

## **NORTHEAST CONSORTIUM Progress Report**

**Project Title:** Archival Tagging Study of Monkfish, *Lophius americanus*

**NEC Award Number:** 09-042

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**Project objectives and scientific hypotheses**

The primary objectives of this project are (1) to investigate movements of monkfish (including deepwater excursions) among the southern and northern U.S. management regions and Canadian waters, and (2) to validate aging methods for monkfish. Additional objectives are to learn about monkfish behavior, including off-bottom excursions that may be related to transport on ocean currents and/or spawning behavior; activity rhythms in relation to tidal cycles; and habitat (depth-temperature) associations. We hypothesize that monkfish move extensively and that there is exchange between fishery management areas and possible deepwater excursions by maturing females from the southern area.

**Major Accomplishments and Milestones**

We have taken 6 day-trips to release data storage tagged (DST) monkfish in the Gulf of Maine and southern New England (1 trip within this performance period):

<b>Date</b>	<b>Vessel</b>	<b>Tagging Location</b>	<b>Captain</b>	<b>Number Tagged</b>
1/13/2009	Gertrude H	So. New England	Ted Platz	16
7/23/2009	Gertrude H	So. New England	Ted Platz	26
10/16/2009	C.W. Griswold	W. Gulf of Maine	Tim Caldwell	6
10/26/2009	C.W. Griswold	W. Gulf of Maine	Tim Caldwell	43
11/10/2009	Gertrude H	So. New England	Ted Platz	54
10/24/2010	C.W. Griswold	W. Gulf of Maine	Tim Caldwell	42
		Total DSTs released	W. Gulf of Maine	91
			So. New England	96
			<b>Total</b>	<b>187</b>

To date, 4 tagged monkfish have been recaptured. Two were recaptured within 3 days of release on October 21, 2010, in the same area in which they were released. Two that were released on November 11, 2009 were recaptured in June 2010 (a male, 213 days at large) and July 2010 (a female, 248 days at large) (Figure 1). Of these, one had shed its DST but retained both t-bar tags. The DST insertion site on both fish was healed and appeared healthy.

The recaptured fish were dissected to collect food habits, maturity data, samples for age and growth studies, genetics, isotopic analysis of diet, and otolith microconstituents analysis. The growth rates (annualized cm/day) differed between the two fish recaptured after 7-8 months at

large, suggesting the possibility of sex-specific differences in growth rates of monkfish of this size range (Figure 2).

The record from the DST (female) recovered after 8 months showed that this fish remained in relatively shallow (<35 m) water during its time at large, experienced temperatures ranging 4-16 °C, and made occasional off-bottom excursions, which became more frequent in late May (Figure 3). The DST data show a strong tidal signal (Figure 4), which will be important for attempting to estimate location from the depth and temperature traces.

### **Project Alterations**

We were able to release more tags than anticipated thanks to additional funding through the Monkfish Research Set-Aside program.

The oxytetracycline (OTC) injection used to mark the bones for age and growth studies caused a strong tissue reaction in both specimens recovered (Figure 5), therefore we did not use OTC for the October 2010 releases. Laboratory studies are being conducted by C. Bank at UMass Dartmouth to investigate other possibilities for marking hard parts.

### **Next Steps (6 months)**

We will continue outreach efforts and continue testing other possible chemicals for marking monkfish bones.

### **Impacts of the project**

We have become progressively better at tagging large numbers of fish on each day trip, which will help us in future tagging efforts.

The two tag returns obtained so far have allowed us to see how well the incisions heal, observe the impacts of the OTC injections, and hint at a possible direction for improving the monkfish assessment (by assuming a different growth model for males than females).

The main impacts of the project will be realized when we have had a greater number of tag returns and developed the methods for extracting position information from the depth and temperature records.

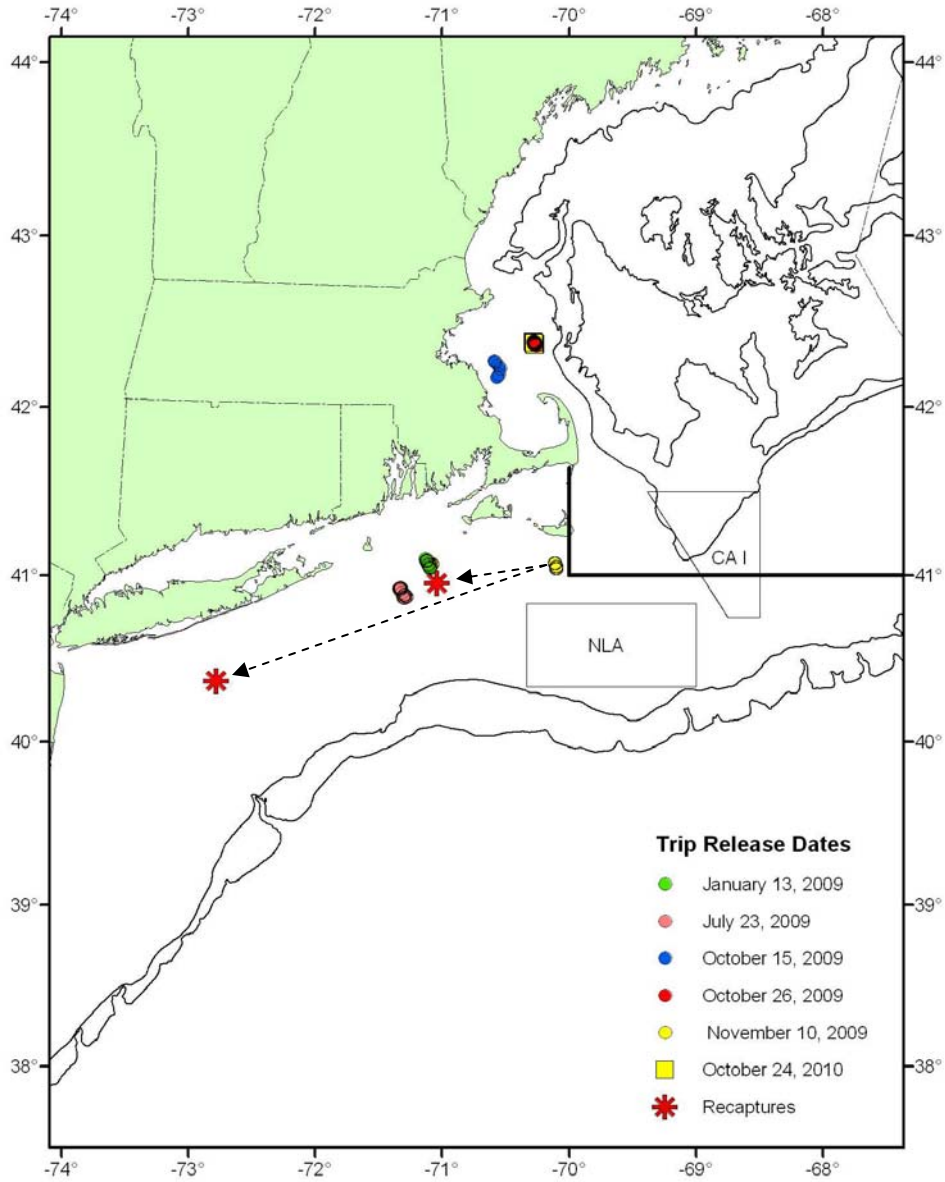


Figure 1. Map showing release of DST-tagged monkfish and recapture locations of two fish that were at large for 7-8 months. The other two recaptures were caught only 3 days after release on October 24, 2010 in the same area as their release.

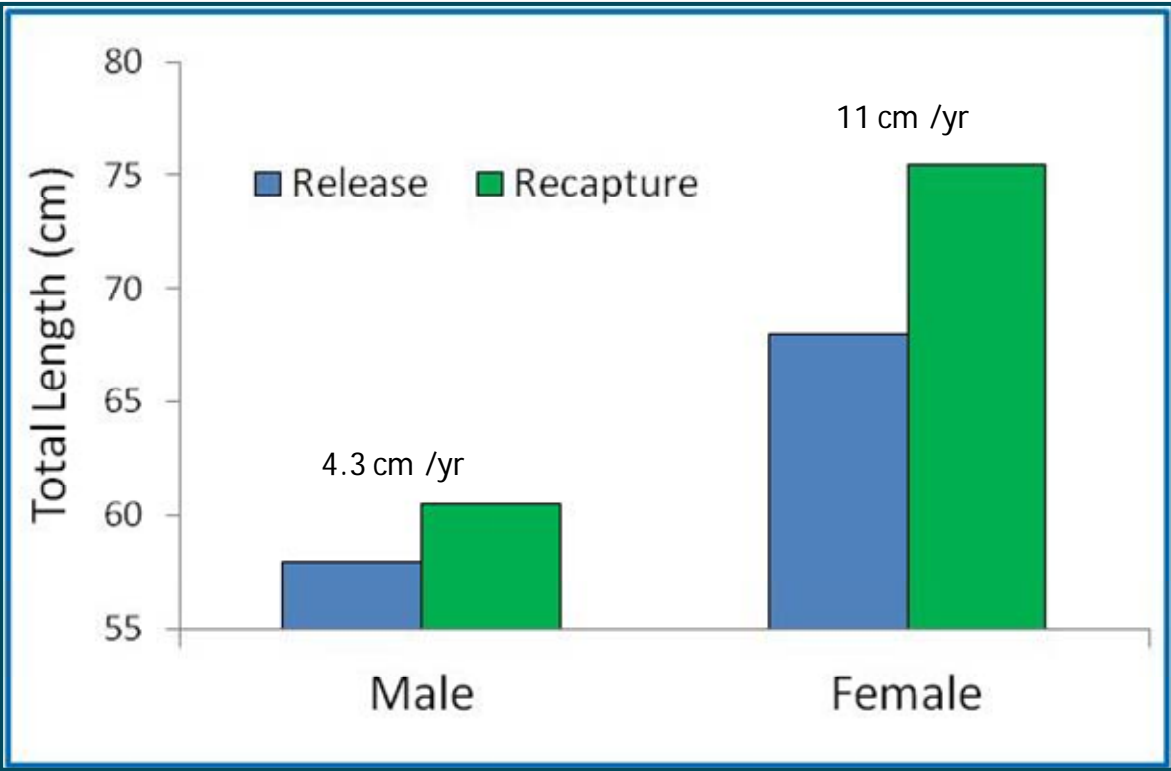


Figure 2. Annualized growth rates of male (n=1) and female (n=1) monkfish recaptured after 7 and 8 months at large.

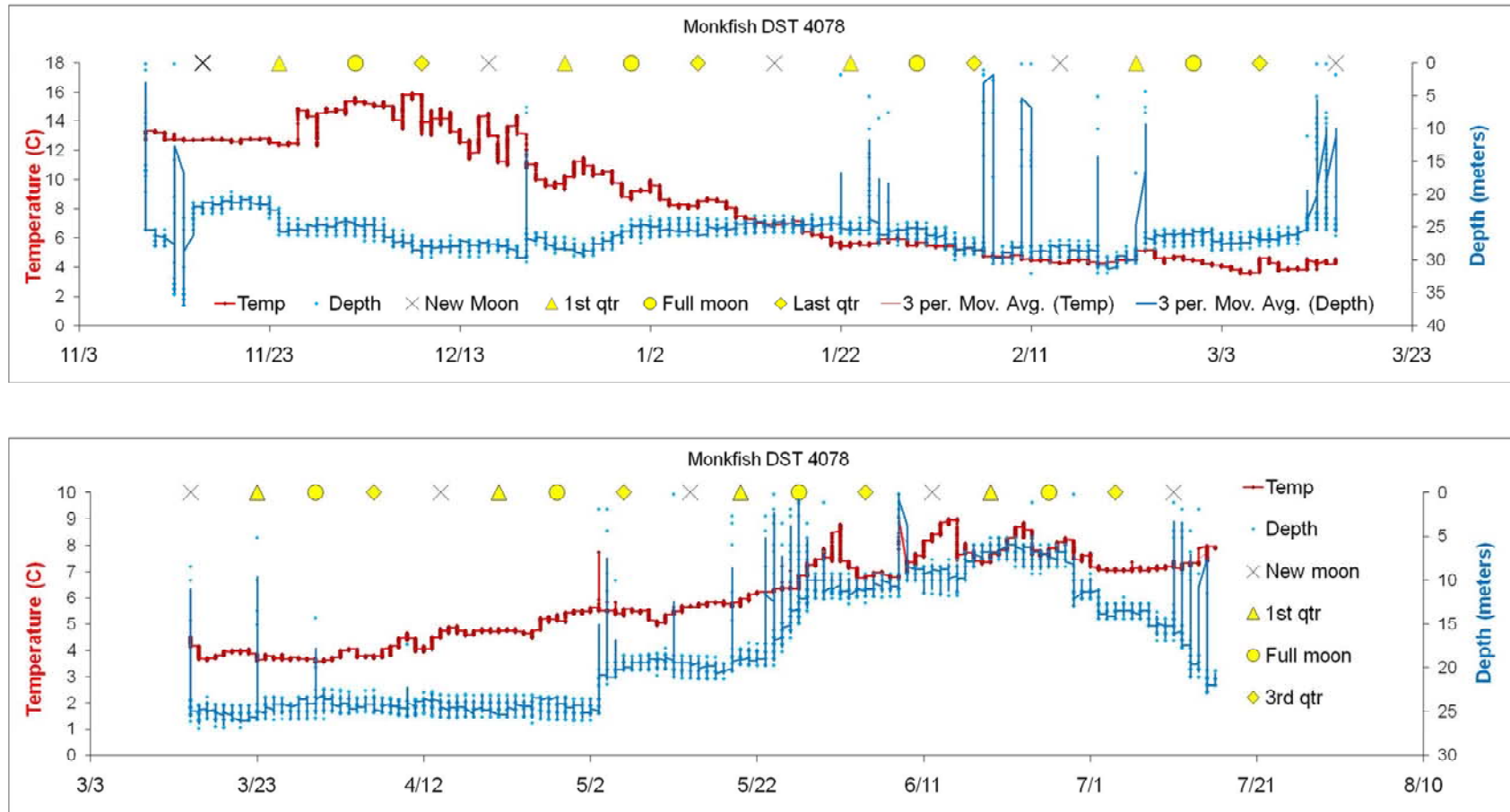


Figure 3. Temperature and depth readings from a DST recovered from a female at large for approximately 8 months, phases of the moon superimposed.

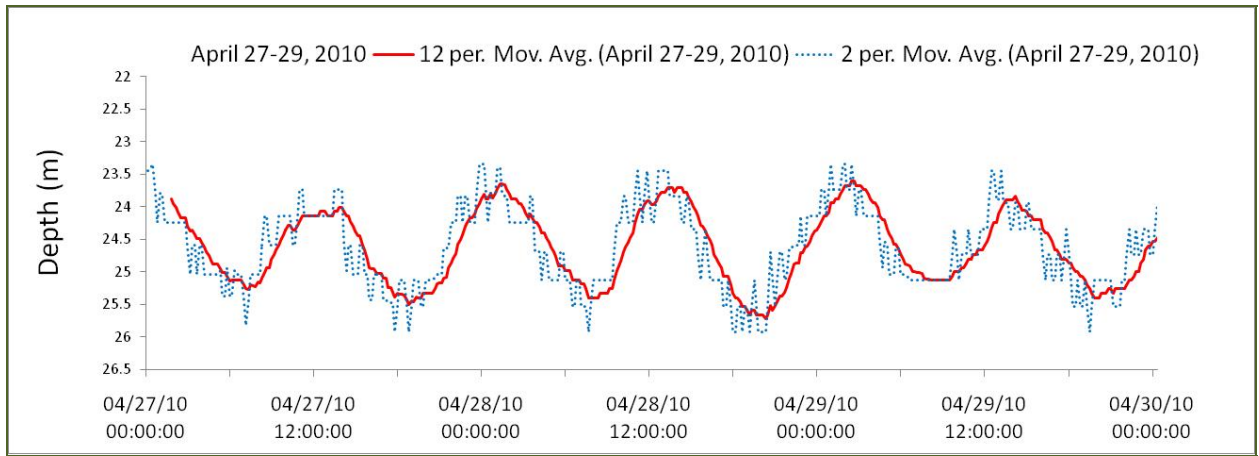


Figure 4. Depth occupied by a recaptured female monkfish during one week in April. The data record reveals the tidal cycle during a time when the fish apparently moved very little.



Figure 5. Recaptured monkfish with necrosis and discoloration of muscle tissue from OTC injection.