



# The Glade

*The Newsletter of the Missouri Chapter of the Society  
for Conservation Biology*

Volume 10, Number 1

Spring 2007

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## News and Notes

•**MOSCB session at MNRC 2008!** MOSCB plans to sponsor a session at the 2008 Missouri Natural Resources Conference on the effect of Climate Change on Missouri biodiversity. If this is your area of expertise or if you know someone who is knowledgeable, please let us know. To get involved contact Alan Journet ([ajournet@semo.edu](mailto:ajournet@semo.edu)).

•**MOSCB needs a Webmaster!** Our current webmaster, Dan Hocking, is retiring in May. If you – or anyone you know – might be interested please let one of the Executive Board officers know. We are planning to relocate the web site from the Mizzou system to the Society server and would like someone to supervise this transition and then maintain the site periodically.

•**Native Plant Sale at Bradford Farm in Columbia on April 14<sup>th</sup> from 9 - noon!** This event will feature local Missouri native plant and seed producers, demonstrations, and seminars including rain garden installation, gardening in difficult areas, and spring wildflowers. Nature books will be for sale and a special bird watch tour will take place from 7 to 9 AM. Please reply if you plan to attend the bird watch tour by calling Nadia at 573-884-7945. For directions, visit: <http://aes.missouri.edu/bradford/index.stm> or call Thresa Chism or Tim Reinbott at 573-884-7945.

•**Are you moving?** Please let us know of any change in address so that we get your issue of *The Glade* to the right place! Email Stephanie Manka ([SGManka@mizzou.edu](mailto:SGManka@mizzou.edu)) with address updates.

•**Contribute an article to *The Glade*!** We welcome article submissions from our membership for publication in *The Glade*. If you have a topic you would like to write about or read about, please email editor Todd Jones-Farrand ([FarrandD@missouri.edu](mailto:FarrandD@missouri.edu)).

# President's Column: Report and Plans

Alan Journet, Southeast Missouri State University, Email: [ajournet@semo.edu](mailto:ajournet@semo.edu)

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As the outgoing Vice President it is with considerable pleasure that I now find myself writing the 'President's' column for *The Glade*. Before commenting on some plans for the forthcoming year, I would like to acknowledge both outgoing President Stacy James for her outstanding efforts on behalf of the chapter over the last few years, and also other members of the outgoing Executive Board who have collectively kept the Chapter alive and well over the years. Additional thanks also are due to the incoming Board members with whom I look forward to collaborating over the forthcoming months.

## Officers 2007-2008

Our new Executive Board for 2007-2008 was elected at the 2007 Missouri Natural Resources Conference. Officers are:

**President:** Alan Journet – Biology Professor, Southeast Missouri State University: email above

**Vice-president:** Nadia Navarrete-Tindall – Researcher, University of Missouri-Columbia  
[navarreten@missouri.edu](mailto:navarreten@missouri.edu)

**Treasurer:** Esther Stroh – Ecologist, U.S. Geological Survey, Columbia [esther\\_stroh@usgs.gov](mailto:esther_stroh@usgs.gov)

**Secretary:** Stephanie Manka – Biology Graduate Student University of Missouri – Columbia  
[SGManka@mizzou.edu](mailto:SGManka@mizzou.edu)

**Glade Editor:** Todd Jones-Farrand – Postdoctoral Fellow, University of Missouri – Columbia  
[farrandd@missouri.edu](mailto:farrandd@missouri.edu)

**Webmaster:** A critical position – currently unfilled



**Alan Journet presents reluctant Stacy James with a souvenir in recognition of her service to the Chapter.**

## MONRC and The Silent Auction

At the Missouri Natural Resources Conference we annually advertise our Chapter and the Society by means of an information booth, conduct our annual business meeting, and judge student posters that have been entered in the Conservation Biology competition (see the article by this year's winner Lacy Church on her Niangua Darter research on page 4).

As a new venture designed to augment our coffers, we instituted a Silent Auction at the Missouri Natural Resources Conference in 2007. The Silent Auction ran from Wednesday afternoon through lunch time Thursday. We are very grateful both to those who bid and those who donated items to the Auction. Since this was a novel experience for us, we had no idea what to expect – but are delighted to report that we raised over \$400.00 on the auctioned items. Without the generosity of these donors, our Auction could not have possibly been the success it was. We acknowledge with great appreciation the following donors:

- Jerry and Joannie Smith of River Ridge Winery in Commerce, MO for a bottle of wine.
- Alan Journet for three mounted prints of Missouri wildflowers.
- Dennis Figg for art work, a calendar and a book,
- Peter Raven, Missouri Botanical Gardens (also Kathy Busso) and Shaw Nature Reserve (also Scott Woodbury, Barbara Troutman, and Helen McCauley) for autographed textbooks, an autographed copy of Steyermark Vol 2, cane plants, and a gift basket.
- Bethany Williams for a wildlife drawing.
- Chuck and Bobbi Everitt of Award Pet Supply in Columbia, MO for a gift basket.

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We'd also like to acknowledge the many folks who bid on the auction items and thus donated to the Chapter. Those people include: Aaron Baughn, Reg Bennett, Kate Brinkmeyer, Darby Caton, Christopher Crabtree, Bill Dijack, Jack Harris, Patty Hermann, Alan Journet, Mary Lyon, Wayne Morton, Nadia Navarrete-Tindall, Chris Reeves, Ben Stratton, Esther Stroh, Dana Thomas, Steven Thurman, and Andy West.

Since the auction was so successful, we will probably run it again next year. We will, therefore, be tapping friends, acquaintances, and regional businesses in the hope of acquiring an array of auction items at least the equal of those we acquired for 2007. If you have any potential items, please contact one of the Executive Board members.

## Membership Dues

Although our by-laws state that members of the chapter should be paid up members of the Society we have been rather flexible in enforcing that requirement. However, the Society has requested that chapters adopt a more inflexible approach to this by-law in the future. Indeed, at some stage in the near future we hope that members will be able to make their chapter contributions at the same time as they pay society dues (whether through mail-in forms or the society web site). The result of our approach has been that our Treasurers have battled constantly to find funds enough to maintain our bi-annual publication: *The Glade*. At our last annual meeting, members agreed to a new fee structure: henceforth, we are asking that Chapter members become at least members of the Society at the lowest level of \$10.00 (which gains no journals) and additionally pay a Chapter fee of \$5.00 (Regular members). As a dispensation to students and retired professionals, we decided to waive the chapter dues – thus chapter membership requires only the \$10.00 Society membership fee.

## 2008 Missouri Natural Resources Conference Session

We are organizing a workshop under the tentative title: “The Potential Impact of Climate Change on Missouri Biodiversity”. We have identified a lead speaker (Missouri State Climatologist, Dr. Pat Guinan), plus presenters dealing with ecological associations, birds, and Missouri species of conservation concern. We are, however, seeking help from Chapter members who might be able to think of either a topic or a speaker that would fit well under this title. Please suggest speakers for any of the following topics:, mammals, herps, insects, native fishes, forests, non-woody flora, bryophytes & pteridophytes, invasive/exotic species,, State Parks, or human cultural consequences. We have more topics than time slots, so will select from among them.

If you have any questions or suggestions about activities in which you think the Chapter should be involved, or resolutions we should develop, please don't hesitate to contact me or any other Board member.

*Till now [we have] been up against nature, from now on  
[we] will be up against [our] own nature.*

-- Dennis Gabor



**Alan Journet and Nels Holmberg staff the Chapter booth and Silent Auction during the Natural Resources conference.**

# Initial Increases in Niangua Darter Abundance, Suitable Habitat, and Fish Species Richness Following Road Crossing Improvements

Lacy J. Church & Douglas C. Novinger, University of Missouri, Email: [ljc96c@mizzou.edu](mailto:ljc96c@mizzou.edu)

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Poorly designed low water crossings can be barriers to the passage of aquatic organisms and materials. “Slab”-type crossings are often associated with a heavily silted, impounded pool upstream that results from blocked openings, and a plunge pool downstream. In addition, perched openings may present a vertical barrier to aquatic organisms attempting to pass upstream. Numerous deficient crossings may be found throughout the Ozarks, including the range of the Niangua darter (*Etheostoma nianguae*). The Niangua darter is endemic to Missouri, occurring only in north-flowing streams of the Osage River basin. The species is federally listed as threatened and state listed as endangered.

Benthic fishes like the Niangua darter may be negatively affected by deficiencies associated with slab crossings due to their limited swimming ability and need for clean substrates. There have been recent efforts to replace degraded low water crossings within the Niangua darter range with clear span bridges that do not obstruct passage. The goal of this research is to monitor patterns in Niangua darter populations, habitat, and associated fish communities upstream and downstream of three low water crossings before and after replacement with clear span bridges.

We present preliminary results describing initial response of Niangua darter populations, fish communities, and habitat characteristics to replacement of low water crossings. We are currently monitoring three sites where slabs were replaced with clear span bridges: Massman bridge over Little Tavern Creek (Ridge Road, Miller County), Mule Shoe bridge over Little Niangua River (County Road 96, Hickory County), and Lakota Road bridge over Thomas Creek, a tributary of Little Niangua River (Dallas County).



**The Massman bridge over Little Tavern Creek before replacement.**

We monitored 500-m reaches upstream and downstream of crossings during May-June before and following low water crossing replacement. Habitats were recorded as riffle, run, and pool. General habitat assessments such as algae, livestock impact, and erosion were made for each habitat. Two snorkelers surveyed riffles and runs, macrohabitats commonly used by flow and sediment-sensitive benthic fishes, counting Niangua darters and noting presence of other species. In locations where Niangua darters were observed, we recorded relative size of the Niangua darter, depth, relative current velocity, substrate size, and GPS coordinates. Drag and kick seining also were performed to quantify fish communities; however, for these preliminary results we discuss only the snorkeling data. We performed a Wolman pebble count to describe substrate size distributions and also visually estimated substrate embeddedness by fine particles.

We found that Niangua darter numbers increased in abundance at Lakota and Mule Shoe following bridge replacement (Table 1). The discovery of Niangua darters at Lakota was the furthest upstream record of occurrence of this species in Thomas Creek. Niangua darters observed at Massman represented the first record of the species in Little Tavern Creek (North).

Upstream of the bridge-crossings, non-pool habitat (e.g. lengths of riffles and runs) increased at each site. Non-pool habitat increased by 24% at Lakota, 40% at Massman, and 23% at Mule Shoe. Changes in non-pool habitat downstream of crossings were less consistent. An increase in non-pool habitat would be expected to benefit Niangua darters and other small benthic fishes.

Fish species richness increased upstream of all crossings following bridge replacement. This may reflect an increase in habitat diversity after the impounded pool was reduced. Changes in species richness downstream were less consistent, possibly because the changes in habitat were less consistent. Changes in fish communities by guild showed that the number of benthic species increased both upstream and downstream in two of three locations after bridge replacement.

Changes in fish communities by guilds showed that the number of benthic species increased both upstream



**The new and improved Massman bridge.**

The number of benthic species increased in two locations, possibly reflecting improved habitat conditions. Monitoring will confirm if these patterns are significant trends. Additional opportunities to monitor crossing replacements will establish the generality of our observations.

Special thanks to MDC Resource Science staff John Calfee, Zachary Blevins, Jennifer Hrabik, and Dan Joseph for field assistance. Craig Fuller (MDC Fisheries) provided comments and has been the force behind getting the slabs replaced with clear span bridges. Funding was provided by the Missouri Department of Conservation and USFWS State Wildlife Grant.

and downstream in two of three locations after bridge replacement. The number of large fishes increased upstream of crossings at two of three sites.

Initial results suggest that replacement of poorly-designed low water crossings with clear span bridges can benefit the Niangua darter, habitat, and associated fish communities. Niangua darter abundances, the amount of non-pool habitat, and fish species richness all tended to increase following bridge replacement.

Table 1. Number of Niangua darters before and after bridge replacement.

	Upstream		Downstream	
	Before	After	Before	After
Lakota	0	5	0	6
Massman	0	0	2	1
Mule Shoe	1	12	19	22

# Ethanol Part 1: Impacts on Water Quality and Quantity

Bob Broz, Water Quality Specialist, University of Missouri, email: [BrozR@missouri.edu](mailto:BrozR@missouri.edu)

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***Editor's Note:** Corn-based ethanol has been in the news a lot lately. It has been heralded as a savior of the farm economy and a way to reduce our dependence on foreign oil, but also has been blamed for raising the price of tortillas in Mexico. The issues are complex and need to be discussed openly. Thus, we are initiating a series of articles on the impacts of ethanol production on natural resources of Missouri and beyond. In this is the first installment, Bob Broz examines impacts on water resources. In later installments, we would like to address impacts on air quality, wildlife habitat, and food prices. If you have other ideas you would like to contribute, please contact us ([FarrandD@missouri.edu](mailto:FarrandD@missouri.edu)).*

Reducing our need for foreign oil by increasing the use of ethanol in the United States may sound like an excellent way of supporting agriculture while reducing our dependency on foreign oil. But when we look at ethanol production there are several water quality issues that we don't want to overlook.

Nutrient leaching and runoff, pesticide runoff and soil erosion are all issues that should be considered when talking about corn production to feed the new ethanol industry. The next step is to determine if the high price of corn will drive away any chance of conservation and water quality protection.

The increase of corn production to meet the demand for corn needed creates some concerns since this can only be achieved through reduced crop rotation – corn following corn instead of corn following soybeans or wheat – or through marginal land being tilled and put into corn production. In either case the potential for herbicide runoff and nutrient runoff is increased.

Generally we see about a 17% decrease in yield when farmers don't rotate crops. When applying fertilizer the farmer needs to take this into account more nutrients than the crop will utilize are not being applied. Herbicide resistance may also be a concern and with that the need for higher levels of herbicide application. If the land is marginal it doesn't have the production capability and generally has a higher capacity for erosion and runoff. Much of this land was put into the Conservation Reserve Program several years ago to help protect water quality but higher corn prices may encourage farmers to put marginal land back into production.

Nutrient runoff from any land can increase algal bloom in water supplies and cause aquatic habitat impairment; we would anticipate seeing higher levels of runoff from marginal lands. This reduces surface water quality and creates concerns for livestock producers, human health, and public drinking water watersheds that use surface water supplies

Nitrate leaching into ground water is another concern. The concentration of nitrates acceptable in drinking water is 10 parts per million. Since many rural residents have private wells, nitrate levels in groundwater may create a health concern that will need to be monitored.

The herbicide atrazine is used on over 80% of corn production acres to reduce weed populations. Atrazine is highly water soluble and has a tendency to runoff into water bodies if rains come soon after application. The maximum level of atrazine in public drinking water is 3 parts per billion so it takes very little atrazine to create water quality problems. If atrazine runoff cannot be controlled, we may see the use of atrazine reduced or denied in certain watersheds.

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Sedimentation and erosion are major concerns that will need to be reviewed as we see more marginal acreage being put into corn production. For years producers have used funding sources to implement conservation practices to help reduce soil erosion from marginal lands. If the price of corn becomes high enough to encourage producers to remove land from these conservation practices, such as CRP, what are the environmental and conservation consequences for the land that result from such decisions?

With the production of ethanol comes the production of distiller grains. For each gallon of ethanol produced, we get 6-7 pounds of distiller grain. This is high in protein and can be used as an effective cattle feed. By feeding out the livestock we then have to determine how to properly dispose of the manure that is being produced by the cattle and if we have the land mass to properly apply the manure without causing water quality concerns. Nutrient management planning becomes an essential part of how to best manage the land in an economic and environmentally productive way.

An ethanol plant that produces 1,000,000 gallons of ethanol also produces approximately 6,000,000 pounds of distiller grain. To do this the plant uses approximately 335,000 bushels of corn and 400,000 gallons of water. The water quantity concerns in areas where we have confined aquifers are becoming a limiting factor influencing where ethanol plants can be located. Is there enough groundwater to support the ethanol industry and other activities that depend on groundwater? What if the area is an intense irrigation area for crop production, will there be enough groundwater to support crop production, private wells for human use and the ethanol industry? In many cases we haven't looked at the water quantity issues because water quantity has never been an issue in many states.

The ethanol industry may cause a change in the trends we have seen in agriculture over the years. Producers can take advantage of the higher corn prices and be able to afford advancements in their production practices. We may see more diversity in farming with both crop and livestock production because of an inexpensive feed source. From the research/education side, there is ample opportunity for new research to see what conservation practices are available to protect the water quality that weren't feasible with low corn prices – drip irrigation, more precision application of nutrients and herbicides, etc. The training needs of farmers on how to handle and feed distiller grains for livestock production is another critical area.

No one knows when we will see ethanol plants go from corn-based to bio-mass based. Bio-mass energy production will have its own set of concerns. Certain bio-mass products can be produced on marginal land without the loss of soil or increase in herbicides. Other bio-mass products still require high levels of nutrients and herbicides that have not been considered. Maybe the best approach to reduction on foreign oil is a combination of bio-mass fuel production and conservation. We need to set a limit on how much oil we import to focus on conservation practices and then increase our ability to supply more of the overall percentage through bio-mass.

*Today's problems cannot be solved if we still think the way we thought when we created them.*

-- Albert Einstein

*The Glade*

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*When one tugs at a single thing in nature,  
he finds it attached to the rest of the world. --John Muir*

## **Membership Information**

The goal of MOSCB is to promote communication among conservation biologists throughout the state of Missouri. Membership in MOSCB is \$5.00 ([esther\\_stroh@usgs.gov](mailto:esther_stroh@usgs.gov)). Please contact one of the Board members for more information – and bear with us as we transfer web site locations.

The Glade Vol. 10, No.1 was edited by Todd Jones-Farrand ([FarrandD@missouri.edu](mailto:FarrandD@missouri.edu)). Special thanks to the authors in this issue for their time and thought in writing their articles. Funding for this issue of *The Glade* was provided by contributions from members of MOSCB.

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