

2013

Heidecke Lake Spring Muskie Survey Report



Submitted by:

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INTRODUCTION

As part of a research project, 1,955 acre Heidecke Lake which is located in Grundy County near Morris received an initial stocking of pure muskellunge in 1980. Annual additions of these fish (which were extensively-reared, purchased fish) commenced in October of that year. Field data from these early stockings indicated slightly accelerated growth rates and fair recruitment. Pure muskellunge stockings ceased in 1986 with the completion of this research project. Hybrid muskellunge (tiger muskie) were initially stocked in 1981 and were released on a somewhat annual basis through 1997. Tiger muskie released from 1993 through 1997 were "minnow-finished", larger in size and released later in the year. In 1999 when surplus fish produced by the state hatchery system became available, pure muskellunge were once again released into Heidecke Lake and continue to be stocked on a biennial schedule (Table 1).

TIGER MUSKIE			
YEAR	No. STOCKED	SIZE	COMMENTS
1981	430	12"	Wisconsin
1982	347	13"	LaSalle
1984	1,437	8-10"	Sand Ridge
1985	1,877	5-8"	LaSalle/S.R.
1986	1,955	8"	Jake Wolfe
1987	1,955	5"	Jake Wolfe
1987	1,955	8"	Orange ribbon-tag
1988	1,955	8"	Jake Wolfe
1989	1,955	8"	Jake Wolfe
1990	4,170	8"	Jake Wolfe
1991	2,933	8"	Jake Wolfe
1992	1,955	10"	Jake Wolfe
1993	4,887	10"	Minnow-finished
1994	3,519	10"	Minnow-finished
1995	3,660	10"	Minnow-finished
1996	2,710	11"	Minnow-finished
1997	26,609	3"	"Excess fish"
1997	6,032	10"	Minnow-finished

PURE MUSKELLUNGE			
YEAR	No. STOCKED	SIZE	COMMENTS
1980	136	8-12"	LaSalle
1981	609	10-15"	Wisconsin
1982	676	9"	LaSalle
1983	228	4"	LaSalle
1984	232	11"	LaSalle
1986	471	13"	LaSalle
1987	734	8.5"	LaSalle
1999	4,644	11-13"	Jake Wolfe
2001	1,955	11.5"	Jake Wolfe
2002	1,955	10.9"	Jake Wolfe
2003	500	10"	Jake Wolfe
2005	1,955	10"	Jake Wolfe
2007	1,955	11"	Jake Wolfe
2009	1,955	11.2"	Jake Wolfe
2011	1,955	11.3"	Jake Wolfe

Table 1. Heidecke Lake Esocid stocking record, 1980 – 2011.

METHODS

The muskie population is evaluated via ancillary and biennial standardized surveys, formal angler creel surveys, voluntary angler survey (green card) and by annual spring trap netting. Trap netting tends to provide a greater data set from which to work from and has resulted in some of the largest single catches for this species. Trap nets utilized for this project are 1-inch mesh with 4-foot frames with leads typically averaging 50 feet in length. However, in 2013 due to the poor condition of some of the larger nets a combination of 4-foot and 3-foot framed nets were utilized (8 with 4-foot and 7 with 3-

foot frames). Due to the nature of Heidecke Lake with much of the shoreline consisting of rapidly sloping perched, rip-rapped dikes, net locations are restricted to the natural shoreline area of the extreme south bank. Although nets are occasionally fished off rip-rap shores, they are predominantly set from the natural shoreline which affords a more gradual slope (Figure 1). Effort has ranged over the years from as high as 72 net-nights in 2000 to a low of 20 in 1999. In 2013 an impending strong storm lead to the termination of collection efforts after two nights, for a total of 30 net-nights of effort.



Fig. 1. Trap net being set along natural shoreline at Heidecke Lake.

All muskellunge collected are sexed, measured, weighed and fin-clipped. Since 2005, a total of 70 muskellunge have been fitted with PIT tags (internal) which provide valuable age and growth data. A number of fish have also been marked with Floy tags (external). From 2003 to 2009, a total of 121 muskellunge were tagged with these external tags. Tagged fish recaptures were encountered in the surveys which followed, the earliest occurring in 2006.

RESULTS

From 2004 through 2013, a total of 24 tagged muskellunge have been recovered with PIT (passive integrated transponder) tagged fish accounting for the majority of these recaptures (79.2%). This reflects the observed poor retention of Floy-style external tags. Some of these tagged fish were recaptured during the same season in which they were initially tagged. The longest period of time which had elapsed between tagging and recapture was for a male muskie collected three years after it had been originally collected and tagged. During that time this fish had increased in length by 5.2 inches. The largest gain observed was a 6.7-inch increase realized in two years by a young male muskie. This is not all that uncommon as muskies tend to grow very rapidly during the early years of their lives.

In mid-April, 2013, a total of 15 nets were fished for a period of two nights. Nets were set prior to strong frontal system which created very hazardous collection conditions. For safety concerns, the decision was made to terminate the survey one day early. Daytime air temperatures reached the upper 50's (°F) while the overall average surface water temperature was identical to the previous year at 52°F. Despite the decrease in netting effort, the 2013 survey yielded a record number of muskies. A total combined effort of 30 net-nights yielded a collection of 91 muskies ranging from 28.5"/712mm to 46.6"/1165mm, averaging 31.9"/817mm (Table 2). Males dominated the survey and accounted for 84% of the collection. Females were collected with less frequency, accounting for 16% of the collection which is nearly identical to their contribution to the 2012 netting survey. No immature fish were encountered. Maturity, which is determined more by size, is reached between ages II and IV but generally by age III which is roughly 30 inches. The smallest female in the 2013 survey measured 32.3"/807mm while the smallest male was 28.5"/712mm.

Table 2. Individual length/weights for muskellunge collected April, 2013.

Length (mm)	Weight (g)	Standard Wt.	Relative Wt.	Length (in.)	Weight (lbs.)	Rating	Sex
712	2400	2621	92	28.5	5.3	FAIR	MALE
723	3420	2758	124	28.9	7.5	EXCELLENT	MALE
730	2880	2848	101	29.2	6.3	GOOD	MALE
733	3480	2887	121	29.3	7.7	EXCELLENT	MALE
734	3260	2900	112	29.4	7.2	EXCELLENT	MALE
740	3420	2980	115	29.6	7.5	EXCELLENT	MALE
740	3280	2980	110	29.6	7.2	EXCELLENT	MALE
740	3040	2980	102	29.6	6.7	GOOD	MALE
741	2160	2993	72	29.6	4.8	POOR	MALE
742	3640	3007	121	29.7	8.0	EXCELLENT	MALE
743	2980	3020	99	29.7	6.6	GOOD	MALE
744	3140	3034	104	29.8	6.9	GOOD	MALE
746	3260	3061	107	29.8	7.2	EXCELLENT	MALE
750	3620	3116	116	30.0	8.0	EXCELLENT	MALE
752	4540	3144	144	30.1	10.0	EXCELLENT	MALE
752	3200	3144	102	30.1	7.1	GOOD	MALE
753	3240	3157	103	30.1	7.1	GOOD	MALE
754	3400	3171	107	30.2	7.5	EXCELLENT	MALE
755	3060	3185	96	30.2	6.7	GOOD	MALE
756	3620	3200	113	30.2	8.0	EXCELLENT	MALE
757	3080	3214	96	30.3	6.8	GOOD	MALE
761	3500	3270	107	30.4	7.7	EXCELLENT	MALE
762	4480	3285	136	30.5	9.9	EXCELLENT	MALE
762	3780	3285	115	30.5	8.3	EXCELLENT	MALE
762	3710	3285	113	30.5	8.2	EXCELLENT	MALE
767	3480	3357	104	30.7	7.7	GOOD	MALE
767	3920	3357	117	30.7	8.6	EXCELLENT	MALE
768	3780	3372	112	30.7	8.3	EXCELLENT	MALE
769	2900	3386	86	30.8	6.4	FAIR	MALE
770	4780	3401	141	30.8	10.5	EXCELLENT	MALE
772	3880	3430	113	30.9	8.6	EXCELLENT	MALE
772	3220	3430	94	30.9	7.1	FAIR	MALE
772	3580	3430	104	30.9	7.9	GOOD	MALE
773	3340	3445	97	30.9	7.4	GOOD	MALE
774	3660	3460	106	31.0	8.1	EXCELLENT	MALE
775	3800	3475	109	31.0	8.4	EXCELLENT	MALE
779	3740	3535	106	31.2	8.2	EXCELLENT	MALE
781	3680	3565	103	31.2	8.1	GOOD	MALE
781	3440	3565	96	31.2	7.6	GOOD	MALE
782	3700	3580	103	31.3	8.2	GOOD	MALE
783	3560	3595	99	31.3	7.8	GOOD	MALE
785	3540	3626	98	31.4	7.8	GOOD	MALE
789	3940	3688	107	31.6	8.7	EXCELLENT	MALE
790	3640	3703	98	31.6	8.0	GOOD	MALE
793	3820	3750	102	31.7	8.4	GOOD	MALE
794	4460	3766	118	31.8	9.8	EXCELLENT	MALE
795	4480	3782	118	31.8	9.9	EXCELLENT	MALE
797	3580	3814	94	31.9	7.9	GOOD	MALE
798	3820	3830	100	31.9	8.4	GOOD	MALE
801	3900	3878	101	32.0	8.6	GOOD	MALE

Table 2 (continued). Individual length/weights for muskellunge collected April, 2013.

Length (mm)	Weight (g)	Standard Wt.	Relative Wt.	Length (in.)	Weight (lbs.)	Rating	Sex
802	4480	3894	115	32.1	9.9	EXCELLENT	MALE
802	4060	3894	104	32.1	9.0	GOOD	MALE
802	3380	3894	87	32.1	7.5	FAIR	MALE
803	3940	3910	101	32.1	8.7	GOOD	MALE
803	4260	3910	109	32.1	9.4	EXCELLENT	MALE
807	5280	3975	133	32.3	11.6	EXCELLENT	FEMALE
810	5520	4025	137	32.4	12.2	EXCELLENT	MALE
810	4240	4025	105	32.4	9.3	GOOD	FEMALE
810	3860	4025	96	32.4	8.5	GOOD	MALE
811	3580	4041	89	32.4	7.9	FAIR	MALE
814	4740	4091	116	32.6	10.4	EXCELLENT	MALE
819	4360	4175	104	32.8	9.6	GOOD	MALE
820	3880	4192	93	32.8	8.6	FAIR	MALE
822	4480	4226	106	32.9	9.9	EXCELLENT	MALE
822	4000	4226	95	32.9	8.8	GOOD	MALE
823	4420	4243	104	32.9	9.7	GOOD	MALE
823	4240	4243	100	32.9	9.3	GOOD	MALE
827	3860	4312	90	33.1	8.5	FAIR	MALE
828	3740	4330	86	33.1	8.2	FAIR	MALE
830	4300	4365	99	33.2	9.5	GOOD	FEMALE
832	4100	4400	93	33.3	9.0	FAIR	MALE
845	4440	4632	96	33.8	9.8	GOOD	FEMALE
854	5000	4798	104	34.2	11.0	GOOD	FEMALE
860	5260	4911	107	34.4	11.6	EXCELLENT	MALE
874	4900	5182	95	35.0	10.8	GOOD	MALE
887	4820	5443	89	35.5	10.6	FAIR	MALE
892	4480	5546	81	35.7	9.9	POOR	MALE
897	5260	5650	93	35.9	11.6	FAIR	MALE
913	5380	5992	90	36.5	11.9	FAIR	MALE
922	6286	6191	102	36.9	13.9	GOOD	MALE
923	5820	6213	94	36.9	12.8	FAIR	MALE
957	7180	7007	102	38.3	15.8	GOOD	FEMALE
993	9600	7922	121	39.7	21.2	EXCELLENT	FEMALE
995	8020	7976	101	39.8	17.7	GOOD	FEMALE
999	10180	8083	126	40.0	22.4	EXCELLENT	FEMALE
1012	10360	8438	123	40.5	22.8	EXCELLENT	FEMALE
1024	9660	8775	110	41.0	21.3	EXCELLENT	FEMALE
1165	12660	13475	94	46.6	27.9	FAIR	FEMALE
1157	11880	13170	90	46.3	26.2	FAIR	FEMALE
1067	8700	10061	86	42.7	19.2	FAIR	FEMALE

Muskellunge are typically weighed in a cradle and then the weight of the cradle is subtracted to derive the weights as shown in Table 2. These weights are then contrasted with the standard weight to calculate traditional relative weight values. The rating system is applied as follows: 84 and lower – poor, 85 to 94 – fair, 95 to 104 – good, 105 and above – excellent.

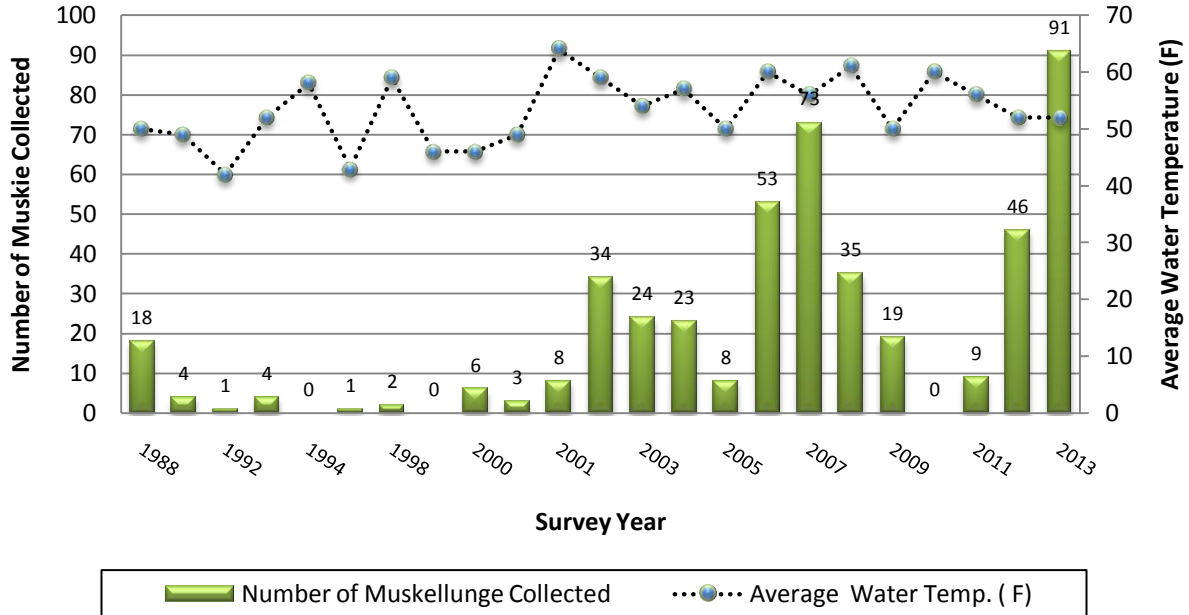
Trap netting collection data from 1988 through 2013 is summarized in Table 3. CPUE, or catch per unit effort, is the number of muskies collected per net fished overnight. One trap net fished overnight is the equivalent of one net-night of effort. "AVE TEMP" is the average surface water temperature in degrees Fahrenheit. "NEW FISH" are those which have not been captured previous to that survey while "DUPS" (duplicates) are fish which were caught twice or more in the same year. Fish which have been collected in previous years (generally identified by an external or internal tag) are listed as "RECAPS". "IMM" denotes young, immature fish. "AVE LN" is the overall average length in inches for muskies collected during that particular sampling event. "BIG INCH" and "BIG LBS" are the largest muskie collected in that particular survey in inches and pounds.

Table 3. Heidecke Lake historical trap netting results.

	AVE	Total	Net		NEW	% NEW		%			%		%		%	AVE	BIG	BIG
YEAR	TEMP	Catch	Nights	CPUE	Fish	FISH	RECAPS	RECAPS	DUPS	MALE	MALE	FEMALE	FEMALE	IMM	IMM	LN	INCH	LBS
1988		18	NA	#####	18	100%	0	0%	0		0%		0%		0%	33.8	39	20.7
1989	49	4	NA	#####	4	100%	0	0%	0		0%		0%		0%	35.5	40.2	19
1992	47	5	62	0.1	5	100%	0	0%	0		0%		0%		0%	32.3	40.3	30.9
1994	58	0	30	0.0	0		0		0									
1996	43	1	39	0.0	1	100%	0	0%	0		0%		0%		0%	36.4	36.4	11
1998	59	2	36	0.1	2	100%	0	0%	0		0%		0%		0%	28.8	39.5	
1999	46	0	20	0.0	0		0		0									
2000	49	9	72	0.1	9	100%	0	0%	0		0%		0%		0%	24.2	31.6	8.2
2001	64	10	36	0.3	10	100%	0	0%	0		0%		0%		0%	28	29.1	5.8
2002	59	34	40	0.9	34	100%	0	0%	0		0%		0%		0%	31.6	34.9	12.2
2003	54	24	42	0.6	24	100%	0	0%	0		0%		0%		0%	30.9	37.6	16.9
2004	57	23	45	0.5	23	100%	0	0%	0		0%		0%		0%	35.6	40.4	19.7
2005	50	9	45	0.2	9	100%	0	0%	0	8	89%	1	11%	0	0%	32.6	37.2	14.4
2006	60	53	45	1.2	51	96%	2	4%	0	36	68%	8	15%	9	17%	34.4	43.7	23
2007	56	73	45	1.6	62	85%	11	15%	0	53	73%	19	26%	1	1%	35	46.6	31.6
2008	61	35	45	0.8	29	83%	6	17%	0	23	66%	12	34%	0	0%	36	45.6	28.7
2009	50	19	45	0.4	17	89%	1	5%	1	12	63%	6	32%	0	0%	33	41.7	18
2010	60	0	28	0.0	0	0%	0	0%	0	0		0		0				
2011	56	9	24	0.4	9	100%	0	0%	0	6	67%	3	33%	0	0%	36.1	46.8	30.5
2012	52	46	48	1.0	46	100%	0	0%	0	17	37%	8	17%	21	46%	30.5	46.5	32.5
2013	52	91	30	3.0	90	99%	0	0%	1	76	84%	14	16%	0	0%	31.9	46.6	27.9
TOTAL		465	685	0.6	443	95%	20	4%	2	231		71		31		32.36		

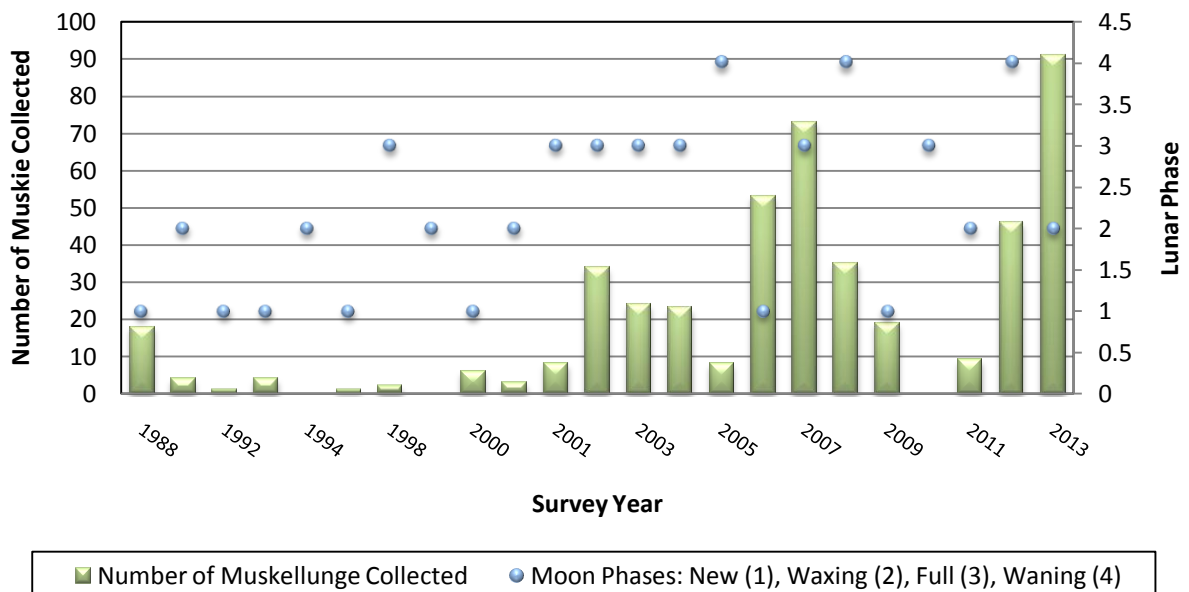
After a record-setting collection in 2007 (73 muskies), spring trap netting success declined dramatically. In 2012 a resurgence was experienced and in 2013 an all-time high number of muskies were captured. Catch rates of 3.0 fish per net-night greatly exceeded anything up to this point. Along with photoperiod, water temperature plays a key role in the success of this sampling effort (Figure 2). Average daily surface water temperatures in 2013 were identical to 2012 (52°F) and less than those experienced in either 2011 (56°F) or 2010 (60°F) when catch rates fell to less than 0.5 fish per net-night. However, if water temperature is too low, catch rates are also poor; in 2005 and 2009 an average water temperature of 50°F resulted in catch rates of 0.4 and 0.2, respectively.

**Figure 2. Heidecke Lake Spring Muskie Surveys
Total Catch vs. Ave. Water Temp.**



The effect of lunar phases was also investigated but there seems to be little correlation between this and catch rates, and it may even be contradictory (Figure 3). For example, in 2007 a total of 73 muskies were collected under a full moon while the same lunar conditions in 2010 resulted in zero fish collected. The 2013 collection occurred during a waxing moon and resulted in an all-time high in terms of number of muskie captured.

**Figure 3. Heidecke Lake Spring Muskie Surveys
Total Catch vs. Lunar Phase**



The 2013 spring trap netting survey was the most successful to date, in terms of the total number of muskies which were captured. This continues an upward trend which was observed the preceding year following the dismal collection efforts of 2010 and 2011. Attempting to draw comparisons between successful and poor collection years has been somewhat enigmatic. Male fish continue to dominate these collections and generally account for at least two-thirds of the total number of muskies which are captured. This also tends to drive down the overall average length for fish collected. In 2013 the average size muskie collected (31.9") exceeded the long-term overall average by nearly a full inch. Not surprisingly, females are the largest fish which are collected in these surveys and while several fish have been collected in excess of 30 pounds, no legal size muskies have been captured in any of these netting surveys.

Previously sampled and tagged fish have been fairly rare in spring collections and these fish have accounted for less than 5% of the total number of muskies captured. Issues with tag retention on the external tags has had an influence on this but muskies which have been tagged internally have not been collected to any great degree, either. Starting in 2005 and continuing through 2007, a total of 70 muskies had been fitted with PIT tags and to date only two of these have ever been recaptured during spring trap netting. Tagging was discontinued after 2009 and fish collected in subsequent years are fin-clipped to identify them as having been collected.

Voluntary angler or "green card" information for 2013 was not yet available when this report was being compiled. Angler harvest of muskellunge at Heidecke Lake is presently regulated by a 48-inch length limit. A partially perched lake, Heidecke came become very rough under windy conditions. The decommissioning and demolition of the Collins Generating Station has eliminated thermal loading to Heidecke and has resulted in ambient water temperatures. Heidecke Lake is open to fishing from April 1st to mid-October, closing ten days prior to the opening of the North Zone waterfowl season.



Fig. 5. Forty-five inch muskellunge collected from Heidecke Lake in April, 2012.