

NATURAL RESOURCES MANAGEMENT PLAN: LEDGE LAKE, HINCKLEY RESERVATION

Cleveland Metroparks Technical Report 2013



Above: photos of fisheries management activities at Ledge Lake coordinated by Cleveland Metroparks Natural Resources Division.

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Executive Summary

Ledge Lake is a 4.37 acre impoundment acquired by the Park District from private ownership in 1976. Since that time, the lake and surrounding area has been an important recreation area in Cleveland Metroparks for fishing, picnicking, swimming (in the adjacent pool), and open field recreational activities. The overarching management goal of the lake is to maintain its “fishable” status per Federal Clean Water Act (CWA) objectives, which is accomplished through active management activities focused on the fishery as will be detailed in this management plan.

There are no known current water quality issues in the lake. From 2006-7 the lake experienced uncharacteristic heavy nuisance filamentous algae and macrophyte growth. This issue was due to nutrient enrichment tracked back to improperly stored (uncovered outdoors) horse manure at an adjacent property on the south side of Ledge Road. The symptoms were effectively treated with algaecide/herbicide and the root problem was brought to the attention of the landowner and was promptly dealt with effectively. No other negative water quality incidences have been documented at the lake.

The lake offers a popular recreational fisheries in Cleveland Metroparks. The fishery consists of a typical warmwater assemblage of fish consisting of largemouth bass predators and a sunfish forage (prey) base, supplemented by annual stocking of adult rainbow trout (winter and spring). There are at least 10 species of fish known in the lake. Data collected in fall 2012 revealed that the lake has an imbalance in the predator composition of the lake, with lower than ideal densities of quality size (>300 mm) predatory largemouth bass (*Micropterus salmoides*), likely due to selective harvest of

legal size minimum length 12 inch (300.8 mm) fish by anglers. On a positive note, the prey fish population of bluegill and pumpkinseed sunfish (*Lepomis macrochirus* and *L. gibbosus*) exhibited a balanced proportional stock density. Overall, the current largemouth bass (in terms of numbers) and sunfish (in terms of quality) fisheries would be characterized as “good”. Given the relatively small size of the waterbody, periodic stocking of the lake with quality size (>300 mm) largemouth bass could help regain balance in the predator population and is recommended. The rainbow trout (*Oncorhynchus mykiss*) and fishery of the lake would be characterized as “very good” due to annual stocking of this species in the lake and therefore current regulations are considered effective in this regard. No other fish species in the lake are managed through bag or size regulations.

Although the lake is manmade, it does provide a secondary function as wildlife habitat. Although no rare species are known to inhabit the lake or immediate surrounding area, the lake does offer a typical urban lake assemblage of common waterfowl, wading birds, reptiles, amphibians, invertebrates, and aquatic macrophytes.

Historic Overview and Background

The main basin of Ledge Lake is a 4.37 acre impoundment which was acquired by the Park District upon purchase of the 34.5 acre Ledge Lake Park from private ownership in 1976. The lake was constructed by the previous owner in 1964. The degraded spillway structure was replaced in 2009 (John Kilgore, Manager of Engineering and Design, personal communication). There is also a shallow basin upstream of the lake to the southwest that functions as wildlife habitat. The main lake inlet is shallow and located in the southwest corner of the waterbody, with much of the main lake basin to the northeast having graded sloping shorelines reaching depths of approximately 20 feet. An updated bathymetric survey of the lake would be beneficial. The lake is situated in a depression bordered to the north, east, and west by parkland and to the south by Ledge Road and private horse farms in Hinckley, Ohio (Fig 1). Despite park development, the lake retains a mostly scenic quality with mowed grass along the northern shoreline and a margin of trees along the south shoreline. A wheelchair accessible fishing platform is available in the northwest portion of the lake for the convenience of anglers.

Ever since its acquisition, the lake has been part of a popular recreation area which features fishing, picnicking, swimming (in the adjacent pool), and open field recreational activities, both organized and impromptu in nature. Activities are overall most intense during the late spring through summer months.

The overarching goal for management of Ledge Lake is to maintain, and improve where possible, the chemical, physical, and biological integrity of the lake as reflected in the national water quality objective as contained in the Federal Clean Water Act (CWA). The CWA objective is often referred to as the “fishable/swimmable goal”, and the

foremost goal for the lake is its continued management as a fishing area, since swimming is not allowed in the lake and is offered in an adjacent in-ground pool area. This is currently accomplished through management activities focused on the fishery of the lake, as will be outlined in this report.

Water Quality Overview

Overall water quality is good for this lentic system given its watershed location in a park-agricultural setting. Ordinarily the lake does not receive excessive nutrient loading from adjacent watershed runoff. One exception would be in Spring 2006 through Spring 2007 when uncharacteristically heavy growth of nuisance filamentous algae and submersed aquatic vegetation occurred (Figure 2). In May 2007 Natural Resources Division staff tracked runoff that feeds the upper, and subsequently lower, Ledge Lake basins along and under Ledge Road and ultimately to a private horse farm located at 1150 Ledge Road which had a large pile of uncovered and otherwise uncontained manure outside a barn. This issue was brought to the attention of the landowner and it was promptly removed. Following this action an algaecide/herbicide treatment was applied at the lake and the issue has not occurred again (Figure 2). Aquatic macrophyte growth immediately around several popular fishing access points has been, and continues to be, treated annually with herbicide and algaecide. Although water in the lake is clear, overall, seasonal water transparency varies slightly, being clearest during the colder months due to seasonal variation in phytoplankton and zooplankton communities in the lake (Wetzel 1983).

There is no significant industry in the Ledge Lake sub-watershed to contribute industrial pollutants. No further documentation of physical or chemical water quality issues at the lake were found in Cleveland Metroparks historic files.

Fisheries Resource Overview

In an effort to obtain current data on the fish community in Ledge Lake, electrofishing was performed on 25 October 2012 in two sampling runs totaling 94 minutes. Both sample runs encompassed the entire shoreline of the waterbody (Figure 1). Electrofishing is a well established method utilized by fisheries managers to accurately assess fish population dynamics, abundance, and structure (Nielsen and Johnson 1983, Reynolds 1993, Smith-Root 2007). A Smith Root GPP 5.0 electrofishing unit and customized Alweld commercial johnboat, including booms constructed by Ashcraft Machine and Supply, Inc., of Newark, Ohio, were used. One person maneuvered the boat and operated the electrofishing unit control box while two assistants collected stunned fish, which were retained in an aerated 90 gallon onboard livewell for later processing. Fish lengths (mm) were obtained using a custom measuring board and weights (g) were obtained using a digital scale. Data was recorded onsite and all fish were released afterwards. Datasheets from the sampling activity are available in Appendix A.

Ledge Lake offers a typical fish assemblage for a small lake in Ohio. Fish species of importance (albeit to varying degrees) to anglers include the largemouth bass (*Micropterus salmoides*), crappie (*Pomoxis* sp.), bluegill (*Lepomis machrochirus*), pumpkinseed sunfish (*L. gibbosus*), green sunfish (*L. cyanellus*), channel catfish (*Ictalurus punctatus*), yellow bullhead (*Ameiurus natalis*), and seasonally stocked

rainbow trout (*Onchorynchus mykiss*). Other fish species known to be present, but of lesser immediate interest to anglers, include a few reported incidences of koi (*Cyprinus carpio*), an ornamental domesticated common carp, which appear to be escapees from a small pond upstream in the drainage on the south side of Ledge Road. Sterile white amur (*Ctenoparyngodon idella*), commonly known as grass carp, were also present in small numbers for supplemental vegetation control.

Considering the perspective of being a small waterbody in a fairly heavily utilized setting adjacent to an urban center, the fishery would be characterized overall as “very good” for seasonally stocked rainbow trout and “good” for largemouth bass (in terms numbers) and panfish (in terms of quality) species (Table 1, Table 2, Figure 5). Other species would be characterized as incidental catches by the majority of anglers who utilize the lake.

The predominant year-round predator and prey species in Ledge Lake are largemouth bass and bluegill/pumpkinseed sunfish. Properly managed ponds and small lakes can harbor self-sustaining largemouth bass and bluegill populations (Austin et al. 1996, Carlander 1977). Sampling yielded 224 largemouth bass weighing a total of 32.13 kg (70 lbs, 13 oz) (Table 1). Based on plotting length against frequency, there appears to be four year classes of largemouth bass present in the sample, with one and four year old year classes being markedly dominant (Figure 3). According to Hall (1986) density of largemouth bass over 199 mm (stock size) in Ohio impoundments can be correlated to electrofishing catch per hour, and the relationship is as follows:

$$\text{Log}_{10}Y=1.2274\text{Log}_{10}X-0.5489$$

Where X = electrofishing catch of largemouth bass over 199 mm (7.83 inches) per hour (CPH) and Y = number of largemouth bass over 199 mm per hectare. Ledge Lake, at 1.8 hectares (4.5 acres), yielded a CPH of 76.4 largemouth bass over 199 mm (120 bass over 199 mm in 1.57 hours) which would indicate a largemouth bass density of $57.85 \geq$ stock size bass per hectare ($23.42 \geq$ stock size bass/acre) when Hall's relationship is applied. This would suggest a largemouth bass abundance of $104.1 \geq$ stock size fish ($57.85 \geq$ stock size bass per hectare x 1.8 hectares) weighing a total of 24.9 kg (104.1 fish x 0.239 kg average weight of stock size bass), or 54.9 lbs, in Ledge Lake. This is a low density of bass \geq stock size for an Ohio lake, considering that 50-75 stock size bass per acre is recommended (William Lynch, Aquatic Ecosystem Management Program Specialist, Ohio State University Extension, personal communication).

Proportional stock density (PSD) of largemouth bass in the lake was calculated using the following formula (Anderson 1976):

$$\text{PSD}(\%) = (\text{number} \geq \text{quality size} / \text{number} \geq \text{stock size}) \times 100$$

Where "quality" and "stock" designations are as outlined in Gabelhouse 1984. PSD of largemouth bass in the lake was low at 5.83% (Table 2), as a PSD range between 40-70 is indicative of balance when the population supports a substantial fishery (Anderson 1980).

Relative weight (W_r) of individual fish was used as the metric to determine fish condition and was calculated using the following formula:

$$W_r = (W/W_s) \times 100$$

Where W is the weight of a given fish and W_s for largemouth bass is calculated as such (Wege and Anderson 1978, Anderson and Gutreuter 1983):

$$\text{Log}_{10} W_s = -5.316 + 3.191 \text{Log}_{10} L$$

Where L = the length of the specimen in mm. Largemouth bass sampled from Ledge Lake exhibited a mean W_r of 95.5 (Table 1) compared against the ideal W_r of 100. This is within the typical range for an Ohio lake and reflects a bass population in good condition (Phil Hillman and Andy Burt, Ohio Division of Wildlife, personal communications).

Bluegill and pumpkinseed sunfish are the dominant forage fish in Ledge Lake. Sampling yielded 64 bluegill and pumpkinseed weighing a total of 3.86 kg (8.5 lbs) (Table 1). Based on plotting length against frequency, there appears to be seven year classes of bluegill/pumpkinseed sunfish in the sample (Figure 4). Note that the smallest size classes of sunfish are less susceptible to electrofishing than larger specimens due to less surface area exposed to the electric field, hence their lower frequency in the sample. Proportional stock density (PSD) of bluegill was in the balanced range at 32.1% (Table 3), since a PSD range between 20-40 is indicative of balance when the population supports a substantial fishery (Anderson 1980). According to Novinger and Legler (1978) density of bluegill in the 76-150 mm (3.0-5.9 inch) length range can be correlated to density of largemouth bass 200-300 mm, and the relationship is as follows:

$$Y=3,185-1,436\text{Log}_{10}X$$

Where Y = the abundance of 76-150 mm (2.99-5.91 inches) bluegill as thousands per hundred pounds of population biomass and X = the number of bass 200-300 mm (7.87-11.81 inches) per acre. The largemouth density calculated and presented in this paper was $57.85 \geq$ stock size bass per hectare. Considering that 93.8% of the bass catch was in the stock size range of 200-300 mm of those ≥ 200 mm, that percentage was extrapolated to the calculated population density (54.26 stock size bass/ha, or 21.92 stock size

bass/acre). When this bass density is used in Novinger and Legler's relationship, abundance of bluegill in stock size range (76-150 mm) is predicted to be 1,259 thousand per hundred pounds of population biomass. This density would be indicative of a relatively healthy population of prey species (Andrew Burt, Ohio Division of Wildlife Inland Fisheries Research Unit, personal communication).

Relative weight (W_r) of individual fish was used as the metric to determine fish condition, and was calculated using the following formula, as outlined earlier, where W_s specific for bluegill is calculated as (Wege and Anderson 1978, Anderson and Gutreuter 1983):

$$\text{Log}_{10}W_s = -5.374 + 3.316\text{Log}_{10}L$$

Where L = the length of the specimen in mm. Compared against the ideal W_r of 100, bluegill sampled from Ledge Lake were in good condition for an Ohio lake, exhibiting a mean W_r of 108.3 (Table 1). This reflects a very healthy average for individual bluegill sunfish.

Balance within the fish community of Ledge Lake was assessed by analyzing prey-predator ratios in this system. To determine overall status of largemouth bass and bluegill dynamics in Ledge Lake a Total Quality (TQ) plot was constructed by plotting a point that aligned with predator (largemouth bass) PSD on the X axis and prey (bluegill) PSD on the Y axis (Figure 5). Gabelhouse (1983) determined that the PSD ranges indicative of balance in a prey population is 20-40% and the PSD range indicative of balance in a predator population is 40-60%, which are represented by dashed lines on the TQ plot. The square formed by the intersection of the desired PSD ranges on the plot is therefore representative of a state of mutual balance for predator and prey. The point of

intersection of the bass and bluegill PSDs for Ledge Lake is not within this range of mutual balance, but instead lies very near the far left grid of the plot. This is due to predator PSD being very low even though prey PSD is within the healthy range. This would be indicative of a largemouth bass predator population where quality size fish of legal size (minimum of 12", or 300.8 mm) are overharvested, which is a fairly common issue in small public lakes (Ney 1993).

It should be noted that the October 2012 fish sampling was performed during daylight hours. More quality size bass, in particular, would likely have turned up in the sample if sampling was done closer to dawn or dusk. Several studies have shown that night sampling can be more effective (up to 5-10 times more so) than daytime fishing in lakes, especially for larger predatory specimens such as largemouth bass (Loeb 1958, Witt and Campbell 1959, Kirkland 1962, Smith-Root 2007). In the future, a night sampling may be scheduled to help confirm this possibility.

Other Recreational Uses

Swimming and non-Cleveland Metroparks watercraft are not allowed in Ledge Lake. New in summer 2013 several paddleboats are available for rental on the lake through the Ledge Pool concession. The lake also serves functions for aesthetics and wildlife viewing, in addition to fishing.

Ecosystem Function Overview

Although Ledge Lake is not a natural lake, it does serve some general ecosystem functions in the watershed. Great blue heron (*Ardea herodias*), belted kingfisher (*Ceryle*

alcyon), mallard duck (*Anas platyrhynchos*), and Canada goose (*Branta canadensis*) are observed at the lake regularly. The lake is host to an assemblage of common reptiles and amphibians, including eastern painted turtle (*Chrysemys picta picta*), snapping turtle (*Chelydra serpentina*), green frog (*Rana clamitans*), and bullfrog (*R. catesbeiana*). No known threatened or endangered species of flora or fauna are resident in the lake.

Although common dragonfly (suborder Anisoptera) and damselfly (suborder Zygoptera) species can be observed utilizing the lake margin a regular basis, there is little information collected on specific macroinvertebrate or microbial communities within the lake. The vegetative/algal community of the lake is comprised mainly of *Najas* spp., unicellular algae, and some filamentous algae. Pickerelweed (*Pontederia cordata*), arrowhead (*Sagittaria latifolia*), softstem bulrush (*Schoenoplectus tabernaemontani*), and Eurasian watermilfoil (*Myriophyllum spicatum*) are also present. A full inventory of aquatic plants at Ledge Lake has not been undertaken so a number of other species are likely present, as well.

Current Fisheries Management

Ledge Lake is an actively managed fishery, and the urban nature of the waters of Cleveland Metroparks, in general, require intensive management efforts which go beyond traditional management approaches (Halko 1983). A bag limit of 3 rainbow trout per angler per day (no size limit) and 2 largemouth bass of 12" or greater per angler per day are in affect. There are no bag or size limit regulations on any other fish species in the lake. As is the case with all Cleveland Metroparks waters, a valid Ohio fishing license is required to fish Ledge Lake.

The Ledge Lake fish community is supplemented with annual scheduled, as well as opportunistic, fish stocking activities. Stocking of species such as rainbow trout, channel catfish, sunfish, and largemouth bass is a very common fisheries management activity which has been shown to have a many of benefits to the public (DesJardine 1983, Gordon 1983, Heidinger 1993, Manfredo et al. 1983, Norville 1961, Weithman 1993,). Catchable size rainbow trout have been stocked annually for over three decades from mid to late winter to offer a popular ice fishing opportunity in the Park District (Halko 1983). Approximately 700 pounds of trout total are stocked in two installments, the first typically right around Christmas followed by a second round in late January or early February. Additionally, 200 pounds of rainbow trout stocked annually in mid May for the longstanding Ken Mantkowski Memorial Handicapped Fishing Derby. The rainbow trout are available as a seasonal cold-water fishery which lasts until about mid-May most years. There is no evidence that channel catfish formerly stocked in the lake have reproduced naturally, which is typical in other similar bodies of water in Ohio (Austin et al. 1996).

Ledge Lake is also stocked with native warmwater species as opportunities become available. Notably, in May 2008 approximately 1,700 sunfish, 150 largemouth bass, and 2 large white amur (grass carp) were transferred to Ledge Lake (of approximately 5,000 fish total distributed around the Park District)¹. Warm water species are also transferred from other Cleveland Metroparks non-fishing waters (such as golf course and nature center ponds) to public fishing waters, including Ledge Lake, on a non-scheduled basis.

¹ As donated to the Park District by Rick Huff from his private lake. The lake from which these fish originated required draining due to failure to meet ODNR dam requirements for small impoundments.

It has been noted by various fish managers that proper communication with the public and the media is a powerful, and often underutilized, fisheries management tool (Decker and Krueger 1993, Patterson 1983, Cohen et al. 2008). With this in mind, information regarding fishing at Ledge Lake is disseminated through a number of outlets, including; Cleveland Metroparks fishing booklet and trifold, in the popular online fishing report blog on the Cleveland Metroparks website, through Cleveland Metroparks Facebook page, and in the Plain Dealer newspaper (typically in the Outdoors area of the Sports section).

Fishing derbies and other organized fishing events are noted as an exceptionally effective way to offer fishing to the public (Schedler and Haynes 1983, Lang et al. 2008). An annual and longstanding fishing event is offered to the public at Ledge Lake in the form of the Ken Mantkowski Memorial Fishing Derby in mid to late May annually. This event is a collaboration between Cleveland Metroparks Natural Resources Division staff, Cuyahoga County Board of Developmental Disabilities and Ohio Central Basin Steelheaders sportsman group.

Ledge Lake has a minimal quantity of woody debris along the shoreline that serves as natural fish structure. To address this situation, in spring and summer 2011 and 2012, Natural Resources Division Staff coordinated with Eagle Scout candidates Erik Jorgensen (2011) and John Hartman (2012) to construct a total of eight snag-resistant underwater brush-mimicking structures with “branches” made of gray PVC with a concrete base, which were deployed at Ledge Lake on 19 August 2011 and 11 April 2012 (Figure 6). The structures, which were made at the Eagle Scout’s expense, were similar to commercially available units that retail for between \$50-135 each and were sunken off

the end of the fishing dock (4 units), near the lake overflow structure (2 units), and in the southeast corner of the lake (2), all being popular fishing locations.

Nuisance vegetation and filamentous algae management is a routine management practice at Ledge Lake in target areas to facilitate a more desirable fishing experience. In recent years, this has entailed treating the lake in late May when the water temperature exceed 50 deg F (10 deg C) with a combination herbicide/algaeicide (such as RewardTM). Algae treatments are also conducted occasionally throughout the summer on an as needed basis. In recent years, use of backpack sprayer units from the shoreline has served adequately as a treatment method. Overall, this approach keeps nuisance growth in check in target areas, yet allows the establishment of vegetative growth beneficial to the aquatic ecosystem elsewhere in the lake. Supplemental biological control of vegetation occurs due to the presence of herbivorous triploid white amur (sterile grass carp); two of which were released into the lake in May 2008. Overall, vegetative growth is currently not at nuisance levels in the lake from an ecosystem or fisheries standpoint, but is in fact at desirable levels.

Current Wildlife Habitat Management

Ledge Lake currently has four wood duck nest boxes situated around the lake which are routinely maintained by Natural Resources Division staff (John Krock, Natural Resources Area Manager, personal communication).

Management Recommendations

The aforementioned routine management techniques have all had desirable effects on the Ledge Lake system from a recreational and ecosystem perspective and will therefore be continued into the future.

Based on initial data collection and analysis, the fishery could benefit from a greater proportion of quality size largemouth bass >300mm. This could potentially be accomplished through the periodic selective stocking of larger bass. This might also be facilitated by changing the largemouth bass regulations to a larger minimum size (such as 15”), although a change in traditional Park District bass regulations could confuse anglers at this lake. Further improvement of the panfish population structure should follow, as well, from a balanced largemouth bass predator population.

Increasing public education regarding introduction of aquatic invasive species should also be a focus at Ledge Lake, as well as all other park waters. This issue is noted in a bold red box on the onsite fishing kiosk at nearby Hinckley Lake, but needs to be part of a wider-reaching campaign to be most effective.

The current overall assessment of Ledge Lake is that it fulfills its roles within the Park District well and, therefore, does not require any drastic change in management strategy. The lake continues to be a popular fishing destination in the Park District. The management practices currently employed at the lake will therefore continue to be utilized and assessed periodically in an adaptive approach to management of the Ledge Lake resource.

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Table 1. Basic characteristics of largemouth bass and bluegill/pumpkinseed sunfish populations based on 25 October 2012 assessment (sampling time = 94 minutes)

Species	Total Number	Total Weight (kg)	Average Size (mm)	Average Relative Weight (W_r)¹
Largemouth bass	224	32.13	205.2	95.5
Bluegill and Pumpkinseed	64	3.86	125.5	108.3

¹ As outlined in Wege and Anderson 1978 and Anderson and Gutreuter 1983.

Table 2. Predator (largemouth bass) and prey (bluegill and pumpkinseed sunfish) proportional stock density information

Species	\geq Stock Size¹	\geq Quality Size¹	Proportional Stock Density (%)
Largemouth bass	120	7	5.83
Bluegill and Pumpkinseed	56	18	32.14

¹ Designations per Gablehouse 1983.

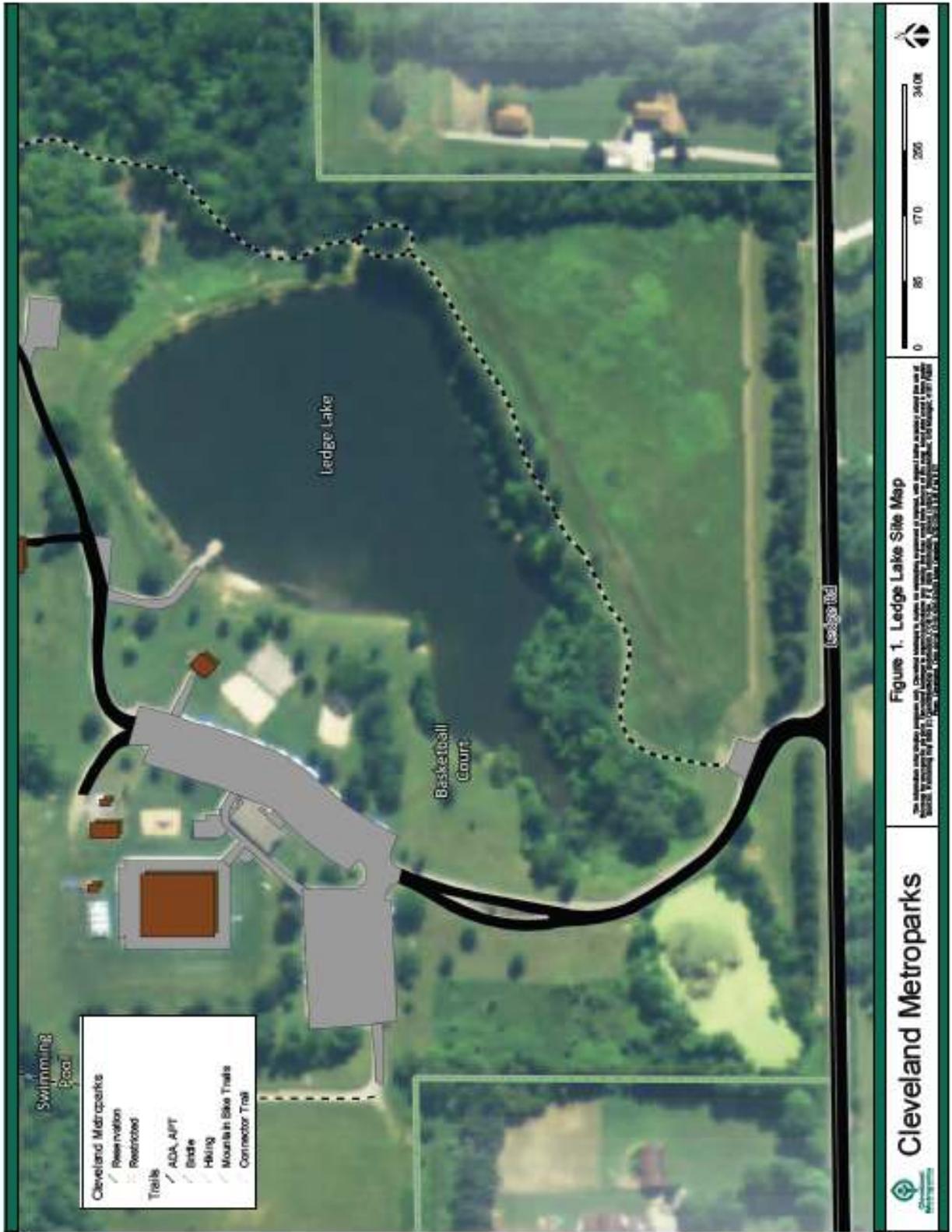
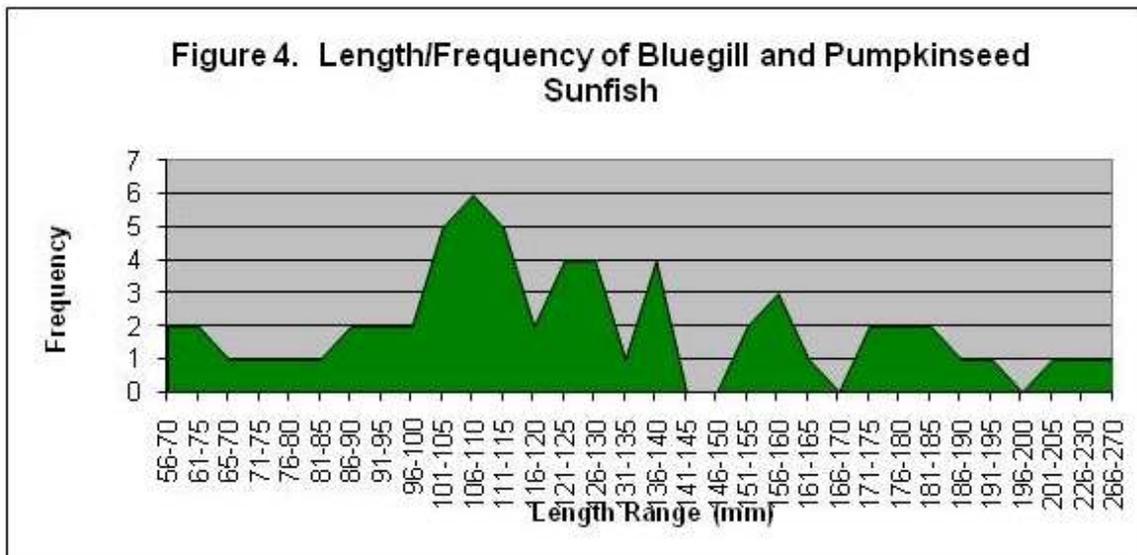
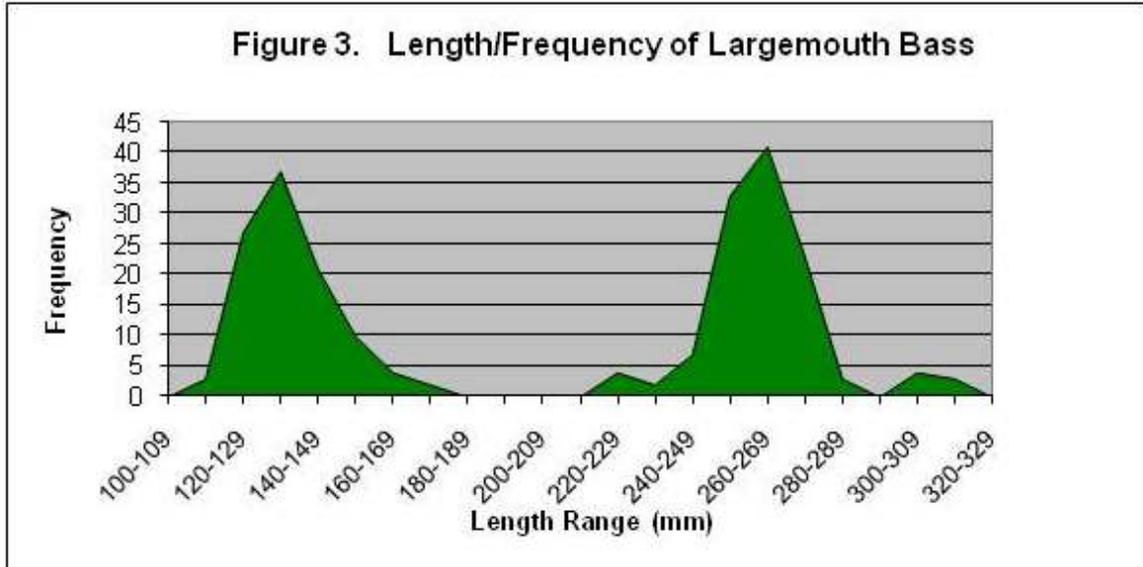
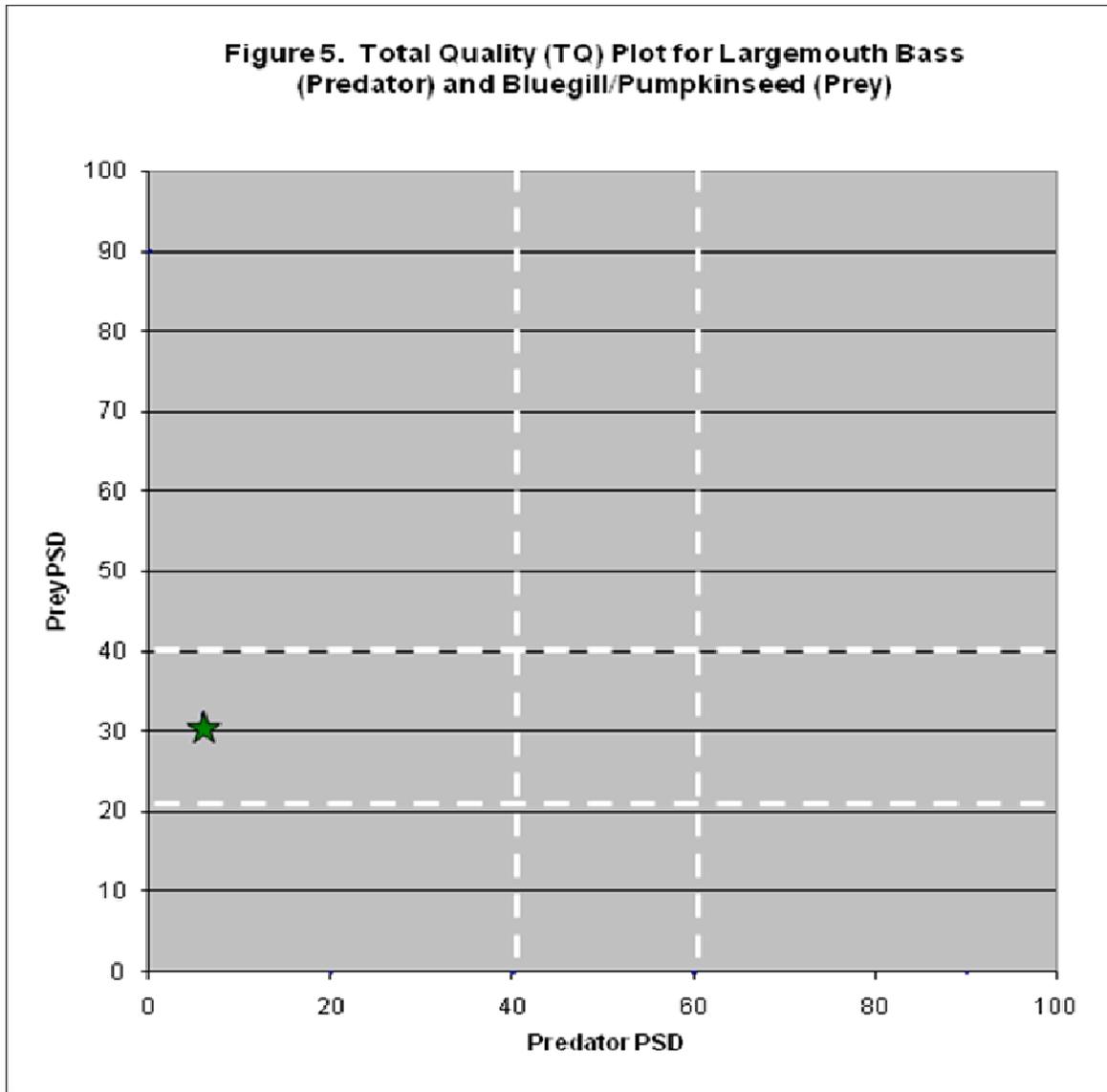




Figure 2. Photos of Ledge Lake nuisance vegetation/algae issue May & June 2007, before (top) and after (bottom) treatment.





★ = Intersection of observed Predator and Prey PSDs.
PSD values.



Figure 6. Photos of Ledge Lake fish attraction structures and their deployment.

**APPENDIX A:
Fish Population Assessment Data Sheets
25 October 2012 (five pages)**



Fish Population Assessment Data Sheet

Date: 10/25/2012

Location: Ledge Lake - 1st Pass

Species: Sunfish & Others

Time Sampled: start: 8:40 a.m. } 52 min
end: 9:32 a.m.

	Length (mm)	Weight (g)		Length (mm)	Weight (g)		Length (mm)	Weight (g)	
B6	1	267	538	B6	41	56	5	81	
B6	2	236	271	B6	42	48	3	82	
B6	3	174	101		43			83	
B6	4	151	64		44			84	
PS	5	106	24		45			85	
B6	6	136	45		46			86	
B6	7	116	26		47			87	
B6	8	30	1		48			88	
B6	9	155	64		49			89	
PS	10	140	51		50			90	
B6	11	193	162		51			91	
B6	12	160	76		52			92	
B6	13	156	71		53			93	
Gr	14	136	44		54			94	
B6	15	158	75		55			95	
PS	16	107	24		56			96	
B6	17	114	28		57			97	
PS	18	110	27		58			98	
B6	19	107	22		59			99	
PS	20	174	137		60			100	
PS	21	105	24		61			101	
B6	22	77	9		62			102	
B6	23	45	1		63			103	
Gr	24	112	27		64			104	
PS	25	125	40		65			105	
PS	26	136	56		66			106	
PS	27	176	132		67			107	
Gr	28	101	20		68			108	
PS	29	109	31		69			109	
PS	30	122	35		70			110	
B6	31	127	22		71			111	
PS	32	130	78		72			112	
PS	33	73	10		73			113	
B6	34	114	29		74			114	
B6	35	109	27		75			115	
B6	36	95	14		76			116	
B6	37	85	8		77			117	
B6	38	100	14		78			118	112 8
PS	39	65	8		79			119	255 215
B6	40	98	10		80			120	266 253

* Fairly abundant YOY B6 along margin



Fish Population Assessment Data Sheet

Date: 10/25/2012

Location: Ledge Lake - 157 Pass

Species: LMB

Time Sampled: 52 min

	Length (mm)	Weight (g)		Length (mm)	Weight (g)		Length (mm)	Weight (g)
LMB 1	270	245	LMB 41	256	199	LMB 81	135	28
LMB 2	306	381	LMB 42	138	31	LMB 82	130	27
LMB 3	309	378	LMB 43	131	25	LMB 83	139	30
LMB 4	278	262	LMB 44	139	32	LMB 84	130	26
LMB 5	271	266	LMB 45	166	55	LMB 85	252	224
LMB 6	260	247	LMB 46	137	32	LMB 86	263	228
LMB 7	274	259	LMB 47	141	33	LMB 87	265	249
LMB 8	246	209	LMB 48	149	36	LMB 88	271	240
LMB 9	269	230	LMB 49	146	34	LMB 89	264	229
LMB 10	252	200	LMB 50	125	20	LMB 90	277	278
LMB 11	160	47	LMB 51	133	20	LMB 91	131	28
LMB 12	263	212	LMB 52	300	318	LMB 92	251	215
LMB 13	254	211	LMB 53	259	239	LMB 93	265	241
LMB 14	257	213	LMB 54	284	306	LMB 94	261	237
LMB 15	253	226	LMB 55	232	159	LMB 95	249	193
LMB 16	146	39	LMB 56	278	229	LMB 96	272	270
LMB 17	128	23	LMB 57	145	29	LMB 97	268	227
LMB 18	244	195	LMB 58	259	224	LMB 98	139	33
LMB 19	256	226	LMB 59	268	250	LMB 99	263	253
LMB 20	119	20	LMB 60	267	251	LMB 100	126	23
LMB 21	273	237	LMB 61	141	38	LMB 101	255	217
LMB 22	259	219	LMB 62	147	39	LMB 102	255	224
LMB 23	269	271	LMB 63	159	47	LMB 103	269	265
LMB 24	274	254	LMB 64	125	22	LMB 104	275	297
LMB 25	266	238	LMB 65	129	19	LMB 105	313	378
LMB 26	259	206	LMB 66	127	15	LMB 106	265	248
LMB 27	258	215	LMB 67	270	262	LMB 107	263	231
LMB 28	268	242	LMB 68	246	180	LMB 108	150	35
LMB 29	145	33	LMB 69	162	55	LMB 109	269	254
LMB 30	175	67	LMB 70	131	25	LMB 110	132	32
LMB 31	260	229	LMB 71	155	38	LMB 111	133	20
LMB 32	316	426	LMB 72	132	28	LMB 112	140	33
LMB 33	268	256	LMB 73	145	17	LMB 113	261	235
LMB 34	256	208	LMB 74	122	17	LMB 114	127	27
LMB 35	260	210	LMB 75	151	41	LMB 115	266	250
LMB 36	227	147	LMB 76	249	199	LMB 116	155	45
LMB 37	179	257	LMB 77	265	234	LMB 117	139	52
LMB 38	225	228	LMB 78	135	29	LMB 118	141	26
LMB 39	255	221	LMB 79	246	200	LMB 119	126	18
LMB 40	255	96	LMB 80	264	250	LMB 120	121	19



Fish Population Assessment Data Sheet

Date: 10/25/2012

Location: Ledge Lake - 1st Pass

Species: LMB

Time Sampled: 52 min

	Length (mm)	Weight (g)		Length (mm)	Weight (g)		Length (mm)	Weight (g)
LMB 1	153	39	41			81		
LMB 2	139	33	42			82		
LMB 3	136	30	43			83		
LMB 4	135	33	44			84		
LMB 5	222	378	45			85		
LMB 6	282	295	46			86		
LMB 7	272	233	47			87		
LMB 8	127	33	48			88		
LMB 9	147	46	49			89		
LMB 10	149	38	50			90		
LMB 11	256	225	51			91		
LMB 12	147	39	52			92		
LMB 13	140	31	53			93		
LMB 14	129	19	54			94		
LMB 15	152	38	55			95		
LMB 16	155	43	56			96		
LMB 17	229	135	57			97		
LMB 18	139	22	58			98		
LMB 19	122	19	59			99		
LMB 20	124	20	60			100		
LMB 21	138	33	61			101		
LMB 22	132	30	62			102		
LMB 23	134	39	63			103		
LMB 24	121	28	64			104		
LMB 25	129	124	65			105		
LMB 26	140	47	66			106		
LMB 27	119	13	67			107		
LMB 28	264	234	68			108		
LMB 29	129	33	69			109		
LMB 30	134	32	70			110		
LMB 31	146	44	71			111		
LMB 32	156	39	72			112		
LMB 33	135	46	73			113		
LMB 34	141	35	74			114		
LMB 35	132	26	75			115		
LMB 36	130	25	76			116		
LMB 37	129	26	77			117		
LMB 38	126	21	78			118		
LMB 39	121	21	79			119		
40			80			120		



Fish Population Assessment Data Sheet

Date: 10/25/2012

Location: Ledge Lake - 2nd Pass

Species: Sunfish & Others

Time Sampled: ^{start: 10:55 am} _{end: 11:17} } 42 min

	Length (mm)	Weight (g)		Length (mm)	Weight (g)		Length (mm)	Weight (g)
PS 1	183	150	41			81		
PS 2	101	22	42			82		
PS 3	126	25	43			83		
BS 4	116	26	44			84		
BS 5	163	86	45			85		
PS 6	198	197	46			86		
BS 7	222	176	47			87		
BS 8	125	35	48			88		
PS/Gr 9	140	61	49			89		
PS 10	176	131	50			90		
BS 11	184	129	51			91		
BS 12	111	29	52			92		
PS 13	122	38	53			93		
BS 14	131	42	54			94		
PS 15	101	17	55			95		
BS 16	101	15	56			96		
BS 17	90	10	57			97		
PS 18	93	13	58			98		
BS 19	55	3	59			99		
BS 20	190	155	60			100		
PS/Gr 21	111	28	61			101		
PS 22	100	23	62			102		
23			63			103		
24			64			104		
25			65			105		
26			66			106		
27			67			107		
28			68			108		
29			69			109		
30			70			110		
31			71			111		
32			72			112		
33			73			113		
34			74			114		
35			75			115		
36			76			116		
37			77			117		
38			78			118		
39			79			119	247	198
40			80			120	632	2660

4 Bullheads
Cranial Catfish



Fish Population Assessment Data Sheet

Date: 10/05/2012

Location: Ledge Lake - 2nd Pass

Species: LMB

Time Sampled: 4:30pm

	Length (mm)	Weight (g)		Length (mm)	Weight (g)		Length (mm)	Weight (g)
LMB 1	272	259	LMB 41	136	27	81		
LMB 2	267	253	LMB 42	138	28	82		
LMB 3	264	238	LMB 43	130	28	83		
LMB 4	271	260	LMB 44	132	26	84		
LMB 5	270	231	LMB 45	135	31	85		
LMB 6	227	159	LMB 46	142	42	86		
LMB 7	257	209	LMB 47	223	266	87		
LMB 8	269	249	LMB 48	129	18	88		
LMB 9	268	261	LMB 49	257	214	89		
LMB 10	143	29	LMB 50	223	222	90		
LMB 11	120	24	LMB 51	141	33	91		
LMB 12	227	144	LMB 52	131	26	92		
LMB 13	257	216	LMB 53	230	156	93		
LMB 14	266	242	LMB 54	126	26	94		
LMB 15	269	248	LMB 55	128	26	95		
LMB 16	259	240	LMB 56	156	43	96		
LMB 17	146	39	LMB 57	136	32	97		
LMB 18	114	11	LMB 58	254	280	98		
LMB 19	266	234	LMB 59	127	28	99		
LMB 20	259	216	LMB 60	273	268	100		
LMB 21	130	25	LMB 61	122	29	101		
LMB 22	272	265	LMB 62	127	23	102		
LMB 23	259	235	LMB 63	264	214	103		
LMB 24	257	203	LMB 64	264	229	104		
LMB 25	271	257	LMB 65	138	27	105		
LMB 26	305	374	66			106		
LMB 27	246	194	67			107		
LMB 28	262	245	68			108		
LMB 29	282	283	69			109		
LMB 30	273	293	70			110		
LMB 31	260	219	71			111		
LMB 32	275	289	72			112		
LMB 33	254	204	73			113		
LMB 34	263	214	74			114		
LMB 35	253	195	75			115		
LMB 36	259	203	76			116		
LMB 37	270	254	77			117		
LMB 38	251	224	78			118		
LMB 39	256	213	79			119		
LMB 40	255	215	80			120		

* Tookest 100 LMB to Ranger Lake