Executive Summary

Lake Hallie is an oxbow lake of the Chippewa River located about 500 feet from that river approximately midway between Eau Claire and Chippewa Falls. It has an area of 79.9 acres, a maximum depth of 13 feet, and a shoreline of 2.9 miles. About one-half of the shoreline is natural and wooded mainly because of steep hillsides and wetland areas. About one-half mile is heavily developed and another half-mile lies alongside an 18-hole golf course.

The lake was originally dammed and used as a log holding area for the Blue Mills sawmill that was constructed in 1843 at the southwest corner of the lake. The dammed water source was a series of groundwater seeps, particularly in the northeast corner of the lake. The mill closed in the 1890's, and in the early 1900's, lake usage turned to recreation and fishing, which use continues to the present day.

In February 1998, the Lake Hallie Lake Association was formed to monitor and protect the quality of this recreational resource. In the fall of 2002, this association obtained a lake planning grant from the DNR to collect and analyze information about the lake for the purpose of developing a comprehensive lake management plan. Subsequently, the association entered into an agreement with the Chippewa County Land Conservation Committee, under the terms of which the Land Conservation Department (LCD) would compile specific information necessary to developing a lake management plan.

Included in this information is an overview of the history and physiographic setting of Lake Hallie (including a series of maps), a compendium of historic water quality data, detailed DNR plant and fish management studies, a summary of management recommendations, and an information and education plan to support lake management efforts.

In March 2003, a survey of residents of the watershed was conducted to obtain feedback on management recommendations made by the DNR and Village of Lake Hallie on plant, fish, and water quality issues specific to Lake Hallie. Response rate was 36%. Results show strong support for all recommendations, except increasing the shoreline buffer zone from 35 to 50 feet and lukewarm support for a size and bag limit on northern pike (more than 1/3 not sure).

Plant management strategies call for continuation of mechanical harvesting during the early season, harvesting channels in dense plant beds in mid and late summer, and developing a budget for operation of the plant harvester.

Fish management strategies include maintaining the current regulations on panfish and largemouth bass, improving winter oxygen conditions, dredging the groundwater discharge area, and monitoring the impact of these activities on the fishery.

Water quality management strategies stress the implementation of best management practices in the riparian zone and further study to determine the causes of variable groundwater flow and impacts of the culvert discharge at the northeast corner of the lake.

Management Recommendations from The Aquatic Plant Community of Lake Hallie (1991-2001)
(Dec. 2002)

1. Preserve and expand the natural buffer zones of native vegetation around the lake shoreline. Replace mowed lawn at the shoreline with a buffer of natural, non-mowed vegetation at least 50 feet deep.

2. Cooperate with programs to manage run-off and erosion in the watershed.

3. Develop an aquatic plant management plan. Include mechanisms for modifications as the plant community changes.

4. Develop a lake association budget that will provide funds for repair and maintenance of the plant harvester and pay harvester operators.

5. Continue the mechanical harvesting program during the early season to remove curly-leaf pondweed biomass from the lake before the early summer die-off and nutrient release.

6. Harvest channels in dense plant beds in mid and late summer to improve habitat and boat access and reduce amount of vegetation decomposing in the winter under the ice. Avoid harvesting in areas with valuable habitat plants.

Konkel, Deborah, 2002. The Aquatic Plant Community of Lake Hallie 1991-2001. Wisconsin Department of Natural Resources. 32pp.

Conclusions and Management Recommendations from The Status and Management of Fish Populations in Lake Hallie

(Jan. 2003)

1). Discontinue the stocking of rainbow trout beginning in 2002.

The illegal introduction and expansion of a northern pike population in Lake Hallie has resulted in a major decline in a stocked, rainbow trout fishery. The return of trout to the angler's creel has declined dramatically even within the first month after stocking. A winter fishery for trout, which existed up to the early 1990s, has been eliminated and replaced with a very popular northern pike fishery. Northern pike removal to continue a trout fishery would be costly. In addition, high summer water temperatures and periodic, low winter oxygen levels may no longer favor trout stocking. It is recommended that trout stocking be discontinued in 2002.

2) Consider a size limit and a reduced bag limit on northern pike.

The interest in northern pike fishing, specifically during winter, has grown with the notoriety Lake Hallie has received for producing large fish. Without the presence of trout, the fast growth rates of northern pike will undoubtedly slow to average or possibly below average rates. In addition, efforts to improve winter oxygen levels will produce better fishing action with an expected increase in northern pike harvest. A county resolution at the 1998 spring rules hearing recommended that there should be no size limit on northern pike because of their predation on trout. This is no longer applicable with the curtailment of trout stocking In order to maintain a quality northern pike fishery, it may be prudent to control harvest by enacting a minimum size limit and/or reduce the daily bag limit. With the current set of regulations available for use with northern pike, the 26" minimum size limit with a daily bag limit of 2 is the most appropriate regulation to consider. It is recommended that a local resolution be proposed at the spring rules hearing to determine the interest by local anglers for a change in northern pike regulations.

3). Maintain the current regulations on largemouth bass

A county resolution passed at the 1998 spring rules hearing proposed a reduction of the largemouth bass daily bag limit of five to two. The justification for this proposal was that most legal-size bass (≥14") were being harvested during the first few weeks of the fishing season. The 2001 survey shows a very high density of legal-size bass in the lake. The minimum size limit apparently has done much to improve bass size structure, however, dense aquatic vegetation restricts the angler's ability to catch bass during much of the open-water season. It is recommended that the current bass regulations remain, and that bass populations be monitored to determine what impact mechanical harvesting of aquatic plants may have on angler harvest.

4). Maintain the current regulations on panfish

A county resolution passed at the 1998 spring rules hearing proposed a reduction in the daily, aggregate bag limit of panfish from 25 to 15. Bluegill is the dominant panfish in the lake. Their dense population currently has a good size structure. Current and proposed lake management practices could indirectly affect density and size structure through increased predation and/or angler harvest. It is recommended that daily bag limits on panfish remain at 25/day. However, future studies should be conducted to determine what impacts mechanical harvesting and improved winter oxygen levels have on panfish size structure, in particular bluegills. If increased angler harvest reduces the quality of the size structure, then a reduced bag limit should be considered.

5). Continue the mechanical harvesting program of submerged aquatic plants.

The mechanical harvesting program was designed to control curly-leafed pondweed (*P. crispus*) populations and to improve fish habitat and angling opportunities. Reducing plant growth also may lower winter oxygen demand. It is recommended that mechanical harvesting of aquatic plants be continued, however, the current harvesting plan should be reevaluated to determine its effectiveness in reaching the above objectives. Additional areas of dense vegetation may need to be included to further improve fish habitat

6). Improve winter oxygen conditions in the lake

Despite the low, winter oxygen conditions experienced during the winters of 1999-2000 and 2000-2001, fish populations are in relatively good shape. However, if this winter oxygen condition persists, fish populations may begin to suffer. The northeast corner of the lake provides a winter oxygen refuge. However, concentrating fish into a smaller area increases the stress level of individuals. This may lead to post-winter fish kills due to bacterial or viral infections. The temporary aeration system used in early 2001 did an excellent job of providing dissolved oxygen levels above the water quality standard. Anglers found greatly improved action on fish once this system was in place. The winter of 2001-2002 was a mild winter, and low oxygen levels were not experienced. A 4-inch stoplog was removed from the bottom draw structure to aid in the removal of oxygen-poor water from the bottom. However, because of the mild winter, it is unknown how much, if any, this practice aided in providing higher oxygen levels. Prior to the winter of 2002-2003, two stoplogs were removed (10") from the bottom draw structure. It is recommended that winter oxygen levels continue to be monitored to determine if this practice aids in maintaining higher oxygen levels. If this practice does not maintain adequate oxygen levels, then a permanent aeration system should be installed.

7). Consider dredging of the groundwater discharge area

The groundwater discharge area in the northeast end of the lake once provided a large area of open water during winter. Discharge measurements at the dam have not changed appreciably from 1963 to 1996. But, despite similar outlet flows, the open water area has decreased considerably in size over the past 10 years indicating a change in the thermal regime for this area during winter. Because of dense plant growth, water depths in this area have decreased due to the deposition of decomposing plant matter. It is unknown if the location of groundwater inputs to the lake have changed and if increased sediments in this area impact the ability of groundwater to effectively flow into this lake area. This area provided a source of oxygen to the lake during winter via open water. It also provided coolwater habitat for fish during summer. Consideration should be given to dredging the northeast corner of the lake to improve winter and summer habitat conditions for fish.

8). Monitor the impact of lake and fish management activities

Lake Hallie is undergoing some major management activities including, mechanical harvesting of plants, efforts to improve winter oxygen conditions, and the curtailment of rainbow trout stocking. These activities have the potential of impacting fish populations, in particular largemouth bass, bluegill and northern pike. The results of this survey will act as a baseline of information for these management activities. It is recommended that future surveys be conducted to evaluate the impacts of management activities on the size structure of bass, bluegill and northern pike, bass recruitment, angler harvest, and the growth rates of bass, bluegills and northern pike. An evaluation should occur no sooner than five years after implementation of a new management activity.

Kurz, Joe, 2003. The Status and Management of Fish Populations in Lake Hallie, Chippewa County (WBIC 2150200). Wisconsin Department of Natural Resources.

Management Recommendations from Town of Hallie
Water Quality Management Planning Project
(July 1997)

1. Best management practices should be implemented to protect and improve water quality in Lake Hallie, particularly in the following critical areas that have the potential to contribute the most pollutants associated with stormwater runoff:
   Hallie Golf Course (pesticide and nutrient runoff)
   Residential neighborhood adjacent to Lake Hallie (possible septic system leaching from drainfields into the lake, as well as other pollutants).

2. Nuisance plant growth should be controlled through reducing nutrient inputs and harvesting rooted aquatic plants.

3. The impact of the stormwater discharge near the northeast end of the lake, both existing and future, should be further evaluated.

4. Encourage Lake Hallie residents to form a Lake Association, converting the existing Lake Hallie Dam Committee to a Lake Association.

Ayres Associates, 1997. Town of Hallie Water Quality Management Planning Project.
Project No. 11-0351.00

Management Recommendations from Lower Chippewa River Basin Water Quality Management Plan

(May 1996)

1. Bureau of Water Resources Management (WRM) staff should find a self-help lakes monitoring volunteer for Lake Hallie.

2. WRM should consider Lake Hallie a high priority for receiving a lake planning grant.

3. WRM should consider Lake Hallie a high priority for receiving a lake protection grant.

4. Water Regulation and Zoning and WRM should assist local land use decision makers and riparian residents in developing and implementing land use management programs that protect the water quality of Lake Hallie.

5. WRM should assist local lake management interest groups in organizing and/or working to improve and protect the water quality of Lake Hallie.

Koperski, C., LaLiberte, P., Sorge, B., Larson, N., Ryan, D., and C. Roesler, 1996. Lower Chippewa River Basin Water Quality Management Plan. Wisconsin Department of Natural Resources. PUBL-WR-216-96-REV

Management Recommendations from Nonpoint Source Control Plan for the Duncan Creek Priority Watershed Project
(Sept. 1995)

1. Develop and implement a construction site erosion control ordinance for construction sites not currently regulated.

2. Develop and implement a stormwater management plan.

3. Include an I and E component in the stormwater management plan.

Simonson, D., Tetzloff-Jensen, J., and L. Hess., 1995. Nonpoint Source Control Plan for the Duncan Creek Priority Watershed Project. Department of Natural Resources. Publication WR-427-95.

Table of Contents

Lake Data

- DNR Water Chemistry Data for 1991, 2001, 7 2002
- DNR Dissolved Oxygen Data at Specific Sites for 1999 – 2003
- DNR Zone of Refuge Study – January 2001
- Self-Help Lake Monitoring Data collected by George Wanserski for 1995 – 2002
- Lake Hallie Piezometric Testing - 10/26/2002
- Lake Elevation Gauge Data Record Sheets

Survey

- Lake Hallie Watershed Community Opinion Survey
- Lake Hallie Watershed Community Opinion Survey Results
- Map of Parcels included in Lake Hallie Watershed
- List of Residents in Lake Hallie Watershed

Geology and Physiography of Lake Hallie

The physical development of the Lake Hallie area occurred slowly over the course of the last few billion years. Evidence in rocks in the surrounding areas indicates that about three billion years ago during the Archean period of the Precambrian era, pressure from within the earth exploded, and molten mantle material was forced to the surface. This process was repeated many times as the earth heated, cooled, and again rebuilt new features, only to be redesigned by the forces of wind and water. In such a manner, the complex igneous and metamorphic bedrock of northern Wisconsin was formed through these processes of volcanism, erosion and sedimentation.

Examples of these Precambrian rocks can be found today in the Chippewa River at Jim Falls and at the Lake Wissota dam and along the Eau Claire River at Big Falls. These exposed rock layers formed collectively what is known as the "fall line." They made places such as Black River Falls, River Falls, and Chippewa Falls ideal sites for early saw and grist mills because of the easy availability of water power as rivers dropped over the hardened Precambrian rock.

More mountain building activity occurred about 2.4 billion years ago in the northern parts of our region when Flambeau Ridge and the Blue Hills of Barron and Rusk counties were formed during the Animikian period. By about 1.5 billion years ago, the mountains that had formed earlier had largely eroded away, leaving these latter two monadnock formations still in place. About this time, another change occurred in our area, when the earth entered the Keweenawan period, and the deposition and formation of sandstone began.

This was a cooling period, which lasted until about 500 million years ago, overlapping into the Paleozoic Era. During this period, Wisconsin was submerged, possibly four times, by great seas and oceans. Great sediments formed at the bottom of these oceans, burying the Precambrian landscape beneath as much as several thousand feet of sedimentary rocks. The earliest of these, the Mount Simon sandstone, forms the present day bedrock in the Lake Hallie area. It consists of poorly sorted fine-grained to very coarse grained sandstones that are generally poorly consolidated. A general color change occurs downward from white to yellowish gray to grayish red below. Outcroppings occur in numerous places in the area, including the east side of Duncan Creek in Irvine Park in Chippewa Falls, as well as at its namesake Mt. Simon in Eau Claire.

Beginning in the late Paleozoic Era, perhaps 250 million years ago, a period of gentle uplift occurred, and this has continued to the present day. During this time, the land surface was carved continuously by rain, wind, and running water.

Glaciation of the area occurred only recently in geologic time, during the Pleistocene epoch or "Ice Ages," which began about one million years ago. There were four separate glacial advances through Wisconsin, interspersed with interglacial periods when the ice receded. The last ended about ten thousand years ago, and the Chippewa lobe, ending just east and north of Bloomer, was its furthest southward advance in our county. As the Chippewa lobe retreated, meltwater streams flowing from its terminal moraine carried thick sediments of Copper Falls Formation outwash southward and then southwestward over the Lake Hallie area and into Eau Claire County.

Later, postglacial sediments were deposited along a sharp turn in the Chippewa River forming terraces, which eventually cut off a portion of the river to form the oxbow lake that today is known as Lake Hallie

Lake Hallie Area

Digital orthophoto taken by
USDA Natural Resources
Conservation Service in 1998

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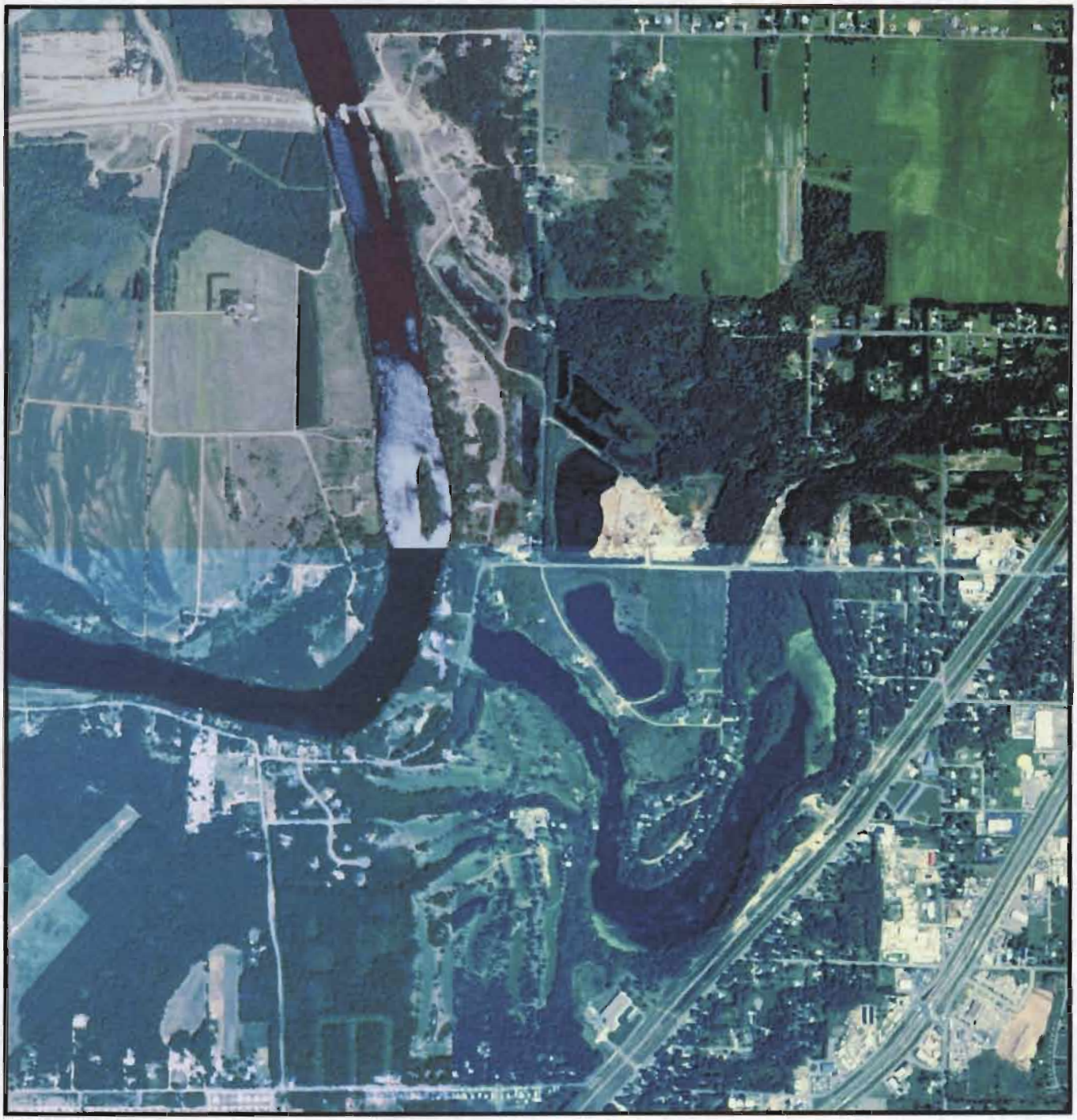
Feet

Chippewa County
Land Conservation Dept.

May 7, 2003

Lake Hallie Area



Color photography taken by USDA Natural Resources Conservation Service in 2002

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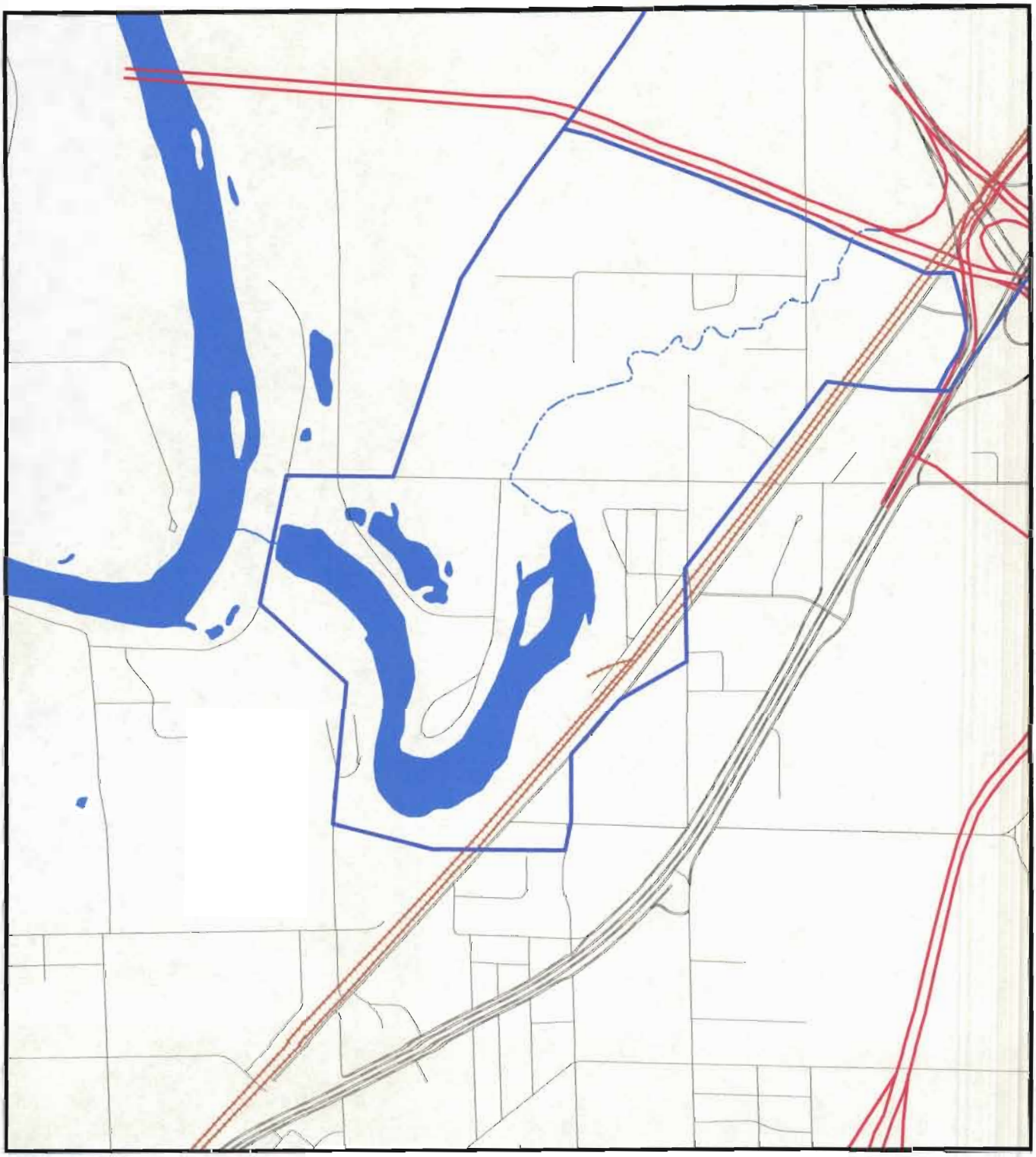
Chippewa County Land Conservation Dept.

June 10, 2003

Lake Hallie Watershed



Watershed boundaries delineated by Ayres Associates in 1997 and modified by new road construction (shown in red).

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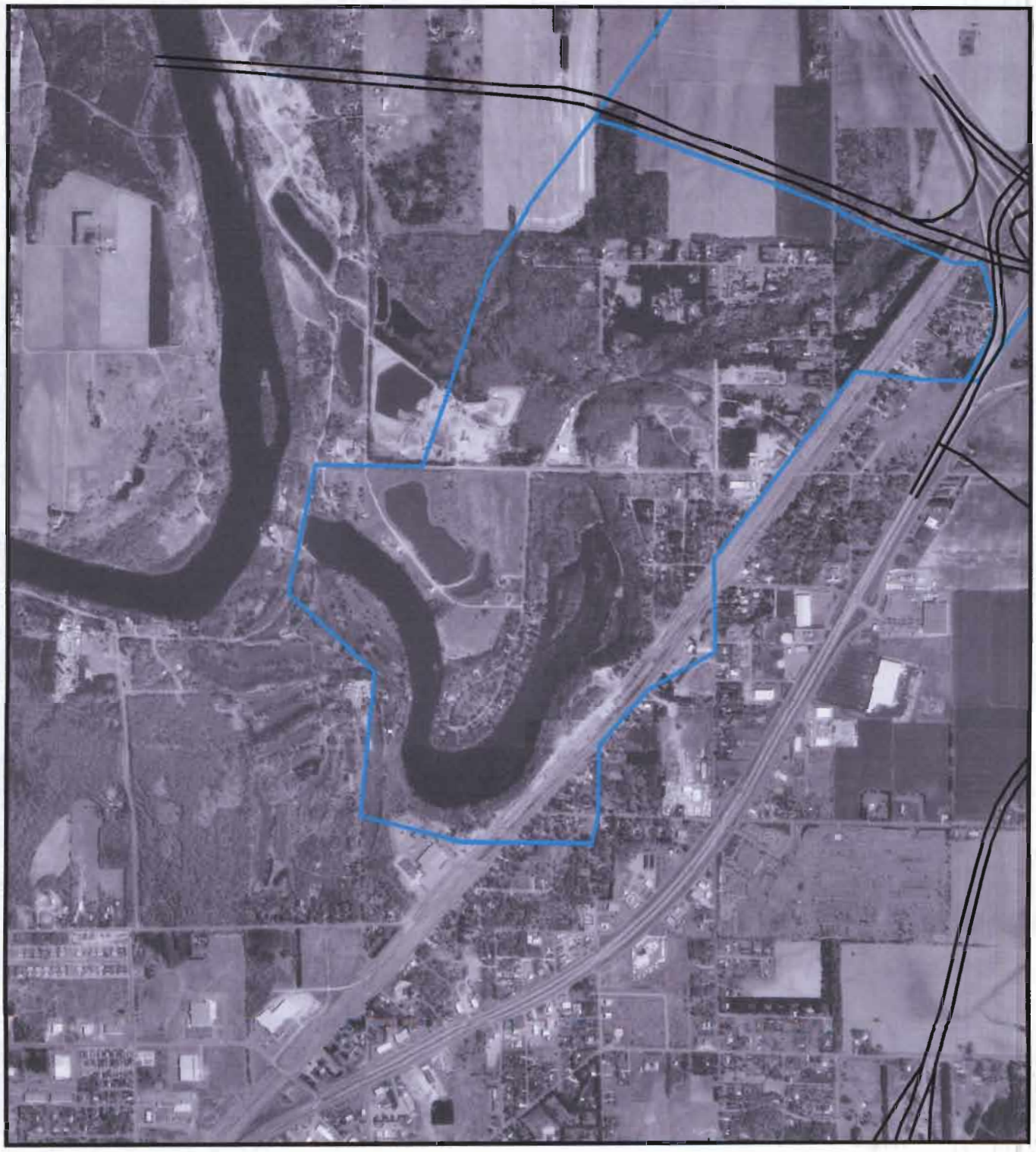
Chippewa County Land Conservation Dept.

May 7, 2003

Lake Hallie Watershed



Digital orthophoto taken by USDA Natural Resources Conservation Service in 1998

Watershed boundaries delineated by Ayres Associates in 1997 and modified by new road construction.

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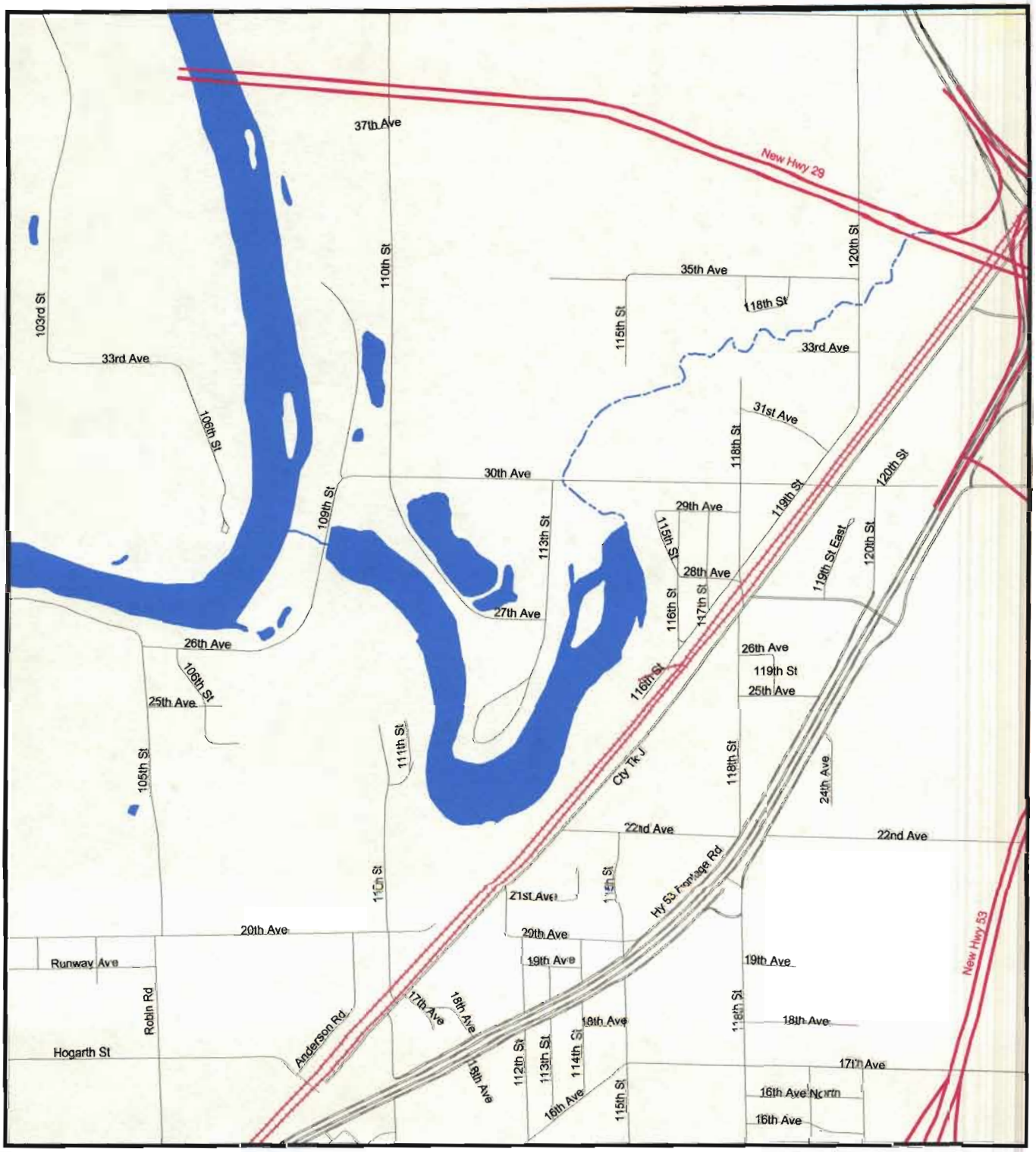
Chippewa County Land Conservation Dept.

May 7, 2003

Lake Hallie Area Street Map



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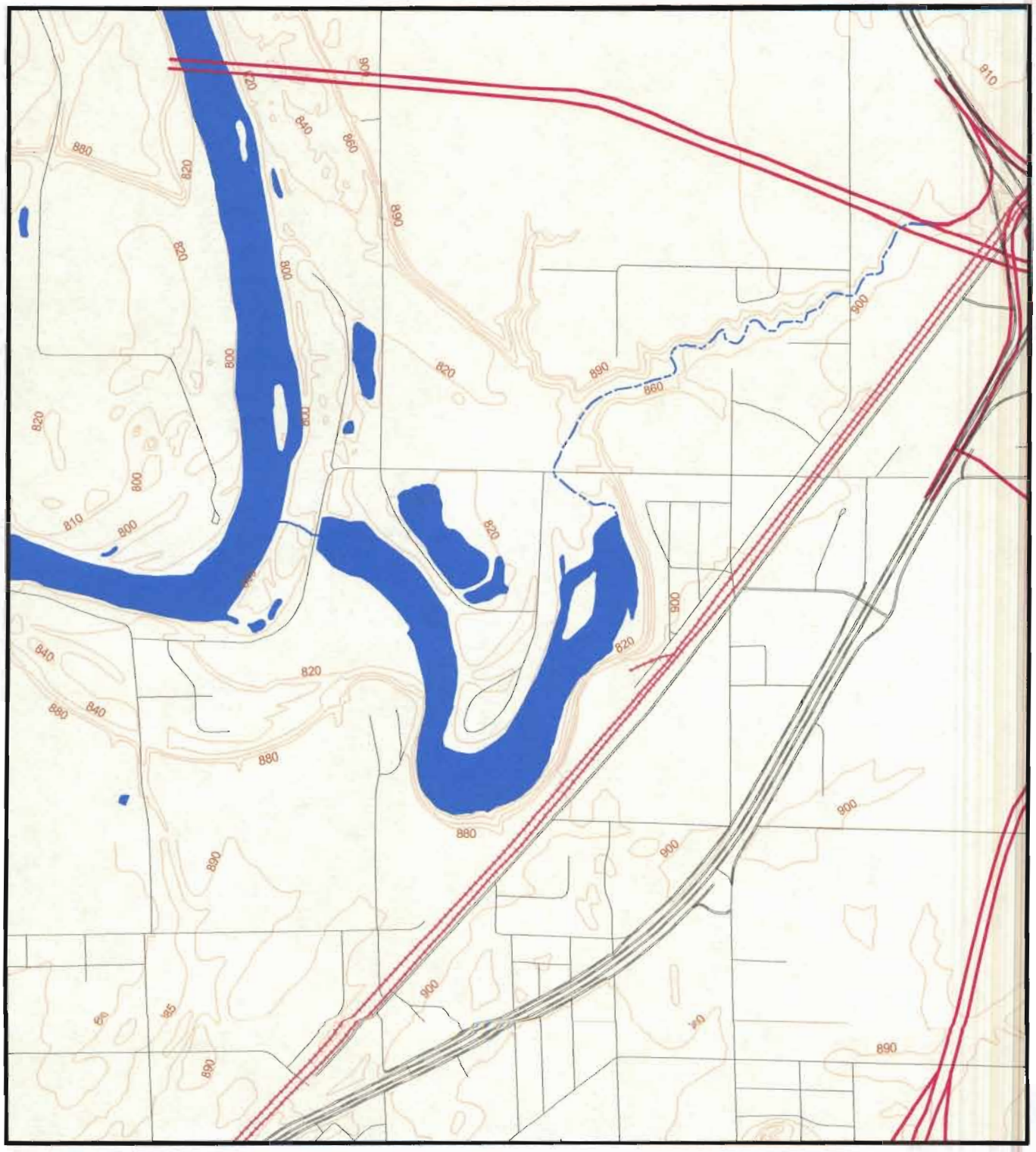
Roads GPS'd and digitized by Chippewa County Land Records Department staff

Chippewa County Land Conservation Dept.

June 6, 2003

Lake Hallie Area Surface Topography



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Contour lines digitized from USGS 7.5" quadrangles.

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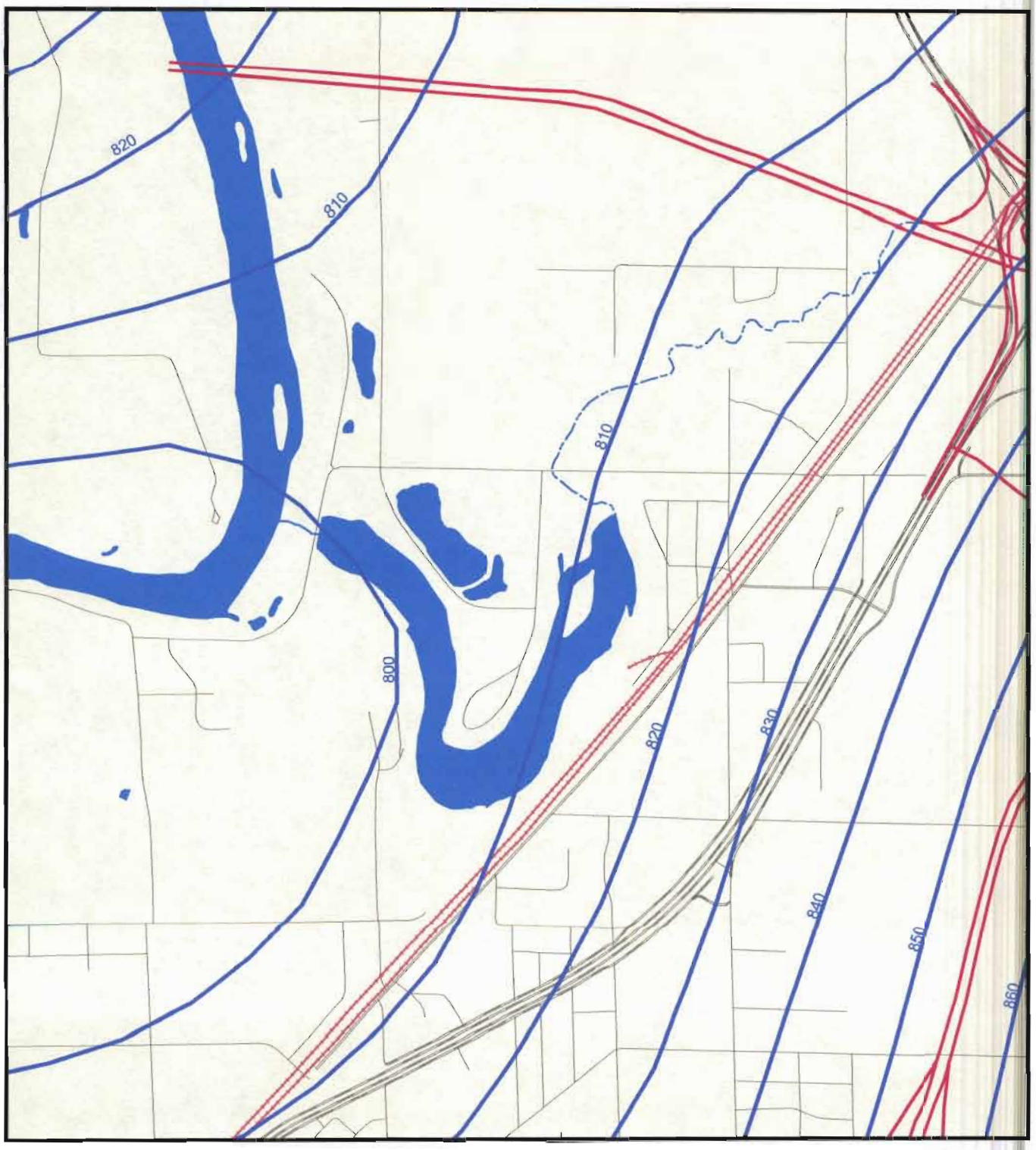
Chippewa County Land Conservation Dept.

May 7, 2003

Lake Hallie Area Groundwater Flow



Groundwater contours mapped in 1995 by Chippewa County LCD staff from well construction data

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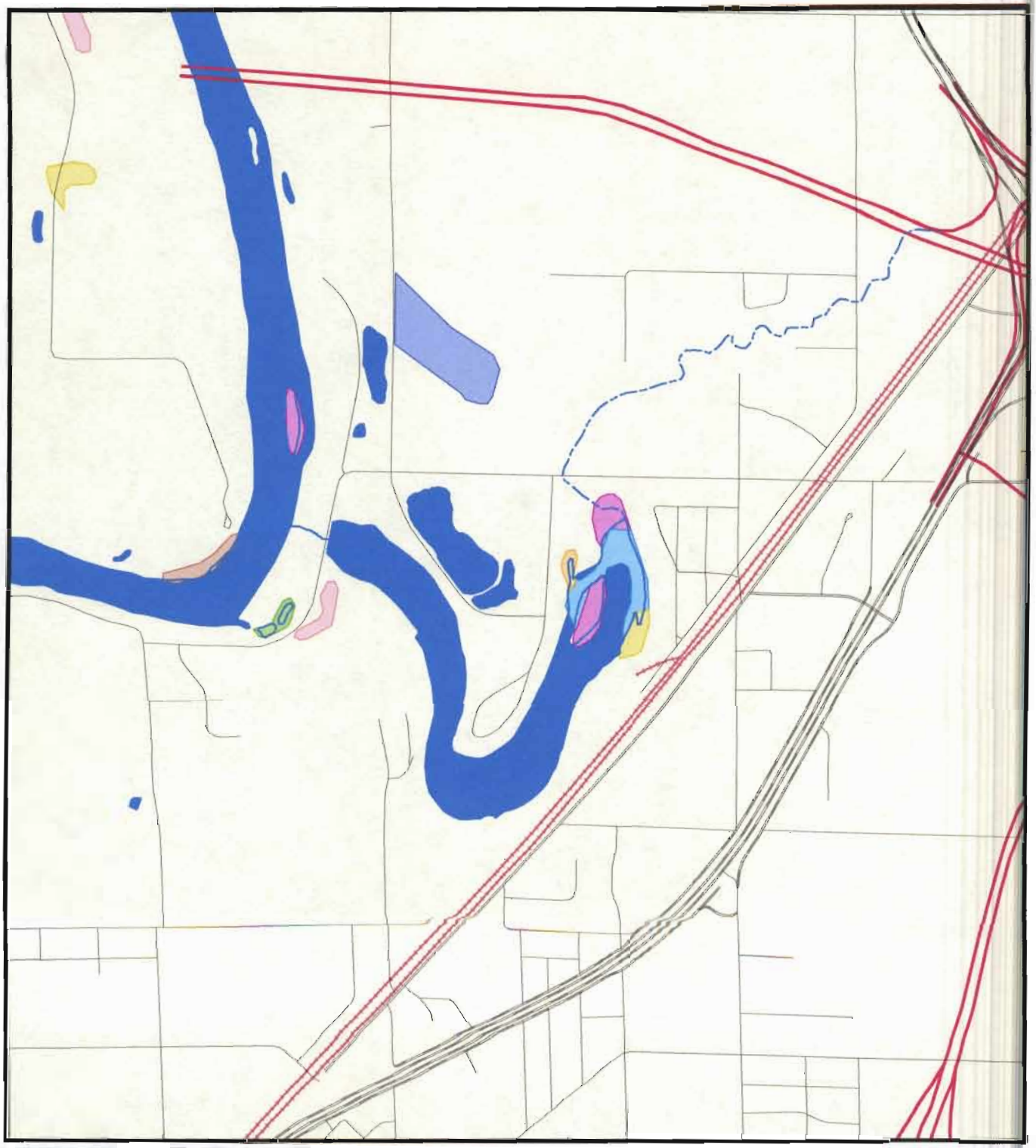
Chippewa County Land Conservation Dept.

May 7, 2003

Lake Hallie Area Wetlands Vegetation



A4L -- Free floating, lake
E1/W0H -- Persistent emergent/wet meadow or open water
E2/W0Hx -- Narrow-leaved persistent emergent/wet meadow or open water
S3/E1K -- Broad-leaved deciduous shrub/Persistent emergent
S3K -- Broad-leaved deciduous scrub/shrub
T3/E2K -- Broad-leaved deciduous forested or Narrow-leaved persistent emergent/wet meadow
T3/S3K -- Broad-leaved deciduous forested or Broad-leaved deciduous scrub/shrub
T3K -- Broad-leaved deciduous forested, wet soil

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From ***Wisconsin Wetland Inventory Classification Guide***, published by WiDNR, 1992
(Note: Vegetated mapping units are classified by the uppermost layer of vegetation which covers 30% or more of the area)

A4L -- Aquatic bed plants which float freely on the water surface (Ex: Duckweed, water meal, surface algae)

E1/W0H -- Plant remains persist into next year's growing season (Ex: Narrow- or broad-leaved plants; undetermined vegetation in open water)

E2/W0Hx -- Persistents with grass-like leaves without petioles or Undetermined bottom characteristics (Ex: Cattail, most sedges & grasses; undetermined vegetation in open water) Artificially excavated.

S3/E1K -- Deciduous shrubs other than tamarack or Plant remains that persist into next year's growing season (Ex: Willows, alder, young green ash/Narrow or broad-leaved plants)

S3K -- Deciduous shrubs other than tamarack (Ex: Willows, alder, young green ash)

T3/E2K -- Deciduous trees other than tamarack or Persistent emergents with grass-like leaves without petioles (Ex: Black ash, elm, silver maple/Cattail, most sedges & grasses)

T3/S3K -- Deciduous trees other than tamarack or Deciduous shrubs other than tamarack (Ex: Black ash, elm, silver maple/Willows, alder, young green ash)

T3K -- Deciduous trees other than tamarack (Ex: Black ash, elm, silver maple)