APPENDIX A: Watershed Plan Outline

This appendix includes:

- An outline for your watershed plan, compiled from the Write It Down sections of each chapter and intended to make it easier for you to put your Watershed Plan together
- A list of other records your team should retain
- A list of maps required for 319-funded projects

Chapter 1: Introduction

The Watershed

Identify the waterway and watershed to which this plan pertains.

Explain briefly why this area was chosen.

Provide a summary or details of local concerns about the waterway.

Partners and stakeholders

List the partners and stakeholders who are involved in your planning process. Identify their organizations, if any, and roles. This list will grow as your process proceeds, so be sure to update it regularly. Provide a contact person and contact information.

NOTE: Your planning team should never overstate the commitment of a partner or stakeholder, nor publish a list including a stakeholder without approval of the listing by the stakeholder. However, it may be appropriate to list partners that your team hopes to work with or you have contacted, clearly indicating their prospective status.

How Much To Share?

The detail provided for each of the topics in this section depends on the subject and the scope of your plan as well as your findings.

If you can, integrate information your team discovered through visual or stream surveys into the related sections.

If you were unable to find information or the category is not relevant to your plan, it is still worthwhile to explain, because otherwise people may wonder why you did not consider that particular factor in your analysis.

If you cannot connect information with a specific location, try to connect it with a sub-watershed, or note where the practice or condition is applicable to a part or to the entire watershed.

Identify sources of information whenever possible.

Chapter 2: The *[insert the name of your watershed]* Watershed

Introduction

Describe your watershed in one or two paragraphs, relating:

- The name of the waterway of concern
- The larger watershed to which it is a tributary
- Its location within Kentucky (counties and communities)
- Its area in square miles

Add a paragraph or two to introduce the information you found about water resources, natural features and human

influences. This is the part of the plan where you begin to tell the story of your watershed, to integrate existing information.

Water Resources

Describe and provide map(s) of the water resources in your watershed.

- Watershed Boundary
- Hydrology
- Groundwater-Surface Water Interaction
- Flooding
- Regulatory Status of Waterways
- Water Chemistry and Biology
- Geomorphology

Natural Features

Describe and provide maps of the natural features of your watershed.

- Geology and Topography
- Soils
- Ecoregion

Riparian/Streamside Vegetation

Describe and provide maps of any riparian information you found.

Rare and Exotic/Invasive Plants and Animals

Describe and provide any information about rare and exotic/invasive plants and animals you identified in your watershed.

Human Influences and Impacts

Describe and provide maps about human activities in your watershed. As much as possible, connect these activities to specific locations or sub-watersheds. Be accurate and respectful.

- Water Use
- Land Use
- Other Water Disturbances
- Land Disturbances
- Hazardous Materials

Demographics and Social Issues

Provide any relevant information about demographics or social issues. If feasible, identify differences within sub-watersheds.

Team Observations

Describe any visual or stream survey activity of the team, partners, or volunteers. Include any observations that have not been integrated into other sections of this chapter.

Interim Conclusions

Consider including a short section that summarizes the information that appears to be most relevant.

Chapter 3: Monitoring

Introduction

Provide a brief overview of the existing monitoring data that you have and the additional monitoring data needs. If you are developing a KY 319-funded watershed plan, be sure to explain the phase of monitoring that you completed at this stage of the planning process.

Provide an overview of your monitoring strategy.

- Include a map with all of the sampling locations clearly labeled.
- Discuss how you selected your monitoring locations.
- Provide a brief overview of the parameters collected, methods used and the sampling frequency. If you are developing a KY 319-funded watershed plan, reference your KDOW approved QAPP for details.

Describe any problems you encountered during the monitoring effort. For example, you should provide an explanation if it was an unseasonably dry year and you were unable to collect a number of samples. This information will be important for Chapter 4.

Include all of the qualified monitoring data results as an appendix. If you are developing a KY 319-funded watershed plan, these results should be thoroughly reviewed and properly flagged to ensure they meet the standards set forth in the KDOW approved QAPP.

Remember you will have a great deal of information upon the completion of this chapter. You will not be including all of this in your watershed plan, but you need to maintain this information and keep it on file.

Chapter 4: Analysis

Phase 1 – Analysis

Analyze the monitoring data collected in the Phase 1 monitoring for prioritization of up to three smaller sub-watersheds for additional assessment and implementation

- Compare parameter concentrations
    - Establish benchmark concentrations and make comparisons for each parameter
    - Describe the relationship between the actual water quality and the benchmark water quality conditions for the concentrations of all parameters collected for each sampling location
- Compare pollutant loads/yields
    - Calculate pollutant loads/yields
    - Calculate target loads
    - Compare the actual annual load to the target annual load and calculate the reduction needed to achieve the target load
- Compare watershed inventory data to pollutant concentrations and loads/yields
    - Examine any potential relationships between this inventory and the effects these may have, either positive or negative, on water quality for each sub-watershed

Phase 1 – Prioritization

Prioritize up to three sub-watersheds from your larger watershed for further monitoring and analysis in Phase 2 of your project

- Examine these factors:
    - Organizing analytical data
        - Comparisons of parameter concentrations
        - Comparisons of pollutant loads/yields
    - Regulatory status of waterway

        - Impairment status
        - TMDL status
        - Special Use Waters
    - Feasibility factors
        - Comparison of watershed inventory data to pollutant loads
        - Regulatory matters
        - Stakeholder cooperation
        - Political will
        - Available funding
        - Areas of local concern
        - Existing priority status
        - Watershed management activities
        - Monitoring considerations

Phase 2 – Analysis
Analyze the monitoring data collected in the Phase 2 monitoring to make determinations of pollutant sources within your prioritized sub-watersheds

- Compare parameter concentrations and compare pollutant loads
    - Use same methods utilized in your Phase 1 analysis
    - Make comparisons of all your parameter concentrations to benchmarks
    - Calculate pollutant loads for all of your sampling locations
    - Determine load reductions needed to achieve your target loads
- Compare watershed inventory data to pollutant concentrations and loads
    - Examine any potential relationships between this inventory and the effects these may have, either positive or negative, on water quality for each sub-watershed
    - Examine results of habitat and biological assessment
    - Examine local concerns

Chapter 5: *[Optional: included here as a placeholder to avoid confusion]*

Although the list of BMPs is important for the next phase of planning, it is not necessary to include the list at this point in your watershed plan. However, if you are developing a watershed plan with KY 319 funding you should keep a record of this list and be able to provide the list to the Nonpoint Source and Basin Team Section upon request.

Chapter 6: Strategy for Success

BMP Feasibility
Feasibility - record the factors at play in your watershed and the choices you made about BMPs.

BMPs and Action Items
In some manner (a table, chart, narrative, etc.), record all necessary information about the BMPs selected. If most of the information is going into a table, it may still be helpful to have some explanatory narrative.

Chapter 7: Making it Happen

Organization

Briefly describe how you will oversee the implementation phase of your planning. Identify key people, their organizations, and their roles, including (if applicable) Watershed Coordinator, Implementation Team, and Technical Team. Update lists of team members and partners.

Presentation and Outreach

Briefly describe how you will share the plan and progress reports with political leaders, stakeholders, important audiences, and the public. Describe plans for outreach events and other marketing methods.

Fundraising

Briefly describe your fundraising plans. If you have a budget for the complete project, consider including it - perhaps as an appendix.

Monitoring Success

Describe how you plan to monitor progress on action items, watershed health or practices, and improvements in water quality.

For the water quality outcome indicators in the plan, describe how the team's earlier monitoring plan might be revised to better monitor results. If feasible, specify who will provide the monitoring, the monitoring schedule, and the schedule of regular reports on progress toward pollutant load reductions. If the team decides to apply for 319 funds to implement your plan, the application will require an approved Quality Assurance Project Plan for monitoring results.

Evaluating and Updating Your Plan

Describe when and how you will evaluate the implementation of your plan, and who will be involved in the evaluation process. Ideally, evaluation will occur soon enough to influence the achievement of short-term, mid-term and long-term goals.

Specifically, describe:

- How you will evaluate the implementation of your action items
- How you will evaluate the outcome indicators associated with Load Reduction targets
- How you will evaluate your outreach activities

Briefly discuss how modifications to your plan may occur. Address the role of key partners, stakeholders, and the wider planning team in plan modifications.

Other Records Your Team Should Retain

Chapter 1:

Keep records of the contacts you made while looking for partners and workgroup members, including their contact information, the date(s) of contact, and their responses. Make a note of those who you may want to engage or query further into the planning process.

Keep minutes of all your workgroup meetings.

Chapter 2:
Record your team's impressions of watershed issues before, during, and after collecting information. What implications does the team see? These impressions will be helpful as you continue your discoveries. Hopefully, you will either prove the impressions are right or wrong.

Although your plan will summarize much of your research findings, be sure to keep records of your research activities:

- Who you contacted and their contact information, whether or not the contact yielded data. Keeping this information electronically will make it easier to share and update.
- Data inventories
- Calculations

Chapter 3:
Remember you will have a great deal of information upon the completion of this chapter. You will not be including all of this in your watershed plan, but you need to maintain this information and keep it on file.

Chapter 5:
Although the list of BMPs is important for the next phase of planning, it is not necessary to include the list at this point in your watershed plan. However, if you are developing a watershed plan with 319 funding you should keep a record of this list and be able to provide the list to the Nonpoint Source and Basin Team section upon request.

Chapter 7:
Document the specific responsibilities of any person or committee. If a contract is involved, be very specific. Keep copies of any financial management policies you develop, marked with the date they became effective. This is especially important, of course, if you have or expect to receive significant quantities of funds.

Document your outreach events: how they were announced, efforts to secure press and other coverage, participation, and evaluative information.

Generally track the distribution of any Executive Summary, and specifically list presentations made.

Keep copies of any fundraising letters or proposals and budgets that are not included in the plan.

Update contact lists.

Appendix B: Nine Minimum Elements to Be Included in a Watershed Plan for Impaired Waters Funded Using Incremental Section 319 Funds

Although many different components may be included in a watershed plan, EPA has identified a minimum of nine elements that are critical for achieving improvements in water quality. (Go to 208 for more information on the 319 Program.)

EPA requires that these nine elements be addressed for watershed plans funded using incremental section 319 funds and strongly recommends that they be included in all other watershed plans that are intended to remediate water quality impairments. Once the plan has been developed, plan sponsors can select specific management actions included in the plan to develop work plans for nonpoint source section 319 support and to apply for funding to implement those actions.

The nine elements are provided below, listed in the order in which they appear in the guidelines in the EPA Handbook. Although they are listed as *a* through *i*, they do not necessarily take place sequentially. For example, element *d* asks for a description of the technical and financial assistance that will be needed to implement the watershed plan, but this can be done only after you have addressed elements *e* and *i*. Explanations are provided with each element to show you what to include in your watershed plan. In addition, chapters in the *EPA Handbook for Developing Watershed plans to Restore and Protect Our Waters* where the specific element is discussed in detail are referenced.

Nine Elements

Element a: *Identification of causes of impairment and pollutant sources or groups of similar sources that need to be controlled to achieve needed load reductions, and any other goals identified in the watershed plan. Sources that need to be controlled should be identified at the significant subcategory level along with estimates of the extent to which they are present in the watershed (e.g., X number of dairy cattle feedlots needing upgrading, including a rough estimate of the number of cattle per facility; Y acres of row crops needing improved nutrient management or sediment control; or Z linear miles of eroded streambank needing remediation).*

What does this mean?
Your watershed plan should include a map of the watershed that locates the major sources and causes of impairment. Based on these impairments, you will set goals that will include (at a minimum) meeting the appropriate water quality standards for pollutants that threaten or impair the physical, chemical, or biological integrity of the watershed covered in the plan.

Element b: *An estimate of the load reductions expected from management measures*.

What does this mean?
You will first quantify the pollutant loads for the watershed. Based on these pollutant loads, you'll determine the reductions needed to meet the water quality standards. You will then identify various management measures (see element *c* below) that will help to reduce the pollutant loads and estimate the load reductions expected as a result of these management measures to be implemented, recognizing the difficulty in precisely predicting the performance of management measures over time.

Estimates should be provided at the same level as that required in the scale and scope component in paragraph *a* (e.g., the total load reduction expected for dairy cattle feedlots, row crops, or eroded streambanks). For waters for which EPA has approved or established TMDLs, the plan should identify and incorporate the TMDLs. Applicable loads for downstream waters should be included so that water delivered to a downstream or adjacent segment does not exceed the water quality standards for the pollutant of concern at the water segment boundary. The estimate should account for reductions in pollutant loads from point and nonpoint sources identified in the TMDL as necessary to attain the applicable water quality standards.

Element c: *A description of the nonpoint source management measures that will need to be implemented to achieve load reductions in paragraph 2, and a description of the critical areas in which those measures will be needed to implement this plan.*

What does this mean?
The plan should describe the management measures that need to be implemented to achieve the load reductions estimated under element *b*, as well as to achieve any additional pollution prevention goals called out in the watershed plan. It should also identify the critical areas in which those measures will be needed to implement the plan. This can be done by using a map or a description.

Element d: *Estimate of the amounts of technical and financial assistance needed, associated costs, and/or the sources and authorities that will be relied upon to implement this plan.*

What does this mean?
You should estimate the financial and technical assistance needed to implement the entire plan. This includes implementation and long-term operation and maintenance of management measures, I/E activities, monitoring, and evaluation activities. You should also document which relevant authorities might play a role in implementing the plan. Plan sponsors should consider the use of federal, state, local, and private funds or resources that might be available to assist in implementing the plan. Shortfalls between needs and available resources should be identified and addressed in the plan.

Element e: *An information and education (I/E) component used to enhance public understanding of the project and encourage their early and continued participation in selecting, designing, and implementing the nonpoint source management measures that will be implemented.*

What does this mean?
The plan should include an I/E component that identifies the education and outreach activities or actions that will be used to implement the plan. These I/E activities may support the adoption and long-term operation and maintenance of management practices and support stakeholder involvement efforts.

Element f: *Schedule for implementing the nonpoint source management measures identified in this plan that is reasonably expeditious.*

What does this mean?
You need to include a schedule for implementing the management measures outlined in your watershed plan. The schedule should reflect the milestones you develop in *g*.

Element g: *A description of interim measurable milestones for determining whether nonpoint source management measures or other control actions are being implemented*.

What does this mean?
You'll develop interim, measurable milestones to measure progress in implementing the management measures for your watershed plan. These milestones will measure the implementation of the management measures, such as whether they are being implemented on schedule, whereas element *h* (see below) will measure the effectiveness of the management measures, for example, by documenting improvements in water quality.

Element h: *A set of criteria that can be used to determine whether loading reductions are being achieved over time and substantial progress is being made toward attaining water quality standards.*

What does this mean?
Using the milestones you developed above, you'll develop a set of criteria (or indicators) with interim target values to be used to determine whether progress is being made toward reducing pollutant loads. These interim targets can be direct measurements (e.g., fecal coliform concentrations) or indirect indicators of load reduction (e.g., number of beach closings). You must also indicate how you'll determine whether the watershed plan needs to be revised if interim targets are not met and what process will be used to revise the existing management approach. Where a nonpoint source TMDL has been established, interim targets are also needed to determine whether the TMDL needs to be revised.

Element i: *A monitoring component to evaluate the effectiveness of the implementation efforts over time, measured against the criteria established under item h immediately above.*

What does this mean?
The watershed plan must include a monitoring component to determine whether progress is being made toward attainment or maintenance of the applicable water quality standards. The monitoring program must be fully integrated with the

established schedule and interim milestone criteria identified above. The monitoring component should be designed to determine whether loading reductions are being achieved over time and substantial progress in meeting water quality standards is being made. Watershed-scale monitoring can be used to measure the effects of multiple programs, projects, and trends over time. Instream monitoring does not have to be conducted for individual BMPs unless that type of monitoring is particularly relevant to the project.

Appendix C: Sample Team Invitation and Brochure

Example of a Recruitment Letter:

Date
Name
Address
Dear _____:

Our watershed project, Clean Up the Crawdad, is seeking committed, enthusiastic volunteers to serve on our steering committee and subcommittees, and during project activities. We are looking for community residents who are interested in conserving natural resources, improving water quality, and enhancing the recreational uses of Crawdad Lake and Crawdad River.

Clean Up the Crawdad is a locally-led initiative formed to restore and protect water resources in the Crawdad Lake watershed, in order to provide high-quality recreational opportunities for area residents. Members and supporters include the Hushpuppy and Mudflat County SWCDs, county commissioners, county health departments, county highway departments, the state Fish & Game Commission, the Hoosierville Rotary and Grange, agricultural commodity organizations, the Crawdad Lake Association, and Infinite Bass.

Please review the attached information and pass it along to others. If you or someone you know is interested in participating in Clean Up the Crawdad, please contact the Watershed Project Coordinator, Sally Coordinator, at 555-555-1234 for more information.

Sincerely,

William B. Chairperson

Example of a Recruitment Attachment:

We're looking for concerned citizens in the Crawdad River Watershed and surrounding communities to help us protect and restore Crawdad Lake.

Who we are: Clean Up the Crawdad (CLUC) is a non-profit, volunteer, umbrella group seeking to involve citizens in and around Crawdad Lake. The Riverbank Resource Conservation & Development board and the Mudflat and Hushpuppy County Soil & Water Conservation Districts are our sponsors.

Our Mission: To protect and restore water quality in Crawdad Lake through coordinated community & agency efforts. We want to have a beautiful, healthy lake in a thriving community!

What we're concerned about:
Algae blooms and weeds in the lake
Unrestricted boating activity
Reduced quality of fishing
Beaches closed due to pollution

What's your commitment?

- **Steering committee members** serve a two-year term. The 15-member steering committee discusses and formulates decisions for the watershed project and reviews the work of the Planning and Assessment committees who are developing the watershed plan. The committee meets on the first Tuesday of each month at Pete's Fish & Ribs in Hoosierville, from 6:30 to 8:30 PM. The public is welcome to attend and provide input to the committee's decisions. More frequent meetings are occasionally required. Training workshops are available. **We currently need three more steering committee members.**

- **Subcommittee members** work with the committee of their choice (Planning, Assessment, or Outreach) for a year (or more, if they want to). Committees may need to meet frequently during some phases of the project. Only the committee chair is expected to attend the monthly steering committee meeting, although others are welcome to come.

- **Project volunteers** participate in an activity such as stream assessment, trash pickup, or a canoe trip, on the day of the event. The Coordinator will take your contact information and let you know when events are planned.

What's in it for you?

As a member of Clean Up the Crawdad, you can: Be a voice for citizens of your community.....Have the satisfaction of helping to restore the lake so everyone can enjoy it.....Be recognized as a community leader.....Learn more about water resource protection and restoration..... Contribute your unique knowledge and skills.....Meet and work with great folks, and have a lot of fun!

Want more information?

Call Sally Coordinator at 555-555-1234, or drop into the Hushpuppy or Mudflat County SWCD office any weekday from 8:00 to 4:00. We need you now!

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Appendix D: Resources for Team Development

The following list of websites will help you build your watershed planning team, reach out to stakeholders in your area, give you ideas for keeping your stakeholders active and interested, and will offer other helpful hints for working with groups.

EPA Getting In Step: Engaging and Involving Stakeholders in Your Watershed
The Getting in Step watershed outreach guidebook provides some of the tools you will need to develop and implement an effective watershed outreach plan. If you're a watershed practitioner trained in the sciences, this manual will help you address public perceptions, promote management activities, and inform or motivate stakeholders 209.

The Center for Technology Information Center (CTIC) has developed a series of documents to help you know your watershed. This information clearinghouse for watershed coordinators helps to ensure measureable progress towards local goals. The clearinghouse is available at 210.

River Network is a non-profit organization with a mission to "help people understand, protect and restore rivers and their watersheds." Their website is full of helpful information for watershed planning, including information on ordering *Starting Up: A Handbook for New River and Watershed Organizations.* Go to 211.

The EPA has a Capacity Building Website with a full tool kit for watershed and restoration projects. Go to 212.

The Social Sciences Team of the Natural Resources Conservation Services (NRCS) offers helpful factsheets on running meetings, running public meetings, conflict resolution, community listening, focus groups, and any other social skill you might need 213.

The following are helpful printed resources on Consensus Building and Group Facilitation:

Breaking the Impasse: Consensual Approaches to Resolving Public Disputes by Lawrence Suskind and Jeffrey Cruikshank, Basic Books, 1987.

Collaborating: Finding Common Ground For Multiparty Problems by Barbara Gary, Jossey-Bass Publishers, 1989.

Getting to Yes by Roger Fisher and William Ury of the Harvard Negotiation Project, Penguin Books, 1983.

Group Power: A Manager's Guide to Using Meetings by William R. Daniels, University Associates, Inc., 1986.

How to Make Meetings Work: The New Interaction Method by Michael Doyle and David Straus, Berkley Publishing Group, 1976.

Managing Public Disputes: A Practical Guide to Handling Conflict and Reaching Agreements by Susan L. Carpenter and W. J. D. Kennedy, Jossey-Bass Publishers, 1988.

Mining Group Gold: How to Cash In on the Collaborative Brain Power of a Group by Thomas A. Kayser, Serif Publishing, 1990.

Pulling Together: A Land Use and Development Consensus Building Manual by David R. Godschalk, David W. Parham, Douglas R. Porter, William R. Potapchuk, and Steven W. Skulkraft (Washington, D.C.: Program for Community Problem Solving), 1994.

Appendix E

Habitat Assessment (EPA Rapid Bioassessment Protocol Scoring Sheet)

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS (FRONT)

STREAM NAME	LOCATION	
STATION #_____ RIVERMILE_____	STREAM CLASS	
LAT _____ LONG _____	RIVER BASIN	
STORET #	AGENCY	
INVESTIGATORS		
FORM COMPLETED BY	DATE _____ TIME _____ AM PM	REASON FOR SURVEY

	Habitat Parameter	Condition Category			
		Optimal	Suboptimal	Marginal	Poor
Parameters to be evaluated in sampling reach	**1. Epifaunal Substrate/ Available Cover**	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
	SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
	2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
	SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
	3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
	SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
	4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
	SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
	5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
	SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS (BACK)

Parameters to be evaluated broader than sampling reach	Habitat Parameter	Condition Category			
		Optimal	Suboptimal	Marginal	Poor
	6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
	SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
	7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
	SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
	8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
	SCORE ___ (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
	SCORE ___ (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
	9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
	SCORE ___ (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
	SCORE ___ (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
	10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
	SCORE ___ (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
	SCORE ___ (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score _____

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (FRONT)

STREAM NAME	LOCATION	
STATION #_____ RIVERMILE_____	STREAM CLASS	
LAT _____ LONG _____	RIVER BASIN	
STORET #	AGENCY	
INVESTIGATORS		
FORM COMPLETED BY	DATE _____ TIME _____ AM PM	REASON FOR SURVEY

Parameters to be evaluated in sampling reach	Habitat Parameter	Condition Category			
		Optimal	**Suboptimal**	**Marginal**	**Poor**
	1. Epifaunal Substrate/ Available Cover	Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
	SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
	2. Pool Substrate Characterization	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
	SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
	3. Pool Variability	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
	SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
	4. Sediment Deposition	Little or no enlargement of islands or point bars and less than <20% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
	SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
	5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
	SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (BACK)

	Habitat Parameter	Condition Category			
		Optimal	Suboptimal	Marginal	Poor
Parameters to be evaluated broader than sampling reach	**6. Channel Alteration**	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
	SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
	7. Channel Sinuosity	The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.)	The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.	The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
	SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
	8. Bank Stability (score each bank)	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
	SCORE ___ (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
	SCORE ___ (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
	9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
	SCORE ___ (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
	SCORE ___ (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
	10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
	SCORE ___ (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
	SCORE ___ (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score _____

Appendix F: Potential Pollutant Sources

Causes (Pollutant or Stressor)	Possible Sources	Potential Adverse Impacts
Sediment/Siltation (sand, silt, clay)	Cropland Forestry activities Pasture Stream banks Construction Roads Mining operations Gullies Livestock operations Other land-disturbing activities	Sediment may destroy fish habitat by: (1) blanketing spawning and feeding areas; (2) eliminating certain food organisms; (3) causing gill abrasion and fin rot; and (4) reducing sunlight penetration, thereby impairing photosynthesis. Suspended sediment decreases recreational values, reduces fishery habitat, adds to mechanical wear of water supply pumps and distribution systems, and adds treatment costs for water supplies. Nutrients and toxic substances attached to sediment particles may enter aquatic food chains, cause fish toxicity problems, impair recreational uses or degrade the water as a drinking water source.
Nutrients (phosphorus, nitrogen)	Erosion and runoff from fertilized fields Urban runoff Wastewater treatment plants Industrial discharges Septic systems Animal production operations Cropland or pasture where manure is spread	Nutrient enrichment may cause excessive algae and aquatic plant growth, which may choke open waters and consume oxygen (primarily from decomposition of dead plants and algae). These conditions will adversely affect fish and aquatic organisms, fishing and boating, and the taste and odor of finished drinking water. Nitrogen contaminants in drinking water significantly above the drinking water standard may cause methoglobinemia (blood disease) in infants, and have forced the closure of many water supplies.
Pathogens (bacteria and viruses)	Human and animal excreta Animal operations Cropland or pasture where manure is spread Wastewater treatment plants Septic systems Urban runoff Wildlife	Waterborne diseases may be transmitted to humans through drinking or contact with pathogen-laden water. Eating shellfish taken from or uncooked crops irrigated with pathogen-laden waters may also transmit waterborne diseases. The principal concern in both surface and ground waters is the potential degradation of public water supply sources. Pathogens reaching a lake or other surface water body may limit primary contact recreation, such as swimming.
Pesticides	All land where pesticides are used (forest, pastures, urban/ suburban areas, golf courses, waste disposal sites) Sites of historical usage (chlorinated pesticides) Urban runoff Irrigation return flows	Pesticides may enter surface waters either dissolved in runoff or attached to sediment or organic materials, and may enter ground water through soil infiltration. The principal concerns in surface water are their entry into the food chain, bioaccumulation, toxic effects on fish, wildlife and microorganisms, habitat degradation and potential degradation of public water supply sources. Ground water impacts are primarily related to water supply sources.

Causes (Pollutant or Stressor)	Possible Sources	Potential Adverse Impacts
Toxic Substances (heavy metals, oil and petroleum products)	Urban runoff Wastewater treatment plants Industrial discharges	Toxic substances may enter surface waters either dissolved in runoff or attached to sediment or organic materials and may enter ground waters through soil infiltration. Principal concerns in surface water include entry into the food chain, bioaccumulation, toxic effects on aquatic organisms, other wildlife and microorganisms, habitat degradation and degradation of water supplies. Ground water impacts are primarily related to degradation of water supply sources.
Organic Enrichment (depletion of dissolved oxygen)	Human and animal excreta Decaying plant/animal matter Discarded litter and food waste	Organic materials (natural or synthetic) may enter surface waters dissolved or suspended in runoff. Natural decomposition of these materials may deplete oxygen supplies in surface waters. Dissolved oxygen may be reduced to below the threshold necessary to maintain aquatic life.
Thermal Stress/ Sunlight	Riparian corridor destruction Bank destruction Urban runoff Hydromodifications Industrial dischargers	Direct exposure of sunlight to streams may elevate stream temperatures, which can exceed fish tolerance limits, reduce dissolved oxygen and promote the growth of nuisance algae. The lack of trees along a stream bank contributes to thermal stress and excessive sunlight. Thermal stress may also be the result of storm water runoff, which is heated as it flows over urban streets. Hydromodifications that create wider, shallower channels create more surface area and allow for quicker temperature changes. Modifications that create pools and increase the storage time of water may also contribute to thermal stress by increasing surface area and not allowing the warmed water to wash out of the watershed. Coldwater fish may be eliminated or only marginally supported in streams affected by thermal stress.
pH (acidic and alkaline waters)	Mine drainage Mine tailings runoff Atmospheric deposition Industrial point source discharges	Acidic or alkaline waters will adversely affect many biological processes. Low pH or acidic conditions adversely affect the reproduction and development of fish and amphibians, and can decrease microbial activity important to nutrient cycling. An extremely low pH will kill all aquatic life. Acidic conditions can also cause the release of toxic metals that were adsorbed to sediments into the water column. High pH, or alkaline conditions, can cause ammonia toxicity in aquatic organisms.

Causes (Pollutant or Stressor)	Possible Sources	Potential Adverse Impacts
Salinity (dissolved solids)	Brine from oil extraction Road deicing	High levels of dissolved solids will affect the taste of drinking water. High concentrations of sodium sulfate or magnesium sulfate in drinking water can cause laxative effects, and excess sodium may affect persons restricted to low sodium diets. High concentrations of salts can inhibit aquatic plant growth and have an adverse effect on aquatic life. Lakes receiving runoff with high salt concentrations may form a saline layer near the bottom that will resist mixing, thereby reducing dissolved oxygen in the saline layer.
Flow Alterations (hydrologic modifications)	Channelization Dams Dredging Streambank modifications	Hydrologic modifications alter the flow of water through the stream. Structures or activities in the water body that alter stream flow may in turn be the source of stressors, such as habitat modifications, or exacerbate others, such as thermal stress. Dams may also act as a barrier to the upstream migration of aquatic organisms. Stream flow alterations may result from a stressor such as sedimentation, which may change a stream bed from narrow with deep pools to broad and shallow.
Habitat Modifications	Channelization Construction Changing land uses in the watershed Stream burial Dredging Removal of riparian vegetation Streambank modifications	Habitat modifications include activities in the landscape or in the water body that alter the physical structure of the aquatic and riparian ecosystem. Some examples include: removal of stream side vegetation that stabilizes the stream bank and provides shade; excavation in the stream and removal of cobbles from the stream bed that provide nesting habitat for fish; stream burial; and development that alters the natural drainage pattern by increasing the intensity, magnitude and energy of runoff waters.
Refuse, Litter and Other Debris	Litter Illegal dumping of solid wastes	Refuse and litter in a stream can clog fish spawning areas; stress aquatic organisms; reduce water clarity; impede water treatment plant operations; and impair recreational uses of the water body, such as swimming, fishing and boating.

Source: A Guide to Developing Local Watershed Action Plans in Ohio State of Ohio Environmental Protection Agency, Division of Surface Water 1997

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Appendix G: Glossary

303(d): The section of the Clean Water Act that requires states to develop a list every 2 years of the streams and lakes in the state that are impaired and require a Total Maximum Daily Load (TMDL). The list is a subset of the 305(b) list. The list is called the 303(d) list and since 2006 is submitted along with the 305(b) list to EPA by the Kentucky Division of Water as the Integrated Report to Congress. The 303(d) list in found in Volume II. Before 2006, the two lists were submitted separately.

305(b): The section of the Clean Water Act that requires states to develop a list every 2 years of the streams and lakes in the state that have been assessed. The list is called the 305(b) list and since 2006 is submitted along with the 303(d) list to EPA by the Kentucky Division of Water as the Integrated Report to Congress. The 305(b) list is found in Volume I. Before 2006, the two lists were submitted separately.

319 Nonpoint Source Pollution (NPS) Control Program: Congress amended the Clean Water Act (CWA) in 1987 to establish the section 319 Nonpoint Source Management Program because it recognized the need for greater federal leadership to help focus State and local nonpoint source pollution efforts. Under section 319, State, Territories, and Indian Tribes receive grant money, or **319(h) funding**, which supports a wide variety of activities including technical assistance, financial assistance, education, training, technology transfer, demonstration projects, and monitoring to assess the success of specific nonpoint source implementation projects. Groups apply to the Kentucky Division of Water for 319(h) Funds.

319(h) watershed planning funds: The portion of 319(h) funds that are allocated for watershed planning purposes.

401 program, Water Quality Certification program: The Clean Water Act Section 401 Water Quality Certification (WQC) program in Kentucky ensures that activities involving a discharge into waters of the state and requiring a federal permit or license, are consistent with Kentucky's water quality standards in Title 401, Chapter 5, of the Kentucky Administrative Regulations. In Kentucky, the Water Quality Certification Section in the Water Quality Branch is responsible for implementing the Section 401 program.

404 permitting program: Projects that involve the discharge of dredged or fill materials into waters of the United States, including wetlands, are regulated by the U.S. Army Corps of Engineers under Clean Water Act Section 404 and require Section 401 certification. Examples of activities that may require a Section 404 permit and Section 401 water quality certification are stream relocations, road crossings, stream bank protection, construction of boat ramps, placing fill, grading, dredging, ditching, mechanically clearing a wetland, building in a wetland, constructing a dam or dike, and stream diversions.

Algae: (singular form is alga) Simple, single-celled and rootless plants that grow in sunlit waters and provide food for fish and macroinvertebrates; water that contains

too many nutrients will have an overgrowth of algae that can lower the dissolved oxygen in a waterbody as they die and decay

Aquifers: An underground geological formation, or group of formations, containing water. Aquifers are sources of groundwater for wells and springs.

Bacteria: (Singular form is bacterium) Single-celled organisms that can't be seen with the naked eye. Bacteria are found everywhere and perform many valuable functions that support life on the planet, however, some bacteria can cause diseases; they reproduce rapidly.

Basins: Area of land where water from rain and melting snow or ice drains downhill into a body of water. There are 12 major river basins in Kentucky.

Basin coordinators: Person(s) responsible for facilitating Kentucky Watershed Management Framework activities in one or more of the state's basin management units.

Basin team: People from state agencies and other organizations that provide the partnership network for watershed planning within a basin and who serve as planning and implementation resources.

Best Management Practices (BMPs): A best management practice or BMP has traditionally been defined as something built on the ground with guaranteed documentable results in reducing nonpoint source pollution. With paradigms changing to include more expansive management practices, the term best management practice or BMP is now often used to refer to any management practice designed to reduce pollution in the watershed as well.

- **Structural BMPs** – These Best Management Practices require construction, installation and maintenance. These are usually BMPs that you can see such as vegetated stream buffers, rain gardens, and silt fences.
- **Nonstructural BMPs** - These Best Management Practices involve changes in activities or behavior among people in the watershed. Examples include erosion prevention and sediment control plans for construction sites, ordinances that prohibit building in the floodplain, and education and outreach campaigns.

Benchmark: An acceptable water quality concentration for a healthy stream.

Benthic macroinvertebrates: Small animals that can be seen with the naked eye, live on the bottom of streams and lakes, and don't have a backbone. They are often the immature forms of insects that live on land as adults, and they are an important food source for fish and other aquatic animals.

Biochemical Oxygen Demand (BOD): A measure of the amount of oxygen consumed in the biological processes that break down organic matter in water. The greater the BOD, the greater the degree of pollution found in the system.

Biological assessment: Using information about the macroinvertebrates, fish, and/or algae and diatoms found in a waterbody to determine the health of the waterbody.

Biological indicators: Organisms, processes, or characteristics found in a waterbody that serve as markers to indicate the status or health of that waterbody.

Biological survey: Collecting and identifying macroinvertebrates, fish, and/or algae and diatoms.

Clean Water Act (CWA): Federal law enacted by Congress in 1972 to protect surface water in the United States.

Cold Water Aquatic Habitat (CAH): Surface streams that will support native aquatic life or self-sustaining or reproducing trout populations on a year-round basis.

Colony forming unit (cfu): The reporting unit for laboratory bacterial analysis; based on the number of clusters, or colonies, of bacteria that have grown in laboratory conditions until they can be seen with the naked eye.

Combined Sewer Overflow (CSO): Combined Sewer Systems (CSSs) carry both storm water and wastewater (sewage). Normally, the waste all goes to a treatment facility, but when rainfall or snowmelt is heavy, the flow in combined sewer systems can exceed pipe capacity, resulting in discharges to CSOs. CSOs are direct outlets to ditches, lakes, rivers, streams and creeks, which prevent backups in the CSSs. Because the wastes in CSSs are untreated, discharges from CSOs can contain a variety of pollutants, such as pathogens, oxygen-demanding pollutants, suspended solids, nutrients, toxics, and floatable solids.

Combined Sewer System (CSS): These systems carry both storm water and wastewater (sewage) in one pipe to a water treatment facility.

Conductivity: A measure of the ability of a solution to carry an electrical current.

Conduits: Openings and channels formed in bedrock by the infiltration of acidic precipitation.

Designated uses: The Clean Water Act directs states to assign "uses" to their waterways that are legally recognized descriptions of the desired use(s) of the waterway. In Kentucky, the designated uses are Warm Water Aquatic Habitat, Cold Water Aquatic Habitat, Primary Contact Recreation, Secondary Contact Recreation, Domestic Water Supply/ Drinking Water, and Outstanding State Resource Water.

Diatoms: Single celled plant-like organisms that have rigid structures made of silica in their cell walls.

Dissolved Oxygen (DO): The oxygen that is freely available in water, and that is vital to fish and other aquatic life and for the prevention of odors. DO levels are considered an important indicator of a water body's ability to support desirable aquatic life.

Ecoregions: Large areas where the environmental conditions and natural features are similar so the plants and animals that live there are similar, too.

Ecosystem: The interacting systems of plants and animals and their non-living environmental surroundings.

Erosion: The wearing away of land surface by wind or water, intensified by land-clearing practices related to farming, residential or industrial development, road building, or logging.

Eutrophication: The slow aging process during which a lake, estuary, or bay evolves into a bog or marsh and eventually disappears. During the later stages of eutrophication the water body is choked by abundant plant life due to higher levels of nutritive compounds such as nitrogen and phosphorus. Human activities can accelerate the process.

Facilitator: Someone who helps a group of people understand their common objectives and assists them to plan to achieve them without taking a particular position in the discussion.

Fauna: All of the animal life in a particular area.

Fecal Coliform: Bacteria found in the intestinal tracts of mammals. Their presence in water or sludge is an indicator of pollution and possible contamination by pathogens.

Fishable, swimmable, **and drinkable:** The intent of the Clean Water Act is to ensure that the waterways in the United States meet these goals.

Flora: All of the plant life in a particular area.

Geomorphology: The study of erosion, sediment transport, and sediment deposition and how these processes shape the surface of the earth.

GIS data layer: Computer programs linking features commonly seen on maps (such as roads, town boundaries, water bodies) with related information not usually presented on maps, such as type of road surface, population, type of agriculture, type of vegetation, or water quality information. A GIS is a unique information system in which individual observations can be spatially referenced to each other.

Glide: Areas in the stream where the water flow is increasing in speed as it flows out of pools and decreasing depth.

Habitat: The place where a population (e.g. human, animal, plant, microorganism) lives and its surroundings, both living and non-living.

High gradient streams: Steep streams that flow out of hills and mountains and have many riffles and runs.

Hydrologic Cycle: A continuous cycle that represents the movement of water from one phase to the next between the atmosphere and Earth; this includes evaporation, precipitation, infiltration and runoff.

Hydrologic Unit Code (HUC): A cataloging system developed by the U.S. Geological Survey and the Natural Resource Conservation Service to identify watersheds in the United States. HUCs are typically reported at the large river basin (6-digit HUC) or smaller watershed (11-digit and 14-digit HUC) scale. These codes were developed to standardize hydrological unit delineations for geographic description and data storage purposes.

Hydromodification: When undeveloped land is covered with buildings and pavement, it causes more stormwater runoff to flow into creeks at faster rates. This may result in creek channel erosion, as well as flooding, habitat loss, and, in some cases, property damage. These are development-induced changes to the natural hydrological processes.

Hypoxia: Waters with dissolved oxygen concentrations of less than 4 parts per million, the level generally accepted as the minimum required for most marine life to survive and reproduce.

Impaired waters: These are waterbodies that do not fully support their designated uses.

Impervious surface: Any surfaces that are covered by materials that block water infiltration such as asphalt, concrete, etc. These surfaces include roads, sidewalks, driveways, parking lots, and rooftops. Compacted soils (including some lawns) are also highly impervious.

Infiltration: The physical process by which water on the ground surface moves into the soil.

Integrated Report Volume I: Section 305(b) of the Clean Water Act requires states to submit a report every two years that provides the status of waterways that have been assessed in the state. This list of assessed streams is called the 305(b) list and is submitted to EPA as Volume I of the Integrated Report to Congress.

Integrated Report Volume II: Section 303(d) of the Clean Water Act requires states to submit a report every two years that provides the status of waterways that have been assessed in the state. This list of assessed streams is called the 303(d) list and is submitted to EPA as Volume II of the Integrated Report to Congress.

Intermittent streams: Streams with a defined channel that only flow during a precipitation event.

Karst: A geologic formation of irregular limestone deposits with sinks, underground streams, and caverns.

Larvae: (singular form is larva) Immature forms of some insects.

Low gradient streams: Streams that flow through flat land and have few, if any, riffles, many glides and pools, and mostly fine sediment bottoms.

Match: The percentage of a 319(h) project budget that is not funded by federal dollars. Match can be in-kind goods and/or services or money.

Model: A set of equations that can be used to describe the natural or man-made processes in a watershed system, such as runoff or stream transport. By building these cause-and-effect relationships, models can be used to forecast or estimate future conditions that might occur under various conditions.

Municipal Separated Storm Sewer System (MS4): A conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, man-made channels or storm drains):

- Owned and operated by a state, city, town, borough, county parish, district, association or other public body (created by or pursuant to state law) having jurisdiction over disposal of sewage, industrial wastes, stormwater or other wastes, including special districts under state law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, or a designated and approved management agency under section 208 of the Clean Water Act that discharges to waters of the United States; Designed or used for collecting or conveying stormwater;
- Which is not a combined sewer; and
- Which is not part of a publicly owned treatment works.

Nonpoint source pollution: Pollution originating from runoff from diffuse areas (land surface or atmosphere) having no well-defined source. The pollutants are generally carried off the land by storm water. Common nonpoint sources are agriculture, forestry, urban, mining, construction, dams, channels, land disposal, saltwater intrusion, and city streets.

Nonpoint Source Pollution Control Program: The Kentucky Nonpoint Source (NPS) Pollution Control Program goals are to protect the quality of Kentucky's surface and groundwater from NPS pollutants, abate NPS threats and restore degraded waters to the extent that water quality standards are met and beneficial uses are supported.

Nutrients: Any substance assimilated by living things that promotes growth. The term is generally applied to nitrogen and phosphorus in wastewater, but is also applied to other essential and trace elements.

Package treatment plants: A small-scale wastewater treatment facility.

Pathogens: Microorganisms (e.g., bacteria, viruses, or parasites) that can cause disease in humans, animals and plants.

Perennial streams: Streams that receive groundwater and normally flow year round.

Periphyton: Microscopic underwater plants and animals that are firmly attached to solid surfaces such as rocks, logs, and pilings.

pH: An expression of the intensity of the basic or acid condition of a liquid; may range from 0 to 14, where 0 is the most acid and 7 is neutral. Natural, healthy waters usually have a pH between 6 and 9.

Point bars: Areas of accumulating sediment in a stream; often called sand bars.

Point source: Any discernible, confined, and discrete conveyance, including but not limited to, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, landfill leachate collection system, vessel or other floating craft from which pollutants are or may be discharged. This term does not include return flows from irrigated agriculture or storm water runoff.

Pollutant load: The amount of a specific pollutant moving through a stream. The pollutant load is based upon both the concentration of the pollutant and the stream flow. Loads are generally expressed in terms of a weight (of pollutant) and a period of time, resulting in pounds per day, for example.

Pollutants: Generally, any substance introduced into the environment that adversely affects the usefulness of a resource or the health of humans, animals, or ecosystems.

Pollutant yield: A pollutant yield is calculated from a pollutant load to account for geographic size differences. This normalized load, the pollutant yield, can be determined by dividing the pollutant load by a unit of area (e.g. acre, square mile).

Pools: The deepest areas with the slowest flow in a stream.

Primary Contact Recreation (PCR): Recreational activities such as swimming that create contact between the water and the mucus membranes of humans (mouth, eyes, inside nose) that will allow infection by any pathogens that could be in the water.

Precipitation: Any form of water that falls from the atmosphere; includes rain, snow, sleet, and hail.

Quality Assurance Project Plan (QAPP): A QAPP is a project-specific document that specifies the data quality and quantity requirements of the study, as well as all procedures that will be used to collect, analyze, and report those data. A QAPP helps monitoring staff to follow correct and repeatable procedures and helps data users to ensure that the collected data meet their needs and that the necessary quality assurance (QA) and quality control (QC) steps are built into the project from the beginning.

Reach: A selected length of a stream.

Recharge: The process by which water is added to the water table, or groundwater, usually by percolation from the soil surface; e.g., the recharge of an aquifer.

Riffles: The areas in a stream where there is a drop in elevation that causes the rocks on the bottom of the stream to extend above the surface of the water creating a churning action that causes the surface of the water to look rough and bubbly.

Riparian areas: Areas adjacent to rivers and streams with a differing density, diversity, and productivity of plant and animal species relative to nearby uplands.

Runoff: That part of precipitation, snow melt, or irrigation water that runs off the land into streams or other surface-water. It can carry pollutants from the air and land into receiving waters.

Run: A segment of a stream that flows quickly out of a riffle.

Sanitary Sewer Overflows (SSOs): Occasional unintentional discharges of raw sewage from sanitary sewers. These types of discharges are called Sanitary Sewer Overflows (SSOs). SSOs have a variety of causes, including but not limited to severe weather, improper system operation and maintenance, and vandalism.

Secondary Contact Recreation (SCR): Recreational activities such as fishing, wading, and boating that create limited human contact with the water in a stream or lake.

Sediment: Soil, sand, and minerals washed from land into water, usually after rain. They pile up in reservoirs, rivers and harbors, destroying fish and wildlife habitat, and clouding the water so that sunlight can't penetrate the water.

Sediment deposition: The process by which sediments carried by the flow of water in a stream are deposited on the stream bottom as the flow loses energy and slows.

Sediment transport: The process by which sediments in a stream are moved by the force of the flow of water.

Septic systems: An on-site system designed to treat and dispose of domestic sewage. A typical septic system consists of a tank that receives waste from a residence or business and a system of tile lines or a pit for disposal of the liquid effluent (sludge) that remains after decomposition of the solids by bacteria in the tank and must be pumped out periodically.

Sinkholes: Depressions on the land surface formed as precipitation carries soil into the ground through cracks and conduits in limestone.

Source: The KY 319(h) program defines source for the 319-funded watershed plans as the area that contributes a pollutant. Refer to the Chapter 3 Introduction for a figure illustrating source.

Special Use waters: Rivers, streams, and lakes that are worthy of additional protection and are listed in Kentucky Administrative Regulations or the Federal Register as Cold Water Aquatic Habitat, Exceptional Waters, Reference Reach Waters, Outstanding State Resource Waters, Outstanding National Resource Waters, State Wild Rivers and Federal Wild and Scenic Rivers. Not included as special use waters are water bodies designated by default as Warm Water Aquatic Habitat, Primary Contact Recreation and Secondary Contact Recreation.

Springs: Ground water seeping out of the earth where the water table intersects the ground surface.

Stakeholder: Anyone who is involved in or affected by watershed planning. Stakeholders include landowners, government agencies, businesses, private individuals, and special interest groups.

Straightpipes: Some homes or other buildings are neither on sewers nor have an installed septic system. Instead, wastes are illegally "straight piped" to a creek, ditch or other area outside the structure. In addition to the odor this creates, straight pipes directly contribute pathogenic wastes to streams, posing a health hazard.

Stream Discharge: The amount of water (based on the depth, width, and flow speed of the stream) that is flowing past a given point in the stream for a given amount of time. It is usually measured in cubic feet per second (cfs or ft3/sec). An example to demonstrate stream discharge is: Water is flowing past a given point in two 11 feet wide streams at the same flow speed. However, one stream is 10 inches deep and the other is 10 feet deep. A larger amount of water is flowing past the given point in the stream that is 10 feet deep. So, this stream has a greater discharge than the one that is 10 inches deep.

Total Coliform: A group of 16 different bacteria that have similar properties and are found in soils, plants, and in the intestines and waste of warm-blooded and cold-blooded animals.

Total Maximum Daily Loads (TMDLs): 1. A TMDL is a calculation of the maximum amount of a pollutant (examples are sediment, phosphorus, and bacteria) that a stream or lake can receive and still meet water quality standards. 2. A TMDL may also refer to a written report, which includes detailed assessment information of site-specific impaired waters, watershed information, mathematical modeling and the calculated number of a pollutant load.

Total Suspended Solids: A measure of the suspended solids in wastewater, effluent, or water bodies, determined by tests for "total suspended non-filterable solids." Suspended solids are small particles of solid pollutants that float on the surface of, or are suspended in, sewage or other liquids.

Transpiration: The process by which water vapor is lost to the atmosphere from living plants. The term can also be applied to the quantity of water thus dissipated

Tributary: A stream that flows into another stream or into another waterbody.

Turbidity: A cloudy condition in water due to suspended silt or organic matter.

Warm Water Aquatic Habitat (WAH): A surface waterbody and associated substrate capable of supporting native warm water aquatic life.

Wastewater treatment facilities: A facility containing a series of tanks, screens, filters, and other processes by which pollutants are removed from water. Most treatments include chlorination to attain safe drinking water standards.

Water cycle: See hydrologic cycle.

Watershed: The area of land that drains to a specific stream; watersheds join together to form larger watersheds; a major river will encompass many smaller watersheds.

Water table: The boundary in a geologic formation below which the rock is saturated and groundwater exists.

Watershed coordinator: Person responsible for organizing watershed planning, education, and implementation for the protection and restoration of local water resources.

Watershed roundtable: A regional government-citizen forum whose purpose is to promote collaboration and cooperation on environmental concerns, especially water quality issues, among the various local governments and stakeholder interest groups residing within a watershed.

Weathering: The process where rock is dissolved by the acidity in precipitation and groundwater.

Wetland: A natural area that is covered with water or soggy, but may not be wet all year round.