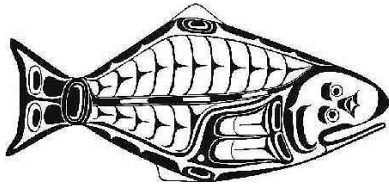


Analysis of the impacts of potential minimum size limit changes

Juan Valero
Steven Hare

RARA (p. 195) and Blue Book (p. 22) related reports

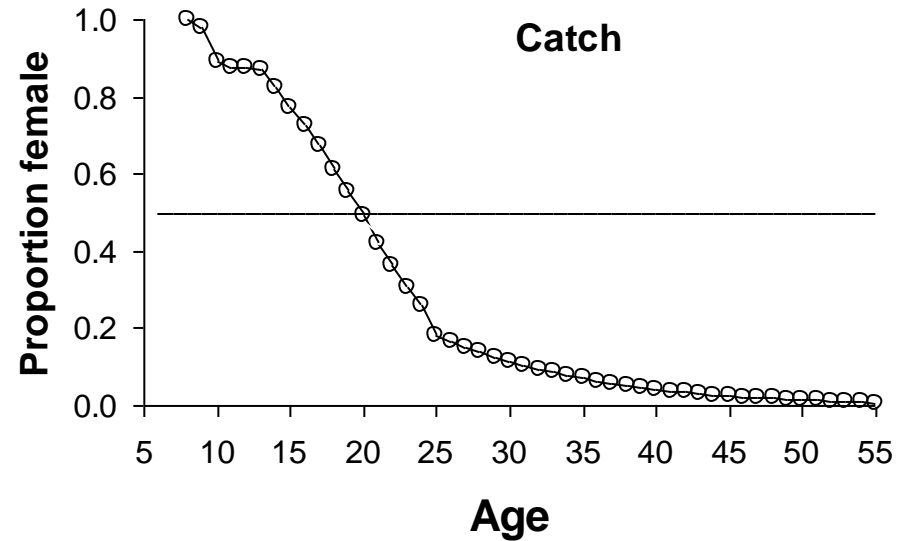
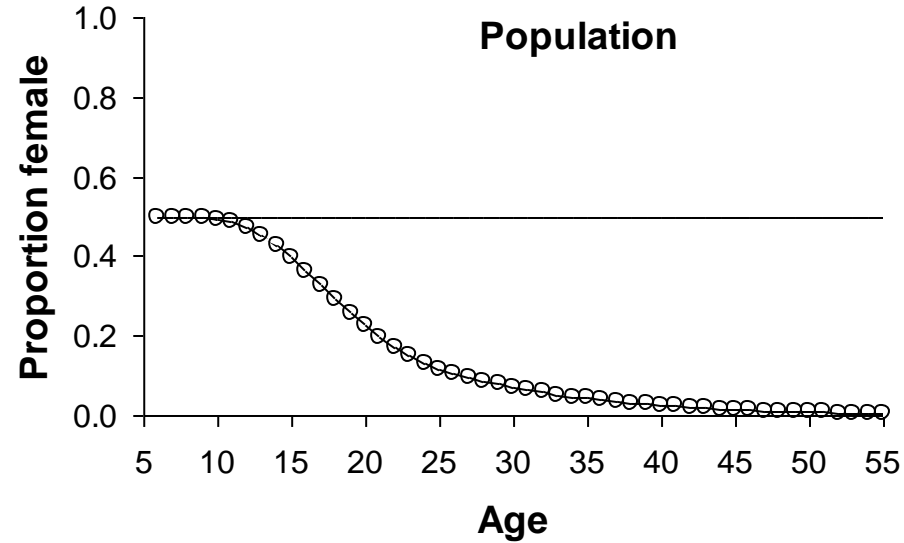
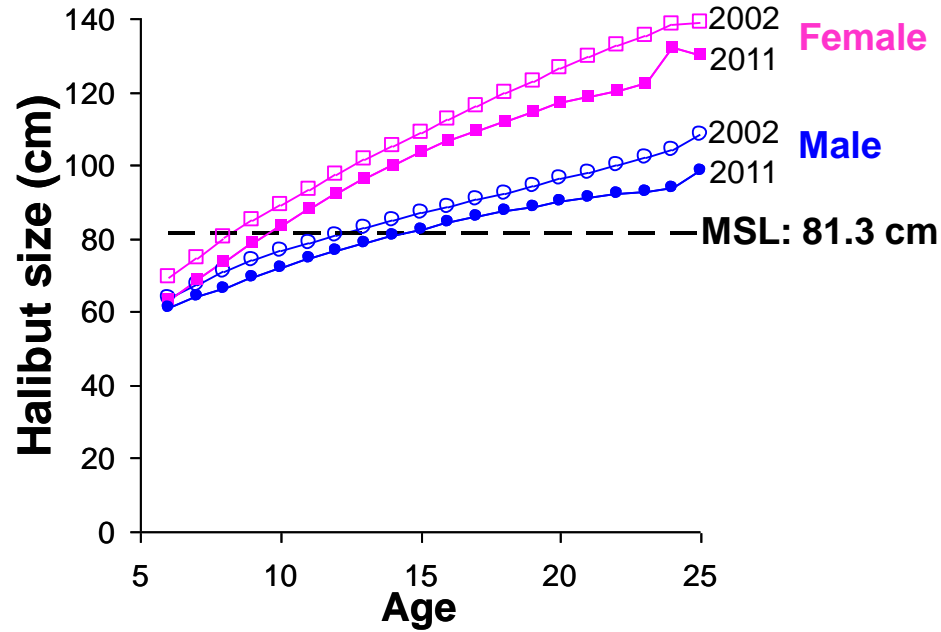


88th IPHC Annual Meeting, Anchorage January 23-27, 2012

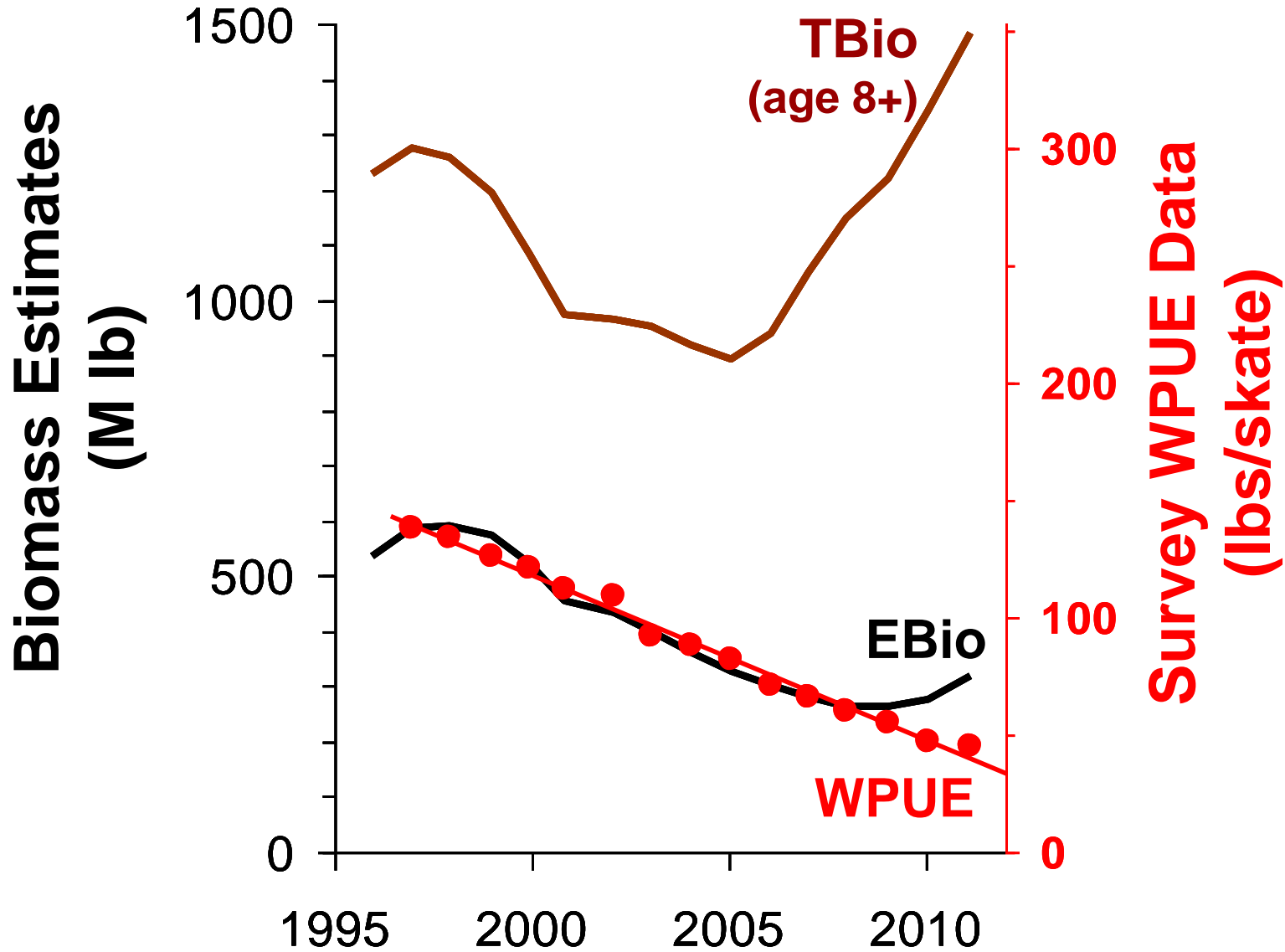
Introduction

- Current minimum size limit (MSL) 32 inches - 81.3 cm
- MSL history:
 - MSL: no limit (1888 to 1943)
 - MSL: 26 inch – 66 cm (1944 to 1973)
 - MSL: 32 inch – 81.3 cm (1974 to present)
- Request to Staff to evaluate potential lower MSL

Rationale for request of analysis of lower MSL

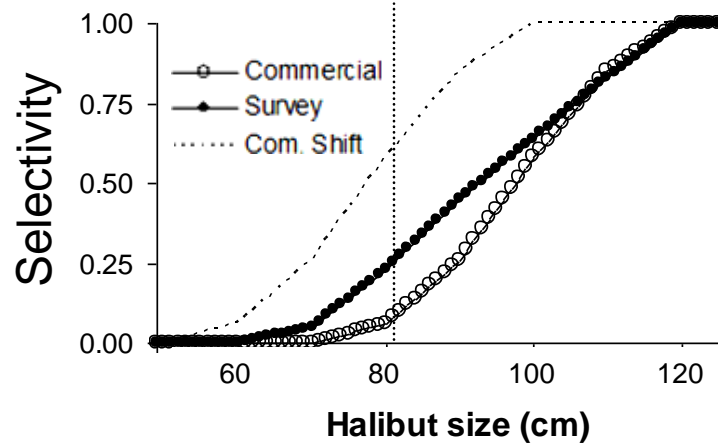


Rationale for request of analysis of lower MSL

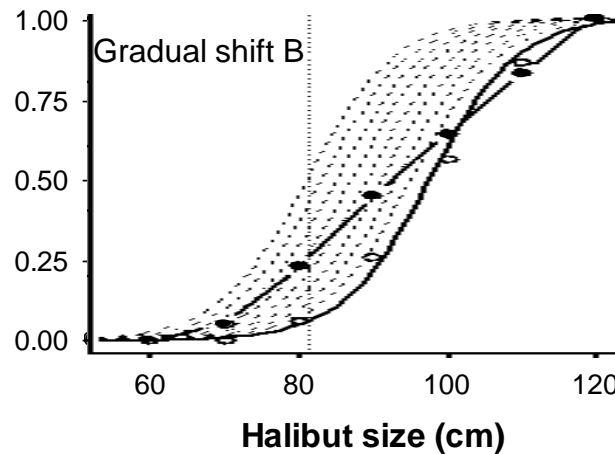
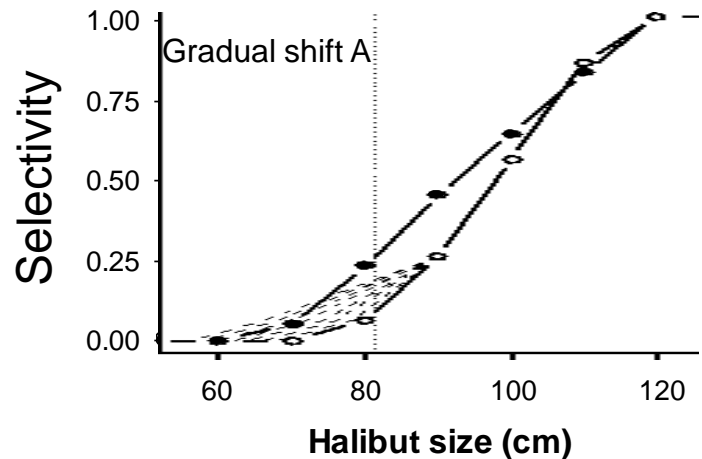


Approaches to evaluate potential lower MSL

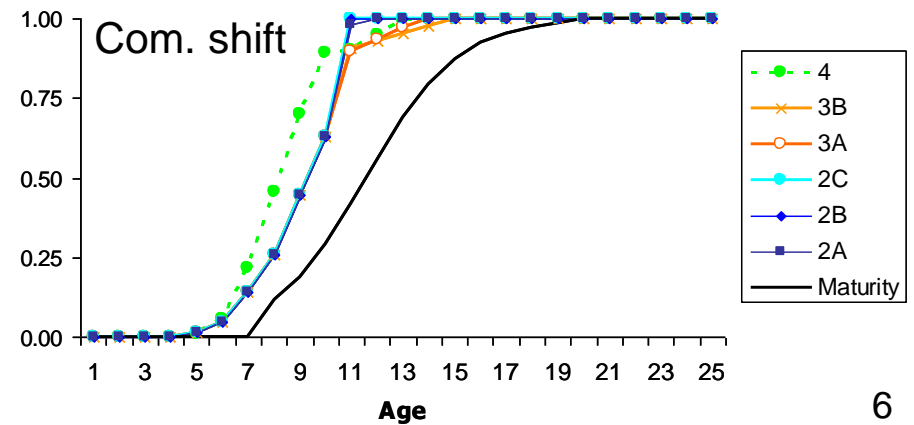
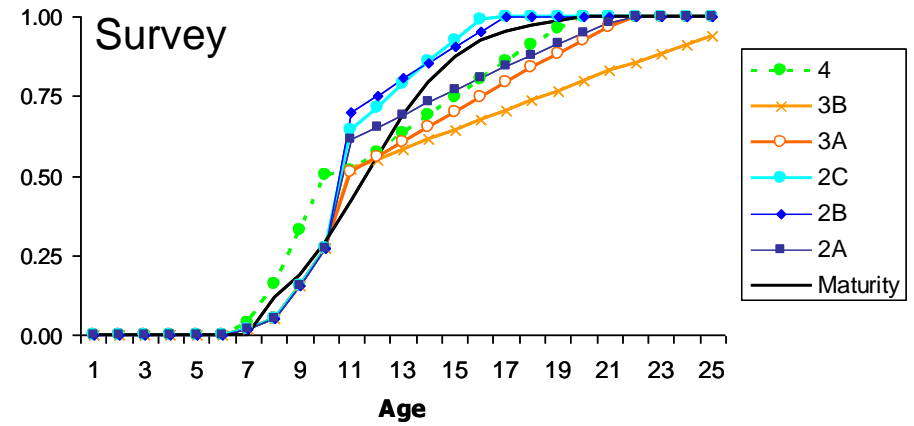
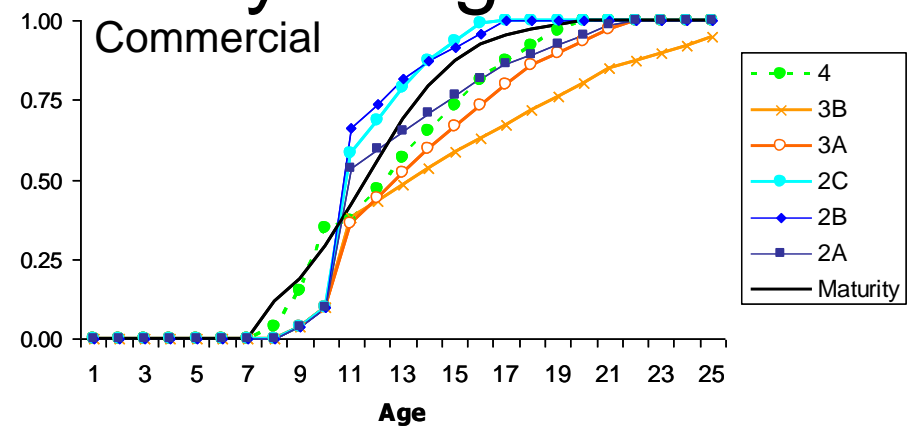
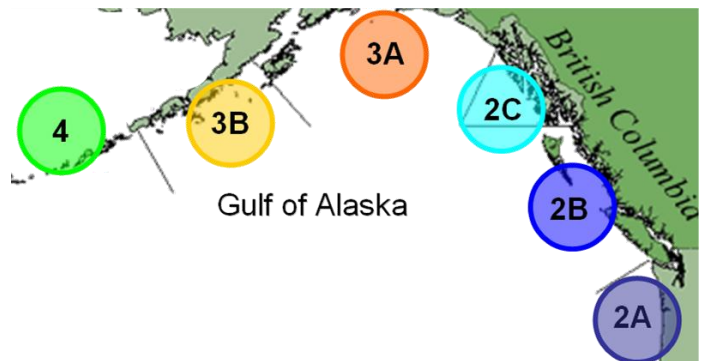
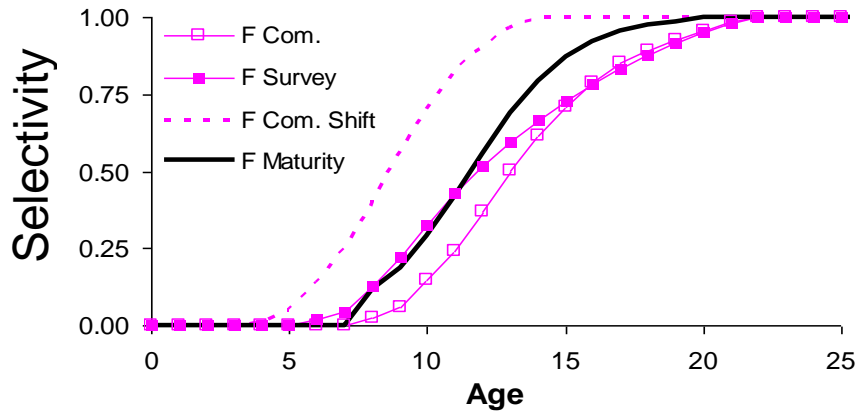
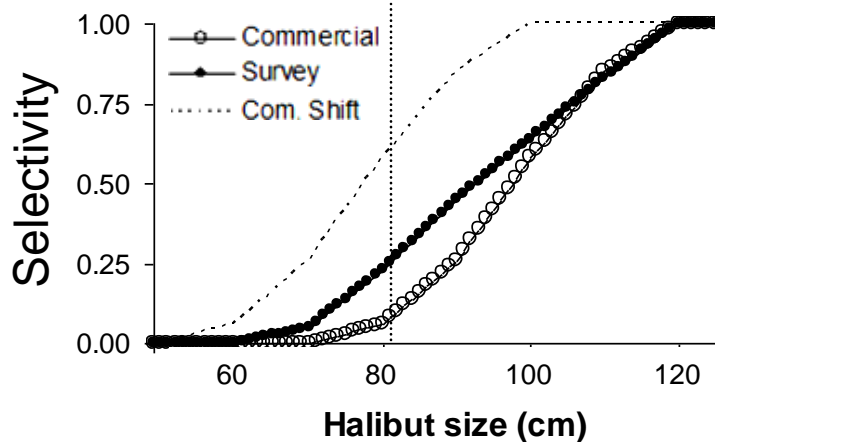
- 1. Female selectivity and maturity at age (life history theory)
- 2. Yield per recruit and biomass per recruit (modeling)
- 3. Migratory yield per recruit and biomass per recruit (modeling)



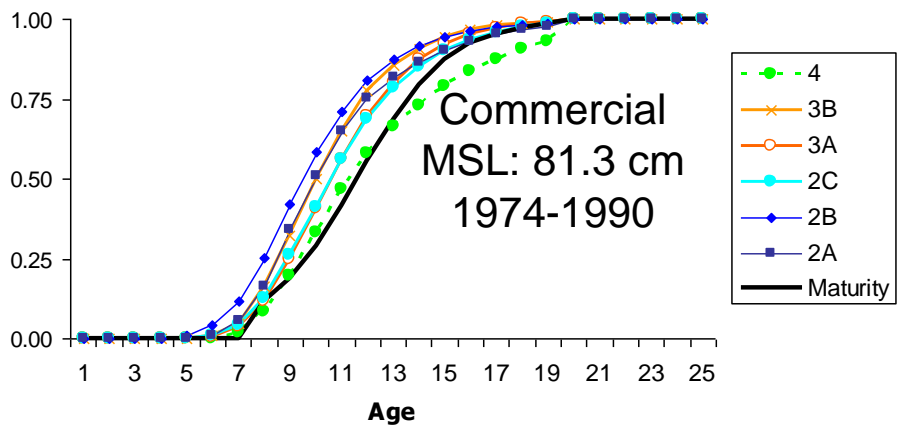
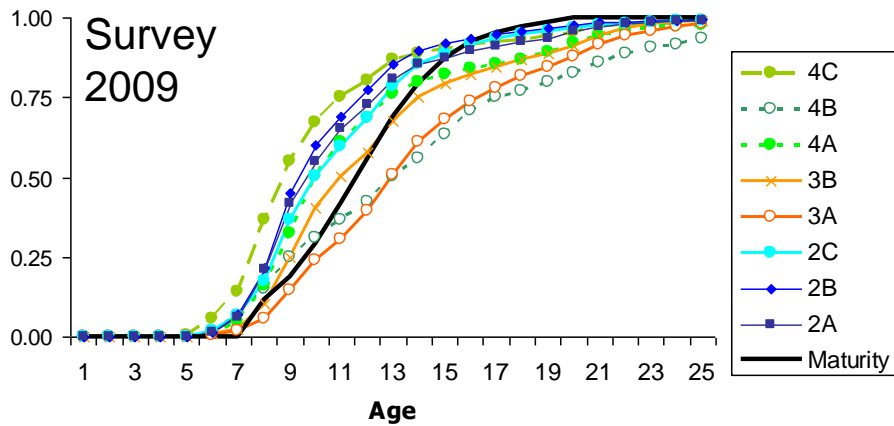
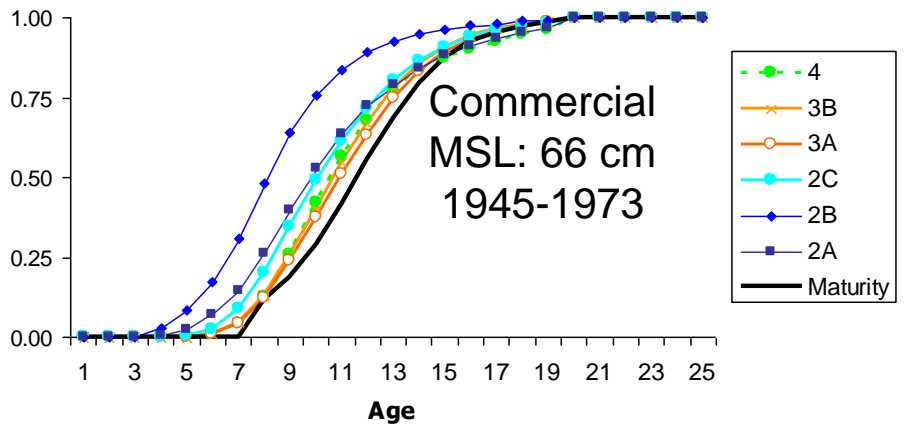
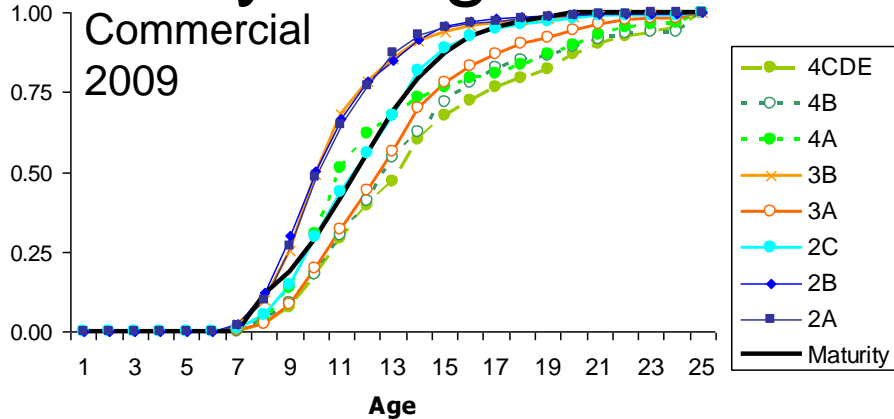
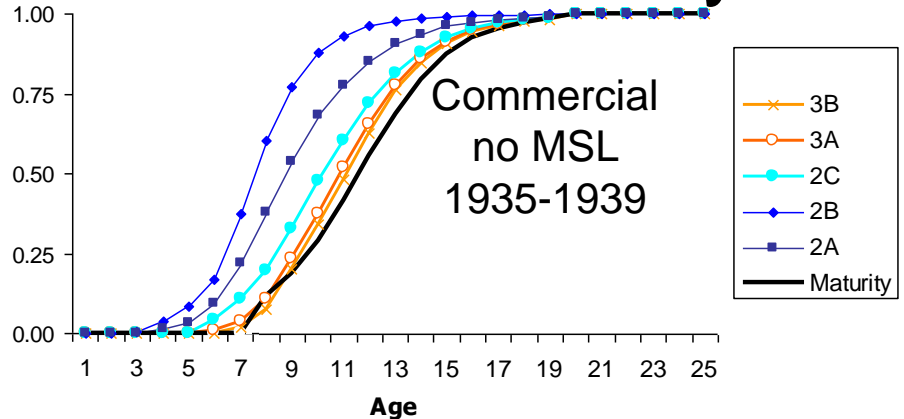
- 4. Gradual changes in selectivity and MSL (modeling)



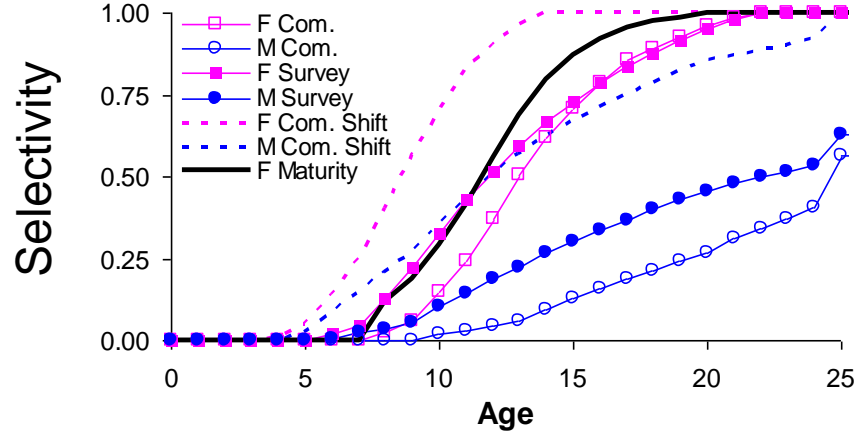
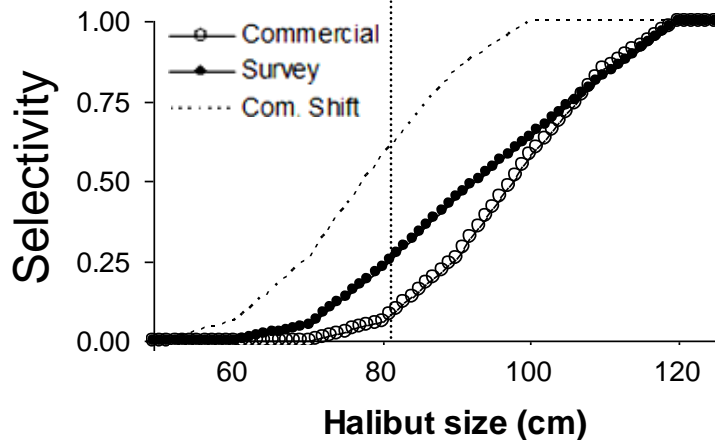
1. Female selectivity and maturity at age



1. Female selectivity and maturity at age



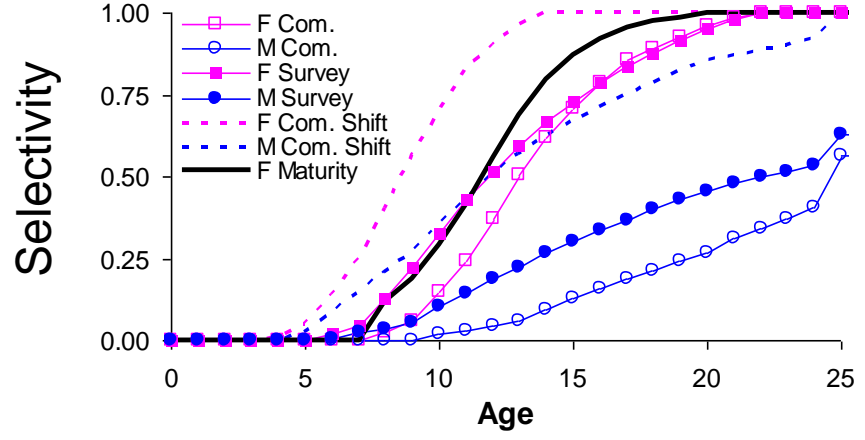
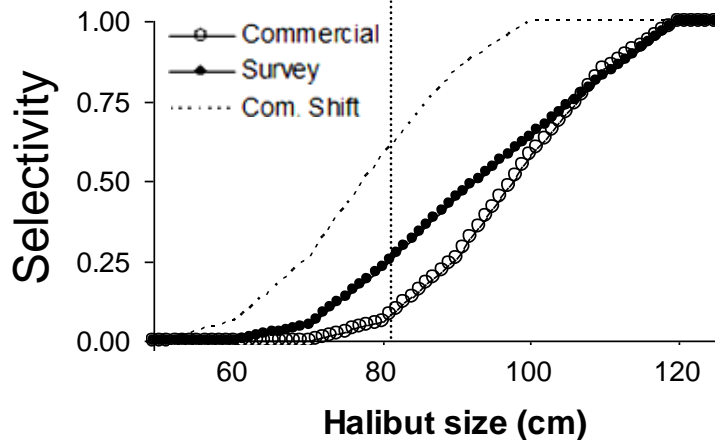
2. Yield and spawning biomass per recruit



<i>Current target HR</i>		Yield per recruit		Spawning biomass per recruit	
Selectivity	HR	lb	Relative to status quo	Relative to max	Relative to status quo
08-10 Commercial	0.215	4.14	1.00	0.37	1.00
08-10 Survey	0.215	4.01	0.97	0.31	0.82
08-10 Commercial shift	0.215	4.72	1.14	0.17	0.47

Current target HR and lower MSL would reduce the level of protection to spawning biomass to 82% and 47% of the protection provided by the current MSL

2. Yield and spawning biomass per recruit

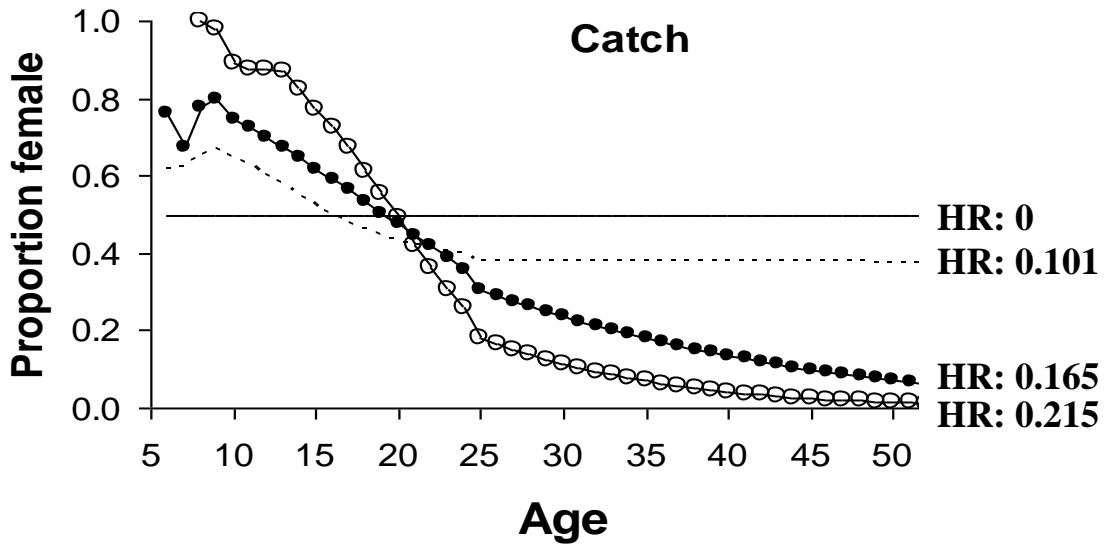
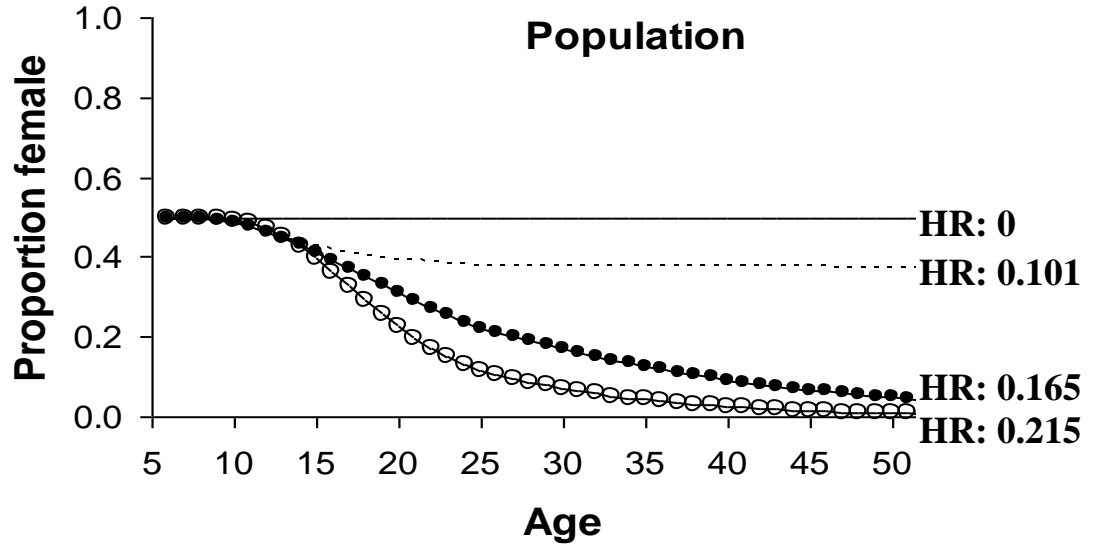
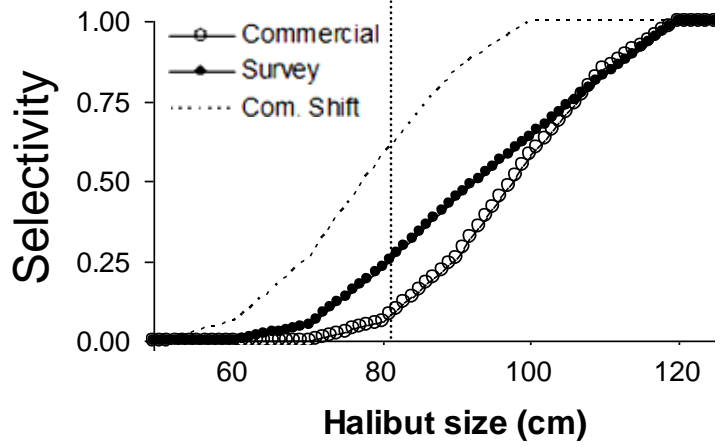


Constrained to have the same protection to spawning biomass

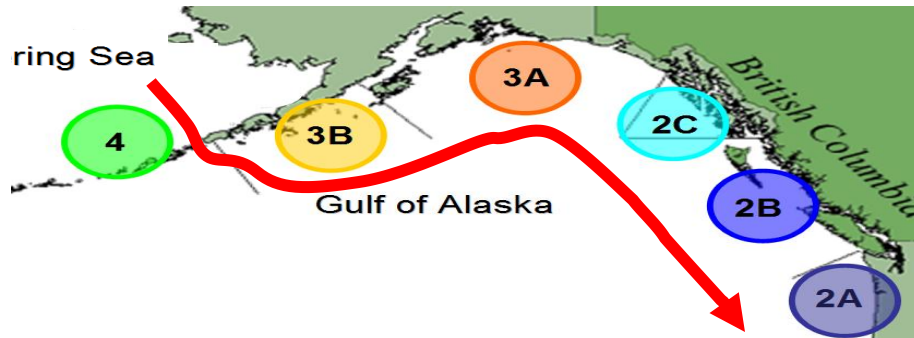
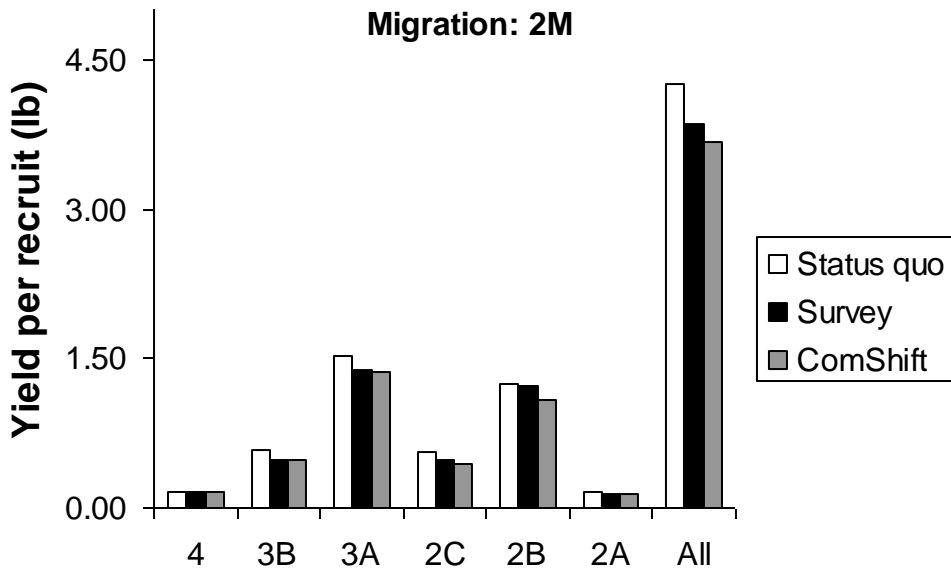
<i>HR SPR_{ratio} equivalent</i>		Yield per recruit		Spawning biomass per recruit	
Selectivity	HR	lb	Relative to status quo	Relative to max	Relative to status quo
08-10 Commercial	0.215	4.14	1.00	0.37	1.00
08-10 Survey	0.165	3.67	0.89	0.37	1.00
08-10 Commercial shift	0.101	3.75	0.91	0.37	1.00

The target HR would have to be reduced to have the same level of protection to spawning biomass if using lower MSL, yet the yield per recruit would be lower than with the current MSL

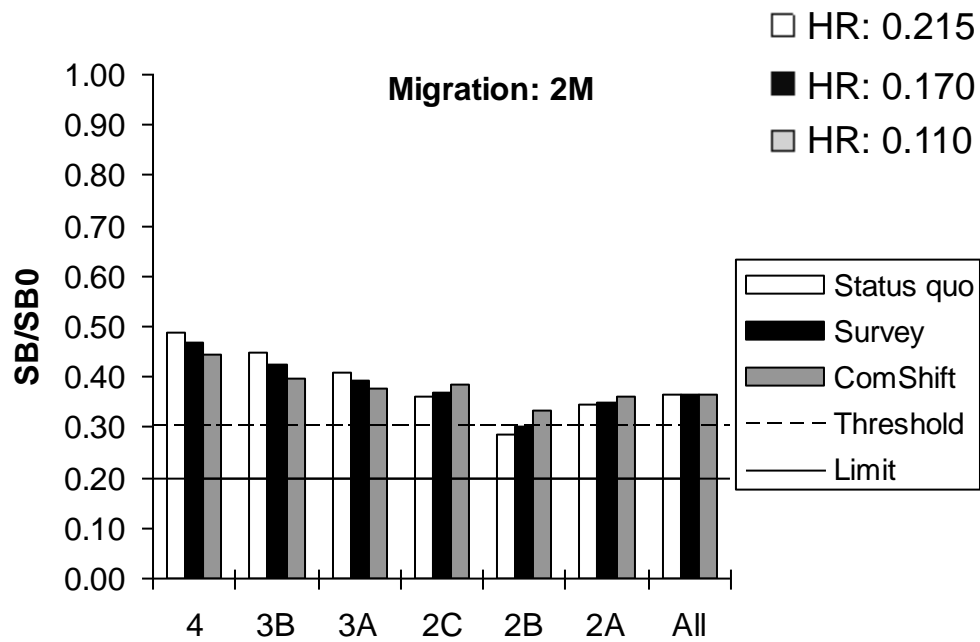
2. Yield and spawning biomass per recruit



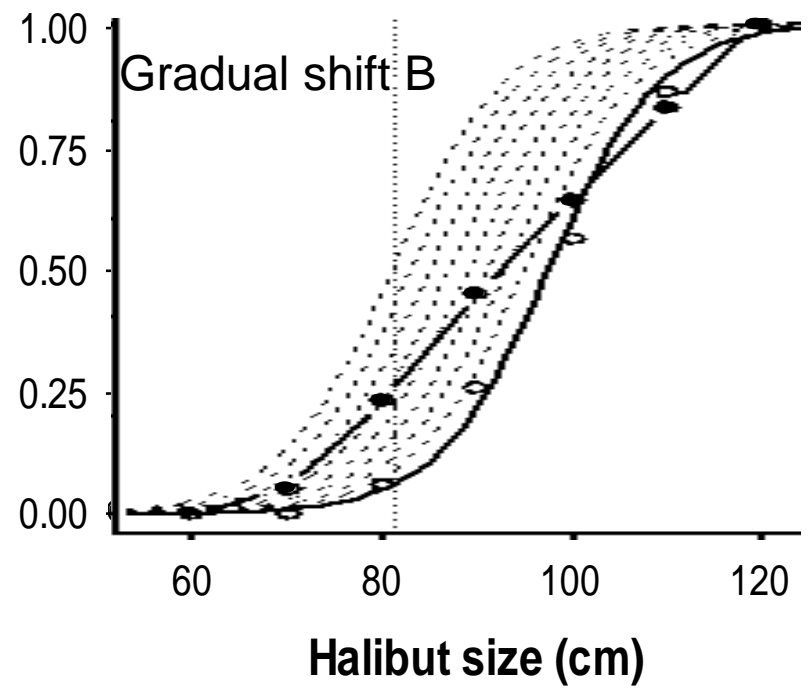
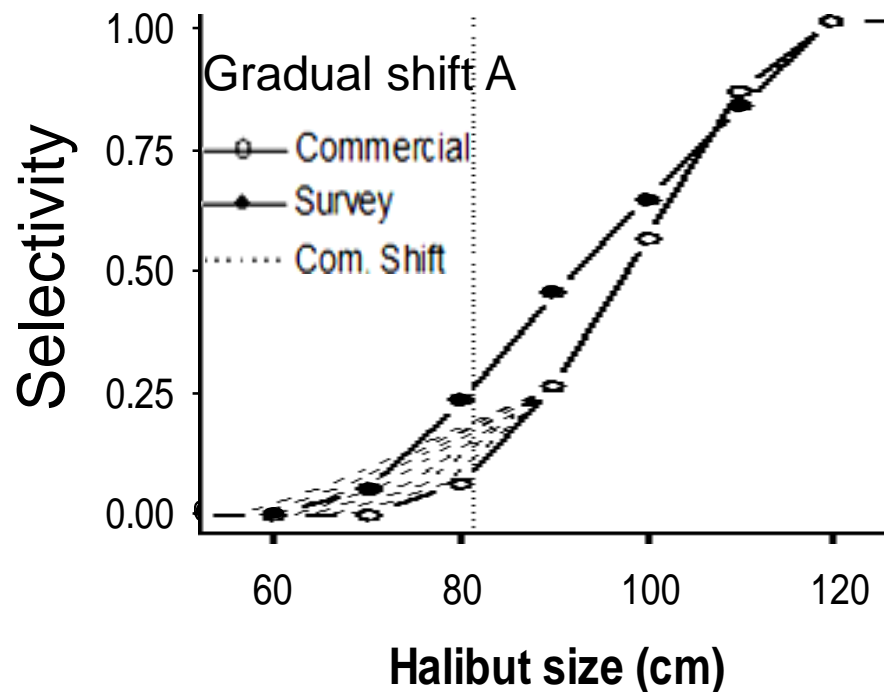
3. Migratory yield and biomass per recruit



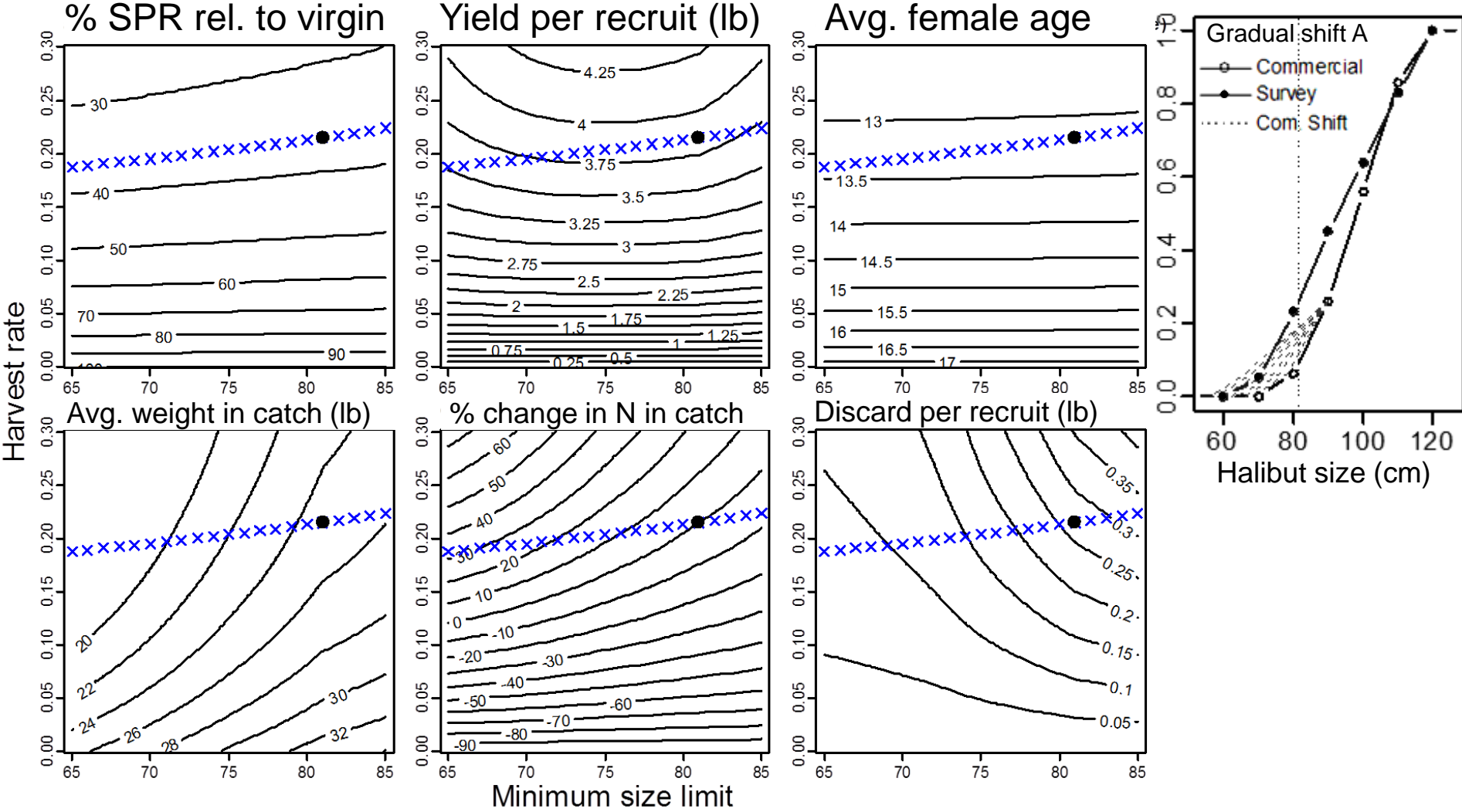
Migration following two scenarios:
1M: One migration matrix for all sizes based on PIT tagging
2M: Two migration matrices by size < 65 cm tagging of juveniles > 65 cm PIT tagging



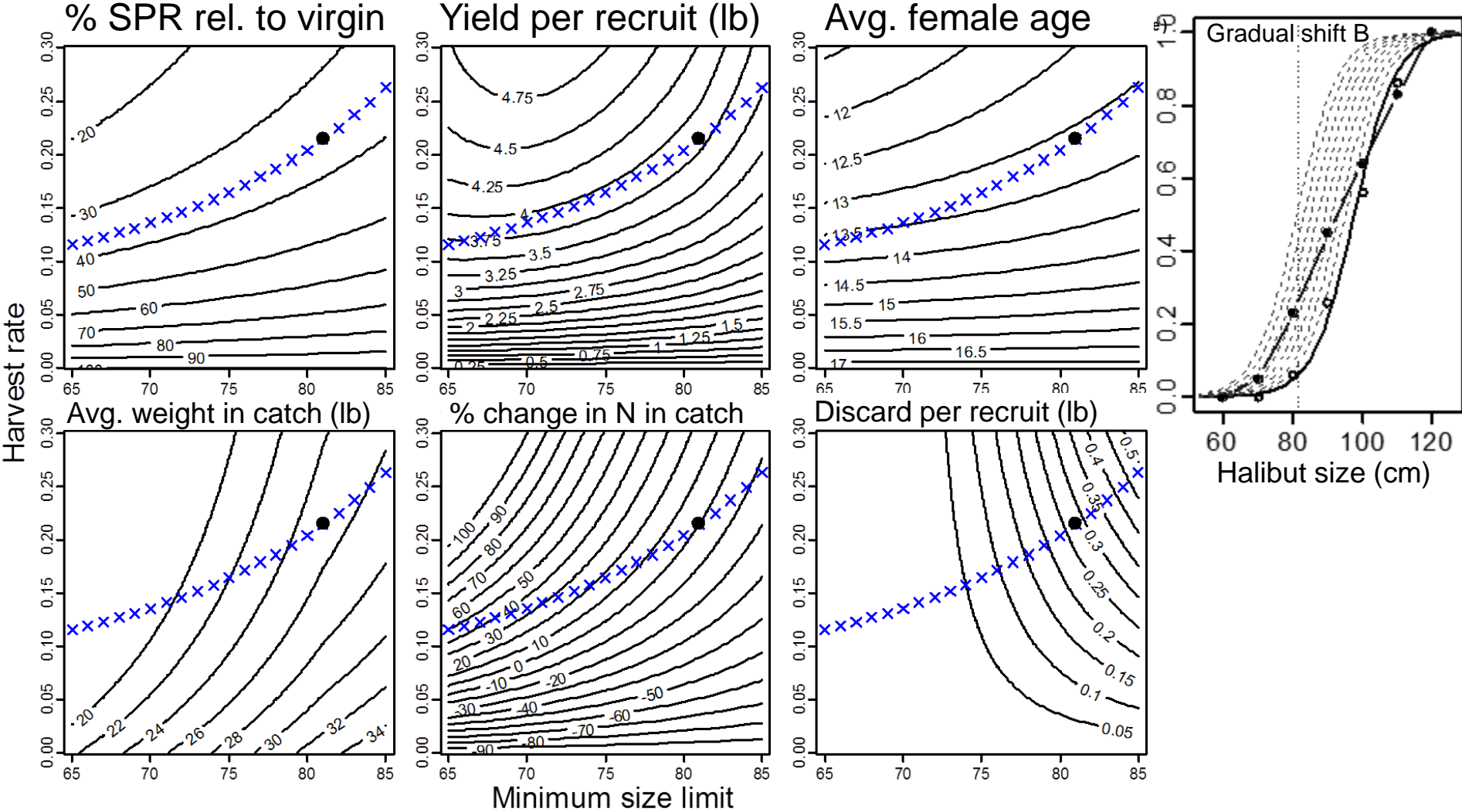
4. Gradual changes in selectivity and MSL



4. Gradual changes in selectivity and MSL

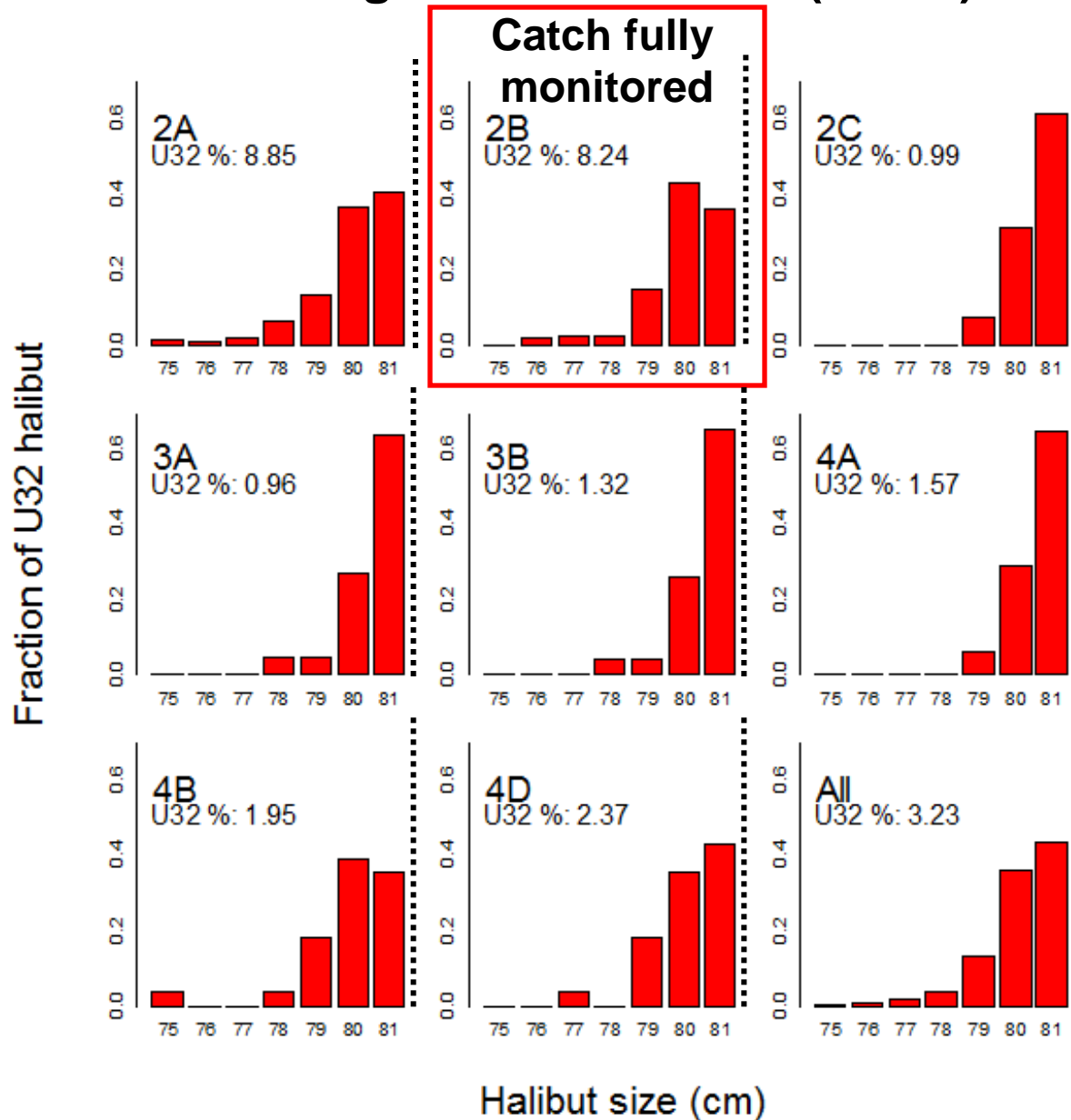


4. Gradual changes in selectivity and MSL

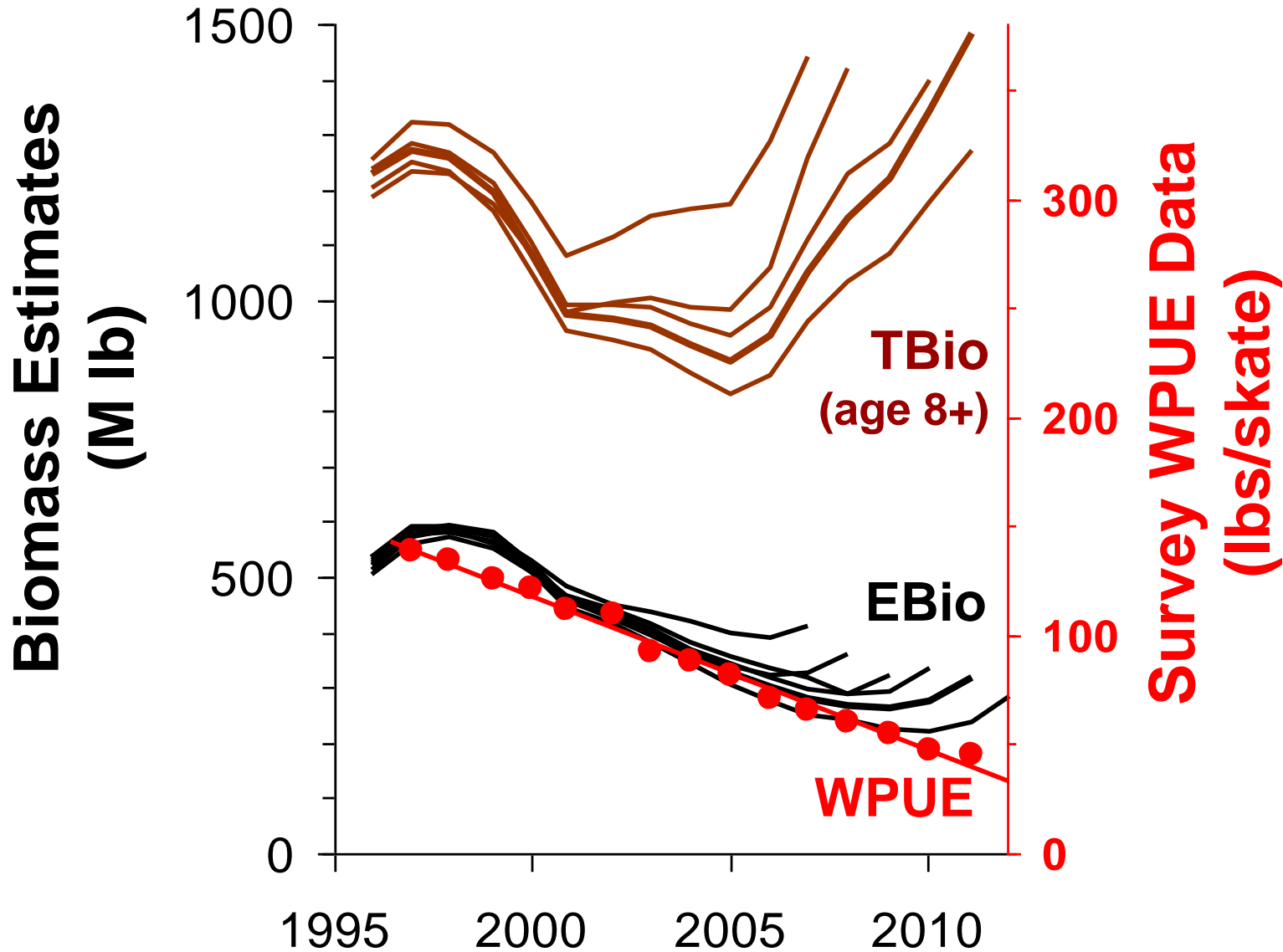


Can we monitor effects of MSLs in commercial selectivity and catch?

% of commercial landings below the MSL (U32%) and fraction by size



Overestimation of biomass and reversal of increasing trends: **retrospective bias**



- 1. Female selectivity and maturity at age
 - With current MSL areas 2A, 2B and 3B have larger capture of immature females than other areas
 - Lower MSL increases catch of immature females up to 4 years before they mature (model results and historic periods with different MSL)
 - Lower MSL not precautionary based on life history theory
- 2. Yield per recruit and biomass per recruit
 - Current target HR: 0.215 and survey or shifted commercial selectivities reduces SPR to 82% and 47% of the status quo.
 - SPR_{ratio} equiv. HR: 0.165 and 0.101 result in ~10% lower yield per recruit
- 3. Migratory yield per recruit and biomass per recruit
 - Similar to single area results, SPR_{ratio} lower in Area 2 than Area 3
- 4. Gradual changes in selectivity and MSL
 - Lower MSL reduces yield and spawning biomass per recruit with SPR_{ratio} equivalent HR. Only increase in yield per recruit is at most 3%, would require precise control of HR: 0.16. Females in the population change at most from 44% to 45% (ages 6+) and from 12% to 22% (age 25)
- **Conclusion: Lowering MSL is not supported by analyses**

