Cacapon

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"Where did all the bugs go?" Stream Scholars campers (page 8) were shocked this summer to see that our little study stream at the headwaters of the North River, vibrantly healthy two years ago, was in trouble. The reason was obvious – the stream is being buried in fine sediment. The experience of these young people provides the context for our Revisit the Baseline project . . . the environmental legacy we are leaving our children and grandchildren.

Revisiting the Baseline

"Crunch, crunch, crunch"

Eleven years ago, the authors of *Portrait of a River* said they cringed with every step in the Cacapon River because of all the snails that crunched underfoot. Often abundant in shallow, basic streams in this region, their numbers dropped for some reason in the late 1990s. . . but they're abundant again, just in time to make another generation of Cacapon Institute scientists cringe with every step in the river as they "revisit the baseline."

How do you protect a river? Seventeen years ago, the founders of Cacapon Institute (then named Pine Cabin Run Ecological Laboratory) asked that question about the Cacapon. They saw the Cacapon as a special river, and a lucky river. In part, that luck was an accident of geography. To the east were rivers damaged by urban growth and industry. To the west, more than a thousand miles of West Virginia streams and rivers were severely degraded from acid mine drainage, a legacy of coal mining.

The Cacapon had escaped their fate so far, but for how long? Explosive population growth was on the horizon, new highways were being planned, new and expanding industries were bringing the potential for pollution – all of these changes threatened the Cacapon. But how do you protect a river?

Between 1989 and 1992 Cacapon Institute (then named Pine Cabin Run Ecological Laboratory) conducted an ecological baseline study of the Cacapon River. It was the first baseline of an entire river in the United States.

Why a baseline study? The underlying concept was simple:

> "As a society, we have agreed to protect our rivers . . . . According to federal and West Virginia state law, surface waters — which include rivers — must be maintained at "existing quality." "The State Water Resources Board has adopted an Anti-degradation Policy, which states that "the level of water quality necessary to protect existing uses shall be maintained." On the Cacapon, this means that water quality must support water-contact recreation, such as swimming, boating, and fishing. In theory, these laws should be adequate. In practice, however, they sometimes fall short because West Virginia lacks the funds necessary to document subtle water quality changes. This baseline is an effort to provide the data needed for conserving one river." (*Portrait of a River*, 1995)

During the four-year process of assembling the baseline, researchers visited 106 study sites along the Cacapon, Lost and North rivers. They analyzed water quality and benthic macroinvertebrate samples (see box

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INSIDE

"Like a medical chart, the baseline is part of an early warning system, allowing future changes in the river's health to be diagnosed quickly and, it is hoped, treated before problems become too serious."

Portrait of a River, 1995

Take an aerial tour of the Cacapon River mainstem on our website and compare the river today to the river during the baseline years.

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Cacapon Institute
Is a nonprofit corporation dedicated to using science and education to help people protect and enjoy the Cacapon, Potomac and other Appalachian watersheds.

This newsletter was supported by The MARPAT Foundation, the Evenor Armington Foundation, and the members of Cacapon Institute.

In Brief

Its time for our annual autumn party in Washington DC. Join us on November 6 for an evening of great food, conversation, and wonderful old time music. For more information, you can visit our website, or call us at 304-856-1385.

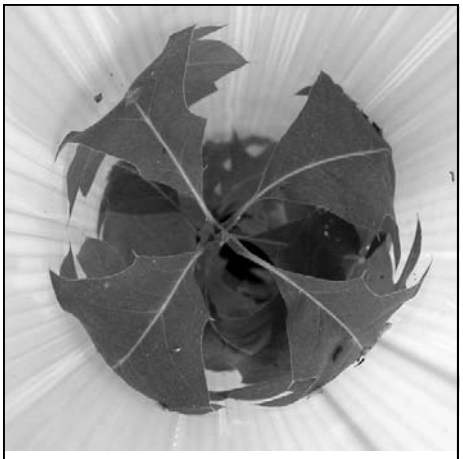
Have you ever tried to explain the idea of a watershed to children? So have we. Over the summer, we produced a new Flash activity for the Potomac Highlands Watershed School (our e-school) that we think does the trick. ***"What is a watershed?"*** can be found in our Elementary and Middle school classrooms on the web. The vocabulary and pacing are designed with the younger kids in mind. Its an easy download even on a dial-up connection, so please give it a try.

Job Opening —Full-time assistant. We're looking for the right person to join the staff at CI. The successful applicant will experience the full scope of our small nonprofit environment: working on science and education projects, fundraising, writing proposals, developing projects. Experience or demonstrated interest in environmental education a plus. Opportunities for advancement. Send letters and resumes, and inquiries to the mail or email address at left.

Forested Riparian Buffer Demonstration Project
Early Results: July-August 2005

Forested riparian buffers are an important component of West Virginia's Potomac Tributary Strategy to reduce the transport of nutrients and sediment into West Virginia waters and downstream to the Chesapeake Bay. In the last issue of *Cacapon*, we described two forested riparian area demonstration projects, one along the Cacapon near Yellow Spring, one on the South Branch of the Potomac near Romney.

Mostly native hardwood trees were planted in April 2005. Each plant had a weed mat to reduce competition and retain moisture. At Yellow Spring, all were planted in tubes as protection from browsing. At the South Branch, half had tubes, half did not.



Is it safe to come out? Oak growing in a tree tube.

Planting success was assessed at each site in late summer. Both sites had heavy "weed" growth that made it difficult to find the plantings, and no attempt was made to find all of the plants. Plants totally encased in tubes had a high survival rate at both sites (89% at Yellow Spring, 81% at South Branch), generally lush leaf growth, and little damage from insects.

Plants that were poking above the tops of tubes (mostly shrubs and small trees in 2' tubes) had a high survival rate with healthy leaves in the tubes and poor leaves (if any) above the tubes due to browsing and insect damage. 56% exhibited browse damage at Yellow Spring, while a staggering 93% were browse damaged at the South Branch site.

Trees and shrubs planted without tubes at the South Branch site had a low 48%survival rate. The survivors had nearly universal (97%) and severe browse damage. The few existing leaves were small in comparison to leaves on the same species in tubes and the vast majority of survivors were of one species - Washington Hawthorne (*Crataegus phaenopyrum*).

The first site selected for this demonstration project was near Yellow Spring in Hampshire County, along the banks of the Cacapon River. This site has, sadly, been a highly visible demonstration of how difficult it is to establish trees in this area. Saplings were planted and replaced repeatedly at this site in the mid-1990s. They really did a very good job with the planting (you can see a Flash slide show of their work on our website), but later the trees were not watered or protected from deer browse and few, if any, survived.

For more details and pictures, visit our website at www.cacaponinstitute.org.

This project is funded by the Chesapeake Bay Program and administered by the WV Conservation Agency and WV Division of Environmental Protection.

(***Revisit Baseline*** *Continued from page 1)*

below), and conducted thorough habitat assessments. Taken together, the data produced a detailed scientific picture of the Cacapon.

Baseline findings

Portrait of a River: The Ecological Baseline of the Cacapon River (now available on the web) transformed four years of scientific data into a popular report that made technical information accessible to the public.

Portrait found that the Cacapon River was relatively healthy, but burdened by pollution created by certain land uses. In particular, two upstream reaches, Lost River and Middle Cacapon, were more polluted than the others, in part due to cattle having free access to the river in these areas. At high flow, bacteria levels often exceeded water quality standards established to protect human health.

These water quality patterns were consistent with "non point source" pollution. The river's non point pollution problem was linked to public health concerns for recreational users of the river, and to riverside homes and children's camps.

Portrait predicted change for the Cacapon watershed. "Dramatic change — which has swept the basin in the past— appears ready to revisit the area. Population growth, new industries, the construction of dams, and a major highway — these and other developments will bring change. In the face of certain change, the question we face is how to protect — and improve — the ecological health of the Cacapon River."

Portrait **made four recommendations that would help protect the Cacapon River watershed:**

- "First and foremost, the Cacapon's riparia — the riverbank corridors of vegetation that defend the river against a wide range of threats — must be restored. In places, this will mean planting trees and shrubs, ideally in a 100-foot wide buffer-strip on both banks. In others, it will mean rebuilding or stabilizing eroded banks with rip-rap. In still others, it will mean limiting cattle access to the river. Some sites will need all of these actions.
- Second, further riparian damage must be prevented. Whether by voluntary agreement or law, those who use riverfront lands should act with the health of the river and downstream users in mind. This does not mean the riparium must remain untouched. . . .
- Third, the Cacapon's health must be monitored. Without periodic check-ups, this baseline's early warning value will be lost. . . .
- Finally, more study is needed. . . . We also need better tools -— such as computerized land-use analyses — to determine how large-scale changes in the basin affect the river's health. . . . **Protecting the Cacapon** will take cooperation — from state and federal government officials, business owners and civic leaders, and landowners and parents. The time to act is now."

What has happened in the watershed since the baseline?

It's a mixed picture. The big changes anticipated by *Portrait* have all come to pass. Population growth has been high and is probably accelerating. According to the U.S. Census Bureau, population increased between 1990 and 2000 in Morgan, Hampshire and Hardy counties by 23.2%, 22.5%, and 15.4% respectively. The poultry industry in the Potomac Highland region more than doubled in size, with the Cacapon River's Lost River headwaters region leading the way. Two flood control dams have been built in the Lost River watershed, one more is under construction, and a fourth is still being considered. The major highway, Corridor H, is being completed in the Lost River watershed with three bridges crossing the lower sections of the river.

Were *Portrait's* recommendations adopted?

Protecting the Riparian Zone

It seems safe to say that there has been, at best, limited success at protecting or restoring the Cacapon's damaged riparian zone. Although there is a scientific consensus that forested and

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Point and Non Point Source Pollution

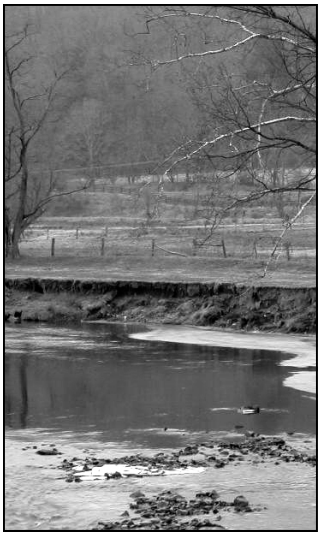
Point source pollution comes from an easily located source such as a factory outlet pipe or a sewage treatment plant.

Non point source pollutants wash off the landscape from a broad array of hard-to-control sources, such as fertilizer, oil, manure, and sediment.

Common Stonefly

Do Bottom Dwelling Animals indicate Water Quality?

The animals that live in our streams can be important indicators of water quality. Benthic macroinvertebrates (animals without backbones that live on the river bottom and can be seen without magnification—like the stonefly above right) are used by both professional and amateur river scientists to see the effects of pollution that may not be readily detectable in water samples. But not all pollution has this effect. Analysis of the baseline's benthic invertebrate samples (published in 1998) found only minimal disturbances. In particular, it found relatively high species richness in the most agricultural region of the watershed that may have been due to moderate nutrient enrichment.



There is a scientific consensus that forested and other well vegetated areas along rivers play an essential role in preventing pollution from reaching our streams, reducing erosion, and limiting damage from floods. Unfortunately, thirteen years after completion of the Cacapon baseline, we still lack a community consensus to protect and restore these areas. There are many miles of failing stream banks like the one above in the Cacapon watershed.

However, West Virginia is promoting voluntary riparian restoration and streamside fencing as part of the State's commitment to protect the Chesapeake Bay.

(***Revisit Baseline*** *Continued from page 3)*

other well vegetated areas along rivers play an essential role in preventing pollution from reaching our streams, reducing erosion, and limiting damage from floods, we still lack a community consensus to protect and restore these areas.

One of the related issues identified in *Portrait* – cattle with free access to streams, remains an issue. The farm community is resistant to fencing livestock from streams, often for very practical reasons; cost, fences in the floodplain can be damaged by flooding, fenced areas may represent a loss of usable agricultural land and the need for an alternative water supply. However, West Virginia is promoting riparian restoration and streamside fencing through voluntary adoption of Best Management Practices as part of the WV Potomac Tributary Strategy process. As we clean our own waters we will also protect the Chesapeake Bay.

The USDA's Farm Service Agency and Natural Resources Conservation Service in Hampshire County have had notable success over the last few years signing farmers to the USDA-Conservation Reserve and Enhancement Program (CREP). CREP provides high cost shares and significant financial incentives for planting trees and fencing along streams. As of this writing, 33 producers have placed 163 acres along the Cacapon and North rivers into this program (Steve Ritz, personal communication).

However, having both a community commitment and the financial resources to restore riparian zones may not be enough. It can be very difficult to get trees to grow these days. A demonstration project that planted trees along a stretch of the Cacapon near Yellow Spring in 1995 failed due to both drought stress and excessive deer browsing. A new effort is working to turn that project into a success and to research methods that increase tree survival (see page 2). The difficulty and expense of riparian restoration initiatives underscores the need to prevent further damage to intact riparian forests.

Continued Monitoring and New Study

CI has always taken the responsibility of using the baseline "like a medical chart" very seriously. In 1996, we began the Cacapon River Water Quality Monitoring Study. Monthly water quality data suitable for trend analysis is collected at several of the original baseline sites.

In 1997, we began a study designed to address what seemed a simple question: "Where's the phosphorus (P)." Phosphorus that was (and is) being used in abundance on our agricultural soils as a component of poultry litter, particularly in the Lost River watershed. The baseline study didn't find elevated P in that watershed's rivers, nor did a later U.S. Geological Survey study. So where was it? The answer to the question was that phosphorus in our watershed mostly moves into streams during big storms, and then rapidly moves out of the water column by settling to the bottom with sediment and being used by plants and microbes. In other words, the P is there, but it's hiding.

This highlights the biggest problem with water quality studies where the major sources of pollution are non point – the pollution is often in hiding. This makes detecting the "subtle water quality changes" noted in *Portrait* excruciatingly difficult. An analysis of nine years of CI's water quality data that is trying to separate real changes from the considerable background noise is currently under way.

Today, state agencies are much more actively involved in water quality monitoring throughout the Potomac Highlands region than at the time of the baseline. The West Virginia Department of Agriculture has been collecting water quality data in the Lost River watershed since 1998, and last year began sampling one site on the lower Cacapon. The West Virginia Department of Environmental Protection's Watershed Assessment Program began detailed assessments of all major WV watersheds in the late 1990s. Their suite of parameters is more comprehensive than the Cacapon baseline's list. They first visited the Cacapon in 2000, sampling 63 sites in the Cacapon watershed; of these, seven were in the Cacapon River, eight in the Lost River and 12 in the North River. WVDEP is back again this year.

Protecting the Cacapon

Local, state and federal agencies came to a consensus in the mid 1990s that the expansion of the poultry industry posed a threat to water quality in the Potomac Highlands. The Lost River headwaters of the Cacapon was identified as the region most in need of agricultural Best Management Practices. Most of the farmers in that watershed agreed to participate in this program. Management of poultry litter, cattle manure and fertilizer was significantly improved, some feedlots were relocated, and many fields now have winter cover crops. However, as noted above, widespread acceptance and adoption of streamside buffers and fencing remains an elusive goal.

(***Revisit Baseline*** *Continued from page 4)*

The Cacapon and Lost Rivers Land Trust is leading the way in helping Cacapon watershed landowners find ways to voluntarily protect their lands. Together they have protected more than 6500 acres from excessive development.

Revisiting the baseline

Beginning this September and continuing next year, we will be revisiting many of the original baseline sites to assess how they have changed. We are collecting standard field chemistries (temperature, pH, conductivity) and preserving samples for later nutrient analysis in the laboratory. However, the Cacapon River Water Quality Monitoring program is much better suited to studying water quality. This program's focus is on habitat, in particular comparing characteristics of the water, and the condition of the stream banks, surrounding lands, and stream bottom today with that recorded in the baseline.

This year's Stream Scholars experience (page 8) illustrated the importance of quality habitat, and highlighted the problem with sedimentation. Anyone who lives in the Potomac Highlands, or travels here frequently, has become accustomed to seeing streams muddy after storms in a way they did not used to be. There are many contributing reasons for this, including river banks failing due to lack of vegetation, new development, and highway construction.

Sedimentation is a problem because, when sand and silt fill the spaces between boulders, cobble and gravel on the stream bottom, the space available for bottom living organisms is diminished. This also raises the bed of the stream, making it more prone to flooding. Even though it seems obvious that our rivers are muddy more often these days, sedimentation is one of the most difficult problems to monitor, because most of the time sediment is not suspended in the water column. It sits on the bottom of the stream – and routine water samples tell you little about the problem.

You have to look at the bottom of the stream to assess sediment. There are two ways to do this. One is by estimating the percent coverage of silt, sand, gravel, cobble, boulders, and bedrock in a riffle. This may seem imprecise, but with careful "eye calibration," field crews produce remarkably consistent results. The other way to assess the bottom is by actually measuring a random sample of the different sizes of sediment using a "pebble count" – a standard method in stream assessments. The baseline used the former method; today, we are using both. In addition, we have added percent coverage estimates in areas like pools where sediment is likely to be deposited; this is likely where real understanding of the sedimentation issue will be found. The new information will help establish a benchmark for future assessments.

Partners. This year WVDEP has again brought their considerable resources to the Cacapon watershed. They have included a number of our baseline sites in their assessment, as well as a number of the sites they visited in 2000. They share CI's deep concern about sedimentation, and we will work together to assess this watershed. In addition, we will work with our friends at the Friends of the Cacapon River to assess the lower sections of the river.

New issues. Invasive exotic species like the gypsy moth and honeysuckle were a big concern at the time of the baseline. The gypsy moth in

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Separating habitat degradation caused by people from natural change can be a challenge. For example, when the baseline field crew visited a site at Lost City in 1991, they noted that the stream bottom was mostly covered with cobble and gravel. When first visited as part of the Cacapon Monitoring Program in 1996, the cobble and gravel had mostly disappeared and the bottom was nearly solid bedrock. Two years later, after a big storm, the cobble was back. Today the bedrock is again becoming more and more evident. How much of this happened because of land use changes in the watershed, and how much represents a natural cycle of change? It's a good question.

Invasive Species: Japanese Stilt Grass

Reference books might well use "Japanese stilt grass" as a synonym for invasive exotic species. Accidentally introduced to America from Asia in 1919, it has become common in the Cacapon watershed in the last few years. Its pedigree as an invasive is a mile long, but here are a few highlights: although its favorite habitat is damp and shady (it can produce seeds in 95% shade), it can live in both wet and dry, shady and sunny conditions; it produces a large number of seeds that persist in the soil for up to seven years and it aggressively colonizes any exposed soil; it grows at very high densities and is tall enough (see picture at left) that it can easily shade out many native plants; if you try to pull it out of the ground at the wrong time of the year (all but about two weeks), it will re-sprout from any roots left in the ground; and native species do not like to eat it. Our riparian areas are under assault from this plant

(***Revisit Baseline*** *Continued from page 5)*

particular had the potential to devastate our forests. However, a mixture of proactive pest management and the timely arrival of a fungal pathogen have helped keep the gypsy moth from realizing its devastating potential in WV.

A thick bed of the invasive aquatic weed *Hydrilla* in the Cacapon, September 2005.

However, other invasive species that were not anticipated in *Portrait* are now transforming our landscape, both in the river and surrounding lands. Exotics like the aquatic weed *Hydrilla* (which was very abundant in the lower Cacapon River over the last two years), the rapidly spreading Japanese stilt grass (*Microstegium vimineum* - that threatens to overwhelm riparian zones and forests - see box page 5), and the hemlock wooly adelgid (*Adelges tsugae* - that seems to be inexorably killing the beautiful hemlocks that line our rivers). In addition, although native to the area, abundant deer are stressing our forests. We have added assessments of these issues to our list.

Fish are threatened by the emerging problem known as intersex, in which testes in male fish develop eggs. This is probably due to hormone or hormone like substances in the water. It has generally been linked with waste streams from sewage treatment plants and animal feeding operations. This issue was discussed in the March 2004 issue of *Cacapon* (available on the web). State and federal agencies are studying the intersex issue in the Cacapon and other area rivers.

How you can help

We really need your help in making the Revisit the Baseline project a success. Here's what you can do:

1. You'll find a map of all of the original baseline study sites on our website. If you find one in your area, or along your section of the river, we could use you help in obtaining permission to access the river, and would love to have you join us as we do our assessments.
2. Do you own or have access to forested land anywhere in the Cacapon watershed? If so, you can help us by describing the condition of your forest understory. There is a form on page 7 of this newsletter for that purpose, or you can submit information using the form on our website. Do you have pictures of the forest on your land from the late 80's early 90s? If so, can you share them with us, as well as provide pictures of the current condition?
3. Have you been fishing the Cacapon, North or Lost rivers for a long time? With the full knowledge that asking a fisherman about the fish they catch sounds like the punch line for a joke, we would be interested to know how the fishing today compares to fishing in years gone by. In particular, do you catch different species today than you used to? Do some species seem to be more common? Are others that were once common now rare? Where do you fish? Rather than bias your answers to this with a form, we're just asking for you to respond in your own words either by email, snail mail, or the form on our website.
4. CI does its work with a mixture of member, foundation, and government support. The Revisit the Baseline project is no different. Your donations will help us carry this project to a successful conclusion.

So the Revisit the Baseline Project has begun. Over the next year we will develop a much better picture of how the Cacapon watershed has changed in the last 15 years. Early results are mixed—some sites seem to have changed little over the last 13 years, while others appear to have changed for the worse.

At the end of the day, protecting the Cacapon River, still considered by many to be one of the most beautiful rivers in the East, will depend on the behavior of the people who live here. *Portrait of a River* said it well:

> "Is the Cacapon an example of the "tragedy of the commons"?
>
> In the late 1960s, ecologist Garrett Hardin coined that phrase to describe the abuse of public resources for private gain. According to West Virginia law, the Cacapon's water is a public resource — it has no single owner and many users. But the land along the river is in private hands. Riverside activities can degrade the water commons.
>
> Though these activities may be legal, they are unethical, for they strip the rights of downstream and recreational users to enjoy a healthy river. Only when law fully reflects the moral obligation of private parties to protect public resources will a healthy commons remain for our grandchildren."

The Revisit the Baseline Project is supported by grants from the Evenor Armington Foundation, the Marpat Foundation, and the members of Cacapon Institute.

(***Stream Scholars 2005*** *Continued from page 8)*

Returning Scholars were distressed by the change, and seeing the problem led to a discussion of solutions. There are many Best Management Practices (BMPs) that can reduce movement of sediment and other pollutants into our rivers. But the difficulty isn't knowing how to address the problem (whether caused by forestry, development or agriculture). The difficulty is in developing a community consensus that the problem exists and needs to be addressed, that we all contribute to the problem, and then doing it.

On the last two days, our Scholars had the chance to see the other end of the watershed with a trip down to the Chesapeake Bay. The Chesapeake Bay Foundation led a canoe trip through a marshland tributary of the Patuxent River. We were chased back to the van by an impressive thunderstorm and camped at Point Lookout that evening. We spent the following day at the University of Maryland's Marine Biological Laboratory at Solomon's Island, with hands-on activities ranging from dissection of oysters to sifting through the proceeds in several crab-pots. The Baker Run Conservation Society funded this trip through a Stream Partners grant. Carla Hardy of the WV Conservation Agency made all of the arrangements. Alana Hartman, WVDEP's Potomac Basin Coordinator, and Hampshire County science teacher Janet Gillies helped make this trip a success.

It seemed fitting to end our week on the Chesapeake Bay. The Bay is afflicted by the same pollutants that we saw in Skaggs Run, nutrients and sediment, and some of those pollutants in the Bay probably originated in our study stream's watershed. As we work to protect streams in our own backyard, we'll also help to cleanup the Bay.

Stream Scholars Summer Camp is supported by The MAR-PAT Foundation and the members of Cacapon Institute.

Cut form

I want to help Cacapon Institute Revisit the Baseline

☐ I want to financially support the Cacapon Institute and the Revisit the Baseline Program

☐ $35 ☐ $60 ☐ $100 Sustainer ☐ $250 Baseline Site Sponsor $_____ Other

☐ I want to support the Revisit the Baseline Program by providing information and site access.

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Forest Understory Survey. If you are a resident, landowner, or frequent visitor to a forested area in the Cacapon watershed, please take the following survey (also available on the web). Note: You should only consider the forest condition away from roads and houses, especially houses with dogs. Feel free to wait until next spring to take this survey if necessary.

When I look through "my" woods during the growing season, at eye level I see:

_____ An open vista with few or no leaves obscuring my view (In other words, does it look like a park?)
_____ A somewhat open vista with a few shrubby tree species like witch hazel having leaves near the forest floor
_____ It is difficult to see any distance due to undergrowth of trees and shrubs of many different species and sizes.

When I look at the forest floor during the growing season, this is what I typically see:

_____ Seedlings of many different tree species ranging from a few inches to several feet in height are common.
_____ Seedlings of many different tree species ranging up to eight inches in height are common. Second year seedlings rare.
_____ Seedlings of many different tree species ranging up to eight inches in height are common. No taller seedlings are seen.
_____ Seedlings of many different tree species ranging up to eight inches in height are uncommon.
_____ Tree seedlings of any kind are rare or non-existent.

Leaf litter on forest slopes during the growing season is typically:

_____ Up to my shins _____ up to my ankles _____ a thin layer _____ there is no leaf litter

Please describe where you live: _____

_____

_____

Mail checks and surveys to: **Cacapon Institute**, Rt. 1 Box 326, High View, WV 26808

"There is something really wrong"

In its third year, Cacapon Institute's Stream Scholars Summer Camp was a mixture of exciting new experiences, new partnerships that expanded the scope of the camp, and a sobering look at the future of our streams if we fail to protect them.

Stream Scholars is CI's hands-on exploration of stream ecology and conservation for middle and high school students. As in past years, the non-residential camp was held on Skagg's Run, a tributary of the North River, during the first week in August. The Scholars performed habitat assessments, chemical analysis using field and laboratory equipment, and used benthic macroinvertebrates to assess stream health. For the first time, we included detailed physical surveys of the study stream to establish a benchmark for future comparisons.

Tim Craddock, WVDEP's Citizens Monitoring Coordinator, joined us for Stream Scholars again this year. We were all stunned to see that our study stream was in trouble. Over the past several years, the spaces between the gravel and cobble on the stream bottom that used to provide habitat have become filled with sand and silt. There is simply no room for many of the organisms that used to live there. Two years ago, every set of the kick net produced hundreds of aquatic insects of many different kinds. This year, it took four "sets" to collect 91 organisms, and the diversity was way down.

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Stream Scholars surveying our stream.

Receiving the Shadline Special Issue

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