Section IX: Watershed Management Goals

Based on the concerns and problem statements elucidated in the previous sections, a set of goals were developed. Goal achievement was parsed into short-term and long-term target outcomes with each having an associated objective, action item, and indicator(s) of success listed.

These goals listed in their order of importance are;

(1) Reduce *E. coli* loads in Eagle Creek Watershed.

Problem: Streams in the Eagle Creek Watershed exceed the Indiana single sample daily maximum of 235 colonies per 100 milliliters for *Escherichia coli* (*E. coli*) bacteria.
Short-term Target: Reduce the number of times in which streams in Eagle Creek Watershed exceed 10,000 CFU/100mL during event flow. By eliminating the number of times E. coli exceeds 10,000 CFU/100mL, the overall load will be reduced by 81%.
Long-term Target: Eliminate *E. coli* concentrations of greater than 1,000 CFU/100mL from occurring in Eagle Creek Watershed with the ultimate goal of meeting the single sample standard of 235 CFU/100 mL.

(2) Reduce Atrazine loads in Eagle Creek Watershed.

Problem: Concentrations of Atrazine in Eagle Creek Watershed streams result in elevated Atrazine levels in Eagle Creek Reservoir that exceed the USEPA standard of 3.0 ug/L (0.003 mg/L) for drinking water supplies.
Short-term Target: Reduce Atrazine concentrations in Eagle Creek Watershed streams such that concentrations of Atrazine in Eagle Creek Reservoir do not exceed 3.0 ug/L (0.003 mg/L). A total atrazine load reduction of 40% is expected when the number of times atrazine exceeds 3.0 ug/L is eliminated.
Long-term Target: Reduce application of Atrazine in Eagle Creek Watershed.

(3) Reduce sediment loads in Eagle Creek Watershed.

Problem: Sediment loads in the subwatersheds of Eagle Creek are high during event flows, eventually transporting large pulses of sediment to the reservoir and potentially degrading aquatic health.
Short-term Target; Reduce fine-grained sediment (silt and clay) loading into headwater (first order) streams in Eagle Creek Watershed.
Long-term Target: Reduce sediment loading to Eagle Creek Watershed to enhance aquatic habitats.

(4) Reduce nutrient loads in Eagle Creek Watershed.

Problem: Nutrient concentrations in all streams in Eagle Creek watershed frequently exceed the national average for watersheds with 50-75% agricultural use.

Short-term Target: Reduce stream nutrient concentrations such that Total P does not exceed 0.125 mg P/L and Total N does not exceed 2.75 mg N/L. By eliminating such exceedences, Total P loads can be reduced by 58% and Total N loads can be reduced by 36%.

Long-term Target: Reduce nutrient loading to Eagle Creek Reservoir such that reservoir trophic status reverts from its current eutrophic state to a mesotrophic state.

(5) Increase watershed education and outreach in Eagle Creek Watershed

Problem: An adequate educational outreach program is not in place to inform the residents in the Eagle Creek Watershed about their role in maintaining the overall quality of the watershed.

Short-term Target: Raise awareness of watershed and water quality issues, especially septic system maintenance, agricultural best management practices, and urban storm water management.

Long-term Target: Change attitudes and behaviors to foster environmental stewardship.

(1) Reduce *E. coli* loads in Eagle Creek Watershed.

Problem: Streams in the Eagle Creek Watershed exceed the Indiana single sample daily maximum of 235 colonies per 100 milliliters for *Escherichia coli* (*E. coli*) bacteria.

Short-term Target: Reduce the number of times that streams in Eagle Creek Watershed exceed 10,000 CFU/100mL during event flow[11].

Objective	Action Item	Stakeholders	Responsible Party	Schedule	Indicators of Success
Reduce *E. coli* load from livestock with access to streams.	Work with NRCS and SWCDs to identify partners.	Landowners with livestock	Boone Co. SWCD ECWA	Present – Year 2	✓Identification of landowners with livestock amenable to fence installation
	Install fencing	Landowners with livestock	Boone Co. SWCD ECWA	Present – Year 3	✓Miles of fencing installed ✓Visual confirmation of fewer animals with stream access.
	Monitor fencing effectiveness		ECWA	Year 2 – Year 3+	✓Reduction in the number of event flows[11] with *E. coli* concentrations higher than 10,000 CFU/100mL. ✓Creation of BMP effectiveness database.
Reduce *E. coli* load from event flow run-off.	Work with NRCS and SWCDs to identify partners.	Agricultural landowners	ECWA	Present – Year 2	✓Identification of agricultural landowners amenable to buffer installation.
	Install buffers	Agricultural landowners	ECWA	Year 1 – Year 3	✓Number of implemented buffers.
	Monitor buffer effectiveness		ECWA	Year 2 – Year 3+	✓Reduction in the number of event flows with *E. coli* concentrations higher than 10,000 CFU/100mL. ✓Creation of BMP effectiveness database.

[11] An “event” is defined as the duration of time at which discharge at the Eagle Creek Gage in Zionsville (USGS 03353200) was greater than three times the 40 year average base flow for that month

Long-term Target: Eliminate *E. coli* concentrations of greater than 1,000 CFU/100mL from occurring in Eagle Creek Watershed.

Objective	Action Item	Stakeholders	Responsible Party	Schedule	Indicators of Success
Reduce *E. coli* load from malfunctioning or absent septic systems. Reduce *E. coli* load from unsewered communities.	Determine the number of un-sewered areas near stream	Landowners with septic systems or no waste disposal system	ECWA County Health Departments	Present – Year 3	✓Creation of a map showing the location of unsewered areas in Eagle Creek Watershed.
	Develop an educational brochure and distribute throughout the watershed.	Landowners throughout the watershed Septic maintenance businesses	ECWA County Health Departments	Year 2 – Year 3+	✓Number of educational packets distributed. ✓Number of attendees to educational events.
	Eliminate failing septic systems and sewer un-sewered areas.	Landowners Rural Community Assistance Program	County Health Departments Indiana Community Action Association	Year 3+	✓Number of un-sewered homes sewered. ✓Number of rehabilitated septic sytems. ✓Reduction in *E. coli* concentrations greater than 1,000 CFU/100mL.
Reduce *E. coli* load from agricultural stormwater run-off.	Work with NRCS and SWCDs to increase whole farm planning practices	Agricultural landowners	ECWA SWCDs	Year 1 – Year 3+	✓Increase in the amount of agricultural fields using whole farm practices..

(2) Reduce Atrazine loads in Eagle Creek Watershed.

Problem: Concentrations of Atrazine in Eagle Creek Watershed streams result in elevated Atrazine levels in Eagle Creek Reservoir that exceed the USEPA standard of 3.0 ug/L (0.003 mg/L) for drinking water supplies.

Short-term Target: Eliminate Atrazine concentrations in Eagle Creek Watershed streams such that concentrations of Atrazine in Eagle Creek Reservoir do not exceed 3.0 ug/L (0.003 mg/L).

Objective	Action Item	Stakeholders	Responsible Party	Schedule	Indicators of Success
Reduce Atrazine run-off from agricultural fields from entering the trunk streams of Eagle Creek Watershed.	Work with Boone Hendricks, and Hamilton SWCDs to identify partners	Agricultural landowners	ECWA	Year 1 – Year 2	✓ Identification of landowners amenable to accommodating BMP implementation.
	Provide cost-sharing-funding, education, and demonstration projects (e.g., buffers, constructed wetlands, and controlled drainage).	Landowners throughout the watershed	ECWA	Year 1 – Year 3+	✓ Miles of installed buffers or enhanced buffers. ✓ Area of land rededicated to wetland land-use.
	Monitor effectiveness of demonstration projects.		ECWA	Year 2 – Year 3+	✓ Reduction in Atrazine loading to Eagle Creek Reservoir. ✓ Creation of BMP effectiveness database.
	Work with NRCS and SWCDs to increase the use of Whole Farm Planning practices.	Agricultural landowners	ECWA	Year 1 – Year 3+	✓ Increase in the amount of agricultural fields using Whole Farm Planning practices.

Long-term Target: Reduce application of Atrazine in Eagle Creek Watershed.

Objective	Action Item	Stakeholders	Responsible Party	Schedule	Indicators of Success
Reduce Atrazine usage on agricultural fields.	Identify specific agricultural landowners using Atrazine and the quantities they use	Agricultural landowners	SWCD	Year 3+	✓ Development of Atrazine application rates specific to agricultural land in Eagle Creek Watershed.
	Monitor Atrazine Application	Agricultural landowners	ECWA	Year 3+	✓ Creation of Atrazine application database
	Work with NRCS to determine feasible alternatives to Atrazine	Agricultural landowners	ECWA	Year 3+	✓ Inclusion of information into educational brochure, educational programs. ✓ Increase in the amount of agricultural fields using whole farm practices.
	Develop brochure on Atrazine application	Agricultural landowners	ECWA	Year 2 – Year 3+	✓ Number of educational brochures distributed. ✓ Number of meetings with agricultural landowners. ✓ Reduction in Atrazine application
Reduce Atrazine load from agricultural stormwater run-off.	Work with NRCS and SWCDs to increase whole farm planning practices	Agricultural landowners	ECWA SWCDs	Year 1 – Year 3	✓ Increase in the amount of agricultural fields using whole farm practices.

(3) Reduce sediment loads in Eagle Creek Watershed.

Problem: Sediment loads in the subwatersheds of Eagle Creek are high during event flows, eventually transporting large pulses of sediment to the reservoir and potentially degrading aquatic health.

Short-term Target: Reduce fine-grained sediment (silt and clay) loading into headwater (first order) streams in Eagle Creek Watershed.

Objective	Action Item	Stakeholders	Responsible Party	Schedule	Indicators of Success
Reduce fine-grain sediment load from headwater erosion.	Work with NRCS, SWCDs and County Drainage Board to identify partnerships	Agricultural landowners, NRCS, SWCDs, County Drainage Board	ECWA SWCDs NRCS	Present – Year 2+	✓Development of common goals between NRCS, County Drainage Board, and ECWA. ✓Identification of landowners amenable to buffer installation.
	Quantify extent of headwater erosion	Landowners throughout the watershed	ECWA	Present – Year 1	✓Development of a detailed baseline map showing headwater erosion.
	Provide cost-sharing-funding, education, and demonstration projects (e.g. buffers and fencing)	Landowners throughout the watershed	ECWA	Year 1 – Year 3	✓Number of implemented buffers. ✓Miles of fencing installed. ✓Visual confirmation of fewer animals with stream access and less animal-caused bank erosion.
	Monitor effectiveness of demonstration projects.		ECWA	Year 2 – Year 3+	✓Reduction in total suspended sediment loading ✓Creation of BMP effectiveness database.
Reduce sediment load from agricultural run-off.	Work with NRCS and SWCDs to increase conservation tillage practices.	Agricultural landowners	ECWA SWCDs	Year 1 – Year 3+	✓Increase in the amount of agricultural fields using conservation tillage practices.

Long-term Target: Reduce sediment loading to Eagle Creek Watershed to enhance aquatic habitats.

Objective	Action Item	Stakeholders	Responsible Party	Schedule	Indicators of Success
Reduce sediment load from stormwater run-off from impervious surfaces and urbanized areas.	Promote whole community planning and begin storm drain marking.	Homeowners	ECWA	Year 1 – Year 3+	✓Implemented whole community planning practices. ✓Number of marked storm drains
Reduce sediment load from bank erosion in the lower reaches of Eagle Creek Watershed.	Create and deliver watershed education programs.	Schools, Homeowners, Park Patrons, and Developers	IndyParks, Veolia Water CEES, ECWA	Present – Year 3	✓Number of educational events held. ✓Attendance at educational events.
	Work with developers to ensure that sediment traps are being used and are properly functioning.	Developers and Homeowners	ECWA, Co. Commissioners, NRCS, SWCDs, IN Green Building Council	Present – Year 3+	✓Visual Assessments HHEI and QHEI scores. ✓Number of developers that agree to participate.
	Develop sustainable development practices	Developers and Homeowners	County Commissioners, NRCS, SWCDs, ECWA, Indiana Green Building Council	Present – Year 3+	✓Development of common goals between land developers, Indiana Green Building Council and ECWA ✓Number of developments using sustainable development practices.

(4) Reduce nutrient loads in Eagle Creek Watershed.

Problem: Nutrient concentrations in all streams in Eagle Creek watershed frequently exceed the national average for watersheds with 50-75% agricultural use.

Short-term Target: Reduce stream nutrient concentrations such that Total P does not exceed 0.125 mg P/L and Total N does not exceed 2.75 mg N/L.

Objective	Action Item	Stakeholders	Responsible Party	Schedule	Indicators of Success
Reduce nutrient loads from agricultural run-off.	Work with NRCS and SWCDs to identify partners	Agricultural landowners	ECWA	Present – Year 1	✓Identification of agricultural landowners amenable to buffer and/or wetland installation.
	Work with NRCS and SWCDs to educate agricultural landowners to reduce fertilizer applications and/or change fertilizer application practices.	Agricultural landowners	ECWA	Present – Year 1	✓Decrease in the amount of agricultural fertilizers applied in Eagle Creek Watershed and/or improve fertilizer retention on farms. ✓Increase in the amount of farms with developed and implemented Whole Farm management.
	Work with NRCS to increase conservation tillage practices.	Agricultural landowners	ECWA	Present – Year 3	✓Increase in the amount of agricultural fields using conservation tillage practices.
	BMP installation	Agricultural and Residential landownders	ECWA	Year 2 – Year 3+	✓Number of BMPs installed.

Long-term Target: Reduce nutrient loading to Eagle Creek Reservoir such that reservoir trophic status reverts from its current eutrophic state to a mesotrophic state.

Objective	Action Item	Stakeholders	Responsible Party	Schedule	Indicators of Success
Reduce nutrient load from tile drainage.	Work with NRCS and SWCDs to increase controlled drainage practices	Agricultural landowners	ECWA SWCDs	Year 3+	✓ Increase in the amount of agricultural fields using controlled drainage practices.
Reduce nutrient load from point sources.	Work with point source dischargers to determine feasibility of load reductions.	Point source Dischargers	ECWA	Year 3+	✓ Number of meetings with Point Source Dischargers and CAFOs[12]. ✓ Determination of feasible goals ✓ Implementation of possible reductions.
Reduce nutrient load from non-point sources other than agricultural run-off.	Identify partners	Landowners throughout the watershed	ECWA	Present – Year 2	✓ Identification of landowners amenable to buffer installation.
	Provide cost-sharing-funding, education, and demonstration projects	Landowners throughout the watershed	ECWA	Year 1 – Year 3	✓ Number of installed buffers or enhanced buffers.
	Monitor effectiveness of demonstration projects.		ECWA	Year 2 – Year 3+	✓ Reduction in nutrient loading ✓ Creation of BMP effectiveness database.
Reduce nutrient load from stormwater run-off from impervious surfaces and urbanized areas.	Promote whole community planning and begin storm drain marking.	Homeowners	ECWA	Year 1 – Year 3	✓ Implemented whole community planning practices. ✓ Number of marked storm drains
					✓

[12] CAFO = Confined Animal Feeding Operation

Long-term Target: Reduce nutrient loading to Eagle Creek Reservoir such that reservoir trophic status reverts from its current eutrophic state to a mesotrophic state (continued).

Objective	Action Item	Stakeholders	Responsible Party	Schedule	Indicators of Success
Reduce suburban and urban lawn phosphorous fertilizer application.	Begin education and outreach program regarding sustainable fertilizer use.	Landowners throughout the watershed	ECWA	Year 3+	✓ Initiation open discussions regarding future reductions and eventual elimination of phosphorous lawn fertilizers applications. ✓ Eventual increase in landowners and homeowners using non-phosphorous and low-phosphorus fertilizers.

(5) Increase watershed education and outreach in Eagle Creek Watershed

Problem: An adequate educational outreach program is not in place to inform the residents in the Eagle Creek Watershed about their role in maintaining the overall quality of the watershed.

Short-term Target: Raise awareness of watershed and water quality issues, especially septic system maintenance, agricultural best management practices, and urban storm water management.

Objective	Action Item	Stakeholders	Responsible Party	Schedule	Indicators of Success
Educate farmers on Whole Farm Planning practices.	Work with NRCS and SWCDs to increase Whole Farm Planning implementation and controlled drainage practices.	Agricultural landowners	ECWA SWCDs	Year 1 – Year 3+	✓Increase in the amount of farmers using Whole Farm Planning and controlled drainage practices.
Raise public awareness of watersheds and their role in water quality.	Install watershed identification signs and storm drain markers for watershed education.	All residents in the Watershed	ECWA	Present – Year 3+	✓Number of signs installed. ✓Number of storm drains marked.
Raise public awareness of watershed and water quality issues.	Create a web site for the ECWA	All residents in the Watershed	ECWA	Present – Year 2	✓Number of hits on the website.
	Establish a semi-annual paper and electronic newsletter	All residents in the Watershed	ECWA	Present – Year 3+	✓Number of residents receiving newsletter.
	Create education materials and activities	All residents in the Watershed	ECWA Watershed Parks Schools, IndyParks	Present – Year 3+	✓Number of educational materials distributed ✓Number of outreach events hosted.
	Watershed and Water Quality Awareness Day program	All Residents in the Watershed	ECWA, Hoosier River Watch	Year 2 – Year 3	✓Number of residents attending event

Long-term Target: Change attitudes and behaviors to foster environmental stewardship.

Objective	Action Item	Stakeholders	Responsible Party	Schedule	Indicators of Success
Continue to build on and expand watershed outreach activities.	Create and install watershed exhibits and educational programs at Eagle Creek Park Nature Center	Eagle Creek Park, Park Visitors	ECWA Eagle Creek Park	Year 2 - Year 3+	✓ An increase in environmental stewardship.