

CHAPTER 7

MEASURES TO APPLY

7.1 Measures to Apply (by Subwatershed)

The measures listed below are a combination of targeted public education and outreach, best management practices, land use planning, and revised monitoring, all with the goal to reduce specific non-point source pollution in each subwatershed. They are the result of the recommendations of the technical committees, based on the aforementioned information in Chapters 2-5, along with input and approval from citizens from all three subwatersheds and around Delaware County. Comments and input were gathered in a wide variety of ways, both in writing (mail, email, and hand delivered) and verbally (phone, public meetings, and personal interviews). The draft of this plan was made available to the public for review and comment. It was made available via the internet (project website – pdf downloadable files by chapter) and in print (by mail or for pick up in the DCSWCD office). Several meetings were held in Muncie and in each of the three subwatersheds to ensure the public had multiple opportunities to comment on the document.

Note: All best management practices installed shall follow all NRCS technical guidelines (where appropriate), or other scientifically accepted specifications where NRCS guidelines are not available.

Through the public education and outreach efforts listed below, there will be active public education to enhance the community's understanding of our efforts and encourage their participation in specific WRWP programs. Techniques such as personal interviews, media spots (newspaper and radio), direct mailings, establishing partnerships with local agencies and organizations, and public events shall be utilized.

Actions listed below are in order of priority within each subwatershed and under the overall actions sections. It is the desire of the WRWP to implement actions in the listed critical areas, however, being a voluntary, community-driven project, this will depend entirely upon willing partners.

7.1.1 Killbuck/Mud Creek Subwatershed

Increase Filter Strips/Riparian Buffers Along Primary and Secondary Waterways

Why: High ammonia, orthophosphates, and total suspended solid levels, along with fish and macroinvertebrate scores indicative of poor water quality found during monitoring, and low dissolved oxygen levels observed during monitoring sampling events. Atrazine was also detected.

Where: Along stream/ditch channels that are being farmed or mowed up to/near the edge

Critical Areas: Along Mud Creek (Northern most stream) and the area between KB-2 and KB-3 on Killbuck Creek (Southern most stream)

Partners: Land owners/operators (agricultural and residential); Delaware County Surveyor Office; Delaware County Drainage Board, USDA, IDNR

How: Provide technical and financial assistance for installation of above practices through providing cost-share dollars for application installation and hiring a agricultural technician (to promote listed practices, identify willing landowners, assist in application design, and to implement cost share program).

Increase Conservation Tillage/Residue Management

Why: High total suspended solids on both creeks (especially KB-1, 2 and 5); high phosphate levels on Mud Creek, fish; high ammonia and nitrate levels on Killbuck Creek and macroinvertebrate scores indicative of poor water quality throughout; low dissolved oxygen throughout; and Atrazine was also detected in this subwatershed.

Where: Throughout the subwatershed – there is relatively little in the entire subwatershed

Critical Areas: Areas on highly erodable or leachable soils

Partners: Agricultural land owners/operators

How: Provide technical assistance for installation of above practices through hiring a agricultural technician (to promote listed practices, identify willing landowners, and assist in application design).

Install a Water Table Control Structure Demonstration Site

Why: High nitrate levels present – source agricultural tile drainage

Where: Drainage Area of KB-6 – KB-4
(highest nitrate levels – primarily agricultural land use in this area)

Critical Areas: Drainage Area of KB-6 – highest nitrate levels in KB subwatershed

Partners: Agricultural land owners/operators

How: Provide technical and financial assistance for installation of above practices through providing cost-share dollars for application installation and hiring a agricultural technician (to promote listed practices, identify willing landowners, assist in application design, and to implement cost share program).

Reengineer Both Stream Channels

Why: Current channel dimensions have resulted in instability and will continue to cause increased TSS levels and negatively impact fish and macroinvertebrate scores

Where: Both Killbuck and Mud Creeks

Critical Areas: Both Killbuck and Mud Creeks

Partners: Delaware County Surveyor Office; Land Owners along Killbuck and Mud Creek; Delaware County Drainage Board; IDNR; Ball State University

How: Partner with Ball State University to conduct a feasibility study.

Install a Constructed Wetland Storm Water Treatment Demonstration Site

Why: Country Village sewers will also have a storm water line discharging directly into Mud Creek (a wetland would be able to clean the runoff before it polluted the water); Due to the cost of the lines to connect those unsewered land owners, tying in would be cost prohibitive.

Where: Mud Creek drainage area (specifics under “Partners”)

Critical Areas: Country Village

Partners: Country Village; IDNR; Delaware County Drainage Board; Ball State University

How: Provide technical and financial assistance by providing cost-share for demonstration site and bringing together technical professionals to assist in the design of said site.

Repair/Remove Failed/Failing Septic Systems and Treatment Facilities

Why: High ammonia, *E. coli*, nitrogen, and total suspended solid levels and fish and macroinvertebrate scores indicative of low water quality, and low dissolved oxygen levels

Where: Throughout the entire subwatershed

Critical Areas: Dense residential populations along Mud Creek (Southern most stream)

Partners: Residents with these systems; Some being completed by the Regional Wastewater District. Ones not included in the sewer project, Delaware County Health Department especially 1) between KB-2 and KB-3, 2) Country Village treatment plant

How: Public education and outreach (conduct a septic system maintenance workshop, publish and distribute education/outreach materials on maintenance – both in conjunction with the Regional Wastewater District and the Delaware County Health Department); the majority of septic systems will be tied into municipal sewers by the end of 2004

7.1.2 Buck Creek Subwatershed

Restore and Protect Riparian Corridor along Buck Creek and Determine Ability to Support Salmonid Species

Why: Temperatures are at levels bordering a cold water stream, riparian cover is needed to keep those temperatures low; such vegetation buffers help to protect water quality by reducing the amount of unfiltered water runoff entering the waterway; fish and macroinvertebrate scores were positive throughout the subwatershed as a result of the current riparian corridor and temperature; TSS, orthophosphates, ammonia, nitrate, and *E. coli* levels were high; Atrazine was also detected

Where: Restore = East bank of Buck Creek just North of BC-5 (where they were removed in 2003) Protect = the entire length of Buck Creek (within an agreed boundary, i.e. the 100 year floodplain)

Critical Areas: Same as above

Partners: Land Owners along Buck Creek; Muncie-Delaware Metropolitan Plan Commission; Delaware County Surveyor Office; Delaware County Drainage Board

How: Public education and outreach (conduct a drainage conference, publish and distribute education/outreach material on drainage management options); develop conservation buffers with Plan Commission along Buck Creek; promote tree planting to restore areas denuded of woody vegetation (provide technical assistant and cost-share); bring local stakeholders into the decision making process

Promote Manure/Nutrient Management

Why: Ammonia, total suspended solids, nitrate show elevated levels at BC-7 compared to other sampling points in this subwatershed, orthophosphate and *E. coli* elevated throughout the subwatershed

Where: Lands where manure is applied/livestock is raised

Critical Areas: Drainage area for BC-7

Partners: Agriculture land owners/operators

How: Provide technical and financial assistance for installation of above practices through providing cost-share dollars for application installation and hiring a agricultural technician (to promote listed practices, identify willing landowners, assist in application design, and to implement cost share program).

Increase Conservation Tillage/Residue Management

Why: High total suspended solids throughout (with most of the increase occurring by BC-5 during increase); ammonia, nitrate and orthophosphates were all high; Atrazine was also detected

Where: Throughout the watershed

Critical Areas: Drainage area for BC-5 (this includes the drainage areas of BC-8, 7 and 6)

Partners: Agricultural land owners/operators

How: Provide technical assistance for installation of above practices through hiring a agricultural technician (to promote listed practices, identify willing landowners, and assist in application design).

Remove rock dam upstream of BC-6

Why: This illegal dam is negatively affecting the macroinvertebrate populations by the alteration of the natural stream habitat.

Where: Site of the dam, upstream of BC-6

Critical Areas: Site of the dam, upstream of BC-6

Partners: Delaware County Surveyor Office, Delaware County Drainage Board, County Highway Department Muncie Sanitary District; United States Geologic Survey (due to proximity of gage station)

How: Physically remove the illegal dam with assistance from above partners.

Install a Tile Control Structure Demonstration Site

Why: High nitrate levels present – suspected source is agricultural tile drainage

Where: Agricultural drainage areas

Critical Areas: Drainage area for BC-7 and BC-6 – highest nitrate levels

Partners: Agricultural land owners/operators

How: Provide technical and financial assistance for installation of above practices through providing cost-share dollars for application installation and hiring a agricultural technician (to promote listed practices, identify willing landowners, assist in application design, and to implement cost share program).

Remove/Repair Failed/Failing Septic Systems

Why: *E. coli* is high throughout the watershed, as are nitrate, orthophosphates, and total suspended solids

Where: Throughout the subwatershed (possibly beyond, in Oakville)

Critical Area: Septic discharge from Oakville (just downstream from BC-8)

Note: Oakville possibly has received a grant or low interest loan to address some of the problems; Beverly Hills Edition (interested parties)

Partners: Septic System Owners, Delaware County Health Department; Regional Wastewater District

How: Public education and outreach (conduct a septic system maintenance workshop, publish and distribute education/outreach materials on maintenance – both in conjunction with the Regional Wastewater District and the Delaware County Health Department).

7.1.3 Prairie Creek Subwatershed

Develop a Master Plan for the Prairie Creek Watershed

Why: Prairie Creek Reservoir is the secondary drinking water source for the City of Muncie. Master planning will achieve a balance between development and resource protection needed for a subwatershed that provides drinking water.

Where: The entire watershed

Critical Areas: Wooded and grassed area surrounding the reservoir

Partners: Muncie-Delaware County Metropolitan Plan Commission; Indiana-American Water Company; Land owners

How: Work with local stakeholders, Indiana-American Water Company, and the Muncie-Delaware County Metropolitan Plan Commission to develop a Master Plan for the Prairie Creek Reservoir and the subwatershed; provide financial assistance to create the Master Plan

Promote Manure/Nutrient Management

Why: Highest *E. coli* readings are at PC-7, which occur during wet weather events reducing the septic system failure that would result in consistently high bacteria readings. *E. coli*, nitrate, orthophosphate and ammonia are elevated in all three of the tributaries (PC-6,7 and 8) draining into Prairie Creek Reservoir, with a spike of *E. coli* at PC-7. Ammonia can be correlated to runoff, however, total suspended solid levels are within acceptable ranges, therefore a more direct contamination is suspected occurring.

Where: Lands where manure is applied/livestock is raised

Critical Areas: Drainage area for PC-7 – highest *E. coli* readings; little residential development; PC-8 – highest ammonia readings

Partners: Agricultural land owners/operators

How: Provide technical and financial assistance for installation of above practices through providing cost-share dollars for application installation and hiring a agricultural technician (to promote listed practices, identify willing landowners, assist in application design, and to implement cost share program).

Increase Conservation Tillage/Residue Management

Why: Atrazine was detected; nitrate and orthophosphate all were high in the tributaries feeding into the reservoir (PC-6, 7, and 8); ammonia was high in both the tributaries and in the reservoir itself. Further, ammonia can be tied to soil runoff, however, total suspended solid levels are within acceptable ranges, therefore a more direct contamination is occurring.

Where: Throughout the watershed.

Critical Areas: Drainage area for BC-5 (this includes the drainage areas of BC-8, 7 and 6)

Partners: Agricultural Land Owners

How: Provide technical assistance for installation of above practices through hiring a agricultural technician (to promote listed practices, identify willing landowners, and assist in application design).

Install a Constructed Wetland Demonstration Site

Why: New Burlington is known to have failed septic systems, therefore is contributing to the high *E. coli* levels in the reservoir, and is too isolated to be put on municipal sewers

Where: New Burlington; Drainage area for PC-7

Critical Areas: New Burlington

Partners: Land owners, Delaware County Regional Wastewater District; Delaware County Board of Health; Indiana American Water Company, City of Muncie Parks Department

How: Provide technical and financial assistance by providing cost-share for demonstration site and bringing together technical professionals to assist in the design of said site.

Install a Tile Control Structure Demonstration Site

Why: High nitrate levels present – source agricultural tile drainage; there are high nitrate, phosphorus and *E. coli* levels at PC-7, which already has high amount of riparian cover along the stream and grassed covered tile drainage upstream of the open channel.

Where: Agricultural drainage areas

Critical Areas: Drainage area for PC-7

Partners: Agricultural land owners/operators

How: Provide technical and financial assistance for installation of above practices through providing cost-share dollars for application installation and hiring a agricultural technician (to promote listed practices, identify willing landowners, assist in application design, and to implement cost share program).

Remove/Repair Failed/Failing Septic Systems

Why: *E. coli* is high throughout the watershed

Where: Throughout the watershed

Critical Area: New Burlington; Drainage area of PC-7

Partners: Septic System Owners, Delaware County Health Department

How: Public education and outreach (conduct a septic system maintenance workshop, publish and distribute education/outreach materials on maintenance – both in conjunction with the Regional Wastewater District and the Delaware County Health Department).

7.1.4 Overall Actions

Public Education:

Identify and Promote Drainage Management Options

Goal: Investigate and adopt management options that combine both drainage and water quality needs, consistent with the Indiana Drainage Handbook (published by Christopher B. Burke Engineering, Ltd.)

Reason: Found a direct correlation between water quality and riparian corridor land cover; such a balance is key to the reduction of non-point source pollution. Without properly designed, maintained, and protected waterways the community will not be able to achieve their stated pollutant load reductions.

Target Audience: Delaware County Surveyors Office; Drainage Board

Actions: Conference; publication production and distribution; partner with Delaware County Surveyor's Office on public education

Promote Septic System Maintenance

Goal: Encourage self-maintenance, repair and replacement of septic systems and disconnect illegal connections to reduce water contamination

Reason: *E. coli* contamination found throughout all three watersheds; many areas known to have failed/failing septic systems in all three watersheds

Target Audience: Residents with septic systems

Actions: Workshop; publication production and distribution; partner with Health Department and Regional Wastewater District on public education

Promote Erosion Control

Goal: Work with contractors, MS4 entities, and agricultural landowners/operators to encourage self-management of sediment contamination

Reason: Total suspended solids were found to be problematic in Killbuck/Mud Creek and Buck Creek subwatersheds. Nutrients that are associated with sedimentary runoff were also found to be problematic in these watersheds in urban and agricultural areas.

Actions: Partner with MS4 entities and Purdue Extension to conduct a workshop, create and distribute publications, and other public education efforts

Promote Lawn/Turf Management

Goal: Encourage self-management of lawns/turf to reduce water contamination

Reason: Pesticides and herbicides have been identified as problematic, with pesticide levels the highest in the nation in the White River Basin

Target Audience: General Public; Golf Courses; Turf Growers

Actions: Workshop; publication production and distribution; partner with Purdue Extension

Conduct Education on Organic/Chemical Free Agriculture/Gardening

Goal: Encourage self-management for reduction of pesticide/herbicide water contamination

Reason: Pesticides and herbicides have been identified as problematic, with pesticide levels the highest in the nation in the White River Basin; Atrazine was found at every sampling location; ammonia, nitrate, phosphorus

Target Audience: Agricultural landowners and Operators; General Public

Actions: Partner with local organic/chemical free producers and Purdue Extension on public education

Conduct Public Watershed Education and Outreach

Goal: Provide the community (youth and adults) with a deeper understanding of what watersheds are and how we interact with them to positively or negatively affect water quality

Reason: Non-point pollution has been identified in all three subwatersheds from a variety of sources. Increased knowledge of the consequences of our actions allows us all to become better stewards and positively affect water quality.

Target Audience: General Public (youth and adults)

Actions: Public presentations; continued Project Wet! teacher training workshops (using WRWP information); website update and maintenance; newspaper articles; subwatershed tours; newsletter

Provide an Agricultural Technical Assistant

Goal: To reduce agriculturally related non-point source pollution

Reason: Total suspended solids, Atrazine, ammonia, nitrogen, orthophosphates and *E. coli* were found to be problematic in the subwatersheds in agriculturally dominant sub-subwatershed drainage areas

Actions: Put landowners/operators in touch with current NRCS programs;
coordinate/identify “new” cost-share opportunities using 319 funds;
secure some cost-share projects as demonstration sites for public education

Target Practices: Promote manure/nutrient management; increase conservation
tillage/residue management; increase filter strips/riparian buffers

Conduct a Modified Monitoring Program

***E. coli* source identification**

Goal: Identify the source(s) of *E. coli* contamination in all three subwatersheds

Reason: Source(s) of such contamination are not definitive; community has
requested such identification to further focus remediation and prevention
efforts

Actions: Develop and contract out *E. coli* source monitoring program

Lake study on Prairie Creek Reservoir

Goal: Gain a better understanding of water quality and biological conditions in the
reservoir and its tributaries (the ones that act more like lake [lentic]
systems)

Reason: Monitoring conducted in the Prairie Creek Subwatershed was limited due
to the methodology utilized for the study; the community has requested
such a study

Actions: Develop and contract out a Prairie Creek Reservoir lake-methodology
study

Modified bacteriological, biological and chemical monitoring of the three subwatersheds

Goal: Continue to monitor water quality, biological and stream habitat conditions

Reason: Identify if the implementation plan has an impact on non-point source
pollution

Actions: Develop and contract out a modified monitoring program

Update GIS Data Layers

Goal: Provide the most accurate picture of land use and land cover for the
three subwatersheds

Reason: To measure the success of plan implementation

Actions: Digitize new color aerial photography and practices installed through the
WRWP implementation program

7.2 Action Register

Below is the action register for the first implementation phase of the White River Watershed Project. Please note that there are some actions that will require longer than three years to complete. These shall be worked on during the initial three year implementation period and the goals continued pending future funding.

Table 7.1:

Action Register Prioritization: **Orange:** High, **Green:** Medium, **Blue:** Low

Goal	Objective	Task (linked to objectives)	Start	End	Responsible (in addition to WC)	Resources	Progress Indicators	Products	Estimated Load Reductions
Reduce TSS, ammonia, nitrates, atrazine, E. coli and orthophosphates from agricultural areas	1. Install 250 acres (20 miles at 50' wide) of wooded or grassed filter strips	1-5. Hire agricultural technician	2004	2009	DCSWCD agricultural technical assistant	NRCS; FSA; IDNR	Water quality monitoring; track acreage	At least 20 miles of additional wooded or grassed buffers on primary and secondary waterways	Sediment: 307 tons/year P: 470 lbs/year N: 934 lbs/year (Figures for acreage combined with acreage for 6 acres grassed waterways.)
	2. Increase reduced tillage practices by 7400 acres (roughly 1/3 of total agricultural area)	1-5. Identify interested landowners	2004	2009	DCSWCD agricultural technical assistant	NRCS; FSA; IDNR	Water quality monitoring; track new acreage	At least 7400 acres of reduced tillage practices	Sediment:3324 tons/year P: 4782 lbs/year N: 9554 lbs/year
	3. Promote manure/nutrient management	1-5. Develop cost-share program for WRWP funds	2004	2007	DCSWCD agricultural technical assistant	NRCS; FSA; IDNR; Purdue Extension	Track number of management plans created	Increase participation in manure/nutrient management	
	4. Install 3 tile flow treatment demonstration sites	1-5. Create and distribute education and outreach materials	2004	2007	DCSWCD agricultural technical assistant	NRCS; FSA; IDNR; Purdue Extension; Ball State University	Track the number of demonstration sites created	Install one active tile flow demonstration site in each subwatershed	

Goal	Objective	Task (linked to objectives)	Start	End	Responsible (in addition to WC)	Resources	Progress Indicators	Products	Estimated Load Reductions
	5. Install 6 acres (2 miles at 25' wide average) of grassed waterways		2004	2007	DCSWCD agricultural technical assistant	NRCS; FSA; IDNR	Measure pollutant levels and calculate load reductions; track acreage	Install at least 6 acres of grassed waterways	Sediment: 307 tons/year P: 470 lbs/year N: 934 lbs/year (Figures for acreage combined with acreage for 250 acres filter strips.)
	6. Provide education on organic/chemical free practices	6. Partner with local organic/chem free producers to develop education and outreach materials	2004	2007	Outreach/Education Committee	Local producers; Purdue Extension	Track attendance and information output	Produce and distribute educational materials to the general public	
	7. Identify and promote drainage management options	7. Identify range of practices suitable for drainage and water quality protection	2004	2007	Outreach/Education Committee	Surveyor; Drainage Board; Purdue Extension; NRCS; BSU	Track attendance and feedback from participants	Increase use of drainage management practices that protect drainage and water quality	
		7. Partner with local Surveyor and Drainage Board to implement practices							
		7. Conduct conference on drainage management options							
Reduce TSS, ammonia, nitrates, E. coli and orthophosphates from urban/suburban areas	1. Install 100 acres (4 miles at 100' wide average) of wooded or grassed filter strips	1&2. Identify interested landowners	2004	2007	Monitoring Committee	NRCS; IDNR; Purdue Extension; Ball State University	Water quality monitoring; track acreage	At least 100 acres of wooded or grassed filter strips	TSS: 11242 lbs/year

Goal	Objective	Task (linked to objectives)	Start	End	Responsible (in addition to WC)	Resources	Progress Indicators	Products	Estimated Load Reductions
	2. Install 10 acres of constructed wetlands (septic effluent and stormwater treatment)	1&2. Develop cost-share program for WRWP funds	2004	2007	Monitoring Committee	IDEM; County and State Health Departments; local Regional Wastewater District	Water quality monitoring; track acreage	At least 10 acres of constructed wetlands treating both septic effluent and storm water runoff (together or separately)	TSS: 4627 lbs/year
	3. Conduct septic system maintenance workshop	3. Identify presenter and develop education/outreach materials	2004	2007	Outreach/ Education Committee	IDEM; County and State Health Departments	Track attendance and feedback from participants	Conduct workshop, develop educational materials	
	4. Provide education on organic/chemical free practices	4. Partner with local organic/chem free producers to develop education and outreach materials	2004	2007	Outreach/ Education Committee	Local producers; Purdue Extension	Track attendance and information output	Produce and distribute educational materials to the general public	
	5. Conduct a lawn/turf management workshop	5. Have BSU students develop basic landscape plans for several lawn and garden styles 5. Partner with local greenhouses/plant growers to provide materials for installation	2004	2007	Outreach/ Education Committee	NRCS; Purdue Extension; Master Gardeners; BSU	Track attendance and feedback from participants	Conduct workshop, develop educational materials, intall practices	

Goal	Objective	Task (linked to objectives)	Start	End	Responsible (in addition to WC)	Resources	Progress Indicators	Products	Estimated Load Reductions
	6. Identify and promote drainage management options	6. Identify range of practices suitable for drainage and water quality protection	2004	2007	Outreach/ Education Committee	Surveyor; Drainage Board; Purdue Extension; NRCS	Track attendance and feedback from participants	Increase use of drainage management practices that protect drainage and water quality, consistent with the Indiana Drainage Handbook	
	7. Conduct an erosion control workshop	7. Partner with local MS4 entities to develop participant list and presenter list	2004	2007	Outreach/ Education Committee	Purdue Extension; County MS4 entities; Muncie Sanitary District	Track attendance and feedback from participants	Conduct workshop, develop educational materials	
Develop targeted methods for reducing <i>E. coli</i> levels	1. Identify sources of <i>E. coli</i> contamination	1. Research available technology/monitoring methods and select appropriate method	2004	2007	Monitoring Committee	Ball State University; U.S. Geological Survey; IDEM; Center for Watershed Protection	Evaluate monitoring program ability to accurately identify <i>E. coli</i> sources	Identify sources of local <i>E. coli</i> contamination and their relative contribution	
	2. Conduct septic system maintenance workshop	2. Identify presenter and develop education/outreach materials	2004	2007	Outreach/ Education Committee	IDEM; County and State Health Departments	Track attendance and feedback from participants	Conduct workshop, develop educational materials	

Goal	Objective	Task (linked to objectives)	Start	End	Responsible (in addition to WC)	Resources	Progress Indicators	Products	Estimated Load Reductions
Maintain the low temperature regime in Buck Creek	1. Protect and restore wooded riparian corridor along the primary channel	1. Partner with Muncie-Delaware County Plan Commission to develop conservation zones; Drainage Board; Surveyor	2004	2007	Monitoring Committee; DCSWCD agricultural technical	Plan Commission; County GIS Department; IDNR; Surveyor; Drainage Board	Monitor progress of zoning; track stream temperature	Conservation zones along Buck Creek	
	2. Install wooded plantings along Buck Creek	2. Identify interested landowners 2. Develop cost-share program for WRWP funds (tie into program stated above to increase buffer strips in ag and urban areas)	2004	2009	Monitoring Committee; DCSWCD agricultural technician	NRCS; IDNR; Purdue Extension; Ball State University	Track stream temperature and planted acreage	Enhanced wooded riparian corridor along Buck Creek	
Maintain and improve overall water quality in Prairie Creek reservoir	1. Protect and enhance the wooded and grassed buffer strip around the reservoir	1. Develop a master plan for the Prairie Creek Subwatershed	2004	2007	Muncie-Delaware County Plan Commission; Indiana-American Water Co.	Plan Commission; Delaware County GIS Department; Water Company	Creation of a completed Master Plan	Master plan for the Prairie Creek Subwatershed	
Continue to educate public on local non-point source issues and the WRWP project	1. Conduct watershed tours – highlight implementation practices	1&2. Partner with local organizations to conduct tours and give presentations, etc.	2004	2007	Outreach/Education Committee	Local Organizations	Track public participation in tours and other outreach activities	Public tours, presentations, and publications	

Goal	Objective	Task (linked to objectives)	Start	End	Responsible (in addition to WC)	Resources	Progress Indicators	Products	Estimated Load Reductions
	2. Maintain public outreach campaign: newsletters, articles, presentations								
Improve TSS, stream habitat and biology in Buck Creek	1. Remove illegal rock dam at BC-6	1. Identify regulatory/permit requirements needed	2004	2007	Monitoring Committee	Surveyor; County Highway Dept. USGS (gauging station at same location); IDEM; IDNR	Determine what is needed to remove dam (regulatory)	Remove illegally placed dam	
		1. Partner with local organizations and citizens to conduct a dam removal field day							
	2. Stabilize 400 feet of stream bank upstream of BC-7	2. Determine best methods for bank stabilization	2004	2009	Monitoring Committee	IDEM; IDNR; BSU; Purdue Extension	Measure TSS, stream habitat and biology; identify any improvements	Stabilize bank at site upstream from BC-7	Sediment: 75.7 tons/year P: 64.3 lbs/year N: 128.5 lbs/year
		2. Identify regulatory/permit requirements needed							
Improve TSS, stream habitat and biology in Killbuck and Mud Creeks	1. Reengineer both stream channels	1. Conduct a feasibility study to assess possibility of conducting reengineering	2004	2009	Monitoring Committee	NRCS; IDEM; Purdue; BSU	Evaluate feasibility study results	At least a feasibility study that provides recommendations for or against further action	

7.3 Estimated Implementation Costs

The following is an estimated cost breakdown for the first three-year implementation phase of the WRWP:

Personnel = \$185,000

Watershed Coordinator - \$140,000

Agricultural Technician - \$45,000

Best Management Practices = \$100,000

Cost share for agricultural, suburban and urban on-ground practices - \$75,000
(buffer strips [avg. \$150/acre], manure/nutrient mgmt, grassed buffers, reduced tillage)

Constructed wetlands = \$15,000

Tile flow systems = \$10,000

Outreach and Education (includes in-house expenses) = \$50,000

Conferences and Workshops (lawn/turf mgmt., septic, drainage, erosion) - \$15,000

Community outreach and education programs – \$30,000

Watershed Tours (2) - \$5,000

Land Use Planning = \$15,000

Master plan (Prairie Creek) and zoning development (Buck Creek) - \$15,000

Monitoring = \$50,000

E. coli sourcing program - \$25,000

Baseline water quality, biology and stream habitat - \$20,000

Update GIS layers - \$5,000

Note: Estimations based on average costs per activity, known salary requirements, and review of expenses from the initial planning phase of the WRWP.

7.4 Funding Sources

Funding for the implementation phase of the White River Watershed Project shall come from the following sources (for further information on these and other funding sources, see Chapter 9):

Clean Water Act Non-Point Source, Section 319 Grant = \$400,000

(\$300,000 is cash with a mandatory match of \$100,000 in cash or in-kind services)

Ball Brothers Foundation = \$10,000

George and Frances Ball Foundation = \$10,000

Community Foundation of Muncie and Delaware County = \$10,000

In-Kind Commitment from the Local Community = \$70,000

7.5 Implementation Action Responsibilities and Regulatory/Legal Needs

All actions shall be carried out under the direction of the DCSWCD and their representatives. Maintenance of BMPs installed by landowners shall be the responsibility of those parties that own the land on which the practice(s) are installed upon. Protocol for long term reporting of the status of such practices shall be developed by the DCSWCD and shall be a stipulation of participation in the WRWP cost-share program. All necessary permits, easements, landowner agreements, land acquisition, or other legal actions that are necessary to implement above listed actions shall be determined prior to any such actions being taken. All participation in the WRWP program is strictly voluntary, thereby being a result of the willingness of the individual/organization.