



If you live in the Kokosing River watershed, then finding one of the highest quality rivers in the state of Ohio may be as easy as looking out the nearest window.

Based on extensive data collected in 2007, the Ohio Environmental Protection Agency (Ohio EPA) has completed a report on the health of the Kokosing River and concluded that **the river is one of the best in the state.**

The Ohio EPA surveys rivers to determine if our waterways are meeting water quality standards and if the rivers' health has changed over time.

The agency takes a comprehensive view by measuring water chemistry, physical habitat (such as stream bottom composition or damage by livestock), and biological life.

In the Kokosing study, 53 sampling stations were used to sample water and the "fish and bugs" that are used as biological indicators, or "bioindicators" of water quality. Ohio has led the nation in the use of bioindicators, based on the overall biological diversity of the river as well as the types of fish species and macroinvertebrate (or 'bug') species that are present.

If a stream or river is polluted or altered by human activities, diversity tends to decrease and the species that are sensitive to disturbance tend to disappear from that location. Bioindicators are often more valuable than chemical analysis of water samples because they integrate all of the conditions of the stream, particularly those that change over time.



*Within
the Kokosing
wildlife reveals the
river's vitality*

Kenyon College students net tiny bugs that are the trademark of exceptionally clean, cool, water.

SENSITIVE SPECIES THRIVE

The Kokosing River and its tributaries (like Center Creek, Dry Creek, Big Run, Jelloway Creek and Schenck Creek, to name a few) are brimming with sensitive fish species. A few highlights include:

Redside dace (*Clinostomus elongatus*), is a colorful fish that is threatened or endangered throughout much of its range. These are visual surface feeders that feed primarily on terrestrial insects (that fall into the water), so they must have clear flowing wa-

ter with overhanging vegetation in order to survive. Their specialized feeding habit means that they are quite sensitive to human alterations to the environment.

Blubrest darters (*Etheostoma camurum*, pictured next page), depend on fast flowing water over gravel in order for their eggs to hatch. While they have been present in the Kokosing for some time, their numbers have increased and their distribution within the watershed has expanded as water quality has improved. At one location nearly 200 bluebreast darters were caught (and released!).

Northern pike (*Esox lucius*) are in large part limited to western Lake Erie, a few of its tributaries, and a few small populations in rivers such as the Kokosing.

FLIES AND BUGS GET THEIR DUE

If you've ever tied a fly in order to flyfish the Kokosing, then you've mimicked one of the best bioindicators of

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Pictured clockwise from top left: mayfly nymph (often the dinner of....), bluebreast darter (photo by Lance Merry), and freshwater mussel. All three are considered excellent indicators of a healthy river.

clean water that we have, the mayfly. Mayflies belong to a much larger group known as the benthic invertebrates. These are small animals that live on the stream bottoms (benthos), are visible to the naked eye (macro) and are without a backbone (invertebrate). This group includes crayfish, freshwater clams and snails, and the immature forms (e.g., nymphs) of terrestrial insects such as mayflies and dragonflies.

Benthic invertebrates make good indicators of stream health because they are easy to collect, they differ widely in their tolerance to pollution and habitat changes, they don't move around much and they integrate the varying environmental conditions they experience over time.

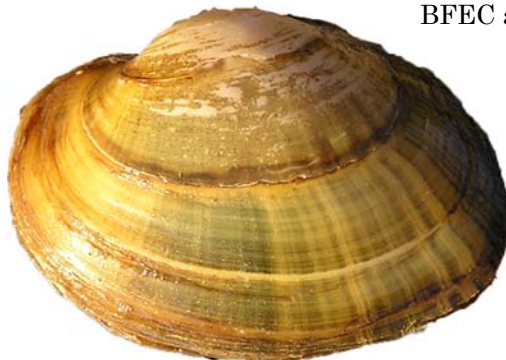
Many invertebrates are very sensitive and disappear from a river if it becomes polluted with excess nutrients or sediments, or if the water becomes too warm, for example if the riparian (streamside) trees are cut allowing more sunlight to reach the water.

In the highest quality areas of the watershed, between 80 - 86 macroinvertebrate species were collected at each sampling site! This is a **remarkable level of diversity** and is an indication of the exceptionally clean, cool, highly oxygenated water that we have in the Kokosing.

HIDDEN TREASURE

A diversity of freshwater mussel species was also found. The U.S. Fish and Wildlife Service calls freshwater mussels our "hidden treasure"; they cannot make sounds or see, they seldom move, and they may live for decades. The US leads the world in the diversity of mussels it supports.

While all the European countries together claim only 12 species, in the U.S. there are nearly 300 native species. Historically, Ohio alone supported 80 different species, representing 27 percent of all species known in the U.S. And of all the different types of freshwa-



ter species in the U.S., mussels are among the most endangered group. It is estimated that about **70 percent are listed as extinct, endangered, threatened or of special concern.**

Because mussels are sensitive to habitat changes they are considered barometers of stream health and stability. Their declining populations are largely the result of habitat changes including sedimentation, toxic pollutants and altered patterns of river flow. Dam building is a significant cause of the loss of species, and the occurrence of dams in Knox County are no exception. Despite this, the Kokosing River supports a variety of species.

Mussels are an important part of a river's food web; a river system with abundant mussels typically supports more muskrats, otters, wading birds, and game fish. The creeper mussel (*Strophitus undulatus*) is one example of a species that is found in the Kokosing but is thought to be imperiled in other states. [sources: www.dnr.sc.gov/cwcs/pdf/Creeper.pdf, <http://www.glooskapandthefrog.org>]

STREAMSIDE FORESTS A KEY FACTOR

Why is the Kokosing so healthy? Many factors have helped preserve this jewel of biodiversity. The fact that the watershed is primarily agricultural without large urban areas reduces the pressure on our waterways.

Another benefit comes from the abundance of streamside, or riparian, forests along much of the length of the river and its tributaries. These riparian forests help buffer the stream from pollutants, their shade cools the water, and the leaves they drop in the fall form the basis of much of the stream's food web. **They also protect the floodplain from eroding during floods and in doing so also protect downstream residents.** (See page 5 to learn more about one of our seminal streamside tree - the Sycamore.)

Given the benefits that come from protecting streamside forests for people and the river, the residents of Knox County are fortunate that a network of organizations have taken on this work, including the Knox Co. Park District, Knox Soil & Water Conservation District, Ohio Dept. of Natural Resources - Scenic Rivers Program and Owl Creek Conservancy. Within its preserve, the BFEC also protects two miles of river bank.

WORK TO DO

Despite the above there are areas of the watershed that have been heavily impacted by human activities. The Ohio EPA found that about twelve percent of the sites it sampled

were impaired, including some locations on Dry Creek, Jelloway Creek and on the Kokosing itself.

Threats to the river that are causing problems include livestock near or in the waterways leading to bank erosion and high bacterial levels. Agricultural activities can lead to sediment and nutrient runoff. High nutrient levels also result from municipal wastewater discharge.

WATERSHED KNOW-HOW

Supporting the protection of streamside forests and the organizations doing that work is a good way to help ensure our beautiful Kokosing River stays that way. But there is more that individuals can do, and that starts by defining an important term we've used in this article: "watershed."

A watershed is the area of land that drains into a particular body of water. If you live anywhere in the 485

square miles that encompass the Kokosing watershed (including Mt. Vernon, Gambier, Fredericktown, Danville, and Chesterville), then runoff from rain that falls on your roof will collect into ditches, then creeks and streams, and eventually empty into the Kokosing River.

Water has a habit of picking up anything lying on the ground on its way to the river, including exposed dirt from farm fields and construction sites, (which can get washed into rivers by the 100's of tons), or car fluids dripped onto parking lots.

Being mindful of potential runoff pollution can help. For instance, applying fertilizer to your lawn before a heavy rain may result in much of it being washed into the river, where it feeds algae and later depletes the water of oxygen. A better alternative: lightly water the fertilizer into your lawn with a hose, thereby controlling the water and limiting how much of it (and the fertilizer) leaves your property.



Adopt-a-Bench! Check the box below to have a bench placed at a BFEC trail location of your choice with a plaque honoring your special contribution.

Support the BFEC

Now is the time to become a member or renew your annual membership! There are many reasons to give, perhaps foremost for the satisfaction of knowing you're a part of critical environmental education and conservation programs. Your membership entitles you to be the first to know of our offerings, receive a hard copy of newsletters, a 10% discount on high quality bird seed, and preferential RSVP status on workshops. Please use the form below or payment envelope to send your contribution today, and thanks!

Membership level: Student ___ \$20 Individual ___ \$35
 Family ___ \$50 Friend ___ \$100 Patron ___ \$250
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Amount enclosed: _____

- My check, payable to Kenyon College, is enclosed
- Please bill my ___ Visa or ___ MasterCard
 Card number _____ Exp. date _____
- Yes! I've enclosed a special gift of \$250 to have a bench placed along a BFEC trail of my choice, along with a plaque recognizing my contribution.

Name _____
 Address _____
 City _____
 State, zip code _____
 Telephone _____
 Email _____

Your donation is tax deductible as allowed by law. The Brown Family Environmental Center at Kenyon College is a 501c(3) nonprofit organization.

Mail to: BFEC, P.O. Box 508, Gambier, Ohio 43022



It's been too blistering this summer to disassemble - let's get straight to the ground:

On the bluebird trail love was in the hot, hot air and eggs were laid to the sultry chirping of generally monogamous pairs of swallows, chickadees, wrens and, of course, bluebirds. And while the success rate of bluebird eggs in their struggle to become bluebirds proper was up from last year, our overall numbers dipped slightly to around 75 from over 100.

How can this be you may wonder? With love so thick in the air? Well, my friends, there may have been a touch too much love in the air and it may have been tolerated, if begrudgingly, in places where previously it has been discouraged.

In the past, wrens, notorious for cutting down on competition by stuffing every nesting box they can find with twigs, have had their own nests removed by our monitors so long as no eggs had been laid. As per extended state protection this year, we only removed twig traps but absolutely no nests. **In short, we were compelled to allow the wrens their love den.** And love they did...

What they did NOT do so well was survive. While bluebird eggs tend to have a 60% shot at making it to wing, the wrens wallowed around 10%. If even half of the wren eggs laid had belonged to bluebirds, we would have smashed last year's record. C'est la vie; we'll always have European sparrows to kick around.

Speaking of things we ought to kick around, fall is an ideal time of year for many- and not all of them need to be directed at goals, uprights or ill-intentioned drifters. If we might depart from the literal for a moment, perhaps I could suggest that you give

On the Ground

by Facility Manager David Heithaus



Kenyon student Jenny Shoots helps remove privet at the BFEC during a September service outing of the "Land Lords," a student organization recently formed with this task in mind.

your nearest invasive plant a kick this fall?

Don't get me wrong, go ahead and literally kick yourself an invasive plant but then go ahead and help it kick the bucket with a shovel, mattock, spot herbicide treatment or old-fashioned bare hands (maybe wear gloves).

Fall is a fantastic time to strike a blow against the invading botanical hordes.

Many woody invasives spread by producing massive quantities of berries, each of which has a fairly high germination rate and extremely high curb appeal to birds and mammals starting their fall/winter foraging patterns.

Remember the Cold War? Think of each Japanese barberry, privet, multiflora rose or buckthorn shrub as an organic ICBM loaded with MIRV warheads. MIRV in this case being modified slightly to: **M**ultiple, **I**ndependently targeted (by foraging ani-

mals), **R**e-entry (into the seed bank where said animal squats), **V**ehicles.

Since the shrub is already there, the missile has left the bunker. What we want to do now is to make sure it fails to fully disperse its payload.

The time to do that: now. The method: your choice. Whether you hand-pull, dig the roots or prune and paint a touch of roundup onto a cut stump, make sure you pile your slash in one place. Even if you can't burn it, many of the berries will be inconvenient forage at best and confined to a small area at worst. Not a perfect solution but better than losing the whole eastern seaboard, right?

If you've accepted the fact that controlling invasive plant species on any reasonable scale will require some targeted herbicide application (and yes, I said 'fact' rather than 'opinion'. If someone out there has a device that can control time and produce savings bonds, I will reconsider), fall is a wonderful time to strike home.

As your quarry focuses on bringing its nutrient stores underground for the winter, throw a spoke in its supply line. Whether you treat individual cut-stumps with a focused spray or paintbrush (preferred) or choose to apply a foliar herbicide, you can take advantage of the plants natural processes to carry your weapon of choice right back to enemy HQ.

When spring rolls back around, you may well find one less unit has rejoined the field. If your time allows, painting herbicide onto a cut stump is safe and very effective. If you do choose foliar application, wait until later in the fall. Often invasive shrubs and vines will hold their leaves longer than native plant species. By waiting until desired plants have shed their leaves and gone dor-

NEWS from the BROWN

GHOST WOOD

In summer, hints of cream and tawny brown peek through broad green leaves. Beneath the canopy, warm light and webs of complex shadows. February. Deep in the long gray. When light forces its way through a sky of old blankets, cracked ivory spires emerge from a forest cold and drab. Where snow covers a landscape in undignified slumber, earth and sky are tied together by these white giants that define the courses of river and stream.

Finches hang upside down from orb-like, yellow pods like ornaments left from the New Year; drawing life from one of the very few places left to offer it. Finally, spring buds burst from branch and twig as North America's largest native broadleaf wakes once again. The American Sycamore.

Anyone who has strolled along the Kokosing has no doubt noticed one or two of its great kind. Also known as 'ghostwood' or 'the button ball tree', the sycamore comes from an ancient lineage of hardwoods and is considered the most massive tree in the Eastern U.S.

It is estimated that a sycamore tree can attain ages of five-to-six-hundred years and is capable of growing to over eighty feet tall and sixty feet wide with a trunk circumference exceeding 40 feet. In fact, the record American Sycamore tree grows not 40 miles from Gambier in Jeromesville, Ohio. At approximately 129 feet tall, 105 feet wide and just shy of 50 feet in circumference, it is truly a paragon amongst its abundant Ohio kin.

While rare today, during colonization, trees of this size were not uncommon. Stories even exist of humans using their often hollow trunks for storage or even long-term shelter! While the tree pictured here (courtesy of Ray Heithaus) is not large enough to keep you dry, it is awe inspiring; see for yourself on the BFEC river trail. Attend our "Halloween Legends Lantern Tour" on October 29th to here a pioneer's story of her Sycamore home.



WOOLLY BEAR WISDOM

Fall seems to be a busy time for caterpillars, especially for the woolly bear, which can hardly be bothered to pause while crossing your path. Don't take it personally - it is surely, single-mindedly, en route to more food before cold weather signals that it's time to hibernate.

The common woolly bear caterpillar is the immature form of the Isabella tiger moth (though it has many look-alike cousins). They are black with a rust-colored band in the middle, and their stiff bristles give them a fuzzy appearance. The caterpillar survives the winter in hibernation by producing a chemical that works much like antifreeze, keeping its body tissue from freezing. In spring it matures into the moth, which is dull yellow-orange with a few black spots.

Now for the question we've all been waiting for: does a greater proportion of black on the woolly bear actually predict a harsher winter? Unfortunately for the believers of the folklore, caterpillars born in the same clutch can vary widely in color, and rust-colored bands expand over time as caterpillars mature. Even if they can't predict its severity, their hurried appearance in the fall is a true sign that winter is coming.

Calendar of Events

*All events start from the BFEC Resource Center at 9781 Laymon Road unless stated otherwise.
For additional information, contact us at 740-427-5050, dohertyh@kenyon.edu, or visit <http://bfec.kenyon.edu>*

Fall Sky Astronomy - Friday, October 1, 8:30pm

Explore the fall sky with Kenyon Professor of Humanities Tim Shutt. Bring a blanket or chair and admire the season's constellations as you listen to mythological stories about the stars. Call the BFEC in the event of inclement weather for event status. Rain date: Monday, October 4th.

The Mudman Triple Trail Race Series Saturday & Sunday, October 16-17

Ohio's most unusual trail racing series will challenge you with a nighttime time trial, a 5k super steeplechase featuring "The Gauntlet", and a 10k cross-country run. And if the mud doesn't get you, the hills will! Do one, two, or all three races to earn the coveted "Mudman Triple". Please visit <http://bfec.kenyon.edu> to download a registration form.

Knox County Nature Photography Contest - Deadline: October 18

Photographs of our natural world remind us of the beauty to be found when we take the time to look. All community members are invited to enter this contest in celebration of our scenic Knox County. Photos must be submitted by Monday, October 18th. Prizes will be awarded in Children's (15 & under) and Adult Divisions. 'People's Choice' voting will take place at the Harvest Festival on October 23rd. Complete contest rules available at <http://bfec.kenyon.edu> (click on 'programs & events').

Fall Harvest Festival

Saturday, October 23, 2-5pm

Celebrate the season and the out-of-doors with this FREE family event, featuring pumpkin decorating, horse-drawn wagon rides, live music, kid's crafts and games, cider press, bonfire, and 'People's Choice' voting on the BFEC's annual community nature photography contest.

Winter Weeds Walk - Sunday, November 21, 2pm

After summer blooms, the delicate stalks of many flowers remain standing in gardens and fields. Hike BFEC trails to explore their subtle, structural beauty and use as food for wildlife in winter.

Christmas Bird Count - Sunday, December 19

Join the BFEC to participate in the longest running citizen science project in the world! For over 100 years the Audubon Society has been organizing the Christmas Bird Count, which now boasts 50,000 volunteers and nearly 2,000 counts every year. Count data have been instrumental in showing long term trends like the decline or recovery of bird species.

The BFEC is the host of a count covering portions of Knox County that fall within a 15 mile radius of Mt. Vernon (including Gambier, Apple Valley, and Fredericktown). Participants may count the numbers and species of birds seen at their home feeders, or count in the field along roads and trails. All participants will be invited to gather at the center for lunch. Please call to register.



**Halloween
Legends
Lantern Tour**

Friday, October 29, 7-9pm

Meet the characters and hear the legends of the season on a guided lantern tour along BFEC trails. Gather afterwards for stories by the bonfire.

Tickets \$5 - kids 8 & under free
Advanced purchase recommended, available at BFEC, Kenyon Bookstore and Sips in Mt. Vernon.

*Co-sponsored by
Mount Vernon Players &
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Our Volunteers

In the office, classroom, gardens and on the trails: Ellen Biscotti, Amy Goeppinger, Kenyon Circle-K, Kenyon Land Lords club (especially club founder Ninah Hamilton), Kenyon Pre-Orientation service groups

Bluebird Monitors: Keith Kitchen, Jan Ellis, Sarah Goslee-Reed, Susie Fish

Field Trip Volunteers: thank you to nearly 50 volunteers who helped make field trips for elementary students this fall possible!

Nature's Keepers Outdoor Adventure Camp Counselors: Liz Doernhoefer, Sarah Fowler, Kate Klessner, Joey Montoya, Thomas Rice, Brittany Shellhorn

Continued from page 4:

mant, you will minimize the potential for collateral damage caused by overspray.

Okay; baby bluebirds and the advocacy of botanical car-

nage may not seem the best column mates but fall is a time for transitions, right? I promise I'll get back to prairies, plantings, grand dedications and tales of the Mudman Triple when we really need them: February.

Brown Family Environmental Center at Kenyon College

9781 Laymon Road, Gambier, Ohio 43022 ~ (740) 427-5050 ~ <http://bfec.kenyon.edu>



Our Mission

The BFEC at Kenyon College exists to engage Central Ohioans of all ages with nature, and to support the goals of Kenyon College by conserving the natural diversity of the Kokosing River valley and providing opportunities for education and research.

Co - Executive Directors

E. Raymond Heithaus, *Jordan Professor of Environmental Studies & Biology*
Siobhan Fennessy, *Associate Professor of Biology*

Facility Manager

David Heithaus

Program Manager

Heather Doherty

Facility & Program Assistant

Jill Kerkhoff

Upcoming Events

- October 16-17 Mudman Triple Trail Race Series
- October 18 Knox County Nature Photo Contest Deadline
- October 23 Fall Harvest Festival
- October 29 Halloween Legends Lantern Tour
- November 21 Winter Weeds Walk
- December 19 Christmas Bird Count

Fall Harvest Festival

Saturday, October 23, 2-5pm
wagon rides ~ live music ~ bonfire
pumpkin decorating ~ cider press
kids games ~ photo contest
& "people's choice" voting
FREE!



Details inside & at <http://bfec.kenyon.edu>

DATE MAILED: October, 2010
CONTAINS DATED MATERIAL

Brown Family Environmental Center
at Kenyon College
P.O. Box 508, Gambier, Ohio 43022



