



WATERSHED RECOMMENDATIONS

The recommendations that follow are the result of a collaborative effort of the project team. Throughout the assessment process, a number of resource issues or concerns were discussed, each seeming to have both social and scientific components. Therefore, multiple goals were defined to address these aspects. Individual recommendations then follow to direct management and community discussion toward resource stewardship.

Issues, goals, and recommendations are systematically numbered for reference throughout the document.

For example, WQ 1.2 refers to goal 1.2 in the water quality recommendations chapter.



WATERSHED IDENTITY

WI 1.0 Issue: Each watershed has unique ecological and cultural features that

distinguish it from its surrounding region.

The Kettle Creek watershed certainly has much in common with the surrounding north central Pennsylvania region: logging and mining histories, a dispersed rural population, and thousands of acres managed by the state forests and parks, to name a few. But it also has features and qualities that distinguish it from its surrounding region. The exceptional coldwater streams, the natural formation of the Oxbow Bend, and natural gas fields and storage set the Kettle Creek watershed apart from other watersheds along the West Branch of the Susquehanna. Its cultural distinction lies in its rich agricultural history, its immigrant communities, its layers of resource extraction and conservation, its scenic quality from roads, streams, and trails, and its recreational network

within and beyond the watershed. These features, whether specific sites, landscape patterns, architectural styles and details, or the history that connects them, create a unique character and identity that draws residents and visitors to the Kettle Creek watershed.

1.1 Goal: Develop a vision of the common goal(s) of the watershed community.

See also Community Capacity, page 225.

1.1.1 Develop a watershed logo and slogan for use on all official watershed (association) publications and signs. These could be solicited from watershed residents, through a contest, through a school art class competition, or from a consultant. Example: The Lititz Watershed Alliance chose their logo from entries submitted by a 5th grade art class from a local elementary school.

1.1.2 Develop a song, poem, T-shirt, hat, bumper sticker, fly, and/or fishing vest to publicize awareness for the watershed conservation. These too could be designed by residents, other watershed stakeholders, or hired consultants.

1.2 Goal: Explore and celebrate the rich cultural history of the watershed as a community and for visitors.

1.2.1 Identify a cultural history committee to incorporate historic and cultural components into watershed efforts.

This committee could include the following potential candidates: Historical Society representatives, local historians (e.g. Jim McGuire), regional historians, journal and/or news archivists, university faculty from history, geography, and/or leisure studies, state forest/park managers, local developers, contractors, building trades personnel who would be familiar with local buildings and building styles, and PennDOT public relations staff, among others.

1.2.2 Seek information, assistance and funding partnerships with local, county, and state agencies.

Contact the county historical society, the county conservation district, the State Archives, the Nature Conservancy, Preservation Pennsylvania, the Pennsylvania Historical and Museum Commission, the Bureau of Forestry, and the Bureau of State Parks. These agencies and organizations may have historical files that include documents, photographs, and maps that depict historical conditions. They may also have grant and cost-share programs for research and interpretation.

1.2.3 Develop and prioritize projects that evaluate and conserve historic and cultural resources and that portray local history as a common link among stakeholders. Potential projects include:

- Celebrate the historic and cultural significance of sites throughout the watershed.
- Utilize historical markers to celebrate significant people, places, and events of the watershed. Examples: mill location of Lackawanna Lumber Company, William Radde and Charles Meine, the Germania Hotel. Funding available from Pennsylvania Historical and Museum Commission - 50% matching grant for sign production.



An historical marker in Abbott Township

- Nominate additional historic sites to be recognized for their local, regional, state, and national significance. Consider the use of rural historic landscape designation (again, at local, regional, state, or national levels) for areas or corridors that exhibit historic features across numerous, contiguous sites.
- Continue to integrate local history with recreational opportunities.
- Enhance existing historical routes with signage, such as logging rail beds along trails. Develop and interpret new sites that have both historical significance and recreational access, such as CCC camps (throughout state forests and parks), the town of Germania, Hammersley Village, and the flooded town of Leidy (at Kettle Creek State Park). Expand or enhance trail



Logging grade in Ole Bull State Park



Ole Bull Lodge built by the CCC

networks to access new sites, such as the historic town of Bitumen.

- Explore historically and culturally significant watershed sites
 - as a group tour by bus, caravan, or hike;
 - as self-guided tour;
 - as a group paddling tour; and/or
 - through events hosted at significant sites.
- Complete a building inventory to discover the historic value and architectural patterns in building and development. Inquire about dates of construction, materials and their sources, current and previous owners, exterior design and interior layout, and outbuildings (past and present).
- Capture oral history through focus groups and interviews. Gather hunting and fishing tales, CCC descriptions and stories, notes on the agricultural history, and personal experiences of the flooding of Leidy.
- Host commemorative events, such as a splash dam parade, a log float, a fishing trip from Bitumen to Kettle Creek, and/or

the whiskey robbery to celebrate the local history for current residents and visitors.

- Develop database of historic documents.
- Document current people, achievements, and events: local history. Develop an on-going archive or collection of watershed news (newsletters, news articles, audio/video recordings, public gossip, etc.).
- Publicize the watershed history through outreach. Publish historical snippets in newsletter, newspaper or on local radio. The stories could be titled: “kettle creek cuts,” “hooks on history,” “hook some history of your watershed,” “extract the past,” “remember when ...”.
 - through an almanac style of “One year, five years, ten years, fifty years, one hundred years ago today...” or
 - through excerpts from the cultural history assessment.
- Hold competitions for oldest photo, oldest letter, longest-living resident, newest resident, largest family, smallest outhouse, and oldest farm in the watershed.

1.2.4 Utilize history as an objective perspective to introduce the impacts of land use and land management.

Sources of Assistance:

Pennsylvania Historical and Museum
Commission Grants:

- Archives and Records Management Grants
- Historic Preservation Grants
- Historical Marker Grants
- Local History Grants
- Technical Assistance Grants

Contact: Bureau for Historic Preservation,
Commonwealth Keystone Building, 400 North
Street, Harrisburg, Pennsylvania 17120-0093

<http://www.artsnet.org/phmc/>

Preservation Pennsylvania:

Preservation Fund of Pennsylvania

- Priority Issues
- Discretionary Projects

Contact: Preservation Pennsylvania, 257 North
Street, Harrisburg, PA 17101

[http://www.preservationpa.org/
FrameFunding.htm](http://www.preservationpa.org/FrameFunding.htm)

1.3 Goal: Recognize that the current visual quality of the watershed is characterized by a forested landscape of valley slopes and ridges and acknowledge that visual quality results from land use and management actions.

1.3.1 Document present watershed landscape. Implement a photo journal of the watershed.

1.3.2 Consider conservation programs that limit change in community-identified scenic areas.



Agricultural fields of Germania Branch

- Agricultural Areas
- Wild and Scenic Rivers Program (see appendix X for contact information)
- Scenic Road corridor
- Greenways (trails)

1.3.3 Develop voluntary guidelines for architectural development. This could follow from inventory and analysis of the building architecture in the watershed. (See above recommendation 1.2.3)

1.3.4 Identify areas for visual (and ecological) enhancement projects. Plan enhancement in coordination with PennDot and local road maintenance supervisors.

• Roadside vegetation for visual and ecological enhancement

1.3.5 Document historic watershed landscapes (e.g. during the logging and mining eras) for comparison with current and future landscapes.

1.4 Goal: Recognize and protect the unique natural features of the watershed that have influenced resident life and visitor experiences.

1.4.1 Develop promotional slide/video show about the watershed.

1.4.2 Develop and prioritize projects for recognition.

- Signage of the ‘kettle’ (the distinctive shape of the creek), Leidy gas field, streams, geologic features - incorporate watershed logo

- Heritage and recreational connections to these features

1.4.3 Explore a variety of resource conservation mechanisms. Select and apply those that the community feels would provide the most appropriate protection.

- Greenways - local and state
- Scenic rivers
- National, State historic sites/corridors/landscape and recreation
- Local planning and purchase of development rights (PDRs)
- Conservation easements

WI 2.0 Issue: A watershed is part of both ecological and social systems.

As water moves throughout the landscape as surface and groundwater, its drainage patterns form a network of corresponding land units-watersheds. But as a result of human interaction with the natural environment, a watershed is also part of, or affected by, social systems. Various political, social, and cultural associations also define land units or regions. Residents abide by government policies that are implemented across state and municipal boundaries. Individuals identify with socioeconomic

structures. Watershed residents also identify with cultural organizations and associations, such as churches, granges, and sporting clubs.

As part of these systems, the watershed plays a major or a minor role but nonetheless affects or is affected by other parts or members. Knowing what these interactions are, how they operate, and how they can be managed is critical to understanding the impacts of decision-making in any system.

2.1 Goal: Work cooperatively with organizations and associations of the north central Pennsylvania region, the West Branch of the Susquehanna River, and the Chesapeake Bay to achieve local goals, to rally support for local efforts, and to support regional goals.

2.1.1 Dialogue/Partner with county resources: conservation district, planning department, and historical societies.

2.1.2 Dialogue/Partner with other West Branch watersheds and the larger Susquehanna River Basin community: Pine Creek, Sinnemahoning, First Fork, Susquehanna River Basin Commission.

2.1.3 Dialogue/Partner with Chesapeake Bay organizations. Organizations and associations support a wide range of efforts and interests from stream improvement projects to education and outreach programs to recreational events such as hiking, biking and paddling.

2.1.4 Dialogue/Partner State Agencies, such as state foresters/Bureau of Forestry, state park manager/Bureau of State Parks, the North Central Regional Planning Office, and the Department of Community and Economic Development.

2.1.5 Dialogue/Partner efforts in the Lumber Heritage Region.



In the context of watersheds, education typically refers to the process of instilling in watershed association members a basic knowledge of social and ecological systems. Outreach works toward a similar goal but to a wider audience, generally those not currently involved in the association.

The project statement for this assessment and stewardship plan asked the team to develop education and outreach programs relevant to the resource issues of the watershed. This was a somewhat challenging task. As the team examined a wide range of natural and cultural resources, the assessment suggested that resource management discussions (whether watershed scale or not) would benefit from some type of educational effort. To this end the following list of educational topic ideas has been generated.

On culture:

Why is history important to a watershed?

History as

...storytelling as a social event

...the story of continuous change

...a reference for resource management

Recreation: Contributions to economy and landscape conservation

Appreciation, documentation, and conservation of scenic qualities of Kettle Creek

EDUCATION & OUTREACH

On land use:

The impact of individual land use on shared (watershed) resources.

Land use planning as a tool for rural communities (residents) to guide 'smart' development: How to consider cultural and 'natural' resources, quality of life and the general character of the landscape in planning policy.

The benefits and costs of watershed planning?

Stormwater management: What is it? How can landowners address it?

What is watershed identity and why is it important?

The potential for sprawl in north central Pennsylvania's mountains.

The definition and functional importance of 'natural areas'.

Precedents for watershed stewardship: Environmental and economic benefits from environmentally friendly site design practices.

Wetlands in the Kettle Creek watershed: Where are they and why are they important? How can I identify wetlands?

Regional impacts of AMD mitigation on Kettle Creek.

Corridors: Important linkages for wildlife, recreation, and streams.

On fisheries:

What is a habitat assessment and how can it be useful?

The importance of temperature on coldwater fisheries

What causes temperature increases in a stream?

What can be done to mediate thermal problems in streams?

The importance of woody debris in streams.

On water quality:

Acidic deposition: Effects on streams and forest ecosystems, specifically potential effects on Kettle Creek.

How do riparian buffers influence a stream?

Ways to reduce sediment deposition.

Ways to measure and protect water quality: Chemical and biological (macroinvertebrates) indicators.

What causes erosion and what can be done to stop it.

What is a wellhead? How does a wellhead affect private landowners?

How does development impact drinking water?

On general environmental stewardship:

Simple ways that a landowner can be a watershed steward.

Stream improvement projects in your watershed.

While this list may seem to suggest that education is needed in all areas, these topics may not all be pertinent to the current priority issues in the watershed. Therefore, as the KCWA sets its goals for each year, it can prioritize educational and outreach efforts to support current and upcoming resource discussions.

The project team recognized that community members have a variable understanding of watershed delineation, what constitutes a resource, how public and private resource management affect them personally, and how they can participate in resource management discussions. This led to a broader series of recommendations regarding education and outreach.

EO 1.0 Issue: Public understanding of watershed boundaries and the purpose of a watershed association are essential for public support and involvement.

Community members need to understand what a watershed is and how the watershed boundary and the resources within affect them. Without an understanding of how resource management decisions affect them personally, community members often see little or no need for participation in resource decision-making. As a result of an attitude of self-sufficiency in rural areas, residents are often skeptical about new community organizations, suspecting ulterior motives on the part of government regulators. Clear, consistent communication of community-initiated goals are critical in clarifying that the association is non-governmental and is acting on behalf of the community.

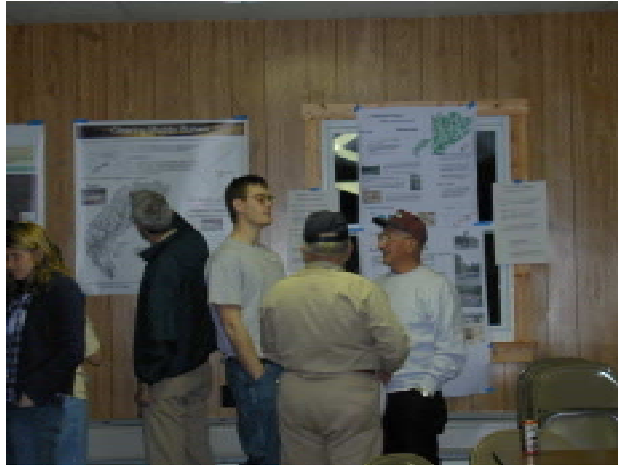
1.1 Goal: Promote baseline knowledge of the watershed and watershed issues to enable full participation in local resource decision-making by community members.

1.1.1 Post signs identifying the boundaries of the watershed along roads, trails, and vistas. Look to PennDot and state forests as potential partners for this project.

1.1.2 Distribute printed copies of any annual report to all landowners or land managers in the watershed.

1.1.3 Display a printed copy of any annual report at locations where community members can discuss it. Locations might include public bulletin boards at post offices and stores, the bar at watershed restaurants, and the reception desk of township offices.

1.1.4 Host an annual retreat to inform new and potential association members about resource delineation and resource management. This retreat could be held in conjunction with the KCWA annual meeting each spring. The retreat



April 26 public meeting

could be targeted to adult, child, or family audiences.

1.2 Goal: Clearly and consistently post a KCWA mission statement

1.2.1 Develop a mission statement to guide the activities of the association.

1.2.2 Post the mission statement at locations where KCWA announcements are displayed.

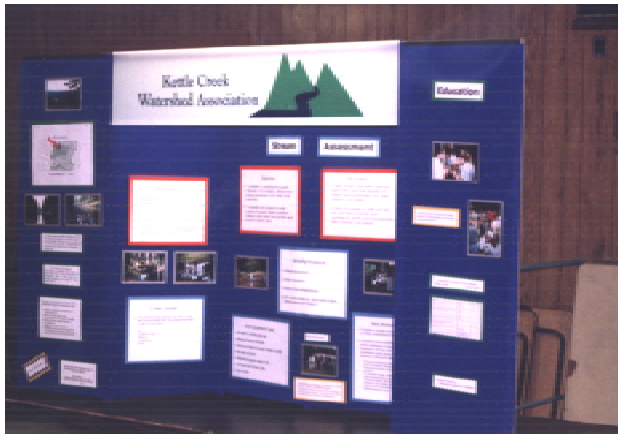
1.2.3 Review the mission statement once a year based on new projects and initiatives.

1.3 Goal: Use consistent media coverage to promote awareness for the watershed association and its activities.

1.3.1 Contribute KCWA updates to other local organizations' newsletters (e.g. churches, granges, and sportsmen's clubs).

1.3.2 Announce all KCWA events via newspaper, radio, and TV "community calendars" (e.g. association meetings, project groundbreaking).

1.3.3 Invite newspaper, radio, and TV coverage to all KCWA events (e.g. the annual meeting/ annual retreat, project groundbreaking and project completion).



Project display

1.3.4 Submit press releases or articles to local newspapers on a bimonthly, or monthly basis.

1.3.5 Update the KCWA website regularly (monthly).

1.3.6 Circulate a traveling display of current events and issues throughout the watershed. Locations could include restaurants, hotels, parks, stores, the grange hall and churches.

EO 2.0 Issue: Watershed stakeholders need accurate information on resource management to confidently and effectively participate in decision-making discussions.

Stakeholders often seek or receive information on resource management (and other community issues) from a number of sources. Each source may have somewhat different information to share. In some cases, the information may be incomplete, inaccurate, or even biased. As an advocate for watershed stewardship, the Kettle Creek Watershed Association should deliver complete, accurate, and unbiased information to watershed stakeholders.

Education and Outreach (E&O) requires continuous support and development. As watershed priorities and stakeholders change over time, an on-going effort is required to tailor educational programs and outreach efforts

toward current and upcoming watershed issues. Therefore, education and outreach activities need to become a permanent part of the Kettle Creek Watershed Association's program.

2.1 Goal: Supply complete and accurate information on resources to enable effective participation in watershed decision-making discussions.

2.1.1 Form an E & O committee or utilize an E & O coordinator.

2.1.2 Develop E & O programs that respond to watershed issues

- Develop, prioritize, and implement educational efforts on current and upcoming watershed issues.
- Create and install educational displays along streams to describe key issues in the watershed.
- Re-prioritize efforts as issues and stakeholders change.
- Target different audiences, who may have different priorities and knowledge bases.

2.1.3 Enable understanding of natural systems and their relation to human systems through a consistent program outline. The following model could be used to develop a variety of educational materials and programs that cover these points. The materials and programs could include printed pamphlets, slide presentations, field talks, presentations supplemented with overhead transparencies, and even project reviews. It outlines the most basic points that should be covered to give the audience a basic understanding of their local environment.

Outline:

- What is (the topic) - definition of terms.
- How does it work/function.
- What does it look like (through images, illustrations, and diagrams).
- Where can I find it (potential map).
- What relies on it/What does it depend on.
- Why does it matter to me.
- How can I improve it.

2.1.4. Seek active involvement from all current and future/potential stakeholders.



Touring the watershed

- Seek knowledgeable community residents to lead and/or present programs. Acknowledge leaders with a certificate for outstanding leadership and service.
- Document participation in education and outreach efforts.
- Photograph and record names and dates of participants.



State park campers

- Invite media coverage to all events/send press report.
- Include event coverage in the KCWA newsletter so people can see how much fun their neighbors had.
- Incorporate brief, consistent education information in the KCWA newsletter.
- Highlight news and information about the West Branch basin to convey a greater sense of hydrologic scale and the neighbors downstream.
- Develop or include “Tips to improve your watershed” or a “Tip of the month” to address landowner influences on natural resource quality.
- Invite watershed visitors from state parks, lodges, camps, and motels to participate in single-day or short-term programs and events. Their participation may help economize outreach efforts and encourage their support of watershed activities in Kettle Creek and in their home watersheds.

2.1.5. Seek assistance (funding, materials, and educators) from resource agencies and organizations. Options include, but are not limited to

county conservation districts, Susquehanna River Basin Commission, Chesapeake Bay organizations, and DEP/DCNR.

- Explore partnerships with state forests and state parks for funding and assistance for education on natural resource management.

- Explore existing programs and materials available through PA DEP.

Fact Sheets (on environmental topics for aid in making pamphlets) (<http://www.dep.state.pa.us/dep/deputate/watermgt/watermgt.htm>)

Pennsylvania Chesapeake Bay Mini-Project Education Program

- Tap federal agencies, such as EPA and U.S. Fish and Wildlife Service, and Americorps for a number of funding options specific to education efforts.

<http://www.epa.gov/owow/watershed/wacademy/fund/wag.html>

<http://www.epa.gov/owow/watershed/wacademy/fund/envedu.html>

<http://www.epa.gov/owow/watershed/wacademy/fund/envjustice.html>

<http://www.epa.gov/greenkit/whowere.htm>

<http://www.epa.gov/enviroed/grants.html>

<http://www.epa.gov/greenkit/grants.htm>

U.S. Fish and Wildlife Service (<http://www.fws.gov/educon.html>)

<http://www.americorps.org>

EO 3.0 Issue: Regional education efforts can more efficiently utilize funding and technical resources in sparsely populated areas.

Successful partnerships start with partners understanding each other's current needs and concerns about watershed issues. Awareness over a regional area of the important environmental issues in each watershed benefits each partner, by creating a working relationship with other areas to increase the amount of support and recognition. Educational funding may be most easily obtained in sparsely populated areas by combining efforts to obtain funding resources. Sharing funding resources may benefit each watershed partner in a unique way. Materials may be shared or rotated through out a region or labor forces united to accomplish environmental tasks. In addition, establishing connections within a region may benefit local business owners to promote business and employment from new areas.

3.1 Goal: Create a regional watershed education network by partnering with adjacent watersheds and/or school districts.

3.1.1 Employ a regional watershed/environmental education coordinator.

3.1.2 Share costs of equipment and supplies with all partner watersheds through the network.

HOBO temperature loggers were purchased with funding from partner Trout Unlimited and installed to assess thermal impacts to the stream network.





Young anglers in Ole Bull State Park

3.1.3 Invite educators from regional resource agencies and organizations to discuss common resource issues. Educators could spend several days talking with schools, sportsmen's clubs, church organizations, and township officials throughout the region.

3.1.4 Work with local school districts and other watershed coordinators to develop programs that address Kettle Creek and neighboring watersheds.

- Students could do a project in Kettle Creek, then one in Pine Creek, then one along the Sinnemahoning.
- Publicize research needs to high school students, Eagle Scouts, and others who may be looking for community service projects.

- Students could work in a native plants nursery - watering, repotting, weeding, and fertilizing native species for planting across the watershed. Specify funding sources (e.g. Chesapeake Bay Foundation).



COMMUNITY CAPACITY

CC 1.0 Issue: Inter-municipal collaborative capacity can capitalize on existing and future resources.

There are often times when people and communities face the same or similar situations in how to provide the services and resources for the benefit of the entire community. A first step in building a sense of community is for people to get to know each other. Communication is of the utmost importance especially with people already in prominent leadership positions.

1.1 Goal: Increase dialogue between local levels of government, business leaders and the Kettle Creek Watershed Association.

1.1.1 Identify Kettle Creek Watershed Association members to attend and represent the association at public meetings of the school districts, municipalities, and counties.

1.1.2 Personally invite all elected and nonelected representatives of the different branches and levels of government to all public activities of the Kettle Creek Watershed Association.

1.1.3 Establish or attend regular business or nonprofit organizations breakfast / lunches in or near the watershed

CC 2.0 Issue: Kettle Creek Watershed Association can help to further establish and maintain a sense of community.

Nonprofit organizations can often help in the process in building pride and a stronger sense of community by working with individuals, government, and other interest groups. Finding common themes, topics, issues that people can agree on goes a long way to help build consensus for the future decisions of a community.

Water is something that everyone shares and needs. Water is critical to a community whether it be for human consumption, wildlife, or recreation.



KCWA meeting held on November 2, 2000

2.1 Goal: Envision the future of the KCWA as a potential long-term community-based organization for the conservation of natural and cultural watershed resources.

- 2.1.1 Periodically reassess vision of KCWA.
- 2.1.2 Develop a financial plan for the next five years.
- 2.1.3 Produce an annual financial report.
- 2.1.4 Develop a fund raising plan.
- 2.1.5 Explore the possibility to secure a grant or grants to establish an endowment.
- 2.1.6 Develop a membership recruitment and retention plan.
- 2.1.7 Evaluate the association through an annual assessment or report card.
- 2.1.8 Increase the number of partnerships with people and organizations within the community.

2.2 Goal: Increase the dialogue with people and other community organizations in the watershed, counties, and region.

- 2.2.1 Go on tour to give slide presentations about the KCWA to other civic organizations (e.g. Grange(s), Church Groups).
- 2.2.2 Set up and staff a display at all civic events such as Cross Fork Snake Hunt and County Fairs.
- 2.2.3 Co-sponsor roadside cleanup maintenance along a heavily traveled state and or township roadway with one or more other civic organizations.
- 2.2.4 Invite other civic organizations to give presentations at KCWA meetings



KCWA meeting held on November 2, 2000

- 2.2.5 Co-sponsor social fund raising activities with other civic organizations

CC 3.0 Issue: Identify known and potential differing viewpoints that could influence future community decisions.

Conflict is often the first way people start to address concerns in the society. However, conflict is not the only way and sometimes not the best way to resolve differing viewpoints in the community. Engaging people on a regular personal basis can help to foster trust and connections for expanded community interaction.



KCWA meeting held on April 26, 2001

Consensus democracy can often lead to more long term productive relationships.

3.1 Goal: Reach out to under represented and non-traditional stakeholders to improve understanding of community.

3.1.1 Develop a written list of business and other organizations that might have a conflicting view points in the region that are not in partnership with KCWA.

3.1.2 Invite the developed list of stakeholders to KCWA activities.

3.1.3 Brainstorm ways KCWA and business or organizations can find benefits of mutual interest.

3.1.4 Further develop understanding of community attitudes with Penn State Cooperative Extension and County Conservation Districts through survey and focus group activities.

3.1.5 Explore getting involved with the Community Information Network through Penn State Cooperative Extension.



Project team discussion of watershed recommendations



KCWA meeting held on April 26, 2001



FH 1.0 Issue: Stream habitat characteristics determine the number, size, and species of fish that can be sustained.

Understanding the interactions of habitat factors is important in determining the characteristics of the fish communities in a stream. Five classes of factors affect the distribution and abundance of stream fish: streamflow, water quality, energy source, physical habitat structure, and biotic interactions. These interact to determine the characteristics of the fish community along with characteristics of the riparian zone and the watershed.

Rapid bioassessments are the first step in determining potential fish habitat problem areas with habitat throughout the watershed. These assessments look at: instream cover, favorable epifaunal colonization, riffle quality, riffle quantity, various velocity-depth combinations, embeddedness, sediment deposition, channel alteration, channel flow status, bank vegetative protection, grazing or other disruptive pressure,

bank stability, and riparian vegetative zone

width. The current habitat assessments that have been used in the watershed need to be more detailed in order to better characterize the stream. One issue is that the same assessment sheet has been used regardless of the gradient of the stream being assessed. The gradient of the stream greatly affects the type of habitat that are available and needs to be considered. The Kettle Creek watershed consists of both low and high gradient streams, therefore a single habitat assessment sheet is insufficient. A detailed habitat assessment also needs to be completed in order to pinpoint locations that are in need of habitat improvement projects.

The recommendations pertaining to the complete previous habitat assessments are divided into five categories: fish and macroinvertebrate living conditions, riffle and velocity-depth

FISHERIES RECOMMENDATIONS



A typical stream bottom condition in Cross Fork

combinations, sediment in the stream, channel of the stream, and bank condition.

1.1 Goal: Improve and develop habitat assessments.

1.1.1 Perform a detailed habitat assessment (Level 2 or also called EMAP Analysis) throughout the watershed. An appropriate sampling design is critical to the success of any habitat. By taking an inventory on the amount of different habitat types, biologists can quantify habitat availability, identify potential limiting factors, and estimate fish species abundance. Before and after inventories of habitat types can also quantify the effects of habitat alterations and assess effective habitat enhancements. Coarse woody debris and available fish spawning beds are two examples of categories crucial in determining optimal habitats. These are not considered in detail using the Level 1 habitat assessments, but are examined in the Level 2 habitat assessments. More information can be obtained by reviewing Ch. 5 of the EPA rapid bioassessment protocol (EPA rapid bioassessment protocol website 2001). Some examples of this more detailed (level 2) habitat assessment can be found in Meador and others 1993, Klemm Lazorchak (editors) 1994, and Kauffman and Robison 1997, or by the American Fisheries Society, Humboldt

Center (<http://www.northcoast.com/~humbafis/fishmod.html>).

- Locations to look for funding or research assistance for this level 2 assessment are the EPA, Fish & Wildlife Service, Trout Unlimited, Bureau of Forestry, Penn State University, Lock Haven University, Mansfield University, and/or the Army Corps of Engineers (specifically, Section 206 of the Water Resources Development Act of 1996).

1.1.2 Utilize the existing habitat advisory board to guide cooperative efforts. Detailed habitat assessments involve many different fields of studies and include agency and community cooperation. An advisory board could consist of the Pennsylvania Fish and Boat Commission (PFBC), Bureau of Forestry, Trout Unlimited, and local townships.



Scenic views of Kettle Creek's main stem

1.1.3 Conduct (Level 1) habitat assessments using gradient specific habitat assessment protocols, one for low gradient streams and one for high gradient streams. According to the stream class map on page 7, the high gradient habitat assessment data sheet would be used on class A or B streams (>2% slope). The low gradient habitat assessment data sheet would be used on streams with class C (<2% slope). A suggested example of these gradient habitat assessment data sheets is included in Appendix, pages 301-304, and are available on the rapid bioassessment protocol website (<http://www.epa.gov/owow/monitoring/rbp>).

1.1.4 In conjunction with habitat assessment sheets, require that the Physical Characterization/Water Quality Field Data Sheet also be completed. This form (see appendix, pages 299-300) includes observations on riparian vegetation, instream features, watershed features, large wood debris, aquatic vegetation, sediment/substrate, along with water quality parameters. It is also available on the rapid bioassessment protocol website (see above).

1.1.5 Create a uniform sampling protocol which is conducted during the same season. Some categories in the habitat assessment change depending on season and may not be seasonally comparable. For example, channel flow status would score marginal in most streams during the summer months due to low flow conditions. If the assessment was conducted at the same location during the spring months (high flow conditions), the site may score higher in the channel flow status category. If a standard season was set to collect the data for these habitat assessments this problem could be eliminated.

1.1.6 Train volunteers and anyone else that will be conducting the Level 1 habitat assessments. Training is essential for the habitat assessments to be valid. The Chesapeake Bay Foun-



Clean, stream bottom rocks provide essential habitat for macroinvertebrates.

dation or the EPA are two organizations that may offer training workshops.

1.1.7 Make the rapid bioassessment protocol document available to the public, especially those conducting assessments. Chapter 5 of this document explains in detail the definitions of each category, why they are important, and gives pictures of examples of optimal and poor conditions in both high and low gradient streams. This is important for everyone conducting assessments to know and review.

1.2 Goal: Improve stream habitat focusing on flow, substrate, and riparian areas

1.2.1 A completed detailed habitat assessment, will identify potential areas that can be improved and then methods of habitat enhancement can be discussed.

1.2.2 Improve habitat conditions for fish and macroinvertebrates. Management for diversity will usually keep the stream in sound condition for biological resources. A well-functioning trout stream has plunges, backwaters, large woody debris and streamside vegetation, cobble, gravel, even sand and silt, depth, pockets, undercuts, and an optimal relationship between this diversity and yearlong food and habitat requirements. By providing complex

habitats, the overall biotic diversity is increased throughout the stream. Sections of Bergstresser Hollow, Cross Fork, Hammersley Fork, John Summerson Branch, Walters Run, Bearfield Run, and the mainstem all have some areas that potentially need improvement of these living conditions (For specific locations see page 137).

1.2.3 Maintain and improve riffle quality, quantity and ensure a mixture of velocity-depth combinations. Billings Branch, Sliders Branch, Ives Hollow Run, Boone Run, Cross Fork, Hammersley Fork, Trout Run, Walters Run, Bearfield Run, Twomile Run and the mainstem all contain sections that may need some riffle or velocity-depth combination improvements (For specific locations see pages 138 & 141). Macroinvertebrates prefer riffles over pools due to the availability of substrate to inhabit. Generally, different habitat types, including riffles, pools and backwaters provide different



Hevner Run

value to different fish species or certain life history stages of a particular species.

- Adding cobble sized rocks and boulders would improve riffle quality and cause a variety of velocity-depth combinations to occur. This also adds macroinvertebrate habitat. Be aware streamflow may move material downstream with storm events,

thus stream type and discharge should be considered.

- Adding coarse woody debris has many advantages. Installing woody debris increases the amount of fish cover. Pools are formed which can provide fish habitat and add to the variety of stream characteristics
- Trout productivity can be altered by the availability of spawning habitats, common techniques are to clean trap or secure gravels

1.2.4 Reduce sediment deposition in streams. Sections of Sliders Branch, Ives Hollow Run, Little Kettle Creek, Spicewood Run, Beaverdam Branch, Twomile Run, Huling Branch, and the mainstem all contain potential sediment problems (For specific locations see pages 138 & 140). Sediment deposition causes embeddedness and smaller channels which limits habitat potential for both fish and macroinvertebrates. Siltation is a major cause of degraded spawning habitat for fish species. Silt can smother eggs and decrease survival of juvenile fish. Silt can be a limiting factor in natural reproduction of trout. Sediment deposition can be caused by dirt and gravel roads (see goal WQ 1.1), agricultural practices (see goal LU 1.2), and stream bank erosion (see recommendation FH 1.2.6).

1.2.5 Maintain natural channel of stream and improve areas where the channel has been affected by human activities. Channel flow status needs to be studied more closely throughout the watershed due to seasonal variations in the data. The confluence of Kettle Creek and Hammersley Fork needs improvements due to a wide and shallow channel. The channel was altered when a bridge was installed and now does not follow its natural path. Some instream improvements to this section could be:

- Decrease erosion by implementing stream improvement projects (see FH 1.2.6 recommendation)

- Research bridge removal

1.2.6 Decrease erosion potential and increase stream bank vegetation. Sliders Branch, Germania Branch, Hungry Hollow, Long Run, Little Kettle Creek, Cross Fork, Hammersley Fork, Trout Run, Twomile Run, and the mainstem all had sections that had some potential bank problems (For specific locations, see pages 143 - 145). Stream bank erosion is an effect of the natural process of streams to change their course. Landowners living near these streams want to stop this movement of the stream so that they can enjoy the recreational and aesthetic benefits of their land. Stream bank erosion occurs when soil is worn away from the bank and transported by the stream flow. Streams whose banks are protected by trees and other vegetation can alleviate the nor-



mal stresses of flooding and stream velocity. The first step to erosion control is to prevent bank erosion from occurring. Key characteristics of a protected bank are:

- Vegetated banks
- No structures located on stream banks
- Minimal channel changes

Many effective means of stream bank erosion control are available, but all are situation specific. To choose the best solution, local conditions, possible techniques, and the objectives of the landowner must be considered. A concerned landowner could build some of the structures mentioned below and funding is available to aid in the construction. For further information, consult the book "A Stream Bank Stabilization and Management Guide for Pennsylvania Landowners," which is referenced at the end of this chapter. However, be aware that before improvement structures can be built on stream banks, a permit is needed from the DEP. Some potential erosion improving structures include:

- Live Stakes
- Live Fascines (bundles)
- Branch Packings
- Live Cribwall
- Stone Riprap
- Channel Block
- Log Frame Deflector



Gabions along Elk Lick Run

- Dry Stone Walls
- Gabions
- Cross vanes and J-hooks
- Streamside plantings of vegetation

1.2.7 Encourage landowners to implement habitat improvement projects on their own land. Private landowners should be a part of the conservation process. Funding is available for them to voluntarily improve the habitat on their own property. The U.S. Fish and Wildlife Service (Partners for Fish and Wildlife) is one example of this type of funding (<http://partners.fws.gov/index.htm>)



Fishing in Ole Bull State Park

1.3 Goal: Monitor habitat to attain more self-sustaining wild trout populations.

1.3.1 Completion of an angler survey on different trout streams to determine angler pressure and attitude on current management strategies.

The three fundamental descriptors of a fishery are the catch, angler effort expended and catch per unit effort. All are typically estimated by the angler survey technique which consists of interviews of anglers, inspection of catch, and tabulation of hours spent fishing. The surveys are completed by the Pennsylvania Fish and

Boat Commission (PFBC) and prioritized by the Unit Leaders and Fisheries Management, then executed if sufficient funds are available to conduct. The KCWA volunteers could work with PFBC to target stream sections or management strategies to determine angler attitudes and pressure specific to an area. The last survey completed on Kettle Creek was in 1984 on one of the catchable trout sections of the mainstem.

1.3.2 Manipulation of the biotic community by stocking.

A commonly used management approach to modify the fish community structure of a stream is to stock hatchery trout. The role of hatchery reared fish is to either supplement wild trout populations or to provide angling where no wild trout exist. Stocking can reduce the number of wild trout available to anglers and may cause some genetic alterations of the wild stocks. Kettle Creek is one of the most intensively stocked streams in Pennsylvania due to the high angling pressure. The PFBC has developed many trout management strategies for the Kettle Creek watershed. Completion of a more comprehensive angler survey will help target stream areas and will lead to a better understanding of the fishery.

1.3.3 Regulate the catch

Management of self-sustaining wild trout streams would be better directed at maintaining or enhancing riparian habitat, maintaining adequate water flows, and applying appropriate catch regulations. The PFBC decides and enforces all the catch regulations on Kettle Creek. Angler surveys could provide target areas for which regulation changes may be needed.

FH 2.0 Issue: Warm water fish habitats constitute an important component of recreational fisheries.

Success of a fishery is determined largely by the degree to which the desires and expecta-

tions of the fishing public are fulfilled. Fishing harvest can have a major affect on the numbers, size growth rates, and productivity of fish populations. Other factors that influence fish communities in lakes include the water level, timing and nature of fishing harvest which in turn affects the quantity, sizes, and types of fish available for future harvests. Angler regulations and controls on lake access are the primary means of controlling angler harvest. Problems can result from both over fishing and under utilized.

2.1 Goal: Recognize values and opportunities in the Kettle Creek Watershed

2.1.1 Establish a balance between allocations to the different users groups and the health of the resources that serve them in the Kettle Creek Lake recreational fishery

Potential Lead Organizations and/or Funding Sources for Fisheries Recommendations:

U.S. Fish and Wildlife Service

Trout Unlimited

County Conservation Districts

Pennsylvania Fish and Boat Commission

DCNR Scenic Rivers Program (See Appendix C for more details)

NRCS- branch of the USDA

State soil conservation services

Local Universities (labor and research)

U. S. Corps of Engineers (specifically, Section 206 of the Water Resources Development Act of 1996)



Kettle Creek Lake

Available funding sources for recreational fisheries partnership projects opportunities

<http://swr.ucsd.edu/funding.htm>

References

EPA Rapid Bioassessment Protocol website
<http://www.epa.gov/owow/monitoring/rbp>
Accessed on April 16, 2001.

Jones, Daniel and Mark Battaglia. A Streambank Stabilization and Management Guide for Pennsylvania Landowners.

Kaufmann, P.R. and E.G. Robison. 1997. Physical

Habitat Assessment. Pages 6-1 to 6-38 in D.J. Klemm and J.M. Lazorchak (editors). Environmental Monitoring and Assessment Program. 1997 Pilot Field Operations Manual for Streams. EPA/620/R-94/004. Environmental Monitoring Systems Laboratory, Office of Research and Development, U.S. Environmental Protection Agency, Cincinnati, Ohio.

Klemm, D.J. and J.M. Lazorchak (editors). 1994. Environmental monitoring and assessment program -- surface waters and Region 3 regional environmental monitoring and assessment program. 1994. Pilot field operation and methods manual for streams. Environmental Monitoring Systems Lab. Office of Research and Development, U.S. Environmental Protection Agency, Cincinnati, Ohio. EPA/620/R-94/004.

Meador, M.R., C.R. Hupp, T.F. Cuffney, and M.E. Gurtz. 1993. Methods for characterizing stream habitat as part of the national water-quality assessment program. U.S. Geological Survey Open-File Report, Raleigh, North Carolina. USGS/OFR 93-408.

American Fisheries Society, Humboldt Center-



Photo: Tim Stecko

Northern pike (Esox lucius)



Photo: Tim Stecko

Largemouth bass (Micropterus salmoides)

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Photo: Tim Stecko

Rock bass (Ambloplites rupestris)



Photo: Tim Stecko

Bluegill sunfish (Lepomis macrochirus)



Photo: Tim Stecko

Brown Bullhead catfish (Ameiurus nebulosus)



Photo: Tim Stecko

Longnose dace (Rhinichthys cataractae)



TP 1.0 Issue: Data are needed to evaluate changes in temperature that may threaten coldwater fisheries.

Aquatic ecosystems are extremely sensitive to minimal fluctuations in water temperature. The Kettle Creek watershed is known for having a thriving coldwater fishery and an abundant trout population. Besides having the proper habitat and available food sources, cool stream temperatures are essential for survival of trout populations.

To ensure the protection of Kettle Creek's coldwater fisheries, any factors that influence the thermal regime of the stream must be monitored and evaluated periodically. Thermal issues have been a concern on the Kettle Creek watershed for over 60 years, yet no comprehensive thermal study has been completed. Currently, coldwater fisheries with thermal problems have not been located and cannot be remediated.

1.1 Goal: Continuation and annual re-evaluation of the newly established thermal study on the Kettle Creek watershed.

1.1.1 Continue monitoring water temperatures throughout the watershed. In the spring of 2001, a comprehensive thermal study was implemented on the Kettle Creek watershed. The study implemented must continue for one year of time for the data to be useful in evaluation of the thermal regime of streams throughout the watershed and to locate potential problem areas.

1.1.2 Re-evaluate thermal study annually. After one year of data collection, data must be evaluated to locate areas along the watershed with and without thermal problems. The HOBO temperature loggers should then be relocated from areas without problems to other areas in the watershed that have not yet been thermally assessed.

THERMAL PROTECTION

1.1.3 Annually document thermal study progress. After each year of data, a formal report should be written. This will document changes over time and serve as a historical reference in future studies.

1.2 Goal: Monitor temperature stratification of the Kettle Creek Lake.

1.2.1 Develop and implement a thermal study of the Kettle Creek Lake. In August of 1997, it was documented that the Kettle Creek Lake had violated the minimum limit of dissolved oxygen (DO) for lakes (Clean Water Act Section 303d Impaired Waters Listing). Low levels of DO may be caused by increased temperatures and both can adversely affect fish populations. A cooperative thermal study should be developed with the PFBC and the PADEP to monitor temperature stratification and identify any thermal problems.

1.2.2 Annually document thermal study progress. After each year of data, a formal report should be written. This will document changes over time and serve as a historical reference in future studies.



Alvin R. Bush Dam

1.3 Goal: Monitor and evaluate each dam's influence on the thermal regime of Kettle Creek, and (if necessary) implement improvement projects.

1.3.1 Develop and implement a thermal study of each dam on Kettle Creek. Dams can have a significant effect on water temperatures in a stream, which can, over time, lead to changes in fish assemblages. A study should be designed to monitor the temperatures above and below each dam to determine if any changes occur as a result of the dam.

1.3.2 Implement a thermal improvement project below each dam with thermal problems.

- Erosion and streamside revegetation projects (For more information see recommendation FH 1.2.6)
- Consult with the Pennsylvania Fish and Boat Commission on dam breaching and improvement projects (http://sites.state.pa.us/PA_Exec/Fish_Boat/pfbchom2.html)

1.4 Goal: Monitor and evaluate each tributary's influence on the thermal regime of Kettle Creek, and (if necessary) implement improvement projects.

1.4.1 Develop and implement a thermal study of each tributary's influence on Kettle Creek. Kettle Creek's coldwater fisheries are dependent on the cooling provided by the coldwater tributaries. In some locations along Kettle Creek, tributaries have experienced channel alteration at the confluence with the mainstem. This stream modification has caused increased temperatures along the tributary, which then does not contribute coldwater to the mainstem. Some major tributaries in the Kettle Creek watershed have already been included and will be assessed by the comprehensive thermal study already implemented (as mentioned above). After evaluation of the major tributaries, all other tributaries should be studied and evaluated for thermal problems.

1.4.2 Implement a thermal improvement project at each tributary with thermal problems.

- Erosion control and streamside revegetation projects (For more information see recommendation FH 1.2.6)
- Agricultural runoff reduction projects (For more information see goal LU 1.2)

1.5 Goal: Monitor and evaluate the effects of land use on the thermal regime of Kettle Creek, and (if necessary) implement improvement projects.

1.5.1 Develop and implement a thermal study of land use impacts on the thermal regime of Kettle Creek and its tributaries. Many streams in the Kettle Creek Watershed may have experienced or are experiencing increased temperatures due to changes in land use in the area. These areas need to be evaluated to determine if they are contributing to watershed-wide thermal problems.

- Evaluate headwater agricultural areas.
- Evaluate streams below camps or towns
- Evaluate streams below state parks

1.6 Goal: Monitor and evaluate any instream or riparian thermal improvement projects implemented.

1.6.1 Evaluate all thermal improvement projects. By periodic monitoring and evaluation of the projects implemented, a determination of the significance of the project can be made and future projects can be modeled after successful ones.

1.7 Goal: Identify and raise awareness among streamside residents on steps they can take to reduce habitat disturbances.

(For more information see EO 2.1)



Lack of riparian cover along Kettle Creek mainstem.

TP 2.0 Issue: Minimal instream and riparian cover and buffers contribute to the increasing temperature of coldwater fisheries.

Streamside forest canopy is one factor that significantly contributes to the cooling of stream ecosystems. Loss of shade from vegetation removal or stream widening can warm streams above temperatures trout can withstand while, at the same time, reducing dissolved oxygen available for all aquatic biota. Agricultural areas may also contribute to increased stream temperatures when cooler groundwater is drained to unshaded ditches (USDA 1991).

2.1 Goal: Continue to identify and prioritize areas lacking adequate canopy cover.

2.1.1 Complete the identification of areas lacking streamside forest/riparian canopy cover. The watershed above Long Run has been remotely assessed for riparian buffers to determine where canopy cover is lacking and temperature increases are probable. This assessment could be continued within Arc View GIS to determine other areas with potential for thermal problems and where vegetative cover is needed. Coordinating this project with instream



Watercress in Germania Branch.

thermal studies, and detailed habitat studies will provide areas for improvement.

2.1.2 Prioritize areas lacking canopy cover. Those areas identified as problems should be evaluated to determine which spots should be a priority. These areas are based on need for improvement and potential for success. Areas that need improvement, but may not support a fish population regardless of the canopy cover should be last to receive attention. Those problem locations with adequate food availability and excellent instream habitat should have canopy improvements first.

2.1.3 Implement canopy cover improvement projects. After identification and prioritization of areas needing improved vegetative cover, implement projects to increase canopy cover on those areas.

- Plant native trees that will provide adequate canopy cover.
- Plant native trees that grow fast and grow well in riparian conditions.

The Chesapeake Bay Program's Riparian Handbook: A Guide for Establishing Maintaining Riparian Forest Buffers (1997). (photocopies available from 1-800-YOUR-BAY, or USDA Forest Service 304-285-1592)

2.1.4 Periodically re-assess the watershed for areas lacking canopy cover. Over time, streams may widen and other areas may be added to those with inadequate canopy cover. Every few years, this riparian buffer assessment should be done to detect new problem areas and observe successful ones.

2.2 Goal: Protect and improve canopy cover and riparian buffers throughout entire watershed.

2.2.1 Identify and protect exemplary riparian buffers throughout watershed to ensure that these important resources are maintained.

2.2.2 Improve riparian buffers throughout the watershed. Besides the benefits of erosion, flooding, and sediment control, adequate riparian buffers protect streams from thermal pollution. Even well-established riparian buffers can be enhanced to ensure temperature increases do not occur.

- Continue periodic planting of native riparian vegetation.

Potential Lead Organizations and/or Funding Sources

Pennsylvania Fish and Boat Commission
http://sites.state.pa.us/PA_Exec/Fish_Boat/pfbchom2.html

Environmental Protection Agency - Cooperative State Research Education and Extension Service
<http://www.epa.gov/owow/watershed/wacademy/fund/special.html>

The Chesapeake Bay Program's Riparian Handbook: A Guide for Establishing and Maintaining Riparian Forest Buffers (1997). Photocopies available from 1-800-YOUR-BAY, or USDA Forest Service at 304-285-1592.



Water quality is a measure of watershed health. Water is positively and negatively influenced as it flows across the surface and through the subsurface of a watershed. The water is the ultimate indicator of watershed health because it collects and transports chemicals, soil, and energy through a watershed. Water quality also influences the biotic communities that develop in a watershed. All life is dependent on water. The quality or characteristics of the water inhibit or enhance the abilities of certain organisms to exist. Trout need clean cold water to reproduce and survive. Largemouth bass need warm, nutrient rich water to survive and reproduce. The water quality of a stream or lake influences whether bass or trout will be found there.

Water quality can be measured and classified using parameters ranging from chemical thresholds to depth of light penetration in the water column. Most classifications use a combination of chemical and physical parameters to express

water quality. Legal regulations have been developed that use water quality as a determinant of a violation. The Clean Water Act and the National Pollution and Discharge and Elimination System are examples.

WQ 1.0 Issue: Non-point source (NPS) pollution in surface waters degrades water quality.

Several NPS pollution sources exist within the Kettle Creek watershed including dirt and gravel roads, acid mine drainage (AMD), acidic deposition, and agricultural runoff. These and other sources impact the water quality of the watershed by increasing siltation, decreasing pH, and increasing nitrogen and phosphorous levels in streams and wetlands. Stormwater runoff also influences water quality by washing oils, silt, and salt from roadways into adjacent streams and wetlands.

WATER QUALITY

1.1 Goal: Reduce nutrient, sediment, and chemical non-point source pollution delivery to target areas and key tributaries.

Nutrients

1.1.1 Prioritize subwatersheds of concern based on potential nutrient pollution from the Generalized Watershed Loading Function (GWLF) model. Balance priority with fishery issues and riparian habitat inventory data. The priority watersheds appear to be Long Run (protection/conservation), Sliders Branch (improvement), Germania Branch (improvement), Cross Fork (conservation/improvement) and Little Kettle Creek (improvement/restoration), in that order.

1.1.2 Develop a means for ground-based investigation within priority subwatersheds. This ground inventory should identify watershed landowners (public or private) that have actively employed Best Management Practices (BMPs) for demonstration opportunities and landowners that may need assistance in employing BMPs.

1.1.3 Develop strategies to improve wastewater treatment systems on the watershed. Develop educational programs on maintenance and potential harmful effects of poorly designed or maintained septic systems. Identify landowners with exemplary systems for demonstration to other residents. Cooperate with state parks to develop alternative/effective wastewater demonstration in floodplains. Assist Bureau of Forestry (BOF) to achieve compliance on seasonal homes and camp systems through education. Connect with Penn State University for research regarding alternative wastewater systems technology.

Chemicals

1.1.4 Cooperate with utility industry and the State Forests to assist and develop maintenance of gas pipeline rights-of-way with non-herbicide maintenance near stream crossings,

wetlands, and sensitive areas. Identify current practices and procedures related to gas pipeline hazard mitigation.

1.1.5 Cooperate with PennDOT, State Forests and Townships to develop road maintenance alternatives to salt as well as environmentally-benign dust suppressants. Utilize the opportunities as demonstration areas within the state.

1.1.6 Inventory specific areas where paved roads approach and parallel streams for potential road runoff directly to streams. Cooperate with PennDOT to develop strategies and mitigate the paved road runoff problem sites.

1.1.7 Assist the Bureau of Forestry with announcements relating to the application of herbicides.

1.1.8 Cooperate with conservation districts and Penn State Cooperative Extension to improve BMPs at agricultural sites and work with landowners on chemical application safety.

Sediment

1.1.9 Prioritize the Dirt and Gravel Road program's identified problem sites for improvement based on subwatershed sediment runoff rankings. Long Run should be an immediate priority related to the quality of the stream and minimal work required to improve the current conditions. Cross Fork, Upper Kettle Creek, Sliders Branch, Germania Branch, and Little Kettle Creek are other priority subwatersheds. Work with the Potter and Clinton counties QAB and relevant townships to target funds for these sites. Implement demonstration areas using the most innovative road erosion reduction strategies for educational benefit/demonstration.

1.1.10 Monitor runoff from the sites before and after implementation using community volunteers and county conservation districts.

1.1.11 Develop a “road husbandry” program with community volunteers for monitoring potential problem areas, trash clean-up and erosion control maintenance.

1.1.12 Inventory road-crossings for problems with scour, fish passage blockages, and infrastructure damage. Cooperate with PennDOT on routine maintenance assessments for bridges and culverts.

1.1.13 Attend county-level Dirt and Gravel Road training events to develop knowledge base for monitoring and husbandry program.

1.1.14 Work with landowners, townships and counties to reduce erosion from private lands within priority subwatersheds. Develop a driveway inventory during storm-events and work with landowners to correct local problems.

1.1.15 Cooperate with Bureau of Forestry, USDA Forest Service, and Farm Bureau for assistance on streamside tree-planting efforts to reduce erosion at identified problem sites.

1.1.16 Cooperate with the Bureau of Forestry to identify problematic old roads, trails, and harvest sites that may not have fully revegetated. Complete this forest lands problem sites inventory in key watersheds, (i.e. Cross Fork)

1.1.17 Identify forested lands in private ownership within target watersheds that could be assisted by state and federal cost-sharing programs for forestry BMPs.

1.2 Goal: Identify and mitigate acid mine drainage sources.

1.2.1 Identify and inventory secondary AMD sources using advanced technology including ground penetrating radar, terrain conductivity, and thermal infrared imaging. Seek assistance from Terry Akerman (U.S. Department of Energy, Pittsburgh Office) to use state of the art tools. The Klimkos, Hedin, and TMDL studies



AMD remediation on the Kettle Creek watershed

have identified the primary sources of AMD, however there is the potential for multiple diffuse sources to contribute significant volumes of AMD. Examples are springs discharging to stream beds and early spring flows.

1.2.2 Collaborate with other watershed organization in the region to share the costs of expensive sampling techniques listed in 1.2.1 and EO3.1.2. Several watershed associations located in the surrounding region, including Anderson Creek, Beech Creek, and Babbs Creek Watershed Associations, also have AMD impacts and a collaboration between the groups would economize expensive sampling techniques.

1.2.3 Continue to construct passive treatment systems to mitigate AMD impacts. Passive treatment systems are less expensive to maintain and mitigate aluminum and iron loads. Passive systems with wetland components also provide wildlife habitat.

1.2.4 Dedicate an area to AMD mitigation research. Publicize this area to attract groups (local universities, research groups, and government agencies) conducting AMD research. Research organizations continually search for sites to conduct research. Volunteering a site will provide increased information and potentially subsidized treatment of AMD impacts.

Potential Lead Organizations and/or Funding Sources

Lock Haven University, West Virginia University Extension Service, Penn State University, Acid Drainage Technology Initiative (ADTI), and Appalachian Clean Streams Initiative from Office of Surface Mining, Department of the Interior.

1.2.5 Aggressively pursue the remediation of AMD on Huling Branch even if it includes active treatment. Huling Branch contributes approximately 50 % of the metals and acidity discharged via Twomile Run into Kettle Creek. Full restoration of the lower Kettle Creek is dependent on improved water quality on Huling Branch. A small reservoir could be constructed on the headwaters of the Huling branch to collect diffuse sources near the tipple. The hydraulic head developed by the reservoir could be used to power lime dosing devices or other chemical addition devices without the construction of expensive utility lines. The standing water could facilitate the construction of treatment wetlands to naturally mitigate AMD sources.

1.2.6 Use the reclamation of both terrestrial and aquatic ecosystems, and regional water quality improvement to increase potential sources of funding. Kettle Creek is a major tributary to the West Branch of the Susquehanna River. Reclamation of Kettle Creek has ecosystem scale impacts which could attract funding from the Chesapeake Bay Foundation, Nature Conservancy, and US Env. Protection Agency. The following website has a list of federal funding sources for watershed projects: <http://www.epa.gov/owow/watershed/wacademy/fund/sources.html>

1.3 Goal: Identify, reduce and mitigate stormwater runoff.

1.3.1 Identify present and potential problem areas. Develop an inventory of problem areas using community members to locate and describe stormwater issues.

1.3.2 Develop a comprehensive stormwater management plan based on watershed boundaries not political boundaries. Stormwater problems occur across municipal boundaries and are unresolvable unless addressed at the watershed scale.

1.3.3 Implement plan under Act 167, the Stormwater Management Act. Resources are available under the stormwater management act to develop the plan.

1.3.4 Develop landuse policies requiring stormwater retention basins for 25 year events, reduction/limitation of impervious surfaces, and implementation of BMPs. Retention of stormwater reduces runoff and erosion to streams and wetlands, reduction of impervious surfaces also decreases run off, and application of BMPs will have benefits beyond stormwater including, wildlife and visual benefits.

WQ 2.0 Issue: Comparable studies are necessary for effective evaluation of water quality

Many resource agencies, universities, and volunteer groups take part in watershed water quality monitoring. Each of these groups functions independently and problems can arise when the watershed organization attempts to use the data provided from each group. In order for studies to be useful, a standard set of parameters needs to be measured enabling a comparison of the data to other studies and other areas of the watershed. The Water Quality Network station is a continuous monitoring study currently on the watershed. Continuous monitoring studies are extremely important in

determining changes in the water quality. The data collected should be representative of the majority of the watershed. Being that the station is located below the Alvin Bush Dam, the data are not a clear representative of the whole watershed due to the impoundment effects on water quality.

2.1. Goal: Develop a water quality sampling protocol.

2.1.1 Develop a standard set of parameters that each group working on the watershed should use (for a list of suggested parameters see Appendix L, page 340). This standard list is also a suggested standard practice when conducting the Level 1 habitat assessments. It is acceptable if a certain group would like to expand on the standard parameters as long as the standard set is always sampled. This enables the KCWA to compare data between studies and throughout the watershed.

- For macroinvertebrate field and lab analysis, it is suggested that Ch.7 of the rapid bioassessment protocol (see references) should be reviewed and followed. A standard index should be chosen from the rapid bioassessment protocol indices (also in Ch.7 of the rapid bioassessment protocol).
- Air temperature needs to be taken every time water temperature is taken for comparison purposes and for seasonal or yearly variations. The air temperature is taken frequently at the Alvin Bush Dam and this can be used while monitoring or it can provide historical air temperature data.

2.1.2 Develop standard methods for sampling standard set of parameters. This will ensure that data collected will be usable and comparable to data collected by all groups.



Temperature readings along Germania Branch

2.1.3 Attempt to use previous sites for new studies. By using the same sites for newer studies, background data are available for comparison. For example, any new studies focusing on the mainstem could use the same sites as the thermal monitoring project.

2.1.4 Add an estimation of flow to the Volunteer Sampling Protocol. Rather than reporting flow as high, normal, or low, a numeric flow value would be more beneficial to use. Flow can be estimated without using expensive equipment and is fairly accurate (see Appendix L, page 339).

2.1.5 Develop a rating curve relating water level to flow. By the end of the summer of 2001, several staff gauges will be installed throughout the mainstem and some tributaries of Kettle Creek (at most of the thermal monitoring sites). At these locations, it is most desirable to develop a rating curve to enable samplers to estimate flow without having flow measuring equipment (see Appendix L, page 339).

2.2. Goal: Establish Water Quality Network station above Alvin Bush Dam.

2.2.1 Establish a Water Quality Network station at the USGS gauge at Cross Fork to collect water quality information not impacted by the Alvin Bush Dam.

Potential Lead Organizations and Funding Sources

Pennsylvania Department of Environmental Protection (PA DEP)

Pennsylvania Department of Conservation of Natural Resources (PA DCNR)

Pennsylvania Fish and Boat Commission (PFBC)

Susquehanna River Basin Commission (SRBC)

Chesapeake Bay Foundation - Chesapeake Bay Program Financial Assistance Funding Program <http://www.epa.gov/r3chesp/>

(http://www.dep.state.pa.us/dep/local_gov/GrantStatusCalendar.htm)

Trout Unlimited

Local Universities

Environmental Protection Agency (EPA) <http://www.epa.gov/owow/nps/funding.html>

WQ 3.0 Issue: Acidic Deposition has potential to impact the water quality.

Many areas in the northeastern U.S. have become concerned over atmospheric deposition of pollutants to natural ecosystems. The Kettle Creek watershed is centrally located in a state that experiences some of the highest levels of acidic deposition in the country. Although areas of Pennsylvania are not adversely affected by the occurrence of acid rain, there are many locations throughout the Kettle Creek watershed that are potentially susceptible.

The impacts of acidic deposition can be substantial in forested watersheds because it negatively affects both terrestrial and aquatic resources. Extreme acidification of soil can cause infertility of the soil, leading to reduced growth

in many acid sensitive tree species. Aquatic ecosystems are very sensitive to acidification. Fish populations and other aquatic biota may be compromised if severely impacted by acidic deposition. No comprehensive study has been conducted on the Kettle Creek watershed concerning acidic deposition and, therefore, its impact on the watershed is unknown.

3.1. Goal: Stay abreast of regional trends in acidic deposition

3.1.1 Continue looking at acidic deposition data for Pennsylvania by the using the information provided by the Pennsylvania Atmospheric Deposition Monitoring Network. By periodically accessing the website (<http://nadp.sws.uiuc.edu/>) for National Atmospheric Deposition Program (NADP), the Kettle Creek Watershed Association can remain informed on regional trends.

3.2. Goal: Identify if any areas in the Kettle Creek watershed are adversely affected by acidic deposition.

3.2.1 Develop study of episodic acidification. Episodic acidification occurs when a stream is impacted by sudden high water events carrying water low in pH (such as snow melt or rain events). If a stream is affected by acidic deposition, during rain events, the pH of the stream will temporarily greatly decrease. Sampling of this type should be done during high flow, which usually occurs during spring snow melt events (see Appendix K, pages 329 - 330).

Potential Lead Organizations and Funding Sources

Local universities (labor and research)

National Atmospheric Deposition Program

Pennsylvania Atmospheric Deposition Monitoring Network



Fern growth is abundant throughout the forests in the Kettle Creek watershed.

Pennsylvania Department of Environmental Protection

Environmental Protection Agency - The Science to Achieve Results (STAR) program

<http://www.epa.gov/owow/watershed/wacademy/fund/science.html>

<http://www.epa.gov/owow/nps/funding.html>

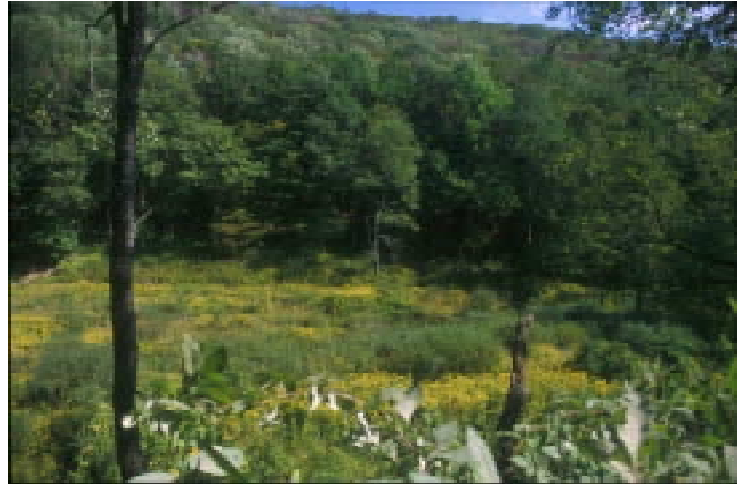
WQ 4.0 Issue: Wetlands perform critical functions in protecting water quality.

Wetlands can remove nutrients (nitrogen, phosphorous, potassium), retain sediments, store flood flows, and provide habitat for many species of wildlife. Wetlands in the watershed have been mapped by the United States Geological Survey (USGS) on National Wetland Inventory (NWI) maps. The delineation of the wetlands was completed using aerial photography. Very little ground verification was conducted. Wetland resources need to be protected in the watershed as a step to protecting the exceptional water quality of Kettle Creek.

4.1 Goal: Identify wetland resources in the watershed.

4.1.1 Develop a detailed inventory of all wetlands in the watershed using NWI maps, thermal infrared imaging, ground verification, and wetland models. The wetland model (see appendix, pages 293-294) applied to the watershed identified 472 acres of additional potential wetlands in the watershed.

4.1.2 Develop a GIS to inventory and display wetlands identified by methods in 4.1.1. Use the GIS to develop wetland protection areas



A beautiful wetland area found downstream of Billings Branch

4.1.3 Develop an agreement with a local university or DCNR to conduct the wetland inventory.

4.2 Goal: Protect wetland resources in the watershed.

4.2.1 Develop landuse policies to protect wetlands throughout the watershed including:

- Twenty-five foot buffer between identified wetlands and any development (road construction, building construction, etc).



Looking for fish in a pool on Billings Branch

See Appendix E page 291 for a list of programs and funding sources

WQ 5.0 Issue: High quality water supplies are essential.

Biotic communities depend on high quality surface water to grow, reproduce, and survive. Groundwater provides baseflow to streams and wetlands. Springs and seeps are used as drinking water sources for wildlife and people. Residents of Kettle Creek depend on high quality ground and surface water for drinking, cooking, bathing, and commercial uses. Every organism in the watershed is dependent on high quality water supplies.

- Require 2:1 mitigation ratio for impacted wetlands including a functional assessment after replacement is completed to determine if the constructed wetland replaces the impacted.

4.2.2 Develop a program encouraging landowners to sell development rights for wetlands and wetland buffers.

4.2.3 Educate landowners about the potential availability of Wetlands Reserve Program (USDA) which protects wetlands via the purchase of easements.

4.2.4 Incorporate wetlands in stream restoration projects via development of backwater areas, overbank flooding to naturally low areas, and grading banks to facilitate natural wetland development.

Federal funding sources for wetland protection are listed on the following website: <http://www.epa.gov/owow/watershed/wacademy/fund/sources.html>

The National Audubon Society has an active wetlands protection program and multiple funding sources can be found at this website: <http://www.audubon.org/campaign/wetland/funding.html>

5.1 Goal: Preserve and protect groundwater.

5.1.1 Identify major groundwater recharge areas. Positive identification of recharge areas is beyond the capabilities of the Keystone Project. A detailed identification of recharge areas will delineate areas that should be protected via landuse practices.

5.1.2 Develop landuse policies to protect recharge areas including restricting activities that potentially threaten groundwater quality, such as mining or landfill development.

5.1.3 Identify zones of discharge and features associated with discharge including wetlands, springs, and seeps and use landuse practices to protect discharge areas.

5.1.4 Seek assistance from the DEP to assist with implementation of Comprehensive State Groundwater Protection Program (CSGWPP) in the watershed.

5.1.5 Coordinate ground water quality protection practices with the DCNR.

5.2 Goal: Preserve and protect surface water.

5.2.1 Develop a comprehensive surface water quality policy with benchmarks including current water quality and future water quality goals.

5.2.2 Identify present and potential impacts to surface water quality.

5.2.3 Develop and implement a plan to address the impacts.

5.2.4 Develop landuse policy creating a minimum of 25 ft. buffers around surface water bodies including: ponds, springs, seeps, streams, and wetlands.

5.2.5 Coordinate surface water quality protection practices with the DCNR.

5.3 Goal: Preserve and protect drinking water supplies.

5.3.1 Identify drinking water supplies in the watershed. The watershed assessment identifies 52 wells that have been permitted by the DEP; however, there are a large number of private wells that are not identified.

5.3.2 Delineate surface areas that supply drinking water and delineate areas with signs to increase awareness of impacts of certain activities to the water supplies of the watershed.

5.3.3 Identify source of supply and develop landuse policy to protect that source.

5.3.4 Seek assistance for development and implementation of a DEP wellhead protection program.



LU 1.0 Issue: Conservation can maintain the amount of agricultural lands in the watershed.

Productive farmland in Kettle Creek was once dispersed throughout the watershed. Today, few remnants of the once extensive agricultural landscape exist. Agricultural lands are rapidly declining as smaller scale farming operations can simply no longer afford to stay in production. Today, these lands are increasing in economic value. They are being sold off to developers for potential residential, commercial and even resort development, resulting in a changing watershed identity.

In addition to the potential loss of agricultural heritage, private agricultural lands in Kettle Creek are situated in areas that have the greatest impact on the watershed. Specifically, private agricultural lands in the northern portion of the watershed rest within the headwaters of Kettle Creek. Development in this area could not only have a direct impact on the water quality and wildlife habitat, but also on all reaches further downstream.

Conservation of agricultural lands, in addition to careful management of production practices, particularly within the northern portion of the watershed, could serve to preserve the agricultural identity and the ecological integrity of the watershed.

LANDUSE RECOMMENDATIONS

1.1 Goal: Identify and prioritize high value agricultural lands for conservation.

1.1.1 Consider land with high agricultural productivity a priority for easement programs and PDRs (Purchased Development Rights) to prevent future development in these areas. This might include limiting road construction on high productivity soils to perpetuate agricultural use and promote connectivity of the vegetated areas.

1.1.2 Encourage resident participation in agricultural preservation programs such as the



Billings Branch

Farmland Preservation program, ASAs (Agricultural Security Areas), Conservation Easements, Environmental Quality Incentives Program (EQIP) and Clean and Green. Promote these programs, not only as conservation initiatives, but also according to their benefits to the landowner through federal and state tax cuts and technical and financial assistance.

1.1.3 Develop separate tax rates for open space. For example agricultural land and forested land are taxed at 50% of the rate for developed land to encourage landowners to maintain their land as undeveloped green space.

1.2 Goal: Develop and encourage the use of Best Management Practices (BMPs) on Agricultural Production lands to minimize impacts on adjacent natural resources.

1.2.1 Implement buffer programs in areas where agricultural lands are situated in close proximity to the stream (particularly in the headwaters in Potter County).

1.2.2 Promote NRCS (Natural Resource Conservation Service) BMP practices for agricultural production.

- nutrient management
- no till farming
- sustainable agriculture

LU 2.0 Issue: There is a potential for more intense development of existing private lands.

The rural character of the watershed is important to both residents and visitors. Both groups enjoy the abundant open space and low-density development that maintains a high quality of natural space. Yet, limited landuse planning could invite development that does not follow the existing, low-density (and in many cases historic) development character.



Cross Fork

Development potential within the watershed could occur via redevelopment of existing private lands or through new development on open parcels such as the agricultural areas discussed above. While lands in private ownership today might have a minimal affect on the resources offered in the watershed, this land, if sold, could be developed with larger homes, inviting greater infrastructure to serve those parcels. Private open spaces, in areas with limited or no zoning, present an even greater chance of development that does not follow the character of the watershed today.

While zoning and landuse planning provide vehicles for the community to guide future development in their neighborhood, alternatives, such as Conservation Easements and the Purchase or Transfer of Development Rights (PDRs and TDRs) could allow residents to maintain ownership of their valued property, yet ensure its conservation through time.

2.1 Goal: Monitor growth and development in the watershed

2.1.1 Inventory existing structures and continue this inventory on an annual basis to document change.

2.1.2 Inventory existing historical and cultural resources.



Yochum Hill Cemetery

2.2 Goal: Encourage positive future residential and commercial development that not only maintains the rural architectural identity of the watershed but which also follows sustainable ‘BMP’ development.

2.2.1 Educate residents, local officials and business about the heritage in their watershed and its value to both the watershed and the region. Monitor local development patterns, identify potential development sites, and guide growth to desirable sites.



The Folded Hills Lodge

2.2.2 Consider and educate about the potential for future development; plan for future development.

2.2.3 Demonstrate that property values will increase in areas adjacent to a greenway or recreational corridor.

2.2.4 Encourage developers to create green ways in developments.

2.2.5 Develop policy to limit growth at a sustainable rate that increases the value of each parcel without explosive growth.

2.3 Goal: Encourage development that follows the existing architectural and cultural identity of the watershed.

2.3.1 Maintain open space.

2.3.2 Identify conservation areas prior to development and encourage the conservation of these areas as open space.

2.3.3 Link natural conservation areas to larger natural areas and to greater recreational corridor.

2.3.4 Encourage infill and redevelopment to minimize impervious surfaces.



The rural landscape along Route 144

2.3.5 Encourage new development in close proximity to existing infrastructure such as roads and utilities.

2.3.6 Acknowledge, publicize, and give awards to builders who follow BMP building techniques.

2.4 Goal: Encourage development in environmentally suitable areas (site suitability) and cluster new development around existing infrastructure.

2.4.1 Consider stormwater management: future development should consider impact on water quality and quantity (following the Clean Water Act and the Stormwater Act 167). Create a zero storm water discharge policy for the 25-year storm event.

2.4.2 Encourage flood control programs: through flood proofing and rehabilitation, clearance and relocation of structures, safety inspections, flood insurance, flood warning and community education.

- a. Enable relocation of residences in the flood plains through agencies such as Federal Emergency Management Agency (FEMA). (<http://www.fema.gov>)

- b. Land swaps with the state forest: Swap a floodplain parcel for upland plateau parcel 1:1.5 ratio to make the swap an incentive.

- c. TDRs: transfer of development rights from the floodplains to uplands and more suitable sites.

2.4.3 Consider septic suitability in new developments and encourage maintenance of existing septic systems through tax incentives or financial support.

2.4.4 Consider the placement and management of utility lines and its impact on the adjacent environment.

- a. Limit the use of pesticides and other harsh chemicals in utility corridors.
- b. Plan future utility corridors around identified natural / conservation areas.

2.4.5 Create a 50-foot buffer between development (buildings and roads) and natural features: streams, dry channels, and wetlands.

2.5 Goal: Encourage coordination between the county comprehensive plan and the township zoning ordinance.

See also community capacity recommendations starting on page 225.

2.5.1 Collaborate with the county extension offices to guide inter- and intra-municipality efforts.

LU 3.0 Issue. Conserve natural areas. There is no comprehensive inventory of natural and sensitive areas in the watershed.

High value streams and fisheries, large tracts of contiguous, densely forested lands and abundant wildlife habitat make the Kettle Creek watershed a cherished landscape to residents and visitors from all over the state.

Natural and sensitive areas include places such as wetlands, floodplains, riparian corridors and slopes that both are particularly vulnerable to development and have a high capacity to support unique biota. While undeveloped natural lands are abundant in the watershed, substantive mapping has yet to identify key natural areas throughout the watershed. For example, the heavily forested landscape prevents remote sensing NWI (National Wetlands Inventory) mapping from accurately inventorying wetland occurrences in the watershed. PNDI (Pennsylvania Natural Diversity Index) inventories identify individual areas of concern, however there is no existing inventory for Potter County.

Accurate and thorough identification of these areas could facilitate conservation by the state and by the local Kettle Creek residents. While the state forests expressly manage sensitive areas, greater identification would allow more state land to be designated managed lands. On private lands, the identification of these areas could bring with it a greater awareness of the existence of these areas in addition to an awareness of the implications of developing near natural areas. It could furthermore facilitate the prioritization of development that has minimal impacts on these areas. Finally, it could help to identify potential recreational and wildlife corridors throughout the watershed.

3.1 Goal: Educate local residents, municipal officials and business representatives about the value of these areas.

3.1.1 Promote awareness of these areas through signage.

3.1.2 Educational topics: landscape fragmentation, the value of wetlands, riparian corridors and floodplains.

3.1.3 Develop a comprehensive map of natural and sensitive areas including wetlands, slopes, seeps, high value forests based upon GAP

analysis, PNDI, NWI and further inventory of wetland areas. Make this map available to all stakeholders in the watershed. Promote the use of this map in the development of future landuse plans and zoning within the municipalities.

3.1.4 Encourage the donation of conservation easements for wetland and riparian areas, in addition to other identified areas of special concern.

3.2 Goal: Designate and protect high value areas. Encourage the protection of these areas through large buffers and the promotion of natural areas or recreational open spaces.

3.2.1 Work with the state forests in the designation and conservation of natural areas. This might include partnerships with organizations such as The Nature Conservancy.

3.2.2 Explore the land preservation and protection tools available through participation in the PA Wild and Scenic Rivers Program under the direction of the DCNR (For more information on the Scenic Rivers Program, see page 88 and Appendix C page 271).

3.2.3 Explore possibilities of connecting natural resource protection on private and public lands to recreation interests; recognize the importance of recreation in fostering stewardship of existing natural resources. Greenways (one form of large scale recreation planning) are becoming increasingly popular in the state of Pennsylvania and may present opportunities for the Kettle Creek watershed. (For more information on greenways, see the Appendix B page 267).

3.2.4 Develop management options for natural and sensitive areas - emphasizing those in or adjacent to private lands.

Wetlands:

a. Develop landuse policies to protect wetland resources including development of 50 ft buffer around wetlands. Apply to programs such as the Wetland Reserve Program (USDA) and wetlands conservation projects (USFWS).



Spicewood Run

b. Actively pursue wetland restoration and creation in watershed. Use Wetland Restoration/Creation Registry program (DEP) to identify and include potential landowners.

Floodplains:

a. Develop policies that outline ecologically sound land use in floodplains. Can be accomplished under Municipal Planning Code Section 603 and “Environmental Rights Amendment” of the Pennsylvania Constitution (Act 1, Section 27) (Wetland and Riparian Stewardship in Pennsylvania, 1997).

Wild areas:

a. Participate in the Wild Areas Program to limit the development of utility lines through wild areas.

3.2.5 Develop a land acquisition program with Western Pennsylvania Conservancy, North Central Pennsylvania Conservancy, Wildlands Trust, Pennsylvania Game Commission, and the Pennsylvania Fish and Boat Commission (PFBC). The watershed association can locate properties particularly in floodplains and in contiguous natural areas. A land trust could retain this land until an agency such as the DCNR, PGC (Pennsylvania Game Commission), or PFBC can purchase it.

3.2.6 Develop land use policy to protect well-heads, groundwater recharge areas, drinking water and high quality groundwater discharges to wetlands and streams.

3.3 Goal: Minimize landscape fragmentation:

3.3.1 Minimize the use of Utility Line Rights of Way (ROW) through designated natural areas such as the F.H. Dutlinger and proposed Hammersley Fork Wild area. If a ROW must be placed in these areas, encourage the use of vegetation within that ROW.

3.3.2 Minimize the use of applied herbicides and pesticides in managed areas - particularly ROW.

3.3.3 Acquire private inholdings on existing state forest land.

A CASE STUDY: Bucks County

Bucks County has revised existing residential landuse ordinances to consider the historical character and identity of the areas in addition to environmental principles. They have successfully reduced the width of streets, minimum required residential street right-of-way widths and the size and number of residential cul-de-sacs. Open space designs for community developments have been incorporated the Farmview subdivision; this development uses smaller lot sizes, conserves natural areas, provides community recreational space and promotes watershed protection.

Impervious covers are a major cause of water related problems. Not only do impervious surfaces increase the prevalence of flooding in an area, but also they contribute heavily to sediment and nutrient loading in a stream. (For more information see page 178). Reduction in impervious cover through the use of development BMP's can thus improve water quality. These revised ordinances have not only helped achieve recognizable environmental benefits but also resulted in numerous economic benefits achieved from reduced clearing and grading infrastructure, stormwater management costs and long term maintenance costs.

For more information on Bucks County:

1. Bucks County Planning Commission (1980). Performance Streets: A Concept and Model Standards for Residential Streets.

Bucks County Planning Commission
Route 611 and Almshouse Road
Neshaminy Manor Center
Doylestown PA 18901
215-345-3400

2. Montgomery County (PA) Planning Commission. Guidelines for Open Space Management in the Land Preservation District.



Kettle Creek's main stem in Ole Bull State Park

Montgomery County Planning
Commission Courthouse
Norristown PA 19404
215-278-3722

3. Reid Ewing (1996). Best Development Practices: Doing the Right Thing and Making Money at the Same Time.

4. Center for Watershed Protection. Better Site Design: A Handbook for Changing Development Rules in your Community



View from the castle vista in Ole Bull State Park

Programs and Resources:

Below are just a few of the available resources relating to natural resource conservation, rural preservation and sustainable development. Each of the groups listed below provide sources for economic funding and technical assistance. Admittedly, assistance opportunities overlap from one source to another, providing multiple options for conservation.

Natural Resource Conservation

Conservation Plant Material Centers

Contact: USDA, Natural Resources Conservation Service

This program provides native plants that could solve natural resource problems. This program provides for stream bank and riparian area protection (one of the considerations in the Kettle Creek watershed), wetland restoration, water quality restoration, erosion reduction. This program is carried out with the help of State and federal agencies, commercial businesses and seed and nursery association.

Emergency Watershed Protection (EWP)

Contact: USDA, Natural Resources Conservation Service

This program includes drastic measures in case of an emergency such as purchase of flood plain easements, flood protection, protection to life and property in case of a flood event, or protection in case of natural disasters like fire and flood which may lead to erosion events that could cause a sudden changes in the watershed. It includes providing financial and technical assistance to the carry out the necessary recovery measures.

Flood Risk Reduction Program (FRR)

Contact: USDA, Farm Service Agency

Farmers who enter this program voluntarily would receive payments on lands that run a risk of flooding. (Relevant to the headwaters of the Kettle Creek watershed.) This program provides incentives to move farming operations from frequently flooded land.

Forestry Incentives Program (FIP)

Contact: USDA, Natural Resources Conservation Service

This programs support sustainable forest management practices on privately owned or non-industrial forestland.

Watershed Surveys and Planning

Contact: USDA, Natural Resources
Conservation Service

The program is designed to assist the local watershed groups to control erosion, flood water and sedimentation problems and to conserve and develop land and water resources. Could be considered as a possible funding source for the watershed organization.

Stewardship Incentives Program (SIP)

Contact: USDA, Forest Service

The program provides technical and financial assistance to private forest landowners to maintain their lands and the natural resources sustainably.

NRCS Buffers Program

NRCS Initiatives: <http://www.nh.nrcs.usda.gov/>

State NRCS and FSA Contacts-

PA Technical: Barry Isaacs

USDA-NRCS

One Credit Union Pl., Ste. 340

Harrisburg PA 17110-2993

717-782-2202

Communications:

Stacy Mitchell, PAS

USDA-NRCS

One Credit Union Pl., Ste. 340

Harrisburg PA 17110-2993

717-237-2208

FSA: Rex Wright, Program Specialist

USDA-FSA

One Credit Union Pl., Ste. 320

Harrisburg PA 17110

717-782-4593

**Pennsylvania Fish and Wildlife Service
Conservation Buffer Initiative**

Spotts, David E.

Fisheries Biologist

PA Fish & Boat Commission

450 Robinson Lane

Bellefonte, PA 16823

814-359-5115

**Resource Conservation & Development
Councils (RC&Ds)**

Another NRCS program that seeks to sustain and improve the natural and economic resources of rural areas. RC & Ds foster municipal collaboration through encouraging the participation of representative of local stakeholder groups and organizations in addition to municipal officials. Provides technical assistance to communities in the development of business and recreational opportunities. For an overview of all NRCS conservation programs:

<http://www.pa.nrcs.usda.gov/publications/resconstoc.pdf>

The Nature Conservancy:

The Nature Conservancy is a national organization that provides technical and financial assistance in the conservation of plants, animals and other natural communities. It also will acquire and manage sensitive lands for conservation such as the West Branch Wilderness located in Clinton County.

For more information:

<http://nature.org/states/pennsylvania/preserves/>

Pennsylvania Field Office

Lee Park, Suite 470

1100 East Hector Street

Conshohocken, PA 19428

610-834-1323

Agricultural Conservation

Farmland Protection Program

The Farmland Protection Program funds the purchase of development rights on agricultural lands. It seeks to maintain productive farmland in agricultural use. The program is a joint program with the United States Department of Agriculture (USDA), the state and local governments - easements. The USDA will provide up to 50% of the fair market easement value. To qualify, farmland must:

- be part of a pending offer from a State, tribe, or local farmland protection program;
- be privately owned;
- have a conservation plan;
- be large enough to sustain agricultural production;
- be accessible to markets for what the land produces;
- have adequate infrastructure and agricultural support services; and
- have surrounding parcels of land that can support long-term agricultural production.

For more information: <http://www.info.usda.gov/nrcs/fpcp/fpp.htm>

Conservation Reserve Program (CRP)

A program established by the NRCS to promote the conservation of agricultural lands in addition to the reduction of soil erosion, the conservation of water and the provision of wildlife habitat. The CRP offers financial incentive in the form of rental payments and cost-share assistance for particular agricultural activities. It also provides technical assistance in the revegetation of particular lands. The participation in the program is 10 to 15 years at which point it can be renewed.

For more information in the CRP, visit the NRCS website at <http://www.pa.nrcs.usda.gov/programshome.htm>

Environmental Quality Incentives Program (EQIP)

Contact: NRCS, USDA

A voluntary conservation program that facilitates the implementation of structural or vegetation management practices in areas that have been identified as a priority by the local conservation districts. It offers financial, educational and technical assistance to a locally led initiative. Contracts range from 5 to 10 years and include cost share and incentive payments to carry out individual land management practices.

Conservation Farm Option (CFO)

Contact: USDA, Farm Service Agency or Natural Resources Conservation Service

A voluntary program for wheat, feed grains cotton and rice producers, its purpose being conservation of soil water, and related resources, water quality protection and improvement, wild life habitat protection and development, wetland restoration and similar other conservation purposes. The farmers have to be a part of the Agricultural Market Transition program to be a part of this program. The farmers would receive annual payments to implement the CFO program. However the farmer cannot receive payments from the Conservation reserve program, the wetlands reserve program, and the Environmental Quality Incentives program in exchange for one consolidated payment.

Rural Landscape Conservation

Center for Rural Pennsylvania

Works with organizations and municipalities to provide financial and technical assistance in the form of grants and information.

For more information:

<http://www.ruralpa.org>

USDA Rural Development Program

Providing funding and technical assistance to rural communities. For more information:

<http://www.ruraldev.usda.gov>

Small Watershed Program

Providing funding and technical assistance for natural resource and economic problems for a host of issues including flood control, water quality, fish and wildlife habitat and wetlands.

For more information:

<http://www.ftw.nrcs.gov/pl566/pl566.html>

PA Environmental Council

An example of Municipal Collaboration in the regional development of heritage corridors, recreational networks and open space. The PA Environmental Council promotes awareness of historical, natural and recreational resources.

<http://www.libertynet.org/~pecphila>

Example:

Project Green Space Alliance (a collaboration of 5 counties in the Philadelphia region:

<http://www.perpa.org/greenspace/index.html>

PA State Association of Township Supervisors

<http://www.psats.org>

Cultural Resource Conservation

Bureau for Historic Preservation:

PA Historical and Museum Commission (PHMC)

The PHMC collaborated on the preservation PA program in the development of a Preservation Plan for the state. Specifically, within the PHMC, the bureau for Historic Preservation provides technical and financial assistance in the protection of “buildings, structures, roads, districts and neighborhoods of historic significance in public and private ownership.” For more information:

<http://www.phmc.state.pa.us/BHP/preservation.htm>

Preservation Pennsylvania:

<http://www.preservationpa.org>

Collaborate with the PHMC on Preservation PA (available online). Focuses on initiatives to protect rural lands with a focus on historic preservation. Lays out guidelines for considering historical character while encouraging positive future growth.

Community Development Block Grant (CDBG):

The CDBG is a national initiative run through HUD that provides funding to low to moderate income communities to develop community based programs such as public works and facilities, housing improvement projects and rehabilitation, conservation programs, economic development and others. For more information visit HUD’s website:

<http://www.hud.gov/cpd/statefct.html>

To apply for a grant in PA:

http://www.dced.state.pa.us/PA_Exec/DCED/community/housing.htm

Governors Center for Local Government Services

<http://www.dced.state.pa.us>

Friends of Pennsylvania

www.10000friends.org

North Central Pennsylvania Regional Planning and Development Commission

www.ncentral.comPrograms:

Conservation for Recreational Value

Scenic Rivers

The Pennsylvania DCNR Web Site: Scenic Rivers Home Page. <<http://www.dcnr.state.pa.us/rivers/srhome.htm>>

The Pennsylvania DCNR Bureau of Recreation & Conservation, which “provides a variety of educational and informational services on several environmental issues, most notably on the subject of land use, rails-to-trails, and rivers conservation. These services include facilitation, technical advice and support for educators, and discussion facilitation for citizen groups and local officials” (PADNCR web site). To contact the Bureau of Recreation & Conservation, phone its main office at (717) 783-2658.

Greenways

The Pennsylvania Greenways Partnership Commission (a joint effort between the PADNCR and several non-profit organizations). The PAGCP can be contacted through the PADNCR Bureau of Reclamation and Conservation.

The PADNCR Bureau of Recreation & Conservation, which “provides a variety of educational and informational services on several environmental issues, most notably on the subject of land use, rails-to-trails, and rivers conservation. These services include facilitation, technical advice and support for educators, and

discussion facilitation for citizen groups and local officials” (PADNCR web site). To contact the Bureau of Recreation & Conservation on the subject of greenways, phone its office at 717-783-5877.

Other Tools for Resource Conservation

Conservation Easements

Conservation easements are a viable alternative to strict zoning regulation at the local level. They ensure the perpetual protection of a piece of property in return for property tax cuts. Easements are a voluntary contract between a landowner and a conservation organization such as the Kettle Creek Watershed Association. They seek to conserve the natural features of the landscape through limiting future development of that land while allowing the landowner to retain ownership of the property. Easements provide a feasible alternative to zoning in that each agreement is unique to both the piece of land and the needs or desires of the owner.