

On-going assessment of muskie abundance and size at Lake Webster

Kosciusko County

Supplemental Evaluation – 2010

Date of Fieldwork: March 30 through April 6, 2010

Biologist: Jed Pearson

Background: Since 2005 the Division of Fish and Wildlife has implanted Passive Integrated Transponder (PIT) tags into adult muskies captured during brood stock operations (“egg-taking”) at Lake Webster. The purpose of the tagging is to assess muskie growth and population density. PIT tags allow biologists to measure changes in fish length based on subsequent recaptures of tagged individuals. Using PIT tags is therefore less time-consuming and more accurate than traditional methods of assessing growth based on examining body parts (e.g. scales and fin rays). PIT tags also provide a way to place individually marked fish within the population. By noting the ratio of marked to unmarked fish during subsequent sampling, biologists can estimate the number of fish present, as long as assumptions of random mixing and equal vulnerability of marked and unmarked fish are met.

The purpose of this report is to document the number, location and sizes of muskies captured during spring 2010, and provide data on growth and the number of muskies in Lake Webster. The results will be used to set direction for any change in current fingerling stocking rates (5/acre) and angler harvest regulations (36-inch minimum size limit). The results will also be used to monitor any long-term effects of reducing the number of days that muskie fingerlings are fed live minnows prior to stocking from 90 to 30 days. This change was made in 2007. A summary of data from previous years and a discussion of muskie management concerns were presented in Pearson (2009).



Photo: Assistant biologist Steve Donabauer displays a muskie captured in 2010.

Methods: Three large “Lake Michigan-style” traps were set between March 29 and April 6 at three traditional locations (Figure 1: #1,#2,#3) and two alternative sites (#6,#7). Traps at #2 and #3 were set at the same locations throughout the period, while the trap first set at #1 was moved to #7, then #6. Two other traps of similar design (see appendix) but smaller in size were set at five locations, (Figure 1: H1 to H6), although the H1 site was fished in the same general area on different occasions. The smaller traps were used to try to locate additional concentrations of muskies. Although each trap was not checked daily, they were fished each day through the period. Water temperature rose from 42F to 60F and averaged 51F. Similar field procedures used previously were followed in processing trapped muskies and recording data. Likewise, similar data analysis and presentation formats were used to summarize the results (Pearson 2009).

Results: A total of 127 muskies were caught, including two that were initially marked and then recaptured in 2010 (Table 1). The large traps caught 101 and the smaller traps caught 26. Site #2, “the island” provided 49 muskies (6.1/day) and site #3, “the north shore”, provided 52 (6.5/day). These rates were slightly higher than previous 4-year daily means (5.2 and 4.7, respectively). No muskies were captured at site #1 over two days or nearby at site #7 on one day, so it was moved to site #6 where no muskies were caught over four days. Subsequent examination of the trap indicated it was in good shape and was capable of catching and holding muskies.

Of the 125 individual muskies captured in 2010, 59 had been marked in previous years and 66 were unmarked previously (Table 2). Recaptured muskies included 17 marked in 2005, seven in 2006, eight in 2007, 16 in 2008, and 11 marked in 2009. The population estimate was 676, down 50% from 2009 and down 76% from the initial estimate in 2006. Mean length was 35.8 inches and modal length was 36 inches (Figure 2). The size range was similar to previous years, although the percentage of 42-inch and larger muskies was greater.

Lengths of muskies recaptured in 2010 continued to demonstrate wide differences in growth between males and females (Figure 3). Growth of males after they reach legal-size nearly ceases. Females in general continue to grow 1-2 inches per year after they reach 36 inches. For example, a 34-inch male can be expected to grow only two inches longer over the next five years. In contrast, a 34-inch female is likely to grow up to 10 inches longer over the next five years.

Summary: Catch rates at site #2 and site #3 remained high, but the declining population estimate (1/acre) suggests fewer adult muskies are now present. The estimate, however, is probably biased due to violations of basic assumptions (see Pearson 2009). If a large percentage of muskies exhibit site fidelity from year to year, more extensive sampling throughout the lake is needed to overcome biases associated with estimating abundance solely on brood stock catches. Likewise, it is too early to say if any decline is related to the 2007 diet change because young muskies are not vulnerable to the gear. More time will be needed to assess the diet change. Meanwhile, the 2010 data do not support the notion that muskies are over-abundant and that the stocking rate should be reduced. Keeping the same stocking rate at this time may be particularly important if there is a chance that survival of 30-day forage-reared fingerlings is less than 90-day fingerlings due to potential differences in size, condition and differences in behavior once stocked. Although few new PIT tags are being placed annually within the population (66 in 2010), additional tagging may provide some useful data until a more extensive project, again as was done in 2005, is conducted. And finally, traps were set at several new sites in 2010 but only one location in the Backwater Area (H1/5) provided muskies. Why traps at the other locations failed to catch muskies is not known, but more effort is needed to continue to look for sites that provide more adults in order to obtain sufficient eggs.

Recommendations and References:

1. Continue to record muskie length, catch location, sex, and tag numbers during brood stock operations.
2. Assess site fidelity among recaptured muskies.
3. Continue the current muskie fingerling stocking rate at 5/acre.
4. Set a "Lake Michigan-style" trap at site H1 in 2011 in the Backwater Area in lieu of site #1 and continue to use the smaller traps in various new locations.
5. Consider repeating a more-intensive study of the muskie population and fishery in a manner similar to the study in 2005.

Pearson, J. 2005 Current status of the fish community and quality of fishing at Lake Webster, Indiana. Indiana Division of Fish and Wildlife, Indianapolis, Indiana.

Pearson, J. 2009. Status of the muskellunge population at Lake Webster, Indiana – 2006 through 2009. Indiana Division of Fish and Wildlife, Indianapolis, Indiana.

Table 1. Date, water temperature *F*, number, and trap locations (see Figure 2 for site locations) of muskies captured at Lake Webster from 2006 through 2010, including recaptured muskies.

2006											
Date	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7	Total	Temp F		
4/4/06	0	16	8					24	43		
4/5/06	12	2	10					12	45		
4/6/06	13	13	3					16	51		
4/7/06	3	9	10					19	44		
4/8/06	7	6	13					19	46		
4/9/06	2	10	8					18	45		
4/10/06	4	8	3					11	46		
4/11/06	3	13	6					19	47		
4/12/06	2	12	11					23	48		
4/13/06	3	5	3					8	57		
Total	49	94	75					169			
Days	10	10	10						Mean F	47	
N/day	4.9	9.4	7.5								
2007											
Date	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7	Total	Temp F		
4/3/07	9	17	8					25	54		
4/4/07	0	0	7					7	49		
4/6/07	2	2	0					2	38		
4/9/07	0	14	5					19	37		
4/10/07	0	3	0					3			
4/13/07	1	0	3					3	38		
4/16/07	1	1	3					4	40		
4/18/07	10	0	4					4	43		
4/19/07	5	0	0					0	44		
4/22/07	1	5	3					8	56		
4/24/07	1	1	1					2	55		
4/25/07	0	0	4					4	54		
Total	30	43	38					81			
Days	23	23	23						Mean F	45	
N/day	1.3	1.9	1.7								
2008											
Date	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7	Total	Temp F		
4/3/08	10	8	12					30	42		
4/4/08	9	10	21					40	44		
4/6/08	3	9	8					20	48		
4/7/08	0	7	7					14	48		
4/8/08	3	0	7					10	54		
4/9/08	5	3	4					12	51		
4/10/08	3	1	4					8	49		
4/11/08	1	4	5					10	46		
4/12/08	0	7	8					15	48		
4/13/08		2	4	2				8	42		
4/16/08		9	8	1				18	49		
Total	34	60	88	3				185			
Days	10	14	14	4					Mean F	48	
N/day	3.4	4.3	6.3	0.8							
2009											
Date	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7	Total	Temp F		
3/31/09	2	19	8					29	49		
4/1/09	2	6	1					9	49		
4/3/09	0	9	12					21	46		
4/4/09	0	8	3					11	46		
4/6/09		13	9		1			23	45		
4/7/09		9	6		0			15	45		
4/8/09		2	3					5	44		
4/9/09		3	1					4	42		
4/10/09		3	0					3	46		
4/13/09		1	5					6	45		
Total	4	73	48		1			126			
Days	5	14	14		2				Mean F	46	
N/day	0.8	5.2	3.4		0.5						
2010											
Date	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7	HMH	Total	Temp F	
3/30/10	0	10	6					4	16	42	
3/31/10	0	3	12					1	15	44	
4/1/10		1	10				0	0	11	52	
4/3/10		21	13			0		10	34	56	
4/5/10		13	8			0		5	21	54	
4/6/10		1	3			0		6	4	60	
Total	0	49	52			0	0	26	101		
Days	2	8	8			4	1			Mean F	51
N/day	0.0	6.1	6.5			0.0	0.0				
Grand total	117	319	301	3	1	0	0	26			
Days	50	69	69	4	2	4	1				
N/day	2.3	4.6	4.4	0.8	0.5	0.0	0.0				

Table 2. *Seber-Jolly population estimates of muskies in Lake Webster from 2006 through 2010, based on PIT-tagged recaptured fish (r) from specific years (t). Population estimates (N_t) were obtained by dividing the proportion of marked muskies (a_t) by the size of the marked population (M_t).*

	Number of recaptures per year (r_t)					
	2005	2006	2007	2008	2009	2010
Year of marking						
2005		44	29	37	28	17
2006			11	18	7	7
2007				13	6	8
2008					14	16
2009						11
Total marked (m_t)	0	44	40	68	55	59
Total unmarked (u_t)	844	176	70	117	72	66
Total caught ($n_t = m_t + u_t$)	844	220	110	185	127	125
Total released (s_t)	844	203	97	180	121	124
Proportion marked (a_t)	0.000	0.204	0.369	0.371	0.438	0.476
Marked population size (M_t)	0	562	540	506	296	
Population estimate (N_t)		2761	1461	1364	676	1566

Figure 1. Locations of muskie trapping sites at Lake Webster from 2006 through 2010. See Table 1 for site-specific catch data. Large trap nets were set at sites labeled 1 through 7 and were described in field notes as follows: 1 = channel 1, 2 = island, 3 = north, 4 = point, 5 = northwest, 6 = southwest, 7 = channel 2. Small trap nets were set at sites labeled H1, H2, H3, H4 and H6. Traps were set at H1 on two occasions in 2010.



Figure 2. Frequency distributions (percentage) of muskies per inch captured at Lake Webster in spring 1998 and 2005 through 2010. Distributions do not include muskies captured more than once during the same year.

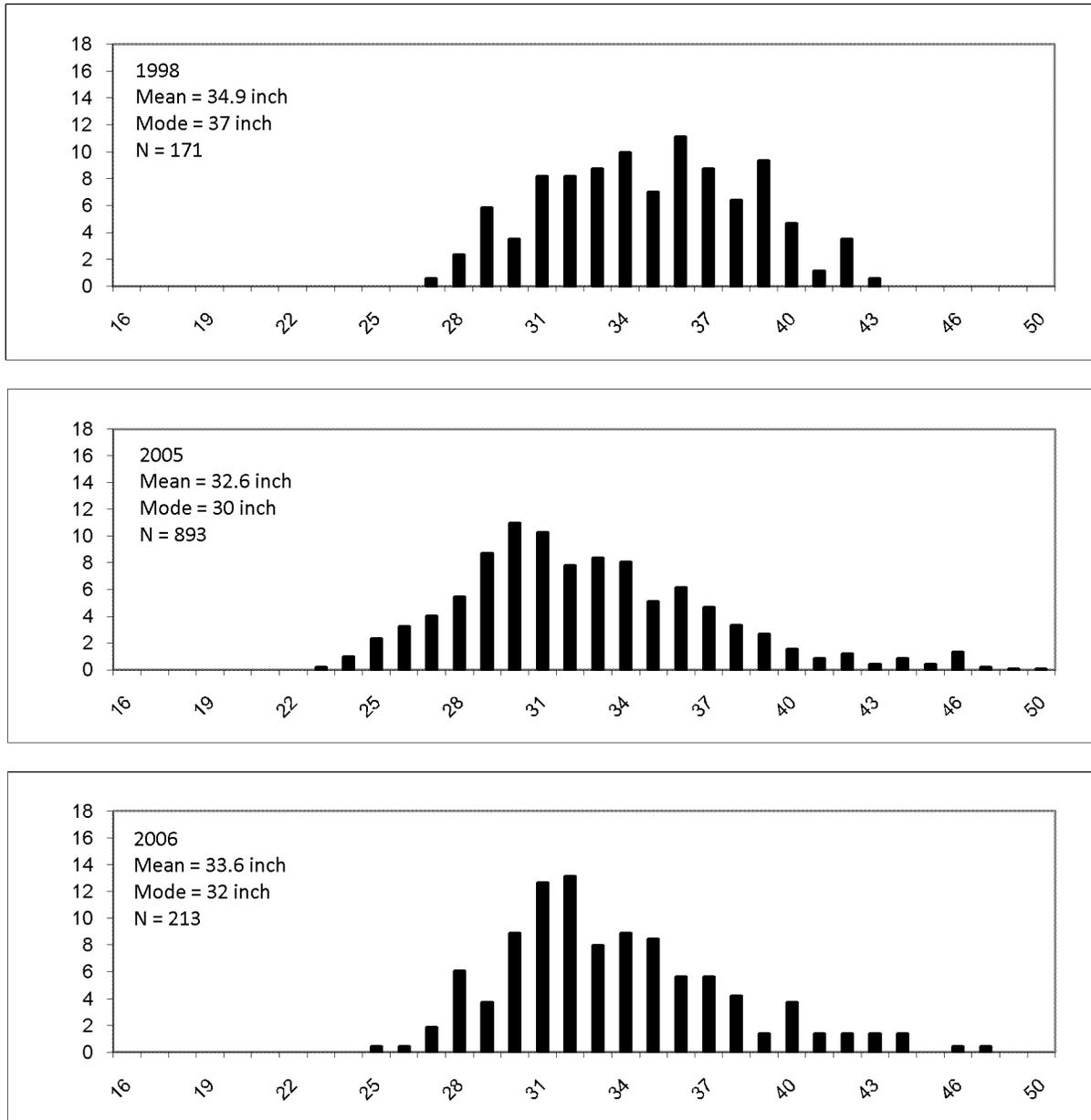


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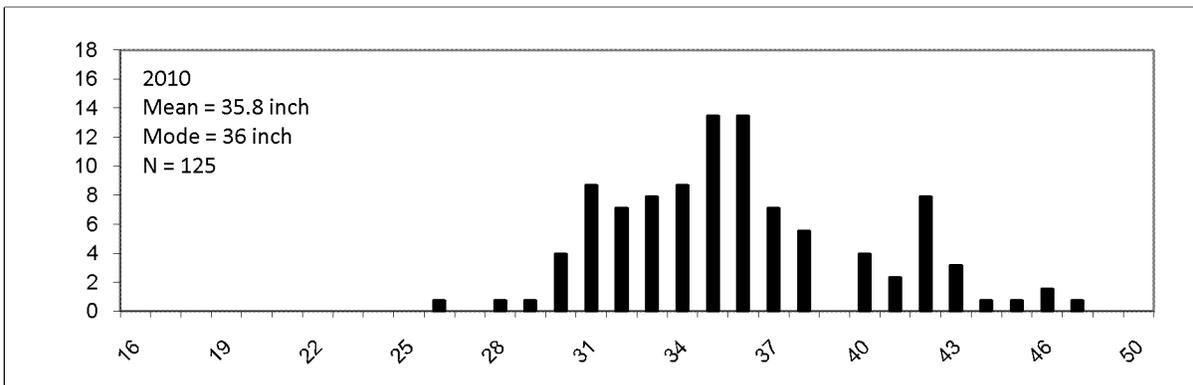
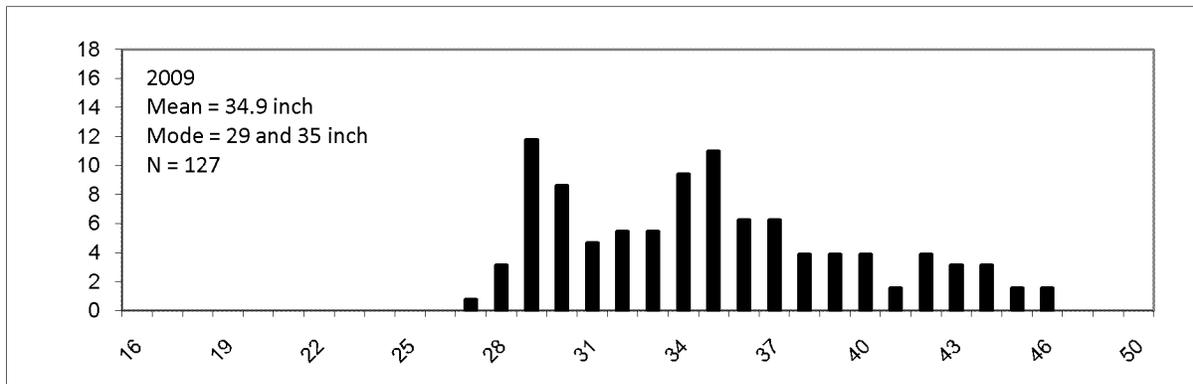
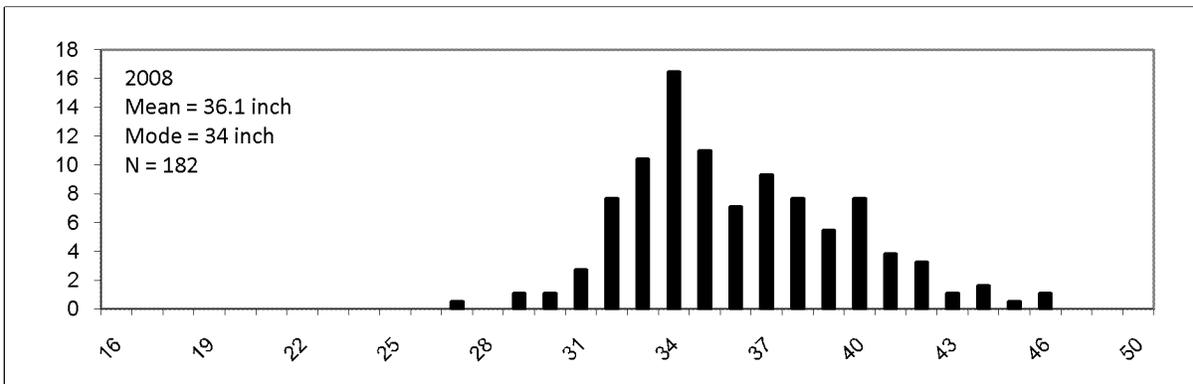
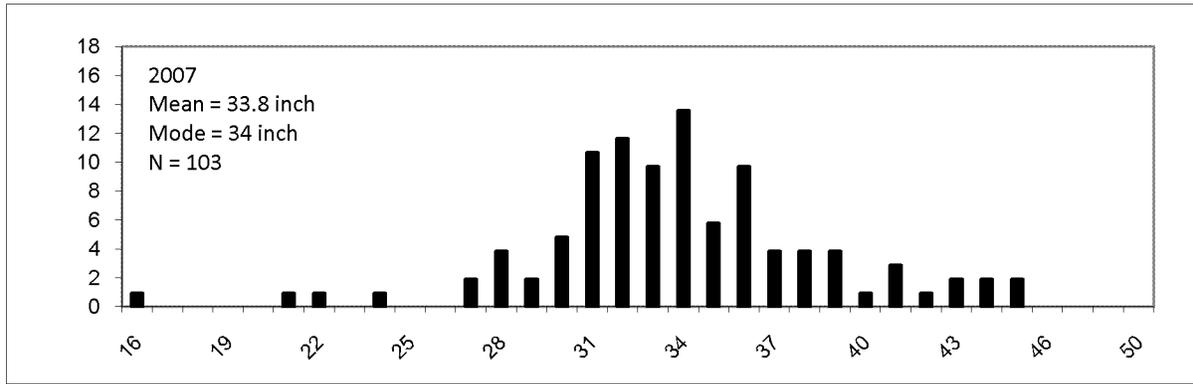
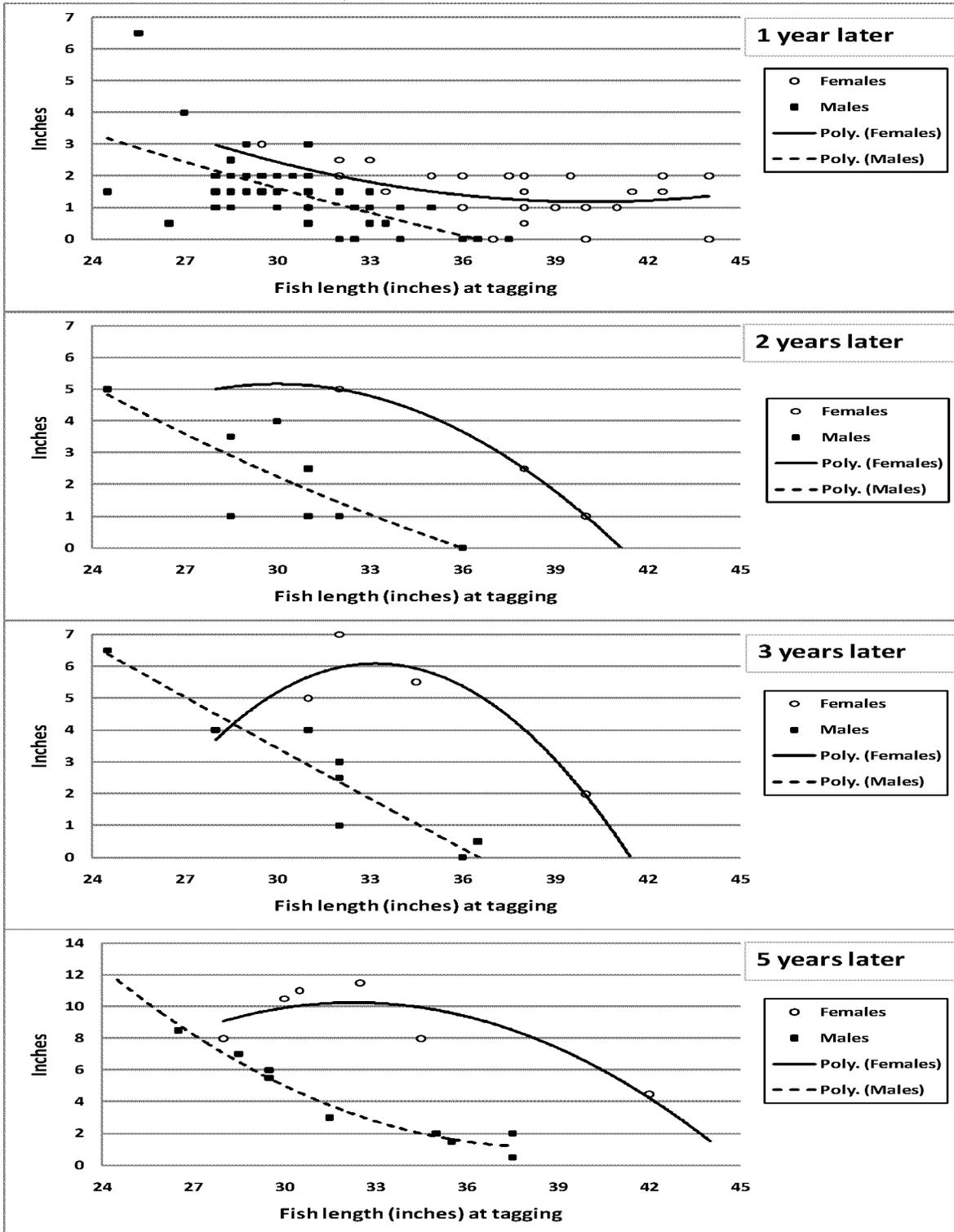


Figure 3. Growth increments in inches of male and female muskies within 1-, 2-, 3-, and 5-year intervals based on length at the time of PIT-tagging at Lake Webster from 2006 through 2010. The curved lines represent the best fit (polynomial) of the data.



Appendix 1. *Specifications of the traps purchased in 2010 by the Hoosier Muskie Hunters for use in muskie brood stock collection at Lake Webster.*

Standardized Fyke Net Specifications

- Two 4-foot by 6-foot frames of solid, 1/2-inch diameter cold-rolled steel, spaced ~38 inches (~36 meshes) apart
- Three 4-foot-diameter fiberglass hoops spaced ~30 inches (~26 meshes) apart and ~36 inches (~32 meshes) from second frame
- #15 knotted nylon netting with 3/4-inch bar mesh in trap and lead, tied to frames and hoops with #21 twine
- All cut pieces of nylon mesh burned at every cut in order to prevent unraveling
- One funnel directed rearward of first hoop with 7-inch square throat held firmly open by 4 cords of #36 twine
- Diagonal side winklers attached to second frame 7 inches away from point of attachment of perpendicular center winkler, leaving a 7-inch aperture for fish to enter on either side of center
- Cod end of net with 1-2 inch loops to allow easy passage of 1/4-inch nylon draw cord
- 75-foot lead 4 feet high with PVC sponge or hard foam floats-SB3 (2-1/2" x 1-1/2") spaced 3 feet apart along the top, and 2-ounce lead weights spaced 18 inches apart along the bottom on 5/16" diameter polypropylene
- Draw cord, float line, and lead line all of 1/4-inch braided nylon with all ends burned to prevent unraveling