

# Happles Lake 2008 – Preliminary Report

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## Introduction

Happles Lake<sup>1</sup> is a 23.5-acre (9.51-ha) undeveloped, soft-water seepage lake located in the Chequamegon National Forest in Bayfield County (T46N-R8W, section 9). Happles Lake, along with nearby Silver Lake, were part of a section (640 acres) that was owned by the Walton family of the Twin Cities, MN<sup>2</sup>. The original patriarch of the family split the original property into two half-sections such that one part included Silver Lake and the other part included Happles Lake. The two half-sections were willed separately to two sons. The son that owned Silver Lake eventually sold his property to Lee Getschow, who owned the section containing Canthook and Steelhead Lakes immediately across the road from Silver and Happles Lakes. The son that owned Happles Lake eventually willed that area to his children. The entire section was re-united when it was acquired by the Trust for Public Land and ultimately added to the Chequamegon-Nicolet National Forest (CNNF) in June, 2001<sup>3</sup>. As part of the CNNF, Happles and Silver Lakes are designated as “wild lakes” because they are completely undeveloped.

Very little has been documented about the fisheries in Happles Lake because it was privately owned. There are no systematic or detailed analyses of the fish population in the Wisconsin Department of Natural Resources (WDNR) records. A cursory WDNR survey indicated the presence of largemouth bass (*Micropterus salmoides*), sunfish, and “minnows.” The WDNR records also show that, in 1935, approximately 175,000 lake trout (*Salvelinus namaycush*)<sup>4</sup> and, in 1935, approximately 3500 largemouth bass were stocked into Happles Lake. A variety of other fish, including bluegills (*Lepomis macrochirus*), largemouth bass, and various trout, were stocked into Happles Lake by Lee Getschow from the mid-1980s to the mid-1990s. The stocked largemouth bass originated from either Florida or Arkansas. The stocked trout were a “mixed bag” of brook trout (*Salvelinus fontinalis*; at approximately 12 inches), brown trout (*Salmo trutta*; up to 4 lbs), and rainbow trout (*Oncorhynchus mykiss*; in the 12-18 inch range) that originated from “Kellup Fish Farms” near Medford, WI. The trout provided a put-and-take fishery as there was never any evidence of reproduction. Northern pike (*Esox lucius*; the source was thought to be the small unnamed lake at R46N-T8W, section 4), were “illegally” stocked into Happles Lake by “a group of teen-agers.” Anecdotal observations suggest that Happles Lake also contains walleye (*Sander vitreus*), white suckers (*Catostomus commersoni*), and emerald shiners (*Notropis atherinoides*).

A bathymetric map was constructed in 1977. There are no surface water inlets or outlets to Happles Lake. The maximum depth is 36 feet and the total shoreline length is 4200 feet (0.80 miles). Water clarity derived from satellite imagery<sup>5</sup> suggests that Happles Lake has a secchi depth of 17.9 feet (5.5 m) which is above-average water clarity for lakes in Bayfield County. A minimal limnological survey conducted by the WDNR on 29Aug50 found a secchi depth of 17 feet (5.2 m), a M.O. alkalinity at 10 feet of 20 ppm, a pH of 7.1, and a temperature and dissolved oxygen profile as shown in the appendix.

## Objectives

The purpose of this study was to provide information on current fish populations in Happles Lake to form a baseline to which future examinations of the fish populations in Happles Lake can be compared. The specific objectives of this initial field study were to

1. Develop a list of fish species present.
2. Construct catch-per-effort (CPE) for all major fish species.

<sup>1</sup>Named after Max Happle who was a game warden and sheriff in the Iron River area for many years. Happles Lake was originally called Diamond Lake and Canthook Lake was originally called Happles Lake because Mr. Happle had set up a hunting shack there.

<sup>2</sup>Most of the uncited information in this paragraph was obtained from an interview that I (DHO) conducted with Raleigh Fox on September 17, 2007. Mr. Fox managed the properties that collectively included Happles, Silver, Canthook, and Steelhead Lakes for Lee Getschow from 1988 to 2000. Mr. Fox also grew up in the Iron River, WI area.

<sup>3</sup>[www.tpl.org/tier3\\_cd.cfm?content\\_item\\_id=21167&folder\\_id=208&www.fs.fed.us/r9/cnnf/news/2001/0110.html](http://www.tpl.org/tier3_cd.cfm?content_item_id=21167&folder_id=208&www.fs.fed.us/r9/cnnf/news/2001/0110.html)

<sup>4</sup>Mr. Fox confirmed this report and noted that his father and Max Happles helped coordinate the stocking through the Wisconsin Conservation Commission. Mr. Fox noted that the lake trout did “well” in Happles Lake though they rarely exceed about 7 or 8 lbs in size. He noted that lake trout were still being caught from Happles after World War II.

<sup>5</sup>[www.ersc.wisc.edu/research/Projects/LakesTSI/](http://www.ersc.wisc.edu/research/Projects/LakesTSI/)

3. Construct a population estimate for all major fish species.
4. Construct length frequencies for all major fish species.
5. Compute PSD values for all major fish species.
6. Compute relative weight ( $W_r$ ) for all major fish species.
7. Construct age frequencies for all major fish species (*time permitting*).
8. Compute parameters for the Von Bertalanffy growth model for all major fish species (*time permitting*).
9. Archive these data and computations with the USFS, WiDNR and at Northland College so that future data and measurements can be compared to this baseline information.

## Methods

Sampling was conducted during the fall of 2007 (netting on Sep 26-29, angling on Sep 12-29) and spring of 2008 (netting on May 12-15, angling on Jun 8-18) with a variety of gears. Fyke nets used in both seasons included (1) “regular”, (2) “Northland College” (NC) mini, and (3) “Wisconsin DNR” (WiDNR) mini fyke nets. The “regular” fyke nets (borrowed from the U.S. Fish and Wildlife Service, Ashland Fisheries Resource Office) have a frame covered with either 1/4- or 3/8-inch bar measure black mesh, a first frame that is six feet wide and three feet deep, a second frame with two “hard” (i.e., metal) two-inch wide vertical openings, and at least 30 foot leads of either 1/4- or 3/8-inch bar measure mesh. The NC mini-fykes have frames covered with 3/8-inch bar measure black mesh, a first frame that is three feet wide and 27 inches deep, a second frame with two “soft” (i.e., rope) two-inch wide vertical openings, and 30 foot leads of 3/8-inch bar measure mesh. The WiDNR mini-fykes have frames covered with 1/4-inch stretch measure green mesh, a first frame that is 3 feet wide and 3 feet deep and covered with one-inch bar measure “excluder” mesh, and a 75 foot lead of 1/4-inch stretch measure mesh. Fyke nets were set at specified (non-random) locations by early afternoon and lifted the following morning (i.e., “one-night soak”). The fyke net leads were staked at the water’s edge and stretched perpendicular to shore with the top of the first frame generally under less than 2.0 feet of water. Less than 35 feet of lead was used on most nets because of the relatively steep near-shore bathymetry of Happles Lake (a bathymetric map with the approximate sampling zone is shown in the Appendix). Surface temperature and general habitat observations were recorded for each set. Locations of fyke net sets are shown in **(Figure 1)**.

Gee minnow traps were fished at a variety of locations for a variety of nights in 2007 **(Figure 1)**. The minnow traps were 16 inches long, nine inches wide, constructed of 1/4-inch square wire mesh covered with a black plastic coating with a 7/8-inch entrance hole. Minnow traps were set in water between one and three feet deep within 10 to 20 feet of shore. Each minnow trap was “baited” with a handful of dry dog food each time it was set.

Beach seines were hauled 13 times at various (non-random) locations around the entire lake in 2008. The beach seines were 20 feet wide and four feet deep with 1/4-inch bar measure white mesh and no bag. Seine hauls were either perpendicular to shore starting at an approximate four foot depth resulting in an approximate 30 foot drag or, because of the relatively steep near-shore bathymetry, were roughly parallel to shore for an approximate 30 foot drag with the deep edge of the seine at the approximate four foot depth.

Hook-and-line angling was used to sample large juvenile and adult largemouth bass as largemouth bass are known to avoid fyke nets (e.g., [Divens et al. \(1998\)](#)). Angling was conducted by a variety of anglers (both novice and experienced) using different artificial lures (primarily “plastic worms”, “beetle spins”, and “plugs”) with a variety of presentations. Angling was conducted on three days in 2007 (12-Sep, 19-Sep, 29-Sep) for a total of 13.5 angler-hours of effort and on three days in 2008 (08-Jun, 09-Jun, 18-Jun) for a total of 19 angler-hours of effort. Largemouth bass appeared to be on spawning nests during the 2008 sampling dates.

All captured fish were identified to species, counted, and measured for total length (TL) to the nearest 0.1 inch except in catches of more than 1000 bluegills smaller than 3 inches where a subsample of at least 50 individuals were measured and in catches of more than 100 bluntnose minnows where a subsample of at least 40 individuals were measured. Weights (to the nearest 0.1 gram for fish less than approximately 8 inches and to the nearest 1.0 gram for fish larger than approximately 8 inches) were taken in the field with digital scales for a subsample of five fish per 0.5-inch TL interval for largemouth bass (<8 inches), bluegill (>3 inches),

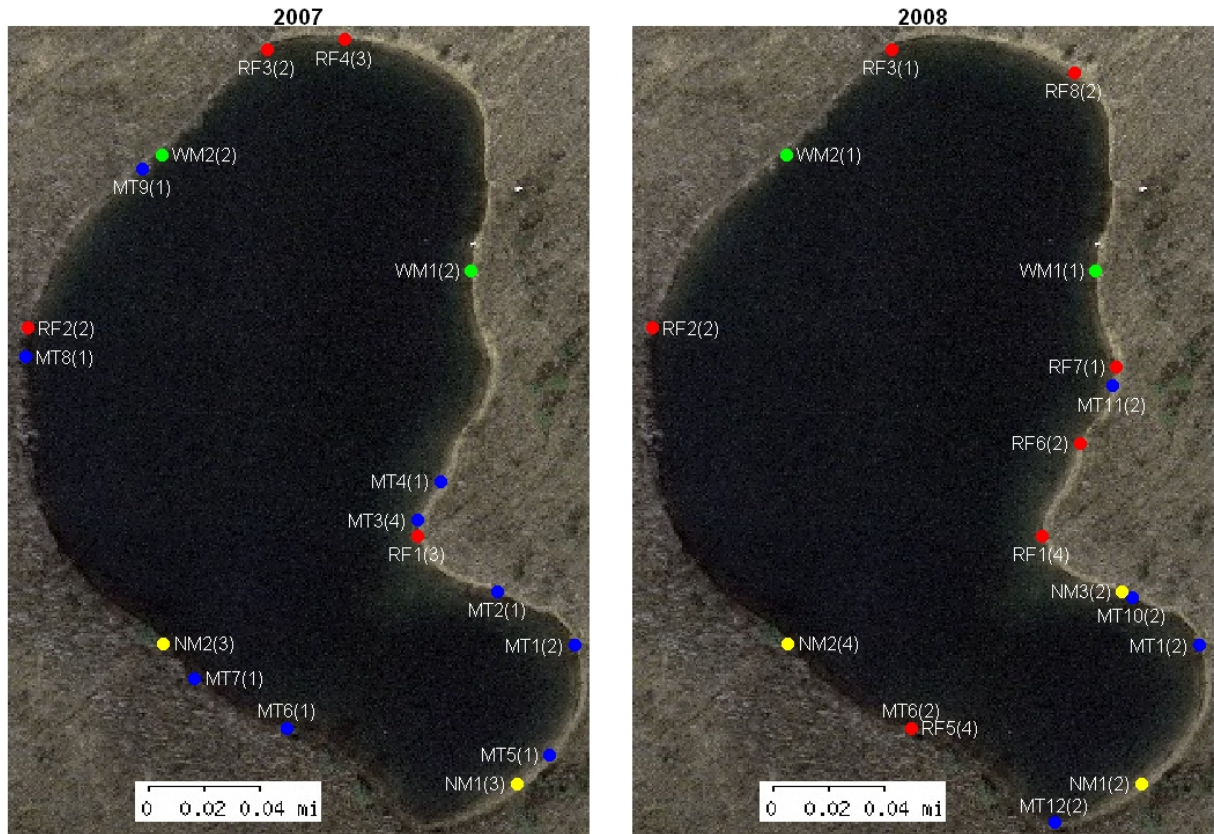


Figure 1: Approximate locations of regular (RF), Northland College mini (NM), and WiDNR mini (WM) fyke nets and minnow traps (MT). Labels used in 2007 were maintained in 2008. Values in parentheses are the number of nights or hauls at that location.

and rockbass (>3 inches) and five fish per 0.1-inch TL interval for bluntnose minnows, bluegill (<3 inches), and rockbass (<3 inches). All largemouth bass (>8 inches) and a subsample of as many as five bluegills or rockbass per 0.5-inch length interval greater than three inches had 8-12 scales removed from the left side of the fish just posterior of the depressed pectoral fin and below the lateral line. In addition, largemouth bass larger than twelve inches also had the second dorsal spine removed. Finally, all largemouth bass >8 inches TL, bluegill >3 inches TL, and rockbass >3 inches TL were “marked” by removing approximately 0.25-inch of the dorsal (Fall 2007) or ventral (Spring 2008) tip of the caudal fin. Largemouth bass >12 inches in Fall 2007 and bluegill >8 inches in 2008 were also tagged with a numbered T-bar anchor tag.

Analysis for major game fishes was separated into sub-stock-length (hereafter, called “small”) and stock-length individuals (**Table 1**). Average catch-per-unit-effort (CPE) was computed separately for each size of fish, gear type, and year. Units of effort were a “trap-night” for the fyke nets and minnow traps, a “haul” for the seines, and a “person-hour” for angling. Proportional stock density (PSD) was computed (where samples sizes were large enough) as the percentage of the number of stock fish that were larger than quality size ([Anderson and Neumann, 1996](#)). Confidence intervals for the PSD values were computed using the binomial distribution with the Clopper-Pearson exact method.

Table 1: Minimum lengths (inches) for stock, quality, and preferred levels of the major game fishes found in Happles Lake.

Species	Stock	Quality	Preferred
Bluegill	3	6	8
Largemouth Bass	8	12	15
Rockbass	4	7	9

## Results

Seven fish species were captured in Happles Lake during this study (**Table 2**). Small bluegill dominated (85.7%) the catch in all gears combined in September 2007 whereas bluntnose minnows (59.5%) and small bluegills (31.5%) dominated in May 2008 (**Table 3**).

Table 2: Species of fish observed in Happles Lake, September 2007 and May 2008.

Family	Common Name	Scientific Name
Centrarchidae	Largemouth Bass	<i>Micropterus salmoides</i>
Centrarchidae	Bluegill	<i>Lepomis macrochirus</i>
Centrarchidae	Rockbass	<i>Ambloplites rupestris</i>
Percidae	Iowa Darter	<i>Etheostoma exile</i>
Percidae	Johnny Darter	<i>Etheostoma nigrum</i>
Cyprinidae	Bluntnose Minnow	<i>Pimephales notatus</i>
Catastomidae	White Sucker	<i>Catostomus commersoni</i>

Table 3: Catch of all fish species and basic size categories in Happles Lake, September 2007 and May 2008.

	2007	2008
Bluegill	197	231
Bluegill (<3)	5260	1305
Bluntnose Minnow	519	2468
Iowa Darter	0	17
Johnny Darter	0	1
Largemouth Bass	16	91
Largemouth Bass (<8)	48	0
Rockbass	75	24
Rockbass (<4)	24	4
White Sucker	1	4

## Bluegill

The picture of the bluegill population in Happles Lake differed dramatically from Fall 2007 to Spring 2008. The catch of bluegills in both samples was dominated by very small fish caught primarily in Wisconsin DNR mini-fyke nets (and primarily in the net marked as “WM1” in **Figure 1**). However, the cpe of small bluegills in the Wisconsin DNR mini-fyke nets was much lower in Spring 2008 than in Fall 2007 (**Table 4**). In Fall 2007 there was a large group of sampled fish between 0.8-1.2 inches TL, another smaller group between 1.4 and 1.6, and another smaller group of sampled fish between 2.2 and 2.7 inches TL (**Figure 2**)<sup>6</sup>. In Spring 2008 a large group of fish between 1.2 and 1.9 inches was observed but with a mode of approximately 1.5 inches (**Figure 2**). A close look at the length frequencies by gear type and year (**Figure 3**) shows that this difference in length frequency of small bluegills is largely due to the catch in the Wisconsin mini-fyke nets. As these nets were set in the same location during each season it appears that the very small bluegills observed in Fall 2007 either (1) grew, (2) experienced a higher mortality on the smallest individuals, or (3) experienced an emigration of the smallest individuals. There is very little evidence of growth among other length categories or in other gears.

Stock length bluegills were captured largely in the regular and Wisconsin DNR mini-fyke nets (**Table 5**). In Fall 2007 there were peaks of stock bluegills just above 3 inches and between approximately 5 and 6.5 inches (**Figure 4**). In Fall 2007 only two bluegills over 7 inches were captured (both were over 8 inches). In

<sup>6</sup>Actual length measurements are shown in the Appendix.

Table 4: Catch-per-unit-effort of small bluegills separated by gear type. No fish were captured in gear types not shown.

gear	year	n	Mean	St. Dev.	Min.	1st Qu.	Median	3rd Qu.	Max.	GeoMean
miniNC	2007	6	14.00	13.81	1	2.5	12.0	21.5	35	7.05
miniWDNR	2007	4	1133.25	1333.05	89	129.5	761.0	1765.0	2922	475.40
minnow trap	2007	14	0.57	1.59	0	0.0	0.0	0.4	6	0.01
regular	2007	10	63.40	60.63	3	21.5	48.0	75.8	179	34.09
miniNC	2008	8	16.75	17.81	0	1.8	14.5	21.8	51	3.23
miniWDNR	2008	2	288.50	21.92	273	280.8	288.5	296.2	304	287.80
minnow trap	2008	7	0.29	0.76	0	0.0	0.0	0.0	2	0.00
regular	2008	16	35.00	61.88	0	0.0	7.5	41.8	240	0.94
seine	2008	5	6.40	10.97	1	1.0	2.0	2.0	26	2.53

Spring 2008 the peak just over 3 inches was still evident, the peak between 5 and 6.5 inches was not observed (in fact no fish between 5 and 7 inches were observed), and a rather large cluster of fish between 7 and 9 inches was observed. The PSD for bluegills from all gears combined in Fall 2007 was 11 (95% CI: 7, 16). The collection of the larger fish in Spring 2008 resulted in an increased PSD of 54 (95% CI: 47, 61). The difference in collection of large bluegills between the two samples was likely due to fish behavior. In spring 2008 most of the 7 to 9 inch bluegills were captured in two regular fyke nets on one day suggesting that these bluegills were moving around the lake as a school. It should be noted that bluegills had not yet built spawning nests during the May 2008 sampling.

Table 5: Catch-per-unit-effort of stock bluegills separated by gear type. No fish were captured in gear types not shown.

gear	year	n	Mean	St. Dev.	Min.	1st Qu.	Median	3rd Qu.	Max.	GeoMean
angling	2007	4	0.07	0.14	0	0.0	0.0	0.1	0	0.00
miniNC	2007	6	1.17	1.83	0	0.0	0.0	2.2	4	0.02
miniWDNR	2007	4	4.75	4.57	0	3.0	4.0	5.8	11	0.65
regular	2007	10	16.90	10.45	3	9.8	18.5	21.0	36	13.02
miniNC	2008	8	2.12	1.46	0	1.0	2.0	3.2	4	0.81
miniWDNR	2008	2	22.00	28.28	2	12.0	22.0	32.0	42	9.16
regular	2008	16	10.62	18.93	0	1.0	3.5	5.8	67	1.65

In general the relative weight of bluegills captured in Happles Lake was below 100 indicating Happles Lake bluegills were generally “thinner” than the management standard (**Figure 5**). There was no difference in relative weight between stock and quality sized bluegills in Fall 2007. In Spring 2008 there was a tendency for longer fish to have a higher relative weight (significant increase from stock to quality but not from quality to preferred; preferred to memorable was not tested because of the small sample size). The relative weight of stock and quality fish in Spring 2008 did not differ from the same size of fish sampled in Fall 2007. The higher relative weight of larger fish in Spring 2008 may have been due to (1) increased weight at pre-spawn or (2) larger fish in Happles Lake are in better condition than smaller fish.

Population estimates of stock length bluegill from mark-recapture data were variable due to the relatively low number of recaptured marked fish (**Table 6** and **Table 7**). The population estimate in Fall 2007 was 1273 (95% CI: 603, 2911). The population estimate in Spring 2008 was 1387 (95% CI: 821, 2505) or approximately 145.8 stock length bluegill per ha.

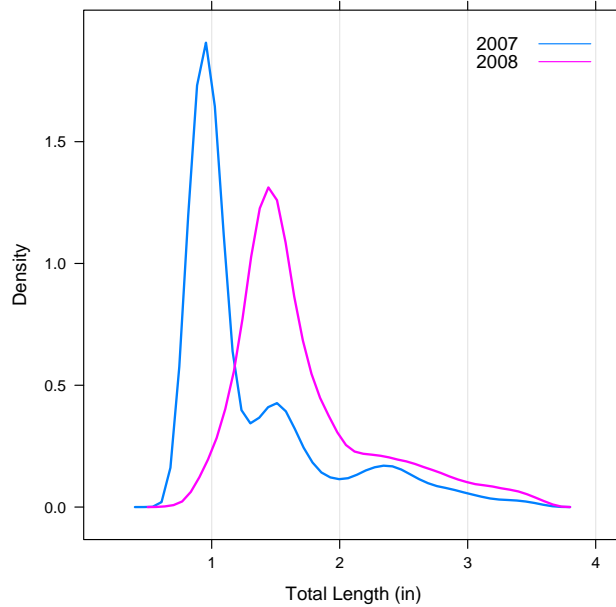


Figure 2: Bluegill (< 3.5 inches) length frequencies (as a kernel density plot) by year for all gear types combined.

Table 6: Number of captured fish (n), recaptured fish (m), and fish returned with a mark (R) for stock length bluegills by date in Fall 2007

	n	m	R
2007-09-12	0	0	0
2007-09-17	0	0	0
2007-09-19	2	0	1
2007-09-26	0	0	0
2007-09-27	71	0	38
2007-09-28	82	4	69
2007-09-29	42	1	3

Table 7: Number of captured fish (n), recaptured fish (m), and fish returned with a mark (R) for stock length bluegills by date in Spring 2008

	n	m	R
2008-05-12	56	0	55
2008-05-13	23	0	23
2008-05-14	98	7	98
2008-05-15	54	5	54
2008-06-08	0	0	0
2008-06-09	0	0	0
2008-06-18	0	0	0

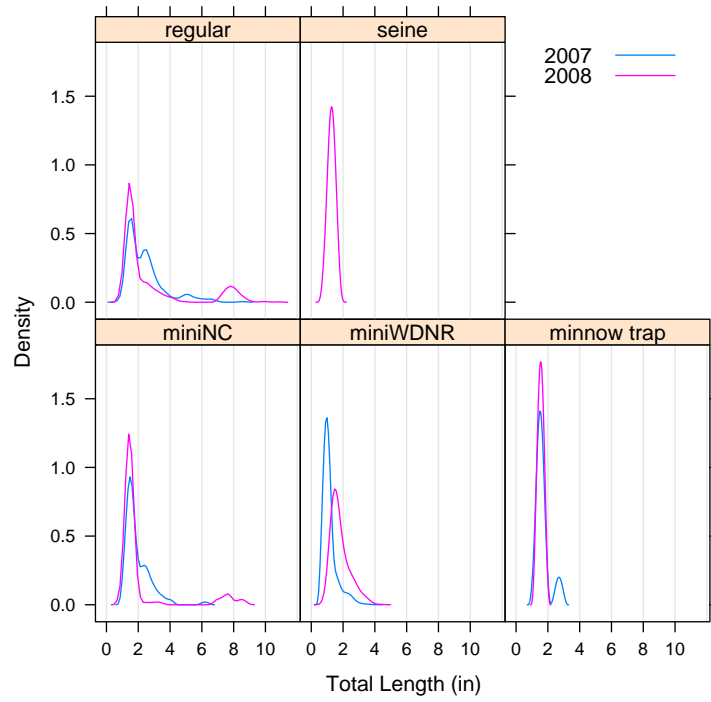


Figure 3: Bluegill length frequencies by gear type.

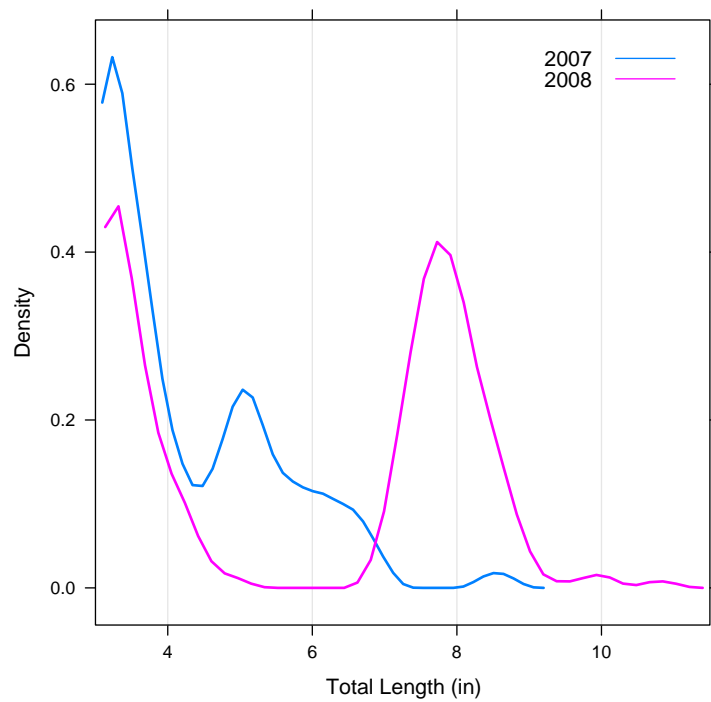


Figure 4: Bluegill (>3 inches) length frequencies by year for all gear types combined.

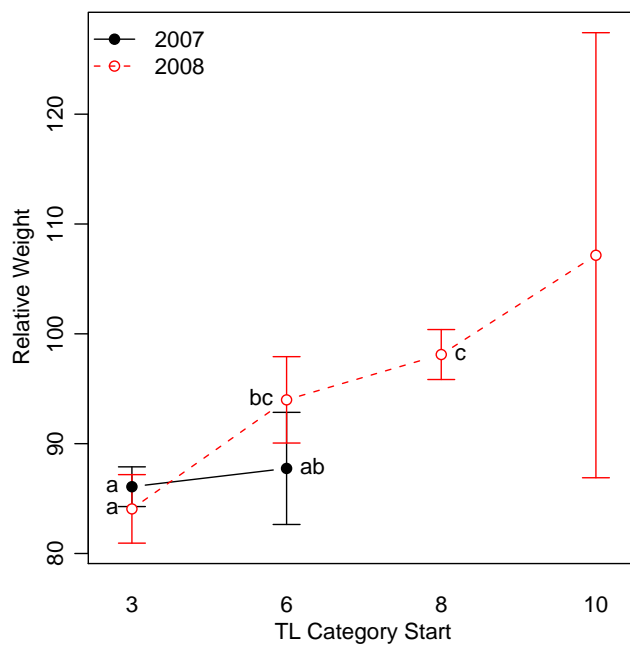


Figure 5: Bluegill mean relative weight (with 95% CI) versus length categories for Fall 2007 and Spring 2008. Points with the same letter are not statistically significantly different.

## Largemouth Bass

As with bluegill, the picture of the largemouth bass population in Happles Lake differed dramatically between Fall 2007 and Spring 2008. Small largemouth bass were only captured in Fall 2007, albeit in relatively low numbers (**Table 8, Figure 6**). Stock length largemouth bass were captured much more frequently in Spring 2008 with an average of approximately five fish caught angling per person per hour (**Table 9**). The high catch of stock length largemouth bass in the spring was likely largely due to bass holding in shallow waters on spawning nests.

Table 8: Catch-per-unit-effort of small largemouth bass separated by gear type. No fish were captured in gear types not shown.

gear	year	n	Mean	St. Dev.	Min.	1st Qu.	Median	3rd Qu.	Max.	GeoMean
miniNC	2007	6	2.00	2.10	0	0.2	1.5	3.5	5	0.18
miniWDNR	2007	4	2.50	3.11	0	0.8	1.5	3.2	7	0.34
regular	2007	10	2.60	5.56	0	0.0	0.5	1.8	18	0.05

Table 9: Catch-per-unit-effort of stock largemouth bass separated by gear type. No fish were captured in gear types not shown.

gear	year	n	Mean	St. Dev.	Min.	1st Qu.	Median	3rd Qu.	Max.	GeoMean
angling	2007	4	1.34	0.78	0	0.8	1.4	2.0	2	1.14
regular	2007	10	0.30	0.95	0	0.0	0.0	0.0	3	0.00
angling	2008	3	5.19	2.12	3	4.3	5.7	6.3	7	4.85

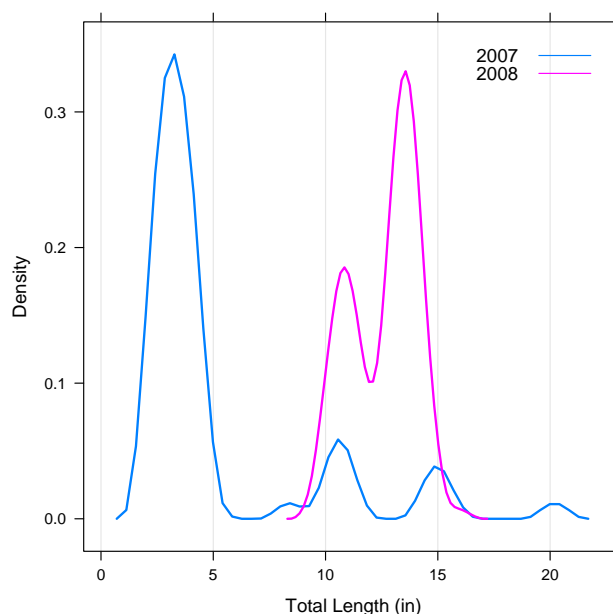


Figure 6: Largemouth bass length frequencies by year for all gear types combined.

The length frequency of stock length largemouth bass exhibited a partial bimodal shape with one peak near 11 inches and a second peak near 15 inches in Fall 2007 and 13 inches in Spring 2008 (**Figure 6, Figure 7**). The larger sample in Spring 2008 showed a relative decrease in abundance of bass larger than 14 inches, though this observation should be interpreted cautiously because of the small sample size of stock length bass captured in Fall 2007. The PSD was 42 (95% CI: 15, 72) in 2007 and 65 (95% CI: 54, 75) in 2008. The RSD-14 (percentage of stock size fish that were larger than 14 inches) was 42 (95% CI: 15, 72) in 2007

and 18 (95% CI: 10, 27) in 2008. The relatively high PSD and relatively low RSD-14 results suggest that largemouth bass in Happles Lake (1) do not have enough resources to grow substantially beyond 14 or 15 inches, (2) do not live long enough to grow substantially beyond 14 or 15 inches, (3) are being harvested as soon as they reach 14 inches (the minimum legal length in the “Northern Zone of Bass Waters” is 14 inches), or (4) or are affected by some combination of these possible explanations.

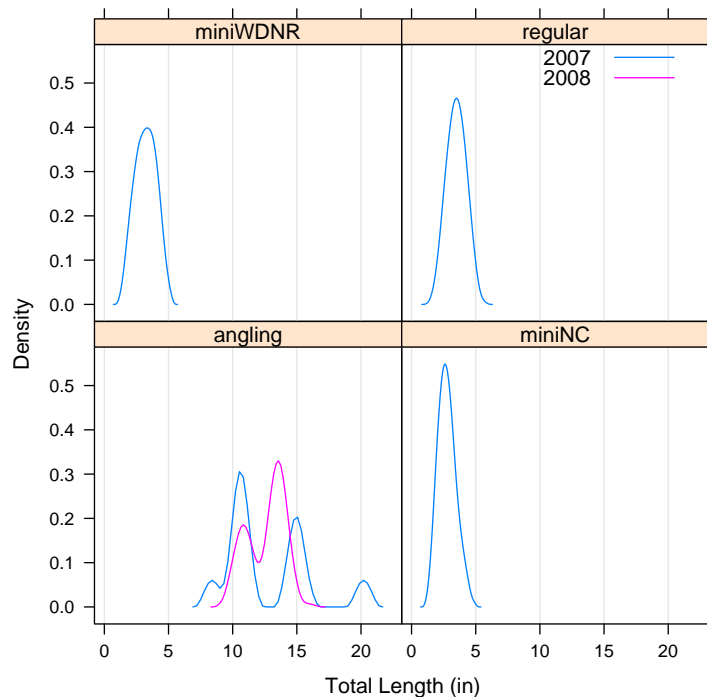


Figure 7: Largemouth bass length frequencies by gear type.

The relative weight of largemouth bass did not differ significantly between Fall 2007 and Spring 2008 but did differ significantly between fish in the 8-12 inch and 12-15 inch length categories with the larger fish being in significantly poorer condition<sup>7</sup>(Figure 8). Larger fish in poorer condition may be indicative of a possible resource limitation to largemouth bass growth.

Population estimates of stock length largemouth bass could not be made in Fall 2007 because no marked fish were recaptured (Table 10). The population estimate in Spring 2008 was 540 (95% CI: 221, 1335; Table 11) which corresponds to approximately 56.8 stock length largemouth bass per ha.

Table 10: Number of captured fish (n), recaptured fish (m), and fish returned with a mark (R) for stock length bluegills by date in Fall 2007

	n	m	R
2007-09-12	4	0	4
2007-09-17	0	0	0
2007-09-19	6	0	5
2007-09-26	0	0	0
2007-09-27	3	0	0
2007-09-28	0	0	0
2007-09-29	3	0	3

<sup>7</sup>There were not enough fish larger than 15 inches to include in this analysis.

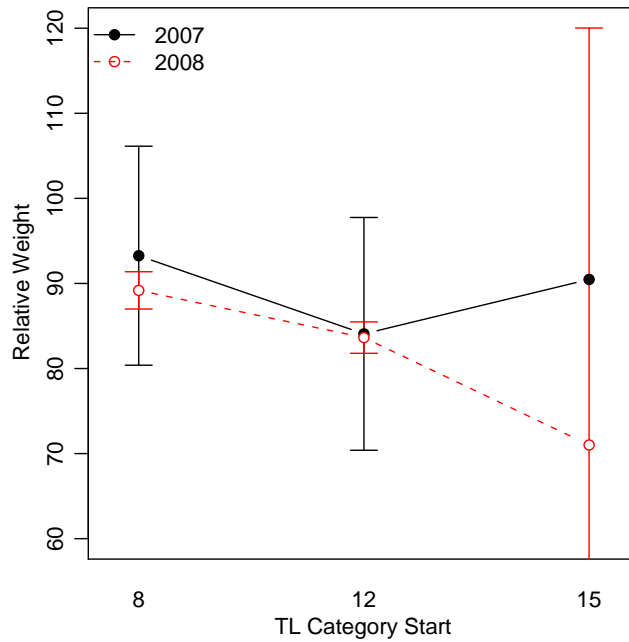


Figure 8: Largemouth bass mean relative weight (with 95% CI) versus length categories for Fall 2007 and Spring 2008.

Table 11: Number of captured fish (n), recaptured fish (m), and fish returned with a mark (R) for stock length bluegills by date in Spring 2008

	n	m	R
2008-05-12	0	0	0
2008-05-13	0	0	0
2008-05-14	0	0	0
2008-05-15	0	0	0
2008-06-08	14	0	14
2008-06-09	20	1	20
2008-06-18	57	2	57

## Rockbass

Small (geometric mean less than 1 fish; **Table 12**, **Table 13**) numbers of small and stock length rockbass were captured in both Fall 2007 and Spring 2008. Both the Fall 2007 and Spring 2008 samples exhibited a bimodal length frequency distribution with peaks at approximately 2 and 6.5 inches (**Figure 9**).

Table 12: Catch-per-unit-effort of small rockbass separated by gear type. No fish were captured in gear types not shown.

gear	year	n	Mean	St. Dev.	Min.	1st Qu.	Median	3rd Qu.	Max.	GeoMean
miniNC	2007	6	0.83	1.17	0	0.0	0.5	1.0	3	0.04
miniWDNR	2007	4	0.75	0.96	0	0.0	0.5	1.2	2	0.04
minnow trap	2007	14	0.18	0.32	0	0.0	0.0	0.4	1	0.01
regular	2007	10	1.20	1.81	0	0.0	0.0	2.5	5	0.02
miniNC	2008	8	0.38	0.52	0	0.0	0.0	1.0	1	0.01
miniWDNR	2008	2	0.50	0.71	0	0.2	0.5	0.8	1	0.03

Table 13: Catch-per-unit-effort of stock rockbass separated by gear type. No fish were captured in gear types not shown.

gear	year	n	Mean	St. Dev.	Min.	1st Qu.	Median	3rd Qu.	Max.	GeoMean
angling	2007	4	0.78	1.39	0	0.0	0.1	0.9	3	0.03
miniNC	2007	6	1.33	1.63	0	0.0	1.0	2.0	4	0.05
regular	2007	10	4.60	6.45	0	1.2	3.0	4.8	22	0.73
angling	2008	3	0.07	0.12	0	0.0	0.0	0.1	0	0.01
miniNC	2008	8	0.12	0.35	0	0.0	0.0	0.0	1	0.00
regular	2008	16	1.31	2.77	0	0.0	0.0	1.0	10	0.02

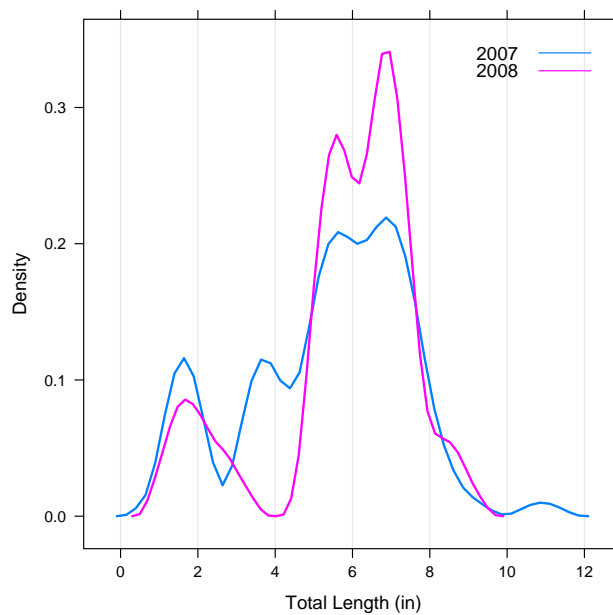


Figure 9: Rockbass length frequencies by year for all gear types combined.

## Bluntnose Minnows

An extremely large number of bluntnose minnows (1795 fish) were captured in one Wisconsin DNR mini-fyke net (net “WM1”) in Spring 2008 (**Table 14**). Moderately larger numbers of bluntnose minnows were also captured in regular and Northland College mini-fyke nets in Spring 2008 and in minnow traps in Fall 2007 (**Table 14**). In Fall 2007, the length frequency distribution was bimodal with peaks at approximately 2.2 and 2.8 inches (**Figure 10**). The length frequency distribution in Spring 2008 was also bimodal but with peaks at 1.7 and 2.2 inches. This shift in length between Fall 2007 and Spring 2008 could be due to (1) high over-winter mortality on the larger individuals observed in Fall 2007, (2) a recruitment to the gear of smaller individuals in Spring 2008, or (3) a movement to shallower water (and thus, vulnerability to our gear) of smaller individuals in Spring 2008.

Table 14: Catch-per-unit-effort of bluntnose minnow separated by gear type. No fish were captured in gear types not shown.

gear	year	n	Mean	St. Dev.	Min.	1st Qu.	Median	3rd Qu.	Max.	GeoMean
miniNC	2007	6	6.67	12.94	0	1.0	1.5	2.8	33	0.76
miniWDNR	2007	4	1.00	1.41	0	0.0	0.5	1.5	3	0.04
minnow trap	2007	14	21.93	29.37	0	1.2	5.2	37.5	82	4.15
regular	2007	10	1.50	2.80	0	0.0	0.0	1.5	8	0.01
miniNC	2008	8	24.75	19.93	0	6.0	30.5	36.5	53	2.20
miniWDNR	2008	2	910.50	1250.87	26	468.2	910.5	1353.0	1795	215.82
minnow trap	2008	7	1.00	1.00	0	0.5	1.0	1.0	3	0.16
regular	2008	16	26.12	47.61	0	1.0	11.5	26.0	195	2.33
seine	2008	5	4.80	10.73	0	0.0	0.0	0.0	24	0.01

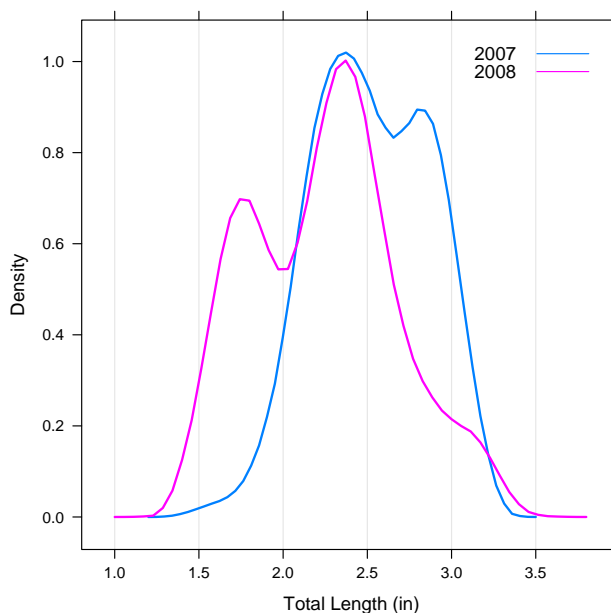


Figure 10: Bluntnose minnow length frequencies by year for all gear types combined.

## Iowa Darter

Small numbers of Iowa darters mostly between 1.7 and 2.1 inches total length were captured only in Spring 2008, likely due to spawning behavior in shallow water (**Table 15**, **Figure 11**).

Table 15: Catch-per-unit-effort of Iowa darter separated by gear type. No fish were captured in gear types not shown.

gear	year	n	Mean	St. Dev.	Min.	1st Qu.	Median	3rd Qu.	Max.	GeoMean
miniNC	2008	8	0.75	0.89	0	0.0	0.5	1.2	2	0.04
miniWDNR	2008	2	1.50	2.12	0	0.8	1.5	2.2	3	0.05
minnow trap	2008	7	0.43	0.53	0	0.0	0.0	1.0	1	0.02
regular	2008	16	0.19	0.40	0	0.0	0.0	0.0	1	0.00
seine	2008	5	0.40	0.55	0	0.0	0.0	1.0	1	0.02

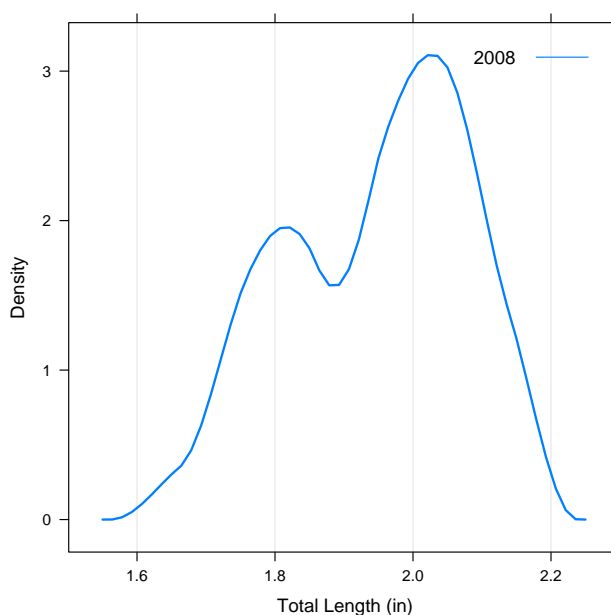


Figure 11: Iowa darter length frequencies by year for all gear types combined.

## Other Observations

### White Suckers

In Spring 2008, we captured four large (15.6, 17.4, 17.5, and 17.9 inch) ripe male white suckers. Only one small (3.6 inches) juvenile was observed in Fall 2007.

### Angling Use

In Spring 2008, we observed a pair of anglers harvesting a small number of bluegills and a large group of adult-supervised “kids” fishing on Happles Lake. We also observed three fishing holes on the ice in April 2008 and, in Spring 2008, evidence of a canoe or other watercraft being pulled into and out of Happles Lake.

### Habitat

Fish in Happles Lake appear to be cover-limited. During our sampling and in snorkeling runs in Summer 2007 we observed a littoral zone with a largely sand or fine silt bottom substrate, a lack of macrophytes, only a few small areas of medium-size boulders, and coarse woody debris (CWD) that was generally limited to three large off-shore beaver “caches”, three either old or active “on-shore” beaver “lodges”, and a relatively

small number of birch or oak trees that have been felled by beavers. The larger catches of fish and most snorkeling observations of fish were generally near these CWD structures. In addition, we observed bluegill, rockbass, and Iowa darters oriented toward our sampling gear in a manner that suggested they were using the gear as structure.

### Limnological Information

We recorded two secchi depth measurements of 16.25 feet on 15-May-08 in the south and north “basins” of Happles Lake. The mean surface temperature recorded at most net sets is shown in (Table 16).

Table 16: Mean surface temperature (C) at gear sets by date.

	Mean Temp
2007-09-27	63.9
2007-09-28	65.0
2007-09-29	62.0
2008-05-12	52.0
2008-05-13	52.2
2008-05-14	51.8
2008-05-15	55.5

We measured the temperature and dissolved oxygen profile (Figure 12) near the deepest portion of the northern half of Happles Lake on 7-Apr-2008. The ice at this time was becoming “candled” and there was no snow cover on the 20 inches of ice.

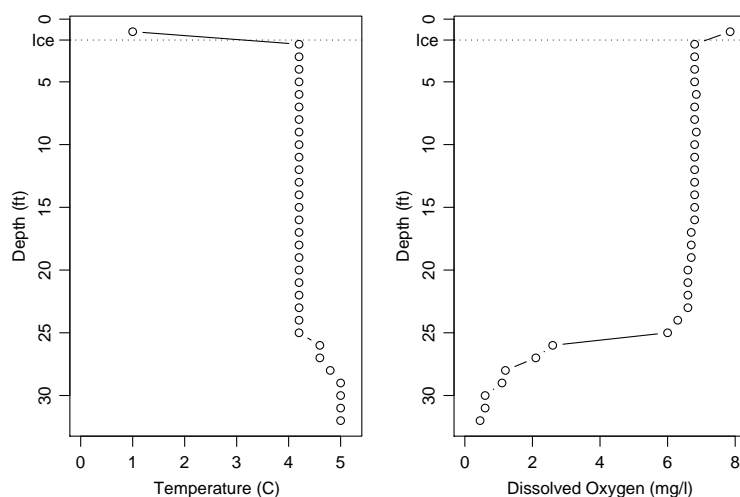


Figure 12: Temperature (left) and dissolved oxygen (right) profile for Happles Lake on 7-Apr-2008.

### Other Animals

In Fall 2007, we observed a resident beaver and a transient group of five otters on Happles Lake. In Spring 2008, we also observed a resident beaver and a lone loon. A “large” number of frogs were observed in Fall 2007 and a “small” number of painted turtles were observed in Spring 2008.

## Acknowledgments

This research and field experience could not have been completed without the assistance and cooperation of Andy Goyke (Northland College), Teresa Maday (U.S. Forest Service, Washburn), Glenn Miller (National Fish and Wildlife Conservation Office, Ashland), Sue Reinecke (U.S. Forest Service, Park Falls), Spring Rosales (U.S. Forest Service, Washburn), Thomas “Skip” Sommerfeldt (Wisconsin DNR, Park Falls), and Scott Toshner (Wisconsin DNR, Brule). The Fall 2007 field work was conducted by the NRS349 class of Casie Amend, Erika Fronk, Jonathon Herron, Katie Lancaster, Reed Perkins, and Trista Shirk. Volunteers included Ryan Leveque, Josh Smith, Logan Tucker, Lance Uselman, Hnue Yang, and Tony Young in Fall 2007; Kevins Schanning and Josh Smith in April 2008; and David Saetre, Kevin Schanning, and Josh Smith in May 2008. Ryan Leveque coordinated some of the field work in Fall 2007 and Josh Smith performed much of the field work in Spring 2008. A special thanks to Teresa Maday for having the trail into Happles “cleared” in Fall 2007, Spring Rosales for expediting the approval letter and key in Spring 2008, and Skip Sommerfeldt for logistical and interpretational assistance.

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# Appendix

## Limnological Information

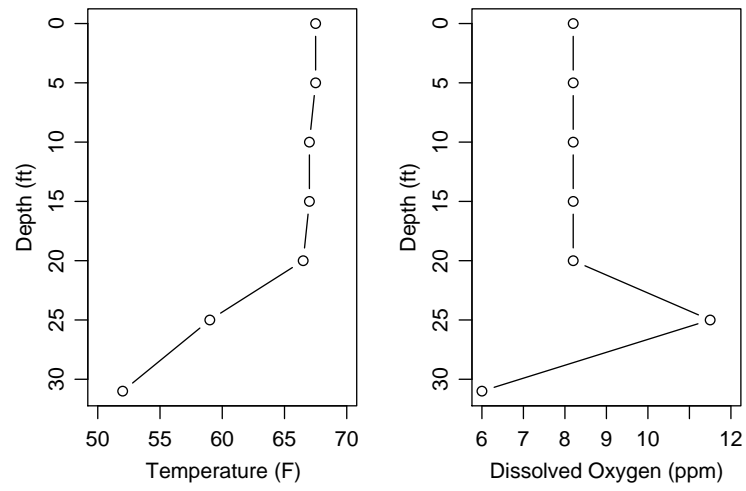


Figure 13: Temperature (left) and dissolved oxygen (right) profile for Happles Lake on 29Aug50.

## Bathymetric Map with Sampling Zone



Figure 14: Bathymetry of Happles Lake (from WiDNR website). The area less than five feet, a rough representation of the area that was sampled, is shown in gray.

## Tagged Fish

List of all tagged fish in Happles Lake is shown below.

tag	species	length	date	recap
1001	Largemouth Bass	20.2	2007-09-12	0
1002	Largemouth Bass	14.6	2007-09-19	0
1003	Rockbass	8.0	2007-09-27	0
1004	Bluegill	8.8	2008-05-14	0
1006	Rockbass	9.0	2007-09-27	0
1007	Rockbass	7.7	2007-09-27	0
1008	Rockbass	7.3	2007-09-27	0
1009	Rockbass	6.9	2007-09-28	0
1010	Rockbass	6.5	2007-09-28	0
1010	Rockbass	6.7	2008-05-13	0
1011	Largemouth Bass	15.1	2007-09-29	0
1012	Largemouth Bass	14.7	2007-09-29	0
1501	Bluegill	8.0	2008-05-14	0
1502	Bluegill	8.0	2008-05-14	0
1503	Bluegill	8.2	2008-05-14	0
1504	Bluegill	8.2	2008-05-14	0
1505	Bluegill	8.0	2008-05-14	0
1506	Bluegill	8.8	2008-05-14	0
1507	Bluegill	8.2	2008-05-14	0
1508	Bluegill	8.2	2008-05-14	0
1509	Bluegill	8.7	2008-05-14	0
1510	Bluegill	8.6	2008-05-14	0
1511	Bluegill	8.1	2008-05-14	0
1512	Bluegill	9.3	2008-05-14	0
1513	Bluegill	8.2	2008-05-14	0
1514	Bluegill	8.7	2008-05-14	0
1515	Bluegill	8.7	2008-05-14	0
1516	Bluegill	8.8	2008-05-15	0
1517	White Sucker	17.4	2008-05-15	0
1526	Bluegill	8.4	2008-05-14	0
1527	Bluegill	8.1	2008-05-14	0
1528	Bluegill	7.9	2008-05-14	0
1529	Bluegill	8.7	2008-05-14	0
1530	Bluegill	8.4	2008-05-14	0
1533	Bluegill	8.2	2008-05-14	0
1534	Bluegill	8.0	2008-05-14	0
1535	Bluegill	8.2	2008-05-14	0
1536	Bluegill	8.0	2008-05-14	0
1537	White Sucker	17.9	2008-05-14	0
1538	White Sucker	17.5	2008-05-14	0
1539	Bluegill	8.0	2008-05-14	0
1540	Bluegill	8.2	2008-05-14	0
1541	Bluegill	8.3	2008-05-14	0
1542	Bluegill	8.1	2008-05-14	0
1543	Bluegill	8.0	2008-05-14	0
1544	Bluegill	7.9	2008-05-14	0
1545	Bluegill	7.9	2008-05-14	0
1546	Bluegill	8.4	2008-05-14	0
1547	Bluegill	8.2	2008-05-14	0
1548	Bluegill	8.0	2008-05-14	0
1549	Bluegill	7.9	2008-05-14	0
1550	Bluegill	8.5	2008-05-14	0

1676	Bluegill	10.0	2008-05-14	0
1677	Bluegill	10.8	2008-05-14	0
1678	Bluegill	7.9	2008-05-13	0
1679	Bluegill	8.3	2008-05-13	0
1679	Bluegill	8.3	2008-05-14	1
1680	Rockbass	8.1	2008-05-13	0
1680	Bluegill	8.2	2008-05-14	0
1681	Bluegill	8.4	2008-05-14	0
1682	Bluegill	8.2	2008-05-13	0
1683	Bluegill	7.9	2008-05-13	0
1684	Bluegill	8.4	2008-05-13	0
1684	Bluegill	8.4	2008-05-14	1
1685	Bluegill	8.4	2008-05-13	0
1687	Bluegill	8.9	2008-05-13	0
1688	Bluegill	7.9	2008-05-13	0
1689	Bluegill	8.5	2008-05-13	0
1691	Bluegill	9.9	2008-05-14	0
1692	White Sucker	15.6	2008-05-13	0
1693	Bluegill	8.6	2008-05-12	0
1693	Bluegill	8.6	2008-05-14	1
1694	Bluegill	7.7	2008-05-12	0
1695	Bluegill	8.4	2008-05-12	0

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## Length Measurements of “Small” Fish

Length measurements of all captured bluegills, bluntnose minnows, Johnny darters, Iowa darters, and rockbass in 2007.

	Bluegill	Bluntnose Minnow	Rockbass
0.7	1	0	0
0.8	103	0	0
0.9	1289	0	0
1	888	0	0
1.1	230	0	2
1.2	135	0	0
1.3	103	0	0
1.4	151	0	0
1.5	224	1	1
1.6	165	2	3
1.7	85	2	3
1.8	66	3	3
1.9	49	10	1
2	36	18	0
2.1	49	31	0
2.2	65	55	0
2.3	69	53	0
2.4	74	51	0
2.5	68	58	0
2.6	40	38	0
2.7	41	36	0
2.8	30	56	0
2.9	31	49	0
3	23	33	0
3.1	15	23	1
3.2	15	2	1
3.3	8	0	0
3.4	14	0	0
3.5	10	0	1
3.6	11	0	4
3.7	4	0	2
3.8	6	0	1
3.9	8	0	1
4	4	0	1
4.1	1	0	1
4.2	1	0	0
4.3	4	0	0
4.4	2	0	1
4.5	4	0	0
4.6	0	0	1
4.7	2	0	0
4.8	3	0	1
4.9	7	0	2
5	5	0	0
5.1	6	0	5
5.2	6	0	1
5.3	1	0	0
5.4	4	0	2
5.5	3	0	4
5.6	3	0	3
5.7	1	0	1

5.8	3	0	3
5.9	2	0	0
6	4	0	3
6.1	1	0	0
6.2	1	0	1
6.3	4	0	2
6.4	1	0	4
6.5	3	0	2
6.6	1	0	1
6.7	1	0	0
6.8	3	0	3
6.9	1	0	3
7	0	0	1
7.1	0	0	4
7.2	0	0	2
7.3	0	0	2
7.4	0	0	2
7.5	0	0	2
7.7	0	0	2
7.9	0	0	1
8	0	0	3
8.5	1	0	1
8.6	1	0	0
9	0	0	1
10.9	0	0	1

Length measurements of all captured bluegills, bluntnose minnows, Johnny darters, Iowa darters, and rockbass in 2008.

	Bluegill	Bluntnose Minnow	Iowa Darter	Johnny Darter	Rockbass
0.8	3	0	0	0	0
0.9	6	0	0	0	0
1	47	0	0	0	0
1.1	39	0	0	0	0
1.2	87	0	0	0	0
1.3	136	1	0	0	0
1.4	232	3	0	0	0
1.5	211	87	0	0	2
1.6	149	111	0	0	0
1.7	87	193	1	0	0
1.8	69	209	4	0	0
1.9	68	124	2	0	0
2	30	109	6	0	0
2.1	31	143	4	0	1
2.2	36	188	0	0	0
2.3	29	277	0	0	0
2.4	30	261	0	0	0
2.5	30	224	0	1	0
2.6	24	151	0	0	0
2.7	24	79	0	0	0
2.8	21	93	0	0	1
2.9	16	50	0	0	0
3	15	49	0	0	0
3.1	13	52	0	0	0
3.2	12	46	0	0	0

3.3	13	13	0	0	0
3.4	6	1	0	0	0
3.5	12	1	0	0	0
3.6	7	0	0	0	0
3.7	6	0	0	0	0
3.8	2	0	0	0	0
3.9	3	0	0	0	0
4	4	0	0	0	0
4.1	4	0	0	0	0
4.2	1	0	0	0	0
4.3	4	0	0	0	0
4.4	1	0	0	0	0
4.7	1	0	0	0	0
4.9	1	0	0	0	0
5.2	0	0	0	0	1
5.3	0	0	0	0	2
5.5	0	0	0	0	2
5.6	0	0	0	0	3
6.2	0	0	0	0	1
6.3	0	0	0	0	2
6.7	0	0	0	0	1
6.8	0	0	0	0	1
6.9	0	0	0	0	3
7	3	0	0	0	1
7.1	2	0	0	0	2
7.2	5	0	0	0	1
7.3	4	0	0	0	0
7.4	9	0	0	0	1
7.5	10	0	0	0	0
7.6	7	0	0	0	0
7.7	9	0	0	0	0
7.8	12	0	0	0	0
7.9	13	0	0	0	0
8	8	0	0	0	0
8.1	3	0	0	0	1
8.2	11	0	0	0	0
8.3	3	0	0	0	0
8.4	8	0	0	0	0
8.5	2	0	0	0	0
8.6	3	0	0	0	0
8.7	4	0	0	0	1
8.8	3	0	0	0	0
8.9	1	0	0	0	0
9.3	1	0	0	0	0
9.9	1	0	0	0	0
10	1	0	0	0	0
10.8	1	0	0	0	0

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## Length Measurements of “Large” Fish

Length measurements of all captured largemouth bass and white suckers, by 0.5 inch length categories, in 2007.

	Largemouth Bass	White Sucker
2	7	0
2.5	12	0
3	10	0
3.5	10	1
4	11	0
4.5	1	0
8	1	0
10	3	0
10.5	1	0
11	2	0
14.5	2	0
15	1	0
15.5	1	0
20	1	0

Length measurements of all captured bluegills, bluntnose minnows, Johnny darters, Iowa darters, and rock-bass in 2008.

	Largemouth Bass	White Sucker
9.5	2	0
10	7	0
10.5	9	0
11	10	0
11.5	4	0
12	2	0
12.5	6	0
13	18	0
13.5	17	0
14	13	0
14.5	2	0
15.5	1	1
17	0	1
17.5	0	2