River Crossings

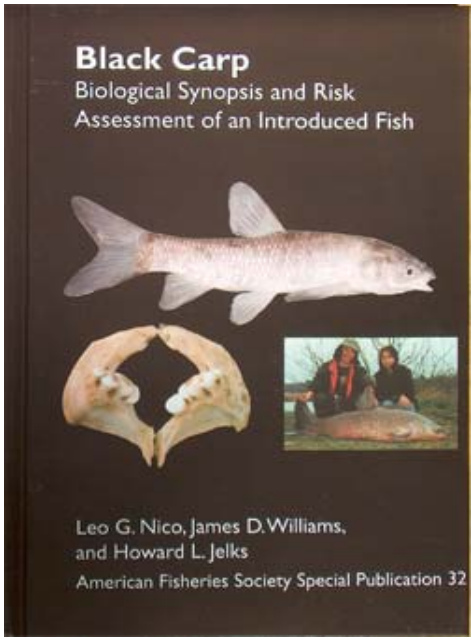
Volume 14 **July/August 2005** **Number 4**

Black Carp Risk Assessment Published

A new publication entitled, "Black Carp – Biological Synopsis and Risk Assessment of an Introduced Fish" by Leo G. Nico, James D. Williams and Howard L. Jelks, is now available from the *American Fisheries Society*. Readers will remember that MICRA petitioned the U.S. Fish and Wildlife Service to list the black carp, *Mylopharyngodon piceus,* as an injurious species under the Federal Lacey Act in 2000. Such listing would prevent the importation and interstate transport of the species. To date the species has not been so listed.

The black carp is a large predator of snails and mussels used by fish farmers to control infestations of snails in their ponds. The snails are an intermediate host of a trematode parasite that infests catfish and reduces the value of the fish flesh. While this is a beneficial use to fish farmers, it is almost certain that fish held in such ponds will escape captivity. In fact in 1994, several black carp are known to have escaped from fish farm ponds in Missouri, and to date three wild black carp have been collected from public waters in Illinois and Louisiana.

It is hoped that too few black carp exist in the wild to form viable populations. But continued use of the fish by fish farmers will increase the likelihood of further escapes and raise the odds that wild populations of black carp will be established in public waters. If that happens, native populations of snails and mussels will be threatened with extinction because many species are already listed as threatened or endangered by federal and state wildlife agencies.



Black carp can grow up to 5 ft. in length and reach weights of up to 150 lbs., maturing at ages 6-11. A 4-year-old black carp has been shown to eat an average of 3-4 lbs of mussels per day, so older, larger black carp probably consume even more. At that rate of consumption, a single black carp could eat more than 10 tons of native mollusks during its lifetime.

Major subjects addressed by the new publication include black carp:

- taxonomy, description, and distinguishing characteristics;
- native distribution;
- biology and natural history;
- history of the species in world aquaculture;
- history of introduction within and outside the United States;
- use as a biological control agent;
- alternatives to the use of black carp;
- environmental tolerance and potential geographic range; and
- risks associated with its introduction.

The 337 page hard cover publication is available from the *American Fisheries*

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Society, Attn: Orders Department, 1650 Bluegrass Parkway, Alpharetta, GA 30004, (678) 366-1411, FAX (770) 442-9742, www.fisheries.org (click on "Bookstore").

Asian Carp Prevention and Control Act

Wisconsin Congressman Mark Green (Green Bay) on June 23 introduced the *Asian Carp Prevention and Control Act* (H.R. 3049) designed to help stop the spread of Asian carp into the Great Lakes. Green's proposed legislation would add four species of Asian Carp to a federal list of banned species under the Lacey Act. These species include the black carp (*Mylopharyngodon piceus*); bighead carp (*Hypophthalmichthys nobilis*); silver carp (*Hypophthalmichthys molitrix*); and largescale silver carp (*Hypophthalmichthys harmandi*). Mike De Wine (R/OH) and 4 Co-Sponsors introduced similar legislation (S. 1403) in the Senate.

"The Asian Carp is one of the most serious threats to the health and integrity of the Great Lakes ," Green said, "It not only competes with native species for food and spawning areas, it pushes them out entirely. If these destructive fish get loose in the Great Lakes – the most important freshwater ecosystem on the planet – the results could be devastating."

Green said the Lacey Act prohibits the importation of designated species deemed injurious to human beings and the interests of agriculture, horticulture, forestry, wildlife or wildlife resources. "The Asian Carp can eat 40% of its body weight every day, weigh in excess of 100 lbs., and each female can carry up to one million eggs," Green said. "That spells trouble for scores of native fish we know and love. This invader is a threat to the Great Lakes' multi-billion dollar fishing industry, and Wisconsin's proud fishing tradition, he said. We must stop it while we can."

As a member of the congressional *Great Lakes Task Force*, Green has been a leader in Congress in the fight to preserve and protect the Great Lakes . He helped secure $6.825 million for the construction of a permanent dispersal barrier in the Chicago Sanitary and Ship Canal to prevent the Asian Carp from reaching the Great Lakes.

Source: Mark Green, 8th District, Wisconsin, *News Release*, 6/23/05

Reservoirs Construction and Exotic Species Spread

Just as disturbance makes a landscape susceptible to invasion by alien plant species, the construction of reservoirs around the globe could be contributing to the accelerating spread of exotic aquatic species, says a *Forum* article in the June 2005 issue of *BioScience.* John A. Havel of Southwest Missouri State University, and Carol Eunmi Lee and M. Jake Vander Zanden of the University of Wisconsin survey evidence indicating that the physical and biological properties of reservoirs make them more likely to be invaded by exotic species than natural lakes. The researchers point to cases in which reservoirs are believed to have facilitated the rapid spread of invasive species.

The authors note that reservoir construction often leads to manyfold increases in the area of standing water in a region and that reservoirs typically replace varied stream habitats with habitats more similar to each other. Compared to natural lakes, reservoirs are usually shallower, more connected to other water bodies, and more laden with suspended and dissolved solids; they also have a higher and more variable flushing rate. Moreover, they typically contain unstable, recently assembled communities of stocked fish. An ecological hypothesis known as the fluctuating resource availability hypothesis suggests that these characteristics will enhance the susceptibility of reservoirs to invasion.

Because reservoirs are more saline than freshwater lakes, Havel, Lee, and Vander Zanden propose that they could provide a haven that helps invaders from saline and brackish habitats adapt to fresh water. Several invasive species are suspected to

River Crossings

Published by

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River Crossings is a mechanism for communication, information transfer, and coordination between agencies, groups and persons responsible for and/or interested in preserving and protecting the aquatic resources of the Mississippi River Drainage Basin through improved communication and management. Information provided by the newsletter, or opinions expressed in it by contributing authors are provided in the spirit of "open communication", and do not necessarily reflect the position of MICRA or any of its member States or Entities. Any comments related to "River Crossings" should be directed to the MICRA Chairman.

A Message From the Chairman

In 1984, green out of graduate school, I was employed as the District Fisheries Biologist in northeast Arkansas – farm country – flat and fertile. One of my first projects was the renovation of 300-acre Mallard Lake, a four-levee public fishing lake located adjacent to Big Lake National Wildlife Refuge. Mallard Lake was essentially a highly eutrophic bathtub. For the preceding 12 months my assistant and I had been monitoring the lake's water quality – turbidity, chlorophyll-A, and total organic carbon. Now we were applying liquid rotenone to the remaining borrow ditches to kill out the lake's remaining fish prior to draining the lake. As we motored through the stumps and logs, silver carp hurled through the air, occasionally landing in the boat, flaying themselves bloody against the metal deck.

We were closing out a grand failed experiment to improve Mallard Lake's water quality using silver carp, a planktivore. The fish had proven effective in improving water quality in sewage treatment ponds in studies funded by the USEPA. Interest in the fish came from Alabama, Illinois, North Carolina and Missouri, just to name a few. In Mallard Lake, home of the state record largemouth bass, the fish failed. Chlorophyll-A and turbidity levels remained essentially the same. Now I was closing out this chapter in the fish's history.

Today the fish is *persona non grata.* Disdained by resource managers, discarded by the water quality community, and abandoned by aquaculture – the fish is just so much debris along the fisheries highway, a regretful reminder that well intentioned introductions of non-indigenous species can have long lasting, unintended consequences. Silver carp, along with its more viable cousins, the bighead and black carp, are now center stage of a policy debate on the role of federal, state, and private interests in the use and regulation of non-indigenous species. The U.S. Fish and Wildlife Service struggles with a decision to list black and bighead carp as Injurious to Wildlife under the Lacey Act, a regulation ill-suited to the need. The National Asian Carp Management Work Group, an assembly of government scientists, academics and private aquaculturists, thread their way along an arduous process to keep these fish from spreading to other drainages and the black carp contained on fish farms. Personally, I am much more hopeful of the latter effort. Meanwhile, both silver and bighead carp have established self-sustaining populations in the Mississippi, Missouri, and Illinois Rivers and threaten to invade the Great Lakes.

This country needs to get a grip on its intentional use of non-native species. Any policy development needs to be a collaborative effort involving federal, state, and private industry. The recent role out of *Habitattitude*™ is an excellent model upon which to build. The costs are too high, both in terms of our natural resources, and to the small businesses depending the animals for their livelihood, to continue on going as we have. We don't need to wait for another train wreck before acting.

Mike Armstrong

Acting Fisheries Section Chief
Arkansas Game and Fish Commission

have benefited from the use of reservoirs as avenues of invasion. These include *Daphnia lumholtzi*, a water flea from the Old World tropics, and the copepod *Eurytemora affinis*.

Some evidence indicates that zebra mussels, an economically important invasive species, may also have made use of reservoirs to spread. Havel, Lee, and Vander Zanden argue for research aimed at comparing rates of invasion in freshwater lakes and reservoirs that are in similar geographic regions, to determine whether the rate in reservoirs is indeed higher, as predicted.

Source: *UPI/Nature News*, 7/7/05

American Eel Status Review

The U.S. Fish and Wildlife Service (FWS) in coordination with the National Marine Fisheries Service (NMFS) has completed its evaluation of a petition to list the American eel as either threatened or endangered under the Endangered Species Act (ESA) and determined that substantial biological information exists to warrant a more in-depth examination of its status. This finding will commence with a status review of the species, and once the review is complete, the agencies will determine whether to propose listing the species.

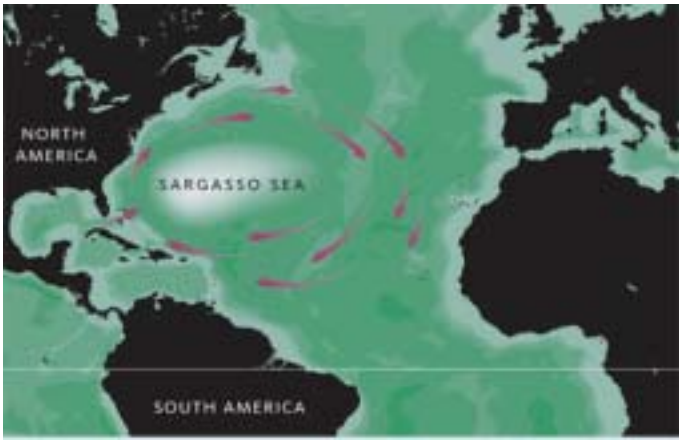
American eel

The American eel lives in freshwater streams from Greenland south along the North American coast to Brazil in South America. In the U.S. it lives inland to the Great Lakes and in the Mississippi River drainage basin. The only freshwater eel in the Western hemisphere, American eels begin their lives in the mid-Atlantic Sargasso Sea. About a year later, they migrate to freshwater rivers and lakes and coastal areas where they live for 7-30 years. At maturity, eels then return to the Sargasso Sea to spawn and die. Because the eel spends a portion of its life in the marine environment and a portion of its life in freshwater, it falls under the

responsibilities of both the FWS and NMFS, so the agencies will work together on the issue.

The current decision, published in the Federal Register and commonly known as a 90-Day Finding, is based on scientific information about the species provided in the petition requesting the listing. The finding does not mean that it is appropriate to list the American eel. Rather, it is the first step in a long process that triggers a more thorough review of all the biological information available. This process, which includes a request for input from the public, should be completed within 12 months of receiving the petition.

"During the review, a comment period will serve as an invitation to provide biological information so we will have all the best available scientific information on which to base decisions," said FWS Northeast Regional Director Marvin Moriarty. To ensure this status review is comprehensive, the FWS and NMFS are soliciting information from State and Federal natural resource agencies, tribes, other countries, and interested parties regarding the American eel. If listing is not warranted, no further action will be taken. But if listing is warranted, one of the two agencies will publish a proposal to list, solicit independent scientific peer review of the proposal, seek additional input from the public, and consider the input before making a joint final decision about listing the species. Generally, there is a one-year period between the time a species is proposed and the final decision.



Sargasso Sea spawning area of the American eel.

The American eel supports commercial and limited recreational fisheries throughout most of its range. In the U.S. eels are marketed for human consumption and as bait for crabs and game fishes, including striped bass (*Morone saxatilis*), cobia (*Rachycentron canadum*), and largemouth bass (*Micropterus salmoides*). Adult eels often are shipped alive or frozen to Europe where they frequently are smoked before marketing.

The American eel is catadromous, spending most of its life in rivers, freshwater lakes, and estuaries, but returning to the sea to spawn. Many details of its life history are only generally understood and much of what is known has been derived from studies in the Middle and North Atlantic regions of the U.S. and the eastern provinces of Canada.

Different stages of the eel's life cycle are known by a variety of common names that are used throughout the scientific literature. The eels spawn in the ocean and the larva (leptocephalus) gradually metamorphoses into an unpigmented glass eel which migrates into freshwater and gradually develops pigmentation. The young eel is now called an elver. Elvers may remain in coastal rivers or may continue to move upstream. During the growth phase which follows the eel is called the yellow eel, and this phase may last many years. Yellow eels may be sexually undifferentiated (i.e. gonads contain no definable gametes), hermaphroditic (oogonia and spermatogonia present), or sexually differentiated (females with oogonia; males with spermatogonia). Because none of these stages are capable of reproduction, all yellow eels are immature.

Maturity is reached after age III for males and between ages IV-VII for females from northerly populations, although females more than 15 years old have been reported in large inland lakes. Eels mature at younger ages in the southeastern U.S. than in New England. Maturation is accompanied by changes in body color and morphology; maturing eels that migrate downriver and through the ocean to the spawning grounds are known as bronze eels or silver eels. The metamorphosis from yellow eel to silver eel includes several physiological changes: (1) color change (to a metallic, bronze-black sheen; pectoral fins change from yellow-green to black); (2) fattening of the body; (3) thickening of the skin; (4) enlargement of the eyes and changes in visual pigments in the eye in preparation for migrating at greater ocean depths; (5) increased length of capillaries in the rete of the swim bladder, which also may be an indication of migration at greater depths; and (6) degeneration of the digestive tract. Silver (metamorphosed) eels appear to be better adapted to swimming than yellow eels.

Eels begin the spawning migration in late summer and fall throughout much of New England and eastern Canada. Migration from lakes that are well inland may begin earlier. Catches of eels leaving Lake Champlain by way of the Richileau River were heaviest from June to August. Eels seem to leave later in the Southeastern and Middle Atlantic states than in New England states. This delay may function to synchronize arrival at the spawning grounds in the Sargasso Sea. Many downstream migrating eels may not yet have developed the external characteristics associated with the migratory silver eel stage. Northern eels may begin migration at an earlier developmental stage, perhaps to compensate for the longer time required to reach the spawning grounds. Few details are known about the oceanic spawning migration, and the means by which eels locate the spawning grounds are poorly understood, but may include use of geoelectric fields generated by ocean currents.

Spawning of American eels has never been directly observed, and spawning areas have been inferred on the basis of collections of larvae. Spawning seemingly occurs in the Sargasso Sea as early as February and may continue until at least April. Spawning zones have been documented south of Bermuda and north of the Bahamas. The youngest stages of American eel larvae may coexist with European eel larvae. The large overlap of spawning areas between American and European eels is evidenced by the capture of leptocephali of both species in the same trawl. Thermal fronts that separate the northern and southern water masses of the Sargasso Sea are believed to form the northern limit of American eel spawning. The depth at which spawning occurs is not known, but morphological and physiological evidence suggests that eels may migrate and spawn in the upper few

hundred meters of the water column. Adult eels presumably die after spawning. None have been observed to migrate up rivers, and spent eels have not been reported. Hatching probably begins and peaks in February, but may continue through April. The larval stage lasts up to about 1 year. The body is lanceolate, sharply pointed at both ends, and deepest at the middle. American eel larvae grow as they are transported by ocean currents. Leptocephali grow rapidly until October when growth slows or stops, and many metamorphose into glass eels. Larvae are transported from the spawning grounds to the eastern seaboard of North America by the Antilles Current, the Florida Current, and the Gulf Stream. Most leptocephali probably enter the Gulf Stream directly from the Sargasso Sea.

Douglas Harold Watts of Augusta, ME, and Timothy Allan Watts of South Middleborough, MA, petitioned the two Services to extend ESA protection to the American eel. Prior to receiving the petition, the Services had already agreed to review the American eel status at the request of the Atlantic States Marine Fisheries Commission (representing 15 states from Maine to Florida) in light of an apparent decline in commercial eel harvest. Anyone wishing to submit information regarding the American eel may do so by writing to: Martin Miller, Chief, Endangered Species, Northeast Regional Office, U.S. Fish and Wildlife Service, 300 Westgate Center Drive, Hadley, MA 01035 or by electronic mail to: AmericanEel@fws.gov. Comments must be received by Sept. 4, 2005.

Sources: Facey, D.E. and M.J. Van Den Avyle. 1987. American Eel. USACE Biol. Rept. 82(11.74) TR EL-82-4. Coastal Ecology Group Waterways Experiment Station, U.S. Army Corps of Engineers, Vicksburg, MS 39180 and U.S. Department of the Interior, Fish and Wildlife Service, Research and Development, National Wetlands Research Center, Washington, DC 20240. 28 pp.; *Press Release*, U.S. Fish and Wildlife Service, Hadley, MA; and http://www.fws.gov/northeast/images.html

Coal Mining Concerns in the Upper Clinch River Watershed

A recent dramatic increase in coal mining in the Clinch River watershed in Virginia has and continues to raise concerns in Tennessee over violation of state and federal environmental law. The U.S. Environmental Protection Agency (EPA) has identified coal mining in the Clinch River Watershed as a significant threat to fish, aquatic life and aquatic habitat; and the Tennessee Wildlife Resources Commission (TWRC) and the Tennessee Wildlife Resources Agency (TWRA) have contacted their Congressional representatives for relief.

The Clinch River rises out of the mountains of southwestern Virginia, draining portions of the Jefferson National Forest as well as a considerable amount of agricultural land, and urban areas. In addition to coal mining, the river's water quality is impacted by agricultural runoff, sewage, and industrial wastes. The Clinch travels 135 mi in a southwesterly direction in Virginia before entering the state of Tennessee and merging with the Powell River in TVA's Norris Reservoir with a discharge of about 1,601 cfs. The Upper Clinch River in Tennessee's Hancock, Claiborne and Grainger Counties supports a diverse fish and aquatic community, including freshwater mussels of global significance. The Clinch is a coolwater stream, supporting smallmouth and spotted bass, rock bass, introduced muskellunge, and walleye. Forage fish species include gizzard shad, hogsucker, several redhorse species, stoneroller minnows, and a variety of other minnows and darters.

The TWRC and TWRA have petitioned the EPA (with federal jurisdiction over interstate waters), the U.S. Department of the Interior (DOI) (with responsibility for the federal Office of Surface Mining), the U.S. Fish and Wildlife Service (FWS) (with federal responsibility for the protection of Critical Habitat for listed threatened and endangered species), the State of Virginia (with state responsibility for the regulation of coal mining and water quality in the Clinch River watershed), and the Tennessee Valley Authority (TVA) (with multistate natural resource management capability and responsibility) to:

- take those actions necessary to protect fish, aquatic life, and aquatic habitat in the Clinch River and its tributaries;
- participate fully and support an aquatic resource conservation initiative; and
- provide all useful information related to water quality, fish and aquatic life, and aquatic habitat, in the Clinch River and its tributaries.

Specifically, the TWRC and TWRA are asking their Congressional representatives to support the following three projects related to a comprehensive *Upper Clinch River Conservation Initiative*:

1. It is vital that the EPA Region IV office in Atlanta, GA and the Region III office in Philadelphia, PA prepare and implement a carefully coordinated plan for the monitoring, assessment, and protection of water quality and fish and aquatic life in the Clinch River in Tennessee and Virginia. TWRC and TWRA request that EPA, through its prime contractor *Tetratech, Inc*., prepare a comprehensive monitoring plan for the Upper Clinch River to be presented at the *5th National Monitoring Conference* in May of 2006 as an example of state-of-the-art in assessment, innovation, communication, and integration for a large scale water quality and aquatic resource conservation program.

2. A comprehensive report on the status of critical habitat and federally listed species in the Upper Clinch River should be prepared by the USFWS. A draft report for review and comment by Tennessee and Virginia should be prepared by May of 2006. Thereafter, annual updates should be prepared to provide a clear record of protection and conservation of aquatic resources in Upper Clinch River.

3. TVA should employ its nationally recognized expertise for assessing water quality and pollution sources utilizing low-level color infrared photography to characterize the Upper Clinch River Watershed. This assessment should be repeated every three (3) years to provide a clear record of pollution impacts to the Upper Clinch River. TWRA proposes to contract with TVA for this service.

Sources: Tennessee Wildlife Resources Commission and Tennessee Wildlife Resources Agency, Nashville

Dredging Issues on the Kansas River

Degradation of the Kansas River streambed has caused millions of dollars in economic damage and created a host of environmental problems, according to a new state study. "Considering how many people rely on the river ... degradation

really is a serious issue that we ought to be taking a look at," said Earl Lewis, manager of hydrology and evaluation at the Kansas Water Office (KWO). More than 1 million people live in counties bordering the river, known as the Kaw, and they depend on it for drinking water, power plant operations and industrial development.

The KWO report recommends further review of the 170-mile river, which runs through Lawrence and other major cities of northeast Kansas, to determine the extent of damages and what can be done about them. The KWO reviewed numerous studies and analyses of the river dating back to 1978, then assembled an advisory committee to gather more information. Laura Calwell of Mission, who serves as the Kansas Riverkeeper for the environmental group *Friends of the Kaw*, said she was disappointed that the

A View of the Kansas River

brief report didn't mention the effect that problems on the river had on recreational opportunities such as boating and canoeing. But, she added, "I just want the study to go on to the next step. The natural state of the Kansas River is so compromised now."

But sand dredgers are wary about any further study. "It's pouring money down the hole," said Edward "Woody" Moses, director of the *Kansas Aggregate Producers Assn*. The report found that river degradation — the lowering of the streambed — was occurring in all river reaches, but especially in the Kansas City area. And it was being caused by natural flooding, dams, commercial sand and gravel dredging and channel degradation on the Missouri River. Moses said he feared further study could be used to try to limit dredging operations.

Each year, about 1.4 million tons of sand is taken from the Kansas River, with much of it removed from the river bed through hydraulic dredging operations at several sites. The high-quality sand is a primary source of aggregate for cement used in construction projects in the Kansas City area. "We're like a teaspoon compared to a shovel," Moses said, comparing the changes in the streambed from dredging with natural flooding and reservoir operations. Water discharges from reservoirs carry less silt and are more erosive, lowering channel beds that are downstream. "The ultimate question is you spend a bunch of money studying the impacts and what are you going to do about it? Is it worth depriving people of jobs?" he asked.

But degradation in the Kansas River has caused bank erosion and widened the channel in some areas, forcing cities, water districts and energy companies to construct weirs, or barriers in the channel to control water. The city of Lawrence has spent $1 million in recent years to maintain and upgrade the Bowersock Dam, whose foundation was eroded in part because of downstream degradation, the report said. A *Kansas City Board of Public Utilities* power plant in Kansas City, was forced to shut down 15 years earlier than scheduled because the stream elevation fell below the water intakes needed to help cool the plant, the report said. On the environmental side, the report said that the shovelnose sturgeon and plains minnow have disappeared from the river.

The KWO wants to inventory all structures in and around the river to determine their condition and vulnerability to degradation, set up groups of stakeholders within specific reaches of the river and then determine the extent of degradation in those areas of the river and come up with a plan to limit it. KWO's Lewis said the studies weren't meant to blame sand dredgers. "Our issue is that people who rely on the river have water and power," he said.

Sources: Scott Rothschild, *Lawrence (KS) Journal-World*, 6/1/05; *Greenwire*, 6/2/05

MT/WY Coalbed Methane Water Issues

Montana regulators are setting water-quality degradation limits that may seriously effect the lucrative yet largely untapped coalbed methane (CBM) gas resources of northeast Wyoming. Officials from both states have been discussing the issue for about five years, and Gov. Dave Freudenthal (WY) said recently that the two states are at loggerheads. At issue is how far Wyoming can degrade water quality in the Tongue, Powder and other rivers that flow from Wyoming's CBM gas fields into southeast Montana. Gov. Freudenthal warned that if the two states can't resolve the issue, the U.S. Environmental Protection Agency might be tempted to weigh in, and "that's an undesirable prospect", he said.

Wyoming regulators believe they can meet Montana's "numeric standards" at the border, but Montana officials say that would leave no wriggle room for CBM water discharges on their side of the border. "There are differences in how fast the development is occurring in Wyoming versus...Montana. So we're talking about things like, does it make sense for Wyoming to use most of the assimilative capacity now and then back off on that when coalbed methane development starts to take off in Montana," said John Wagner, administrator of the Wyoming Department of Environmental Quality's Water Quality Division.

Montana proposes a 50/50 split of the capacity for additional electrical conductivity and sodium adsorption ratio in the subject streams. Meanwhile, Wyoming regulators believe they should be allowed to go beyond 50% at least until Montana begins developing its own CBM gas resources in earnest. At stake may be the size and scope of CBM gas development in Wyoming and Montana. With more than 22,000 wells so far in northeast Wyoming, the industry has tapped less than 5% of the CBM gas resources there.

Wyoming's CBM industry has significantly impacted local economies, making city, county and state tax hikes unlikely anytime soon. But by contrast, the industry is barely a blip on the radar screen in Montana, due in part to a series of legal challenges to protect irrigation. Several irrigation and conservation groups in the region say the new found wealth shouldn't come at the expense of those dryland ranchers on either side of the border who rely on a delicate system of stream irrigation.

Ranchers traditionally use spreader dikes to irrigate their flatlands during the five or so spring flood days that occur naturally.

But in the past five years some of the creeks they use have been altered from ephemeral streams to ones that run almost year-round. This change came from the onset of CBM gas development, which pumps water from coal aquifers and discharges it into holding ponds and natural drainages. It's hard to believe ranchers in the arid Powder River Basin could have too much water. But dryland ranching is a delicate operation that stems from the narrow trickle of water that comes from the sky, not water that comes from the ground.

Adding a big flow of CBM water to some area soils is like adding salt to your bacon. For instance, ranchers believe a sodium adsorption ratio (SAR) of 6 or less is safe for irrigation. This year SAR measures of 13 occurred in February, and even the heavy snowfall in April couldn't dilute the SAR back down to 6. "I've tried irrigating with (CBM water) and it was a disaster," Bill West, a rancher along Spotted Horse Creek, said. "This year we didn't irrigate with the floodwater at all." But not every rancher has the same experience. A wide variety of soils and water quality provide for mixed results in the Powder River Basin.

Industry consultant Gene George said Wyoming water quality regulators are very careful to set standards to protect downstream uses such as irrigation. He said a general lack of understanding among the public seems to stack the cards against the industry. "I am pleased the governor is talking to (Montana regulators), because they're imposing a severe limit on the amount of water we can put into the Powder River," George said. "That potentially limits the activity in Wyoming, and that could be detrimental to Wyoming."

But Montana DEQ officials say their numeric standards for electrical conductivity and SAR are reasonable. "We're required to maintain and protect the quality of water for beneficial uses, and that includes irrigation for agricultural use," said Bob Bukantis, program manager for water quality standards at Montana DEQ.

Source: Dustin Bleizeffer, *Casper Star-Tribune* and *Billings Gazette*, 7/9/05

Upper Mississippi Refuge Management Plan Stirs Anger

Recreation on the Upper Mississippi River is big business, generating over a billion dollars annually in revenue, while historic public access and use has been, for the most part, free to all. The tiny islands along the channel and in the backwaters have been perfect for overnight camping trips, and fishing and hunting have been widespread. Generally, except for the occasional beach party or jet ski, there has been peace and quiet for all.

View of the Upper Mississippi River

But now, planning for the Upper Mississippi River National Wildlife and Fish Refuge (UMRNWFR), stretching along 261 miles of the River from Wisconsin into Iowa, has raised concern that boating, camping, fishing and hunting options could in the future be heavily restricted by the U.S. Fish and Wildlife Service (FWS). All of the nation's wildlife refuges are developing plans to protect and manage their animal life and habitat. But on the UMRNWFR, the proposals are stirring angry resentment from many residents who have long seen themselves as good stewards of the land.

"This is our Virginia Beach," said Les Goetzinger, 50, a carpenter who lives in Freeburg, MN. "This is the home away from home. These proposals would limit the quality of life out here." Furthering the controversy is the fact that the 240,000-acre refuge itself is unusual in that it stretches through four states — Minnesota, Wisconsin, Illinois and Iowa — is bisected by a nationally significant commercial waterway, and has drastically different needs and concerns from one end to the other. In the north, there is more camping, hunting and jet skis in the backwaters, while in the south, where barge traffic is heavier, there is less camping and more boating. So residents say a one-size-fits-all plan, which would govern the land for the next 15 years, does not accommodate the refuge's diversity.

The proposed plan, priced at about $216 million for land acquisition and other improvements, would also limit duck hunters to 25 shotgun shells a day during the fall season and keep jet skis to the main river channel. Camping would be allowed on islands in the main channel for a fee, but campers would have to bring costly portable toilets and would not be allowed to drink alcohol. Refuge manager Don Hultman said limiting access to specific islands and placing shell limits on duck hunters, among the other limits, are the best ways to ensure the environment can remain available to the public and to the million waterfowl and other migratory birds that rest at the refuge each fall.

"The backwaters are the most important areas for wildlife," Hultman said from his office in Winona, MN. "There haven't been any changes like this made here in 45 years, and if you don't change anything, you really need to do that." But locals say the changes are too intrusive. "It seems like the government pulls a little more away from you all the time," Goetzinger said. "But I do know a few fishermen who wouldn't complain about jet skis being off the backwaters."

Pam Walhovd, 42, a lifelong resident of Brownsville, MN, population 517, said she relies on the sandbars and beaches for camping. The shallow backwaters are perfect for running jet skis, and, for the most part, people police themselves on the water and respect wildlife, she said. But on beaches where alcohol and overnight stays are prohibited, people have bent metal signs posting the rules — a signal they don't want more limits here on what they can do. More government regulations to reduce recreation would foster even more conflict between residents and government officials, she said. "People feel like they own the river in this area," Walhovd said. "I think it's because when you look around, it's a pristine area, a great place to live."

Hultman insists the regulations on the backwaters — home to at least 500,000 canvasback ducks (about 50% of the world's population) and 20% of the planet's tundra swans — are fairly mild. More than 136 bald eagles also nest in the refuge, as do about 5,000 herons and egrets. The refuge gets about 3.7 million visitors each year, he said. "With these

proposals," Hultman said, "we are just trying to minimize the disturbance. People have relied on this river for livelihoods for generations, so any little change is like a big thing here. They will still be able to make a living off the water."

Debate over the regulations has spurred at least one Web site, http://upriverrats.org/, and has attracted hundreds of people to the few public hearings held up and down the River. In Stoddard, WI, Ronald Nicklaus, 56, a retired biologist with the Wisconsin Department of Natural Resources, said he is joining the fight against the FWS's proposed limits. The regulations, he said, are too tough on people and are not focused enough on restoring sandbars in the river that create diverse habitat, or tending to sick wildlife. "This isn't just a grass-roots rebellion [of people] who hate the government," he said. "But there's nothing in these plans to regulate the environment, it's to regulate the people. You can't regulate this refuge like other traditional refuges where the boundaries are clearly defined."

From Wabasha, MN, to near Rock Island, IL, the refuge runs through 70 municipalities and is lined with a mixture of private property, power plants and state parks — different uses that complicate what regulations should be in place. "The officials want to swat the fly with a sledgehammer to make everything illegal so everyone will just go away to make it like other refuges," Nicklaus said. "You have to work on tougher problems to fix the environment. Kicking these guys off sandbars and checking how many shells they have in their pockets won't work."

Hultman says that under the proposal, people will still be able to camp on some main channel islands and boat in specific areas of the river, and they will still be able to enjoy the Mississippi. "If you read [the proposal], it's not very extreme," he said, "but it's change and people do not like that change."

But by mid July, Hultman and other FWS officials had apparently heard enough and announced that an alternative plan will be released in October. "The new plan will probably be a hybrid of options presented in the original plan plus recommendations from workshops," said FWS spokesman Scott Flaherty. "It will reflect the input of a lot of people up and down the river." Flaherty said that more than 2,600 people attended the public hearings. Some were against any change, while others supported them, he said. Most of the discussion focused on hunting, fishing, beach use, closed areas and motorless areas, he said.

Tim Grunewald, regional director of *Wisconsin Ducks Unlimited*, saluted the FWS for revising the original proposal. "We are very supportive any time a government agency steps back when it hears critical analysis of a project, and is willing to reevaluate and come up with an alternative," he said. "It's refreshing to know that they will take into account comments they received."

But Brad Redlin, Mississippi River coordinator for the *Izaak Walton League of America*, a conservation group, said the league supported the original plan. "Seeking public comment on conservation plans for public lands is clearly the right thing to do, and responsiveness to those comments is appropriate and expected," said Redlin, who is based in St. Paul, MN. "But the resource base itself has no voice to comment. Habitat protection and scientific principles must be given priority over present-day public preferences." He added, "The mission of wildlife conservation is to perpetuate natural habitats that will support abundant wildlife populations, not to preside over the allocation of a vanishing resource."

But Rep. Ron Kind (D/WI) said he expects the agency to ease the proposed restrictions in the new plan. "They realize they have to do that or there will be a public outcry," said Kind, a duck hunter with a house on the Mississippi. "It would make enforceability very difficult, if not impossible, and they certainly don't have the money to go out and hire 500 new agents in the refuge system."

The federal Wildlife Refuge Improvement Act of 1997 requires that refuges be managed according to their mission to restore fish, wildlife and plants. The act calls for every national refuge to have a plan in place by 2012. The proposed UMRNWFR plan will outline regulations through 2020

Sources: Robert Gutsche Jr., *Washington Post*, 6/13/05; Frederic Frommer, *AP/St. Paul Pioneer Press*, 7/13/05; and *Greenwire*, 7/13/05

Sustainable River Management Study

The *Nature Conservancy* announced in mid July that it will launch a pilot project to investigate sustainable water practices (i.e. environmentally safe water management practices and new approaches for storing and diverting river water). The program, underwritten by a $1 million donation from bottled water distributor *Nestle Waters*, will take place on Virginia's Rivanna River and a waterway in Texas.

The two sites are thriving watersheds with the ability to supply nearby regions, researchers said, adding that the project could provide a better understanding of large-scale water transfer. "This is a ubiquitous problem across the U.S. and we want to demonstrate ways to meet challenges and be an example to other places," said Brian Richter, director of the *Nature Conservancy's Sustainable Waters Program*.

Richter said that the Rivanna was chosen because its watershed remains healthy despite serving many users. "Virginia has identified the Rivanna watershed as one of the most important," he said. He added that a local water supply issue has compelled the *Conservancy* to help area agencies identify long-term solutions to water needs. According to Richter, the *Conservancy* has been working closely with the *Rivanna Water and Sewer Authority* (RWSA) for two years to find ways to alleviate local water storage problems. In April, the *Conservancy* proposed an idea to build a pipeline from the Ragged Mountain Reservoir to the South Fork Rivanna Reservoir. Ridge Schuyler, director of Piedmont programs at the local chapter of the *Nature Conservancy*, said that the pipeline would allow for full recreational and environmental usage of the water.

David Dadurka, media relations manager for the *Conservancy*, said the new study will provide more research to help the RWSA and other water officials find eco-friendly solutions for taking water from the Rivanna. "By providing science-based information and assistance to the RWSA, we hope to help them to understand how to achieve their water supply needs, while protecting the environment," Dadurka said. "This, in turn, may help

facilitate a successful permitting process when they approach the regulators."

Schuyler added that the research will help officials identify the amount of water that can be removed from the Rivanna without affecting the health of the river. Richter said he hopes that the new research will not only help local officials but also have global impact. "We have the potential to make a difference here," he said.

Sources: Annie Johnson, *Charlottesville Daily Progress*, 7/11/05; and *Greenwire*, 7/13/05

Pharmaceuticals in Waterways

More and more academics, state officials and environmental advocates are questioning whether massive amounts of discarded pharmaceuticals, which are often flushed down the drain, pose a threat to the nation's aquatic life and possibly to people. In waterways from the Potomac to the Brazos River in Texas, researchers have found fish laden with estrogen and antidepressants, and many show evidence of major neurological or physiological changes. No one has seen evidence of effects on human health, but a number are asking publicly why the federal government isn't taking a more aggressive approach to what they see as a looming problem.

In October 2002, Maine's Department of Environmental Protection (MDEP) asked federal scientists to analyze water samples to determine to what extent prescription drugs had seeped into the state's waterways. Worried that discarded birth-control pills, antidepressants and other drugs could affect the state's fishing industry and public health, the MDEP's Ann Pistell hoped the U.S. EPA's Northeast office could give her a speedy answer. But 2.5 years later she received a partial report in June identifying drugs in the water, but without a detailed explanation. She is still waiting for a full breakdown. "We're sort of baffled and frustrated by the lack of a sample analysis," said Pistell. "We see this as an emerging issue. The more we find out, the more concerned we are."

Meanwhile, Raoul Clarke, an environmental administrator in Florida's Department of Environmental Protection, has worked with colleagues to establish a listserv where state and local officials can exchange information with concerned activists. "There are many unanswered questions, but these things are showing up, and people are taking notice," Clarke said.

But U.S.EPA officials say they are still gauging the seriousness of the threat. Technological advances in testing make it possible to detect very low levels of hormones and chemical compounds in waterways, they say, and it is unclear whether such levels harm animals and people. Hal Zenick, who monitors health issues in the EPA's Office of Research and Development, said several agencies are working to determine whether such contaminants "lead to exposures, and do these exposures have implications for health effects." Others, including drug manufacturers and sewage treatment operators, say that while they are monitoring the contaminants, their threat has been overstated.

Thomas White, an environmental consultant for the *Pharmaceutical Research and Manufacturers of America* (PhRMA), said industry studies indicate there are "no appreciable human health risks" and no "appreciable impacts on the aquatic environment" linked to drugs in the water.

But in recent months scientists have issued a series of findings suggesting that discarded drugs, which pass through municipal wastewater systems and into rivers, lakes and streams, could affect the environment. In 2002, a U.S. Geological Survey (USGS) study found these kinds of contaminants in 80% of the 139 streams sampled in 30 states (See Table 1). Other researchers suspect that hormones and medicines in the water may be responsible for effects on wildlife that include feminizing male fish and making others sluggish or uninterested in eating.

Also, Rebecca D. Klaper, an ecological genomics scientist at the University of Wisconsin at Milwaukee, recently exposed fathead minnows to a popular anti-cholesterol drug at a level that was only slightly higher than what now occurs in area streams. She had to stop the week-long experiment after 24 hours because the fish were struggling to survive. "They were sitting at the bottom of the tank, barely moving and barely breathing," Klaper said in an interview. "We're concerned [these pharmaceuticals] are not only having an effect on aquatic organisms, but on human populations as well."

Also, Timothy S. Gross, a USGS toxicologist, has spent several years studying how fish are faring downstream from Las Vegas. He examined three species — carp, largemouth bass and the endangered razorback sucker — and detected "a very large and marked decrease in sperm quality and quantity" in all three populations. There are enough carp and bass to withstand such effects, Gross said, but the razorback sucker may not recover. "When you have a species already on the brink, this may push them over," he said.

Senate Minority Leader Harry M. Reid (D/NV), who has secured $2.5 million over the past decade to fund USGS water quality studies in the Las Vegas Valley, said the government needs "to do a comprehensive national study to determine how these contaminants might affect our health, our water supplies and our environment. I think it would be irresponsible not to provide funding on this issue. It is a wise, and necessary, investment in our future."

Table 1. Pharmaceuticals Found in U.S. Waterways.

Chemical	*% of Streams Where Found*
Steroids	***89***
Nonprescription Drugs	***81***
Insect Repellent	***74***
Detergent Metabolites	***69***
Disinfectants	***66***
Plasticizers	***64***
Fire Retardants	***60***
Antibiotics	***48***
Insecticides	***45***
PAHs	***44***
Hormones	***37***
Other Prescription Drugs	***32***
Antioxidants	***29***
Fragrances	***27***
Solvents	***24***

Sources: USGS and Washington Post

But several rank-and-file EPA employees said senior agency officials have expressed little interest in the subject. Hilary Snook, an EPA research scientist who has been analyzing pharmaceutical levels in about 45 water samples from Maine, Connecticut, New Hampshire and Vermont, said he has yet to receive funding from headquarters for the project.

As a result, he said, his office lacks the money to complete the study quickly. "I don't think there's much political will at all" to tackle the issue, Snook said. "We should at least look at it. We shouldn't be burying our heads in the sand."

State and local officials are growing increasingly impatient. David Galvin, who manages the hazardous waste program in King County, WA, is coming under pressure from county residents to collect unused pharmaceuticals from hospitals as well as from elderly residents' homes. He is working with the nonprofit *Product Stewardship Institute* in Boston to start a national dialogue between drug manufacturers and government agencies on how to minimize the environmental impact of discarded medicines. "Otherwise, we at the local level are going to be stuck with figuring out how to deal with it and having to pay for it," Galvin said. "I'd rather that not happen."

Maine officials hope to establish a program that would encourage consumers to mail back unused drugs to be incinerated, and they want drug manufacturers to pay for it. But in February, according to a letter obtained by the *Natural Resources News Service*, PhRMA wrote that it was "opposed to the recommendation that manufacturers solely fund this approach." Ann Pistell and others would like to start taking back medicines, but, she said, "the state is not in a position to pay for it."

Sources: Juliet Eilperin, *Washington Post*, 6/23/05; and *Greenwire*, 6/23/05

Asphalt Sealant Pollution Concern

The runoff from chemicals in asphalt sealants could be causing significantly more pollution in waterways than previously believed, according to a U.S. Geological Survey (USGS) study published on 6/22/05 in *Environmental Science & Technology*. The new study released by Austin, TX officials and the USGS blames a common chemical for significantly more pollution, particularly in waterways, than was previously believed.

Such findings could have implications for anyone, anywhere, who walks or plays on a parking lot. "We're surrounded, in the areas that we live and work, by parking lots. This is not a contamination issue that is limited to industrial areas or densely urbanized downtown areas," said Barbara Mahler, USGS research hydrologist and the report's lead author. "This is a potential contamination issue that affects all of us."

State and federal environmental officials said they want to review the study, and possibly conduct new ones, to ascertain the risk to people and the environment and to determine whether policymakers need to take action. The contamination in question comes from a family of chemicals known as polycyclic aromatic hydrocarbons, or PAHs. Such chemicals can, with sufficient concentrations and exposure levels, cause cancer in humans and kill aquatic life. PAHs are primary components of many common parking lot sealants, particularly those with coal tar, a toxic by-product of coke, a fuel derived from coal that's used in the production of steel. Though the report singled out coal-tar sealants, Mahler said it's not clear whether other types are substantially better for the environment.

Initial findings, reported a year ago, showed that PAH concentrations in the particles washing off coal-tar-treated parking lots were 65 times higher than those in the runoff from untreated lots. The conclusions, Mahler said, were reviewed by other scientists before *Environmental Science & Technology* agreed to publish them. "I think it's a big, big piece of the puzzle," Mahler said of the report's findings. "As soon as you recognize the problem and you start looking around, it's right in front of your face. I don't know why it hasn't been figured out."

Health officials said that PAH levels in parking lot sealants are almost certainly too low to make people sick. The biggest concern, city officials say, is for aquatic ecosystems. According to the report, parking lot sealants may contribute 90-95% of the PAH pollution in urban watersheds. Because of the findings, city officials are contemplating a ban on sealants deemed harmful to the environment. But they also plan discussions through the summer with state and federal counterparts, other scientists and companies that make or sell the sealants.

Some environmental experts and sealant industry leaders were skeptical of the report's findings. Gordon Blickle, a spokesman for *Gardner-Gibson Inc.*, a Tampa, FL company that makes pavement sealants, told *Bloomberg News* that components of sealants are present in numerous other products. "It's going to be tough to narrow it down and say it's specifically driveway sealers," he said. Also, David Palmerton, who heads a Syracuse, N.Y.-based environmental consulting firm that's worked with a number of *Fortune 500* companies, said he doubted that sealants could be such a significant pollutant without being dumped en masse into a waterway. What helps sealants protect asphalt — the strong chemical bonds they form with pavement — also keeps them from running off with rainwater during storms, he said. Asked whether sealants could represent such an overwhelming share of a watershed's PAH pollution, Palmerton said, "I find it difficult to imagine."

But Mahler said the report is far from the last word on parking lot sealants and the environment. The report, she said, raises questions of which sealants are friendlier to the environment, whether alternatives to them exist and whether different solutions would be better in different parts of the country. "I think really what this study does is open our eyes to this as a source and hopefully spur some more research," she said.

Sources: Stephen Scheibal, *Austin American-Statesman*, 6/23/05; and *Greenwire*, 6/23/05

Poultry Waste Controls in DE

Delaware agriculture and industry leaders said in late June that scientific research, changing farm practices, and dump trucks have combined to nearly eliminate a poultry manure surplus problem, long viewed as a major threat, in Delaware. "We need a handful of small-scale alternatives," to eliminate the remaining excess manure, said William Rohrer, director of Delaware's *Nutrient Management Commission*.

Delaware farms produce about 240 million chickens a year and about 280,000 tons of poultry "litter", a mix of wood chips and manure. Waste from these chickens carry large amounts of nitrogen and phosphorus that can pollute wells and promote the growth of harmful algae in waterways, robbing streams and bays of oxygen and disrupting aquatic habitats. Studies dating to the late 1990s estimated that the volume until recently was about 150,000

tons higher than the amount state soils can absorb. The leftovers escapes into soils, groundwater and streams.

But a push by industry and government officials have cut the excess to about 50,000 tons a year. Control measures being used include:

- Development of a factory near Laurel, backed by poultry giant *Perdue Farms*, that converts more than 60,000 tons of farm waste each year into commercial fertilizers and pellets sold to local and national vendors.
- Expanding the use of a feed additive called phytase that reduces the need to add phosphorus to grains fed to chickens.
- Taxpayer subsidies to help farms transport manure away from overfertilized fields and onto more suitable soils.

"Delaware has become an example and a model for the rest of the nation," said John Chlada, *Perdue* vice president of environmental affairs. William W. Saylor, University of Delaware Department of Animal and Food Sciences, said that use of a key food additive had cut phosphorus levels in manure by about 50%. Edward A. Lewandowski, who directs the nonprofit environmental group *Center for the Inland Bays*, said members of his organization are convinced that the efforts are helping to protect and improve eastern Sussex County's Chesapeake Bay waters.

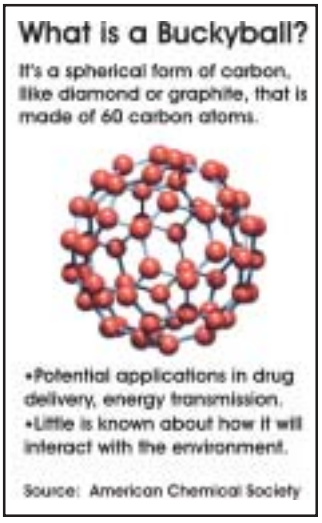
Rohrer said also that use of manure as an alternative power plant fuel is under study as one alternative for the remaining excess. Proposals are being considered for the Dover Air Force Base power plant and a farm in Hurlock, MD.

Source: Jeff Montgomery, *The Wilmington News Journal*, 06/24/05

Concerns About Buckyballs

Buckyballs, described by some scientists as "the perfect molecule" and a hallmark of Rice University research, may cause more havoc in the aquatic environment than researchers originally thought. A team of researchers at Rice and Georgia Tech universities has found that the ultra-tiny, soccer-ball-shaped buckyballs do in fact dissolve in water, a finding that suggests they could pose a risk for wildlife and water supplies. The new study results were reported in the June issue of the journal *Environmental Science & Technology.*

The research team found that buckyballs dissolve after clumping together, and persist for up to 15 weeks in fresh water. The scientists also exposed buckyballs to two common types of soil bacteria, and found that the particles inhibited both growth and respiration of bacteria at concentrations as low as 0.5 parts per million. Researchers believe that buckyballs can cause harm because their unique configuration acts as an efficient vacuum for sucking the electrons off of nearby molecules. Once stripped of an electron, some of these molecules become so-called "free radicals," which can damage cell membranes or harm bacteria. The new results compound concerns raised by earlier studies that found buckyballs can cause brain damage in bass and harm human cells.



Discovered nearly two decades ago at Rice, buckyballs are among a handful of new materials, far smaller than human cells or even DNA, driving the nanotechnology revolution. No scientists or government regulators have called for stopping the research and commercialization of nanotechnology, a rapidly expanding field of specialized materials that encompasses everything from novel medical approaches to bulletproof vests. Nor are many likely to call for a ban now. What the new findings should do, researchers say, is increase pressure on the federal government to further regulate the production and handling of buckyballs and potentially other nanotechnology materials, such as carbon nanotubes. "I don't view this new research as something that's very scary," said Kristen Kulinowski, executive director of Rice's *Center for Biological and Environmental Nanotechnology*. "But it may highlight the need for caution."

The call to consider tighter regulations comes as nanotechnology is moving, with increasing rapidity, from academic labs to industry. A *Mitsubishi Corporation* subsidiary in Japan already can make 40 tons of buckyballs a year and has plans to expand its capacity to 1,500 tons annually within a few years. Moreover, 40 countries, including the U.S., have state-sponsored nanotechnology research and development programs to accelerate these transition efforts.

Meanwhile, some institutions have concluded that the environmental effects of nanotechnology must be better studied before its materials are too widely distributed in products. In a nanotechnology report for the United Kingdom's government last year, *The Royal Society* concluded: "Until more is known about the environmental impacts of nanoparticles and nanotubes, we recommend that the release of manufactured nanoparticles and nanotubes into the environment be avoided as far as possible." And the world's second-largest insurer, *Swiss Reinsurance Co*., recently issued a report saying there were many unknowns with nanotechnology and that the insurance industry should carefully consider how much they cover products that include nanomaterials. The new findings could also stoke environmental groups to include nanotechnology as one of the chemical pollutants they seek to restrict. In Europe, some environmentalists have been vocal about their concerns, but in the U.S. criticism has been limited to a handful of smaller groups.

Meanwhile, the *National Science Foundation* gave Rice a five-year, $12.4 million grant in 2001 to establish a center, in part, to research the safety of nanomaterials in the environment. Unlike the model for most new technologies, which are rolled out and environmental impacts determined after the fact, the government sought to take a proactive stance on the safety of nanotechnology, Kulinowski said. Rice scientists have also developed a method for neutralizing the toxic effects of buckyballs, and they believe it will be possible to safely work with them and other nanomaterials in all manner of applications. "It's much better, obviously, to investigate these questions in advance of commercialization," Kulinowski said. "Then we can devise strategies to deal with any problems so there's no surprises down the road."

Source: Eric Berger, *Houston Chronicle*, 6/23/05 and *Greenwire*, 6/23/05

GM Crops Produce Superweed

Modified genes from plants used in a genetically modified (GM) crop trial in the United Kingdom (UK) have been documented to transfer into local wild plants, creating a form of herbicide-resistant "superweed". The cross-fertilization between GM oilseed rape, a brassica, and a distantly related plant, charlock, had been discounted as virtually impossible by scientists. But the new plant was found during a follow up to a government sponsored three-year trial of GM crops which ended two years ago.

The new form of charlock was growing among many others in a field which had been used to grow GM rape. When scientists treated it with lethal herbicide the new weed showed no ill-effects. The scientists also collected seeds from other weeds in the oilseed rape field and grew them in the laboratory. They found that two – both wild turnips – were herbicide resistant. The findings, documented by five scientists from the *Centre for Ecology and Hydrology*, the government research station at Winfrith in Dorset, were placed on the department's website in late July.

Brian Johnson, an ecological geneticist and member of the government's specialist scientific group which assessed the farm trials, has no doubt of the significance of this finding. "You only need one event in several million. As soon as it has taken place the new plant has a huge selective advantage, that plant will multiply rapidly," he said. Dr. Johnson, who is head of the biotechnology advisory unit and head of the land management technologies group at *English Nature*, the government nature advisers, also said: "Unlike the researchers I am not surprised by this. If you apply a herbicide to plants which is lethal, eventually a resistant survivor will turn up." The glufosinate-ammonium herbicide used in this case put "huge selective pressure likely to cause rapid evolution of resistance". To assess the potential of herbicide-resistant weeds as a danger to crops, a French researcher placed a single triazine-resistant weed, known as fat hen, in maize fields where atrazine was being used to control weeds. After four years the plants had multiplied to an average of 103,000 plants, Dr Johnson said.

What is not clear is whether the charlock was fertile. Scientists collected eight seeds from the plant, but they failed to germinate them and concluded the plant was "not viable". But Dr Johnson points out that the plant was very large and produced many flowers. He said: "There is every reason to suppose that the GM trait could be in the plant's pollen and thus be carried to other charlock in the neighborhood, spreading the GM genes in that way. This is after all how the cross-fertilization between the rape and charlock must have occurred in the first place."

Since charlock seeds can remain in the soil for 20 to 30 years before they germinate, once GM plants have produced seeds it would be almost impossible to eliminate them. Although the government has never conceded that gene transfer was a problem, it was this fear that led the French and Greek governments to seek to ban GM rape. Emily Diamond, a *Friends of the Earth* GM researcher, said: "I was shocked when I saw this paper. This is what we were reassured could not happen – and yet now it has happened and the finding has been hidden away. This is exactly what the French and Greeks were afraid of when they opposed the introduction of GM rape."

The findings will now have to be assessed by the UK's *Advisory Committee on Releases to the Environment*. The question is whether it is safe to release GM crops into the environment when there are wild relatives that might become superweeds and pose a serious threat to farm productivity. The discovery that herbicide-resistant genes have transferred to farm weeds from GM crops is the second blow to the hopes of bio-tech companies to introduce their crops into Britain. Following farm scale trials there were already scientific evidence that herbicide-tolerant oilseed rape and GM sugar beet were bad for biodiversity because the herbicide used to kill the weeds around the crops wiped out more wildlife than with conventionally grown crops. Now this new research, a follow-up on the original trials, shows that a second undesirable potential result is a race of superweeds.

The findings mirror the Canadian experience with GM crops, which has seen farmers and the environment plagued with severe problems. Farmers the world over are always troubled by what they call "volunteers" – crop plants which grow from seeds spilled from the previous harvest. Canadian farmers found that these volunteers were resistant to at least one herbicide, and became impossible to kill with two or three applications of different weed killers after a succession of various GM crops were grown. The new plants proved resistant to three herbicides while the crops they were growing among had been genetically engineered to be resistant to only one. To stop their farm crops from being overwhelmed by these superweeds, farmers had to resort to using older, much stronger varieties of "dirty" herbicides long since outlawed as seriously damaging to biodiversity.

GM crops are grown extensively in the U.S., Canada and Argentina; and in Europe, Portugal, France and Germany have all dabbled with GM insect-resistant maize. Spain plants about 250,000 acres of it each year for animal feed. Experiments in Germany have shown sugar beets genetically modified to resist one herbicide accidentally acquired the genes to resist another – so called "gene stacking", which has also been observed in oilseed rape grown in Canada. Research published in the journal *Science* in 2003 showed widespread gene flow from non-GM oilseed rape to wild flowers

Gene flow and hybridization are as old as plants themselves, so this should come as no surprise. Short of creating sterile male plants, it's simply impossible to stop crops from releasing pollen to fertilize related neighbors. But government scientists had thought that GM oilseed rape and charlock were too distantly related for it to occur.

Sources: Paul Brown, *The London Guardian*, 7/25/05; and *Greenwire*, 7/25/05

Scientists Protest FWS Genetic Data Policy

A U.S. Fish and Wildlife Service (FWS) policy that critics say may undermine the Endangered Species Act by ignoring new genetic studies in evaluating plants and animals drew a protest letter in June from 163 scientists. The letter, sponsored by the Washington-based *Union of Concerned Scientists* (UCS), a nonprofit public-policy group, urges that the policy be rescinded.

Announced in January by Dale Hale, FWS Regional Director of the Southwest Region (Albuquerque), the policy limits

the use of genetic data in determining if a species should be taken off the endangered species list. The policy, which currently applies only to the Southwest Region, drew sharp dissent from Ralph Morgenweck, Regional Director of the FWS's Mountain-Prairie Region in Denver. In a March letter, Morgenweck said the policy violated the agency's directive to use the best available science and ran "counter to the purposes of the Endangered Species Act."

In essence, the ruling says that the information used to determine whether all distinct lines within species need to be protected is limited to data available when the species was first listed. But some species have been on the endangered species list for more than 30 years. "This is a pretty powerful weapon to disable protection for endangered species," said Sally Stefferud, a retired FWS biologist and spokeswoman for the UCS. "If you accept the premise that all populations of a species are interchangeable, you have much more leeway to let some be wiped out," she said.

Hall said that critics have misunderstood his intent and the policy was made to be consistent with a federal judge's ruling in an Oregon case on how genetic data are used in a case involving salmon. "As scientists, we would love to be able to use every piece of information to take care of a species," Hall said. "Legally we have to also balance how much of this new science applies to questions posed by the Endangered Species Act." But while the policy was developed in discussions over delisting the Apache trout in Arizona, scientists say it could hamstring efforts to recover other species across the country, such as the Mexican spotted owl and the Southwestern willow flycatcher. "The more diversity you can maintain, the better it is in the long run for perpetuation of species," said retired Colorado State University biologist Dr. Robert Benke.

FWS officials in Washington refused to discuss Hall's policy or indicate whether it should apply to the rest of the country. Meg Durham, a service assistant director, said the agency would issue a clarification on the policy, but she declined to say when it that would be.

Meanwhile, the Bush Administration announced in mid July that Hall has been selected to replace Steve Williams (who resigned earlier this year) as Director of the FWS in Washington, D.C. Representatives from the *Center for Biological Diversity* and the *Arizona Chapter of the Sierra Club* said having Hall as FWS director would mean trouble for wildlife. "This is not good news for threatened and endangered species, that is for sure," said Sandy Bahr, conservation outreach director for the Grand Canyon chapter of the *Sierra Club*. "I have not seen anything from Mr. Hall that would indicate that he considers that responsibility seriously."

But Hall's nomination was praised by at least one national environmental group as well as by Interior Secretary Gale Norton and Senate Environment and Public Works Chairman James Inhofe (R/OK). Hall would have to be confirmed by the Senate, and Inhofe's panel would hold his confirmation hearing. "He seems like a knowledgeable professional, who I think will give a fair hearing to suggestions from outside the agency for how to administer programs for the Fish and Wildlife Service, so he is someone we'll try to work with," said Michael Bean of the advocacy group *Environmental Defense*.

Sources: Theo Stein, *Denver Post*, 6/20/05; and *Greenwire*, 6/20, and 7/18/05

Forest Conservation, Energy, Endangered Species and Climate Change

Agricultural conversions, largely to produce soybeans and row crops, along the lower Mississippi River Valley had wiped out 80% of the natural bottomland forest ecosystem by the 1970s. Once 26 million acres strong, vast numbers of ancient bald cypress, native oaks, tupelo gums and green ash that provided forest cover for rare and endangered species, including Louisiana's few remaining black bears, were gone.

Conservation efforts proved difficult, but the U.S. Fish and Wildlife Service (FWS) tacked together as much native forest as possible into a patchwork of roughly 50 national wildlife refuges between Memphis and New Orleans. Still, the Mississippi River bottomlands continued to suffer until the late 1990s, when they found a new and unusual benefactor – big energy – with pockets full of money and an emerging environmental problem called global climate change.

Today some of the region's leading forest conservation partners, measured in dollars spent to buy and reforest land, include *Entergy Corp.*, *American Electric Power Co.* (AEP), *ChevronTexaco*, *Detroit Edison Co.*, *Cinergy Corp.*, *Dynegy Inc.* and *Reliant Corp.* They are among a growing list of energy companies using forest conservation as a tool to reduce industrial greenhouse gases from the atmosphere. The frontline workers under the approach, known as "terrestrial carbon sequestration," are trees, nature's highly efficient, self-maintaining and relatively inexpensive carbon dioxide (CO_2) scrubbers.

Since the late 1990s, utility partnerships with federal agencies and conservation groups have yielded millions of saplings across thousands of acres, much within or adjacent to national wildlife refuges and other protected lands. If the strategy works, utilities say they will achieve a "win-win" for shareholders by offsetting carbon emissions while advancing conservation goals in a region that has lost millions of acres of forest to agricultural conversion and urban sprawl.

"What we're trying to do is reduce our risk [on climate change] while at the same time do what is right for the environment and our customers," said *Entergy's* Brent Dorsey, who directs the New Orleans-based utility's environmental programs. Just last month, *Entergy* marked its largest forest-based sequestration project to date, a $1.5 million investment to help purchase 2,900 acres for the Tensas River National Wildlife Refuge in northern Louisiana. The new acreage, mostly fallow or underutilized agricultural land, will be replanted in native tree species and managed in perpetuity by the FWS. While providing habitat for a variety of wildlife, including the recently rediscovered ivory-billed woodpecker, the new Tensas refuge acreage will store an estimated 800,000 tons of CO_2 over its 70-year lifespan, from which *Entergy* can derive carbon credits.

Pete Jerome, a FWS refuge manager who has worked on a number of utility sequestration projects in the Mississippi Delta region, said the agency views the utilities interest as highly compatible with its own conservation mandate, particularly in states and regions where money for land acquisition and restoration is scarce. Prior to the surge in utility interest in forest-based sequestration, Jerome said his

agency was restoring about 2,000 acres per year in the lower Mississippi River Valley. Yet three years after the first large-scale sequestration project was launched in 1999 with *Illinova Generating Co*., FWS had reached a high mark of 50,000 reforested acres, virtually wiping out the agency's restoration backlog. And the trend continues as new sequestration projects come online, Jerome said.

In total, the FWS estimates that 65,000 acres of land has been reforested under public-private sequestration partnerships with utilities. Perhaps more significant is the fact that 20,000 acres of new land has been added to the National Wildlife Refuge system in the lower Mississippi River Valley as utilities front money to acquire land for replanting, often in high-value species like cypress and oak.

Conservation Fund President Larry Selzer, whose organization was an early proponent of forest-based sequestration, said that in the mid-1990s he began fielding calls from energy firms looking to shore up their environmental credentials while exploring ways to hedge against future carbon regulation. At the same time, agencies like FWS and the Forest Service were searching for new strategies of their own, including ways to leverage private funds to advance their goals of forest conservation. "We realized one group wanted land but didn't have money to buy it, while the other group had money and didn't know what to do with it. It was a match made in heaven," Selzer said.

Don Morrow, a senior project manager with the *Trust for Public Land*, said he was doubtful that forest-based sequestration will fully offset the loss of tens of millions of acres of Southeastern forest. But, he added, "enough of this reforestation is going on that it has become a significant factor in conservation today and is likely to become even more significant." Since launching its first sequestration project in 2000 with *Texaco* on 1,500 acres in Mississippi and Louisiana, the *Conservation Fund* has partnered with numerous other energy firms on similar projects. Its industry partners include AEP, *Entergy*, *Reliant*, *Cinergy* and a recently formed industry consortium known as *PowerTree Carbon Co*. The largest of those was an 18,000-acre restoration undertaken by AEP in Louisiana's Catahoula National Wildlife Refuge. The new forest acreage is expected to capture 7 million tons of CO_2 over the next 70 years while tripling the size of the Catahoula refuge.

Gary Kaster, AEP's eco-assets manager, said the company has invested roughly $12 million in terrestrial sequestration projects in the U.S. since 2000, including planting trees on 23,000 acres of company-owned property. Properties like the Catahoula National Wildlife Refuge are particularly attractive to companies like AEP because the forest conservation efforts reap multiple benefits, including improved environmental stewardship. "We can plant any bean field in Arkansas that someone is willing to let us plant," Kaster said. "But that might not be as important as planting something close to the White River, which is near the woods where the ivory-billed woodpecker is located."

While the Mississippi River bottomlands are particularly attractive for carbon capture — in part because the region's species tend to grow faster than trees in other regions — utilities have nonetheless embarked on forest sequestration outside the Deep South. AEP, for example, has projects in Tennessee and in its home state of Ohio. Houston-based *Reliant Energy* has planted 600 acres of trees on former Texas pasture, while *Cinergy* has partnered with the Kentucky Department of Fish and Wildlife Resources to plant 730 acres within the Obion Creek Wildlife Management Area.

Yet without a regulatory framework for CO_2 reduction — something the Bush administration strongly opposes — there is no certainty that utilities will continue doing forest sequestration. Carbon credit trading in the U.S. remains largely experimental despite efforts by some industry players to establish a viable trading venue, such as the *Chicago Climate Exchange*. However, if and when a viable U.S. carbon market develops, utilities that have invested in forest sequestration could reap significant profits, experts say.

According to Morrow, an acre of mature bottomland forest can soak up about 400 tons of CO_2. At $2 per ton of carbon, an acre of Mississippi bottomland forest is valued at about $800 for its carbon content alone, experts say. Should the value of U.S. credits reach current European averages, that same acre increases in value to $10,400. By extension, credits earned from an 18,000-acre project like AEP's Catahoula project could be valued at more than $187 million. Experts say such figures should be enough to entice more utilities to launch forest sequestration projects, including greater investment beyond the seedbed of experimentation in the lower Mississippi River Valley.

Source: Daniel Cusick, *Greenwire*, 6/2/05

Climate Change Update

The heat wave and drought across much of the U.S. this summer has brought the reality of climate change to the forefront. In testimony before the Senate Energy and Natural Resources Committee, Ralph Cicerone, president of the *National Academy of Sciences*, described what he said is the "current state of scientific understanding" on climate change. Global mean surface temperatures have increased about 0.7 °F since the early 1970s, and carbon dioxide (CO_2) emissions in the atmosphere are currently at their highest levels in 400,000 years and rising. And, he said, much of the Earth's current warming has been caused by increases in greenhouse gas concentrations, most of which came from fossil fuel burning. "We are way outside the range of natural variability," Cicerone said.

Jim Hurrell, a climate and global dynamics scientist from the *National Center for Atmospheric Research* in Boulder, CO, dismissed the skeptics in his Senate testimony. "The globe is warming at an alarming rate, and any claims to the contrary are not credible," Hurrell said. On the policy end, Massachusetts Institute of Technology professor and 1995 Nobel Prize winner Mario Molina said the risks of global warming to humans are exponential as greenhouse gas emissions continue to rise. "Unless society starts taking some aggressive actions now, we are well on our way to reaching perhaps even a tripling of pre-industrial CO_2 levels with far greater adverse economic and environmental consequences," he said.

John Houghton, co-chairman of the scientific assessment working group from the United Nations *Intergovernmental Panel on Climate Change* and also a writer on the link between religious faith and the environment, pressed lawmakers to push U.S. policy forward as a display

of world leadership. "The world is watching what the United States, and indeed this committee, will do," he said.

On the international front, the national science academies of all the G8 countries issued an unprecedented challenge to their governments prior to the recent G8 Conference held in Scotland, urging immediate action to curb greenhouse gas emissions. Scientific evidence about the causes and impacts of climate change is now so clear that effective measures to address them can no longer be delayed, the elite institutions said. "Significantly,...this statement's signatories include Brazil, China and India who are among the largest emitters of greenhouse gases in the developing world. It is clear that developed countries must lead the way in cutting emissions, but developing countries must also contribute to the global effort to achieve overall cuts in emissions. The scientific evidence forcefully points to a need for a truly international effort. Make no mistake we have to act now. And the longer we procrastinate, the more difficult the task of tackling climate change becomes." A lack of targets for the developing world was one of the key objections cited by the Bush administration when it withdrew from the Kyoto Protocol on climate change in 2001.

The academies also reject another important American argument: that the science of climate change is not yet sufficiently certain to justify action. "The scientific understanding of climate change is now sufficiently clear to justify prompt action," the academies' statement said. "It is vital that all nations identify cost-effective steps that they can take now, to contribute to substantial and long-term reduction in net global greenhouse gas emissions." While it accepted that climate science will always carry an element of uncertainty, it said: "a lack of full scientific certainty about some aspects of climate change is not a reason for delaying an immediate response that will, at a reasonable cost, prevent dangerous anthropogenic interference with the climate system." It concluded: "We urge all nations to take prompt action to reduce the causes of climate change, adapt to its impacts and ensure that the issue is included in all relevant national and international strategies."

The agreement of the *Russian Academy of Sciences* with the statement is also significant, as its members, who have previously been more sceptical of the science of global warming than the other institutions, last year advised President Putin not to ratify the Kyoto treaty. Also, Lord May of Oxford, President of the *Royal Society*, Britain's national academy, attacked the American position on global warming as "misguided", pointing out that Mr. Bush had repeatedly overruled his own scientists' advice on the issue.

Environmental groups welcomed the statement, though they pointed out that it sets no targets for emissions cuts. Catherine Pearce of *Friends of the Earth* said: "The national science academies are right to call for prompt action on climate change. But this document lacks targets or a timetable for urgent action. G8 countries must accept their historic responsibility in creating the problem, and show genuine leadership through annual reductions in emissions. "It is crucial that the entire world – including the United States – recognizes that there is a window of opportunity to avert potentially catastrophic climate change. Emissions must peak and decline within the next decade. The world must act now before it is too late." The Kyoto Protocol, which was signed in 2000, demands an average 5.2% cut in emissions by 2010 from developed nations, taking 1990 figures as a baseline

At the local level, the *U.S. Conference of Mayors* has acted by passing an agreement in early June, spearheaded by Seattle Mayor Greg Nickels (D), to require cities to attempt to meet Kyoto Protocol requirements. So far, Nickels has enlisted 167 cities from 37 states to sign a pledge to cut greenhouse gas emissions. The mayors agreed to the *U.S. Mayors Climate Protection Agreement*, under which cities agree to reduce their greenhouse gas emissions by 7% of 1990 levels by 2012 — the standard to which the U.S. would have been held under the Kyoto Treaty. The agreement also urges the Senate to pass the McCain-Lieberman climate change bill. "We're very pleased ... today is our first endorsement from a major organization," Nickels said. "We'll continue to talk to cities one by one and get them signed up and then work with each town to define what the local actions might be.

With regard to Kyoto, the European Union's $C0_2$ emissions trading market has grown surprisingly fast, both in terms of volume and the price of carbon allowances. Trading volume recently eclipsed 2.2 million tons per day. And the price of one allowance of kilowatt-hour of coal-fired power is now more expensive than coal itself, topping out at a record $34.90 last week. New carbon emissions exchanges are also appearing in Austria, Amsterdam and Paris. Also, a shift toward nuclear energy as the power source of choice has been spurred by concerns about climate change. While the industry has suffered over the past 25 years due to accidents and opposition from environmentalists, western governments are "increasingly looking anew at nuclear energy." The environmental movement has shifted as well, forming an unlikely alliance with the nuclear industry as a growing number of greens have come to believe that nuclear power is the best way to reduce carbon emissions.

Also, industrial leaders such as *General Electric* Chairman Jeffrey Immelt recently announced that his company, which reports $135 billion in annual revenue, will spend $1.5 billion a year to research conservation, pollution and the emission of greenhouse gases. Joining him for the announcement were executives from such mainline corporations as *American Electric Power, Boeing* and *Cinergy*. Also, religious groups, such as the *United States Catholic Conference of Bishops, National Association of Evangelicals* and *National Council of Churches*, have joined with scientists to call for action on climate change under the *National Religious Partnership for the Environment*. "Global warming is a universal moral challenge," the partnership's statement says. And high-profile politicians from both parties are getting into the act. For example, California Gov. Arnold Schwarzenegger has called for a reduction of more than 80% over the next five decades in his state's emission of greenhouse gases.

What the various business factions don't necessarily agree on is what to do. The heart of the discussion is "really about how to deal with climate change, not whether it's happening," says energy technology expert James Dooley of the *Battelle Joint Global Change Research Institute* in College Park, MD. "What are my company's options for reducing greenhouse gas emissions? Are there new business opportunities associated with addressing climate change? Those are the questions many businesses are asking today."

However, many companies — most notably oil industry leader *Exxon Mobil* — still express skepticism about the effects of global warming. And the Bush administration has supported research and voluntary initiatives, but has pulled back from any multi-national pact on environmental constraints. Nonetheless, the tides of change appear to be moving on. "As big companies fall off the 'I don't believe in climate change' bandwagon, people will start to take this more seriously," says environmental scientist Don Kennedy, editor in chief of the journal *Science*. Companies aren't changing because of a sudden love for the environment, Kennedy says, but because they see change as an opportunity to protect their investments.

"On the business side, it just looks like climate change is not going away," says Kevin Leahy of *Cinergy*, a Cincinnati-based utility that reports $4.7 billion in annual revenue and provides electricity, mostly generated from coal, to 1.5 million customers. Most firms see global warming as a problem whose risks have to be managed, he says. Power companies want to know what sort of carbon constraints they face so they can plan long term and avoid being hit with dramatic emission limits or penalties in the future, he says.

Even President Bush is starting to recognize the inevitable. Human actions are worsening global warming, he said at a stop on his journey to the G8 Summit. "I recognize that the surface of the Earth is warmer and that an increase in greenhouse gases caused by humans is contributing to the problem," Bush told reporters in Denmark. But he also cast further doubt on U.S. support for any climate plan that would call for emissions cuts to combat global warming. "Kyoto didn't work for the United States, and it frankly didn't work for the world," he said. "The reason it didn't work for the world was that developing nations weren't included.

"All the signals from the White House since Bush's re-election in November is that the U.S. position has been hardening, not weakening, on this point," said Stephen Tindale, director of the U.K. branch of *Greenpeace*. But the official U.S. position is not shared by the majority of Americans, according to an opinion poll by the *Program on International Policy Attitudes*. The group found that 94% of the 812 survey participants said the U.S. should limit greenhouse gas emissions, while 73% said the country should "participate" in the Kyoto Protocol. The margin of error on the poll was 3.5%

Meanwhile, officials at the start of a world population conference in Tours, France predicted that world population growth and the global failure to reduce greenhouse gases will result in a drastic increase in CO_2 emissions in the years to come, "We're on a toboggan and we've gone over the edge," said conference speaker Tim Dyson, professor of population studies at the *London School of Economics*. "It will screw everyone up, no matter where you are," he added, referring to global warming. Dyson also said that the *Intergovernmental Panel on Climate Change*, set to release its next report in 2007, is likely to raise its temperature estimates "by 0.2 degrees [Celsius] at both the low and high end."

World population is expected to grow to 9 billion in the next 50 years, which would outweigh even a 40% per capita reduction in CO_2 emissions in the developed world, Dyson said. He added that even in the best case scenario, in which emissions would remain constant in the developed world by 2050. but double in the poorer nations, greenhouse gas emissions would be at 90% above 2000 levels.

Meanwhile, according to an article in the journal *Science*, an accelerating Arctic warming trend over the past quarter of a century has already dramatically dried up more than a thousand large lakes in Siberia. Comparing satellite images made in the early 1970s to those from recent years, a team of U.S. scientists determined that the number of large lakes in a vast 200,000-square-mile region of Russia's Siberia diminished by about 11%, from 10,882 to 9,712. About 125 of the 1,170 shrunken lakes disappeared altogether, and most are now considerably smaller than the study's baseline of about 99 acres, the researchers found.

If Arctic temperatures continue to rise, the scientists said, many of the lakes in high northern latitudes, where they are ubiquitous, could eventually disappear. Laurence C. Smith, an associate geology professor at UCLA conducted the research with UCLA colleague Glen M. MacDonald, Yongwei Sheng of the State University of New York and Larry Hinzman of the University of Alaska at Fairbanks. The researchers found that lakes are disappearing in areas where the permafrost, ground that is frozen as solid as concrete year-round, is known to be softening.

They believe the lakes are receding because the water is seeping into the increasingly mushy ground, a finding that scientists have already confirmed in portions of Alaska where Arctic lakes are also drying up. By contrast, the scientists found that in Siberian areas where the ground below is still permanently frozen, the number of lakes actually increased by about 4% and total lake area grew by about 12% over the last three decades. That is consistent with scientific predictions that, in the short run, global warming would lead to more shallow ponds and lakes in thermokarst, or small pits and depressions caused by a thawing of turf at ground level.

Average Arctic temperatures have risen at nearly twice the rate of overall global temperatures in recent decades, according to the *Arctic Climate Impact Assessment* (ACIA), a comprehensive evaluation of warming in the region conducted by eight nations and six organizations of indigenous people. In Alaska and western Canada, temperatures have increased by as much as 7 degrees over the last 50 years, and the loss of surface water is expected to have immediate and profound effects on Arctic ecosystems, notably the lake habitat that many migratory birds rely upon, Smith said. "If you were to lose the Arctic lakes, that would be hugely important for waterfowl," MacDonald said. "If permafrost continues to melt, it could also affect everything from oil platforms to landing strips. "In west Siberia, there is not much geology there aside from the permafrost and peatlands. If the permafrost goes away, the lakes are going to go away."

On another front, 40 members of the polar bear specialist group of the *World Conservation Union* (including representatives from Alaska, Canada, Russia, Norway, Greenland and Denmark) warned in early July that populations of the Arctic's top predator could crash by 30% over the next 35-50 years and should now be rated as vulnerable on an international "Red List" of threatened species. Polar bears are facing slow elimination as their vast frozen habitat melts away the experts say. If the warming Arctic climate continues to erode sea ice, as predicted by many

climate scientists, the iconic white carnivores will be driven ashore or onto increasingly smaller floes in their endless feast-or-famine hunt for seals to eat. Many animals will then sicken and starve, and populations will die out.

Over the past decades, sea ice has lost thickness, melted faster in spring and re-formed later in fall, according to the international ACIA. Vast stretches near Alaska have become ice-free during the last three summers, setting a record in 2003 and a near-record in 2004 for least coverage ever measured. The thick multiyear ice essential to polar bears has been shrinking 8 -10% per decade. Some climate models predict summer ice could disappear from the Arctic Ocean by the end of the century.

"This is the first time that we've evaluated the plight of polar bears (with) respect to climate change, and we found that they were vulnerable to extinction," said the group's outgoing chairman, biologist Scott Schliebe, who oversees management of polar bears in Alaska for the U.S. Fish and Wildlife Service. "Polar bears don't have a place to go if they lose the ice." "I'm impressed to have a detailed, thoughtful evaluation," said Rosa Meehan, chief of marine mammal management for the agency in Alaska. "The outcome makes my heart sink."

Ocean surface temperatures off the British Columbia coast and in the Gulf of Alaska in spring and summer 2004 were the highest in 50 years, according to the 2004 Pacific Region State of the Ocean Report by Fisheries and Oceans Canada. With temperatures up by as much as 5-7 °F in some areas, one effect was the appearance of unexpected species such as jumbo flying squid and invasive species, including *Acartia tonsa*, an exotic zooplankton found in the Atlantic Ocean. The findings, released in early July, by nearly 30 scientists was prepared, supervised and published by the *Pacific Scientific Advice Review Committee*.

The oceans play a vital role in global biogeochemical cycles, contribute enormously to the planet's biodiversity and provide a livelihood for millions of people. They also absorb atmospheric CO_2 and in so doing are becoming more acidic (that is, decreasing their pH). In the past 200 years the oceans have absorbed approximately half of the CO_2 produced by fossil fuel burning and cement production, and this uptake has led to a reduction of the pH of surface seawater of 0.1 units, equivalent to a 30% increase in the concentration of hydrogen ions.

If global emissions of CO_2 from human activities continue to rise on current trends then the average pH of the oceans could fall by 0.5 units (equivalent to a three fold increase in the concentration of hydrogen ions) by the year 2100. This pH is probably lower than has been experienced for hundreds of millennia and, critically, this rate of change is probably one hundred times greater than at any time over this period. Such levels of ocean acidification are essentially irreversible during our lifetimes. It will take tens of thousands of years for ocean chemistry to return to a condition similar to that occurring at pre-industrial times (about 200 years ago). Our ability to reduce ocean acidification through artificial methods such as the addition of chemicals is unproven. These techniques will at best be effective only at a very local scale, and could also cause damage to the marine environment. Reducing CO_2 emissions to the atmosphere appears to be the only practical way to minimize the risk of large-scale and long-term changes to the oceans.

There are potentially important interactions and feedbacks between changes in the state of the oceans (including their pH) and changes in the global climate and atmospheric chemistry. Changes in the chemistry of the oceans will reduce their ability to absorb additional CO_2 from the atmosphere, which will in turn affect the rate and scale of global warming. The socioeconomic effects of ocean acidification could thus be substantial. Damage to coral reef ecosystems and the fisheries and recreation industries that depend on them could amount to economic losses of many billions of dollars per year. In the longer term, changes to the stability of coastal reefs may reduce the protection they offer to coasts. There may also be direct and indirect effects on commercially important fish and shellfish species.

Sources: Miguel Bustillo, *Los Angeles Times*, 6/3/05, *AP/Anchorage Daily News*, 7/9/05; Doug O'Hara, *Anchorage Daily News*, 7/5/05; Blaine Harden, *Washington Post*, 7/7/05; *The Economist*, 7/7/05; Ocean Acidification Due to Increasing Atmospheric Carbon Dioxide, *The Royal Society*, Policy Document 12/05, June 2005; Dan Vergano, *USA Today*, 6/12/05; Dan Caterinicchia, *Seattle Post-Intelligence*r, 6/13/05; Scott Heiser, *Financial Times*, July 5; *Agence France-Presse*, 7/6 and 7/19/05; Mark Henderson, *London Times*, 6/8/05; *The London Guardian*, 6/8/05; and *Greenwire*, 6/3, 6/8, 6/14, 7/6, 7/7, 7/11, 7/19 and 7/22/05

Meetings of Interest

Sep 11-15: 135th Annual Meeting of the A*merican Fisheries Society*, Anchorage, AK. Contact: Betsy Fritz, bfritz@fisheries.org, (301) 897-16, ext. 212.

Sep 11-16: *International Association of Fish and Wildlife Agencies* 2005 Annual Meeting, Nashville, TN. Contact info@delaneymeeting event.com, 800/624-4960.

S**ep 11-23:** Environmental Leadership Course, National Zoo's Conservation and Research Center, Front Royal, VA. See www.si.edu/simab. Contact Jennifer Sevin, sevinj@si.edu.

Sep 12-18: The *Society for Ecological Restoration* World Conference on Ecological Restoration: A Global Challenge, Zaragoze, Spain. See www.ser.org/content/2005Conference.asp

Sep 18-21: 2005 National Forum on Contaminants in Fish, Baltimore, MD. See www.epa.gov/waterscience/fish/. Contact Camille Heaton, heaton@rti.org, 202/974-7817.

Oct 16-19: 59th Annual Conference of the *Southeastern Association of Fish and Wildlife Agencies*: When Practice Meets Policy, St. Louis, MO. See www.sdafs.org.

Oct 17-20: Fourth National Conference: Nonpoint Source and Stormwater Pollution Education Programs, Chicago, IL. Contact Bob Kirschner, bkirschn@chicagobotanic.org.

Oct 17-20: *Organization of Fish and Wildlife Information Managers* 2005 Annual Meeting and Conference, Tallahassee, FL. See www.ofwim.org.

Oct 25-28: 8th Annual Wetlands and Watersheds workshop: Aquatic systems and Water Quality, Atlantic City, NJ. See www.wetlandsworkgroup.org. Contact Frank Reilly, Jr., frank@wetlandsworkgroup.org, (540) 286-6072.

Nov 9-11: 25th Annual Symposium of the *North American Lake Management Society*: Lake Effects: People/Water Exploring the Relationship, Madison, WI. See www.nalms.org. Contact Carol Winge, winge@nalms.org, (608) 233-2836.

Nov 13-17: 26th Annual Meeting of the *Society of Environmental Toxicology and Chemistry*: Environmental Science in a Global Society: SETAC'S Role in the Next 25 Years, Baltimore, MD. See www.setac.org.

Dec 5-7: Environmental Results Using Market-Based Approaches, Atlantic City, NJ. Contact Andrew Seligman, seligman.andrew@epa.gov, 215/814-2097.

Feb 8-12, 2006: *Southern Division American Fisheries Society* Spring Meeting: Water Allocation for Fisheries, San Antonio, TX. See http://www.sdafs.org/meetings/2006. Contact Dave Terre, dave.terre@tpwd.state.tx.us, 903/566-1615.

May 14-19, 2006: 14th International Conference on Aquatic Invasive Species, Key Biscayne, FL. Contact: Elizabeth Muckle-Jeffs, Conference Administrator, 1027 Pembroke Street East, Suite 200 Pembroke ON K8A 3M4, Canada, N.Amer. phone: 1-800-868-8776, International phone: 613-732-7068, Fax 613-732-3386, email: profedge@renc.igs.net, Web Site: www.icais.org

Jun 25-28, 2006: International Conference on Rivers and Civilization: Multidisciplinary Perspectives on Major River Basins, La Crosse, WI. Contact: Jim Wiener, University of Wisconsin-La Crosse, (608) 785-6454, wiener.jame@uwlax.edu

Aug 6-11, 2006: 8th International Conference on Mercury as a Global Pollutant, Madison WI. See www.mercury2006.org. Contact James Wiener, weiner.jame@ uwlax.edu, 608/785-6454.

Sep 10-14, 2006: *American Fisheries Society* 136th Annual Meeting, Lake Placid, NY. Contact Betsy Fritz, bfritz@fisheries.org, 301/897-8616, ext. 212.

Congressional Action Pertinent to the Mississippi River Basin

Climate Change

S. J. RES. 5. Feinstein (D/CA) and 13 Co-Sponsors. Expresses the sense of Congress that the U.S. should act to reduce greenhouse gas emissions.

S. 245. Collins (R/ME) and 5 Co-Sponsors. Provides for the development and coordination of a comprehensive and integrated U.S. research program that assists in understanding, assessing, and predicting human-induced and natural processes of abrupt climate change.

S. 342. McCain (R/AZ) and 12 Co-Sponsors and **H.R. 759.** Gilchrest (R/MD) and 25 Co-Sponsors. Provides for scientific research on abrupt climate change, to accelerate the reduction of greenhouse gas emissions in the U.S. by establishing a market-driven system of greenhouse gas tradeable allowances, to limit greenhouse gas emissions in the U.S. and reduce dependence upon foreign oil, and ensure benefits to consumers from the trading in such allowances.

S. 387. Hagel (R/NE) and 3 Co-Sponsors. Amends the Internal Revenue Code of 1986 to provide tax incentives for the investment in greenhouse gas intensity reduction projects, and for other purposes.

S. 388. Hagel (R/NE) and 3 Co-Sponsors. Amends the Energy Policy Act of 1992 to direct the Secretary of Energy to promote the adoption of technologies that reduce greenhouse gas intensity and to provide credit-based financial assistance and investment protection for projects that employ advanced climate technologies or systems, to provide for the establishment of a national greenhouse gas registry, and for other purposes.

S. 1151. McCain (R/AZ) and Lieberman (D/CT). Provides for a program to accelerate the reduction of greenhouse gas emissions in the U.S. by establishing a market-driven system of greenhouse gas tradeable allowances.

H. R. 955. Olver (D/MA) and Gilchrest (R/MD). Amends the Clean Air Act to establish an inventory, registry, and information system of U.S. greenhouse gas emissions to inform the public and private sectors concerning, and encourage voluntary reductions in, greenhouse gas emissions, and for other purposes.

Conservation

S. 260. Inhofe (R/OK) and **H. R. 2018.** Sullivan (R/OK). Authorizes the Secretary of the Interior to provide technical and financial assistance to private landowners to restore, enhance, and manage private land to improve fish and wildlife habitats through the Partners for Fish and Wildlife Program.

S. 339. Reid (D/NV) and 4 Co-Sponsors and **H. R. 731.** Udall (D/CO) and Otter (R/ID). Reaffirms the authority of States to regulate certain hunting and fishing activities.

S. 421. Lott (R/MS) and Kohl (D/WI). Reauthorizes programs relating to sport fishing and recreational boating safety, and for other purposes.

H. R. 524. Berkley (D/NV). Amends the Internal Revenue Code of 1986 to provide incentives for the conservation of water.

Endangered Species Act (ESA)

H. R. 93. Gilchrest (R/MD). Assists in the conservation of flagship species throughout the world.

H.R. 1299. Cardoza (D/CA) and 16 Co-Sponsors. Amends the ESA to reform the process for designating critical habitat under that Act.

H. R. 1837. Flake (R/AZ) and 4 Co-Sponsors. Amends the ESA to establish limitations on the designation of critical habitat, and for other purposes.

H. R. 2779. Herger (R/CA). Amends the ESA to enable rescue and relocation of any species that would be taken in the course of certain reconstruction, maintenance, or repair of Federal or non-Federal man-made flood control levees.

H. R. 3300. Graves (R/MO) and 2 Co-Sponsors. Amends the ESA to authorize species recovery agreements which provide for annual payments or other compensation for activities that improve the recovery of one or more listed species, and for other purposes.

Energy

H. R. 140. McHugh (R/NY). Promotes use of anaerobic digesters by agricultural producers and rural small businesses to produce renewable energy and improve environmental quality.

H. R. 174. Millender-McDonald (D/CA). Encourages greater use of geothermal energy resources.

H. R. 2064. Udall (D/CO). Assures that development of certain Federal oil and gas resources will occur in ways that protect water resources and respect the rights of the surface owners, and for other purposes.

Federal Water Pollution Control Act (FWPCA) Amendments:

S. 912. Feingold (D/WI) and 8 Co-Sponsors and **H.R. 1356.** Oberstar (D/MN) and 125 Co-Sponsors. Amends the FWPCA to clarify the jurisdiction of the U.S. over waters of the U.S.

S. 1400. Chafee (R/RI) and 3 Co-Sponsors. Amends the FWPCA and the Safe Drinking Water Act to improve water and wastewater infrastructure in the U.S. .

H. R. 74. Davis (R/VA). Amends the FWPCA to impose limitations on wetlands mitigation activities carried out through the condemnation of private property.

Invasive Species

S. 363. Inouye (D/HI) and 3 Co-Sponsors. Amends the Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990 to establish vessel ballast water management requirements, and for other purposes.

S. 507. De Wine (R/OH) and 4 Co-Sponsors and **H. R. 1593.** Ehlers (R/MI). Establishes the National Invasive Species Council, and for other purposes.

S. 770. Levin (D/MI) and 12 Co-Sponsors and **H.R. 1591**. Gilchrest (R/MD) and 4 Co-Sponsors. Amends the Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990 to reauthorize and improve that Act.

S. 1402. DeWine (R/OH) and 7 Co-Sponsors and **H. R. 3049.** Green (R/WI). *Asian Carp Prevention and Control Act* amends the Lacey Act, to add certain species of carp to the federal list of injurious species that are prohibited from being imported or shipped.

H. R. 489. Pearce (R/NM). Provides for an assessment of the extent of the invasion of Salt Cedar and Russian Olive on lands in the Western U.S. and efforts to date to control such invasion on public and private lands, including tribal lands, to establish a demonstration program to address the invasion of Salt Cedar and Russian Olive, and for other purposes.

H. R. 1592. Ehlers (R/MI) and 5 Co-Sponsors. Establishes marine and freshwater research, development, and demonstration programs to support efforts to prevent, control, and eradicate invasive species, as well as to educate citizens and stakeholders and restore ecosystems.

Mining

S. RES. 64. Jeffords (I/VT) and 7 Co-Sponsors. Expresses the sense of the Senate that the U.S. should prepare a comprehensive strategy for advancing and entering into international negotiations on a binding agreement that would swiftly reduce global mercury use and pollution to levels sufficient to protect public health and the environment.

S. 961. Rockefeller (D/WV) and **H. R. 1600.** Cubin (R/WY) and 4 Co-Sponsors. Amends the Surface Mining Control and Reclamation Act of 1977 to reauthorize and reform the Abandoned Mine Reclamation Program, and for other purposes.

H. R. 905. Cubin (R/WY). Amends the Mineral Leasing Act to provide for the development of Federal coal resources.

H. R. 1165. Kanjorski (D/PA) and 6 Co-Sponsors. Amends the Internal Revenue Code of 1986 to allow a credit against income tax to holders of bonds issued to finance land and water reclamation of abandoned mine land areas.

H. R. 1265. Udall (D/CO). Provides a source of funding for the reclamation of abandoned hardrock mines, and for other purposes.

H. R. 1266. Udall (D/CO) and Salazar (D/CO). Facilitates the reclamation of abandoned hardrock mines, and for other purposes.

H. R. 2721. Peterson (R/PA) and 16 Co-Sponsors. Amends the Surface Mining Control and Reclamation Act of 1977 to reauthorize collection of reclamation fees, revise the abandoned mine reclamation program and for other purposes.

Public Lands

H. R. 599. Udall (D/CO) and Tancredo (R/CO). Provides a source of funds to carry out restoration activities on Federal lands under the jurisdiction of the Secretary of the Interior or the Secretary of Agriculture, and for other purposes.

H. R. 975. Tancredo (R/CO) and 5 Co-Sponsors. Provides consistent enforcement authority to BLM, NPS, FWS, and FS to respond to violations of regulations regarding the management, use, and protection of public lands under the jurisdiction of these agencies, and for other purposes.

H. R. 3166. Grijalva (D/AZ). Provides compensation to livestock operators who voluntarily relinquish a grazing permit or lease on Federal lands where conflicts with other multiple uses render livestock grazing impractical, and for other purposes.

Water Resources

S. 232. Smith (R/OR). Authorizes the Secretary of the Interior, acting through the Bureau of Reclamation, to assist in the implementation of fish passage and

screening facilities at non-Federal water projects, and for other purposes.

S. 353. Conrad (D/ND) and Dorgan (D/ND). Amends the Water Resources Development Act of 1999 to direct the Secretary of the Army to provide assistance to design and construct a project to provide a continued safe and reliable municipal water supply system for Devils Lake, ND.

S. 728. Bond (R/MO) and 17 Co-Sponsors and **H.R. 2864**. Provides for the consideration and development of water and related resources, to authorize the Secretary of the Army to construct various projects for improvements to rivers and harbors of the U.S., and for other purposes.

S. 753. Feingold (D/WI). Provides for modernization and improvement of the Corps of Engineers, and for other purposes.

S. 802. Domenici (R/NM) and 10 Co-Sponsors and **H. R. 1386.** Hastings (D/FL) and 24 Co-Sponsors. Establishes a National Drought Council within the Department of Agriculture, to improve national drought preparedness, mitigation, and response efforts, and for other purposes.

S. 1017. Chaffee (R/RI) and 10 Co-Sponsors. Reauthorizes grants for the water resources research and technology institutes established under the Water Resources Research Act of 1984.

H. CON. RES. 120. Schakowsky (D/IL) and 23 Co-Sponsors. Expresses the sense of the Congress with regard to the world's freshwater resources.

H. J. RES. 3. Davis (R/VA). Acknowledges a long history of official depredations and ill-conceived policies by the U.S. Government regarding Indian tribes and offers an apology to all Native Peoples on behalf of the U.S.

H. R. 109. Herseth (D/SD). Provides compensation to the Lower Brule and Crow Creek Sioux Tribes of South Dakota for damage to tribal land caused by Pick-Sloan Projects along the Missouri River.

H. R. 135. Linder (R/GA) and 8 Co-Sponsors. Establishes the "Twenty-First Century Water Commission" to study and develop recommendations for a comprehensive water strategy to address future water needs.

H. R. 391. Leach (R/IA). Directs the Secretary of the Army to convey the remaining water supply storage allocation in Rathbun Lake, Iowa, to the Rathbun Regional Water Association.

H. R. 487. Pearce (R/NM). Imposes limitations on the authority of the Secretary of the Interior to claim title or other rights to water absent specific direction of law or to abrogate, injure, or otherwise impair any right to the use of any quantity of water.

H. R. 494. Rohrabacher (R/CA). Amends the Water Resources Development Act of 1986 to expand the authority of non-Federal interests to levy harbor fees.

H. R. 1368. Burgess (R/TX) and 2 Co-Sponsors. Provides the Secretary of the Army with additional and enhanced authority with respect to water resources projects, and for other purposes.

Source: http://www.gpoaccess.gov/bills/index.html

River Crossings

Mississippi Interstate Cooperative Resource Association
P.O. Box 774
Bettendorf, IA 52722

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