SUMMARY OF PASSIVE SYSTEM EFFECTIVENESS

Table 5: Raw (Pre- & Post-Const.) and Treated Site Drainage Characteristics
(mean values)

Discharges	Sampling Events (n)	Flow (gpm)	pH	acidity		Fe		Mn		Al	
				mg/l	lbs/day	mg/l	lbs/day	mg/l	lbs/day	mg/l	lbs/day
RAW pre-construction (38/39/40/41/42)	4	246	4.0	34	100	3	9	2	6	2	6
RAW post-construction (38/39/40/40A/41/42)	4	64	3.6	104	80	20	15	3	2	7	5
TREATED post-construction (38/39/40/40A/41/42)	4	64	6.5	0	0	<1	0	<1	<1	<1	<1

Weighted averages listed for raw water quality. Total metals concentrations. Average pH not determined from H ion concentrations. Raw pre-construction sample dates used are 05/13/97, 07/10/97, 10/09/97, 01/30/98 (no sample for ST40 on 7/10/97 used 7/10/96 and for ST42 on 01/30/98 used 01/15/97). Raw and treated post-construction sampling dates are 06/05/01, 09/18/01, 11/08/01, 01/25/02.

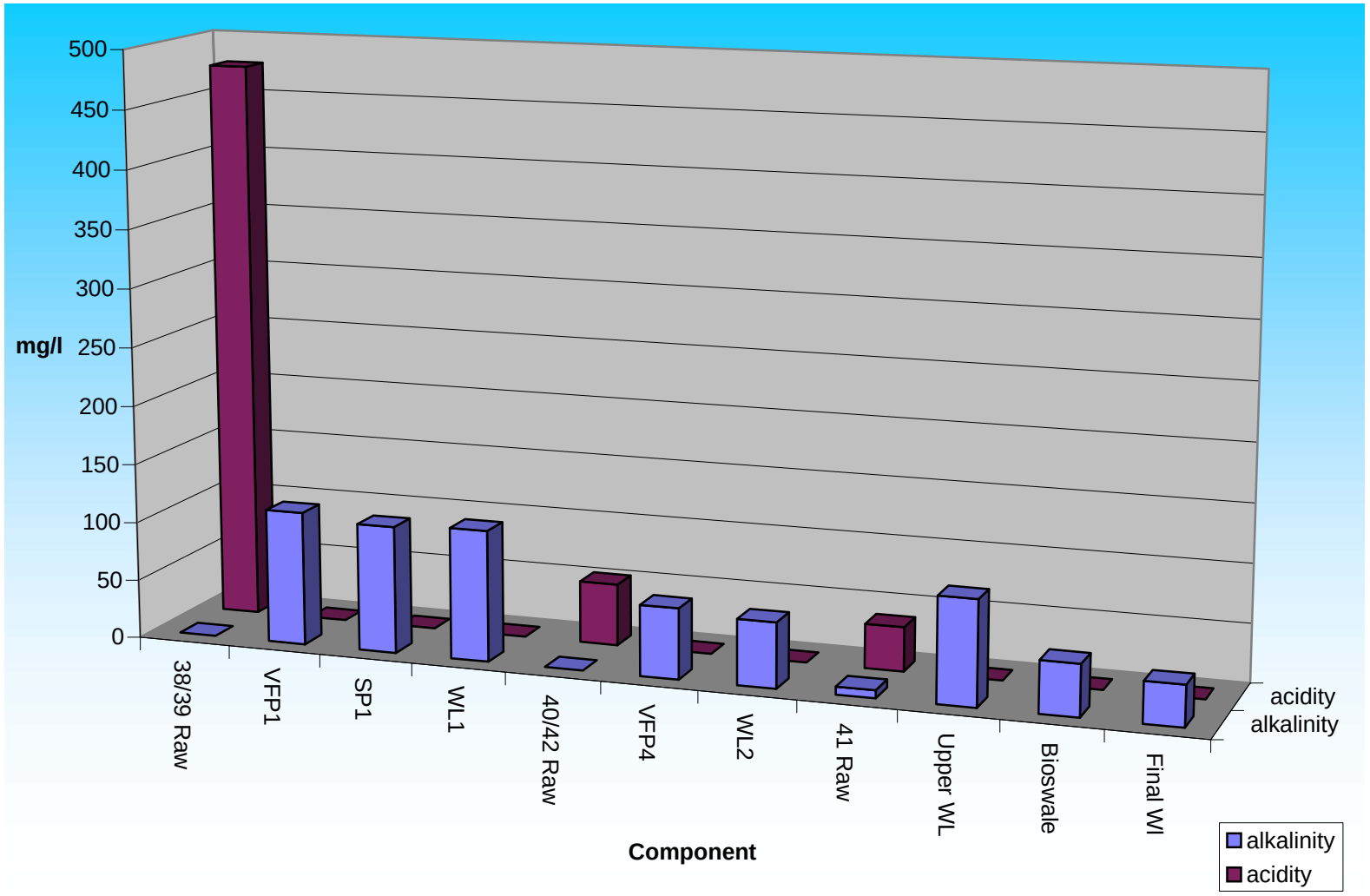
A final effluent discharge for the entire system began in late July 2001. Since that time there have been four monitoring events that have included both flow rates and sample analyses.

Extensive monitoring (17 to 26 events since 1995) by the PADEP, Knox DMO indicated that the flows at the site varied substantially seasonally; i.e., high flows in spring and low flows in fall. Based on this, four monitoring events of the pre-construction raw water were chosen to approximately correspond with the seasons represented by the monitoring available for the passive system. Table 5 provides an initial comparison of the raw water with the final effluent. A long-term monitoring program is necessary for adequate and statistically significant evaluation of the restoration effort.

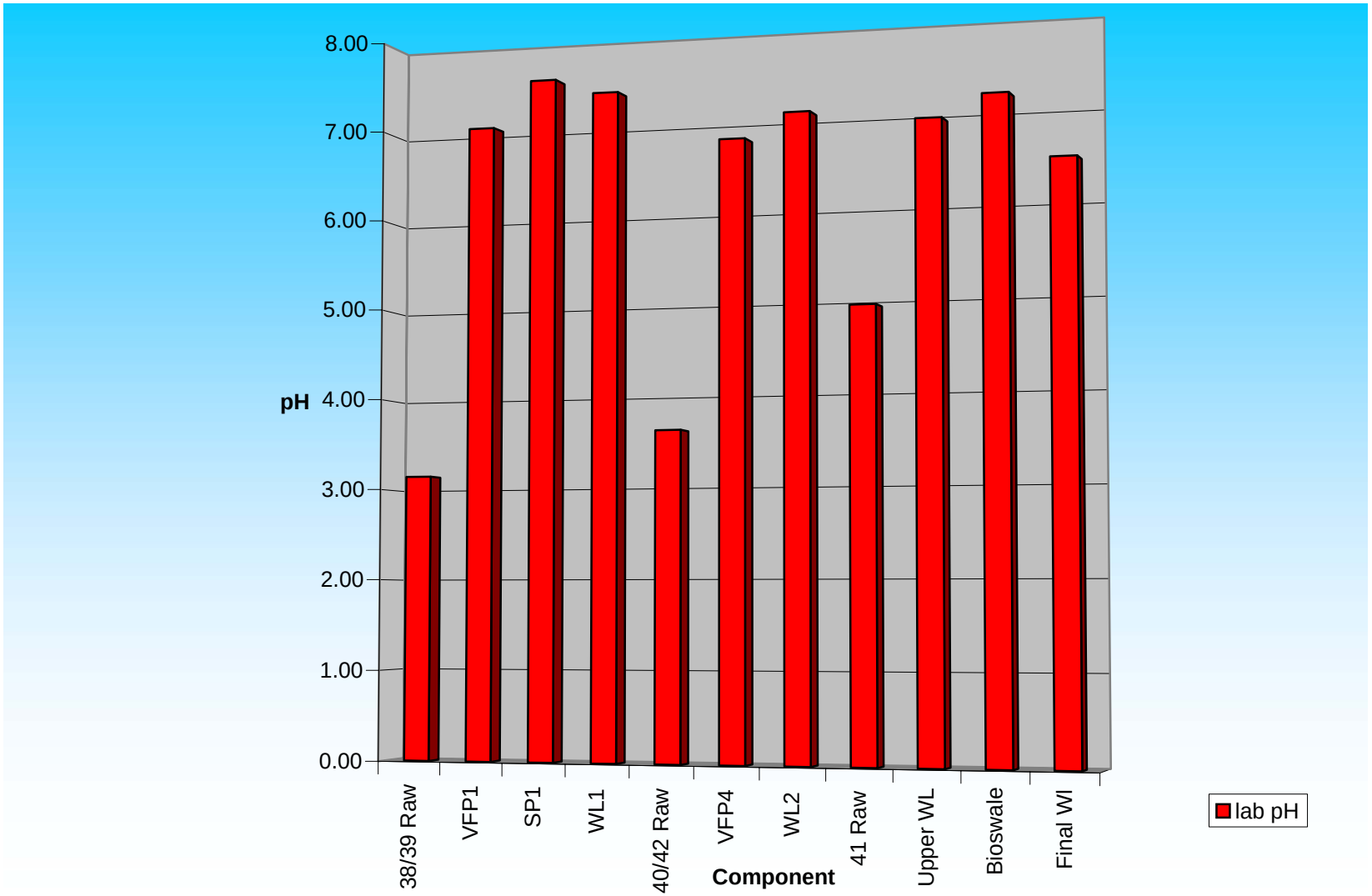
Comparison of the pre- and post-construction monitoring indicates that flows are lower than normal for the site and the water quality is more degraded. As noted earlier, however, a 2/22/02 PA DEP site inspection reported that the total flow through the system was ~300 gpm.

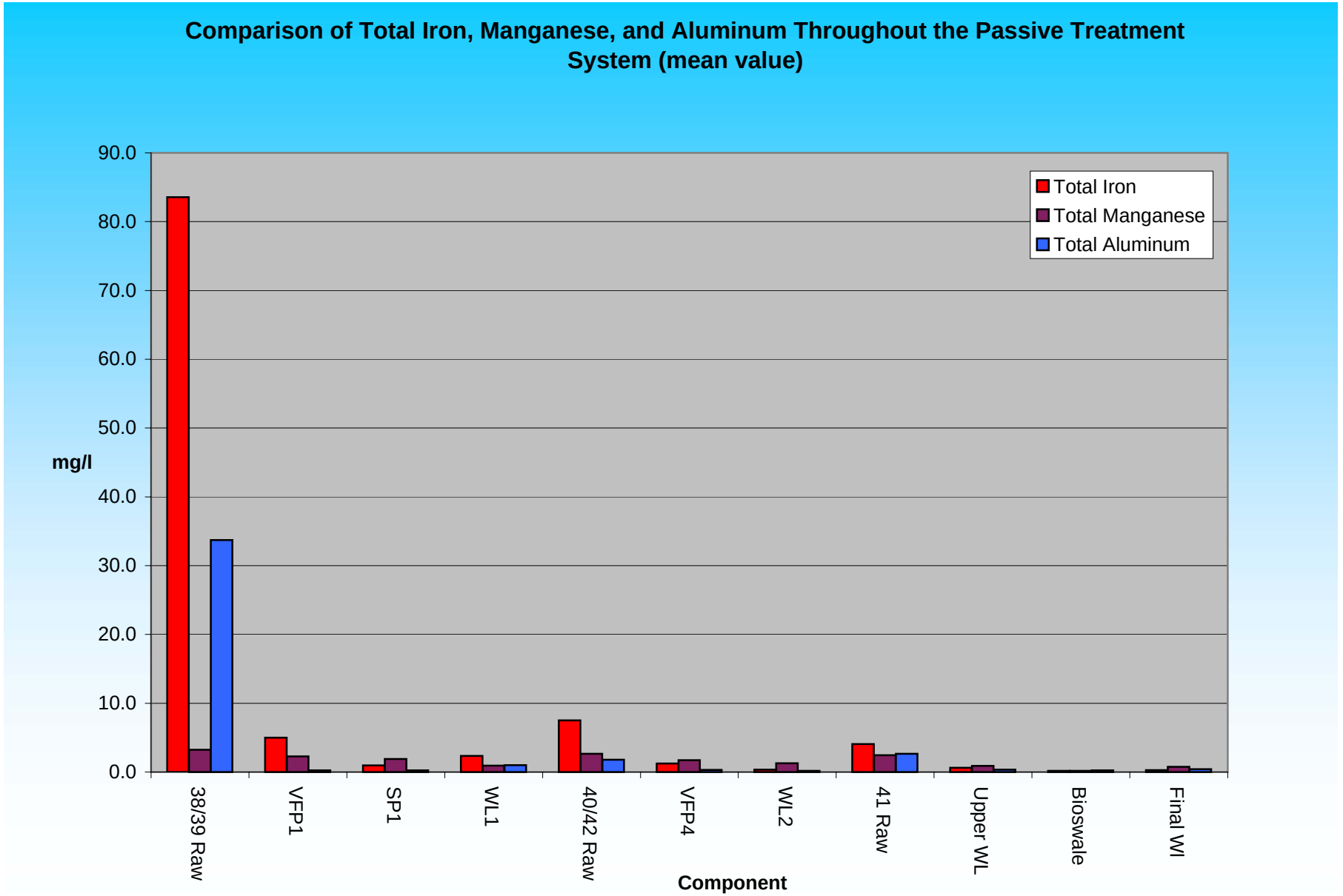
Comparison of the post-construction raw water and final effluent quality demonstrates that the system is functioning extremely well **and is 100% effective in neutralizing the acidity of the site drainage and is essentially 100% effective in preventing all metals (iron, manganese, aluminum) from entering Murrin Run. The final alkalinity is averaging about 30 mg/l and fish and other wildlife are thriving in the Final Wetland. (See Wetland and Biomonitoring sections.)**

Comparison of Alkalinity and Acidity Through the Passive Treatment System (mean values)



Comparison of Lab pH Values Through the Passive Treatment System (mean values)




Comparison of Total Iron, Manganese, and Aluminum Throughout the Passive Treatment System (mean value)
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
mg/l
Total Iron
Total Manganese
Total Aluminum
38/39 Raw
VFP1
SP1
WL1
40/42 Raw
VFP4
WL2
41 Raw
Upper WL
Bioswale
Final Wl
Component

Measurable Environmental Impact

Based upon early results, the Goff Station passive treatment system not only is treating abandoned mine drainage at the site to an exceptional quality but also is improving the quality of Murrin Run, the receiving stream in the Seaton Creek Watershed of the Slippery Rock Creek headwaters. As the flows from the site have been less than in previous years, the current impact is minimal even with the **elimination of essentially 100% of all metal and acidity loadings from the site drainage.** The final site effluent from the Final Wetland can be described as a net-alkaline low-metal discharge with **metal concentrations not only less than the receiving stream, Murrin Run, but also better than the Title 25 allowable in-stream concentrations.** Although meaningful evaluation of the impact of the treated drainage is difficult as flows are in the process of re-establishing due to the drought conditions and manipulation of the mine pool during construction, the following is a preliminary review of the impact.

Comparison of the Raw and Final Effluent and Receiving Stream Impact

(mean values unless otherwise noted)

Monitoring Points	Flow	pH	ALK	ACD	Fe	Mn	Al
Raw (weighted average 38/39/40/40A/42)	64	3.6	0	104	19.6	2.9	7.2
Final Effluent (Final WL) Passive Treatment System	64	6.5	33	0	0.3 (diss. 0.1)	0.9 (diss. 0.3)	0.4 (diss. 0.2)
Murrin Run downstream (DEP18) **Before** PTS on-line	NM	6.6/6.4	52/37	0/4	2/1	5/6	0/1
Murrin Run downstream (DEP18) **After** PTS on-line	NM	6.8	59	0	1	4	0
Seaton Creek(DEP19) **Above** Murrin Run 11/8/01	NM	6.1	8	23	5	9	0
Seaton Creek(DEP19A) **Below** Murrin Run 11/8/01	NM	6.6	35	0	2	5	0

flow in gpm; alkalinity, acidity, and total metals in mg/l;
- Raw and Final Effluent post-construction sample dates 6/5/01(raw only), 9/18/01, 11/8/01, 1/25/02
- DEP18 Before PTS on-line first value is average of 6/28/00, 9/14/00, 11/17/00; second value is average of all sampling from 5/3/94 to 5/8/01 (n = 50)
- DEP18 After PTS on-line is average of 7/11/01, 8/6/01, 10/18/01

In order to more accurately depict the impact to Murrin Run, the first value listed for DEP18 in the above table is the average of the preceding year during approximately the same season. In addition, the improvement to Seaton Creek below the confluence with Murrin Run is not solely attributed to the improvement of the site drainage at Goff Station. Murrin Run has also been improved by remining on the Brookville coalbed in the headwaters by the Sunbeam Coal Corporation Balestrieri Operation (SMP 10860119).

In addition to the improvements in water quality, over 2 acres of naturally-functioning wetlands have been created that are extremely successful in providing wildlife habitat and plant diversity as well as water treatment. **(See Wetland and Biomonitoring sections.)** Currently, fish have been observed in the deeper areas of the Final Wetland. The fish have not been stocked; therefore, birds utilizing the wetland or other natural means have introduced the fish. Also 1/4-acre of riparian buffer along Murrin Run has been improved which not only provides wildlife habitat, but also provides stream bank stabilization reducing erosion and stream sediment loadings while providing cover to stabilize water temperatures and a food source for wildlife as well.

Since installation of the passive treatment system, fish have also been documented in Murrin Run during the electrofishing program, an outgrowth project not originally included in the proposal. The following brief survey depicts the outcome of this program:

Dr. Fred Brenner and Nick Morgan, Grove City College, electrofishing in the Seaton Creek Watershed.

Murrin Run Fish Survey

On August 6, 2001, a brief fish survey of Murrin Run was completed as part of a larger survey of Seaton Creek through a public-private partnership effort. Murrin Run is a major tributary to Seaton Creek, which has been extremely impacted by mining activities in the past. Within the last twenty years, remining operations in the headwaters of Murrin Run have significantly improved the quality of water within the stream. In addition, a passive treatment system complex has been constructed at the Goff Station Restoration Area effectively treating abandoned mine drainage.

Personnel from Stream Restoration Inc., Grove City College, and volunteers from within the Slippery Rock Watershed assisted with the survey. Electrofishing was chosen to complete the survey due to the size and amount of obstructions within Murrin Run. Using a small generator and electric probes, AC current passed between the two probes momentarily stunning the fish. The fish were then collected, identified, and returned to the stream. In addition, a brief macroinvertebrate survey was completed at each station by examining the underside of rocks for macroinvertebrates.

Brown bullhead.

Common shiner (in net) and Johnny Darter (in hand).

Due to the cursory nature of the survey, the results were limited to a qualitative analysis. Below is a table listing the results of the survey.

Aquatic Organism	**Common Name**
Fish	Common Shiner
	Brown Bullhead
	Johnny Darter
Macroinvertebrate	Midge Larva
	Caddisfly
	Water Strider
Amphibian	Green Frog
Crustacean	Crayfish

The majority of organisms discovered during the survey are tolerant of the quality of Murrin Run; however, Johnny Darters are generally considered a sensitive species indicative of good water quality. It is extremely encouraging to see Johnny Darters inhabiting this stream. Murrin Run has adequate riparian buffers, substrate, and suitable riffle and pool environments typical of healthy streams. With additional restoration activities, Murrin Run has the potential to support a diverse community of aquatic organisms.

WATER QUALITY:

	pH	Field Temp. (^{o}C)	alkalinity (mg/l)	DO (mg/l)
Murrin Run	7.2	23	69	3

Water quality analyzed in field on August 6, 2001.

PROFESSIONAL NEWS MEDIA ITEMS

Date	Title	Publication
04/28/00	"Growing Greener" to Fund Watershed Restoration Project	DEP Update
07/23/00	Ripple effect	Pittsburgh Tribune Review
07/23/00	Industry left its mark on township	Pittsburgh Tribune Review
12/17/00	Passive treatment ponds helping to return fish to Slippery Rock Creek	Pittsburgh Post-Gazette
04/13/01	Slippery Rock Watershed Coalition Holds Annual Symposium	DEP Update
05/10/01	Going batty	Pittsburgh Tribune Review
05/14/01	Making a place for bats	Pittsburgh Post-Gazette
05/14/01	Bat hibernaculum	WPXI Channel 11 News
05/31/01	Coalition entices bats with man-made cave	Butler Eagle
07/29/01	Watershed coalition working to improve the environment	Butler Eagle
10/11/01	Hands-on rehabilitation	Pittsburgh Tribune Review
10/24/01	Groups work to save bat habitat	Allied News
10/31/01	Watershed Hero - Margaret Dunn	Watershed Weekly
11/–/01	Slippery Rock Watershed	Watershed Weekly

SRWC BROCHURES

Date	Brochure
07/–/01	Goff Station Restoration Area Brochure

SRWC NEWSLETTER, *"THE CATALYST"*

Date	Article
12/–/00	Stream Releaf Tour Visits Slippery Rock Watershed
12/–/00	Girl Scouts Plant Wetland At Goff Station
02/–/01	Year 2000 In Review - What A Year It Was!!!!!
04/–/01	2001 Symposium Virtual Field Tour
04/–/01	The Batty Catalyst
05/–/01	The Batty Catalyst
06/–/01	In the News!
06/–/01	Girl Scout Troop Construct Bluebird Boxes
07/–/01	ASSMR Conference in New Mexico
07/–/01	Coloring Contest - *Kids Catalyst*
08/–/01	DEP Watershed Academy In Slippery Rock Headwaters
08/–/01	Concordia Haven Woodworking
08/–/01	Butler County Youth Assist With Wetland Planting
08/–/01	Bat Hibernaculum Maze - *Kids Catalyst*
09/–/01	Shamokin Watershed Tours Slippery Rock Watershed
09/–/01	Fish Get Buzzed On Electrical Current
10/–/01	Saving Slider Turtle
10/–/01	Going Batty...Mist Netting at Golf Station
11/–/01	Butler County Environmental Quality Board Tours SRWC Sites
11/–/01	Butler County Juvenile Program and Goff Station in the News
11/–/01	Cedar Waxwing Activity Page - *Kids Catalyst*
11/–/01	“Sense of Place” Workshop at JEEC
11/–/01	PASDA Visits SRWC
12/–/01	SRWC Recognized For It’s Continuing Efforts

"Growing Greener" to Fund Watershed Restoration Project

The completion of the Goff Station watershed restoration project in Venango Township, Butler County, is being funded through "Growing Greener." Stream Restoration Inc. is leading a coalition of partners to address pollution from abandoned mines in the Slippery Rock Creek and Connoquenessing Creek watersheds.

A Watershed Restoration Assistance Program (WRAP) grant and in-kind contributions from project partners in the Slippery Rock Watershed Coalition provided for the necessary stream crossing for Murrin Run and the removal and neutralization of 20,000 to 30,000 cubic yards of coal refuse, which was placed in an abandoned strip mine. Coal refuse is currently being removed at a rate of about 1,600 tons per day and is being mixed with alkaline coal ash. As part of the WRAP grant, the riparian buffer in the area currently overlain by the coal refuse will be restored and rough grading for a constructed wetland will be completed.

Because of "Growing Greener," this wetland area can now be put online concurrently with the completion of the passive treatment systems. Stream Restoration received $815,751 in "Growing Greener" funds in January to construct passive treatment systems to treat several acid mine drainage discharges at the site. Based on the available water monitoring by the DEP's Knox District Mining Office, this wetland will receive an average of about 400 gpm of passively-treated mine drainage.

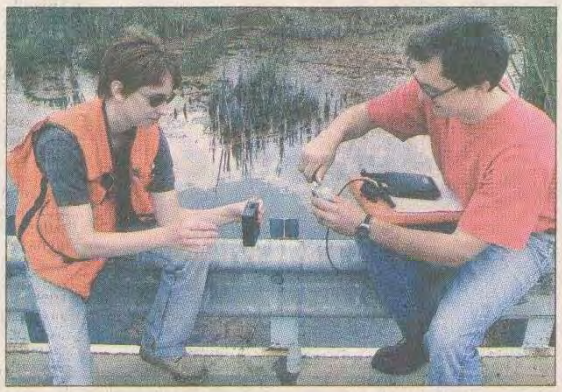
The coordination of partnerships has enabled the restoration effort to be expanded from what was outlined in the grant proposal. After representatives from Stream Restoration, the Department of Conservation and Natural Resources, the Pennsylvania Game Commission and other partners conducted a site inspection, they devised plans to construct a bat hibernaculum, which will have the potential to house several hundred to several thousand bats. This innovative installation will use recycled materials. Another partner, Quality Aggregates, has offered to donate the equipment and materials for this outgrowth project.

<> For more information about this project, contact Stream Restoration Inc. at 724 776-0161 or e-mail sri@ccia.com. For more information on Growing Greener, visit http://www.GrowingGreener.org.

Contact the Webmaster
Last Modified on 04/28/2000 13:06:04.

'The nice thing is, like the phoenix, (those streams) can rise again.'

— Dave Johnston
BUTLER COUNTY PLANNING DIRECTOR



Christopher Horner/Tribune-Review

Darcy Peart and Tim Danehy check pH levels in the water while monitoring the impact of the Goff Station restoration area Friday on Seaton Creek in Venango Township, Butler County. The stream is one of the most heavily impacted streams in the county from acid mine drainage.

Ripple effect

Mapping campaign targets dying and endangered streams

By Lawrence Sanata
TRIBUNE-REVIEW

For decades, mining companies in the far northern reaches of Butler County decimated vast tracts of land in their search for coal.

Because of the county's close proximity to Pittsburgh, Butler County's rich reserves of bituminous coal were an ideal source of power for the once giant, billowing industries to the south.

Today, thousands of acres of above-ground and underground mines lie abandoned and barren and release thousands of pounds of acid and metals into a myriad of streams that crisscross the county.

Compounding the county's water pollution problems is the significant increase in population and commercial development that has occurred in the southern end of the county.

As a result, dead, dying and endangered streams are a fact of life in the fastest growing county in western Pennsylvania, where people and businesses are arriving in record numbers each year.

"The nice thing is, like the phoenix, (those streams) can rise again," said Dave Johnston, Butler County's planning director. "In fact, the dead and dying streams are coming back to life."

RESTORATION UNDER WAY

An ambitious campaign is under way by public and private sectors to pump new life into unhealthy waterways throughout the county.

Nonprofit environmental groups, such as Stream Restoration Inc. and the Slippery Rock Watershed Coalition, which for years worked in the background reclaiming old mines and streams, are being joined by local government.

Johnston is optimistic that county government working with private groups will be awarded grants from the state's Growing Greener program, perhaps as much as $250,000, to identify dead and dying streams, and to begin aggressively saving them.

The planning director pointed to a detailed map prepared by environmentalists, which read like an obituary. The map identifies streams such as one in Washington Township in the county's far north sector that died as a result of acid mine pollution.

Detailed assessments like this one, he said, are planned for the rest of the county. And while acid mine pollution is a substantial problem in some areas, the maps are likely to reveal other problems, including malfunctioning sewage systems, as well as nitrates entering from farmland and industry, Johnston said.

"There are a lot of streams up there that were always red and never had any fish in them. And now the fish are returning," Johnston said.

He credited environmental groups in the county that have formed alliances with mining companies, such as Amerikohl Mining and Quality Aggregates, which have been successful in saving waterways in the county.

The new public-private campaign also will attempt to clean a maze of abandoned mines in Washington Township, near the headwaters of the Slippery Rock Creek Watershed.

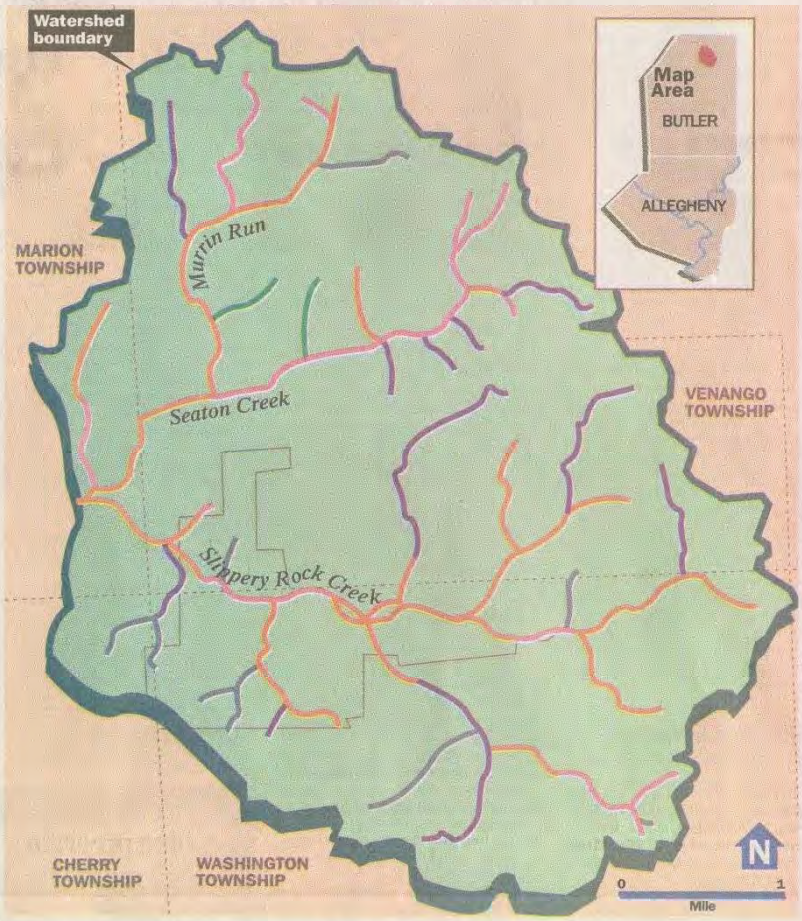
That watershed feeds dozens of streams that flow south through the county, said Margaret Dunn, a geologist in Cranberry who has gained a national reputation for her environmental work.

Parts of the Slippery Rock Watershed also feed into the Connonquenessing Creek, which is a source of drinking water for Zelienople, she said. Slippery Rock Creek is a source of drinking water for Ellwood City.

PLEASE SEE **CAMPAIGN/N4**

Slippery Rock Creek watershed

Plans are in the works in Butler County to produce detailed maps like this to identify dead and dying streams in the county, as well as streams that have been revived. This map, the first in a series, targets the headwaters of the Slippery Rock Creek Watershed in Washington Township.
Working with the county as it plans its stream inventory is the Slippery Rock Creek Watershed Coalition, an environmental group that has been a pioneer in reclaiming endangered waterways in the county, as well as Stream Restoration Inc., a consulting company that specializes in mine reclamation.



GOOD: (pH > 6, acidity < alkalinity, iron < 1mg/1)
MARGINAL/ACID SENSITIVE: (pH 5 to 6, sulfates < 50mg/1)
MARGINAL/ACID DRAINAGE IMPACTED: (pH 5 to 6, sulfates > 50mg/1)
POLLUTED: (pH < 5, acidity > alkalinity, iron > 1.5mg/1)
UNDESIGNATED

Source: Slippery Rock Creek Watershed Coalition

R. Jason Middleton/Tribune-Review

Industry left its mark on township

By Lawrence Sanata
TRIBUNE-REVIEW

Washington Township in northern Butler County is well-known for miles of pristine gamelands.

But for the captains of industry who set up shop in Pittsburgh a century ago, Washington Township was a prime source of coal used in the steel-making process.

That seemingly endless need for fuel has left its mark on the township in the form of defoliated land and polluted waterways.

Washington Township "is perhaps the most heavily impacted areas in the county," according to Margaret Dunn, who has gained an international reputation for her local environmental efforts in Butler County.

In addition to vast tracts of land that were stripped of vegetation to gain access to the coal beds below, there are roughly 4,000 acres of land in the township that sits atop a labyrinth of deep underground mines, she said.

Most of those mines were worked before the federal Surface Mine Control and Reclamation Act of 1977, which placed strict regulations on mining operations.

"It's those old mines that have greatly impacted the streams of Butler County," Dunn said.

'Black's Creek is heavily impacted. Murrin Run flows the color of 2 percent milk because of the aluminum in it.'

— Margaret Dunn
ENVIRONMENTALIST

Huge piles of coal residue alongside Seaton Creek in Washington Township have released toxic compounds that flow from one creek to another, she said.

"Black's Creek is heavily impacted. Murrin Run flows the color of 2 percent milk because of the aluminum in it. McMurray Run has an old coal refuse disposal site on it that has water that is very acidic," Dunn said.

Glade Dam, which is on game lands that have a wildlife propagation area, also is heavily impacted, Dunn said.

Fortunately, Dunn said, new technology is available to save the streams. Treatment systems that remove toxins from the water through a series of filtering processes — using limestone, mushroom compost and other materials — have helped to clean formerly polluted waterways.

The Slippery Rock Watershed Coalition and Stream Restoration Inc., both of which she is closely involved with, have rehabilitated four miles of Slippery Rock Creek, she said.

Playing a significant role in those efforts, Dunn said, are companies such as Amerikohl Mining and Quality Aggregates, which have donated equipment and expertise. Both companies remain involved in mining.

"This year alone we're hoping to improve another four miles of the stream, which was formerly dead," the environmentalist said. Along with her involvement in nonprofit environmental efforts, she is the president of a for-profit geology consulting firm.

With the public sector partnering with private groups, there is the potential for many more streams to be saved, she said.

Campaign targets dying streams

CAMPAIGN FROM/**N3**

The creek has come under heightened public scrutiny since June, when the U.S. Environmental Protection Agency ordered AK Steel in Butler to supply water to the residents of Zelienople. The EPA also ordered AK Steel to reduce nitrates discharged into the creek.

With the help of $86,000 in Growing Greener funds approved earlier this year, the Connoquenessing Watershed Alliance is conducting a separate assessment of that creek and its tributaries.

"One stream is reported to have acid mine drainage, and that's Yellow Creek. But I have not seen that stream yet," said Mark McShane of Killam Associates, an engineering firm in Cranberry that is helping with the assessment.

Altogether, 10 sites in the watershed will be sampled each month for a year, while another eight sites will be sampled for two years, to help determine the health of the watershed, McShane said.

THE TIP OF THE ICEBERG

John Holden, a water specialist with the Pennsylvania Department of Environmental Protection, said more work needs to be done to fully understand the health of streams in the southern part of the county.

Unlike the northern portion of the county, "you have an entirely different array of problems, and many of them are related to increasing population and commercial development," said Freda Tarbell, a state Department of Environmental Protection spokeswoman in Meadville.

Identifying endangered waterways and reclaiming them is good for everyone, Dunn said. The value of people's property along streams that have been reclaimed has increased tremendously, she said.

Instead of looking like "moonscapes," former mines in the county have been resurfaced and are covered in lush green grass, said Tim Danehy, an associate of Dunn's. Likewise, birds, fish and other animals have returned to those areas, he said.

In addition, the streams and adjacent land are available once again for recreation, he said. And there even is talk of farming returning to some areas, he said.

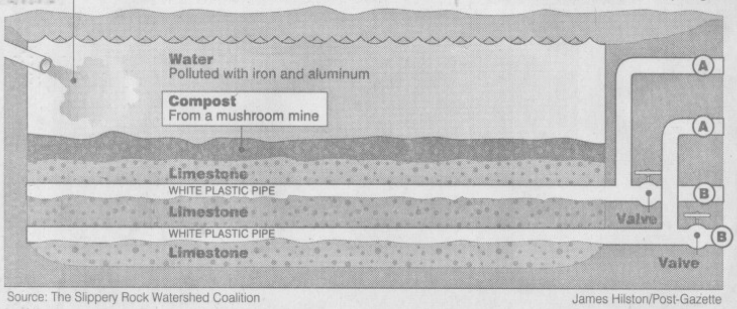
Low-budget water cleanup

In the 1990s, environmental groups increasingly turned to cheaper passive treatment systems to clean polluted streams near abandoned mines. One example of a passive treatment system is the pond pictured below. Developed by the Cranberry-based Slippery Rock Watershed Coalition, it uses natural components, such as limestone, compost and gravity, to filter metals from polluted water. The system requires no electricity and only occasional human maintenance.

Polluted water From surrounding area

(A) Discharge pipes Cleaned water is sent to a settling pond. The water then goes to a man-made wetland, then into a stream.

(B) Flush pipes About every 3 months, the valves are opened. Contaminated water is sent to the settling pond. Metals are collected for safe burial or recycling.



Source: The Slippery Rock Watershed Coalition

James Hilston/Post-Gazette

IN CRANBERRY: **ENVIRONMENT**

Passive treatment ponds helping to return fish to Slippery Rock Creek

By Scott Deacle
Post-Gazette Staff Writer

Fish and other organisms haven't lived in Slippery Rock Creek for years. But as new systems come on line to rid the creek water of pollution, aquatic life is slowly swimming back.

That's mostly due to the Slippery Rock Watershed Coalition, a partnership of colleges and universities, youth groups, government agencies, businesses, and nonprofit organizations. With help from the state government and private donations, the coalition has initiated 13 cleanup projects in the Slippery Rock Watershed, an area encompassing the streams, creeks and tributaries in northern Butler County that feed the Slippery Rock Creek.

Water enters some of the cleanup areas as acidic as vinegar and contaminated with metals. In one project at Murrin Run, the group estimates its system removes 2½ tons of iron and two tons of aluminum from the water each year. That's enough iron to build 2½ pickup trucks and enough aluminum to make more than 70,000 soda cans.

As a result, fish have returned to some of the streams for the first time in 100 years, said Margaret Dunn, a consultant to the mining industry who has led and organized much of the Slippery Rock Watershed Coalition's work.

The watershed's environmental problems began more than a century ago, when mining companies dug coal and limestone from the watershed. Until the 1970s, there were no laws requiring companies to repair the land they mined. During World War II, the government discouraged mine reclamation to conserve fuel.

As a result, the Slippery Rock Watershed's water suffered. A 1970 state study found most of the water in the watershed either comes from, or touches, abandoned mines.

Dunn spearheaded the formation of the coalition in 1994, two years after she attended a seminar on passive treatment systems, a new method for treating water from abandoned mines. This system doesn't require the chemicals and pumps that historically were necessary to treat water.

Passive treatment systems cost about as much to build as chemical treatment systems, but they're far cheaper to maintain. Once they're built, they need only to be tested and flushed occasionally. Dunn has become so convinced of the superiority of passive treatment systems she spends much of the time she used to spend with her business building the systems and sharing her knowledge with others.

"This is making a difference, so I'm putting more into it," she said.

Building a passive treatment system is a multistep process. Usually, Dunn's group must remove piles of gob, an aptly-named acidic mixture of unused coal, dirt and metals left from the mines.

Then the group builds ponds to filter polluted water. They seal the ground beneath the pond, so the pollution doesn't re-enter groundwater. Then they put a system of compost, limestone and pipes at the bottom of the ponds. The limestone causes the metals that have dissolved in the water to turn into solid particles, which settle to the bottom of the pond.

The group also builds artificial wetlands, swamplike areas where microorganisms clean the water further. After passing through a pond and a wetland, the water drains into a stream.

Some projects cost over a million dollars and require dozens of workers to build. For example, mine reclamation project in the works at Goff Station in Venango Township will cost at least $1.1 million.

To accomplish this, the Slippery Rock Watershed Coalition has been able to assemble disparate groups to work toward common goals. At Goff Station, the state provided a $815,000 grant. Private companies provided more than $300,000 in in-kind contributions. Each project has involved one or two state agencies, one or two colleges, a Boy Scout or Girl Scout troop, volunteers and the mining industry, Dunn said.

The state agencies and colleges supply technical know-how. The Scouts and volunteers supply labor. And mining companies often supply earth-moving equipment, limestone and other materials.

"I still don't understand how it all gets done," Dunn said.

Much of the coalition's work is done by Dunn and her employees, Tim Danehy and Shaun L. Busler. All three donate some working time.

Dunn, Danehy and Busler are now working on the mine reclamation effort at Goff Station. The group is building four passive treatment ponds there. Two of the ponds — one built with compost, one without — will be used in an experiment to see which better cleans the water.

The coalition received its biggest financial boost when Gov. Tom Ridge signed the $645 million Growing Greener initiative in 1999. The initiative encourages grassroots, collaborative projects to clean pollution — the sort of thing the Slippery Rock Watershed Coalition does. The Department of Environmental Protection features the coalition in some of its Growing Greener promotional materials. Dunn expects to use more Growing Greener funds.

Some of the coalition's work also has caught the eyes of biologists, geologists and others concerned about pollution from abandoned mines. The coalition has received visits from regulators who work for the Environmental Protection Agency and the Department of Energy, as well as researchers from across the United States and Australia. They've been contacted by people from Germany and Mexico. Most of the coalition's newsletters include a mention of a coalition member presenting a report at an academic or trade conference outside Pennsylvania.

The watershed coalition received a Three Rivers Environmental Award in 1999. Dunn's most grandiose dream is that their passive treatment system designs will someday be used in Third World countries that can't afford more expensive forms of cleanup.

"All I see is work, and we've got to get it done," she said.

ISSUE AT A GLANCE

Stream water polluted by acid, aluminum and iron from abandoned coal mines is being successfully and cheaply cleaned.

THE PLAYERS: The Slippery Rock Watershed Coalition, a partnership of colleges and universities, youth groups, government agencies, businesses and nonprofit organizations.

THE SITUATION: The coalition has developed systems to remove pollution from the water without the chemicals and pumps previously used.

WHAT'S NEXT: The group has already initiated 13 cleanup projects since 1994. It hopes to start more.

Slippery Rock Watershed Coalition Holds Annual Symposium

On April 6, more than 200 people packed the Jennings Environmental Education Center in Slippery Rock, Butler County, for the Slippery Rock Watershed Coalition's annual watershed symposium. Deputy Secretary for Mineral Resources Management Jeffrey Jarrett was one of a distinguished list of speakers that also included college professors and students, local government officials, mining industry representatives, and members of the coalition.

Jarrett spoke about the need for private-public partnerships to accomplish successful watershed restoration projects. He also commended the Slippery Rock Watershed Coalition for its efforts. The coalition has built a team of volunteers, academia and local mining companies to complete large passive treatments in only months. Jarrett's predecessor, Robert Dolence, received a lifetime appreciation award from the coalition for his support.

For the first time, the annual symposium also featured a question and answer session with a panel of experts. The symposium concluded with a tour of the coalition's DeSale Restoration Area and Goff Station Project, which are treating acid mine drainage in the Slippery Rock Watershed and were funded through the Reclaim PA and Growing Greener programs. The coalition has constructed a number of projects in the watershed to reclaim abandoned mines and treat acid mine drainage.

<> For more information on the Slippery Rock Watershed Coalition, visit http://www.srwc.org .

4/13/2001

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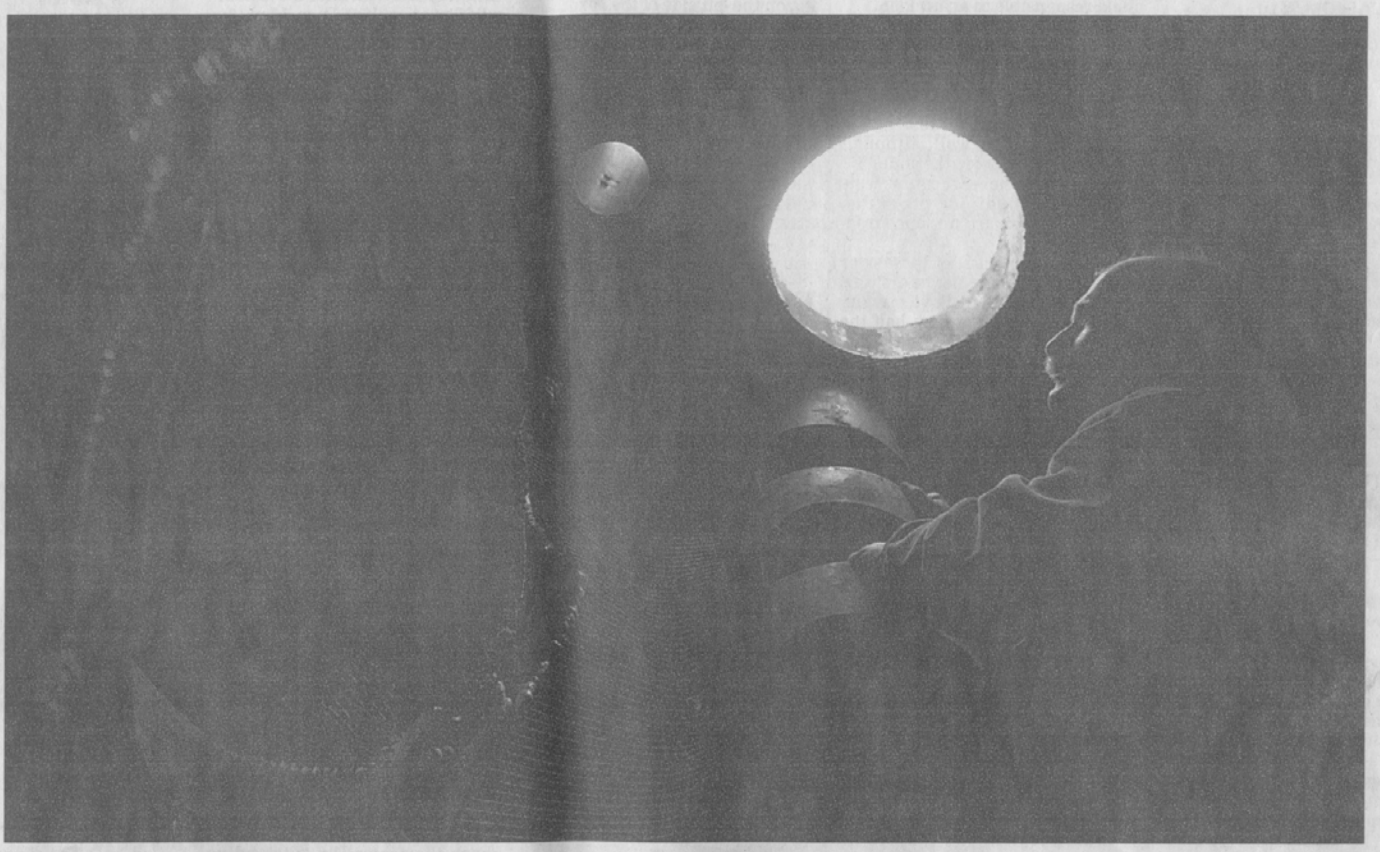


Keith Hodan/Tribune-Review

Bob Beran looks into a pipe Tuesday that will function as a tunnel in the first man-made bat hibernaculum east of the Mississippi in Venango Township. Beran, who is standing on a ladder in the cave section, is the director of environmental services for Aquascape Wetland and Environmental Services, and has hopes that the hibernaculum, in the Goff Station Restoration Area, will increase the number of bats in the vicinity. The tunnel and small cave will use natural methods to vary and maintain temperatures, allowing various breeds of bats to hibernate in different areas of the hibernaculum.

Going batty

Group builds home for the night-flyers to hibernate

By Lawrence Sanata
TRIBUNE-REVIEW

Those squeamish about bats might not want to read beyond this sentence.

But those who respect the peculiar habits of the little brown, big brown, eastern Pipistrelle, Indiana, northern long eared and small footed bat will be thankful for the efforts of a handful of environmentalists, consultants and heavy equipment operators.

Venango Township

Last month, the group completed building the equivalent of a motel for bats in northern Butler County to provide them shelter when they hibernate during the winter months.

"To our knowledge, it's the first artificial bat hibernaculum to be placed east of the Mississippi," said Will Taylor, an environmental educator at the Jennings Environmental Education Center in Brady Township.

If all goes well, several thousand bats someday will make their home in the underground winter haven, at the Goff Station Restoration Area in Venango Township, he said.

And because bats are "loyal" to their hibernaculum, Taylor thinks the shelter will be used for as long as it is there.

That's good news for Butler County and surrounding counties, the environmental educator explained. While many people are quick to condemn bats, they are responsible for helping rid a great many insect pests.

"They're one of the only predators of nighttime flying insects," he said. In addition to loving the taste of mosquitoes, bats are exceptionally good at reducing the pests' population, he said.

"Probably our most common bat in Pennsylvania would be the little brown bat, a very small bat, but it has the ability to eat over a thousand insects in about an hour," Taylor said.

"And the bats feed for about three to four hours during an evening, and

PLEASE SEE **GROUP/N7**

Bat facts

- Bats consume more than half their weight nightly in mosquitoes and moths.
- Some bats live more than 30 years.
- Bats make their unnerving swoops over people's heads looking for mosquitoes.
- Less than 0.5 percent of bats are rabid, and they do not become aggressive when sick.
- Plants providing peaches, bananas, avocados, cashews and mescal are pollinated by bats.
- Few bats consume blood, and none that do live in the United States.

Source: Slippery Rock Watershed Coalition

Group builds home for bats to hibernate

GROUP FROM/**N3**

oftentimes they feed in colonies that number from 20 to 2,000 bats."

As a result, they can have a significant impact on those pesky insects that fly at night, Taylor said. But bats, especially hibernating bats, are finding themselves at risk.

Bats prefer to hibernate in caves, mine shafts and rock outcroppings, Taylor said. But with spelunking becoming a popular recreational activity and coal mining remaining a viable business in Pennsylvania, bats are being forced to find new homes for hibernating.

Those responsible for building the hibernaculum were working in Venango Township on another project — helping to reclaim a stream and land affected by acid mine runoff from an abandoned coal mine.

Jeff Reidenbaugh of Aquascape Wetland and Environmental Services said his boss, Bob Beran, along with Margaret Dunn of the Slippery Rock Watershed Coalition, Jeff Ankrom of Quality Aggregates and Taylor came up with the idea of building a hibernaculum after a Penguins game and dinner.

The Slippery Rock Watershed Coalition, based in Cranberry, is a nonprofit group that has been active in reclaiming waterways damaged by acid mine runoff in Butler County. Quality Aggregates of Neville Island is a mining company that has been involved in reclamation projects. Aquascape is a consulting business specializing in water and wetland projects, which is owned by Quality Aggregates.

"We had all the big equipment there. We had the manpower there. We had the expertise there. We thought we would throw in an artificial hibernaculum, a manmade cave," Taylor said.

After consulting with Cal Butchkowski of the Pennsylvania Game Commission, a bat specialist, the group located a site for the hibernaculum.

"The location was suitable because there was already a depression in the ground to receive the cave. It had a downhill grade to it. It had water flowing through it," Taylor said.

All that was needed was a compartment in which bats could hibernate. Taylor credited Beran with gathering surplus parts from local businesses to construct the compartment.

With the help of a massive dozer and excavator and equipment operators, it took about two days to prepare the site, insert the hibernaculum and cover the compartment, said Ankrom.

While it was the first project of its kind for the mining company, Ankrom said it seemed to make sense.

"We look at it as a holistic approach," he explained.

Quality Aggregates, Aquascape Wetland and Environmental Services and the Slippery Rock Watershed Coalition already were working to resolve the acid mine problem and plant vegetation in the area.

So, he said, it made sense to go a step further and develop a site for hibernating bats.

"It kind of all came together," he said. They located an old mine entry that could be used for the hibernaculum. All that was needed was to clean the site, improve the slope and place the hibernation compartment, he said.

Today, all that is visible of the hibernaculum is a series of pipes sticking up from the ground to provide air into the underground compartment. While bats prefer to roost in hot places during the spring and summer, usually in temperatures of between 95 degrees and 100 degrees Fahrenheit, they hibernate in a cool area during winter, usually in a temperature of about 45 degrees Fahrenheit.

The hibernaculum is constructed to provide a constant cool temperature.

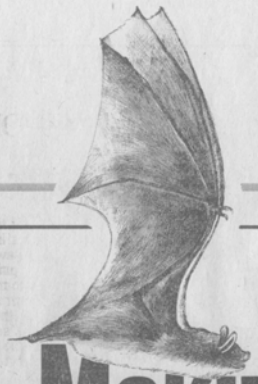
Taylor said he is optimistic that the hibernaculum will attract bats.

He said the site is in a good area for bats. "There are open areas with woodland borders, and there's lots of water, so there's going to be good insect population," Taylor said.

Lawrence Sanata can be reached at lsanata@tribweb.com or (724) 779-7109.

Keith Hodan/Tribune-Review

Bob Beran stands in the cave section of the Goff Station Restoration Area as he inspects the first manmade bat hibernaculum east of the Mississippi River in Venango Township.



Making a place for bats

Stream restoration expands to include consideration of wildlife

By Don Hopey
Post-Gazette Staff Writer

It's time to switch on the old bat-light and shine a bat-signal into the night sky over northern Batler, er Butler, County.

The Slippery Rock Watershed Coalition has just put the finishing touches on the first man-made bat hibernaculum east of the Mississippi River and is awaiting the arrival of nature's most misunderstood creatures and the only mammals capable of flight.

The hibernaculum was designed to provide a cool, dark place for bats to sleep during the day and hibernate in the winter. It was a late addition to the Goff Station stream restoration and acid mine drainage treatment project on Murrin Run near the headwaters of Slippery Rock Creek.

While comic book hero Bruce Wayne's subterranean digs on the outskirts of Gotham City are undoubtedly plusher and more high-tech, the Watershed Coalition's new bat cave — constructed from 60 feet of culvert pipe and a recycled 10-foot tall sewer manhole — should eventually make a fine hangout for up to 5,000 bats.

"We have built it. Now the question is, Will they come? We feel they will," said Will Taylor, a coalition member and program coordinator at the state Department of Conservation and Natural Resources' Jennings Environmental Education Center.

Nine species of bats are found in Pennsylvania, although four of those are extremely rare. All nine belong to the family Vespertilionidae, also known as evening bats. All are insect eaters, often taking their prey on the wing and often dining over water.

On a good summer night a bat will consume up to 25 percent of its body weight and up to 1,000 insects in an hour.

After feeding through the evening, night and early morning, they roost, alone or in small or large groups, depending on the species, in dark, secluded spots such as caves, hollow trees, rock crevices or abandoned mines. They can also congregate in church steeples, vacant buildings, barns and attics, or under bridges.

"We know that this site is generally good bat habitat with open water near by, some forested area and fields," Taylor said. "There will also be wetlands with lots of aquatic insects, so the setting should be ideal."

Dwindling prey and habitats

Bats – the only major predator of night-flying insect pests like June bugs, cucumber beetles, leaf hoppers, tent caterpillar moths and mosquitoes — need all the help they can get.

Their populations are in decline across the United States and worldwide. Of the 45 species found in the U.S., six are federally endangered or threatened, and another 20 are listed as species of special concern by the U.S. Fish and Wildlife Service.

Some bat populations have dropped because pesticides have reduced or eliminated the supply of tasty insects. But the main reason is loss of habitat due to suburban sprawl, development, timbering and mine reclamation that fills in or blocks their entrance to underground voids favored for winter hibernation and summer roosts.

A recent study by the federal Office of Surface Mining found that of the 32,000 mine openings closed by local, state or federal agencies, 1,630 — just 5 percent — were done in a bat-friendly manner, using gates or closures that keep people out for safety reasons but allow bats free access.

Sheryl Ducummon, bats and mines director for Bats Conservation International in Tucson, Ariz., said an educational program started in 1993 has been successful in educating public officials and mining companies. Many state abandoned mine closure programs now require that bat surveys be done before a mine is closed.

"There's still work to be done but the awareness is out there now. There are more people understanding the value of bats and the need to help preserve their accommodations," Ducummon said. "And the costs of closing mines in a bat-friendly way are comparable, so it's a conservation project that mining companies, states and watershed groups can tackle."

An expanded reclamation

Although the Slippery Rock Watershed Coalition has completed 11 other surface mine reclamation and treatment projects in the Slippery Rock Creek watershed since it formed in 1995, Goff Station is the first to provide a haven for bats.

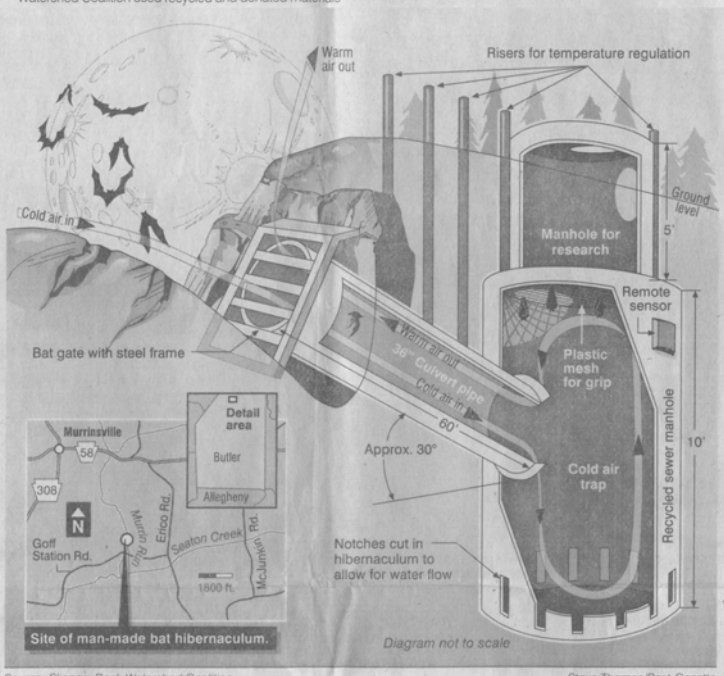
"It's an outgrowth of the project and an indication how the group is evolving with new ideas as it grows," said Margaret Dunn, a coalition leader and president of the nonprofit Stream Restoration Inc. "I was just trying to get the metals out of the mine water when the question came up 'What about the wildlife?' "

SEE **BATS,** PAGE A-11

Bat hibernaculum

Throughout the United States and Pennsylvania, bat populations are declining, in part because development has destroyed their habitat or caves and abandoned mines where they roost have been closed off by humans.

To provide alternative housing, the Slippery Rock Watershed Coalition used recycled and donated materials to create the first intentionally man-made bat hibernaculum (not counting abandoned mines) east of the Mississippi River. It should provide a range of cool roosting areas along its 60-foot tunnel, and so could attract several of Pennsylvania's nine bat species.



Source: Slippery Rock Watershed Coalition

Steve Thomas/Post-Gazette

Bob Beran, left, and Will Taylor at work on the hibernaculum. Taylor is sitting atop a manhole that will allow researchers access to study the hibernaculum's inhabitants. Beran, who owns a wetlands construction company presented the idea of making room for wildlife as part of the restoration of the stream at Goff Station. Taylor is program coordinator at Jennings Environmental Education Center.

Slippery Rock Watershed Coalition

Making a place for bats to live

BATS FROM PAGE A-10

Raising that question was Bob Beran, coalition member, wetland ecologist and owner of the wetland construction firm AquaScape. He contacted the Pennsylvania Game Commission's Wildlife Diversity Section for design help, arranged for the donation of materials and supervised installation.

"Providing wildlife habitat is one of the things that should naturally be a part of any mine restoration project," Beran said. "On other projects we've included bat, kestrel and bluebird boxes. It's a multiple use management approach to stream restoration."

The manhole chamber was dug into the ground at the bottom of a natural slope to take advantage of cooler air circulation, and over the entrance to a long-abandoned deep mine that had collapsed. Drainage from the mine had been coming out of the entrance and the seep has been allowed to continue flowing through the bottom of the chamber because bats are attracted to the sound of running water.

The 60-foot-long, vented culvert pipe was buried at a 30-degree angle, sloping from the entrance down to the chamber, to facilitate the collection and flow of cool air — another element that attracts bats. The tunnel and manhole are lined with plastic industrial netting designed for use as a landfill liner.

Beran said the coalition's hibernaculum project took advantage of donated materials, but other watershed groups doing stream restoration and mine reclamation projects could easily and inexpensively adapt the model to their area's needs.

Only the gated tunnel entrance, the five tunnel vents and a padlocked trap door that will allow researchers and students to enter the top of the main chamber, are visible above ground.

"The research potential for this project is incredible. The design will allow observation, and vents will allow us to play with the temperature inside the main chamber and tunnel," Taylor said.

"Our hope is that maternity colonies will live throughout the summer in the area and, once new bats are born, they will start scanning the area, scoping for air currents and low temperatures, and looking for new nesting and hibernating sites."

Bat stats

Pennsylvania is home to nine species of bats. Bats are mammals that give birth to live young, which are nursed by their mothers just as human infants are. Bats use echolocation to find food, emitting sounds that bounce off flying objects, like insects, to tell the bat where the food is. All of Pennsylvania's bats are insectivorous, consuming moths, grasshoppers, mosquitoes and beetles. A single Little Brown bat may consume 600 mosquitoes in one hour of foraging.
Here are brief descriptions of the Pennsylvania bats:

Common name: Indiana bat
Habitat: Wooded or semi-wooded areas near streams or rivers. Lives in one site in Pennsylvania: an abandoned mine tunnel on state land in Blair County. It is an endangered species.
Food: Moths, mosquitoes, beetles, flies
Reproduction: A single pup in late June

Common name: Red bat
Habitat: Forest edges, shrub borders. Prefer American elms
Food: Moths, flies, beetles, crickets, cicadas
Reproduction: Only bat with four teats, produces 1-4 pups

Common name: Big Brown bat
Habitat: Attics, belfries, barns, hollow trees in rural areas
Food: Wasps, ants, flies, leafhoppers
Reproduction: Usually bears 2 pups in June

Common name: Eastern Pipistrelle
Habitat: Caves, mines, crevices, wooded areas near water
Food: Flies, grain moths, leafhoppers, beetles
Reproduction: Usually two pups in June or July

Common name: Hoary bat
Habitat: Prefers conifers, forest edges and farmlands
Food: Moths, mosquitoes
Reproduction: Little is known, twins frequently in May to July

Common name: Silver-haired bat
Habitat: Woodland areas with ponds and streams, forest clearings
Food: Wide variety of small insects
Reproduction: Little is known.

Common name: Small-Footed bat
Habitat: Little is known.
Food: Little is known, probably related to other small, closely related bats.
Reproduction: Little is known.

Common name: Northern Long-Eared bat
Habitat: Little is known.
Food: Small insects, flies
Reproduction: Single pup in July; nursery colonies in attics, barns, tree cavities

Common name: Little Brown bat
Habitat: Buildings near rivers, marshes, lakes
Food: Moths, mosquitoes, beetles, flies
Reproduction: Single pup in June or July. Maternity colonies of up to 10,000 are found in attics, barns and other very warm locations.

Source: Wild Resource Conservation Fund

Pennsylvania has had an active bat research and management program in the Game Commission's Bureau of Wildlife Management since 1980, and has cataloged more than 1,000 caves and 4,122 abandoned coal and limestone mines as potential bat roosting locations.

Each winter the Game Commission enlists volunteers to survey some of the mines and caves to determine if bats are living in them. An old limestone mine at Canoe Creek State Park in Blair County was found to contain more than 20,000 bats and six different bat species.

"A lot of the mines are potential safety hazards, and the state has been closing them on a priority basis. When there's an indication that bats are present, we're called in to do a survey," said Jerry Hassinger, supervisor of the commission's Wildlife Diversity Section in the Bureau of Wildlife Management.

"We hit a lot of dead ends, but in the summer, if we can feel cool air blowing out, it's a 'breathing mine,' and there's a good chance there's bats in it."

About two dozen deep mines in the state have been closed using bat-friendly doors or grates to exclude humans. Hassinger also works with property owners who discover bats in their homes or barns and want to get rid of them.

"If it's a big colony we'll provide alternative housing by building what we call a 'bat condo' nearby," he said. "They're like giant bat boxes, 8 feet tall, 8 feet wide and 8 feet deep."

Two condos have been built: at Canoe Creek State Park — a bat hotspot — and on an island in the Susquehanna River. Each houses more than 1,000 bats.

Hassinger said another ongoing project involves the recent opening of a sinkhole that leads to an underground cave, again near Canoe Creek State Park.

"There's a 1,000-foot-long passage that leads to an underground chamber where bats hibernate," he said. "We're going to try to put a cage over the top of the hole, and we're trying to do it in a way that will set an example."

Bat Hibernaculum on Channel 11 News

On May 14, 2001 WPXI Channel 11 News reporters visited the Goff Station Restoration Area to film a segment about the Bat Hibernaculum which was aired that evening. Shaun Busler, Stream Restoration Inc.; Jeff Reidenbaugh, Aquascape; and Kevin Stiner, Quality Aggregates Inc.; active participants in the Slippery Rock Watershed Coalition were interviewed. They discussed the construction, function and importance of the bat hibernaculum.

BUTLER COUNTY'S DAILY NEWSPAPER

Butler Eagle – May 31, 2001

GOING BATTY

JACK NEELY/BUTLER EAGLE

Will Taylor, program coordinator at the state Department of Conservation and Natural Resources' Jennings Environmental Education Center, left, and Bob Beran, director of environmental services for Aqurscape, check out the entrance to the bat cave built by the Slippery Rock Watershed Coalition in northern Butler County.

Coalition entices bats with man-made cave

Project is 1st east of Mississippi River

BY THE ASSOCIATED PRESS

HILLIARDS — Bruce Wayne may have had a fancier bat cave, but how many actual bats did he have at sleepovers?

In the northern reaches of Butler County, the Slippery Rock Watershed Coalition is finishing up work on a manmade bat cave of its own — this one is called a "hibernaculum" — where the furry, flying mammals can hang out in the day and sleep through the winter.

With 60 feet of culvert pipe and a recycled 10-foot long manhole sunk into the ground, the group hopes to give up to 5,000 bats a fine place to roost, what with development destroying natural habitats and abandoned mines being boarded up.

"We have built it. Now the question is, 'Will they come?' We feel they will," said Will Taylor, a member of the coalition and program coordinator at the state Department of Conservation and Natural Resources' Jennings Environmental Education Center.

The hibernaculum is part of the coalition's Goff Station stream restoration and acid mine drainage treatment project on Murrin Run, near the headwaters of Slippery Rock Creek.

Nine species of bats call Pennsylvania home, and four of those are considered extremely rare. All of them are insect eaters, feeding throughout the evening, night and early morning before retreating to some dark, secluded place to spend the day.

The manmade cave should fit the bill.

"We know that this site is generally good bat habitat with open water near by some forested area and fields," Taylor said. "There will also be wetlands with lots of aquatic insects, so the setting should be ideal."

JACK NEELY/BUTLER EAGLE

Will Taylor, program coordinator at the state Department of Conservation and Natural Resources' Jennings Environmental Education Center, climbs out of the manhole that leads to the bottom of the bat cave the group built from a 60-foot plastic pipe.

Across the nation, bat populations are on the decline. Out of 45 species found in the United States, six are considered by the federal government

■ See **Bat** on **Page 5**

Bat

■ **From Page 1**

as endangered or threatened. Another 20 species are listed by the U.S. Fish and Wildlife Service as warranting special concern.

While pesticides have cut into bat food supplies, development, timbering and mine reclamation are considered other prime reasons the populations have been decreasing.

In some places across the nation, groups are encouraging that, when mines are reclaimed or closed, they are done so in a way that still leaves access for bats — which use them to hibernate or roost during the rest of the year.

"There's still work to be done but the awareness is out there now," said Sheryl Ducummon, bats and mines director for Bats Conservation International in Tucson, Ariz. "There are more people understanding the value of bats and the need to help preserve their accommodation."

The hibernaculum in Butler County is the first to be built east of the Mississippi River.

To build the hibernaculum, the coalition dug the manhole chamber into the ground at the bottom of a slope, which provides for cooler air. It is situated over the entrance to an old mine, where the drainage from the mine provides the sound of running water — which attracts bats.

The 60-foot-long culvert, with a gate covering one end, serves as the entrance to the cave. It was buried at a 30-degree angle connecting to the manhole, allowing for cool air to be recirculated. Inside the culvert and manhole are plastic nets from which bats can hang.

Margaret Dunn, a coalition leader and president of the nonprofit Stream Restoration Inc., said the bat project came out of the stream cleaning effort.

"I was just trying to get the metals out of the mine water when the question came up, 'What about the wildlife?'" she said.

Sunday Butler Eagle - July 29, 2001

RICK KROSEL/SPECIAL TO THE EAGLE

Checking water quality at a mine water clean-up site are, from left, Darcy Peart of Butler, Tim Gillen, a geologist with the Pennsylvania Department of Environmental Protection, and Chris Treter of Cranberry. Peart and Treter are students at Chatham College and Grove City College, respectively.

Watershed coalition working to improve the environment

By **KRIS MILLER**
Eagle Staff Writer

SLIPPERY ROCK — From geologists to Girl Scouts, people from all walks of life have contributed to the success of the Slippery Rock Watershed Coalition.

In the same way, the people who have benefited from the coalition's work are varied, from students in kindergarten to adults conducting research.

Within the last six years, the coalition has gathered and used $4 million to rid local streams of acid-mine drainage.

The coalition has substantially improved four miles of streams so that fish are living in them for the first time in a century, according to coalition co-founder Margaret Dunn.

Coalition members have installed 12 passive water treatment systems that handle more than 500 million gallons of abandoned mine drainage each year.

The 12 systems prevent 150 tons of iron and 190 tons of acid, among other pollutants, from entering the streams.

Members find sites that need remediation with the help of the Knox District Mining office in Knox.

The coalition recently received the Governor's Award for Stream Restoration, one of many state honors received in the past few years.

■ See **Coalition** on **Page C4**

RICK KROSEL/SPECIAL TO THE EAGLE

Jeff Reidenbaugh and Laura Spencer, environmental consultants with Aquascape of Boyers, hold a duck house next to a recently created wet land used to clean mine drainage water. Others helping are Jeff Ankrom, vice presdient environmental operations at Quality Aggragate of Nevile Island, and Chip Brunst and Dale Hockenberry, of the Pennsylvania Game Commission.

Coalition

■ From Page C1

Without the collaboration of all the groups involved in the projects, including scientists, businesses, teachers, students and community members, the coalition wouldn't be as successful as it is, Dunn said.

Each member brings unique expertise to the coalition. Dunn, for example, is a geologist who has worked as a mining consultant, trying to reclaim land and streams at active mining sites.

"We have a lot of Type-A personalities," she said of the group. "I kind of think of it as open sourcing, like on a computer. We put information into (a project) and the next thing we know it just grows."

Goff Station

One example of a project that took on a life of its own is the Goff Station Restoration Project on Goff Station Road in Venango Township. The effort began as a way to stop local mine drainage from damaging Murrin Run, a stream located in the headwaters of Slippery Rock Creek.

The area includes ponds and wetlands. Water flows from abandoned mine sites through the systems and filters into Murrin Run without the unwanted elements discharged by the mine.

Coalition members monitor water at the site with the help of Aquascape of Boyers. Jeff Reidenbaugh said his company has also helped to plant vegetation in the wetlands and stream areas that will help to improve water quality.

In addition to the elaborate drainage system, the area contains a bat haven, the first one to be constructed east of the Mississippi River. The idea for the haven came from Will Taylor, program coordinator at Jennings Environmental Center and active member of the coalition.

Taylor has always had an interest in bats and encouraged the group to locate the simulated bat cave on the property. The haven has water from one of the five mine discharges flowing through the bottom of it, providing the needed humidity that attracts bats.

Since bats follow streams, the haven should attract a large number of them. It is built for 5,000 of the mammals, and this winter will be its first test.

Working together

Coalition members consist of environmentalists, geologists, professors, students, business owners and other community members. There are no dues to join the coalition and members are encouraged to help out when they can. No one is pressured, Dunn said.

Members volunteer their time, Dunn added, providing expertise without cost to the coalition.

Valentine Kefeli, biology professor at Slippery Rock University, said the diversity of the membership is vital to its efforts.

"The coalition has the advantage of the integration of sciences for the betterment of the stream restoration," he said. The result, Kefeli said, is an "invisible college," that can be used by many people.

"It's an idealogical gathering of people concentrated on the same problem," he said

Kefeli is a soil scientist who teaches and works at the Macosky Center at SRU. He and his students help to prepare fabricated soils that are used in the areas that the coalition tries to restore.

Darcy Peart of Butler is a student at Chatham College who helps the coalition in the summer. Some of the scholarships she received to attend Chatham were based on work she did with the group while she was a homeschooled student during high school.

"It's an educational opportunity," she said. "I've learned a lot by being involved in the coalition, not just about the watershed but about working together in groups and other issues."

Fred Brenner, a professor at Grove City College, uses coalition projects for his students to get hands-on experience.

"Actual experience is the most valuable thing in their college careers," he said.

Along with the coalition's regular membership, the group often receives help from local Girl Scout troops, Butler County Juvenile Court System and Concordia Homes, among other community groups.

For example, Girl Scouts earn badges while helping to plant the wetland areas that the coalition creates. The wetlands drain into the stream and filter out the iron and other unwanted elements.

Residents of Concordia Homes help to make boxes for local birds to nest, Dunn said. Kids involved in the juvenile court system can perform community service at the coalition sites as well.

Then there are other corporate partners, such as the Scrubgrass Generating Plant, a power plant that supplies alkaline coal ash to neutralize acid spoils from mining efforts. The coal ash is a byproduct of the power plant, Dunn said, and they provide it to the coalition free of charge.

Joining adversaries

One of the byproducts of the coalition's work has been joining forces with groups that didn't get along in the past, said Dunn. Environmentalists are now working with mine owners, she said.

"One of the great things that happened was you saw people who used to be adversaries getting along," she said. "With this cross-section of people getting along, you'd be surprised what you can get done."

Jeff Ankrom, vice president of Quality Aggregates Inc., a company that has several active and closed mining sites in Venango Township, has become an active member of the coalition himself.

"This is a learning process for me," Ankrom said of his involvement. "That makes it fun."

While mining used to "typically leave a bad taste in people's mouths," the industry has changed dramatically lately, Ankrom said.

"Today with the governmental regulations that are in place, we've realized we have to work with the community," he said. "What we're doing is just the reverse of mining. It's enjoyable to come back and do things like monitor the water, see the aesthetic changes."

It's a learning experience for the mining industry as well, Ankrom said.

"We've learned what to do and not to do in the future," he said.

Funding

Much of the funding for the coalition's projects comes from state and federal grants, according to Dunn.

The Goff Station project is funded through the state's Growing Greener Program, for example. The coalition has applied for a similar grant for its next planned project, at Erico Bridge, south of the Goff Station site.

Other funds are donated by local businesses, including Quality Aggregates Inc. Without their equipment and donations, much of the coalition's work couldn't be done, Dunn said.

In addition to Ankrom's involvement, Quality Aggregates has donated $1.6 million in equipment to help with the coalition's work. The company also sends employees to help with the projects.

"We're actually on-site to see what needs done and how we handle it," Ankrom said.

He added that if one of the water treatment systems fails, for example, the workers and equipment are on-site and can fix any problems. If the coalition was forced to hiring a private contractor, the process would likely be more complicated.

For more information about the coalition, check out its Web site at www.srwc.org, or call Dunn at 724-776-0161.

Tribune-Review (October 11, 2001)

Hands-on rehabilitation

James Knox/Tribune-Review

Angela Lamberto, director of the Working Opportunities to Repay the Community program that oversees juvenile offenders performing community service, shows off some pictures of young people doing their service projects.

Probation officer works with young first-time offenders

By Lawrence Sanata
TRIBUNE-REVIEW

Slipping on bright yellow hip boots and standing knee deep in muck and murky water was a first for Angela Lamberto. It also was a first for a handful of young people — all of whom have had run-ins with the law — who were with her.

Over a period of weeks this summer, under Lamberto's watchful eyes and with her help, those youths helped clean a stream, construct a wetland and serve several hours of community service, as ordered by Butler County Juvenile Court.

More importantly, those young people — first-time, nonviolent, juvenile offenders — came away with a sense of self-respect, Lamberto said with a wide smile.

"It's such a wonderful program because it helps young people to get on their feet again and move on," said Lamberto, a community service probation officer in the Butler County Juvenile Court Services. She oversees the Working Opportunities to Repay the Community program, also called WORC.

The program ensures that young offenders meet the community service penalties imposed on them by juvenile court. A big part of that, Lamberto said, is giving something back to the community. About 300 young people each year are referred to the WORC program. About half are required to do more extensive community service under Lamberto's supervision.

GETTING DIRTY

Although it would have been easier for her if she had not dressed in the hip boots and not slipped into the murky water, Lamberto said, she believes it is important for her to participate with the young people, rather than stand on the sidelines.

> "To have adults that take such an interest in seeing that young students who get a foot going in the wrong direction get an opportunity to come back ... is an awesome thing."
>
> — Nancy Brice
> COORDINATOR OF THE MARS EMERGENCY MEDICAL SERVICE

She picked pumpkins with a group of youths earlier this month and delivered those pumpkins to youngsters whose mothers are living temporarily at a shelter operated by the Victim Outreach Intervention Center.

Lamberto will be involved later this month with another group of youths when they collect newspapers as part of a countywide recycling effort. They also will remove discount food coupons from those papers and deliver them to the needy.

"I tell them right at the beginning, 'I'll respect you and you respect me, and we'll work together.' I think they appreciate that I'm in the mud with them and digging holes with them," she said.

Butler County Commissioner Glenn Anderson commended Lamberto for taking such an active role in the program, which often means working weekends and late afternoons. He said she is able to relate to kids more effectively by working as closely as she does with them.

"It's good to be a role model. ... I think it's for adults to model positive behavior," said Lamberto, who often is accompanied by juvenile probation officer Sue Daugherty on these community work assignments.

It is important to set an example, said Daugherty, who also actively participates in work projects, like the wetland project.

She also commended Lamberto. "She does a wonderful job. We've had other people in that job, and I've never seen anybody take the initiative that she does. ... The kids love her."

Young people between the ages of 10 and 21 are eligible to participate in the WORC program, she said, but most of those involved are between the ages of 12 and 18.

Nancy Brice, coordinator of the Mars Emergency Medical Service, remembered a 17-year-old girl placed on probation by juvenile court and assigned by Lamberto last year to help there.

"It was a young lady who had planned on quitting school long before the end of her education. She came down here, thanks to Angela, and stayed in school," Brice said.

The girl, who has since moved from the area, also passed a cardiopulmonary resuscitation class and served as an observer on Mars EMS ambulances, she said.

"To have adults that take such an interest in seeing that young students who get a foot going in the wrong direction get an opportunity to come back ... is an awesome thing," Brice said.

"I feel that if organizations in the community do not get involved with our young people, we leave the education to the wrong people."

Lamberto, a teacher by training, began with the county about two years ago as coordinator of the Balanced And Restorative Justice program.

The program requires that youths who have gotten into trouble with the law be held accountable for the crimes they have committed.

Almost every young person who appears in court on a nonviolent offense is assigned to at least 20 hours of community service, Lamberto said.

Since joining the county, Lamberto has developed a more expansive and comprehensive community service program for those youth.

Construction of a wetland at the Goff Station in Venango Township this summer was one such project. Young people assigned to that project worked several hours a week at the site, she said.

PLEASE SEE **PROBATION/N6**

Probation officer works with young first-time offenders

PROBATION FROM/**N3**

In doing so, "they were held accountable (for their past mistakes)," she said. They also learned new skills that might be applied to other activities, she said.

Even after the youths had completed their court-ordered community service there, some returned to help with the project, Lamberto said.

DOING GOOD WORK

Bob Beran of Aquascape, one of several professional groups involved in the wetland project, was so impressed with the young people, he offered jobs to two of them.

"We're planning in the spring to have a couple of these kids come to work," he said.

Beran said he also was pleased to have participated in the program with the youths. "I think that one of the things that is really extremely important is for the kids to have a chance for some self-respect," he said.

"They got to see over the course of the summer the fruits of their effort. They got to see this wetland grow. They got to see fish in it. They got to see bugs in it. When they came in the beginning, it looked like a big mud puddle," Beran said.

Lamberto was reluctant to talk about the crimes committed by the kids in her program. As a matter of fact, she said she usually does not even check to see why young people have been assigned to WORC.

It is more important, she said, for those young people to become involved in the community, to appreciate the things around them and to develop new interests and skills.

WORC clients learn why certain agencies and organizations exist in their communities and why their services are important, she said.

For instance, after picking pumpkins and delivering them to the shelter, young people were told about the victim outreach agency and the continuing problem of domestic abuse in the county.

Some in the group were moved by what they heard, Lamberto said. "You could see the expression on the kids' faces," she said.

"I think it's our job and responsibility as adults to provide opportunities for these kids to know what's out there."

Lawrence Sanata can be reached at lsanata@tribweb.com or (724) 779-7109.

Allied News – October 24, 2001

Groups work to save bat habitat

► Flying mammals are important to environment, local expert says

By Felicia A. Petro
Allied News Staff Writer

Most people consider bats to be pests. They couldn't be more wrong says Will Taylor, coordinator of Jennings Environmental Education Center in Slippery Rock Township.

Taylor, along with members of the Pennsylvania Game Commission, the Slippery Rock Watershed Coalition and others, are trying to help local bats.

The coalition cleans up tributaries in the Slippery Rock Watershed affected by acid mine drainage, using various systems. At one of its sites at Goff Station, across the Marion Township border in Butler County, a winter home was built this year for the bat population.

Bats hibernate in the winter, generally in caves and at mine entrances. Their sleep is being disturbed, however, with humans exploring mines during the winter and the sealing of mines, Taylor said.

From the start of winter to the spring, "They have a limited fat reserve of energy in months hibernating," he said. "When humans wake them up, it burns those fat reserves and they may not have enough to get through that winter period."

For this reason, most bat species in Pennsylvania are on the decline, and everyone should care, even if they don't like the looks of a bat.

"They're extremely valuable, virtually the only nighttime predator of insects like mosquitoes and moths, or 'pest insects,'" Taylor said. Bats also eat potato beetles, which destroy summer crops.

The Goff Station's treatment system — like many projects with the coalition — involve establishing a wetland, which attracts bugs.

"We were building about four acres of wetlands. Bats really like wetlands for insects," said Tim Danehy, spokesperson with the Slippery Rock Watershed Coalition.

See **BATS,** *page A-2*

Bat myths dispelled by expert

By Felicia A. Petro
Allied News Staff Writer

Bats are often thought of as being ugly and dirty, and seen as a symbol associated with Halloween.

Yet, the coordinator of Jennings Environmental Education Center in Slippery Rock Township said those stereotypes are just not true of the furry, flying creatures of the night.

For one, bats aren't like a mouse, even if they kind of look like one, said Will Taylor.

"They're more closely related to us than a mouse. They're a mammal, not a rodent and not a bird," he said. "Their wing structure is like our hand, with five fingers that are just long and skinny and have skin in between them."

A common myth is that bats will nest on a head of long hair.

"That's always been my favorite," Taylor said. "Bats don't build nests, lay eggs or fly in people's hair."

Bats may swoop near people at night, stirring that myth. But, "The body has carbon dioxide and attracts mosquitoes, and they're trying to help you by eating them," he said. "They won't run into you."

Bats aren't blind either, but since they hunt at night, their sight is about as good as a human's. "They judge distance, texture and speed with echo frequencies. They 'see with their ears,' so they won't blunder into your hair," Taylor said.

Some bats do like blood. "There are vampire bats," he said, but not like Dracula. "They land near an animal, like a cow or chicken, crawl to the animal and use their teeth and specialized saliva to make a tiny incision and lap up the blood," Taylor said. "They won't suck the blood out of them."

The few species of vampire bats live in Central and South America. All nine species of bats in Pennsylvania feed off of insects.

"As you move farther west, you get bats that feed on fruits and nectar," Taylor said. "They're important in distributing seeds in the tropics."

That leads to another myth about bats being dirty.

"It's not true," he said. They're one of the cleanest animals around. They constantly groom themselves, like a cat."

Bats have to keep their bodies free of parasites or their flying will be affected. "If you see a dirty bat in the day, it's probably sick with rabies or distemper," Taylor said. "Don't mess with it."

Rabies can be given to humans through a bat bite, "but it's extremely rare," he said. "Most rabies contracted in Pennsylvania to humans is from pets, like a dog or cat bite." Skunks and raccoons are also carriers.

Bats hardly ever attack. "Usually, they'll be disturbed and leave or they will ignore you," Taylor said.

The age expectancy is surprising for a bat. "Most small animals have a short life span, and they're lucky to live a year or two," he said. Bats, especially the small brown ones most common in Pennsylvania, "are known to live up to 32 years."

Bats don't reproduce in herds, either. "Usually a bat has one pup per year and they don't begin having pups until they're three years old," Taylor said.

They also reproduce like humans and nurse. "The young will stay a few weeks with Mom and other bats will even 'baby-sit' while the mother goes out at night and gets food," he added.

❖ ❖ ❖

Bats

from page A-1

Last spring, two bat boxes were built by residents of a local nursing home. They are basically summer homes hung in trees for the bats. They look like "a larger birdhouse with no bottom and a number of boards inside for bats to sleep under during the day," Danehy added.

Taylor had the idea about building a winter home for the bats, officially called a hibernaculum. He contacted Cal Butchkowski of the state Game Commission, a bat expert who offered suggestions. Butchkowski also provided and installed sensory equipment to adjust how much air is going into the hibernaculum to the bats' taste. The overall design of the home was put together by Bob Beren, with Aquascape, a wetland consulting company in Boyers.

"Quality Aggregates Inc. donated manpower and equipment to get it installed this past spring. We finished it up this summer," Danehy added.

The plastic hibernaculum begins as a tunnel that's 60 feet long and three feet in diameter, Taylor said. At the end is a cave that is 10 feettall and about eight feet in diameter. The equipment is buried three to four feet underground and is lined with a plastic netting for the bats to hold on to while they sleep.

"Quite a few could live in there, about 5,000 under optimum conditions," Taylor said.

Many bats were seen this summer, but with the new wetlands — with few insects — at Goff Station, the bat boxes weren't probably used much. "In a few years, the insect population will jump up," Taylor said, and so will the bat population.

He doesn't expect many bats in the hibernaculum this winter, either. "We should see a lot more next year," he said. "This will be the test year ... We will use the remote sensors for optimum temperature in the cave which will play on the bats' echo sensors."

Volunteers will put up more bat boxes next summer to "beef up" the population, Taylor said, as well as catch bats to see what species are in the area and if they're raising young.

"One species is endangered and one is soon to be endangered," he said. "We want to help it out."

So, as Oct. 31 approaches, don't expect to see a lot of bats. Most will start hibernating by then, Taylor said. You can also expect not to find any bats turning into humans. "No, they're pretty much what they are and that's it," he added, chuckling.

"With any animal, you learn more about it and begin to realize their value and appreciate them more," Taylor said. "Bats are a great little animal. They're a significant advantage to us. They're not a pest, unless you get 100 of them in your attic."

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Watershed Heroes

Slippery Rock Watershed by Margaret Dunn

Margaret and Cal Butchkoski, Bat Specialist

- **Favorite Water Activity:** *Planting wetlands*
- **Favorite Water Animal or Plant:** *The bat. "Even though it's not considered a water animal, water is needed, because they live off of insects." Margaret also loves all of the wetland plants, because "each has a different role in the ecosystem."*
- **Watershed Public Service Message:**

"Make it happen." "You can do it. Just get out there and get things done."

For the first time in 25 years, Margaret Dunn can see how her work can really make a difference. Margaret is a geologist and the current president of Stream Restoration Incorporated (SRI), a non-profit organization in Western Pennsylvania whose focus is restoring streams impacted by abandoned coal mine drainage.

Stream Restoration Incorporated (SRI) administers grants to other organizations — such as the Slippery Rock Watershed Coalition — that in turn work to restore watersheds. SRI works with a number of partners, both public and private, to get the job done. Margaret says that it's this public-private partnership that gets projects done quickly and efficiently.

Margaret says — *"It's exciting to just get things done. We've been involved in projects that would normally take years to complete, and by working in the public-private partnership, we've been able to complete these projects in just six weeks."*

Working in such an economical, efficient and effective manner is what motivates Margaret to work to improve watersheds every day. Margaret says a normal workweek for her and the folks she works with can range from 50 to 90 hours total. But she doesn't mind the longs hours at all. *"You're actually contributing,"* Margaret said. *"You're helping not only the environment, but you're working with people and helping people. You're helping to sustain and promote watershed restoration, and that just makes everything worthwhile to me."*

Margaret, who works in a career community that is typically dominated by men, didn't think twice about being a woman in the watershed world. Although there were few women such as herself when she started out as a geologist 25 years ago, Margaret said she never saw her gender as a help or hindrance.

A workshop in 1992 that focused on mine drainage issues was the springboard for Margaret's current job. She said after the workshop, with very little funding, she began working with mining companies and state agencies to get small systems installed.

Stream Restoration Inc., works with Girl Scouts and other youth groups on a regular basis. Her method of motivating others, particularly young boys and girls, to become interested in watershed restoration is to get them involved in hands-on projects. She believes that actions speak louder than words and that when young people get involved early on, they will make room for environmental awareness for the rest of their lives. *"No matter what field they take, there's always room for watershed restoration,"* Margaret said. *"The important thing is to get people involved in real-life projects and get hands-on experience."*

One of the efforts that SRI supports is a program where juvenile offenders fulfill a public service sentence by restoring watersheds. Margaret said one of the gratifying things about that program has been the return of some of the youth after their public service requirement has been fulfilled.

Margaret said she couldn't pinpoint any one particular project over her career that has been her biggest accomplishment. She said that restoring watersheds in general has been the most gratifying experience of her life. *"It's not like we're going and taking care of one site and then leaving,"* Margaret said. *"All of our projects tie together into a larger plan as far as the watershed restoration. That's what's really exciting."*

Phone interview with Margaret Dunn.

Audio report 1 **Audio report 2** **Audio report 3**

Written by Lori Litchman

More information: Those interested in learning more about the history, cause and solutions to abandoned mine drainage can check out a new book published by the Slippery Rock Watershed Coalition called *Accepting the Challenge*. Find out about the book at **www.srwc.org**. To learn more about SRI, check out **www.streamrestorationinc.org**.

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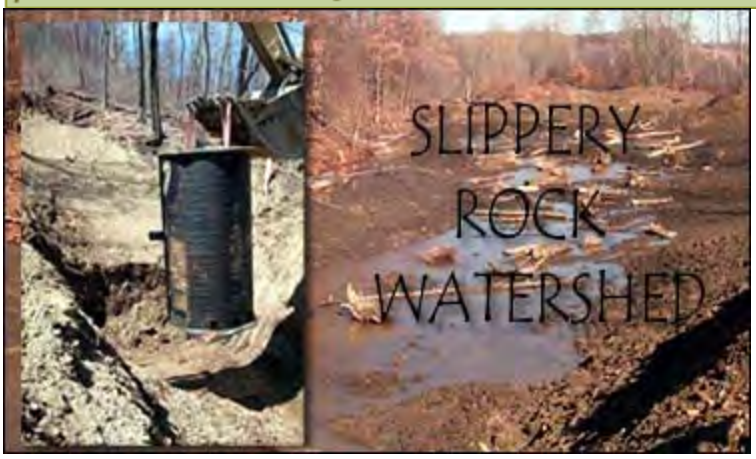

Watch these videos online with Real Player. If you do not have Real Player, **click here** to download it for free.

Additional information on this topic provided below.

Slippery Rock Watershed

Like many streams of Western Pennsylvania, those in the Slippery Rock Watershed are overwhelmed by the affects of abandoned mine drainage (AMD) and the damage caused by over 100 years of mining in Pennsylvania. The Slippery Rock Watershed covers over 410 square miles of Western Pennsylvania, and was once documented by the Commonwealth as one of the most seriously degraded watersheds within the state, due to mine drainage, with the most heavily impacted area centered underneath the headwaters of the Slippery Rock Creek. Underneath these headwaters lie 4,000 acres of underground mining operations, along with 8,000 acres of surface mining permits that were also located in the headwaters.

Bat Hibernaculum— Bob Beran

- Video Clip 1
- Video Clip 2
- Video Clip 3
- Video Clip 4

And so, in 1994 a very special alliance was formed to treat the remnants of a once-booming coal mining industry. The Slippery Rock Watershed Coalition, working together with Stream Restoration Inc., and other private, volunteer, and government agencies work together to treat over 500 gallons of mine drainage each year from 16 different discharges in the watershed. All in all, these discharges remove about 150 tons of iron, 8 tons of aluminum, and 182 tons of acidity from the waters of the Slippery Rock Creek - each year! That's enough iron to create 150 trucks and 273,000 aluminum cans each year…Amazing? Yes, it is, and even more amazing is the group of individuals who make it all happen.

Quality Aggregates

John Stoops

- Video Clip 1
- Video Clip 2

Jeff Ankrom

- Video Clip 1
- Video Clip 2

I had the opportunity to visit the Slippery Rock Watershed several months ago for a 'grand opening' of sorts. We were celebrating the beginning stages of one of their twelve AMD remediation sites, this one called Goff Station. We were also celebrating the installation of something very unique, a bat hibernaculum. A bat what? Well, I'll start by telling you that it's the first of its kind east of the Mississippi. And simply put, it is a man-made hibernating cave for bats. But what is most amazing about it is its location. The hibernaculum has been placed in the hillside of the Goff Station remediation site. Why there? Simple. The wetland and surrounding wooded areas provide the perfect habitat for many species of bats, including the Indiana bat. The hibernaculum has a large underground plastic piping system with an outside entrance at the end of the pipe. This pipe acts as a tunnel for the bats to enter the housing area to roost. The housing area itself is a large round structure that is placed 10 feet into the ground. It's really quite amazing, and it's unique to the east coast.

Stream Restoration Inc. — Shaun Busler

- Video Clip 1
- Video Clip 2
- Video Clip 3

Not only are these organizations motivated to protect the water resources of the region and provide habitat for wildlife, they also work with the community to provide educational sources about the affects of pollution on our waterways, and provide a valuable resource to their community through educational tours and programs at their AMD sites. They also work together with the PA DEP, and Department of Conservation and Natural Resources, along with the Jennings

Environmental Education Center to promote clean water resources, not only in the Slippery Rock Watershed - but for all watersheds.

Getting the community involved is another story. These folks are not only excited about the work they're doing, but they're also like a family - and they'll bring you right into the family to tell their story. They're an incredibly warm, hosting group of people whose ideals about the environment and our place in it is not only admirable but inspiring. They bring this inspiration to the community through many outlets, but one of the most recent and most impressive is their work with a community effort to help first-time juvenile offenders get a second chance. This past summer the group worked with these young adults through a program called "Working Opportunities to Repay the Community" or WORC for short. Through this program, SRI and SRWC not only received help in planting the wetland at Goff Station, but they were able to give two of those individuals a start at a new future - by giving them a job. Aquascape, the organization completing the actual construction of the remediation site, was so impressed by the work being done by these young adults, that they have hired them to continue working with AMD remediations and wetland development projects.

In sitting down to write about SRWC and SRI I felt overwhelmed. Not because I didn't know what to say, but because there's just SO MUCH to say about this group of individuals that I didn't know where to start! I feel like in this writing I've still only touched the surface of the amazing work being done by these inspirational watershed groups. So, be sure to check out their websites, get on their newsletter mailing list, read about Margaret Dunn, Director of SRI in this month's "Watershed Hero" spotlight, and if at all possible get out to the Slippery Rock Watershed to see their projects first hand. You'll be glad you made the trip!

Wetland Construction — Jeff Reidenbaugh

Video Clip 1

Photo Gallery

Click on the photo to enlarge it.

Related Links:

Slippery Rock Watershed
Get all the details on the Slippery Rock Watershed - their history, projects, newsletters and so much more!

Stream Restoration Incorporated
Get facts on abandoned mine drainage, technical grants, AMD projects and partnerships and even peruse their AMD database and glossary.

Bureau of Abandoned Mine Reclamation
The Pennsylvania Department of Environmental Protection (PA DEP) has two offices dedicated to the reclamation of AMD. Check out this site to learn more about their programs.

Slippery Rock Watershed Coalition

Since 1995, the Slippery Rock Watershed Coalition has installed 12 passive treatment systems, treating over 500 million gallons of abandoned mine drainage every year. With the installation of these systems, the following no longer enters Slippery Rock Creek:

- **Acidity:** 190 tons/year
- **Aluminum:** 8 tons/year
- **Iron:** 150 tons/year of iron

Goff Station 41 wetland after construction

Project Participants

- **State, Federal, and Local Agencies/Governments** - US Department of Energy; US Environmental Protection Agency; Marion, Venango, and Washington Townships; PA Game Comm.; PA Fish and Boat Comm.; PA Dept. Of Environmental Protection, Knox Dist. Mining Office and Bureau of Abandoned Mine Reclamation; PA Department of Conservation and Natural Resources;
- **Academic Institutions** - Slippery Rock Univ., Grove City College; Allegheny College;
- **Private Companies** - Aquascape: ARMCO; Scrubgrass Generating Co.; Civil & Env,. Consultants, Inc.; RECMIX of PA; Northwest Sanitary Landfill, Inc.; Kerry Coal Co.; Sunbeam Coal Corp.; Amerikohl Mining, Inc.; Shaliston Enterprises, Inc.; C D S Assoc., Inc.; Allegheny Mineral Corp.; Quality Aggregates Inc.; Hedin Environmental; Jesteadt Excavating; Puryear Excavating; BioMost, Inc.;
- **Nonprofit** - W. PA Coalition for Abandoned Mine Rec; Neshannock and Penns Woods Chapters Of Trout Unlimited; Stream Restoration Inc.

SLIPPERY ROCK WATERSHED COALITION
3016 Unionville Rd.
Cranberry Twp., Pa 16066
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Website: http://www.srwc.org

Slippery Rock Watershed Coalition

Bat Hibernaculum

Goff Station Restoration Project

Goff Station 41 wetland during construction

Tel: 724-776-0161

Goff Station Restoration Project

Goff Station Restoration Project is an effort to treat abandoned mine drainage (AMD) that flows into Murrin Run and remove mine refuse in the area. A passive treatment system has been constructed utilizing vertical flow ponds, sediment ponds, aerobic wetlands and a final polishing wetland. The passive treatment system has been designed to remove approximately 87,000 lb/yr of acidity and about 12,600 lb/yr of metals from entering Murrin Run, a stream located in the headwaters of Slippery Rock Creek.

41 Wetland: Water flows out of this wetland into a limestone spillway, which functions to raise the pH

The Goff Station Restoration Project will be monitored by Stream Restoration, Inc. and maintained by Quality Aggregates for a period of five years after the completion date. The wetlands associated with the project will be monitored by Aquascape.

Goff Station Restoration Project is funded through the State's Growing Greener Program.

Goff Station Riparian Restoration

The former Riparian Area of Murrin Run consisted primarily of coal refuse and supported little vegetation and aquatic habitat. Our restoration effort will provide bank stabilization, provide wildlife habitat, serve as a source of organic matter contribution, promote visual diversity through an appealing greenbelt and to provide shade which will provide and protect aquatic habitat.

The riparian zone will be transplanted with native vegetation that is growing in the area. Tree revetments will be placed in the stream in order to trap sediment. Willow wattles and live stakes will be planted and will provide shade to the stream and prevent erosion.

Rapid Bioassessment of Murrin Run conducted before Riparian Restoration. Continuous assessments will be conducted to monitor stream health.

Goff Station Bat Hibernaculum

As an additional effort to provide wildlife habitat, a bat hibernaculum has been constructed at the Goff Station Restoration Site. The hibernaculum will provide an area for up to 5000 bats to hibernate.

Temperature monitoring devices will be installed in the hibernaculum to maintain appropriate temperatures. The hibernaculum will be monitored with the help of the Pa Game Commission and will be open to students from nearby schools to perform research.

The restoration project has utilized many volunteers and volunteered materials throughout the entire construction. Thanks to: Girl Scout Troop#653, Butler County Juvenile Court System, State Game Commision, Concordia Homes, Waste Mgmt., Quality Aggregates and the landowners Mr. Hindman and Mr. Tiche.

Bat Hibernaculum in construction. Air vents allow for temperature modification.

December 2000

THE CATALYST

SLIPPERY ROCK WATERSHED COALITION MONTHLY ACTIVITIES UPDATE

THIS MONTH'S MEETING: Thursday December 14 @ 7:00 PM, Jennings Environmental Education Center, Pizza and Pop will be provided!! 11/9/00 meeting attendance: L. Ansell, J. Belgredan, F. Brenner, S. Busler, C. Cooper, T. Danehy, M. Dunn, V. Kefeli, J. Reidenbaugh, and W. Taylor.

STREAM RELEAF TOUR VISITS SLIPPERY ROCK WATERSHED

Thanks to all those who visited the Slippery Rock Watershed during the **Stream ReLeaf Tour** sponsored by the Pennsylvania Department of Environmental Protection. Over 40 people visited the **Goff Station Restoration Area** and **De Sale Restoration Area**. Participants of the Slippery Rock Watershed Coalition presented different aspects of these projects at stations within the construction area. Despite the rain, the tour provided a wonderful forum to discuss the challenges and team effort involved in the restoration project and to exhibit systems in different stages of completion.

John Stoops and **Kevin Steiner, Quality Aggregates Inc.,** stopped from their busy construction schedule to give a hands on point of view to those at the tour of Goff Station. We are fortunate to have them on our team and appreciate their willingness to share their expertise.

GIRL SCOUTS PLANT WETLAND AT GOFF STATION

Junior Girl Scout Troop 653 from West Sunbury came to the Goff Station Restoration Project to participate in a wetland planting on Saturday, October 21st. On the evening of the 20th, **Bob Beran** introduced the troop to the site and discussed the characteristics and functions of wetlands and wetland plants. The troop then harvested some plants from a nearby wetland for the planting the following morning. In addition to Troop 653, employees from **Stream Restoration Inc.**, **Quality Aggregates Inc.**, and **Aquascape** assisted in the harvesting and planting of the wetland plants. This activity is a part of Troop 653's work in attaining a Water Drop Patch, which is an EPA sponsored wetland education program.

The girl scouts plan to continue visiting the Goff Station Restoration Project to install and monitor blue bird boxes, which will provide additional habitat opportunities on the site. **Many thanks to Troop 653 for their help and hard work! And special thanks to Dale Hockenberry of the PA Game Commission for allowing us to harvest some of the plants from State Game Lands No. 95!**

Thanks to **Bob Beran** for contributing this article! For more information on EPA's wetland education program visit the Coalition's website.

SRWC WEBSITE ONLINE

www.srwc.org

Visit the Coalition's newest website. The Coalition hopes to use the site to facilitate communication with participants and to provide access to information regarding projects within the watershed.

Some of the features of the website include:

- SRWC Event Calender
- **Interactive** Project Location Map
- Project Descriptions
- Catalyst Archive
- Participants within the Coalition
- Relevant Links
- Pictures
- Water Quality Data
- **MORE TO COME!!!**

In the coming months, additional information will be available. Any suggestions or contributions are appreciated. Please contact **Shaun Busler** at Stream Restoration Inc.

WEB SITE OF THE MONTH

www.epa.gov/OWOW/watershed/wacademy/catalog.html

EPA's Watershed Academy was formed as part of the Clean Water Action Plan released by the President in February 1998. Its purpose is to assist in the protection of water quality on a watershed basis by offering training courses and developing educational materials. This web site provides one-page summaries of 180 watershed-related training courses offered by federal, state and local agenices, private organizations and universities. If you have information on a watershed-related training course that is not mentioned, you can submit it by filling out a form obtained from the web site.

Thanks to **Mike Leon**, Harding ESE, for submitting this article! Check out the Slippery Rock Watershed Coalition website for the link!

PHOTO OF THE MONTH

PHOTO OF THE MONTH

STATEWIDE GROWING GREENER WATERSHED CONFERENCE

Participants in the Slippery Rock Watershed Coalition including **Tim Danehy** and **Valentine Kefeli** (pictured above) presented a poster at the first annual statewide watershed conference. Other attendees include **Jeff Ankrom, Fred Johnson, Galena Kefeli, Jeff Reidenbaugh, Bob Beran, Shaun Busler, and Margaret Dunn**. In addition to the poster, participants gave a power point presentation titled ***The Right Stuff is...The Right Team*** describing the team work effort in two projects within the Slippery Rock Watershed.

Coming Next Month: Jennings Environmental Education Center and Grove City College attend 8th annual Monastery Run Project Symposium, and DCNR education coordinator commends Jennings.

Thanks to The William & Frances Aloe Charitable Foundation, Amerikohl Mining, Inc., Quality Aggregates Inc., and Allegheny Mineral Corporation for their support. For more information contact: Slippery Rock Watershed Coalition, c/o Stream Restoration Incorporated (PA non-profit), 3016 Unionville Road, Cranberry Twp., PA 16066, (724) 776-0161, fax (724)776-0166, sri@salsgiver.com, www.srwc.org. December Distribution: 585 copies

February 2001

THE CATALYST

SLIPPERY ROCK WATERSHED COALITION MONTHLY ACTIVITIES UPDATE

THIS MONTH'S MEETING: Thursday February 8 @ 7:00 PM, Jennings Environmental Education Center, Pizza and Pop will be provided!! 1/11/01 meeting attendance: L. Ansell, F. Brenner, S. Busler, C. Cooper, T. Danehy, C. Denholm, M. Dunn, D. Johnson, V. Kefeli, W. Taylor, and B. Beran.

YEAR 2000 IN REVIEW - WHAT A YEAR IT WAS!!!!!

Abandoned Mine Drainage Projects Completed

Site	Flow (avg. gpm)	Tons of Pollutant Removed Per Year Acidity	Metals
De Sale Phase I	34	25	6
De Sale Phase II	34	21	3
Goff Station (ST38 & ST39)	164	34	4
Total	232	80	13

Reclamation Projects Completed

- De Sale Restoration Area Phase I (June) - 8 Acres of Abandoned Minelands Restored
- Goff Station Gob Pile Removal (June) - Over 60,000 cubic yards of coal refuse removed and neutralized

Conferences Attended (Presentations Given)

- Society for Mining, Metallurgy, and Exploration Annual Meeting - Salt Lake City, UT, 2/28-3/1 (Receive award)
- Amer. Inst. of Mining, Metallurgical, and Petroleum Engineers Annual Mtg.- Nashville, TN, 3/12-3/14 (Receive award)
- West Virginia Surface Mine Drainage Task Force Symposium Annual Meeting - Morgantown, WV, 4/4-4/5 (Poster)
- American Society for Surface Mining and Reclamation Annual Meeting - Tampa, FL, 6/11-6/15 (2 professional papers - 1 by Darcy Peart at the tender age of 18!!, 3 posters - related to work completed at Jennings Env. Ed. Center
- Harrisville Community Days - Harrisville, PA, 7/1 (Poster Presentation)
- International Diatom Symposium - Athens, Greece (Presentation)
- PA Watershed Conference: Restoration and Protection - State College, PA 10/12-10/13 (Oral /Poster Presentation)
- 2nd Annual Southwest Watershed Workshop - University of Pittsburgh, Greensburg, PA, 10/21 (Presentation given)
- Mining and Reclamation Advisory Board - Harrisburg, PA, 10/26 (Presentation)
- 8th Annual Monastery Run Project Symposium - Saint Vincent College, Latrobe, PA, 11/16

Public Outreach/Volunteer Activities

- Scrubgrass Power Plant Reclamation Site Tour - Numerous sites within watershed, 3/30
- Slippery Rock Watershed Coalition Annual Symposium - Jennings Env. Ed. Center, Slippery Rock, PA, 4/6 -4/7
- Slippery Rock Watershed Coalition Annual Get-Together - Epiphany Catholic Church, Boyers, PA, 4/12
- Earth Day Tree Planting - Quality Aggregates Princeton Limestone Quarry, Princeton, PA, 4/29
- Testimony to House Subcommittee on Energy and Mineral Resources by Margaret H. Dunn - Washington, D.C.,5/17
- De Sale Restoration Area - Phase I Wetland Planting - De Sale, PA, 6/3
- Site Visit of De Sale Phase I & II, Goff Station, and Jennings - Visited by Robert Narin, PhD., Oklahoma Univ., 8/15
- Field Tour-De Sale Phase I & II, Goff Station, & Jennings- USGS, Australian Professors/Researchers & others attended, 8/24
- Local Television Interview - De Sale Restoration Area - Phase I, Aired on local cable channel 10
- De Sale Restoration Area - Phase II Wetland Planting - De Sale, PA, 10/2
- Science Presentation - Evangel Heights Christian Academy, Science classes learn first hand about impacts of AMD and current restoration efforts, Sarver, PA, 10/5
- Butler County Annual Farm Tour - Approx. 400 people visited De Sale Restoration Site, De Sale, PA,10/7
- Girl Scout Wetland Planting - Goff Station Restoration Project - Goff Station, PA, 10/20-10/21
- Stream Releaf Tour - De Sale and Goff Station Restoration Areas, 11/9

Recognition Received

- Army Corps Recognize PA DEP, Knox District Mining Office - "Interagency cooperation, partnership, and environmental contribution" (For their work in Elk County, PA)
- Environmental Conservation Distinguished Service Award - Margaret H. Dunn, PG - Presented by American Institute of Mining, Metallurgical and Petroleum Engineers
- Volunteer Group Award - Jennings Env. Ed. Center - Presented by Butler County Parks and Recreation Society
- Letter of Congratulations from Tom Ridge, Govenor - Margaret H. Dunn - Presented by Robert C. Dolence, Dept. Secretary for Mineral Resources Management
- TriBeta Competition Recognition of Kim Kosick, Grove City College - Presented by Beta Beta Beta honorary fraternity
- Governors Award for Environmental Excellence - Jennings Env. Ed. Center - Presented on behalf of Governor Tom Ridge by James Seif, Secretary and Robert Barkanic, Deputy Secretary for Pollution, Prevention and Compliance Assistance, PA DEP

PHOTO OF THE MONTH

PHOTO OF THE MONTH

Center receives education award

Environmental efforts recognized

By Lawrence Sanata
TRIBUNE-REVIEW

Many consider it a shining star tucked away in the rolling, wooded hills of Butler County. It is the Jennings Environmental Education Center, which last week received a Governor's Award for Environmental Excellence.

The award recognizes the state-operated center in Brady Township for its enterprising efforts in educating people from throughout the world about the impact of acid mine runoff and what can be done to resolve it.

Brady Township

Visitors learn by seeing a polluted stream running from an abandoned coal mine at the center, as well as some of the most advanced methods in the world for treating acid mine runoff, said Margaret Dunn, a Cranberry geologist and environmentalist who was among a handful of people to nominate Jennings for the award.

"This (award) is a great thing. "We're just very excited about it," said Dunn, who is involved with a variety of nonprofit environmental organizations that have been active in cleaning acid mine runoff in the county.

Fred Brenner, a professor of biology at Grove City College, said there is no question that Jennings is worthy of recognition. "They've been a major player," in helping understand acid mine runoff and helping clean acid mine runoff in the region, he said.

Many of the acid mine treatment systems that have been studied at Jennings are being used in this country and other countries, the biology professor said.

In addition, the center's involvement with elementary and secondary students, as well as college students, has helped more people to understand the environmental dangers caused by abandoned mines, he said.

Will Taylor, an environmental educator at the center, said a public-private partnership born in 1989 at Jennings has led to miles of polluted streams and acres of polluted soil being restored in Butler County. "I think what makes us unique is that we were one of the first people to do this," he said.

Companies such as Amerikohl Mining in Butler and Quality Aggregates in Neville Island have played an essential role in helping address acid mine runoff problems by lending their expertise and equipment, he said.

"I think the people who have been involved in some of the projects had their eyes open to what could be accomplished by working together," Taylor said.

In the beginning, Taylor said, he was skeptical of the effort to reclaim water and land affected by acid mine runoff.

"By 1992, or 1993, I started to get a clue that this is a big deal. If these systems work, this could be incredible. This could be the answer to some pretty major problems that we have," he said.

PLEASE SEE **CENTER/N4**

JENNINGS RECEIVES GOVERNOR'S AWARD!!!!!!!!

Jennings Environmental Education Center received the Governor's Award for Environmental Excellence in the category of Education and Outreach. On behalf of the center, **Will Taylor** and **Dave Johnson** accepted the award. Pictured above are **Will Taylor, Tanya Rucosky, Dave Johnson, Senator Mary Jo White, Darcy Peart, Cindy Shirley, Margaret Dunn, Tim Danehy, and Shaun Busler.** The following article is from the December 24, 2000 issue of the **Pittsburgh Tribune-Review.**

Center nets education award for efforts

CENTER FROM/**N3**

Work at Jennings also inspired the creation of the Slippery Rock Watershed Coalition, which has been instrumental in addressing acid mine runoff problems in the county, he said. The nonprofit group has been awarded hundreds of thousands of dollars in government grants to help restore streams and land, he said.

The coalition estimates that about 4,000 acres, or 25 percent of the headwaters of Slippery Rock Creek, are underlain with abandoned underground coal mines. The headwaters are located in northern Butler County and southern Mercer County, with Slippery Rock Creek running south through Butler County.

Gov. Tom Ridge honored 43 Pennsylvania organizations, individuals and companies from 27 counties for their environmental initiative.

The Governor's Environmental Excellence Award honors organizations, businesses and individuals for positively affecting Pennsylvania's environment. The awards are presented in nine categories: pollution prevention, energy efficiency/renewable, technology innovation, management systems, technical assistance provider, land use, industrial recycling, recycling and market development and education and outreach.

The Jennings Environmental Education Center was the only winner in Butler County.

Many of the awards, Dunn said, went to businesses that have reduced manufacturing wastes or developed new environmental processes. Jennings is different in educating, researching and cleaning the environment, she said.

The center was presented with the governor's award specifically for its education and outreach efforts. Even before the presentation of the award, Jennings was recognized by the Pennsylvania Department of Conservation and Natural Resources in one of its publications for its work in environmental education and outreach, Dunn said.

Jennings operates essentially "a public laboratory," she said. The passive treatment systems, which have been developed at Jennings, are on display and constantly are being studied, she said.

National and international environmental experts have visited Jennings to discover some of the methods being used locally to treat acid mine drainage, Dunn said.

Jennings, which is overseen by the Department of Conservation and Natural Resources, is one of 116 state parks within Pennsylvania. It is one of only four environmental education centers in the state and the only one in western Pennsylvania, according to state officials.

Last year, more than 167,000 people visited the center. Among those visitors were students from 260 elementary and secondary schools and 11 colleges and universities, state officials said.

Dunn estimated that about 2,400 miles of streams in Pennsylvania are affected by acid mine runoff. No one government agency will ever be able to restore those streams, she said.

A public-private partnership, like the one developed at Jennings, is the only viable way for streams like this to be reclaimed, she said.

6th Annual Slippery Rock Watershed Coalition Symposium!!!!!!

The 6th Annual Symposium will be held on **Thursday, April 5** and **Friday, April 6** at the Jennings Environmental Education Center. The date for the Get-Together at the Epiphany Church in Boyers, PA is scheduled for **Wednesday May 9.**

THE KIDS CATALYST

SLIPPERY ROCK WATERSHED COALITION FUN ACTIVITIES

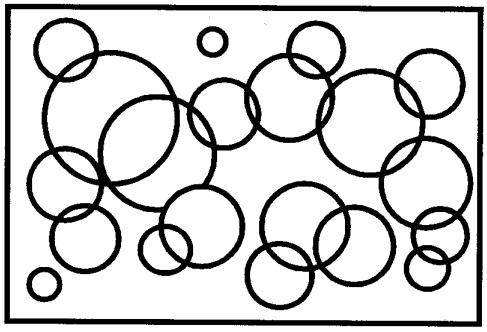
Coal is just one of the natural resources within many watersheds. By using these resources wisely we can help protect our watersheds from being impacted. Learn more about coal and why we use it on the back page. We hope you have fun with the word search below!!!

Thanks to everyone who participated in the coloring contest!!! If you haven't sent your coloring in to us yet, it is not too late!!! Send it to the Slippery Rock Watershed Coalition at 3016 Unionville Road, Cranberry Twp., PA 16066. For more information or hands on learning call us at (724) 776-0161.

Word Search Coal Challenge

What did one penny say to the other? "Together we make cents."

Can you find all of the hidden words? Complete the word search below by finding all of the bolded words from the paragraph on the back page.



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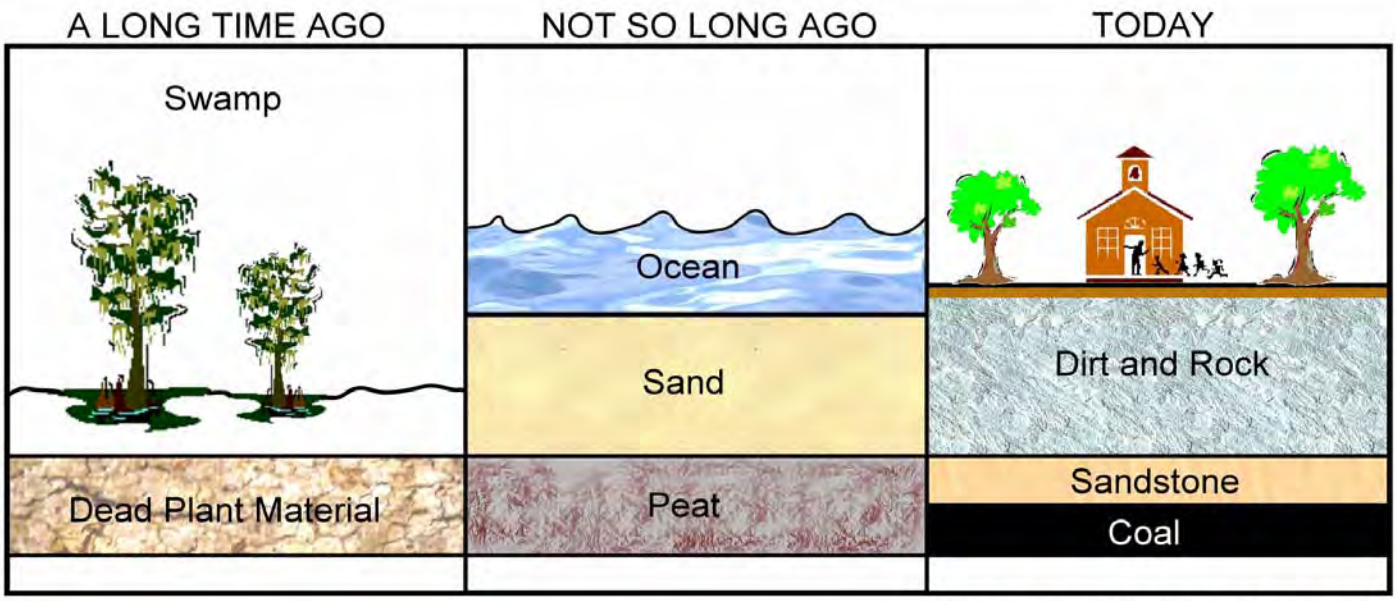


Illustration by: Cliff Denholm and Shaun Busler

How Coal Formed and Why We Use It

Coal, **oil**, and **natural gas** are **fossil fuels**. Fossil fuels formed from dead plants and animals that were buried a long time ago beneath **tons** of **rock** and **soil**. The **heat** and **pressure** created by the rock and soil slowly turned the dead plants and animals into these fossil fuels. Coal formed mostly from the dead plants that collected at the bottom of **swamps** and **bogs**. It took about 10 feet of dead plant material to make 1 foot of coal.

Coal is mainly used for heating, making **electricity**, and making **steel**. 60% of the electricity used in **Pennsylvania** is made by burning coal. Coal is burned to make **steam** which turns turbines which makes electricity.

Coal can also be baked in hot furnaces to make **coke**. This coke is used to make **iron** from iron ore which is needed to make steel for **bridges**, **buildings** and **automobiles**.

The United States mines 1,100,000,000 tons or 1.1 billion tons of coal per year. That is about 1/5 of all the coal mined in the world.

Thanks to The William & Frances Aloe Charitable Foundation, Amerikohl Mining, Inc., Quality Aggregates Inc., and Allegheny Mineral Corporation for their support. For more information contact: Slippery Rock Watershed Coalition, c/o Stream Restoration Incorporated (PA non-profit), 3016 Unionville Road, Cranberry Twp., PA 16066, (724) 776-0161, fax (724)776-0166, sri@salsgiver.com, www.srwc.org. February Distribution: 606 copies

Slippery Rock Watershed Coalition c/o Stream Restoration Incorporated
A PA Non-Profit Organization
3016 Unionville Road
Cranberry Twp., PA 16066

THE CATALYST-

SLIPPERY ROCK WATERSHED COALITION MONTHLY ACTIVITIES UPDATE

THIS MONTH'S MEETING: Thursday April 12 @ 7:00 PM, Jennings Environmental Education Center, Pizza and Pop will be provided!! 3/8/01 meeting attendance: J. Belgredan, F. Brenner, C. Cooper, C. Denholm, D. Johnson, V. Kefeli, and W. Taylor.

2001 SYMPOSIUM VIRTUAL FIELD TOUR

Come on out and learn about passive treatment technology first hand from participants active in the Slippery Rock Watershed Coalition in a field tour of some projects in the watershed. Below is a brief description of each with a before and after picture of the site. The tour will begin approximately around 1:00 PM on Friday, April 6.

De Sale Phase I

Constructed in Spring 2000 by Amerikohl Mining Inc., the passive treatment system treats one of the worst discharges in the watershed. Amazingly it only took five weeks to construct this system. With full support, projects can be completed quickly and cost effectively.

De Sale Phase II

After seeing the reclamation of De Sale Phase I, an adjoining landowner with a 200 gpm discharge became interested, which resulted in Phase II. This system treats an entire stream! Using only environmentally friendly materials, the two passive treatment systems at De Sale are the first steps to restore Seaton Creek.

Goff Station Restoration Area

Scarred by towering gob piles that form the stream banks of Murrin Run and strip pits filled with acidic mine drainage, Goff Station is one of the largest projects to date within the Slippery Rock Creek Headwaters. Construction will be completed later this year by Quality Aggregates Inc. The construction will include a **bat hibernaculum**, which is first known of its kind east of the Mississippi.

(more on bats inside!)

SRWC ANNUAL SYMPOSIUM

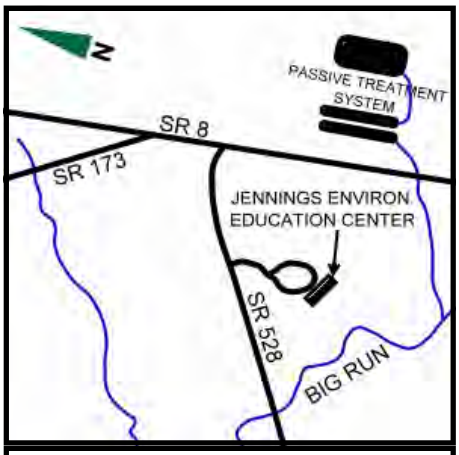
THURSDAY, APRIL 5

6:30 PM - 8:30 PM

Multimedia presentation entitled Hard Coal, Soft Coal: PA Mining in Film and Song by Dr. Philip Mosley, a historical, interpretative entertainer

- Food
- Posters
- Educational
- Family Fun!!

Call Jennings at (724) 794-6011 for more information.



The Symposium will be held at JEEC, which is located at the corner of State Routes 8 and 528 across from the Old Stone House about 8 miles north of Butler.

FRIDAY, APRIL 6

8:30 AM - 3:30 PM

Speakers

- Fred Brenner, PhD, Professor of Biology, Grove City College
- Jeff Jarrett, PA Department of Environmental Protection
- Joan Clippinger, PA Department of Conservation and Natural Resources
- Joe Aloe, President, Quality Aggregates Inc.
- Maurie Kelly, Pennsylvania Spatial Data Access (PASDA)
- Valentine Kefeli, Soil Scientist, Slippery Rock Watershed Coalition
- Students from local universities

As a new feature at our symposium this year, the Slippery Rock Watershed Coalition is having a panel of experts address questions regarding watershed/stream restoration, conservation, and protection. Please prepare questions and **stump the experts!!**

Panel will include:

- Bob Beran, Wetland Specialist, Aquascape
- Dave Johnston, Butler County Planning Commission
- John Stilley, President, Amerikohl Mining, Inc.
- John Oliver, Secretary PA Department of Conservation and Natural Resources
- Margaret Dunn, President, Stream Restoration Incorporated

Lunch will be provided!

A field tour of several recent projects will be conducted after lunch.

NO FEES OR DUES FOR ATTENDING!!

GET TOGETHER!

It is time once again for the annual "Get Together" which will be held at the Epiphany Catholic Church located off of Forestville Road and Rt. 308 in Boyers, PA on May 9, 2001 from 6:00 P.M. to 8:00 P.M. There will be door prizes, great picnic foods and loads of fun for everyone. So, come on out!!! All are Welcome!!! Bring the Family!!! Bring the Kids!!! Smash some Piñatas!!! For directions and more information call (724) 776-0161.

WILDLIFE LECTURE AT GROVE CITY COLLEGE

Jerry Hassinger, Endangered Species Coordinator, Pennsylvania Game Commission, will be presenting a lecture at Grove City College concerning the value of wildlife. The lecture will take place May 2 at 7:00 PM in Room 113, Rockwell Hall.

THE BATTY CATALYST

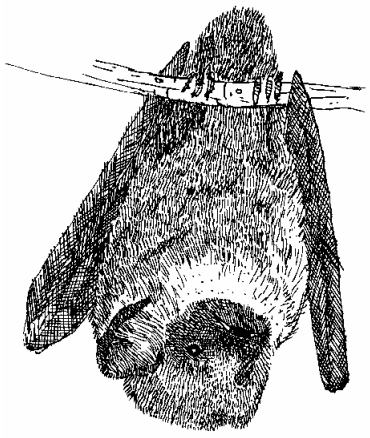
ANNOUNCING THE UNVEILING OF THE BAT HIBERNACULUM AT GOFF STATION

BAT HIBERNACULUM TO BE COMPLETED ON APRIL 6

Come and see the construction of the hibernaculum for yourself on April 6th as part of the Slippery Rock Watershed Coalition's Symposium Field Tour. That's right! The Slippery Rock Watershed Coalition is celebrating the construction of the bat hibernaculum at the Goff Station Restoration Area. Special thanks goes to Quality Aggregates Inc. who have donated the time, labor, and materials for this expansion project, which will further enrich and support the local ecosystem. Located in ideal bat habitat, this site will be the first manmade hibernaculum east of the Mississippi, that we know of, and will help support and increase the numbers of these vital animals in our area.

BAT FACTS

- Bats consume more than half there own weight nightly in mosquitoes and moths!
- Bats have perfectly good eyesight!
- Some bats can live for more than 30 years!
- Bats make their unnerving swoops over people's heads looking for mosquitoes!
- Less then 1/2 of 1% of bats are rabid, and they do not become aggressive when sick!
- Peaches, plantains, bananas, avocados, cashews, cloves, and mescal are all pollinated by bats!
- Very few bats eat blood, and none that do live in America!



OH GIVE ME A HIBERNACULUM!

Bats survive the harsh Pennsylvania winters by falling into a deep sleep called hibernation. By hibernating, bats can conserve their precious energy and survive for months without food or water. A hibernating bat's breathing and heart rate slows and their temperature drops dramatically. Often, it is hard to tell that they are alive at all!

Although hibernation helps bats conserve energy, it also leaves them helpless and weak. If a bat is disturbed during its hibernation, the energy it uses to wake up is wasted, and it may die before spring. Each time a bat has to wake up, two months worth of energy is consumed. In fact, tens of thousands of bats die every year because of human disturbances.

For these reasons, bats need to find a safe, warm and quiet place to hibernate. A cave or other such place that is used by bats is called a hibernaculum.

However, suitable hibernacula are increasingly hard to come by. Human disturbances have made many hibernacula unfit for bats. Without appropriate areas to hibernate, whole bat populations are at risk. The hibernaculum at Goff Station seeks to provide an ideal hibernating space for a wide range of bat species. Proper ventilation, insulation and predator exclusion have all been considered in our design, which we hope will serve generations of these tiny

PHOTO OF THE MONTH

PHOTO OF THE MONTH

WATERSHED RESTORATION AND LAND USE

The **Growing Smarter: Land Use in PA Conference** was recently held on March 18-20, 2001 at the Hershey Lodge & Convention Center in Hershey, PA. **Margaret Dunn**, **Tim Danehy**, **Shaun Busler**, **and Cliff Denholm**, representing the Slippery Rock Watershed Coalition, were among the **1400 people** in attendance. The conference focused on sound land use practices that are currently being utilized on the state, regional and local levels and how they can be further used and developed to ensure sustainable development and a high quality of life for all citizens. The Coalition presented a poster on the restoration activities at the De Sale Restoration Area and the North Liberty Reclamation sites and how they tied in with sound land use practices. Margaret was one of the speakers at the *Watershed Planning Initiatives at the Community Level* session and did an excellent job. We met lots of wonderful and interesting people from a wide variety of organizations. A great time was had by all!

Thanks to The William & Frances Aloe Charitable Foundation, Amerikohl Mining, Inc., Quality Aggregates Inc., and Allegheny Mineral Corporation for their support. For more information contact: Slippery Rock Watershed Coalition, c/o Stream Restoration Incorporated (PA non-profit), 3016 Unionville Road, Cranberry Twp., PA 16066, (724) 776-0161, fax (724)776-0166, sri@salsgiver.com, www.srwc.org. April Distribution: 651 copies

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THE CATALYST

SLIPPERY ROCK WATERSHED COALITION MONTHLY ACTIVITIES UPDATE

THIS MONTH'S MEETING: NO MEETING THIS MONTH!! COME TO THE "GET TOGETHER ON MAY 9!" 4/12/01 meeting attendance: J. Belgredan, B. Beran, F. Brenner, S. Busler, C. Cooper, T. Danehy, M. Dunn, D. Johnson, V. Kefeli, S. Stevenson, and W. Taylor.

GET TOGETHER—MAY 9, 6:00 PM!!

Yes, the annual "Get Together " is finally here!!! It will be held at the Epiphany Catholic Church located off Forestville Road and Rt. 308 in Boyers, PA on May 9, 2001 from 6:00 P.M. to 8:00 P.M. There will be **door prizes, great picnic foods, and loads of fun for everyone!!!** So, come on out!!! All are Welcome!!! Bring the Kids!!! **Smash some Piñatas!!!!** For more detailed directions and more information call (724) 776-0161.

2001 ANNUAL SRWC SYMPOSIUM

We cannot thank Jennings Environmental Education Center, the speakers, and all the attendees enough for making the 6th Annual Slippery Rock Watershed Coalition Symposium so rewarding and memorable!!! (Some traveled as far away as Harrisburg and Wilkes Barre!!!)

Thursday evening (4/05/01), Dr. Philip Moseley, PSU, provided a great "kick-off" to the event by depicting an historical overview of coal mining in film and song.

Very special thanks to **The William and Frances Aloe Charitable Foundation** for their generous donation to Stream Restoration Inc. which will be dedicated to the expansion of the award-winning programs at Jennings Environmental Education Center.

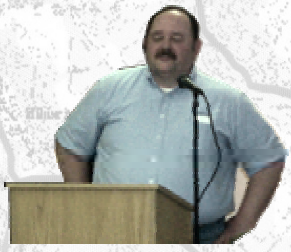
Joe Aloe

J. Clippinger, DCNR

Janice Belgredan, a watershed resident and Coalition participant, donated her matchless talents to organize and to moderate the event. Working with **Dave Johnson, Will Taylor, Cindy Shirley, Eric Best, Tanya Rukoski, Mary Jo Graham, Ray Markle, and Gary Jenkins** at Jennings, the event went smoothly and appeared effortless. For the first time, a program with a summary of each presentation was distributed. Needless to say, this was an excellent effort. As requested, additional copies are being made available. In addition to those pictured, speakers included undergraduate college students from Slippery Rock University Scott Daly (Professors: Dean DeNicola, PhD, Biology; Michael Stapleton, PhD, Geochemistry) and from Westminster College (See next page).

J. Belgredan, SRWC

M. Kelly, PASDA

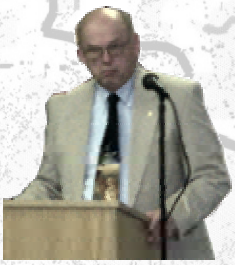


T. Lawton, Scrubgrass Gen.

Bob Dolence, former PA DEP Deputy Secretary accepts **2001 SRWC Appreciation Award** for his vision and steadfast support of watershed groups and restoration efforts throughout the Commonwealth.

Dr. Mosley, PSU

Dr. Kefeli, SRWC



Dr. Brenner, GCC

J. Jarrett, Dep. Sec. DEP

PHOTO OF THE MONTH

PHOTO OF THE MONTH

A NEW IDEA — A NEW SUCCESS

Dr. Fred Brenner, after providing a follow-up on the successful careers of Grove City College students previously involved in our restoration effort, ably moderated (assisted by Tim Danehy) a panel of experts in a discussion regarding watershed restoration.

The panelists were **Bob Beran** of Aquascape, designer of naturally-functioning wetlands; **Dave Hogeman**, Director of the PADEP Grants Center, part of the largest-ever, state-sponsored environmental program; **John Oliver**, Secretary of the PADCNR, promoting environmental stewardship in the state parks and forests; **John Stilley**, President of Amerikohl Mining, Inc., a surface coal mining company that has received state and national awards for reclamation ; **Margaret Dunn**, PG, President of the non-profit Stream Restoration Inc., involved in the restoration of abandoned minelands; **David Johnston**, Director of the Butler County Planning Commission involved in watershed efforts and landuse issues relating to abandoned minelands restoration. **This was a unique opportunity with experts from state and local government, environmental companies, the mining industry, and non-profits.** (Special thanks to **Connie White, New Wilmington School District** for bringing her students, who asked well thought-out questions!!! Special thanks to **Dr. Valentine Kefeli**, who first presented the idea for the panel.)

WESTMINSTER STUDENTS CONDUCT RESEARCH AT JENNINGS

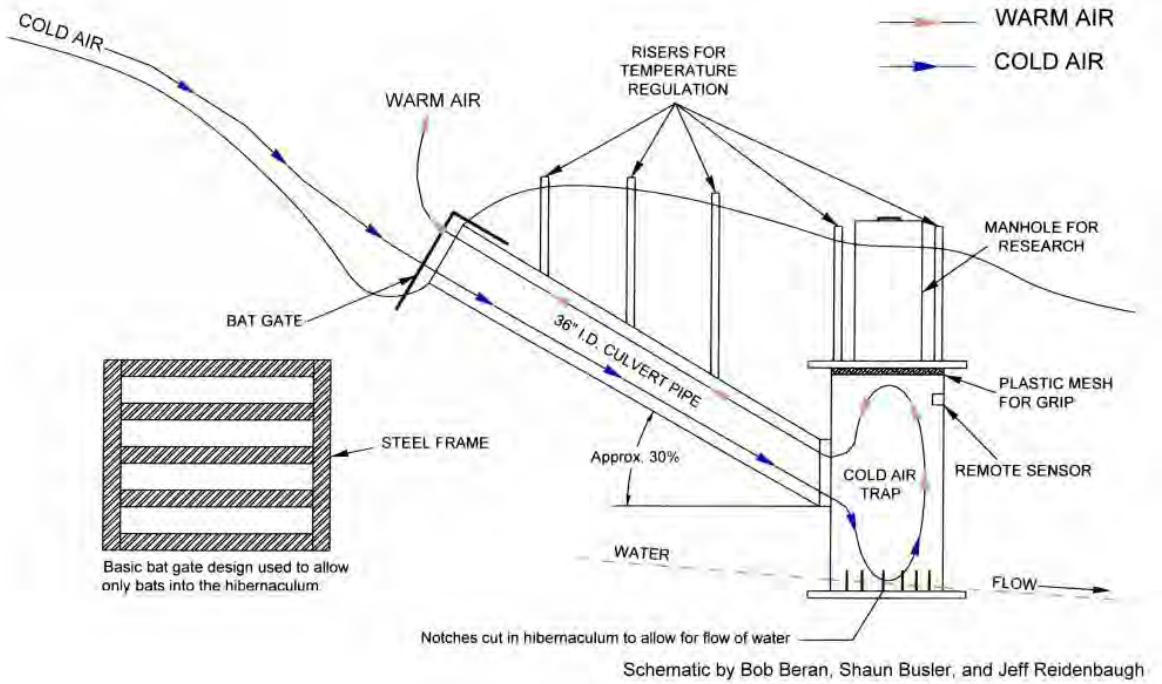
Early this year, Westminster College seniors **Jessica Beham, Jennifer Bennett, Katherine Borden, Christopher Hall, Joshua Martin, Seth Rice, and Christina Zahniser,** under the direction of **Dr. Joseph Balczon and Dr. Timothy Wooster**, initiated a research project at Jennings Environmental Education Center. Two replicated model passive treatment systems were established utilizing two organic constituents, untreated saw dust and aquatic macrophyte compost, as well as river gravel and limestone in the project design. The overall purpose of the project was to examine the ability of each system to reduce the concentration of iron, aluminum, and nickel in the discharged water as a result of contact with system substrate and chemistry.

Thanks for the excellent presentation at the Symposium!
We cannot wait to hear the results!

THE BATTY CATALYST

ANNOUNCING THE UNVEILING OF THE BAT HIBERNACULUM AT GOFF STATION

AN IDEA...



Basic bat gate design used to allow only bats into the hibernaculum

Schematic by Bob Beran, Shaun Busler, and Jeff Reidenbaugh

TURNED INTO REALITY!!!

SYMPOSIUM FIELD TOUR

Following lunch, we put on our boots (and boy, we sure needed them!) and headed out into the field, to see what all of this is really about. We visited De Sale Phase I and Goff Station Restoration Areas. Goff Station was the first site of the tour, which in addition to the very interesting passive treatment system that has been constructed by Quality Aggregates Inc. also includes a man-made bat hibernaculum. Thanks to **Kelly Meinhart** (right) for coming out to film the installation of the bat hibernaculum and the Goff Station site. Be sure to watch the feature on **Watershed Weekly** sometime in the coming months!

JENNINGS ENVIRONMENTAL CENTER SPRINGS INTO ACTION

For the eighth year in a row the dynamic spirit of volunteerism that fuels the Slippery Rock Watershed Coalition was harnessed for a day at Jennings Environmental Center. Over a hundred enthusiastic volunteers turned out on a dreary Saturday morning to celebrate Earth Day by helping their local park.

Armed with heavy gloves, mattocks, paint buckets, rakes, and Pulaski axes, workers aged 12 to 82 gave a much needed facelift to Jennings passive treatment system and added a set of new drainage pipes. Meanwhile troops of scouts painted bridges and installed water bars and drains throughout the park. Other volunteers scoured the roads and streams which amble through the park removing trash and exotic invasive plant species. Through-out the park, clogged drains were cleared, gravel was raked, two bridges were built, signs were painted and a composting bin was even constructed. Sitting tired on the top of the ridge, one boy scout was heard saying, "Wow, I had no idea we could do this, I can't wait to show my mother what I helped build today. From now on, this trail belongs to me too."

Exhausted, proud and muddied by their accomplishments the work teams poured into Jennings Center for a hearty lunch and a special "Spring into Action" T-shirt designed by a fellow volunteer. As the day wound to a close binoculars, fishing gear and berry bushes were raffled off to excited participants.

Jennings wishes to thank all the super people who made this year yet another phenomenal success. Special thanks are in order to **Giant Eagle, the Bulter Garden Club, King's Family Restaurant, Titlers' Special Tees, Natili's, Appalachian Trails LTD, Marti Outdoor Extreme, Eisler Nurseries, General Electric, Dean Dairy, Wild Birds Unlimited and the Pennsylvania Social Services Union**. No thanks would be complete without thanking each and every one of those hardy volunteers, many of whom have come back year after year, who lent their unique skills and expertise to making Jennings the wonderful place that it is.

Thanks to The William & Frances Aloe Charitable Foundation, Amerikohl Mining, Inc., Quality Aggregates Inc., and Allegheny Mineral Corporation for their support. For more information contact: Slippery Rock Watershed Coalition, c/o Stream Restoration Incorporated (PA non-profit), 3016 Unionville Road, Cranberry Twp., PA 16066, (724) 776-0161, fax (724)776-0166, sri@salsgiver.com, www.srwc.org. May Distribution: 692 copies

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THE CATALYST

SLIPPERY ROCK WATERSHED COALITION MONTHLY ACTIVITIES UPDATE

THIS MONTH'S MEETING: Thursday, June 14 @ 7:00 PM, Jennings Environmental Education Center, Pizza and Pop will be provided!! There was no May meeting due to the Get-Together.

In the News!

Check out the two recently published newspaper articles regarding the bat hibernaculum at Goff Station. Both articles can be found online. The Pittsburgh Post Gazette published an article entitled "Making a Place For Bats" by Don Hopey on Monday, May 14. The Tribune Review published another article entitled "Going Batty" by Larry Sanata on Thursday, May 10. Also, WPXI Channel 11 local news broadcasted a segment on the bat hibernaculum which aired Monday, May 14. We have received many wonderful comments. The bat hibernaculum is an "outgrowth" of the Growing Greener project to passively treat abandoned mine drainage. **Thanks to Quality Aggregates for donating materials, equipment, and manpower. Thank you to WPXI Channel 11 local news, Tribune Review, Larry Sanata, the Pittsburgh Post Gazette, and Don Hopey for taking the time to look at the Goff Station bat habitat project.**

Where to find the articles on the World Wide Web:

Go to **www.postgazette.com** and search for the article by the title, "Making a Place for Bats"

&

Go to **http://library.triblive.com/interconnect/intercon.dll** and search

Slippery Rock University's Earth Day Celebration

Slippery Rock held a week-long celebration in honor of Earth Day (April 19th). Over 200 high school students came from all over the area to partake in the earth friendly festivities. There were exhibition booths, workshops, and live music! **Shaun Busler** manned the Slippery Rock Watershed Coalition booth while **Cliff Denholm**, an SRU graduate, facilitated a workshop which gave an overview of passive treatment technologies. **The SRU Earth Day project was excellent and thanks to Cliff and Shaun for representing the SRWC!!**

Geological Field Tour

In April, **Valentine and Galena Kefeli** attended a three day geological expedition, with students of Slippery Rock University. On the field tour Valentine studied the geological history of the area and explained soil formation in the Appalachian region. In the photo to the left are several Slippery Rock University Students studying a rock outcrop, "up close and personal."

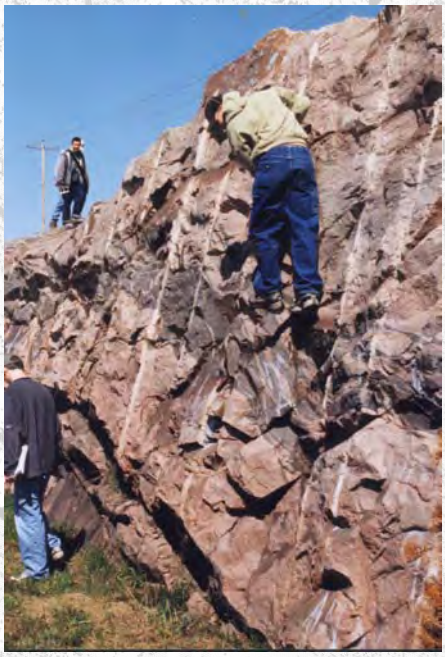

PHOTO OF THE MONTH

PHOTO OF THE MONTH

A Look at the DeSale Restoration Area from the air. Phase I is in the foreground and Phase II is center left.

Helicopter Tour at De Sale Restoration Area

Senator Mary Jo White; Representative Sam Smith; Acting Secretary of DEP, Dave Hess; and President of Amerikohl Mining, Inc., John Stilley toured the watershed on 05/17/01 via helicopter!!!! They viewed Chernicky (Able-Dreshman), North Liberty, and active mining sites from the air. They landed and took a walking tour of the De Sale Restoration Area with **Tim Danehy, Margaret Dunn, and Cliff Denholm**. Thanks to all for taking the time to stop out and especially for taking some wonderful aerial pictures of the watershed. An account of their trip appears in the Secretary's Scrapbook (05/23/01) on the PADEP website at http://www.dep.state.pa.us/dep/hess and click on the Secretary's Scrapbook and follow the links to find

Girl Scout Troop Constructs Bluebird Boxes

Junior Girl Scout Troop 653 from West Sunbury constructed bluebird boxes with the guidance of **Chip Brunst of the PA Game Commission**. **Robert Beran of Aquascape** assisted the members of **Troop 653**, **and troop leaders Deb Bowser and Marian Hall**, with the installation of the nest-boxes at the Goff Station Restoration Area on March 3rd. The girl scouts plan to continue visiting the Goff Station Restoration Area to monitor the bluebird boxes, which will provide additional habitat opportunities on the site. **Many thanks to Troop 653 for their help and hard work!!!!**

The Kids Catalyst

Word Jumble

Place the highlighted letters in the boxes to the left in order from 1-5 to spell a word **(read the definitions for clues).**

☐☐☐☐☐

1. LNDAWTE ☐☐☐☐☐☐☐
2. DACI ☐☐☐☐
3. TBA ☐☐☐
4. MEIN ☐☐☐☐
5. MSTAER ☐☐☐☐☐☐
6. IREVR ☐☐☐☐☐

1. Noun, swamps or marshes, especially as an area preserved for wildlife.
2. Noun, a sour substance or a substance with a low pH
3. Noun, a flying mammal
4. Noun, where coal or other minerals are removed from the earth
5. Noun, a flow of running water along the earth's surface, a small river
6. Noun, a natural flow of water larger than a creek which empties into another body of water.

Remember to mail in the completed word jumble to receive a dollar discount at McDonald's or other local restaurants.
Mail to: Stream Restoration, Inc., 3016 Unionville Rd., Cranberry, Twp., PA 16066

Kid News Corner

If you belong to an organization and want your group to participate in restoration activities, there is always work to be done. Wetland plantings are coming up and help is needed. Contact Stream Restoration Incorporated for more information. You might even get your picture in the Catalyst!

The SRWC "Get-Together "

The kids had a wild and wonderful time with the Piñatas .

Feeding Frenzy

"I'm gonna git it"

Whack the fish, get the candy!

Thanks to everyone who helped with the Get-Together. A good time was had by all and we cannot wait until next year. Maybe we'll have to bring some safety goggles for protection from all the flying candy. **A special thanks to Quality Aggregates for their donations and all their help.** Everyone had lots of food, lots of fun, and we hope to see everyone next year. Special thanks to **Mark and Gloria DeMatteis** for the wonderful time.

Thanks to The William & Frances Aloe Charitable Foundation, Amerikohl Mining, Inc., Quality Aggregates Inc., and Allegheny Mineral Corporation for their support. For more information contact: Slippery Rock Watershed Coalition, c/o Stream Restoration Incorporated (PA non-profit), 3016 Unionville Road, Cranberry Twp., PA 16066, (724) 776-0161, fax (724)776-0166, sri@salsgiver.com, www.srwc.org. June Distribution: 717 copies

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THE CATALYST

SLIPPERY ROCK WATERSHED COALITION MONTHLY ACTIVITIES UPDATE

THIS MONTH'S MEETING: Thursday July 12 @ 7:00 PM, Jennings Environmental Education Center, Pizza and Pop will be provided!! 6/14/01 meeting attendance: T. Danehy, J. Campbell, J. Campbell, S. Busler, M. Busler, C. Treter, D. Funkhouser, F. Brenner, W. Taylor, V. Kefeli, M. Dunn, B. Beran, C. Cooper

ASSMR CONFERENCE IN NEW MEXICO

Margaret Dunn, **Cliff Denholm**, **Shaun Busler**, and **Tim Danehy** traveled to **Albuquerque**, **New Mexico** June 3-7 to attend the American Society for Surface Mining and Reclamation (ASSMR). During the meeting, they presented 4 posters!!! Their poster topics included *Visual Demonstration of Water Distribution in Vertical Flow Systems*, *Use of Biosolids in the Passive Treatment of Abandoned Mine Drainage*, *Enhanced Flushing of Metal Particulates from Vertical Flow Ponds Using a Multi-Tiered Underdrain*, and *Multi-Component Passive Treatment System: A One Year Study*. Other activities at the conference included technical sessions, panel discussions, and tours of the surrounding country side. The conference also served as an excellent forum for spreading the SRWC name with questions being asked about the bat hibernaculum and 70 SRWC hats being handed out! Congratulations on a successful conference and thank you for representing SRWC so well!

SLIPPERY ROCK WATERSHED COALITION WINS 2001 GOVERNOR'S AWARD FOR WATERSHED STEWARDSHIP

The Slippery Rock Watershed Coalition has been utilizing money that has become available through **PA Governor Tom Ridge's** "Growing Greener" initiative. The SRWC has applied this money to the restoration and reclamation of mine land affecting the Slippery Rock Creek. The actions of the SRWC were recognized and were selected as one of 25 projects across the state to be awarded with the ***2001 Governor's Award for Watershed Stewardship***. Attending the award ceremony for SRWC were **Dr. Fred Brenner**, **Dr. Valentine Kefeli**, **Galina Kefeli**, **Inna Alper, Shaun Busler**, **Melissa Busler, Tim Danehy**, **Margaret Dunn**, **Darcy Peart**, **Charles Cooper**, and **Chris Treter** . Inna came all the way from **California** to attend the award ceremony! Dr. Brenner and Dr. Kefeli accepted the award from **David Hess** Secretary of the Department of Environmental Protection, **David Hogeman** Director of the Department of Environmental Protection Grant Center, and **Robert Barkanic** Deputy Secretary of the Office of Pollution Prevention and Compliance Assistance. The SRWC also received a citation from PA State Senator Mary Jo White, PA State Representative Daryl Metcalfe, and PA State Senator Jane Orie. **Thanks to everyone who has worked hard making these awards possible!** (check out the picture on the last page of the Catalyst!)

PHOTO OF THE MONTH

PHOTO OF THE MONTH

Participants assisting with the flushing of the Eastern Vertical Flow Pond at De Sale Phase II

FLUSHING AT DE SALE PHASE II

On June 20, flushing of the Eastern Vertical Flow Pond at De Sale Phase II was used to further our understanding of passive treatment technology. Participating were **Lauren Avon**, **Candace Kairies**, **George Watzlaf**, **Karl Schroeder**, **Jeff Skousen**, **Jennifer Demchak, Tim Danehy**, **Margaret Dunn**, **Shaun Busler**, **Cliff Denholm**, **Darcy Peart**, and **Chris Treter**. Jeff and Jen came all the way from **West Virginia** to help out! The Vertical flow pond was designed with 2 layers of pipes, with each layer being divided into quadrants. The flushing of the vertical flow pond involved opening valves for the flushing pipes for each quadrant of pipe in the vertical flow pond. The valves were opened one at a time, and sludge samples were taken at timed increments. Flow measurements were also conducted using a "4 inch drop-off" technique and a calibrated 30-gallon bucket. Flow from each pipe sometimes exceeded 300 gallons per minute!!! The purpose of the sample collections and the flushing was to gather information concerning the effectiveness of the Eastern Vertical Flow Pond at De Sale Phase II. Thanks to everyone for all their help and support with the flushing. A special thanks to the **US Department of Energy, National Energy Technology Lab in Pittsburgh** for making this all possible!!!

STREAM RESTORATION INCORPORATED INTERN

Stream Restoration Inc. was recently selected by the **Office of Surface Mining** to receive a grant to sponsor a summer internship. Stream Restoration Inc. selected **Chris Treter** as their summer intern. Chris is currently a student at **Grove City College**, studying biology. He was referred to the internship by **Dr. Fred Brenner**. As an intern, Chris will be accomplishing a variety of tasks. These tasks include helping to write and mail this monthly newsletter (not as easy a task as it seems), to develop and maintain the SRWC web page (you should really check it out at www.srwc.org), and to monitor and maintain the treatment systems installed by Stream Restoration Inc. Chris will also attend and aid in poster presentations at conferences, develop informational handouts, write news releases for local newspapers, and aid in the grant research and writing process.

The KIDS Catalyst

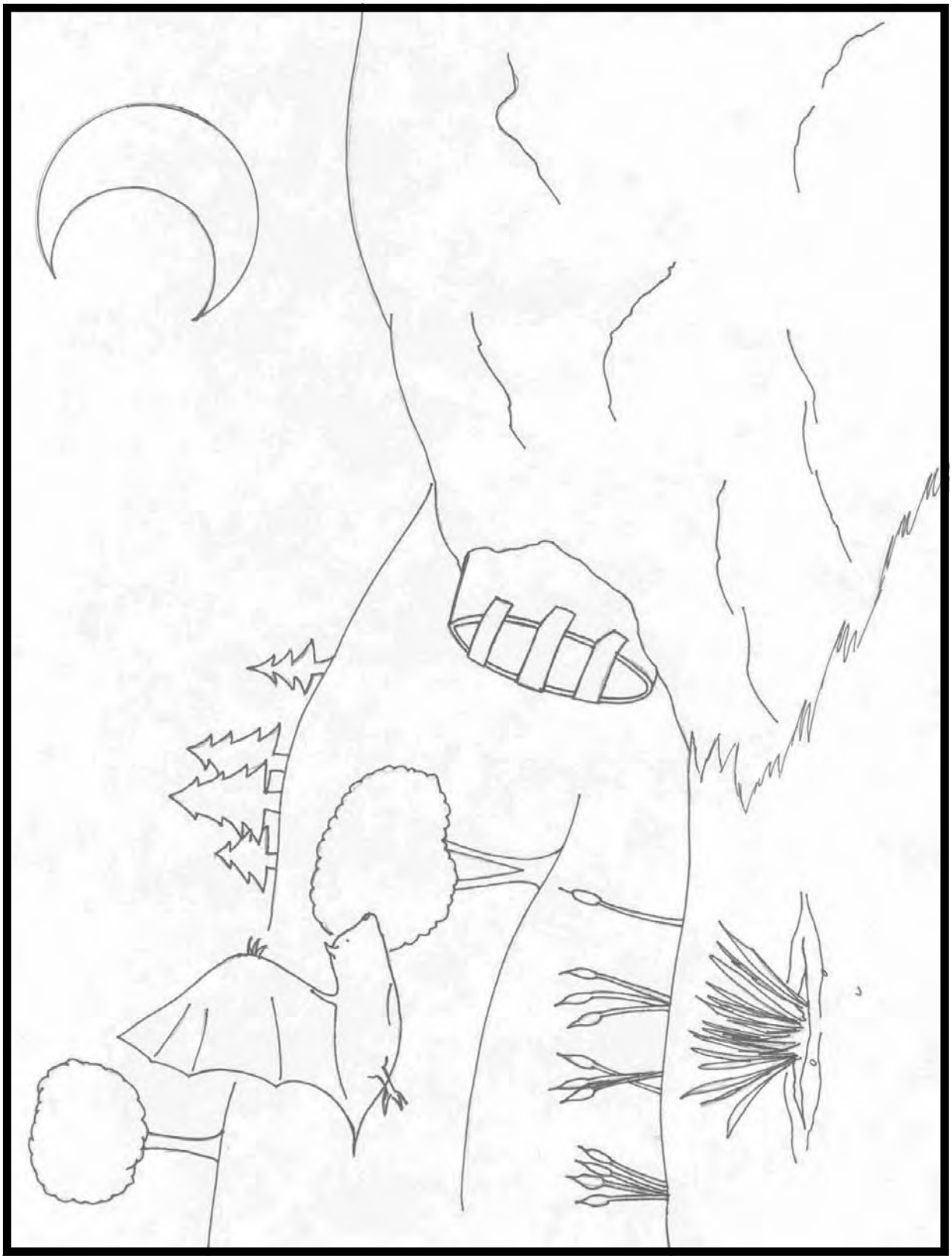
SLIPPERY ROCK WATERSHED COALITION FUN ACTIVITIES

COLORING CONTEST!

You asked for one, so here it is. Grab your crayons, colored pencils, markers, chalk, or whatever and color the picture below. The first 100 kids that send in a colored picture to the Slippery Rock Watershed Coalition will win a ***GIFT CERTIFICATE TO MCDONALDS OR ANOTHER LOCAL RESTAURANT!*** Good luck and happy coloring.

Picture Colored by:_____ **Age:**____ **School:**_____

Address:_____



A bat flies towards the bat hibernaculum, where it will make its new home.

2001 Governor's Award for Watershed Stewardship Reception

Left to Right: David Hogeman (Director, PA DEP Grants Center), Margaret Dunn, Chris Treter, Darcy Peart, Galina Kefeli, Charles Cooper, David Hess (Secretary, PA DEP), Tim Danehy, Inna Alper, Fred Brenner, Melissa Busler, Shaun Busler, Valentine Kefeli.

Check out all of the improvements that Chris has made to the SRWC web page at

www.srwc.org

Thanks to The William & Frances Aloe Charitable Foundation, Amerikohl Mining, Inc., Quality Aggregates Inc., and Allegheny Mineral Corporation for their support. For more information contact: Slippery Rock Watershed Coalition, c/o Stream Restoration Incorporated (PA non-profit), 3016 Unionville Road, Cranberry Twp., PA 16066, (724) 776-0161, fax (724)776-0166, sri@salsgiver.com, www.srwc.org. July Distribution: 740 copies

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THE CATALYST

SLIPPERY ROCK WATERSHED COALITION MONTHLY ACTIVITIES UPDATE

<u>THIS MONTH'S MEETING:</u> Thursday August 9 @ 7:00 PM, Jennings Environmental Education Center, Pizza and Pop will be provided!! 7/14/01 meeting attendance: C. Denholm, C. Cooper, J. Belgredan, F. Brenner, V. Kefeli, D. Funkhouser, C. Treter, S. Busler, M. Busler, M. Dunn, T. Danehy

VALENTINE KEFELI AND FRED BRENNER ACCEPT AWARD FOR SRWC

Picture of the Slippery Rock Watershed Coalition receiving the 2001 Governor's Award for Watershed Stewardship on June 26. *Left to right:* **David Hess**, Secretary, PA Department of Environmental Protection; **David Hogeman**, Director, Department of Environmental Protection Grant Center; **Dr. Valentine Kefeli**, SRWC; **Dr. Fred Brenner**, Grove City College; **Robert Barkanic**, Deputy Secretary, Office of Pollution Prevention and Compliance Assistance. 9 other SRWC participants were in the audience cheering!

<u>Congratulations again to all participants that made this award possible!</u>

HARRISVILLE COMMUNITY DAY

On behalf of the Slippery Rock Watershed Coalition, **Darcy Peart** attended the Harrisville Community Day on July 4th. Everyone that came by the poster received a SRWC hat and information about the SRWC. It was wonderful to meet and talk with all the members of the community. Thank you Harrisville for the opportunity to inform the community about SRWC activities in the area. Now when Harrisville community members drive past the De Sale site, they will know what is there and why.

GIRL SCOUT TROOP 653 AT GOFF STATION

West Sunbury's Junior **Girl Scout Troop 653** led by **Deb Bowser** and **Marian Hall** came to the Goff Station Restoration Project to participate in a wetland planting on Saturday, May 19th. Before the replanting got underway, **Bob Beran** led the girls to the nearby bat cave and discussed the functions of the cave. The troop then assisted in planting the harvested vegetation while the equipment rested. In addition to Troop 653, employees from **Quality Aggregates** and **Aquascape** assisted in the harvesting and planting of the wetland plants. The wetland planting is a part of Troop 653's work in attaining a Water Drop Patch, which is an EPA sponsored wetland education program. The girl scouts plan to continue visiting the Goff Station Restoration Project to monitor blue bird boxes, which will provide additional habitat opportunities on the site. Many thanks to Troop 653 for their help and hard work. And special thanks to **Dale Hockenberry** and **Chip Brunst** of the PA Game Commission for allowing us to harvest some of the plants from State Game Lands No. 95.

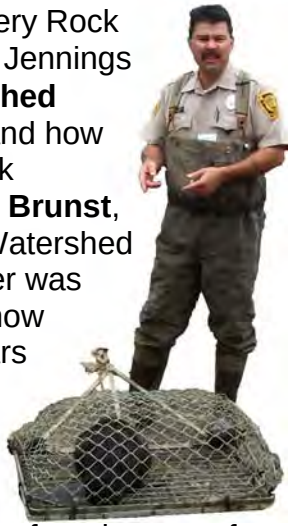
PHOTO OF THE MONTH

PHOTO OF THE MONTH

Bob Beran discusses one of the wetlands at Goff Station with the **DEP Watershed Academy**

DEP WATERSHED ACADEMY IN SLIPPERY ROCK HEADWATERS

On July 18, 19, and 20, over 60 members of the Pennsylvania DEP traveled to the Slippery Rock Watershed to tour the reclamation sites of the area, and attend lectures and seminars at Jennings Environmental Education Center. The tours and lectures were part of the DEP's **Watershed Academy**, a program for DEP personnel about watersheds, the problems facing them, and how these problems are being corrected. **Margaret Dunn** and experts from the Slippery Rock Watershed Coalition, including **Bob Beran**, **Dr. Fred Brenner**, **Jeff Reidenbaugh**, **Chip Brunst**, **John Stoops**, **Kevin Stiner**, and **Tim Danehy** conducted a tour of Goff Station for the Watershed Academy participants. In addition, a tour of the Jennings Environmental Education Center was conducted by **Will Taylor**. Will explained the history of passive treatment systems and how passive treatment technology has evolved at the Jennings Center. Lectures and seminars were conducted at the Jennings Center. Margaret, **Shaun Busler**, **Cliff Denholm**, and **Chris Treter** conducted lectures on behalf of the Slippery Rock Watershed Coalition.



The Watershed Academy also had an unexpected guest. Wednesday morning, before the tour of Goff Station began, a **beaver** was caught in Murrin Run for release in a more suitable area! The beaver allowed Chip to talk about another issue for passive treatment systems, wildlife. SRWC hats and informational packets concerning the Coalition were distributed to DEP personnel attending the Watershed Academy. DEP attendees included members from various disciplines of the DEP including **waste management**, **watershed management**, and **air quality management**! These three days were a learning experience for all, including the Slippery Rock Watershed Coalition! A special thank you to **Gina Mason** and **Art Provost** for inviting the SRWC to aid and attend the Watershed Academy.

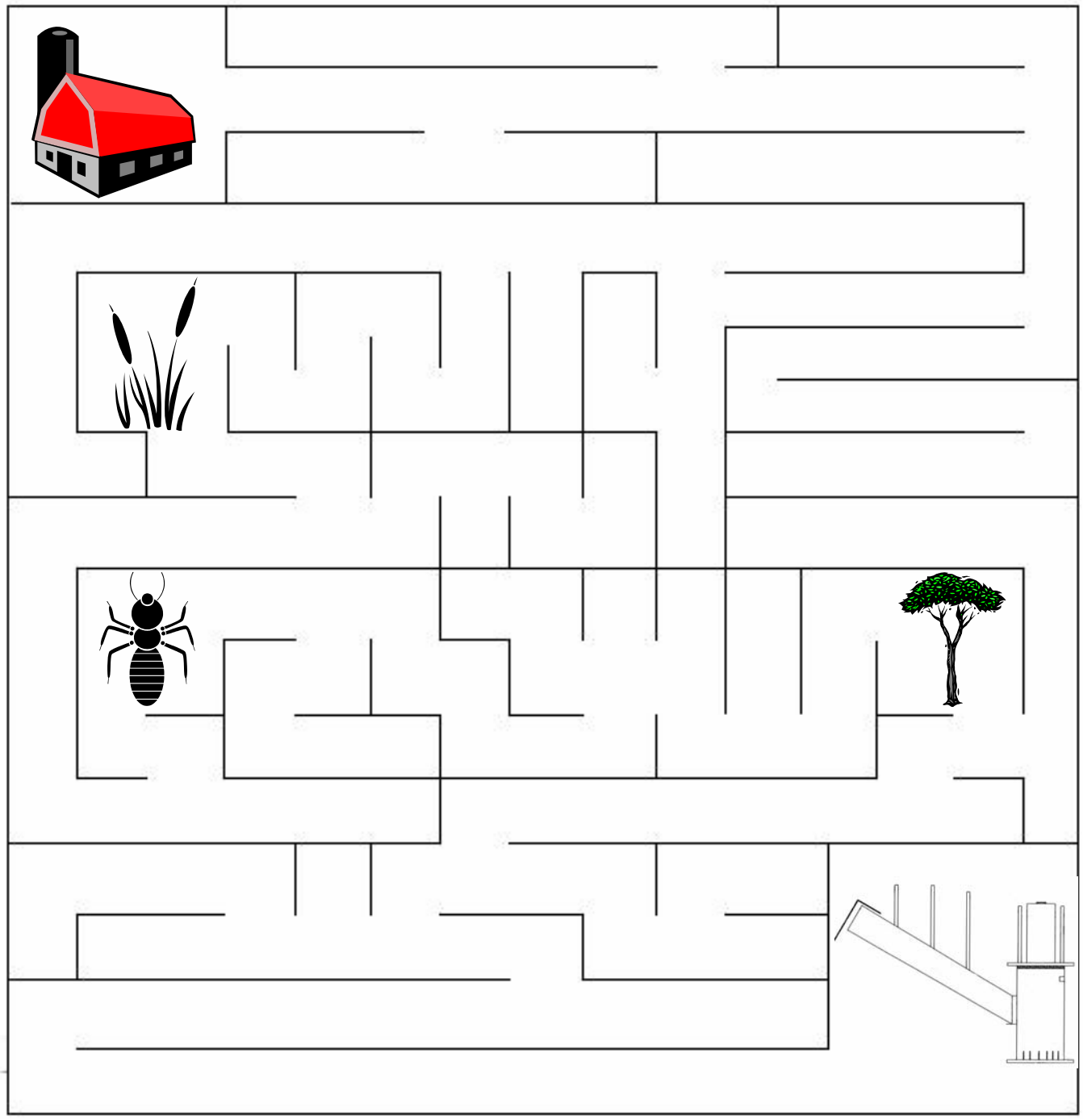
The *KIDS* Catalyst

SLIPPERY ROCK WATERSHED COALITION FUN ACTIVITIES

Remember to mail in the completed maze to receive a dollar discount at a local restaurant.

Completed by:_____ **Age:**____ **School:**_____

Address:_____



OH NO! The bat's old home, the abandoned barn, has fallen apart. The bat needs your help to find its way to a new home, **THE BAT HIBERNACULUM**. On the way, make sure that the bat finds a wetland near the bat hibernaculum. Also, be sure to find some tasty bugs for the bat to eat. The bat also needs some trees near by to provide some cover when it flies. Good Luck!

CONCORDIA HAVEN WOODWORKING

A special thanks to **Jim Arner** and **Joe Schiedel** from the **Concordia Haven One Workshop** in Cabot, PA for their efforts in constructing **four bat boxes** to be placed near the bat hibernaculum at the Goff Station Restoration site!!! The bat boxes were constructed using plans supplied by the **Pennsylvania Game Commission** and are of a design that is not commercially available making it necessary to have them custom built. The efforts of Mr. Arner and Mr. Schiedel will further promote the successful utilization of the "bat cave" by providing summer habitat, in close proximity to the cave, for the young bats ("pups") born this year. It is hoped that these young bats may utilize the cave for their first year hibernation and begin to establish a new bat colony.

BUTLER COUNTY YOUTH ASSIST WITH WETLAND PLANTING

As part of the Butler County Juvenile Court Rehabilitation Program, **Angela Lamberto**, **Sue Daugherty**, and 5 youths came to the Goff Station Restoration Project to participate in two plantings of the "finishing wetland" on June 26th and July 17th. Plants were harvested by employees of Quality Aggregates and Aquascape. Prior to planting, **Bob Beran** led the group on an educational tour of Goff Station, discussing the functions of the treatment system. The wetland constructed for the ST 41 seep was used to show them how the finishing wetland would look, given time, after planting. Mr. Beran also showed the youths the bat hibernaculum and discussed the importance of bats. The youths then assisted in planting the finishing wetland. The group has also returned to help in the seeding, planting, and stabilization of the "bioswale," which will convey flows from the wetlands and vertical flow ponds treating the ST 40, ST 41, and ST 42 seeps. Angela, Sue, and the youths plan to continue visiting the Goff Station Restoration Project to provide assistance throughout the summer. Many thanks to Angela, Sue, and their team for their help and hard work!!!! Again, special thanks to **Dale Hockenberry** of the PA Game Commission for allowing us to harvest some of the wetland plants from State Game Lands No. 95.

COMING NEXT MONTH: SRWC participants instruct the Shamokin Watershed group during a tour of the Slippery Rock Headwaters AND adventures on the ARIPPA tour!!!

Thanks to The William & Frances Aloe Charitable Foundation, Amerikohl Mining, Inc., Quality Aggregates Inc., and Allegheny Mineral Corporation for their support. For more information contact: Slippery Rock Watershed Coalition, c/o Stream Restoration Incorporated (PA non-profit), 3016 Unionville Road, Cranberry Twp., PA 16066, (724) 776-0161, fax (724)776-0166, sri@salsgiver.com, www.srwc.org. August Distribution: 743 copies

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THE CATALYST

SLIPPERY ROCK WATERSHED COALITION MONTHLY ACTIVITIES UPDATE

<u>THIS MONTH'S MEETING:</u> Thursday September 13 @ 7:00 PM, Jennings Environmental Education Center, Pizza and Pop will be provided!! 7/14/01 meeting attendance: C. Denholm, C. Cooper, J. Belgredan, F. Brenner, V. Kefeli, L. Spencer, W. Taylor, S. Busler, M. Busler, M. Dunn, T. Danehy, J. Reidenbaugh, T. Kennedy

Flushing at De Sale Phase I

On August 10, flushing of a vertical flow pond at the De Sale Phase I site was conducted by **Chris Treter,** OSM intern at Stream Restoration Incorporated, and **Jamie Stilley,** volunteer. The vertical flow pond was designed with two layers of pipe, with each layer being divided into quadrants. The flushing of the vertical flow pond involved a quadrant on the upper layer of pipe and a quadrant on the lower layer of pipe and lasted for over *5 and 1/2 hours!* The valves for each pipe were opened at the same time and several sludge and water samples were taken throughout the flushing. Flow measurements were conducted using the "4 inch drop-off" technique.

This preliminary attempt at extended flushing was conducted to observe the movement of solids through the compost and limestone layers of the vertical flow pond. The information collected from this test will help improve passive treatment technology. *Thanks to Jamie and Chris for conducting the flushing and collecting the samples!*

SITE MAINTENANCE IN THE SLIPPERY ROCK WATERSHED

Last month, **Jamie Stilley,** volunteer, and **Chris Treter,** OSM Intern at Stream Restoration Inc. traveled in the Slippery Rock Watershed and conducted maintenance on several of the passive treatment systems. The sites included **De Sale Phase I**, which is entering its second year of operation, and **SR 114** (also known as **Argentine**) which is entering its sixth year of operation. The maintenance at SR 114 involved the removal of iron precipitate from a trash rack that protects the drain to the wetland. It was a challenging job because the precipitate was extremely soft and had worked its way into every possible crack and crevice. By cleaning the trash rack, flow into the wetland drastically increased from its previous trickle and overflowing the settling pond was avoided! Maintenance at De Sale Phase I involved the cleaning of a pipe that was partially clogged with iron precipitate. Maintenance of these sites took less than three hours to complete! **Thanks to Jamie and Chris for the maintenance effort!**

SHAMOKIN WATERSHED TOURS SLIPPERY ROCK WATERSHED

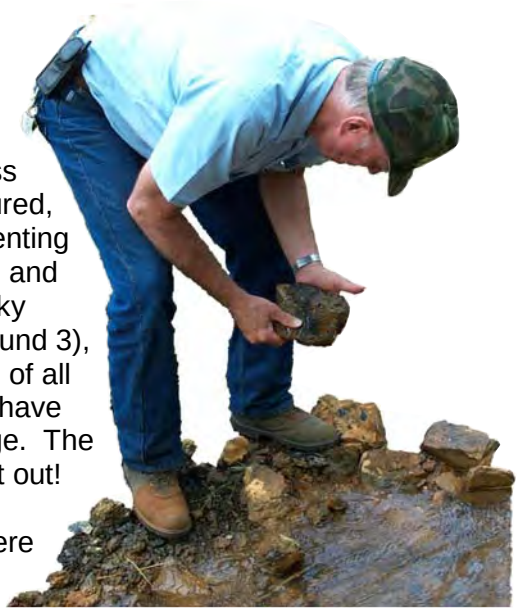
Recently, the **Shamokin Watershed Group** toured several sites in the Slippery Rock Watershed. The tours were conducted by **Will Taylor** (Jennings Environmental Education Center), with help from **Dr. Fred Brenner** (Grove City College) and **Bob Beran** (Aquascape). Fred Brenner assisted in the morning at **Jennings Environmental Education Center** and Bob Beran assisted at **Goff Station**. The tour concluded at **De Sale.** Thank you, Shamokin Watershed Group for praising our efforts!! We can not tell you how much this means to us.

PHOTO OF THE MONTH

PHOTO OF THE MONTH

Dr. Fred Brenner of Grove City College and Shaun Busler of Stream Restoration Incorporated busy themselves with electro-fishing as Nick Morgan and John Lawrence look on.

FISH GET BUZZED ON ELECTRICAL CURRENT



Monday, August 6th, an electro-fishing survey was conducted in Seaton Creek by **Dr. Fred Brenner, Nick Morgan** (Grove City College), **John Lawrence** (Slippery Rock Watershed resident) **Shaun Busler, Cliff Denholm,** and **Chris Treter** (Stream Restoration Incorporated). Electro-fishing is a harmless process that involves stunning fish with a mild electrical current so the fish can be captured, identified, and released back into the stream. The fish survey involved documenting the absence of fish at the raw flow at **De Sale Phase II** (before any restoration) and shocking at **McJunkin Road** downstream of the De Sale systems and Chernicky reclamation), **Erico Bridge** (future restoration area under Growing Greener Round 3), **Murrin Run** (at the Goff Station system), and **Goff Station Road** (downstream of all restoration areas). The water tested prior to entering De Sale Phase II did not have any fish, due to the poor water quality and no fish were observed at Erico Bridge. The iron content in the water at Erico Bridge was so high, the generator would short out! When the survey was completed, 4 five-spine stickleback, 1 pumpkinseed, 2 johnny darter, 1 bullhead, 3 crayfish, 3 green frogs, and 13 common shiners were found. *Special thanks to everyone involved in the testing and thanks to Grove City College for making this possible!*

The *KIDS* Catalyst

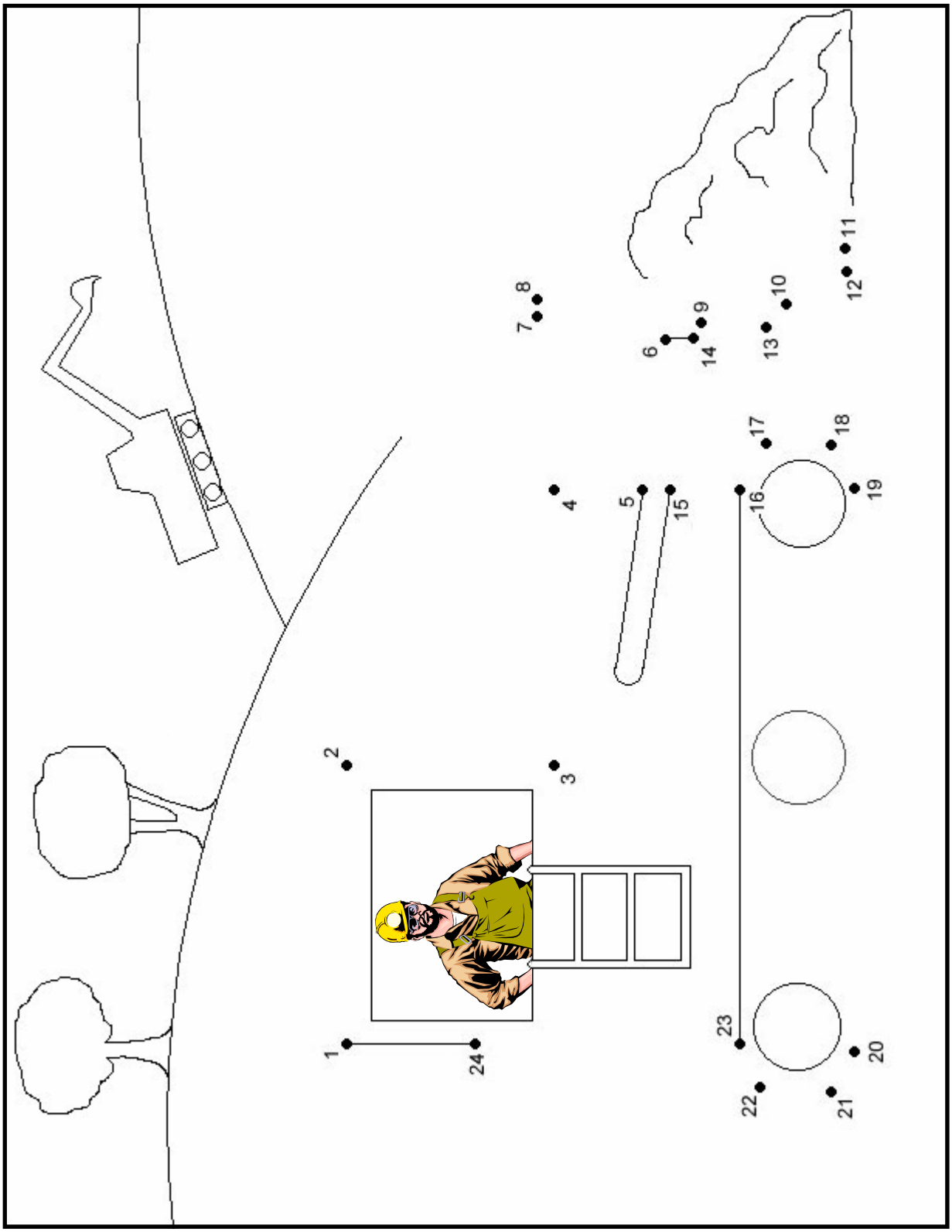
SLIPPERY ROCK WATERSHED COALITION FUN ACTIVITIES

CONNECT THE DOTS

Connect the dots to see what the picture is. When you are done connecting the dots, color the picture. And don't forget to send the colored picture to the Slippery Rock Watershed Coalition for a ***GIFT CERTIFICATE TO A LOCAL RESTAURANT!***

Completed by:_____ **Age:**_____ **School:**_____

Address:_____



Construction equipment, like this bulldozer, is important for the construction of passive treatment systems.

ARRIPA TOUR

On 7/20/01, participants of the Slippery Rock Watershed Coalition had the privilege to attend a tour of reclamation sites in Indiana and Cambria Counties with the Association of Independent Power Producers in the Anthracite and Bituminous Regions of Pennsylvania (ARIPPA). First stop on the tour was the Ernest site where **John Stilley** of Amerikohl Mining, Inc. discussed a current remining operation that will reclaim a previously barren coal waste pile situated between a church and a stream. Amerikohl's project in addition to a major reclamation effort being made by the Cambria Reclamation Corporation, discussed by **Dave Young,** Cambria CoGen, will reduce pollution in the stream, improve the drinking water supply for the town of Ernest, reclaim and revegetate about 250 acres and create about 14 acres of wetlands!! The learning kept moving along as **Barry Scheetz**, PSU & **Roger Hornberger**, PADEP discussed geology, mining, reclamation and coal ash whilst traveling between sites. Next stop was the Colver Power Project where presentations on coal ash utilization were given by **Dennis Noll**, Earthtech, Inc., **Mike Menghini**, PADEP, **Dr. Art Rose**, Prof. Emer. PSU, **Dennis Simmers, Jeff Zick,** and **John Hall**, Colver Power Project. The award winning Colver project utilizes waste coal as fuel and produces alkaline coal ash used in the successful reclamation of the site! Last but not least was a trip to Nanty Glo and Revloc where **Gary Anderson**, General Manager Ebensburg Power Company presented the problems and solutions being applied in the field!! Special thanks goes to **Todd Lawton**, Scrubgrass Generating, for the invite and **Bille Ramsey**, ARIPPA for the hospitality!!!! *It is truly exciting to see reclamation in action!*

FUTURE ARTICLES

- Jennings Environmental Education Center hosts Watershed Workshops
- Jack Dam construction at De Sale Phase II

Thanks to The William & Frances Aloe Charitable Foundation, Amerikohl Mining, Inc., Quality Aggregates Inc., Allegheny Mineral Corporation and PA DEP for their support.
For more information contact: Slippery Rock Watershed Coalition, c/o Stream Restoration Incorporated (PA non-profit), 3016 Unionville Road, Cranberry Twp., PA 16066, (724)776-0161, fax (724)776-0166, sri@salsgiver.com, www.srwc.org. September Distribution: 743 copies

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THE CATALYST

SLIPPERY ROCK WATERSHED COALITION MONTHLY ACTIVITIES UPDATE

THIS MONTH'S MEETING: Thursday October 11 @ 7:00 PM, Jennings Environmental Education Center, Pizza and Pop will be provided!! 9/13/01 meeting attendance: C. Denholm, C. Cooper, J. Belgredan, F. Brenner, V. Kefeli, W. Taylor, M. Dunn, T. Danehy, D. Johnson, D. DeNicola

Butler County Commissioners Donate $180,000 to Slippery Rock Watershed Restoration Projects!!!!!!!

The **Butler County Commissioners** have generously donated an amazing $180,000 to two SRWC restoration projects located in Venango Twp., Butler County!!! They gave $120,000 to the Erico Bridge Restoration Project, which will include the removal of gob piles, some of which are situated in Seaton Creek, and the installation of the largest known Anoxic Limestone Drain within PA!!! In addition, large wetlands will also be created at the Erico Bridge site. The County Commissioners also gave $60,000 to the De Sale Phase III project which is planned to be an innovative system to treat abandoned mine drainage with a high metals concentration!!! This funding is in addition to the Growing Greener Funding provided by the PA DEP and the in-kind contributions among the project partners.

To **James Kennedy, Glen Anderson, and Joan Chew** we would all like to say:

THANK YOU, THANK YOU, THANK YOU FOR YOUR SUPPORT AND MAKING THIS PROJECT HAPPEN!!!!!!!

Jack Dams at De Sale

On August 17th, **Shaun Busler** of **Stream Restoration Inc.,** and **Nick Morgan** (see photos below) of **Grove City College** under the direction of **Dr. Fred Brenner,** professor at Grove City College, constructed jacks dams of various sized limestone donated by **Quality Aggregates' Boyers Quarry.** The jack dams were strategically placed in unnamed tributaries of Seaton Creek, with the hope of reducing acidity and increasing alkalinity. Monitoring these jack dams has been and will continue to be conducted by Grove City College students. Monitoring has already indicated a decrease in acidity.

PHOTO OF THE MONTH

PHOTO OF THE MONTH

Saving Slider Turtle!!!

On September 6th, **Paula Langsdale,** a Cranberry Township resident and Mohawk Elementary Special Education teacher, happened to notice while driving home on the PA Turnpike a little turtle trying to cross the road amongst rush hour traffic. Paula, pulled off the side of the road, made a literal mad dash across the two lanes of speeding east bound traffic, picked up the turtle and ran back hoping not to get hit herself. She contacted **Stream Restoration Incorporated** who told her to bring it on in. Stream Restoration in turn handed it over to **Bob Beran** of **Aquascape,** who with the help of his son **Matt** (pictured above holding the turtle) released it into the final polishing wetland of the **Goff Station Restoration Area** on September 9th. **Bob Beran** identified the turtle as being a Pond Slider Turtle. Pond Slider Turtles are typically found from Virginia to Florida and West to New Mexico as well as down into South America; however, they are also very popular as pets and probably had just been dropped off at some convenient location. But thanks to Paula and members of the Slippery Rock Watershed Coalition the turtle has a new home where he should be quite happy. Pond Slider Turtles prefer calm waters, with soft bottoms, and dense vegetation which makes the final wetland an ideal habitat.

SRWC in the Pittsburgh Tribune

We hope you saw **Laura Spencer** and **Bob Beran** of **Aquascape** wading in the iron sludge at the Erico Bridge Restoration Area in a wonderful article written by **Larry Sonata** of the **Pittsburgh Tribune-Review**. The excellent photos were taken by **Joe Appel** also of the Tribune Review. If you missed it, the article appeared in the Butler County section on August 9, 2001. The article can be found at www. Triblive.com/search/. Then under the search enter : Seaton Creek.

SRWC's Dr. Valentine Kefeli Teaches Soils Lab Course

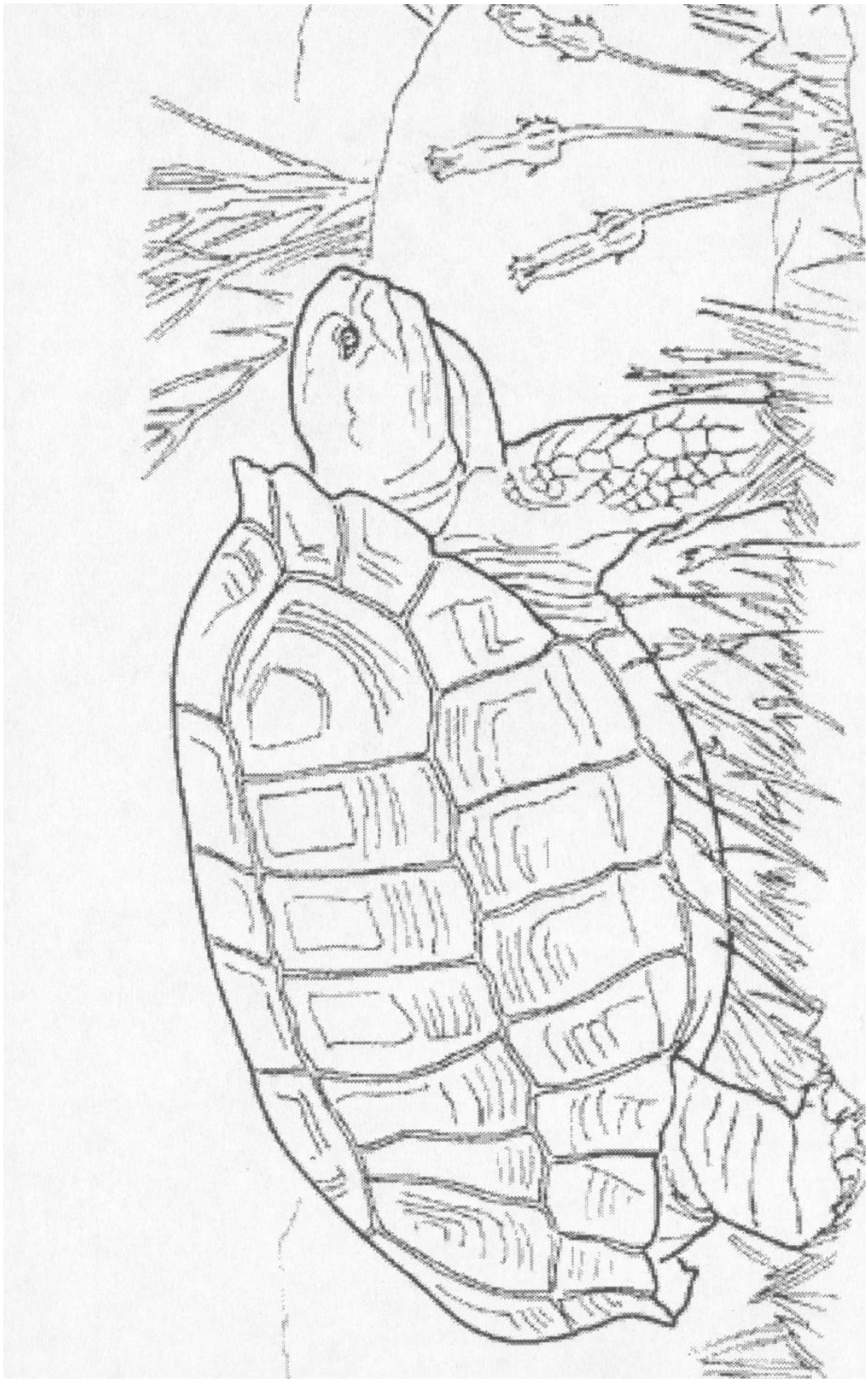
Dr. Valentine Kefeli of the **Slippery Rock Watershed Coalition** has teamed up with **Professor Bruno Borsari** of **Slippery Rock University** to teach a lab course entitled "Soils as a Resource" at the Macoskey Center, Slippery Rock University, for the Fall 2001 Semester. The course will include a wide variety of topics ranging from soil as an ecosystem to Carbon/Nitrogen Ratios to chemical and physical parameters of soil to polluted soils. Dr. Valentine will also include in this course aspects of his work involving fabricated soils for landscape reclamation.

The *KIDS* Catalyst

SLIPPERY ROCK WATERSHED COALITION FUN ACTIVITIES

Turtle Color Page

Color the picture and send it into the Slippery Rock Watershed Coalition to get a free gift certificate.



Turtles are reptiles that have outer shells and lay eggs. There are over 250 different kinds of turtles. Different kinds of turtles live in different kinds of places. Some live in hot dry deserts, while others live in cool mountains. Some live in forests while others live in the oceans. Many like to live in ponds and wetlands. Wetlands are also known as marshes, bogs, and swamps. Check out the article about the pond slider turtle on the opposite page

The largest turtle is the Leatherback Sea Turtle which lives in the ocean and can be 6-8 feet long and weigh between 1,200 and 1,500 lbs. The smallest turtle is the Bog Turtle which is only 3-4 inches long. Different turtles also eat different things. Most turtles eat plants, insects , or small fish. Turtles can live to be about 30-40 years old, but some live to be over 100 years old. The large tortoise that lives on the Galapagus Islands can live to be 200 years old.

Name_____ Age_____ School_____

Address_____

Going Batty...Mist Netting at Goff Station

On a warm summer night in late August, a group of about 25 people representing various organizations and government agencies including members of the **PA Game Commission, PA DCNR, Slippery Rock Watershed Coalition, and students from Slippery Rock University** came together to answer a question: Are there bats at Goff Station and will they use or are they using the bat boxes and hibernaculum? A tour of Goff Station was conducted by **Bob Beran** of **Aquascape** for those unfamiliar with the site. Inspections of the bat boxes revealed a bat was using one of the boxes. As dusk approached, two nets were set up and then we waited. We saw lots and lots of bats……flying around, but no bats were actually caught in the net so we could not identify what type or types of bats were there. The important thing is bats were there and we were very excited about it despite not catching any, besides we all had a great time!!! There are plans to do it again one more time in the next couple of weeks with **Dr. Fred Brenner** of **Grove City College, Will Taylor** of the **PA DCNR's Jennings Environmental Education Center,** and **Bob Beran**.

On a related note **Cal Butchkowski,** of the **PA Game Commission** has installed remote sensing equipment so that we can monitor conditions within the bat hibernaculum such as temperature. This information can then be used to try to maintain optimal conditions for wintering bats.

Thanks to The William & Frances Aloe Charitable Foundation, Amerikohl Mining, Inc., Quality Aggregates Inc., Allegheny Mineral Corporation and PA DEP for their support.
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THE CATALYST

SLIPPERY ROCK WATERSHED COALITION MONTHLY ACTIVITIES UPDATE

THIS MONTH'S MEETING: Thursday November 8 @ 7:00 PM, Jennings Environmental Education Center, Pizza and Pop will be provided!! 10/11/01 meeting attendance: C. Cooper, F. Brenner, V. Kefeli, M. Dunn, T. Danehy, T. Rucosky, C. Treter, D. Funkhouser, S. Busler

Erico Bridge Groundbreaking!!!!

On October 3, a ceremonial groundbreaking was held to celebrate the kick off of the Erico Bridge Restoration Project, which will include the removal, neutralization, and placement of 25,500 cubic yards of coal refuse piles situated along/in Seaton Creek into an abandoned Brookville coal pit, a neighboring reclamation project. The project will also consist of a passive treatment system that will include the largest Anoxic Limestone Drain to date (that we know of anyway) and the creation of about 10 acres of wetlands. **PA DEP Secretary David Hess** was on hand to take part in the celebration and present two Growing Greener checks to **Margaret Dunn** of **Stream Restoration Inc.** One of the checks was actually an additional surprise check of $150,000 to make up the difference in funding needed to complete the project!!!!

Thank you David Hess and everybody at PA DEP for helping us make this happen!!!!!

Also thanks to project partners **Quality Aggregates, Inc., AquaScape, PA DEP Knox DMO, Butler County Commissioners, Ted Kopas of PA DEP, Venango Township Supervisors, Scrubgrass Generating Plant, Grove City College, BioMost, Inc, Stream Restoration Inc., Senator Mary Jo White's office, and Representative Dick Stevenson's office.**

Butler County Environmental Quality Board Tours SRWC Sites

On September 26, members of the **Butler County Environmental Quality Board** toured De Sale Phase I, Goff Station, and the Flick gob pile at Erico Bridge with members of Aquascape and Stream Restoration, Inc. Those who participated include from front left going clockwise: **Cheryl Kelly, Butler County Recycling Coordinator; Bob Shurtleff, DCNR Bureau of Forestry; Dave Lamperski, Butler County Conservation District; Bob Beran, AquaScape, Doniele Beck, Butler County Planning Commision; Margaret Dunn, Stream Restoration Inc.;** not pictured **Shaun Busler, Stream Restoration Inc.**

PHOTO OF THE MONTH

PHOTO OF THE MONTH

From left to right at the Erico Bridge Groundbreaking ceremony, symbolically removing the gob piles are: John Wells, Venango Twp. Supervisor; Todd Lawton, Scrubgrass Generating; David Hess, Secretary PA DEP; Margaret Dunn, Stream Restoration Inc; Jim Shaffer, Venango Twp. Supervisors; Glenn Anderson, Butler County Commissioner; Robin Lutz, Senator Mary Jo White's office; Joe Aloe, President Quality Aggregates; Joan Chew, Butler County Commissioner; Jane Rath, Rep. Dick Stevenson's office;

Grove City College Students… Where Are They Now?

Since the beginning, **Grove City College** students, under the direction of **Dr. Fred Brenner** have been actively involved and an important asset to the Slippery Rock Watershed Coalition. These students participated in studies at Jennings Environmental Education Center and/or Seaton Creek, the most heavily impacted tributary of Slippery Rock Creek. So what has happened to these students? Where are they now? What are they doing with their lives? Read on...

Shaun Busler, 2000, Biologist for Stream Restoration Inc.

Daniel Dougherty, 2001, Currently Student Teaching

Mike Enright, 1999, Wildlife Biologist for Dayton Ohio Metro Park System

Corrie Gardner, 2000, Graduate School- Ohio State University– Agricultural Pest Management MS program

Kim Kosick, 2000, Graduate School– Aquatic Toxicity – Ph.D. Program

Elizabeth Mountz, 1999, Congressional Fellow - U.S. House of Representatives

Peter Sharpe, 1997, Garnett-Fleming Consulting Firm, Harrisburg, PA

And others...

Butler County Juvenile Program and Goff Station in the News!!!

We hope you saw **Angela Lamberto** of **Butler County's Working Opportunities to Repay the Community Program (WORC)** in the article entitled " Hands-on rehabilitation" in the 10/11/01 issue of the **Pittsburgh Tribune-Review**. Once again **Larry Sanata** has written an excellent article.

The WORC program is designed to help first-time, non-violent, juvenile offenders meet the community service penalties required by the juvenile court. The community service program strives to get the young people back on their feet, develop a sense of pride/ self-respect, and improve the communities they live in while teaching them new skills and fostering new interests.

One of the projects that the youth worked on was at the **Goff Station Restoration Area** where under the guidance of **Bob Beran, Jeff Reidenbaugh, and Laura Spencer of Aquascape,** they planted wetlands throughout the summer. Several of the youth were very interested in the work and wanted to know how they could do this for a living.

Check it out at www.Triblive.com/search :
Search using: WORC

The *KIDS* Catalyst

SLIPPERY ROCK WATERSHED COALITION FUN ACTIVITIES

Cedar Waxwing Activity Page

Read the Cedar Waxwings article and then complete the word search. If you send it into the Slippery Rock Watershed Coalition you'll get a free gift certificate.

Cedar Waxwings Visit Goff Station

Just six months after building the wetlands at Goff Station, a flock of cedar waxwings were heard hunting for insects. Because they travel in large flocks, their buzzy calls could be heard a long way off.

Wetland habitat, like Goff Station's, provide food and a resting place for many migrating birds. While cedar waxwings won't be flying south for the winter, they are always on the move looking for food. Besides insects, waxwings love to eat fruits, and berries.

It is easy to tell if a bird is a cedar waxwing. They look like gray cardinals and like to travel with a large group of relatives and friends. Waxwings have a crest on their heads, a black mask over their eyes and cool red tips on the ends of their wing feathers. Their drab color is a great adaptation to help them blend in. Often you will only hear them talking to each other, and not see them at all. Like your own relatives at a picnic, waxwings are great at sharing and can often be seen passing berries to each other.

Cedar Waxwing Word Search

R	M	N	A	D	Y	L	R	M	C	N	G	O	E	F
P	J	J	A	O	F	N	B	N	F	E	W	D	X	E
A	D	A	P	T	A	T	I	O	N	Q	Q	C	T	O
M	H	Z	B	E	R	R	Y	I	C	B	Z	R	W	C
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G	P	V	V	O	V	X	H	T	W	T	E	F	Z	D
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B	N	C	O	P	C	R	M	J	H	T	D	E	M	X
V	X	H	K	D	N	L	H	D	P	A	N	A	I	W
I	N	S	E	C	T	L	D	U	A	T	J	K	L	I
B	T	K	U	D	S	M	M	D	Q	O	G	I	Y	N
P	N	J	F	E	A	T	H	E	R	A	X	T	M	G

Cedar Waxwing
Adaptation
Berry
Habitat
Migrate
Family
Cardinal
Beak
Insect
Wetland
Feather

Name _____

Address _____

"Sense of Place" Workshop at JEEC

The **Jennings Environmental Education Center** held a workshop from September 25th through September 28th entitled "Sense of Place." The workshop was for the **Department of Conservation and Natural Resource's Environmental Education staff.** The week long workshop focused on the use of a regional approach to teach environmental education as well as addressing the Pennsylvania state academic standards for environment and ecology. On September 27th, participants in the workshop toured various sites within the watershed. The first stop was **Quality Aggregates' Limestone quarry** located in **Boyers, PA** where they learned from **Jeff Ankrom** about how overburden and limestone are drilled, blasted, removed, and processed. From there they traveled to **Goff Station** where members of **Aquascape** and **Stream Restoration Inc.** led a tour of the passive treatment system and discussed how the successful public-private partnership has reclaimed this once abandoned mine site.

PASDA Visits SRWC

In conjunction with the "Sense of Place" tour, **Maurie Kelly, PASDA Coordinator, and Mike Kulakowski, Watershed Coordinator** of **PA Spatial Data Access (PASDA)** pictured below, visited and toured several reclamation sites within the Slippery Rock Watershed with **Shaun Busler of SRI,** including the Jennings Environmental Education Center demonstration site, Sunbeam Tipple, Goff Station, and Erico Bridge.

Thanks to PASDA for coming all the way out from State College and for all the help that they have given us!!!

Thanks to The William & Frances Aloe Charitable Foundation, Amerikohl Mining, Inc., Quality Aggregates Inc., Allegheny Mineral Corporation and PA DEP for their support.
For more information contact: Slippery Rock Watershed Coalition, c/o Stream Restoration Incorporated (PA non-profit), 3016 Unionville Road, Cranberry Twp., PA 16066, (724)776-0161, fax (724)776-0166, sri@salsgiver.com, www.srwc.org. November Distribution: 792 copies

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December 2001

THE CATALYST

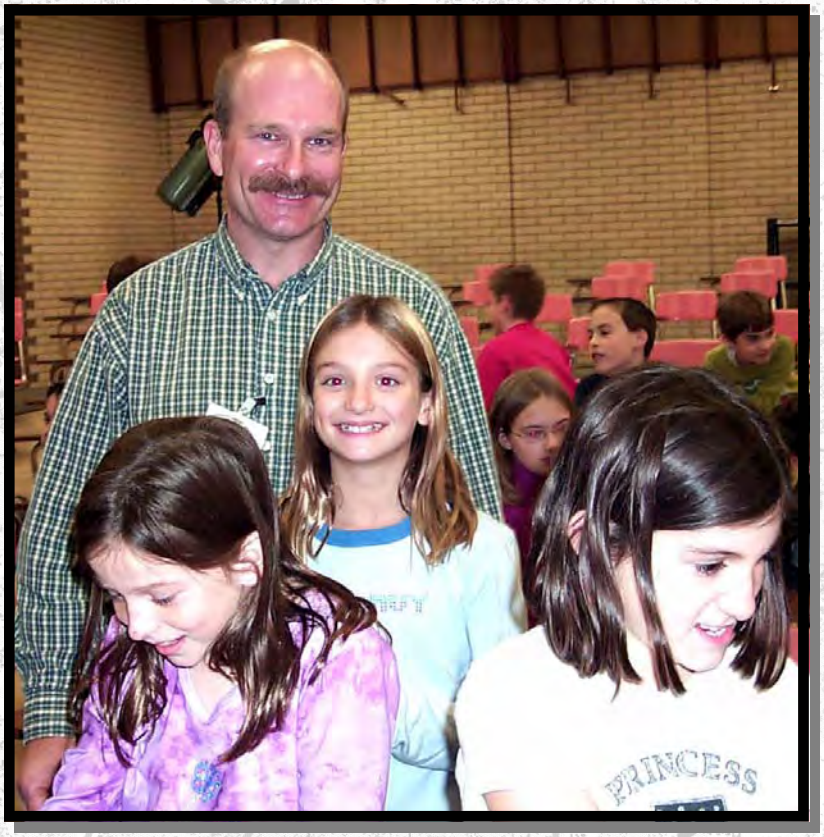
SLIPPERY ROCK WATERSHED COALITION MONTHLY ACTIVITIES UPDATE

THIS MONTH'S MEETING: Thursday December 13 @ 7:00 PM, Jennings Environmental Education Center, Pizza and Pop will be provided!! 11/08/01 meeting attendance: C. Cooper, F. Brenner, V. Kefeli, M. Dunn, T. Danehy, C. Treter, D. Funkhouser, C. Denholm, K. Denholm, W. Taylor, M. Stapleton, B. Beran

Aquascape and Quality Aggregates Educate Boyce School Fifth Graders on Importance of Wetlands

On Friday, November 9, 2001, **Bob Beran** of **Aquascape**, and **Joe Aloe** of **Quality Aggregates**, spoke to a classroom of approximately 50 5th grade students at the **Boyce School** in Upper St. Clair on the importance of wetlands. Bob Beran demonstrated the functions and values of wetlands by involving the students in a "Pick your Wetland Metaphor" activity. Bob Beran also brought examples of wetland and upland soils to demonstrate unique hydric soil identification features. With the aid of **Will Taylor, PA DCNR Jennings Environmental Education Center**, Bob Beran was able to obtain wetland informational packets and posters to give to each of the students.

Joe Aloe spoke to the students about the key role of limestone in providing alkalinity to neutralize acidic water in passive treatment systems. The students were enthused to each receive a piece of limestone containing fossils.



Bob Beran of Aquascape pictured with Julie Aloe and other 5th grade students of the Boyce School located in Upper St. Clair.

Unveiling *Accepting The Challenge*!!!

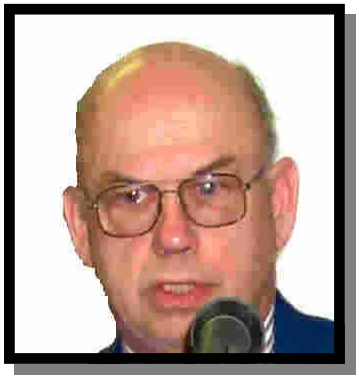
In October, we received the first copies of this remarkable book. As many of you know *Accepting The Challenge* is designed as a public outreach/education project to provide information about the history, cause, and solutions to abandoned mine drainage. The November 9 issue of Watershed Weekly includes an article entitled Up Stream & Down Stream, a summary of the book. If you were listening to WYEP or WDUQ on Tuesday the 20th of November you would have heard them announce the availability of the book. It was announced again on Saturday the 24th on WDUQ. There is more information about the book available on our web site www.srwc.org. We are very excited about how professional this book turned out. Congratulations Will Taylor, great job! Our congratulations also go out to Margaret Dunn, Shaun Busler, and others who assisted Will in his efforts.

PHOTO OF THE MONTH

PHOTO OF THE MONTH

The Growing Greener Participants help celebrate receiving the 2001 Council of State Governments Innovations Award during the PA Watershed Conference at Split Rock. (SRWC participants pictured are: Valentine and Galena Kefeli, Shaun and Melissa Busler, Charles Cooper, Cliff Denholm, Jeff Reidenbaugh, Laurce Spencer, Tim Danehy, and Margaret Dunn.)

SRWC Participants Spotlight

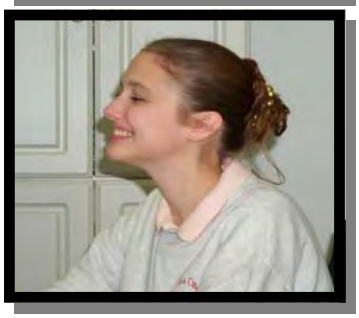


Dr. Brenner Recognized With The Campus-Community Award

On November 14, Dr. Brenner and Allied News Editor Brad Isles were recognized for their efforts concerning Grove City College as well as the community. Dr. Brenner was recognized for these efforts in an October 31 article in the Allied News. The article went into great depth regarding all the different organizations and associations he is affiliated with. We are very proud of Dr. Brenner for being recognized with such a prestigious award.

Dr. Valentine Kefeli Speaks At MS3 Sustainable Systems Seminar Series

On November 28, Dr. Kefeli's topic was "Fabricated Soils for Landscape Rehabilitation." Also lecturing in the seminar series were students, former students and faculty at Slippery Rock University. Dr. Kefeli represented The Slippery Rock Watershed Coalition and Stream Restoration Inc. The lectures, that started in mid September, will conclude on December 5th. Great Job Dr. Kefeli, thank you for representing us so well at this function.



Deanna Funkhouser Joins The Team!

Deanna's fiancé, Chris Treter, was the intern with SRI over the summer. After getting to know everyone through the SRWC meetings, she came on board in late October. Deanna is a graduate of Grove City College with a degree in Business/Communications. Her role right now: get the office in order, keep up with bookkeeping and keep Tim on his toes.

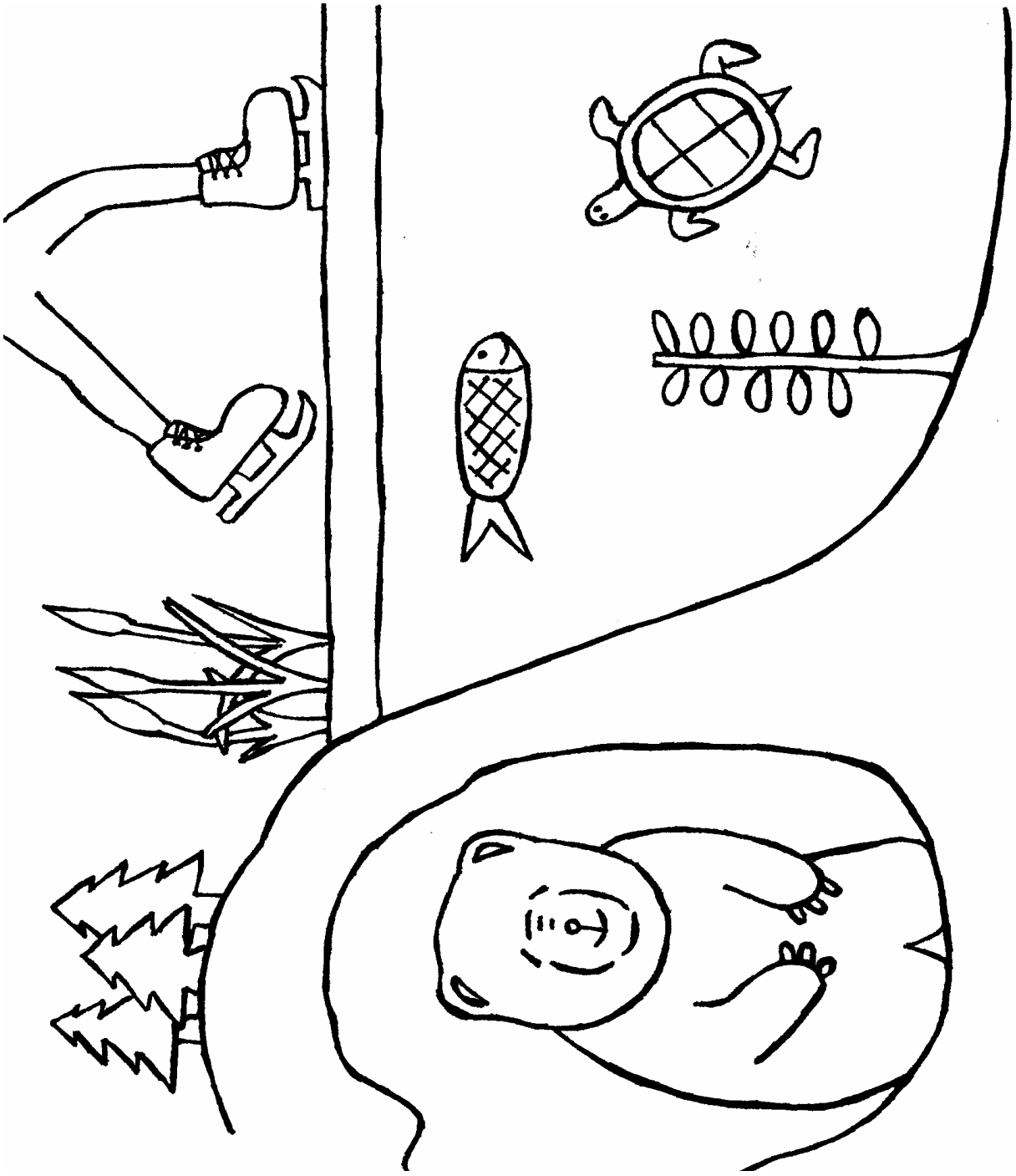
The KIDS Catalyst

SLIPPERY ROCK WATERSHED COALITION FUN ACTIVITY

Life Beneath The Snow and Ice

After the last leaf has fallen the cold weather comes. When it is cold we do not see the animals and the plants. But they are still there. Under all the snow and ice everything waits until spring when they can come out and enjoy the warm weather. Here are some pictures of things that are still alive, even when the weather is cold. The bear is hibernating in his cave, the fish and turtle are swimming under the ice, the plant is still alive under the water, and the cattails (even though they are brown) are alive and waiting for spring.

After you color them in mail them back to us to get a gift certificate.



Name _____ Age _____

Address _____

Watershed Weekly Recognizing SRWC

Margaret Dunn: Watershed Hero

Margaret was honored with the title Watershed Hero for the month of November. She was honored for her ongoing efforts to restore our watershed. The article written was a glowing one, highlighting her watershed public service message: “Make it happen.” “You can do it. Just get out there and get things done.” And Margaret has been getting it done for years now. This recognition is well deserved. Congratulations Margaret. Also included at the end of the article is a three part interview with Margaret. You can listen to Margaret answer some interesting and thought provoking questions.

SRWC Recognized For It’s Continuing Efforts

In the Watershed Weekly for November 26 the SRWC and SRI were the subject of the featured article. The article talks about the different work being done by SRWC. The Goff Station restoration site was the highlighted project. The Bat Hibernaculum stole the show, with good reason. It is the only one of it’s kind on the east coast. Also highlighted was SRI and SRWC’s involvement with a program called “Working Opportunities to Repay the Community.” In addition, there are video interviews for online viewing. Those interviewed for the article are: Bob Beran, John Stoops, Jeff Ankrom, Jeff Reidenbaugh, and Shaun Busler. It is always nice to be recognized by your peers for doing something you love.

To learn more about the articles above visit: www.watershedweekly.org

Thanks to The William & Frances Aloe Charitable Foundation, Amerikohl Mining, Inc., Quality Aggregates Inc., Allegheny Mineral Corporation and PA DEP for their support.
For more information contact: Slippery Rock Watershed Coalition, c/o Stream Restoration Incorporated (PA non-profit), 3016 Unionville Road, Cranberry Twp., PA 16066, (724)776-0161, fax (724)776-0166, sri@salsgiver.com, www.srwc.org. December Distribution: 812 copies

Slippery Rock Watershed Coalition c/o Stream Restoration Incorporated
A PA Non-Profit Organization
3016 Unionville Road
Cranberry Twp., PA 16066

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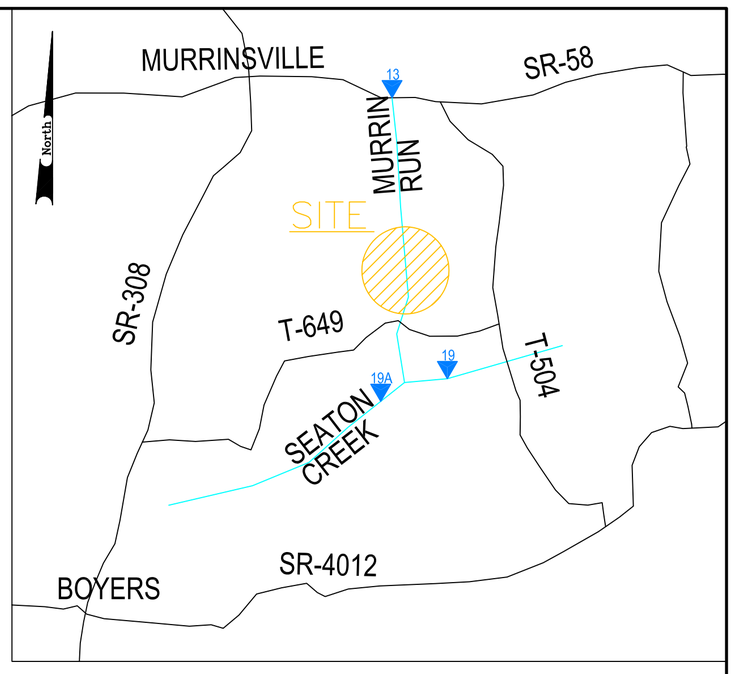


0 0.25 0.5 1 1.5

GRAPHIC SCALE
(1" = 0.5 MILE)

ENERGY DISSIPATOR
24" PE CULVERT
ST41
UPPER WETLAND
ST42
40/42
VFP3
VFP4
FP
WL2
OPEN LIMESTONE CHANNEL
ST40
40A
ST39
BIOSWALE
FINAL WETLAND
DROP STRUCTURE
RIPARIAN BUFFER AREA
TEMP. ACCESS ROAD
MURRIN RUN
DIVERSION DITCH
MATCH LINE (SHEET 3)
(SHEET 2)
E(OH)
ST38
38/39
VFP2
VFP1
SP1
WL1
CONSTRUCTION BASELINE
GAS PIPELINE (UG)
GOFF STATION ROAD (T-649)
HEAVY FOLIAGE
18
1215.7
North

LEGEND

- PASSIVE SYSTEM COMPONENT
- CONTOUR - INDEX
- CONTOUR - INTERMEDIATE
- WATER
- PROJECT BOUNDARY
- E(OH) — UTILITY LINE (E-ELECTRIC)
- ⌀ — UTILITY POLE
- PAVED/IMPROVED ROAD
- UNIMPROVED ROAD
- TRAIL
- OUT BUILDING OR OTHER STRUCT.
- 4" PVC SCH 40 SOLID (UPPER TIER)
- 4" PVC SCH 40 PERFORATED (UPPER TIER)
- 4" PVC SCH 40 SOLID (LOWER TIER)
- 4" PVC SCH 40 PERFORATED (LOWER TIER)
- CLEANOUT
- 10" PVC SDR 35 SOLID
- 8" PVC SDR 35 SOLID
- RIP RAP (R-4) SPILLWAY/CHANNEL
- BIOSWALE (VEGETATED CHANNEL)
- ×1213.6 — SPOT ELEVATION
- A — A' — AS BUILT CROSS SECTION
- TOP OF EMBANKMENT
- TOE OF SLOPE

Water Sample Notes:
Constructed wetlands and settling ponds sampled at spillway outlets.
Vertical Flow Ponds sampled at discharge pipes.
VFP3 - Western set of 8 pipes
VFP4 - Eastern set of 8 pipes
Bioswale sampled prior to confluence with WL1 effluent.
40/42 may include effluent from upper wetland (treated ST41 discharge) if OLC is being directed into 40/41 conveyance pipe.
ST42 sampling point location unchanged.

ST38 APPROXIMATE ORIGINAL DISCHARGE MONITORING LOCATIONS (BEFORE CONSTRUCTION) (MONITORING WEIRS LOCATED DOWNGRADIENT)

38/39 SAMPLE POINT LOCATIONS (POST CONSTRUCTION)

Notes:
Base map prepared by PA DEP, BAMR, from aerial photographs taken 2/16/99.
As-Built EDM survey by Chamberlin Surveying and Consulting, Brookville PA with additional information from site inspections provided by BioMost, Inc., Aquascape, and Quality Aggregates.
Wetland surface areas calculated at approximate water elevation.
Water surface areas and elevations subject to change based on passive component permeability and/or spillway outlet conditions.
Diversion ditch not located by survey.

Passive Component Abbreviations:
FP - Flush Pond
SP - Settling Pond
VFP - Vertical Flow Pond
WL - Wetland

100 50 0 100 200

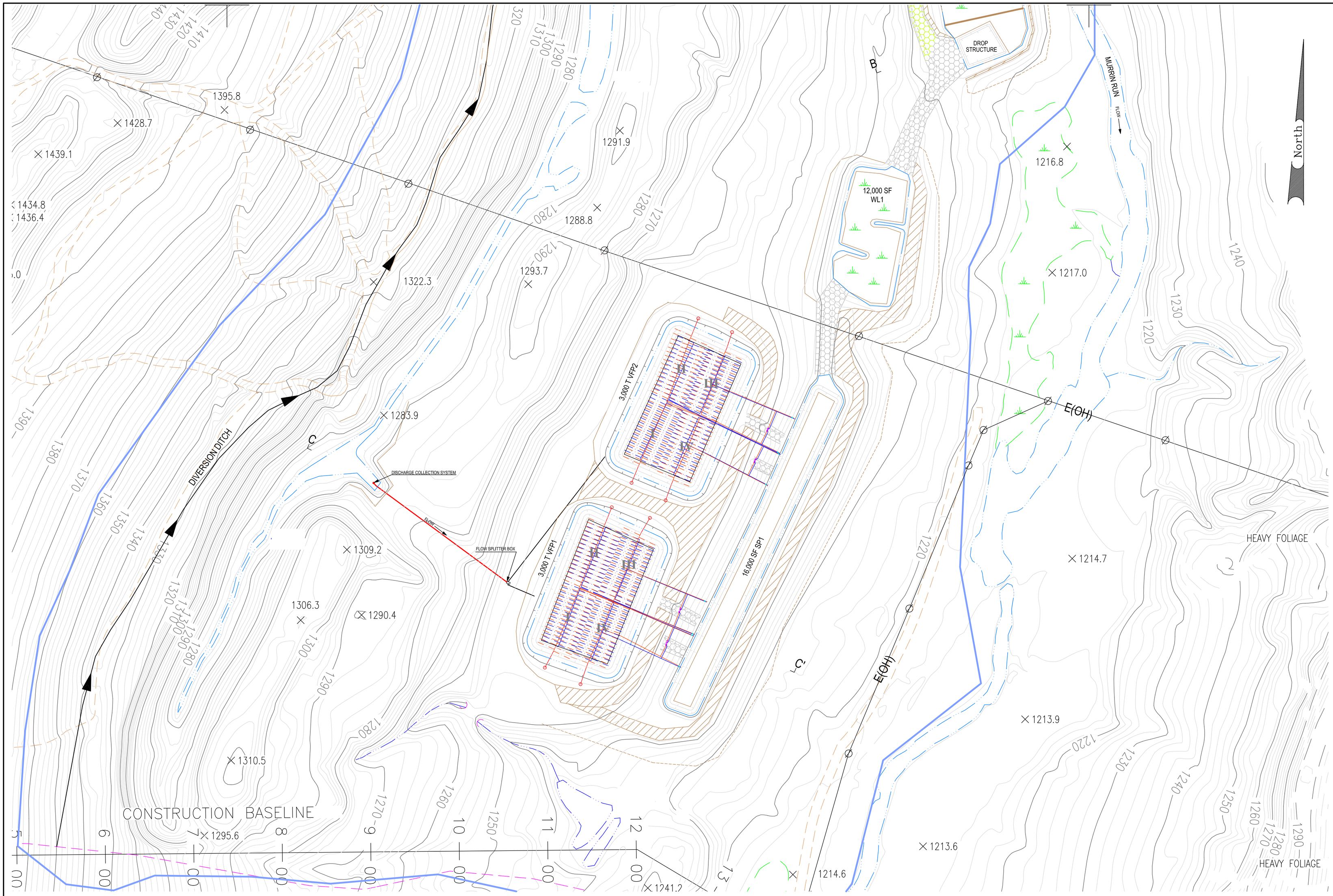
SHEET 1 OF 4

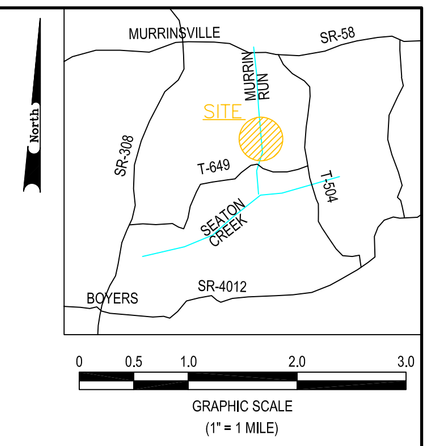
REVIEWED BY	REVIEWED BY

AS-BUILT PLANS - PROJECT AREA
GOFF STATION RESTORATION AREA

Slippery Rock Watershed Coalition
STREAM RESTORATION INCORPORATED
situate in
Venango Township
Butler County, PA
Scale: 1" = 100' Date: 11/2001
BioMost, Inc., Cranberry Twp., PA

102903/Goff Station As-Builts/Entire Area

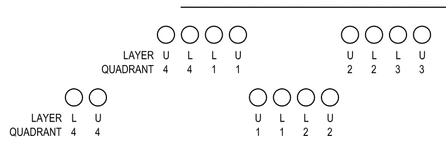




LEGEND

- PASSIVE SYSTEM COMPONENT
- CONTOUR - INDEX
- CONTOUR - INTERMEDIATE
- WATER
- PROJECT BOUNDARY
- E(OH) — UTILITY LINE (E-ELECTRIC)
- ⌀ — UTILITY POLE
- PAVED/IMPROVED ROAD
- UNIMPROVED ROAD
- TRAIL
- OUT BUILDING OR OTHER STRUCT.
- 4" PVC SCH 40 SOLID (UPPER TIER)
- 4" PVC SCH 40 PERFORATED (UPPER TIER)
- 4" PVC SCH 40 SOLID (LOWER TIER)
- 4" PVC SCH 40 PERFORATED (LOWER TIER)
- 10" PVC SDR 35 SOLID
- 8" PVC SDR 35 SOLID
- RIP RAP (R-4) SPILLWAY/CHANNEL
- BIOSWALE (VEGETATED CHANNEL)
- ×1213.6 — SPOT ELEVATION
- A — A' — AS BUILT CROSS SECTION
- TOP OF EMBANKMENT
- TOE OF SLOPE
- FLUSH VALVE
- ADJUSTABLE OUTLET RISER
- CLEANOUT

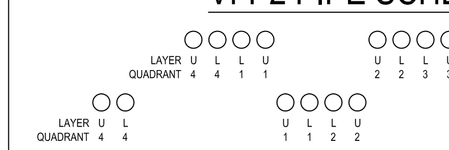
VFP1 PIPE SCHEMATIC



NOTE:
Pipe schematic drawn as if standing in Settling Pond looking west towards the discharge and flush pipes.

Layer: L - Lower Tier, U - Upper Tier
Quadrant: Corresponds to VFP labels

VFP2 PIPE SCHEMATIC



NOTE:
Pipe schematic drawn as if standing in Settling Pond looking west towards the discharge and flush pipes.

Layer: L - Lower Tier, U - Upper Tier
Quadrant: Corresponds to VFP labels

Notes:
Base map prepared by PA DEP, BAMR, from aerial photographs taken 2/16/99.
As-Built EDM survey by Chamberlin Surveying and Consulting, Brookville PA with additional information from site inspections provided by BioMost, Inc., Aquascape, and Quality Aggregates.
Wetland surface areas calculated at approximate water elevation.
Water surface areas and elevations subject to change based on passive component permeability and/or spillway outlet conditions.
Diversion ditch not located by survey.

Passive Component Abbreviations:
SP - Settling Pond
VFP - Vertical Flow Pond
WL - Wetland

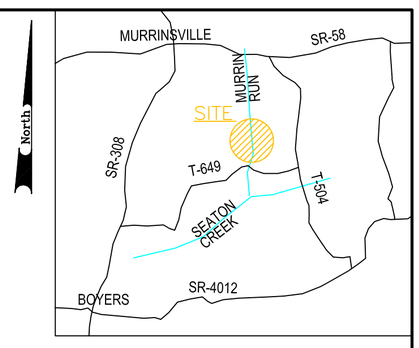
50 25 0 50 100

SHEET 2 OF 4

REVIEWED BY	REVIEWED BY

AS-BUILT PLANS - VFP 1 & 2
GOFF STATION RESTORATION AREA
Slippery Rock Watershed Coalition
STREAM RESTORATION INCORPORATED
situate in
Venango Township
Butler County, PA
Scale: 1" = 50' Date: 11/2001
BioMost, Inc., Cranberry Twp., PA

102903\Goff Station As-Builts\VFP1&2



PIPE SCHEMATIC

DISCHARGE PIPES

LAYER	L	L	L	L	U	U	U	U	U	U	U	U	L	L	L	L
QUADRANT	4	3	2	1	4	3	2	1	1	2	3	4	1	2	3	4

FLUSH PIPES

LAYER	U	U	U	U	U	U	U	U
QUADRANT	4	3	2	1	1	2	3	4

LAYER	L	L	L	L	L	L	L	L
QUADRANT	4	3	2	1	1	2	3	4

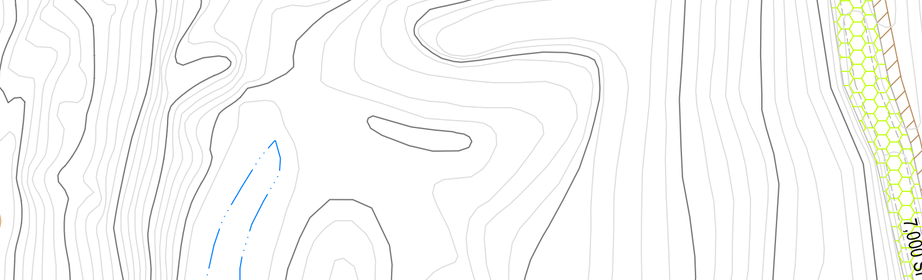
NOTE:
Pipe schematic drawn as if standing on ther berm between the Flush Pond and Wetland 2 looking north towards the discharge and flush pipes.

Layer: L - Lower Tier, U - Upper Tier
Quadrant: Corresponds to VFP labels

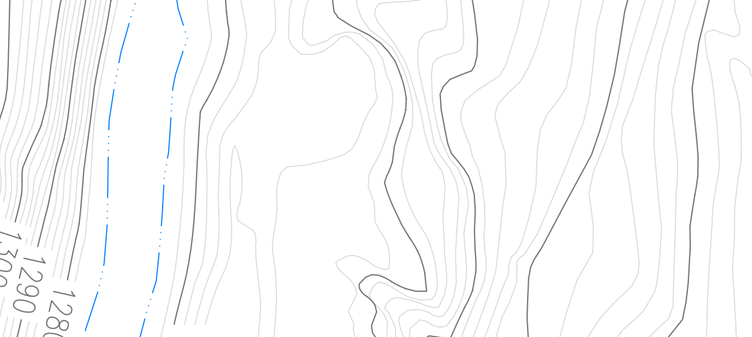
LEGEND

- PASSIVE SYSTEM COMPONENT
- CONTOUR - INDEX
- CONTOUR - INTERMEDIATE
- WATER
- PROJECT BOUNDARY
- E(OH) — UTILITY LINE (E-ELECTRIC)
- Ø — UTILITY POLE
- PAVED/IMPROVED ROAD
- UNIMPROVED ROAD
- TRAIL
- OUT BUILDING OR OTHER STRUCT.
- 4" PVC SCH 40 SOLID (UPPER TIER)
- 4" PVC SCH 40 PERFORATED (UPPER TIER)
- 4" PVC SCH 40 SOLID (LOWER TIER)
- 4" PVC SCH 40 PERFORATED (LOWER TIER)
- 10" PVC SDR 35 SOLID
- 8" PVC SDR 35 SOLID
- RIP RAP (R-4) SPILLWAY/CHANNEL
- BIOSWALE (VEGETATED CHANNEL)
- ×1213.6 — SPOT ELEVATION
- A — A' — AS BUILT CROSS SECTION
- TOP OF EMBANKMENT
- TOE OF SLOPE
- FLUSH VALVE
- ADJUSTABLE OUTLET RISER
- CLEANOUT

ST41 RISER INLET



BAT HIBERNACULUM



Notes:
Base map prepared by PA DEP, BAMR, from aerial photographs taken 2/16/99.
As-Built EDM survey by Chamberlin Surveying and Consulting, Brookville PA with additional information from site inspections provided by BioMost, Inc., Aquascape, and Quality Aggregates.
Wetland surface areas calculated at approximate water elevation.
Water surface areas and elevations subject to change based on passive component permeability and/or spillway outlet conditions.
Diversion ditch not located by survey.

Passive Component Abbreviations:
FP - Flush Pond
VFP - Vertical Flow Pond
WL - Wetland

50 25 0 50 100

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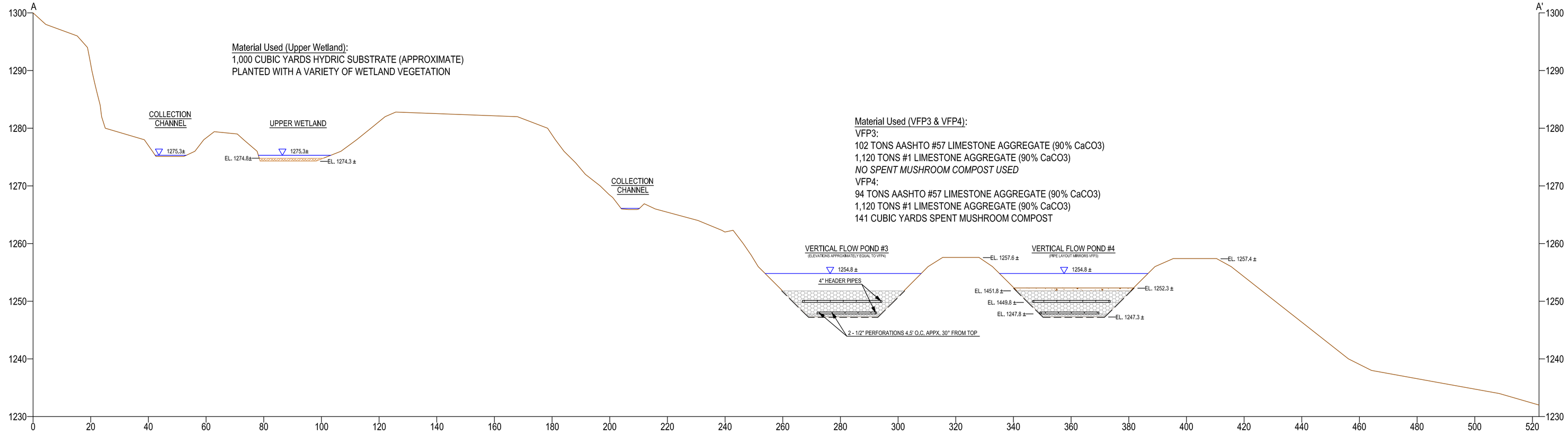
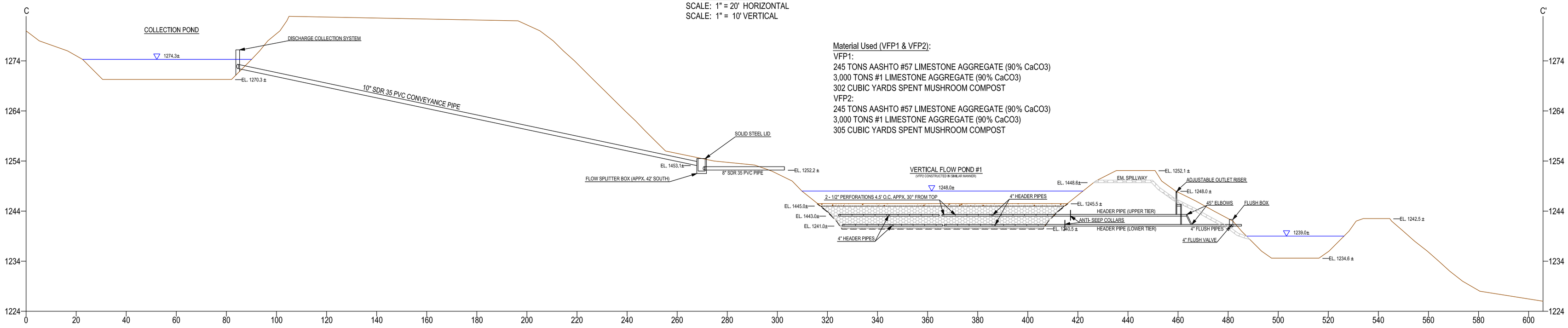
SHEET 3 OF 4

AS-BUILT PLANS - VFP 3 & 4
GOFF STATION RESTORATION AREA
Slippery Rock Watershed Coalition
STREAM RESTORATION INCORPORATED
situate in
Venango Township
Butler County, PA
Scale: 1" = 50' Date: 11/2001
BioMost, Inc., Cranberry Twp., PA

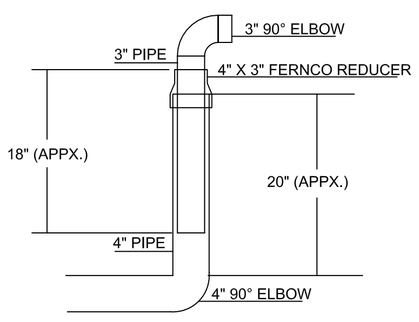
102903/Goff Station As-Builts/VFP3&4



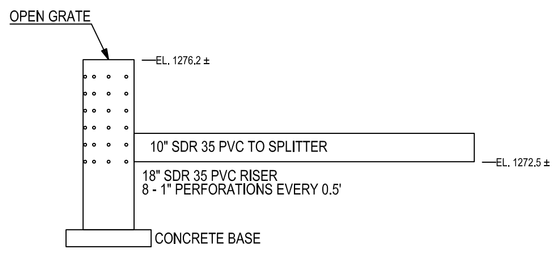
SECTION A - A'
SCALE: 1" = 20' HORIZONTAL
SCALE: 1" = 10' VERTICAL



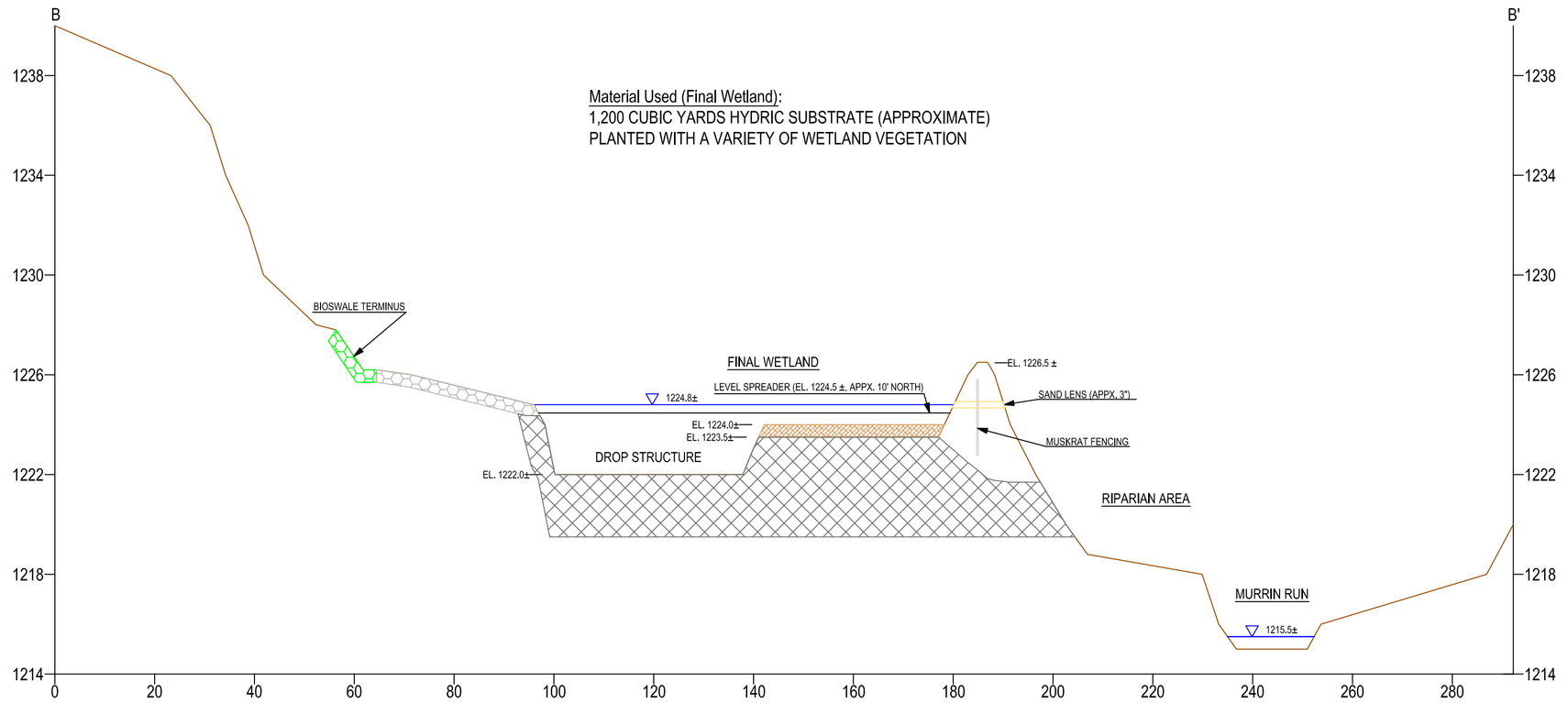
SECTION C - C'
SCALE: 1" = 20' HORIZONTAL
SCALE: 1" = 10' VERTICAL



SCALE: 1" = 1'
ADJUSTABLE OUTLET RISER TYPICAL



DISCHARGE COLLECTION SYSTEM
(NOT TO SCALE)



SECTION B - B'
SCALE: 1" = 20' HORIZONTAL
SCALE: 1" = 4' VERTICAL

Treatment Abbreviations:
FP - Flush Pond
SP - Settling Pond
VFP - Vertical Flow Pond
WL - Wetland

Notes:
Chain link fenced built into berm to prevent destructive nature of muskrats.
Wetland elevations are averages. Microtopographic relief, irregular edges, and other features incorporated to maximize natural function.
Hydric substrate volume provided by Aquascape (Approximate).
Compost volume calculated from As-Built Plans (Approximate).
AASHTO #57 limestone tonnage calculated from As-Built Plans (Approximate).

LEGEND

- LIMESTONE (AASHTO #57)
- LIMESTONE (AASHTO #1)
- RIP RAP (R-4)
- SPENT MUSHROOM COMPOST
- HYDRIC SUBSTRATE
- BIOSWALE
- CLAY LINER
- GROUND SURFACE
- WATER
- PVC SCH 40 PIPE (SIZE AND TYPE AS NOTED)
- GEOTEXTILE
- SAND LENS

20 10 0 20 40

REVIEWED BY	REVIEWED BY

SHEET 4 OF 4

AS-BUILT CROSS-SECTIONS
GOFF STATION RESTORATION AREA
Slippery Rock Watershed Coalition
STREAM RESTORATION INCORPORATED
situate in
Venango Township
Butler County, PA
Scale: 1" = 20' Date: 11/2001
BioMost, Inc., Cranberry Twp., PA

102903/Goff Station As-Builts/XS/ALL

Water Sampling Points

Discharge Sampling Points

1. **ST38**
2. **ST39**
3. **ST40**
4. **40-A**
5. **ST41**
6. **ST42**

Stream Sampling Points

7. **13**
8. **18**
9. **19**
10. **19A**

Passive Treatment Sampling Points

11. **38/39 RAW**
12. **VFP1**
13. **VFP2**
14. **SP1**
15. **WL1**

16. **41 RAW**
17. **UPPER WL**

18. **40/40A/42 RAW**
19. **VFP3**
20. **VFP4**
21. **WL2**

22. **BIOSWALE**

23. **FINAL WL**

Goff Station Water Quality Database

Sample Point	Date	Method of Flow Meas.	Flow (gpm)	Field pH	Lab pH	Spec. cond. (umhos/cm)	Field Temp (C)	Alk. (F) (mg/L)	Alk. (L) (mg/L)	Acid. (mg/L)	T. Fe (mg/L)	D. Fe (mg/L)	T. Mn (mg/L)	D. Mn (mg/L)	T. Al (mg/L)	D. Al (mg/L)	Sulfate (mg/L)	Susp. Solids (mg/L)
ST38	1/30/96	Measured	40		3.4				0	176	29.8		2.4		13.8		487	12
ST38	2/21/96	Measured	30		3.3				0	128	16.3		2.2		10.5		393	6
ST38	3/13/96	Measured	30		3.4				0	98	5.8		1.7		6.0		327	12
ST38	4/17/96	Measured	30		3.5				0	74	4.7		1.7		5.5		351	3
ST38	5/7/96	Measured	50		3.5				0	68	2.2		1.6		4.3		294	3
ST38	6/5/96	Measured	25		3.3				0	74	3.2		1.7		4.9		361	3
ST38	7/10/96	Measured	20		3.3				0	126	10.4		2.1		8.3		519	0
ST38	8/14/96	Measured	0															
ST38	9/10/96	Measured	2		3.0				0	142	5.3		2.2		7.2		407	4
ST38	9/10/96	Estimated	2		3.0				0	142	5.3		2.2		7.2		407	4
ST38	10/8/96	Measured	30		3.3				0	208	31.6		2.8		12.7		551	18
ST38	11/19/96	Measured	45		3.4				0	108	9.4		2.3		8.3		424	14
ST38	12/11/96	Measured	55		3.6				0	76	4.0		1.9		5.2		577	0
ST38	1/15/97	Measured	29		3.6				0	76	4.4		1.9		5.3		466	0
ST38	2/11/97	Measured	45		3.6				0	70	3.8		1.9		5.6		426	0
ST38	3/11/97	Measured	78		3.6				0	56	2.0		1.6		4.1		297	0
ST38	4/15/97	Measured	50		3.6				0	58	2.4		1.8		4.6		366	0
ST38	5/13/97	Measured	25		3.5				0	80	3.5		1.9		5.4		383	0
ST38	7/10/97	Measured	3		3.1				0	184	18.9		3.1		9.9		517	0
ST38	10/9/97	Measured	0															
ST38	1/30/98	Estimated	40		3.7				0	144	21.8		2.4		8.7		458	0
ST38	4/15/98	Estimated	50		3.7				0	78	11.2		1.9		5.2		356	0
ST38	2/23/00	Measured	0															
ST38	4/17/00			3.3	3.3	1199	15		0	263	41.7		2.3		15.6		687	3

Goff Station Water Quality Database

Sample Point	Date	Method of Flow Meas.	Flow (gpm)	Field pH	Lab pH	Spec. cond. (umhos/cm)	Field Temp (C)	Alk. (F) (mg/L)	Alk. (L) (mg/L)	Acid. (mg/L)	T. Fe (mg/L)	D. Fe (mg/L)	T. Mn (mg/L)	D. Mn (mg/L)	T. Al (mg/L)	D. Al (mg/L)	Sulfate (mg/L)	Susp. Solids (mg/L)
Min			0	3.3	3.0	1199	15		0	56	2.0		1.6		4.1		294	0
Max			78	3.3	3.7	1199	15		0	263	41.7		3.1		15.6		687	18
Avg			30	3.3	3.4	1199	15		0	116	11.3		2.1		7.5		431	4
Range			78	0.0	0.7	0	0		0	207	39.7		1.5		11.5		393	18

Description: Abandoned Mine Discharge associated with surface and underground mining of the Brookville Coal

Goff Station Water Quality Database

Sample Point	Date	Method of Flow Meas.	Flow (gpm)	Field pH	Lab pH	Spec. cond. (umhos/cm)	Field Temp (C)	Alk. (F) (mg/L)	Alk. (L) (mg/L)	Acid. (mg/L)	T. Fe (mg/L)	D. Fe (mg/L)	T. Mn (mg/L)	D. Mn (mg/L)	T. Al (mg/L)	D. Al (mg/L)	Sulfate (mg/L)	Susp. Solids (mg/L)
ST39	10/13/94				3.3				0	138	14.5		2.8		11.0		547	3
ST39	6/7/95	Measured	275		3.6				0	56	0.7		1.7		1.9		353	4
ST39	8/15/95	Measured	29		3.3				0	66	4.3		2.5		3.5		342	6
ST39	9/12/95	Measured	25		3.4				0	78	5.0		2.4		4.2		371	3
ST39	10/11/95	Measured	25		3.3				0	88	5.4		2.7		4.1		410	3
ST39	11/7/95	Measured	25		3.4				0	80	5.0		2.5		4.6		418	4
ST39	12/5/95	Measured	19		3.4				0	92	5.9		2.7		5.8		510	3
ST39	1/30/96	Measured	430		3.5				0	82	3.7		2.3		5.1		504	3
ST39	2/21/96	Measured	78		3.4				0	60	2.9		1.9		4.0		428	7
ST39	3/13/96	Measured	362		3.6				0	66	0.7		1.5		2.1		351	3
ST39	4/17/96	Measured	139		3.6				0	42	1.3		1.5		2.2		354	3
ST39	5/7/96	Measured	544		3.8				0	54	0.4		1.6		1.6		326	3
ST39	6/5/96	Measured	122		3.7				0	40	1.4		1.5		1.9		352	3
ST39	7/10/96	Measured	122		3.7				0	40	1.3		1.6		2.0		447	0
ST39	8/14/96	Measured	50		3.5				0	60	2.4		1.9		2.4		383	0
ST39	9/10/96	Measured	45		3.5				0	58	3.6		2.0		2.4		387	6
ST39	10/8/96	Measured	189		3.7				0	54	1.8		2.2		2.9		429	4
ST39	11/19/96	Measured	395		3.7				0	42	1.0		2.0		2.2		427	14
ST39	12/11/96	Measured	395		3.9				0	44	0.6		1.7		1.6		436	0
ST39	1/15/97	Measured	223		4.0				3	34	0.6		1.7		1.6		471	0
ST39	2/11/97	Measured	363		4.0				2	32	0.5		1.8		1.6		427	0
ST39	3/11/97	Measured	564		4.0				2	30	0.3		1.6		1.2		351	0
ST39	4/15/97	Measured	302		4.1				5	24	0.5		1.6		1.1		343	0
ST39	5/13/97	Measured	248		4.0				3	30	0.6		1.6		1.2		357	0
ST39	7/10/97	Measured	66		3.8				0	48	1.9		1.9		1.7		369	0
ST39	10/9/97	Measured	29		3.4				0	64	4.6		2.4		2.3		451	0
ST39	1/30/98	Estimated	150		3.9				0	36	1.9		2.0		2.1		422	4
ST39	4/15/98	Estimated	150		4.0				3	22	0.9		1.8		1.2		392	0
ST39	2/2/00			3.7	3.5	1110	4		0	88	6.1		3.7		3.6		845	7

Goff Station Water Quality Database

Sample Point	Date	Method of Flow Meas.	Flow (gpm)	Field pH	Lab pH	Spec. cond. (umhos/cm)	Field Temp (C)	Alk. (F) (mg/L)	Alk. (L) (mg/L)	Acid. (mg/L)	T. Fe (mg/L)	D. Fe (mg/L)	T. Mn (mg/L)	D. Mn (mg/L)	T. Al (mg/L)	D. Al (mg/L)	Sulfate (mg/L)	Susp. Solids (mg/L)
ST39	2/23/00	Estimated	50		3.5				0	84	10.9		3.4		4.8		617	0
ST39	4/17/00			3.5	3.6	899	12		0	51	2.3		1.7		3.4		462	2
Min			19	3.5	3.3	899	4		0	22	0.3		1.5		1.1		326	0
Max			564	3.7	4.1	1110	12		5	138	14.5		3.7		11.0		845	14
Avg			193	3.6	3.6	1005	8		1	58	3.0		2.1		2.9		428	3
Range			545	0.2	0.8	211	8		5	116	14.2		2.2		9.9		519	14

Description: Abandoned Mine Discharge connected to surface and underground mining of the Brookville coal.

Goff Station Water Quality Database

Sample Point	Date	Method of Flow Meas.	Flow (gpm)	Field pH	Lab pH	Spec. cond. (umhos/cm)	Field Temp (C)	Alk. (F) (mg/L)	Alk. (L) (mg/L)	Acid. (mg/L)	T. Fe (mg/L)	D. Fe (mg/L)	T. Mn (mg/L)	D. Mn (mg/L)	T. Al (mg/L)	D. Al (mg/L)	Sulfate (mg/L)	Susp. Solids (mg/L)
ST40	6/7/95	Measured	43		3.7				0	40	0.3		1.5		0.9		369	10
ST40	8/15/95	Measured	45		3.6				0	32	0.7		2.4		1.4		426	3
ST40	9/12/95	Measured	29		3.5				0	50	2.8		2.6		2.5		484	3
ST40	10/11/95	Measured	25		3.3				0	62	3.2		2.6		2.4		504	3
ST40	11/7/95	Measured	25		3.3				0	74	5.5		2.6		3.1		556	3
ST40	12/5/95	Measured	36		3.3				0	114	9.3		2.9		4.9		683	3
ST40	1/30/96	Measured	45		3.6				0	50	5.2		2.2		2.5		451	6
ST40	2/21/96	Measured	45		3.4				0	46	2.9		1.9		1.9		471	3
ST40	3/13/96	Measured	36		3.6				0	52	1.4		1.3		1.1		333	14
ST40	4/17/96	Measured	32		3.8				0	26	0.6		1.2		0.8		337	3
ST40	5/7/96	Measured	45		3.8				0	30	0.4		1.1		0.6		313	3
ST40	6/5/96	Measured	25		3.8				0	24	0.4		1.2		0.8		315	3
ST40	7/10/96	Measured	30		3.8				0	26	0.0		1.4		0.7		442	0
ST40	8/14/96	Measured	45		3.7				0	28	0.3		2.0		0.8		441	0
ST40	9/10/96	Measured	40		3.7				0	28	0.7		2.1		0.9		530	0
ST40	10/8/96	Measured	50		3.8				0	32	0.4		2.3		1.1		480	0
ST40	11/19/96	Measured	36		3.9				0	26	0.4		1.7		1.0		387	10
ST40	12/11/96	Measured	45		4.0				3	30	0.4		1.4		0.9		362	0
ST40	1/15/97	Measured	36		4.1				4	6	0.3		1.2		0.7		362	0
ST40	2/11/97	Measured	45		4.6				8	10	0.0		1.2		0.0		357	0
ST40	3/11/97	Measured	29		4.2				5	10	0.0		1.3		0.0		329	0
ST40	4/15/97	Measured	19		4.3				7	15	0.4		1.4		0.0		363	0
ST40	5/13/97	Measured	17		4.2				6	19	0.0		1.3		0.0		337	0
ST40	10/9/97	Measured	17	3.6					0	38	2.3		2.9		1.1		542	0
ST40	1/30/98	Estimated	40		3.8				0	30	1.2		1.7		1.0		414	0
ST40	4/15/98	Estimated	40		3.9				0	19	0.5		1.5		0.8		374	0
ST40	2/2/00			3.4	3.5	1115	9		0	82	14.4		2.9		1.7		723	10
ST40	2/23/00	Estimated	40		3.5				0	58	4.5		2.9		2.0		684	0
ST40	4/17/00			3.7	3.7	911	11		0	35	3.5		1.8		1.1		501	5

Goff Station Water Quality Database

Sample Point	Date	Method of Flow Meas.	Flow (gpm)	Field pH	Lab pH	Spec. cond. (umhos/cm)	Field Temp (C)	Alk. (F) (mg/L)	Alk. (L) (mg/L)	Acid. (mg/L)	T. Fe (mg/L)	D. Fe (mg/L)	T. Mn (mg/L)	D. Mn (mg/L)	T. Al (mg/L)	D. Al (mg/L)	Sulfate (mg/L)	Susp. Solids (mg/L)
ST40	7/27/01				4.1				4	82	8.9		2.5		1.5		420	
ST40	10/16/01	Estimated	15		4.2				7	77	17.4		2.9		1.9		467	
ST40	7/10/07	Estimated	15		4.2				5	22	0.5		1.5		0.5		358	0
Min			15	3.4	3.3	911	9		0	6	0.0		1.1		0.0		313	0
Max			50	3.7	4.6	1115	11		8	114	17.4		2.9		4.9		723	14
Avg			34	3.6	3.8	1013	10		2	40	2.8		1.9		1.3		441	3
Range			35	0.3	1.3	204	3		8	108	17.4		1.8		4.9		410	14

Description: Abandoned Mine Discharge connected to surface and underground mining of the Brookville coal.

Goff Station Water Quality Database

Sample Point	Date	Method of Flow Meas.	Flow (gpm)	Field pH	Lab pH	Spec. cond. (umhos/cm)	Field Temp (C)	Alk. (F) (mg/L)	Alk. (L) (mg/L)	Acid. (mg/L)	T. Fe (mg/L)	D. Fe (mg/L)	T. Mn (mg/L)	D. Mn (mg/L)	T. Al (mg/L)	D. Al (mg/L)	Sulfate (mg/L)	Susp. Solids (mg/L)
40-A	10/30/00	Bucket	9	4.5	3.5	1234	10		0	93	23.5	22.2	2.9	2.8	5.7	2.8	642	4
Min			9	4.5	3.5	1234	10		0	93	23.5	22.2	2.9	2.8	5.7	2.8	642	4
Max			9	4.5	3.5	1234	10		0	93	23.5	22.2	2.9	2.8	5.7	2.8	642	4
Avg			9	4.5	3.5	1234	10		0	93	23.5	22.2	2.9	2.8	5.7	2.8	642	4
Range			0	0.0	0.0	0	0		0	0	0.0	0.0	0.0	0.0	0.0	0.0	0	0

Description: Seep encountered during construction

Goff Station Water Quality Database

Sample Point	Date	Method of Flow Meas.	Flow (gpm)	Field pH	Lab pH	Spec. cond. (umhos/cm)	Field Temp (C)	Alk. (F) (mg/L)	Alk. (L) (mg/L)	Acid. (mg/L)	T. Fe (mg/L)	D. Fe (mg/L)	T. Mn (mg/L)	D. Mn (mg/L)	T. Al (mg/L)	D. Al (mg/L)	Sulfate (mg/L)	Susp. Solids (mg/L)
ST41	6/7/95	Measured	247		6.0				22	12	0.5		1.0		0.5		336	6
ST41	8/15/95	Measured	45		3.7				0	54	0.9		2.4		1.7		423	4
ST41	9/12/95	Measured	29		3.7				0	44	1.3		2.5		2.3		454	3
ST41	10/11/95	Measured	22		3.5				0	48	1.8		2.6		2.2		506	4
ST41	11/7/95	Measured	19		3.5				0	50	1.9		2.5		2.5		484	7
ST41	12/5/95	Measured	19		3.5				0	64	3.3		2.8		3.1		616	3
ST41	1/30/96	Measured	331		6.0				22	14	5.8		1.6		0.9		362	6
ST41	2/21/96	Measured	122		4.0				2	32	3.2		2.0		1.6		457	4
ST41	3/13/96	Measured	78		4.0				2	50	1.2		1.6		1.3		364	12
ST41	4/17/96	Measured	55		3.9				0	28	1.0		1.4		1.2		346	3
ST41	5/7/96	Measured	78		4.1				3	30	0.5		1.3		0.9		302	3
ST41	7/10/96	Measured	50		3.9				0	26	0.8		1.5		0.9		419	0
ST41	8/14/96	Measured	45		3.8				0	28	1.1		1.8		1.1		387	0
ST41	9/10/96	Measured	40		3.8				0	28	1.6		2.0		1.2		399	0
ST41	10/8/96	Measured	55		3.9				0	36	0.9		2.3		1.5		624	4
ST41	11/19/96	Measured	55		3.9				0	28	0.5		1.9		1.3		412	10
ST41	12/11/96	Measured	45		4.0				3	32	1.3		1.7		1.2		335	0
ST41	1/15/97	Measured	45		4.1				5	22	0.0		1.3		0.9		369	0
ST41	2/11/97	Measured	72		5.7				14	13	0.0		1.1		0.0		339	6
ST41	3/11/97	Measured	91		4.8				9	16	0.0		1.1		0.6		314	0
ST41	4/15/97	Measured	66		4.3				7	16	0.4		1.2		0.7		350	0
ST41	5/13/97	Measured	55		4.3				6	18	0.3		1.1		0.7		315	0
ST41	7/10/97	Measured	45		4.3				5	26	0.4		1.5		0.8		362	0
ST41	10/9/97	Measured	29		3.7				0	38	1.5		2.6		1.5		510	0
ST41	1/30/98	Measured	78		4.0				3	22	0.9		1.7		1.1		431	0
ST41	4/15/98	Measured	78		4.0				3	18	0.4		1.4		0.8		370	0
ST41	2/2/00			3.6	3.5	1237	6		0	69	8.4		2.8		2.7		895	8
ST41	2/23/00	Measured	40		3.5				0	52	3.6		2.7		2.0		702	0
ST41	4/17/00			3.7	3.7	929	12		0	49	2.4		1.9		1.5		488	3

Goff Station Water Quality Database

Sample Point	Date	Method of Flow Meas.	Flow (gpm)	Field pH	Lab pH	Spec. cond. (umhos/cm)	Field Temp (C)	Alk. (F) (mg/L)	Alk. (L) (mg/L)	Acid. (mg/L)	T. Fe (mg/L)	D. Fe (mg/L)	T. Mn (mg/L)	D. Mn (mg/L)	T. Al (mg/L)	D. Al (mg/L)	Sulfate (mg/L)	Susp. Solids (mg/L)
ST41	10/16/01				5.8				15	84	0.4		2.5		0.0		403	
Min			19	3.6	3.5	929	6		0	12	0.0		1.0		0.0		302	0
Max			331	3.7	6.0	1237	12		22	84	8.4		2.8		3.1		895	12
Avg			72	3.6	4.2	1083	9		4	35	1.5		1.9		1.3		436	3
Range			312	0.1	2.6	308	6		22	72	8.4		1.8		3.1		593	12

Description: Abandoned Mine Discharge connected to surface and underground mining of the Brookville coal.

Goff Station Water Quality Database

Sample Point	Date	Method of Flow Meas.	Flow (gpm)	Field pH	Lab pH	Spec. cond. (umhos/cm)	Field Temp (C)	Alk. (F) (mg/L)	Alk. (L) (mg/L)	Acid. (mg/L)	T. Fe (mg/L)	D. Fe (mg/L)	T. Mn (mg/L)	D. Mn (mg/L)	T. Al (mg/L)	D. Al (mg/L)	Sulfate (mg/L)	Susp. Solids (mg/L)
ST42	1/30/96		30		4.4				7	34	2.7		1.5		0.8		340	6
ST42	2/21/96		30		4.6				7	28	2.8		1.8		0.7		392	3
ST42	3/13/96		40		4.6				7	46	2.0		1.5		0.6		365	8
ST42	4/17/96		40		4.5				7	24	1.4		1.1		0.0		344	3
ST42	5/7/96		40		4.4				6	36	1.3		0.9		0.0		300	4
ST42	7/10/96		40		4.6				8	19	1.6		0.7				396	4
ST42	8/14/96		40		4.1				4	18	1.0		1.0		0.0		327	4
ST42	9/10/96		35		4.0				3	19	1.2		1.1		0.0		353	12
ST42	10/8/96		40		4.3				6	22	1.6		0.9		0.0		341	12
ST42	11/19/96		30		5.2				10	16	1.7		0.8		0.0		369	26
ST42	12/11/96		50		5.2				12	19	1.6		0.7		0.0		316	0
ST42	1/15/97		40		5.7				16	7	1.0		0.5		0.0		311	0
ST42	2/11/97		40		6.0				28	0	1.5		0.5		0.0		299	0
ST42	3/11/97		50		6.2				28	0	0.7		0.3		0.0		274	0
ST42	4/15/97		50		6.1				22	0	1.0		0.3		0.0		283	0
ST42	5/13/97		30		6.0				22	0	1.3		0.4		0.0		282	0
ST42	7/10/97		20		5.8				17	13	2.0		0.6		0.0		298	0
ST42	10/9/97		20		5.2				10	17	3.7		1.2		0.0		359	0
ST42	2/2/00			4.9	4.9	1062	3		3	15	3.3		1.3		24.3		666	8
ST42	4/17/00			4.7	4.3	891	12		0	13	1.3		1.4		0.5		480	5
ST42	7/27/01				4.6				8	88	11.4		8.6		0.0		429	
ST42	10/16/01	Estimated	2		4.9				11	94	16.7		5.3		0.0		428	
Min			2	4.7	4.0	891	3		0	0	0.7		0.3		0.0		274	0
Max			50	4.9	6.2	1062	12		28	94	16.7		8.6		24.3		666	26
Avg			35	4.8	5.0	977	7		11	24	2.9		1.5		1.3		361	5
Range			48	0.2	2.2	171	9		28	94	16.0		8.3		24.3		392	26

Description: Abandoned Mine Discharge connected to surface and underground mining of the Brookville coal.

Goff Station Water Quality Database

Sample Point	Date	Method of Flow Meas.	Flow (gpm)	Field pH	Lab pH	Spec. cond. (umhos/cm)	Field Temp (C)	Alk. (F) (mg/L)	Alk. (L) (mg/L)	Acid. (mg/L)	T. Fe (mg/L)	D. Fe (mg/L)	T. Mn (mg/L)	D. Mn (mg/L)	T. Al (mg/L)	D. Al (mg/L)	Sulfate (mg/L)	Susp. Solids (mg/L)
13	8/24/93				7.2				110	0	0.4		0.7		0.5		492	4
13	11/2/94				7.1				52	0	0.5		0.9		0.5		94	12
13	3/22/95				6.5				28	0	0.5		7.4		1.9		386	6
13	4/18/95				6.5				28	0	1.1		6.2		2.4		362	10
13	6/7/95				7.4				94	0	0.3		1.1		0.5		175	4
13	6/29/95				7.1				110	0	0.5		2.9		0.5		180	4
13	8/22/95				6.7				72	0	0.9		10.7		0.5		658	3
13	9/12/95				6.7				86	0	0.9		6.3		0.5		666	3
13	10/11/95				6.5				62	0	1.0		7.2		0.5		689	12
13	11/7/95				6.5				92	0	1.3		5.8		0.5		357	9
13	12/6/95				7.3				86	0	0.5		3.3		0.5		234	4
13	1/30/96				6.3				24	6	0.5		8.3		4.0		369	22
13	2/22/96				5.3				8	20	0.3		6.5		3.0		232	26
13	3/14/96				6.2				26	6	0.4		5.8		2.4		324	9
13	4/17/96				5.8				16	22	0.3		8.7		3.0		373	3
13	5/8/96				6.6				58	0	0.3		4.8		0.8		198	3
13	6/5/96				5.9				17	40	4.1		16.3		6.1		603	3
13	5/18/99				6.5				40	0	0.6		17.0		1.8		631	10
13	8/27/99				6.8				56	0	0.8		10.5		0.0		707	0
13	3/8/00				6.6				50	0	0.4		5.9		1.6		414	0
13	1/24/01				6.8				80	0	1.0		4.5		0.5		436	8
13	4/5/01				6.6				34	0	0.3		7.6		1.0		401	0
13	5/8/01				7.1				80	0	0.3		5.8		0.0		340	0
13	7/17/01				7.2				78	0	0.0		5.4		0.0		633	6
13	10/18/01				7.0				76	0	0.4		3.3		0.0		641	10

Goff Station Water Quality Database

Sample Point	Date	Method of Flow Meas.	Flow (gpm)	Field pH	Lab pH	Spec. cond. (umhos/cm)	Field Temp (C)	Alk. (F) (mg/L)	Alk. (L) (mg/L)	Acid. (mg/L)	T. Fe (mg/L)	D. Fe (mg/L)	T. Mn (mg/L)	D. Mn (mg/L)	T. Al (mg/L)	D. Al (mg/L)	Sulfate (mg/L)	Susp. Solids (mg/L)
Min					5.3				8	0	0.0		0.7		0.0		94	0
Max					7.4				110	40	4.1		17.0		6.1		707	26
Avg					6.6				59	4	0.7		6.5		1.3		424	7
Range					2.1				102	40	4.1		16.4		6.1		613	26

Description: Murrin Run; Upstream of Goff Station; sampled at bridge on RT58; DEP Sampling Point

Goff Station Water Quality Database

Sample Point	Date	Method of Flow Meas.	Flow (gpm)	Field pH	Lab pH	Spec. cond. (umhos/cm)	Field Temp (C)	Alk. (F) (mg/L)	Alk. (L) (mg/L)	Acid. (mg/L)	T. Fe (mg/L)	D. Fe (mg/L)	T. Mn (mg/L)	D. Mn (mg/L)	T. Al (mg/L)	D. Al (mg/L)	Sulfate (mg/L)	Susp. Solids (mg/L)
18	5/3/94				6.3				22	13	1.3		8.8		3.8		252	20
18	11/2/94				6.6				26	0	1.0		4.2		0.6		247	8
18	3/22/95				6.5				28	0	1.0		5.4		1.6		358	6
18	4/18/95				6.5				26	0	1.1		6.1		2.5		2989	14
18	6/7/95				6.6				32	0	0.3		4.4		0.5		323	6
18	6/29/95				6.5				36	0	0.5		6.7		0.5		47	26
18	8/22/95				6.4				62	0	0.7		4.7		0.5		505	6
18	9/12/95				6.6				64	0	0.8		3.4		0.5		560	3
18	10/11/95				6.6				60	0	0.9		3.2		0.5		495	4
18	11/7/95				6.4				46	0	1.5		3.7		0.7		394	3
18	12/5/95				6.9				44	0	0.9		4.3		0.5		362	3
18	1/30/96				6.3				20	5	1.4		5.4		3.1		309	20
18	2/21/96				5.5				9	9	0.9		5.5		2.8		207	20
18	3/13/96				6.2				18	36	0.9		6.5		2.9		328	20
18	4/17/96				6.1				15	9	0.8		7.1		2.3		326	8
18	5/7/96				6.2				16	18	0.7		6.1		1.4		304	6
18	6/5/96				6.2				30	10	0.9		9.1		0.6		449	3
18	7/10/96				6.3				46	0	1.4		6.2		0.5		395	4
18	8/14/96				6.5				52	0	1.0		5.5		0.0		487	0
18	9/11/96				6.5				34	0	0.8		5.3		0.0		291	0
18	10/8/96				6.7				48	0	0.7		4.7		0.6		327	4
18	11/19/96				6.4				28	1	0.8		5.6		1.0		310	36
18	12/11/96				6.3				28	28	1.0		7.4		2.1		327	0
18	1/15/97				6.4				34	2	1.2		7.5		1.9		607	0
18	2/11/97				6.4				28	0	0.8		5.8		1.7		354	0
18	3/11/97				6.2				16	11	0.9		5.0		2.8		249	10
18	4/15/97				6.0				16	12	0.7		7.4		2.4		317	4
18	4/24/97				6.3				28	0	1.8		7.9		0.9		389	0
18	5/13/97				6.5				34	0	0.7		6.3		0.5		460	0

Goff Station Water Quality Database

Sample Point	Date	Method of Flow Meas.	Flow (gpm)	Field pH	Lab pH	Spec. cond. (umhos/cm)	Field Temp (C)	Alk. (F) (mg/L)	Alk. (L) (mg/L)	Acid. (mg/L)	T. Fe (mg/L)	D. Fe (mg/L)	T. Mn (mg/L)	D. Mn (mg/L)	T. Al (mg/L)	D. Al (mg/L)	Sulfate (mg/L)	Susp. Solids (mg/L)
18	7/10/97				6.7				58	0	0.9		6.1		0.0		451	0
18	7/16/97				6.5				62	0	0.7		4.7		0.0		478	0
18	10/9/97				6.3				56	0	0.8		6.1		0.0		443	4
18	1/30/98				6.0				24	7	1.2		8.1		3.2		405	12
18	4/15/98				5.7				12	10	0.7		4.8		1.7		228	0
18	6/2/98				6.5				38	0	0.8		12.7		0.0		529	0
18	7/28/98				6.5				46	0	0.7		10.9		0.3		684	0
18	11/5/98				6.6				68	0	1.5		5.4		0.4		438	
18	3/24/99				6.3				26	0	0.9		5.8		1.6		345	32
18	6/17/99				6.6				44	0	0.9		8.2		0.3		510	0
18	9/1/99				6.6				54	0	1.4		0.5		0.2		512	0
18	12/21/99				4.3				7	19	0.0		1.2		1.8		202	0
18	2/10/00				6.6				66	0	1.4		4.9		0.5		624	6
18	3/30/00	Measured	1900		6.3				34	0	0.8		3.9		0.0		368	0
18	5/10/00	Measured	3200		6.6				36	0	0.8		8.3		0.0		413	0
18	6/28/00				6.5				44	0	2.0		6.7		0.0		377	8
18	9/14/00				6.4				52	0	1.8		5.2		0.0		560	0
18	11/17/00				6.8				60	0	1.6		3.2		0.0		569	8
18	1/24/01				6.8				60	0	2.4		4.5		0.0		445	16
18	4/5/01	Measured	1740		6.5				34	0	0.2		4.2		0.0		397	6
18	5/8/01	Measured	2060		6.7				48	0	1.0		4.8		0.0		361	0
18	7/11/01				7.0				58	0	1.0		4.5		0.0		391	10
18	8/6/01				7.0	1018			81		0.7		2.0		0.1		543	2
18	10/18/01				6.9				74	0	0.9		1.9		0.0		610	4

Goff Station Water Quality Database

Sample Point	Date	Method of Flow Meas.	Flow (gpm)	Field pH	Lab pH	Spec. cond. (umhos/cm)	Field Temp (C)	Alk. (F) (mg/L)	Alk. (L) (mg/L)	Acid. (mg/L)	T. Fe (mg/L)	D. Fe (mg/L)	T. Mn (mg/L)	D. Mn (mg/L)	T. Al (mg/L)	D. Al (mg/L)	Sulfate (mg/L)	Susp. Solids (mg/L)
Min			1740		4.3	1018			7	0	0.0		0.5		0.0		47	0
Max			3200		7.0	1018			81	36	2.4		12.7		3.8		2989	36
Avg			2225		6.4	1018			39	4	1.0		5.6		0.9		450	7
Range			1460		2.7	0			74	36	2.4		12.2		3.8		2942	36

Description: Murrin Run; Downstream of Goff Station; Sampled at the bridge on Goff Road; DEP sampling point

Goff Station Water Quality Database

Sample Point	Date	Method of Flow Meas.	Flow (gpm)	Field pH	Lab pH	Spec. cond. (umhos/cm)	Field Temp (C)	Alk. (F) (mg/L)	Alk. (L) (mg/L)	Acid. (mg/L)	T. Fe (mg/L)	D. Fe (mg/L)	T. Mn (mg/L)	D. Mn (mg/L)	T. Al (mg/L)	D. Al (mg/L)	Sulfate (mg/L)	Susp. Solids (mg/L)
19	5/3/94				5.0				11	68	10.0		19.0		3.1		512	3
19	11/2/94				4.1				4	34	1.0		7.9		0.7		232	14
19	3/22/95				5.0				10	38	6.6		14.1		1.4		428	3
19	6/7/95				5.1				9	56	6.3		11.0		0.5		358	8
19	6/29/95				3.8				0	38	2.1		14.1		0.7		395	14
19	8/22/95				3.4				0	96	2.7		25.9		0.6		767	6
19	9/12/95				3.5				0	100	2.8		28.1		0.8		814	6
19	10/11/95				3.6				0	62	1.5		22.9		0.7		715	3
19	11/14/95				4.2				5	28	0.8		9.2		0.8		285	24
19	2/21/96				4.4				5	20	1.8		6.6		1.0		193	3
19	3/14/96				4.2				7	74	2.7		12.1		1.4		416	3
19	4/16/96				4.0				2	30	0.9		12.8		1.7		393	3
19	5/8/96				3.9				0	70	0.7		10.2		1.0		391	3
19	6/18/96				3.5				0	114	2.2		19.1		1.0		687	3
19	7/10/96				3.6				0	74	1.5		19.1		0.9		610	0
19	8/16/96				3.7				0	76	1.0		17.1		0.8		541	0
19	9/11/96				3.7				0	48	0.8		14.4		0.5		424	0
19	10/16/96				3.9				0	60	0.9		17.0		0.8		534	0
19	11/19/96				4.1				3	40	0.9		11.1		0.9		327	38
19	1/28/97				4.3				7	40	1.5		8.8		1.1		310	0
19	2/12/97				4.2				6	38	1.6		9.9		1.0		346	0
19	3/19/97				4.2				5	32	1.4		9.5		1.2		343	0
19	5/20/97				3.8				0	56	0.6		12.8		1.1		454	0
19	8/5/97				3.4				0	104	3.3		23.4		0.8		672	0
19	10/10/97				3.7				0	56	1.0		18.0		0.7		558	0
19	1/7/98				4.0				2	24	1.1		12.0		1.1		413	0
19	5/14/98				4.1				3	44	1.3		11.3		0.9		392	0
19	6/17/99				3.7				0	52	1.3		19.7		0.6		614	8
19	6/28/00				5.8				14	10	1.5		9.1		0.0		349	0

Goff Station Water Quality Database

Sample Point	Date	Method of Flow Meas.	Flow (gpm)	Field pH	Lab pH	Spec. cond. (umhos/cm)	Field Temp (C)	Alk. (F) (mg/L)	Alk. (L) (mg/L)	Acid. (mg/L)	T. Fe (mg/L)	D. Fe (mg/L)	T. Mn (mg/L)	D. Mn (mg/L)	T. Al (mg/L)	D. Al (mg/L)	Sulfate (mg/L)	Susp. Solids (mg/L)
19	4/5/01	Measured	1500		5.4				11	14	2.8		8.0		0.0		387	0
19	6/5/01			5.8	5.4	823	17		3	15	3.6	3.1	7.2	6.9	0.3	0.1	507	2
19	11/8/01			6.0	6.1	1163	10		8	23	4.8	4.6	8.9	8.7	0.2	0.2	723	3
Min			1500	5.8	3.4	823	10		0	10	0.6	3.1	6.6	6.9	0.0	0.1	193	0
Max			1500	6.0	6.1	1163	17		14	114	10.0	4.6	28.1	8.7	3.1	0.2	814	38
Avg			1500	5.9	4.2	993	14		4	51	2.3	3.9	14.1	7.8	0.9	0.1	472	5
Range			0	0.2	2.7	340	7		14	104	9.4	1.5	21.5	1.8	3.1	0.0	621	38

Description: Seaton Creek; Upstream of the confluence with Murrin Run; DEP sampling point

Goff Station Water Quality Database

Sample Point	Date	Method of Flow Meas.	Flow (gpm)	Field pH	Lab pH	Spec. cond. (umhos/cm)	Field Temp (C)	Alk. (F) (mg/L)	Alk. (L) (mg/L)	Acid. (mg/L)	T. Fe (mg/L)	D. Fe (mg/L)	T. Mn (mg/L)	D. Mn (mg/L)	T. Al (mg/L)	D. Al (mg/L)	Sulfate (mg/L)	Susp. Solids (mg/L)
19A	6/5/01			7.0	7.0	824	14		28	0	1.3	0.6	4.7	4.6	0.3	0.1	480	3
19A	11/8/01			6.9	6.6	1125	10		35	0	2.1	1.8	4.9	4.9	0.2	0.2	679	2
Min				6.9	6.6	824	10		28	0	1.3	0.6	4.7	4.6	0.2	0.1	480	2
Max				7.0	7.0	1125	14		35	0	2.1	1.8	4.9	4.9	0.3	0.2	679	3
Avg				7.0	6.8	975	12		31	0	1.7	1.2	4.8	4.7	0.3	0.1	580	3
Range				0.1	0.4	301	4		7	0	0.7	1.2	0.2	0.3	0.1	0.1	199	1

Description: Seaton Creek; Imediately downstream of the confluence with Murrin Run

Goff Station Water Quality Database

Sample Point	Date	Method of Flow Meas.	Flow (gpm)	Field pH	Lab pH	Spec. cond. (umhos/cm)	Field Temp (C)	Alk. (F) (mg/L)	Alk. (L) (mg/L)	Acid. (mg/L)	T. Fe (mg/L)	D. Fe (mg/L)	T. Mn (mg/L)	D. Mn (mg/L)	T. Al (mg/L)	D. Al (mg/L)	Sulfate (mg/L)	Susp. Solids (mg/L)
38/39 RAW	1/8/01			4.5	3.4	1697	5		0	633	150.8	135.0	3.6	3.4	8.8	8.3	1166	10
38/39 RAW	2/15/01	Estimated	20		3.5				0	356	75.9		3.0		34.2		802	6
38/39 RAW	6/5/01	Measured	2	4.3	3.0	1337	15		0	354	51.3	50.8	2.3	2.3	24.8	23.0	600	2
38/39 RAW	7/27/01				3.2				0	469	77.6		2.7		37.8		417	
38/39 RAW	9/18/01	Bucket	5	4.5	2.9	1533	16		0	428	71.3	67.5	2.5	2.4	35.5	32.7	693	8
38/39 RAW	10/16/01	Measured	2		3.0				0	597	74.3		3.8		51.8		873	4
38/39 RAW	11/8/01	Measured	2	4.5	3.1	1727	9		0	498	83.8	83.0	4.8	4.3	43.2	39.7	984	10
38/39 RAW	12/12/01			4.6	3.0	1643			0	426	78.5		3.9		37.4		821	9
38/39 RAW	1/25/02	Estimated	50		3.0	1579			0	400	107.6		4.0		40.9		1261	2
Min			2	4.3	2.9	1337	5		0	354	51.3	50.8	2.3	2.3	8.8	8.3	417	2
Max			50	4.6	3.5	1727	16		0	633	150.8	135.0	4.8	4.3	51.8	39.7	1261	10
Avg			13	4.5	3.1	1586	11		0	462	85.7	84.1	3.4	3.1	34.9	25.9	846	6
Range			49	0.3	0.6	390	11		0	279	99.5	84.3	2.5	2.1	43.1	31.4	844	8

Description: Raw sample of combined ST38 and ST39 discharges taken at the flow splitter box before passive treatment.

Goff Station Water Quality Database

Sample Point	Date	Method of Flow Meas.	Flow (gpm)	Field pH	Lab pH	Spec. cond. (umhos/cm)	Field Temp (C)	Alk. (F) (mg/L)	Alk. (L) (mg/L)	Acid. (mg/L)	T. Fe (mg/L)	D. Fe (mg/L)	T. Mn (mg/L)	D. Mn (mg/L)	T. Al (mg/L)	D. Al (mg/L)	Sulfate (mg/L)	Susp. Solids (mg/L)
VFP1	6/5/01	Bucket	2	6.9	7.2	1222	16		142	0	9.2	8.7	2.5	2.5	0.4	0.1	600	3
VFP1	9/18/01	Bucket	1	6.8	6.9	1360	20		118	0	3.7	3.4	2.1	2.0	0.1	0.1	725	10
VFP1	11/8/01	Measured	0	6.9	7.0	1427	12		82	0	2.2	2.0	2.2	2.1	0.2	0.1	900	10
VFP1	12/12/01				7.1	1335			83	0	2.4		1.9		0.1		744	6
VFP1	1/25/02	Estimated	25		7.2	1419			110	0	8.9	8.2	3.6	3.3	0.1	0.1	1131	7
Min			0	6.8	6.9	1222	12		82	0	2.2	2.0	1.9	2.0	0.1	0.1	600	3
Max			25	6.9	7.2	1427	20		142	0	9.2	8.7	3.6	3.3	0.4	0.1	1131	10
Avg			7	6.9	7.1	1353	16		107	0	5.2	5.6	2.4	2.5	0.2	0.1	820	7
Range			25	0.1	0.3	205	8		60	0	7.0	6.7	1.7	1.3	0.2	0.1	530	7

Description: Effluent of Vertical Flow Pond #1 of the ST38/39 Passive Treatment System.

Goff Station Water Quality Database

Sample Point	Date	Method of Flow Meas.	Flow (gpm)	Field pH	Lab pH	Spec. cond. (umhos/cm)	Field Temp (C)	Alk. (F) (mg/L)	Alk. (L) (mg/L)	Acid. (mg/L)	T. Fe (mg/L)	D. Fe (mg/L)	T. Mn (mg/L)	D. Mn (mg/L)	T. Al (mg/L)	D. Al (mg/L)	Sulfate (mg/L)	Susp. Solids (mg/L)
VFP2	9/18/01	NO FLOW																
VFP2	11/8/01	NO FLOW																
VFP2	12/12/01				7.4	982			192	0	3.0		1.1		0.2		436	6
VFP2	1/25/02	Estimated	25		7.3	1240			93	0	4.5	4.4	2.2	2.0	0.1	0.1	1008	5
Min			25		7.3	982			93	0	3.0	4.4	1.1	2.0	0.1	0.1	436	5
Max			25		7.4	1240			192	0	4.5	4.4	2.2	2.0	0.2	0.1	1008	6
Avg			25		7.4	1111			143	0	3.7	4.4	1.6	2.0	0.1	0.1	722	6
Range			0		0.1	258			99	0	1.5	0.0	1.2	0.0	0.1	0.0	572	1

Description: Effluent of Vertical Flow Pond #2 of the ST38/39 Passive Treatment System.

Goff Station Water Quality Database

Sample Point	Date	Method of Flow Meas.	Flow (gpm)	Field pH	Lab pH	Spec. cond. (umhos/cm)	Field Temp (C)	Alk. (F) (mg/L)	Alk. (L) (mg/L)	Acid. (mg/L)	T. Fe (mg/L)	D. Fe (mg/L)	T. Mn (mg/L)	D. Mn (mg/L)	T. Al (mg/L)	D. Al (mg/L)	Sulfate (mg/L)	Susp. Solids (mg/L)
SP1	6/5/01			8.0	8.1	1184	21		141	0	1.6	0.1	2.0	1.7	0.3	0.1	656	3
SP1	9/18/01	LOW		7.3	6.8	1151	24		87	0	0.8	0.1	2.9	2.2	0.2	0.1	689	15
SP1	11/8/01	LOW		7.2	7.6	1190	10		96	0	0.6	0.1	0.8	0.4	0.2	0.1	767	13
Min				7.2	6.8	1151	10		87	0	0.6	0.1	0.8	0.4	0.2	0.1	656	3
Max				8.0	8.1	1190	24		141	0	1.6	0.1	2.9	2.2	0.3	0.1	767	15
Avg				7.5	7.5	1175	18		108	0	1.0	0.1	1.9	1.5	0.2	0.1	704	10
Range				0.8	1.3	39	14		54	0	1.0	0.0	2.1	1.8	0.1	0.0	110	12

Description: Settling Pond #1 of the ST38/39 Passive Treatment System.

Goff Station Water Quality Database

Sample Point	Date	Method of Flow Meas.	Flow (gpm)	Field pH	Lab pH	Spec. cond. (umhos/cm)	Field Temp (C)	Alk. (F) (mg/L)	Alk. (L) (mg/L)	Acid. (mg/L)	T. Fe (mg/L)	D. Fe (mg/L)	T. Mn (mg/L)	D. Mn (mg/L)	T. Al (mg/L)	D. Al (mg/L)	Sulfate (mg/L)	Susp. Solids (mg/L)
WL1	2/15/01	Estimated	20		6.9				86	0	8.9		2.1		4.5		631	66
WL1	6/5/01			8.0	8.1	1165	27		120	0	0.9	0.1	1.0	0.9	0.3	0.1	646	3
WL1	7/27/01				7.1				124	0	0.8		1.2		0.0		708	
WL1	9/18/01	Not Flowing																
WL1	10/16/01	Estimated	2		7.2				118	0	0.8		0.2		0.0		509	
WL1	11/8/01	Not Flowing		7.3	7.6	1110	8		109	0	0.4	0.1	0.1	0.0	0.2	0.1	696	8
Min			2	7.3	6.9	1110	8		86	0	0.4	0.1	0.1	0.0	0.0	0.1	509	3
Max			20	8.0	8.1	1165	27		124	0	8.9	0.1	2.1	0.9	4.5	0.1	708	66
Avg			11	7.7	7.4	1138	18		111	0	2.3	0.1	0.9	0.5	1.0	0.1	638	26
Range			18	0.7	1.2	55	19		38	0	8.5	0.0	2.0	0.9	4.5	0.0	199	63

Description: Effluent of Wetland #1 of the ST38/39 Passive Treatment System.

Goff Station Water Quality Database

Sample Point	Date	Method of Flow Meas.	Flow (gpm)	Field pH	Lab pH	Spec. cond. (umhos/cm)	Field Temp (C)	Alk. (F) (mg/L)	Alk. (L) (mg/L)	Acid. (mg/L)	T. Fe (mg/L)	D. Fe (mg/L)	T. Mn (mg/L)	D. Mn (mg/L)	T. Al (mg/L)	D. Al (mg/L)	Sulfate (mg/L)	Susp. Solids (mg/L)
41 RAW	7/27/01				4.7				10	67	3.1		2.4		1.0		356	12
41 RAW	9/18/01			5.2	5.2	915	20		3	8	5.1	1.4	2.5	2.3	4.4	0.4	515	3
41 RAW	1/25/02				3.6	1314			0	37	2.8		3.2		1.8		1093	6
Min				5.2	3.6	915	20		0	8	2.8	1.4	2.4	2.3	1.0	0.4	356	3
Max				5.2	5.2	1314	20		10	67	5.1	1.4	3.2	2.3	4.4	0.4	1093	12
Avg				5.2	4.5	1115	20		4	38	3.6	1.4	2.7	2.3	2.4	0.4	654	7
Range				0.0	1.5	399	0		10	59	2.3	0.0	0.8	0.0	3.4	0.0	737	9

Description: Raw water sample of the ST41 discharge sampled at the influent of the Upper Wetland

Goff Station Water Quality Database

Sample Point	Date	Method of Flow Meas.	Flow (gpm)	Field pH	Lab pH	Spec. cond. (umhos/cm)	Field Temp (C)	Alk. (F) (mg/L)	Alk. (L) (mg/L)	Acid. (mg/L)	T. Fe (mg/L)	D. Fe (mg/L)	T. Mn (mg/L)	D. Mn (mg/L)	T. Al (mg/L)	D. Al (mg/L)	Sulfate (mg/L)	Susp. Solids (mg/L)
UPPER WL	6/5/01			6.5	7.1	980	18		67	0	2.1	0.7	1.8	1.8	0.2	0.1	490	2
UPPER WL	7/27/01				6.4				56	0	0.0		1.6		0.0		447	0
UPPER WL	9/18/01			6.7	6.7	960	20		72	0	0.2	0.0	0.0	0.0	0.2	0.1	48	6
UPPER WL	11/8/01	NO FLOW		6.8	7.4	873	10		161	0	0.2	0.1	0.1	0.1	0.9	0.7	316	15
Min				6.5	6.4	873	10		56	0	0.0	0.0	0.0	0.0	0.0	0.1	48	0
Max				6.8	7.4	980	20		161	0	2.1	0.7	1.8	1.8	0.9	0.7	490	15
Avg				6.7	6.9	938	16		89	0	0.6	0.3	0.9	0.6	0.4	0.3	325	6
Range				0.3	1.0	107	10		105	0	2.1	0.7	1.8	1.7	0.9	0.6	442	15

Description: Effluent of the Upper Wetland treating the ST41 discharge

Goff Station Water Quality Database

Sample Point	Date	Method of Flow Meas.	Flow (gpm)	Field pH	Lab pH	Spec. cond. (umhos/cm)	Field Temp (C)	Alk. (F) (mg/L)	Alk. (L) (mg/L)	Acid. (mg/L)	T. Fe (mg/L)	D. Fe (mg/L)	T. Mn (mg/L)	D. Mn (mg/L)	T. Al (mg/L)	D. Al (mg/L)	Sulfate (mg/L)	Susp. Solids (mg/L)
40/40A/42 RAW	6/5/01	Bucket	27	4.7	4.0	923	14		0	26	6.3	5.7	2.3	2.3	1.3	1.2	495	1
40/40A/42 RAW	9/18/01	Measured/est	30	4.5	3.5	1035	16		0	67	6.2	5.9	2.6	2.5	1.5	1.4	521	6
40/40A/42 RAW	11/8/01	Estimated	20	4.5	3.4	1290	11		0	64	9.9	9.1	3.1	3.0	2.6	1.9	563	7
40/40A/42 RAW	12/12/01			4.4	3.4	1413			0	83	12.7		3.3		2.8		765	7
40/40A/42 RAW	1/25/02	Meas/Est.	120		3.6	1340			0	43	8.5		3.3		2.1		1116	2
Min			20	4.4	3.4	923	11		0	26	6.2	5.7	2.3	2.3	1.3	1.2	495	1
Max			120	4.7	4.0	1413	16		0	83	12.7	9.1	3.3	3.0	2.8	1.9	1116	7
Avg			49	4.5	3.6	1200	14		0	57	8.7	6.9	2.9	2.6	2.0	1.5	692	5
Range			100	0.3	0.6	490	5		0	57	6.5	3.4	1.0	0.8	1.5	0.7	621	6

Description: Raw water sample of the combined ST40, ST40A, and ST42 discharges taken at the flow splitter box.
* Effluent from the ST41 Upper Wetland can be and sometimes is directed into this flow to allowfor further treatment.

Goff Station Water Quality Database

Sample Point	Date	Method of Flow Meas.	Flow (gpm)	Field pH	Lab pH	Spec. cond. (umhos/cm)	Field Temp (C)	Alk. (F) (mg/L)	Alk. (L) (mg/L)	Acid. (mg/L)	T. Fe (mg/L)	D. Fe (mg/L)	T. Mn (mg/L)	D. Mn (mg/L)	T. Al (mg/L)	D. Al (mg/L)	Sulfate (mg/L)	Susp. Solids (mg/L)
VFP3	9/18/01	NO FLOW																
VFP3	11/8/01	NO FLOW																
VFP3	1/25/02	Estimated	60		7.1	1318			59	0	2.5	1.1	3.1	3.0	0.7	0.2	1008	1
Min			60		7.1	1318			59	0	2.5	1.1	3.1	3.0	0.7	0.2	1008	1
Max			60		7.1	1318			59	0	2.5	1.1	3.1	3.0	0.7	0.2	1008	1
Avg			60		7.1	1318			59	0	2.5	1.1	3.1	3.0	0.7	0.2	1008	1
Range			0		0.0	0			0	0	0.0	0.0	0.0	0.0	0.0	0.0	0	0

Description: Effluent of the Vertical Flow Pond #3 of the ST40/40A/42 Passive Treatment System; Contains Limestone Only

Goff Station Water Quality Database

Sample Point	Date	Method of Flow Meas.	Flow (gpm)	Field pH	Lab pH	Spec. cond. (umhos/cm)	Field Temp (C)	Alk. (F) (mg/L)	Alk. (L) (mg/L)	Acid. (mg/L)	T. Fe (mg/L)	D. Fe (mg/L)	T. Mn (mg/L)	D. Mn (mg/L)	T. Al (mg/L)	D. Al (mg/L)	Sulfate (mg/L)	Susp. Solids (mg/L)
VFP4	9/18/01	Bucket	37	6.8	6.9	1000	17		65	0	1.6	0.3	1.4	1.4	0.2	0.1	518	9
VFP4	11/8/01	Bucket	37	6.8	6.7	1192	10		55	0	0.9	0.1	2.1	2.1	0.4	0.1	780	9
VFP4	12/12/01			6.5	6.9	1312			61	0	1.4		1.7		0.5		652	7
VFP4	1/25/02	Estimated	60		7.2	1361			69	0	1.4	1.3	2.2	1.7	0.6	0.1	1093	4
Min			37	6.5	6.7	1000	10		55	0	0.9	0.1	1.4	1.4	0.2	0.1	518	4
Max			60	6.8	7.2	1361	17		69	0	1.6	1.3	2.2	2.1	0.6	0.1	1093	9
Avg			45	6.7	6.9	1216	14		63	0	1.3	0.5	1.8	1.7	0.4	0.1	760	7
Range			23	0.3	0.5	361	7		14	0	0.7	1.2	0.8	0.7	0.3	0.1	575	5

Description: Effluent of Vertical Flow Pond #4 of the ST40/40A/42 Passive Treatment System

Goff Station Water Quality Database

Sample Point	Date	Method of Flow Meas.	Flow (gpm)	Field pH	Lab pH	Spec. cond. (umhos/cm)	Field Temp (C)	Alk. (F) (mg/L)	Alk. (L) (mg/L)	Acid. (mg/L)	T. Fe (mg/L)	D. Fe (mg/L)	T. Mn (mg/L)	D. Mn (mg/L)	T. Al (mg/L)	D. Al (mg/L)	Sulfate (mg/L)	Susp. Solids (mg/L)
WL2	6/5/01	Bucket	20	6.5	7.1	957	14		52	0	0.1	0.1	0.3	0.2	0.3	0.0	485	4
WL2	9/18/01			7.3	7.1	986	19		62	0	1.1	0.1	1.1	1.0	0.2	0.1	508	8
WL2	10/16/01				6.8				58	0	0.0		2.4		0.0		488	0
WL2	11/8/01	Assumed	37	7.2	7.2	1180	10		50	0	0.1	0.1	1.4	1.4	0.2	0.1	773	3
Min			20	6.5	6.8	957	10		50	0	0.0	0.1	0.3	0.2	0.0	0.0	485	0
Max			37	7.3	7.2	1180	19		62	0	1.1	0.1	2.4	1.4	0.3	0.1	773	8
Avg			29	7.0	7.1	1041	14		56	0	0.3	0.1	1.3	0.9	0.2	0.1	564	4
Range			17	0.8	0.4	223	9		12	0	1.1	0.0	2.1	1.2	0.3	0.1	288	8

Description: Effluent of Wetland of the ST40/40A/42 Passive Treatment System;

Goff Station Water Quality Database

Sample Point	Date	Method of Flow Meas.	Flow (gpm)	Field pH	Lab pH	Spec. cond. (umhos/cm)	Field Temp (C)	Alk. (F) (mg/L)	Alk. (L) (mg/L)	Acid. (mg/L)	T. Fe (mg/L)	D. Fe (mg/L)	T. Mn (mg/L)	D. Mn (mg/L)	T. Al (mg/L)	D. Al (mg/L)	Sulfate (mg/L)	Susp. Solids (mg/L)
BIOSWALE	9/18/01			7.4	7.2	971	21		45	0	0.2	0.0	0.2	0.2	0.4	0.2	518	12
BIOSWALE	11/8/01			7.2	7.1	1180	10		43	0	0.1	0.1	0.1	0.1	0.1	0.1	622	8
BIOSWALE	1/25/02	Estimated	120		7.2	1293			48	0	0.1		1.4		0.2		1070	2
Min			120	7.2	7.1	971	10		43	0	0.1	0.0	0.1	0.1	0.1	0.1	518	2
Max			120	7.4	7.2	1293	21		48	0	0.2	0.1	1.4	0.2	0.4	0.2	1070	12
Avg			120	7.3	7.2	1148	16		45	0	0.1	0.0	0.6	0.2	0.3	0.1	736	7
Range			0	0.2	0.2	322	11		5	0	0.2	0.1	1.2	0.1	0.3	0.2	552	10

Description: Effluent of the BIOSWALE which conveys all flow from the ST40/40A/42 Passive Treatment System and the ST41 Upper Wetland to the Final Wetland.

Goff Station Water Quality Database

Sample Point	Date	Method of Flow Meas.	Flow (gpm)	Field pH	Lab pH	Spec. cond. (umhos/cm)	Field Temp (C)	Alk. (F) (mg/L)	Alk. (L) (mg/L)	Acid. (mg/L)	T. Fe (mg/L)	D. Fe (mg/L)	T. Mn (mg/L)	D. Mn (mg/L)	T. Al (mg/L)	D. Al (mg/L)	Sulfate (mg/L)	Susp. Solids (mg/L)
FINAL WL	7/27/01			6.5					40	0	0.4		2.1		0.8		466	
FINAL WL	9/18/01	Cross-section	42	6.5	6.3	918	20		18	0	0.6	0.1	0.8	0.4	0.6	0.2	458	10
FINAL WL	10/16/01	Estimated	40		6.5				48	0	0.0		0.1		0.0		432	
FINAL WL	11/8/01	Cross-section	40	6.5	6.6	1151	11		33	0	0.1	0.0	0.1	0.1	0.2	0.2	699	9
FINAL WL	1/25/02	Calculated	170		6.6	1073			25	0	0.2		1.5		0.8		811	5
Min			40	6.5	6.3	918	11		18	0	0.0	0.0	0.1	0.1	0.0	0.2	432	5
Max			170	6.5	6.6	1151	20		48	0	0.6	0.1	2.1	0.4	0.8	0.2	811	10
Avg			73	6.5	6.5	1047	16		33	0	0.3	0.1	0.9	0.3	0.5	0.2	573	8
Range			130	0.0	0.3	233	9		30	0	0.6	0.1	2.0	0.3	0.8	0.0	379	5

Description: Effluent of the Final Wetland taken at spill way before discharging into Murrin Run; The Final Wetland provides final "polishing" treatment of ST38, ST39, ST40, 40A, ST41, and ST42 discharges.