

**2000 SUMMARY REPORT
of
Ames Pit**

Lake County, Illinois

Prepared by the

**LAKE COUNTY HEALTH DEPARTMENT
ENVIRONMENTAL HEALTH SERVICES
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LAKE IDENTIFICATION AND LOCATION

Lake Name: Ames Pit

State: IL

County: Lake

Nearest Municipality: Wadsworth

Township/Range: T46N, R11E, Section 15 SW ¼

Basin Name: Des Plaines River

Subbasin Name: Upper Des Plaines River

Major Tributaries: Des Plaines River

Receiving Water Bodies: Des Plaines River

Surface Area: 10.5 acres

Shoreline Length: 0.9 miles

Maximum Depth: 24.0 feet

Mean Depth: 12.0 feet

Storage Capacity: 126 acre-feet

Lake Type: Borrow Pit

Watershed Area: Unknown

LIMNOLOGICAL DATA – WATER QUALITY

Water samples were collected at 3 feet and 2 feet from the bottom (20-23 feet) from May through September at the deep hole location in the lake (Figure 1). Ames Pit was thermally stratified during the entire course of the study. This means that the lake was divided into a warm upper water layer (epilimnion) and a cool lower water layer (hypolimnion). The strength of stratification dictates whether these layers mix. Thermal stratification is measured by the relative thermal resistance to mixing (RTRM). At an RTRM of 20, layers generally do not mix. On Ames Pit, peak RTRM ranged from 14.8 (May) to 126.05 (June). This strong thermal stratification prevented any of the high nitrogen^a (3.67 mg/L) and phosphorus (0.17 mg/L) levels in the hypolimnion from mixing into the epilimnion. Mixing of these nutrients into the epilimnion could cause a variety of water quality problems. During turn over, these nutrients are mixed throughout the lake but are diluted to lower levels. The extent to which dilution occurs cannot be calculated without a bathymetric map. Since these layers are strongly separated and do not mix, epilimnetic water quality is more relative to water quality issues. For this reason, only epilimnetic water quality is discussed below. The complete water quality data set is located in Table 1.

The region between the epilimnion and hypolimnion is called the metalimnion and is an area of changing water temperature and dissolved oxygen (D.O.) levels. Due to thermal stratification, oxygen is unable to mix into the hypolimnion. Therefore, as oxygen consuming biological and chemical processes (such as decomposition of plant material) increase, oxygen is stripped from the water and the hypolimnion becomes more anoxic as the summer progresses. Within the metalimnion is the anoxic boundary, which is the point at which D.O. drops below 1.0 mg/L. At this level, no aquatic organisms (except non-photosynthetic bacteria) can live. The anoxic boundary becomes more shallow as summer progresses (the epilimnion becomes smaller; hypolimnion becomes larger). In months with an anoxic boundary (all except September), depth of the boundary ranged from 19 feet in May to 7.6 feet in June. Due to stratification, water quality of the epilimnion is different than the hypolimnion.

Overall Ames Pit has *above average* water quality. Several water quality parameters had outstanding results^b. Average total suspended solids (TSS), on Ames Pit during the study were 3.30 mg/L. A majority of these suspended solids were from soil particles. This is largely due to the soil type in and around Ames Pit as well as continual flooding and back flow from the Des Plaines River. This allows for soil particles to be washed into the lake and results in increased turbidity. This was evident in the average nonvolatile suspended solids (NVSS), which is the part of TSS that is related to sediment particles, with a concentration of 2.11 mg/L (2/3^{rds} of average TSS). In general, all of the solids measured were well below average reinforcing the good water quality of Ames Pit. Due to lower

^a NH₃ + NO₃ + Total Kjeldahl Nitrogen

^b In relation to some water quality parameters, such as the various solids measurements and nutrient levels, the lower the concentration the better the water quality (*below average* is good). With Secchi disk, the deeper the reading the better the water quality (*above average* is good). With some parameters, such as alkalinity and pH, being too low (or too high) is considered problematic.

than average TSS (and lack of excessive algal growth), average Secchi disk depth (6.54 feet) was slightly above the County average of 5.0 feet (95-2000 Lake County average). The deepest Secchi readings were in May (12.4 feet).

Water quality is partially affected by external inputs such as runoff, stream inflow, etc. If these sources are of poor quality, water quality will be negatively effected. Ames Pit receives an appreciable amount from the Des Plaines River during flood stages. This is especially evident in the seasonal water level fluctuations. Water levels on Ames Pit decreased by 48 inches (May through August). More than likely, inputs from the Des Plaines negatively affected the water quality in Ames Pit (mainly sediment loads). However, despite the flooding, Ames Pit still had above average water quality. This corresponds with many of the other borrow pit lakes within the County.

Another measurement of water quality is nutrient levels. Algae need light and nutrients, most importantly carbon, nitrogen (N) and phosphorus (P), to grow. Light and carbon are not normally in short supply (limiting). This means that nutrients (N&P) are usually the limiting factors in algal growth. To compare the availability of these nutrients, a ratio of total nitrogen ($\text{NO}_3 + \text{TKN}$) to total phosphorus (TP) is used (TN:TP). Ratios $< 10:1$ indicate nitrogen is limiting. Ratios of $>15:1$ indicate phosphorus is limiting (low P concentrations). Ratios $>10:1$, $<15:1$ indicate that there is enough of both nutrients for excessive algal growth. Ames Pit has a TN:TP ratio of 58:1, which means that the lake is highly phosphorus limited. Average epilimnetic phosphorus levels in Ames Pit were 0.03 mg/L (Lake County average is 0.06 mg/L). Problematic algae growth usually starts to occur at a TP concentration of 0.05 mg/L and above. However, Ames Pit experienced some filamentous algae growth. This was largely due to the lack of aquatic vegetation, which competes with algae for resources. Filamentous algae growth was confined near shoreline areas and was not considered problematic. With these low levels of phosphorus, and resulting severe phosphorus limitation, it is important to keep external phosphorus sources to a minimum. Any additional phosphorus could trigger widespread planktonic and filamentous algae blooms.

Another way to look at phosphorus levels and how they affect productivity of the lake is to use a Trophic State Index (TSI) based on phosphorus. TSI values are commonly used classify and compare lakes productivity levels (trophic state). The phosphorus TSI is setup so the higher the phosphorus concentration the greater amount of algal biomass and as a result, a higher trophic state. Based on a TSI phosphorus value of 52.1, Ames Pit is classified as eutrophic (>50 , <70 TSI). A eutrophic lake is defined, as a highly productive system that has above average nutrient levels and high algal biomass (growth). However, this definition does not hold completely true for Ames Pit. The eutrophic classification was due to slightly elevated phosphorus levels. These elevated levels did not cause high algal biomass, which phosphorus TSI trophic states are partially based. Since Ames Pit was borderline eutrophic, classifying Ames as mesotrophic (moderately productive) is a more representative of the condition of the lake. Based on a Secchi TSI, Ames pit was classified as mesotrophic. This is a moderately productive classification more representative of Ames Pit. Furthermore, based on phosphorus TSI,

Ames Pit is ranked 21st out of 87 lakes in the County studied by the LMU from 1988-2000 (Table 2).

TSI values along with other water quality parameters can be used to make other analysis of Ames Pit based on use impairment indexes and water quality standards established by the Illinois Environmental Protection Agency (IEPA). All water quality standard impairment assessments were listed as *None* meaning that none of the water quality parameters caused any negative impacts on the overall lake health. Based on EPA use indices, such as Aquatic Life Use, Swimming Use, and Recreation Use Ames Pit was ranked as providing *Full* support with Overall Use listed as *Full* support.

LIMNOLOGICAL DATA – AQUATIC PLANT ASSESSMENT

Aquatic plant surveys were conducted monthly for duration of the study (*Appendix A* for methodology). Aquatic plant diversity in Ames pit is below average and consists of only a few species (Table 3). Ames Pit has limited aquatic plant growth mainly due to its previous existence as a borrow pit, which has resulted in a steep morphometry that is not conducive to aquatic plant growth. Additionally, since the area was not a natural wetland or lake, the number of aquatic plant species is limited to those that have been brought in from outside sources (birds, mammals, man, floods etc.). The extent to which these plants grow is largely dictated by light availability and substrate. Plants need at least 1% of surface light levels in order to survive. Based on the depth of 1% light level, depth at which plant growth could occur in Ames Pit varied on a monthly basis. Measurements show that aquatic plants could have grown to a depth of about 7.0 feet (May) to as deep as 12.5 feet (June). However, surveys of aquatic plants show that vegetation was found at depths of up to 16 feet. Only one species of plant was found at this depth, *Chara* sp. (which is a macroalga and not a vascular plant), and was the one of the only species found to occur in water deeper than 7 feet. *Chara* plants deeper than the 1% light level depth were reduced in structure and had a noticeable dark appearance to them. This is typical of plants found at depths below adequate light penetration. From depths of 1 foot to 7 feet there was higher species diversity of aquatic vegetation. Ames Pit does have a well-balanced aquatic vegetation population with no one species becoming excessive (Table 4). This is largely due to lack of disruption and human intervention and steep slope of the shoreline, which prevents plants from spreading and becoming weedy. However, some species were more frequent than others throughout the study (Table 4). Slender naiad was the most commonly occurring plant during the study (37% of all sample sites). It was found in as many as 90% of sample sites in July. By September it was not found at any sample site. Slender naiad is one of only few aquatic annuals species found in the County and therefore it grows best in the warm waters of summer. Another common plant found through out the study was sago pondweed, which was found at 35% of all sample sites. Unfortunately, another commonly occurring plant was Eurasian water milfoil (29% of all sample sites), which can be an extremely noxious plant. However, Eurasian water milfoil is prevented from becoming weedy due to the

gravel substrate, steep morphometry, and competition from other plants and in general is of little of minimal concern at this time.

Table 3. Aquatic Plants Found in Ames Pit (May – September 2000).

Chara	<i>Chara sp.</i>
Coontail	<i>Ceratophyllum demersum</i>
Common Duckweed	<i>Lemna minor</i>
Purple Loosestrife	<i>Lythrum salicaria</i>
Eurasian Water Milfoil	<i>Myriophyllum spicatum</i>
Slender Naiad	<i>Najas flexilis</i>
Southern Naiad	<i>Najas guadalupensis</i>
Swamp Smartweed	<i>Polygonum coccineum</i>
Water Smartweed	<i>Polygonum amphibium</i>
Leafy Pondweed	<i>Potamogeton foliosus</i>
Illinois Pondweed	<i>Potamogeton illinoensis</i>
Flatstem Pondweed	<i>Potamogeton zosterifomis</i>
Sago Pondweed	<i>Stuckenia pectinatus</i>
Common Cattail	<i>Typha latifolia</i>

LIMNOLOGICAL DATA – SHORELINE ASSESSMENT

Shoreline assessment was conducted on June 29, 2000. The shoreline condition at Ames Pit was consistent with other borrow pit lakes in the County. All shoreline at Ames pit (with the exception of the southwestern bay) was gravel in nature. Occurrence of erosion was moderate due to the unstable soil type, lack of suitable shoreline vegetation and steep topography. Another source of erosion was unrestricted foot traffic. However, due to the nature of the lake (borrow pit) erosion is to be expected. The lack of shoreline vegetation was due to the rocky nature of the soil. Most of the shoreline vegetation consisted of various prairie grasses and willows. It would be beneficial to plant emergent vegetation around the shoreline. This would improve soil stability as well as provide improvement of wildlife habitat. However, plant species would have to be carefully selected to be tolerant of inhospitable soil types and flooding. The wetland nature of the southwestern bay allowed for growth of cattails along shore. However, due to the steep morphometry of the lake, cattail encroachment is not a concern.

An area of concern is eliminating/preventing the spread of invasive species such as purple loosestrife, buckthorn, and reed canary grass, which were observed at scattered locations around the lake. Another major concern on Ames Pit is the trash on the

shoreline. This garbage mainly consists of beverage (plastic and glass bottles, cans, etc.) and bait containers (styrofoam, plastic, etc.). This trash is the result of persons that are either careless, inconsiderate, or both. Trash not only lends to a poor appearance but can also negatively impact wildlife.

LIMNOLOGICAL DATA – WILDLIFE ASSESSMENT

Wildlife observations were made on a monthly basis during water quality and plant sampling activities. All observations were visual. Several types of waterfowl were observed during the course of the study (Table 5). Included in these were great blue and green herons, which are highly desirable. The healthy populations of cattails on the southwestern bay provide good habitat for a variety of bird species. Additionally, there are several shrub areas that provide habitat for other types of wildlife.

Fishery assessment was only on an observational basis and no sampling was conducted. Overall, the fishery seemed to be well balanced with several year classes present for bluegill, bass, and catfish/bullhead. Minnow species were observed on several occasions and included sightings of spawning black striped topminnows. Due to its connection with the Des Plaines River, Ames Pit probably contains important non-game fish species including those that are threatened or endangered that are found in the river. Fishery studies (especially seining) would need to be conducted in order to determine the condition of the fishery in Ames Pit.

Table 5. Observed Wildlife Species on Ames Pit (May – September 2000).

Birds

Pied-billed Grebe+	<i>Podilymbus podiceps</i>
Mute Swan	<i>Cygnus olor</i>
Canada Goose	<i>Branta canadensis</i>
Mallard	<i>Anas platyrhynchos</i>
Wood Duck	<i>Aix sponsa</i>
Great Egret	<i>Casmerodius albus</i>
Great Blue Heron	<i>Ardea herodias</i>
Green Heron	<i>Butorides striatus</i>
Belted King Fisher	<i>Megaceryle alcyon</i>
Unknown Sandpiper	<i>Calidris</i> sp.
Red-winged Blackbird	<i>Agelaius phoeniceus</i>

Mammals

Beaver	<i>Castor canadensis</i>
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Table 5. Observed Wildlife Species on Ames Pit (May – September 2000) (cont.).

<u>Reptiles</u>	
Painted Turtle	<i>Chrysemys picta</i>
Garter Snake	<i>Thamnophis</i> spp.
+Threatened in Illinois	

Existing Lake Quality Problems and Management Suggestions

Ames Pit was one of the higher quality Lake County Forest Preserve lakes analyzed by the unit in 2000. Highpoints of Ames Pit included low phosphorus concentrations, limited nuisance aquatic plant/algae growth and good quality wildlife habitat. However, Ames Pit does have room for improvement. Listed below are a few key areas for where noticeable improvements could be made. Included are management recommendations for these problems.

- *Bathymetric Map*

An important tool in any lake management plan is a good quality bathymetric map. Many times if a bathymetric map does exist it is old and/or of poor quality. The information provided by these old maps is only as good as their quality - poor. Current high quality maps can be of great use to fishermen as well as lake managers. Bathymetric data can show where possible problematic areas may be located (i.e., shallow areas). Bathymetric maps can also provide volumetric data that can be utilized for management techniques such as herbicide application and rotenone and aluminum sulfate applications. These practices can not be properly executed without a good bathymetric map and accompanying data. These maps can be easily made using different methods. Costs can range from \$3,000 – 10,000 depending on the size of the lake. Ames Pit is a small body of water and costs would be on the low end of the price range.

- *Trash*

A very evident problem on Ames Pit is the presence of trash. This trash consists of plastic bottles, empty bait containers, and even fishing line. The trash is left behind by careless fisherman. The trash is not only an eyesore but also poses possible health risks for wildlife that might ingest the trash becoming seriously ill or even die. Educational signs and trashcans could easily remedy this problem. Trash cans have

already been placed at other Forest Preserve locations such as the Des Plaines River Trail that have experienced fisherman related trash problems. Additionally, fines for littering could be listed and imposed.

- *Accessibility*

Ames Pit is moderately used by fisherman. However, there is no official access to the property. Users must climb over a cable gate or rip a hole in the chain link fence, as is the case on the east side of the lake across from the school. This could easily be remedied by installing a break in the fence along Rt. 173 with a walkway across the drainage ditch. A more involved approach would be to build a parking lot with an entrance accessible by car. Currently users park in the lots in Van Patten Woods recreational area or at the nearby school. This would provide a closer location to park and also might deter people from leaving their trash behind because their vehicle is parked far away.

Another access issue that could be addressed is providing fishing piers. Additionally, crushed limestone pathways could also be laid to provide better access to other parts of the lake. Signage about littering as well as trashcans could be placed on the pier(s) and walkways. These improvements would significantly improve the use of Ames Pit and would be a nice addition to the Van Patten Woods recreational area.