8.0 MEASURING PLAN PROGRESS & SUCCESS

It is essential to have a monitoring component as part of any watershed plan. This watershed plan includes two monitoring components. The first is a "Water Quality Monitoring Plan" that includes specific locations and methods where future sampling should occur and a set of "Criteria" that can be used to determine whether pollutant load reduction targets and other watershed improvement objectives are being achieved over time. The second component includes "Report Cards" for each plan goal. The Report Cards include interim, measurable milestones linked to criteria that are specific to each plan goal/objectives. The Water Quality Monitoring Plan and Report Cards are designed to be implemented and used by Spring Creek Watershed partnership (SCW), Watershed Council or other plan users in the future to measure plan progress, success, failures, and any need for adaptive management.

8.1 Water Quality Monitoring Plan & Evaluation Criteria

As noted in Section 3.14 there is a general lack of data collection within the watershed. The Illinois EPA/IDNR and Illinois Volunteer Lakes Monitoring Program (VLMP) are not actively monitoring any sites within the watershed. The best water chemistry data is being collected by Friends of the Fox River (FOFR) near Spring Creek's confluence with the Fox River. However, the water samples were not processed by a certified lab but rather less accurate surface water test kits. No know water chemistry data is available for any of the major lakes in the watershed. Significant biological data (fish, macroinvertebrates, mussels) has been collected by IDNR, INHS, MCCD, private consultants, RiverWatch and FOFR. However, most of this data is from the mid to late 1990's.

Background Information

Water quality monitoring is performed by collecting physical, chemical, biological and/or social indicator data related to water quality goals and objectives and should be implemented in Spring Creek watershed to; 1) assess the current condition of water quality within streams and lakes; 2) assess changes in water quality following implementation of Management Measures, and 3) assess the public's social behavior related to water quality issues. **It is critically important that all future monitoring be completed using the same protocol and methods used by the Illinois EPA for comparison and QAQC purposes.** Illinois EPA Quality Assurance Project Plans (QAPPs) and Standard Operating Procedures (SOPs) can be found at:http://www.epa.state.il.us/water/water-quality/methodology/index.html.

Most physical, chemical, and biological water quality criteria and indicators are measured during base flow and again after significant (≥ 1.0 inches) rain events. Monitoring water quality in lakes and streams usually includes monitoring for nutrients, bacteria, suspended solids, water clarity, and dissolved oxygen to name a few. Biological (fish, macroinvertebrates, and mussels) and habitat assessments can also be performed depending on the criteria being assessed. Certified labs should analyze chemical water quality samples, or if a sufficient amount of samples are going to be analyzed, portable handheld monitoring instruments can be purchased but generally produce less accurate results. Physical parameters such as habitat characteristics, temperature, oxygen concentration, specific conductance, and pH should be collected or analyzed in the field by trained individuals. In the future, water quality sampling related to individual Management Measures should also be monitored. Management Measure monitoring should include water samples of inflow into the structure and a second sample at the outflow. It is best to complete Management Measure

monitoring during or shortly after large rain events (≥ 1.0 inches) to provide data on how well the practice works. Biological and habitat quality monitoring should also be part of any habitat improvement project. Because funding for such monitoring is typically limited, money should be built into the initial Management Measure project budget.

It is also important to monitor stream discharge/flow (cubic feet per second (cfs)), when calculating and comparing pollutant loads. This is performed by measuring the stream width and average depth then multiplying to obtain cross-sectional area. A flow meter must then be used to find the average velocity (feet per second) of the water in the stream. An object can also be floated to determine velocity but is less accurate. The cross-sectional area of the stream is then multiplied by the stream velocity and stream substrate correction factor to obtain stream discharge/flow. Pollutant loading is then a function of pollutant concentration taken during a grab sample and discharge/flow.

Monitoring Plan Implementation

The following sections describe procedures by which physical, chemical, and biological monitoring criteria and indicators should be collected in the watershed, where they should be collected, by whom, and how often (Table 42; Figure 53). Table 42 and Figure 53 do not depict recommended sampling locations related to specific Management Measures as this monitoring will come later as projects are implemented.

Table 42. Recommended water quality and biological monitoring locations.

Site	Recommended or Existing Sampling Parties	Sampling Location (See Figure 53)	Sampling Frequency	Parameters Tested
Lakes	Illinois Volunteer Lakes Monitoring Program	Penny Road Pond, Galvins Lake, Spring Lake, Mud Lake, & Goose Lake	Every 5 Years	Physical; Chemical; Trophic State
Spring Creek	Citizens for Conservation; School Environmental Programs	Trib A confluence, Lake-Cook Rd., Rock Ridge Rd.	Every 5 Years	Physical and Chemical
Spring Creek	Illinois EPA and IDNR: Intensive Basin Survey	Lincoln St. near confluence with Fox River	Every 5 Years	Physical, Chemical, and Biological
Spring Creek	Friends of Fox River	Lincoln St. near confluence with Fox River	Yearly	Physical, Chemical, Biological
Spring Creek	Barrington Hills/GHA	Braeburn Rd. (SC North) Rt. 59 (SC South)	Yearly	Physical, Chemical
Macroinvertebrates	RiverWatch	Spring Creek at Penny Rd.	Yearly	Biological
Fish & Mussels	McHenry County Conservation District	Spring Creek at Rock Ridge Rd.	Every 5 Years	Biological
Fish & Mussels	Cook County Forest Preserve District	Between Rt. 62 and Spring Lake	Every 5 Years at 2 Locations	Biological
Management Measures	Environmental Consultants	Varies: Specific to each project	Pre and Post Implementation	Physical, Chemical, and Biological

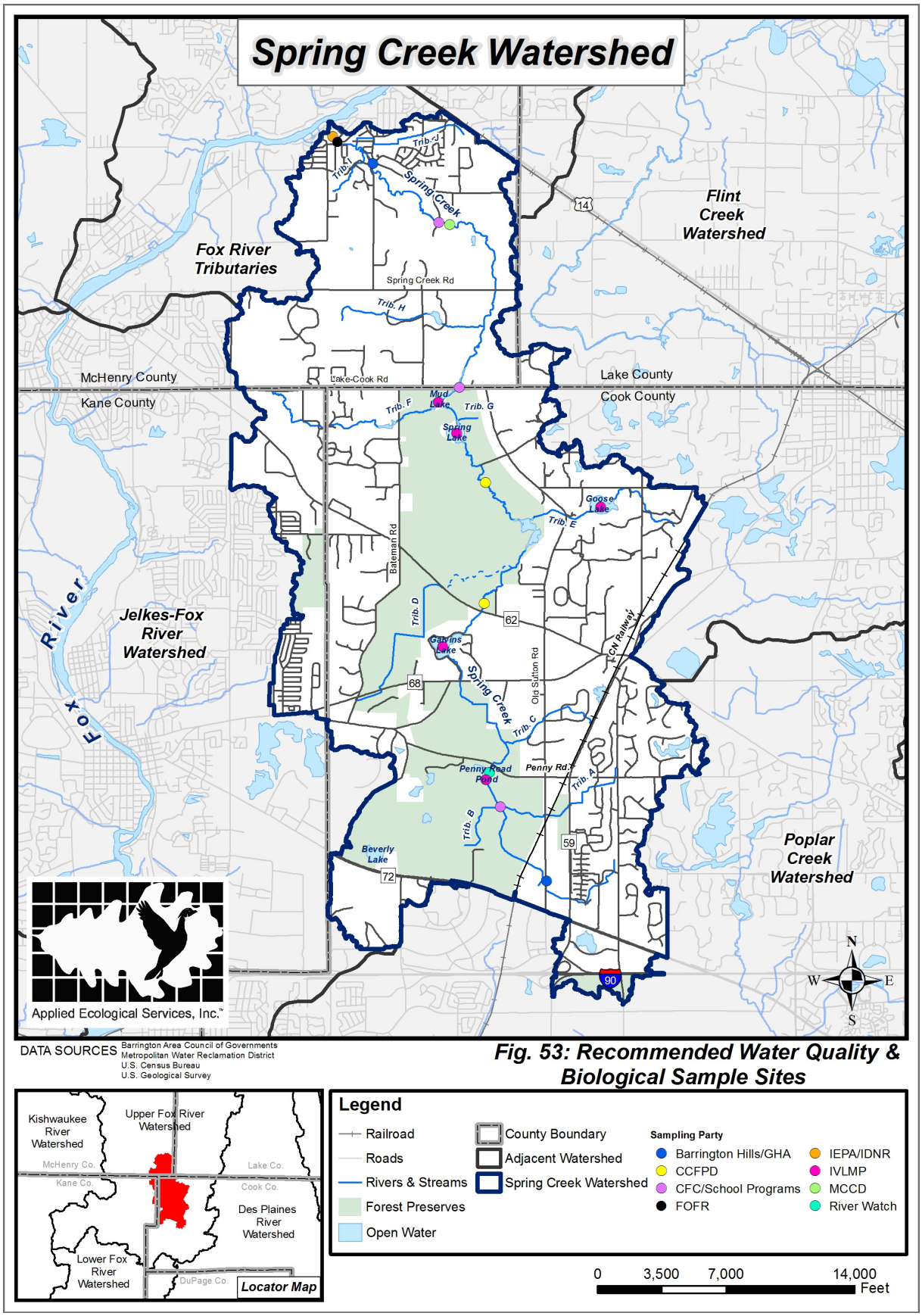

Fig. 53: Recommended Water Quality & Biological Sample Sites

Physical and Chemical Monitoring Methods & Recommendations

Physical and chemical monitoring of water can be time consuming and expensive depending on the complexity of the sampling program. Usually the budget and/or personnel available for monitoring limit the amount of data that can be collected. Therefore, the monitoring program should be developed to maximize the usable data given the available funding and personnel. Any monitoring program should be flexible and subject to change to collect additional information or use newer equipment or technology when available.

Streams

Many different parameters are included in physical monitoring of water quality in streams. They include but are not limited to temperature, pH, conductivity, dissolved oxygen, clarity, and habitat assessments. Temperature, pH, dissolved oxygen, turbidity, and conductivity measurements are usually collected at the same time that chemical water quality samples are taken but should be taken directly in the field using portable instruments. Continuous recorders (sondes) are also available. These units are typically placed in a stream or lake and left for a given period of time allowing for continuous reading of one or more parameters.

Many different chemical parameters can be tested for in streams but it is recommended that testing only be completed for parameters shown in Table 43. Unlike physical monitoring, chemical monitoring usually requires that samples be collected using specific methods and taken to certified labs for analysis. Chemical monitoring in streams should be done during base flow and then again following significant rain events (≥ 1.0 inches) to allow for pollution load comparison. This same technique can be used to determine pollutant removal efficiencies resulting from constructed water quality Management Measures. The data should also include flow and rainfall estimates at each location using a velocity meter and National Weather Service data.

It is crucial to collect representative water samples using careful handling procedures. Unrepresentative samples or samples contaminated during collection or handling are useless. The collected samples should be submitted for analysis to a laboratory certified by the National Environmental Laboratory Accreditation Conference (NELAC). Generally, the certified laboratory of choice will work closely with the client to assure that the samples are collected in the proper containers with preservatives for the parameter of interest. The laboratory often provides the containers, ice chests for transport, labels, and chain-of-custody forms to the client as part of their service.

Monitoring the overall water quality in streams throughout the watershed should occur at frequencies recommended in Table 42 and include samples from key locations shown on Figure 53. Sampling at these locations will yield pollutant loading results throughout the watershed and will help pinpoint pollutant loading hotspots thereby narrowing down and prioritize locations for future implementation of Management Measures. Most importantly, the Village of Barrington Hills should continue to sample Spring Creek at site "Spring Creek North" (Braeburn Rd.) as part of their NPDES Phase II requirements. This sample location provides a snapshot of water quality for the majority of Spring Creek watershed.

Table 43. Water quality parameters collection and handling procedures.

Parameter	Stream Aquatic Life Statistical Guideline*	Container	Volume	Preservative	Max. Hold Time
pH	>6.5 or <9.0	These parameters are measured in the field			
Conductivity					
Dissolved Oxygen	>5.0 mg/l				
Temperature	<32.2 C				
Turbidity	<20 NTU				
Total Suspended Solids	<116 mg/l	Plastic	32 oz	Cool 4 °C	7 days
Total Dissolved Solids	<1500 mg/l	Plastic	32 oz	Cool 4 °C	7 days
Biochemical Oxygen Demand	<5.0 mg/l	Plastic	32 oz	Cool 4 °C	48 hours
Total Kjeldahl Nitrogen [1]	<10 mg/l	Plastic	4 oz	Cool 4 °C 20% Sulfuric Acid	28 days
Nitrate-nitrogen [2]	<7.8 mg/l	Plastic	4 oz	Cool 4 °C 20% Sulfuric Acid	28 days
Total Phosphorus	<0.61 mg/l (<0.05 Lakes)	Plastic	4 oz	Cool 4 °C 20% Sulfuric Acid	28 days
Chloride	<500 mg/l	Plastic	32 oz	Cool 4 °C	28 days

*Statistical Guidelines obtained from IEPA Integrated Water Quality Reports & conversations with IEPA staff and other sources.
[1] TKN measures organic nitrogen and ammonia-nitrogen in the sample.
[2] Nitrate-nitrogen is measured on a filtered sample (adding TKN and nitrate-nitrogen gives the total nitrogen of the sample).

Lakes

Most water quality samples related to pollutant loading are taken in stream systems because the data provides estimates of pollutant loading following differently-sized rain events. In lakes however, the water is usually slow to cycle through the system and different techniques are needed to assess water quality. In addition to collecting parameters included in Table 43, biologists and limnologists often use "productivity" of a lake to assess its health. Productivity is measured via the Trophic State Index (TSI), an index that uses phosphorus concentrations as the primary means to assess lake health. The state of Illinois set the standard for Total Phosphorus (TP) at 0.05 mg/L. When phosphorus levels exceed 0.05 mg/L, lake-wide algal blooms can occur leading to decreased water clarity, decreased light penetration, and increased total suspended solids. The TSI is used to categorize lakes as oligotrophic (TSI <40), mesotrophic (TSI 40-49), eutrophic (TSI 50-69), and hypereutrophic (TSI >70). TSI values greater than 70 indicate that a lake is in poor health.

The work required to sample water chemistry and develop TSI values for the major lakes in the watershed should be conducted by the Illinois Volunteer Lake Monitoring Program (VLMP) as outlined in Table 42 and include samples from key locations shown on Figure 53.

Habitat

Stream habitat assessments comprise a major component of physical water quality monitoring. Many habitat assessment methods are available for assessing streams such as those developed by IDNR and Ohio EPA. The Qualitative Habitat Evaluation Index (QHEI) developed by the Ohio EPA is a

quick, accurate, and straightforward analysis with dependable and repeatable results. The QHEI is also used by the Illinois EPA to assess "Aquatic Life" use attainment in streams. The index can be used on any stream reach and used on stream restoration projects to document improvements. Prior to stream restoration, a QHEI evaluation should be completed by the project ecologist or engineer. A follow-up QHEI for comparison purpose should be conducted by the same ecologist/engineer or at least 2-4 years following project implementation after plant material and in-stream structures have had time to grow and perform. QHEI forms and a narrative explaining how to use the index can be located on the web at http://rock.geo.csuohio.edu/norp/qhei.htm.

The QHEI was found to correlate well with biological integrity of streams in the Midwest. It is composed of six criteria that are scored individually then summed to provide the total QHEI score. The best possible score is 100. QHEI scores from hundreds of stream segments indicate that habitat values greater than 60 generally support average quality warm-water fauna. Scores greater than 80 typify pristine habitat conditions that have the ability to support exceptional warm-water fauna (Ohio EPA 1999). Areas with habitat scores lower than 60 may support warm-water fauna but usually exhibit significant degradation. Table 44 summarizes QHEI score classifications. Stream restoration projects should strive to create conditions that produce QHEI scores of at least 60.

Table 44. QHEI score classes and characteristics.

QHEI	Class	Usual Characteristics
80-100	Excellent	Comparable to pristine conditions; exceptional assemblage of habitat types; sufficient riparian zone
60-79	Good	Impacts to riparian zone
30-59	Fair	Impacts to riparian zone; channelization; most in-stream habitat gone
0-29	Poor	All aspects of habitat in degraded state

Biological Monitoring Methods and Recommendations

The Illinois EPA uses biological data for determining "Aquatic Life" use attainment in streams and can also be useful for assessing the success of water quality and habitat improvement measures. Fish and macroinvertebrates are relatively easy to sample/identify and reflect specific and predictable responses to human induced changes to the landscape, stream habitat, and water quality. Two indices have been developed that measure water quality using fish (fish Index of Biotic Integrity (fIBI)) and macroinvertebrates (Macroinvertebrate Biotic Index (MBI)). These indices are best used prior to a stream restoration project to obtain baseline data and again following restoration to measure the success of the project. Or, they can be conducted to simply assess resource quality in a stream reach. The work required to sample and calculate biotic indexes should be conducted by the IDNR, FOFR, MCCD, Cook County Forest Preserve District, and/or private consultants as outlined in Table 42.

Fish Index of Biotic Integrity (fIBI)

The fIBI is designed to assess biological health directly through several attributes of fish communities in streams. IDNR biologists or qualified firms should be contracted to perform the fish collection and identification. Collection is usually done within a stream reach using electrofishing equipment such as backpack shockers or electric seines. After the fish have been collected and identified, the data is used to evaluate 12 metrics and a rating is assigned to each metric based on whether it deviates strongly from, somewhat from, or closely approximates the expected values found in a high quality stream. The sum of these ratings gives a total IBI score for the site.

The best possible IBI score is 60 The Illinois EPA has determined that a score less than 41 indicates a stream is not fully supporting aquatic life (Table 45). A manual for calculating IBI scores for streams in Illinois is available from IDNR.

Macroinvertebrate Biotic Index (MBI)
The MBI is designed to rate water quality using macroinvertebrate taxa tolerance to degree and extent of organic pollution in streams. The MBI is calculated by taking an average of tolerance ratings weighted by the number of individuals in the sample. The Illinois EPA has determined that a MBI score less than 5.9 indicates a stream is not fully supporting aquatic life (Table 45). A manual for collecting and calculating MBI scores for streams is available from the USEPA.

Table 45. Illinois EPA indicators of aquatic life impairment using MBI and fIBI scores.

Biological Indicator	**Score**		
MBI	> 8.9	5.9 < MBI < 8.9	≤ 5.9
fIBI	≤ 20	20 < IBI< 41	≥ 41
Impairment Status - Use Support - Resource Quality			
Impairment Status	Severe Impairment	Moderate Impairment	No Impairment
Designated Use Support	Not Supporting	Not Supporting	Fully Supporting
Resource Quality	Poor	Fair	Good

Source: Integrated Water Quality Report (2010).

Water Quality Evaluation Criteria
Water quality criteria (expressed as measurable interim targets) need to be developed so that water quality improvement objectives and pollutant load reductions can be evaluated over time. The criteria are designed to take data gathered from the Water Quality Monitoring Plan and other data and analyze the success of the plan in terms of protecting and improving water quality. These criteria also support an adaptive management approach by providing ways by which to reevaluate the implementation process if adequate progress is not being made toward achieving water quality goals. Environmental and social indicators of water quality are examined in detail below. Note: evaluation criteria are included for the water quality goal only; criteria and milestones for other plan goals are examined within the appropriate progress evaluation "Report Cards".

Watersheds are complex systems with varying degrees of interaction and interconnection between environmental (chemical, physical, biological indicators), and social characteristics. Criteria related to these attributes are a measure of health of the watershed. For example, phosphorus or nitrogen concentrations are chemical indicators; habitat characteristics in a stream or water temperature are physical indicators; and biological indicators include fish, macroinvertebrate, or mussel health and diversity. Physical habitat indicators are often highly interconnected with hydrologic and morphologic characteristics. Environmental criteria related to water quality are obtained by implementing the Water Quality Monitoring Plan.

Social criteria related to water quality issues are more difficult to guage but can and should be assessed to determine factors influencing social change and individual behaviors. Measuring social criteria will enable the Watershed Council to assess whether initiated programs and policies are indeed influencing people's behavior. Social indicators can be measured using demographics

information, values and beliefs of individuals in the watershed, number of cleanup miles along a stream, and other means.

The Spring Creek Watershed partnership (SCW) specifically developed a water quality goal and objectives for this plan (see Section 2.0). The water quality goal reads as follows:

Goal A: *Protect, enhance, and monitor surface water quality and groundwater resources to meet Illinois EPA water quality standards that fully support designated uses.*

Criteria (indicators and specific targets) are selected for each water quality objective to ascertain whether components of the water quality goal are being met (Table 46). Targets are based on Illinois EPA water quality criteria, data analysis, reference conditions, literature values, and/or expert examination of water quality conditions that primarily support Illinois EPA's "Aquatic Life" use support which is most applicable to Spring Creek watershed. Criteria are also designed to address potential or known sources of water quality impairment identified in Section 4.0. Future evaluation of the criteria will allow the watershed committee to guage plan implementation success or determine if there is a need for adaptive management.

Table 46. Set of criteria related to water quality objectives.

GOAL A: Protect, enhance, and monitor surface water quality and groundwater resources to meet Illinois EPA water quality standards that fully support designated uses.	
Water Quality Objective	**Criteria: Indicators and Targets**
1) Identify, implement, and monitor Management Measures that address "Critical" and other high priority pollutant loading areas.	• *# of Wetland Restorations:* Implement at least 2 "Critical Area" or high priority wetland restoration projects within 15 years. • *Linear Feet of Restored Stream & Riparian Area:* Implement at least 2 "Critical Area" or high priority stream channel & riparian area restoration projects within 15 years. • *# of Detention, Pond, Wetland, Lake Retrofits*: Implement at least 3 "Critical Area" or high priority detention, pond, wetland, or lake retrofits within 15 years. • *Chemical & Physical Water Quality Standards:* Water in streams meets "Aquatic Life" statistical guidelines within 15 years (Table 29). • *Biotic Indexes:* Biological communities achieve at least "Fair" resource quality within 15 years (Table 45) • *Social Indicator:* 75% of surveyed citizens are able to identify where water pollution originates, and are able to identify shallow aquifer water issues and the methods to protect them within 10 years.
2) Retrofit existing stormwater management systems and design new systems within developed areas to specifically reduce nutrient and sediment loading.	• *# of Detention, Pond, Wetland, Lake Retrofits*: Implement at least 3 "Critical Area" or high priority detention, pond, wetland, or lake retrofits within 15 years. • *New Stormwater Design:* 100% of all new systems properly designed and reviewed by Ecological Consultant. • *% of Developments Infiltrating Water:* 100% of all new development includes stormwater design that infiltrates water.
3) Use alternative to road salt.	• *Chloride (salt):* Less than 500 mg/l in stream or lake samples. • *% of Communities using Alternatives:* 50% of local communities use alternatives to road salt within 15 years.
4) Pursue phosphorus ban in the watershed.	• *Total Phosphorus:* No more than 0.61 mg/l in streams and 0.05 mg/l in lakes • *Trophic State Index:* ≥ 50 based on phosphorus concentrations (not eutrophic) • *% of Communities Implementing Ban:* 100% of local communities implement phosphorus ban within 10 years

5) Identify opportunities for drain tile modification to improve water quality.	• *% of Ag Land w/Temporarily Tile Plugs:* 50% of agricultural land with plugged tiles between fall harvest & spring planting within 15 years
6) Use "Best Equestrian Practices" to reduce nutrient runoff.	• *Social Indicator:* 75% of surveyed equestrian community implements "Best Equestrian Practices".
7) Identify and replace failing septic systems.	• *# Failing Septic Systems:* 100% of failing septic systems are identified and repaired or replaced within 10 years.
8) Illinois EPA/IDNR begin monitoring Spring Creek as part of Intensive River Basin Survey program, monitor major lakes via the Illinois Volunteer Lake Monitoring Program, and continue RiverWatch and Friends of Fox River programs.	• *Monitoring Program:* Illinois EPA/IDNR establish plan to monitor Spring Creek by 2014. • *Monitoring Program:* VLMP establish plan to monitor major lakes by 2014. • *Monitoring Program:* RiverWatch continue macroinvertebrate monitoring yearly. • *Monitoring Program:* FOFR continue monitoring program yearly.
9) Protect open space and monitor shallow aquifer water quality and supply in important recharge areas.	• *Open Space:* Use Green Infrastructure Plan in conjunction with identified "Priority Protection Areas" to implement recommendations as development occurs. • *Monitoring Program:* Establish shallow aquifer monitoring program within 10 years. • *Social Indicator:* 75% of surveyed citizens are able to identify shallow aquifer water issues and the methods to protect the resource from contamination.

Social Indicators of Water Quality

Quantifying social indicators of success in a watershed planning initiative is difficult. It is subjective to a large degree and complaints about poor conditions are often heard rather than compliments on improvements. The Great Lakes Regional Water Program (GLRWP), a leading organization that addresses water quality research, education, and outreach in Illinois, Indiana, Michigan, Minnesota, Ohio, and Wisconsin, defines social indicators as standards of comparison that describe the context, capacity, skills, knowledge, values, beliefs, and behaviors of individuals, households, organizations, and communities at various geographic scales. The GLRWP suggests that social indicators used in water quality management plans and outreach efforts are effective for several reasons including:

- Help watershed committee evaluate projects related to education and outreach;
- Help support improvement of water quality projects by identifying why certain groups install Management Measures while other groups do not;
- Measure changes that take place within grant and project timelines;
- Help watershed committee with information on policy, demographics, and other social factors that may impact water quality;
- Measure outcomes of water quality programs not currently examined.

Several potential social indicators could be evaluated by the Watershed Council using different strategies to assess changes in water quality. For example, surveys, public meetings, and establishment of interest groups can give an indication of the public feelings about the water quality in the watershed. It is important to involve the public in the water quality improvement process at an early stage through public meetings delineating the plans for improvement and how it is going to be monitored. Table 47 includes a list of potential social indicators and measures that can be used by the watershed committee to evaluate the social changes related to water quality issues.

Table 47. Social indicators and measures related understanding behavior toward water quality issues.

Social Indicator	Measure
1) Media Coverage	• # of radio or television broadcasts related to water quality protection • # of newspaper articles related to water quality protection • # of community newsletters related to water quality protection
2) Citizen Awareness	• # of informational flyers distributed per given time period • % of citizens who are able to identify where "Critical Pollutants" (phosphorus, nitrogen, sediment) is originating from • % change in volunteer participation to protect water quality • % change in attendance at water quality workshops • # of requests to create public use areas with interpretive signage • % of stakeholders who are aware of watershed management information
3) Watershed Management Activities	• # of stream miles cleaned up per year • # of volunteer water quality monitoring sites assessed each year • # of linear feet or miles of trails created or maintained each year • # of municipalities adopting watershed management plan • # of watershed groups implementing plan recommendations • # of farmers that properly implement nutrient management plans

Monitoring social indicators in the watershed should be the responsibility of the Spring Creek Watershed partnership (SCW). Mail or e-mail surveys are among the most popular method to gauge social behavior toward water quality. Demographic information on a county basis can be obtained from the U.S Census Bureau but will need to be modified based on the watershed boundary. This information is then followed by taking a randomized sample of individuals in the watershed from a phone directory or other means. Next, a survey should be developed that identifies citizens' perceptions of water quality problems and protection strategies. Citizens that respond to the survey should be given a chance to donate a small amount of money ($1) to a not for profit environmental group then sent thank you letters while those that did not respond should be sent a second survey. The results of the survey can be used to develop appropriate media, citizen awareness, and watershed management activities to improve social behavior.

8.2 Goal Milestones/Progress Evaluation "Report Cards"

Milestones are essential when determining if Management Measures are being implemented and how effective they are at achieving plan goals over given time periods. This allows for periodic plan updates and changes that can be made if milestones are not being met.

Watersheds are often complex systems with varying degrees of interaction and interconnection between physical, chemical, biological, hydrological, habitat, and social characteristics. Criteria that reflect these characteristics may be used as a measure of watershed health. Goals and objectives in the watershed plan determine which indicators should be monitored to assess the success of the watershed plan.

A successful watershed plan must involve stakeholder participation to get projects completed, and must include a feedback mechanism to measure progress toward meeting goals. Watershed "Report Cards" provide this information. Report Cards are intended to provide brief descriptions of current conditions, suggest performance criteria/indicators that should be evaluated and monitored, milestones to be met, and adaptive management if milestones are not being met. Report Cards were developed for each of the six plan goals and are located at the end of this section. The milestones are based on short term (1-5 years), medium term (5-10 years) and long term (10+ years) objectives. Grades for each milestone term should be calculated using the following scale: 80%-100% met = A; 60%-79% met = B; 40%-59% met = C; and < 40% = failed.

Report Cards should be used to identify and track plan implementation to ensure that progress is being made towards achieving the plan goals and to make corrections as necessary. Lack of progress could be demonstrated in factors such as monitoring that shows no improvement in indicators, new environmental problems, lack of technical assistance, or lack of funds. In some cases, other uncontrollable factors such as weather, development, and flow impediments in streams might result in milestones not being met. In these cases the user of the Report Card should explain why other factors resulted in milestones not being met in the notes section of the Report Card.

Early on in the plan implementation process Spring Creek Watershed partnership should establish a Watershed Council and hire a Watershed Implementation Coordinator. The Council should meet at least twice a year and the Watershed Implementation Coordinator should update the Council on plan implementation progress by way of the Report Cards. If needed, adaptive management should be implemented accordingly by referencing the adaptive management recommendations on the each Report Card then developing a strategy to either change the milestone(s) or decide how to implement projects or actions to achieve the milestone(s).

Goal A Report Card

Protect, enhance, and monitor surface water quality and groundwater resources to meet Illinois EPA water quality standards that fully support designated uses.

Current Conditions:

- Spring Creek is not listed by Illinois EPA as impaired for any of its 5 Designated Uses. Available data indicates that water quality is generally fair with only moderate impairments.
- 1,900 acres are "moderate," 2,200 acres are "sensitive," and 8,800 acres are "highly sensitive" groundwater recharge areas. 75.5% of the watershed has excellent recharge capability.

Criteria to Meet Objectives:

See Criteria in Table 46

Milestones:	**Grade**
1-5 Yrs: 1) Determine feasibility and develop concept plans for at least two "Critical Area" or high priority wetland restoration projects. 2) Develop stream restoration concept plans for at least two "Critical Area" or high priority stream channel & riparian area projects. 3) Implement at least one "Critical Area" or high priority detention, pond, wetland, or lake retrofit project. 4) All natural stormwater designs in new development are reviewed by Ecological Consultant. 5) At least three local communities use alternatives to road salt. 6) Form subcommittee to decide whether to pursue a phosphorus ban in the watershed. 7) At least one farmer plugs tiles between fall harvest and spring planting. 8) Barrington Hills work with equestrian community to evaluate "Best Equestrian Practices". 9) All failing septic systems are identified. 10) Establish and implement a surface and groundwater quality monitoring program. 11) All "Priority Protection Area" recommendations are implemented as development occurs.	
5-10 Yrs: 1) Implement at least one "Critical Area" or high priority wetland restoration project. 2) Implement at least one "Critical Area" or high priority stream channel & riparian area project. 3) Implement at least one "Critical Area" or high priority detention, pond, wetland, or lake retrofit project. 4) All natural stormwater designs in new development are reviewed by Ecological Consultant. 5) Alternatives to road salt are used on all locally managed roads. 6) A phosphorus ban is implemented in the watershed if decided on by the subcommittee. 7) At least one additional farmer plugs tiles between fall harvest and spring planting. 8) 50% of failing septic systems are repaired or replaced. 9) All "Priority Protection Area" recommendations are implemented as development occurs.	
10+ Yrs: 1) Implement at least one "Critical Area" or high priority wetland restoration project. 2) Implement at least one "Critical Area" or high priority stream channel & riparian area project. 3) Implement at least one "Critical Area" or high priority detention, pond, wetland, or lake retrofit project. 4) All natural stormwater designs in new development are reviewed by Ecological Consultant. 5) At least 50% of farmers plug tiles between fall harvest and spring planting. 6) At least 50% of local communities use alternatives to road salt. 7) All "Priority Protection Area" recommendations are implemented as development occurs.	

Monitoring Needs/Efforts:

- Monitoring of physical, chemical, and biotic parameters will need to continue indefinitely to track changes in water quality.
- Periodically visit wetland, stream, detention basin, pond, wetland, and lake retrofit projects to assess success and failures.

Remedial Actions:

- Assess number of projects that have been implemented versus water quality changes to determine if projects are effectively removing pollutants or improving Biotic Index scores. If not, conduct assessment to find causes of pollution and address.
- If targeted chemical pollutants and physical parameters are not improved after 10+ years, implement only "Critical Area" projects that are specifically designed to remove pollutants and continue monitoring cycle.
- Determine if hydraulic impediments are blocking fish passage upstream or downstream if Biotic Index scores are low.

Notes:

Grade Evaluation: 80%-100% met = A; 60%-79% met = B; 40%-59% met = C; and < 40% = failed.

Goal B Report Card

Identify and protect important natural areas/open space and provide appropriate passive recreational benefits.

Current Condition:

- The historic landscape consisted of prairies, savannas, and wetlands prior to European settlement in the 1830's.
- Single family residential comprises 39% of the watershed followed by forest & grassland (31.1%) then agricultural (9.2%).
- An inventory found that 76% of the watershed is classified as open or partially open space.
- Several Ecologically Significant Areas remain including 12 ADID wetlands and 3 Forest Preserves totaling 4,000+ acres.

Criteria to Meet Objectives:

- Number of communities incorporating Green Infrastructure Plan into Comprehensive Plans and development review maps.
- Percent of permanently protected sites harboring high quality natural areas or T&E species.
- Number of unprotected buffer parcels (identified in the Green Infrastructure Plan) adjacent to existing Forest and Nature Preserves and sites with high quality natural areas and/or T&E species that are protected.
- Number of "Priority Protection Area" recommendations implemented as development occurs.
- Number of new developments on Green Infrastructure Plan parcels that use conservation or low density design standards.
- Number of passive recreation opportunities that are incorporated into the Green Infrastructure Plan.

Milestones:	**Grade**
1-5 Yrs: 1) All communities incorporate the Green Infrastructure Plan into Comp Plans and development reviews. 2) At least 50% of sites with high quality natural areas or T&E species are protected. 3) At least 1 unprotected buffer parcel adjacent to high quality natural areas/T&E species is protected and managed if any parcels become available for acquisition. 4) All "Priority Protection Area" recommendations are implemented as development occurs. 5) All new developments on Green Infrastructure parcels use conservation and/or low density design. 6) All new Green Infrastructure Plan implementation incorporates passive recreation.	
5-10 Yrs: 1) At least 75% % of sites with high quality natural areas or T&E species are protected. 2) At least 1 unprotected buffer parcel adjacent to high quality natural areas/T&E species is protected and managed if any parcels become available for acquisition. 3) All "Priority Protection Area" recommendations are implemented as development occurs. 4) All new developments on Green Infrastructure parcels use conservation and/or low density design. 5) All new Green Infrastructure Plan implementation incorporates passive recreation.	
10+ Yrs: 1) At least 90% of sites with high quality natural areas or T&E species are protected. 2) At least 1 unprotected buffer parcel adjacent to high quality natural areas/T&E species is protected and managed if any parcels become available for acquisition. 3) All "Priority Protection Area" recommendations are implemented as development occurs. 4) All new developments on Green Infrastructure parcels use conservation and/or low density design. 5) All new Green Infrastructure Plan implementation incorporates passive recreation.	

Monitoring Needs/Efforts:

- Track number of communities that incorporate Green Infrastructure Plan into Comp Plans and development reviews.
- Track number of protected sites that harbor high quality natural areas or T&E species.
- Track number of "Priority Protection Area" recommendations that are implemented as development occurs.
- Track percentage of new developments that implement conservation and/or low density design standards.
- Track percentage of Green Infrastructure Plan implementation that includes passive recreation.

Remedial Actions:

- Reassess county, township, or municipal budgets for green infrastructure protection efforts.
- Check permitting process to ensure Green Infrastructure and "Priority Protection Area" recommendations are considered.
- Check permitting process to ensure conservation and/or low density development and recreation is considered.
- Develop policies for development.

Notes:

Grade Evaluation: 80%-100% met = A; 60%-79% met = B; 40%-59% met = C; and < 40% = failed.

Goal C Report Card

Reduce existing structural flood damage and ameliorate potential flooding where flooding threatens structures and infrastructure.

Current Condition:

- Four potential and three documented Flood Problem Areas (FPAs) were identified in the Spring Creek watershed.
- Documented FPAs are found at three locations including road and basement flooding at Tributary E's crossing with Old Sutton Road, flooding over Chapel Road, and Flooding on Bartlett Road.

Criteria to Meet Objectives:

- Number of unprotected floodplain parcels identified in the Green Infrastructure Plan that are protected.
- Number of stream restoration projects that reconnect the stream channel to the adjacent floodplain.
- Number of structural Flood Problem Areas mitigated for.
- Percentage of new and redevelopments implementing natural stormwater storage/infiltration measures that are managed.

Milestones:	**Grade**
1-5 Yrs: 1) Identify at least 2 undeveloped parcels in 100 year floodplain for future protection or conservation easements. 2) Develop stream restoration concept plans for at least 2 "Critical Area" or high priority stream channel & riparian area project that includes reconnection to the floodplain. 3) Identify and develop concept plans to mitigate for at least 3 Flood Problem Areas. 4) All new and redevelopment incorporates natural stormwater storage and infiltration measures.	
5-10 Yrs: 1) Protect at least 1 undeveloped parcel in 100 year floodplain. 2) Implement at least one "Critical Area" or high priority stream channel & riparian area project. 3) Mitigate for at least 1 Flood Problem Area. 4) All new and redevelopment incorporates natural stormwater storage and infiltration measures.	
10+ Yrs: 1) Protect at least 1 undeveloped parcel in 100 year floodplain. 2) Implement at least one "Critical Area" or high priority stream channel & riparian area project. 3) Mitigate for at least 2 Flood Problem Areas. 4) All new and redevelopment incorporates natural stormwater storage and infiltration measures.	

Monitoring Needs/Efforts:

- Track number of unprotected floodplain parcels that are protected.
- Track number of stream restoration projects that include floodplain reconnection.
- Track number of mitigated Flood Problem Areas.
- Track number of new and redevelopments that use natural stormwater storage and infiltration measures.

Remedial Actions:

- Reassess county, township, or municipal budgets for green infrastructure protection efforts.
- Conduct follow-up visits to Flood Problem Area sites during flood events to determine if additional remedial work is needed.
- Conduct inventory of new and redevelopments to determine feasibility for potential retrofits.

Notes:

Grade Evaluation: 80%-100% met = A; 60%-79% met = B; 40%-59% met = C; and < 40% = failed.

Goal D Report Card

Improve aquatic and terrestrial habitat to encourage balanced ecosystems.

Current Condition:

- The historic landscape consisted of prairies, savannas, and wetlands prior to European settlement in the 1830's.
- Following European settlement, fires rarely occurred and large tracts of savanna were cleared, prairies were tilled for farmland or developed, wetlands were drained, and many streams were channelized.
- Most remaining remnants are degraded by invasive species or by poor land management by humans.
- Over 50% of stream length is moderately to high channelized; 13% of stream length is moderately to highly eroded; 97% of riparian corridor is in poor condition.

Criteria to Meet Objectives:

- Number of stream and riparian area restoration projects using natural design.
- Acres of terrestrial habitat that is restored and managed on both public and private land.
- Number of natural area management plans created and implemented.
- Percentage of new development that includes restoration of degraded natural areas then donation of natural areas to entity for long term management with dedicated funding.
- Number of wetland restorations.
- Number of municipal ordinances that allow use of native vegetation in projects.

Milestones:	**Grade**
1-5 Yrs: 1) Develop concept plans for at least 2 "Critical Area" or high priority stream channel/riparian area projects. 2) Restore at least 50 acres of habitat and implement long term management on public or private land. 3) Develop and implement management plans for at least 2 public or private natural areas. 4) All new development on Green Infrastructure Plan parcels and/or "Priority Protection Areas" include natural area restoration then donation and management of land. 5) Determine feasibility and develop concept plans for at least two "Critical Area" or high priority wetland restoration projects. 6) All local ordinances allow use of native plants in projects. 7) Continue practice of trash pick-up throughout communities to protect riparian corridors	
5-10 Yrs: 1) Implement at least one "Critical Area" or high priority stream channel & riparian area project. 2) Restore at least 50 acres of habitat and implement long term management on public or private land. 3) Develop and implement management plans for at least 3 public or private natural areas. 4) All new development on Green Infrastructure Plan parcels and/or "Priority Protection Areas" include natural area restoration then donation and management of land. 5) Design and implement at least one "Critical Area" or high priority wetland restoration project.	
10+ Yrs: 1) Implement at least one "Critical Area" or high priority stream channel & riparian area project. 2) Restore at least 200 acres of habitat and implement long term management on public or private land. 3) Implement at least one "Critical Area" or high priority stream channel & riparian area project. 4) Develop and implement management plans for at least 4 public or private natural areas. 5) Design and implement at least one "Critical Area" or high priority wetland restoration project.	

Monitoring Needs/Efforts:

- Track number of "Critical Area" or high priority stream channel, riparian, and wetland projects implemented each year.
- Track acres of degraded habitat that is restored each year.
- Track number of natural area management plans that are created and implemented each year.
- Track number of new developments that restore land, donate land, and provide long term funding for management.
- Track number of local municipalities that allow native plants in projects.

Remedial Actions:

- If terrestrial restoration acreage milestones cannot be achieved, reduce acreage to more feasible goal.
- Actively pursue private and public entities to create and implement natural area management plans.
- Meet with communities that do not allow native plants in projects and explain their benefits.

Notes:

Grade Evaluation: 80%-100% met = A; 60%-79% met = B; 40%-59% met = C; and < 40% = failed.

Goal E Report Card

Increase communication and coordination among municipal decision-makers and other stakeholders within the watershed.

Current Condition:

- Very few watershed stakeholders or "Champions" are currently pursuing grant funds to implement watershed improvement projects.
- A number of practices and projects will require multi-jurisdictional and public-private participation/cooperation.
- This plan recommends that SWC partnership establish a Watershed Council among multiple stakeholders to implement this plan and track progress.

Criteria to Meet Objectives:

- Number of municipalities in the watershed that adopt the Spring Creek Watershed-Based Plan.
- Number of municipalities and stakeholders that identify a "Champion" to participate in the Watershed Council.
- Number of municipalities that adopt municipal comprehensive plans, codes, and ordinances supportive of watershed plan goals and objectives.
- Number of workshops that teach municipal stakeholders how to use and implement the Watershed-Based Plan.

Milestones:	**Grade**
1-5 Yrs: 1) All municipalities in the watershed adopt the Spring Creek Watershed-Based Plan and implement plans, codes, and projects that support watershed plan goals and objectives. 2) A Watershed Council is established and Watershed Implementation Coordinator hired; meetings occur twice each year to discuss plan recommendations and track plan success. 3) "Champions" from each municipality and other stakeholder groups attend regular meetings of the Watershed Council and SCW partnership. 4) Implement 2 workshops related to plan implementation for municipal stakeholders.	
5-10 Yrs: 1) Watershed Council meets twice yearly to discuss plan recommendations and to track plan success. 2) "Champions" from each municipality and other select stakeholders groups attend regular meetings of the Watershed Council and SCW partnership. 3) Implement at least 1 workshop related to plan implementation for municipal stakeholders.	
*10 + Yrs:*1) Watershed council meets twice yearly to discuss plan recommendations and to track plan success. 2) Representatives from each municipality and other select stakeholder groups attend regular meetings of the Watershed Council and SCW partnership. 3) Implement at least 1 workshop related to plan implementation for municipal stakeholders.	

Monitoring Needs/Efforts:

- Track number of municipalities that adopt the Spring Creek Watershed-Based Plan.
- Track number of "Champions" identified, Watershed Council meetings, and what was discussed.
- Track number of workshops related to plan implementation for municipal stakeholders.

Remedial Actions:

- SCW partnership or Watershed Council conduct meetings with government officials to adopt the watershed plan if it is not adopted in years 1-5.
- Seek out potential "Champions" in the watershed if not already identified.
- Approach municipalities regarding plan implementation that do not attend workshops.
- Develop policies that support watershed plan goals and compliance issues.

Notes:

Grade Evaluation: 80%-100% met = A; 60%-79% met = B; 40%-59% met = C; and < 40% = failed.

Goal F Report Card

Foster appreciation and stewardship of the watershed through education.

Current Condition:

- Spring Creek Watershed partnership (SWC) is currently the primary entity promoting the Watershed-Based Plan.
- Citizens for Conservation (CFC), Barrington Area Council of Governments (BACOG), and Friends of Spring Creek Forest Preserves promote appreciation and stewardship of the watershed through education and volunteer activities.
- Education will be ongoing and involve constant and continuous campaigns to reach as many target audiences as possible.

Criteria to Meet Objectives:

- Number of Information & Education programs that are implemented.
- Number of Friends of Spring Creek volunteers participating in natural area restoration.
- Number of environmental interpretation/education signage installed at access public access points.
- Number of garden and restoration walks in areas currently planted with native vegetation.
- Number of identified open space parcels adjacent to public facilities that would be appropriate for outdoor education.
- Attendance at watershed education programs such as seminars, workshops, etc.
- Number of publicized watershed improvement projects in news media, agency newsletters, website, etc.

Milestones:	**Grade**
1-5 Yrs: 1) Implement at least 5 programs recommended in the Information & Education Plan. 2) Local conservation groups recruit at least 2 new volunteers to assist with natural area restoration. 3) Install environmental interpretation/education signage at all public access points to natural areas. 4) Conduct at least 2 native garden and/or restoration walks. 5) Identify at least 1 open parcel adjacent to each school appropriate to teach outdoor education. 6) At least 20 people on average attend each education program. 7) Publicize all watershed improvement projects in news media, newsletters, website/internet, etc.	
5-10 Yrs: 1) Implement at least 5 programs recommended in the Information & Education Plan. 2) Local conservation groups recruit at least 3 new volunteers to assist with natural area restoration. 3) Install environmental interpretation/education signage at all new public access points. 4) Conduct at least 2 native garden and/or restoration walks. 5) At least 25 people on average attend each education program. 6) Publicize all watershed improvement projects in news media, newsletters, website/internet, etc.	
10+ Yrs: 1) Implement at least 5 programs recommended in the Information & Education Plan. 2) Local conservation groups recruit at least 3 new volunteers to assist with natural area restoration. 3) Install environmental interpretation/education signage at all new public access points. 4) Conduct at least 2 native garden and/or restoration walks. 5) At least 25 people on average attend each education event. 6) Publicize all watershed improvement projects in news media, newsletters, website/internet, etc.	

Monitoring Needs/Efforts:

- Track number of education programs implemented each year.
- Track number of new volunteers recruited each year.
- Track number of native garden and/or natural area restoration walks conducted each year.
- Track number and location of open parcels identified and used for environmental education.
- Track number of people attending education programs.
- Track publicized watershed improvement projects.

Remedial Actions:

- Hire Watershed Implementation Coordinator to organize education programs.
- Ask state, county, and government agencies such as IDNR, NRCS, and Forest Preserves to hold workshops.
- Actively pursue interested people if attendance at education programs is low.

Notes:

Grade Evaluation: 80%-100% met = A; 60%-79% met = B; 40%-59% met = C; and < 40% = failed.