

SEWRPC Community Assistance Planning Report No. 302
Volume Two, Alternative and Recommended Plans

A LAKE MANAGEMENT PLAN FOR ELIZABETH LAKE AND LAKE MARY
KENOSHA COUNTY, WISCONSIN

Chapter IV

RECOMMENDED MANAGEMENT PLAN
FOR THE TWIN LAKES

INTRODUCTION

This chapter presents a recommended management plan for the Twin Lakes. The plan is based upon the inventories and analyses of land use and land and water management practices, pollution sources in the area tributary to Lake Mary and Elizabeth Lake—known as the Twin Lakes—the physical and biological quality of the waters of the Lakes, recreational use and population forecasts, and an evaluation of alternative lake management measures, set forth in Volume One. The recommended plan sets forth means for: 1) managing lake water surface elevations, with a primary focus in the role of the Elizabeth Lake dam; 2) providing water quality conditions suitable for full-body contact recreational use and the maintenance of healthy communities of warmwater fishes and other aquatic life, with a primary focus on land use management measures; 3) reducing the severity of existing or perceived problems which constrain or preclude desired water uses, with a primary focus on fisheries and aquatic plant management measures; 4) improving opportunities for water-based recreational activities, with a primary focus on maintaining adequate public recreational boating access as defined in Chapter NR 1 of the *Wisconsin Administrative Code*; and, 5) protecting environmentally sensitive areas within and adjacent to the Lakes. The elements of the recommended plan were selected from among the alternatives described in Chapters II and III of this volume, and evaluated on the basis of those feasible alternatives, set forth in Table 1, that may be expected to best meet the foregoing lake management objectives.

Analyses of water quality and biological conditions, summarized in Chapters IV and V of Volume One, indicate that the general condition of the waters of the Twin Lakes is very good. There appear to be few impediments to water-based recreation, although access by recreational watercraft is limited in some portions of the Lakes by water depths and growths of aquatic macrophytes, as summarized in Chapter VI of Volume One. Nevertheless, based upon a review of the inventory findings and consideration of planned developments within the area tributary to the Lakes, as set forth in, *inter alia*, the adopted Kenosha County land and water resource management plan, regional land use plan, regional water quality management plan, and regional natural areas and critical species habitat protection and management plan, measures will be required to continue to protect and maintain the high quality of the Lakes for future lake users.¹ Therefore, this plan sets forth recommendations for

¹*SEWRPC Community Assistance Planning Report No. 255, A Land and Water Resource Management Plan for Kenosha County: 2000-2004, September 2000; SEWRPC Planning Report No. 30, A Regional Water Quality Management Plan for Southeastern Wisconsin: 2000, Volume One, Inventory Findings, September 1978; Volume Two, Alternate Plans, February 1979; and Volume Three, Recommended Plan, June 1979; SEWRPC Memorandum Report No. 93, A Regional Water Quality Management Plan for Southeastern Wisconsin: An Update and Status Report, March 1995; SEWRPC Planning Report No. 42, A Regional Natural Areas and Critical Species Habitat Protection and Management Plan for Southeastern Wisconsin, September 1997; SEWRPC Planning Report No. 48, A Regional Land Use Plan for Southeastern Wisconsin: 2035, June 2006.*

land use management, including protection of environmentally sensitive lands in the area tributary to the Twin Lakes; water level management; pollution abatement; water quality monitoring and improvement; aquatic plant and fisheries management; recreational water use management; and informational programming. These measures complement and refine the watershedwide land use controls and management measures recommended in the adopted regional water quality management plan² and Kenosha County land and water resource management plan.³

The recommended management measures for the Twin Lakes are graphically summarized on Map 2, and are listed in Table 2. The recommended plan measures are more fully described in the following paragraphs. The recommended management agency responsibilities for tributary area land management also are set forth in Table 2.

RECOMMENDED LAKE LEVEL RANGE

Based on the evaluation presented in the preceding subsections, it is concluded that the criteria adopted for the lake level analysis can best be satisfied through maintenance of the levels of Elizabeth Lake between elevations 793.5 feet and 794.5 feet above the National Geodetic Vertical Datum of 1929 (NGVD-29). Under most conditions, outflow from Lake Mary also is controlled by this dam. Establishing these operational levels reduces the Lake level range observed over the past 17 years by about one foot. Lake levels exceeding the elevation of 794.5 feet above NGVD-29 would invoke the Village of Twin Lakes high water level slow-no-wake boating restrictions.

Achievement of the recommended range generally could be achieved with appropriate modifications to the spillway at the Elizabeth Lake dam. Because the dam board is out during the summer months, when the highest Lake levels have generally occurred, attaining a lower “maximum” elevation would require the addition of an auxiliary spillway, or replacement of the existing spillway with another one of a different configuration. An operable principal spillway that functions in a similar manner to the existing spillway, but which can be operated more easily by the Village, should be designed. Only authorized Village of Twin Lakes Public Works personnel should operate the spillway.

The principal spillway should operate in conjunction with an auxiliary spillway. The precise configuration of the auxiliary spillway and possible improvements in the operation of the existing principal spillway should be determined by the Village Engineer utilizing appropriate hydrologic and hydraulic analyses during the preliminary engineering and design phases. Consistent with applicable State of Illinois regulations related to dam safety as described previously, and in keeping with sound engineering practice, the following issues should be addressed during the preliminary engineering and design phases:

- The hazard and size classification of the Elizabeth Lake dam based on the criteria set forth in *Illinois Administrative Code* Title 17, Part 3702 should be verified. Based on a review of available information, it appears that the dam would be classified as an intermediate size, low hazard (Class III) structure.
- Detailed hydrologic and hydraulic analyses for design of the proposed spillway should be prepared according to State of Illinois standards. It may be necessary to perform a dam failure evaluation or analysis, depending on specific requirements established by IDNR.

²SEWRPC Planning Report No. 30, op. cit.; see also, SEWRPC Memorandum Report No. 93, op. cit.

³SEWRPC Community Assistance Planning Report No. 255, op. cit.

- Adequate total spillway capacity should be provided to meet the criteria of Title 17, “Conservation,” of the *Illinois Administrative Code*, Chapter I: Department of Natural Resources, Subchapter h: Water Resources, Part 3704: Regulation of Public Waters. Based upon the preliminary assessment of the dam as an intermediate size, low hazard structure, the total spillway capacity should be adequate to safely pass the 100-year flood outflow. It should be possible to meet that requirement through addition of an auxiliary spillway.
- The spillway analyses should demonstrate “that, for floods up to the 100-year frequency flood, the pool elevation will not be increased above existing conditions,” in accordance with the requirements of Section 3702.40(b)(7)(F), Title 17, “Conservation,” of the *Illinois Administrative Code*, Chapter I: Department of Natural Resources, Subchapter h: Water Resources, Part 3704: Regulation of Public Waters.

With respect to the collection and reporting of lake level data, the following additional recommendations should be considered:

- The past practice of referring to depths above the top of the dam board should be discarded and all lake levels should be reported in feet above NGVD-29.
- As called for in the September 2008 proposed Village “Lake Level Management Goals and Policy,” permanent Lake level gauges should be established at the Elizabeth Lake boat launch and Lance Park and subjected to an annual verification survey of the Lake level gauges, using reference bench marks established near each Lake gauge.
- Only trained, Village Public Works Department staff should measure and record official lake levels, in NGVD-29, using the Elizabeth Lake boat launch and Lance Park gauges.
- Any surveys deemed necessary by the Board of Commissioners of the Twin Lakes Protection and Rehabilitation District and/or by the Village of Twin Lakes Board of Trustees to monitor or ensure the correct operation of the Elizabeth Lake dam and spillway should be performed using the reference bench marks shown on Map I in Chapter II of this Volume, and using spirit level equipment appropriate for second-order, Class II leveling.

LAND USE MANAGEMENT AND ZONING

A fundamental element of a sound management plan and program for the Twin Lakes is the promotion of a sound land use pattern within the area tributary to the Lakes. The recommended land use plan for the area tributary to the Twin Lakes under buildout conditions is described in Chapter III in Volume One of this report.⁴ The framework for the plan is the regional land use plan as prepared and adopted by the Southeastern Wisconsin Regional Planning Commission (SEWRPC). The recommended land use plan envisions that urban land use development within the area tributary to the Twin Lakes will occur primarily at low densities and only in areas which are covered by soils suitable for the intended use; which are not subject to special hazards, such as flooding; and which are not environmentally sensitive, that is, not encompassed within the SEWRPC-delineated environmental corridors described in Chapter V in Volume One of this report.

Maintenance of the historic low- and medium-density residential character of the shorelines of the Twin Lakes to the maximum extent practical is recommended. It is further recommended that lakefront developments, as well as setback and landscaping provisions, be carefully reviewed by the Village of Twin Lakes. Such review would address specific shoreland zoning requirements, and could consider the stormwater and urban nonpoint source

⁴See also *SEWRPC Planning Report No. 48*, op. cit.

pollution abatement practices proposed to be included in shoreland development activities. Provision for shoreland buffers—such as those required pursuant to the Village of Twin Lakes Ordinance No. 2005-8-1, creating Chapter 17.38 of the *Twin Lakes Code of Ordinances*, that establishes shoreline setbacks and provides for vegetated shoreline buffer strips—along with use of appropriate and environmentally friendly landscaping practices and inclusion of stormwater management measures that provide water quality benefits, are practices to be encouraged.

Adoption by all riparian municipalities of common stormwater management ordinance provisions is strongly recommended. The Village of Twin Lakes currently holds an MS4 General Stormwater Permit issued by the Wisconsin Department of Natural Resources (WDNR)—Permit No. WI-S050075-1—in terms of which the Village undertakes an ongoing program of outreach and public involvement, discharge detection and elimination, and pollution prevention and control activities. Currently, this program is executed principally by the Village building inspector and Village engineer, in accordance with the provisions of the Village stormwater management plan.⁵ Periodic review of this plan and its accomplishments is recommended; annual reporting is required pursuant to the general permit requirements as set forth in Chapter NR 216 of the *Wisconsin Administrative Code*.

Periodic review of county and local government ordinances by Kenosha County, the Village of Twin Lakes, and the Town of Randall should be undertaken to ensure consistency with current nonpoint source pollution abatement practices, including stormwater management practices. Similar reviews by McHenry County and the Village of Richmond in Illinois are to be encouraged, especially with respect to those lands that drain to Elizabeth Lake.

POLLUTION ABATEMENT

The recommended tributary area land management measures are specifically aimed at reducing the water quality impacts on the Twin Lakes of nonpoint sources of pollution within the tributary area. These measures are set forth in the aforereferenced regional water quality management plan. As indicated in the lake and tributary area inventory, the only significant sources of phosphorus loading to the Lake that are subject to potential controls are rural and urban nonpoint sources in the tributary area; groundwater sources and direct deposition onto the surfaces of the Lakes through precipitation and dry fallout are not considered to be readily controlled. All of the lakeshore areas of the Twin Lakes are currently served by a public sanitary sewerage service system that conveys wastewater away from the Lakes.

Nonpoint source pollution abatement controls in the tributary area are recommended to be achieved through a combination of rural agricultural nonpoint controls, urban stormwater management, and construction erosion controls. The implementation of the land management practices may be expected to result in a reduction in nonpoint source pollutants that is considered to be the maximum practicable given the findings of the inventories and analyses compiled during the planning effort. These measures are consistent with the recommended measures set forth in the Kenosha County land and water resource management plan.⁶ As an initial step in carrying out the recommended urban practices, it is recommended that a fact sheet identifying specific residential land management measures beneficial to the water quality of the Twin Lakes be prepared and distributed to property owners. This fact sheet could be distributed by the Village of Twin Lakes, with the assistance of the UWEX and Kenosha County Park Division of the Department of Public Works office.

It is recommended that Kenosha and Walworth Counties, and the Towns of Bloomfield and Randall continue efforts to control soil erosion attendant to construction activities in accordance with existing ordinances. As noted

⁵*Earth Tech, Inc.*, Stormwater Management Plan prepared for the Village of Twin Lakes, Wisconsin, *January 2004*.

⁶*SEWRPC Community Assistance Planning Report No. 255*, op. cit.

in Chapter III, Walworth County has adopted construction site erosion control ordinances; Kenosha County has not yet adopted construction site erosion control ordinance requirements outside of the County's building code. Enforcement of the ordinances is generally considered effective. The provisions of these ordinances apply to all development, except single- and two-family residential construction. The single- and two-family construction erosion control is to be carried out as part of the building permit process.

WATER QUALITY MONITORING

Continued water quality monitoring of the Twin Lakes is recommended. Ongoing participation of volunteer lake monitors under the auspices of the UWEX Citizen Lake Monitoring Network (CLMN), previously the WDNR Self-Help Monitoring Program, is recommended. In addition, periodic participation in the U.S. Geological Survey (USGS) Trophic State Index (TSI) monitoring program should be considered. This latter programs provides a more-detailed analysis of the lake waters and can contribute to greater insights into the environmental health of the Lakes.

FISHERIES MANAGEMENT

A baseline fishery survey in Lake Mary was recently conducted in 2004 by the WDNR, and a similar survey of Elizabeth Lake was proposed to be conducted in Elizabeth Lake during 2008. Future surveys are recommended to 1) identify changes in fish species composition that may have taken place in the Lakes since the previous surveys; 2) refine and update information on fish spawning areas, breeding success, and survival rates; and, 3) determine the need for, and inform the timing of, any additional stocking of northern pike, smallmouth bass, walleyed pike, and/or other gamefish species, as appropriate, by the WDNR, in order to maintain a continuing, viable sportfishery and limit the impacts of rough fish on the Lake fisheries.

Habitat protection measures are recommended for the Twin Lakes to avoid disturbances in fish breeding areas during spring and autumn by appropriately managing nuisance aquatic plants and maintaining stands of native aquatic plants. In addition, it is recommended that environmentally sensitive lands, including wetlands along the lakeshore and in the tributary area, be preserved. To this end, note is made of the McHenry County conservancy lands at the southern extreme of Elizabeth Lake, which have established a high level of protection of the riparian wetland areas upstream of the dam. Similarly, the Village of Twin Lakes has adopted shoreland wetland zoning ordinance requirements that have established a high level of protection of the extensive wetland system on the northwestern shores of Elizabeth Lake. Additional shoreland wetlands, known as the Elizabeth Lake Lowlands and located on the southwestern shore of Elizabeth Lake, are recommended in the regional natural areas and critical; species habitat protection and management plan for protection as a natural area of countywide or regional importance. These areas contribute to the available aquatic and terrestrial habitat in and around the Twin Lakes.

Use of vegetated buffer strips is recommended for shoreline protection in lakeshore areas and on tributary waterways wherever practical in order to maintain habitat value and the natural ambience of the lakeshore. Continued maintenance of existing revetments and other protection structures also is recommended. Conversion of vertical bulkheads to sloping revetments or to natural vegetated shoreline or combinations is recommended to be considered where potentially viable at such time as major repairs are found necessary.

In addition to the foregoing measures, it also is recommended that the Villages of Twin Lakes and Richmond continue to enforce existing shoreland setback requirements, and construction site erosion control and stormwater management provisions, set forth in each Village *Code of Ordinances*. Provision of informational materials to shoreland property owners to encourage protection, restoration and/or maintenance of shoreland vegetation is recommended, as set forth in the informational and educational programming element of this plan. To the extent that the Town of Randall and Kenosha and McHenry Counties have jurisdiction in portions of the drainage area to the Lakes outside of the Villages of Twin Lakes and Richmond, enforcement of setback, construction site erosion control, and stormwater management requirements within the drainage area also is recommended. Periodic review of these requirements for currency and consistency with the requirements of the *Wisconsin Administrative Code* is strongly recommended for those municipalities and counties within the State of Wisconsin.

AQUATIC PLANT MANAGEMENT

It is recommended that aquatic macrophyte surveys be conducted at about five-year intervals, depending upon the observed degree of change in the aquatic plant communities. This interval is consistent with the requirements of Chapters NR 107 and NR 109 of the *Wisconsin Administrative Code*, which govern permitting for various types of aquatic plant management measures. In addition, information on the aquatic plant control program should be recorded and should include descriptions of major areas of nuisance plant growth; areas chemically treated and/or harvested; and, in areas where harvesting is conducted, species harvested and amounts of plant material removed from the Lakes. Note also should be taken of the species and approximate numbers of fish and invertebrates, if any, caught in the harvest. It is further recommended that a daily harvester log, containing this information, be maintained. This information, in conjunction with the conduct of the recommended aquatic macrophyte surveys, will allow evaluation of the effectiveness of the aquatic plant control program over time and allow adjustments to be made in the program to maximize its benefit.

To enhance the use of the Twin Lakes while maintaining the quality and diversity of the biological communities, the following recommendations are made:

1. Reconnaissance surveys of the aquatic plant communities in the Twin Lakes are recommended to be conducted periodically and the approved aquatic plant management plan should be updated every three to five years.
2. It is recommended that the use of chemical herbicides be limited to controlling nuisance growths of nonnative species in shallow water around docks and piers. Chemical applications, if required, must be made by licensed applicators in early spring, subject to Chapter NR 107 permitting requirements. Treatments should be evaluated annually and herbicides applied only on an as-needed basis. Only herbicides that selectively control milfoil, such as 2,4-D and fluridone, should be used. Algicides, such as Cutrine Plus, are not recommended because there are few significant, recurring filamentous algal or planktonic algal problems in the Twin Lakes and valuable macroscopic algae, such as *Chara* and *Nitella* are killed by this product.
3. The control of rooted vegetation between adjacent piers and docks is recommended to be left to the riparian owners concerned. The Twin Lakes Protection and Rehabilitation District (TLPRD) and the Village of Twin Lakes may wish to obtain informational brochures regarding shoreline maintenance, such as information on hand-held specialty rakes made for this specific purpose, to inform residents of the control options available.
4. The ongoing collection of aquatic plant fragments and other debris along shoreline areas is recommended.
5. It is recommended that ecologically valuable areas be excluded from aquatic plant management activities, especially during fish spawning seasons in early summer and autumn.
6. It is further recommended that the TLPRD and the Village of Twin Lakes conduct public informational programming on the types of aquatic plants in the Twin Lakes; on the value of, and the impacts of, these plants on water quality, fish, and on wildlife; and on alternative methods for controlling existing nuisance plants, including the positive and negative aspects of each method. This program can be incorporated into the comprehensive informational and educational programs that also would include information on related topics, such as water quality, recreational use, fisheries, and onsite sewage disposal systems.

The recommended aquatic plant control areas are shown on Map 2. The control measures in each area are designed to optimize desired recreational opportunities and to protect the aquatic resources. The recommended aquatic plant management plan represents a continuation of the current aquatic plant management program conducted by the TLPRD and the Village of Twin Lakes.

RECREATIONAL USE MANAGEMENT

It is recommended that current levels of enforcement of the boating ordinances applicable to the Twin Lakes be maintained. In addition, recreational boating access users should be made aware of the presence of the exotic invasive species Eurasian water milfoil within the Twin Lakes. Appropriate signage should be placed at the public recreational boating sites, and supplemental materials on the control of invasive species should be made available to the public. In addition, it is recommended that disposal bins be made available at the public recreational boating access sites for disposal of plant materials and other refuse removed from watercraft using the public recreational boating access sites.

PUBLIC INFORMATIONAL AND EDUCATIONAL PROGRAMS

It is recommended that the TLPRD and the Village of Twin Lakes assume the lead in the development of a public informational and educational program. This programming should deal with various lake management-related topics, including onsite sewage disposal system management, water quality management, land management, groundwater protection, aquatic plant management, fishery management, invasive species, and recreational use. Educational and informational brochures and pamphlets are available from the WDNR and the UWEX. These cover topics, such as beneficial lawn care practices and household chemical use. Such brochures should be provided to homeowners through local media, direct distribution, or targeted library and civic center displays. Such distributions can also be integrated into ongoing, larger-scale activities, such as lakeside litter collections, which can reinforce anti-littering campaigns, recycling drives, and similar environmental protection activities. It also is recommended that the Village of Twin Lakes or TLPRD consider offering regular informational programs on the Lakes and issues related thereto. Such programming can provide a mechanism to raise awareness of the lake issues, and provide a focal point from which to distribute the informational materials referred to above.

The Village of Twin Lakes and the municipalities are also encouraged to take an active role in encouraging the local school districts to adopt and utilize lake-related educational programs, such as a Pontoon Classroom or Project WET, as means of more closely linking students to the lake environment.

INSTITUTIONAL DEVELOPMENT

In the case of the Twin Lakes, general oversight of lake management activities currently is provided by the TLPRD pursuant to the provisions of Section 33.23 of the *Wisconsin Statutes*. This Board of Commissioners is advised through a formally established system of committees coordinated by a Lake Steering Council comprised of the Committee chairpersons and a member-at-large, who serves as the Chairperson of the Steering Council. These Committees are tasked with developing specific advice for consideration by the Steering Council within the following areas of concern to the Lakes community: boating safety and user conflicts; communications, education and youth; water quality, lake habitat, fish and fishing; aquatic plants and natural and invasive species; shoreline protection and rehabilitation; and, stormwater management and nonpoint pollution mitigation. The Committees are comprised of self-nominated volunteers engaged through the annual meeting of the TLPRD.

In order to create a more productive relationship between the TLPRD board and the citizens of the District, and to improve communication between the property owners and electors of the District and the Board of Commissioners, it is recommended that a formal reporting mechanism be developed between the TLPRD and the citizen-based steering council. As of 2008, this recommendation had been implemented through the appointment of Lake District Commissioners to each of the Committees and to the Steering Council, so as to facilitate communication between the Board of Commissioners and the citizen advisory committees. Additionally, during the 2008 annual meeting of the District, the citizen chairperson of the Steering Council actively participated in the conduct of the annual meeting of the TLPRD. This formal relationship between the committees, Steering Council, and Lake District Board of Commissioners should be maintained. In this regard, it is suggested that the quarterly Commissioner meetings required pursuant to Section 33.28(6) of the *Wisconsin Statutes* be held in conjunction with the monthly meetings of the Steering Council, and that both meetings allow an exchange of views. It should be noted, however, that during the quarterly Lake District Board of Commissioner meetings only the Lake District

Commissioners would be able to vote on motions or resolutions, even if the discussion includes the views of the Lake Steering Council members.

PLAN IMPLEMENTATION AND COSTS

The actions recommended in this plan largely represent an extension of ongoing actions being carried out by the TLPRD, the Villages of Twin Lakes and Richmond, and Kenosha and McHenry Counties, in cooperation with neighboring municipalities and State agencies. The recommended plan introduces few new elements, although some of the plan recommendations represent refinements of current programs. This is particularly true in the case of the fisheries and aquatic plant management programs, where the field surveys recommended in this plan will permit more-efficient management of these resources.

The establishment of adequate public recreational boating access on Elizabeth Lake, consistent with the requirements of Chapter NR 1 of the *Wisconsin Administrative Code*, during the planning period, ensures that both Lake Mary and Elizabeth Lake are eligible for State of Wisconsin enhancement services and can access various lake management planning and protection grants, amongst other State grant programs. This eligibility has contributed to, *inter alia*, the development of the public recreational boating access sites on the Lakes and to the implementation of stormwater management programs within the Village.

Generally, aquatic plant and fisheries management practices and public awareness campaigns currently implemented by the Village of Twin Lakes, the TLPRD, and local municipalities, are recommended to continue with refinements, as proposed herein. Some aspects of these programs lend themselves to citizen involvement through participation in the UWEX CLMN volunteer monitoring program, and identification with environmentally sound owner-based land management activities. It is recommended that the TLPRD and the Village of Twin Lakes, in cooperation with the local municipalities, assume the lead in the promotion of such citizen actions, with a view toward building community commitment and involvement in lake management programs. Assistance is generally available from agencies such as the WDNR, the County UWEX office, and SEWRPC.

The suggested lead agency or agencies for initiating program-related activities, by plan element, are set forth in Table 2, and the estimated costs of these elements, linked to possible funding sources where such are available, are summarized in Table 3. In general, it is recommended that the TLPRD and the Village of Twin Lakes continue to provide a coordinating role for community-based lake management actions, in cooperation with the appropriate local government units.

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**A LAKE MANAGEMENT PLAN FOR ELIZABETH LAKE AND LAKE MARY
KENOSHA COUNTY, WISCONSIN**

Chapter IV

**RECOMMENDED MANAGEMENT PLAN
FOR THE TWIN LAKES**

TABLES

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Table 1

SELECTED CHARACTERISTICS OF ALTERNATIVE LAKE MANAGEMENT MEASURES FOR TWIN LAKES

Plan Element	Subelement	Alternative Management Measure	Considered Viable for Inclusion in Recommended Lake Management Plan
Dam Operations and Management	Lake Elizabeth Dam	Reference all lake levels in the framework of the National Geodetic Vertical Datum of 1929 (NGVD-29)	Yes
		Establish permanent lake level gauges at the Elizabeth Lake boat launch and Lance Park; verify their elevations annually	Yes
		Train Village of Twin Lakes Public Works Department staff to read the gauges; record lake levels daily	Yes
		Reference all survey work to appropriate benchmarks; use second order, Class II leveling for determination of elevations	Yes
		Establish lake surface elevation operational programs to maintain the levels of Elizabeth Lake, to the extent practicable, at between 793.5 feet and 794.5 feet above NGVD-29	Yes
		Provide auxiliary spillway capacity to supplement the existing spillway capacity at the Elizabeth Lake outlet based upon a thorough hydrologic and hydraulic analysis, in a manner consistent designed to minimize downstream consequences of flood events, and in conformance with the requirements of the applicable State of Illinois dam safety regulations	Yes
		Consider downstream hydrologic and hydraulic effects in the design and analyses associated with providing additional spillway capacity at the Elizabeth Lake dam	Yes
Land Use	Zoning	Implement regional land use plan within tributary area	Yes
		Maintain existing density management in lakeshore areas to the extent practicable; consider conservation development principles for new development	Yes
	Protecting environmentally significant lands	Develop and implement consistent stormwater management ordinances and practices in all riparian communities; periodically review of stormwater ordinances	Yes
Pollution Abatement	General nonpoint source pollution abatement	Implement regional natural areas and critical species habitat protection and management plan recommendations within tributary area	Yes
	Rural nonpoint source controls	Implement regional water quality management plan and County land and water resource management plan recommendations within the watershed; consider integrated nutrient and pest control at Twin Lakes CC and Nippersink CC	Yes
	Urban nonpoint source controls	Develop farm conservation plans that encourage conservation tillage, contour farming, contour strip cropping, crop rotation, grassed waterways, and pasture and streambank management in agricultural areas of the tributary area	Yes
		Promote urban housekeeping practices, public educational programming, and grassed swales	Yes
		Implement additional urban nonpoint source controls, including street sweeping, catch basin cleaning, leaf litter and garden refuse collection, materials storage facility protection, and stormwater management measures in urban areas of the tributary area	Yes

Table 1 (continued)

Plan Element	Subelement	Alternative Management Measure	Considered Viable for Inclusion in Recommended Lake Management Plan
Pollution Abatement (continued)	Developing Area nonpoint source controls	Enforce construction site erosion control ordinances requiring soil stabilization, surface roughening, barriers, diversion swales, sediment traps, and detention/retention/infiltration basins	Yes
	Public sanitary sewerage system management	Conduct periodic review of sewer service area needs within sewer areas of the tributary area	Yes
	Onsite sewage disposal system management	Implement onsite sewage disposal system management, including inspection and maintenance protocols	Yes
Water Quantity	Habitat protection and water quality management	Drawdown	No
		Water level stabilization	No
		Dredging	Yes
Water Quality	Water quality monitoring	Continue participation in WDNR Self-Help monitoring program and periodic participation in the USGS Trophic State Index (TSI) water quality monitoring program; alternatively, consider participation in University of Wisconsin-Stevens Point TSI monitoring program or WDNR Expanded Self-Help Program	Yes
	Water quality improvement	Conduct alum treatment to achieve phosphorus inactivation in lake sediments Promote nutrient load reduction within the Lake basin through sediment management	No No
Aquatic Biota	Fisheries management	Protect fish habitat	Yes
		Maintain shoreline and littoral zone fish habitat by maintaining existing shoreline structures and repair as necessary using vegetative means insofar as practicable (reconstruction may require WDNR Chapter 30 permits)	Yes
Continue stocking of selected game fish species and monitor rough fish populations		Yes	
Enforce size and catch limit regulations		Yes	
Chemical eradication of rough fish populations		No	
Aquatic Biota	Aquatic plant management	Use (limited) aquatic herbicides for control of nuisance plants such as Eurasian water milfoil and purple loosestrife	Yes ^a
		Consider mechanical harvesting of aquatic macrophytes to provide navigational channels and fish lanes, control nuisance plants and to promote growth of native plants	Yes ^b
		Manually harvest aquatic plants from around docks and piers where feasible	Yes
		Conduct periodic aquatic plant reconnaissance surveys and periodically update aquatic plant management plan	Yes
		Employ biological controls using inocula of Eurasian water milfoil weevils	No
		Use sediment covers to shade out aquatic plant growth around piers and docks	No
		Collect floating plant fragments from shoreland areas to minimize rooting of Eurasian water milfoil	Yes
		Continue to monitor populations of invasive species; continue current efforts to control purple loosestrife and Eurasian water milfoil	Yes
Water Use		Enforce boating regulations to maximize public safety; improve signage	Yes
		Develop time and/or space zoning schemes to limit surface use conflicts	No

Table 1 (continued)

Plan Element	Subelement	Alternative Management Measure	Considered Viable for Inclusion in Recommended Lake Management Plan
Ancillary Management Measures	Public Informational and Educational Programming	Conduct public informational programming utilizing seminars and distribution of informational materials	Yes
		Support participation of schools in Project WET, Adopt-A-Lake, pontoon classrooms, etc.	Yes
		Conduct public informational and educational programming on aquatic plants and options for their management	Yes
		Encourage methods of preventing unwanted intrusions of invasive biota at public recreational boat access	Yes
Institutional Development		Create a self-governing TLPRD board through selection of board members pursuant to Chapter 33, <i>Wisconsin Statutes</i>	Yes
		Develop a formal reporting mechanism through which the citizen-based steering committee can interact with the current TLPRD board	Yes

^aLimited areas when necessary to control exotic, invasive species.

^bIn areas where water depth, bottom substrate material, and dock/moored watercraft densities are within desirable limits to promote the effectiveness of this method of aquatic plant management.

Source: SEWRPC.

Table 2

RECOMMENDED MANAGEMENT PLAN ELEMENTS FOR TWIN LAKES

Plan Element	Subelement	Management Measures	Management Responsibility
Dam Operations and Management	Lake Elizabeth Dam	Establish lake surface elevation operational programs to maintain the levels of Elizabeth Lake, to the extent practicable, at between 793.5 feet and 794.5 feet above NGVD-29	Village of Twin Lakes
		Train Village of Twin Lakes Public Works Department staff to read the gauges; record lake levels daily	Village of Twin Lakes
		Provide auxiliary spillway capacity to supplement the existing spillway capacity at the Elizabeth Lake outlet based upon a thorough hydrologic and hydraulic analysis, in a manner consistent designed to minimize downstream consequences of flood events, and in conformance with the requirements of the applicable State of Illinois dam safety regulations	Village of Twin Lakes
Land Use	Zoning	Observe guidelines set forth in the regional land use plan; consider conservation development principles	Kenosha and Walworth Counties, Villages of Twin Lakes and Genoa City, and Towns of Randall and Bloomfield
		Maintain historic lake front residential dwelling densities to extent practicable	Kenosha County, Town of Randall, Village of Twin Lakes
		Enforce adequate setbacks and promote environmentally friendly landscaping practices, such as vegetative buffer strips, in shoreland areas	Kenosha and Walworth Counties, Villages of Twin Lakes and Genoa City, and Towns of Randall and Bloomfield, and WDNR
		Develop and implement consistent stormwater management ordinances in all riparian communities; periodic review of stormwater ordinances	Kenosha and Walworth Counties, Villages of Twin Lakes and Genoa City, and Towns of Randall and Bloomfield
	Protection of environmentally sensitive lands	Establish adequate protection of wetlands and shorelands, and other environmental corridor lands and isolated natural features, and consider public or private acquisition of features of local or greater significance, as set forth in the regional natural areas and critical species habitat protection and management plan	Kenosha County, Town of Randall, Village of Twin Lakes, and WDNR
Pollution Abatement	General nonpoint source pollution abatement	Implement regional water quality management plan and county land and water resource management plan recommendations within tributary area; consider integrated nutrient and pest control at Twin Lakes CC and Nippersink CC	Kenosha and Walworth Counties, Villages of Twin Lakes and Genoa City, and Towns of Randall and Bloomfield
	Rural nonpoint source controls	Promote sound rural land management practices to reduce soil loss and contaminant loadings through preparation of farm conservation plans in accordance with the county land and water resource management plans	USDA, WDATCP, and Walworth and Kenosha counties
	Urban nonpoint source controls	Promote sound urban housekeeping and yard care practices through informational programming; implement stormwater management measures	Twin Lakes Protection and Rehabilitation District, Kenosha County, Town of Randall, Village of Twin Lakes
	Developing Area nonpoint source controls	Install construction site erosion control measures as required by local ordinance; enforce construction site erosion control and stormwater management ordinances; review ordinances for concurrency with proposed NR 152	Walworth County, Villages of Twin Lakes and Genoa City, Town of Bloomfield, private landowners, and WDNR

Table 2 (continued)

Plan Element	Subelement	Management Measures	Management Responsibility
Pollution Abatement (continued)	Developing Area nonpoint source controls (continued)	Develop adequate construction site erosion control and stormwater management ordinances	Kenosha County and Town of Randall
	Onsite sewage system management	Implement onsite sewage disposal system management, including inspection and maintenance, in those portions of the watershed not served by public sanitary sewerage systems	Kenosha and Walworth County and private landowners
	Public sanitary sewerage system management	Implement refined regional water quality management plan recommendations to provide sanitary sewerage services to selected areas of the Twin Lakes tributary area; provide informational programming encouraging wise use of public systems; conduct periodic review of sewer service area needs	Village of Twin Lakes
Water Quality	Water quality monitoring	Continue participation in WDNR Self-Help monitoring program and periodic participation in U.S. Geological Survey TSI or WDNR Expanded Self-Help monitoring programs	WDNR, USGS, Village of Twin Lakes and Twin Lakes Protection and Rehabilitation District
Aquatic Biota	Fisheries management	Conduct periodic fish surveys to determine management and stocking needs; continue stocking; conduct periodic creel census; enforce size and catch limit regulations	WDNR
		Protect fish habitat, including environmentally sensitive lands such as wetlands	Village of Twin Lake, WDNR, individuals
		Maintain existing shoreline structures and repair as necessary using vegetative means insofar as practicable; reconstruction may require WDNR Chapter 30 permits	Kenosha County, Town of Randall, Village of Twin Lakes, WDNR, and private landowners
	Aquatic Plant Management	Conduct periodic reconnaissance surveys of aquatic plant communities and update aquatic plant management plan every three to five years Consideration to future mechanical harvesting of boating channels, navigation lanes and fish cruising lanes as necessary Limited use of aquatic herbicides for control of nuisance aquatic plant growth where necessary; specifically target Eurasian water milfoil ^a	WDNR, TLPRD, Village of Twin Lakes
		Manually harvest around piers and docks as necessary ^b Collect floating plant fragments from shoreland areas to minimize rooting of Eurasian water milfoil and deposition of organic materials in Lake	Private landowners
Water Use	--	Maintain recreational boating access from the public access sites pursuant to Chapter NR 7 guidelines; enforce and periodically review boating regulations Maintain signage at public access sites regarding invasive species; provide disposal containers for disposal of plant material removed from watercraft	WDNR, TLPRD, Village of Twin Lakes
Ancillary Measures	Public informational and educational programming	Continue to provide informational material and pamphlets on lake-related topics; consider offering public informational programming on topics of lake-oriented interest and education	TLPRD, Village of Twin Lakes, Town of Randall, WDNR, and UWEX
		Encourage inclusion of lake studies in environmental curricula (e.g., Pontoon Classroom, Project WET, Adopt-A-Lake)	Village of Twin Lakes School District, UWEX, WDNR, and TLPRD

Table 2 (continued)

Plan Element	Subelement	Management Measures	Management Responsibility
Ancillary Measures (continued)	Institutional Development	Develop a formal reporting mechanism through which the citizen-based steering committee can interact with the current TLPRD board	TLPRD

^aUse of aquatic herbicides requires a WDNR permit pursuant to Chapter NR 107 of the Wisconsin Administrative Code.

^bManual harvesting beyond a 30 linear foot width of shoreline harvesting is subject to WDNR permitting pursuant to Chapter NR 109 of the Wisconsin Administrative Code. Mechanical harvesting could be considered by the Wind Lake Management District should the area of aquatic plant growth warrant the possible use of larger-scale aquatic plant management measures. Such a determination should be based upon the conduct of future aquatic plant surveys; use of mechanical harvesting is subject to WDNR permitting pursuant to Chapter NR 109 of the Wisconsin Administrative Code.

Source: SEWRPC.

Table 3

ESTIMATED COSTS OF RECOMMENDED LAKE MANAGEMENT MEASURES FOR TWIN LAKES

Plan Element	Management Measure	Estimated Cost 2000-2020 ^a		Potential Funding Sources ^b
		Capital	Annual Operation and Maintenance	
Dam Operations and Management	Establish the levels of Elizabeth Lake at between 793.5 feet and 794.5 feet above NGVD-29	--	--	Village
	Train Village of Twin Lakes Public Works Department staff to record lake levels daily	--	--	Village
	Provide auxiliary spillway capacity to supplement the existing spillway capacity at the Elizabeth Lake outlet	--	--	Village
Land Use	Observe regional and county land use plan guidelines; consider conservation development principles	--	--	County, Towns
	Density management in the shoreland zone; enforce adequate setbacks and promote environmentally friendly landscaping practices in shoreland areas	--	--	County, Towns
	Develop and implement consistent stormwater management ordinances in all riparian communities; periodic review of stormwater ordinances	--	--	County, Towns
	Protection of environmentally sensitive lands and environmental corridors	--	--	WDNR Lake Protection Grant and Stewardship Grant Programs, TLPD
Pollution Abatement	Implement regional and county land and water resource management plans	-- ^c	-- ^c	County, USDA EQIP, WDNR/WDATCP Runoff Management Program
	Rural nonpoint source controls	-- ^c	-- ^c	County, WDNR/WDATCP Runoff Management Program
	Urban nonpoint source controls	-- ^c	-- ^c	County, WDNR/WDATCP Runoff Management Program
	Construction site erosion controls and storm water management ordinances	-- ^c	\$250-\$500/acre ^c	Municipalities, county, private firms, individuals
	Stormwater management systems developed where appropriate densities exist; use conservation subdivision designs	--	--	County, Towns
	Public sanitary sewer system management	--	--	County, Towns, local sanitary districts
	Onsite sewage system management	-- ^c	\$100-\$200 ^c	County, Towns, local sanitary districts
Water Quality	Continue participation in WDNR Self-Help Water Quality Monitoring Program; consider participation in WDNR Expanded Self-help program, USGS monitoring program; or University of Wisconsin-Stevens Point Environmental Task Force TSI monitoring program	--	\$5,500 ^d	TLPD, USGS, WDNR
Water Quantity	Maintain outlet structure and monitor water levels	--	--	Village of Twin Lakes, ILDNR

Table 3 (continued)

Plan Element	Management Measure	Estimated Cost 2000-2020 ^a		Potential Funding Sources ^b
		Capital	Annual Operation and Maintenance	
Aquatic Biota	Conduct periodic fish surveys and continue stocking of selected game fish ; enforce size and catch limit regulations	--	--	WDNR
	Protect fish habitat	--	--	TLPRD, individuals
	Maintain shoreline and littoral zone fish habitat	--	--	County, TLPRD, individuals, WDNR
	Maintain existing shoreline protection structures and use vegetative means insofar as practical	--	--	
	Encourage shoreline restoration projects through informational programming and demonstration sites	--	--	
	Conduct periodic reconnaissance surveys of aquatic plant communities; continue to monitor invasive species	--	\$1,500 ^e	WDNR Lake Management Planning Grant Program, TLPRD
	Update aquatic plant management plan every three to five years	--	\$1,500 ^e	WDNR Lake Management Planning Grant Program, TLPRD
	Use (limited) aquatic herbicides for control of nuisance plants such as Eurasian water milfoil and purple loosestrife	--	\$1,000/acre ^f	TLPRD, individuals
	Consider mechanically harvesting aquatic macrophytes to provide navigational channels and fish lanes, control nuisance plants and to promote growth of native plants, if future conditions warrant this type of management	--	\$8,500 ^g	WDNR Lake Management Planning Grant Program, TLPRD
	Manually harvest aquatic plants from around docks and piers where feasible	\$100	\$100	TLPRD, individuals
Collect floating plant fragments from shoreland areas to minimize rooting of Eurasian water milfoil	--	--	TLPRD, individuals	
Water Use	Enforce regulations governing the operation of watercraft; improve signage and materials at public recreational access site to aid in the identification and control of exotic species; provide disposal containers for disposal of plant material removed from watercraft	\$700	\$300	Towns, TLPRD, WDNR
	Maintain recreational boating access from the public access sites pursuant to Chapter NR 7 guidelines	--	--	Village of Twin Lakes, WDNR
Ancillary Management Measures	Provide and conduct programming on aquatic plants and various management measures	--	--	WDNR Lake Management Planning Grant Program, TLPRD
	Public informational and educational programming: seminars, programs, Project WET, Adopt-A-Lake	--	\$1,200	TLPRD, UWEX, WDNR/WAL Lakes Partnership, school districts

Table 3 (continued)

Plan Element	Management Measure	Estimated Cost 2000-2020 ^a		Potential Funding Sources ^b
		Capital	Annual Operation and Maintenance	
Institutional Development	Establish a formal reporting mechanism for the citizen-based steering committee to the TLPRD	--	--	TLPRD
Total	--	\$800	\$18,700	--

^aAll costs expressed in January 2002 dollars.

^bUnless otherwise specified, USDA is the U.S. Department of Agriculture, USGS is the U.S. Geological Survey, WDNR is the Wisconsin Department of Natural Resources, WDATCP is the Wisconsin Department of Agriculture, Trade and Consumer Protection, County is Kenosha and Walworth Counties, Towns is the Towns of Bloomfield and Randall, UWEX is the University of Wisconsin-Extension, and WAL is the Wisconsin Association of Lakes, TLPRD is the Twin Lakes Protection and Rehabilitation District.

^cCosts vary with the amount of land under development during any given year.

^dMonitoring by the USGS can be cost-shared between the federal agency and local cooperators; the WDNR Self-Help Monitoring Program involves no cost but does entail a time commitment from the volunteer.

^eCost-share assistance may be available for lake management planning studies under the NR 190 Lake Management Planning Grant Program.

^fcost-share assistance may be available from the Wisconsin Waterways Commission Recreational Boating Facilities Grant Program.

^gbased on contract minimum in 2004 and 2005.

Source: SEWRPC.

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**SEWRPC Community Assistance Planning Report No. 302
Volume Two, Alternative and Recommended Plans**

**A LAKE MANAGEMENT PLAN FOR ELIZABETH LAKE AND LAKE MARY
KENOSHA COUNTY, WISCONSIN**

Chapter IV

**RECOMMENDED MANAGEMENT PLAN
FOR THE TWIN LAKES**

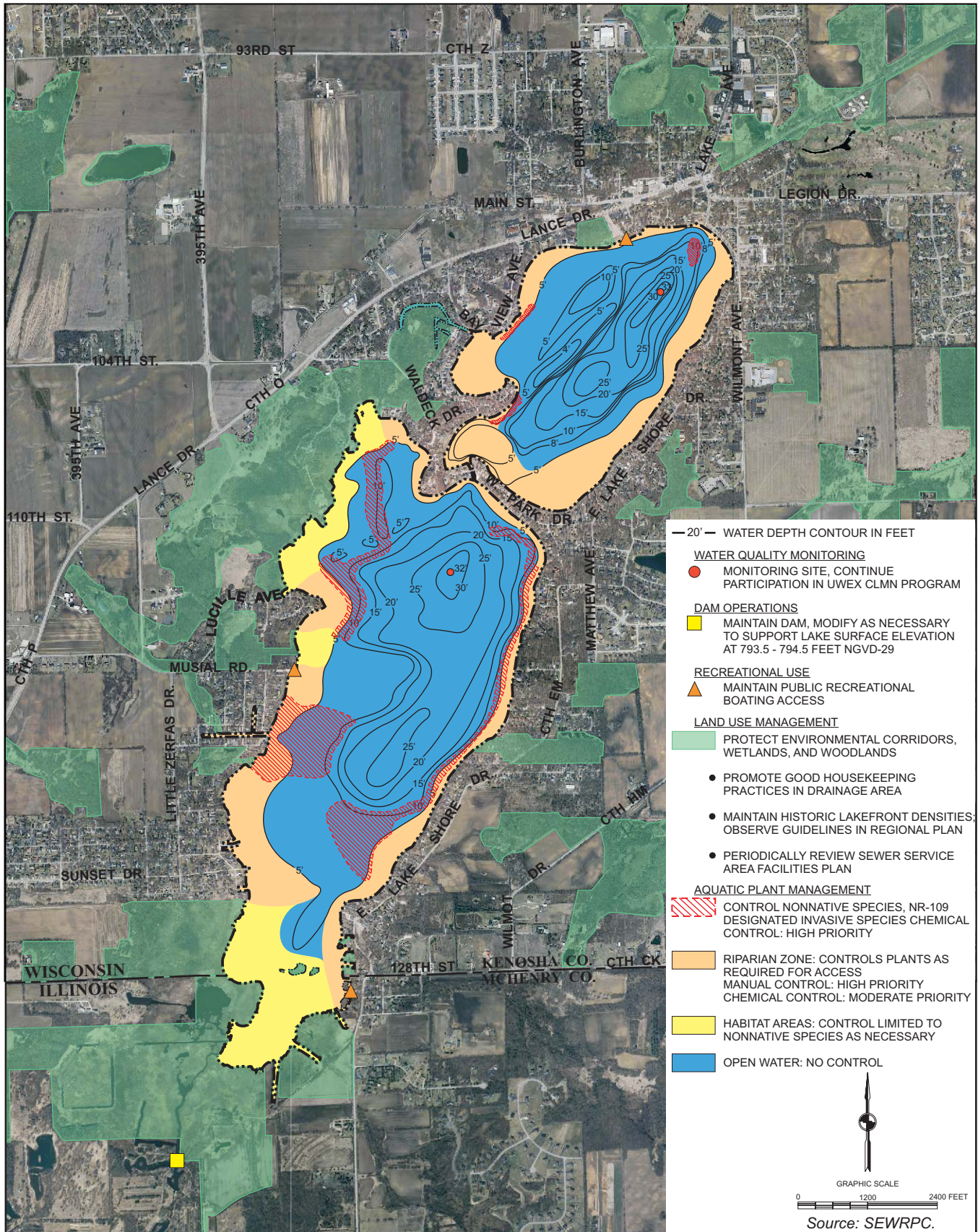
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Map 2

RECOMMENDED LAKE MANAGEMENT PLAN FOR TWIN LAKES



PRELIMINARY DRAFT

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