Goals & Indicators

Problem	Present Condition	Target Condition – Short Term	Target Condition – Long term	Target Date - Short Term	Target Date - Long Term	Indicators
1. Excessive Sediment Loading & Soil Loss	10 Sub-watersheds exceeding 30 mg/L TSS on > 50% of samples. 6 sub-watersheds exceeding on > 10% of the samples	8 sub-watersheds meeting 30 mg/L on 90% of samples	All sub-watersheds meeting 30 mg/L 90% of the time	5 years	40 years	1. Turbidity levels (where 30 mg/L TSS = 20 NTU) 2. Adoption of BMPs
2. Pathogens	6 sub-watersheds exceeding 235 CFU/100 mL on > 50% of samples. 10 sub-watersheds exceeding on > 10% of samples	3 sub-watersheds meeting 235 CFU/100 mL on 90% of samples	All sub-watersheds meeting 235 CFU/100 mL on 90% of samples	5 years	40 years	1. *E. coli* levels 2. Changes in septic system usage and ag bmp adoption.
3. Channel Quality	70% of streams with a high risk rating. 75% of streams with poor habitat quality. 1/3 of streams with impaired biotic communities	Five stream reaches with improved risk rating and habitat quality	All reaches with moderate or lower risk rating and meeting QHEI targets	5 years	40 years	1. WARSSS and QHEI score 2. IBI results 3. adoption of BMPs
4. Excessive Nutrient Loading	8 sub-watersheds above nutrient criteria on >10% of samples, 6 sub-watersheds on 1-10% of samples; 7 sub-watersheds above nitrate standard on >10% of samples, 3 on 1-10% of samples; Two sub-watersheds above ammonia nitrogen standards on >10% of samples, one on 1-10% of samples	12 sub-watersheds meeting nutrient criteria on 90% of samples. All sub-watersheds meeting ammonia nitrogen on 90% of samples.	All sub-watersheds meeting nutrient criteria & ammonia nitrogen standards on 90% of samples.	5 years	40 years	1. Nitrate, Phosphate, pH, dissolved oxygen, algae, and Ammonia Nitrogen levels 2. Changes in septic system usage and ag bmp adoption 3. Reporting from NPDES facilities
5. Education	Steering committee representation in 8 of the sub-watersheds	Steering committee representation in all of the sub-watersheds	Continued support of committee	5 years	40 years	1. Turnout at events and membership in committee

Table 5-A: Goals & Indicators-Summary

Table 5-A: Goals & Indicators: Summary summarizes the goals set forth by the steering committee using data and other information that came as a result of the watershed project. Support for the indicators and goals is described in the previous sections and more detail about the goals and indicators is described below.

5.1: Excessive Sediment Loading & Soil Loss Goals

Overall, sediment loading to streams and soil loss from fields will be reduced to create an environment that is safe for aquatic life and drainage ways that are not clogged with sediment

By 2050, all waterways in the Big Creek Watershed will be safe for aquatic life, achieving a total suspended solids concentration of 30 mg/L on 90% of samples. Within 5 years of beginning implementation, 8 of the 16 sub-watersheds will achieve this standard. This reduction will also keep streams free from sediment that can create impediments to drainage.

5.1.1: Indicators

Turbidity will be used as the main indicator of total suspended solids. Turbidity levels are strongly related to total suspended solids levels and turbidity is easier and less expensive to test since it does not require a lab. Achieving a turbidity level of 20 NTU is expected to be equivalent to the total suspended solids level of 30 mg/L recommended for aquatic habitat. Dissolved oxygen levels and changes in biotic community structures will also be monitored to validate that reductions in sediment loading also corresponds with increases in dissolved oxygen and increases in indices of biologic integrity (i.e. macroinvertebrate index of biotic integrity or fish index of biotic integrity).

In addition, progress towards the reductions needed set forth in the previous section will be tracked by monitoring the acceptance of BMPs or installation of structural practices. Changes will be added to the existing database of BMPs and tillage rates. Modeling of the percent reduction and reduction in sediment in tons will be accomplished using the RUSLE2 method in combination with the Region V Pollutant Load Reduction Tool for each BMPs adopted or structural practice installed.

5.2: Pathogens Goals

Overall, pathogen loading to streams will be reduced to level where the waterways are safe for full body recreational contact.

By 2050, all waterways in the Big Creek Watershed will achieve the *E. coli* standard (235 mg/L). Within 5 years of beginning implementation, Buente Creek-Maidlow Ditch, Pond Flat-Headwaters, and the Pond Flat Ditch – Jordan Creek sub-watersheds will achieve *E. coli* standard.

5.2.1: Indicators

Water monitoring results for *E. coli* will be used as the main indicator of achieving the pathogen goal. Achieving the standard of 235 mg/L on at 90% of samples collected from any give sub-watershed will indicate the achievement of the pathogen goal

In addition, progress towards the reductions set forth in the previous section will be tracked by monitoring successful implementation of recommended measures. For example, acceptance of agricultural BMPs on farms with livestock will be monitored and the progress towards the needed reductions will be tracked using appropriate modeling techniques. Changes in behavior related to septic system use or the changes in the number of septic systems will also be tracked. This may include changes in the number of times a septic tank is maintained or the willingness to alter water use habits. Any extensions of existing municipal sewer lines or development of other centralized treatment facilities that provide alternatives to septic systems will be followed and changes in the number and location of septic systems will be added to the existing database. The expected reductions from these changes will be tracked to follow the progress towards necessary reductions.

5.3 Channel Quality Goals

Overall, channel quality will be improved through restoring aquatic habitat and creating the conditions necessary for a stable channel and floodway. Past channelization efforts have created water quality, aquatic habitat, and drainage issues. Combining efforts to reduce peak flows and sediment loading along with restoration efforts made to the channel itself will create drainage network that can satisfy the needs of the community.

By, 2050, all channels will meet the target for the QHEI of 51, and be found to have a moderate or lower risk rating according to the 2nd phase of the WARSSS. When combined with other goals to reduce sediment and nutrient loading, this should also improve IBI scores so that all sites also meet the IBI target of 36. Within five years, the committee will choose five stream reaches to improve by following stability and habitat guidelines.

5.3.1: Indicators

Improvements to channel quality will be tracked primarily using the 2nd phase of the WARSSS, and the Ohio QHEI. Fish data will also be collected to analyze changes in the IBI for the sample points. If a reach is selected for channel quality improvements that is not near a sample points, at the least, macro-invertebrates (or fish) should be collected and a habitat assessment should be performed prior to construction so that before and after results can be compared. Biological monitoring is scheduled to be completed after 5 or 10 years of implementation (depending on support from partner universities). Other indicators include the number of filter strips or riparian cover installed and the amount of stream bank stabilization conducted. Changes in management measures by the local drainage boards will also be tracked.

5.4: Nutrient Goals

Overall, nutrient loading to streams and loss from fields will be reduced to create an environment that is safe for aquatic life. Nutrients such as phosphate and nitrate create algal blooms that cause periods of low dissolved oxygen and cover normally available habitat with filamentous algae. By combining reduction in water soluble nutrients with reductions in sediment loading, algal blooms will be reduced to an acceptable level. Ammonia nitrogen, the byproduct of incomplete nutrient cycling causes unhealthy water for aquatic life even in small amounts.

By 2050, all waterways in the Big Creek Watershed will achieve the desired levels of nitrate, phosphate, dissolved oxygen, pH, and algal growth to protect aquatic life as suggested by the nutrient criteria. To achieve these acceptable levels as prescribed in the nutrient target, nitrate

will be reduced to 4 mg/L. This target also satisfies the drinking water quality standard for nitrate of 10 mg/L. Within 5 years of beginning implementation, waterways in half of the impaired watersheds will achieve desired levels. In addition, within 5 years ammonia nitrogen will be reduced to achieve the standard in the two sub-watersheds where levels have been found to be at levels dangerous to aquatic life.

5.4.1: Indicators

Reductions in nitrate and ammonia nitrogen will be the primary method of tracking progress towards the nutrient loading goals. Additionally, water will be monitored to ensure that the reductions are causing complimentary changes in pH, dissolved oxygen, and algal growth and that sediment loading reductions are achieving necessary levels of total phosphates. Meeting targets and standards for the 5 parameters of the nutrient criteria and the ammonia nitrogen standard on 90% of samples in any given sub-watershed will indicate the achievement of the goal. Dissolved oxygen levels and changes in biotic community structures will also be monitored to validate that reductions in nutrient loading also corresponds with increases in dissolved oxygen and increases in indices of biologic integrity (i.e. macro-invertebrate family biotic index or fish index of biotic integrity).

Progress towards the reductions set forth in the previous section will be tracked by monitoring successful implementation of recommended measures. For example: acceptance of agricultural BMPs on farms, changes in behavior related to septic system use, or the changes in the number of septic systems will also be tracked. This may include changes in the number of times a septic tank is maintained or the willingness to alter water use habits. Any extensions of existing municipal sewer lines, development of other centralized treatment facilities that provide alternatives to septic systems, or changes in the effluent level from existing permitted facilities will be followed and changes in the number and location of septic systems will be added to the existing database. The expected reductions from these changes will be tracked to follow the progress towards necessary reductions.

5.5: Education Goals

Overall, the Big Creek Steering Committee will be strengthened through additional locally based community involvement and support by including on the steering committee a representative from each of the sixteen eight digit sub-watersheds within 5 years. The committee will continue to meet at least four times annually.

5.5.1: Indicators

Attendance at meeting and membership in the steering committee will serve as the primary indicator for achievement of the education goal.