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River Voices

Visual Surveys and Assessments: An Overview

by Geoff Dates

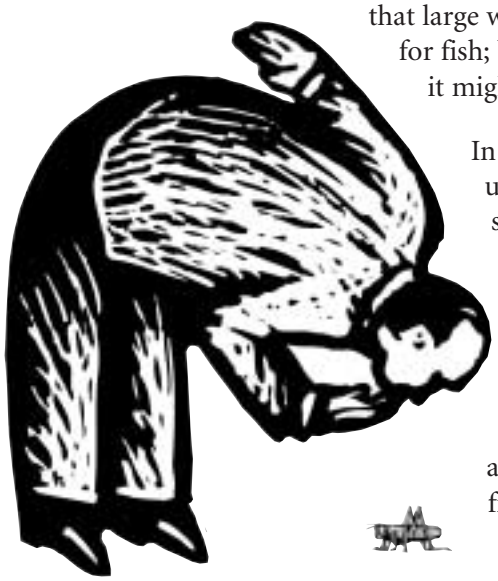
Often, those of us who test water, collect invertebrates, plot channel cross sections and the like miss important information. What about the strange pipe with water (well, some sort of liquid) coming out of it? What about that rusty looking stuff on the rocks? Who owns this riverfront anyway? Every now and then, we need to look for visual clues that just might explain why there are no aquatic insects on the bottom. Sometimes we can learn more by looking than measuring.

Surveys and Assessments

It's important to distinguish between visual *surveys* and *assessments*. For our purposes, a *survey* is about counting and locating things: what's there, how many and where? Another term for this is *inventory*, it's quantitative. An *assessment* is assigning a judgment or value to the thing you are looking at.

For example:

- A *survey* might tell you that there are 4 pieces of large woody debris (e.g., submerged logs) greater than 6 feet long and 8 inches in diameter in a 200-foot stream reach.
- An *assessment* might tell you that this habitat feature should be scored as an "8" out of a possible 10 points and is 80% comparable to the best situation (a.k.a. the "reference condition") for that eco-region. It so happens that large woody debris provides important habitat for fish; based on the assessment system used, it might be assessed as "good."



In the example above, survey data was used in an assessment; however, sometimes no data are collected at all and the assessment is done entirely subjectively (a.k.a. "best professional judgment"). A fish biologist might simply look at a stream reach and see woody debris, features that provide cover for fish, healthy riparian buffers and other features that support a healthy aquatic community. She might judge it "good." On the other hand, an aquatic entomologist ("bug guy") might look at the same reach and feel that these features are not as important to insects as they are to fish. He may rate it as "fair."

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River Voices

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River Network is a national organization whose mission is to help people understand, protect and restore rivers and their watersheds.

From the President


Linda Kliewer

Drive By Surveys

The practice of science does not require white lab coats and expensive computers. In fact, naturalist science is and always has been based first of all on careful observation, measurement and analysis of phenomena in the natural world. Perhaps most famously, Charles Darwin's observations of the differences in the size and shape of finch populations on individual islands in the Gallapolis archipelago, combined with other observations, led him to the theory of evolution. Observation continues to be an important part of the basis of the ecological sciences.

In determining the health and health trends of river systems, it is important to remember that whatever we do on the land, we can read in the river, as aquatic biologist James Karr has memorably observed. Because of the way watershed functions, human land uses and other events that happen far from the water body itself can have critical consequences for river health.

Observation and recordation of land uses within a watershed are not sufficient for understanding river health, but are a necessary element. With the simple tools of a map, a notebook and pen, and a camera, land uses may be recorded, mapped and documented. The resulting information can be combined with direct biological and chemical measurements within the stream to yield understanding of the causes and nature of stream health problems. Typically, a first synthesis of these two sets of information will raise questions that suggest just where we need to develop more detailed information, whether it be about soil type or the nature of emissions from a manufacturing plant.

An understanding of the role of observation and the simple rules of watershed function can empower concerned citizens by demystifying the realm of scientific understanding. Stories about the relevant, useful findings of concerned citizen—including youth—remind us that we all have the ability to be part of the important job of understanding and improving the health of our rivers.

Kenneth Ralzol

Visual Surveys and Assessments: An Overview

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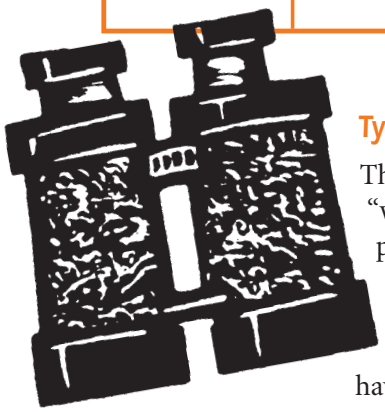
Visual Surveys

Visual surveys involve gathering the visual information on selected features of the water, the channel, the riparian area, the corridor and the watershed.

So, what is inventoried? Just about anything you can think of can be inventoried—from the color of the water to the conditions of the surrounding lands. Visual surveys focus on one, or some combination of features. The following table lists some of the most common inventoried features.

Type of Feature	Aesthetic Examples	Physical Examples	Biological Examples	Stressor Examples (Pollution Sources)	Human Uses & *Example Restoration Measures*
Water Column *(the water itself)*	• appearance • color • clarity • foam • litter • scum	• water level (high/low) • submerged large woody debris	• fish (alive) • fish (dead) • aquatic invertebrates • water birds • floating algae • native aquatic plants • nuisance/invasive aquatic plants • rare species	• sediment • pollution	• swimming • fishing • wading • boating • *Pollution control* • *Wastewater Treatment* • *Dam Removal*
Riparian *(all the above, including river-related lands adjacent to the river; roughly the floodplain)*	• litter • disturbed land	• buffer width • land use • roads	• vegetative cover • birds • water dependent terrestrial animals (beaver, otter, etc.) • invasive species • rare species	• pollution sources • disturbed land	• river access • trails • *silt fences* • *settling ponds*
Corridor *(all the above, including some of the upland fringe)*	• disturbed land • litter	• sinuosity • valley • slope	• vegetative cover • birds • water dependent terrestrial animals (beaver, otter, etc.) • invasive species • rare species	• pollution sources • impervious surfaces • disturbed land	• river access • trails • *best management practices (construction, forest, agriculture, manure storage areas)*
Watershed *(the uplands)*	• disturbed land • litter	• geology & soils *(from maps)* • weather	• forested land • land cover	• pollution sources • impervious surfaces • disturbed land	• impervious surfaces • urban/suburban land use • *creating permeable surfaces*
Channel *(the above, including the river bottoom to the top of the banks; roughly the floodway)*	• litter • disturbances *(e.g., gravel removal)*	• bottom materials • point bars • embeddedness • entrenchment • meandering • cover by water • canopy cover • habitat type *(e.g., riffle, pool, etc.)*	• bank vegetation • attached algae • attached plants • amphibians • leaf packs • rare species • invasive species	• bank erosion • incision • sediment deposition • discharge pipes	• channelization • dams • water supply intakes • human-made habitat structures • *bioengineered bank stabilization*



Types of Visual Surveys

There is an amazing variety of visual surveys. They range from "drive-bys" (a.k.a. "windshield surveys") where you are driving from place to place noting the presence of resources and/or problems, to detailed "counts" of critters. Some of these features are inventoried with visual measurements. For example, a secchi disk is a device that measures water clarity by how deep you can see it in the water column. Other features are simply observed and recorded. What they all have in common is a high tech survey instrument—your eyes.

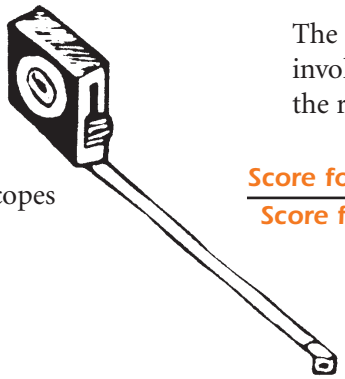
Some of the most common types of surveys are described elsewhere in this issue and include:

- **Stream Walks,** including most any or all of the water column, channel and riparian features.
- **Aquatic Habitat Assessments** (the inventory part), focusing on the physical features of the channel and riparian areas.
- **Erosion Surveys,** focusing on the condition of the channel and the river banks, such as evidence of erosion, bank slumping, etc.
- **Invasive Species,** focusing on introduced plants and animals that may become dominant, crowding out the natives.
- **Pipe Surveys,** looking for pipes entering the river.
- **Nonpoint Source Pollution Surveys,** gathering information about the origin, transport, and final destination of pollutants generated at a site.

In addition to these, there are numerous others: breeding bird surveys, songbird surveys, thalweg surveys, windshield surveys, and so on.

The information is gathered by walking, wading, paddling, driving, looking at maps and/or aerial photographs, snorkeling, diving…you get the idea. People also use a wide variety of equipment including:

- Forms
- Cameras
- Aerial Photos
- Maps
- GPS Units
- Special Viewing Scopes
- Field Guides
- Binoculars
- Tape Measures.



Assessments

The results of the survey are usually recorded on forms. The assessment involves taking those results and interpreting or evaluating them. A typical assessment involves scoring the features observed. This is usually done according to some sort of table that lists the scoring criteria. Here's an example from the Harpeth River Watershed Association's Visual Stream Assessment:

1. Riparian zone *(rate each bank)*

	Vegetation extends at least 30 to 40 feet or more from the top edge of stream bank.	Vegetation extends at least 20 to 30 feet or more from the top edge of stream bank.	Vegetation extends at least 10 to 20 feet or more from the top edge of stream bank.	Vegetation extends less than 10 feet or more from the top edge of stream bank.
right bank	**4**	**3**	**2**	**1**
left bank	**4**	**3**	**2**	**1**

In this example, the vegetation of the riparian zone is given a score from 1 to 4, with 4 being the best condition. The other features are scored in the same way. The scores for all features are totaled to come up with a total score for the site. This total score is compared to either:

- the maximum possible score—in this case, if there were 10 features, each with a maximum score of 4, the maximum possible score would be 40; or
- the reference site—the score from a site known to represent the best in a region. Note that this score may be less than the maximum possible score.

The mechanics of the comparison may involve calculating a *percent comparison* to the reference site. This calculation would be:

$$\frac{\text{Score for assessment site}}{\text{Score for reference site}} = \text{percent comparison to reference}$$

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Visual Surveys and Assessments: An Overview

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This means you should gather habitat information at a reference site during the same period as you are measuring your assessment site. A reference site is a site minimally affected by human activities and similar in most respects (e.g., elevation, geology, stream type) to your assessment site. As such, it represents something approaching natural habitat conditions.

Let's say the total score for the assessment site is 30 and the total score for the reference site is 38. The percent comparison to the reference site would be 30/38 = 79%. This is interpreted using the following table.

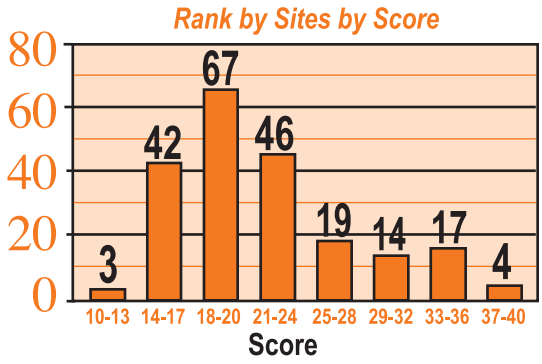
% Comparison	Assessment
> 90%	***Excellent:*** *Comparable to the best habitat conditions to be expected within an ecoregion.*
75 - 88%	***Good:*** *Habitat structure slightly impaired.*
60 -73%	***Fair:*** *Loss of habitat compared with reference.*
< 58%	***Poor:*** *Severe habitat impairment.*

Of course, some surveys produce information that may not need to be "assessed." Pipe inventories, for example, locate the pipes. The follow up is direct—is this pipe polluting the river and, if so, how can we make it stop?

Compiling the Information and Telling the Story

Getting results is just the beginning—you were planning to do something with the data, weren't you? Rows and columns of numbers and descriptions may mean something to you after you've been staring at them for weeks, but they'll likely just confuse everyone else. Summarizing the results and using graphs can make the story jump out at you.

Here's a sample graph of an overall stream visual assessment protocol.



This shows the number of sites with scores in the ranges listed. The higher the score, the better the site. Some methodologies include critical thresholds that will enable you to identify sites that are considered unhealthy and in need of restoration.

Deciding What to Do: Getting Started

Given the myriad options for carrying out visual surveys and assessments, how do you decide which one to use? Like any other kind of assessment work, take some time to think about the following:

1. Why do you want to do one? What is the purpose of your assessment? Examples of purposes include:

- To find and document problems for future action
- To locate sites for future monitoring
- To get to know the watershed.

2. Quality of Information Needed: Who will use the results and for what? What information do they require?

3. Type of survey: Which of the surveys will accomplish your purpose and produce information of the quality you need?

4. How will you interpret the results? Are there benchmarks with which to compare your results?

5. Where will you carry out the assessment? Are there reference sites? What will be the scale? Will you be covering the whole watershed? Just the water column?

6. Quality control: How will you demonstrate that you met the data quality requirements of those who will use your data?

Using the Results

Now, remember why you started the visual assessment in the first place? Let's say you wanted to identify problem areas for restoration and exceptional sites for protection. Based upon your findings, you may create a plan outlining potential action steps, similar to the one below:

EXAMPLES:

Results	Potential Action
Location and severity of bank erosion	Set priorities for bank stabilization projects
High quality habitat areas	Nominate for Outstanding Resource Waters under anti-degradation provisions of the water quality standards
Critical forested riparian areas	High priority for protection with conservation easements
Pollution from illegal pipes	Trace back to source and correct the problem
Map of invasive species	Organize volunteer effort to eradicate *(or at least control)*
Animal/plant *(bio-indicators)* counts	Track changes over time

Why Do Visual Assessments?

Visual assessments can be effective ways to gather information that can be used for river protection and restoration. The results can help explain the results of other data gathering you might be doing (e.g., water sampling, bio-assessment). But, they are also very powerful tools to increase public awareness and involvement with their rivers. I've watched people doing simple visual habitat assessments discover that the river is more than just water between banks. It's a living community that needs the very things that visual assessments get us to look at—cover, habitat, spawning gravel, shade…Visual assessments can change the way people look at their river. And that's a big, and necessary, first step to saving our rivers.

Stop, Look & Listen:

How watershed groups can use visual surveys to monitor their rivers

Compiled by
Nicole Waldheim,
River Network

Visual surveys and assessments come in a variety of styles and provide a great opportunity to involve community members and recruit new volunteers. While some techniques require special tools and knowledge, others involve minimal equipment such as tape measures, walking shoes and a good set of eyes. The following pages provide a sampling of the types of surveys available to river and watershed conservation groups.

Aquatic Habitat Assessment

By Geoff Dates, River Network
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Summary

An aquatic habitat assessment is the estimate and/or measurement of certain physical characteristics of the river or riverside area in order to determine the overall quality of the habitat for aquatic life. The quality of the habitat in a given place is based on a comparison of this information to a reference condition: a place minimally affected by human activities or theoretical ideals based on experience or research. Examples of important aquatic habitat characteristics include:

- The velocity of the current
- The composition of the river bottom
- Sediment deposition
- Shading by riverside vegetation
- Presence or absence of shelter or cover
- Diverse physical structure
- The nature and extent of macro-habitats

Together with water quality, these characteristics determine the kinds and numbers of critters or plants that can live there. Habitat assessments are available for both high and low gradient streams, wetlands and some lakes.

Purpose

Both habitat quality and water quality are affected by human activities in the river. By assessing the habitat along with aquatic life (fish, benthic macroinvertebrates, algae, plants), you may be able to determine whether habitat conditions explain what you find (or don't find). You may also be able to pinpoint specific habitat features that may be causing the problem. For example, low numbers of aquatic insects might be due to the lack of a rocky bottom or too much sediment.

A habitat assessment is also an excellent way to connect people to their waters. Spend an hour or two wading and walking, looking at some of the features that support life, and you will never see the river the same way again. This might be the best reason to consider adding this tool to your assessment kit.

Costs/Difficulties

Habitat assessments can be simple qualitative efforts that rely primarily on an hour's worth of observations to rigorously quantitative efforts that take all day. Here we focus on the visual end of the spectrum. Costs involve fairly minimal equipment and supplies: tape measures, yard sticks, floats (to estimate current velocity), field sheets, waders, etc. Nothing particularly high tech or expensive.

Habitat assessments are easy to do. The main challenge is that they are subjective: to some extent, habitat quality is in the eye of the beholder. Also, the interpretation of the results is sometimes ambiguous: whose habitat is it anyway? For example, a fish biologist might rate a habitat with lots of cover highly. An insect biologist might place more emphasis on attachment surfaces.

Description of Methods and Materials Used

There are two basic steps in most habitat assessments: 1) systematically gathering observations and/or simple measurements of important habitat features, 2) scoring each feature from a low number (poor) to a high number (excellent).

The observations are gathered by walking the bank or wading in the channel and recording observations like: What percent of the stream bottom is cobble? Current velocity may be measured using a float, measuring tape and top watch. For non-wadeable waters, the observations are done by walking along the banks.

The scores may be based on opinion, or on some sort of scoring guide. The field information and the scores are recorded on a field sheet. Some methods eliminate recording the observations altogether and just have you score each feature. I prefer including the basic information upon which the scoring is based, in case there are questions later.

How Results Should Be Interpreted and Used

The scores of the habitat characteristics are usually totaled and compared with those of one or more regional or upstream reference sites. These sites represent the best attainable habitat conditions in an area or conditions just upstream of an impact. If the habitat quality of all the collection sites is comparable to the reference site(s) and to each other, then differences in kinds and numbers of aquatic organisms would be due to water quality conditions, perhaps caused by a pollution source. If habitat quality differs among sites, differences in kinds and numbers of aquatic life may be due to natural variations in habitat characteristics or to alterations of the river caused by various human activities.

While the overall comparability to reference conditions is useful for identifying impaired habitat, low scores for individual features may point to follow up actions. For example, embedded or buried cobbles may be the reason that a site's habitat is impaired. This suggests steps to deal with a sediment problem.

Stop, Look & Listen:

Monitoring for Erosion

By Sue Marshall, Tualatin Riverkeeper
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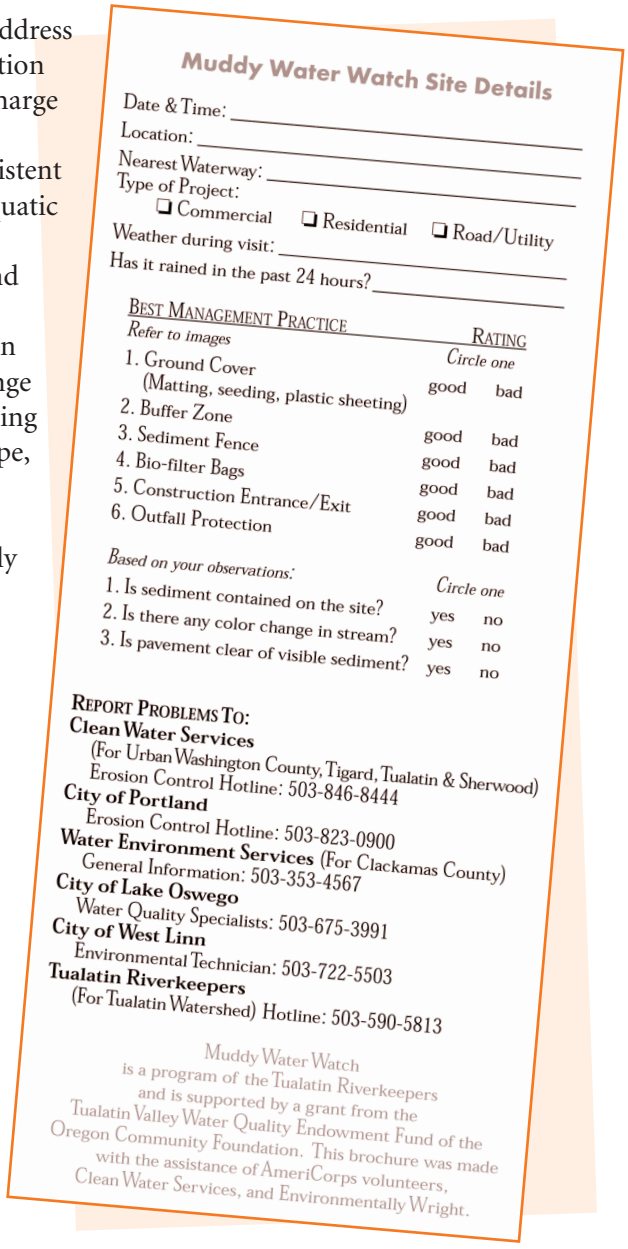
Summary

Tualatin Riverkeepers' "Muddy Water Watch" provides training (a two hour lecture plus a field trip) and illustrated guides for volunteer monitors to identify and report observable erosion problems so that corrective action can be taken to stop these sources of sediment from entering public waters. This type of program is transferable and can be used in any watershed.

Purpose

The purpose of erosion monitoring is to address the problem of inadequate erosion prevention and sediment control resulting in the discharge of sediment to surface waters from urban construction sites. Sedimentation is a persistent problem that impairs water quality and aquatic habitat of the river and its tributaries. A secondary purpose is to raise awareness and engage the community in a tangible stewardship activity that addresses a known water quality limiting parameter. A challenge to cleaning up many watersheds is addressing the activities that occur across the landscape, such as urban development, agricultural practices and forest management. Muddy Water Watch focuses on erosion as an easily understandable and observable phenomenon.



Muddy Water Watch Site Details

Date & Time: _____
Location: _____
Nearest Waterway: _____
Type of Project:
❑ Commercial ❑ Residential ❑ Road/Utility
Weather during visit: _____
Has it rained in the past 24 hours? _____

Best Management Practice *Refer to images*	Rating *Circle one*	
1. Ground Cover (Matting, seeding, plastic sheeting)	good	bad
2. Buffer Zone	good	bad
3. Sediment Fence	good	bad
4. Bio-filter Bags	good	bad
5. Construction Entrance/Exit	good	bad
6. Outfall Protection	good	bad

Based on your observations:

	Circle one	
1. Is sediment contained on the site?	yes	no
2. Is there any color change in stream?	yes	no
3. Is pavement clear of visible sediment?	yes	no

Report Problems To:
Clean Water Services
(For Urban Washington County, Tigard, Tualatin & Sherwood)
Erosion Control Hotline: 503-846-8444
City of Portland
Erosion Control Hotline: 503-823-0900
Water Environment Services (For Clackamas County)
General Information: 503-353-4567
City of Lake Oswego
Water Quality Specialists: 503-675-3991
City of West Linn
Environmental Technician: 503-722-5503
Tualatin Riverkeepers
(For Tualatin Watershed) Hotline: 503-590-5813

Muddy Water Watch
is a program of the Tualatin Riverkeepers
and is supported by a grant from the
Tualatin Valley Water Quality Endowment Fund of the
Oregon Community Foundation. This brochure was made
with the assistance of AmeriCorps volunteers,
Clean Water Services, and Environmentally Wright.

Costs/Difficulties

At a minimum it would take a half-time person in the first year to develop a program similar to that of Muddy Water Watch, which includes reporting forms and guides. Expenses can be kept low by staffing the project, primarily, with an AmeriCorps placement. Material costs depend on the complexity of the project, but must include a camera, map and reporting forms. There is also an ongoing need for staff to conduct outreach so that more people will report observable erosion problems, and to refine report tracking to determine the extent of community participation and adequacy of the regulatory response.

A Grass Filter Strip, which slows water, increases infilration and thus reduces run-off.

For the Muddy Water Watch program, start up costs were provided by a small grant of $18,000. It paid for staff to develop training materials and for the production of the *Field Guide to Erosion Prevention and Sediment Control*. One thousand copies of this initial guide were printed addressing sediment management of urban construction sites. They plan to expand the program with the production of three additional guides dealing with sedimentation related to agricultural practices, roads and forest practices.

Description of Methods and Materials Used

Monitoring is opportunistic. When the rains begin, monitors are advised to watch for muddy water running off construction sites. If a problem is observed, monitors or staff should follow up to assure corrective action has been taken.

Muddy Water Watchers participate in a two-hour lecture and a field trip. They are given a laminated field guide and reporting forms (trouble tickets). Trouble tickets may be filled out by volunteer monitors or called in for the staff to fill out. The tickets document the date, time, location and description of the problem, notification to regulatory agency and actions taken to correct the problem. Forms are available online for a joint online reporting process with the principle regulatory agency in the watershed.

How Results Should Be Interpreted and Used

Trouble tickets result in immediate calls to regulatory agencies. So far, agencies have been very responsive to calls, and the responsible parties have corrected faulty erosion prevention and sediment control management practices. Broader issues may also come to light as a result of monitoring efforts. Two things that came up for the Muddy Water Watch program were: 1. Are settling ponds effective in dealing with very fine particles that do not settle out? and 2. Are the rules applied consistently between jurisdictions or when responsibility is delegated to another jurisdiction?

Monitoring results should be collected and compiled quarterly into a report and sent to a list of agencies dealing with water quality issues. The report informs people of policy positions regarding local design and construction standards, National Pollutant Discharge Elimination System stormwater permit renewals and total maximum daily load development. The report also can track trends over time and be used for public awareness and education.

Monitoring with Streamwalks

By Lynn Ridley, James Riverkeeper
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Introduction

Streamwalks provide a simple means for anyone interested in river conservation to play a role in the management of their local waters. They allow people to walk or boat along a stream, collecting physical data concerning the health and condition of the waterway. Simply observing and making notes of the river's vegetation, wildlife, point sources, shading and other characteristics can be extremely beneficial. They also provide a great way to identify potential clean-up sites.

Purpose

Physical stream assessments provide valuable baseline data. In addition to chemical and benthic monitoring, streamwalk data can help craft state Total Maximum Daily Load plans (TMDLs).

Andreas Janssen, an intern from Germany, assists during a stream walk. Volunteers play a large role in our stream walk program.

In Virginia, the James Riverkeeper began to ask for baseline data from physical stream assessments to help craft TMDL plans, but it quickly became apparent that such information was largely not available. As a result, TMDL models were being developed using assumptions instead of facts. The importance of getting the TMDL models right the first time around cannot be over stated. Virginia's Department of Environmental Quality has estimated that the cost to develop TMDLs for its 600 impaired water bodies will cost more than $64 million dollars, and the cost to implement the TMDLs will exceed $700 million dollars. These numbers are similar for other states.

It is crucial to start conducting stream walks in advance of every TMDL in your watershed. Actual data can influence TMDL models, and create baseline data on each impaired water body against which TMDL implementation plans could be measured.

Costs/Difficulties

Costs are extremely nominal. Materials needed are basic and easily used by volunteers. They include a topographic map, waders, canoe or boat as appropriate, watch with second hand, ping-pong balls, disposable cameras, 300' tape measure, first aid kit and a cell phone. The boats, canoe, waders, watch and phone come from the volunteers themselves. The remainder must be purchased or provided by the organization.

Difficulties that may arise from this type of monitoring are limited, but include gaining access to the water along private properties, as well as steep slopes or dangerous terrain.

Description of Methods and Materials Used

There are many protocols already in use for streamwalks (See Resources and References section for examples). With that in mind, the James Riverkeeper created a physical assessment protocol that was valid for their watershed. It contained sufficient data to be accepted and used by state agencies, and was easy enough that volunteers could accurately perform the assessment. This combination stream walk/habitat assessment includes some flow and bank data. Survey Sheets help track in-stream characteristics, stream bank and channel characteristics, local watershed characteristics and habitat parameter. Their volunteers monitor monthly and after a significant storm event. Organizations interested in using streamwalks should look at various protocols and decide which elements would provide the most useful information for their waterway.

How Results Should Be Interpreted And Used

The James Riverkeeper primarily uses the data they obtain from their streamwalks to influence the TMDL modeling and the follow-up implementation plans in Virginia. However, data can also be used to determine the condition of a stream and the surrounding riparian areas, as an educational tool, to detect specific pollution problems so they can be prioritized, identify sites for water quality monitoring, assess trends and as baseline information.

Monitoring for Invasive Species in Riparian Areas

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Tamarix ramosissima - infestation

Summary

Monitoring for non-native invasive species is a necessary and important component in preserving our natural river habitats. Without vigilance, we risk ultimately losing the uniqueness and ecosystem functions of these areas. Staying aware of what species may become problematic in your watershed, having a system in-place to report early infestations and having a rapid response team, are the keys to success. The early detection of invasive species when their populations are still small, has the added benefit of lowering total costs for control.

Purpose

Non-native species invasions are currently rated as the second largest threat (after habitat loss) to biodiversity. In watershed and riparian areas, invasive species can be especially mobile. Waterways work as corridors, linking discrete water bodies and watersheds, and can also act as refuges, harboring both native and non-native species, in an otherwise harsh surrounding environment. In riparian areas in the arid Southwest, tamarisk, Russian olive and giant reed have severely altered not only the vegetation composition, providing little suitable habitat for native wildlife, but have also changed the natural hydrology of these river systems. In the Pacific Northwest, Japanese knotweed is becoming an increasingly pestiferous menace to native vegetation and salmonid habitats. In the Southeast, native biodiversity has suffered a tremendous blow as melaleuca forests have drastically changed the natural environment of the Everglades.

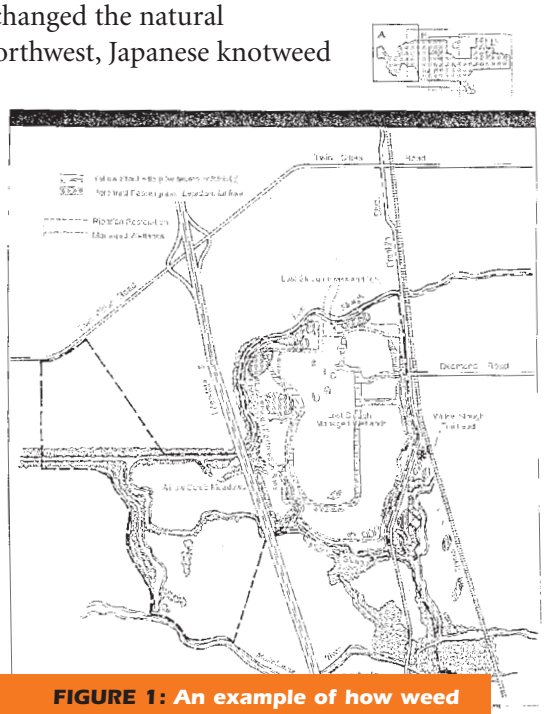

FIGURE 1: An example of how weed infestations can be directly drawn onto maps.

Costs/Difficulties

Monitoring costs depend on the scope of the project area and how much staff and/or volunteer time is needed to adequately cover this area. Watersheds tend to be harder to monitor for invasives (as compared to grasslands) because of steep slopes, remoteness or accessibility only by boat. Identifying and controlling a pest population when the infestation is still very small, is the most cost- and resource-effective.

Stop, Look & Listen:

Tamarix ramosissima - dense growth

Description of Methods and Materials Used

The simplest technique for monitoring invasive plant species in riparian areas is to walk or float down the river or stream, and map or GPS the sites where priority* non-native species are detected (Figure 1). GIS maps or aerial photography can also be useful for plotting infestations. Although river systems tend to be very dynamic and unregulated watercourses will change over time, the use of permanent plots (or the use of permanent photo-points) is a very useful tool in determining invasive species trends (increasing, decreasing or stable) over time, and should be used to determine the course of further management actions. Monitoring for invasive plants should take place once a year, usually during the growing season. If there is a specific species that has a high probability of showing up in a watershed, such as zebra mussels or Chinese mitten crabs, monitoring several times a year is good practice. Volunteers can also be trained to be on the look-out every time they go out.

How Results Should Be Interpreted and Used

Once the priority* invasive species are mapped, populations to be managed should be prioritized and actions taken. Whether to treat a certain population will depend on:

a. current extent of the species on or near the site;
b. current and potential impacts of the species;
c. value of the habitats/areas that the species infests or may infest; and
d. difficulty of control.

Once it is determined which species are the most manageable, staff and volunteers should be mobilized. Usually, weeds can be best controlled by hand-pulling, other times by pulling with mechanical tools. However, if a weed rapidly grows back, an area is best treated by using controlled burns, flooding or other natural habitat processes. Biocontrols have also been used with success.

**Note: Priority species should be determined by an ecologist or botanist who is familiar with the species that may have the largest negative impact(s) in your area. Prioritizing invasive species for management action is a better use of limited monetary and staff/volunteer resources, since not all invasive species have large negative impacts. Once identified, these species can be compiled into a small notebook or flashcards, for staff and volunteers to take into the field.*

The "Following the Flow" Nonpoint Source Pollution Site Assessment

By Jeffrey Schloss, New Hampshire Lakes Lay Monitoring Program, Univ. of New Hampshire Cooperative Extension
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http://ceinfor.unh.edu/home.html

Summary

Riparian or site walks can be done in a general manner to try to detect pollution sources, but the University of New Hampshire Cooperative Extension, the NH Lakes Lay Monitoring Program and the USDA Natural Resources Conservation Service have developed a more detailed visual assessment approach called, "Following the Flow." Essentially the assessment follows the path of water from the receiving water (lake, river, stream or wetland), along the transport route to the impact site.

Purpose

When monitoring indicates a water quality problem, the cause of the disturbance is often hard to detect if it involves nonpoint source (NPS) pollution. It is generally not cost-effective for an agency, professional or volunteer to sample water chemistry or investigate biological integrity by bracketing every suspect source. A visual survey method to screen for the most likely cause would be best. Typically, even a small stream watershed can have a variety of land use impacts: Is sediment leaving a construction site and causing the problem downstream? Are the nutrients being lost from the corn field, just upstream? What about the newly constructed camp road or the logging area? Or is that newly fertilized lawn on the lakeshore the culprit? This method provides a systematic approach for the lay person to evaluate the seriousness of an erosion, sedimentation or runoff problem.

Costs/Difficulties

Training for the method typically can be done in a day. Costs can be low if volunteer monitors are involved. The major material requirements include copies of the assessment sheets, maps, a camera and sometimes, aerial photos. A primary difficulty may be getting access to a site, due to private property issues. Volunteers may not be able to determine what the proper conservation and best management practices on the site should be, but with training it is very easy to determine the seriousness of erosion, sedimentation or runoff problems.

Description of Methods and Materials Used

The approach of "Following the Flow" is graphically depicted in Figure 1, but the method uses the questions below to evaluate nonpoint source problems. For each type of impact site, specific questions relate visual indicators, impacts, best management practices, and land use activity. While each type of activity being assessed has a specific set of evaluation sheets and questions, the overall approach remains the same.

- What is the potential of erosion or pollution production to occur given the characteristics of the site (soils, slope, vegetation, etc.), site history and contributing areas above the site? (Typically assessed using topographic and soil maps).
- Is there evidence of sediment or related NPS pollution being generated on the site?
- Are there measures in place for limiting or preventing NPS pollutants from being generated (i.e., Best Management Practices), and if so, do they seem to be working?

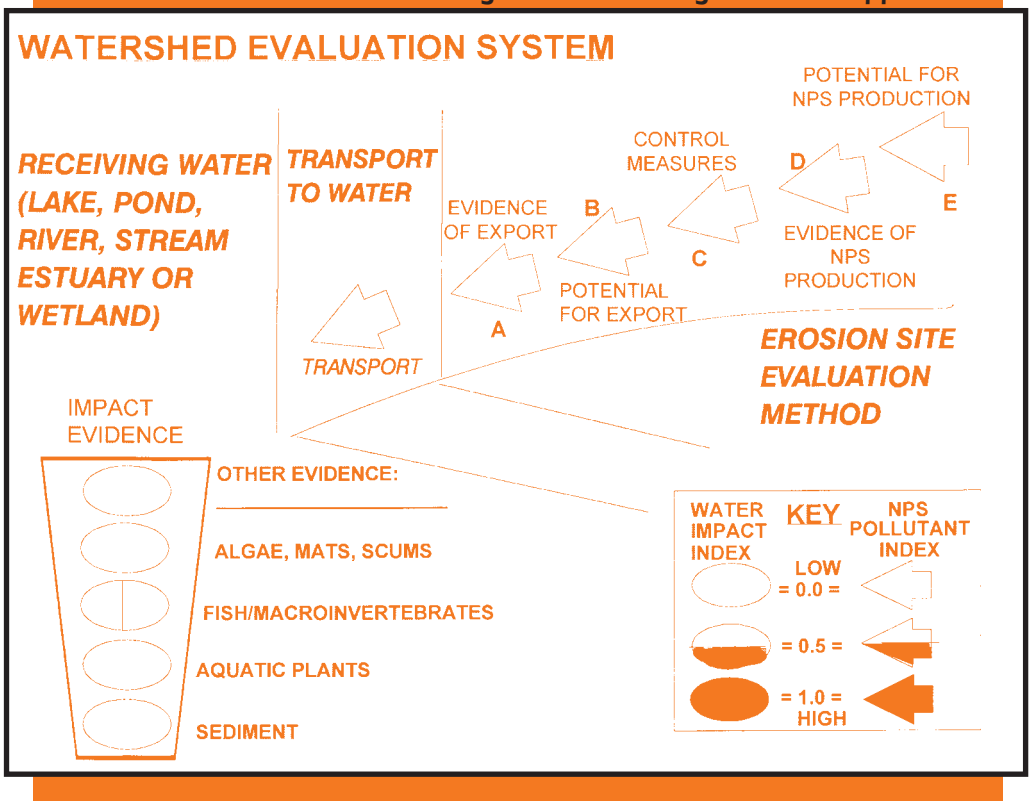
- If NPS pollution is generated on the site, could it easily move off of the site, or are there vegetative buffers in place?
- Is there evidence that material has moved off of the site?
- Is there a transport route that would allow this material to get to the water of concern?
- Is there any evidence of impact on the receiving water? (Generally from the original monitoring activity of the group).

Site worksheets have been developed for a range of agriculture activities, logging operations, construction sites, shoreline areas, residential developments, roads, parking lots and boat ramps. A neighborhood evaluation has been developed to assess homeowner practices and the density and design of developments.

How Results Should Be Interpreted and Used

The same figure that was used to graphically represent the method approach can be used as a visual diagnostic tool for interpretation. A scoring system where 0 represents an excellent condition and 1.0 represents the worst condition is employed for the questions. Either the average or the highest score of questions in each section is transferred to a scoring sheet and the arrows in the diagram are filled in accordingly. Dependent on which arrows are filled in, interpretations can range from no problem to an existing problem to a potential problem just waiting to happen during the next big storm. The transport route assessment allows for the determination of the significance of that site contributing to the water of concern. Results can be used to get proper management practices in place to mitigate or prevent the problems found.

Figure 1: "Following the Flow" Approach



Using Pipe Surveys with Volunteers to Map Stormdrain Outlets

By Rachel Calabro, Massachusetts Adopt-A-Stream Program
Rachel.Calabro@state.ma.us
http://www.state.ma.us/dfwele/River/rivAAS toc.htm

Purpose

The Adopt-A-Stream Stormdrain and Pipe Survey was designed to allow local volunteers to assist with mapping and monitoring stormdrain outfalls which is a requirement for many communities under Phase II of the Clean Water Act's National Pollutant Discharge Elimination System (NPDES) program (this program requires a permit for all point source discharges). The survey can also be used to assess pollution "hot spots" or other issues related to pipes and stormdrains, and the results often highlight local nonpoint source pollution problems, resulting in public education about these issues.

Cost/Difficulties

This is a low cost visual survey. Although most pipes are easily visible, there is sometimes a difficulty with locating and safely viewing the pipes and being in the "right place at the right time" to catch a problem. Some pipes are inaccessible or dangerous to approach because of bank slope, poison ivy or other reasons, so volunteers should use their best judgement when measuring pipes.

The costs of running this type of monitoring program are similar to any other visual monitoring that requires little equipment. Administration and supervising of volunteers takes time, as does training the volunteers for fieldwork. Expenses include film and/or cameras, obtaining and copying maps and data sheets. Often the town will help with this and many groups get in-kind donations of materials. The most expensive survey item is a Global Positioning System (GPS) unit, but many town Engineering Departments have units on hand.

Members of the Howard Brook Stream Team in Northborough (MA) measuring a pipe in the field.

Description of Methods and Materials Used

Many stormdrain systems have been created and manipulated over decades, with new materials replacing old, and with little knowledge written down or saved. The sophistication of systems also varies, with many towns using "country drainage," consisting of paved swales to funnel water off the road and into a local stream. Using the Stormdrain and Pipe Survey, volunteers identify every pipe outfall and swale and its diameter, material and condition. They also note if the outfall has a concrete or stone headwall, rip-rap or other armoring, and the condition and slope of the bank beneath the pipe. Flow in the pipe is indicated and described, and problems with odor, color, sediment or algae are noted. The location of the pipe is noted and marked on a map. Volunteers can also use GPS units to obtain coordinates of the pipe locations.

The survey is designed to be done once, but once the data is interpreted, long term visual monitoring of certain problem pipes can be set up. Many pipes need to be revisited because of a suspect odor or color.

Materials needed include a tape measure to measure pipe diameter, a camera (or cameras) and film to document the pipe condition and location, and a flashlight to look inside pipes and catchbasins. Maps are also needed of the survey area. Often towns will provide Assessors' maps for marking pipe locations. GPS units are often used to identify exact outfall locations.

How Results Should Be Interpreted and Used

The data sheets are designed to be a record of what was found during the survey, including the condition of pipes and any associated problems, such as suspected leaking sewage, foam, oil, excessive algae growth, sediment, etc. The problems are then added to a list of proposed actions recommended by the monitoring group. The data sheets can also be interpreted by town officials when they are preparing their management strategy for addressing nonpoint source pollution.

In several instances, volunteers have reported problems with suspected sewage discharge into stormdrains to municipal officials. This has resulted in local action by the volunteers to solve nonpoint sources of contamination. Almost every survey will identify some pipe-related issue, such as cracked or leaking pipes or eroding headwalls and scour. Town officials are often not aware of these problems.

The data sheets are designed to be given directly to the city engineers or Public Works directors to be added into a database or used for GIS mapping and following up on problems. Information is used in preparing local education and outreach for stormwater management and can also help with the delineation of contributing drainage areas, a necessary component when a community is trying to determine stormwater remediation strategies.

CASE STUDY

Volunteer Sightings:

Site-specific Visual Stream Assessment of Streams in the Harpeth River Wateshed

By Dorene Bolze, Executive Director, Harpeth River Watershed Association & Peter Jordan, Volunteer Newsletter Editor

In August of 2001, the Tennessee Department of Agriculture's Nonpoint Source (NPS) Program contracted with the Harpeth River Watershed Association to conduct a volunteer visual stream survey along 303(d)/305(b) listed streams in the watershed, in order to identify specific sources of pollutants to these streams. The purpose of this assessment is to help the NPS program, other federal and state agencies, and other entities prioritize where to focus efforts to implement best management practices (BMPs) with the overall goal to improve the water quality of these stream segments. Thus, ultimately these segments could be removed from the 303(d)/305(b) list.

303d/305b Definition

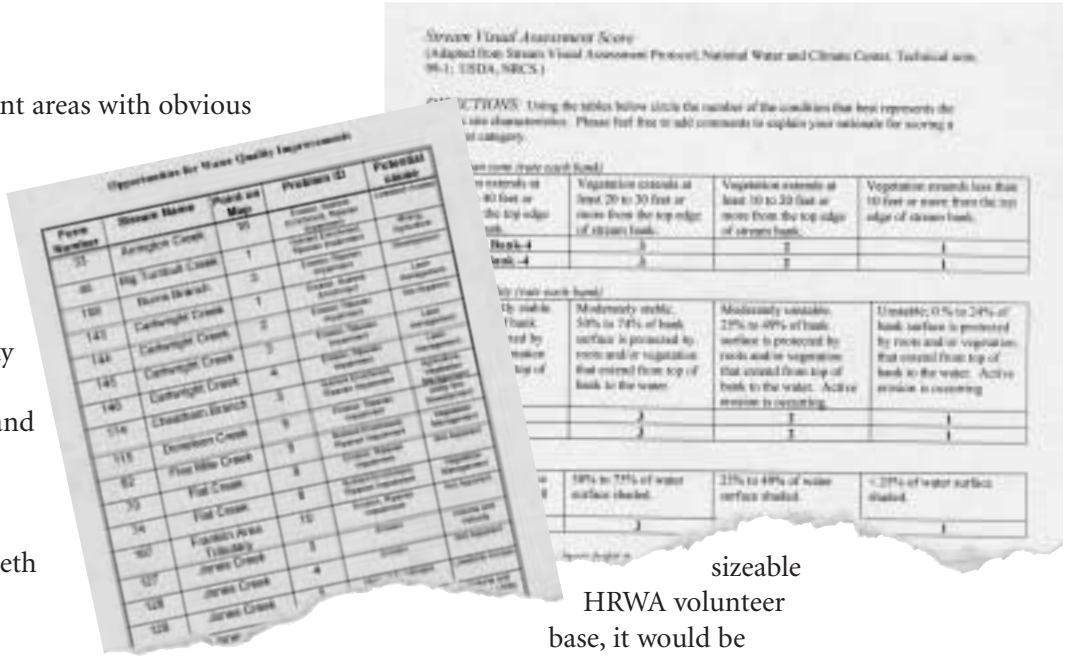
303(d): List of Impaired Waters as required by the Clean Water Act

305(b): The National Water Quality Inventory report to Congress as required by the Clean Water Act

Project staff modified several existing visual protocols developed by the U. S. Environmental Protection Agency, Tennessee Valley Authority and the Natural Resources Conservation Service to create the protocol utilized in this assessment. The protocol combined qualitative and quantitative components relative to physical water characteristics and habitat components. A training session was held, including classroom and field instruction, in which participants discussed and conducted the protocol for the visual stream assessment at two sites that rated both high and low in habitat quality.

Volunteers surveyed and photographed over 217 sites along all 303(d)/305(b) listed streams and many unassessed streams in the Harpeth River watershed. The quantitative component of the protocol involved scoring eight characteristics (e.g., canopy cover, water appearance, channel condition) for a possible total score of 42 for high quality habitat. Based on the total score for each site, 109 sites scored above 30. Forty-six sites scored between 26 and 30, 19 between 21 and 25, and 14 sites between 16 and 20. Finally, 17 and 4 sites scored between 11 and 15, and between 6 and 10, respectively. One hundred twenty-one (right bank) and one hundred seventeen (left bank) sites scored poor for the riparian zone (less than 10'). The majority of bank stability scores were in the excellent range, however 42 (left bank) and 36 (right bank) sites scored in the good range, 29 and 36 in the fair range and 10 and 9 in the poor range. With regard to canopy cover, 54 sites scored excellent, 39 scored good, 52 scored fair, while 65 scored poor. Invertebrate habitat was rated as excellent at 131 sites, while 37 sites scored good, 12 sites scored fair and 16 sites scored poor. For sedimentation in riffle and pool habitat, 125 sites scored excellent, 36 sites good, 13 sites fair and 6 sites scored poor. One hundred thirty-three sites scored excellent for water appearance, while 43 sites scored good, 13 fair and 3 poor. One site scored in the poor range for nutrient enrichment, while 15 scored fair, 50 good and 118 in the excellent range. Twelve sites were rated in the poor range for channel condition, 31 sites scored fair, 68 good and 98 excellent.

This visual stream assessment identified at least 48 sites that appear to be examples of gross conditions that represent sources of water quality degradation. However, volunteers did not collect water quality data such as physical/chemical measures or benthic macroinvertebrates.



These 48 sites represent areas with obvious water quality related problems and priority opportunities for the implementation of BMPs. Riparian zone impacts appear to play a large part in water quality impairment, and bank instability was identified as an important source of sediment in the Harpeth River watershed.

Given the nature of nonpoint source water pollution, natural resource agencies would have spent countless dollars surveying the 303(d) listed streams to identify these sites. In fact, the volunteers spent over 550 hours carrying out the visual stream assessment survey. Based on this study, volunteers can make gross problem identification cost-effective and can help natural resource managers target limited staff time to gross problem areas. This may help natural resource agencies in developing successful strategies for finding, documenting and addressing opportunities for water quality enhancement along 303(d) listed streams. In addition, the approach should lead to the removal of the streams or segments from the 303(d) list in that this approach helps to prioritize where to focus efforts for BMPs.

The protocol designed in this study is worth modifying for use elsewhere, both in the Harpeth River watershed and in other priority areas in the state. In addition, important next steps include making water quality improvements by implementing BMPs in targeted areas identified in this study and assessing water quality improvements with further water quality testing that is site-specific. Because of the sizeable HRWA volunteer base, it would be possible to design a volunteer based approach that would be cost effective and enable the assessment of stream recovery. Such site-specific assessments of BMPs and water quality testing can also be a part of Tennessee Department of Environment & Conservation's (TDEC) watershed management plan for the Harpeth and the development and implementation of the TMDLs that the EPA and TDEC are drafting for Harpeth for both sediment and nutrient enrichment/Dissolved Oxygen. In addition, municipalities responsible for implementing the Phase II MS4 permit for stormwater are priority partners in the next phase in order to implement solutions to reduce flashing and to manage in-stream flow rates at more natural conditions. Such next steps should be designed and carried out in cooperation with the relevant federal and state natural resources agencies, municipalities, landowners and businesses.

HARPETH RIVER WATERSHED ASSOCIATION

The success of this project in covering all the 303(d)/305(b) streams and many unassessed segments is a real testament to the dedication of the Harpeth River Watershed Association members who volunteered their time, expertise and energy for this project.

HRWA's Assessment Protocol and Directions are available at: www.harpethriver.org.

A Visual Assessment For the Birds

Using Songbirds as Indicators for Ecological Health

Modified with permission from Laura Jackson, U.S. EPA Office of Research & Developement, Research Triangle Park, N.C.

During the spring breeding season, more than a hundred songbird species conduct a birds-eye assessment of the Mid-Atlantic highlands to determine suitable habitat for mating and raising young. Different bird species require different habitats for food, shelter and breeding. The types of birds found in an area indicate the ecological condition of an area. Bird communities and ecological condition are also linked to land cover. As the land cover of an area changes, so do the types of birds in that area.

We can now measure how the distribution of various bird changes as land use is altered. This association allows birds to be used in conjunction with other indicators to estimate ecological condition. Since the health of rivers is inextricably linked to the land through which they flow, this process can also be useful in determining the health of riparian areas.

Ecological Indicators

Our understanding of how living things interact and how these interactions contribute to healthy surroundings is limited. To better understand these interactions and improve efforts to protect the environment, we need to measure characteristics which reflect the condition of ecological resources and the impacts which adversely affect them. These are ecological indicators.

Birds exhibit numerous traits that make them good ecological indicators at regional and national scales. They are everywhere, and different species vary in their sensitivity to physical, chemical and biological threats. Each species also exhibits life history traits (e.g., ground nester—nests on the ground; omnivore—feeds on both animal and plant material) that link to multiple environmental characteristics. Recording bird species within a designated area is relatively easy and inexpensive; birds have strong public appeal; bird species are well known; there are many trained field observers available; and no laboratory analysis is required. Additionally, survey methods harm neither birds nor the survey sites, and long-term records and ongoing programs are available to provide or augment data.

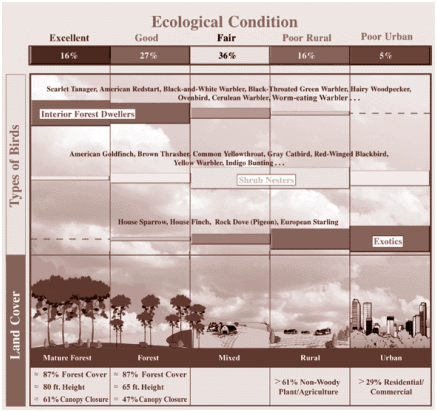
It is important to realize that the correlation between the highest ecological condition and the bird species that indicate that condition may differ from region to region. Therefore, a bird based ecological indicator for the Mid-Atlantic highlands is intended for use solely in that study area. Similar indicators can be developed for almost any region, based on the region's birdlife.

A Closer Look

In the early 1990s, 34 sites in central Pennsylvania were selected and ranked according to their degree of ecological decline or degradation (human disturbance gradient). The degree of degradation was based on an intensive study of soil type; amount of soil deposited by erosion; plant, amphibian and wildlife communities; and where each site fits into the general landscape pattern. Sites were ranked from nearly pristine to severely degraded.

Next, an independent ranking of these sites using only bird species data was developed. Birds were surveyed at each of these sites, thus determining the bird composition (community) at each site. The bird community at each site is comprised of multiple groups of species that require similar elements for survival (e.g., habitat, food, nest location or other elements for

survival) reflective of ecological condition. The separate rankings of the sites based on the original human disturbance gradient and the bird communities were compared. This comparison satisfactorily demonstrated that ecological condition, as indicated by the bird community, closely matched the ecological condition determined previously by other physical and biological characteristics of each survey site.

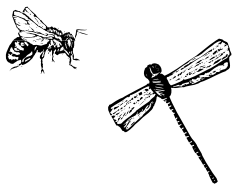


Sixteen specific groups of bird species (e.g., shrub nesters, omnivores, etc.) were ultimately selected as representative of the mostly forested Mid-Atlantic highlands area. Of the sixteen groups, nine were "specialists" (e.g., insectivores) and seven were "generalists" (e.g., omnivores). In general, a high proportion of birds with specialized requirements indicates healthy natural habitat that provides ecological benefits at larger scales. Birds and vegetation were surveyed across the entire Mid-Atlantic highlands within sites sufficiently large (200 acres) to represent most of the habitat elements that are required by breeding birds.

Findings

Five levels of ecological condition were clearly distinguishable across the study region from the types of birds found at each site:

- Excellent (16%)
- Good (27%)
- Fair (36%)
- Poor Rural (16%)
- Poor Urban (5%)



Highland areas in excellent condition are dominated by birds that, among other traits:

- Eat insects exclusively,
- Seek food on the ground and in tree bark,
- Reproduce only once per year, and
- Migrate from distant wintering grounds.

Such characteristics tell us that these areas also support upper levels of the food chain, structurally complex habitat, relative protection from non-native predators and competitors, and continental-scale lifecycles. In the Mid-Atlantic highlands, an extensive mature hardwood or mixed-hardwood forest provides the maximum amount of these ecological features and benefits.

Many of the same bird species occur in areas of good ecological condition. However, they do not dominate the community as fully, while others species appear that are less specialized, for example, in what and where they eat. The bird community in these areas still reflects forest habitat, but it is not as physically or biologically complex. Areas in excellent condition support a taller (~80 feet) and more closed (61%) tree canopy than areas in good condition (~65-foot canopy height and ~47% canopy closure). The forests are no bigger at the sites in excellent condition, but the trees are.

The bird community in fair ecological condition indicates a significant decline in the provision of protective ground cover as well as upper-canopy feeding and nesting habitats. At the same time, non-native species begin to appear, signaling aggressive competition with native birds for food and shelter. With increasing shrub and grassland species, this community signals a shift from the native ecosystem to a mix of forest and the introduced habitat of agricultural and residential areas.

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A Visual Assessment For the Birds

cont. from page 23

Areas of poor condition were separated into two classes—urban and rural—based on the distinct bird groups observed in each landscape type. In both cases, highland areas in poor ecological condition have birds that:

- are non native
- do not have specialized diets
- reproduce multiple times per season
- parasitize or prey on the nests of other birds.

This is a classic profile of opportunistic behavior, and is observed in both plant and animal species when habitats are simplified or otherwise disturbed by human or other events. Habitats supporting these bird groups are not sustainable.

The five categories of ecological condition as defined by the bird communities were highly related to the configuration of land cover in the 200-acre sites. "Excellent ecological condition" conveys the sense of an undisturbed, self-sustaining natural area. In the Mid-Atlantic highlands, most undisturbed areas develop into mature forest communities. Therefore it is not surprising that this study finds ecological condition, as indicated by bird composition, to be positively correlated with percent forest cover and measures of mature forest vegetation. What may be surprising is that less than 20% of the region remains in excellent condition and that labels of fair to poor describe more than half of the region.

More information can be found at: http://www.epa.gov/maia/pdf/bird06-6.pdf.

For the full research report, The Bird Community Index: A tool for assessing biotic integrity in the Mid-Atlantic Highlands, visit: http://www.cas.psu.edu/docs/CASDEPT/FOREST/wetlands/Research/birdibi.pdf.

Getting Started

Watershed groups can collect their own bird data quite readily, as long as qualified birders take part to generate the data. It can't properly be done unless you (or your resident bird-expert) are able to identify everything you hear. That's the most important part - experienced birders.

Once the personnel are in place, it's probably best to sample riparian habitats with a strip transect (i.e., a long thin strip quadrant). It's just a matter of generating a species list of breeding birds over a relevant area, for example, 1 km. The Bird Community Index is generated from this species list.

If you are serious about utilizing song bird surveys, consider teaming up with the Cornell Lab of Ornithology. The Lab is a nonprofit membership institution whose mission is to interpret and conserve the earth's biological diversity through research, education and citizen science focused on birds. Our programs work closely together and with citizen scientists, government and non-government agencies, and organizations across North America and beyond to learn more about birds, including how to best protect them and their habitats. Visit http://birds.cornell.edu for more information.

Resources & References

There is an overwhelming number of habitat assessments for different types of aquatic life and water body types. Here is a list of selected sources of habitat assessments, both visual and quantitative. In addition, most state assessment agencies have some sort of habitat assessment as part of their programs.

Aquatic Habitat Assessment: Common Methods. This manual represents the synthesis of a comprehensive survey of the most widely used methods for inland aquatic habitat assessment in North America. Sixteen method chapters detail step-by-step; background information and rationales for selection of the various procedures described in each chapter are also provided. 224 pages. Mark B. Bain and Nathalie J. Stephenson, editors. $33. To order, call the American Fisheries Society Publication Fulfillment at 678/366-1411 and ask for Stock #550.28.

Field and Laboratory Methods for General Ecology (4th ed). This introductory ecology lab manual focuses on the process of collecting, recording and analyzing data, and equips students with the tools they need to function in more advanced science courses. By James E. Brower, Jerrold H. Zar, and Carl N. von Ende. A McGraw-Hill publication. 288 pages. Visit http://www.mhhe.com/catalogs/ for ordering information.

Living Waters Using Benthic Macroinvertebrates and Habitat to Assess Your River's Health. This comprehensive resource describes how to design and carry out a river study using benthic macroinvertebrates. By Geoff Dates. $25. River Network, 520 SW 6th Ave.#1130, Portland, OR 97204; 503/241-3506 x21; info@rivernetwork.org; www.rivernetwork.org/marketplace.

Rapid Bioassessment Protocols for Use in Streams and Wadeable Rivers. This report reflects the advancement in bioassessment methods since 1989 and provides an updated compilation of the most cost-effective and scientifically valid approaches. Report# EPA 841-B-99-002. U.S. EPA, Office of Water, Washington D.C., July 1999. Available online: http://www.epa.gov/owow/monitoring/rbp/.

Stony Brook-Millstone Watershed Association. This group organizes River Action Teams (RAT's) to visually assess the waterways and stream corridors in their area. Using a map, data sheets and a camera, volunteers monitor during each season as well as during different flow conditions. For those looking to start a similar program, this organization may be able to provide helpful tips. 31 Titus Mill Road, Pennington, NJ 08534; 609/737-3735; http://www.thewatershed.org/monitors.htm#RAT.

Stream Channel Reference Sites: An Illustrated Guide To Field Technique. This publication is a practical guide to establishing permanent reference sites for gathering data about the physical characteristics of streams and rivers. It describes procedures for selecting and mapping a site, measuring channel cross-sections, surveying a longitudinal profile, identifying bankfull stage, and measuring streamflow and bed material. By Cheryl Harrelson, C.L. Rawlins, and John P. Potyondy. Available online at: http://www.stream.fs.fed.us/PDFs/RM245.PDF.

The **Stream Visual Assessment Protocol** presents an easy to use protocol to evaluate the condition of aquatic ecosystems associated with streams. U.S. Department of Agriculture and Natural Resources Conservation Service. Available online at: http://www.ftw.nrcs.usda.gov/pdf/svapfnl.pdf.

Streamkeeper's Field Guide: Watershed Inventory and Stream Monitoring Methods. The Guide provides comprehensive and entertaining training in watershed inventory and stream monitoring techniques. Includes protocols for monitoring physical, chemical and biological parameters, reproducible data sheets for collecting information, steps on how to create Quality Assurance and Quality Control plans and more. By Thomas B. Murdoch and Martha Cheo with Kate O'Laughlin. 300 pages. $29.95. Contact The Adopt-a-Stream Foundation at the Northwest Stream Center, 600-128th Street SE, Everett, WA 98208-6353; 425/316-8592; www.streamkeeper.org.

Testing the Waters: Chemical & Physical Vital Signs of a River covers nine water quality indicators, including the Physical Survey. It includes background and procedural information, as well as an example of a physical survey field sheet. Copies available for $10. Contact River Network, 520 SW 6th Ave.#1130, Portland, OR 97204; 503/241-3506 x21; info@rivernetwork.org; www.rivernetwork.org/marketplace.

The Visual Stream Survey Manual takes you through the steps of conducting a watershed survey and visual assessment. This site also contains a workshop schedule for those interested in learning how to monitor streams. Georgia Adopt-A-Stream Program, 4220 International Parkway, Suite 101, Atlanta, GA 30354; 404/675-1636 http://www.riversalive.org/AAS_manuals.htm#Visual%20Stream%20Survey%20Manual.

continued on page 26

Resources & References, cont.

Volunteer Stream Monitoring: A Methods Manual is a great resource for any volunteer monitor. U.S. Environmental Protection Agency, Office of Wetlands, Oceans, and Watersheds (4503T) ,1200 Pennsylvania Avenue, N.W., Washington, D.C. 20460; 202/566-1191; http://www.epa.gov/owow/monitoring/volunteer/stream/.

Looking for Information on a specific type of visual survey? Check out these resources!

Erosion

Tualatin Riverkeepers. Using the "Field Guide to Erosion Prevention and Sediment Control," volunteers learn what they need to look for when at a site. The Guide, which is divided into four sections, can be found on their website and contains a sample data sheet. Tualatin Riverkeepers , 16507 SW Roy Rogers Rd. , Sherwood, OR 97140; 503/ 590-5813; http://www.tualatinriverkeepers.org/.

Habitat Assessment

Virginia Save Our Streams. The stream quality survey on this page aids in the recording of data concerning the health of your river. It includes a habitat assessment that could be a useful model for anyone interested in this type of monitoring. http://mason.gmu.edu/~jarcisze/StreamMonitoring.

Invasive Species

The Volunteer Monitor is a national newsletter that facilitates the exchange of ideas, monitoring methods, and practical advice among volunteer monitoring groups. The Fall 2000 issue entitled, "Monitoring Flora," focuses on plant monitoring and invasive species. Susan Vigil, The Volunteer Monitor, 211 Challanooga Street, Apt. A, San Francisco, CA 94114; skvigil@aol.com; 415/695-0801.

Invasivespecies.gov. This site is a one-stop shop to learn about the impacts of invasive species, types of species, and other organizations that deal with the issue. Under "Monitoring," in the Manager's Tool-Kit, is the publication, "Guide to Monitoring Exotic and Invasive Species." http://www.invasivespecies.gov/toolkit/monitor.shtml.

The Nature Conservancy: Wildland Invasive Species Team. Besides providing up to date information about newly sighted invasive species, this site takes you through the necessary steps for starting your own Weed Watchers monitoring program. In addition to this, the "Weed Control Methods Handbook," provides details and specific methods for controlling invasive species in your watershed. http://tncweeds.ucdavis.edu.

Stormdrains

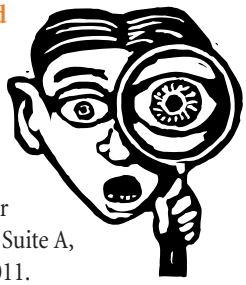
Massachusetts Adopt-A-Stream Program. This site contains the "Stormdrain Data Sheet," used by volunteers to map and monitor outfalls. The data sheet provides a good example for groups interested in this type of monitoring. Another good resource is the, "Reporting Guide for Effective River Watching." This chart lists possible observations a person may make if they pass a polluted river. Although this contact information in this chart is specific to MA, it is helpful to everyone. Riverways Program, Department of Fisheries Wildlife and Environmental Law Enforcement, 251 Causeway St., Suite 400, Boston, MA 02114; 617/626-1549; http://www.state.ma.us/dfwele/river/rivAAS_pubs.htm.

Non-Point Source Pollution

Following the Flow. A detailed description of the Non-point Source Pollution Site Assessment can be found at: http://www.umass.edu/tei/mwwp/nermc.html or at http://epa.gov/OWOW/volunteer/proceedings/concur6.html#session6e.

Stream Walks

Alabama Water Watch. Under, "Group Activities," is information on conducting streamwalks. It includes information on how to prepare for a streamwalk, exactly what to do while on one, and recommended follow-up actions that can be transferable to any organization. Also included is a sample streamwalk data form. Program Office, 203 Swingle Hall, Department of Fisheries, Auburn University, AL 36849; 888/844-4785; http://www.alabamawaterwatch.org/awwp/pubs.htm.



US Department of Agriculture and Natural Resources Conservation Service-CT. Connecticut's Stream Walk Initiative provides basic information on streamwalks, including what they are, tools used, frequently asked questions, and other related resources. 344 Merrow Road, Suite A, Tolland, CT 06084-3917; 860/871-4011. http://www.ct.nrcs.usda.gov/ctthames/images/strmindx.htm.

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❑ ***River Talk!*** ❑ ***The Clean Water Act: An Owner's Manual***

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River Network is seeking nominations for individuals to be honored at the 2003 River Heroes Award's Banquet. Awards will be presented on May 12, 2003 at the 4th Annual River Rally in Stevenson, Washington.

Nomination material and criteria can be found on-line at: **http://www.rivernetwork.org/library/riverheroes.htm** or by contacting Katherine Luscher at 503/241-3506 x16; kluscher@rivernetwork.org.

The deadline for completed nomination packets is ***February 14th, 2003***.

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