Department of Environmental Quality
Water Resources Division
Measures of Success

April 23, 2012

Mission: CLEAN AND SAFE WATER RESOURCES

Welcome to the Water Resources Division's (WRD) Measures of Success. This is our attempt to define the expected outcomes for many of the issues facing the water resources program. We work hard on many activities that affect and/or measure the quality of the waters of our state, and this is how we propose to measure the success in having clean and safe water. It is important to achieve these outcomes such that Michigan has a robust economy in conjunction with clean and safe water resources. Achieving these outcomes will also result in a more robust economy and improved quality of life for Michigan's residents and visitors; for example, water quality improvements at beaches and fewer fish consumption advisories will translate to increased tourism and sporting equipment purchases.

These measures are primarily based on what we can presently measure. There are additional outcomes that are not presently included but desirable. We anticipate that these outcomes and measures will change as we get better at defining and measuring them.

The mission of the WRD is to make Michigan's waters safe and clean for recreating, fishing, drinking, and healthy aquatic ecosystems. Five major goals provide definition to this mission: (1) Enhance Recreational Waters; (2) Ensure Consumable Fish; (3) Protect and Restore Aquatic Ecosystems; (4) Ensure Safe Drinking Water; and (5) Protect Public Safety. For each major goal, measurable outcomes (measures of success) are identified.

The use of outcome oriented goals and measurements serves to focus efforts, motivate staff, communicate progress, improve environmental health and compliance conditions, increase our accountability, and foster collaboration. We intend to use these goals and measurements to enlist external assistance, encourage cooperation across organizational boundaries, and encourage discussion about strategic adjustments and priority trade-offs. We also intend to use these goals and measurements to align our work processes and activities in order to attain the outcome focused goals. The goals and outcomes set here are expected to be reviewed and modified as appropriate.

The use of measurements associated with the goals is essential. Measurements provide insights in many areas, including informed priority setting and daily decisions; finding problems and assessing their relative importance; identifying preventable causal factors; and communicating progress and problems. Measurement reinforces the importance of a goal and managerial priorities, and helps us gauge how well prior actions worked and when adjustments are needed.

The goals we are identifying will, on occasion, require us to stretch to meet them. While attainment of these goals is ideal, the immediate objective is the development of cogent strategies to meet them. These strategies will guide the WRD in measuring progress toward the goals; regular use of the data to make informed decisions; and regular reporting on goals, progress, and strategies, including reporting to the public.

The following five goals are intended to represent the outcomes that are expected from the WRD. These goals are rather self-evident, but the specific measurements established for each goal consider what is needed to assess attainment of the goal, as well as what we are currently able to measure and report.

Limited interpretation of the results is provided. The scale used to portray progress toward meeting the outcomes ranges from Excellent to Poor (Excellent, Good, Fair, Poor) with the category “Don’t know yet” included for where we do not yet have measurements to interpret.

The outcomes included in this document are evolving as we engage and obtain input from other agency staff and our stakeholders. An important contribution to our original thinking was provided as recommendations from the Department of Environmental Quality’s (DEQ) former Environmental Advisory Council in its December 16, 2010, report to the DEQ, “Following the Roadmap: Next Steps in Implementing Outcome-Based Environmental Management." The report includes important suggestions for moving forward on establishing relevant outcomes and their use, and specific recommendations for additional outcomes in areas related to water resources protection, restoration, and management. The specific recommendations for outcomes related to the WRD are provided in this document as Appendix A.

WRD staff continues to be engaged in the process of developing outcomes and measures. In particular, they have identified a number of important resource protection activities for which outcomes are needed but for which developing the outcomes are challenging from various perspectives, including moving from an output to an outcome based approach and identifying and implementing appropriate monitoring and tracking tools to measure progress toward the endpoints. Outcomes that are not well developed but are the subject of ongoing discussion are included in a new section, “Outcomes Under Construction.”

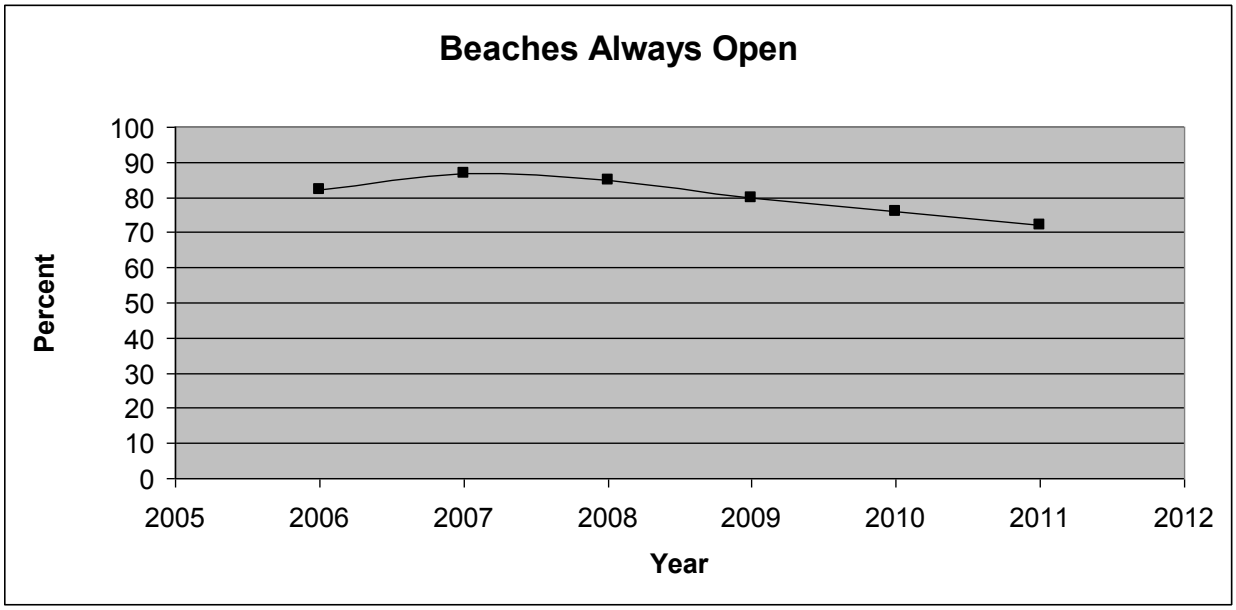
If you have questions or comments on this document, please contact Laura Smith at smithl16@michigan.gov. We are especially interested in comments regarding appropriate outcomes and measures.

GOAL 1: ENHANCE RECREATIONAL WATERS

Ensure that all recreational waters are safe for human contact.

Outcome 1: Clean, safe beaches – By 2014, 100% of Great Lakes and inland lake beaches monitored by beach programs will be safe for swimming.

Measure: Percent of monitored beaches with no closures or advisories due to unacceptable levels of *E. coli* during the recreational season.



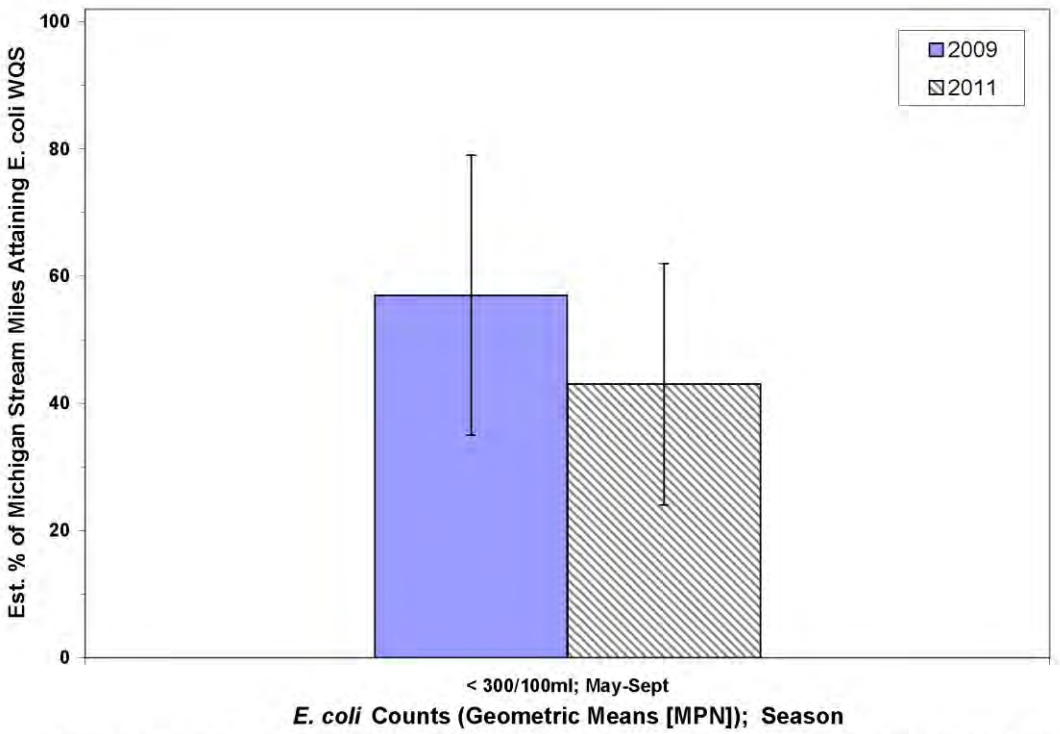
How are we doing? Good

Comment: The percentage has fallen in recent years due at least in part to increased monitoring at beaches with known or suspected water quality problems. The DEQ has been working with local communities to identify sources of contamination and to implement corrective actions to restore water quality. Much of this work is funded by the Great Lakes Restoration Initiative.

Outcome 2: Swimmable rivers and streams – All rivers and streams will meet total body contact water quality standards (WQS).

Measure: Percent of monitored river/stream miles that meet total body contact WQS from future data.

Results: 2009 - 57% (estimated); 2011 – 43% (estimated)



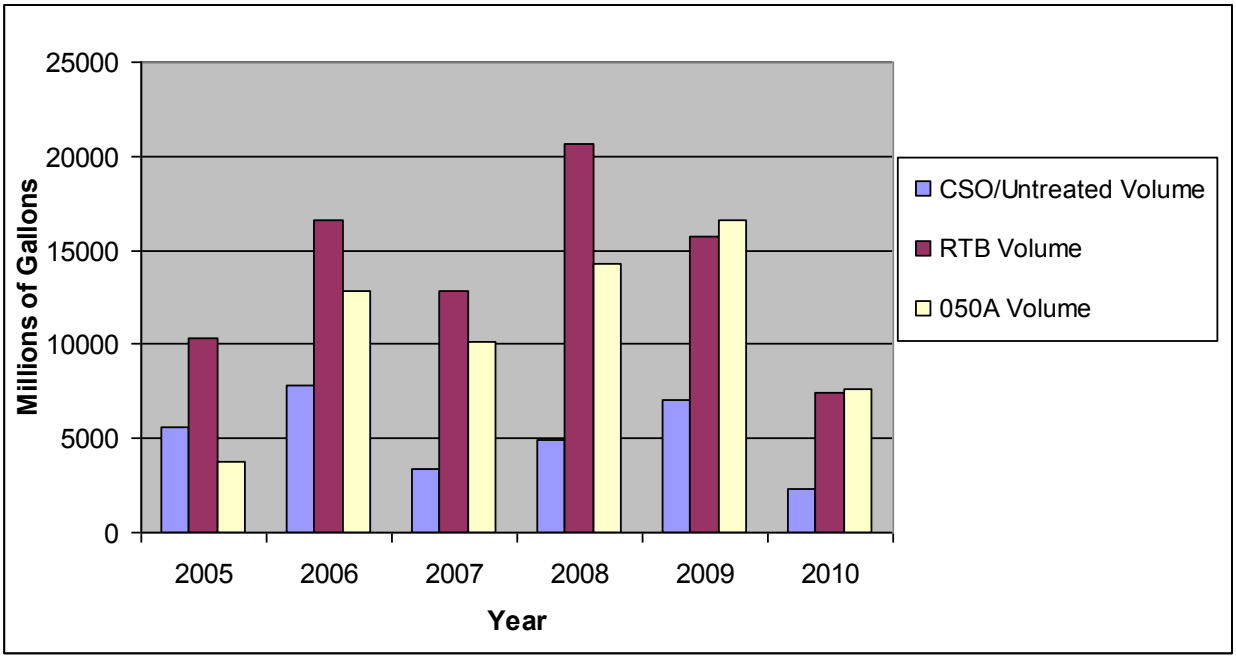
Estimated percent of all Michigan stream miles with a geometric mean *E. coli* concentration less than the Water Quality Standards limits for total body contact recreation season in 2009 and 2011. Error bars represent 95 percent confidence intervals.

How are we doing? Poor

Comment: Monitoring conducted in 2009 based on a random sampling design indicated that only an estimated 57% of stream miles met the daily maximum WQS for total body contact. In 2011, sampling of a different set of randomly selected sites found that an estimated 43% of stream miles met the daily maximum WQS for total body contact. The difference between the two years is not statistically significant. The number of sites sampled and sampling frequency in both years was limited as comprehensive *E. coli* monitoring is very expensive. We are evaluating the data and cost to determine how to obtain meaningful data on an ongoing basis.

Outcome 3: Eliminate untreated sewage discharges – The long-term combined sewer overflow (CSO) goal is complete elimination of untreated CSO discharges. For sanitary sewer overflow (SSO), the goal is to minimize untreated SSO discharges, recognizing that SSOs may occur in a well designed and operated sewer system in response to rainfall that exceeds the 25-year, 24-hour storm (our design storm). Initially, our interim goal was to reduce the volume of SSOs discharged annually, from approximately 58 million gallons in 2007 to less than 20 million gallons in 2020, due to events less than the 25-year, 24-hour storm. We now realize this goal needs to be refined.

Measure: Annual volume of untreated CSO/SSO discharges.



CSO/Untreated, RTB and Related Wet Weather Volume (MG per Year)

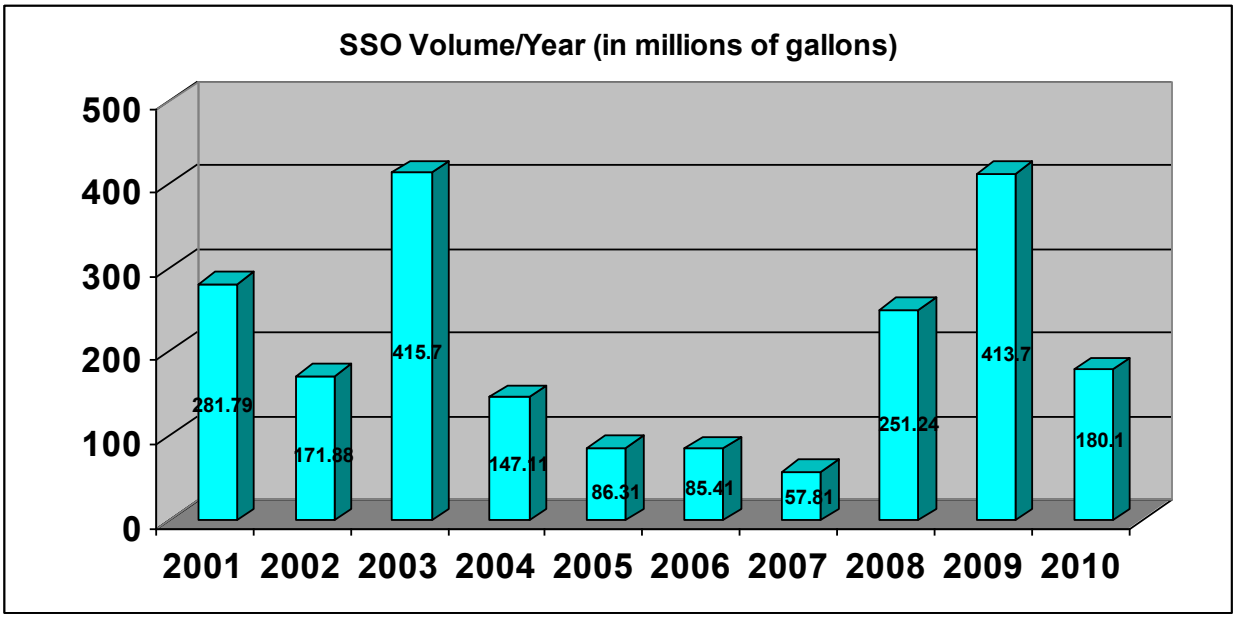
How are we doing? Good

Comment: There has been considerable progress in Michigan in eliminating untreated discharges of sewage. However, the recent economic downturn is causing delays in some major projects, especially those in Detroit and Dearborn. This will result in additional time to meet the goal of elimination of untreated CSOs. It should be noted that the volume of discharge is highly dependent on the amount of precipitation, and whether that precipitation comes during short periods of time or during frozen or saturated ground conditions.

The Detroit Wastewater Treatment Plant (WWTP) and its long-term control plan (LTCP) milestones greatly influence statewide data. In past reports, the discharges from one of Detroit's primary wet weather outfalls have been grouped with untreated CSO discharges. Based upon the fact that discharges from this outfall receive primary treatment through the Detroit plant but lack disinfection, it is more accurate to characterize these discharges as primary treated excess flow without disinfection (not untreated). Therefore, the discharges from this outfall (50A) have been separated from the CSO/Untreated Volume and the Retention Treatment Basin (RTB) Volume. Discharges from this outfall for past years are likewise reclassified for the purpose of this report and are represented in the figure below.

One of the key components of Detroit's LTCP (1996) was increasing the primary treatment capacity of the WWTP in order to significantly reduce untreated CSOs from the upstream collection system outfalls to the Rouge and Detroit Rivers. This included construction of two additional circular clarifiers, a new pump, and other rehabilitation projects at the plant. This project component was completed by 2005 at the cost of approximately $166.5 million.

More important in terms of volume trends is the portion of untreated CSO discharges versus the volume of discharge from RTBs. This is because the goal of the LTCP is to provide adequate treatment of CSO overflows to meet WQS through treatment at an RTB. When comparing annual volume of untreated CSO discharges to the volume of partially treated or adequately treated RTB volumes, statewide progress is evident (see figure above). It is expected that as LTCPs are implemented statewide, the component of the total overflow volume that is the RTB treated volume will continue to increase in the coming years.



How are we doing? Good

Comment: During the period from 2001 through 2007, Michigan made substantial progress in the goal to eliminate SSOs. Data from the last 3 calendar years shows dramatic increases in SSOs. We are reviewing the detailed data to determine the cause for this increase, whether it is related to increase in storm intensity, better reporting, or more failure of municipal systems. Initial reviews indicate that more intense storms are responsible for a large part of this increase. This may be an early indicator of the effects of climate change, as sewer systems designed to handle certain size storms are subjected to more intense storms.

We plan to modify this measure for future reports. We intend to look at the LTCPs for CSOs and graphically depict our anticipated progress in eliminating untreated CSOs based on those schedules. We also intend to report separately on SSOs not associated with wet weather events, and also report on SSOs from wet weather events where the storm is less than our sewer design standard. We believe these will be better measures of our progress to control SSOs. We recognize the SSOs may occur at very large storms, but controlling SSO events in these situations is not practical, nor a valid measure of statewide progress.

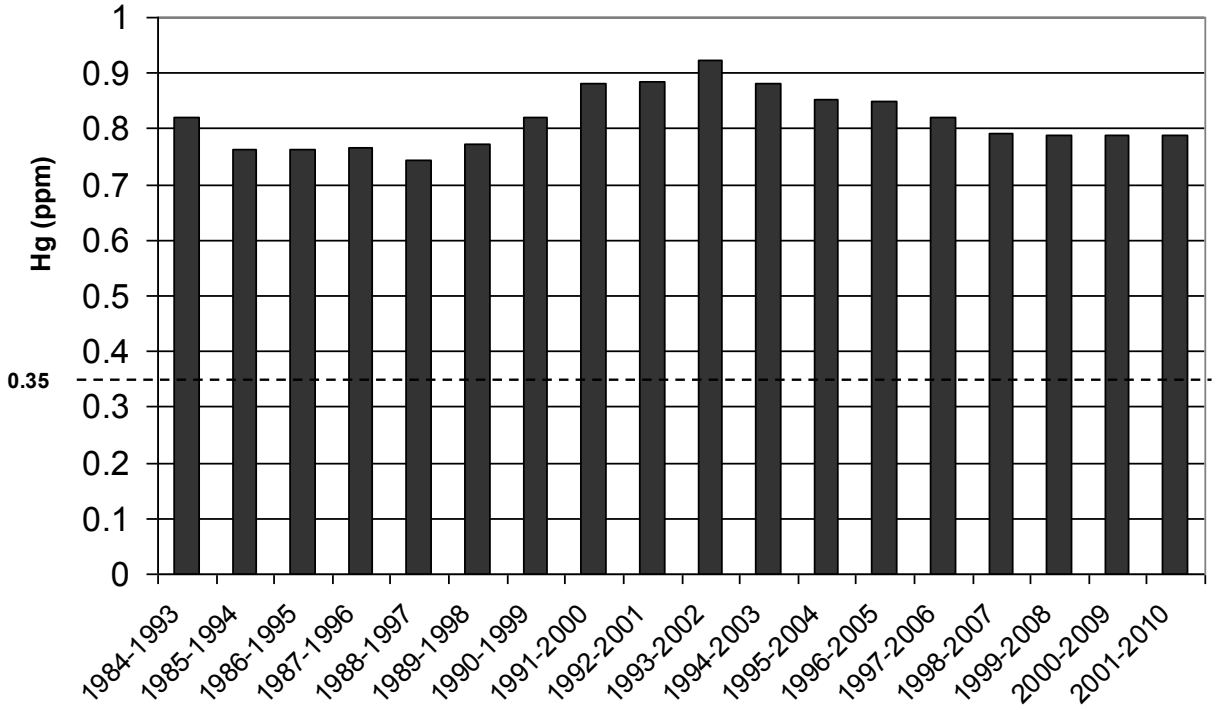
GOAL 2: ENSURE CONSUMABLE FISH

Protect human health and wildlife by reducing exposure to contaminants in fish to levels that are safe.

Outcome 1: Eliminate mercury contamination.

Outcome 1A: Reduce the mercury levels in edible portions of Great Lakes, inland lakes, and stream fish to below 0.35 milligrams per kilograms (mg/Kg) (parts per million) by 2020.

Measure: Mercury concentrations in the 90th percentile of length normalized walleye, northern pike, or largemouth bass from selected sites in the Great Lakes and inland waters.



Estimated 90th percentile mercury concentrations in standard length northern pike from inland waters of Michigan for consecutive running 10-year periods.

How are we doing? Poor

Comment: There has been essentially no change over time. The mercury concentration in these fish appears to be greatly dependent on the mercury from atmospheric deposition, which is primarily due to burning coal to generate electricity. Currently in Michigan, coal fired power plants discharge about 4,000 pounds of mercury per year to the atmosphere, while point source wastewater facilities discharge less than 20 pounds per year to surface waters. Achieving this goal is premised on the DEQ Mercury Strategy being implemented as scheduled (by 2015), with appropriate controls on mercury emissions from burning coal.

Outcome 1B: All streams will achieve the mercury WQS of 1.3 nanograms per liter (ng/L) of total mercury as an annual average ambient concentration by 2020.

Measure: Percent of rivers/streams monitored that meet 1.3 ng/L.

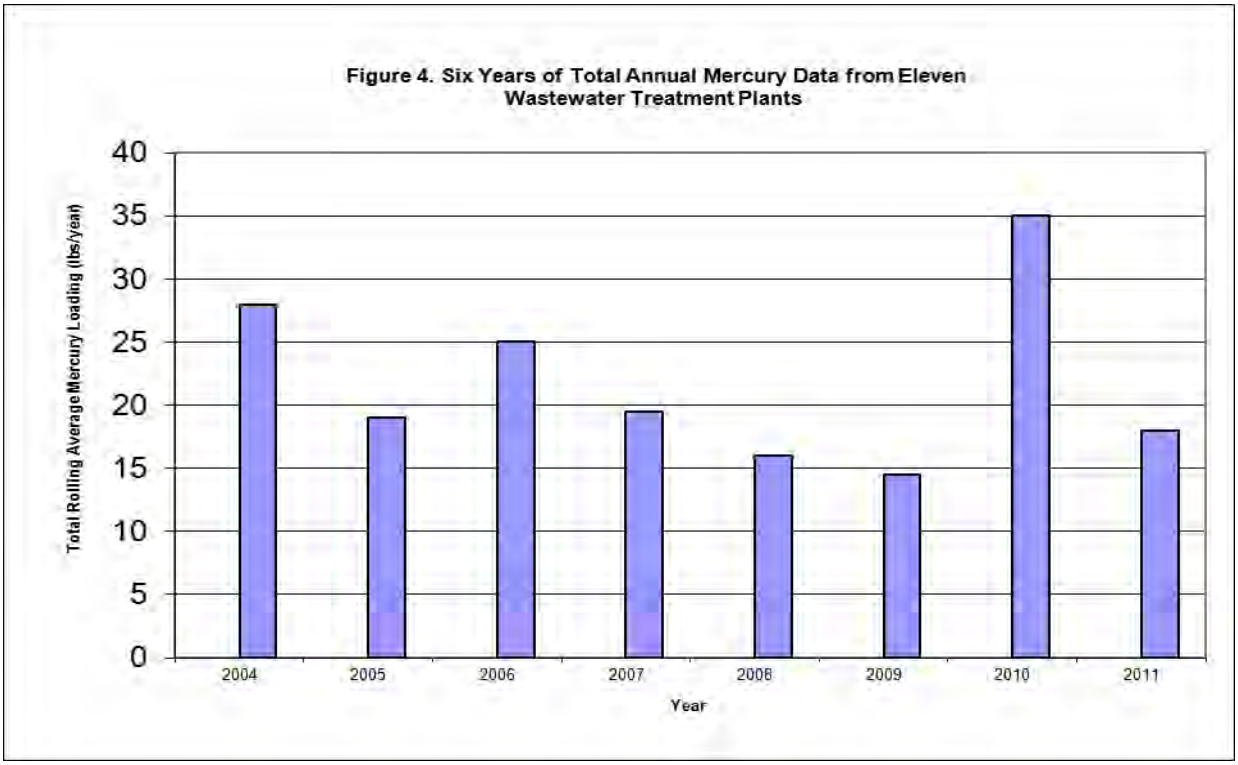
Results 2005-2009: Only 56% of stream miles met the WQS based on data from a 5-year monitoring program.

How are we doing? Fair

Comment: Mercury concentrations in flowing waters appear to portray greater progress in controlling mercury than does mercury in fish tissue where it bioaccumulates at levels that may negatively affect human health and wildlife when consumed. Mercury in water also appears to be greatly dependent on the mercury from atmospheric deposition, which is primarily due to burning coal to generate electricity. Achieving this goal is premised on the DEQ Mercury Strategy being implemented as scheduled (by 2015), with appropriate controls on mercury emissions from burning coal.

Outcome 1C: Reduce the concentration of mercury discharged from permitted point source discharges of mercury with a goal of eventually achieving 1.3 ng/L in all such discharges.

Measure: Annual mercury loading from representative wastewater treatment plants.

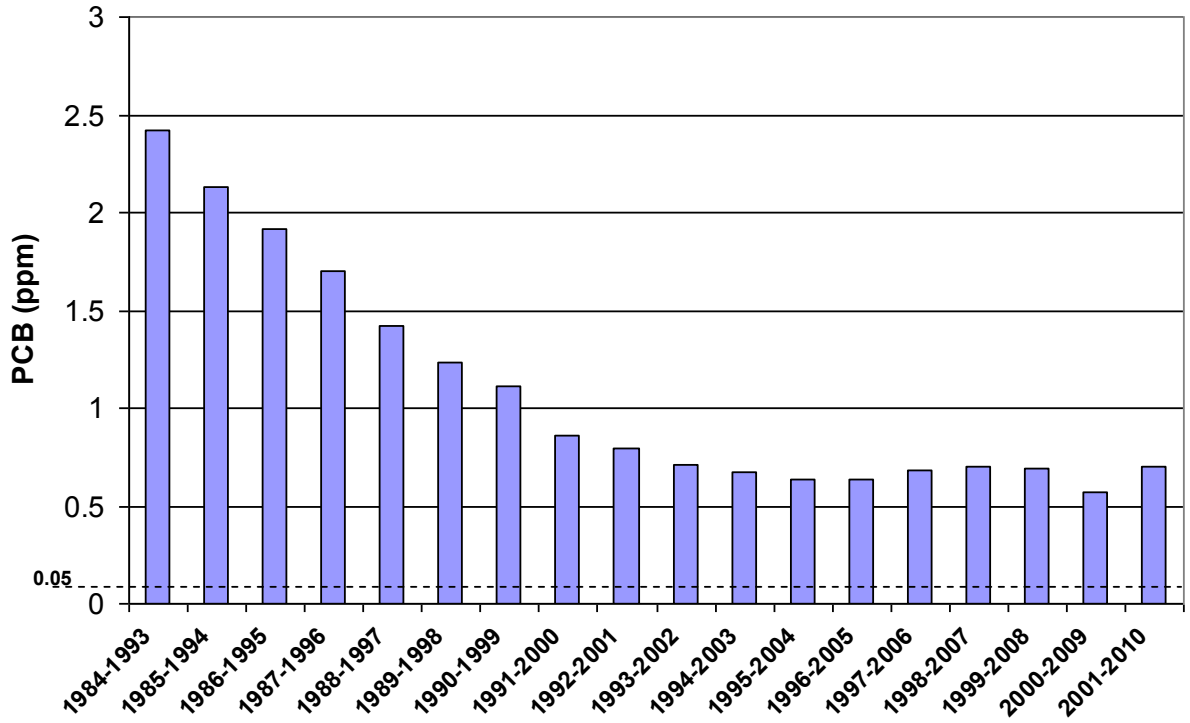


How are we doing? Good

Comment: These permitted point source discharges all have requirements to implement mercury minimization plans and eventually meet a discharge limit of 1.3 ng/L. However, these sources of mercury are dwarfed by the amount of mercury that comes into surface waters from atmospheric deposition, generally from the burning of coal. Because of this, the goal into the foreseeable future is to maintain a loading of 16 pounds or less while still addressing case-specific situations that arise. This represents the current loading with the representative WWTPs being well operated and maintained.

Outcome 2: Eliminate polychlorinated biphenyl (PCB) contamination – Reduce PCB levels in edible portions of Great Lakes, inland lakes, and river fish to below 0.05 mg/Kg by 2025.

Measure: PCB concentrations in the 90th percentile of lipid normalized carp fillets (site dependent) from selected sites not impacted by legacy pollution.



Estimated 90th percentile PCB concentrations in standard lipid carp from inland waters of Michigan for consecutive running 10-year periods.

How are we doing? Good overall; Fair in recent years

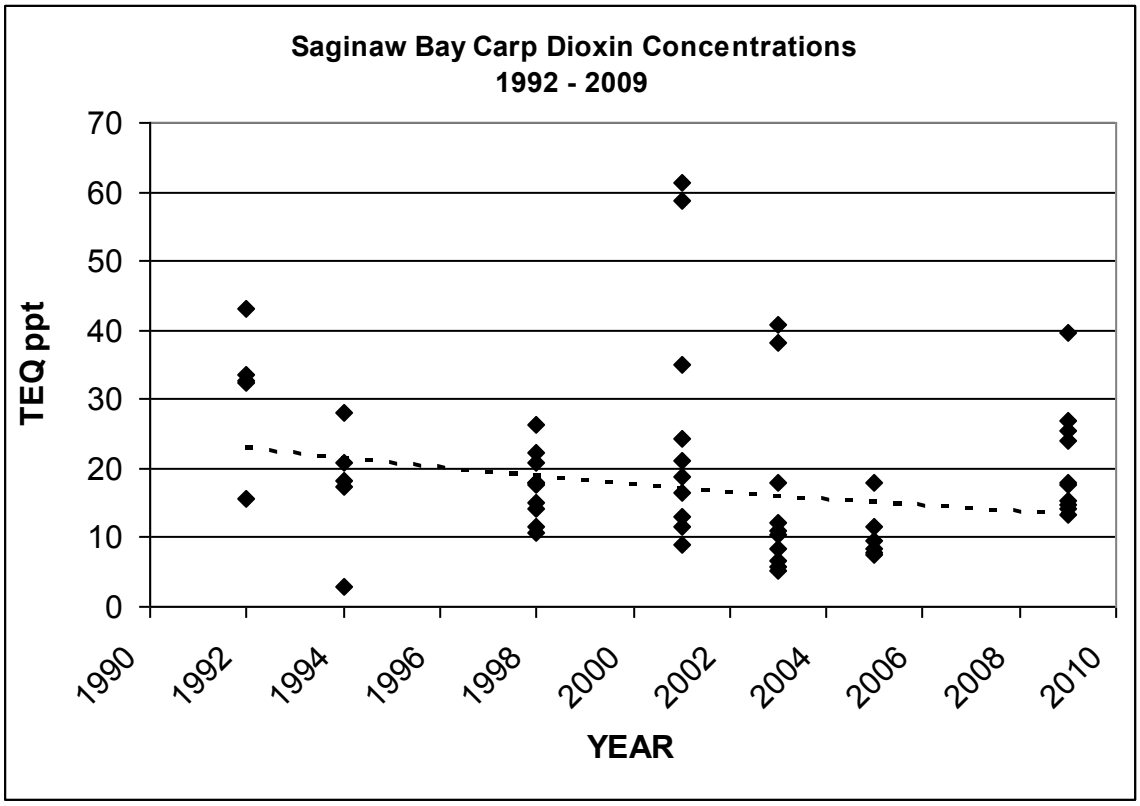
Comment: PCBs have been banned from open use for 30 years. Point source discharges have been controlled, and several sediment remediation activities for PCBs have been completed. The rate of change in recent years has declined, which is a

reflection of the ubiquitous nature of PCB in the environment, its slow degradation rate and the global transport of PCB once it is released.

Outcome 3: Eliminate dioxin contamination.

Outcome 3A: By 2025, achieve an average concentration of 0.53 ng/Kg (ppt) dioxin (TEQ) levels in fish in the Saginaw River and Saginaw Bay.

Measure: Temporal trend in lipid-adjusted dioxin TEQ concentrations in whole carp from Saginaw Bay.



How are we doing? Fair

Comment: The primary point source discharge of dioxin has been controlled, a large PCB sediment remediation of the Saginaw River was completed that likely removed dioxins as well, several hot spots of sediment contaminated with dioxin have been removed from the Tittabawassee River, and the downward trend in dioxin concentrations is expected to continue. Additional sediment remediation actions are being planned for the Tittabawassee and Saginaw Rivers and associated floodplains.

GOAL 3: PROTECT AND RESTORE AQUATIC ECOSYSTEMS

Restore and maintain the physical, chemical, and biological integrity of public trust waters, including inland lakes, streams, wetlands, and the Great Lakes.

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Outcome 1: Ensure healthy aquatic biota – Through 2015, ensure that the condition of the state's wadeable streams does not degrade, such that there is no statistically significant increase in the percent of streams rated "nonattaining," and no statistically significant decrease in streams rated "attaining."

Measure: The trend in attainment status of the other aquatic life and wildlife designated use based on benthic macroinvertebrate communities; percent monitored waters attaining the designated use based on an assessment of the benthic macroinvertebrate communities.

Results 2007-2011: Data collected from this 5-year statewide monitoring cycle indicate that 95% of Michigan's rivers and streams attain the aquatic life designated use.

How are we doing? Status – Excellent; Trend – Don't know yet

Comment: These results indicate that Michigan's wadeable streams are largely supporting this aspect of the designated use. Statewide trend data will not be available until 2014 or 2015.

Outcome 2: Protect natural hydrology.

Measure 1: Percent of new water withdrawals registered that do not cause an adverse resource impact.

Results:

2010 - There were 213 new large quantity withdrawals registered between July 9, 2009, when the Water Withdrawal Assessment Process became effective, and July 9, 2010; 100% have not caused an adverse resource impact. Three proposed withdrawals were not approved because they were likely to cause an adverse resource impact.

2011 - There were 574 new large quantity withdrawals registered between July 10, 2010, and December 31, 2011; 100% have not caused an adverse resource impact. Two proposed withdrawals were not approved because they were likely to cause an adverse resource impact.

Measure 2: Number of watersheds where new large quantity withdrawals since October 1, 2008, are likely to cause an adverse resource impact.

Results 2012: None due to registered withdrawals through December 31, 2011. However, there may be unregistered large quantity withdrawals that could potentially cause an adverse resource impact.

How are we doing: Excellent

Comment: The development of the Water Withdrawal Assessment Process is a major accomplishment toward achieving this goal, and it is performing as designed with excellent results. However, there are not adequate resources available to continue to implement this program, including an effective compliance program.

Measure 3: The stream hydrology at United States Geological Survey gage sites is trending toward natural flow regimes as measured by the Richards-Baker Flashiness Index.

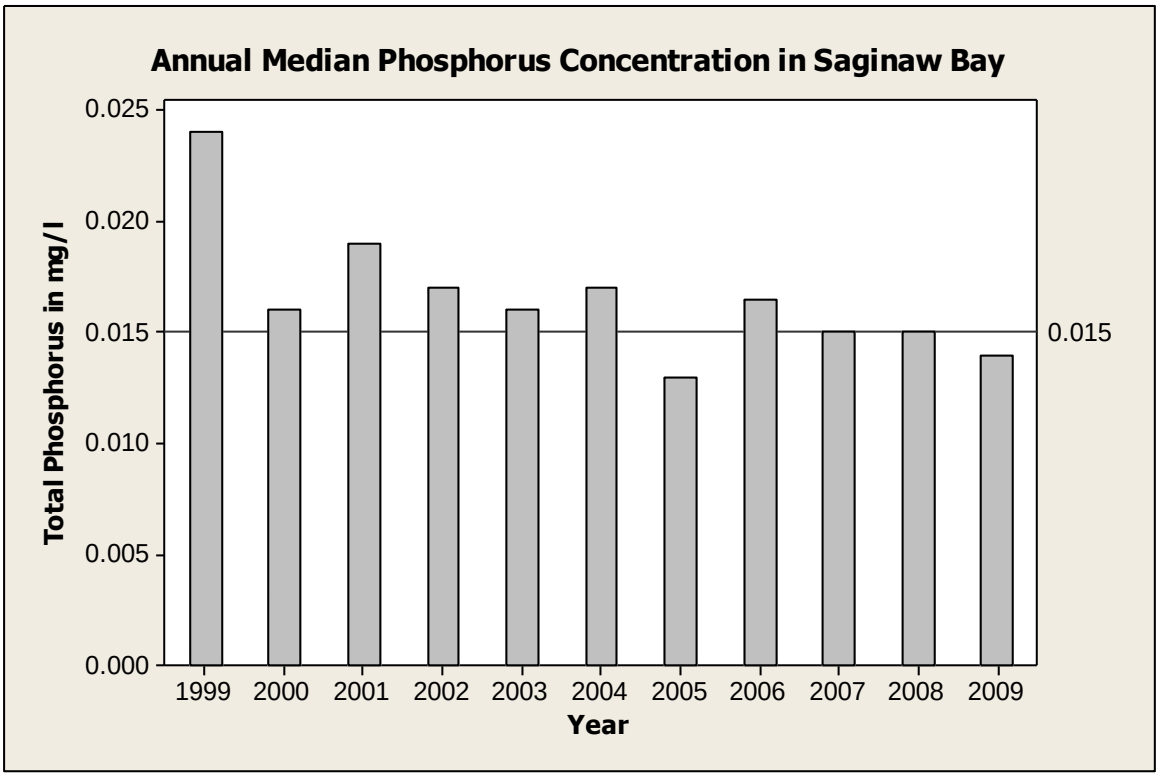
Results: Between 2007 and 2012, stream flashiness trends at 14 gage sites improved, changing from an increasing trend to no trend or a decreasing trend. This implies that unnatural streambank erosion rates at these sites are not worsening or even improving. However, flashiness trends at 11 gage sites worsened, changing from no trend or a decreasing trend to increasing flashiness. This implies that unnatural rates of streambank erosion are possible.

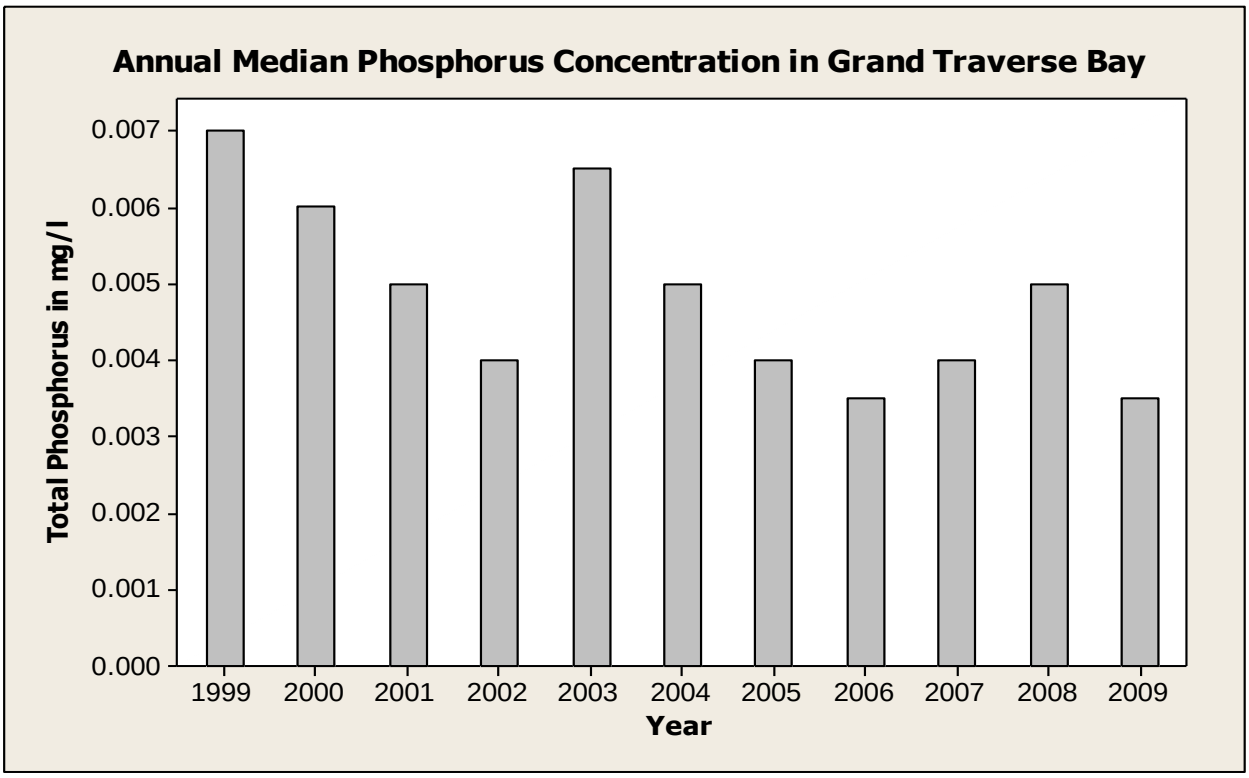
How are we doing? Fair

Comments: These data will next be updated in 2017.

Outcome 3: Meet the total phosphorus goal in Saginaw Bay of 15 micrograms per liter (µg/L) and maintain a neutral trend in total phosphorus in Grand Traverse Bay.

Measure: Phosphorus concentrations and trends in Grand Traverse and Saginaw Bays.





How are we doing? Excellent for Grand Traverse Bay; Good for Saginaw Bay

Comment: In Saginaw Bay, the phosphorus reductions have occurred slowly. Recent efforts have been refocused by the Saginaw Bay Coastal Initiative including the "muck" on the beach issue. However, the presence of invasive species, such as the zebra mussel and quagga mussel, changing lake levels, and other factors have complicated this situation. Additional studies are underway to try to further understand these interactions.

Outcome 4: Reduce the rate of introduction of aquatic invasive species into the Great Lakes to 1 species every 30 years by implementing preventive measures.

Measure: Number of new aquatic invasive species introduced into the Great Lakes.

Result: Based on available studies, the current rate of introduction is estimated to be about 1 species every 8 months.

How are we doing? Poor

Comments: Significant and bold action is needed to meet this outcome. In addition to this measure, the following program outputs were developed.

Program Output: The number of oceangoing vessels under the Michigan ballast water permit.

Results: 2009 - 110; 2010 - 174; 2011 - 183

How are we doing? Excellent on Michigan's permit, but overall effectiveness is doubtful.

Comment: Michigan has led the nation in efforts to prevent future introduction of aquatic invasive species into the Great Lakes. However, support from the federal government and Canada is needed to accomplish this goal, and that support has been very slow in coming. The United States Environmental Protection Agency has a new proposed National Pollutant Discharge Elimination System permit that makes some positive movement toward slowing the introductions via ballast water.

Program Output: Hydrologic separation between the Great Lakes basin and the Mississippi River basin, especially in the Chicago area waterway system.

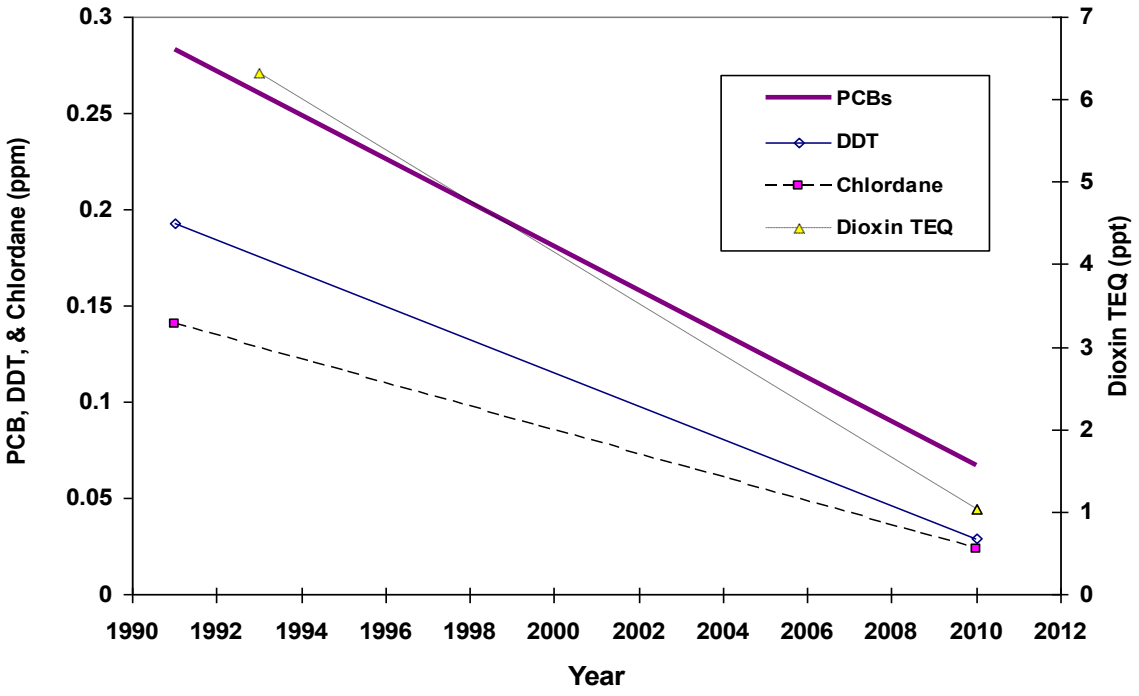
Results: The basins remain connected with no immediate plans for separation.

How are we doing? Poor

Comment: Michigan continues to participate in activities to promote hydrologic separation of the two basins. These activities include participation in the Asian Carp Regional Coordinating Committee and the use of legal action in the form of ongoing lawsuits calling for the development and implementation of plans to permanently and physically separate carp-infested waters in the Illinois River basin, the canal, and connected waterways from Lake Michigan; and the implementation of immediate actions to close some of the locks on the Chicago Sanitary and Ship Canal and connecting channels, operate electric barriers in the canal at maximum efficiency, and monitor for Asian carp and eradicate any Asian carp found. In addition, the United States Army Corps of Engineers plans to conduct a feasibility study (Great Lakes and Mississippi River Interbasin Study) of the range of options and technologies available to prevent the spread of aquatic nuisance species between the Great Lakes and Mississippi River basins through the Chicago sanitary and ship canal and other aquatic pathways. A final recommended plan resulting from the study is expected in 2015.

Outcome 5: Enhance the quality of the Outstanding International Resource Waters - Lake Superior Basin.

Measure 1: Temporal trend in concentrations of PCB, DDT, chlordane, and dioxins in Lake Superior (Keweenaw Bay) lake trout, with a goal of maintaining measurable declines.

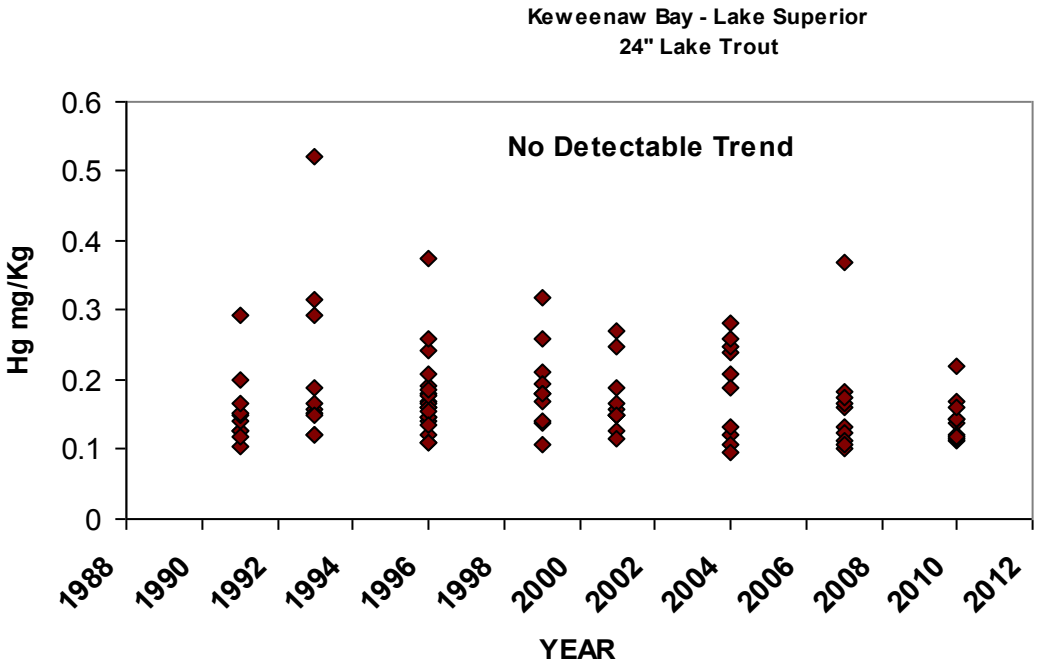


Temporal trends in Lake Superior lake trout contaminant concentrations.

How are we doing? Excellent

Comment: Lake trout have been collected from Keweenaw Bay every 2 to 3 years since 1991 and analyzed as whole fish. Temporal trends in contaminant concentrations are evaluated using regression techniques on that dataset. We expect these declines to continue.

Measure 2: Concentrations of mercury from Lake Superior lake trout, with a goal to begin showing measurable declines by 2020.



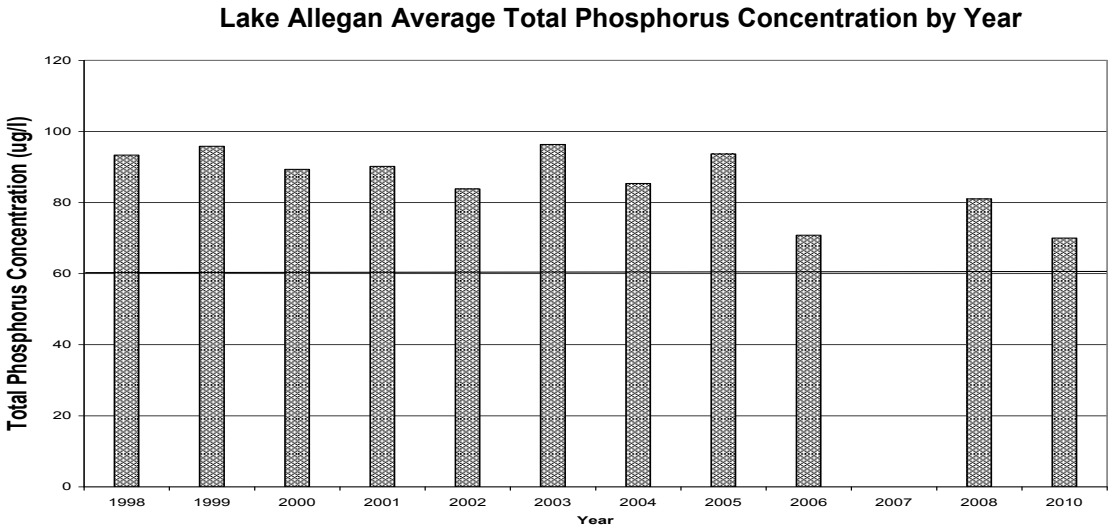
Temporal trend in Lake Superior lake trout mercury concentrations

How are we doing? Fair

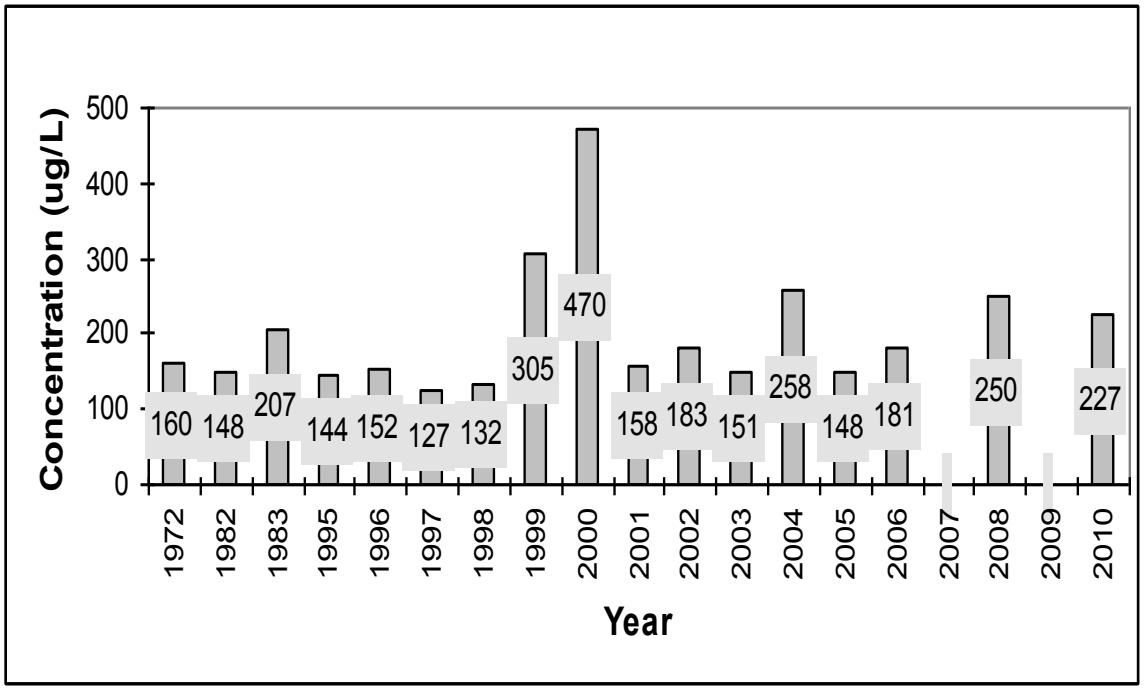
Comment: Although there is no detectable downward trend in mercury concentrations in whole lake trout from Lake Superior, they are not increasing as they are in the other Great Lakes.

<u>Outcome 6</u>: By 2020, achieve the total phosphorus targets for the following impaired lakes: Lake Allegan (60 µg/L); Lake Macatawa (50 µg/L); Ford Lake (50 µg/L); and Belleville Lake (30 µg/L).

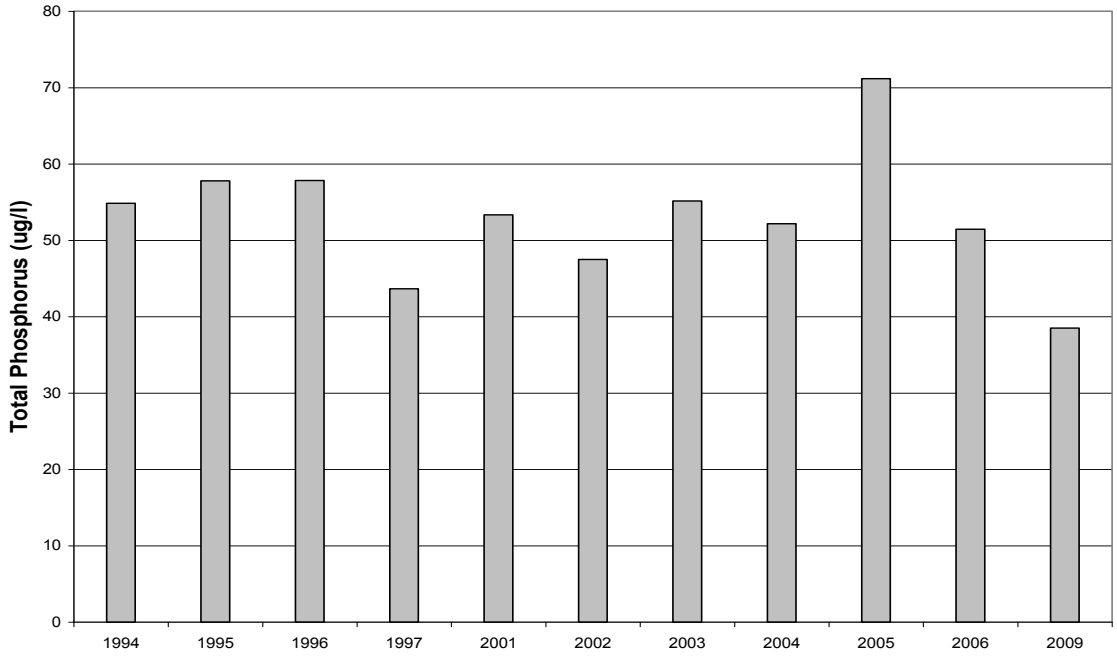
Measure: Total phosphorus concentration in the lakes.



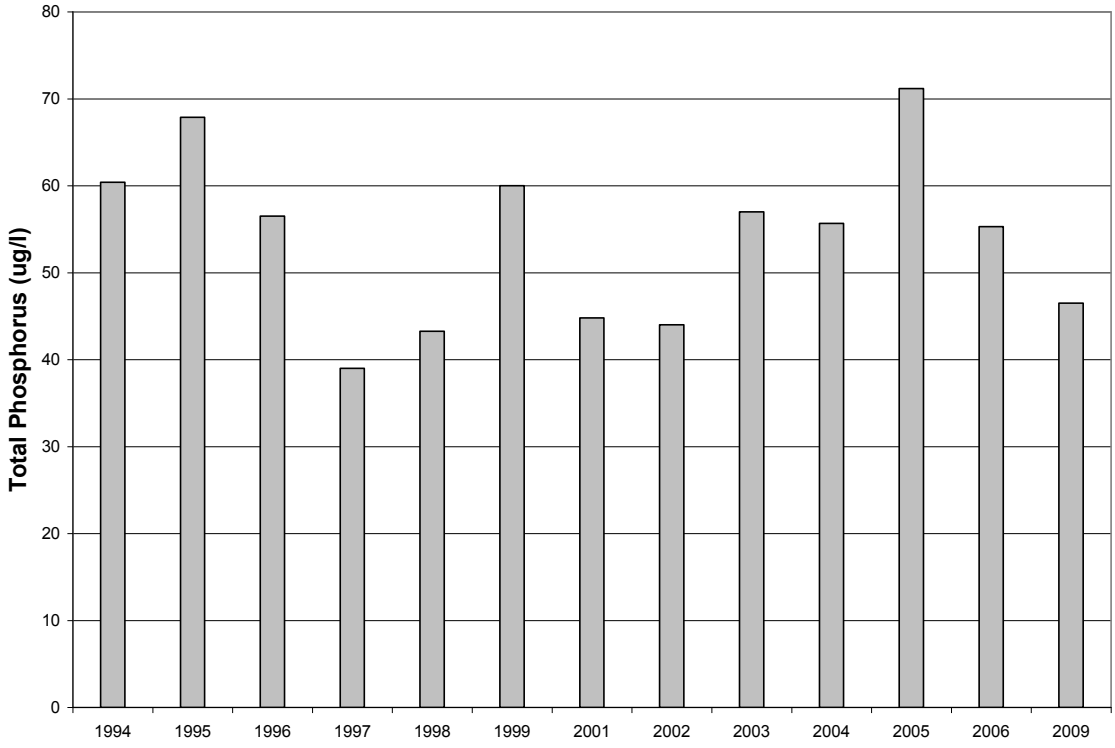
Lake Macatawa Spring Total Phosphorus Concentrations by Year



Ford Lake Total Phosphorus Concentrations by Year



Belleville Lake Total Phosphorus Concentrations by Year



How are we doing? Poor for Lake Macatawa; Fair for Lake Allegan; Good for Ford Lake; Fair for Belleville Lake

Comment: Lake Allegan, Ford Lake, and Belleville Lake may be showing some signs of a decline in phosphorus levels. In the Lake Allegan watershed, point sources have reduced their phosphorus discharges, and nonpoint source reduction efforts have been underway. Total phosphorus concentrations in Ford Lake were under the target in 2009 due to point and nonpoint source loading reductions to the middle Huron River watershed. However, nuisance blooms are still occurring and the lake will need some additional time to meet designated uses. Belleville Lake is not responding as well to phosphorus reductions in the watershed due in part to internal phosphorus loadings and lake dynamics and will require additional time and load reductions to achieve the desired target. Lake Macatawa does not show any evidence of a decline in phosphorus levels in spite of several activities undertaken to reduce nonpoint sources of phosphorus.

Outcome 8: By 2012, eliminate 20 specific instances where the WQS is not met.

Measure: The number of water quality impairments removed from the nonattainment list between 2002 and 2012.

Results: There were 25 instances of WQS restorations documented between 2002 and 2010.

How are we doing? Excellent

Comments: This goal was exceeded, with restoration of sites impaired by *E. coli* bacteria, sediments/siltation, toxic chemicals, etc. Sites delisted due to a change in listing methodology are not included.

Outcome 9: By 2012, fully restore 10 stream segments or lakes to meet all WQS.

Measure: The number of stream segments and lakes with nonpoint source related WQS impairments that were removed from the nonattainment list between 2002 and 2012.

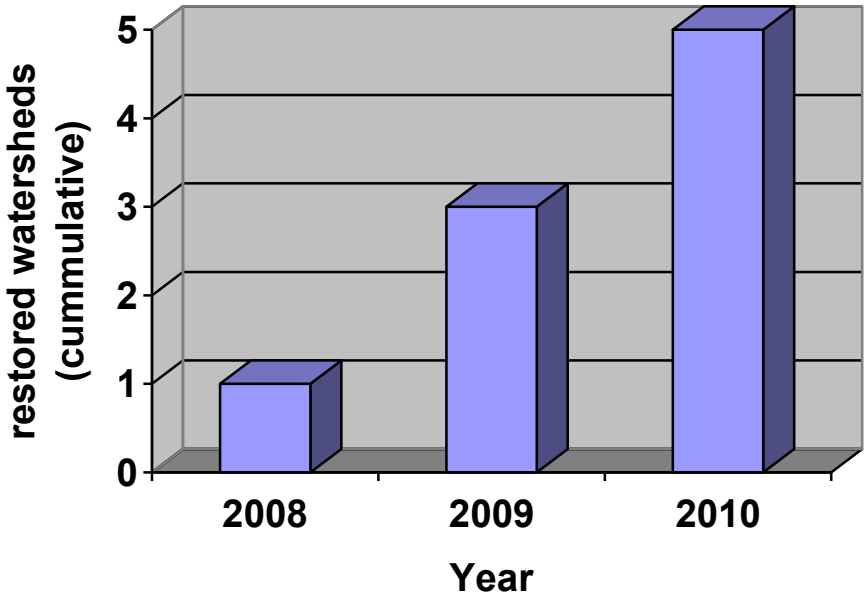
Results: Between 2002 and 2010, 16 previously impaired stream segments were improved to the extent that all assessed designated uses are attained.

How are we doing? Excellent

Comments: These 16 streams remain impaired from concentrations of PCB and mercury, but these materials are ubiquitous across the state due to airborne deposition.

Outcome 10: By 2012, improve water quality conditions in 5 watersheds impaired by nonpoint source pollution.

Measure: A watershed is improved if one or more water quality impairment is removed for at least 40% of the impaired water bodies or impaired miles/acres, or there are significant watershedwide improvements, as demonstrated by valid scientific information, in one or more water quality parameters associated with the impairments. Improvements must be documented as compared to the 2002 nonattainment list. This outcome is based on one of the United States Environmental Protection Agency's national goals for restoring water quality and may change once the current planning cycle is over.



How are we doing? Excellent

Comments: We have documented restoration or improvement in five 12-digit HUC watersheds.

Outcome 11: Increase the number of permits issued for natural shorelines by 50% over the previous year for the next 3 years (2012, 2013, and 2014).

Measure: Increase in number of shoreline protection permits issued for natural shoreline designs.

Results: Not available yet.

How are we doing? Don't know yet

Comments: This is a relatively new focus for the DEQ. We have been actively working with our partners through the Natural Shoreline Partnership and the Michigan Inland Lakes Partnership to develop educational materials and promote natural shoreline design. We expect to see an increase in the permitted shoreline protection projects that use natural shoreline design. Based on 2011, the target number of natural shoreline permits for fiscal year (FY) 2012 is 36, for FY 2013 the target is 54, and for FY 2015 the target is 81.

GOAL 4: ENSURE SAFE DRINKING WATER

Outcome 1: Ensure that groundwater is safe to drink.

Measure: Groundwater meets all applicable health-based standards for drinking.

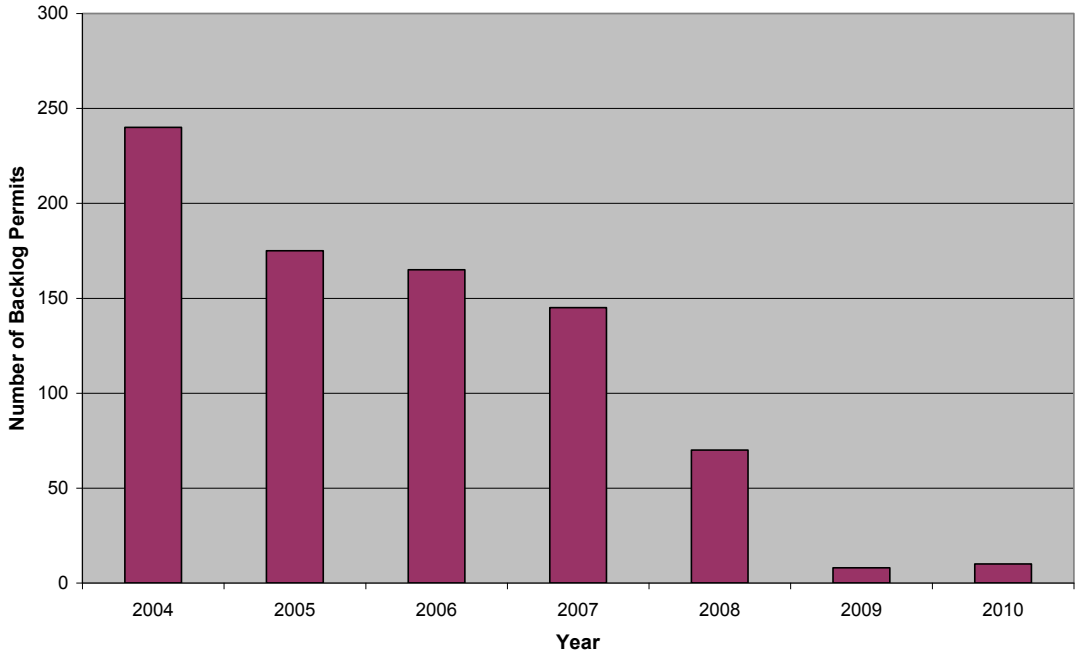
How are we doing? Don't know yet

Comment: There currently is no coordinated or compiled groundwater monitoring in Michigan. This needs to be examined and developed. This was identified as a departmentwide issue to be addressed in the future Strategic Plans with multiple divisions involved. In the interim, the following program outputs will be used to measure progress.

Program Output 1: The Groundwater Discharge Permit backlog will be eliminated, meaning that the permits will be timely with up-to-date limits and requirements to protect groundwater.

Measure: Number of Groundwater Discharge Permits that are in backlog.

Figure 1: Number of Groundwater Permits in Backlog



How are we doing? Excellent

Comment: The Groundwater Discharge Permit backlog was essentially eliminated by 2010. When implementation of the Backlog Elimination Plan began in 2004, there were 240 groundwater permit applications for which no permit action had been taken. At the end of FY 2009, only 8 groundwater permit applications from the original 240 did not have final permit decisions. As of FY 2011, there were 19 backlogged applications.

Program Output 2: By 2014, permitted groundwater discharges will not be creating or contributing to metals mobilization in groundwater.

Measure: Groundwater Discharge Permits with limits and requirements that prevent metals mobilization in groundwater.

Results 2011: During 2009, 101 of 110 permits addressed metals mobilization. Of the remaining 9 facilities, 2 received permits during FY 2011. The remaining 7 permits remain pending. In addition, 3 new permits were issued to food processors, including one that was previously addressed via an administrative consent order.

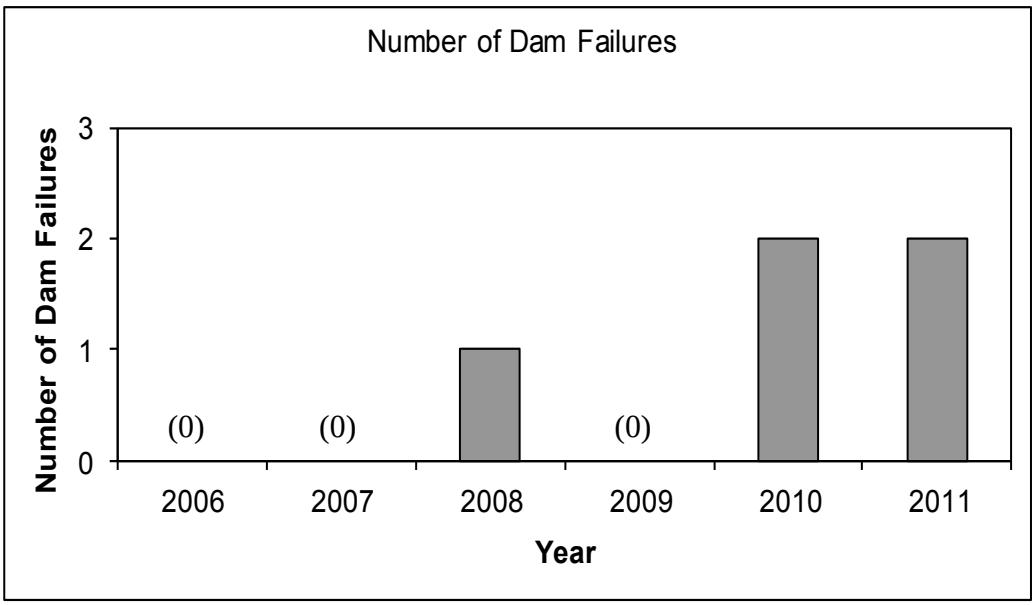
How are we doing? Good

Comment: During FY 2011, the WRD began implementing the food processors permit to address the remaining facilities. The WRD is currently revisiting the food processors permit with the industry prior to completing permits for the remaining facilities. By the end of FY 2012, it is expected that all permits will include limits and requirements to address this problem.

GOAL 5: PROTECT PUBLIC SAFETY

Outcome 1: Ensure there are no dam failures in conditions less than the flood designs.

Measure: Total dam failures per year.



How are we doing? Fair

Comment: The number of dam failures has dramatically declined since the passage of the Dam Safety Act in 1990. The act requires regular dam inspections that identify possible problems and requires the owner to address serious issues that endanger the dam.

OUTCOMES UNDER CONSTRUCTION

1. Recent studies have found a positive correlation between human development on lakeshores and lake watersheds and long-term cumulative ecological degradation of inland lakes. The WRD has been working with inland lake property owners, local governments, construction companies, and other stakeholders to promote natural shorelines and "soft" engineering techniques where shoreline modifications are necessary. Work is ongoing to identify appropriate environmental, social, and administrative outcomes and measures.

2. Wetlands provide important ecological and social benefits and the WRD has a well established, successful program to ensure their protection through regulatory activities and by promoting voluntary wetland protection and restoration. Developing environmental outcomes and measures that adequately portray the importance of wetland resources and demonstrate success in their protection is challenging because available monitoring and tracking tools have not been traditionally used or developed for this purpose. A priority for the WRD is to identify meaningful and measurable environmental outcomes that will describe a successful program within the means of readily available tools and resources.

3. Contaminant levels in wildlife are an important indicator of overall environmental health, and can be useful indicators of water quality trends when the wildlife species monitored are primarily reliant on aquatic organisms for food. The WRD and its partners have been conducting long-term wildlife monitoring to determine trends in contaminant levels and reproductive success. Work is underway to identify specific environmental outcomes that will signify success in protecting wildlife species that are at the top of the aquatic food web.

4. Watershed restoration outcomes in the Measures of Success include target completion dates of 2012 and are oriented primarily to mark the success of nonpoint source pollution control actions. All of these outcomes have already been met or exceeded. The WRD will be establishing new measurable and achievable (but aggressive) goals for restoration meant to draw on the activities conducted throughout the WRD rather than focusing on a specific program area. Key to success in this area will be discussions among staff, program managers, and external partners to identify meaningful outcomes, effective tracking and monitoring approaches, and priority waters where collective efforts will yield results.

APPENDIX A

The information below is an excerpt from "Following the Roadmap: Next Steps in Implementing Outcome-Based Environmental Management. Recommendations of the Environmental Advisory Council, December 16, 2010."

The following list of program areas is not exclusive of all the possible choices. That is, interested parties (including the DNRE), could ultimately choose to move forward with only some of the items identified and/or choose to add additional program areas for the development of outcomes.

We recommend that outcomes be developed in the following priority program areas.

Wet Weather Related Programs

Many of the challenging water impairments in urban watersheds are related to wet weather events. The regulatory framework for managing wet weather is defined by specific regulatory programs: storm water, combined sewer overflows, and sanitary sewer overflows that are largely managed on independent tracks. Yet the costs and water quality benefits of programs within and between these tracks vary enormously. **In order to create a common basis to evaluate alternatives and tradeoffs and facilitate coordinated efforts, interested parties should develop a statement of unifying outcomes for managing wet weather issues that cuts across individual program areas.**

Wetlands

Part 303, Wetlands Protection, defines regulated wetlands and their importance to Michigan's citizens and provides a process for authorization of construction activities in wetlands under both state and federal law where such impacts are unavoidable. The program as administered by the DNRE also provides assistance to landowners in identification of wetlands, promotes wetland restoration, provides for monitoring and assessment of wetland resources, and encourages public support through education and stewardship. The state has established the goal of restoring 500,000 acres of wetland by 2079 through partnerships with other state, federal, and private agencies. Due to budgetary constraints in 2009, the state considered elimination of the Michigan wetland program, returning regulation of activities in wetlands to federal agencies under Section 404 of the Clean Water Act. Instead, the Legislature passed Public Act 120 of 2009, which amended the wetland (and related) law and provides program funding for three years while a statutory-created Wetland Advisory Council evaluates the program and make recommendations for improvement. In developing its report, due August 15, 2012, **the Council is encouraged to consider agreed-upon outcomes for Michigan's wetlands program and the policies and resources necessary to achieve those outcomes.**

Critical Dunes Program

The DNRE regulates activities that significantly alter the physical characteristics of dunes in the 70,000 acres of designated critical dune areas. The governing statute, which dates to 1989, contains difficult decision-making criteria and provides little guidance as to how the DNRE is to apply those criteria. The DNRE has implemented several program improvements recommended by a work group of affected interests convened in 2008. But the underlying program implementation issues have not been resolved. The improving economy will soon increase development pressure in the high-value dune areas with resulting pressure for program reform. These program reforms are likely not possible without agreement on the fundamental purposes of regulating development in critical dunes. Further, the role of

regulation should be designed with reference to the full range of private and public sector activities encouraging appropriate dune management. **Interested parties should agree to the outcomes for critical dune protection and development in order to determine the nature of, and role of government in, appropriate dune management.**

Non-Native Invasive Species

Non-native invasive plant, animal, or microbial species are having dramatic economic and environmental impacts on native plant and animal communities as well as human health. Generally speaking, most of the coordination, control and management of non-native invasive species has reacted to rather than prevented introductions, and has been limited by media specific activities dictated by available funding sources. The number of existing non-native invasive species that are already well established and spreading rapidly throughout Michigan and the certainty of new introductions require strategically focused efforts. This strategic focus could be provided by a statement of the desired outcomes for invasive species management that illustrates why the management of invasive species is environmentally and economically important. **Interested parties should develop a statement of desired outcomes that encourages consistent action by involved agencies, determines the scale of treatment and prevention techniques, and focuses efforts at prioritized sites.**