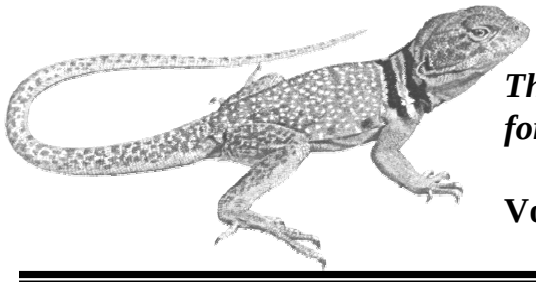

The Glade

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

Volume 7, Number 2 **Fall 2004**

Contents

News and Notes

MOSCB workday: Join fellow MOSCBers and the Columbia Audubon Society for a workday at CAS's Wild Haven nature area on Saturday October 23rd. We will be helping with land restoration projects such as removing exotic species and possibly seed collection. Meet at 8:30am at the MDC office in Columbia at Stadium and College. Bring gloves and a lunch. Work will last until 1pm. Contact: Stacy James (smj21b@mizzou.edu).

Membership: If you are not a member, join us! Membership is free though we do ask for voluntary donations to cover costs such as publishing The Glade. See the MOSCB website for more information (http://www.snr.missouri.edu/moscb/).

Annual membership meeting: Our annual membership meeting is held every year at the Missouri Natural Resources Conference at Tan-Tar-A in January. Please plan to attend. We sponsor a poster competition, and judges are needed. If interested in volunteering to be a judge, contact Stacy James (smj21b@mizzou.edu).

Elections: Annual elections will be held Oct 27, and the call for nominations is Oct 15-24. Descriptions of each office can be found on the MOSCB website (http://www.snr.missouri.edu/moscb/) Send nominations for officers to Sara Storrs (sisk95@mizzou.edu). You can nominate yourself.

Education: We are in the process of forming a conservation outreach committee. We are developing a presentation for children and are looking for committee members who would help chair Bethany Williams (bkh5f2@mizzou.edu) develop the presentation. Those interested should contact Bethany.

Listserv: Join our listserv! Listserv traffic is very low (<2 messages/wk), and it's a good way to be alerted and to alert others about MOSCB news and conservation events occurring in Missouri. Information can be found on our website (http://www.snr.missouri.edu/moscb/).

Bighead and Silver Carp: Invaders of America's Rivers

Duane Chapman, president-elect MO Chapter American Fisheries Society, email: dmchappy@socket.net

Bighead carp and silver carp were imported from China in the early 1970's for use in aquaculture and for controlling water quality in aquaculture and in municipal wastewater. By the late 1980s, bighead carp and silver carp were both considered established in the wild. They have gradually spread throughout the undammed portions of the Mississippi watershed. A few fish have been captured or seen above the navigation dams within the upper Mississippi River system. Bighead carp have also been captured in many lakes and reservoirs outside the Midwest, but it is not believed that the fish are established in the US outside the Mississippi River watershed.

Present Status

Bighead carp and silver carp have become extremely abundant in the Mississippi River and in its larger tributaries, including the Missouri River. In the lower Missouri River, it is often possible to capture over a ton of the fish from the plunge pool behind a wing dike. State biologists in Kentucky have found that some backwaters of the Ohio River are now strongly dominated by bighead and silver carp. There is great fear that bighead and silver carp will invade the Great Lakes and damage that fishery, worth billions of dollars annually. There is a canal connecting the infested Illinois River and uninfested Lake Michigan. An electric barrier, costing millions of dollars, has been built in the canal to repel the fish, and another barrier is under construction.

Large bighead carp *provided by D. Chapman*

Dams have slowed the expansion of these fish, and they are not abundant above the dams on the Mississippi River or the Missouri River. Carp cannot spread from one non-contiguous watershed to another without a human vector. However, young are sometimes inadvertently included in shipments of other hatchery fish. Another danger results from fishermen that catch their own bait and transport the fish between water bodies or over dams. Young silver carp look very similar to gizzard shad, a popular native baitfish, and many fishermen may never notice the difference. A third issue is "Prayer Releases" of fish bought live in fish markets. Asian peoples often prefer to purchase their foodfish live, and a variety of non-native fishes are sold live in Asian markets, including bighead carp. It has been documented that in some Asian cultures, the release of a fish bought in a market is a type of religious observation. It should be noted that the sale of live bighead carp in Asian markets is a significant source of income to many aquaculturalists, and they are loathe to lose this source of profit.

High abundances of these non-native fishes likely are causing negative consequences for our native fishes, but what those consequences are is uncertain. When bighead and silver carp have been introduced into new waters outside the US, they have often largely replaced portions of the native fauna. Since bighead

and silver carp eat plankton, we expect them to compete for food with almost any native larval fish and also with the adults of our native planktivores, including bigmouth buffalo, paddlefish, and gizzard shad. Most native large river fishes have a planktonic larval stage. We do not know if bighead and silver carp eat the planktonic larvae or eggs of our native fishes. Another concern is simple competition for habitat. In the highly engineered rivers of the United States, habitats with low water velocity are in short supply. The simple presence of such large numbers of large, active fish may force native fishes from preferred habitat. Overwintering habitat may be especially critical. Many native fishes have a lowered swimming ability in cold water and require low velocity habitats. USGS research has shown that bighead and silver carp are active in the cold water months and that they occupy low velocity habitats at all times of the year.

An additional problem is the tendency of silver carp to jump high into the air when frightened. Since one of the chief causes of fright in a silver carp is the sound of a boat motor, this often results in collisions with boaters. Silver carp in the Lower Missouri River now average around 5.5 kg and commonly exceed 10kg. Even without factoring in the speed of a moving boat, a collision with a 10kg carp can cause serious injury. Add the speed of the boat, and the results can be devastating. Boat fixtures, depth finders, trolling motors, and fishing equipment are also broken by jumping fish. Although motorized boats cause the strongest reaction in silver carp, canoeists and kayakers have been hit and capsized by silver carp. These collisions are not rare. When conducting research on these carp, sometimes several jump into the boat in a single day. Imagine working where someone randomly throws a bowling ball in your vicinity several times a day and you begin to grasp the problem. Boaters who wish to avoid injury or damage from jumping silver carp on the Missouri River should avoid low velocity water areas and slow moving tributaries, and proceed slowly when it is necessary to boat in these areas.

What Is Being Done?

Most people agree that it is most important to stop or slow the spread of the fish. Educational programs are underway to help limit baitbucket transfers. In South Dakota, the capture of live bait has been prohibited in infested waters. Minnesota and Wisconsin are considering acoustic fish barriers at the Mississippi River dams to slow the spread of bighead and silver carp upstream. In Chicago, the sale of live bighead carp has been prohibited. Some groups believe that all transport of live bighead carp should be stopped, while others maintain that the live market is an insignificant source of animals for introductions, and thus should not be further regulated. Still others advocate allowing transport of only triploid fish across state lines. Techniques for producing triploid carps were developed in the early 1980s. Triploid grass carp have been shown to be facultatively sterile, and other triploid carps are thought also to be sterile, although conclusive research has not yet been performed.

In Missouri and Illinois, efforts are underway to enhance the commercial markets for bighead and silver carps, in the hope that the increased fishing pressure will bring down the size of the population.

At the USGS Columbia Environmental Research Center (CERC), research is being performed to better understand the life history of the fish, to thus be better able to understand and manage this threat. With better understanding of the habitat requirements and life history of these fishes, we hope to be able to design habitats and management methods that promote native species to the detriment of invasive species. Also at CERC, research is underway to assess the efficacy of alarm pheromones (to use as barriers or to remove carp from habitats that are critical to other fishes) and on sex pheromones (for use as attractants for

capture and removal).

There are other potential management methods that are becoming available with new technologies, including, but not limited to, better barrier methods and genetic modification technologies such as the "daughterless carp" technology under development in Australia. In the past, when an aquatic species became established, there were no reasonable ways to eliminate the species. Perhaps those days are nearing an end. One thing is sure: It will take money and time and a lot of effort to answer these questions.

Creature Feature: Wild Turkey (*Meleagris gallopavo*)

DESCRIPTION: Adult males (gobblers, toms) are twice the size of females, have spurs on their legs, a reddish-blue head and neck, and a hair-like appendage called a beard.

WILD VS. DOMESTIC: Tips of tail feathers are dark brown (domestic are white); legs are pink (domestic are gray or black)

FUN FACT: Wild turkeys are believed to have originated in Mexico.

Info and picture from MDC (http://mdc.mo.gov/nathis/birds/turkey/)

Fall Colors: Why Leaves Change and Where to View Them

Randal Clark, naturalist, email: rclark@coin.org

One of nature's grandest displays is the autumn leaf change. Missouri is one of the best places in the United States for fall color, and our fall colors may last as long as six weeks. This is mainly due to the large diversity of trees, shrubs, vines, and habitats that we have.

Photo S. Storrs

The green pigment in leaves is chlorophyll. Chlorophyll is attached to the membranes of chloroplasts, which are the sites of photosynthesis. Chlorophyll is not a very stable compound; bright sunlight causes it to decompose. To maintain chlorophyll in their leaves, plants must continuously synthesize it. The synthesis of chlorophyll in plants requires sunlight and warm temperatures. Therefore, during summer chlorophyll is continuously broken down and regenerated in the leaves of trees.

The shortening days and cool nights of autumn trigger changes in the tree. One of these changes is the growth of a corky membrane between the branch and the leaf stem, the "abscission zone." This membrane interferes with the flow of nutrients into the leaf. Because the nutrient flow is interrupted and there is a decreasing amount of light and warmth in autumn, the production of chlorophyll in the leaf declines and the green color of the leaf fades.

Another pigment found in the leaves of trees is the carotenoids, the carotene and xanthophylls that color carrots and bananas. They function as accessory light absorbers by capturing certain wavelengths of sunlight not absorbed by chlorophyll, and thereby increase overall absorption of the visible spectrum of sunlight. They are contained in chromoplasts and do not need light to be produced. They are also much more stable than chlorophyll and persist in leaves even when chlorophyll has disappeared. When chlorophyll disappears from a leaf, the remaining carotenoids cause the leaf to appear yellow. Carotenoids tint the leaves of hardwood species, such as hickory, ash, birch, cottonwood and sassafras.

A third class of pigments is the anthocyanins. Anthocyanins produce the reds and purples we see in fruits such as apples and blueberries. These pigments act as sun screen for the plants. Unlike chlorophyll and carotenoids, anthocyanins are not present in the leaf during the growing season. They develop in late summer in the sap of cells, and are formed by chemical reactions between accumulating sugars and organic compounds called anthocyanidins. The reaction requires light, and warm sunny days followed by cool nights increases their production. These pigments cause the yellowing leaves to turn red or purple. In trees with acid sap the leaves will be red, and in trees with alkaline sap the leaves will appear purple. Maples, oaks, and black gum produce anthocyanins in abundance and display the brightest reds and purples in the autumn landscape. Anthocyanins are also produced temporarily in the spring and give a red color to the new leaves of maples, oaks, and dogwoods. Deep orange fall colors are due to the presence of both anthocyanins and carotenoids.

The range and intensity of autumn colors is greatly influenced by the weather. The brightest autumn colors are produced by a warm, moist growing season followed by an autumn of dry, sunny days and cool, dry nights. Fall colors start in mid-September, when sassafras, sumac, and Virginia creeper begin to change. The peak of fall colors in Missouri is usually mid-October, when the maples and oaks are at their best. Most of the colors have faded by late October.

Where to View Them Along our many rivers and streams are the best places in Missouri to see fall colors, due to the great number of plant species present. Glades and prairies can also be spectacular. Here are a few of my favorites:

Central Missouri: the section of the Katy Trail State Park and Highway 94 along the Missouri River from Rocheport to St. Charles

Northern Missouri: Cuivre River State Park

South central Missouri: the Current River valley in the Ozark National Scenic Riverways and sections of the Mark Twain National Forest

Southeast Missouri: the scenic granite glades of Taum Sauk Mountain State Park and the sandstone glades of Pickle Springs Natural Area

Southwest Missouri: the tallgrass prairie of Prairie State Park and the rugged mountain-like terrain of Roaring River State Park

I hope you are able to get out this fall and see one of nature's best shows!

Islands In A Waterless Sea: The Need For Collaboration Between Protected Areas And Their Neighbors

Stacy James, Pres. MOSCB, Div. of Biological Sciences, University of Missouri email: smj21b@mizzou.edu

Aerial photographs are often used to document the sharp contrast in vegetation that can occur along fencelines dividing protected areas (PAs) from neighboring private property. They effectively burn into our minds permanent images of the astoundingly destructive effect humans can have on the environment. And as we gaze sadly upon this gaunt, indisputable evidence, we perhaps find ourselves taking sides, even resorting to a primitive dichotomy of: "conservationists=good, private landowners=bad." Yet, by allowing our minds to be as binary as the landscape images before us, we are only promoting their perpetuity. For the fence, like the land, is a product of human economics and culture, and, at least psychologically, could be taken down.

Protected areas were originally considered islands of development in a sea of wilderness. Now they are thought of as islands of wilderness in a sea of development. While some PAs indeed seem to be island-like because they are very different from their surroundings, the use of such a term may be misleading and affect how PAs are managed. It must be realized that PAs are not islands and fences are not shorelines. If the romantic island concept must be used, then PAs are better considered islands in a waterless sea. For their boundaries are crossed by plants, animals, and other biota, as well as by abiotic components such as fire, wind, and water. Many PAs are too small to provide the minimum critical area for some species to survive, which makes it necessary for these species to utilize neighboring habitat. Edge effects from differences in vegetative cover may penetrate many meters beyond the actual edge or boundary. Interaction and exchange permeate and shape the world, thereby destroying the notion of independent entities (Crow 1991). To consider and treat PAs as islands is therefore not only erroneous, but also a potential threat to achieving effective, sustainable conservation (Crow 1991).

A better framework for managing PAs would be to consider them as part of a dynamic landscape that is both ecological and cultural. The particular combination of ecology and culture in a given area makes each management scenario unique. Ecology and culture are partially products of their interactions with each other. Ecological features include climate, species composition, water quality, and burn frequency. Neighboring properties are connected by intricate ecological processes and relationships. Culture consists of language, ethnicity/race, religion, politics, economics, traditions, handicrafts, occupations, and resource use. Culture affects how humans interact with nature, and may explain why societies or groups vary in their environmental viewpoints or in their use of PAs. Regardless of whether the interaction is positive or negative, humans shape and are shaped by their environment and are a part of the natural world. Just as it would be a mistake to manage PAs as isolated from neighboring property, it would also be a mistake to consider PAs as isolated from humankind.

Ecosystem management treats PAs not as individual ecosystems, but as part of a larger ecosystem that should be managed by numerous stakeholders with a long-term perspective. While it may be easier for managers to ignore threats beyond PA boundaries and only address those that are internal, such an approach may come at great ecological, social, and economic cost. For example, programs on PAs to eradicate exotic species may fail if similar programs are not in place elsewhere. Ecosystem management seeks not only to increase spatial and temporal scales of management, but also to achieve a balance between the production of consumer and ecological goods and services (MacKenzie 1996). Because of this vision, there has been a shift from a confrontational approach between PAs and locals, to one that seeks to address both conservation and development needs (Schelhas & Shaw 1995).

There are many examples of successful collaborations (see Wondolleck & Yaffee 2000), and from them many lessons learned. Key factors for making collaboration work include trust, acceptance, understanding, mutual benefit, flexibility, and dedication. Failure occurs when there is a promotion of activities that are incompatible with local social and economic conditions (Schelhas & Shaw 1995). The way stakeholders perceive natural resources affects what land use practices they will consider adopting (Geballe 1989). Coming up with solutions will be easier in some areas than others, and the chances of success should improve with increased understanding of the local culture and how land and resource use decisions are made. "Rather than viewing rural people as engaging in irrational, environmentally destructive land uses, an assumption may be made that, although the land uses may be environmentally destructive, they are probably rational give the resources and knowledge available to people engaging in these uses" (Schelhas & Shaw 1995:210). Protected area managers also must maintain some flexibility in what they consider acceptable practices. Even if a solution seems less than ideal, if agreed upon and achievable by locals it might result in more conservation gains (Schelhas & Shaw 1995).

Each property owner has the right to use their land as they wish, and hence are in a position of power. Collaborative efforts by their nature require participants to give something up. Hence, collaboration may be seen as weakening the power of individual players while strengthening the power of the collective whole. Unfortunately, some will not be able to look beyond their own condition to see the bigger picture and will view any lessening of power and freedom as a threat. Indeed, "many protected area staff and academic conservationists are concerned that this cooperative approach could ultimately reduce the quality of the protected area, and that strong legislation supported by vigorous law enforcement is the best option for long-term conservation" (McNeely 2001:31). Enforcement is necessary, but collaborative efforts will likely achieve more conservation successes than strictly preservationist or isolationist approaches (McNeely 2001). Although it may at times be challenging to come up with a consensus or maintain congeniality, there is great benefit to analyzing a situation from multiple perspectives and learning from each others experience and mistakes. The merit of joining forces must be real and made clear to potential participants. Government and private organizations that simply purchase land and put a fence around it may not be able to achieve conservation or preservation goals (Wondolleck & Yaffee 2000). Collaboration between PAs and their neighbors and an ecosystem management approach may be necessary to achieve sustainability.

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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 free. Please visit our MOSCB web page for more detailed information (http://www.snr.missouri.edu/moscb).

The Glade Vol. 7, No. 2 was edited by Sara Storrs (sisk95@mizzou.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.