Concerns	Supported by Data?	Evidence	Able to Quantify?	Outside Scope?	Group Wants to Focus On?
Fish Consumption from Local Waterways is Unhealthy	Yes	There are several lakes and streams listed on Michigan's and Indiana's fish consumption advisory.	Yes	Yes	No
The Shipshewana Master Plan Needs Updated	Yes	The Master Plan was written in 1993 and the town office does not have a copy of the entire document. The town is currently under new management.	Yes	Yes	No
Endangered and Threatened Plants and Animals That Rely on Water Resources as Their Habitat	Yes	There are 15 species of plants and animals federally listed as endangered or threatened.	Yes	No	Yes

4.0 Water Quality Problems, Causes, and Sources

In this section concerns identified by stakeholders in the watershed and through the watershed inventory will be linked to problems found through the watershed investigation. Additionally, potential causes for the problems identified will be expressed. Finally, potential sources will be identified. Table 94 shows the connection between stakeholder concerns, problems found in the watershed, and the potential causes of those problems. Table 95 takes it a step further by identifying potential sources to the problems found in the watershed.

Table 94: Concerns, Problems, and Potential Causes

Concern(s)	Problem	Potential Cause(s)
- Livestock have access to open water. - Stormwater runoff from barnyards. - Septic system discharge. - Horse manure on public roads. - Water contact is unhealthy.	Area streams are impaired for recreational contact, as a result of *E. coli*, on Indiana's 303(d) list of impaired waters.	- *E. coli* levels exceed the state standard. - Area producers are unaware of the water quality threat of allowing livestock direct access to open water. - Stakeholders are unaware of proper septic system maintenance.
- Livestock have direct access to open water. - Stormwater runoff from barnyards. - Septic system discharge. - Horse manure on public roads. - Fertilizer used on urban lawns. - Lack of riparian buffer.	Area streams have nitrogen and phosphorus levels exceeding the target level of this project.	- Nitrogen levels exceed target levels. - Phosphorus levels exceed target levels. - Lack of riparian buffer
- Increase in impervious surfaces. - Lakes in the area becoming more built-up. - Streambank erosion. - Landowners farming PHEL and HEL.	Streams in the area appear turbid. Excessive algae.	- Historic water quality analysis showed high levels of TSS and turbidity. - Nutrient levels exceed target levels. (Nutrients attach to sediment particles and discharge to open water).
- Endangered and threatened plants and animals rely on water resources as their habitat.	There are 15 endangered and/or threatened species on the federal endangered species list.	- Nutrient levels and dissolved oxygen levels exceed target levels and state standards, respectively thus lowering the quality of the water habitat.

Now that stakeholder concerns have been linked to water quality problems and potential causes of those problems, and a thorough watershed inventory has been conducted, sources to the problems can be outlined. Outlining the sources to the problems found in the watershed will help to narrow the land area of where to focus efforts that will have the greatest impact on improving water quality.

Table 95: Problems, Potential Causes, and Potential Sources

Problem	Potential Cause(s)	Potential Source(s)
Area streams are impaired for recreational contact, as a result of *E. coli*, on Indiana's 303(d) list of impaired waters.	- *E. coli* levels exceed the state standard. - Area producers are unaware of the water quality threat of allowing livestock direct access to open water. - Stakeholders are unaware of proper septic system maintenance.	- Stakeholders have observed animal feeding operations being erected, especially in the entire project area west of LaGrange. - Five sites were noted at the headwaters of East Fly Creek where livestock have direct access to open water. - Four sites were noted where livestock have access to open water in Buck Lake-Buck Creek subwatershed, five sites were noted in Page Ditch, two sites were noted in Little Turkey Lake, and three sites were noted in Fly Creek. - LaGrange County Health Dept. stated that 75% of all septic systems in LaGrange County are faulty. - Large Amish population in the watershed (especially west of LaGrange) using horse and buggy as main source of transportation. - 14 sites were noted throughout the watershed where there were inadequate barnyard runoff control measures in place.
Area streams have nitrogen and phosphorus levels exceeding the target level of this project.	- Nitrogen levels exceed target levels. - Phosphorus levels exceed target levels.	- 32 miles were noted throughout the watershed where there was a lack of riparian buffer as producers were planting crops up to the stream's bank. - Large Amish population in the watershed (especially west of LaGrange) using horse and buggy as main source of transportation. - 25 sites throughout the watershed were noted where livestock had direct access to open water. - LaGrange County Health Dept. stated that 75% of all septic systems in LaGrange County are faulty. - Several sources of manure contamination were noted during the windshield survey as described in row one of this Table.

Problem	Potential Cause(s)	Potential Source(s)
		- There are 13 built-up lakes in the watershed where lawn fertilizer may contribute to excess nutrients reaching surface waters.
Streams in the area appear turbid. Excessive algae.	- Historic water quality analysis showed high levels of TSS and turbidity. - Nutrient levels exceed target levels. (Nutrients attach to sediment particles and discharge to open water).	- LaGrange County Health Dept. stated that 75% of all septic systems in LaGrange County are faulty. - Six locations were noted in the watershed as having extreme stream bank erosion; 1 in Little Turkey Lake, 1 in East Fly Creek, 2 in VanNatta Ditch, and 2 in Page Ditch. - Producers are farming PHEL and HEL throughout the watershed. - 32 miles were noted throughout the watershed where there was a lack of riparian buffer due to producers working land up to the stream bank. - 13 lakes are built-up and construction of new homes continue which increases impervious surfaces in the watershed.
There are 15 endangered and/or threatened species on the federal endangered species list.	- Nutrient levels and dissolved oxygen levels exceed target levels and state standards, respectively thus lowering the quality of the water habitat.	- 32 miles were noted throughout the watershed where producers planted crops within the riparian corridor. - Increase in aquatic plant growth due to the increase in nutrient levels from the sources described in row one and two on this Table.

4.1 Water Quality Conclusion

Up to this point problems have been discussed throughout the document. Below is a consolidated list for quick reference. Although there are many isolated situations causing degradation, **eight major contributors** have been identified. These sources have been expressed by the public, by the steering committee, by historical data, water testing program, and through the land use inventory. First, it is important to review the water testing results that reveal the NPS pollution problems. The list below indicates degraded water quality and outlines the **problem causes** within the region:

- Total Phosphorus exceeds the target of 0.3 mg/l average at many sites.
- Nitrates exceed the target of 1.5 mg/l average at many sites.
- Average sedimentation exceeds yearly target loading of 6229 tons.
- *E.coli* consistently exceeds the human health standard of 235 colonies per 100mls of water at many sites.

Now that we know what the problems are, what land uses are causing the degradation? Below are the major sources of pollutants that need to be addressed in order to improve water quality to target levels.

1. *Direct livestock access to surface water system.* During the land-use inventory over 20% of surface waters within the target Hydrologic Unit Codes have livestock present with direct access to streams resulting in high total phosphorus, nitrates, *E.coli*, and sedimentation levels. The sedimentation is a result of livestock induced ditch bank erosion and nutrients from animal waste.
2. *Direct barnyard runoff into surface waters.* One barnyard was identified with cemented surface tapering directly into the ditch. This is a significant source of nutrient and *E.coli* loading even after minor rainfall events.
3. *Areas in Need of Livestock Manure Management*. LaGrange County has ordinances addressing manure management for new or expanding livestock operations with 50 or more livestock. However, a great number of landowners within the target area have fewer than 50 animals and are not required to have a filed manure management plan (MMP) approved by a specialist. MMPs address nutrient loading in manure. The purpose is to plan land applications of manure to reduce soil saturation of nutrients and reduce surface water contamination.
4. *Lack of Proper Ditch-Bank Buffering.* Approximately 25% of the ditch-bank systems that contain row crops have proper filter strips to reduce sediment runoff. The remaining 75% of row crops adjacent to a ditch-bank system need a riparian buffer installed.
5. *Areas in Need of Nutrient and Sediment Management.* Conventional grain crop practices continue to dominate many agriculture fields in the watershed. Research has clearly demonstrated that no-till and reduced-till practices significantly reduce nutrient and sediment runoff from reaching surface waters.

6. *Improper or Faulty Septic Systems.* Although not specific to the Pigeon River drainage, studies conducted (LaGrange County Health Department 2005) have shown up to 75% of septic systems do not operate properly. It was found that they were either improperly installed (including improper locations), not maintained, or are completely inoperative. Due to the porous soils in the watershed, it is suspected that lateral movement of NPS pollutants from faulty septic systems into moving surface waters is a likely scenario. Several sites with evidence of septic system "straight-piping" or tile connections were reported to the LaGrange County health department.
7. *Urban Runoff.* It is speculated that lawn fertilization is the likely cause of nutrient loading induced from these urban areas. Although not tested for, other potential problematic toxins that enter surface waters through storm water runoff may be present.
8. *Impervious Surfaces.* The impervious surface area has reached 4% in the target area and continues to grow annually. This is due to the increasing population and industrialization. Impervious surfaces increase runoff flow levels after rainfall events resulting in increased NPS pollutants moving into surface waters. The unique aspect of this region is horse drawn vehicles make up a significant portion of the traffic. After moderate to significant rain events manure runoff from roads and parking lots is suspect in contributing nutrient/*E.coli* loading in surrounding surface waters.

5.0 Critical Areas

The previous sections have described the framework to define critical areas more precisely. The watershed problems and sources section lists water quality problems that are ranked according to priority for implementation. The first five, direct livestock access, direct barnyard runoff, areas in need of livestock manure management, lack of proper ditch-bank buffering, and areas in need of nutrient management constitute the critical area definition for initial implementation dollars. Agricultural landowners with these NPS pollution issues are scattered across the entire watershed. The initial land use inventory identified these locations; however, land use is a fluid environment which will result in additional locations being identified for BMP implementation on a periodic basis. Due to changing land use conditions, Figure 66 is not all inclusive for BMP implementation. Water quality testing and the land use inventory clearly demonstrated that the most dramatic effect on reducing NPS pollution is to address the above issues immediately upon plan implementation. BMP installation is an equally fluid environment with many target locations requiring multiple and in some cases innovative BMPs. Development of the cost-share criteria for the implementation phase will undoubtedly require updates with additional BMPs on a periodic basis.

5.1 Critical Area Conclusion

Water quality testing and the land use inventory clearly demonstrated the most dramatic effect on reducing NPS pollution is to address critical area issues immediately upon plan

implementation. BMP priority is listed below; however this is not an all-inclusive list of BMPs but are general categories addressing specific problems. For example, waste management on barnyards may involve many additional BMPs such as roof guttering, alternative watering facilities, water diversions, grassed waterways, and dry stack facilities for manure storage. Only after landowner inputs and engineering designs have been completed will the full extent of a BMP implementation list be realized.

1. Fence livestock from surface waters. This will have an immediate impact in reducing nutrient, sedimentation, and *E.coli* loading. Alternative watering source installation may be required.
2. Repair ditch bank damage. After livestock have been fenced from surface waters, stabilizing bank damage will reduce sedimentation after heavy rainfall events.
3. Install filter/buffer strips. In many cases this BMP will be included with fencing/bank repair. After fencing/bank repair issues have been addressed, ditch bank buffering in association with traditional row crop practices should follow. Conservation tillage will be encouraged in conjunction with buffering.
4. Install waste management systems on barnyards adjacent to surface waters. This is an important BMP but will require time to implement. Special engineering designs are required.

Using the EPA Region 5 load model a significant reduction in nitrates, total phosphorus and sediment can be achieved by implementing all BMPs associated with the problems discussed in the previous paragraph. According to calculations a 55% reduction in sedimentation and nitrates will occur. This equates to 7613.359 tons/year reduction in sediments, and 1637.34 tons/year in nitrates for the region. The model indicated a 71% reduction in phosphorus can be achieved which equates to a reduction of 321.331 tons/year in phosphorus loading. *E.* coli reductions are based on the EPA approved Pigeon Creek-Pigeon River TMDL. Tables 96 below correlates BMPs with critical area definitions and associated estimate for load reductions. Table 97 below helps visualize the **current loading, target load, and yearly reduction** of each contaminant with the exception of *E.coli*. The *E.coli* reduction target of 235 cfu/100ml will be achieved in conjunction with nutrient and sedimentation reduction targets.

Table 96: BMPs Correlated to Critical Areas and Load Reduction Estimates

Critical Area	Reason for Being Critical	BMP or Management Measure	Estimated Load Reduction per BMP/Acre		
			Sediment	**Phosphorus**	**Nitrogen**
Livestock Access to Open Water/Small Scale Feeding Operations	Nitrogen, Total Phosphorus, Sedimentation, *E.coli*	Education Program Geared Toward Livestock Operators	N/A	N/A	N/A
		Limited Access Stream Crossing/Exclusion Fencing*	16 tons/yr	15 lbs/yr	29 lbs/yr
		Rotational Grazing	***	***	***
		Dry Stack Areas**	27 tons/yr	15 lbs/yr	40 lbs/yr
		Conservation Tillage**	32 tons/yr	22 lbs/yr	58 lbs/yr
		Comprehensive Nutrient Management Plans	N/A	N/A	N/A
Rapair Ditch Bank Damage	Nitrogen, Total Phosphorus, Sedimentation, *E.coli*	Ditch Bank Stabilization	***	***	***
		Education Program Geared Toward Livestock Operators	N/A	N/A	N/A
Filter/Buffer Strips (Riparian Buffers)	Nitrogen, Total Phosphorus, Sedimentation, *E.coli*	Riparian Buffers of at least 20' 40' on a 2-4% slope 60' on >4% slope**	27 tons/yr	23 lbs/yr	60 lbs/yr
		Education Program on Benefits of Riparian Buffers	N/A	N/A	N/A
Install Waste Management Systems on Barnyards	Nitrogen, Total Phosphorus, Sedimentation, *E. coli*	Stormwater Diversions	***	***	***
		Barnyard Tiling	***	***	***
		Structure Gutters	***	***	***
		Dry Stack Areas**	27 tons/yr	15 lbs/yr	40 lbs/yr
		Alternative Watering Systems	N/A	N/A	N/A

*Estimated from the Region 5 model assuming 1 acre of land input (unless otherwise noted)

**Estimated from the STEPL model

***Too many variables, or too new of a technology, to accurately estimate load reductions

Table 97: Current and reduced loading in tons per year after BMP Implementation

HUC 12	Nitrates			Phosphorus			Sediment			*E. coli (TMDL Data)*		
Watersheds	Current Load	Target Load	Yearly Reduction Needed	Current Load	Target Load	Yearly Reduction Needed	Current Load	Target Load	Yearly Reduction Needed	Current Load	Target Load	% Reduction Needed
Green Lake	345.691	155.561	190.13	34.569	10.025	24.544	1382.766	622.245	760.521	183	125	32
Mongo Millpond	240.645	108.29	132.355	32.558	9.442	23.116	1132.449	509.602	622.847	188	125	34
Little Turkey Lake	26.678	12.005	14.673	4.091	1.187	2.904	177.856	80.035	97.821	2165	125	94
Cline Lake	579.388	260.725	318.663	54.72	15.869	38.851	2253.175	1013.93	1239.247	910	125	86
East Fly Creek	40.374	18.168	22.206	5.422	1.573	3.849	115.355	51.91	63.445	621	125	80
Fly Creek	148.82	66.969	81.851	9.354	2.712	6.642	425.199	191.339	233.86	1593	125	92
VanNatta Ditch	619.534	278.79	340.744	72.886	21.137	51.749	2915.454	1311.95	1603.5	1156	125	89
Buck Lake	82.766	37.245	45.521	10.76	3.121	7.639	441.4205	198.64	242.781	1354	125	91
Page Ditch	53.488	24.07	29.418	7.764	2.251	5.513	276.065	124.229	151.836	4988	125	97
Pigeon River	839.597	377.819	461.778	89.207	25.87	63.337	4722.73	2125.23	2597.502	617	125	80
Total	2976.98	1339.64	1637.34	321.331	93.186	228.145	13,842.47	6229.11	7613.359	13775		77.5

Watershed Management Plan Implementation Costs

The cost estimate for implementation is as follows:

Filter Strips (200 acres)	$ 145,000
Fencing (40,000 feet)	$ 120,000
Alternative Watering (8)	$ 48,000
Bank Stabilization (12)	$ 50,000
Waste Management Systems (9)	$ 90,000
Barnyard Remediation (13)	$ 130,000
Conservation Tillage	$ 100,000
Monitoring (Supplies/Equipment)	$ 45,000
Contracted Personnel	$ 200,000
TOTAL	**$ 928,000**

There are many sources of funding available to accomplish implementation. Currently, an EPA 319 Grant through the Indiana Department of Environmental Management is available to begin implementation of this watershed management plan. The recent Farm Bill will be employed in the region to compliment the current grant. Technical assistance will be provided by county SWCDs, NRCS and contracted personnel.

6.0 Goals and Objectives

The Pigeon River Watershed Management Plan seeks to improve water quality in the river by addressing non-point source pollution in the region. To accomplish the goals and objectives mentioned below, a broad stakeholder group must be established and maintained throughout the implementation phase. Partnering with private and government institutions is vital and entails crossing county jurisdictions. This of course is a complicated task that requires astute leaders within the oversight group.

The following goals and objectives address the primary concerns of: nutrients, sediment, pathogens and toxins. These are universal concerns throughout the river drainage. Objectives are prioritized as high (implemented in zero to three years), moderate (implemented in four to seven years), and low (implemented in seven to eleven years). It is important to note that many tasks, once begun, must be maintained to prevent a "backslide" in improvements made to water quality. An easy to read, action register, Tables 97 - 101, describing goals and objectives follows this section of the Plan.

Goal #1

Establish a stakeholder group to oversee watershed management plan implementation, promote public awareness, and sustain funding to meet goals and objectives within timelines.

A Expand current steering committee to include additional key stakeholders as identified by the current committee within the watershed to enhance implementation success.

Priority
High

Implementation Timeframe
Within the first six months

Partners
Stakeholder group

Milestones
Continued semiannual meetings

Indicators of Success
Consensus reached on responsibilities of stakeholder group for coordinating implementation of the watershed management plan.

B Develop funding strategy to sustain implementation and administration operations costs.

Priority
High

Implementation Timeframe
Ongoing

Partners
Stakeholder group

Milestones
- Identify funding sources (6 months)
- Design funding strategy (6 months)
- Implement funding strategy (6 months)
- Secure operational funding (Year 2/Ongoing)

Indicators of Success
- Documented funding sources
- Grant proposals submitted
- Private funding solicited
- Records of funding received and solicited

Goal #2

Reduce agriculture induced non-point source pollution from the region to reduce sediment and nitrates by 55%, *E. coli* by 78% and phosphorus by 71% by year 2018.

A Install 40,000 feet of fence to keep livestock out of surface waters and provide alternative watering sources for owners identified in the watershed.

Priority
High

Implementation Timeframe
1-3 years

Partners
County SWCDs
NRCS
Friends of the St. Joe River Association
Indiana Department of Environmental Management
Indiana Department of Agriculture
Indiana Division of Fish and Wildlife
Producers

Milestones
- 25% reduction of nitrates after 3 years
- 55% nitrates load reduction after 5 years
- 30% reduction of total phosphorus after 3 years
- 71% reduction of total phosphorus after 5 years
- 10% reduction of total suspended solids after 3 years
- 15% reduction of total suspended solids after 5 years
- 25% reduction of *E.coli* after 3 years
- 78% reduction of *E.coli* after 5 years

Indicators of Success
- Provide cost-share incentives to landowners (Year 1-3)

- Feet of fence installed
- Develop a comprehensive outreach program for continued education (Ongoing)

B Repair 12 sites that have livestock induced ditch bank damage with bank stabilization BMPs.

Priority
High

Implementation Timeframe
1-3 years

Partners
County SWCDs
NRCS
Friends of the St. Joe River Association
Indiana Department of Environmental Management
Indiana Department of Agriculture
Indiana Division of Fish and Wildlife
Producers

Milestones
- 5% reduction in total suspended solids by year 3
- 10% reduction of total suspended solids by year 4
- 15% reduction of total suspended solids by year 5

Indicators of Success
- Number of sites installed

C Install 9 waste management systems (barnyards with direct runoff).

Priority
High

Implementation Timeframe
1-3 years

Partners
LaGrange County SWCD
Elkhart County SWCD
NRCS
Friends of the St. Joe River Association
Indiana Department of Environmental Management

Indiana Department of Agriculture
Indiana Division of Fish and Wildlife
Producers

Milestones
- 2 waste management systems installed by year 2
- 3 waste management systems installed by year 3

Indicators of Success
- Number of waste management systems installed
- Number of NRCS approved designs

D Plant 200 acres filter/buffer strips where required adjacent to surface waters.

Priority
High

Implementation Timeframe
1-3 years

Partners
County SWCDs
NRCS
Friends of the St. Joe River Association
Indiana Department of Environmental Management
Indiana Department of Agriculture
Indiana Division of Fish and Wildlife
Producers

Milestones
- 15% reduction of total suspended solids after 3 years
- 25% reduction of total suspended solids after 5 years

Indicators of Success
- Cost-share incentives provided
- Acres of filter strips installed
- Ongoing outreach program for continued education

E Promote no-till and reduced-till practices on all fields adjacent to surface waters.

Priority
High

Implementation Timeframe
Ongoing

Partners
County SWCDs
NRCS
Friends of the St. Joe River Association
Indiana Department of Agriculture
Producers

Milestones
- 100% landowner contact that practice conventional tillage (Year 2)
- Develop a comprehensive outreach program for continued education (Year 2)

Indicators of Success
- Number of producers that enroll in incentive programs
- Increase in no-till/reduced-till acreage documented with tillage transects

F Continue the water quality testing program to monitor goal success.

Priority
High

Implementation Timeframe
Ongoing

Partners
County SWCDs
Hoosier River Watch

Milestones
- Solicit funding sources to continue testing program (Year 1)
- Develop public involvement program (Year 1)
- Publish testing results (Yearly)

Indicators of Success
- Funding secured to continue monitoring program
- Public participation in testing program
- Media releases and brochure

Combined BMP Installation Milestones
- A 25% reduction in nitrates and sedimentation after 3 years
- A 30% reduction in total phosphorus after 3 years
- A 25% reduction in *E.coli* after 3 years
- A 55% reduction in nitrates and sedimentation after 5 years
- A 71% reduction in total phosphorus after 5 years
- A 78% reduction in *E.coli* after 5 years

Goal #3

Reduce non-point source pollution from faulty or improper septic systems to reduce sediment and nitrates by 55%, *E. coli* by 78%, and phosphorus by 71% by year 2018.

A Work with county leadership to develop a comprehensive septic system ordinance.

Priority
Moderate

Implementation Timeline
4 years

Partners
County SWCDs
County Commissioners
County Health Departments
County Planning Commissions
County Health Boards
County Sewer Districts

Milestones
- Meetings with county commissioners and appropriate county boards (Year 4-7)
- Develop outreach program (Year 4)
- Develop Comprehensive plan (Year 6)

Indicators of Success
- Semi-annual meetings with county officials
- Educational brochure development
- Change to county comprehensive plan

B Develop a county-wide septic system inspection program

Priority
Low

Implementation Timeline
8 years

Partners
County SWCDs
County Health Departments

Milestones
- Consensus from county leadership that inspection program is needed (Year 8)
- Consolidate information on existing inspection programs (Year 8)
- Educate septic system owners (Year 9)
- Faulty septic systems repaired or replaced (Year 10)

Indicators of Success
- Inspection program developed
- Number of septic system owners contacted about inspection
- Number of faulty septic systems repaired or replaced
- Improved water quality

Goal #4

Reduce urban run-off induced non-point source pollution from the region to reduce sediment, and nitrates by 55%, *E. coli* by 78%, and phosphorus by 71% by year 2018.

A Develop a comprehensive outreach program to educate urban/lake residents on NPS pollution concerns and how they can participate to improve surface waters surrounding their communities.

Priority
High

Implementation Timeline
2 years

Partners
LaGrange County SWCD
Elkhart County SWCD
Town Leadership
Friends of the St. Joe River Association

LaGrange County Lakes Council

Milestones
- Yearly media articles outlining urban runoff and its effects
- Yearly brochures and flyers for urban residents
- Yearly workshops/tours for urban/lake residents
- Bi-annual urban resident survey developed

Indicators of Success
- Annual media articles
- Number of brochures and flyers circulated
- Attendance at workshops/tours by town and lake residents
- Survey results

Goal #5

Monitor and control impervious surfaces development in the region so that water quality is maintained.

A Develop a program to monitor impervious surface development within the watershed.

Priority
Moderate

Implementation Timeline
4 years

Partners
County SWCDs
NRCS
County Planning Commissions
Purdue University

Milestones
- Geo Database of impervious surfaces for GIS systems (Year 4)

Indicators of Success
- Monitoring program

B Work with county planning commission to minimize effects of new construction on surface waters within the watershed and protect sensitive areas.

Priority
Moderate
Implementation Timeline
4 years

Partners
County SWCDs
County Planning Commissions
Purdue University

Milestones
- Runoff effects on surface waters considered for new building permits within 2 years

Indicators of Success
- Change to county comprehensive plan ordinance

Table 98: Action Register for Goal 1

Goal #1: Establish a stakeholder group to oversee watershed management plan implementation, promote public awareness, and sustain funding to meet goals and objectives within timelines					
Indicator #1: Consensus reached on responsibilities of stakeholder group for coordinating implementation of the watershed management plan Indicator #2: Documented funding sources solicited Indicator #3: Grant proposal submitted Indicator #4: Private funding solicited Indicator #5: Records of funding solicited and received					
Objective	**Target Audience**	**Implementation Timeframe**	**Milestone**	**Cost Estimate**	**Partners/Technical Assistance**
Expand current steering committee to include additional key stakeholders to enhance implementation success	Pigeon River Watershed Stakeholders	Within the first six months after WMP approval	Hold steering committee meeting within first quarter	$15,000	Stakeholder Group
Develop funding strategy to sustain implementation and administration operation costs	Pigeon River Watershed Stakeholders	Ongoing	Identify funding sources (6 months)		Stakeholder Group
			Design funding strategy (6 months)		
			Implement funding strategy (2 years)		
			Secure operational funding (2 years)		

Table 99: Action Register for Goal 2

Goal #2: Reduce agriculture induced nonpoint source pollution from the region to reduce sediment and nitrates by 55%, *E.coli* by 78% and phosphorus by 71% by year 2018.					
Indicator #1: Provide cost-share incentives to landowners Indicator #2: Feet of fence installed Indicator #3: A comprehensive outreach program for continued education is developed Indicator #4: Number of ditch bank sites repaired and waste management systems installed Indicator #5: Acres of filter strips installed Indicator #6: Outreach program for continued education Indicator #7: Number of producers that enroll in incentive programs					
Objective	**Target Audience**	**Implementation Timeframe**	**Milestone**	**Cost Estimate**	**Partners**
Install 40,000 feet of fence to keep livestock out of surface waters and provide alternative watering sources where identified in the watershed	Livestock owners and/or operators with in the watershed	1 - 3 years for those identified during the landuse inventory; ongoing for any additional areas of concern found in the watershed	25% N reduction (3 yrs) 30% P reduction (3 yrs) 10% TSS reduction (3 yrs) 25% *E. coli* reduction (3 yrs) 55% N reduction (5 yrs) 71% P reduction (5 yrs) 15% TSS reduction (5 yrs) 78% *E. coli* reduction (5 yrs)	$184,000	County SWCDs NRCS Friends of the St. Joe River Assoc. IDEM ISDA IN DNR Producers
Repair 12 sites that have livestock induced ditch damage	Livestock owners and/or operators with in the watershed	1 - 3 years for those identified during the landuse inventory; ongoing for any additional areas of concern found in the watershed	5% TSS reduction (3 yrs) 10% TSS reduction (4 yrs) 15% TSS reduction (5 yrs)	$65,000	County SWCDs NRCS Friends of the St. Joe River Assoc. IDEM ISDA IN DNR Producers

Objective	Target Audience	Implementation Timeframe	Milestone	Cost Estimate	Partners
Install 9 waste management systems and remediate 13 barnyards with direct runoff	Livestock owners and/or operators with in the watershed	1 - 3 years for those identified during the landuse inventory; ongoing for any additional areas of concern found in the watershed	2 waste management systems installed (2 yrs) 3 waste management systems installed (3 yrs)	$235,000	County SWCDs NRCS Friends of the St. Joe River Assoc. IDEM ISDA IN DNR Producers
Plant 200 acres of filter/buffer strips where required adjacent to surface waters	Landowners adjacent to open water with in the watershed	1 - 3 years for those identified during the landuse inventory; ongoing for any additional areas of concern found in the watershed	15% TSS reduction (3 yrs) 25% TSS reductions (5 yrs)	$160,000	County SWCDs NRCS Friends of the St. Joe River Assoc. IDEM ISDA IN DNR Producers
Promote no-till and reduced-till practices on all fields adjacent to surface waters	Landowners adjacent to open water with in the watershed	1 - 3 years	100% landowner contact who practice conventional tillage (2 yrs) Develop a comprehensive outreach program for continued education (2 yrs)	$115,000	County SWCDs NRCS Friends of the St. Joe River Assoc. ISDA Producers

Objective	Target Audience	Implementation Timeframe	Milestone	Cost Estimate	Partners
Continue the water quality testing program to monitor goal success	County SWCDs and the funding partners	ongoing	solicit funding sources to continue monitoring program (1 yr) Develop public involvement program (1 yr) Publish monitoring results annually (ongoing) <u>Total Reductions after 3 yrs</u> 25% N reduction 25% TSS reduction 30% TP reduction 25% *E. coli* reduction <u>Total Reductions after 5 yrs</u> 55% N reduction 55% TSS reduction 71% TP reduction 78% E. coli reduction	$60,000	County SWCDs Hoosier Riverwatch

Table 100: Action Register for Goal 3

Goal #3: Reduce nonpoint source pollution from faulty or improperly installed septic systems to reduce sediment and nitrates by 55%, *E.coli* by 78% and phosphorus by 71% by year 2018					
Indicator #1: Semi-annual meetings with county officials Indicator #2: Educational brochure developed Indicator #3: There is a change to the county comprehensive plan to address septic issues including development of a new inspection program Indicator #4: Number of septic system owners contacted Indicator #5: Number of faulty septic systems repaired or replaced					
Objective	**Target Audience**	**Implementation Timeframe**	**Milestone**	**Cost Estimate**	**Partners**
Work with county leaders to develop a comprehensive septic system ordinance	County Leaders	4 - 7 years	Meet with county commissioners and appropriate county boards (4 - 7 yrs) Develop outreach septic system outreach program (year 4) Develop a septic system comprehensive plan (year 6)	$16,000	County SWCDs County Commissioners County Health Departments County Planning Commissions County Boards of Health County Sewer District

Develop a county-wide septic system inspection program	Watershed stakeholders who utilize an on-site waste management system	8 - 10 years	Consensus from county leaders that an inspection program is needed (year 8) Consolidate information on existing inspection programs (year 8) Educate septic system owners (year 9) Faulty septic systems repaired or replaced (year 10)	$15,000	County SWCDs County Health Departments

Table 101: Action Register for Goal 4

Goal #4: Reduce urban run-off induced nonpoint source pollution from the region to reduce sediment and nitrates by 55%, *E.coli* by 78% and phosphorus by 71% by year 2018					
Indicator #1: Annual media articles written and disseminated Indicator #2: Number of urban NPS brochures and flyers circulated Indicator #3: Attendance at workshops/tours by town and lake residents Indicator #4: Survey results indicating a behavioral change and/or more knowledge regarding urban NPS					
Objective	**Target Audience**	**Implementation Timeframe**	**Milestone**	**Cost Estimate**	**Partners**
Develop a comprehensive outreach program to educate urban/lake residents on NPS pollution concerns and how they can participate to improve surface waters surrounding their communities	Urban and lake residents	2 years	Yearly media articles outlining urban runoff and its effects	$15,000	County SWCDs Town Leaders Friends of the St. Joe River Association LaGrange County Lakes Council
			Yearly urban NPS brochures and flyers for urban residents		
			Yearly workshops/tours for urban and lake residents		
			Bi-annual urban resident survey developed		

Table 102: Action Register for Goal 5

Goal #5: Monitor and control impervious surface development in the region so that water quality is maintained					
Indicator #1: Development and implementation of a program to monitor impervious surface development within the watershed Indicator #2: A change to the County Comprehensive Plan to implement Low Impact Design					
Objective	**Target Audience**	**Implementation Timeframe**	**Milestone**	**Cost Estimate**	**Partners**
Develop a program to monitor impervious surface development within the watershed	County Planning Commissions	4 years	Shapefile of impervious surfaces for GIS systems	$15,000	County SWCDs NRCS County Planning Commissions Purdue University
Work with county planning commission to minimize effects of new construction on surface waters within the watershed and protect sensitive areas	County Planning Commissions Builders/Construction Companies with in the watershed	4 years	Runoff effects on surface waters considered for new building permits (2 yrs)	$15,000	County SWCDs County Planning Commissions Purdue University

7.0 Monitoring Plan

Continued monitoring for land use changes and water quality is essential for success. County SWCDs should be the lead organization to provide continuity of the data collected. A minimum of 7 years continuous monitoring is critical. This is necessary for several reasons. First, validate the effectiveness of BMP implementation. Second, document if target loadings are achieved and maintained. Samples from historical sites established during the development of this management plan should be taken on a quarterly basis to ensure dry and wet periods are represented.

Monitoring land use changes is equally essential. Since this area has a rapidly growing population, land use changes will occur on a rapid scale. These changes can and will likely affect the water quality of the Pigeon River drainage if not properly monitored and managed. Many Counties in the drainage have or are in the process of developing a comprehensive GIS system to help monitor and manage important influences such as new construction. Using these GIS layers coupled with visual data collection will provide useful information.

The steering committee, meeting on a semi-annual basis, will develop and oversee the landuse and water monitoring plan. The committee will determine if water quality and land use changes warrant modifications to the existing watershed management plan. The criteria used will be consistent water sampling data, coupled with land use changes, indicating water quality degradation. Land use changes can stand alone as an indicator to modify the plan, if those changes clearly indicate a future degradation in water quality. The committee provides the leadership and community link to help insure future success.

The Lagrange County SWCD, primarily responsible for the watershed management plan development, will take the lead as point of contact concerning this plan and for coordinating modifications to the plan. The LaGrange County SWCD contact information is: LaGrange County SWCD (Soil and Water Conservation District), 910 S. Detroit Street, LaGrange IN. 46761, phone: 260-463-3471 ext.3.

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