

IV. WATERSHED IMPAIRMENTS, GOALS, AND IMPLEMENTATION

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A. Introduction

The action items contained in this section are based on a planning process that focused on collaboration among over 100 stakeholders in the Alum Creek watershed. At the outset of the planning process, participants devised six over-arching goals (or ends-objectives) for the action plan to guide their decision making. These were:

- Improve water quality and biological diversity
- Promote a healthy, functioning stream ecosystem
- Protect and increase natural landscapes, including green space
- Promote community awareness, use, stewardship, and involvement
- Protect human health
- Promote sustainable, long-term management efforts, including informed decision making

These overall goals were used to help frame the issues, and as a measure for considering and selecting from a range of action alternatives. Specific goals and performance indicators are included below for each stream segment, and are organized according to four focus areas. Brief descriptions of stakeholder involvement and commitments are included at the head of each action table.

Actions were formulated for the two subwatersheds within the lower Alum Creek watershed. The subwatersheds were delineated by the United States Geological Survey and identified by their 14-digit Hydrologic Unit Code (HUC) numbers. Actions were also formulated for six tributary streams, and are included below within their corresponding 14 digit HUC subwatershed.

Priorities

Given the scope of the issues addressed in this document and the variability in impairment issues and attainment status found throughout the watershed, it was necessary to set priorities for actions and stream segments. The following list of prioritized restoration and protection efforts will provide guidance as the plan is implemented.

Priority actions (in order):

- 1) Actions where local partners and opportunities for collaboration have been identified.
- 2) Actions that will help achieve targets for sediment and habitat TMDL's.
- 3) Actions to preserve riparian corridor, which will help prevent and mitigate impacts from continuing land use change (including sedimentation and habitat modification).
- 4) Actions to selectively remove lowhead dams, which have a large potential to dramatically improve water quality in the watershed's only nonattainment reach (and help achieve the habitat TMDL target).
- 5) Actions for nonpoint source pollution education in selected areas where urban runoff pollution has been identified as a source of impairment.

Priority stream segments (in order):

- 1) The upper subwatershed is the top priority stream segment because it is in attainment (according to most recent data) but threatened by land use change. Within this subwatershed, priority actions include 1) riparian corridor preservation and 2) sediment and erosion control.
- 2) The Spring Run watershed, which is a tributary to Alum Creek (in the lower subwatershed), is the second priority stream segment because it is currently in partial and nonattainment, but potential exists for making water quality improvements. This is due to the watershed's small size (8 square miles) and existence of strong local partnerships. Actions addressing 1) nonpoint source education and 2) stream morphology assessments will be enacted first.
- 3) The lower subwatershed, which is in partial and nonattainment, is the third priority stream reach. Priority actions include 1) riparian corridor preservation, 2) sediment and erosion control and 3) selective low head dam removal.

Total Maximum Daily Loads (TMDL's)

At the time of publication of this document, the Ohio EPA had produced a draft Total Maximum Daily Load (TMDL) restoration plan for the Big Walnut Creek basin, which includes Alum Creek, Big Walnut Creek, and Blacklick Creek (Ohio EPA, 2004). TMDL's are developed by Ohio EPA for impaired waters to determine the extent of pollution reduction necessary for a given stream to regain ecological health, or achieve full use attainment. This is accomplished by identifying pollutant sources, estimating their load contributions, and determining the extent of load reduction needed from each source.

In the Alum Creek watershed, TMDL's have been developed for sediment, pathogens, and habitat. The pathogen TMDL follows the methodology described above; load allocations and

reductions have been prescribed for various NPS sources. For sediment and habitat, however, traditional load-based TMDL's were not developed because these two parameters were considered environmental conditions rather than pollutants. The TMDL target for both sediment and habitat is based on composite scores for specific parameters within the Qualitative Habitat Evaluation Index (QHEI).

The QHEI is comprised of measures of six components: substrate, instream cover, riparian characteristics, channel condition, pool/riffle quality, and gradient/drainage. However, the Ohio EPA has found that some of these components are more strongly correlated with attainment than others. As stated in the TMDL report, "Further analysis of the QHEI components as they relate to IBI scores led to the development of a list of attributes that are associated with degraded communities. These attributes are modifications of natural habitat and were classified as high-influence or moderate-influence attributes based on the statistical strength of the relationship" (Ohio EPA, 2004: 37).

Based on this information, a TMDL Habitat Target was developed based on three components, each worth one point: QHEI score/ Target Ratio (1 point) + moderate influence attribute score (1 point) + high influence attribute score (1 point) = 3.

Similarly, a Sediment TMDL Target was developed that assigns a point to each of three QHEI attributes that reflect sediment loading. A target score equal to or greater than 33 is based on scores for substrate (14), channel morphology (14), and riparian zone/bank erosion (5).

While **performance indicators** are included with each action below to gauge implementation progress, the above TMDL targets are the long term indicators of the success for the plan, and will be assessed through water quality monitoring. Please see the Evaluation Section for more information.

Rationale for land use and habitat recommendations

While habitat recommendations such as lowhead dam removal are expected to have a direct positive impact on water quality, protecting riparian corridors will work indirectly to mitigate current and prevent future nonpoint sources of impairment. Ohio EPA Alum Creek water quality reports (see below) have shown a decline in water quality correlated with the spread of land use change. Actions to preserve riparian corridors can help prevent this decline in currently attaining areas, and help prevent further decline and allow for recovery in partially attaining river reaches. Protective land use regulations, when paired with site specific preservation, will:

- provide floodplain for the storage of increased stormwater volumes, which will reduce further impacts to the stream channel (and potentially local residents);
- assimilate sediment and nutrient loads; and
- allow lateral movement of the stream channel, which will aid its recovery from stormwater impacts (such as entrenchment) and direct hydromodifications (such as channelization).

The Ohio EPA has conducted extensive research which suggests that physical habitat quality plays a major role in determining if the effects of nutrients will be mitigated or exacerbated (OEPA, 1999b). Protection of the many benefits that riparian corridors provide is also a general common sense approach to long term watershed management. These include flood storage, in-stream habitat development, recreation, terrestrial biodiversity, control of water temperature and oxygen levels, organic debris for primary food chains, and buffering of runoff pollutants.

Data sources

Two water quality reports that were completed by the Ohio EPA are frequently referred to within this section and have provided a majority of the information on which recommendations are based. Studies were conducted in 1996 and 2000, and the resulting reports were published in 1999 and 2003, respectively (OEPA 1999a, 2003a). These reports are referred to as “Technical Support Documents,” or TSD’s. The 2003 report includes tributary data but it is also limited in number of mainstem sampling sites (6 over 27 miles). The 1999 report contains data from 13 mainstem sampling points.

Attainment status and causes and sources of impairment

The following table summarizes attainment status and causes and sources of impairment identified by the Ohio EPA in the 2003 TSD. Additional causes and sources of impairment identified through action planning research are also presented in the following pages.

Please note that while stream sediment pollutants (cadmium and priority organics) have been identified as causes of impairment in the lower watershed, actions to address them have not been included in the plan. The Ohio EPA is pursuing enforcement action against a private company (ASARCO) that was a likely source of sediment pollutants near River Mile 9.1 and in a tributary stream. The company may be required to perform sediment remediation. Action planners wished to wait for outcomes of the enforcement action and consider any pertinent data gathered during remediation before setting further action. Given the plethora of actions identified in the plan, action planners also wished to focus on the most feasible actions first; sediment remediation will be very complex and costly. This issue will be revisited during future plan revisions.

Stream Segment	Attainment Status			Cause of Impairment	Sources of Impairment
	Full	Partial	Non		
Alum Creek – Upper Subwatershed <i>Alum Creek Dam to Columbus Boundary (RM 26.7 – 19.9)</i>	6.8	---	---	NA	NA
Alum Creek – Lower Subwatershed <i>Columbus Boundary to Big Walnut Creek (RM 19.9 – 0)</i>	2.25	17.65	---	Siltation – H Organic enrichment – H Flow alterations – H Direct habitat alteration - H Ammonia – M Cadmium – M Priority Organics – M Pathogens – S	Land development – H Urban runoff – H Impoundment – H Channelization - H Storm sewers – M
Spring Run <i>(RM 7.2 – 0)</i>	---	1.95	4.0	Habitat alterations – H Pathogens – M Siltation – S Organic enrichment – S Ammonia – S	Channelization – H Urban runoff – H
West Spring Run <i>(RM 3.1 – 0)</i>	---	---	3.1	Habitat alterations – H Flow alterations – H	Urban runoff – H Channelization – H Natural – M
Kilbourne Run <i>(RM 2.6 – 0)</i>	---	---	1.0	Organic enrichment – H Pathogens – M Siltation – S	Urban runoff - H
Trib to Alum Creek at RM 25.50 <i>(RM 2.8 – 0)</i>	0.7	---	---	NA	NA
Trib to Alum Creek at RM 23.47	1.3	---	---	NA	NA

Attainment status and causes and sources of impairment
H = High magnitude; M = Moderate magnitude; S = Slight magnitude; T= Threatened

B. LOWER ALUM CREEK WATERSHED ACTIONS

The following actions are not related to a specific impairment issue and will apply to the entire lower Alum Creek watershed, including both 14-digit HUC subwatersheds (upper subwatershed / 05060001160010 and lower subwatershed / 05060001160020).

Task Description (Objective)	Resources	How	Time Frame	Performance Indicators
Seek endorsement of the action plan from planning stakeholders	- FACT staff time	- Contact stakeholders and request endorsement of the plan (i.e. through resolutions of support)	2005	- # of written resolutions from major stakeholders
Create monitoring program to assess water quality and habitat, including primary headwater habitat designations (HHEI)	- Staff / volunteer time OSU Extension, FACT - 319 grant funds (\$90,000) to hire part-time staff, purchase equipment, analyze samples, etc.	- Apply for grant funds, hire staff to conduct monitoring and involve volunteers - Establish program with assistance from OSUE - Create database, monitor multiple parameters quarterly	2004 - 2005 2006 2006	- # of samples taken - # volunteer monitors involved - annual summary report of findings

C. UPPER SUBWATERSHED ACTIONS (HUC # 05060001160010)

Background

The upper subwatershed extends along the mainstem from the Alum Creek Lake Reservoir dam at RM 26.7 to Schrock Road at RM 19.9, encompassing 6.8 Alum Creek river miles. As determined by the Ohio EPA, this reach is fully meeting its Warmwater Habitat (WWH) aquatic life use designation. However, the one location within this subwatershed that was sampled in 2000 (RM 22.1 / Cleveland Avenue) was marginally meeting full attainment standards (OEPA, 2003a). The next sampling point, located just one tenth of a mile downstream from the subwatershed boundary (RM 19.8 / Schrock Road), was in partial attainment due to depressed Invertebrate Community Index (ICI) scores.

This subwatershed is threatened by land development, which could potentially deliver sediment and pathogens (via stormwater runoff) to the stream. Land development and associated increased stormwater flows also have the potential to deliver other runoff pollutants, modify the integrity of the stream channel, and reduce riparian vegetation cover (as has occurred in the lower subwatershed).

Problem statement

Violations of primary contact recreation standards for **bacteria** were observed *at every sampling site in the watershed* in the 1999 and 2003 Technical Support Documents (TSD's), and secondary contact recreation violations were observed in all but two sites. In the upper subwatershed, new and existing home sewage treatment systems (HSTS), are potential sources. Approximately 140 semi-public and private discharging treatment systems have been identified in the Delaware County portion of the watershed. General urban runoff, including pet waste, is another potential source, but loading data are not available. In addition, one cattle lot operation is known to exist in the upper watershed along Unnamed Tributary 25.5.

The Big Walnut Creek Watershed Total Maximum Daily Load (TMDL) Draft Report states that a 54% reduction in pathogen loading will be required to meet the TMDL pathogen target, which is a 30 day geometric mean of 1,000 fecal coliform colonies / 100 ml. Load reductions are prescribed for runoff (69%), cattle (100%), and aerator (56%) sources (Ohio EPA, 2004).

The 1999 TSD also reported extremely variable and supersaturated diel dissolved oxygen readings at RM 23.8 (Worthington-Galena Rd.), which is a signature of **nutrient enrichment**. Likely sources of nutrients in the area are nonpoint source pollutants such as lawn care products.

At the single mainstem sampling point in this subwatershed (RM 22.1 /Cleveland Avenue), **sedimentation** was evident in the Qualitative Habitat Evaluation Index (QHEI) assessment, which showed high overall substrate embeddedness. The attribute score was 12.5, while a minimum score of 14 is considered the minimum for supporting WWH aquatic life. At RM 19.8, just one tenth of a mile downstream from the upper HUC boundary, low ICI scores resulted in partial attainment status, and excessive sedimentation was observed.

A review of Ohio EPA construction permit records revealed that over 180 construction permits covering approximately 5340 acres, or 1/3 of the upper subwatershed area, have been filed in the last ten years in the Delaware County (for sites over five acres). According to 2000 census data, the two Delaware County Townships (Genoa and Orange) that lie partially within the watershed are among the fastest growing in the state, and FACT volunteers have observed general noncompliance with erosion and sediment control regulations in the area. The Big Walnut Creek Watershed TMDL Draft Report has sets forth a Sediment TMDL target score of 33 based on the sum of three QHEI components that reflect sediment loadings: substrate (14), channel morphology (14), and riparian zone/bank erosion (5) (Ohio EPA, 2004).

This rate of land use change will also likely result in increased delivery of **urban runoff pollutants** (such as pathogens, nutrients, and organic compounds) via stormwater. Increased impervious cover and related increased peak storm flows may affect **stream channel integrity**, causing bank erosion and channel entrenchment (see “Physical Attributes” in Section IV). The Draft Big Walnut Creek TMDL Report has set forth a Habitat TMDL target score that ascribes one point to each of three components: QHEI score/Target Ratio, moderate influence attributes score, and high influence attribute score. Habitat assessments at River Mile 23.8 and 22.6 are not currently meeting the Habitat Target Score of 3.

Long Term Goals

(please see the introduction of this section for more information on all TMDL targets)

- Sediment TMDL scores of 33 or better
- Habitat TMDL score of 3
- Fecal coliform: TMDL target - 30 day geometric mean of 1,000 fecal coliform colonies/100 ml

Mid-Term Goals

- Maintain full use attainment *(Additional mid-term goals are stated below for specific actions, and summarized in the Evaluation Section).*

Priorities

Among the many actions listed below for the upper subwatershed, those affecting 1) riparian corridor preservation and 2) stormwater and sediment control are priority actions that will be enacted first.

Organic / Nutrient Enrichment & Human Health

Upper Subwatershed

A work group consisting of watershed residents, Ohio EPA staff, health department representatives, and City of Columbus Division of Sewerage and Drainage, and Delaware Health District representatives met throughout 2003 to identify sources and develop alternatives for actions. The Big Walnut Creek Total Maximum Daily Load (TMDL) Draft Report has prescribed pathogen load reductions for runoff (69%), cattle (100%), and home aerator (56%) sources. These load reductions are long term goals of the action plan and will result in meeting the TMDL pathogen target of 30 geometric mean fecal coliform level of 1000 colony forming units /100ml.

Approximately 130 discharging systems exist in the upper watershed. The Delaware Health District expects to upgrade 20 of these by 2010. In addition, sewer line extension to two problem areas will eliminate approximately 35 discharging systems by 2015. Upgrade and sewer extension projects should reduce aerator pathogen loading by 40% by 2015. Actions to address the one known cattle feed-lot operation in the upper watershed are included with Unnamed Tributary 25.5. Urban runoff load reductions will be addressed through educational actions in the table below. Please see the watershed inventory for more information on pathogen, nutrient, and organic enrichment sources, and the introduction of this section for more information on the TMDL.

Task Description (Objective)	Resources	How	Time Frame	Performance Indicators
Home Sewer Treatment System (HSTS) Actions				
Review regulations for sighting, permitting, and use of technology for new systems	- Delaware Health District (DHD) staff time and 319 grant (\$225,000 for county program, including actions below)	- Review Delaware County regulations, enact needed revisions - DHD Apply for 319 grant	2004	- New regulations adopted
Create septic/leach system databases	- DHD staff time and 319 grant	- Per new state regulations, DHD use existing GIS database to add all systems and inspection dates	Completed by 2007	- Database completed
Using GIS, map existing discharging and semipublic systems for which data exists	- FACT staff time - OSU Extension mapping services - DHD staff time	- Access data from health departments and create GIS map to show where systems exist	DONE	- Maps completed
Strengthen inspection policies and enforcement on failing systems	- DHD staff time, 319 grant and/or health levy	- Inspect all new systems and all existing systems as they are added to the database. - DHD apply for 319 funds in 2004, allocate funds from sewage budget per levy	2006 2004	- Growth of database - Grant application submitted - Inspections performed - Levy placed on ballot
Upgrade 20 failing Home Sewage Treatment Systems (HSTS)	- DHD staff time - Replacement cost incumbent upon home owner, DHD will seek low interest loans via DEFA (\$100,000): \$15 - \$10k to replace \$5 - \$2k to upgrade	- Map analysis of existing systems - Apply for grant funding - Determine appropriate system to install - Issue sewage permit - Perform inspection - Record system in database	Completed by 2008	- Documentation of Board of Health priority - Sewage permits recorded, inspections made - GIS database - # upgrades completed
Sewer Line Extension Actions				
- Identify areas of need through Delaware County Sewer Master Plan - Extend sewer lines to	- DHD staff time - County Commissioner approval of sanitary sewer master plan and implementation funding	- Complete map analysis of areas of need for sanitary sewer - Advise public officials - Assist in drafting sewer master plan, work with	Plan fully implemented (sewers installed) by 2015	- Documentation of approved sewer master plan from Delaware County - sewer line extension to

problem areas, eliminate 35 discharging systems		Commissions to approve plan - Implement plan – sewer extension		areas of need - number of HSTS eliminated
Education / Urban Runoff Actions				
Institute education programs for - HSTS maintenance - Nutrients / lawn care - Pet waste	- DHD staff time and 319 grant (\$5,000 for county-wide program via DHD grant) - FACT staff time and 319 funds (\$2,000) - Phase II officials	- Apply for grant funds - Create educational materials and update web site - Distribute materials at community events - DHD sponsor HSTS maintenance workshops	2004 2005 - February 2004	- Number workshops held and documentation of evaluations - Documentation and inventory of materials created and used - Web site available

Stormwater & Construction **Upper Subwatershed**

A work group consisting of watershed residents, municipal utility and service department representatives, and SWCD staff met throughout 2003 to identify sources and discuss alternatives for actions. The watershed coordinator also met individually with Phase II program administrators to discuss opportunities to achieve common action plan and Phase II stormwater goals. The resulting actions are listed below. FACT (and other partnering organizations) will work jointly with Westerville and Delaware County as phase II advisory group members to help further develop Phase II programs.

The Big Walnut Total Maximum Daily Load (TMDL) report has established a Sediment TMDL target score of 33, based on the scores of three Qualitative Habitat Evaluation Index (QHEI) components. Meeting the target score through actions to reduce sediment loading from construction sites and improve/protect riparian and floodplain land is a long term action plan goal. These actions, plus the implementation of Phase II stormwater regulations, should result in a 20% reduction in sediment loading compared to land use change without implementation of local programs. Please see the introduction of this section for more information on the TMDL, and Section III for more information about sediment erosion from construction sites.

Task Description (Objective)	Resources	How	Time Frame	Performance Indicators
Construction site sediment delivery				
Adoption of effective sediment and erosion control BMP's	Staff time – partnering organizations: Delaware County Engineer, FACT, Westerville, Soil & Water Conservation Districts (SWCD)	- Assess BMP's currently recommended in Phase I / II permits - Westerville pass revised ordinance for construction site runoff control	2006 2005	- Meetings conducted - Ordinance passed
Explore alternatives for increased inspection and enforcement of BMP's	-Staff time- partnering organizations -Municipal budgets for personnel to conduct inspections	- Westerville explore alternatives, revise current policy, and conduct trainings for inspection personnel - Del Co Engineer's Office: implement program (bimonthly inspections) by Jan 2004; assess performance end of 2004	2004 2004	- Meetings conducted - Inspection goals - Inspection rates / # conducted
Create citizen network to monitor compliance, beginning with education campaign	- Staff time, partnering organizations - 319 grant funding to conduct meetings, workshops, produce materials (\$2,500)	- Education campaign: presentations, media, FACT workshop/ materials for citizens, w/ local hotlines - Enlistment of citizens to report non-compliant sites - Westerville & FACT meet w/ civic assoc. to build network - Create informal maps to help track sites / monitoring activity - Target areas with steep slopes, highly erodible soils	- Initial workshop 2004 - Print materials, repeat workshop: 2006	- # citizens enlisted in task force - # workshops conducted - # of complaints for erosion control violations
General NPS pollution awareness				
Develop water quality monitoring program in Westerville	- Westerville city staff time; budget allocations (approximately \$5,000 annually) for workshop & sample analysis - FACT and partnering organization staff time	- FACT coordinate water quality monitoring training for Westerville staff - Westerville: establish quarterly monitoring program - Westerville: draft ordinance to allow corrective action when NPS problems are found	2005 2005 2004	- Training conducted - Program established - Ordinance passed
Educate various	- Staff time, partnering	- Conduct drain labeling	Ongoing	- Number of drain

audiences on NPS prevention	organizations - 319 grant funding – (\$1,000) to produce materials	- Produce and distribute educational materials - Seek speaking opportunities - Coordinate w/ Phase II programs; Target Spring Run Watershed in cooperation w/ Westerville Service Dept.	Produce materials: 2006	labeling events, residents receiving materials - Number of speaking engagements
Promote adoption of creek reaches / area cleanups	Staff time, partnering organizations	- FACT work w/ partners to promote adoption programs; (i.e., Keep ___ Beautiful) - Create FACT web page	Beginning 2005	- # of creek reaches or areas adopted - # of cleanups - Web page developed
Post-construction stormwater BMP's				
Conduct tour / workshop on effects of stormwater on stream morphology	Staff time: - FACT, Westerville, Orange Twp, Genoa Twp, FSWCD	- Tour an impacted/ unimpacted tributary w/ officials and give presentation on effects of stormwater	2005	- Workshop conducted - Survey of workshop attendees
Review quantity controls for new / redevelopment	- Staff time, partnering organizations	- Review Phase I/II permit for post-construction BMP's and assess local programs - FACT provide feedback to design manual development in Westerville and Delaware Co. - Explore use of structural litter control BMP's	2006	- Meetings conducted - Policies revised
Promote pilot project for low impact development and/or innovative stormwater controls	Staff time: FACT, DCRPC, Orange Twp, Genoa Twp, Westerville	- Assess feasibility with local governments - Promote revision to development codes, if necessary	2006	- Meetings conducted - Low impact developments or stormwater controls constructed
Promote retention of natural channels in tributaries	Staff time: Westerville, Delaware County, FACT	Assess policy in Westerville, Delaware Co., adopt revisions if necessary	2005	- Policies adopted or revised

Land Use		Upper Subwatershed		
<p>A work group consisting of representatives from municipal development departments, natural resource agencies, local communities, and regional planning agencies met throughout 2003 to identify sources and discuss alternatives for actions. Through individual and work group meetings, Delaware County township and Westerville representatives agreed to jointly research developing land use regulations specific to their jurisdictions. Implementation of land use regulations will help achieve Habitat and Sediment TMDL targets.</p>				
Task Description (Objective)	Resources	How	Time Frame	Performance Indicators
Education of different audiences on the benefits of floodplains, greenways / riparian corridors related to the environment, economy, and public health	- Staff time, partnering organizations: Westerville Rec & Parks; Delaware County Friends of the Trail, MORPC, etc.	Audiences: - public, zoning / development commissions, land owners Components developed by FACT: - Web page- links to local gov't - Presentations to commissions - News articles	2004 – 2005	- Meetings attended - Presentations given - News articles published
Land use regulations, recommendations per municipality				
Westerville	Staff time: - Westerville, Columbus Dev. Dept., FACT	- Explore use of riparian corridor overlay zoning - Implement source water protection zoning regulations	2005	- Meetings conducted - Policies enacted - Resolutions passed
Genoa Twp Orange Twp	Staff time: - DCRPC, FACT, Orange & Genoa Townships - Grant funds (\$10,000) for consultant services	- Submit grant for consultant - Explore use of riparian overlay zoning - Revise subdivision regulations: conservation planned residential district and subdivision floodplain	2005 2005 - 2006	- Meetings conducted - Policies enacted - Resolutions passed
Delaware County	Staff time: - DCRPC - FACT	- Revisions to floodplain regulations - develop setback requirements and public comment provisions on floodplain permits	2005	- Meetings conducted - Policies enacted - Resolutions passed

Habitat & Hydromodification

Upper Subwatershed

There are a number of organizations with potential to encourage long-term corridor protection within the Alum Creek Watershed with a variety of goals. In the summer of 2003, representatives met with action plan work groups and outlined their goals for land acquisition, recreation, and restoration in the Alum Creek watershed. The participants acknowledged that working in partnership to address these issues is an effective means to offset costs, better serve property owners and residents, and achieve the goals of multiple organizations. Increasing canoe access has been identified as a project that holds great interest and significant opportunity to build public support, but currently lacks a concerted effort.

While this river reach is in full attainment of its designated aquatic life use, two sampling sites (River Mile 23.8 /Worthington Rd., and River Mile 22.1 /Cleveland Ave.) are not meeting the TMDL Habitat Target Score of 3. Achieving this target and the Sediment TMDL target is the long term goal of this section. The short-term goal is to preserve 50 acres (or 10,000 linear feet) of riparian land. Habitat continues to be threatened by intense land use change, and recent data have shown a decline in water quality as land use changes has spread to new sections of the watershed. Preserving riparian land will help achieve targets through providing benefits such as in stream habitat and cover, adequate space for lateral channel movement, and filtration of sediment and nutrients. Please see the introduction of this section for more information on the TMDL.

Task Description (Objective)	Resources	How	Time Frame	Performance Indicators
Preserve and restore riparian corridor on the mainstem and tributaries <i>Protect fifty acres by 2010, for upper and lower subwatershed. (equal to 10,000 lf by 200 lf)</i>	Maps provided by Columbus (CRPD) and Westerville Rec. & Parks Departments (WRPD)	Partnering organizations & FACT conduct desk-top analysis of maps and aerial photos to determine areas for further investigation	Ongoing; initial analysis in 2004	- Potential areas identified
	Staff time, partnering organizations: CRPD, FACT, WPRD, SWCD, Orange and Genoa Townships	Conduct site visits, assessment, and priority ranking based on criteria developed by work group	Ongoing; initial analysis in 2005	- Specific sites identified and prioritized
	Staff time – partnering organizations	- Develop database of parcels for protection, submit to OEPA 401 mitigation clearinghouse	Ongoing; initial database in 2005	- Database completed, submitted to OEPA
	Staff time – partnering organizations	Research resources of partnering organizations – goals, interests, and funding	2004	- Meetings among partnering organizations, resource assessment
	Staff time – partnering organizations	Coordinate landowner contact among partner organizations	Ongoing; initial contacts in 2005	# partner organizations meeting and /or collaborative efforts
	- Staff time, partnering organizations - 319 funds (\$1,200) for outreach materials	- Apply for grant funds - FACT & partners develop promotional/ educational material	2004 2006	- Materials developed - # distributed
	-319 grant funds -\$700 - Staff time, partnering organizations	Conduct workshop / meeting for land owners: purpose & benefits	2005 -2006	- # people attending workshop
	Staff time, partnering organizations	Contact owners w/ range of options: stewardship to long-term protection strategies	2005 - 2006	- # of contacts made - # of agreements - # acres w/ bmp's
	Staff time, partnering organizations	Design annual monitoring, inspections, and contact plan	2005	Plan completed
	Staff time, partnering organizations	Funding: Research various options, apply as appropriate - Clean Ohio Funds	Ongoing - Apply in 2005	- # applications submitted - # grants or other

		<ul style="list-style-type: none"> - Municipal funding – ie Westerville CIP budget - 401 mitigation - Donation campaign - Columbus Foundation 	<ul style="list-style-type: none"> - Annually - As permits are submitted - Begin 2005 - Apply Nov 05 	allocations obtained
	Staff time – partnering organizations	Support Westerville, and Greenheads* in the creation of the Otterbein Lake restoration Project along greenway through in-kind donations, publicity, etc.	Ongoing	<ul style="list-style-type: none"> - Otterbein Lake event listings in FACT literature - Grant letters of support
<p>Increase canoe access to Alum Creek</p> <p><i>Install first site by 2008, second site by 2010 (upper and lower subwatershed)</i></p>	Staff time – partnering organizations: CRPD, WRPD, Orange Township, Otterbein College, Greenheads	Analyze list of potential sites; select and prioritize (<i>in order for upper watershed</i>): 1. Alum Creek State Park 2. Westerville dam, above (Astronaut Grove) & below (Alum Creek Park)	Completed	Sites selected
	Staff time – partnering organizations	Research funding – - ODNR Div. of Watercraft grants - Municipalities – Westerville CIP budget	2006	Funding sources researched
	Staff time – partnering organizations, FACT	Contact partnering organizations to assess interest and resources	2006	Organizations contacted
	Staff time – partnering organizations, FACT	Apply for grant funding to install ramp and other site modifications	2006 - 2007	Grant application submitted
	- 319 grant funds (\$2,000) - FACT staff time	- Apply for grant funds - Produce “Alum Creek Water Trail” materials showing access points, landmarks, hazards, etc.	- 2004 - After first access point is constructed	Materials produced
Coordinate natural and cultural heritage signage on Alum Creek multiuse trail	Staff / Volunteer time: Westerville RPD FACT Greenheads	Partnering organizations explore additional trail signage; coordinate with Columbus Parks & Recreation Department	2005 - 2006	- Agreements between Westerville & Columbus on blended formatting
Promote conservation of wetlands and natural stream channels	Staff time, FACT, WRPD	- FACT continue monitoring and submitting comments 401 permits - Submit wetlands list to OEPA 401 mitigation clearing house	Ongoing 2005	- # of comment letters filed, hearings attended - List submitted to OEPA
Conduct stream morphology research on mainstem and tributary streams	- 319 grant funds (\$90,000) for monitoring staff - Staff time, FACT, OSUE, ODNR	- FACT apply for grant funds, hire part-time staff	2004 - 2005	- morphology data collected in database
		- Collect channel morphology data	2006 - 2007	

* The “Greenheads” (a term referring to mallard ducks) is a local citizen’s group dedicated to protected natural resources in Westerville.

D. UPPER SUBWATERSHED TRIBUTARY ACTIONS

Actions listed above for the entire upper subwatershed mainstem will also apply to all tributary streams in the subwatershed. The following actions have also been developed for these specific tributary streams.

Unnamed Tributary at River Mile 25.5

Background

This stream flows for 2.8 miles along the very northeastern edge of the watershed through Genoa and Orange Townships. The stream’s first water quality assessment was conducted by Ohio EPA in 2000. All 0.7 miles that were evaluated were fully attaining WWH aquatic life use standards (although the stream’s aquatic life use is undesignated). However, a small cattle operation with access to the tributary was noted upstream of the sampling point, presenting a source for the **ammonia, nutrients, and pathogens** which threaten the stream’s full attainment status.

Problem statement

Organic and nutrient enrichment, pathogens, and TSS were all observed at elevated levels (above 95th percentile background), and can be linked directly to the presence of cattle in the stream during three of the five field visits by the Ohio EPA. High ammonia levels were prevalent regardless of the presence of cattle, and could indicate other sources such as discharging home wastewater treatment systems. This is the only tributary within the lower subwatershed known to have perennial, cool groundwater flow. These conditions may be supporting the excellent assemblage of aquatic life found in the tributary despite the observation of unrestricted cattle.

Goals:

- Maintain full attainment status
- Fecal coliform: TMDL target score - 30 day geometric mean of 1,000 fecal coliform colonies / 100 ml, through reducing cattle pathogen loading by 100%

Task Description (Objective)	Resources	How	Time Frame	Performance Indicators
Eliminate livestock access to stream	- Cost share program (such as EQIP) - DSWCD and FACT staff time	- Research cost share and incentive programs for the installation of BMP’s - Coordinate contacting land owner with DSWCD; present BMP options - Create Livestock Waste Management Plan (LWMP) if necessary	2007	- landowner contacted, site investigated - conservation plan developed - BMP’s installed

Unnamed Tributary at River Mile 23.47

This stream flows for 3.8 miles through Genoa and Orange Townships, starting near Big Walnut Road and passing through a corner of Westerville before reaching Alum Creek north of Polaris Parkway. It is called Indian Run by some local residents, and a portion of it has been impounded to provide a back-up water supply for the city of Westerville. This stream was studied for the first time by the Ohio EPA in 2000, and 1.3 mile that was evaluated is fully attaining WWH standards (although the stream’s aquatic life use is undesignated). However, slightly elevated levels of pathogens, nutrients, and organic enrichment were noted. These elevated levels were present in dry and wet weather. Proximity to unsewered subdivisions was noted in the TSD. Aside from actions developed for the entire upper subwatershed, no actions specific to this tributary have been developed.

E. LOWER SUBWATERSHED ACTIONS (HUC # 05060001160020)

Background

The lower subwatershed extends along 19.9 miles of the Alum Creek mainstem from Schrock Rd. (north of I-270) at River Mile (RM) 19.9 to the creek's mouth at Three Creeks Park. As determined by the Ohio EPA, 17.7 miles of the mainstem are partially attaining WWH aquatic life use standards, while 2.2 miles near the creek's mouth are fully attaining standards. A sampling site at RM 7.5 was found to be in nonattainment in the 2003 TSD, as was RM 8.6 in the 1999 TSD. (Although the 1999 TSD reported one river mile in nonattainment, the 2003 TSD omitted nonattainment mileage due to insufficient data).

Many causes of impairment are present in the lower subwatershed, and in some areas appear to be acting synergistically to produce poor water quality. Siltation, organic enrichment, flow alterations, direct habitat alterations, ammonia, cadmium, priority organics, and pathogens have been identified as causes of impairment by the Ohio EPA, resulting from land development, urban runoff, impoundments, channelizations, and storm sewers (sewer overflows). In addition, Alum Creek stream morphology has been impacted by urbanization and increased stormwater flows.

Problem statement

Violations of primary and secondary contact recreation criteria for **pathogens** were found at every sampling location in the lower subwatershed. The 2003 TSD mentions urban runoff and storm sewers as sources of pathogens. Eight sanitary sewer overflows (SSO's) and one combined sewer overflow (CSO) are located on the mainstem and tributary streams between RM 15.4 and 3.9. The highest concentration of sewer overflows (five) occurs within a two mile reach between Broad Street and Livingston Avenue, which also contains three lowhead dams. In addition, approximately 150 off-lot aeration systems (private and semi-public combined) and 20 semi-public, on-lot septic systems have been identified in the lower subwatershed.

The Big Walnut Creek Total Maximum Daily Load (TMDL) Draft Report states that a 94% reduction in pathogen loading will be required to meet the pathogen target (1,000 fecal coliform colonies/100ml, 30 day geometric mean). Load reductions are prescribed for runoff (44%), CSO (91%), and aerators (91%).

Although no dissolved oxygen violations were reported in the 2003 TSD, violations were reported in the 1999 TSD at RM 9.9, 6.6, and 3.9. These were attributed to **organic enrichment** from urban runoff and sewer overflows, compounded by lack of riffle development in low gradient reaches and/or impoundments.

Ammonia values in excess of the 75th percentile background level were found at every mainstem sampling location, and could be attributed to a mixture of sources – HSTS's, sewer overflows, and general urban runoff. A peak above the 95th percentile level was observed at RM 3.8, and remained elevated above the 90th percentile level at RM 0.7. The TSD indicates leachate from many older landfills in the vicinity as a possible source. Though the values observed are elevated when compared to background (up to .31mg/L), they are below standard TMDL targets for ammonia (1mg/L).

Siltation is listed as a high magnitude cause of impairment in the 2003 TSD due to land development. While suburban and urban land uses are well established in the lower subwatershed, remaining areas of undeveloped land are under heavy development pressure. For example, construction of the 1,000 acre Easton Towne Center regional shopping complex was underway when these data were collected in 2000. In 1996 and 2000, QHEI substrate scores ranged from 8.5 to 14.5; a score of 14 is considered the minimum for supporting a WWH aquatic life assemblage. The Big Walnut Creek Watershed TMDL Draft Report sets forth a Sediment TMDL target score of 33 based on scores of three QHEI components

that reflect sediment loadings: substrate (14), channel morphology (14), and riparian zone/bank erosion (5) (Ohio EPA, 2004).

Substrate sediments sampled at RM 3.9 were reported in the 2003 TSD. **Priority Organics and Cadmium** were among the most prevalent pollutants, possibly due to the presence of landfills and industrial sites south of Livingston Avenue. Contaminated sediments have also been documented at various locations along the mainstem according to the 1999 TSD and a report published by the Ohio EPA Division of Emergency & Remedial Response in 2001 (Myers, 2001). The most notable problems were high levels of semi-volatile organic compounds (SVOC's) in the vicinity of RM 9.1 (Nelson Park) and high levels of arsenic just upstream of Route 104.

Significant **habitat alterations** are evident in the lower subwatershed, including channelization, numerous impoundments, and morphological impacts from increased impervious cover and stormwater delivery. Much growth has occurred since 1994 when satellite data showed 45% impervious cover in the lower subwatershed, a level thought to cause serious stream morphology impacts. Incised channels and lack of floodplain access is prevalent. The two sampling points found to be in nonattainment in 1999 (RM 8.6) and 2003 (RM 7.5) were both within a two mile reach containing three lowhead dams. QHEI scores in this reach were in the mid-50's and included many highly modified attributes, such as lack of pool-riffle habitats.

The Big Walnut Creek Watershed TMDL Report sets forth a Habitat TMDL target score that is the sum of three components, each worth one point: QHEI score/Target Ratio, moderate influence attributes score, and high influence attribute score. Habitat assessments at River Mile 23.8 and 22.6 are not currently meeting the target Habitat TMDL Score of 3.

Long Term Goals

- Sediment TMDL scores of 33 or better
- Habitat TMDL score of 3
- Fecal coliform: TMDL target - 1,000 fecal coliform colonies /100ml (30 day geometric mean)

Mid-Term Goals

- Maintain full use attainment in river reaches that are currently in attainment, and restore sampling locations that are in nonattainment (River Miles 8.6 and 7.5) to at least partial attainment. (Additional mid-term goals are stated below for specific actions, and summarized in the Evaluation Section).

Priorities

Among the many actions listed below for the lower subwatershed, those affecting 1) riparian corridor preservation, 2) stormwater and sediment control and 3) lowhead dam removal are priorities.

Organic / Nutrient Enrichment & Human Health

Lower Subwatershed

A work group consisting of watershed residents and representatives from Ohio EPA, health departments, and Columbus Division of Sewerage and Drainage met throughout 2003 to identify sources and develop alternatives for actions. The Big Walnut Creek Total Maximum Daily Load (TMDL) Draft Report has prescribed pathogen load reductions for runoff (44%), home aerators (91%), and CSO's (91%), which are long term goals of this plan that will enable achieving the TMDL pathogen target of 1000 fecal coliform /100ml (30 day geometric mean)

The Franklin County portion of the watershed contains 110 discharging aeration systems, while the Columbus portion of the watershed contains 40. Actions specific to Columbus systems were not developed. The Franklin County Board of Health (FCBH) expects to eliminate at least 20 systems through sewer line extension to problem areas by 2015. Of the remaining aeration systems, it expects to update 45 systems (50%) by 2015 and another 45 (100%) by 2025. This would constitute a 95% loading reduction from aeration systems in Franklin County, and a 73% reduction of aerator loading total for the lower watershed. Actions to eliminate the single CSO discharge point in the watershed and reduce runoff loading of pathogens are also described below. Please see the watershed inventory for more information on pathogen, organic enrichment, and nutrient sources, and see the introduction of this section for more information on the TMDL.

Task Description (Objective)	Resources	How	Time Frame	Performance Indicators
HSTS / Sewer Extension Actions				
Create septic/leach, sanitary sewer system and vacant property databases	- Health Dept staff time - GIS database, staff proficiency - No external funding sources needed	- Franklin Co. Board of Health (FCBH), in coordination w/ Auditor's Office 2005 reappraisal update; Franklin Co. Planning Dept's GIS staff; private firms involved in Phase II Storm Water planning; and FCBH's GIS staff - Columbus Health Dept: completed in 2003	2007	- Databases completed
Strengthen inspection policies/ regulations to inspect all systems (discharging and non-discharging) and strengthen enforcement on failing systems	- OEEF grant for ed./ outreach (\$15,000) - FCBH staff time - Require permit fees on all systems to fund expanded inspection program	- FCBH pass revision to existing policies/ regulations, WQ standards to inspect all systems and to strengthen enforcement policies - Outreach / education program, apply for funds	2007	- Inspection and enforcement policies adopted - Systems inspected at prescribed frequencies (i.e., once every five years for on-lot systems)
Using GIS, map existing discharging and semi-public systems for which data exists	- FACT staff time, - OSU Extension mapping services - Health dept database	- FACT access data from health departments and create GIS map (with OSUE assistance) to show system locations	Completed	- Maps completed
Upgrade failed discharging HSTS's to minimize pollution loading (FCBH) <i>Goal: upgrade 45 systems by 2015, and a total of 90 systems by 2025</i>	- FCBH staff time - Grant funds for outreach program - Research access to revolving loan funds - Cost may be incumbent on system owners: \$500 - \$1000 per system	- FCBH and staff pursue necessary in-house policy changes - Apply for education grants - Secure funds for loans, CDBG grants to homeowners, or 319 funds for conversions.	2007	Number of HSTS's upgraded
- Use map to identify areas of failed HSTS's - Extend sewer lines to problem areas, or upgrade HSTS's that	- Funding approval from Franklin County Commissioners and Columbus City Council: average cost	- Health Departments, elected officials, Department Heads - Complete map analysis of critical areas HSTS clusters - Joint meeting with Columbus	2004 2004 Ongoing	- Documentation of map analysis - Agreements / plans for sewer extension

will not have access to sewers within 20 years (FCBH) <i>Goal: extend to three areas by 2015 to eliminate 20 systems</i>	estimated at \$10,000 per HSTS removed - FCBH staff time	and Franklin County Officials - Complete extension projects	Ongoing, through 2015	
Education / Urban Runoff Actions				
Institute education programs on HSTS, lawn care, and pet waste	- 319 grant funds, (\$5,000) - FACT staff time	- Apply for grant funds - Create materials, web page - Coordinate w/ Phase I/II communities	2004 2005-2006 Ongoing	- Number of workshops - Web page created - Materials distributed
Sewer Overflow Actions				
Sewer Overflows	- City of Columbus DOSD staff time - FACT staff time - Franklin County Sanitary Engineer staff time	Columbus DOSD, FACT, Sanitary Engineer: - Develop operations and maintenance plan and schedule - Complete capital improvement projects, provide schedule - FACT attend DOSD advisory committee meetings	Ongoing; schedule completed by end of 2005	- Reduction in TSS, bacteria - Sewer overflows repaired, treated, or on maintenance plan <i>(See appendix 15 for Columbus project schedule)</i>

Stormwater & Construction				Lower Subwatershed
<p>A work group consisting of watershed residents, municipal utility and service department representatives, and SWCD stormwater specialists met throughout 2003 to identify sources and discuss alternatives for actions. In 2003, FACT representatives also participated in a Columbus DOSD stormwater manual advisory group to revise stormwater policies.</p> <p>The Big Walnut Creek Total Maximum Daily Load (TMDL) report has established a Sediment TMDL target score of 33, based on three components of the Qualitative Habitat Evaluation Index (QHEI). Meeting this score is an overall goal of the plan through reducing sediment loading from construction sites, and also improving and protecting riparian and floodplain habitat. These actions, plus the implementation of Phase II stormwater regulations, should result in a 20% reduction in sediment loading compared to land use change without implementation of local erosion control programs. Please see the introduction of this section for more on the TMDL.</p>				
Task Description (Objective)	Resources	How	Time Frame	Performance Indicators
Construction Site Sediment Delivery				
Adoption of effective sediment and erosion control BMP's	Staff time, partnering organizations: FACT, Columbus DOSD, Bexley, FSWCD	- Assess BMP's currently recommended in Phase I / II permits	2006 - 2007	- Meetings conducted
Explore alternatives for increased inspection and enforcement of BMP's	Staff time, partnering organizations	- Research existing inspection and record keeping policies per Phase I / II permits	2007	- Meetings conducted - Inspection goals set - Inspection rates/ #'s
Create citizen network to monitor compliance, beginning with education campaign	- Staff time, partnering organizations - 319 funds (\$2,500) for workshop and materials	- Education campaign: presentations, media - Workshop / materials on erosion control for citizens, recruit volunteers	2006	- # citizens enlisted in task force - # workshops conducted - # of erosion control violation complaints
			2006	
			2004 - 2006	
Litter				
Greater enforcement of existing laws	-Staff time, Franklin County / Nail-a-Dumper organizations, FACT, Columbus	- Meet to explore means to increase program, enforcement. - FACT web page and materials with hotline information	2007 2005	- # Meetings - # of enforcement actions - web page completed
Assess use of structural and nonstructural BMP's to reduce litter delivery via storm system	Staff time – partnering organizations	- Assess current use of litter control BMP's - Install BMP's (such as inlet controls, street sweeping) - Target area within Columbus for pilot project - develop maintenance plan	2006	- # meetings - # BMP installations - Maintenance plan developed and implemented
			2007	
			2007	
			2007	
General NPS Education				
Educate various audiences on NPS prevention	- Staff time, partnering organizations - referrals, labeling material - MORPC & Columbus DOSD - 319 funds (\$2,000) to produce materials	- Conduct drain labeling - Produce and distribute educational materials - Seek speaking opportunities - Target Bexley, work cooperatively on Phase II education programs	Ongoing 2006	- # drain labeling events - # of speaking engagements - # events where materials are distributed
			Ongoing 2006	
Promote adoption of creek reaches / area cleanups	Staff time, partnering organizations	- FACT work w/ partners to facilitate adoption programs; (i.e. Keep ___ Beautiful) - FACT develop web page	Ongoing 2005	- # of creek reaches adopted - # of cleanups - Web page developed
Post-construction stormwater BMP's				
Review quantity controls	Staff time, partnering	- Research /assess Phase I/II	2006	- Meetings conducted

for new / redevelopment	organizations: FACT, Columbus DOSD, Bexley, FSWCD	post-construction BMP regs - Support revisions to Columbus stormwater manual	2005	- Policy revisions
Promote retention of natural channels in tributaries	Staff time: Columbus DOSD, FACT, MORPC	- Support Columbus's revision to stormwater manual, which promotes natural channel retention	2005	- policy adopted
Identify critical areas, develop pilot projects for stormwater retrofits	Staff time: FACT, Columbus DOSD, MORPC	- Work w/ Columbus to identify sites w/ potential to improve stream quality and serve as pilot	2007	- # meetings conducted - sites identified

Land Use		Lower Subwatershed		
<p>A work group consisting of watershed residents and representatives from municipal development departments, natural resource agencies, and regional planning agencies met throughout 2003 to identify sources and discuss alternatives for actions. Through individual and work group meetings, Columbus and Bexley representatives agreed to jointly research developing land use regulations specific to their jurisdictions. Implementation of land use regulations will help achieve Habitat and Sediment TMDL targets through protecting the riparian corridor.</p>				
Task Description (Objective)	Resources	How	Time Frame	Performance Indicators
Education on the natural, economic, and health benefits of floodplains, greenways, and riparian corridors.	- Staff time, partnering organizations: FACT, Columbus, Bexley, MORPC, FSWCD, etc.	Audiences: public, commissions, land owners - Web page- links to local gov't, presentations with commissions, news articles	2004-2005	- Meetings attended - Presentations given - News articles published
Land use regulations, options per municipality:				
Franklin County	Franklin County flood-plain administrators	- Add public comment for floodplain fill permits	2006	-Meetings held -Policy revisions
Columbus	Staff time: CRPD, DOSD, Development Department - City Council	- Revision of parkland dedication ordinance (CRPD) - Support riparian setbacks via stormwater master plan and drainage manual (DOSD) - Support watercourse protection zoning (Devel. Dept) - Develop tree preservation ordinance	- 2005 - 2005 - 2005 - 2006	- Policy revisions finalized
Bexley	Development Office	Pursue riparian corridor overlay zoning set forth in SW Bexley plan	Estimated 2005 - 2006	- Zoning ordinances adopted

Habitat & Hydromodification

Lower Subwatershed

There are a number of organizations with the potential to encourage long-term corridor protection within the Alum Creek Watershed for a variety of goals. In the summer of 2003, representatives met with the Alum Creek habitat work group and outlined their goals for land acquisition, recreation, and restoration in the Alum Creek watershed. The participants acknowledged that working in partnership to address these issues is an effective means to offset costs, better serve property owners and residents, and achieve the goals of multiple organizations. Increasing canoe access has been identified as a project that holds great interest and significant opportunity to build public support, but currently lacks a concerted effort.

The majority of this portion of the watershed is partially attaining its designated aquatic life use. Four sampling locations (river miles 9.2, 7.5, 6.6, and 3.9) are not meeting the TMDL Habitat Target Score of 3. Achieving this target and the Sediment TMDL target are long term goals. A mid-term goal of preserving 50 acres (or 10,000 linear feet) of riparian land has also been established. Habitat continues to be threatened by intense land use change, which likely caused the loss of several full attainment river miles in this subwatershed between 1996 and 1999. Preserving riparian land will help prevent further water quality degradation and may, when combined with other actions such as dam removal, allow the river to recover full use attainment and meet the Habitat TMDL target. Removal of two lowhead dams is another mid-term action plan goal listed below.

Task Description (Objective)	Resources	How	Time Frame	Performance Indicators
Preserve and restore riparian corridor on the mainstem and tributaries <i>Protect fifty acres by 2010, for upper and lower subwatershed. (equal to 10,000 lf by 200 lf)</i>	Maps provided by Columbus Rec & Parks Dept (CRPD)	Conduct desk-top analysis of maps, aerial photos, determine areas for further investigation	Ongoing, initial analysis in 2005	Potential areas identified
	Staff time, partnering organizations: Bexley, FSWCD, Columbus	Conduct site visits, assessment, and ranking based on developed criteria	Ongoing, initial analysis in 2005	Specific sites identified and prioritized
	Staff time, partnering organizations	- Develop database of parcels for protection - Submit to OEPA 401 mitigation clearing house	Ongoing; initial database in 2005	Database completed, submitted to OEPA
	Staff time, partnering organizations	Research resources of partnering organizations – goals, interests, and funding	2004	Meetings among partnering organizations
	Staff time, partnering organizations	Coordinate landowner contact among partner organizations	Ongoing; initial contact in 2005	Number of partner organizations meeting
	- Staff time, partnering organizations - 319 funds (\$1,200) for production of outreach materials	- Apply for grant funds - Develop promotional and/or educational materials as needed and once more is learned about target audience	2004 2006	- Materials developed - # distributed
	- 319 funds (\$700) - Staff time, partnering organizations	Conduct workshop / meeting for land owners. Campaign purpose, benefits, etc.	2005 - 2006	# people attending workshop
	Staff time, partnering organizations	Contact owners w/ range of options: stewardship to long-term protection strategies	2005 - 2006	- # of contacts made - # of agreements
	Staff time, partnering organizations	Design annual monitoring, inspections, and contact plan	2005	Plan completed
	Staff time, partnering organizations	Research funding options: - Clean Ohio Funds - Municipal funding - 401 mitigation - Donation Campaign	Ongoing - Apply in 2005 - Annually - As permits are submitted - Begin 2005	- # applications submitted - # grants or other allocations obtained

		- Columbus Foundation	- Apply Nov 05	
Increase canoe access to Alum Creek <i>Install first site by 2008, second site by 2013 (upper and lower subwatershed)</i>	Staff time, partnering organizations: CRPD, Bexley, Westerville, Columbus Outdoor Pursuits, Metro Parks	Analyze list of potential sites; select and prioritize (<i>in order for lower watershed</i>): 3. Morse Road 4. Innis Park 5. Nelson Park (Maryland Ave.) 6. Three Creeks Park:	DONE	Sites selected
	Staff time, partnering organizations	Research funding – ie., ODNR Division of Watercraft grants	2004	Funding sources researched
	Staff time, partnering organizations	Contact partners to assess interest, resources	Ongoing; initial contact in 2006	Organizations contacted
	Staff time, partnering organizations, FACT	Apply for grant to install ramp and other site modifications	2006 -2007	Grant application submitted
	- 319 funds (\$2,000) - FACT staff time	- Apply for grant funds - Produce “Alum Creek Water Trail” materials showing access points, landmarks, hazards, etc.	2004 After first access point is constructed	Materials produced
	- Staff time, FACT, CRPD - Signage funding from CRPD (\$1,500)	Until actual ramp can be constructed, install visible signage at Nelson Park take-out	2005	Signage installed
Selective removal of low head dams <i>Goal: remove two dams by 2008, and restore nonattainment sampling locations (River Mile 8.6 and 7.6) to at least partial attainment status.</i>	Staff time, partnering organization	Prioritize dams for removal: Nelson Park, Wolfe Park, Route 104	Completed	- Prioritized list of dams
	Staff time, partnering organizations; ODOT	Explore removal of Rte 104 dam as ODOT 401 stream mitigation project	2006	- Number of inquiry, contacts made
	Staff time, partnering organization	Contact local stakeholders and dam owners to assess partnership interests	2004 - 2005	- # of contacts made, meetings held
	Staff time, partnering organizations	Conduct public meeting - answer questions, concerns	2005	- Meetings held, presentations given
	319 grant funds - \$20,000	Engineering / feasibility study regarding contaminated sediments, downstream implications, cost, post-removal design, etc.	2004 - 2006	- Feasibility study conducted
	FACT staff time	Submit plan to ODNR Div of Water, Dam Safety Section for approval	2005 - 2006	- Plan submitted
	FACT staff time	Submit plan to US Army Corps & OEPA, determine if 404 / 401 permits are necessary	2005 - 2006	- Plan submitted
	FACT staff time, OEPA	Determine if ASARCO will be conducting sediment remediation per NPDES permit	2005	- Contacts made, outcomes of ASARCO permit determined
	Staff time, partnering organizations	Pursue funding: - 319 grant funds, municipal CIP budgets & in-kind services, Columbus Foundation	2004 - 2005	- # / types of funding obtained
	319 grant funds (\$290,000 for removal, research, and restoration)	Conduct pre-removal research, breach Nelson Park and Wolfe Park dams	2006	- Dam removed

	319 grant funds (see above)	Conduct post-removal research, channel reconstruction	2006	- Research conducted - Channel reconstructions completed
Create comprehensive natural and cultural heritage signage on Alum Creek multi-use trail	- Staff/ Volunteer time: CRPD, Metro Parks, FACT, Ohio Arts /Humanities Councils, MORPC, Freedom Society - Funding: \$60,000 from CRPD budget and grant funds (such as Columbus Fndtn, Arts/Humanities Cnls)	- CRPD contract for regional design concept (\$18,000 in 2004 dept budget), with input from partnering organizations - Coordinate with neighboring municipalities (ie Westerville) - CRPD install signage as portions of trail are completed (\$100 - \$600 per sign)	2004 2004 - 2005 2005 - 2006	- # of organizations & individuals contribute to design - Agreements between Westerville & Columbus on blended formatting - Research conducted, plans for signage produced - # of signs installed
Promote conservation of wetlands	FACT CRPD	- Continue monitoring and commenting on 401 permits - Submit list of wetlands to Ohio EPA 401 mitigation clearing house	Ongoing 2005	- Number of comment letters filed, hearings attended - List submitted to OEPA
Pursue tributary project at Bridgeview Golf Course	FACT, ODNR, Columbus State Com. College Foundation	- Resume discussion of tributary daylighting project, to coincide w/ course expansion	2007	- Number of meetings held
Conduct stream morphology research on mainstem and tributary streams	- 319 grant funds (\$90,000) for part-time monitoring staff - Staff time, FACT , OSUE, ODNR	- FACT apply for grant funds, hire part-time staff - Collect stream data on channel modification, bank height ratios, levees, floodplain access, and evaluate tributaries against Headwater Habitat criteria	2004 - 2005 2006 - 2007	- morphology data collected in database

F. LOWER SUBWATERSHED TRIBUTARY ACTIONS

Actions listed above for the entire lower subwatershed will also apply to all tributary streams in the subwatershed. The following specific actions have also been developed for the tributary streams below. Nutrient enrichment is described in most of the tributaries, although the values are not extreme. The effect of these nutrient loadings on aquatic life is probably exacerbated by lack of good stream morphology (OEPA, 1999 b). Stream morphology assessments will be an important first step in addressing nonattainment reaches.

Spring Run

Note: Since the city of Westerville spans the upper and lower (Spring Run) subwatersheds, some actions concerning the city of Westerville in the upper subwatershed have been repeated below.

Background

Spring Run is a tributary to Alum Creek that flows approximately 7.2 miles from central Genoa Township south and then west to its confluence with Alum Creek just north of SR 161. This stream's aquatic life use is undesignated, and its water quality was assessed by the Ohio EPA for the first time in 2000. Based on data collected from three sampling points, the upper 4 miles of the stream are not attaining WWH aquatic life use standards, while the lower 2 miles were partially attaining standards. Causes of impairment identified by the Ohio EPA include pathogens, ammonia, and organic enrichment, as well as habitat alterations and siltation. Sources of impairment include urban runoff and channelization. TMDL's were developed for pathogens and habitat.

Problem Statement

Water quality samples from RM 3.7 (Walnut Street) and 0.2 (Buenos Aires Road) were analyzed for **pathogens**. Exceedences were observed in almost every sample, with fecal coliform counts up to five times the limit for secondary contact recreation. Most subdivisions in the watershed have central sanitary sewer service, although portions of some subdivisions and single homes remain on discharging and on-lot systems. General urban run-off, including pet waste, is another potential source. The pathogen TMDL target, prescribed load reductions, and actions for the lower watershed will also apply to Spring Run (specific loadings and actions were not developed).

At RM 3.7, **nutrient and organic enrichment** was mostly limited to a single storm event, where biological oxygen demand (BOD), TSS, and ammonia were recorded above 95th percentile background levels. Some enrichment was also detected during dry weather, which may indicate that discharging and on-lot HSTS's are likely sources. Nutrient enrichment near the mouth was evident in diel (24-hour) dissolved oxygen (DO) readings that showed high levels of variation and "excessive" supersaturation during the day.

Habitat impacts include channelization (notably in Westerville) of the stream channel and the suite of typical responses to increased impervious cover and stormwater delivery, including incised channels with eroding banks. A levee was also built recently near the stream's mouth at a park in Blendon Township. Local residents have reported that the levee has prevented the stream's access to the floodplain and caused erosion of the opposite stream bank. QHEI scores range from 24 at Maxtown Road to 59 near the mouth. **Siltation** is likely the result of bank erosion, although some new development in the watershed continues, especially in the stream's headwaters.

TMDL analysis showed that Spring Run is not meeting the Habitat TMDL target score (3) for at all three sampling locations (river miles 0.2, 3.7, and 6.0), and is not meeting the Sediment TMDL target score (33) at two sampling locations (river miles 3.7 and 6.0). Achieving this target and the Sediment TMDL

target are long term goals for this section. Further assessment of current habitat conditions is needed to address habitat limitations

Long Term Goals

- TMDL Habitat Score of 3
- Fecal coliform: TMDL target - 1,000 fecal coliform colonies /100ml (30 day geometric mean)
- TMDL Sediment Score of 33

Mid-Term Goals

- QHEI score of 45 at Walnut Street and 60 at Buenos Aires Blvd
- Restore the stream from partial / non attainment to full / partial attainment.

Priorities

Among the lower watershed tributaries, Spring Run will be a priority, and actions to 1) reduce nonpoint source pollution (pathogens, nutrients, etc) and 2) assess stream morphology will be enacted first.

Task Description (Objective)	Resources	How	Time Frame	Performance Indicators
Organic Enrichment & Human Health				
Work with Delaware & Franklin Co Health Dept's to target failing HSTS systems	- Staff time: FACT, health depts. - DEFA/ 319 cost share programs	- Create septic / leach system database and inspection policies - Strengthen inspection policies and enforcement - Upgrade HSTS's - Institute education programs	2007 - 2008	- database completed - # of HSTS upgrades - # of educational programs conducted
Stormwater				
Conduct public outreach campaign on NPS prevention	- Staff time, partnering organizations - 319 grant funding to produce materials (\$1,500)	Target civic associations and residents of Spring Run watershed: - Host lawn care program - Seek speaking opportunities - Hold Spring Run creek walk - Conduct drain labeling - Produce educational materials - Coordinate with Phase I/II community programs	Ongoing through 2008 2004 Materials- 2005	- # drain labeling events, participants - # of speaking engagements - # events where materials are distributed
Develop water quality monitoring program in Westerville	- Westerville staff time; budget for workshop, sample analysis (about \$5000 annually for city-wide program) - FACT staff time	- FACT plan staff training - Westerville: establish quarterly program, draft ordinance to allow corrective action when problems are found	2004	- Training conducted - Program established - Ordinance passed
Habitat & Hydromodification				
Determine existence of remaining natural riparian buffer lands in headwaters, target for preservation	- Staff time, partnering organizations: FACT, Westerville RPD - Maps provided by Westerville RPD	Conduct desk-top analysis of maps and aerial photos to determine areas for further investigation	2005	- Analysis completed, parcel list developed
Conduct stream morphology assessments	FACT, ODNR, Westerville Service and RPD	Assess stream morphology of tributary to learn more about habitat disturbances as basis for potential for recovery / restoration goals	2006	- Assessment completed
Explore feasibility of stream channel restoration project	FACT, ODNR, Westerville Service and RPD	- After stream morphology assessment, research cost for channel restoration	2008	- estimate received

West Spring Run

Background

West Spring Run is a tributary to Alum Creek that flows east for 3.1 miles through Columbus along the north side of SR 161 to Alum Creek. It was evaluated for the first time by the Ohio EPA in 2000, and reported to have 3.1 miles in nonattainment of WWH aquatic life use standards (although the stream’s use is undesignated). Nonattainment status was due to habitat alterations and flow alterations. Ohio EPA identified sources include urban runoff, channelization, and natural sources.

Problem Statement

While **pathogens** and nutrient enrichment are not included in the Ohio EPA’s cause / source assessment, the 2003 TSD notes that bacteria exceedences were evident in the majority of samples, one over ten times the maximum standard for secondary contact recreation. **Nutrient and organic enrichment** was reported during wet weather sampling, which is indicative of urban runoff pollution. (Ammonia, Nitrite, and BOD were reported above the 90/ 95th percentile). **Siltation** was evident with elevated TSS (203 mg/L), likely due to bank erosion. High levels of impervious cover in this established suburban area has likely led to stream morphology impacts and bank erosion. **Channelization** was noted by the Ohio EPA field staff.

The pathogen TMDL target (1000 colony forming unites/ 100ml 30 day geometric mean) and prescribed load reductions for the lower watershed apply to West Spring Run, as does the TMDL Habitat Score of 3. Actions targeted pathogens for the lower watershed will apply to this watershed as well; no tributary-specific actions were developed. Further assessment is needed to develop actions to address habitat deficiencies. Please see the introduction of Section IV for more information on TMDL’s.

Long Term Goals

- Fecal coliform: TMDL target - 1,000 fecal coliform colonies /100ml (30 day geometric mean)
- Habitat TMDL Target Score of 3

Task Description (Objective)	Resources	How	Time Frame	Performance Indicators
Conduct stream morphology assessments	FACT, ODNR, Westerville Service and RPD	Assess stream morphology as basis for potential for recovery / restoration goals	2007 - 2008	- Assessment completed

Kilbourne Run

Background

Kilbourne Run is a tributary to Alum Creek located south of West Spring Run and flowing east for 2.6 miles through Minerva Park and Columbus to Alum Creek. The one river mile of Kilbourne Run evaluated by the Ohio EPA in 2000 was not attaining its WWH use designation due to excessive organic enrichment, pathogens, and siltation. Urban runoff was identified as the source of these impairments.

Problem Statement

Water quality samples in Kilbourne Run were limited to three occasions due to low flows. All three samples showed **bacteria** violations, sometimes twice the maximum level for secondary contact recreation. **Nutrients** were slightly elevated above background levels, while **organic enrichment** was evident with a BOD reading above the 95th percentile background. Total Suspended Solids (TSS) were detected above the 95th percentile background level. **Siltation** is likely due to bank erosion, which was also addressed in the Northland Plan Volume 1 conducted by the Columbus Division of Planning in 2001.

The pathogen TMDL target (1000 colony forming unites/ 100ml 30 day geometric mean) and prescribed load reductions for the lower watershed apply to Kilbourne Run, as does the TMDL Habitat Score of 3. Actions targeted pathogens for the lower watershed will apply to this watershed as well; no tributary-specific actions were developed. Further assessment is needed to develop actions to address habitat deficiencies. Please see the introduction of Section IV for more information on TMDL's.

Long Term Goals

- Fecal coliform: TMDL target - 1,000 fecal coliform colonies /100ml (30 day geometric mean)

Task Description (Objective)	Resources	How	Time Frame	Performance Indicators
Conduct stream morphology assessments	FACT, ODNR, Westerville Service and RPD	Assess stream morphology as basis for potential for recovery / restoration goals	2008	- Assessment completed

G. Bliss Run

Background

Bliss Run flows southwest for 1.5 miles into Alum Creek south of Livingston Avenue (further upstream portions of the stream have been piped underground). Although this stream is designated WWH, biological communities and use attainment were not evaluated in 2000. Impaired chemical water quality was evident with elevated levels of pathogens, nutrient enrichment, ammonia, and zinc, likely due to urban runoff.

Problem statement

Extremely elevated levels of bacteria were observed (55,000 colonies /100 ml) in Bliss Run. According to available data, this area is serviced by central sanitary sewers and contains no home sewage treatment systems. Possible sources of **pathogens** could include urban runoff (pet waste) and faulty sanitary sewer infrastructure. Actions targeted pathogens for the lower watershed will apply to this watershed as well; no tributary- specific actions were developed (see the introduction of Section IV for more information on TMDL's). Levels exceeding the 90th percentile background level were detected for ammonia, nutrients (nitrates and phosphorus), and BOD (organic enrichment). These moderately elevated levels were present consistently, regardless of rain events.

Long Term Goals:

- Fecal coliform: TMDL target - 1,000 fecal coliform colonies /100ml (30 day geometric mean)

Task Description (Objective)	Resources	How	Time Frame	Performance Indicators
Work w/ Columbus DOSD to analyze results of sanitary sewer inflow/ infiltration studies	- Staff time, FACT, Columbus DOSD - Columbus CIP budget	DOSD conduct inflow and infiltration studies, upgrade system to eliminate cross flow of sanitary to storm systems	2004-2006	- Study completed - Repairs completed

COMMUNITY ACTION PLANNING

The goal of this portion of the planning process was to facilitate the participation of a wider range of community members by not limiting the topic to water quality, but instead asking community members what they valued about Alum Creek and wanted to create more of to improve their neighborhoods.

Interviews with over one hundred watershed residents and a planning meeting with forty residents led to the creation of five “themes,” or areas of interest, which were: water quality, litter control, recreation, greenspace, and education and awareness.

Not surprisingly, some of the projects developed to address these themes were also identified in the technical section of the plan, and therefore are not included in this section. They include enhancing litter prevention and cleanup programs, creating an Alum Creek Water Trail (for boating), creating a riparian zoning overlay, and creating a Franklin County Land Trust.

The remaining community projects are listed below. At the time of the community meeting, participants did not feel that they had the resources to implement these projects themselves; however, participants will be encouraged to assist in development and implementation of projects as work begins. Standing FACT committees will also provide a platform to coordinate implementation of some community projects.

Implementation priorities will be based on where the most resources and interest exists among FACT and planning participants. Two projects in particular have emerged as having high levels of interest and potential for success: 1) tributary naming and 2) education and awareness of the use of Alum Creek as an Underground Railroad route. Please see Section I (“Introduction”) for more information on the community planning process.

Task Description	Resources	How	Time Frame	Performance Indicators
Wet Shoe Project	- FACT staff and volunteer time -Grant funds (estimated \$10,000 -\$50,000)	- Meet with community members to develop site along creek to encourage public education and interaction - Identify local partners, apply for grants funds to create conceptual plan and develop site	2008	- site identified - grant application - site completed
Name Tributaries	- Staff and volunteer time: FACT, MORPC, local municipalities	- Research local names with community members - Host community meetings - Submit application to USGS - Publicize name, research funds for signage	2005 – 2010	- # community meetings - # of streams officially named
Market value of Alum Creek to watershed neighborhoods	- Staff and volunteer time: FACT - Funds for literature (\$5 per house)	- Prepare literature, create “welcome wagon” literature drop for new residential developments with watershed address, NPS education - Track web site hits after literature drops	2008	- # houses were literature is dropped - web site hits
Celebrate Underground Railroad along Alum Creek	- Staff/volunteer time: FACT, CRPD, OSU African Studies Dept., Friends of Freedom - Grant funds to host events (\$5,000), - CRPD budget for signage (\$50,000)	- Create virtual tour on FACT website - Assist Columbus Recreation and Parks Dept. in including information on UGRR in interpretive greenways signage - Celebrate cultural heritage of UGRR along creek through awareness campaign: press, events, tour, signage, etc.	2006 2004 – 2008 2007	- # events held - # attendees - # of sings erected - web page created
Create Alum Crk Neighborhood Directory	- FACT volunteer time	- Create directory of civic associations, homeowners associations, and housing developments in the watershed for education and outreach purposes	2006	- Directory created