

Saginaw Bay Coastal Initiative Phosphorus Committee Report



Background

Phosphorus concentrations in Saginaw Bay water remain higher than anywhere else in Lake Huron. Generally, the Great Lakes are *phosphorus limited*, meaning that the amount of phosphorus determines the basic productivity of the lake. Higher levels of phosphorus support increased plant growth and greater productivity. This increased productivity due to phosphorus loadings from the Saginaw River and tributaries to Saginaw Bay, along with the introduction of zebra mussels, has led to development of substantial 'muck' along the Saginaw Bay shoreline that creates both an aesthetic and economic problem for area businesses and residents.

As part of the Saginaw Bay Coastal Initiative (SBCI), local opinion leaders identified the reduction of phosphorus entering Saginaw Bay as a high priority for them. Because the issue of phosphorus is extremely important to the water quality of Saginaw Bay, MDA Director Don Koivisto and MDEQ Director Steven Chester organized a committee to determine how local, state and federal interests can work together to identify voluntary measures that will reduce phosphorus in the Bay.

In March 2007, a statewide Phosphorus Policy Advisory Committee identified a number of findings and recommendations to control phosphorus on a statewide basis. In March 2008, the Saginaw Bay Phosphorus Committee was formed and asked to review those findings and recommendations, and determine how to translate those recommendations and other recommendations into actions in the Saginaw Bay coastal area. The Saginaw Bay Phosphorus Committee was charged to:

- Identify and evaluate key sources of phosphorus contributing to impacts on the Saginaw Bay.
- Develop recommended 'next steps' to address these sources of phosphorus.
- Identify next steps that can be taken with existing resources and identify potential funding sources for other potential efforts.
- Summarize the findings and recommendations of the Committee for local action.

History ^(1,2,3)

During the 1970s and 1980s, the Saginaw River added nearly two metric tons of total phosphorus per day to the bay, the largest contribution of phosphorus to the Great Lakes by any river in Michigan. The added phosphorus increased the growth of nuisance blue-green algae that was likely responsible for the foul odor and poor taste of drinking water withdrawn from the bay.

Control of phosphorus inputs was the principal pollution control strategy adopted under the 1972 Great Lakes Water Quality Agreement (GLWQA) between the United States and Canada. The Supplement to Annex 3 of the 1978 Great Lakes Water Quality Agreement specified a total phosphorus target load for Saginaw Bay of 440 tonnes per year. Three phosphorus loading objectives were developed for Inner Saginaw Bay. The primary criterion was taste and odor at the Whitestone Point Water Filtration Plant. Secondary criteria were filter-clogging and taste and odor problems at the Pinconning and Bay City Water Filtration Plants in the inner portion of the bay and the degree of degradation of the inner bay ecosystem.

¹ State of Michigan Phosphorus Reduction Strategy for the Michigan portion of Lake Erie and Saginaw Bay, 1985.

² State of Michigan Phosphorus Reduction Strategy for the Michigan portion of Lake Erie and Saginaw Bay, 1991.

³ "Phosphorus in Saginaw Bay have we met the target?" Fact Sheet, The Lake Huron Binational Partnership, 2006.

In 1976, the corrected base year load was determined to be 870 metric tonnes per year. The target load of 440 metric tonnes per year was established both because of the desired reduction in water supply taste and odor problems and because the level was realistically achievable. The recommended criterion of 0.015 mg/L as a spring areawide mean total phosphorus concentration represents the estimated “in Bay” concentration when the 440 tonnes per year target has been met.

Saginaw Bay and the Saginaw River system were listed by the International Joint Commission, Great Lakes Water Quality Board (IJC 1981) as a Class A Area of Concern because of high levels of nutrient inputs and occurrence of toxic compounds in sediments, fish and gull eggs. The Great Lakes Water Quality Board stated that water quality had been degraded due to excessive nutrient inputs.

In October 1983, a supplement to Annex 3 of the GLWQA called for the development of phosphorus reduction plans for Lake Erie, Lake Ontario and Saginaw Bay. Because of this, in March, 1984, US-EPA and the states agreed that each state would prepare a phosphorus reduction strategy for its jurisdictional boundaries.

The State of Michigan strategy for attainment of the phosphorus reduction goals established in the supplement to Annex 3 consisted of two elements: 1) a point source reduction strategy; and 2) a non-point source reduction strategy. As a result of significant point source phosphorus reduction prior to 1982 and costs of further point source reduction, the emphasis of Michigan's strategy was on developing effective nonpoint programs. In 1991 it was concluded that Michigan had exceeded its phosphorus reduction goals for Saginaw Bay. The following recommendations were made to determine the impact of the phosphorus reductions on the basin: 1) Determine a nutrient budget for Saginaw Bay; and 2) Determine new phosphorus reduction goals for Saginaw Bay.

Soon after 1991, zebra mussels appeared in Saginaw Bay. Their presence is believed to have influenced the cycling of phosphorus in the Bay, and may be a cause for recent increases in algae wash-up on area beaches which has renewed concern regarding phosphorus loadings to the Bay.

Source Identification ⁽⁴⁾

As part of the SBCI Phosphorus Committee effort, it was requested that MDEQ develop an evaluation of potential sources and related loadings of phosphorus to the Bay. Since, the loading of nonpoint source (NPS) phosphorus is believed to be one of the key contributing factors degrading the water quality of Saginaw Bay this was the focus of the evaluation.

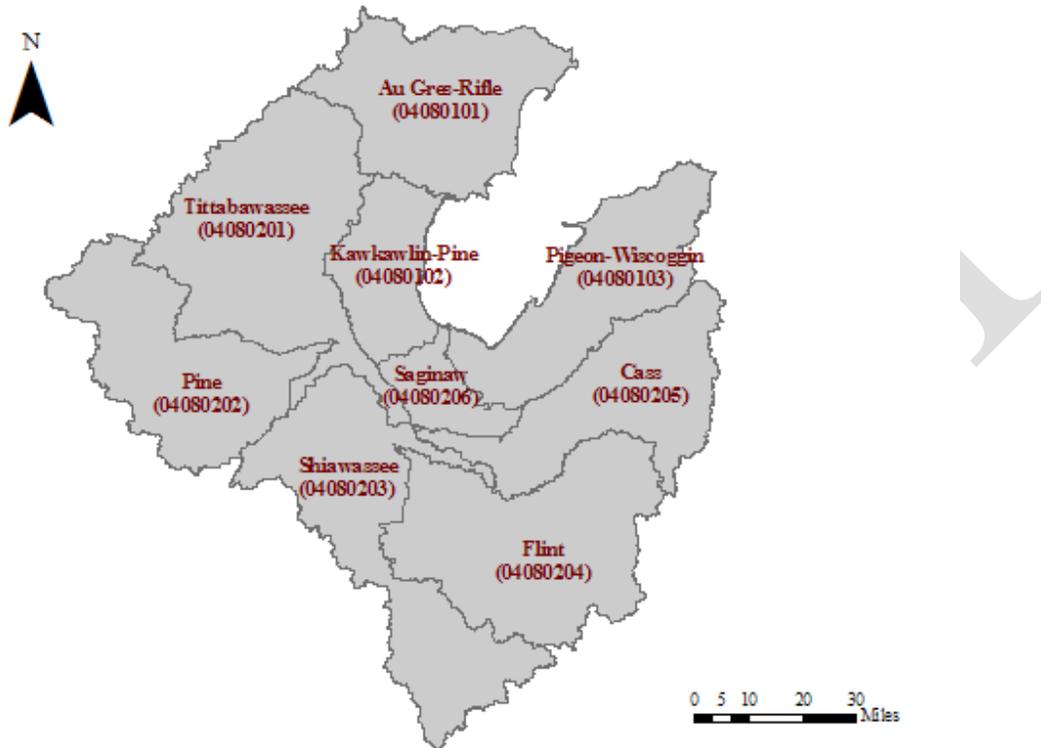
The relationship between land use and NPS pollution is well established and a number of simple models have been developed to provide rough estimates of the NPS loads associated with particular land uses. This analysis applies the Geographic Information System (GIS) version of the Long Term Hydrologic Impact Assessment and Nonpoint Source Pollution (L-THIA NPS) model to the Saginaw Bay Watershed. Approximation of the total phosphorus loads associated with six land use category is presented by each of the nine sub-basins (8 digit hydrologic unit codes, HUC) that constitute the Saginaw Bay Watershed.

⁴ “Using the LTHIA Model to Evaluate Nonpoint Source Loads of Phosphorus to Saginaw Bay”, Peter Vincent – DEQ Water Bureau, 2009.

Study Area

This analysis examined total phosphorus loads associated with the following nine sub-basin (8 digit HUC) within the Saginaw Bay Watershed: Au Gres-Rifle (04080101), Kawkawlin-Pine (04080102), Pigeon-Wiscoggin (04080103), Birch-Willow (04080104), Tittabawassee (04080201), Pine (04080202), Shiawassee (04080203), Flint (04080204), Cass (04080205), Saginaw (04080206), figure 1.

Figure 1.



Comparison of Phosphorus Loads by Sub-Basin within the Saginaw Bay Watershed

The L-THIA NPS model's estimate of total phosphorus derived from all sub-basins within the Saginaw Bay Watershed was approximately 1,514,100 pound a year. Table 1 shows the total phosphorus estimated from each sub-basin. The Pigeon-Wiscoggin, Flint and Shiawassee sub-basins are the largest producers of NPS total phosphorus respectively, these three sub-basins account for approximately 53 percent estimated by the model. When normalized by area the Pigeon-Wiscoggin and the Saginaw total phosphorus load per acre is larger than the other sub-basins. The normalized loads from the Shiawassee, Flint, Kawkawlin-Pine, and the Cass Watersheds are comparable.

Table 1: Total Phosphorus Load by Sub Basin

Sub-Basin Name	Sub-Basin HUC Number	TP Lbs/Year	Percent of Total Load	Acres	TP Normalized by Area (LBS/Acres)
Pigeon-Wiscoggin	4080103	283,017	18.7%	576,505	0.49
Flint	4080204	263,430	17.4%	850,997	0.31
Shiawassee	4080203	259,653	17.1%	809,445	0.32
Cass	4080205	164,129	10.8%	580,807	0.28
Chippewa-Pine	4080202	146,590	9.7%	655,868	0.22
Tittabawassee	4080201	145,345	9.6%	925,689	0.16
Kawkawlin-Pine	4080102	96,261	6.4%	310,565	0.31
Au Gres	4080101	86,466	5.7%	655,594	0.13
Saginaw	4080206	69,208	4.6%	160,696	0.43
Total		1,514,102			

Modeling Results by Land Use Category for the Saginaw Bay Watershed

The total phosphorus load for the Saginaw Bay Watershed is presented by the six land uses categories used in this analysis, table 2. This modeling exercise found agricultural land to account for approximately 90 percent of the total phosphorus load. Low density residential lands, high density residential lands, and commercial lands account for the majority of remaining 10 percent. When normalized by area commercial and high density residential lands have a higher load per acre.

Table 2: Total Phosphorus Load by Land Use Category

Land Use	TP Lbs/Year	Percent of Load	Acres	Percent of Area	Normalized by Area (lbs/acres)
Agricultural	1,365,222	90.2%	2,486,820	45.0%	0.55
Commercial	16,586	1.1%	20,915	0.4%	0.79
Forest	1,400	0.1%	1,196,617	21.7%	0.00
Grass/Pasture	613	0.04%	327,201	5.9%	0.00
HD Residential	40,667	2.7%	58,670	1.1%	0.69
LD Residential	89,612	5.9%	561,603	10.2%	0.16
Water/Wetland			874,149	15.8%	
Total	1,514,102		5,525,978.79		

Recommendations

In order to gain a better understanding of phosphorus impacts on Saginaw Bay, the SBCI Phosphorus Committee held several meetings to hear from technical experts including: NOAA, DEQ, MDA, Michigan United Conservation Club (MUCC), Farm Bureau, United States Department of Agriculture (USDA), Conservation Districts, Michigan Sugar Company, Bay City Wastewater Treatment Plant, and South East Michigan Council of Governments (SEMCOG). In addition to these presentations, the committee representation included technical experts covering agricultural, urban, and point sources of phosphorus.

To comprehensively address the phosphorus source control issues, the Committee formed three workgroups focused on source reduction: an Agriculture Phosphorus Pollution Prevention (P3) Workgroup; a Stormwater Phosphorus Workgroup; and a Point Source Phosphorus Workgroup. These subcommittees were charged with developing reduction strategies for each of these source areas.

The recommendations below are divided by: SBCI Phosphorus Committee and Source Reduction Workgroups. The Committee recommendations address over-arching needs regarding further evaluation of phosphorus impacts on Saginaw Bay, the Workgroup recommendations outline specific next steps to implement phosphorus reduction strategies for the various source areas.

SBCI Phosphorus Committee

After review of existing information regarding phosphorus sources and loadings to Saginaw Bay, the Committee recommends the following actions to further evaluate phosphorus impacts in Saginaw Bay:

1. MDEQ in cooperation with local interests, develop specific and attainable phosphorus goals for the Saginaw River and for Saginaw Bay.
2. MDEQ in cooperation with local interests develop a Saginaw River and Bay Phosphorus Strategy to meet the newly defined goals. While the recommendations in the attached report are a starting point for action, it is anticipated that additional measures may be necessary to achieve the new phosphorus goals.
3. MDEQ should determine phosphorus loadings from direct tributaries to Saginaw Bay and this information should be incorporated into the Phosphorus Reduction Strategy for Saginaw Bay.
4. MDEQ should coordinate with the Saginaw Bay multi-year study being conducted by the National Oceanic and Atmospheric Administration (NOAA) as well as other on-going monitoring efforts to facilitate the development of the above goals. However, this does not mean that development of the above goals and implementation of the Phosphorus Reduction Strategy for Saginaw Bay should be delayed until completion of the NOAA study.

Source Reduction Workgroups

Agricultural Phosphorus Pollution Prevention(Ag P3) Workgroup

As part of the larger effort, an agriculture phosphorus pollution prevention workgroup was formed to identify actions that could be taken to reduce phosphorus from agricultural sources. The workgroup evaluated both livestock and cropping potential concerns. The recommendations which follow are a combined effort from Michigan State University Extension (MSUE); MDEQ; Michigan Agriculture Environmental Assurance Program (MAEAP); Conservation Districts; agribusiness and individuals.

All operations, regardless of size, should be good stewards of the environment. All operations need to comply with current regulations (ex. no discharges into waters of the state). This heightened awareness of the phosphorus impact in Michigan's surface waters and the need for practical and economic recommendations in the agricultural sector is addressed by local, state, and federal partners. The overall goal of the subcommittee is cost-efficient management. Recommendations to evaluate and implement programs may reduce phosphorus loading into our state's surface waters.

The subcommittee did not feel it is appropriate to prioritize between cropping and livestock because they are both of great importance and differ. Below are recommendations divided into cropping and livestock systems. Recommendations are listed **within cropping** and **within livestock** systems in priority order.

Definitions:

BMP – Best Management Practice

CAFO – Concentrated Animal Feeding Operation: as defined by EPA (see Appendix A)

CNMP – Comprehensive Nutrient Management Plan

GAAMP – Generally Accepted Agricultural Management Practice

Hobby Farm – non-commercial operations (ex. not for profit or those operations not filing Schedule F Federal tax return)

MAEAP – Michigan Agriculture Environmental Assurance Program

MDA – Michigan Department of Agriculture

MFB – Michigan Farm Bureau

MSUE – Michigan State University Extension

NPDES – National Pollutant Discharge Elimination System

NRCS – Natural Resource Conservation Service

Small and medium size farm – commercial operation less than CAFO size

USDA – United States Department of Agriculture

Cropping Systems

- 1. Develop consistent nutrient recommendations, specific to the Saginaw Bay area, supported and promoted by all groups providing direction for farmers.**

Discussion: Currently, groups providing support for farmers on nutrient recommendations are not presenting a consistent message. Nutrient recommendations need to be updated specific to crops grown in the Saginaw Bay area, providing a consistent message to farmers regarding fertilizer application.

- 2. Provide incentives to promote on-farm conservation demonstrations in cooperation with producers and agribusinesses.**

Discussion: Funding this recommendation encourages agribusinesses to develop a conservation partnership and jointly support a program to conduct on-farm demonstrations. Conducting on-farm comparisons of management practices is one of the most effective ways to convince producers to adopt management changes. It is important that conservation messages come to producers from a partnership of key business community stakeholders, for example implement dealers, agronomy consultants, lenders, commodity groups, etc.

3. Promote cover crops for control of wind erosion; allow more flexibility to adapt other wind erosion control practices to match specific site conditions.

Discussion: Wind erosion is a significant source of sediment containing phosphorus to the Saginaw Bay. A MDNR 1988 study estimated wind erosion resulted in greater than five million metric tons of the soil erosion, accounting for 63% of the total soil erosion in the Saginaw Bay Basin. Cover crops provide the best protection against wind erosion and should be promoted. Other options to address wind erosion (such as wind breaks and wind rows) should be evaluated. The funding agencies, such as USDA, NRCS, conservation districts, etc., should have practices with more flexibility for site specific conditions leading to wider adoption.

4. Purchase and maintain research farms in the Saginaw Bay area to demonstrate various management practices and evaluate their effectiveness under different cropping systems.

Discussion: Since the early 1990's, MSU Extension, Huron Conservation District, and Tuscola Conservation District in cooperation with area farmers have successfully conducted demonstration research plots to evaluate the benefits of various conservation practices and cropping management systems. This research has been funded through grants and has had a positive impact encouraging conservation tillage in the Saginaw Bay area. The funding sources for demonstration plots are not permanent. This recommendation is to provide funding for the purchase and maintenance of Saginaw Bay area research farms to establish permanent demonstration sites. Research priorities should have local input and oversight.

5. Develop and promote a range of options to achieve a minimum vegetative setback from all drains, creeks, rivers, and lakes.

Discussion: Farming to the edge of drainage ways occurs in the Saginaw Bay area. Providing a vegetative setback between the drainage way and the agricultural production area would reduce the likelihood of erosion and overspray from fertilizer and pesticide applications. Current programs promoting these types of practices have requirements that limit the widespread adoption of vegetative setbacks. The funding agencies, such as USDA, NRCS, conservation districts, etc., should have practices with more flexibility for site specific conditions leading to wider adoption.

6. Establish the Saginaw Bay area as Michigan's agricultural subsurface tile drainage research area for water quality.

Discussion: The Saginaw Bay area provides a unique research area to study the effect of agricultural tile and drainage on water quality. It is recommended that resources be provided to MSU to establish an agricultural drainage research and education program similar to the University of Minnesota's (<http://d-outlet.coafes.umn.edu/education.html#educationlinks>) or The Ohio State University's (<http://www.ag.ohio-state.edu/%7Eagwatmgt/>).

Special note: Insure there are no unlawful septic drain connections to agricultural tile drainage prior to any research.

7. Promote GPS and/or zone soil sampling and testing along with fertilizer application to develop accurate baseline for nutrient levels and apply fertilizers based on this information.

Discussion: This recommendation will reduce input costs for fertilizer by accurately identifying and applying nutrients only where needed. It will reduce P levels by only applying to crops what is necessary to achieve realistic yield goals.

While there can be cost savings to accurately applying fertilizers through means of GPS technology, currently many farmers are concerned about costs associated with GPS soil testing and fertilizer application. Demonstrations and grant funding are needed to offset costs to overcome this barrier for adoption of GPS technology.

8. Demonstrate erosion control best management practices (BMPs) to stabilize temporary v-ditches cut for field drainage.

Discussion: A majority of the Saginaw Bay area soils are poorly drained. Farmers cut v-ditches to drain water from low areas in their fields to the nearest ditch or drain to reduce crop damage. V-ditches are not stabilized and can contribute sediment containing phosphorus directly to nearby waterways. Since v-ditches are temporary measures for storm water relief, the problems encountered are very similar to construction storm water. This recommendation is to demonstrate how construction storm water control practices may reduce the risk of sediment discharges from these temporary v-ditches.

9. Promote innovative, environmentally sound drainage ditch design, construction and maintenance in the Saginaw Bay area. This should be coordinated with the North East District of Michigan County Drain Commissioners (includes: Arenac, Bay, Genesee, Gladwin, Huron, Lapeer, Midland, Saginaw, Sanilac, Shiawassee, St. Clair, and Tuscola counties).

Discussion: Many of the waterways in the Saginaw Bay area are designated county drains established to manage water flow. Design, construction and management of these drains in an environmentally sound way could substantially reduce sediment containing phosphorus into the Saginaw Bay. Current drain law and code do not provide many opportunities to work on water quality projects; however coordination of environmental programs and grants with drain projects can provide a process to accomplish both water quantity and quality management. Coordination with the North East District of Michigan County Drain Commissioners will provide greater opportunity to develop a strong working partnership between drain commissioners and environmental programs.

Livestock Systems

Small/Medium Size Farms

1. Provide funding for Conservation District livestock specialist positions in the Saginaw Bay area to focus on technical assistance to small and medium size livestock operations.

Discussion: Conservation Districts provide much of the on-farm technical assistance to producers regarding management practices in the Saginaw Bay area. One-on-one assistance with farmers is necessary for implementing best management practices. Conservation District

technicians are knowledgeable about the USDA cost share programs and assist farmers with the administrative and technical issues. Additional local technical assistance would result in environmental improvement through greater participation in programs such as the Michigan Agriculture Environmental Assurance Program (MAEAP).

2. Develop “common sense” standards and solutions that provide low cost, flexible alternatives to address operational problems.

Discussion: Often federal and state cost-share programs require more comprehensive and expensive solutions than are necessary to resolve simple problems. While cost-share programs exist to address some of the management issues on the farm, these programs often require a long-term commitment and substantial capital outlay. To receive funding, additional issues beyond the immediate practice must be addressed in conjunction with the desired practice. Many of these programs have substantial administrative and process oversight (i.e. application, engineering review, etc.) creating a reluctance, including financial obstacles, for many farmers to participate. Comprehensive farm management planning is an excellent concept; however, in order to achieve an immediate environmental improvement, the process must be streamlined to allow for implementation of practical, low-cost practices. Building flexibility into these cost share programs and offering more options would lead to a greater acceptance and implementation by producers.

3. Promote the simple message “No runoff – No discharge” through an outreach program targeted to non-permitted (NPDES) small and medium size livestock operations.

Discussion: Small and medium size livestock farms have diverse operations and management practices. Some of the challenges identified are as follows: age of farmer (pending retirement and not willing to adopt best management practices); storage (expensive for small/medium operations); and short-term timeframe to recapture costs associated with improvements. A simple message, “No runoff – No discharge,” should be universally and consistently promoted by all agencies and organizations. The intent is to establish a minimum implementation level for every livestock farm operation in the Saginaw Bay area.

4. Identify non-traditional approaches to conduct educational outreach to small and medium size livestock operations.

Discussion: Because of the diversity in management approaches on small and medium size operations, it is difficult to develop a standard educational outreach program with wide appeal. Traditional approaches have had limited effectiveness. To attain broader acceptance and implementation of best management practices, it will be necessary to identify, implement, and evaluate non-traditional approaches.

Hobby Farms

5. Develop a summary report of local ordinances related to livestock within the Saginaw Bay area to provide information and education on existing local ordinances and the Right to Farm Act.

Discussion: Local ordinances exist to regulate the number of livestock a landowner can have per the area owned. Many residents are not familiar with these ordinances. Ordinances and their enforcement vary between governmental units. The Right to Farm Act preempts any local

ordinance, regulation or resolution that purports to extend or revise in any manner the provisions of this act or generally accepted agricultural and management practices developed under this act. A grant should be utilized to support an education/outreach program on nutrient management, targeting hobby/small livestock facilities in the Saginaw Bay area.

6. Develop an outreach and education program targeting hobby farms regarding appropriate manure management practices and utilization.

Discussion: In field surveys of area watersheds, hobby farms, particularly farms with only a few animals, have discharges as a result of poor manure management practices. Hobby farms have very different operational needs than production livestock operations. Recognizing hobby farms as a specific target group and promoting sound manure management practices to them should effectively address a majority of these discharges. MDA and MSU Extension are implementing outreach and education programs to these types of farms, and coordination with their efforts will provide a good initiation point for a more intensive regional effort.

Concentrated Animal Feeding Operations

7. Farms accepting manifested manure should have a nutrient management plan with appropriate setbacks; identification of environmentally sensitive areas; and application timing.

Discussion: CAFOs generally manifest a majority of their manure to land owners for application to nearby fields. A NPDES CAFO permit requires a Comprehensive Nutrient Management Plan (CNMP) to outline how and where they will apply manure. Proper land application of manifested manure, including appropriate setbacks; identification of environmentally sensitive areas; and application timing, etc., is not required to be documented. To provide reasonable assurance to the surrounding community, farms accepting manifested manure should develop and implement nutrient management plans that minimize discharge and runoff.

8. Develop an education and certification program for manure applicators, specifically targeting the individuals directly applying manure to the fields.

Discussion: Many custom applicators receive training and continuing education; however, employees directly applying manure to fields do not receive sufficient training to ensure that manure application aligns with the recommendations in a CNMP or NMP. Training employees is essential to provide environmentally sound manure application. A training program should be developed for the manure applicators and their employees providing a basic awareness of discharge and runoff issues.

9. Promote farms that have implemented sound environmental practices which positively contribute to the surrounding community.

Discussion: Many farm operations properly manage their manure and have invested in their facilities to achieve sound environmental standards. These positive efforts should be recognized and promoted within the agricultural and local community. It is important to acknowledge that, like other businesses, farms provide jobs and contribute to the local economy.

Manure Utilization

10. Promote the value and alternative uses of manure.

Discussion: Manure is becoming much more valuable. Due to the increase in cost of commercial fertilizer, the value of manure has become similar to a commodity. Ensuring that this message is promoted and alternative use options are made readily accessible will provide for better management of manure. Utilization of manure value calculators are available at: <http://animalagteam.msu.edu/LandApplication/ManureValueCalculators/tabid/250/Default.aspx>.

11. Update regulations regarding waste management to incorporate “green” technologies.

Discussion: Waste management regulations were originally developed primarily to address industrial waste streams. Regulations should be re-evaluated to determine how to actively support green technologies, such as anaerobic digesters and composting facilities using co-mingled waste. A workgroup should be formed to draft recommended changes to waste management laws that will encourage green technologies.

12. Support the Huron Economic Development Council’s efforts at developing regional anaerobic digesters for manure and other wastes.

Discussion: Several years ago, the Huron County Economic Development Corporation (EDC) began to evaluate how they could assist our agricultural industry in economic development projects. One key area that they began to explore was the development of alternative energy related to farms and agriculture. The EDC focused on anaerobic digesters for several reasons. First the basic technology is well understood. Second, there is a significant amount of feedstock, (i.e. manure) for the digesters. Third, digesters could address several issues related to manure and nutrient management on our local farms. The EDC conducted a base line study of several farms in the area, the Lusk Study, to determine implementation issues. The report indicated that digesters could have an impact on farms but the payback was not quick and the farms were not interested in owning and managing what is basically an alternative energy company. The EDC has continued to pursue this track but focused on a large scale, "community" digester that could include several farms and other feedstocks. This has been a long term effort for the EDC.

Currently the EDC is reviewing the qualifications of and interviewing several companies that could be interested in developing a state of the art, community digester in Huron County. The successful company will then begin the process of developing an anaerobic digester, (community scale), meeting with local farms, determining DEQ permitting requirements and utilization of final products. It is anticipated that this process will take 6-8 months ending with the site selection of the digester, all of the required permits, contracts with farms for feedstock, up take contracts for electricity and natural gas and off take solutions for the digested manure.

13. Develop a commercial composting facility for bodies of dead animals and manure in the Saginaw Bay area.

Discussion: Currently there are extremely limited ways to dispose of bodies of dead animals. In the Saginaw Bay area, no landfills accept bodies of dead animals, no rendering options are available, and burial during winter months is not practical. Current legislation does not allow for the co-mingling of bodies of dead animals or manure. Composting is a beneficial way of utilizing various waste streams. Dead animals, both livestock and road kill, pose a hazard when

improperly disposed. A commercial composting facility would allow livestock owners to properly dispose of dead animals and manure.

14. Support a link for a Saginaw Bay area manure brokering website. Potentially expand the existing MSU Extension website: <http://web2.canr.msu.edu/manure/>

Discussion: Provide farmers access to information about where they can buy and/or sell manure. MSU Extension has established a manure brokering website that could be tailored for expanded use in the Saginaw Bay area.

15. Evaluate the Genesee Power model for horse and other manures and explore expanding local collection points.

Discussion: Genesee Power is currently taking horse manure from area farms to convert to energy. Investigating this model may provide another option to address manure utilization in the Saginaw Bay area.

Livestock Exclusion

16. Promote a consistent, simple message “Keep livestock out of waterways.”

Discussion: Keeping livestock out of the water is the best way to ensure there is minimal sediment, nutrient, or fecal discharges from these animals into the nearby streams, creeks, drains, rivers, and lakes. A brochure *Acceptable Practices for Managing Livestock Along Lakes, Streams, and Wetlands*, compiled by MDEQ; MDA; MSU Extension; and the United States Department of Agriculture (USDA), NRCS is a resource for information. MSUE Bulletin No. E-3066.

Phosphorus Feed Management

17. Promote the use of a mass balance approach for including phosphorus in livestock diets.

Discussion: Phosphorus is one of the most expensive supplemented mineral in livestock feeds. Most grains used in animal diets (corn, wheat, soybeans) store as much as 80-90% of the total P in the form which is unavailable for uptake by swine (monogastric digestive systems). Use of phytase, a commercially available enzyme, in monogastric diets increases the availability of phytate-bound P, reducing the need for supplemental inorganic P, and resulting in a reduced total P load in manure. We encourage the use of phytase in swine diets and support continued research that allows for the improvement of P utilization among livestock. Additionally, with drastic increases in input costs for livestock producers, many require utilizing co-products, such as distiller's grain, in livestock feeds. Some of these co-products contain concentrated amounts of P. Livestock producers need to eliminate additional sources of P in the diet to minimize the amount of P being excreted in manure. We support educational and research efforts that help producers and nutritionists include the minimum amount of P necessary into livestock diets.

Ag P3 Workgroup Summary:

The recommendations outlined above must be implemented to reduce phosphorus discharges into surface waters of the Saginaw Bay area. Many resources have to join forces in order to implement these recommendations utilizing science-based information and emphasizing cost-

effective management practices. Table 3 provides an initial implementation strategy for the Ag P3 workgroup recommendations.

The recommendations below require immediate and substantial commitment and financial support from MDA, MDEQ, MSUE, NRCS, Conservation Districts, agribusiness, individuals, and other groups to put into action.

- Develop consistent nutrient recommendations, specific to the Saginaw Bay area, supported and promoted by all groups providing direction for farmers.
- Provide funding for Conservation District livestock specialist positions in the Saginaw Bay area to focus on technical assistance to small and medium size livestock operations.
- Develop “common sense” standards and solutions that provide low cost, flexible alternatives to address operational problems.
- Update regulations regarding waste management to incorporate “green” technologies.
- Purchase and maintain research farms in the Saginaw Bay area to demonstrate various management practices and evaluate their effectiveness under different cropping systems.
- Establish the Saginaw Bay area as Michigan’s agricultural subsurface tile drainage research area for water quality.

All operations, regardless of size, should be good stewards of the environment. Verification of operations through MAEAP (in any and all of the three systems – Cropping, Livestock, and Farmstead) encompasses several components of the recommendations in this document. We strongly encourage increased participation in MAEAP in the Saginaw Bay area.

Stormwater Phosphorus Workgroup

As part of the larger effort, a Stormwater Phosphorus Workgroup was formed to identify actions that could be taken to reduce phosphorus from urban pollution sources. This workgroup identified three key areas where actions may result in significant reductions in phosphorus loads to Saginaw Bay: 1) Septic systems; 2) Low impact development (LID); and 3) Improvements in stormwater regulations.

Septic Systems

If properly designed and maintained septic systems provide an excellent way to treat wastewater. However, where septic systems are inadequately designed or maintained discharges from these systems can contribute phosphorus and bacteria to nearby streams and lakes. In order to ensure appropriate oversight and functioning of these systems, the following actions are proposed:

1) Education –

Many people view septic systems as wastewater disposal instead of wastewater treatment. It is important to educate homeowners on how septic systems work and how to properly maintain them.

- Establish outreach program utilizing readily available resources targeted to homeowners.

2) Data Management:

Septic systems have been used for wastewater treatment in the United States since the 1880s. The permitting system in Michigan for septic systems was standardized in the 1970s. There are many septic systems that were installed prior to this permitting

process and therefore are not effectively tracked. Additionally, as the permitting process and sanitary codes developed, information collected for the design and construction of these systems changed leading to variation in available information.

It is critical that information collection and retrieval be standardized, comprehensive, and easily accessible. The recommendations below will help to establish this process:

- Resolution recommending a specific data management system to standardize on statewide basis.
- Demonstrate value of selected data management system to other counties in the Saginaw Bay Watershed through the Kawkawlin River Watershed project.

3) Develop model local ordinance:

A model local ordinance should be developed to achieve standard level of septic system inspections and maintenance and create resolution to encourage counties in the Saginaw Bay Watershed to adopt it. Sanitary codes in other surrounding counties will be reviewed to evaluate existing provisions. A matrix of this information will be developed to assist in developing the model code. The following issues will be evaluated for possible inclusion in the ordinance:

- Point-of-Sale Inspections - Inspections mandated by LHDs or the local governing body at the time of home sale have been established in a number of counties statewide. In general, a point of sale approach is opposed by realtors, but would have general support of LHDs if promulgated with flexibility.
- Change In Use Inspections - As a condition of issuance of a building permit for modifications to an existing home, some LHD jurisdictions require a review of the existing on-site wastewater system by the LHD. The overall average frequency of inspection resulting from this approach is unknown.
- Mandatory Inspection/Reporting at the Time of Maintenance Event - Statute requiring the inspection /reporting at the time of pumping of the septic tank or other maintenance event would result in inspection of a significant number of systems. This general approach has been implemented as part of the state of Wisconsin administrative code along with a requirement that all systems be inspected for evidence of surface ponding every 3 years and that newly permitted systems include a management plan.
- Alternative System Guidance – identify a central site(s) for common guidance on alternative systems.
- System age – Systems over a certain age (25 years) should be required to have a regular inspection.
- Dwellings without approved permit – Existing dwellings without an approved septic system permit should be required to have an inspection.
- Onsite sewage treatment language – need to change onsite disposal to onsite treatment in ordinance to reflect the need for ongoing maintenance.

- Annual Septic System Community Report – An annual report should be required to report on the effectiveness of onsite sewage treatment throughout the community.

4) Financing –

One of the critical challenges to effectively addressing septic system problems is providing access to funding for homeowners and municipalities. While funding sources are available for much of this work currently, the actions below are recommended to make this funding more easily accessible:

- Low interest loans – Outline local program that would provide zero to low interest loans to homeowners. Need to establish clear technical and financial criteria.
- Evaluate State and/or local funding (loan/grant) for addressing septic system issues.
- Resolution to support local programs and/or modifications to State funding programs to address septic system issues.

5) Partnerships –

While the County Health Departments provide the principal oversight of septic systems, other local agencies and organizations play a critical role in assisting the Health Departments in identifying and correcting failing systems.

It is recommended that partnerships be established between local Health Departments and other local agencies and organizations, and that a model inter-agency process to identify and address septic system failures be developed. Partners would include:

- Drain Commission
- Road Commission
- Local Townships and Municipalities (including planning commissions, building departments, and local elected officials)
- Realtors
- Homeowners Associations
- Home builders Associations

Low Impact Development (LID)

Low Impact Development (LID) is an innovative stormwater management approach with a basic principle that is modeled after nature: manage rainfall at the source using uniformly distributed decentralized micro-scale controls. LID's goal is to mimic a site's predevelopment hydrology by using design techniques that infiltrate, filter, store, evaporate, and detain runoff close to its source. Techniques are based on the premise that stormwater management should not be seen as stormwater disposal. Instead of conveying and managing/treating stormwater in large, costly end-of-pipe facilities located at the bottom of drainage areas, LID addresses stormwater through small, cost-effective landscape features located at the lot level. These landscape features, known as Best Management Practices (BMPs), are the building blocks of LID. Almost all components of the urban environment have the potential to serve as a BMP. This includes not only open space, but also rooftops, streetscapes, parking lots, sidewalks, and medians. LID is a versatile approach that can be applied equally well to new development, urban retrofits, and redevelopment/revitalization projects.

The following recommendations outline actions in the Saginaw Bay Coastal Area to promote the implementation of LID:

- 1. Promote LID Best Management Practices (BMPs) Manual and the Filling the Gaps manual developed for Michigan.**
 - Provide a conduit of communication to professional designers, planners, municipalities, counties and other agencies in a position to implement this manual in the region.
- 2. Combined Sewer Overflow (CSO) / Low Impact Design (LID) Drainage district grant project.**
 - Completion of grant project and release of results.
 - Support the public education portion of this project.
- 3. Provide a model LID ordinance with a resolution to adopt the ordinance.**
 - Remove obstacles for Low Impact Design in the region.
 - Review existing ordinances in the country and state to develop a model ordinance.
 - Meet with regional, county and municipal planners to determine implementation strategy for Saginaw Bay Region.
 - Provide educational opportunities for planning commissions to introduce the LID concept in order to facilitate change.
- 6. Develop LID Outreach Strategy**
 - Develop strategic partnerships with professional regional, state and national organizations to promote LID (Landscape contractors, Michigan Nursery Landscape Association, Turfgrass Association, Professional Associations, MSU Cooperative Extension)
 - Focus Groups for Landscape Architects, Design Engineers, Construction Contractors, Landscape Contractors and lawn / landscape maintenance professionals.
 - Education for review agencies, planners, planning commissions, and engineers to help them understand LID concepts and how to review site plans that are implementing LID in their communities. How not to be a roadblock to change but to be a change agent to implement this type of development.
 - Facilitate education sessions for focus groups.
 - Interaction with local watershed groups, stormwater authorities and municipalities to promote LID.
 - Promote tours to show examples of local LID projects and their impact on water quality
 - Promote use of signage on LID projects in the Saginaw Bay Regions.
 - Provide education for review process of commercial development, plats, condominium projects and industrial sites.
- 5. Incentives for LID – Promotional piece**
 - Develop a list of grants that are available for use as incentives.
 - Research and make available information on grants for use in LID projects.

Stormwater Regulations

Stormwater regulations in Michigan provide a framework for how municipalities, commercial entities, and construction sites can reduce stormwater pollution. While these regulations provide a starting point for pollution reductions, the following recommendations outline actions that will enhance and improve implementation of these regulations:

1. Funding

- Street Sweeping – provide guidance and resources for improved street sweeping equipment.
- Catch Basin Cleaning – provide additional resources to clean catch basins on a more frequent basis.
- Sustainable Funding – Evaluate various sustainable funding options to implement stormwater regulatory requirements.

2. Education

- Litter Removal – provide local education program on appropriate disposal of grass and leaf litter.
- Public Outreach – Increase public education on stormwater issues related to phosphorus control targeting television and radio.
- Catch Basin Signage – Implement programs designed to mark catch basins with environmental message (e.g. Don't Dump Here ... Flows to Saginaw Bay).

3. Authority

- Spills - Expand local authority and resources to address spills.
- Stormwater Ordinance – Evaluate the legal authority to pass stormwater ordinances at the County level.
- Drain Code - Modify Chapter 21 & 22 of the Drain Code to allow assessment for Water Quality improvements.
- Non-MS4 Communities – Evaluate the authority to allow non-MS4 communities to regulate and fund a stormwater program under the MS4 regulations.
- Phosphorus Ordinances – Encourage the development and passage of zero-P phosphorus ordinances in the Saginaw Bay Watershed Counties and municipalities.

4. Effectiveness

- MS4 Regulations - Evaluate the effectiveness and challenges of implementing the MS4 regulations in the Saginaw Bay Area as it relates to phosphorus.
- Common Sense Approach - Establish a stormwater regulatory review committee including regulated communities to develop a “common sense” approach to implementing MS4 requirements.

Stormwater Phosphorus Workgroup Summary

The recommendations above highlight issues that need to be addressed in order to further reduce phosphorus discharges to Saginaw Bay from urban stormwater. These recommendations should be used as a guide in seeking additional technical and financial assistance, and in developing policies related to the implementation of stormwater management practices. Table 4 provides an initial implementation strategy for the Stormwater Phosphorus Workgroup recommendations.

Point Source Phosphorus Workgroup

The Point Source Phosphorus Workgroup was formed to identify actions that could be taken to reduce phosphorus from industrial and municipal wastewater treatment processes. This workgroup identified three key areas where actions may result in additional reductions in phosphorus loads to Saginaw Bay: 1) Research; 2) Collaboration; and 3) Education.

Research

The wastewater treatment facilities in the Saginaw River are currently meeting or doing better than their allowed phosphorus concentration and loading discharge limits. Further reductions in phosphorus from these facilities would need to be done in a cost effective manner in order for them to justify the expense to their customers. Research is critical in this effort and the following areas of research have been identified that may result in cost effective phosphorus reduction at wastewater treatment facilities in the Saginaw Bay area:

- Develop a Best Management Practices (BMP) manual outlining sustainable practices (chemical, biological, physical) for P reduction that evaluates various municipal and industrial processes and recommends cost effective means to reduce phosphorus.
- Conduct a CSO pilot study to evaluate P removal from chemical additions to a CSO retention basin.
- Conduct a review of P removal technology through a grant to a local university. What's going on in Europe and elsewhere with P removal technology?
- Seek funding to hire a consultant to review point source treatment systems in the Saginaw Bay Watershed and recommend cost effective means to further reduce phosphorus in the discharges.
- Evaluate localized impacts of municipal wastewater treatment lagoons on waterways in the Saginaw Bay Watershed.

Collaboration

Working together can often create cost savings, as well as generate new ideas and approaches. The areas identified below could create a forum for discussion of phosphorus reduction strategies in the Saginaw Bay area:

- Establish a Saginaw Bay IPP partnership among wastewater treatment facilities in the area to evaluate an Industrial Pretreatment Program approach to phosphorus reduction.
- Support the Saginaw Bay Sustainable Business Forum, one component of which could be how industries could reduce phosphorus discharges to the Saginaw Bay.

Education

Ensuring that the general public has accurate information on wastewater treatment facilities in the Saginaw Bay area; and how they can help improve treatment at these facilities is important. The following recommendations address this need:

- Provide education outreach to wastewater treatment system users on phosphorus products that go to the WWTP.
- Develop an information piece comparing actual P discharged versus P loadings allowed in permit.

Point Source Phosphorus Workgroup Summary

Point source dischargers of phosphorus in the Saginaw Bay area are generally meeting or discharging less than they are currently permitted to discharge. There is common interest among the dischargers participating in this effort, however, to look at cost effective ways to

further reduce their phosphorus loads. Table 5 provides an initial implementation strategy for the Point Source Phosphorus Workgroup recommendations.

Conclusion

In review of all recommendations for phosphorus reduction to Saginaw Bay, four key concepts stand out:

- 1. Problem Definition** – While phosphorus is clearly a contributor to algae problems in Saginaw Bay, it is unclear at this point how much it contributes to the overall problem. Ecosystem variables such as zebra mussel impacts, impacts of water levels, and impact of sediment re-suspension need to be incorporated into the evaluation. A better understanding of how much phosphorus is in the system already and ongoing contributions from various sources also needs to be summarized in a nutrient budget for the Saginaw Bay, and translated into a more comprehensive Phosphorus Reduction Strategy.
- 2. Education** – Education is identified as a key recommendation throughout all the source reduction strategies. This area can not be over emphasized. Awareness of phosphorus issues is the basis for building partnerships and supporting actions to correct problems. This should be considered as a top priority for any effort to reduce phosphorus in the Saginaw Bay.
- 3. Building Partnerships** – The diversity of participation on the SBCI Phosphorus Committee and its workgroups clearly demonstrates the importance of partnerships in the effort to control and reduce phosphorus. Partnerships not only provide a forum for a broader discussion of issues, but also an opportunity to leverage resources. Moving forward with these initiatives will require strong partnerships to ensure greater local buy-in and sustain efforts over the long term.
- 4. Sustainability** – Economical solutions was a key component of all discussions within the source reduction workgroups. It was continually emphasized by participants that sustainability is based on a “common sense” approach to problem solution. If a solution to phosphorus reduction is also economical, it will sell itself and be sustainable.

**Source Reduction Workgroup
Implementation Strategies**

DRAFT