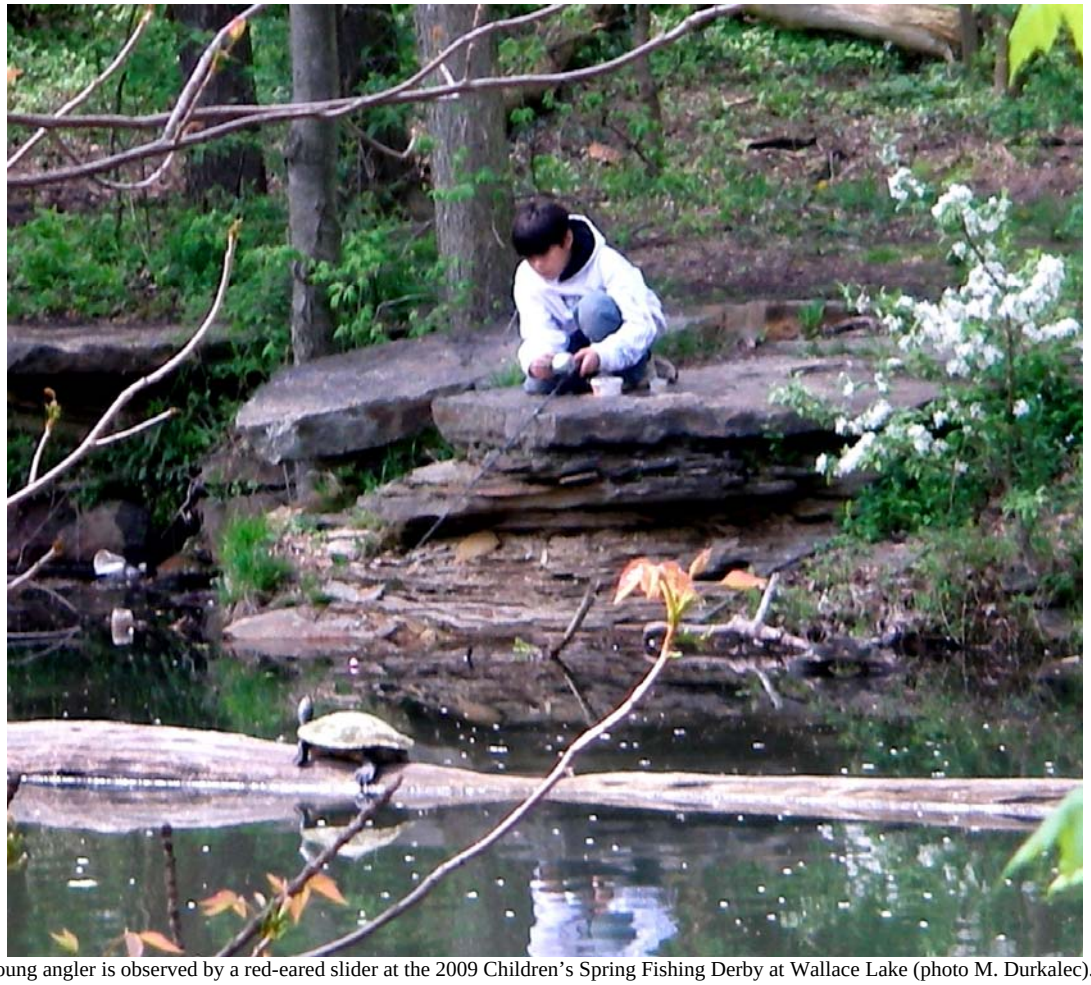
Department of Planning, Design and Natural Resources
Division of Natural Resources
Division of Planning

Department of Park Operations
Division of Outdoor Education
Division of Parks

NATURAL RESOURCES MANAGEMENT PLAN: WALLACE LAKE, MILL STREAM RUN RESERVATION

Cleveland Metroparks Technical Report 2010/NR-07



A young angler is observed by a red-eared slider at the 2009 Children's Spring Fishing Derby at Wallace Lake (photo M. Durkalec).

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Executive Summary

Wallace Lake is a 17.5 acre impoundment created from a former sandstone quarry in 1941 and opened to public fishing in 1943. Since that time, the lake and surrounding area has been an important recreation area in Cleveland Metroparks for fishing, picnicking, swimming, boating, and open field recreational activities. The overarching management goal of the lake is to maintain its "fishable/swimmable" status per Federal Clean Water Act (CWA) objectives, which is accomplished through active management activities focused on the fishery and swimming area of the lake (Table 1).

There are no known major water quality issues in the lake. An initial effort is underway to delineate the extent, to be followed by characterization of the composition, of stormwater run-off to the lake. Fecal coliform monitoring is performed four times a week during the swimming season by the Cuyahoga County Board of Health, and in a typical year, such as 2008, bacteria levels were within Bathing Beach Water Quality Regulation limits approximately 95% of the time. The swimming area does have some nuisance algae and aquatic vegetation growth, which is managed through chemical treatments in the late spring/early summer. In summer 2010, a pilot project was initiated using a microbial product to reduce the level of organic matter in the swimming area. Evaluation of the efficacy of this method will be determined in the coming years. Accumulation of excessive organic matter in the swimming area has historically been addressed though seasonal drawdown of the lake during the peak of leaf fall in autumn.

The lake offers one of the most 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 channel catfish (spring) and rainbow trout (winter and spring). There are at least 23 species of fish known in the lake, most of which are not of primary interest to anglers. Data collected in summer 2010 revealed that the lake appears to have an imbalance in the predator/prey composition of the lake, with lower than ideal densities of predatory largemouth bass (*Micropterus salmoides*) and a stunted population of bluegill and pumpkinseed sunfish (*Lepomis macrochirus* and *L..gibbosus*) forage base, reflective of "fair" and "poor to fair" quality fisheries, respectively. More stringent largemouth bass regulations could be beneficial to the balance of the fish community of the lake, and additional age analysis (via scale samples) are planned for summer of 2011 to further clarify the situation before making any changes to the current regulation of 2 largemouth bass $\geq$12" per angler/day. The rainbow trout (*Oncorynchus mykiss*) and channel catfish (*Ictalurus punctatus*) fisheries of the lake would be characterized as "very good" and "good", respectively, due to annual stocking of these species in the lake and therefore current regulations are considered effective for these species. 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. Successful efforts were made in summers of 2009-10 to transplant native pickerelweed (*Pontederia cordata*) and white water lily (*Nymphaea odorata*) to the shallow southern basin of the lake to improve wildlife habitat, fish nursery habitat, and general aesthetics of this otherwise un-colonized area of the lake.

Historic Overview and Background

Wallace Lake is a 17.5 acre impoundment which was created in 1941 through construction of a raised spillbox which flooded two ends of a former sandstone quarry (Figure 1). The spillbox was replaced with an all stainless steel structure approximately 10-12 years ago (Kevin Vinicky, Park Manager, personal communication). The two deep quarry areas (historic maximum depth of 64' at the south quarry, and 40' at the north quarry) are connected by a shallower, narrow channel with a maximum depth of approximately 6 feet. It was recently observed that the deepest part of the south quarry of the lake encountered with sonar on 23 June 2010 (during fish population sampling) was only 26.3 feet (8.0 m), undoubtedly as a result of sediment inputs to the lake over the past several decades (Figure 1). The lake is situated in a depression bordered to the north, east, and south by parkland and to the west by a relatively steep hill and ridge leading to residential yards adjacent to Prospect Road in Berea, Ohio. Despite intensive park development, the lake retains a mostly scenic quality and is largely surrounded by tree canopy (especially on the west bank) and mowed grass (mostly on the east bank).

In January 1943, based on a fish population survey of Wallace Lake, the Cuyahoga County Conservation Committee of the Ohio Division of Conservation and Natural Resources unanimously adopted a motion that the Cleveland Metropolitan Park Board be petitioned to open public fishing on Wallace Lake (the Park District had planned to keep the lake closed to fishing until 1944 to give the fish community a chance to establish). As an interesting historic side note, the letter outlining this motion, dated 29 January 1943 and addressed to Park founder William Stinchcomb, states that opening the lake would offer anglers *"…a means to supplement steadily declining food supply*

because of wartime. Relaxation from war strain would also be provided. Berea, being close to this metropolitan county, can be reached by bus and many others would have a sufficient supply of gasoline to make the trip by their automobiles". And, of course, they did come.

Ever since that time, the lake has been part of an intensively used recreation area which features fishing, picnicking, swimming, boating, 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 Wallace 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 and swimming area. This is currently conducted through management activities focused on the fishery and swimming area of the lake, as will be outlined in this report (Table 1).

Water Quality Overview

Overall water quality is good for this lentic system given its location in an otherwise urbanized area. The lake would be best characterized as eutrophic and receives nutrient loading from adjacent watershed runoff, as well as from the waters of the East Branch Rocky River (which is utilized seasonally to refill/replenish water to the lake as necessary). Eutrophication is most reflected in the form of green algae and naiad growth (*Najas* spp.) during the mid to late summer months. Nusiance algae and aquatic

macrophyte growth has been, and continues to be, treated with aquatic herbicides and algaecides annually in and immediately adjacent to the swimming area. Seasonal water transparency varies, being clearer during the colder seasons, due to seasonal variation in phytoplankton and zooplankton communities in the lake (Wetzel 1983).

Fecal coliform bacteria in the swimming area have, historically, been within primary public contact standards except following heavy rainfall inputs. In the past, Cleveland Metroparks staff conducted this testing and culturing, but current testing is administered by the Cuyahoga County Board of Health through their Bathing Beach Monitoring Program. As a public beach, Wallace Lake is a considered a Tier 1 beach and is therefore sampled 4 days a week, Monday through Thursday, during the swimming recreational season (Memorial Day through Labor Day). In 2008, of 55 samplings between 27 May and 28 August, bacteria levels only exceeded Bathing Beach Water Quality Regulations limits on three occasions. Sampling results and advisories, when administered, are posted on a sign at the swimming beach, as well as on the CCBH and Cleveland Metroparks websites, although the public is still allowed to swim during these instances at their own discretion.

An aging sanitary line from the Quarry Rock Café, immediately adjacent to Wallace Lake, was replaced in 2008. This line may have formerly contributed fecal coliform bacteria and nutrients to the lake for an undermined period of time. Furthermore, a robust Canada goose (*Branta canadensis*) population on the lake contributes further coliform bacteria and nutrients to the lake. The goose population has been managed by the Natural Resource Area Manager (per ODNR guidelines) since 2002 in an effort to minimize this issue, especially in the swimming area at the lake.

There is no significant industry in the Wallace Lake sub-watershed to contribute industrial pollutants. The lake is seasonally refilled using water from the East Branch of the Rocky River and, according to the Ohio Environmental Protection Agency, the primary physical/chemical water quality concern in the stream is nutrients and fecal coliform bacteria levels (Ohio EPA 1999). As already outlined, there is currently a system in place to monitor fecal coliform counts in the lake. There are no other exceedances of warm water habitat (WWH) physical/chemical criteria for the East Branch of the Rocky River (Ohio EPA 1999). No further documentation of physical or chemical water quality issues at the lake were found in Cleveland Metroparks historic files.

Fisheries Resource Overview

Wallace 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*), white crappie (*Pomoxis annularis*), black crappie (*P. nigromaculatus*), bluegill (*Lepomis machrochirus*), pumpkinseed sunfish (*L. gibbosus*), warmouth sunfish (*L. gulosis*), green sunfish (*L. cyanellus*), channel catfish (*Ictalurus punctatus*), bullhead catfishes (*Ameriurus* spp.), common carp (*Cyprinus carpio*), and seasonally stocked rainbow trout (*Onchorynchus mykiss*). Other fish species known to be present, but of lesser immediate interest to anglers, include the white sucker (*Catostomus commersoni*), goldfish (*Carassius auratus*), gizzard shad (*Dorosoma cepedianum*), golden shiner (*Notemigonus crysoleucas*), common shiner (*Luxilus cornutus*), spotfin shiner (*Notropis spilopterus*), bluntnose minnow (*Pimephales notatus*), fathead minnow

(*P. promelas*), emerald shiner (*Notropis atherinoides*), and round goby (*Neogobius melanostomus*). Sterile white amur (*Ctenoparyngodon idella*), commonly known as grass carp, are also present in small numbers for supplemental vegetation control. Introduction of some of these species, including the invasive exotic round goby, are likely a combination of intrusion from inflow via the East Branch Rocky River, as well as incidentally introductions from angler bait buckets. Although common carp and round gobies can be invasive non-native species, neither currently comprise a predominant component of the fish community in Wallace Lake.

The fish community composition, overall, is typical for a small Ohio lake in excess of ten acres. Considering the perspective of being in a heavily utilized urban setting, the fishery would be characterized overall as "very good" for seasonally stocked rainbow trout and "good" for channel catfish (based on heavy stockings of these two species), "fair" for largemouth bass (in terms of size and numbers), and "fair to poor" for panfish species (which are fairly abundant, but tend to be stunted, in this lake) (Table 2, Table 3, Figure 4). Other species would be characterized as incidental catches by the majority of anglers who utilize the lake.

A basic cross section of the fish community is apparent every year during the popular Spring Children's Fishing Derby at the lake, which is typically attended by over 1,000 young anglers and basically serves as an annual fish survey. This event has drawn large numbers of young anglers and their families for over a generation, and has notably had successive record breaking crowds for the past five years (venue record of 1,736 attendees in at the 2010 event) (Appendix A). This is one measure illustrating the popularity of Wallace Lake as a fisheries resource of the Park District.

The predominant year-round predator and prey species in Wallace Lake are largemouth bass and bluegill sunfish. Properly managed ponds and small lakes can harbor self-sustaining largemouth bass and bluegill populations (Austin el al.1996, Carlander 1977), and to be effective in doing so accurate data is required on the populations of these two species. Electrofishing is a well established method utilized by fisheries managers to accurately assess fish population dynamics, abundance, and structure (Neilsen and Johnson 1983, Reynolds 1993). In an effort to obtain more current data on largemouth bass and bluegill dynamics in Wallace Lake, electrofishing was performed on 23 June 2010 in two sampling runs totaling 110 minutes. Sample run 1 was conducted for 77 minutes along the more developed northeast shoreline and sample run 2 was conducted for 33 minutes along the more natural west perimeter of Wallace Lake (Figure 1). 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 event are available in Appendix B.

Largemouth bass are the dominant year around predator in Wallace Lake and, as such, have a marked influence over the fish community. Sampling yielded 64 largemouth bass weighing a total of 15.73 kg (34.7 lbs) (Table 2). Based on plotting length against frequency, there appears to be six year classes of largemouth bass present

in the sample (Figure 1). It should be noted that the smallest size classes of bass are less susceptible to electrofishing than larger specimens due to less surface area exposed to the electrical field, hence their lower frequency in the sample. 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. Wallace Lake, at 7.1 hectares (17.5 acres), yielded a CPH of 30.6 largemouth bass over 199 mm (56 bass over 199 mm in 1.83 hours) which would indicate a largemouth bass density of 18.82 $\geq$ stock size bass per hectare (7.62 $\geq$ stock size bass/acre) when Hall's relationship is applied. This would suggest a largemouth bass abundance of 133.6 $\geq$ stock size fish (18.82 $\geq$ stock size bass per hectare x 7.1 hectares) weighing a total of 36.9 kg (133.6 fish x 0.276 kg average weight of stock size bass), or 81.4 lbs, in Wallace Lake. This is a very low bass density 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).

Also noteworthy was that while the overall bass catch per unit effort (CPUE) was very similar when the more developed and easily accessible northeast side was compared to the more natural/less developed and less accessible west side of the lake (56.4 and 60.1 bass/hr, respectively), the number of quality size bass of over 300 mm (11.81 inches) (Gabelhouse 1983) was twice as high on the west versus northeast side of the lake (29.5% versus 15.0% of the catch, respectively). Additionally, the only two preferred size class

fish over 380 mm (14.96 inches) (Gabelhouse 1983) were taken on the west side of the lake. This is not surprising given the higher lever of fishing pressure that is apparent on the most accessible northeast side of the lake.

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

$$PSD(\%)=(\text{number} \geq \text{quality size}/\text{number} \geq \text{stock size})x100$$

Where "quality" and "stock" designations are as outlined in Gabelhouse 1984. PSD of largemouth bass in the lake was on the low side at 28.6% (Table 3), 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:

$$W_r=(W/W_s)x100$$

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):

$$Log_{10}W_s=-5.316+3.191Log_{10}L$$

Where L = the length of the specimen in mm. Largemouth bass sampled from Wallace Lake exhibited a mean W_r of 86.4 (Table 2) compared against the ideal W_r of 100. This is typical for an Ohio lake and reflects a bass population in decent, but not great, condition (Phil Hillman and Andy Burt, Ohio Division of Wildlife, personal communications). This could be lower than normal for the lake, though, since relative weight of largemouth bass in Ohio ponds was noted to be lower than normal during summer 2010 due to high water temperatures that may have affected fish metabolism

adversely (William Lynch, Aquatic Ecosystem Management Program Specialist, Ohio State University Extension, personal communication).

Bluegill and pumpkinseed sunfish are the among the dominant forage fish in Wallace Lake. Sampling yielded 102 bluegill and pumpkinseed weighing a total of 3.93 kg (8.7 lbs) (Table 2). Based on plotting length against frequency, there appears to be six year classes of bluegill/pumpkinseed sunfish in the sample (Figure 2). 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 on the low side of the balanced range at 21.5% (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:

$$Y=3,185-1,436Log_{10}X$$

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 18.82 $\geq$ stock size bass per hectare. Considering that 73.2% of the bass catch was in the stock size range of 200-300 mm of those $\geq$200 mm, that percentage was extrapolated to the calculated population density (13.78 stock size bass/ha, or 5.58 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 2,113 thousand per hundred pounds of population biomass. Given the modest size structure of the

Wallace Lake bluegill population, this relatively high bluegill density would be indicative of overpopulation and stunting of this 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):

$$Log_{10}W_s=-5.374+3.316Log_{10}L$$

Where L = the length of the specimen in mm. Compared against the ideal W_r of 100, bluegill sampled from Wallace Lake were in good condition for an Ohio lake, exhibiting a mean W_r of 90.3 (Table 2) .

Balance within the fish community of Wallace Lake was assessed by analyzing prey-predator ratios in this system. To determine overall status of largemouth bass and bluegill dynamics in Wallace 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 3). Gabelhouse (1984) 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 Wallace Lake is not within this range of mutual balance, but instead lies very near the lower left grid of the plot. This would be indicative of a largemouth bass predator population which is likely overfished and,

therefore, resulting in a stunted bluegill and pumpkinseed sunfish prey populations (Ney 1993).

It should be noted that the June 2010 fish sampling was performed during the afternoon on a very hot (90 deg F) day. 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 show 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 follow-up sampling may be scheduled closer to dusk to address this issue.

Other Recreational Uses

Wallace Lake is a popular summer location for swimmers and paddleboat rental within a designated area. The lake is further utilized by small hand-powered watercraft (no motors, even electric, are allowed) such as rowboats, kayaks, and canoes, mostly by anglers. Cleveland Metroparks Water Safety Program, which manages the swimming and rental boat facililities on the lake, reported an estimated 50,371 program attendees at Wallace Lake last year, illustrating the popularity of swimming and paddleboat use at this venue (Bixler 2009). A decline in recreational swimming in the lake over the past several years has been noted, which may be due to turbid stain to the water, accumulation of organic matter in the swimming area, and increase growth of vegetation and algae in and around the swimming area, all of which are invariably related (C. Pofok, Aquatics Facility Manager, personal communication).

Ecosystem Function Overview

Although Wallace Lake is not a natural lake, it does serve some general ecosystem functions in the watershed. The basin collects stormwater from the surrounding neighborhoods within the City of Berea, functionally serving as a buffer to help mediate the affects of direct runoff into the East Branch of the Rocky River. A number of associated aquatic wildlife, notably birds, utilize the lake. Great blue heron (*Ardea herodias*), belted kingfisher (*Ceryle alcyon*), mallard duck (*Anas platyrhynchos*), and Canada goose (*Branta canadensis*) are observed at the lake regularly by wildlife watchers. On occasion, an osprey (*Pandion haliaetus*) may even be observed hunting the lake for fish (personal experience). The lake is host to an assemblage of common reptiles and amphibians, including eastern painted turtle (*Chrysemys picta picta*), snapping turtle (*Chelydra serpentina*), red-eared slider (*Trachemys scripta*), green frog (*Rana clamitans*), and bullfrog (*R. catesbeiana*). Other than occasional seasonal use by state listed (threatened) migratory osprey, as already noted, no other known threatened or endangered species, or even rare 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 (other than fecal coliform) communities within the lake. The vegetative/algal community of the lake is comprised mainly of *Najas* spp., unicellular algaes, and some filamentous algae and cyanobacteria. Pickerelweed (*Pontederia cordata*), arrowhead (*Sagittaria latifolia*), white water lily (*Nymphaea odorata*), swamp loosestrife (*Decodon verticillatus*), softstem bulrush (*Schoenoplectus tabernaemontani*), and floating leaf pondweed

(*Potamogeton natans*) are also present. A full inventory of aquatic plants at Wallace Lake has not been undertaken so a number of other species are likely present, as well.

Current Fisheries Management

Wallace 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 Wallace Lake.

The Wallace 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 the most popular ice fishing opportunity in the Park District (Halko 1983). Approximately 1,800 pounds of trout are stocked in two installments, the first typically right around Christmas followed by a second round in late January or early February. Additionally, 800 pounds of rainbow trout and 500 pounds of farm raised channel catfish are stocked annually in early May for the highly popular Children's Spring Fishing Derbies. The rainbow trout are offered as a seasonal cold-water fishery

which lasts until about mid-May most years, and the channel catfish hold over in the lake from year to year. There is no evidence that channel catfish have reproduced naturally in the lake which is typical in other similar bodies of water in Ohio (Austin et al. 1996).

Wallace Lake is also stocked with native warmwater species as opportunities become available. Notably, in May 2008 approximately 2,000 sunfish, 250 largemouth bass, and 10 white amur (grass carp) were transferred to Wallace Lake (of approximately 5,000 fish total distributed around the Park District) and in April and May 2009 a total of approximately 500 sunfish, 50 largemouth bass, and 25 white crappie were transferred to Wallace Lake (of approximately 4,500 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 Wallace Lake, on a non-scheduled basis.

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 Wallace Lake is disseminated through a number of outlets, including; Cleveland Metroparks fishing booklet and trifold, in the popular online fishing report on the Cleveland Metroparks website, through Cleveland Metroparks Facebook page, in the Plain Dealer newspaper (typically in the Outdoors area of the Sports section), and via a two panel informational kiosk about the Wallace Lake fishery and its place in the watershed installed on the northeast end of the lake in 2008.

[1] As donated to the Park District by Rick Huff, Site Construction, from his private lake and the Cuyahoga Valley National Park from Virginia Kendall Lake. Both lakes from which these fish originated required draining due to failure to meet ODNR dam requirements for small impoundments.

Fishing derbies are noted as an exceptionally effective way to offer fishing to the urban public (Schedler and Haynes 1983, Lang et al. 2008). An annual and longstanding fishing event is offered to the public in the form of the Spring Childrens Fishing Derby in early to mid May..

Additionally, three fishing platforms, two of which are wheelchair accessible, have been constructed along the east margin of the lake north of the swimming area to facilitate fishing opportunities.

Current Swimming and Paddleboat Area Management

Nuisance vegetation and filamentous algae management is a routine management practice at Wallace Lake in target areas to facilitate a more desirable swimming and paddleboat experience. In recent years, this has entailed a two prong approach; first, treating the lake in late May when the water temperature exceed 50 deg F (10 deg C) with a combination herbicide/algaecide (such as Reward^{TM}), followed by use of a chelated copper sulfate algaecide (such as Cutrine Plus^{TM}) approximately a week later. Algae treatments are also conducted occasionally throughout the summer on an as needed basis. In recent years, use of backpack sprayer units from a rowboat have 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 the aforementioned herbivorous triploid white amur (sterile grass carp); ten of which were released into the lake in May 2008. Overall, vegetative growth is not at

nuisance levels in the lake from an ecosystem or fisheries standpoint, but is in fact at desirable levels.

In summer 2010 the Park Operations Aquatics Facility Manager initiated a pilot "bio-dredging" project using a proprietary blend of naturally occurring microbes (bacteria and protists) from Advanced Technical Aquatic Control, LLC, to reduce accumulation of organic matter mixed into the sand within the swimming area. The product was administered once a week during the swimming season. This method will likely require routine treatments for a number of years to see a significant effect, but is still much less expensive and less invasive than traditional dredging. The swimming area substrates will be monitored during this period to determine efficacy. Once the microbial agents perform their function they return to natural levels. If this method works satisfactorily, it will be a routine tool with applicability not only at Wallace Lake, but throughout the Park District. This product does not require a pesticide applicators license, as do the herbicides and algaecides applied by Natural Resource Division staff.

As another means of controlling the accumulation of organic matter in the swimming area, Park Management staff annually coordinate temporary seasonal drawdown of the lake in fall, typically during the two week peak leaf fall period of late October through early November. The assumption is that the lake is drawn down approximately four feet below normal pool to leave the majority of the swimming area out of water so that leaves accumulate primarily in deeper areas of the lake.

Current Wildlife Habitat Management

In June 2009 and 2010, a project was undertaken to facilitate greater colonization of the shallow south end of Wallace Lake with desirable native aquatic macrophytes. Although the substrate of much of the southern lake basin is largely bedrock, which is not conducive to macrophytes growth, a growing silt bed with significant organic matter is present at the far south end. Several dozen each of pickerelweed (*P. cordata*) and white water lily (*N. odorata*) were transferred to this area in clusters in late June 2009, and have taken hold such that they have come back thicker in early summer 2010. A similar amount of additional pickerelweed was transplanted in June 2010. It is believed that in the coming years this cluster of vegetation will continue to advance to a larger area of suitable substrate in this portion of the lake basin, affording increased quantity and quality of wildlife habitat for amphibians, waterbirds, and invertebrates, fish spawning and nursery areas, and enhancing the aesthetics of the area.

Management Recommendations

The aforementioned routine active management techniques have all had desirable effects on the Wallace Lake system from a recreational and ecosystem perspective and will therefore be continued into the future. There are some activities still under evaluation, though, as well as some recommendations based on recently collected data and known issues at Wallace Lake, as discussed below.

The bio-dredging method efficacy will become apparent within the next year or two, as the Aquatics Facility Manger determines whether the level of organic muck

mixed with the sand in the swimming area is being reduced. Its place in the future management of Wallace Lake will determined at that time.

Stormwater inputs to Wallace Lake are present, but likely not increasing, due to nearly maximum development of the area outside the Park District within its subwatershed. Still, further assessment of stormwater inputs to the lake need to be conducted in the future. Most immediately, stormwater inputs to the lake need to be inventoried and mapped, in terms of outfall locations and "sewershed" (stormwater drainage basin). An initial effort to compile available resources necessary to map stormwater drainage to the lake is underway (Stephen Mather, GIS Manager, personal communication). After this is completed, hydrology and chemical/physical characteristics of the stormwater need to be assessed to determine if any water quality issues are present. The final step would be mediation of any significant stormwater impacts in the watershed. Also noteworthy is that Berea is within the service area boundary of the Northeast Ohio Regional Sewer District (NEORSD). If NEORSD becomes the stormwater utility in the region in the coming years, as is currently being proposed, this will offer a wealth of resources to conduct the investigative tasks outlined above, as well as to take appropriate corrective actions for any issues identified.

Further enhancement of the Wallace Lake fishery could be facilitated by purchase and stocking of native warm water fish species in the future, as detailed in a request to the Chief of Natural Resources dated 15 January 2008, although the electrofishing gear also requested in that correspondence has since been acquired and has greatly enhanced Cleveland Metroparks inhouse ability to collect and transfer desirable fish from non-fishing resources to public fishing waters to facilitate fisheries improvements.

Based on initial data collection and analysis, it appears the fishery could also potentially benefit from more restrictive largemouth bass regulations, such as a slot limit (i.e.: requiring the immediate release of all bass between 12-15") or an 18" minimum size limit on these predators. To make a fully informed decision on this matter largemouth bass growth and age data should also be collected (Phil Hillman, Ohio Division of Wildlife Fish Management Supervisor, personal communication). To facilitate making a decision regarding the suitability of current largemouth bass regulations at Wallace Lake, collection of scale samples for aging will be planned for early summer 2011. Improvement of the panfish population structure would occur, as well, from a balanced largemouth bass predator population.

Increasing public education regarding introduction of aquatic invasive species should also be a focus at Wallace Lake, as well as all other park waters. This issue is noted in a bold red box on the onsite fishing kiosk, but needs to be part of a wider-reaching campaign to be effective. Presence of round gobies and red-eared slider turtles in the lake are testaments to the fact that human-introduced species have occurred in the past at Wallace Lake and, although these have proven to have minimal impact on the system thus far, another species could have more devastating affects.

The current overall assessment of Wallace Lake is that it fulfills its varied 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 and swimming destination in the Park District. The management practices currently employed at the lake, both new and historic, will therefore continue to be utilized and assessed periodically in an adaptive approach to management of the Wallace Lake system.

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Table 1. Wallace Lake Annual Management Schedule

Task	Management Category	When Conducted	Responsible Party	Level of Effort
Combination nuisance aquatic algae and macrophyte treatment	*General habitat*	*Late May*	*Natural Resources (Aquatic Biologist)*	*3.0-4.5 acres treated with Reward™, dependant upon extent of colonization*
Nuisance algae treatment	*General habitat*	*Early June*	*Natural Resources (Aquatic Biologist)*	*3.0-4.5 acres treated with Cutrine Plus™, dependant upon extent of colonization*
Spring rainbow trout stocking	*Fisheries*	*First week of May*	*Natural Resources (Aquatic Biologist)*	*800 pounds of catchable size rainbow trout (average 1-2 pounds)*
Spring channel catfish stocking	*Fisheries*	*First week of May*	*Natural Resources (Aquatic Biologist)*	*500 pounds of catchable size channel catfish (average 1-3 pounds)*
Spring Childrens Fishing Derby	*Event*	*First or second week of May*	*Natural Resources (Aquatic Biologist) and Youth Outdoors (Youth Outdoors Manager)*	*One day event, plus approximately three days of combined planning and preparation beforehand*
Canada goose management	*Wildlife*	*Throughout the spring and summer, as needed*	*Natural Resources (Area Manager)*	*Variable, as needed to keep population in check, as determined by Area Manager and ODNR guidelines*
Biodredging pilot project	*General habitat*	*Throughout the swimming season*	*Park Operations (Aquatics Facility Manager)*	*Variable, as deemed necessary by the Aquatics Facility Manager and Aquatic Biologist*
Fall lake drawdown	*Facility*	*November*	*Park Operations (Park Manager)*	*Typically two weeks duration during peak of leaf fall*
Winter rainbow trout stocking	*Fisheries*	*Late December and late January/early February*	*Natural Resources (Aquatic Biologist)*	*1,800 pounds of catchable size rainbow trout (average 1-2 pounds)*

Table 2. Basic characteristics of largemouth bass and bluegill/pumpkinseed sunfish populations based on 23 June 2010 assessment (sampling time = 110 minutes)

Species	Total Number	Total Weight (kg)	Average Size (mm)	Average Relative Weight (W_r)[1]
Largemouth bass	64	15.73	258.4	86.4
Bluegill and Pumpkinseed	102	3.93	123.3	90.3

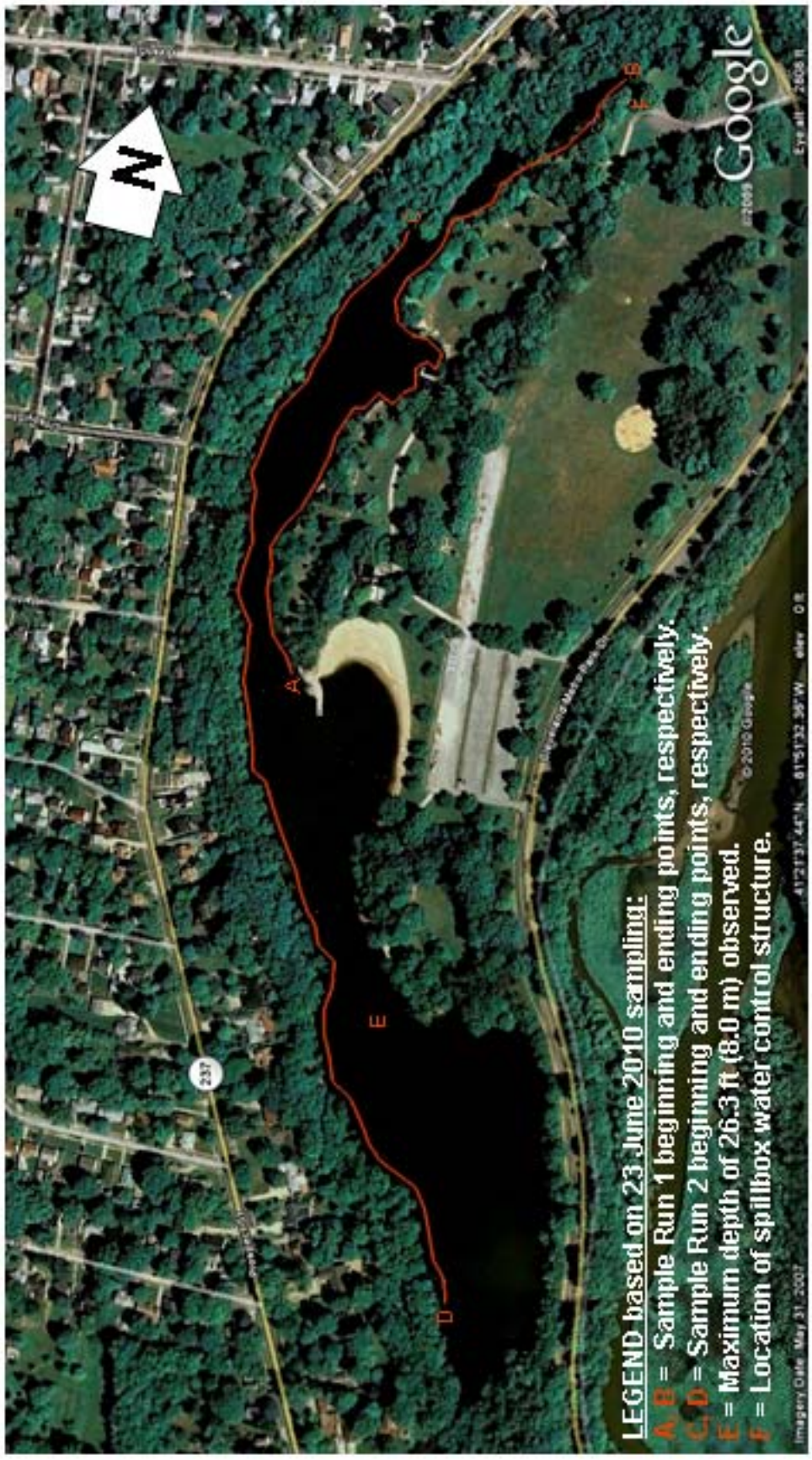
[1] As outlined in Wege and Anderson 1978 and Anderson and Gutreuter 1983.

Table 3. Predator (largemouth bass) and prey (bluegill and pumpkinseed sunfish) proportional stock density information

Species	≥ Stock Size[1]	≥ Quality Size[1]	Proportional Stock Density (%)
Largemouth bass	56	16	28.56
Bluegill and Pumpkinseed	93	20	21.50

[1] Designations per Gablehouse 1983.

Figure 1. Wallace Lake sample site map.



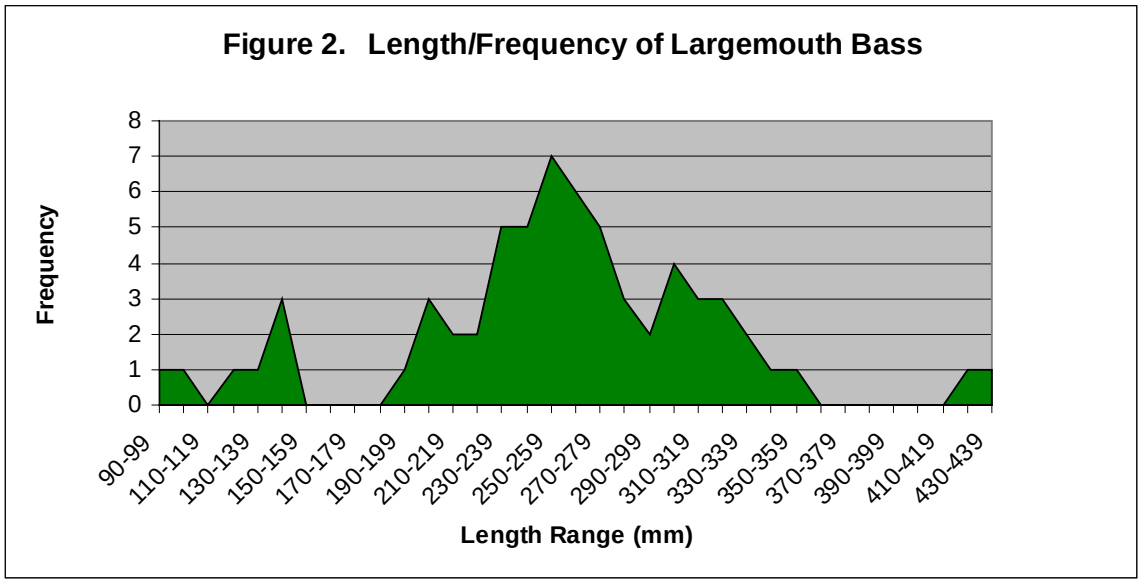


Figure 2. Length/Frequency of Largemouth Bass
Frequency
0
1
2
3
4
5
6
7
8
90-99
110-119
130-139
150-159
170-179
190-199
210-219
230-239
250-259
270-279
290-299
310-319
330-339
350-359
370-379
390-399
410-419
430-439
Length Range (mm)

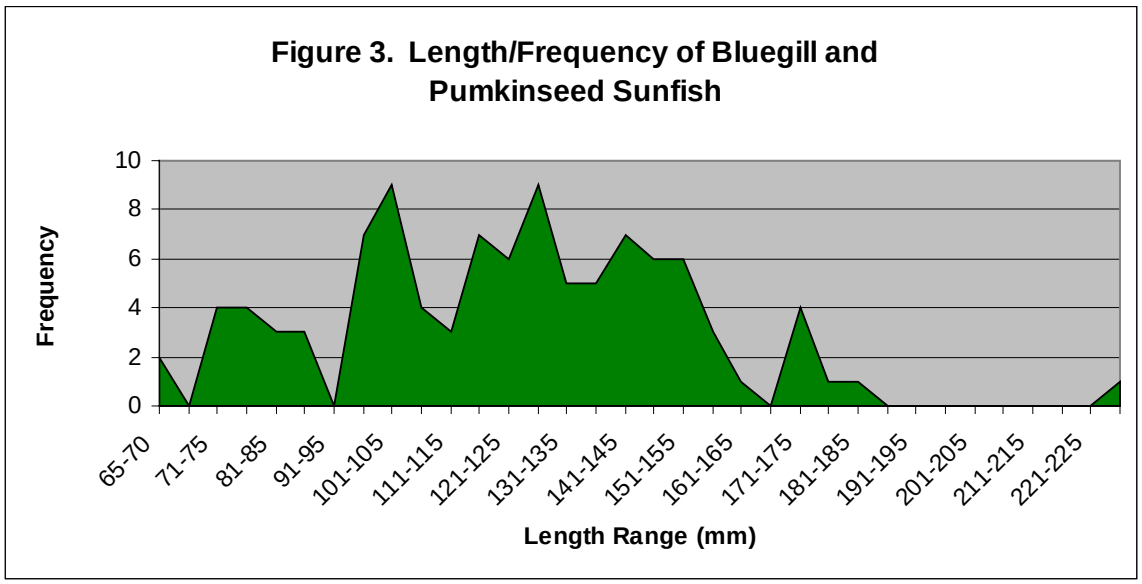
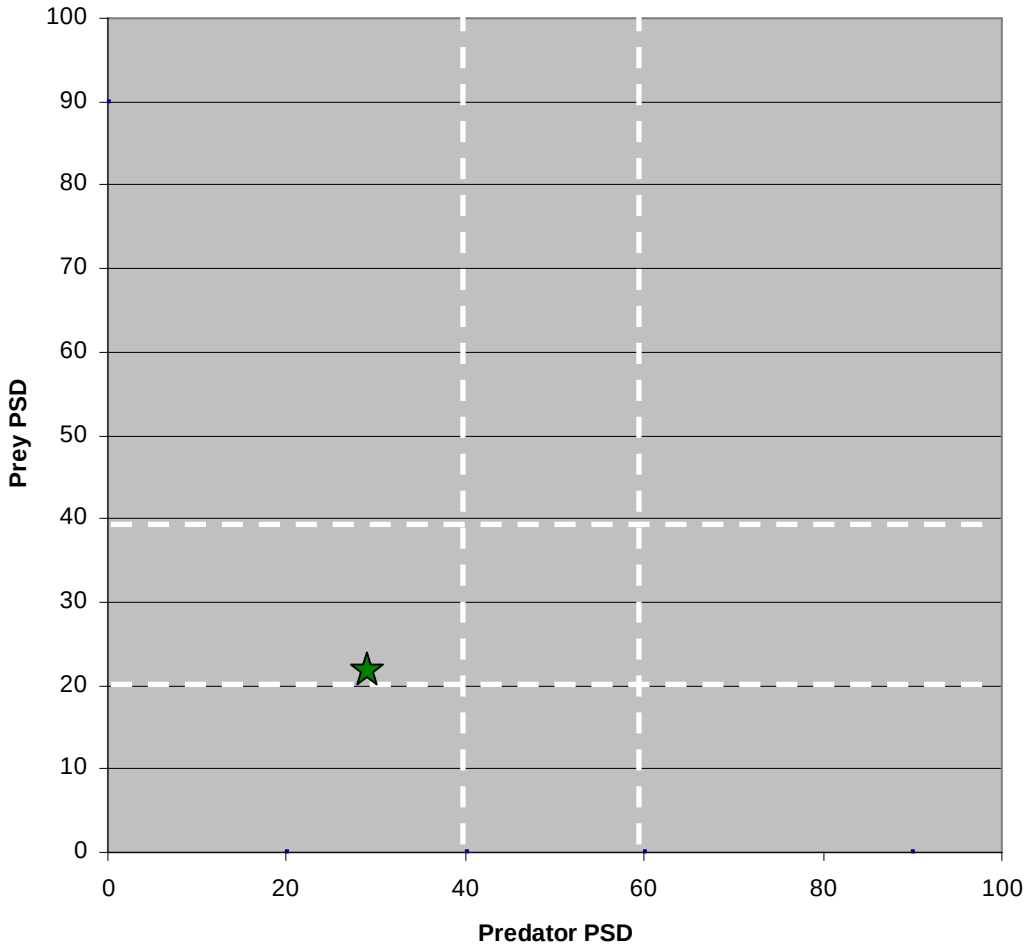


Figure 3. Length/Frequency of Bluegill and Pumkinseed Sunfish
Frequency
0
2
4
6
8
10
65-70
71-75
81-85
91-95
101-105
111-115
121-125
131-135
141-145
151-155
161-165
171-175
181-185
191-195
201-205
211-215
221-225
Length Range (mm)

Figure 4. Total Quality (TQ) Plot for Largemouth Bass (Predator) and Bluegill/Pumpkinseed (Prey)



★ = Intersection of observed Predator and Prey PSDs.

APPENDIX A:
2010 Spring Childrens' Fishing Derbies Statistics

A partnership between

Cleveland Metroparks | The Ohio State University Extension | 4-H | City of Cleveland, Ohio

Youth Outdoors, Cleveland Metroparks
4524 East 49th Street, Cuyahoga Heights, Ohio 44125
TEL: (216) 206-1010; FAX: (216) 206-1008
EMAIL: yo@clevelandmetroparks.com

Children's Fishing Derby 2010 Statistics - (Metroparker style) - Final

Derby Date/Session	5/15 AM	5/15 PM	5/16 AM	5/16 PM
Location	OEC	OEC	Wallace	Wallace
Time	9 - noon	1 - 4 PM	9 - noon	1 - 4 PM
Age Range	4 - 8 yrs.	9 - 15 yrs.	4 - 8 yrs.	9 - 15 yrs.
Total Attendance	345	402	1089	647
Youth Attendance	207	253	653	388
Average stay at event	Hours 2.5	Hours 2.5	Hours 3.0	Hours 3.0
Total Quality (contact) hours	Hours 862.5	Hours 1,005	Hours 3,267	Hours 1,941
Total (estimated) Minority Attendance	65	154	133	79
African American	43	139	101	62
Hispanic	12	10	16	9
Asian	7	5	12	6
Native American	-	-	-	-
Other	3	-	4	2
Weather	Sunny, low 60s	Sunny, mid 60s	Sunny, low 60s	Sunny, mid 60s
Other notes	Many rangers		Only one ranger	

Total attendance:

OEC am/pm	345 + 402 = 747 people	
Wallace L. am/pm	1,089 + 647 = 1,736 people	
Grand total		**2,483 people**

Total quality (contact) hours:

OEC am/pm	862.5 + 1,005 = 1,867.5 hours	
Wallace L. am/pm	3,267 + 1,941 = 5,208 hours	
Grand total		**7,075.5 hours**

APPENDIX B:
Fish Population Assessment Data Sheets
23 June 2010 (four pages)

SAMPLE RUN 1

Fish Population Assessment Data Sheet

Date: 23 June 2010 **Location:** Wallace Lake - NE lake margin

Species: LMB **Time Sampled:** 9:45 - 10:13 32 min 44 sec
10:14 -

	Length (mm)	Weight (g)		Length (mm)	Weight (g)		Length (mm)	Weight (g)
1	320	435	41			81		
2	287	322	42			82		
3	348	556	43			83		
4	265	219	44			84		
5	291	318	45			85		
6	238	172	46			86		
7	267	242	47			87		
8	200	93	48			88		
9	254	200	49			89		
10	297	270	50			90		
11	264	208	51			91		
12	97	12	52			92		
13	124	24	53			93		
14	338	514	54			94		
15	241	174	55			95		
16	132	29	56			96		
17	256	198	57			97		
18	250	202	58			98		
19	249	182	59			99		
20	276	238	60			100		
21			61			101		
22			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		
40			80			120		

SAMPLE RUN 1

Fish Population Assessment Data Sheet

Date: 23 June 2010 **Location:** Wallace Lake - NE lake margin

Species: BG **Time Sampled:** 32min 44sec

	Length (mm)	Weight (g)
1	138	39
2	180	39
3	90	11
4	105	22
5	79	9
6	101	21
7	97	15
8	124	32
9	77	6
10	65	4
11	76	7
12	137	46
13	66	5
14	74	6
15	73	6
16	120	31
17	74	6
18	141	49
19	129	39
20	128	35
21	127	39
22	109	22
23	141	50
24	91	8
25	138	40
26	174	96
27	172	88
28	158	66
29	110	27
30	180	96
31	126	37
32		
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35		
36		
37		
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	Length (mm)	Weight (g)
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	Length (mm)	Weight (g)
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SAMPLE RUN 2

Cleveland Metroparks

Fish Population Assessment Data Sheet

Date: 6/23/10 **Location:** Wallace Lake – W Lake Margin

Species: LMB **Time Sampled:** 10:45 1hr 17min 38 sec

	Length (mm)	Weight (g)
1	205	95
2	142	32
3	312	317
4	259	205
5	265	247
6	240	167
7	259	218
8	325	380
9	277	206
10	325	457
11	265	209
12	246	163
13	252	190
14	105	15
15	438	1012
16	420	975
17	275	246
18	315	370
19	300	300
20	283	298
21	275	232
22	236	149
23	204	106
24	220	120
25	265	216
26	306	351
27	238	147
28	303	308
29	217	111
30	239	162
31	230	167
32	237	164
33	217	120
34	312	369
35	338	439
36	143	34
37	353	536
38	302	306
39	147	35
40	197	94

	Length (mm)	Weight (g)
41	257	187
42	289	260
43	273	228
44	249	189
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	Length (mm)	Weight (g)
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SAMPLE RUN 2

Fish Population Assessment Data Sheet

Date: 6/23/10 **Location:** Wallace Lake - W lake margin

Species: BG, pumpkinseed **Time Sampled:** 10:45 1hr 17 min 38 sec

	Length (mm)	Weight (g)		Length (mm)	Weight (g)		Length (mm)	Weight (g)
1	172	84	41	112	21	81		
2	119	30	42	158	72	82		
3	145	53	43	145	54	83		
4	143	52	44	97	17	84		
5	80	7	45	130	35	85		
6	89	11	46	150	63	86		
7	143	65	47	131	39	87		
8	126	34	48	136	47	88		
9	136	32	49	97	19	89		
10	151	62	50	105	21	90		
11	157	70	51	135	51	91		
12	96	17	52	142	52	92		
13	124	34	53	115	26	93		
14	73	7	54	148	57	94		
15	102	19	55	143	49	95		
16	116	30	56	97	16	96		
17	105	21	57	85	8	97		
18	86	12	58	111	19	98		
19	147	58	59	150	72	99		
20	155	73	60	107	23	100		
21	154	55	61	116	25	101		
22	123	33	62	161	69	102		
23	96	17	63	129	46	103		
24	125	30	64	122	30	104		
25	151	60	65	123	31	105		
26	109	21	66	104	17	106		
27	175	85	67	84	9	107		
28	182	112	68	226	186	108		
29	151	67	69	159	74	109		
30	105	23	70	130	41	110		
31	117	27	71	147	52	111		
32	119	29	72			112		
33	120	29	73			113		
34	131	38	74			114		
35	150	62	75			115		
36	138	44	76			116		
37	103	18	77			117		
38	133	38	78			118		
39	101	17	79			119		
40	100	16	80			120		