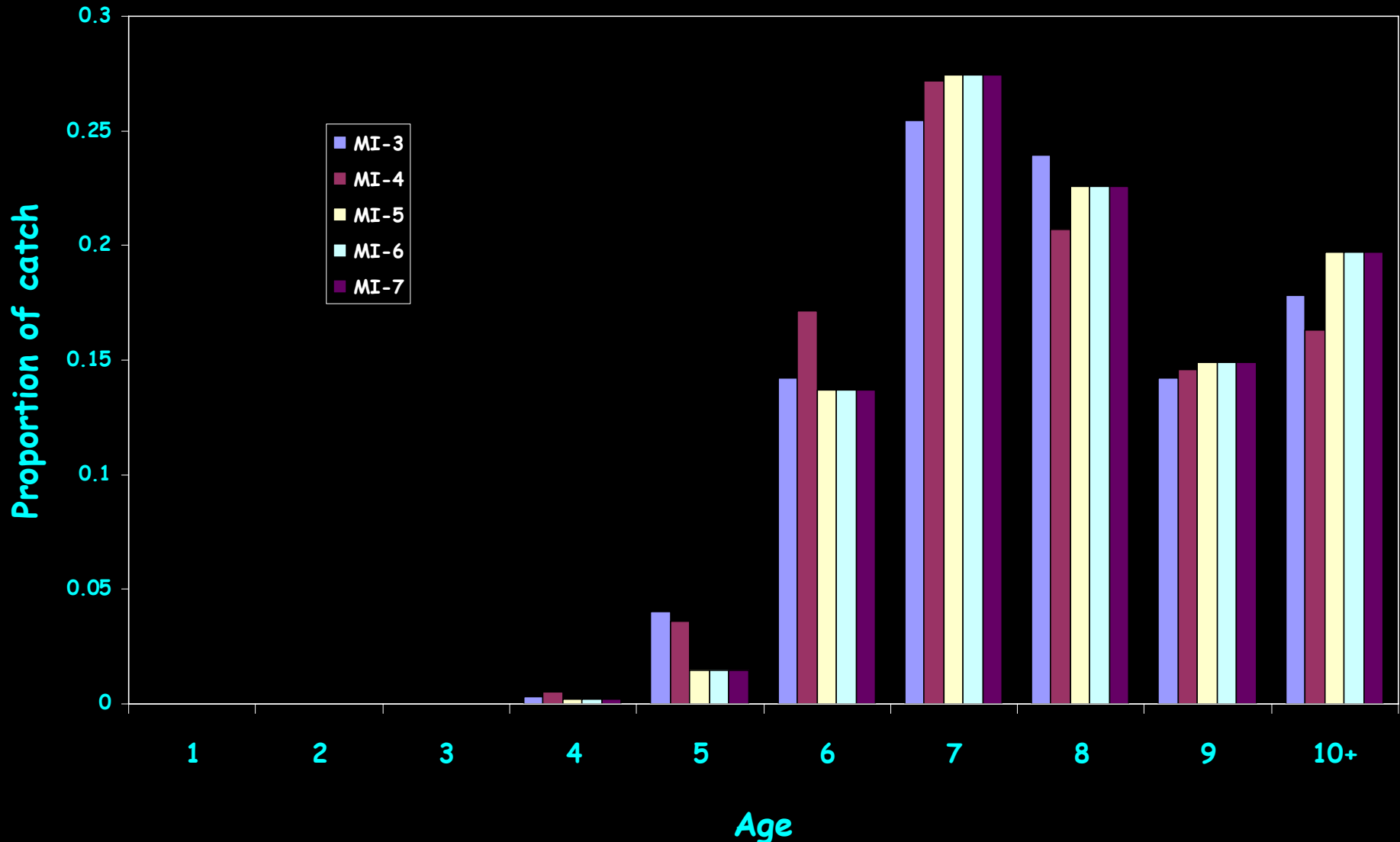
Size selectivity of survey nets



Age composition lean lake trout from pre-recruit survey



Age composition lean lake trout from spring survey



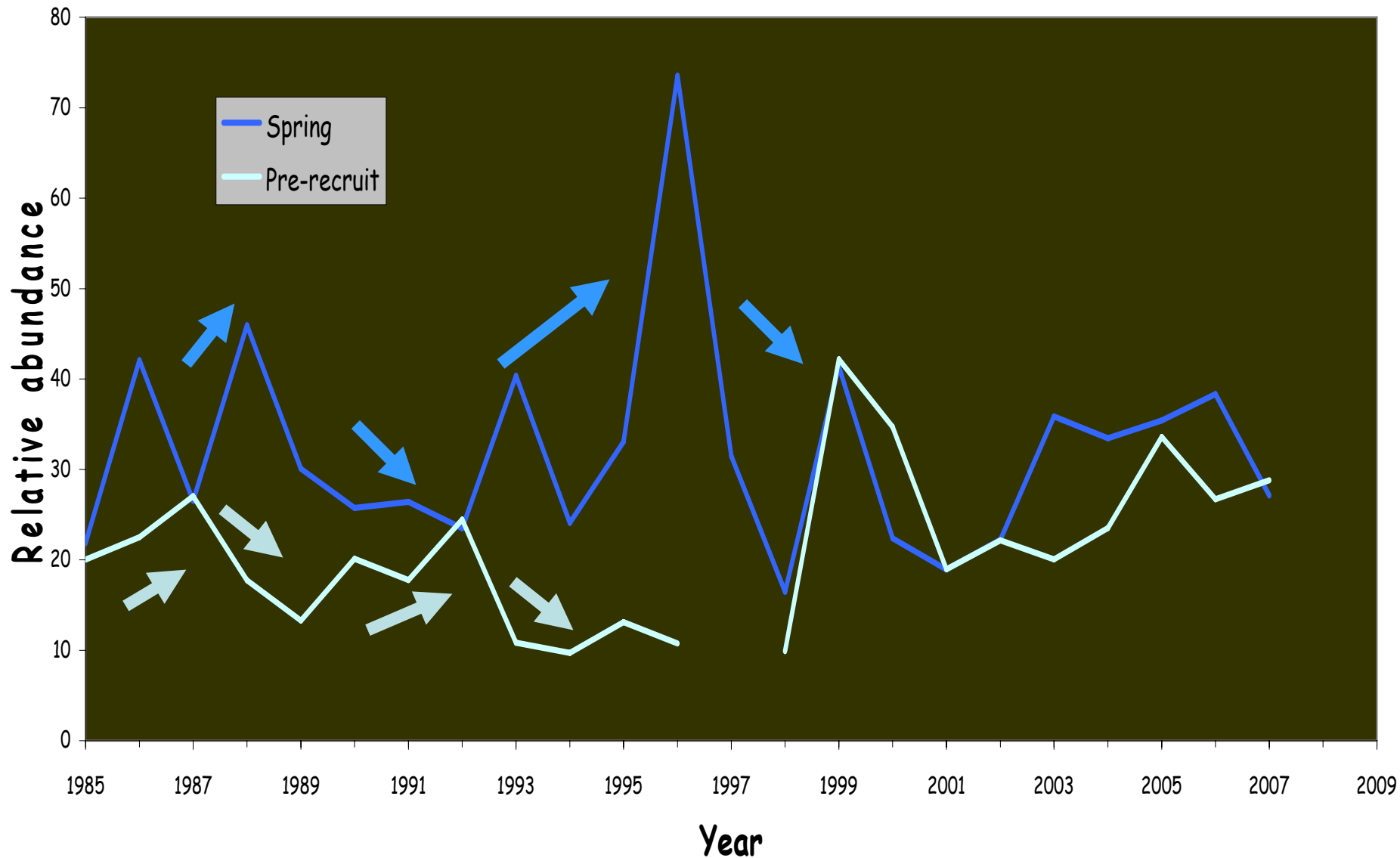
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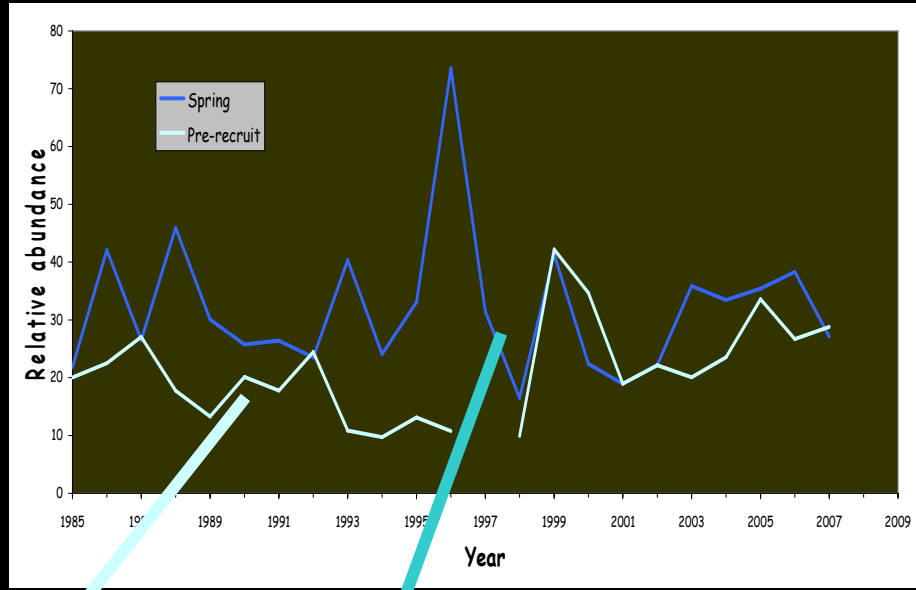
Application to stock assessment models

- Provides index of recruitment to population
- Provides information on year-classes earlier in life than spring (adult) survey data
- Provides information on structural changes in younger age classes of population

Survey index of abundance



Stock assessment modeling



Data

Model

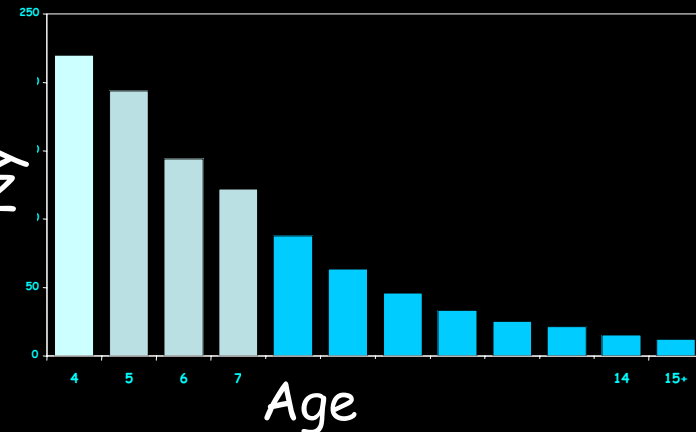
a

	4	5	6	7	8	9	10	11	12	13	14	15+
1975	26680	48830	89143	91301	70322	54164	41718	32133	24749	19063	14682	11309
1976	13808	21368	37484	65563	64282	48478	37229	28688	22112	17039	13128	17910
1977	164902	11023	16306	27282	45646	43869	32964	25314	19512	15042	11592	21129
1978	209604	131212	8341	11697	18770	30781	29471	22139	17007	13112	10109	22004
1979	289649	167802	101864	6245	8532	13586	22382	21549	16253	12522	9671	23733
1980	173100	231486	130155	76401	4491	6062	9687	16035	15491	11711	9033	24139
1981	311736	138315	179560	97981	55758	3235	4368	6991	11585	11198	8465	23990
1982	15354	242553	103057	128459	67506	37720	2180	2940	4701	7782	7514	21768
1983	391511	12758	197840	81916	99022	51309	28651	1658	2238	3581	5930	22331
1984	108782	320244	10064	149268	58957	69379	35605	19785	1141	1538	2456	19373
1985	373468	90594	262787	8118	118092	45624	52825	27108	15123	875	1181	16819
1986	253827	308694	73154	206672	6204	87652	33236	38409	19753	11040	640	13183
1987	231164	211358	253422	58983	162259	4694	65366	24954	29087	15054	8450	10643
1988	402001	193958	176150	208749	47523	127731	3680	51509	19796	23210	12068	15391
1989	289632	324467	150337	130608	147876	32452	85196	2426	33813	12988	15251	18174
1990	77000	238288	260849	117742	99182	109154	23711	62270	1780	24913	9595	24736
1991	302220	63814	194001	207869	91555	75120	81917	17919	47373	1359	19057	26318

y

Abundance

\sum



Outline

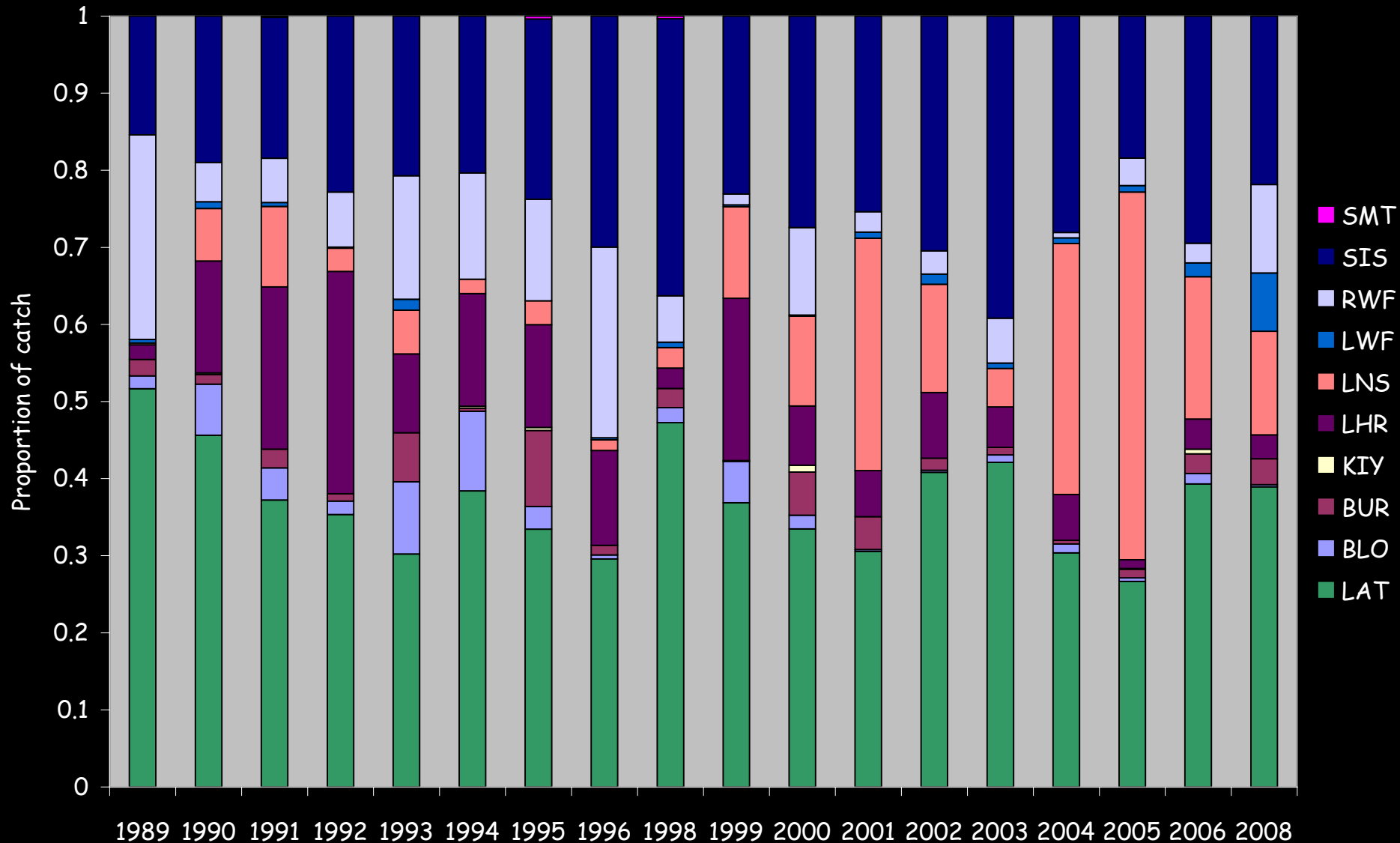
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Suckers

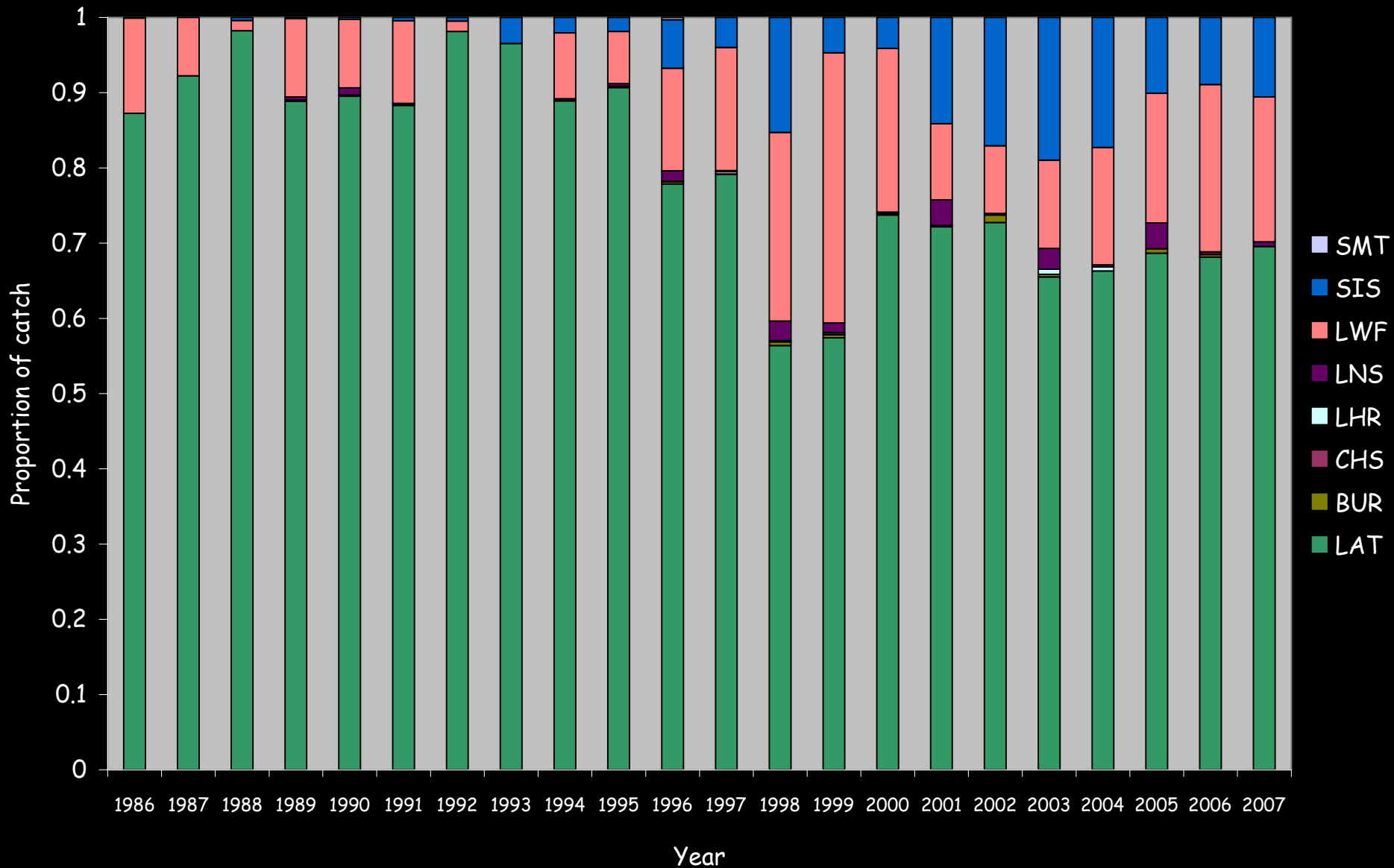
Bycatch



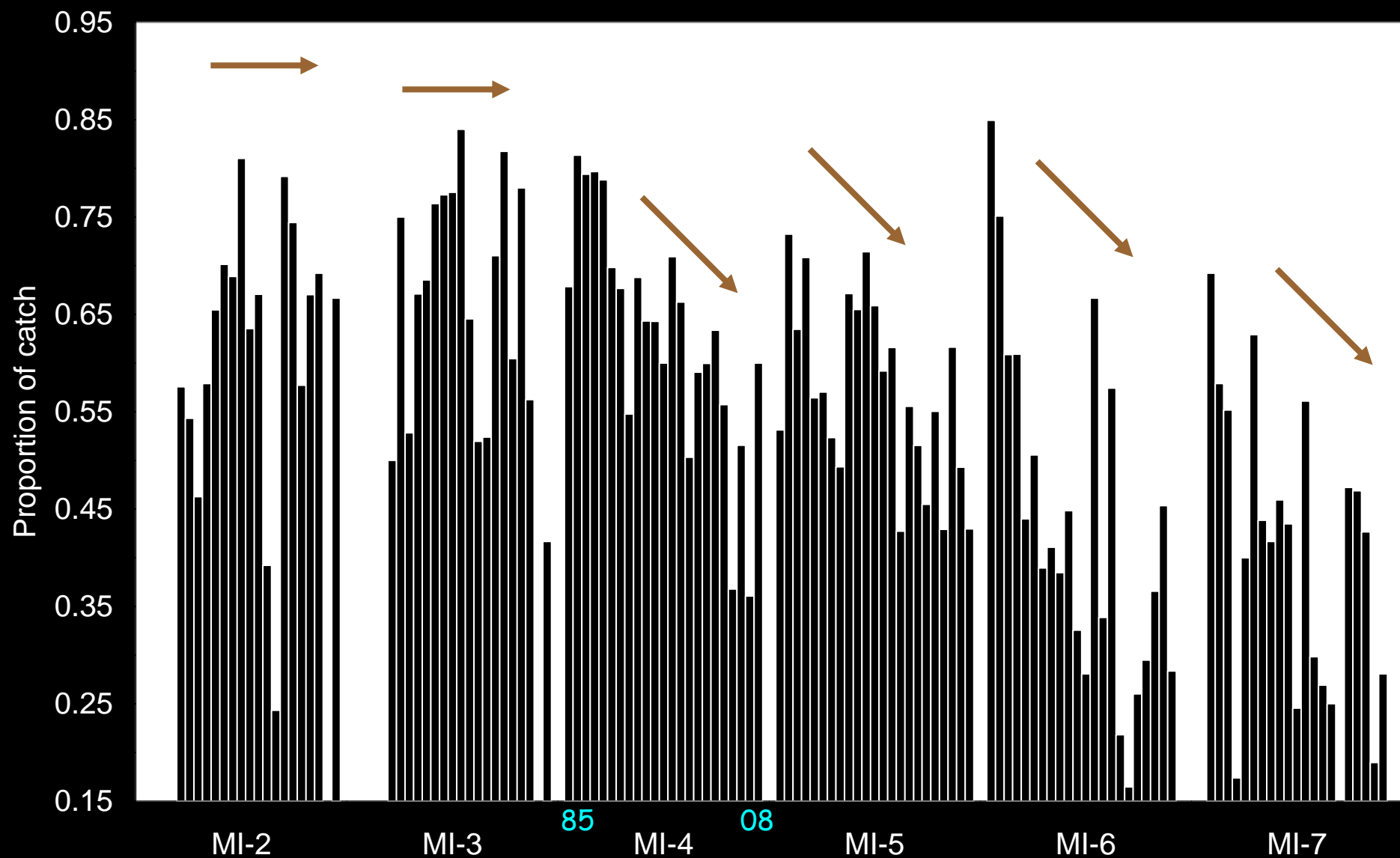
Pre-recruit survey catch composition



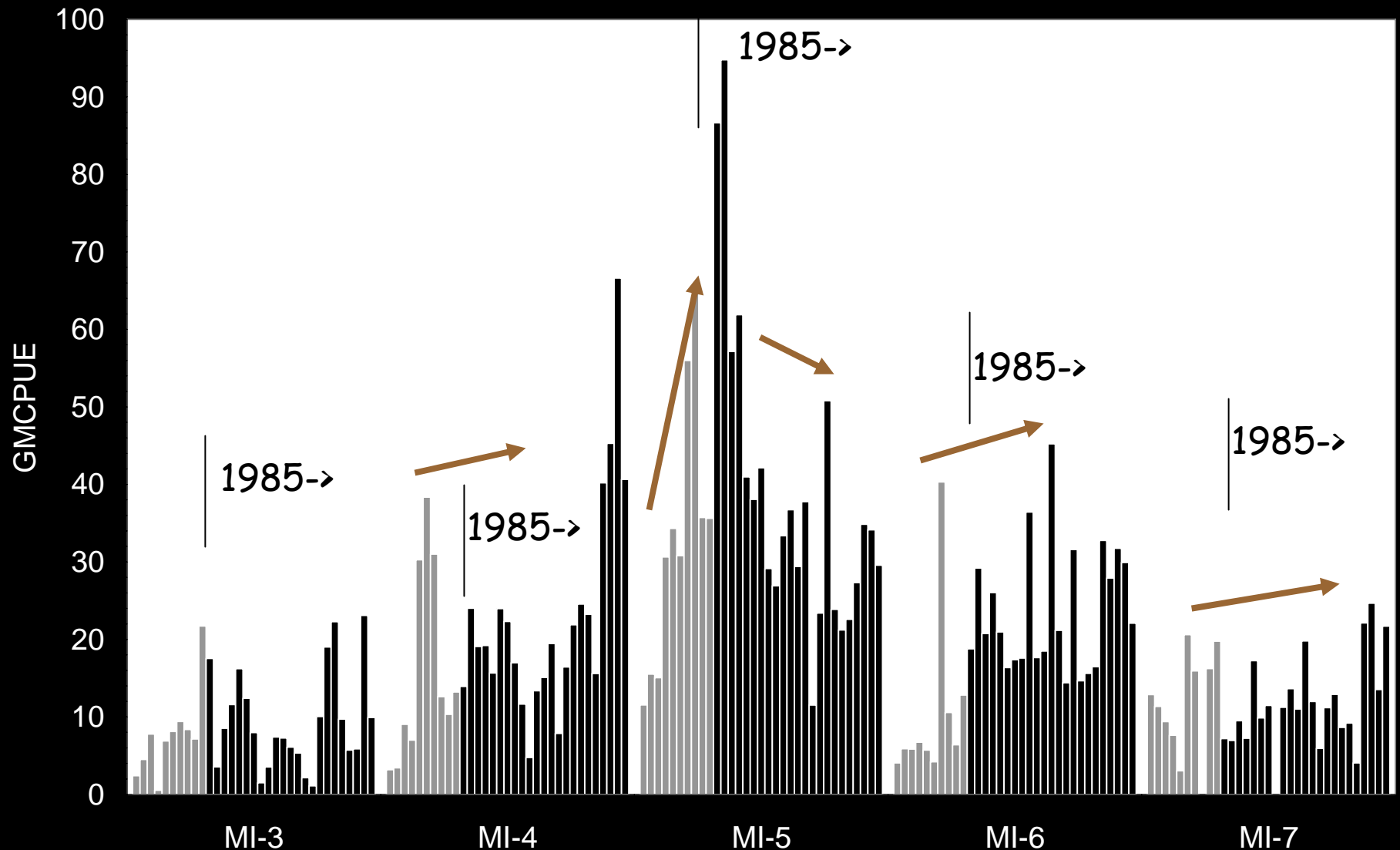
Spring survey catch composition



Proportion of lean lake trout < 432 mm in pre-recruit survey 1985-2008



Relative abundance of adult lean lake trout 1975-2007



Issues with pre-recruit gill net survey in Lake Superior

- Bycatch, net saturation
- Proportion of old/larger fish increasing
- Not getting young lake trout < 250 mm ($<$ age 4)

How do we get these lake trout in Lake Superior?

