

PIT Tag Recoveries from 2003-2007

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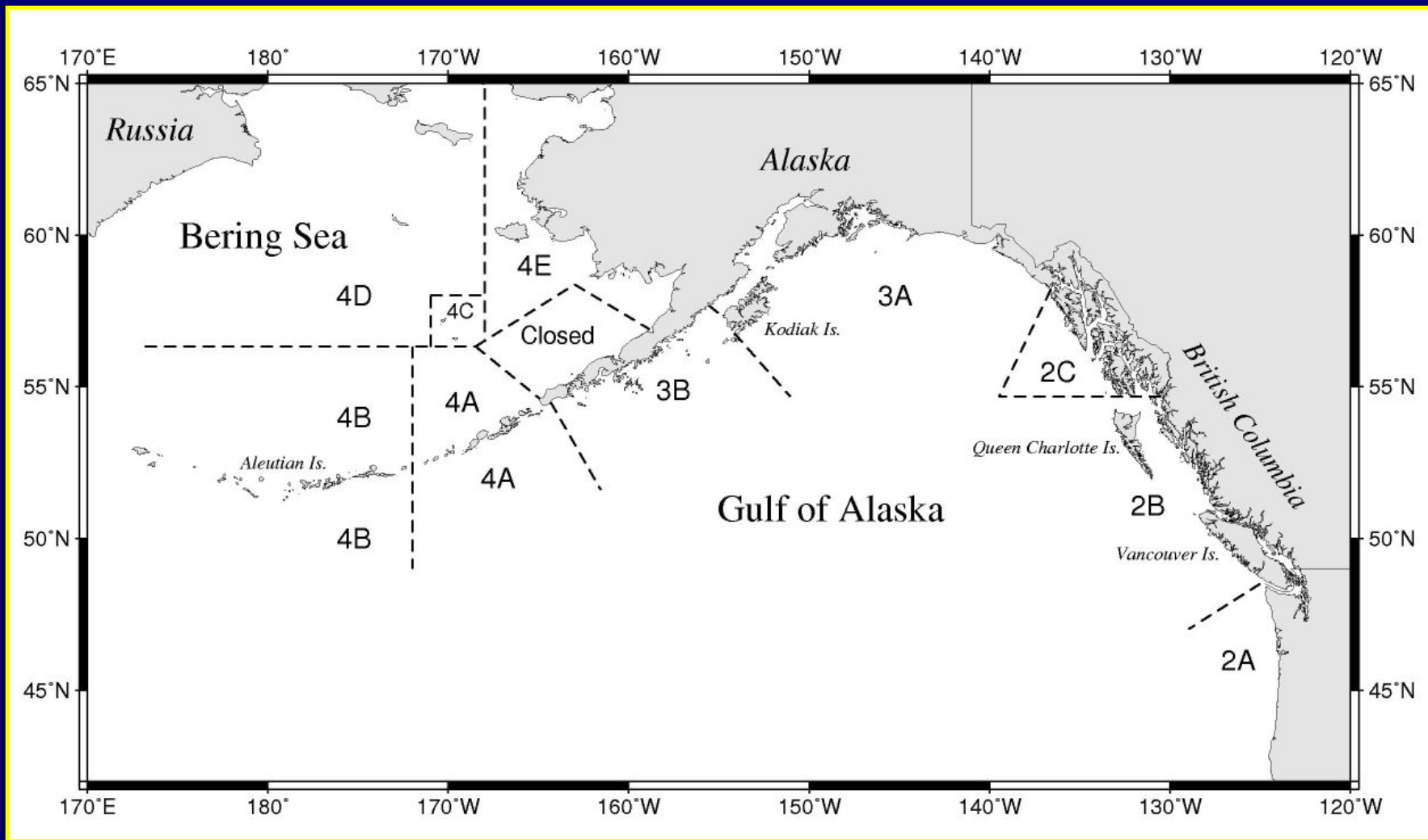


PIT Tag Releases

- 2003: catch on three skates (300 hooks) tagged and released at every survey station coastwide (about 44,000 fish).
- 2004: same release procedure in Areas 2B and 3A only (about 23,000 fish).

Goals

- The goals of the study include:
 - Estimating commercial harvest rates in each regulatory area
 - Estimating migration rates among regulatory areas
 - Estimating the rate of natural mortality



IPHC regulatory areas

2007 Tag Recoveries

- 487 tags were recovered up to Nov 15 2007:
 - 293 from 2003 releases
 - 194 from 2004 releases
- Total recoveries were fewer than in previous years, mainly due to large decreases in Areas 2B and 2C
- Only 4D recoveries showed an increase in 2007



Recoveries of tagged fish in 2007

Release Area	Releases 2003-04	Recovery Area, 2007									Recoveries 2007
		4D	4C	4B	4A	3B	3A	2C	2B	2A	
4D	979	15			1			1	1		18
4C	0										0
4B	1128										0
4A	3452				5	3	7	2	2		19
3B	15282				1	43	35	6			85
3A	36754					17	271	3	2		293
2C	3675						3	30	2	1	36
2B	5802						1	2	31	1	35
2A	299										0
Total	67371	15	0	0	7	63	317	44	38	2	486

Recoveries of tagged fish from 2003-2007

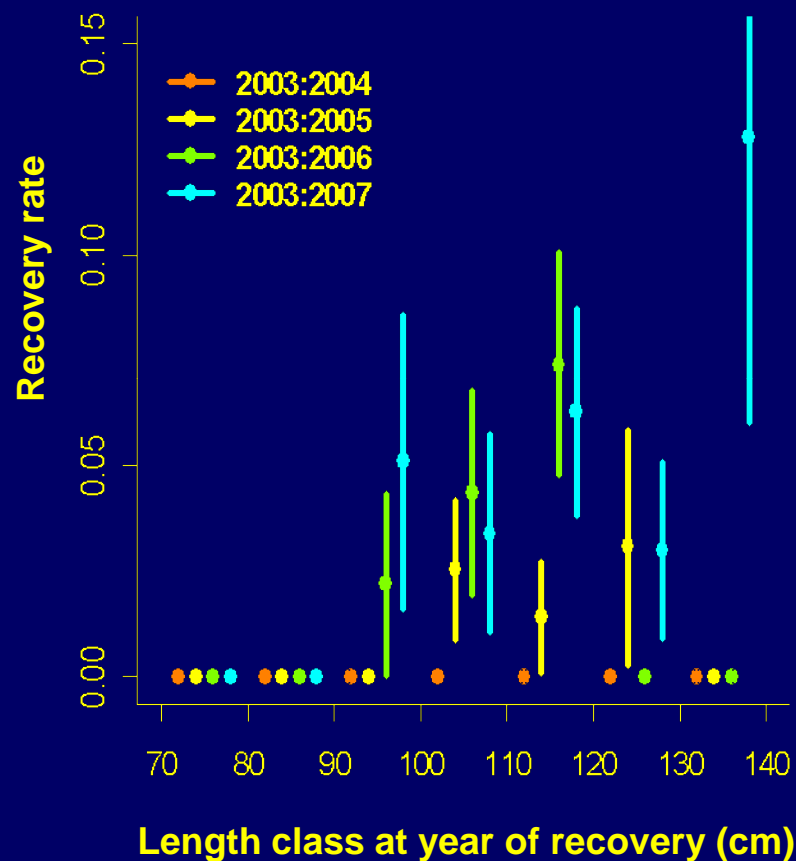
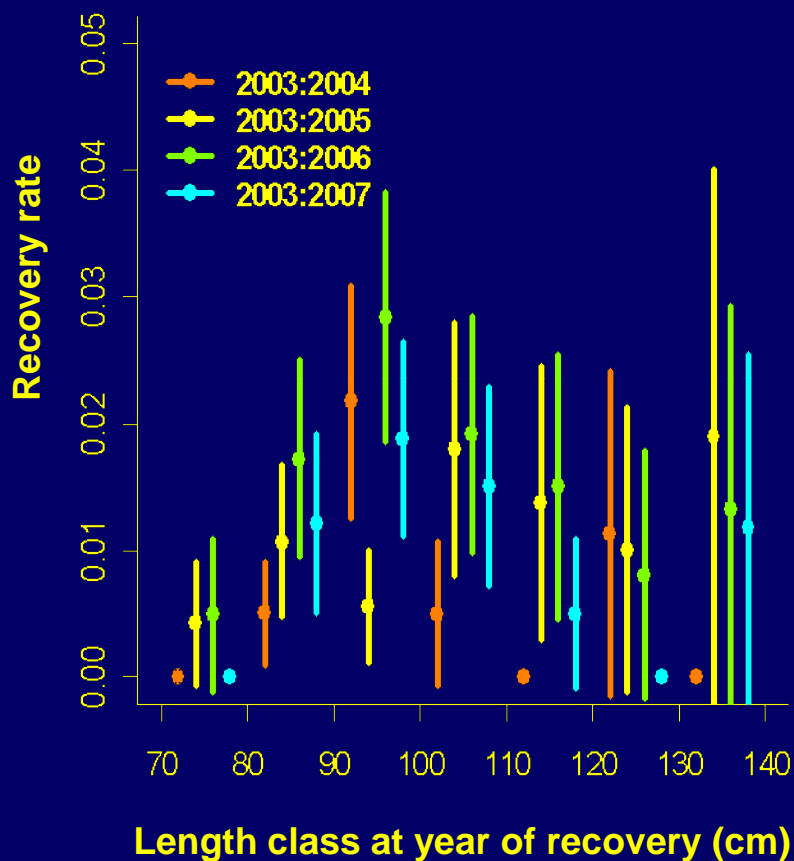
Release Area	Releases 2003-04	Recovery Area, 2003-07									Recoveries 2003-07
		4D	4C	4B	4A	3B	3A	2C	2B	2A	
4D	979	30			2		1	1	2		36
4C	0										0
4B	1128			5			1	1	1		8
4A	3452		1	3	33	9	20	9	11		86
3B	15282				2	272	107	16	9		406
3A	36754				1	91	1135	27	18		1272
2C	3675						10	250	35	3	298
2B	5802				1		1	10	313	5	330
2A	299								3	1	4
Total	67371	30	1	8	39	372	1275	314	392	9	2440

Recovery rates by 10cm length class for 2004-07, adjusted for scanning rates

Release Areas 4A & 4D

Area 4A: 3452 tags

Area 4D: 979 tags

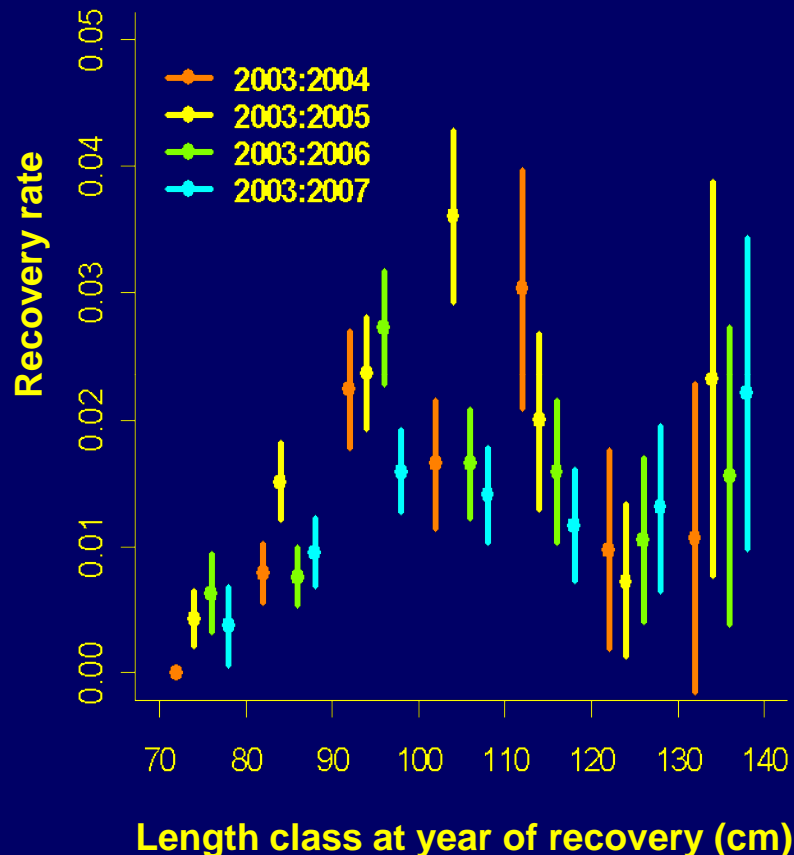
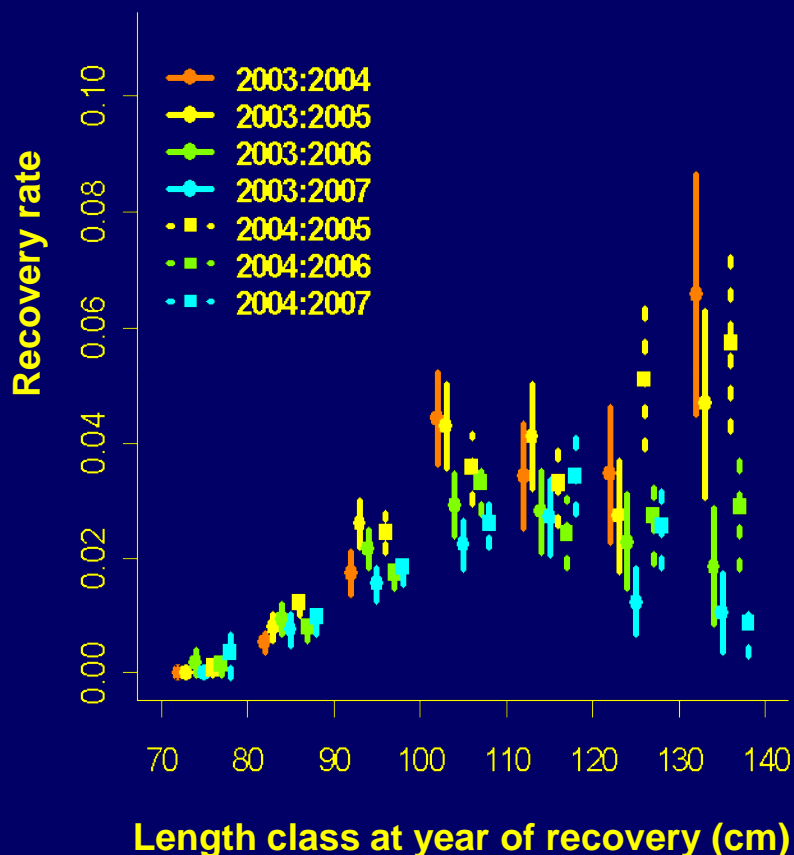


Recovery rates by 10cm length class for 2004-07, adjusted for scanning rates

Release Areas 3A & 3B

Area 3A: 36754 tags

Area 3B: 15282 tags

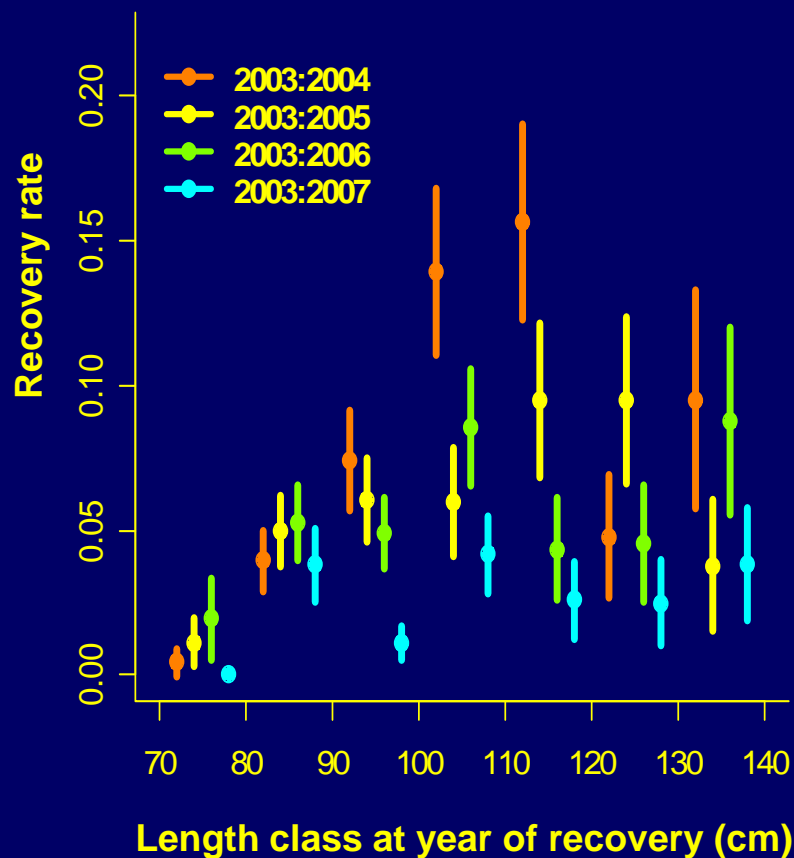
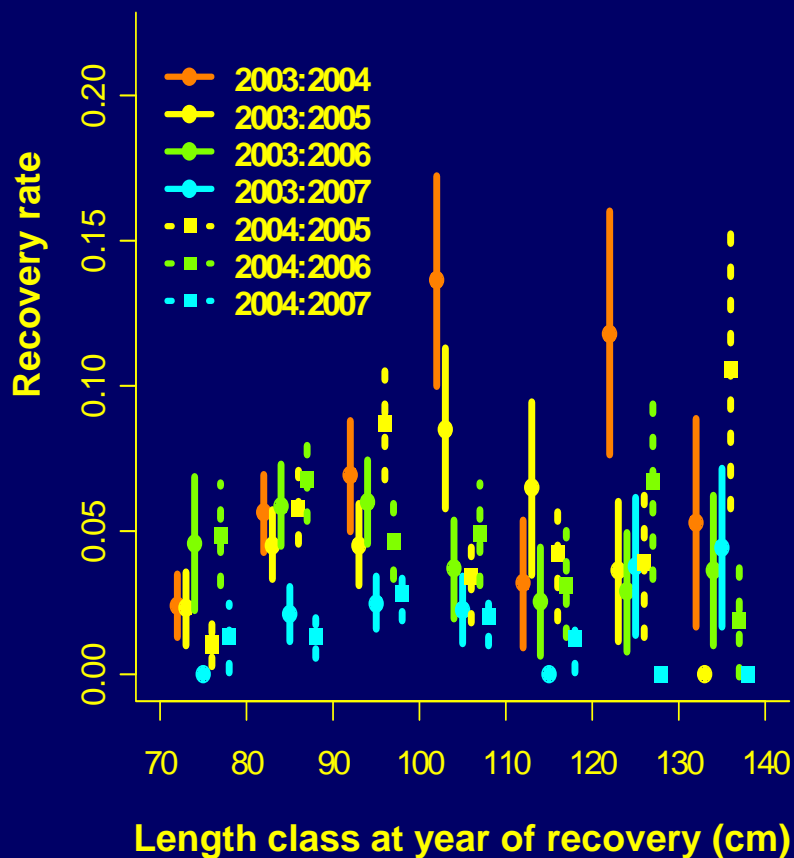


Recovery rates by 10cm length class for 2004-07, adjusted for scanning rates

Release Areas 2B & 2C

Area 2B: 5802 tags

Area 2C: 3675 tags



Tag-recovery Analysis

- We fitted a sequence of plausible statistical models to the data and selected the “best” fitting of these:
- Commercial fishing mortality, F , depends on:
 - Regulatory area
 - Fish length
 - Year

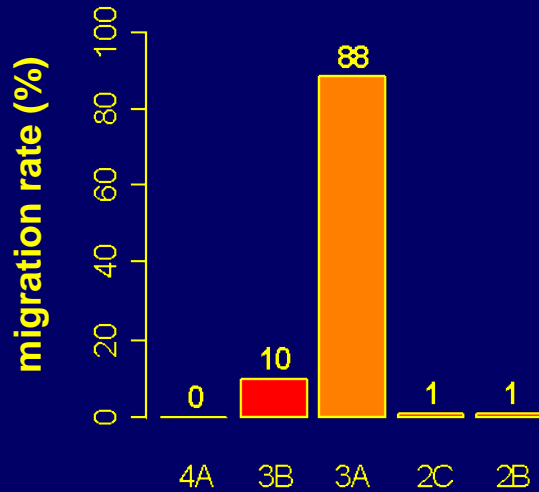
And: Migration rates in the first year differ from those in subsequent years.

Fish Migration

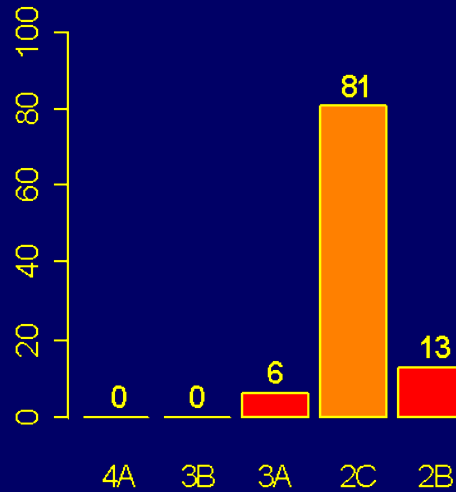
- With constant annual migration, we expect out-of-area recoveries to increase with time since release.
- The raw data imply there are high rates of annual migration eastward from Areas 3B and 4A.
- But rates of out-of-area recoveries for other Areas 2B, 2C and 3A change little with time.

Estimated annual migration rates for Areas 3A, 2C and 2B

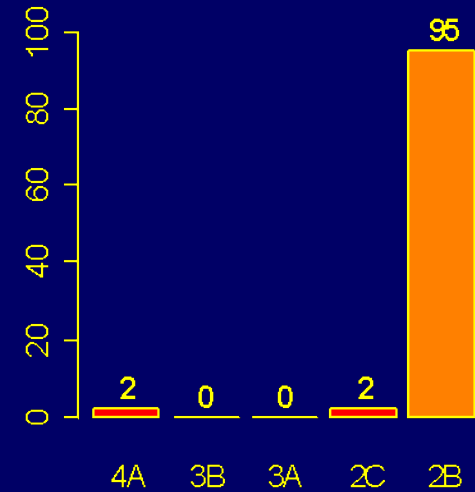
3A, 1st year



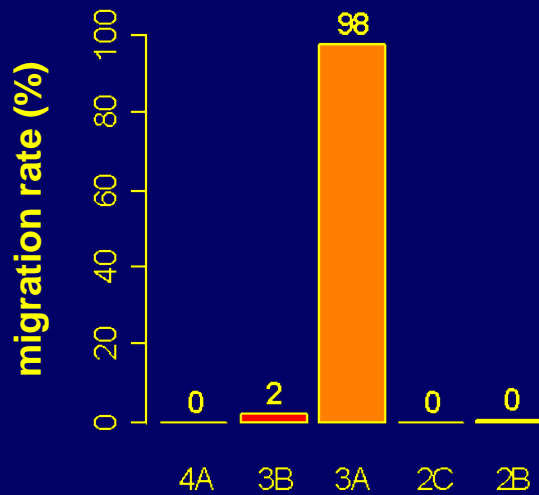
2C, 1st year



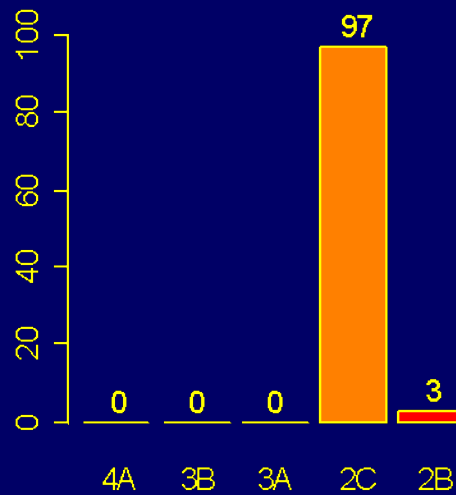
2B, 1st year



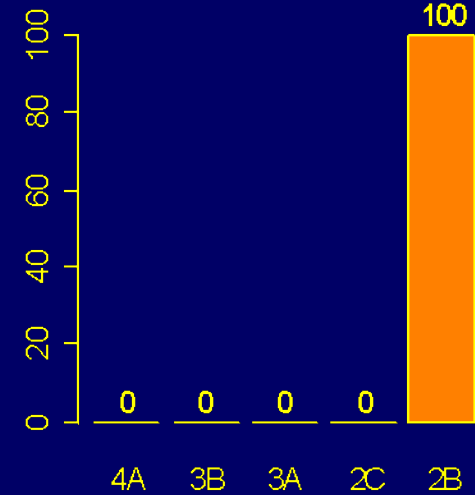
3A, years 2-4



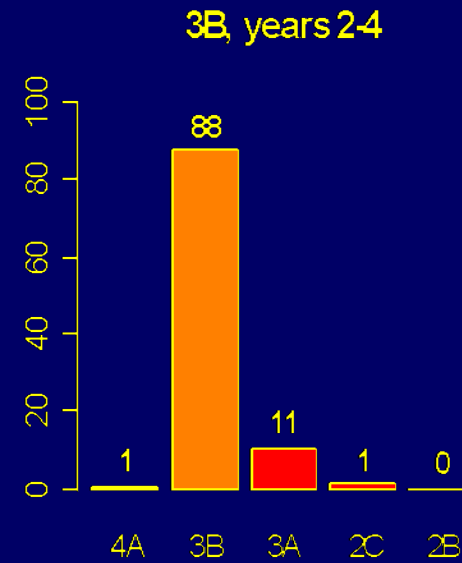
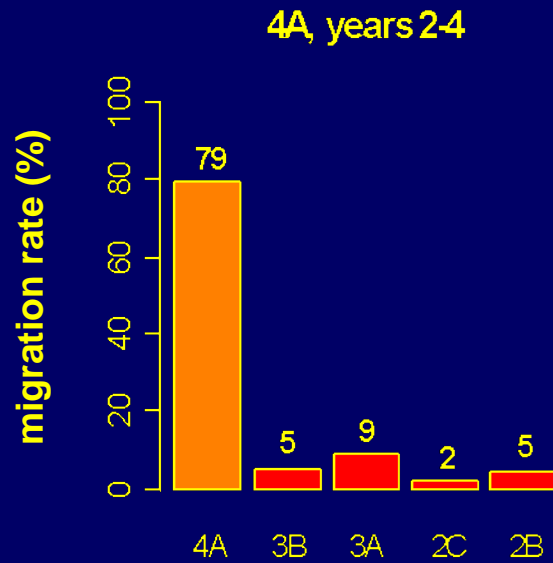
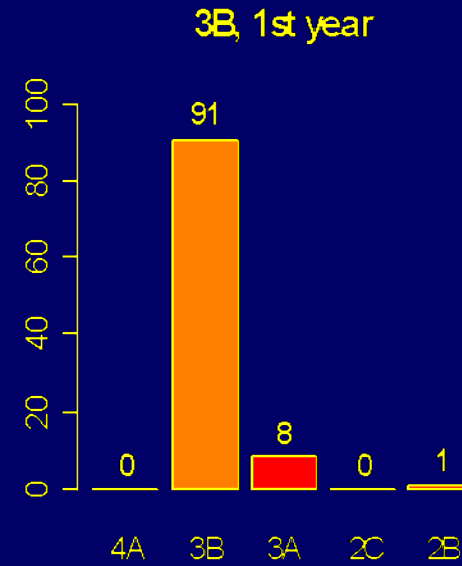
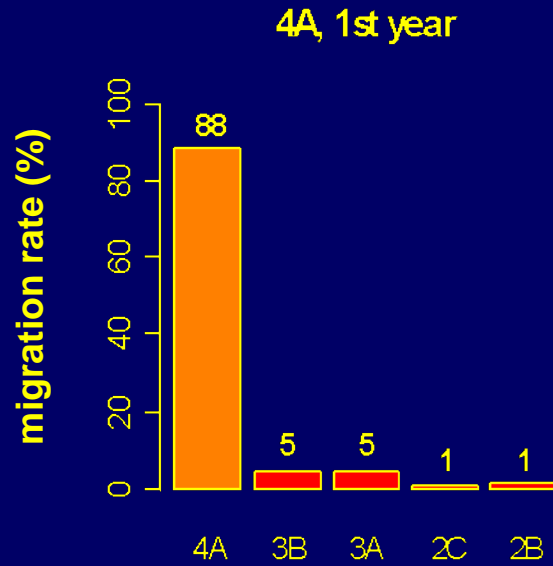
2C, years 2-4



2B, years 2-4



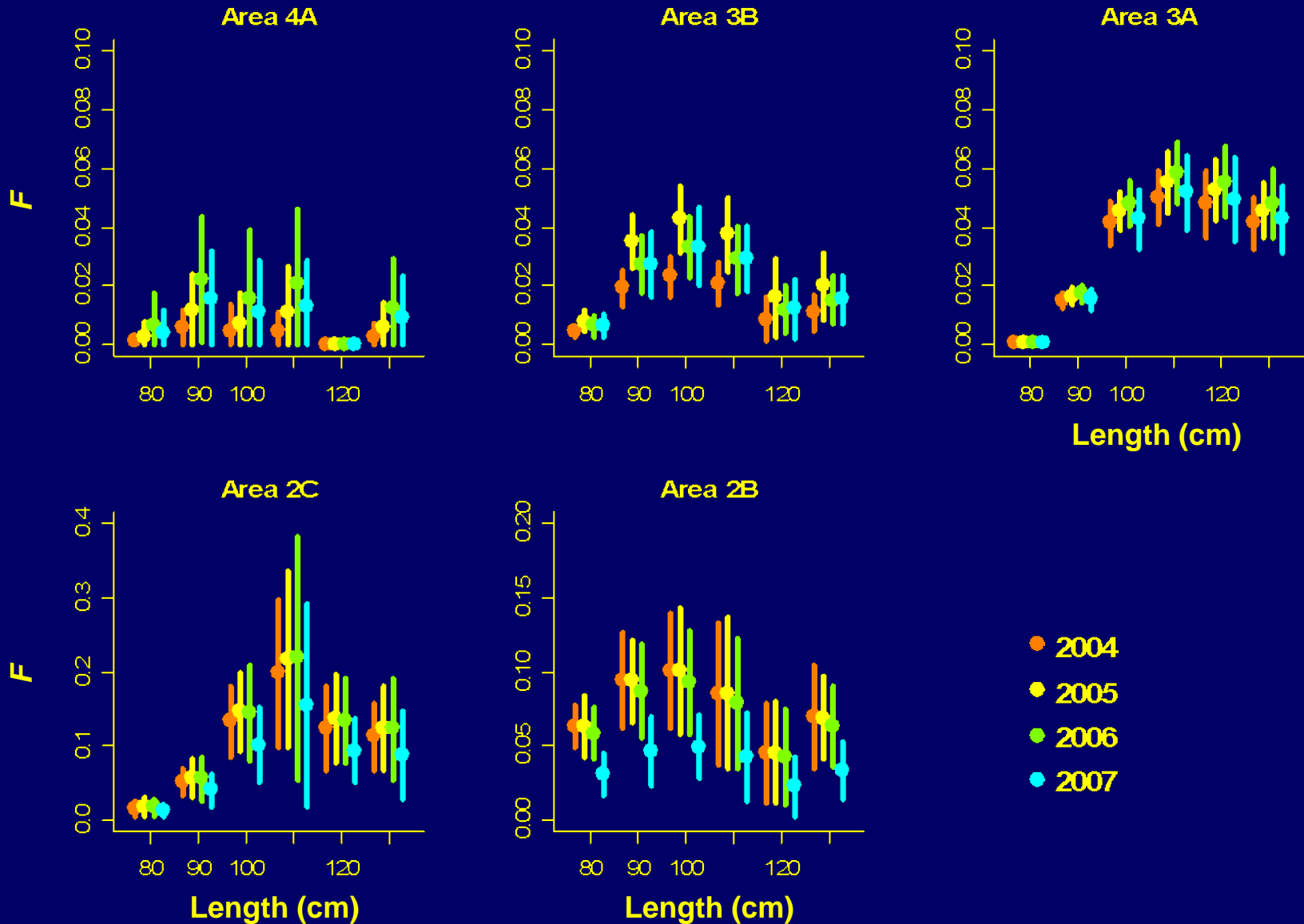
Estimated annual migration rates for Areas 4A and 3B



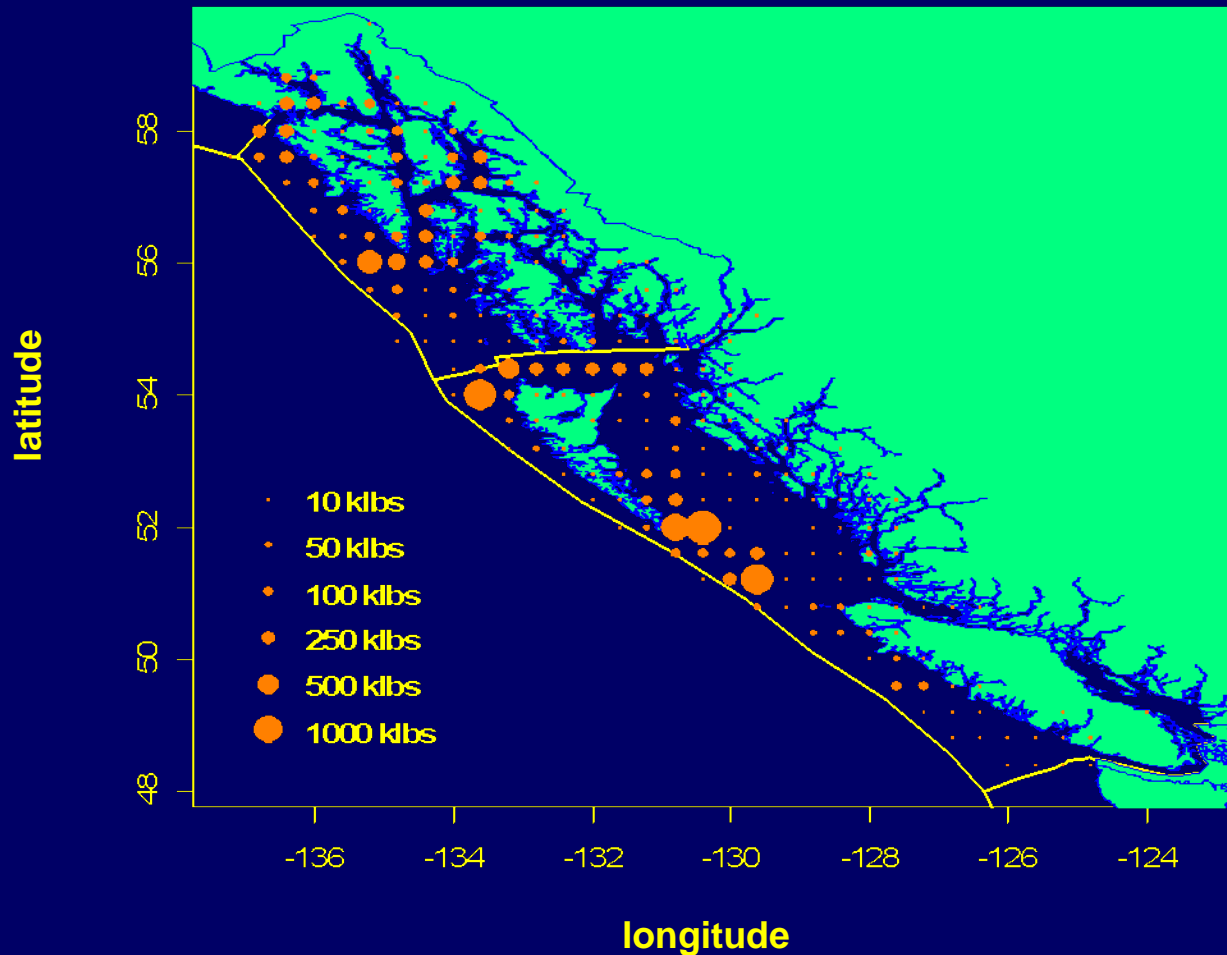
Migration from Areas 3A, 2C and 2B

- Estimates of migration rates are much higher in the year following release than in subsequent years.
- Possible explanations:
 - Movement mainly occurs in the first year following release.
 - Some out-of-area recoveries are seasonal migrants.
 - Part of the population cannot migrate.

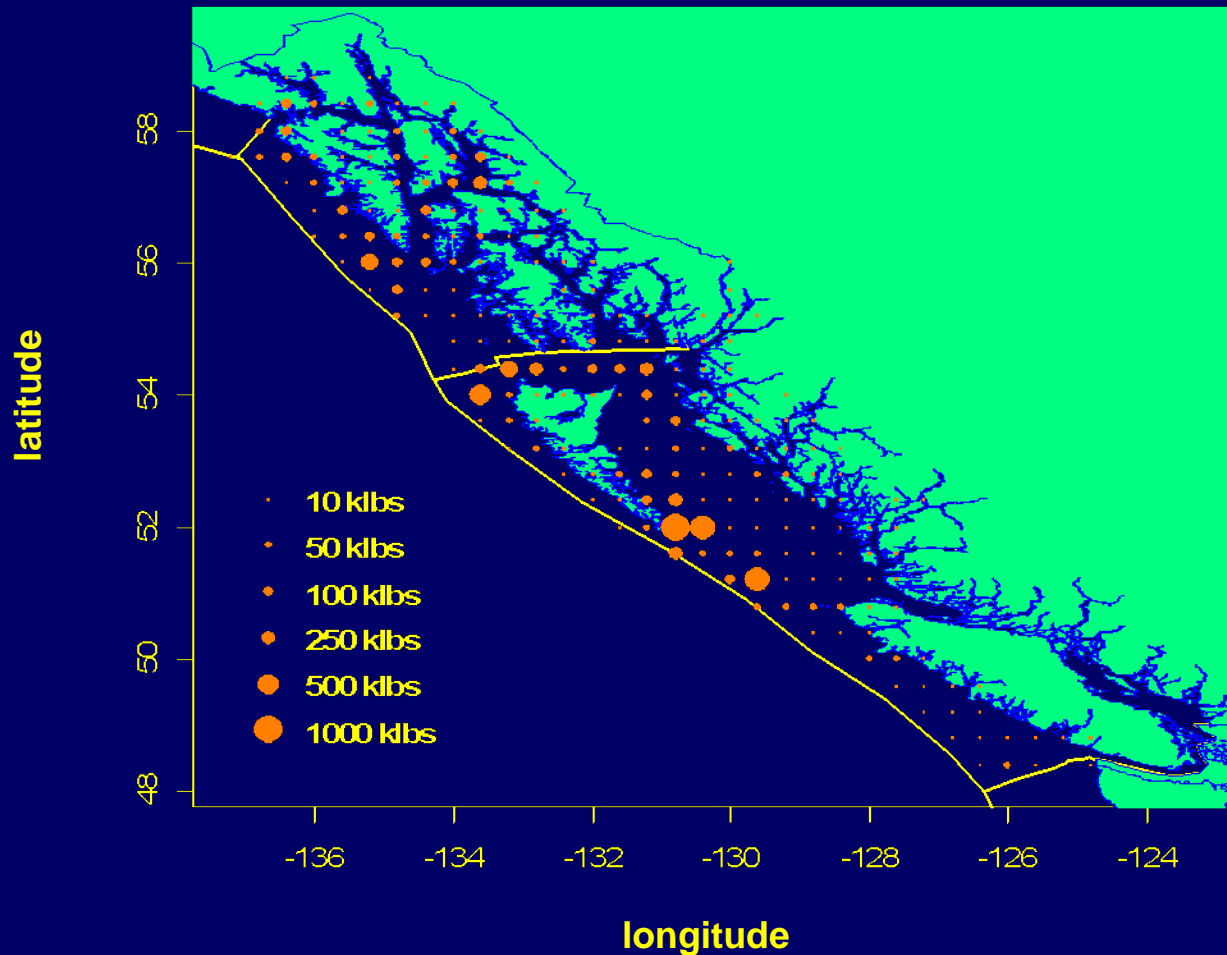
Estimates of commercial fishing mortality rates, F , by area, length and year



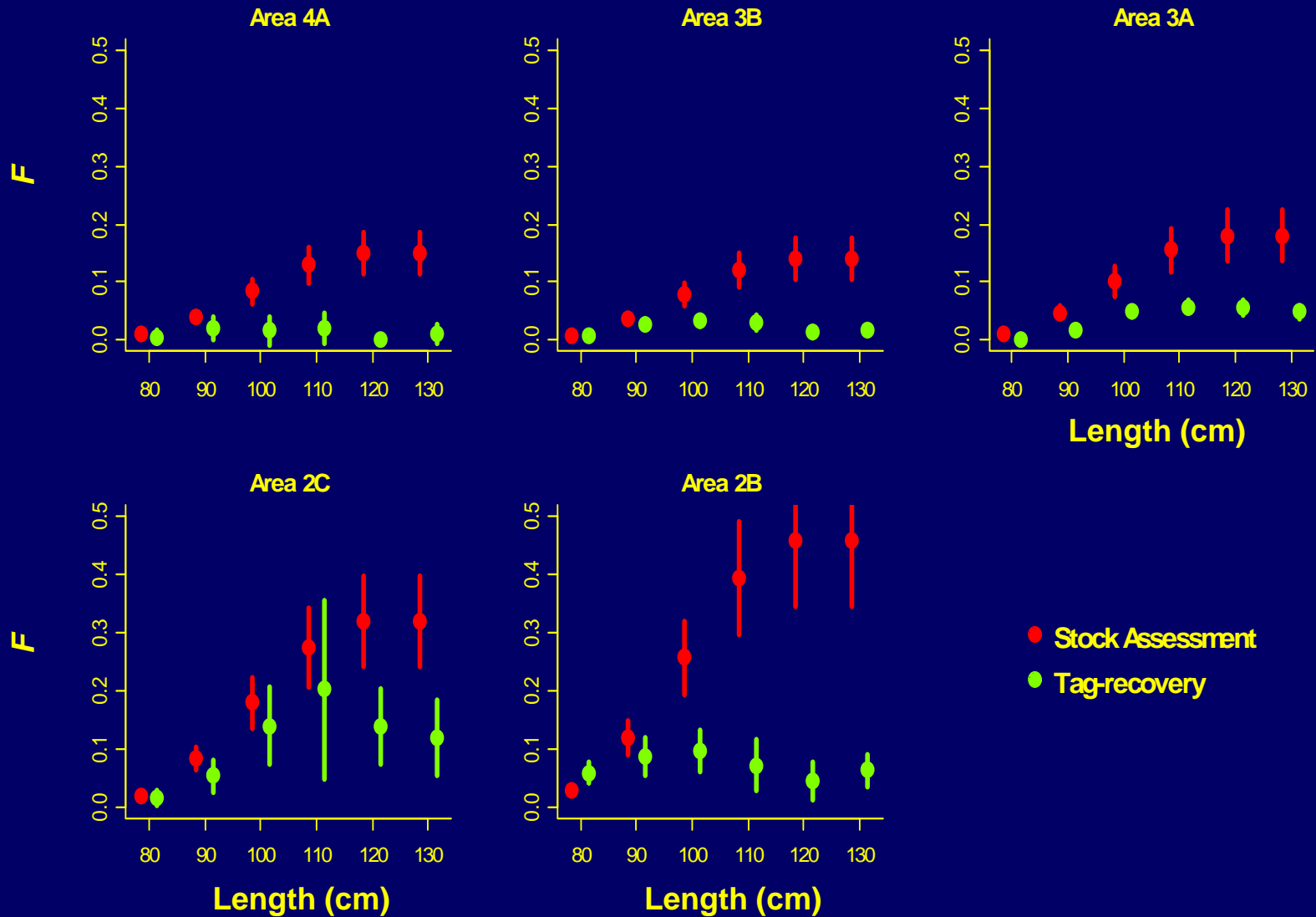
2006 commercial catch distribution for Areas 2B & 2C



2007 commercial catch distribution for Areas 2B & 2C (incomplete data)



Estimates of commercial fishing mortality rates: tag-recovery model vs stock assessment (2006)



Summary

- We continue to estimate high migration rates eastwards from Areas 4A and 3B.
- Patterns of emigration are less clear in other areas.
- Estimates of rates of commercial fishing mortality declined in Areas 2B and 2C in 2007 due to lower recovery rates in these areas.
- Fishing mortality estimates from tag-recovery modelling continue to be much lower than those produced by the stock assessment.
- Because of this, estimates from the tag-recovery modelling should be interpreted with caution.

End