

Chapter

3

A Brief History of Management

Introduction

Lake Wingra has long been a focus of research and recreation. While people have lived along its shores for centuries, the last 150 years of urban development have resulted in pronounced impacts on the hydrology of the lake and its surrounding watershed. Baumann *et al.* (1973) detail the lake's development and research history from 1837 to 1973, but had little to say about the lake's management and the regulations that governed the lake and its watershed. Their report concludes: "An integrated whole ecosystem approach is essential in establishing ecologically sound management...As always, hindsight is better than foresight, which probably explains why the next chapter of this article is not yet written."

This 1999 WRM Workshop document is part of that next chapter. This particular chapter details the management efforts in the Lake Wingra watershed up to 1999, and explains the statutes and regulations in effect at this time. It also takes a look at expected changes in these regulations as projected by federal, state, and local plans. *Chapter 4 (Lake and Watershed Management)* and *Chapter 5 (Stakeholders)* of this report contain more details about the current Lake Wingra watershed management practices and organizations. The tables at the end of this chapter show a timeline of the major management and regulatory issues (**Table 3-1**) and list the current ordinances, along with the jurisdiction to which they apply (**Table 3-2**).

Early Efforts: Controlling Floods and Wetlands

When urban development began around Lake Wingra in the latter half of the 19th century, people were more concerned about the impact of water on land than the impact that land use activities had on water.

Most early efforts in watershed management focused on flood control. The Lake Wingra watershed is no exception. When urban development began around Lake Wingra in the latter half of the 19th century, people were more concerned about the impact of water on land than the impact that land use activities had on water. Although the worst storms have always caused floods, urbanization exacerbated the problem. As more land was paved, more storm-water runoff was generated, leading to more localized drainage problems.

Early flood control efforts included building dams and draining wetlands. In 1905 a dam was built at the outlet of Lake Wingra to control the lake's water level, protecting the surrounding communities from flooding. This dam is now owned by the city of Madison and has been modified over the years to include a lock and a V-notch weir. The lock allowed navigation to the other Yahara Lakes but has been inoperable for years. Structural issues exist, including cracks in the cement works of the dam and an unmanaged emergency spillway (Sue Josheff, personal communication). At least two additional dams exist at inlets to Lake Wingra flowing from the Monroe Street detention pond.

Many areas in the Lake Wingra watershed, including Vilas Park and Gardner Marsh, were dredged and drained to create dry land in the early part of this century. Some of these projects were successful, while others continue to cause ecological and hydrological problems. For example, in the early 1920s some of the wetland areas on the lake's southeast side were drained for housing, an effort that was soon abandoned, leaving what is now known as the "Lost City." Residential areas to the southeast, in the town of Madison, continue to struggle with flooding.

Priority Shift: Water Quality Legislation

By the 1960s concern had shifted, both locally and nationally, to the negative impacts that urbanization was having on water quality (Leopold, 1968). Though Congress had enacted water quality legislation in 1948 through the Water Pollution Control Act, this only provided technical assistance and small grants to states that sought them out. The Federal Water Pollution Control Act of 1956 continued in this vein. The Water Quality Act of 1965 was notable because it required states to establish water quality goals for interstate waters. However, it was not until the Federal Water Pollution Control Act Amendments of 1972, known today as the Clean Water Act (CWA), that a comprehensive water pollution control law was developed. The CWA was amended in 1977 and 1987 (Kent *et al.*, 1995).

Development and implementation of the federal CWA is delegated to the states, provided they enact comparable legislation. Through the adoption of Wis. Stat. ch. 147, Wisconsin was granted authority to administer the federal

program in 1974 (Kent *et al.*, 1995). The federal Environmental Protection Agency (EPA) retains supervisory jurisdiction over state programs and can terminate those that are not implemented in accordance with the CWA (Kent *et al.*, 1995). Significantly, states can adopt stricter regulations than those mandated by the EPA. The Wisconsin program is unique among states because it regulates discharges to groundwater (Wis. Admin. Code chs. NR 140 and 160).

The original CWA of 1972, aiming to protect surface water quality, established the National Pollution Discharge Elimination System (NPDES) program (Section 402), and wetland protection regulations (Section 404). In Wisconsin, the state implements NPDES through the Wisconsin Pollution Discharge Elimination System (WPDES) program.

Aside from the city of Madison's WPDES permit governing stormwater discharges (discussed below), no WPDES permits have been issued in the Wingra watershed. However, the city does regulate non-stormwater discharges to the storm sewer system (Madison General Ordinance Section 7-47). At least two leaking underground storage tank remediation projects exist in the Wingra watershed, which have the potential to discharge to the municipal storm sewer system—and eventually to Lake Wingra (Behm 1999).

Like almost all other states, Wisconsin has not sought Section 404 implementation authority. The EPA and the Army Corps of Engineers administer the wetland program jointly, with the Corps responsible for issuing permits (Kent *et al.*, 1995). However, Section 401 of the CWA provides for state certification of federally-issued 404 permits to ensure that they meet state water quality standards. If they do not, the state can effectively veto issuance of a permit. In Wisconsin, procedures and general standards governing certification of 404 permits can be found in Wis. Admin. Code chs. NR 299 and NR 103 (Kent *et al.*, 1995).

Section 404 regulates the discharge of dredged or fill material into navigable waters. "Navigable waters" are broadly defined to include wetlands. Therefore, any development or other activity that would involve the filling of wetlands in the Wingra watershed requires a permit. Significantly, Section 404 does not regulate wetland drainage (Kent *et al.*, 1995).

The 1972 CWA established the NPDES to eliminate surface water pollution primarily by regulating point source discharges. Point source discharges emanate from identifiable sources; as such, most discharges regulated by the 1972 CWA were industrial and commercial effluents. These regulations did little to improve water quality in urbanized areas like the Lake Wingra watershed where there are no industrial point sources. In the Wingra watershed, pollutants including insecticides, herbicides, petroleum products, heavy metals, and fertilizers often accumulate in stormwater as it flows over road surfaces and lawns. Such non-point source pollution is untreated and enters Lake Wingra from municipal storm sewers designed to transport stormwater runoff.

The CWA was amended in 1977 to address stormwater and other non-point sources of pollution. Section 208 of these amendments gave authority to states

These regulations did little to improve water quality in urbanized areas like the Lake Wingra watershed where there are no industrial point sources.

to develop plans for water quality. Wisconsin designated counties as planning areas, requiring them to develop realistic and workable Section 208 plans for their region.

In 1987, the US Congress passed the Water Quality Act (WQA), which amended the NPDES regulations to include stormwater as a pollutant source to be monitored and, if necessary, treated. Again, implementation was delegated to the states. The Wisconsin Department of Natural Resources' (WDNR) WPDES program governs stormwater regulations. Madison's WPDES permit was issued in 1995 and must be renewed in July 2000.

Recent Watershed, Water Quality, and Stormwater Management Plans

Recent stormwater regulations focus on coordinating different levels of government, local communities, and watershed level management. For example, the city of Madison's WPDES stormwater permit is held jointly with the University of Wisconsin-Madison, as the UW Arboretum is within the Lake Wingra watershed. The EPA, WDNR, Dane County, city of Madison, town of Madison, UW-Madison, neighborhood associations, and watershed interest groups are establishing working relationships that facilitate watershed management. The plans described below are presented in order from national to local origin, but all affect the Wingra watershed.

Federal Clean Water Action Plan

The watershed approach is a fundamental aspect of the federal Clean Water Action Plan, established in 1998. The plan is sponsored by several government agencies and stresses that watershed management must be tailored to individual watersheds because of the differences between individual watersheds. It also stresses that watershed management must address the entire watershed because controlling non-point source pollution is more complex than regulating stormwater pipe discharges (<http://www.cleanwater.gov/>, 1999).

Wisconsin DNR Lower Rock River Basin Water Quality Plan, 1998

This water quality plan is updated every five years, most recently in 1998. It addresses the management of Lake Wingra, the Yahara River, and other water bodies within the Lower Rock River basin. Proposed management actions for Lake Wingra include:

- rerouting a major storm sewer outfall to flow through HoNeeUm pond in the Arboretum
- removing carp
- reintroducing wild rice
- reconnecting Gardner Marsh to Lake Wingra

The plan identifies the following problems in the Lake Wingra watershed:

- alterations of the lake and its wetlands
- introduction of exotic species (e.g. common carp and purple loosestrife)
- pollutants within urban stormwater (e.g. 75% higher sodium levels and 2 times higher chloride levels than those found in Lake Monona)

- nutrients, sediment, and contaminants attached to the incoming sediment
- decreases in groundwater levels due to both urban pumping and increasing impervious surfaces that limit stormwater infiltration

The plan references the WDNR Heritage Resources Database. This monitoring database indicates that Wingra fen is a water-dependent endangered community. It also identifies problems for Wingra Creek (classified as a warm water sport fishery), including:

- low base flow
- high urban stormwater runoff and sedimentation rates
- low dissolved oxygen levels causing occasional fish kills
- presence of heavy metals, DDT metabolites, and PCBs in creek sediment samples

Wisconsin DNR Integrated Ecosystem Management (IEM) Project

In 1997 the WDNR recognized Lake Wingra as an area that needed attention, identifying Wingra as a Lower Rock River Integrated Ecosystem Management (IEM) project. The project goals include:

- bringing partners together for cooperative water quality solutions
- promoting public involvement
- performing public outreach and education

Initial steps have resulted in general assessments of fisheries and dam safety. More information can be found at <http://www.dnr.state.wi.us/org/gmu/sidebar/iem/lowerrock/index.htm>.

In response to the lake's designation as an IEM project, local citizens formed the group Friends of Lake Wingra (FOLW) in 1998 with the mission "to promote a healthy Lake Wingra through an active watershed community" (<http://danenet.wicip.org/fowingra/>, 1999). The FOLW have been active by holding community meetings, encouraging restoration and public education activities, acquiring funding through a DNR Lake Management Planning grant, and working with the University's Water Resources Management Workshop to further define their objectives.

Wisconsin DNR Yahara-Monona Priority Watershed Project

As part of the shift to watershed-level management, and as a response to Section 208 of the CWA, the Wisconsin legislature authorized the WDNR to develop the Priority Watershed Program. This program provides financial assistance to local governments, regional planning commissions, and drainage districts to implement non-point source pollution control projects (Kent *et al.*, 1995). In 1992, the Yahara River and Lake Monona watersheds gained designation as a priority watershed project, with Lake Wingra included as a subwatershed of Lake Monona (Dane County RPC, 1992).

Water quality objectives for the Yahara-Monona Priority Watershed Project include the following (modified from Lorman *et al.*, 1997):

- reduce non-point source pollution loads of phosphorus and sediment by 30-50%
- reduce pollutant loads of chloride and heavy metals
- identify sources and reduce levels of bacteria
- control purple loosestrife

- improve the effectiveness and increase the use of detention ponds
- pursue innovative management practices

The estimated total cost of the Yahara-Monona Priority Watershed Project is \$21 million. Participation in the plan is voluntary, but helps communities comply with stormwater regulations that aim to protect water quality from stormwater runoff and soil erosion. The plan provides cost-sharing and public assistance for control of urban and rural non-point source pollution. In urban areas, like the Wingra watershed, the priority watershed project will pay for 70% of construction costs for stormwater quality practices, including wet detention basins, grass drainage systems, and infiltration basins. The project also pays up to 50% of land acquisition and storm sewer rerouting costs. Remaining costs are paid by the municipality or private landowner.

The Yahara-Monona Priority Watershed Project's recommendations for the Lake Wingra watershed include the following:

- The city of Madison and the town of Madison should pursue stormwater quality management plans and structural practices for critical land areas, with financial assistance provided by the priority watershed project for eligible practices.
- The city of Madison, the town of Madison, the University of Wisconsin, and Dane County should continue to emphasize judicious use of salt and sand. Priority should be given to the South Beltline Highway and Fish Hatchery Road. Alternatives to road salt and sand use should continue to be evaluated.
- The UW Arboretum should be encouraged to pursue wetland and shoreline restoration activities with public information and involvement initiatives.

The Dane County Regional Planning Commission (RPC) prepared the appraisal monitoring report (1990) and the priority watershed project plan (1992) for the Yahara-Monona Priority Watershed Project along with Dane County, municipalities in the watershed, and the 1990 UW-Madison Water Resources Management (WRM) workshop. This plan was prepared under the authority of the Wisconsin Non-point Source Water Pollution Abatement Program as described in Wisc. Stats. sec. 144.25 and Chapter NR 120 of the Wisconsin Administrative Code. The plan is an element of the Dane County Water Quality Plan (RPC, 1979) and the Lower Rock River Basin Water Quality Management Plan (WDNR, 1998).

Wisconsin DNR Non-point Source Redesign Program

In the fall of 1999, the WDNR's Bureau of Watershed Management (BWM) released a draft of the Non-point Source Redesign Program Initiative, which focuses primarily on agricultural areas. Although it specifies an urban stormwater management goal of 40% reduction in sediments, phosphorus, and heavy metals, any implementation of such standards in the Wingra watershed would still be implemented under the existing city of Madison / UW-Madison WPDES permit. The initiative also stresses the importance of education and outreach activities, and specifies several WDNR and UW-Extension programs

that can and do assist communities in reaching stormwater management goals (<http://www.dnr.state.wi.us/org/water/wm/nps/redesign/redesignplan>).

Dane County

In Dane County, water quality plans began developing in the 1970s. In 1975, the Dane County Advisory Council for Lake Quality Improvement released an influential report which recommended urban watershed management actions such as improved street sweeping, catch basin maintenance, downspout “disconnection,” and water quality monitoring (LQIAC, 1975). The report also recommended public outreach and lake management such as weed control, phosphorus reduction techniques, and wetland restoration.

In 1979, Dane County issued its first Water Quality Plan (RPC, 1979) with the goal of assuring that “all surface waters of Dane County will be suitable for the protection and propagation of fish...and wildlife, and provide for primary and secondary contact recreational activities,” that is, to keep Dane County waters “fishable and swimmable.”

Dane County is currently refining a stormwater management plan, and is working with the state and municipalities to ensure compatibility and consistency (Falk, 1998).

City of Madison

The city of Madison has taken several steps in the Wingra watershed to mitigate stormwater impacts on water quality. Most significantly was the construction of the Odana Hills Park retention pond in the 1950s, which holds pollutant-laden sediment and prevents it from entering Lake Wingra. Details on the current effectiveness and management issues of this and other ponds in the watershed are described below and on page 47, *Stormwater Treatment Ponds*.

One of the earliest non-point pollution concerns in Madison was the impact of road salt, which the city started using for road de-icing in 1959. The Madison Department of Public Health studied the effects of road salt on the city’s surface waters in 1962, and determined that these effects were minimal. In 1973, the city began the study again as part of an effort to reduce the use of road salt in the Lake Wingra watershed by 50%. This reduction plan was extended to the rest of Madison in 1977. The Department of Public Health has produced an annual road-salt survey since that time. Lake Wingra has by far the highest chloride concentrations of any of the Madison lakes, and that level has risen an average of 15% since 1972 despite road-salt reductions. Public Health also reports significant rises in sodium and chloride levels in the city’s groundwater (MPH, 1998).

The Madison Department of Public Health also monitors Lake Wingra water quality to determine the need for beach closures and other health advisories.

Future Challenges

Despite innovative management plans and progressive legislation, the conclusion of a 1980 study still holds true: “Governmental and environmental jurisdiction of the Lake Wingra watershed is a labyrinth of structure and regulation. There has been almost phenomenal growth in the number and kind of governmental tools available to deal with water quality issues, but there exists at present low priority rating for the drainage basin’s problems and a lack of integrated and comprehensive remedial action by the various governmental jurisdictions” (Ross *et al.*, 1980). Tools and knowledge are available, but management coordination and a specific focus on Lake Wingra are lacking. Although the many management plans have made important recommendations, they have little authority and are limited by funding.

Perhaps the major change since the conclusions of Ross’ study may be an increase in the watershed’s “priority rating,” both within government agencies and among the general public. Although it may be inaccurate to claim a higher rating until more action is taken, the city of Madison is poised to take the next step by implementing what could be an innovative stormwater utility. The following sections of this report discuss the nature of such a utility, and the people and activities required to make it work effectively.

**Table 3-1
Timeline of management
and regulation changes.**

	Statute / Activity	Description / Significance
1898	Wisconsin begins to regulate the discharge of sewage to the waters of the state.	
1948	Federal Water Pollution Control Act.	
1956	Federal Water Pollution Control Act.	
1950s	City of Madison builds Odana Hills Park detention pond.	
1965	Congress passes the Clean Water Act (CWA).	
1960s	Motorized boating banned on Lake Wingra.	Decreased noise, activity.
1972	Congress amends the Clean Water Act (CWA).	
1972	City of Madison adopts road salt reduction plan. City of Madison Public Health begins publishing an annual Road Salt Reduction Report.	Madison has reduced its salt use since 1972 and the county is encouraging other municipalities to do the same.
1973	Wisconsin enacts ch. 147 and revises ch. 144 to implement the 1972 CWA amendments.	Ch. 144 includes establishment of the “priority watershed” program. As of 1995 there were 78 such watershed projects in the state.
1975	Report of the Dane County Advisory Committee for Lake Quality Improvement: A Framework for Lake Management.	
1977	Congress amends the CWA establishing NPDES permit program.	The CWA makes it unlawful for any person to discharge any pollutant from a point source into navigable waters unless a permit (NPDES) is obtained under the act.
1979	Dane County RPC Water Quality Plan.	
1980 or earlier	Aquatic weed harvesting responsibility changes from city to Dane County Public Works Lake Management.	Harvesting criteria based on visual observation and response to citizen complaints.
1985	Trolling boats allowed back on Lake Wingra on non-holiday weekdays.	
1987	Congress passes the Water Quality Act, which extends the Clean Water Act’s application to stormwater and establishes Phase 1 requirements.	Regulates municipalities over 100,000, construction sites over 5 acres, and industries.
1988	Dane County Lakes and Watershed Commission established.	
1989	Yahara-Monona Steering Committee Public Information and Education Subcommittee is established.	
1992	Yahara-Monona Priority Watershed Plan.	
1992-94	EPA’s NPDES stormwater Phase 1 takes effect.	
1994	Wisconsin begins WPDES permit process (NR216).	Implements EPA Stormwater Phase I.
1995	Madison Commission on the Environment: Stormwater Committee Report and Regulations, Steve Ventura and Nelson Eisman.	Recommendations focus on information and education, pollution prevention, and institutional coordination. Supports active role for Dane County Lakes and Watershed Commission and encourages county-wide standards. Recommends developing revenue source for major water quality improvements.
1995	Madison obtains 5-year WPDES permit.	WPDES Permit No. WI-S056416-1.
1995	Madison Stormwater Management Plan completed.	
1997	Yahara-Mendota Priority Watershed Plan approved.	
1998	Friends of Lake Wingra Established.	
1998	Dane County Board adopts ordinance requiring countywide construction site erosion control standards.	Enforced only in unincorporated areas, but legally apply within entire county.
1999, October	EPA’s NPDES stormwater Phase 2: Final signature.	Regulates municipalities between 10,000 and 100,000, “urbanized areas” with population density over 1,000 per sq. mile, and construction sites between 1 and 5 acres. Exempts industries who demonstrate no contact with stormwater.
2000, July	City of Madison WPDES renewal date.	As of 6-99, the renewal process and requirements are still being determined.
2000	Dane County will begin to enforce the construction site erosion control standards countywide, except where a municipality adopts and enforces the county standards.	

Table 3-2
Current (1999) regulations.

Category	Jurisdiction	Ordinance	Description
Boating	City of Madison	14.3	"Regulation of Boats": Adopts State laws 30.50–30.71.
Boating	City of Madison	14.30(6)	Speed limit in Murphy Creek and Henry Vilas Park Lagoon limited to "slow no-wake," and nighttime speeds limited to 15 mph for all city waters.
Boating	City of Madison	14.30(8)	"No motor boat races shall be approved for Lake Wingra."
Boating	City of Madison	14.30(9d)	Wingra boating restrictions.
Boating			Boating prohibited on weekends and holidays, except for those with physician's statement, and they are limited to slow no-wake, less than 5 mph.
Boating			At all other times, all boats are limited to slow no-wake, 5 mph.
Boating	City of Madison	14.32	Places Henry Vilas Park Locks under jurisdiction of city of Madison Board of Park Commissioners
Boating	Wisconsin	30.50 – 30.71	State boating and water safety laws
Erosion	City of Madison	Chapter 37	"Erosion and Stormwater Control": Details erosion control regulations for construction sites, but as of 1998 it includes the qualification that these regulations will not be more restrictive than the state's Uniform Dwelling Code. These regulations are administered primarily by the city engineer. Applies to sites 4,000 square feet or greater, or sites having at least a 12% grade, or sites having an impact on sensitive areas.
Erosion	City of Madison/Dane	37.08(2c)	"Sites not requiring a control plan as identified above shall submit the "Dane County Erosion Control Plan—Simplified Checklist" with the permit application."
Erosion	Dane	14.50-99	Erosion Control Regulations
Erosion	Dane	14.53	Regulations apply to sites 4,000 sq. ft. or greater, or sites having at least a 12% grade, or sites having an impact on sensitive areas.
Erosion	Dane	14.545	"Simplified Checklist" may be used for sites not greater than 20,000 sq. ft. and not over 6% grade.
Erosion	Dane	14.6	"One- and Two-Family Dwelling Erosion Control: Consistent with the Wisconsin Uniform Dwelling Code ("UDC").
Erosion	Dane	14.81	Penalties apply to sites 20,000 sq. ft. (a little under half an acre) and above.
Erosion	Wisconsin, Dept. of Commerce	Uniform Dwelling Code (UDC)	One- and Two- Family Dwelling Erosion Control. Supersedes local control; i.e., local standards cannot be stricter than UDC. Requirements are minimal and often enforced by building inspectors who may be unfamiliar with erosion control.
Miscellaneous	City of Madison	14.02	"Filling of Lakes and Rivers": \$10-25 fine for dumping trash, dirt, etc. in lakes
Miscellaneous	City of Madison	14.03	"Filling of Lake Ends of Streets When Dock Line Established"
Miscellaneous	City of Madison	14.05	"Piers from Park Property on Lakeshores": \$10-25 fines for unauthorized construction of piers or boat facilities on public property.
Stormwater	City of Madison	10.29	"Downspouts and Eaves of Buildings Not To Drain On Sidewalks"
Stormwater	Wisconsin State	283	This chapter, particularly sections 31-35, simply states that permits are required; all details are left to NR216 and related DNR ordinances.
Stormwater	City of Madison	35.03	"Public Stormwater System": Describes design standards for new construction stormwater management, based on amounts of pervious and impervious surface. Permits are required from the city engineer.
Swimming	City of Madison	Public Health Standards, 1999	Vilas Beach closes if fecal coliform reaches 1300 once or if the geometric mean is over 375. Fecal coliform is resampled if over 350 per 100 ml .
Swimming	City of Madison	14.30(7)	Marks "Vilas Park Beach Swimming Area" as a "bathing or swimming" area.