

Appendix A3: A tagging study to assess monkfish (*Lophius americanus*) movements and stock structure in the northeastern United States

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A conventional tagging study was conducted to examine movement and mixing rates of monkfish (*Lophius americanus*), respectively, within and between two monkfish management areas in the northeastern United States (the Northern and Southern Management Areas, or NMA and SMA). A total of 2770 monkfish were tagged and released in the autumn of 2007 and winter of 2008 (1006 in the NMA and 1764 in the SMA) and recaptures were monitored over the following 21 months. This study represents the first tagging study for monkfish in the U.S. northeast and almost doubles in effort (i.e., tag releases) the next largest tagging study for *Lophius sp.* The following is a summary of the main findings:

- 1) The overall reporting rate for filtered recaptures (i.e., days at liberty > 30 days) was 3.2% and this rate was higher in the SMA (3.9%) than in the NMA (1.7%).
- 2) Tag shedding rate (based on double tagging of all monkfish released), was found to be 18.6% which compares well to shedding rates for other species (e.g., cod).
- 3) Movements after 30 days at liberty were mostly in the southwest direction and ranged from 1 to 503 km; mean displacement was higher in the NMA than in the SMA: 110.4 ± 129.9 km versus 54.7 ± 58.5 km, and positively correlated with monkfish size in the SMA.
- 4) Mixing (straying) among management areas was found to be low and unidirectional; no monkfish tagged in the SMA were recaptured in the NMA (although reporting rates were low in the NMA), and we estimate that 9.1% of the monkfish tagged in the NMA moved to the SMA.
- 5) Growth rate was estimated for a subset of monkfish for which reliable length data existed at the time of recapture ($n = 23$) to be 10.6 ± 4.7 cm year⁻¹ (mean \pm std) which compares well with tagging-based estimates of growth for *Lophius piscatorius*. There was a trend (insignificant) for lower growth in larger monkfish which, if coupled to further data and evidence, could call into question the validity of current aging results and the assumption of linear growth in monkfish.

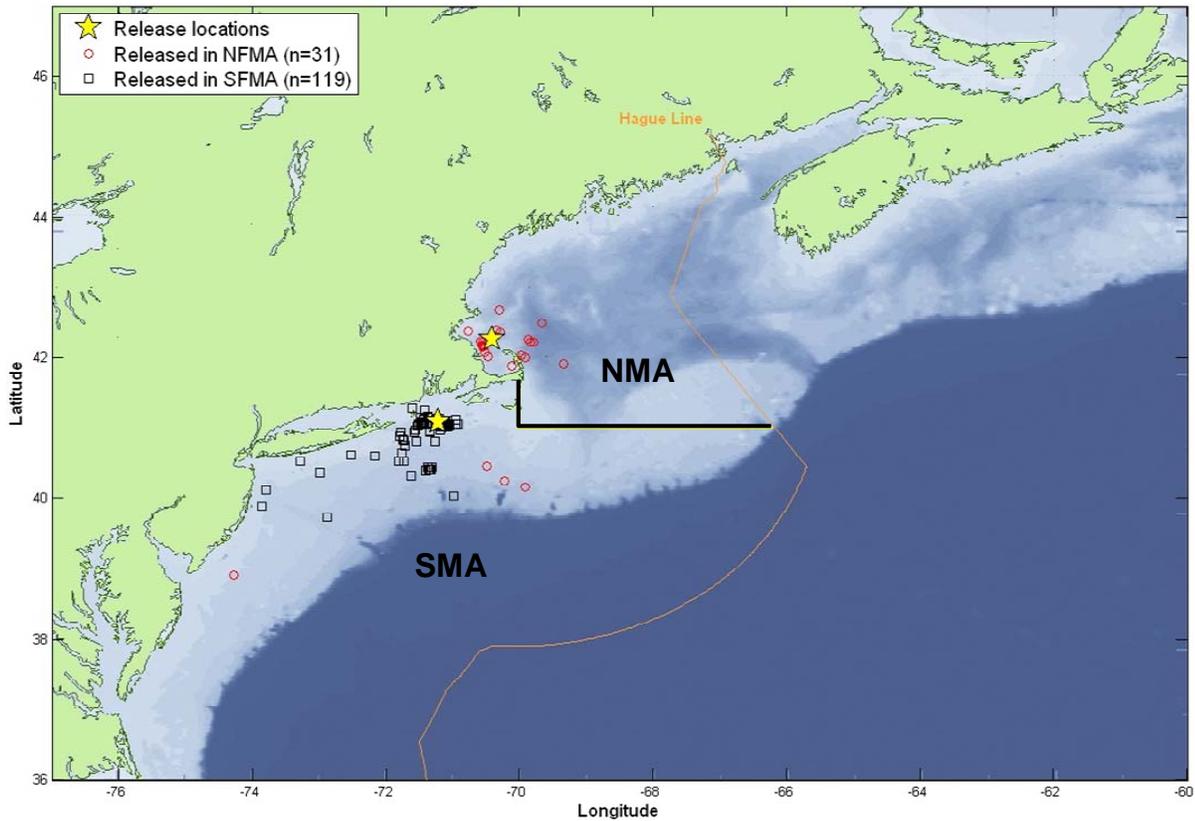


Figure 1. Map showing location of release (note that release sites are close enough within each area to be represented by one star) and recapture locations in the SMA and NMA. Open circles and squares denote the location of fish recapture sites for fish tagged in the NMA and SMA, respectively (see legend). Mean bearing for monkfish released in the NMA was 165° , or almost directly due south (although smaller range movements were to the east). Mean bearing for monkfish released in the SMA was 227° or southwest. Size of released monkfish ranged from 31 to 105 cm (total length).

Table 2. Summary of recaptures by management area and tag color* for non-filtered and filtered (days at liberty > 30 days) data.

Release Area	Tag color	Releases	Total recaptures		NMA recaptures		SMA recaptures	
			Number	Percent	Number	Percent	Number	Percent
<i>No filtering</i>								
NMA	yellow	906	27	3.0	25	2.8	2	0.2
NMA	blue	100	9	9.0	7	7.0	2	2.0
NMA	Total	1006	36	3.6	32	3.2	4	0.4
SMA	yellow	1595	106	6.6	0	0	106	6.6
SMA	blue	169	19	11.2	0	0	19	11.2
SMA	Total	1764	125	7.1	0	0	125	7.1
All	yellow	2501	133	5.3	25	1.0	108	4.3
All	blue	269	28	10.4	7	2.6	21	7.8
All	Total	2770	161	5.8	32	1.2	129	4.7
<i>Filtered for days at liberty > 30</i>								
NMA	yellow	906	13	1.4	11	1.2	2	0.2
NMA	blue	100	8	8.0	6	6.0	2	2.0
NMA	Total	1006	21	2.1	17	1.7	4	0.4
SMA	yellow	1595	59	3.7	0	0	59	3.7
SMA	blue	169	9	5.3	0	0	9	5.3
SMA	Total	1764	68	3.9	0	0	68	3.9
All	yellow	2501	72	2.9	11	0.4	61	2.4
All	blue	269	17	6.3	6	2.2	11	4.1
All	Total	2770	89	3.2	17	0.6	72	2.6

*blue tags were high reward (\$100) and yellow tags were standard reward (t-shirt)