2. RIVERS

Last updated: 10-2007

Monitoring of Wisconsin's large (non-wadeable) rivers is composed of three primary components: Biotic Integrity, Long Term Trend (LTT) monitoring for ambient water quality, and Flow Gaging.

In the 1930s, USGS established a network of over 100 flow gaging stations in Wisconsin. The WDNR contributes funds towards the operation of several of these stations. In 1991, LTT monitoring was established at 42 of these flow gaging stations for sampling water chemistry parameters in rivers. Starting in 2000, fish assemblages were assessed as part of Biological Integrity monitoring to measure river and overall ecosystem health. Initially the rivers of interest were primarily those undergoing hydropower dam relicensing through the Federal Energy Regulatory Commission. Starting in 2002, Biological Integrity monitoring was expanded statewide and 29 sites overlapped with LTT sites. Ultimately 86 fish index of biotic integrity (IBI) runs and 44 gamefish-endangered-threatened species (GET) surveys were conducted on 32 rivers in 2002. The Biotic Integrity program workplanned for 111 IBI surveys and 624 GET surveys on 33 rivers in FY08.

BIOTIC INTEGRITY MONITORING

Contact: Brian Weigel
Last updated: 10-2007

Status: Currently in Place

The current strategy has been in place since 2002.

Monitoring Objectives

Clean Water Act Objectives

- Determining water quality standards attainment
- Identifying impaired waters
- Supporting the evaluation of program effectiveness
- Establishing, reviewing and revising water quality standards

Fisheries Objectives

- Developing quantitative management objectives for waters
- Identifying populations not meeting objectives
- Compiling input for identifying problem causes
- Compiling input for developing management recommendations
- Analyzing general responses to management action

Public Trust Doctrine Objectives

- Developing environmental objectives
- Monitoring impacts of permitting decisions at the general water level

Other Specific Objectives:

- Help determine which management efforts to pursue if a river's potential is not being attained
- Establish geographic trends in river quality
- Identify long-term changes in ecological integrity or game fish characteristics
- Characterize the performance of management actions
- Classify rivers by natural environmental features and subsequently identify reaches that are not sampled at the appropriate intensity
- Develop a macroinvertebrate sampling and assessment protocol for indicating biotic integrity, with the potential for use in establishing biocriteria of rivers
- Identify the performance characteristics of fish IBI monitoring after collecting annual data for 5 years (through 2007 field season). Analyses will identify the variability in IBI scores at least-impacted and degraded sites, suggesting how frequently sites should be sampled in the future.
- Characterize the performance of the GET procedures after collecting annual data for five years (through 2007 field season). Analyses are intended to derive expectations for species-specific gamefish catch per unit effort (CPE) on different river kinds and gear. Subsequently modify GET procedures as appropriate.
- Foster the development of biocriteria, habitat indices, and baseline data for rivers

Monitoring Design

The strategy demands broad spatial and strong temporal components to function optimally. Being statewide in scope, this monitoring effort must be employed over a broad spatial scale to characterize the variety of Wisconsin's river types, and the kinds and intensities of human disturbances upon each river type. The effort necessitates a strong temporal component to evaluate trends in river health, game fish biostatistics, and management over time. Some river reaches have a special local importance because, for example, they are popular fisheries, experiencing development pressures, or under consideration for management changes in fishing regulations, dam operations, or habitat structure. For the 2008 and 2009 field seasons, the Rivers Technical Team prioritized 111 IBI sites and 62 GET surveys on 33 rivers statewide, most of which were sampled during the two years prior. The strategy targets one site per 9 – 18 river km (15-30 river mi). The program focuses on riverine and slightly impounded reaches only (larger impoundments are sampled by the Lakes program). Additional reconnaissance sites may be added as prioritized by Regional staff and the Rivers Technical Team.

All river sites will be sampled annually, for the first 5 years of the program, through 2007. Then data analyses of metric sensitivity, natural environmental variability, and trends will allow refinement of sampling efforts. A subset of high priority sites will likely be sampled annually where there are high-profile fisheries, reference sites, or to closely monitor at-risk sites. Samples are taken only once per summer.

Core and Supplemental Water Quality Indicators

Since 2002, efforts at these sites have focused primarily on fish, with a brief habitat assessment and some macroinvertebrate sampling. Conductivity, pH, dissolved oxygen, temperature, and turbidity are to be measured prior to fish sampling. During 2002-2005, 42 sites were sampled annually for macroinvertebrates to be used in development of a macroinvertebrate IBI for rivers. Macroinvertebrates should be sampled on a regular basis after the IBI is developed and incorporated into a tiered aquatic life use program. WDNR is now proposing that water chemistry be added to the suite of parameters sampled at those sites where it is not already being collected as part of the LTT network (see Surface Water Quality section of the *Strategy*).

Fish Assemblage Characteristics: The standardized fish shocking protocol for calculating the fish-based IBI on warmwater rivers of Wisconsin enables the determination of river health and game fish statistics

simultaneously (Lyons et al. 2001). Every site must be sampled according to IBI procedures. The protocol requires sampling main-channel-border habitats, which are relatively shallow shoreline areas along the river channel that carry the majority of the river flow. Depending upon the project goals, it may be informative to sample the borders of major side channels if the channel carries a substantial amount (> 15%) of river flow. Standard shocking occurs in daylight and in a downstream direction as close to the shoreline as possible. Each site is to be sampled for 1.6 km of contiguous shoreline, a distance at which estimates of species richness were asymptotic and insensitive to variation in sampling effort. Fish collections are made between mid-May and late September. Sampling should be avoided if the river stage is > 1m above normal, but it can occur during below-normal flows.

Standard equipment is a boat-mounted, pulsed-DC electrofishing unit. Typically a 5m-long aluminum boat powered by a 15-25hp outboard motor, with the boat hull serving as the cathode, works well. The anode is a single 4m boom with a "Wisconsin ring" from which 16 cylindrical, 17mm-diameter stainless steel droppers are suspended. In normal operation, about 125mm of each dropper is in contact with the water. A gas-powered generator rated at ~3500 W provides adequate electricity. The control box converts AC to DC and allows standardization of the pulse rate at 60 Hz and a 25% duty cycle. Depending upon water chemistry, sampling can typically be done at ~3000 W output from the control box.

While sampling, a single person uses a 17mm-mesh (stretch) dip net and attempts to capture all of the fish seen. This mesh size consistently retains fusiform species such as cyprinids >75mm total length and longitudinally compressed species like centrarchids >50mm, but smaller individuals are often collected. Sampling techniques are biased are against small (e.g., cyprinids) and nocturnal species (e.g., catfish, walleye), but collect large numbers of suckers and centrarchids, including smallmouth bass. Captured fish are identified to species, counted, and weighed. Game fish should have individual lengths and weights measured, but other species do not need length information and can be weighed in aggregate.

Gamefish, Endangered, and Threatened Species (GET) surveys: A more extensive gamefish, endangered, and threatened species survey is conducted to address fisheries management concerns. Game fish assessments typically target one species and are tailored to meet the management goals for individual rivers. The most anticipated species of management concern include *Micropterus dolomieu* (smallmouth bass), *Stizostedion vitreum* (walleye), *S. canadense* (sauger), *Ictalurus punctatus* (channel catfish), and *Pylodictis olivaris* (flathead catfish). If the primary game species of management concern is smallmouth bass, then IBI electrofishing runs may yield data efficiently. Species-specific sampling protocols include extended daytime electrofishing, nighttime electrofishing, tailwater electrofishing in the fall, and hoop netting.

Extended daytime electrofishing. If enough game fish individuals are not caught after the 1-mile IBI run for estimating population dynamics, then it may be useful to extend the shocking run to sample an additional 1 – 4 miles. Collect and process all game, threatened, and endangered species.

Nighttime electrofishing. Nighttime shocking poses many logistical and safety concerns, particularly in reaches with poor access, numerous obstructions, or fast, turbulent water. However, if nighttime shocking is opted for then site reconnaissance during the day is encouraged. Studies indicate that night shocking yields more total fish species and biomass than day shocking (for references see Lyons et al. 2001). Most game species are found in greater number, and larger individuals are caught during nighttime sampling compared to daytime. The catch differences are pronounced for walleye, sauger, catfish, and esocids, but somewhat less notable for centrarchids.

Fall tailwater electrofishing. Fish migrations to tailwater areas for intense fall feeding or overwintering pose an opportunity to collect walleye, sauger and esocid data efficiently in some river systems. Consider electrofishing during the daytime if the site poses serious logistical and safety problems, but nighttime shocking may provide higher catch rates. The optimal time of year to sample may vary by river and weather conditions but mid- to late-October is probably appropriate. On the Lower Wisconsin River for example, fall tailwater electrofishing at night is much more efficient than summer IBI runs for collecting

walleye, sauger, and esocid data. The walleye catch rate jumps from ~15 fish/hour during summer runs to ~300 fish/hour during fall tailwater sampling.

Hoop netting. Catfish can be targeted by sampling with hoop nets. Sampling during spring migration typically maximizes catch rates. The optimal time for spring sampling varies by river and weather conditions but it generally ranges from mid-March to mid-May. Depending on management interests, a summer sampling option may be preferred to focus on resident fish. Vokoun and Rabeni (2001) provide a standardized hoop net sampling protocol for sampling channel catfish in prairie streams. Pellett et al. (1998) discuss channel catfish movements and sampling procedures they found useful on the Lower Wisconsin River. Protocols for catfish sampling can be explored by Regional staff and the Rivers Technical Team on a river-specific basis.

Water Chemistry: Water temperature, dissolved oxygen, pH, conductivity, and turbidity are measured prior to fish sampling. In addition, select parameters identified in the Surface Water Quality section of this document will be sampled 88 IBI sites over the course of six years.

Contaminants: Rivers are screened for mercury and PCBs in the fish tissue.

Pathogen Indicators: *E. coli* is an indicator of the presence of fecal matter in water and is used as a tool to help protect humans from waterborne exposure to dangerous pathogens associated with feces. *E. coli* may be sampled at select high-use beaches. See the section on Pathogen Monitoring on Inland Beaches for more details.

Habitat Assessment: Assessments of channel morphology, flow, bank features, fish cover, substrate, and riparian land cover are made along the 1.6 km IBI station.

Macroinvertebrates: Macroinvertebrate assessment in large rivers promises a cost-effective method to track changes in water quality and river management over time. In general, fish and macroinvertebrate assessments compliment one another because fish tend to respond primarily to habitat, whereas macroinvertebrates are more closely linked with water quality. A macroinvertebrate IBI is currently being developed and tested. It will be worked into the standardized strategy for Baseline-Rivers Biotic Integrity monitoring.

Quality Assurance

The WDNR has a quality management plan (QMP) and an Evaluation System Manual Code (MC 9314.1) in place that establishes processes and protocols that the state's monitoring program must meet. The QMP is scheduled for review and revision by 6/30/05, and quality assurance processes may be added or modified as needed.

Standard monitoring protocols are distributed to all staff participating in monitoring. Protocols and data sheets are also accessible at any time on our network and web-based database. Training of field staff for consistency in data collection and recording is critical to the success of the monitoring program. Training in taxonomy, deployment of field gear, and general program implementation is periodically made available to all staff. A layer of quality assurance to maximize data integrity through a data screening process is built into the statewide database. All monitoring protocols employed, at a minimum, meet the Department's data standards as developed by the Aquatic and Terrestrial Resources Inventory (ATRI) Team. The State Lab of Hygiene, a certified laboratory with approved quality assurance procedures, completes most water quality analyses.

Data Management

An internet-based electronic data storage system following state geo-locational standards is used to manage fish and habitat data (http://infotrek.er.usgs.gov/wdnr_bio/). In 2005-06, the SWIMS project (through a potential NEIEN Grant) will facilitate the flow of data from the USGS server through SWIMS to USEPA STORET. Contaminant data are managed on a client-server system and are available upon request.

Data Analysis/Assessment

Rankings for fish community IBI scores have been developed and calibrated for Wisconsin waters. These IBI rankings use a 0 – 100 scale to qualitatively define waterbodies in very poor, poor, fair, good, or excellent ecological condition. Similar rankings are anticipated for the macroinvertebrate-based IBI as well.

In the near future, as more Baseline Monitoring data are gathered, biotic core indicator rankings will be developed for our more precise river classification. We will then be able to establish expectations for each classification and refine our standards for determining attainment.

After the initial 5 years of the program, we may invest a proportion of our efforts in a probability-based subsampling approach for all waterbody classes to allow inferences for all waters within the area on a basin, ecoregional, or statewide scale.

Reporting

Biennial administrative reports are produced on the work accomplishments of the monitoring program. Local reports on the health and condition of waterbodies and their fisheries are sometimes produced, but there is currently no systematic approach to this reporting and more consistency would be desirable.

Programmatic Evaluation

The Baseline Monitoring Program operates within the framework of the Water Division biennial workplan. Each Technical Team meets annually to review the protocol, strategy, and products of the sampling program to ensure that it is meeting the needs of resource managers. Any changes to the protocol or strategy are recommended to the Water Division Monitoring Team. Reviews of workplan performance are completed annually, to evaluate job completion.

Sampling methodology will be evaluated in 2007, after 5 years of annual sampling, using analyses of metric sensitivity, natural environmental variability, and trends. These analyses may suggest that sampling should continue annually at the bulk of the sites, or that samples be taken on a 2-3 year rotation. In addition, there may be an opportunity to use a stratified random approach on a subset of sites. Randomization may have to be stratified by river size, dominant substrate, geography, and safe access.

General Support and Infrastructure Planning

Staff & Training – The Bureau of Integrated Science Services coordinates the Rivers Biotic Integrity Sub-team. Volunteers will be considered to conduct some of the monitoring in this program, with consideration of accessibility and safety factors.
Laboratory resources – See Surface Water Quality section for lab funding allocated to rivers.
Funding –This program is funded under Sport Fish Restoration at approximately $68,000 annually. Total estimated support, including permanent salaries, fringe benefits, and other indirect costs is approximately $101,000 annually.

Program Gaps

- Lack of a data entry sheet for habitat information.
- Lack of a program to calculate fish-based IBI scores.
- Lack of robust habitat assessment and interpretation procedures.
- Staffing sufficient for complete coverage on all high-priority reaches statewide.

LONG TERM TRENDS AMBIENT WATER QUALITY (LTT/AWQ) NETWORK

Contact: Ken Schreiber
Last updated: 10-2007

Status: Currently in Place

Forty two Long Term Trend (LTT) monitoring stations for ambient water quality (AWQ) were established along Wisconsin's rivers in 1991. The stations were chosen as a subset of the long-standing USGS flow gaging stations.

Monitoring Objectives

Data from the LTT Ambient Water Quality monitoring program will be used toward meeting a number of Clean Water Act objectives.

Clean Water Act objectives:

- Establishing, reviewing and revising water quality standards
- Determining water quality standards attainment
- Identifying causes and sources of water quality impairments
- Supporting the implementation of water management programs
- Supporting the evaluation of program effectiveness

Specific objectives:

- The primary purpose of this data is to establish a long-term record to determine trends in water quality from a variety of drainage areas and land use types throughout the state.

Monitoring Design

Figure 2 shows the location of the 42 monitoring stations and the total drainage area covered by these stations. The sites for the LTT/AWQ program were selected to represent a wide range of ecological and land use categories. The parameters list was selected to cover water quality parameters that are influenced by changes in land use patterns and have led to or can lead to chronic water quality problems within drainage basins over time. The frequency of sampling varies by site and was determined by looking at past data sets and examining the effects of different sampling frequencies on the strength of trends detected in those data sets. All monitoring is done by field staff and samples are shipped to the State Lab of Hygiene for analysis.

Core and Supplemental Water Quality Indicators

- pH
- Alkalinity
- Conductivity
- Turbidity
- Transparancy
- Total Kjeldal Nitrogen
- NO_x
- Ammonia
- Total Phosphorus
- Dissolved Phosphorus
- Total Suspended Solids
- Chlorophyll *a*
- Fecal Coliform
- *E. coli*
- Chloride
- Calcium/Magnesium/ Hardness
- Mercury, Cadmium, Copper
- Triazine
- Dissolved Silica

There have been proposals for a more thorough analysis for fourteen additional pesticides and low-level metals at some of the LTT/AWQ sites. These may be considered in the future as funding allows.

Quality Assurance

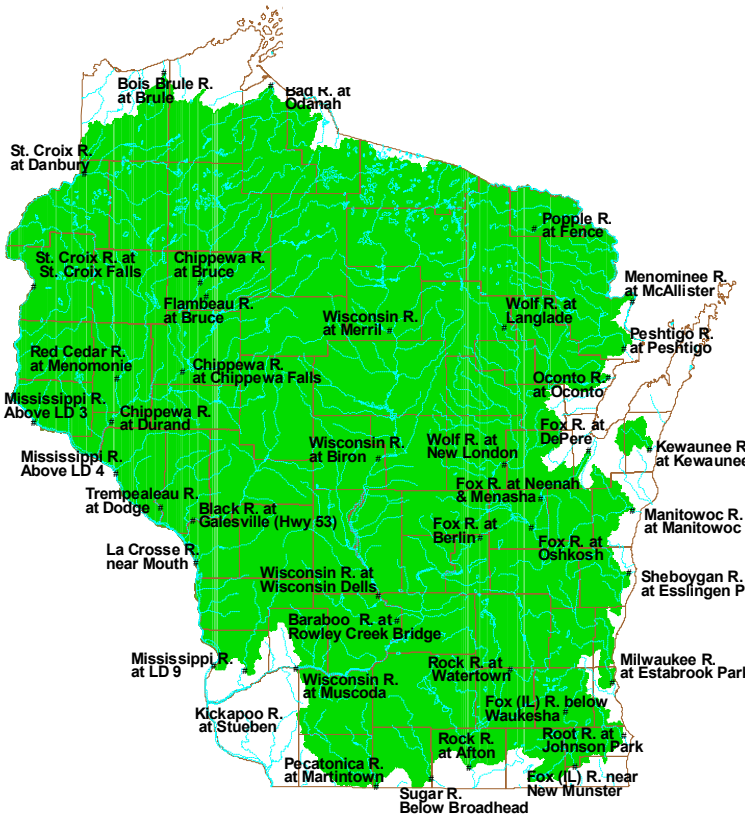
A project-specific QAPP is not necessary for this program. However, the sampling protocols and Quality Assurance/Quality Control (QA/QC) sampling requirements are being followed for each of the parameters sampled as part of the LTT/AWQ monitoring program.

Data Management

Samples collected as part of the LTT/AWQ program are submitted to the Wisconsin State Laboratory of Hygiene (SLOH). The analytical results are then placed into the laboratory's database and eventually downloaded into the SWIMS database system by WDNR staff. All of the station locations are established STORET stations and include latitude and longitude coordinates in their station definitions.

Data are available to WDNR staff through the SLOH database soon after laboratory analysis is complete. Data can be downloaded through WDNR's Intranet site via the Lab Data Portal or accessed directly through SWIMS. Plans are underway to make the raw data tables as well as statistical analysis of the data available to the general public via the Internet.

Figure 2. Long Term Trend/Ambient Water Quality Monitoring stations and drainage area



Data Analysis/Assessment

The primary purpose of this data is to establish a long-term record to determine trends in water quality from a variety of drainage areas and land use types throughout the state. Once water quality data has been collected for a sufficient period of time, the data will be analyzed to determine if trends can be detected indicating a change in mean value of each parameter over time. The ability to detect statistical trends in data is dependent on the deviation about the mean inherent within the data, the magnitude of the change in mean concentrations over a given period of time as well as the ability to filter out confounding factors such as flow conditions, seasonality, and other cyclical influences on the parameters in question.

Water quality chemistry data collected by the program will also be compared to any applicable water quality standards to assess the level of attainment of Wisconsin's rivers. In cases where the water quality parameter concentrations exceed established standards and/or indicate a trend leading toward exceedance of a standard the appropriate water quality managers will be notified so that an increased monitoring plan and, if necessary, a mitigation plan can be adopted.

Reporting

Data from the LTT/AWQ program will be made available to WDNR staff and the general public through SWIMS, WDNR Intranet, and WDNR Internet. The data will be used for the integrated 303(d)/305(b) report, stream classification and use attainability analyses, TMDL development, water quality-based effluent limits in WPDES permit drafting, technical reports, brochure development and television & news media reports. WDNR staff completed a report of the LTT/AWQ data in 2006 (WDNR 2006).

Programmatic Evaluation

As the program continues, an integral part of the data analysis will be to continually reevaluate the sampling regimen and make adjustments to the sampling frequencies based on the data collected to that point and the ability to detect trends within the data set. The 2006 LTT review included a program evaluation.

General Support and Infrastructure Planning

Staff and Training: Approximately $12,000 in travel and supplies is used on an annual basis to conduct the program. The annual cost of supplies is expected to continue to rise at pace with inflation. Volunteers will be considered to conduct some of the monitoring for this program.
Laboratory Resources:
Approximately $ 110,000 of general agreement lab allocation is required on an annual basis to support the LTT/AWQ program. This figure is expected to increase at a rate equivalent to the increase in analytical costs at the State Laboratory of Hygiene.
Funding: Laboratory services are funded through general agreement lab allocations between WDNR and SLOH.

References

The sampling and analysis protocols used to collect and analyze the data for the LTT/AWQ program are contained within the WDNR Environmental Sampling & Laboratory Services Guide available on the WDNR Intranet at http://intranet/int/es/science/ls/ or by contacting the WDNR Bureau of Enterprise Information Technology.

WDNR. 2006. Wisconsin's Long Term Trend Water Quality Monitoring Program for Rivers; July 2001 - June 2005. 47 pp.

FLOW GAGING

Contact: Steve Jaeger
Last updated: 10-07

Status: Currently in Place

WDNR has been funding selected USGS flow gaging sites since the 1970s. Some USGS sites have data records for over 100 years. WDNR funds a portion of USGS's network of long-term gages statewide as well as short-term gages to support development of Total Maximum Daily Loads (TMDLs). Regressions based on data collected at fixed sites are used to develop estimates of critical flows at needed ungaged locations statewide. USGS supplies all staff time for this monitoring program.

Monitoring Objectives

Clean Water Act Objectives

Because flow gaging data are critical for determining sampling regimes for many other activities, it supports all of the following Clean Water Act Objectives:

- Establishing, reviewing, and revising water quality standards
- Determining water quality standards attainment
- Identifying impaired waters
- Identifying causes and sources of water quality impairments
- Supporting the implementation of water management programs
- Supporting the evaluation of program effectiveness

Specific objectives

WDNR's objectives in participating in this cooperative effort are to get high quality continuous flow data that will provide the following:

- Low flow estimates for determining effluent limits for industrial and municipal sources.
- Continuous flow data for evaluating water quality data and calculating annual loads.
- Flood estimates for floodplain determination and zoning.
- Trends in flow that can be used for ensuring that flood predictions consider changes in flow due to development or other land use changes.
- Real time data to determine appropriate times to sample water quality for identification of impaired waters, assessment of management options and evaluation of program effectiveness.
- Stream flow data prior to and at the time of sampling to use in interpretation of water quality data.
- Real time data for the public to assess the safety and appropriateness of rivers for boating, fishing and other recreational activities.
- Flow data to assist in evaluating likely causes of fish kills and human health dangers such as cryptosporidium.

Monitoring Design

WDNR assists in the operation of a statewide network of 126 permanent USGS continuous-stream flow gaging sites, some of which have data records for over 100 years (Figure 3). Many of these sites are also the locations of WDNR's Long Term Trends monitoring stations shown in Figure 2. Though WDNR funds only a portion of these sites, data are available from the entire network of long-term sites. Water-Stage Recorders and Acoustic Velocity Meter (AVM) Systems are used depending on site conditions. All sampling is automated, with water level recorded every 15 minutes. Approximately eight times each year, USGS staff

also conduct in-field flow measurements to check the accuracy of the rating curve. Data are downloaded every day. Regressions based on data collected at fixed sites are used to develop estimates of critical flows at needed ungaged locations statewide.

WDNR cooperates with USGS and their other cooperators to select the long-term gaging sites. A major review and planning effort was undertaken by the USGS and their cooperators with support from University of Wisconsin professors in the mid-1990s when funding for the statewide network was being cut by the WNDR due to budget problems. A resulting 1998 UW Water Resources Institute report documented the need and uses for the statewide network and recommended specific sites and funding sources. WDNR funds sites of unique interest to us as well as other sites to provide adequate coverage for development of regressions at ungaged locations.

In addition, temporary flow gaging sites are also established at waterbodies where data are needed for TMDL development. WDNR funds a number of these short-term, typically two-year, sites on an as-needed basis.

Core and Supplemental Water Quality Indicators

- Continuous flows are calculated using gage height measurements or velocity and water depth.
- Temperature is also measured at some sites.

Quality Assurance

USGS methods and standards are used. Having USGS conduct the work assures high quality, readily accessible data that can be used by different users including the public for their various needs.

Data Management

USGS methods and standards are used. Data are stored by USGS and is available to the public through the USGS website and annual publications. Summary flow and velocity statistics will be stored in SWIMS.

Data Analysis/Assessment

USGS methods and standards are used.

Reporting

All data reporting is done by USGS consistent with their national standards and benefits from technical improvements developed as part of their nationwide flow gaging effort.

USGS's website provides complete data access to all cooperators, regulated industries and the general public. Realtime preliminary data provides the ability to see current flows and trends for operation of dams, evaluation of effluent limits on waste load allocated streams, planning of water quality sampling and for recreational needs. Historical data are available in tabular and graphical form for any period of record desired.

Figure 3. Statewide locations of USGS flow gaging stations.

USGS also publishes daily average flows for all sites in its annual "Water Resources Data – Wisconsin" reports. Summaries of USGS's statewide flow monitoring program are also included in USGS's annual reports of projects in Wisconsin as well as WDNR's biannual 303(d)/305(b) Report.

Programmatic Evaluation

A major review of the statewide flow-gaging network was published in the above-mentioned "Water Resources Data – Wisconsin" report in 1998.

Annual meetings with USGS and their cooperators are held to review the current status of the statewide effort and to discuss changes in funding ability or priorities of the different groups. WDNR's goals are to fund sites that are uniquely critical to our needs as well as to fill in gaps to assure appropriate statewide coverage.

General Support and Infrastructure Planning

Staff – No WDNR staff are used for this program; USGS supplies staff for this monitoring. For standard USGS sites, volunteer monitoring may not be appropriate; however, less rigorous flow monitoring could be done by volunteers at other sites for specific purposes.
Laboratory – No laboratory costs are associated with this program.
Funding of long-term sites – WDNR's funding of a portion of USGS's long-term gaging sites is greatly leveraged by the contributions of other cooperators and by federal match money from USGS. WDNR currently directly funds 15 of USGS's long-term flow gages at a cost of $95,380. USGS provides 40% match on the operation of these sites. Hydroelectric dam owners fund approximately 20 additional sites. USGS has been successful at getting other local cooperators to pick up past reductions in funding from the WNDR so the total number of long-term sites has stayed fairly constant, though is subject to change as funding sources fluctuate. WDNR's current goal is to at least maintain the current level of funding with increases to cover inflation while watching for needs that may arise due to new environmental concerns or reductions in funding by other USGS cooperators.
Funding of short-term sites –DNR continues to fund six to eight short-term TMDL-related sites annually. These sites typically are operated for about two years with new sites selected as older sites reach the end of their cycle. Installation of a gage is a significant cost that USGS does not cost share, but installation costs are reduced by reusing equipment. USGS has offered to cost share the annual operation of these sites at a 25% level (Water Stage Recorders $9,000 each total cost annually, WDNR portion $6750; AVMs $10,000 each total cost annually, WDNR portion $7,500). This is reduced from the 40% match for the long-term sites due to limitations in the amount of match money available and because these sites are generally of less use to other data users. WDNR's desire is to fund needed TMDL-related sites without reducing support of the long-term sites.

References

"An Integrated Water-Monitoring Network for Wisconsin", University of Wisconsin Water Resources Institute, 1998, WRI SR 98-01.

Water Resources Data – Wisconsin. USGS Water-Data Report WI-98-I.

Water Resources Investigation in Wisconsin. USGS Open File Report 02-300.