



RICK SNYDER
GOVERNOR

STATE OF MICHIGAN
OFFICE OF THE GREAT LAKES
LANSING



PATRICIA BIRKHOLZ
DIRECTOR

November 22, 2011

Mr. David Naftzger, Executive Director
Great Lakes-St. Lawrence River Basin Water Resources Council
c/o Council of Great Lakes Governors
20 North Wacker Drive, Suite 2700
Chicago, Illinois 60606

Subject: Water Conservation and Efficiency Program Review Report Submitted on
Behalf of Michigan

Dear Mr. Naftzger:

On behalf of the State of Michigan, please find enclosed a Water Conservation and Efficiency Program Review Report being sent pursuant to and in satisfaction of the obligations included in Section 4.2.2 of the Great Lakes-St. Lawrence River Basin Water Resources Compact.

If you have any questions, please do not hesitate to contact me.

Sincerely,

Patricia Birkholz
Director
517-335-4056

Enclosure

cc/enc: Governor Rick Snyder
Mr. Grant Trigger
Mr. Dan Wyant, Director, Michigan Department of Environmental Quality (MDEQ)
Mr. Rodney Stokes, Director, Michigan Department of Natural Resources
Mr. Keith Creagh, Director, Michigan Department of Agriculture and Rural
Development
Mr. Frank Ruswick, MDEQ



RICK SNYDER
GOVERNOR

STATE OF MICHIGAN
DEPARTMENT OF ENVIRONMENTAL QUALITY
LANSING



DAN WYANT
DIRECTOR

Water Conservation and Efficiency Program Review

This Water Conservation and Efficiency Program Review fulfills Michigan's obligation under Section 4.2.2 of the Great Lakes – St. Lawrence River Basin Water Resources Compact to "annually assess its [water use] programs in meeting the Party's goals and objectives, report to the [Compact] Council and the Regional Body and make this annual assessment available to the public."

1. Lead agency and contact person.

The Michigan Department of Environmental Quality (MDEQ) is the lead agency responsible for Michigan's water conservation and efficiency ("Water Use") program (<http://www.michigan.gov/wateruse>). Patricia Birkholz, Director, Office of the Great Lakes, is the lead contact.

2. Status of the State or Province's Water conservation and efficiency goals and objectives consistent with the Basin-wide goals and objectives.

Michigan adopted goals and objectives consistent with the Basin-wide goals and objectives on December 8, 2010. See Appendix 1. These goals and objectives were developed by the Water Resources Conservation Advisory Council (WRCAC) consisting of a 21-member stakeholder group of executive and legislative appointees (<http://www.michigan.gov/wrcac>). The WRCAC established a collaborative forum for study, evaluation and providing advice on Michigan's Water Use Program.

In recommending goals and objectives, the WRCAC envisioned that it would submit what it had developed, entitled the "Michigan Water Conservation and Efficiency Initiative" for public review and comment. Further, the WRCAC envisioned that it would make final recommendations after addressing public comment. However, Executive Order 2009 - 45, issued on October 8, 2009, eliminated the WRCAC following the completion of its statutory charge of issuing a final report (http://www.michigan.gov/documents/dnr/WRCAC_November_2009_report_301194_7.pdf).

As required by Section 4.2.2 of the Compact, the MDEQ will make this Program Review available to the public. The MDEQ is seeking comment on Michigan's goals and objectives as part of that public review opportunity and will consider modifications to the goals and objectives as indicated by public comment.

3. Water Use Program Overview.

The foundation of Michigan's Water Use Program is the water withdrawal assessment required of all new or increased large quantity withdrawals ("Large Quantity Withdrawals"). The assessment process is established by Michigan's ground-breaking legislation that conserves and protects the water resources of the Great Lakes Basin.

See Part 327, Great Lakes Preservation, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (NREPA) <http://legislature.mi.gov/doc.aspx?mcl-451-1994-III-1-THE-GREAT-LAKES-327>. Using the online water withdrawal assessment tool and available site-specific review, the resource impacts of a proposed withdrawal can be measured in advance. Under Michigan's statute, a proposed withdrawal must meet the environmental and ecological standard of "no adverse impact" through the assessment process before the withdrawal can occur. MCL 324.32706b. Withdrawals are cumulatively tracked and accounted against this standard, ensuring that even at the smallest watershed scale, the water resources of the basin will not be impacted beyond set, acceptable limits.

But Michigan's Water Use Program goes beyond the assessment process to comprise a comprehensive program of water use management. This program is structured by Part 327, Great Lakes Protection, of the NREPA, supported by other authorities such as the Safe Drinking Water Act, 1976 PA 399, as amended (SDWA) <http://legislature.mi.gov/doc.aspx?mcl-act-399-of-1976>, and establishes an integrated framework of roles and responsibilities for private and public water users and governmental agencies in managing Michigan's water resources. Further, this framework creates opportunities for involvement by the public (through, e.g., local committees and volunteer efforts such as stream monitoring), universities, (through, e.g., research and technical assistance) and other interested parties resulting in a latticework of shared investment in the sustainability of Michigan's lakes, streams, and groundwater.

4. Consistency of Michigan's Water Use Program with the regional objectives and promotion of Environmentally Sound and Economically Feasible Water Conservation Measures ("Water Conservation Measures")

a. Guide programs toward long-term sustainable water use.

Michigan implements an adaptive, goal-based, accountable and measureable system of water use management. Michigan's water withdrawal assessment process requires that all Large Quantity Withdrawals be measured against a pre-defined ecologically-based withdrawal limit for the water source in question. The assessment process uses a series of a statutory gradations of impact to the resource from Zone A (least impact) to Zone D (an adverse resource impact, which is prohibited) as the basis for determining whether a withdrawal is authorized and, if so, under what conditions.

A user can evaluate where along this gradation his or her withdrawal would lie by using an online assessment tool. Proposed withdrawals that would have little impact (Zone A and some Zone B withdrawals) can proceed upon registration. Proposed withdrawals in Zone C or D can not proceed and are subject to a site-specific review by the MDEQ.

The online assessment tool uses a series of conservative assumptions to screen for proposed water withdrawals that may result in adverse resource impacts. Based on the assessment, MDEQ can determine whether a proposed withdrawal requires closer

regulatory consideration. If so, through a site-specific review, the MDEQ can consider project and site-specific factors such as the pumping schedule and whether the aquifer is hydraulically-connected to surface water and adjust for the conservative assumptions used by the online assessment tool. When necessary, the MDEQ works with the applicant to evaluate if there are project modifications (e.g., moving the well location, deepening the well, changing the pumping rate and/or schedule) that can avoid adverse resource impacts and still meet the applicant's needs.

The assessment process uses a water availability database that is continually adjusted to account for depletion debits from new withdrawals registered through both the online assessment tool and after site specific reviews.

Special attention is afforded the community water supply sector. The SDWA requires that the MDEQ (as opposed to the community) evaluate Large Quantity Withdrawals proposed by a community public water supply system relative to the adverse resource impact standard of Part 327. The MDEQ is required to utilize the water withdrawal assessment tool for this purpose and confirm the assessment tool's determination. Any withdrawal determined to be in Zone C requires that the community certify implementation of sector Water Conservation Measures that the community supply deems reasonable.

Part 327 requires a permit for a Large Quantity Withdrawal of more than 2,000,000 gallons per day, 1,000,000 gallons per day if the withdrawal is in Zone C, or 100,000 gallons per day if it results in an intra-Basin transfer. MCL 324.32723. The Part 327 permit criteria mirror the Decision-Making Standard in Section 4.11 of the Compact. These criteria require the return of all water to the source watershed after use, no significant or cumulative adverse resource impacts as a result of the withdrawal, incorporation of Water Conservation Measures, compliance with all applicable local, state and federal law and international agreements, and a demonstration that the use is reasonable.

Community water supplies are the only water withdrawal sector that may be granted approval for a withdrawal that has the potential for causing an adverse resource impact. Additional criteria must be met for such a withdrawal to be approved, including that there be no feasible and prudent alternatives. Proposed withdrawals by the city of Cadillac, City of Newaygo, Oakland County Drain Commission and the Gogebic Range Water Authority were denied because of the availability of a feasible and prudent alternative. The first two denials were addressed by relocating wells to watersheds with greater water availability. The other two had as options the purchase of water from an existing system with excess capacity and/or a switch to a Great Lakes surface water withdrawal.

Part 327 recognizes the significant implications of considering approval of a community water supply that might have an adverse resource impact. The MDEQ is authorized to approve such a withdrawal only after balancing the environmental impact against the public benefit relative to public health, safety and welfare. MCL 325.1004(4). The

MDEQ is required to include specifications on the site location, depth of well completion, pumping capacity and rate, and ultimate use as a condition of such an approved withdrawal. MCL 325.1004(4).

Michigan develops and implements programs openly and collaboratively with local stakeholders, Tribes, governments and the public. The water withdrawal assessment process was developed through two multi-stakeholder groups—first the Groundwater Conservation Advisory Council, (http://www.michigan.gov/deq/0,4561,7-135-3313_41033---,00.html), and then the WRCAC. MDEQ Director Dan Wyant has expressed his intent to re-establish the WRCAC to advise the MDEQ on implementation of Michigan's Water Use Program. In September 2011, the MDEQ convened the Southwest Michigan Water Resources Council stakeholders group to focus on the surface and groundwater resources in the Kalamazoo and St. Joseph River Watersheds. The group's membership includes agricultural irrigators, a seed corn company, industrial water users, municipal water suppliers, well drillers, planning commissions, non-profit foundations, watershed groups, environmental groups, state agencies, federal agencies and universities. The MDEQ actively engages with Michigan's tribes on a regular and proactive basis. This includes regular meetings as part of the Water and Climate Accords. The Accords are two intergovernmental agreements signed by the tribes and the previous governor pledging support and cooperation to preserve, protect, restore, and enhance the Great Lakes ecosystem.

Michigan prepares and maintains long-term water demand forecasts. Community water suppliers are required under the SDWA to conduct reliability studies based upon 5-year and 20-year projections of water use. These studies must be updated every five years, unless the system can demonstrate a long-term stability in its customer base, service connections and resulting water use. Trends in water use must be identified including information on the current and projected average daily demand, maximum daily demand, maximum hourly demand and demand that would be necessary to fight fires. Monthly and annual production totals are required of each source including a breakdown of water use by customer class. Systems are required to have a water shortage response plan for emergencies.

Beyond the community water supply sector, the Southwest Michigan Water Resources Council was convened to consider sustainable water use in Southwest Michigan. As part of this charge, that Council will project future user demands for surface and groundwater resources in the Kalamazoo and St. Joseph River Watersheds.

Michigan uses long-term strategies that incorporate water conservation and efficient water use. The water withdrawal assessment process employs both voluntary and compulsory water conservation and efficiency provisions.

Michigan has prepared generic Water Conservation Measures applicable to all large quantity water users based on recommendations from representative trade associations. (http://www.michigan.gov/documents/MDEQ/MDEQ-wb-dwehs-wateruse-genericconsmeas_273138_7.pdf). Water Conservation Measures for individual sectors

have also been accepted (http://www.michigan.gov/MDEQ/0,1607,7-135-3313_3684_45331-190105--,00.html). All registrants must acknowledge that they have reviewed applicable Water Conservation Measures and farms are required to report their applicable Water Conservation Measures and an implementation plan for those practices.

Additional attention on conservation and efficiency is required in direct relation to risk and water scarcity. In environmentally sensitive areas that are approaching the adverse resource impact threshold, all registrants utilizing the same water source are required to review and consider implementing applicable Water Conservation Measures. Additionally, an applicant that proposes a withdrawal that will push a watershed near the adverse resource impact threshold must implement Water Conservation Measures that they consider to be reasonable as a condition of withdrawal approval. Applicants for withdrawals requiring a permit must certify they are in compliance with applicable Water Conservation Measures developed for their sector or specific withdrawal as a condition of approval.

Michigan builds upon existing efforts by considering practices and experiences in other jurisdictions. As a member of the Great Lakes Compact Council and Regional Body, Michigan regularly participates in conversations on the practices and experiences in other jurisdictions and considers applicability to Michigan.

- b. Adopt and implement supply and demand management to promote efficient use and conservation of water resources.**

Michigan maximizes water use efficiency and minimizes the waste of water by the actions outlined in this section.

Michigan promotes appropriate innovative technology for water use. The MDEQ works closely with the Michigan Section of the American Water Works Association (AWWA) through the operator certification and training program (<http://www.mi-water.org/miawwa/index.html>). The purpose of the AWWA Water Efficiency and Conservation Committee is the education of water system operators and citizens about the merits of efficient use of our water resources. Functions of the Water Efficiency and Conservation Committee include: Developing and distributing to operators educational materials that address the need to use available water resources efficiently, working with the Community Awareness Committee to promote water efficiency and conservation activities, developing and distributing media releases to educate the general public of the need to use water efficiently and activities they can undertake, and promoting cooperative efforts in water efficiency and conservation.

Michigan State University and Purdue University work together to support an Extension Agent/Irrigation Educator whose focus is on outreach to agricultural producers and agribusinesses. This outreach provides information on irrigation efficiency and new and leading edge equipment and technologies that can improve both water conservation and the farmer's bottom line. The Universities remain central to identifying, through

research and work with irrigation manufacturers, new and improved methods to serve Michigan's extremely diverse agricultural sector.

Michigan manages existing water supplies to prevent or delay the demand for and development of additional supplies. The MDEQ has denied proposed withdrawals because the applicant had the alternative of purchasing water from an existing system with excess capacity. In order to prevent the need to develop new capacity, community water supplies practice conservation measures involving the efficient use of water as a standard aspect of system operation. For example, various treatment processes in the treatment regime of water plants such as filter backwash, sludge decanting and sludge dewatering create a "water only" waste stream. Historically, this water had been pumped to waste. Today, it is much more common for the water to be rerouted to the front of the treatment regime and delivered to the customer after treatment. Water saving through this practice averages a two percent reduction in the total water pumped, although in some systems it may be as high as 10 percent. Wash down water for cleaning is also generally derived from recycled water.

Michigan provides incentives to encourage efficient water use and conservation. Potential large quantity water users have an incentive to maximize water use efficiency and minimize waste of water in order to pass the online assessment tool, avoid the need for a site-specific review or the need to obtain a permit. Adjusting the well pumping rate and/or irrigation schedule is one of the easiest ways to modify a proposed large quantity water use to pass a site-specific review.

The Michigan Department of Agriculture and Rural Development (MDARD), through the Michigan Agriculture Environmental Assessment Program (MAEAP), works directly with agricultural producers to identify risks and offer efficiencies in their farm and cropping systems. This includes an evaluation of a producer's irrigation system based on industry best management practices. A farm completing the MAEAP process will become "environmentally assured," an honored distinction in the community. While the MAEAP program is voluntary, a producer registering a Large Quantity Withdrawal that falls into a Zone C will provide irrigation scheduling in the form of relevant information related to seasonal use of their proposed withdrawal and certify that they are using applicable Water Conservation Measures.

In addition the Agricultural Water Enhancement Program (AWEP) is a voluntary conservation initiative that provides financial and technical assistance to agricultural producers to implement agricultural water enhancement activities on agricultural land for the purposes of conserving surface and ground water and improving water quality. The Michigan Association of Conservation Districts secured AWEP funding for southwest Michigan agricultural producers by submitting a successful partnership proposal in 2009. This funding is used as financial assistance for producers in the St. Joseph and Kalamazoo River watersheds to implement conservation measures that reduce their water use and improve water quality in those large basins that contribute directly to Lake Michigan.

The Drinking Water State Revolving Fund (DWSRF), Part 54 of the SDWA (www.michigan.gov/drinkingwaterrevolvingfund), specifically references energy efficiency considerations. The DWSRF projects must consider operation and maintenance costs in the analysis and selection of the most cost-effective alternative, including considerations in the selection of processes and equipment that are less intensive in terms of energy use and water treatment chemicals. Reductions in energy use and materials frequently equate to a reduction in water use. The DWSRF program treats these considerations as a *de-facto* requirement that a project has energy and water efficiency as a stated primary goal of the project and not just an incidental benefit.

Michigan includes water conservation and efficiency in the review of proposed new or increased uses. Any Large Quantity Withdrawal determined to be in Zone C withdrawal through the water withdrawal assessment process must certify implementation of Water Conservation Measures applicable to its water use sector. MCL 324.32706c(4). Applicants for withdrawals requiring a permit must certify they are in compliance with applicable Water Conservation Measures developed for their sector or specific withdrawal as a condition of approval. Water conservation and efficiency is part of the project review for a Large Quantity Withdrawal permit application.

Michigan promotes investment in and maintenance of efficient water infrastructure. The DWSRF loan program is in the third year of providing stimulus funding (in the form of principal forgiveness for a portion of loans) to community water supply projects that address green infrastructure, water or energy efficiency improvements, or other environmentally innovative activities. The federal grant appropriation for the loan program requires 20 percent of the grant funds be made available to fund projects that fall within the categories that are considered environmentally innovative activities. From a water supply perspective, the water efficiency efforts focus on the funding of conservation and reuse efforts, as well as water loss reduction and prevention, to protect water resources for the future.

The MDEQ worked with the Water Efficiency and Conservation Committee of the AWWA to develop sector-based conservation measures for community water supplies as required by Part 327. These conservation measures support the following principles and practices: Efficient use of supply sources; appropriate facility rehabilitation or replacement; leak detection and repair; accurate monitoring of consumption and billing based on metered usage; full-cost pricing; water use efficiency standards for new plumbing fixtures and appliances; conversion of existing high water use fixtures and appliance to more efficient designs; use of efficient irrigation systems and landscape design; development and dissemination of educational materials on water conservation; public information programs promoting efficient water use and conservation; integrated resource planning and water reuse where appropriate; and continued research on efficient water use practices. The AWWA's recommended water conservation practices are outlined in "Guidelines for Generally-Accepted Water Management Practices for the Public Water Supply, ([7](http://www.mi-</p></div><div data-bbox=)

water.org/miawwa/committees/Water_Efficiency/MIAWWA%20Water%20Mngmnt%20Guidelines%20Rev%200%20010108.pdf).

c. Improve monitoring and standardize data reporting among State and Provincial water conservation and efficiency programs.

Michigan is improving measurement and evaluation of water conservation and efficiency use. Michigan's water withdrawal legislation requires the annual reporting of water use. Reports are due by April 1 covering water use the previous year. Water use reporting includes the amount and rate of withdrawal on an annual and monthly basis, source of water, purpose of use, amount of consumptive use, the latitude and longitude of the well location if the source is groundwater, and, if practicable, the static water level in the well.

Any community water supply system that provides treatment, regardless of how limited, is required to provide monthly operation reports which include system pumpage. The operation reports must be submitted in the month immediately following the month of operation. The SDWA requires each well serving a community water supply to be equipped with a meter or other acceptable means to measure the volume of water produced. Historically, other means have been used on many small systems such as using the pumping rate and the run time of the pump to determine use. The MDEQ generally considers this unacceptable and requires the installation of meters to determine pumpage or use from individual wells or groups of wells. A vast majority of community water supplies meter the use of each customer providing full cost pricing on all water served to the customer base.

Collection of accurate water use reporting data from the agricultural sector has presented challenges in the relatively short history of the program. To date, agricultural users fill out a paper reporting form and submit it to MDARD on a yearly basis. This information, which can include the submission of up to 70 pumps with respective monthly pumping records for one farm operation, is transcribed by staff into a database. The quality of the data submitted over time has been highly variable with inadequate funding and staff to fully follow up with producers when questions arise. Similar limitations also exist with the MDEQ water use reporting program for non-agricultural sectors. As a result, through a grant with Michigan State University's Institute of Water Research, the MDEQ and MDARD are jointly developing an online reporting application and database that will aim to reduce the potential for error, decrease duplication of annual reporting requirements, decrease the amount of time to report, and link more effectively with the water withdrawal assessment tool to enable a better and more effective Water Use Program.

Michigan encourages measures to monitor, account for, and minimize water loss. The conservative model used by the online assessment tool, the site-specific review, and the permit processes all encourage monitoring, accounting for, and minimization of water loss to help avoid adverse resource impacts. The result is that Large Quantity

Withdrawals that maximize efficiency are more likely to meet the requirements of these processes and avoid adverse resource impacts.

To monitor water losses, the MDEQ has a water depletion tracking database as part of the online assessment tool that accounts for all Large Quantity Withdrawals for each watershed.

Part 327 requires farms reporting their water use to the MDARD to include their applicable Water Conservation Measures and an implementation plan for those practices. MDARD provides a check list which farms use to identify and report Water Conservation Measures used.

As part of the sanitary survey process for water utilities, the MDEQ conducts a review of the total water pumped compared to the amount of water for which the water utility has billed. Water unaccounted for represents the water loss through system leaks and peripheral consumptive use processes, which are routinely in the 5 to 10 percent range. The MDEQ advises the community to address water losses when unaccounted for water reaches 15 percent of the total volume pumped.

Michigan tracks and reports program progress and effectiveness. Michigan issues an annual report of Large Quantity Withdrawals registered using the online assessment tool, site-specific reviews, and permit applications that includes yearly totals and cumulative totals since the start of the water withdrawal assessment program. (http://www.michigan.gov/documents/deq/deq-wb-dwehs-wwciu-wwatregistrants_301492_7.pdf). The MDEQ also tracks the timeliness of site-specific reviews.

d. Develop science, technology and research.

Michigan encourages the identification and sharing of innovative management practices and state of the art technologies. Michigan's water withdrawal assessment process has won national awards presented by the Council of State Governments, Environmental Council of the States, and Renewable Natural Resources Foundation. The development and technical basis of the water withdrawal process has been described in numerous publications. See Appendix 2 for a list of publications.

Michigan encourages research, development, and implementation of water use and efficiency and water conservation technologies. One of the goals of the Southwest Michigan Water Resources Council stakeholders group is the research, development and implementation of water use and efficiency and water conservation technologies.

Michigan seeks a greater understanding of traditional knowledge and practices of Basin Tribes. The MDEQ participates with Great Lakes tribes in the Tribal/State/EPA Exchange Network, an Internet and Standards-based method for securely exchanging environmental information between partners. This network is used by states and tribes

to report water quality monitoring data (including physical, chemical, biological and fish tissue). The MDEQ is also represented with the National Congress of American Indians on the Exchange Network governance board.

Michigan supports research to understand the linkages between water use and ecological responses. The MDEQ partners with the U.S. Geological Survey and volunteer monitoring groups to maintain and improve the stream gaging network in Michigan.

The Michigan Department of Natural Resources Fisheries Division, Michigan Trout Unlimited, and other partners continue to collect temperature information from Michigan streams to further ground truth models that led to the development of Michigan stream classification system. The Fisheries Division in cooperation with the U.S. Geological Survey is initiating a pilot project to collect accurate stream discharge measurements on ungauged streams in southwest Michigan. The Fisheries Division and MDEQ Water Resources Division conduct field inspections to validate or improve water withdrawal assessment tool performance. One of the goals of the Southwest Michigan Water Resources Council stakeholders group is strengthening scientific understanding of the linkages between water conservation practices and ecological responses.

e. Develop education programs and information sharing for all water users.

Michigan undertakes a range of activities to ensure transparency, provide public access to information, educate users, share experiences, enhance regional information sharing, increase collaboration with professional organizations and aid in the dissemination of sector-based information. The MDEQ posts links to water use information and conservation best management practices on its Water Use Program web page (<http://www.michigan.gov/wateruse>). Upon request, this information is also sent to those who don't have internet access or those making specific requests for data not immediately available online. MDEQ staff has made numerous presentations to professional organizations and other interested parties both within Michigan and across the United States on Michigan's Water Use Program and the online assessment tool.

The Michiana Irrigation Association promotes on-going educational activities related to efficient irrigation, including workshops, demonstrations, field meetings, displays, and the preparation and distribution of educational material. The Association was started in the 1970s with the objective of promoting the development, proper use, management, and acceptance of irrigation equipment and practices. It is comprised of irrigators from the counties surrounding the Southwest Michigan and Northern Indiana border. Seventy percent of the reported irrigation water use capacity in each state is in this area.

Michigan State University has held many focus group sessions with different sectors of large water user groups including agriculture, municipalities and golf courses. The purpose of these sessions is to gauge understanding of the current Water Use Program,

especially related to the institution of water user groups should the need arise to convene one locally. The research is still in progress.

5. Description of the State or Provincial Water conservation and efficiency program implementation timeline and status.

All key components of Michigan's Water Use Program have been implemented. The foundation of the program, the water withdrawal assessment process, has been fully in effect since February 2009. The technical basis of the program is well published and nationally recognized. Sector-based Water Conservation Measures have been developed and are in use. The groundwork has been laid for other program components, like the development of local water use committees, but circumstances have not yet required or motivated their creation. The constriction of state revenue has impacted program staffing, but additional resources are being sought. In addition, steps are underway to enhance some aspects of the program, such as re-establishment of a multi-interest group, such as the WRCAC, to advise the MDEQ on program implementation. There remains the long-term potential to link the water withdrawal assessment process with evaluation of well-to-well conflicts.

Appendix 1

December 8, 2010

Michigan Water Conservation and Efficiency Program Appendix A – Water Conservation and Efficiency Goals and Objectives

GOALS

1. Ensuring improvement of the waters and water dependent natural resources;
2. Protecting and restoring the hydrologic and ecosystem integrity of the Basin;
3. Retaining the quantity of surface water and groundwater in the Basin;
4. Ensuring sustainable use of waters of the Basin; and,
5. Promoting the efficiency of use and reducing losses and waste of water.

OBJECTIVES

1. Utilize Michigan's Water Use Program and Water Withdrawal Assessment Process to guide long-term sustainable water use.
 - a. The programs will be adaptive, goal-based, accountable and measurable.
 - b. Continue to develop and implement programs openly and collaboratively, with local stakeholders, Tribes and First Nations, governments and the public.
 - c. Prepare and maintain long-term water demand forecasts.
 - d. Develop long-term strategies that incorporate water conservation and efficient water use.
 - e. Review and build upon existing planning efforts by considering practices and experiences from other jurisdictions.
2. Adopt and implement supply and demand management to promote efficient use and conservation of water resources.
 - a. Maximize water use efficiency and minimize waste of water.
 - b. Promote appropriate innovative technology for water reuse.
 - c. Conserve and manage existing water supplies to prevent or delay the demand for and development of additional supplies.
 - d. Provide incentives to encourage efficient water use and conservation.
 - e. Include water conservation and efficiency in the review of proposed new or increased uses.
 - f. Promote investment in and maintenance of efficient water infrastructure.
3. Improve monitoring and standardize data reporting among State and Provincial water conservation and efficiency programs.
 - a. Improve the measurement and evaluation of water conservation and water use efficiency.
 - b. Encourage measures to monitor, account for, and minimize water loss.

- c. Track and report program progress and effectiveness.
4. Develop science, technology and research.
- a. Encourage the identification and sharing of innovative management practices and state of the art technologies.
 - b. Encourage research, development and implementation of water use and efficiency and water conservation technologies.
 - c. Seek a greater understanding of traditional knowledge and practices of Basin First Nations and Tribes.
 - d. Strengthen scientific understanding of the linkages between water conservation practices and ecological responses.
5. Develop education programs and information sharing for all water users.
- a. Ensure equitable public access to water conservation and efficiency tools and information.
 - b. Inform, educate and increase awareness regarding water use, conservation and efficiency and the importance of water. Promote the cost-saving aspect of water conservation and efficiency for both short-term and long-term economic sustainability.
 - c. Share conservation and efficiency experiences, including successes and lessons learned across the Basin.
 - d. Enhance and contribute to regional information sharing.
 - e. Encourage and increase training opportunities in collaboration with professional or other organizations in order to increase water conservation and efficiency practices and technological applications.
 - f. Ensure that conservation programs are transparent and that information is readily available.
 - g. Aid in the development and dissemination of sector-based best management practices and results achieved.
 - h. Seek opportunities for the sharing of traditional knowledge and practices of Basin First Nations and Tribes.

Appendix 2

Recent publications on the water withdrawal assessment process and its technical underpinnings include:

- Seelbach, P. W., L. C. Hinz, M. J. Wiley, and A. R. Cooper. 2011. Use of multiple linear regression to estimate flow regimes for all rivers across Illinois, Michigan, and Wisconsin. Michigan Department of Natural Resources, Fisheries Research Report 2095, Lansing.
- Zorn, T. G., P. W. Seelbach, and M. J. Wiley. 2009. Relationships between habitat and fish density in Michigan streams. Michigan Department of Natural Resources, Fisheries Research Report 2091, Lansing.
- Reeves, H. W., D. A. Hamilton, P. W. Seelbach, and A. J. Asher. 2009. Groundwater withdrawal component of the Michigan water-withdrawal screening tool: U.S. Geological Survey Scientific Investigations Report 2009-5003. Reston, Virginia.
- Lyons, J., T. G. Zorn, J. Stewart, P. W. Seelbach, K.E. Wehrly, and L. Wang. 2009. Defining and characterizing coolwater streams and their fish assemblages in Michigan and Wisconsin, USA. North American Journal of Fisheries Management 29:1130-1151.
- Hamilton, D. A., R. C. Sorell, and D. J. Holtschlag. 2008. A regression model for computing index flows describing the median flow for the summer month of lowest flow in Michigan. U.S. Geological Survey Scientific Investigations Report 2008-5096. Reston, Virginia.
- Hamilton, D. A., and P. W. Seelbach. 2011. Michigan's Water Withdrawal Assessment Process and Screening Tool. Michigan Department of Natural Resources, Fisheries Special Report 55, Lansing.
- Zorn, T. G., P. W. Seelbach, E. S. Rutherford, T. C. Wills, S. Cheng, and M. J. Wiley. 2008. A regional-scale habitat suitability model to assess the effects of flow reduction on fish assemblages in Michigan streams. Michigan Department of Natural Resources, Fisheries Research Report 2089, Lansing.
- Wills, T.C., E.A. Baker, A.J. Nuhfer, and T.G. Zorn. 2006. Response of the benthic macroinvertebrate community in a northern Michigan stream to reduced summer streamflows. River Research and Applications 22: 819-836.

Steinman, A.D., P.W. Seelbach, J. W. Allan, and F.J. Ruswick. 2011. Science as a fundamental framework for shaping policy discussions regarding the use of groundwater in the State of Michigan: a case study. *Water Policy* 13 (2011) 69–86