PRELIMNARY REPORT ON GRAVEL LAKE LIMNOLOGICAL AND FISHERY SURVEY, 2015

To: Craig DeSimone

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Introduction

We conducted a limnological and fishery survey of Gravel Lake during 29-31 July 2015 with the assistance of James Opoka and Dean Rucinski. Gravel Lake is a almost round lake, well developed, with good clear water clarity, few aquatic plants (plant treatment is practiced), a well balanced fish community, and it has a large shallow area near the middle which is mostly occupied by bulrushes (*Scirpus* spp.). We took a Secchi disk reading, did a dissolved oxygen and temperature profile, collected water samples for nutrient analyses, and collected a sample of zooplankton from the lake. We then seined at several sites with a 50-ft seine, set two gill nets (day only), and four trap nets overnight (for 2 nights to reduce the possibility of killing any important top predators). We released all large predators that were alive after measuring them and taking scale samples. We then kept a sample of fish from each age group (usually five or six) for all species when available for diet analysis and ageing.

Results

The dissolved oxygen profile for Gravel Lake was generally good, although there were depressed oxygen levels from about 10 m to the bottom at 15 m (1.8 or less dissolved oxygen). This condition will degrade more during the remaining summer to where we suspect there will be no dissolved oxygen on the bottom 10 ft or so, which is bad for fish (they cannot reside there and these conditions promote re dissolution of phosphorus from the sediments, which then fuels aquatic plant and algae growth the next year when the lake turns over. There is still adequate dissolved oxygen in the thermocline area (2.7-3.7 mg/L) for warm water fish, but cool water fishes, such as northern pike and walleyes will be stressed, since they prefer cool temperatures and dissolved oxygen levels around 5 mg/L. The Secchi disk reading was 5.9 m or almost 20 ft which is very good.

We collected 14 species of fishes with an additional three species bringing the total to 17 for the lake (Table 1). The total number we kept for analysis was 78 fish plus whatever is left to process in the three bags we have yet to process. In Table 1, a P was put after a fish if we noted it in our log sheets, since we forgot three bags of fishes we collected via seine and now have it but have not processed these fish as of this date. A scale sample was provided by D. Rucinski for smallmouth bass, northern pike were observed in the lagoon as reported to us by a sports fisher at the launch site, and J. Opoka confirmed that bowfin are also present in the lake. We will do additional research of MDNR records for any studies done in the past that can shed light on the growth, fish community, and problems in the past if any data are available. Seventeen species is outstanding fish diversity and a great indicator of a stable fish population. We like to see a diverse fish community since it indicates ecological integrity and promotes efficient utilization of the many forage items available in a lake for fish to eat.

Table 1. Listing of the fishes collected at Gravel Lake, Van Buren County, near Lawton, MI, 29-31 July 2015. Given is common name, scientific name, number of fish kept for analyses, and length range (inches) for 2015 collections (collected using seine, gill nets, and trap nets). *Bowfin presence reported by J. Opoka, **Northern pike reported from lagoon by sportsfisher on the lake, ***=scale sample submitted by D. Rucinski. P=present, based on field note records. The fish from the seine collections have not yet been processed nor the mimic shiner identification verified in the lab. This table does not include fish that had scale samples removed and then were released. These fish will appear in the final report.

Species		**Sample size (n)**	**Length Range (inches)**
BLUEGILL	*Lepomis macrochirus*	12	3--9
BLUNTNOSE MINNOW	*Pimphalus notatus*		
BLACK CRAPPIE	*Pomoxis nigromaculatus*	1	8.4
BOWFIN*	*Amia calva*	P	
BROOK SILVERSIDES	*Labidesthes sicculus*	P	
BROWN BULLHEAD	*Ameiurus nebulosus*	7	11.9-13.9
JOHNNY DARTER	*Etheostoma nigrum*	P	
LARGEMOUTH BASS	*Micropterus salmoides*	16	6-12.9
MIMIC SHINER?	*Notropis volucellus*	P	
NORTHERN PIKE**	*Esox lucius*	P	
PUMPKINSEED	*Lepomis gibbosus*	10	6.2-8.7
SMALLMOUTH BASS***	*Micropterus dolumieu*	P	
SPOTFIN SHINER	*Cyprinella spiloptera*	P	
WALLEYE	*Sander vitreus*	2	14.70
WARMOUTH	*Lepomis gulosus*	5	2.6-4.9
WHITE SUCKER	*Castostomus commersonii*	1	18
YELLOW PERCH	*Perca flavescens*	15	4.5-10.5

The bluegills were eating zooplankton, caddisflies, zebra mussels, and dragonflies, while brown bullheads were eating many small bluegills. Largemouth bass ate crayfish, Johnny darters, bluegills, yellow perch, and some dragonflies. Pumpkinseeds are known for eating snails and were eating almost exclusively snails and a few caddisflies in Gravel Lake. Yellow perch were eating chironomids, zooplankton, some bluegills, and phantom midges.

Discussion and Recommendations

Gravel Lake is a beautiful lake with great water clarity (almost 20 feet Secchi disk reading), a well balanced fish population, and it provides ample sport fishing, water skiing, kayaking, and other water sports activities. The lake is well developed, has one moderately large lagoon where many recreational boats are moored, and it has one shallow area near the middle of the lake which is covered with bulrushes. It has an overflow area/creek on one end, but the only other input is runoff from a farm field during times of excessive flooding. We observed a constant stream of boats at the boat launch that were fishing and there for water skiing. It was also used for swimming. The lake would probably be classified as mesotrophic (in between Lake Superior and Erie) since it has dissolved oxygen depletion on the bottom, but not as severe that eutrophic lakes experience. We would need some late August dissolved oxygen data and need to see our nutrient data to confirm these observations.

As noted we collected and had documentation of the presence of 17 species of fishes, which is excellent. The top predators included northern pike (apparently very rare), largemouth bass (large fish are also rare), smallmouth bass (apparently also rare based on our not catching any in seines or gill nets), walleyes (stocked and not expected to reproduce), and to a lesser degree brown bullheads, large yellow perch, and black crappies. There are also warmouth and pumpkinseeds present. There are at least two species of minnows, white suckers, and brook silversides. With fish it was obvious that one or two year classes of largemouth bass dominated the bass population (10-14 inches) with not much evidence of large numbers of larger bass present. We will have to await age analysis to find out what age these fish are, but there definitely should be larger fish, especially since we think most fisherman practice catch and release. It was also strange that only large pumpkinseeds (6-9 inch) were collected; no young-of-the-year were seined. One major observation is that there appears to be very few standing beds of aquatic plants, suggesting some consideration be given to spot treatment and less treatment of aquatic plants to promote survival of more fish. Plants are important for producing fish-food organisms, providing shelter for small fish (nursery areas), as spawning substrate, and they can also reduce the impact of the constant sloshing and turmoil that skiing and other speed boat activities on the lake generate. They can also maintain sediments in place and prevent re suspension during these events, which reduces re suspension of nutrients into the water column. In making decisions about plant control, you must also consider that the lake will produce either aquatic plants or algae with the existing nutrient regime in the lake. You do not want to kill so many aquatic plants that the balance shifts toward algae, since they are more difficult to kill and can shade out the aquatic plants which are critical to the well being of the lake and its fish populations. We will provide more detail and all the data in a later report.