

Wisconsin Water Use Data and Research Cooperative Agreement Workplan

*A collaborative effort by the Wisconsin Department of Natural Resources,
United State Geological Survey, Wisconsin Public Service Commission,
University of Wisconsin Extension and Wisconsin Geological and Natural
History Survey*

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Introduction

The Wisconsin Department of Natural Resources' (WDNR) Water Use Program applied for the USGS Water Use Data and Research Grant to aid in the improvement of water-availability data for the State of Wisconsin in collaboration with the U.S. Geological Survey (USGS), the Wisconsin Public Service Commission (WPSC), the Wisconsin Geological and Natural History Survey (WGNHS) and the University of Wisconsin Extension. This workplan and the associated priorities included within have been outlined through a joint effort of these collaborators. Multiple meetings and a Water Use Symposium with stakeholders from a variety of water use sectors were held for finalizing the water research and data priorities for Wisconsin. The priorities were chosen through a combination of need— as deemed by large water users and water data users— and limitations— defined by the current shortcomings in water data availability. Receiving future grants and funding will allow for progress in achieving the priorities included in this workplan and help Wisconsin create a model for other states looking to improve their water use data collection and delivery.

Wisconsin's Water Use Program

The Wisconsin Department of Natural Resources' (WDNR) Water Use Program was created to implement the *Great Lakes–St. Lawrence River Basin Water Resources Compact* (Compact) and *Great Lakes–St. Lawrence River Basin Sustainable Water Resources Agreement* (Agreement) and to focus on sustainable and efficient water use. Wisconsin's Compact implementing legislation (2007 Wisconsin Act 227) and related regulatory and case law provide the foundation for the Water Use Program. While most of the program applies statewide, there are specific requirements for water users in the Great Lakes Basin. Detailed information related to the Water Use Program is available on the WDNR website: <http://dnr.wi.gov/topic/wateruse/>.

The Water Use Program is focused on achieving Wisconsin's goal to:

“Sustainably manage the quantity and quality of water in the state to ensure that water is available to be used to protect and improve our health, economy and environment now and into the future.”

The Water Use Program is responsible for:

- Documenting and monitoring water use through registration and reporting;
- Implementing the Compact through water use permitting and regulating diversions of Great Lakes Basin waters;
- Helping communities plan water supply needs;
- Reviewing the construction and impact of high capacity wells;
- Building a statewide water conservation and efficiency program; and
- Developing and maintaining a statewide water resources inventory that includes tracking consumptive use.

Key partners to Wisconsin's Water Use Program include the collaborators to this workplan: WPSC, USGS, WGNHS, and the University of Wisconsin Extension.

Statewide Water Use Registration and Reporting

Section 281.346 (3), Wis. Stat. and Chapter NR 856, Wis. Adm. Code, establish requirements for property owners including registration of water withdrawals and reporting of water withdrawal data annually to WDNR to support management of the state's water resources.

Registration Requirements

Any person who proposes to begin a withdrawal from the waters of the state using a water supply system¹ with the capacity to withdraw 100,000 gallons per day (gpd) (approximately 70 gallons per minute) or more in any 30-day period, or to increase the capacity of a water supply system so that it will have the capacity to withdraw an average of 100,000 gpd or more in any 30-day period, must register the withdrawal with WDNR. Examples of water supply systems that may fall under this category include:

- All high capacity well properties;²
- Permitted (Wis. Stat. Chapter 30) surface water withdrawals;
- Any other properties statewide on which there is a water supply system with the capacity to withdraw an average of 100,000 gpd or more in any 30-day period from surface water or groundwater.

Prior to December 8, 2008—the effective date of the Compact—WDNR catalogued statewide water supply systems with a capacity to withdraw at least 100,000 gpd. These systems that existed pre-Compact were automatically registered with WDNR and merged into one database on December 8, 2008. In addition, pre-Compact sources were given grandfathered withdrawal baselines, approvals and permits as necessary to comply with Wisconsin Compact implementing statutes. Following the implementation of the Compact, all new or increased withdrawals that meet the withdrawal threshold above must register with WDNR prior to withdrawing groundwater or surface water. This is typically done in conjunction with other WDNR approval or permitting procedures (examples: high capacity well applications or Chapter 30 permits). Currently, 15,593 withdrawal sources are registered with WDNR (Table 1).

¹ “Water supply system,” when not preceded by “public,” means one of the following: 1. Except as provided in subd. 2., the equipment handling water from the point of intake of the water to the first point at which the water is used. 2. For a system for providing a public water supply, the equipment from the point of intake of the water to the first point at which the water is distributed. Wis. Stat. s. 281.346(1)(wp).

² Section NR 812.07(52), Wis. Adm. Code, defines “high capacity property as “one property on which a high capacity well system exists or is to be constructed.” Further, s. NR 812.07(53) defines “high capacity well system” as “one or more wells, drillholes or mine shafts used or to be used to withdraw water for any purpose on one property, if the total pumping or flowing capacity of all wells, drillholes or mine shafts on one property is 70 or more gallons per minute based on the pump curve at the lowest system pressure setting, or based on the flow rate.

Table 1: 2016 Water Withdrawal Registrations by Source Type and Major Basin

	Great Lakes Basin	Mississippi River Basin	Total
Groundwater	3,959	10,890	14,849
Surface Water	392	666	1,058
Total	4,351	11,556	15,907

WDNR Reporting Requirements

In addition to registering water withdrawals, persons who make withdrawals from the waters of the state that average 100,000 gpd or more in any 30-day period must annually report to WDNR the monthly volumes of the withdrawal.³

Methods for measuring water for reporting purposes are outlined in s. NR 856.31, Wis. Adm. Code. Persons with registered withdrawals must measure or estimate their monthly withdrawal volumes and report the previous calendar years' monthly water use by March 1 of each year. These reports are collected and analyzed for errors and inconsistencies. A summary analysis is conducted on reported withdrawals and an annual water withdrawal reporting summary is made publicly available on the WDNR website: dnr.wi.gov/topic/WaterUse/WithdrawalSummary.html. Individual reports are also provided upon request to governmental partners, researchers, businesses and private individuals.

Starting in 2008, WDNR upgraded its water use data management systems, improved existing registration data and expanded data collection methods. These efforts resulted in an increase in withdrawal report response rates from below 50 percent in 2008 to 79 percent in 2010. Reporting rates have continued to improve with response rates exceeding 95 percent from 2012 to 2015.

Wisconsin Public Service Commission Reporting

In addition to the information reported to WDNR, additional data related to public water supply systems are reported to the Wisconsin Public Service Commission (WPSC). Wisconsin's 582 municipal and private water utilities are required to submit a report detailing financial and operational information to WPSC annually (s. 196.07, Wis. Stat). In addition to submitting monthly water withdrawals by source, utilities report information related to treated water entering the distribution system, sales by customer class, distribution system water losses, service population estimates, and wholesale water sales/purchases between systems. This information is published annually on the WPSC website: <http://psc.wi.gov/apps40/annlreport/content/viewReport.aspx?whatannl=WEGS>.

³ Pursuant to Wis. Stat. s. 281.346 and Ch. NR 820, Wis. Adm. Code, high capacity well owners must annually report withdrawals to the WDNR, regardless of withdrawal volume. Further, under Ch. NR 860, Wis. Adm. Code, water use permittees must also annually report withdrawals, regardless of volume.

UW Extension and Wisconsin Geological and Natural History Survey

The Wisconsin Geological and Natural History Survey (WGNHS), University of Wisconsin-Extension, performs basic and applied groundwater research as part of their education and outreach mission. WGNHS provides technical assistance, maps, and other information to WDNR to aid in the management of Wisconsin's groundwater and surface water resources. The WDNR and WGNHS partnership has supported the Water Use Program efforts through an improved understanding of water use in relation to specific source aquifers and the interaction with groundwater and surface water resources. In the past several years, WGNHS has developed technical products including an inventory of springs throughout Wisconsin, groundwater flow models to link water use and water resource sustainability, and mapping of geologic and hydrologic features to better understand the interconnection of Wisconsin's water resources.

Great Lakes Compact – Water Use Program Requirements WDNR Water Use Permitting

Sections 281.346 (4m), (4s), and (5), Wis. Stats., and Chapter NR 860, Wis. Adm. Code, establish the process, requirements and criteria for implementing water use permitting. Water Use Permits apply specifically to properties in the Lake Michigan and Superior Basins. A water use permit is required before persons may withdraw water in quantities that average 100,000 gpd or more in any 30-day period from groundwater or surface water in the Great Lakes Basin.

Water use permitting requirements began on December 8, 2011. 'Automatic' permits were granted to existing (pre-Compact) withdrawals in the Great Lakes Basin (742 general water use permits – approval to withdraw 100,000 gpd to 1 MGD and 653 individual water use permits - approval to withdraw at least 1 MGD).

Persons proposing new withdrawals averaging 100,000 gpd or more in any 30-day period, or proposing to increase an existing withdrawal so that it will equal 100,000 gpd or more in any 30-day period (but will not equal at least 1 MGD for any 30 consecutive days) after December 8, 2011 must apply for and receive coverage under the Water Use General Permit No. 2. Persons proposing Great Lakes basin withdrawals that will equal at least 1 MGD for any 30 consecutive days must apply for an Individual Water Use Permit and the state decision-making standard and conservation and efficiency measures apply.

If a person proposes to increase a withdrawal above the withdrawal amount authorized in an existing permit, the person must apply for an amended permit and implement water conservation and water use efficiency measures related to the new or increased source. Since December 8, 2011, ~200 permits (only 1 individual permit) have been issued to new or increased withdrawals in the Great Lakes Basin.

WDNR will continue to improve the water use permitting program by developing guidance and enforcement procedures. Improvement of data collection, as outlined in the priorities below, will complement the water use permitting program.

Great Lakes Diversions

A 'diversion' is defined in Wis. Stat. s. 281.346(1)(h), as "a transfer of water from the Great Lakes basin into a watershed outside the Great Lakes basin, or from the watershed of one of the Great Lakes into that of another, by any means of transfer, including a pipeline, canal, tunnel, aqueduct, channel, modification of the direction of a water course, tanker ship, tanker truck, or rail tanker except that the 'diversion' does not include any of the following:

1. The transfer of a product produced in the Great Lakes basin or in the watershed of one of the Great Lakes, using waters of the Great Lakes basin, out of the Great Lakes basin, or out of that watershed.

2. The transmission of water within a line that extends outside the Great Lakes basin as it conveys water from one point to another within the Great Lakes basin if no water is used outside the Great Lakes basin.

3. The transfer of bottled water from the Great Lakes basin in containers of 5.7 gallons or less."

The WDNR issued diversion approvals to eight public water supply systems that served water outside of the Great Lakes basin prior to December 8, 2008. *See* Wis. Stat. ss. 281.344(3e) and (3m). The WDNR also issued diversion approvals to private properties that began a diversion before June 11, 2008. *See* Wis. Stat. ss. 281.344(3m)(b).

Since Compact implementation, Wisconsin has granted diversion approval to the City of New Berlin, a straddling community, and two short term intrabasin transfer approvals to Enbridge Energy, L.P. Recently, Wisconsin received approval from the Regional Body and Compact Council for the first diversion for a community within a straddling county: the City of Waukesha's Application for Great Lakes Water with Return Flow.

All entities with diversion approvals are required, at a minimum, to annually report monthly withdrawals and associated return flow to the department by March 1. Data is annually submitted to the Great Lakes Commission. Continual improvement of WDNR's water use database, conservation program, and other priorities outlined below are critical to support this aspect of Wisconsin's Water Use Program. A future priority will be drafting an administrative code chapter specific to managing diversions (as WDNR is authorized in statute to do so).

WDNR's Water Use Data

During the formation of the Water Use Program, staff identified the data needed to capture statewide surface and groundwater withdrawals and locational information. Historically, WDNR's High Capacity Well System contained data related to high capacity wells (capacity of 100,000 gpd or more), but surface water withdrawals were obtained by working with other WDNR programs and databases (examples: the Wetlands and Waterways and Wisconsin Pollutant Discharge Elimination System (WPDES) Permit Programs). Much of the information for groundwater and surface water withdrawals was outdated or insufficient to satisfy the Water Use Program needs. Between 2008 and 2011,

an initial effort was made by Water Use staff to correct well ownership, locational data of withdrawals and data accuracy. Continued refinement of this information is part of the Water Use Program's annual data maintenance plan. Annual reporting requirements of monthly withdrawals improve data trend analyses and the Program's ability to implement quality control measures.

During the initial stages of the Water Use Program, USGS was instrumental in the original design of the Water Use Database structure. USGS downloads source data and withdrawal information on an annual basis. Using an U.S. Environmental Protection Agency (EPA) Grant, Water Use staff is finalizing a project to tie into the Exchange Network to enable USGS to obtain WDNR's data more efficiently.

The Water Use Database is the foundation for the WDNR online Water Use System. The Water Use System is the interface for Water Use staff to add and update withdrawal information, to view information related to the withdrawals, and serves as the external-facing system that allows required water users to report online (see Appendix A attached for current data collected). This online interface is more convenient for WDNR staff and our external customers. Approximately 75% of our water users report online, reducing costs of printing, mailing and manually entering paper reports. The online reports are often more complete (due to data validation processes) than the paper reports submitted to WDNR. The Water Use Web Spatial Viewer, currently available to WDNR staff, also references the information stored in the Water Use database for rendering the data in the online mapping tool.

Wisconsin Water Use Data Baseline Goals

The following workplan was created using the 2015 FY USGS Water Use Data Research (WUDR) Grant. As part of the 2015 WUDR grant, WDNR hosted the first statewide Water Use Symposium on May 24th, 2016. The Water Use Symposium focused on water use data in Wisconsin. Over 35 stakeholders representing a variety of sectors (agriculture, industries, local government, trade organizations and environmental non-profits) attended to learn about WDNR's Water Use Program, how we use data, share data and what future water use needs are. The feedback from symposium attendees, including a post-symposium survey, was used to clarify and prioritize this workplan.

Water Use Data and Alignment with USGS Tiers and Objectives

A complete table with the USGS Baseline Standards and an assessment of Wisconsin's data collection by water use category is available in Appendix B. After review of the USGS Baseline Standards for Major Water Use Categories, WDNR determined that Wisconsin water use data currently meets the Tier I objectives with minor exceptions:

- Aggregated data on acres irrigated and method of irrigation are not currently collected (provided by the water user in WI).
- All groundwater withdrawals do not currently have an aquifer designation.
- There may be inconsistencies and/or gaps in the golf course, mining, and aquaculture sectors for surface water sources reporting.

Similarly, Wisconsin water use data currently meets most of Tier 2 objectives with some exceptions:

- Monthly data on acres irrigated, crop type and method of irrigation system are not collected.
- Site-specific animal counts and animal types associated with water use are not tracked.
- Consumptive use data for individual golf courses are not available; some data are available on acres irrigated by course.
- Site-specific facility information (method, species cultured, etc.) on aquaculture facilities is not tracked.

Finally, Wisconsin water use data currently meets some of the Tier 3 objectives. The following lists the Tier 3 objectives that Wisconsin water use data does not meet or WDNR is uncertain of data availability:

- Site-specific consumptive use estimates.
- Interbasin transfers from the Mississippi River Basin to the Great Lakes Basin.
- Improved estimates of population served by site.
- Site-specific discharges to surface water or land application (industrial sector).
- Site-specific return flows for irrigation.
- Evaluation/reporting on water use by process for mining operations

Wisconsin priorities for improved water use data collection and water use data research align well with USGS priorities identified as part of the WUDR program (see Table 2 below). Wisconsin has been systematically improving water use data collection and interpretation through collaborations with state, federal and local government agencies. Wisconsin's immediate priorities for water use data and research include:

- Improve validation of irrigation water use data, including collection of acres irrigated, method of irrigation, crop type and consumptive use.
- Improve site-specific consumptive use and sector-based consumptive use coefficients and reporting.
- Improve data collection and delivery – through upgrading the data quality and expanded tools to provide water use data to interested parties.
- Identify aquifer of withdrawal and improve location information for groundwater withdrawals.
- Identify key factors that affect single family and multi-family residential water use in Wisconsin (for example, demographic, socioeconomic, geographic, and water rate factors).
- Update WDNR's 1982 Municipal Water Supply Conservation Needs Index.
- Improve water use outreach to all sectors.

Priority	USGS Set priority	Tier Objectives Addressed
A. Improve validation of irrigation water use data, including collection of acres irrigated, method of irrigation, crop type and consumptive use.	Irrigation: sources and volumes (including golf courses)	Irrigation Crop- Tier 2 and 3, Irrigation-Golf Course- Tier 2
B. Improve site-specific consumptive use and sector-based consumptive use coefficients and reporting.	Estimation of public supply deliveries to customer groups or classes, such as commercial, industrial, and domestic Improvement of the domestic per capita coefficients	Public Supply- Tier 3, Industrial- Tier 3, Irrigation-Crop- Tier 3, Thermoelectric- Tier 2, Irrigation-Golf Course- Tier 2
C. Improved data collection and delivery – through upgrading the data quality and expanded tools to provide water use data to interested parties.	Improved data collection and delivery	Applies to all objectives
D. Identify aquifer of withdrawal and improve location information for groundwater withdrawals.	Groundwater use: Identifying aquifer and HUC of withdrawal, and further refining the definition of saline/brackish water	Public Supply-Tier 1, Industrial- Tier 1, Irrigation-Golf Courses- Tier 1
E. Identify key factors that affect single family and multi-family residential water use in Wisconsin. (i.e. public supply system residential customers stratified by socioeconomic, demographic, and water rate factors).	Public supply residential customers stratified by socioeconomic, demographic, geographic and water rate factors	Public Supply - Tier -1, Tier 2, Tier 3
F. Update DNR’s 1982 Municipal Water Supply Conservation Needs Index.	Improved data collection and delivery; public supply systems stratified by socioeconomic factors;	Public Supply - Tier -1, Tier 2, Tier 3
G. Improve water use outreach to all water use sectors.	Improved data collection and delivery	Applies to all objectives

Table 2: Alignment of Wisconsin priorities with USGS priorities and tier objective

Workplan

Priority A

Improve collection and validation of irrigation water use data, including collection of acres irrigated, method of irrigation, crop type and consumptive use.

Associated Tier Objectives:

Irrigation Crop- Tier 2 and 3, Irrigation- Golf Course- Tier 2

Current State:

Agricultural Irrigation:

Agricultural irrigation in Wisconsin represents 4 percent of the statewide total annual withdrawal. However, it comprises 35 percent of the annual groundwater withdrawal and approximately one third of all sources. In many locations across the state, irrigation withdrawals are the only significant use of water and new irrigation installations continue to grow. As a result, the Water Use Program considers understanding the regulatory and scientific relevance of irrigation withdrawals to be one of the top priorities. Improving the quality and delivery of irrigation reporting and consumptive use was also identified by stakeholders as a top priority at the 2016 Water Use Symposium. Consumptive use for irrigation is defined as water not returned to the basin from which it was withdrawn – either water lost by evapotranspiration processes or incorporation into a product or agricultural crop.

Wisconsin law requires that registered water users report monthly withdrawals, the type of measurement, location and nature of use. Other factors such as acreage, cropping rotations and irrigation practices are not required and therefore, not currently reported to WDNR.

Water Use staff work to improve our understanding of irrigation withdrawals by merging reported water use data with land ownership records and remote sensing data to estimate irrigation application rates and consumptive use. A product of this effort has been an irrigation lands gridded spatial dataset shared with partners at WGNHS, the University of Wisconsin and USGS. Data are used for scientific research, permitting evaluations and identifying potential errors in reporting. Understanding these processes for specific crops and ecoregions in the state are important for water conservation and efficiency in agriculture.

In addition, WDNR is developing a statewide set of conservation standards for agricultural irrigation with partners including the University of Wisconsin, environmental non-profit organizations and the Wisconsin Potato and Vegetable Growers. Participation in the Conservation Standards Program will require growers to report specific data such as cropping rotations, acreages and irrigation practices. In addition, growers will be

expected to report economic factors so that the savings and efficiencies from water conservation can be calculated.

Golf Course Irrigation:

Irrigation for many golf courses is at the technological forefront of data based water management. Although, golf course irrigation in Wisconsin is relatively small representing less than 1% of the total groundwater withdrawal, it is highly visible and exemplifies the benefits of conservation. Further, Wisconsin's water use reporting shows that Wisconsin golf courses use substantially less water than many other locations in the country.

Recently, WDNR staff began working with individual golf courses, the University of Wisconsin, USGA and the Wisconsin Golf Course Superintendents Association to benchmark irrigation withdrawals and identify practices that conserve the most water at the greatest cost savings. This includes developing methods to separate reporting of source water withdrawals that may be used for multiple purposes from the volume of water used solely for irrigation.

Outcome:

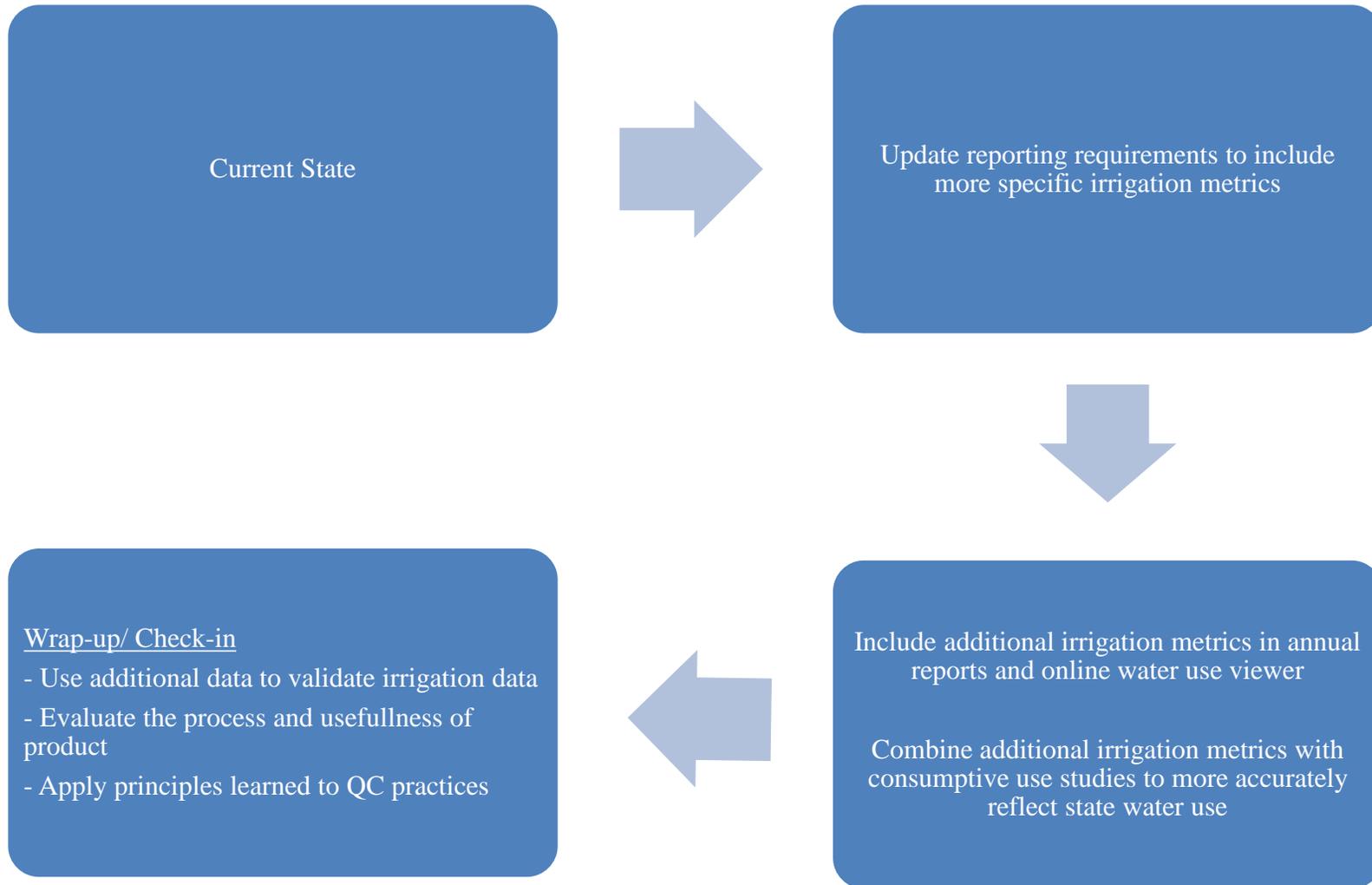
WDNR will improve the accuracy and usefulness of reported irrigation withdrawals through several methods. First, Water Use staff will pursue continued improvement of the irrigated lands dataset by increasing validation of irrigated lands. Results from this estimation will be cross-referenced with the specific data reported as a result of the Conservation Standards Program to revise and improve the irrigated lands dataset.

Second, Water Use staff will work with the Conservation Standards Program's participants to compare withdrawal measurement and reporting methods. This comparison will allow staff to identify potential sources of systematic measurement error and reporting inconsistencies. The overall quality and accuracy of reported irrigation withdrawal will be improved.

Water Use staff will assemble reported data, conservation program findings and remote sensing data to better understand evapotranspiration rates and estimate consumptive uses. Understanding consumptive use is particularly important for irrigation since it has one of the highest water loss rates among all users and is sensitive to climatic and agronomic variability. In addition, staff will collaborate with climatologists and hydrologists from the University of Wisconsin to develop evapotranspiration estimates that can be used to calculate landscape-scale or regional water budgets. This was identified by stakeholders at the 2016 water use data symposium as a priority.

Irrigation data collected by Wisconsin could be used by the USGS and other states that have similar geology, soils, landscape and cropping rotations to better understand their water availability and needs.

Process:



Priority B

Improve site-specific consumptive use and sector-based consumptive use coefficients and reporting.

Associated Tier Objectives:

Public Supply- Tier 3, Industrial- Tier 3, Irrigation-Crop- Tier 3, Thermoelectric- Tier 2, Irrigation- Golf Course- Tier 2

Current State:

Consumptive use is important to understand when managing water resources. The WDNR defines consumptive use as “a use of water that results in the loss or failure to return some or all of the water to the basin from which the water is withdrawn due to evaporation, incorporation into products, or other processes.” (s. 281.246 (1) (e), Wis. Stats.).

Currently, the WDNR relies on consumptive use coefficients to track consumptive use because site-specific water balances or consumptive use data (return flows) are not readily available. The WDNR has worked with USGS to compile sector-based consumptive use coefficients based on a preliminary review of consumptive use literature, specifically using those outlined in Shaffer and Runkle, 2007 (USGS, SIC 2007-5197) and other related documents. Some industries (paper mills, beverage industry) have specific consumptive use estimates that are not readily available to the public.

Using the estimated coefficients, Water Use staff calculate consumptive use for reported withdrawals in the Great Lakes basin to the Great Lakes Commission on an annual basis.

Under current Wisconsin Statute and Administrative Code, water loss approvals are required statewide for new or increased withdrawals that will result in a water loss averaging more than 2 MGD in any 30-day period. Persons with Great Lakes Basin withdrawals that existed prior to December 8, 2008, were given an “interim” authorized base level of water loss, which was reported to the Council of Great Lakes Governors (now the Conference of Great Lakes St. Lawrence Governors and Premiers).

Water use data collected and analyzed by Water Use staff will support future rule making associated with water management by providing a more comprehensive and accurate estimation of consumptive use for each sector.

Outcome:

WDNR will use site-specific industry or sector withdrawal and measured return flow data to establish consumptive use estimates based on withdrawals minus return flow. Data and information summarized will be verified with individual industries for accuracy. In addition, WDNR will engage contacts from specific industrial/commercial sectors to

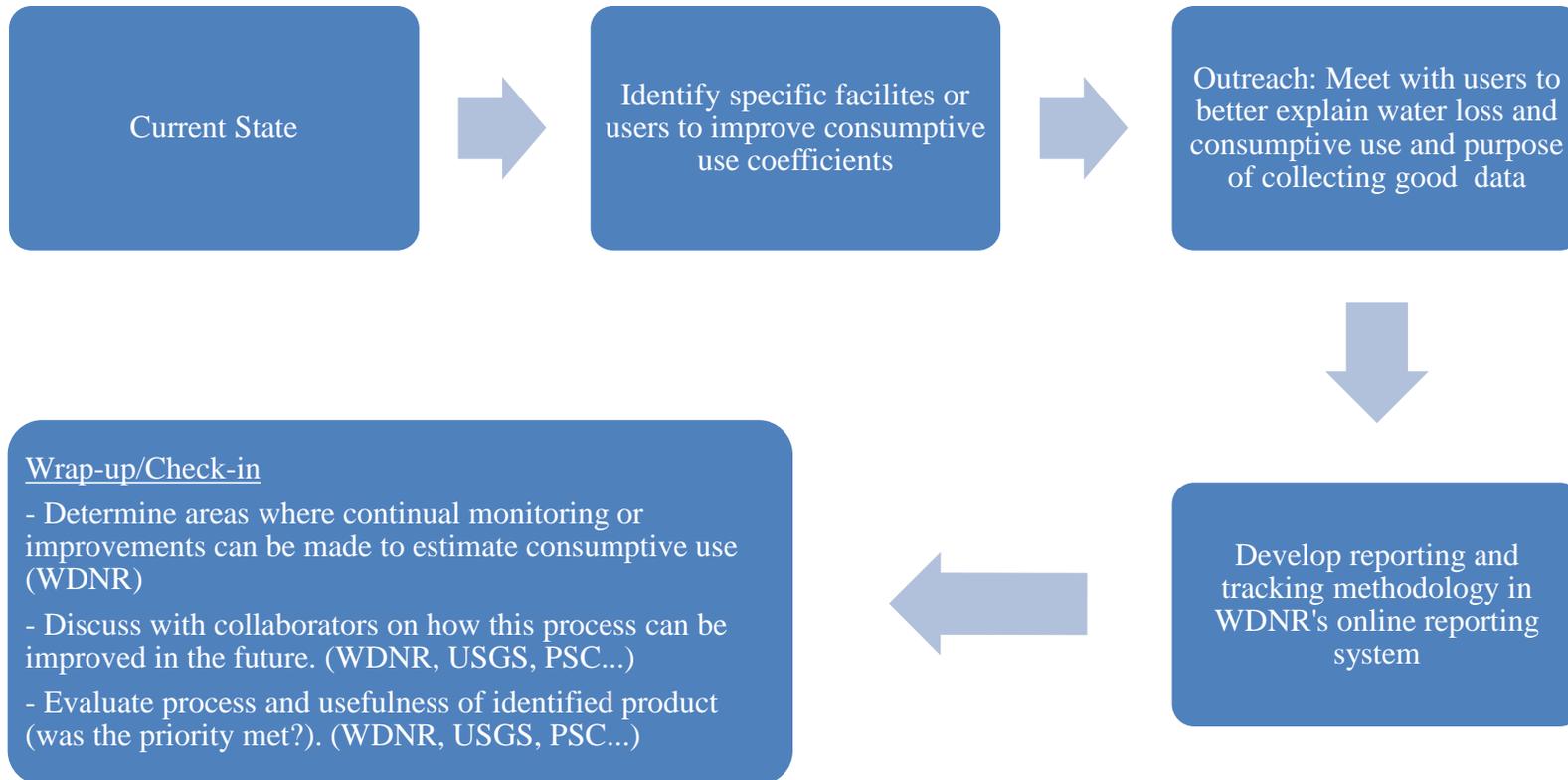
gather feedback on consumptive use estimates. In cases where water balances for facilities or systems may be present (thermoelectric power plants), WDNR will use this data as well.

A better understanding of consumptive use of industrial and commercial customers within public water supply systems is needed. WDNR staff will work with USGS, public water utilities and WPSC to examine the amount of water volumes sold to these customers versus water returned via public sewer systems. This data would help determine more accurate consumptive use estimates for both public water supply and the industrial/commercial sector.

A long-term goal includes statewide tracking in our water use database and verifying consumptive use through WDNR's online reporting process. Required reporting of withdrawals and associated consumptive use to the Great Lakes Commission will be continually improved with more accurate consumptive use estimates and coefficients that are Wisconsin-specific.

Overall, a better understanding of withdrawals and related consumptive use is important to Wisconsin and regional water management.

Process:



Priority C

Improved data integrity and delivery – through upgrading the data quality assurance measures and expanding tools to provide water use data to interested parties.

Associated Tier Objectives:

USGS identified research priority that applies to all tier objectives.

Current State:

In recent years, Wisconsin has established a successful water use reporting program that tracks monthly withdrawals from groundwater and surface water sources. Data are collected electronically or submitted in written form and entered manually into our water use database. Compliance rates with required reporting exceeded 95 percent from 2012 to present and the percentage of those reporting online has increased to over 75 percent. Included in the 95% are all major water users, the five percent annually that we do not receive reports from represent a minor portion of the state water use.

Various methods are currently employed to assess the quality of submitted data and to identify and correct detected errors. All individual reports across all sectors of water use are checked for internal validity by ensuring that sources cannot withdraw above their physical capacity or outside or in inappropriate seasons (e.g. irrigation in Wisconsin January). Data queries are used to identify order of magnitude errors or inadvertent reporting of meter readings instead of total volumes. In addition, sources in individual sectors are checked against expected demands related to the size of the facility or water use system (e.g. irrigation area, herd size, municipal population, etc...). When available, water withdrawal data reported to WDNR are compared to data received by other regulatory agencies such as WPSC or the Wisconsin's Department of Agriculture, Trade and Consumer Protection.

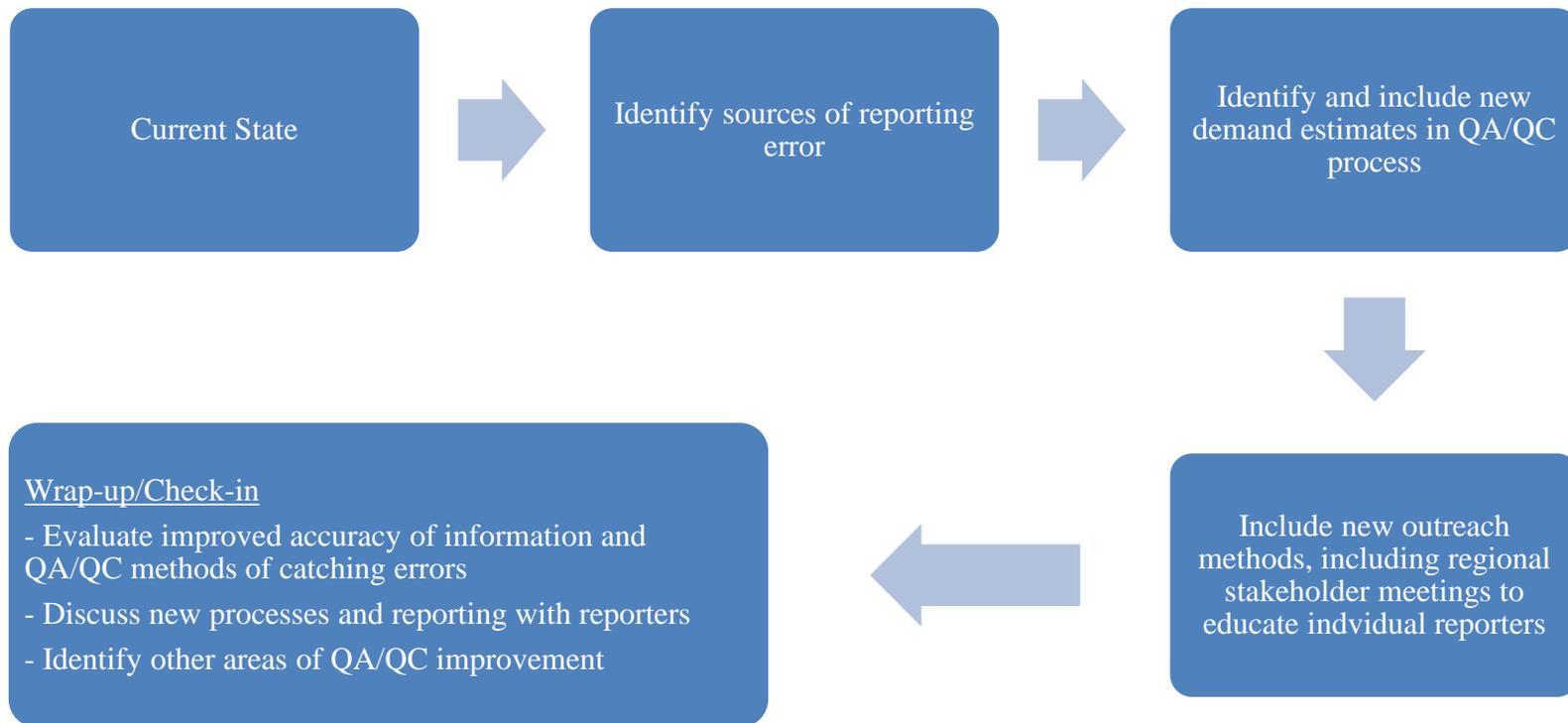
WDNR staff currently delivers water use data in a number of formats as mentioned in the above. An annual report is completed for the general public and [published online](#) that summarizes water use and shows general locations and distributions of water withdrawals across the state. GIS and tabular datasets are made available to other governmental partners and the general public with assigned data request. The department maintains a Water Withdrawal Data Viewer showing withdrawal locations and associated volume of water withdrawn at each source. Currently, the Water Withdrawal Data Viewer is limited to WDNR only and is used to assist in permitting decisions and environmental monitoring. Due to statutory restrictions, WDNR cannot show withdrawal locations at a scale finer than a survey section level. WDNR intends to create a public viewer that shows individual withdrawals identifiable within the section they are located.

Outcome:

WDNR will improve quality assurance and quality control (QA/QC) of water use data by continuing to hone demand estimations for irrigation, dairy and municipal supply and improving cross checking and coordination with other data gathering programs. In

addition, WDNR will continually work with individual reporters to identify potential sources of error in their measurement methods. This will improve the overall quality of individual water use reports as well as providing information regarding the relative accuracy of the statewide dataset used in WDNR's annual water use report.

Process:



Priority D

Identify aquifer of withdrawal and improve location information for groundwater withdrawals.

Associated Tier Objectives:

Public Supply-Tier 1, Industrial- Tier 1, Irrigation-Golf Courses- Tier 1

Current State:

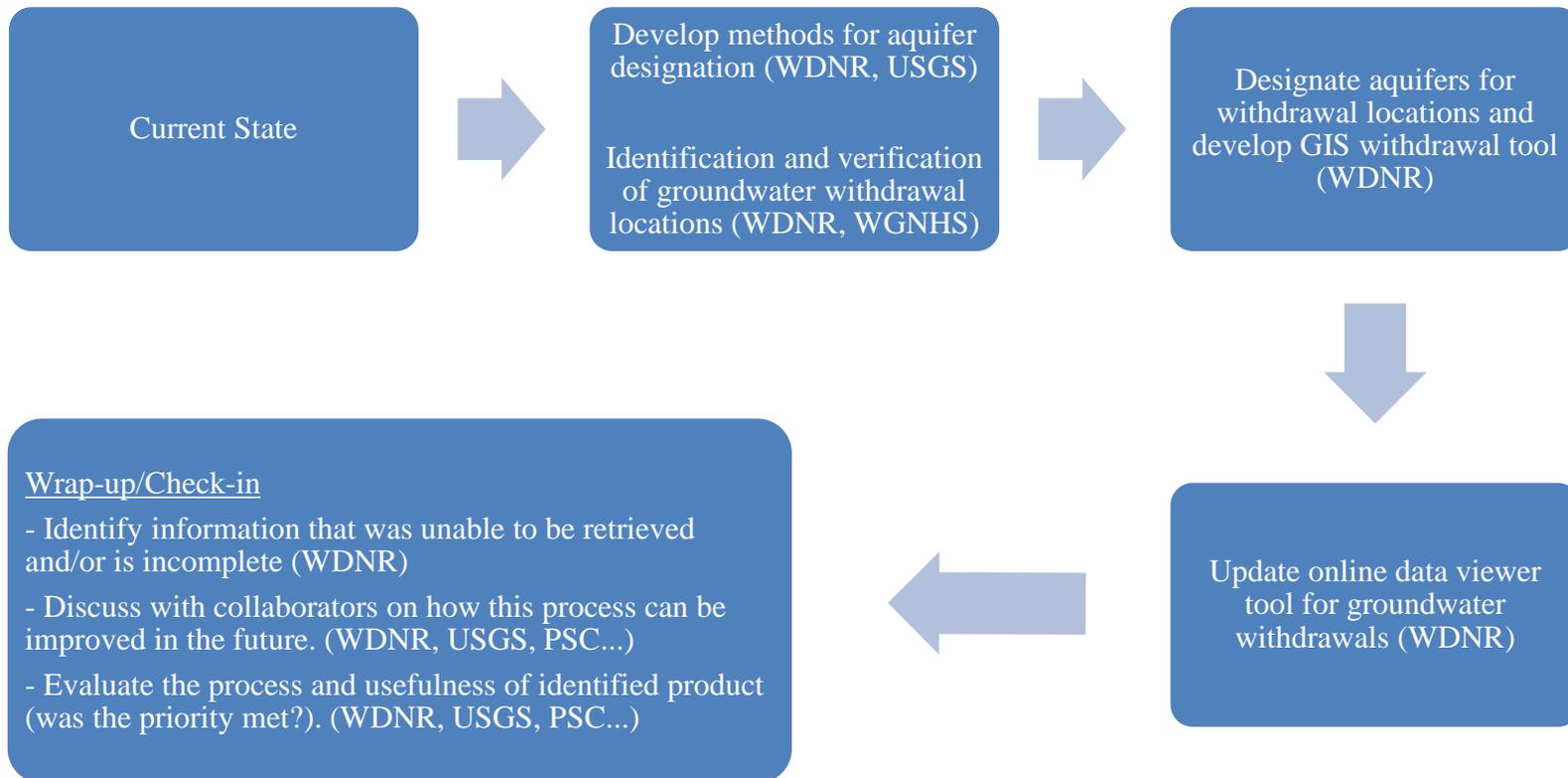
WDNR's Water Use Program has been systematically improving the location information of groundwater withdrawals through the review of well construction records, geologic logs (WGNHS), and aerial imagery. Over the last year, through cross referencing of these systems WDNR has updated or corrected over 75 percent of withdrawals with incomplete location or construction information. Staff continues to verify well locations and construction information where no well construction or geologic information was previously available.

Associated with these projects WDNR is collaborating with USGS and WGNHS to determine how to categorize aquifer withdrawals. Using the updated location and construction information the department is preparing GIS maps that will include withdrawal location, construction information, geologic formation and withdrawal volume.

Outcome:

The outcome of this project is an updated and accurate database that includes verified location information for groundwater withdrawals, well construction details and aquifer information. Further, GIS files containing detailed water use information for Wisconsin will provide accurate digital information to USGS and the general public. This project will create a mapping tool for tracking water use, withdrawal location, volume and aquifer sources in a single visual database through an online viewer. A query function is intended for this tool through which the user will be able to identify withdrawal volume from specific spatial extents and specific aquifers or surface watersheds. This tool will also enhance the public's and decision makers' understanding of water supply issues. For example, this data can be incorporated into WPSC's Residential Water Rates Dashboard <http://psc.wi.gov/utilityInfo/water/waterRatesDashboard.htm>.

Process:



Priority E

Identify key factors that affect single family and multi-family residential water use in Wisconsin.

Associated Tier Objectives:

Public Supply Tier 1, Tier 2, Tier 3

Current State:

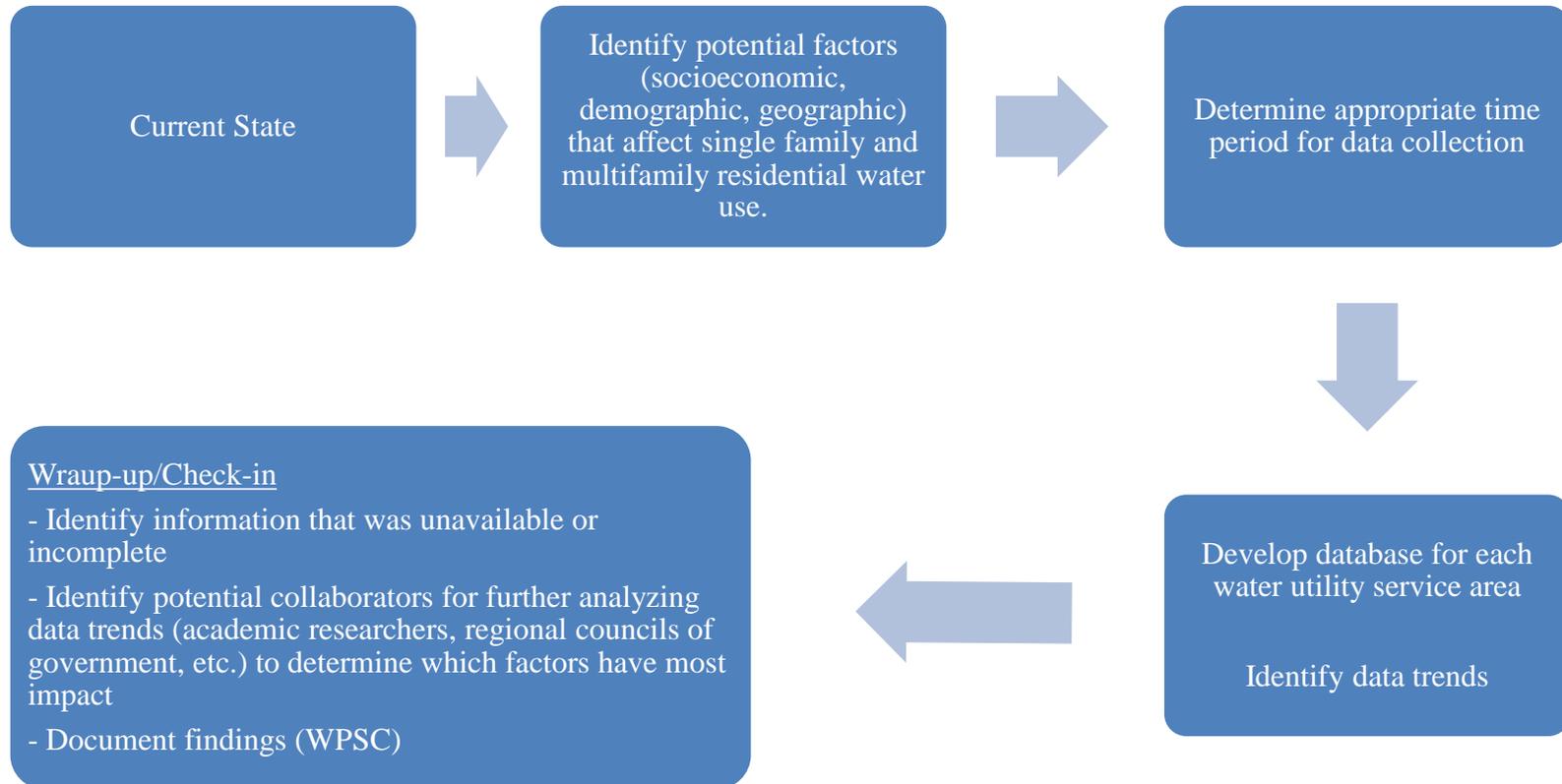
At present, every water utility reports to the WPSC total water volume sold for its residential customers. Beginning with reporting year 2014, WPSC reports and accounting practices were revised to require that utilities segregate single family residential customer data from multifamily customer data. In addition to water sales figures, WPSC maintains a database of every public utility's complete tariff (water rates and rules). While WPSC's Residential Water Rates Dashboard (see <http://psc.wi.gov/utilityInfo/water/waterRatesDashboard.htm>) includes some basic socioeconomic information for each utility's service area, there is currently no link between the WPSC's two primary databases - water sales and pricing – to other factors that affect residential use, including socioeconomic, demographic, housing data, etc.

Currently, forty-one water utilities have a conservation-oriented rate structure for residential customers, and sixteen utilities have a water conservation rebate or incentive program.

Outcome:

The outcome of this project is a list of key factors affecting single family and multifamily water use and an examination of trends over time. In addition to publishing this data on the WPSC and WDNR Water Use websites, this information will facilitate more strategic adoption of effective utility residential water conservation programs.

Process:



Priority F

Update DNR's 1982 Municipal Water Supply Conservation Needs Index.

Associated Tier Objectives:

Public Supply Tier 1, Tier 2, Tier 3

Current State:

Wisconsin has an abundant supply of fresh water – both from groundwater and surface water. However, droughts, contamination, declining water tables, low yield and main breaks in public systems occur, and conserving water provides savings to water utilities, customers and can help assure water availability for future users.

The Municipal Water Supply Conservation Needs Index has not been updated since the 1982 publication. The metrics defined in the index need to be reassessed (based on changing availability of data and definition of the conservation needs) and any progress made by counties/communities should be updated appropriately.

The current metrics outlined in this document include:

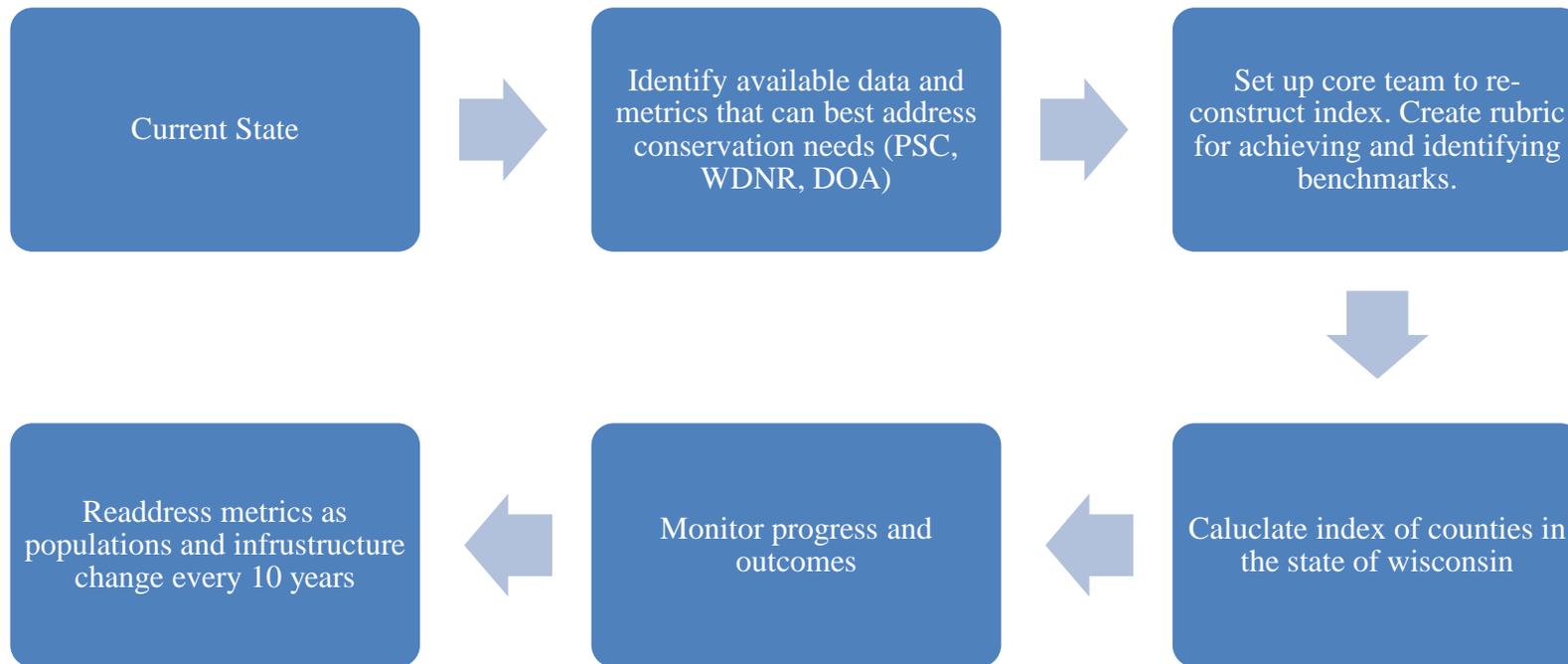
- Distribution system losses (formally unaccounted for water); non-revenue water (water loss)
- Residential water use/hydraulically overloaded sewage treatment plant
- Lack of metering
- Population growth
- Potential for supply problems (based on geology and current withdrawal practices)

Outcome:

Create an updated list of metrics that can be used to identify conservation needs of counties/communities. Establish a workgroup that can implement and analyze the process and progress of this project.

Successful completion of this project will help WDNR and WPSC to identify utilities with water access versus scarcity issues. It will also help Wisconsin answer the question: How do we define an insufficient source capacity?

Process:



Priority G

Improve water use outreach to all water use sectors.

Associated Tier Objectives:

All objectives

Current State:

Outreach is a key component of Wisconsin's Water Use Program and aids in furthering our goal to ensure that water use is sustainable. The Water Use Program undertakes multiple outreach efforts in a variety of channels to reach out to stakeholders, the public, and the regulated community. These include:

- Developing and updating Water Use Program specific fact sheets (Registration, Reporting, Permitting, Fees, Conservation)
- Publishing an annual summary of water withdrawal reporting available on WDNR's website
- Providing funding for Water Use Audits (first major project included a water audit at Peninsula State Park, one of the most used parks in the state)
- Creating an interactive web viewer
- Participating in Fix-a-Leak-Week
- Promoting the Water Use Program, especially water conservation at the Wisconsin State Fair on an annual basis

Through these efforts the Water Use Program provides information and resources to the general public to conserve water in their home such as: dye tablets to detect toilet leaks, faucet aerators, and high efficiency showerheads. Outreach to the regulated community has helped increase compliance and understanding of Water Use Program requirements (for example, statewide water withdrawal reporting has increased to 95%).

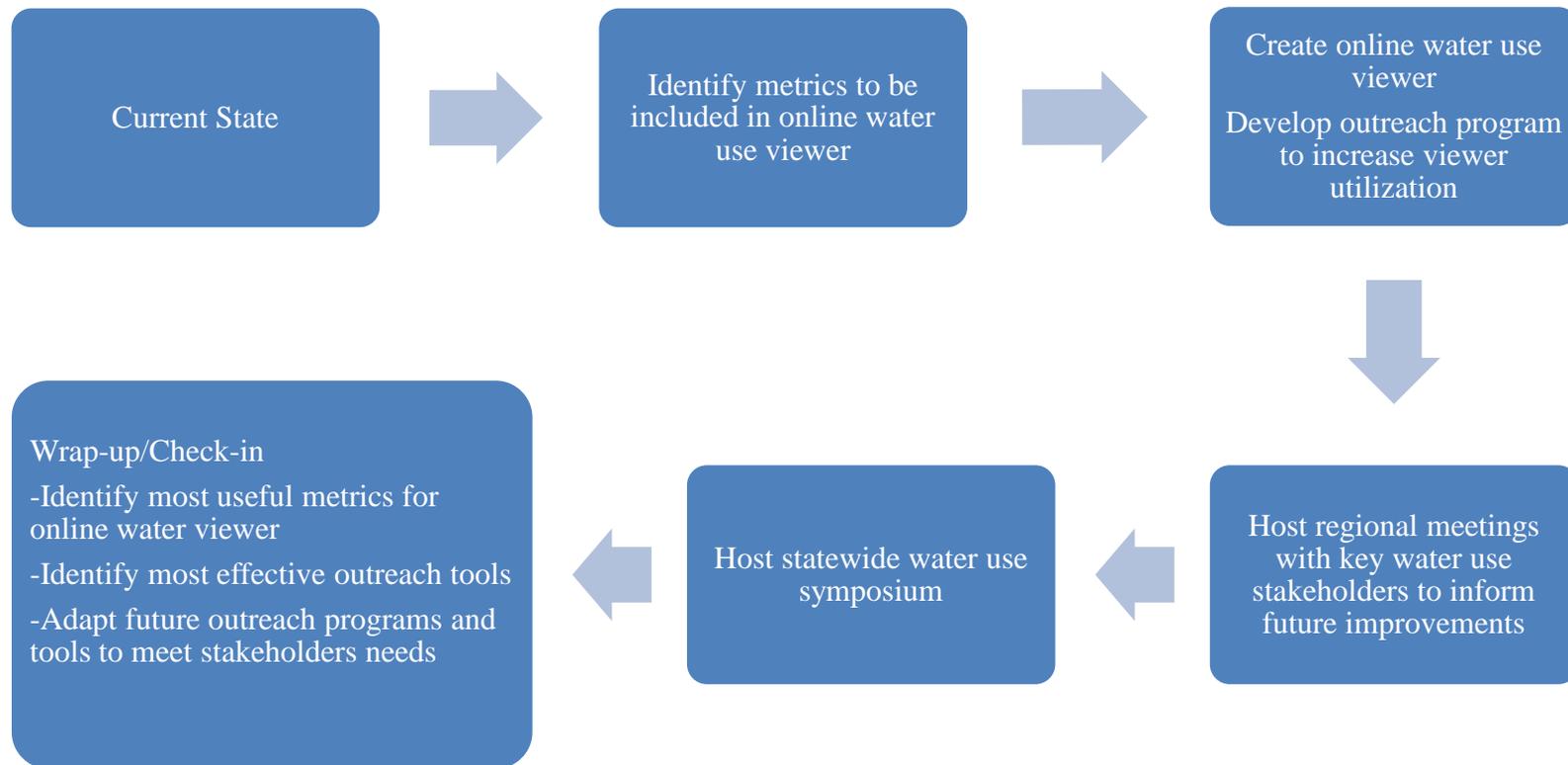
WDNR has delivered water use data reports over the last 5 years as requested by the legislature, general public and regulated community. In addition, the USGS has direct access to data through the Web Exchange Network. WDNR's 2016 Water Use Symposium engaged stakeholders from agriculture, industries, local government, trade organizations and environmental non-profits and determined that current usage of water use data was limited to very specific users, in part due to the limited understanding of what data was available.

Outcome:

The Water Use Program will work towards developing an online water use viewer. The viewer is a tool that will allow all stakeholders to understand annual, monthly, and cumulative withdrawals, spatially from a single source. Combined with the additional work completed on the attachment of aquifer withdrawal source, and use type it will

provide a first of its kind tool to understand water use volume and use category spatially. An ultimate goal identified by stakeholders at the 2016 Water Use Symposium was incorporating water quality and quantity data into a spatial viewer for a comprehensive understanding of Wisconsin's water resources. As part of the online water use viewer effort WDNR will develop a comprehensive outreach program to increase the tools and data usage among all stakeholders of the state. WDNR anticipates hosting an annual meeting, in a different region of the state, each year to best understand key stakeholder's needs. Every five years, the WDNR hopes to host a state wide water use symposium that will draw all the stakeholders together to share new techniques and inform the Water Use Program's future work. There are many opportunities to work in partnership with other agencies and organization on water use outreach.

Process:



Appendix A – Current WDNR Water Use Database Information Collected

1. Property-Level Information
 - a. Owner contact information
 - b. Withdrawal use by property and by source
 - c. Property registration date and status
 - d. Water Use Permit information for Great Lakes Basin withdrawals
 - i. General or Individual permit type
 - ii. Permitted withdrawal amount
 - e. High Capacity Well Application and Approval information
 - f. Historic annual Water Use Reporting information
 - g. Annual Water Use Invoicing information
2. Withdrawal Sources-Level Information
 - a. Source operator contact information
 - b. Source status and date
 - c. High capacity well identifiers (Hicap Well No, WI Unique Well No, Hicap Property No)
 - d. Withdrawal capacity (gallons/day) and approved maximum withdrawal capacity (gallons/day)
 - e. High capacity application approval date and well construction date
 - f. Location information
 - i. County
 - ii. Basin
 - iii. Civil Town
 - iv. Public Land Survey to quarter/quarter
 - v. Latitude and Longitude
 - g. Other DNR water permitting program reference ID's (Chapter 30, WPDES, PWS)
 - h. Link to Well Construction Reports where available
3. External and Internal web annual water use reporting interface

Appendix B – USGS Baseline Standards for Major Water Use Categories and Wisconsin DNR Data Collection

Category	Tier 1 (Baseline Goals)	Tier 2	Tier 3
Public Supply	<p>Monthly withdrawals reported by system, water source, and water type. <i>All data collected by WDNR.</i></p>	<p>Site-specific annual and monthly withdrawals (by intake, well, or well field) reported by water source, and by water type. <i>All data collected by WDNR.</i></p>	<p>Interbasin transfers. <i>Interbasin transfer data collected by WDNR for the Lake Michigan and Lake Superior Basins, but not transfers from the Mississippi River Basin to the Great Lakes Basin.</i></p>
	<p>Deliveries to domestic users from public-supply systems, and populations served. <i>All data collected by PSC.</i></p>	<p>Quantity of water purchased between systems, and source(s) of purchased water. <i>All data collected by WDNR or PSC.</i></p>	<p>System uses (internal and other non-revenue uses) and losses. <i>All data collected by PSC.</i></p>
	<p>Report system information relevant to HUC-8 and county, and groundwater withdrawals with aquifer designation. <i>With this grant, WDNR has assigned aquifer designation for groundwater withdrawals.</i></p>	<p>Quantity of water sold between systems. <i>Data collected by PSC.</i></p> <p>Reporting and/or verification of water deliveries for domestic, commercial, industrial, thermoelectric and other use. <i>Data collected by PSC.</i></p>	<p>Improve estimates of populations served by site (for example, by surface-water intake, well or well field). <i>This is data not collected per withdrawal site.</i></p> <p>Use of reclaimed wastewater for public or landscape irrigation. <i>WDNR is uncertain if these data are collected.</i></p>
Industrial	<p>Annual withdrawals by facility, reported by water source, by water type, and industry classification. <i>All data collected by WDNR (however not tied to standardized federal or international codes, can crosswalk to these).</i></p>	<p>Site-specific (by intake and/or well) annual and monthly withdrawals reported by water source, by water type, and industry classification. <i>All data collected by WDNR.</i></p>	<p>Site-specific consumptive use estimates. <i>These data may exist for some industrial withdrawals, but are not currently collected by WDNR.</i></p>
	<p>Groundwater withdrawals reported with reference to aquifer. <i>With this grant, WDNR has assigned aquifer designation for groundwater withdrawals.</i></p>	<p>Deliveries from public supply to industrial facility, and deliveries from other sources, such as treated wastewater. <i>PSC receives reports on public supply deliveries to industry. All other available information collected by WDNR.</i></p>	<p>Site-specific discharges to surface water, or land application. <i>Industrial discharges to surface water and land application is tracked by WDNR.</i></p>

<p>Irrigation-Crop</p>	<p>Aggregate annual withdrawals reported by water source, by water type, acres irrigated, and method of irrigation. All data collected by DNR, except for acres irrigated and method of irrigation.</p> <p>Aggregate areas may be sub-county levels, but are feasible to summarize to county or HUC8. WDR aggregates data by Great Lakes Basin for irrigation. WDR is able to summarize this data at other levels upon request.</p>	<p>Site-specific monthly withdrawals by well and/or diversion from surface-water feature, or delivery from reclaimed wastewater. All data collected by DNR.</p> <p>Monthly withdrawals reported by water source, water type, with associated acres irrigated and crop type, and method of irrigation system. Monthly withdrawals and water sources are collected. Data on acres irrigated, crop type and method of irrigation system are not collected by WDR.</p>	<p>Consumptive use and conveyance loss estimates by aggregate area (sub-county, county, HUC8, or up to HUC12). WDR currently aggregates this information for Great Lakes Basin. WDR does not do this by HUC code, but the information is available to make these estimates.</p> <p>Site-specific return flows. WDR does not collect this information.</p>
<p>Thermoelectric</p>	<p>Site-specific, annual and monthly withdrawals, and net power generation reported by cooling-system type (once-through or recirculating), by water source and by water type, and the source of the information (plant, govt. agency, etc.). Site-specific return flows. All data collected by WDR.</p>	<p>Site-specific annual and monthly consumptive use. WDR does not collect site-specific consumptive use data, but this may be available for some facilities in Wisconsin.</p>	
<p>Self-Supplied Domestic</p>	<p>Self-supplied domestic populations, by HUC8 and county, and by water source. WDR does not collect or estimate self-supplied domestic water use.</p>	<p>Studies of actual metered domestic withdrawals, monthly by source. Improve estimates of self-supplied populations by utilizing property data and/or public water supply service areas, or other methods. These data are not available.</p>	
<p>Irrigation – Golf Courses</p>	<p>Site-specific annual and monthly withdrawals reported by water source, by water type, and acres irrigated. Groundwater withdrawals designated by aquifer. All data collected by WDR, except for acres irrigated. There may be inconsistencies and/or gaps in the surface</p>	<p>Consumptive use estimates, by course, reported by month or annual. Site-specific consumptive use data for individual golf courses are not available.</p>	

	water sources reporting.	Acres irrigated by system type, by course. Some data are available on acres irrigated by course.	
Livestock	Annual withdrawals for major facilities, reported by water source and by water type. All data collected by WDNR.	Site-specific annual and monthly withdrawals for all facilities reported by source of water, and by water type. All data collected by WDNR. Site-specific animal counts and animal type. Site-specific animal counts and animal types associated with water use are not collected, but withdrawers often use this information to determine monthly water use.	Improved and verified coefficients for water use per head for animal type, confined or open-range, seasonal variability, and other variables. WDNR has not evaluated coefficients for livestock. Water withdrawals from sources supported by USDA programs to protect streams. WDNR does not collect data specific to USDA programs. However some of this information may be available for large permitted facilities (CAFOs) in Wisconsin.
Mining	Annual withdrawals reported by HUC-8 and county, by source of water, and by water type. WDNR collects annual withdrawals by source of water and by water type. Inconsistencies and gaps in the surface water sources reporting may exist. County of withdrawal is included in the report, HUC8 information is not collected, but could be spatially derived.	Site-specific annual and monthly withdrawals. Site-specific commodity identified. Site-specific annual and monthly data are collected by WDNR. WDNR does not collect the site specific commodity. Inconsistencies and gaps in the surface water sources reporting may exist.	Evaluation/reporting on water use by process (commodity processing, dewatering, dust suppression, etc.). These data are not collected by WDNR. Reporting on return flows/discharge of water from dewatering. If the facility has a permitted surface water outfall, return flow or discharge is collected by WDNR's WPDES program.
Aquaculture	Annual withdrawals reported by HUC-8 and county, by source of water, and by water type. WDNR collects annual withdrawals by source of water and by water type. Inconsistencies and gaps in the surface water sources reporting may exist. County of withdrawal is included in the report, HUC8 information is not collected, but could be spatially derived.	Site-specific annual and monthly withdrawals. Site-specific facility information (method, species cultured, etc.) Site-specific annual and monthly data are collected by WDNR. Site-specific facility information (method, species cultured, etc.) on aquaculture facilities are not tracked.	

Commercial	Annual and monthly deliveries from public supply for commercial use. <i>All data collected by WDNR.</i>	Site-specific annual and monthly withdrawals for self-supplied establishments. <i>All data collected by WDNR.</i>	
Hydroelectric Power	Site-specific, annual and monthly water use (water use to spin turbines) by water source and water type, and the source of the information (plant, govt. agency, etc.). <i>All data collected by WDNR.</i>		
Wastewater Treatment	Annual and monthly deliveries from wastewater treatment plants to other users. Specify category delivered to (i.e. industrial, thermoelectric, irrigation, etc.) <i>All data collected by WDNR.</i>		

WDNR – Wisconsin Department of Natural Resources

PSC – Public Service Commission of Wisconsin

Appendix C – Wisconsin DNR Water Use Codes Crosswalk to USGS Water Use Codes

WDNR Water Use Code	USGS National Water Use Code ⁴	USGS Primary Use of Water Codes ⁵	USGS AWUDS equivalent ⁶	Wisconsin DNR Water Use Code Description
PUBLIC WATER SUPPLIES [defined and regulated under NR 809 and NR 811 of the Wis. Adm. Code]				
Municipal Water Systems [defined in NR 811.02(41)]				
PS11	Water supply	P	PS	Public/Municipal/Community Utility [defined in NR 811.02(20)], other than a specifically listed use
PS12	Water supply	T	CO-PS	Hospitals and health institutions; does not include other health care facilities such as dental offices and hospices (see PS45)
PS13	Water supply	T	PS	Military and correctional facilities
Other-Than-Municipal (OTM), Community Water Systems [defined in NR 811.02(45)]				
PS21	Water supply	P	DO or PS	Other than Municipal Community Water Systems, other than a specifically listed use
PS22	Water supply	P	DO or PS	Single-unit housing, including subdivisions, estates, and mobile home or trailer parks serving 25 or more people
PS23	Water supply	P	DO or PS	Multi-unit housing, including duplexes, apartments, resort developments, and condominiums serving 25 or more people
Non-Transient, Non-Community Water Systems [defined in NR 809.04(48)]				
PS31	Commercial	varies (typically C, N, or T)	CO-PS	Public/Non-Transient/Non-Community potable use (examples are day cares and factories); all uses except academic institutions serving 25 or more people
PS32	Commercial	T	CO-PS	Academic institutions, does not include K-12 schools as defined in NR 812.07(94) but serves at least 25 of the same persons over 6 months per year (See PS50 for K-12 schools)
Transient, Non-Community Water Systems [defined in NR 809.04(78)], potable use for more than 25 persons at least 60 days of the year				
PS41	Commercial	C	CO-PS	Public/Transient/Non-Community serving 25 or more people 60 or more days per year, other than a specifically listed use
PS42	Commercial	C	CO-PS	Lodging (examples are hotels and motels)
PS43	Commercial	C	CO-PS	Eating and drinking establishments (examples are restaurants and taverns)

⁴ USGS National Water Use Codes are defined in the National Water Information System Documentation Index version 5.2, section 1.34.

⁵ USGS Primary Use of Water Codes are defined in the National Water Information System Documentation Index version 5.2, section 1.45

⁶ USGS AWUDS (Aggregate Water-Use Data System) equivalent codes are found in AWUDS documentation version 3.1, Appendix A.

PS44	Commercial	C	CO-PS	Businesses and retail stores, including office parks and malls serving 25 or more people 60 or more days per year
PS45	Commercial	C	CO-PS	Other transient, non-community water systems (e.g. dental offices, hospices, churches, airports, bus stations)
Schools [defined in NR 812.07(94)]				
PS50	Commercial	T	CO-PS	K-12 schools, potable use for more than 25 persons served in a school as defined in NR 812.07(94); does not include irrigation withdrawals for athletic fields (see IR32) or facilities that only have 4 year old kindergarten (see PS31)
DOMESTIC SUPPLY, includes apartment buildings, condominiums and small schools that are not public water supplies				
DS11	Domestic	H	DO	Private/Single Residence, potable use (such as a single home or housing unit)
DS12	Domestic	H	DO	Private/Multiple Residences, potable use for less than 25 persons served such as condominium or apartment building with less than 10 units, a shared well or withdrawal serving less than 7 houses or 10 mobile homes
IRRIGATION				
IR10	Irrigation	I	IR	Agricultural irrigation (examples are corn, potatoes, grains, vegetables, and forages), other than a specifically listed use
IR21	Irrigation	I	IR	Forestry and tree farm, including the growing of evergreens, trees, and shrubs
IR22	Irrigation	I	IR	Orchards, green houses, and plant nurseries, including the growing of herbs, seeds, flowers and ornamentals
IR23	Irrigation	I	IR	Cranberries, includes irrigation and harvest; does not include water used to process food products
IR24	Irrigation	I	IR	Berries, does not include cranberries
IR25	Irrigation	I	IR	Sod farm (does not include lawn or landscape watering, see IR99)
IR31	Irrigation	I	IR	Golf courses
IR32	Irrigation	I	IR	Park and recreation fields
IR99	Irrigation	I	IR	Other non-agricultural irrigation, including lawn and landscape watering; does not include supplementing water levels in ponds and lakes (see OT13)
LIVESTOCK				
LV10	Livestock	S	LV	Dairy farming, includes all water uses on farm except irrigation and residential domestic use
LV20	Livestock	S	LV	Non-dairy farming and animal husbandry, includes all water uses on farm except irrigation and residential domestic use

AQUACULTURE				
AQ10	Aquaculture	Q	AQ	Aquaculture (fish farms and hatcheries), includes all water uses at facility except potable use (see PS43 or CO99)
INDUSTRIAL				
IN10	Industrial	"J" for cooling; otherwise, "N"	IN	Paper and paper products manufacturing
IN32	Industrial	N	IN	Dairy product manufacturing
IN41	Industrial	B		Water bottling
IN42	Industrial	N	IN	Beverage manufacturing; does not include dairy products and water bottling
IN51	Industrial	"J" for cooling; otherwise, "N"	IN	Chemical manufacturing (examples are paints, adhesives, asphalt, pharmaceuticals, detergents, resins, plastics, and rubber); does not include fuels
IN53	Industrial	"J" for cooling; otherwise, "N"	IN	Chemical manufacturing, bio-fuels (example ethanol)
IN61	Mining	K	MI	Mine and quarry dewatering, including metallic and non-metallic minerals; does not include mineral preparations or manufacturing
IN62	Industrial	N	IN	Mineral (metallic and non-metallic) preparations (examples are washing and sorting) not including industrial sand preparation
IN63	Industrial	N	IN	Construction, dewatering use only
IN64	Industrial	N	IN	Construction, other use (example, dust suppression); does not include dewatering
IN65	Industrial	N	IN	Industrial sand preparations (aka "frac sand"); examples are washing and sorting
IN98	Industrial	"J" for cooling; otherwise, "N"	IN	Industrial use for manufacturing, other than a specifically listed use; (examples are lumber, furniture, foundries, machinery, electrical and transportation equipment, and leather products)
IN99	Industrial	"J" for cooling; otherwise, "N"	IN	Industrial use, other than a specifically listed use; does not include manufacturing use
COMMERCIAL AND INSTITUTIONAL (see also non-community water system water-use codes)				
CO21	Commercial	C	CO	Recreation, non-potable use for winter sports, including snow making and ice-skating ponds/rinks
CO22	Commercial	C	CO	Recreation, non-potable use other than a specifically listed use, including amusement facilities such as water parks, aquariums, and zoos
CO30	Commercial	A	CO	Geothermal systems used for building heating, ventilation and air conditioning (HVAC) systems
CO99	Commercial	C	CO	Commercial or institutional potable use at places not regulated as a public water supply (serves less than 25 persons or is used less than 60 days per year), other than a specifically listed use above (examples are campgrounds, businesses, stores, offices)

ELECTRICITY GENERATION				
EG21	Thermoelectric power	E	PO	Thermoelectric power generation, once-through cooling, fossil fuel
EG22	Thermoelectric power	E	PO	Thermoelectric power generation, once-through cooling, nuclear
EG31	Thermoelectric power	E	PC	Thermoelectric power generation, recirculated cooling, fossil fuel
EG99	Commercial	C	CO	Electricity generation water use, other than specifically listed, including generation from renewable sources (bio-fuels)
FIRE PROTECTION, REMEDIATION, AND OTHER USES				
OT01	varies	F	CO-OT	Fire protection
OT11	Remediation	Z, D	CO-RM	Groundwater remediation, gradient control, or contaminant plume control
OT12	Wastewater treatment	Z	CO-ST	Wastewater treatment, includes wastewater treatment plants [defined in NR 114.03(14)]
OT13	No equivalent	Z, R	CO-OT	Supplementing water levels in aesthetic ponds or lakes; does not include storage ponds for irrigation or fire protection
OT14	No equivalent	U	CO-OT	Flowing well discharge, where the water is not used for any other listed purpose
OT98	No equivalent	Z	CO-OT	Other withdrawal, not defined by any other water-use purpose, approved at less than 70 gallons per minute
OT99	No equivalent	Z	CO-OT	Other withdrawal, not defined by any other water-use purpose, approved at 70 or more gallons per minute

For specifics of how USGS staff translate Wisconsin DNR water use codes to USGS water use codes please contact Cheryl Buchwald, Water Use Specialist, USGS Wisconsin Water Sciences Center, cbuchwa@usgs.gov.