River Crossings

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Genetically Modified Organisms – Potential Invasive Species

Genetically modified organisms (GMOs), also referred to as "genetically engineered" or "transgenic", are increasingly being developed by biotech companies to exhibit everything from improved growth rates to improved disease resistance. While GMOs offer enormous potential for modern agriculture and for solving other problems, the risk is increasing that these ever-more-exotic organisms could spread their altered genes to other species or unwanted locales, threatening native ecosystems or food supplies.

Human error allowed that to nearly happen in 2002, when corn designed to produce a pig vaccine spread too widely in Iowa and Nebraska fields. Expensive, last-minute intervention by the U.S. Department of Agriculture (USDA) kept the product out of food, and the department has since been tightening regulations. Meanwhile, a new report from the National Research Council of the National Academy of Science (NAS) states that techniques for limiting the spread of GMOs are still in their infancy, and biotech companies must put far more work into making sure that these new products don't taint the food supply or wipe out important species.

"What they seem to suggest is the science for creating risky organisms exists, but we don't have the methods for safely confining them yet," said Gregory Jaffer, director of biotech programs at the *Center for Science in the Public Interest*. "The sad conclusion from the report is that there really aren't any viable bioconfinement methods that could be adopted commercially without significant additional research and testing."

Eecological research has shown that some GMOs are viable in natural ecosystems and can cross with their wild relatives. There also are instances in which transgenes from one domesticated variety can move to others.

The next decade is expected to see exponential progress in GM product development as researchers gain increasing and unprecedented access to genomic resources. As a result, there is growing interest in developing methods to confine certain GMOs and their transgenes to specifically designated release settings.

The NAS report entitled, *Biological Confinement of Genetically Engineered Organisms*, examines the issue. Particular attention is given to transgenic fish and shellfish, trees and grasses, and microbes, because many of those species have been successfully engineered and currently are under federal regulatory evaluation. The report states that bioconfinement should be evaluated on a case-by-case basis. The predominant factors for consideration involve risks associated with the dispersal of a transgene or transgenic organism into a place, a population, or a biological community for which it was not intended.

The report does point out, however, that the majority of GMOs pose virtually no risk to other species, and in many cases prevention methods will not be necessary. But still it recommends that GMO biotech companies invest early in the development of possible methods of biological containment, such as making the organisms sterile or including a "suicide gene" that would cause them to die if they escaped into the wild. For GM fish and marine life, the report recommends that companies grow them only in land-based tanks rather than in open water pens to ensure that they cannot escape.

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The report states further that species which disperse easily can pose particular risks because physical confinement methods may not be effective and because of their potential to escape and interact with and harm wild populations. In fact, a transgenic organism itself can become an environmental problem if the transgenic traits it expresses alters its ecological performance such that it confers the ability to overcome factors that limit wild populations. In which case, the GMO could become an invasive or nuisance species. Feral and naturalized populations are well known for some crops and domesticated animals.

Many bioconfinement methods have been proposed but they have been tailored to specific organisms, and the terminology used to describe them is varied. The report says that all bioconfinement methods can be conceptually divided into three general categories:

- those that reduce the spread or persistence of GMOs;
- those that reduce unintended gene flow from GMOs into related organisms; and
- those that limit expression of transgenes.

"It's really difficult to keep things from multiplying," Allison Snow, a NAS panel member and a biologist at Ohio State University, said. "The challenge is to use biotechnology methods to prevent potential problems before they occur." The report says that several approaches could reduce the survivorship of GMOs by making them dependent on humans, either by genetically engineering the organism so that it requires an anthropogenic substance for its survival or by genetically engineering the organism so that it cannot live without an anthropogenic compound that blocks expression of the harmful gene. For example, in GM plants sexual reproduction can be blocked by including a gene that renders the organism either permanently sterile (nonreversible transgenic sterility) or sterile until the application of an appropriate trigger is available, such as the use of a chemical spray on a plant (reversible transgenic sterility).

In aquatic species bioconfinement has been attempted through the induction of triploidy, a method that creates, in an organism, the state of having three sets of chromosomes in each cell nucleus, rather than the two typically found in most animal cells, which prevents successful cell division and reproduction. Such "triploidization" is fairly successful and inexpensive, the report says, but like all bioconfinement techniques, it cannot guarantee 100% sterility. The latter has been evident with the spread of grass carp in the Mississippi River Basin.

Grass carp were imported from Asia, sterilized using triploidy techniques, and then stocked as a GMO to control aquatic vegetation in lakes and ponds beginning in the early 1970's. Critics were told that the species was sterile, and that reproduction in the wild was impossible because of the induced triploidy. But, 100% sterility had not been achieved, so after escaping confinement, the grass carp produced breeding populations in the wild, and continues to expand its range in the U.S. as a major nuisance species. Unfortunately, it wasn't learned until after the fact, that when the grass carp finishes eating all of the vegetation in a target area it turns to other foods, and competes for food, space and habitat with important game and food fish!

The NAS report says that if only one sex of the GMO is used in the production operation—usually the female—then the likelihood of a self-sustaining feral population becoming established is further reduced. All-female lines often are used for certain commercial species, and their use in conjunction with sterility techniques offers great promise. The report states further that the use of single-sex lines is not a confinement system on its own if related species that could mate with the GMOs are found nearby. If GMOs are crossed with related species, possibly sterile, interspecific hybrids would result, although thorough testing is required to ensure that sterility is close to 100%. But as demonstrated earlier with the grass carp, critics would say that "close doesn't count when talking about the spread of nuisance species!"

The report offered a fast-growing salmon under development by *Aqua Bounty Technologies Inc.* of Waltham, MA as a case study of bioconfinement controversy. The gene-altered salmon reaches market size in half the usual time, requiring less feed. *Aqua Bounty* wants to sell the fish for use in ocean

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pens along the East Coast, where other farm-raised salmon are grown. The company has acknowledged that some fish will inevitably escape, but has said they will be so dependent on food supplied by humans that they are likely to die in the open ocean. Environmentalists, however, are worried that the fish, which they have dubbed "*Frankensalmon*", would not die, but instead wipe out dwindling stocks of wild Atlantic salmon by competing with them for food and, among males, competing for access to wild females. To meet these concerns, *Aqua Bounty* plans to sell only sterile, female fish. But the NAS report said the methods for sterilizing the fish are not entirely reliable, and urged that *Aqua Bounty* fish be tested individually for sterility or grown only in tanks on land — expensive methods that most fish-farming companies are likely to resist.

The stringency of the integrated confinement system, including bioconfinement, should reflect the predicted risk and severity of consequences of GMO escape. Because methods can fail, the report says, a single confinement method will not necessarily prevent transgene escape, so redundancy is encouraged. Redundancy involves applying two or more types of safety measures to product design and use, each with fundamentally different strengths and possible vulnerabilities, so that the failure of one safety measure would be countered by the integrity of another.

In other words, the choice of redundant confinement techniques, including bioconfinement, should consider a list of methods whose characteristics will combine to produce the best results. In many cases, this will involve the application of a mix of biological, physical, and physicochemical confinement measures tailored to specific GMOs. In other cases, it may be possible to combine two barriers of the same type but whose failures would be independent events, such that a failure of one barrier does not trigger a failure of the other. It is unlikely, the report says, that 100% confinement will be achieved by a single method.

With regard to international concerns, the report states that:

- the development, testing, and use of GMOs is increasing worldwide, and GMOs can move across national borders by a variety of mechanisms including natural phenomena and trade;
- no country can manage all of the confinement issues that could affect its environment;
- an assessment of bioconfinement in any country will require attention to the efficacy of a given method and to concerns about its likely consequences not just within that country but in other places as well;
- regulators should consider the potential effects that a failure of GMO confinement could have on other nations, as well as how foreign confinement failures could affect the United States; and
- international cooperation should be pursued to adequately manage confinement of GMOs.

Large nuisance grass carp collected by biologists from the Missouri River.

The reports states further that any bioconfinement scheme will be effective only if it is fully implemented, and that the efficacy of bioconfinement will vary with:

- the human processes involved in applying the technique;
- the confinement method itself;
- the characteristics of the GMO;
- the cost of compliance;
- the characteristics of the organizations involved;
- the regulatory system in place; and
- public acceptance.

Failures in the bioconfinement of GMOs have not been documented to date, the report says, in part because so few methods have been implemented. However, given the imperfections of methods under development and those of methods that have been applied to nonengineered species, the report says, it is likely that failure will occur and that the degree to which failed confinement events can be monitored and managed depends on:

- whether the GMOs are easily detected,
- the scale at which they are released into the environment,
- the GMOs' subsequent population dynamics, and
- the degree to which they can hybridize with related species.

Early detection of failed methods will be important for mitigating bioconfinement failure, the report says, especially if the confined transgenes are likely to spread. However, even if a failure is detected early, effective mitigation might not be feasible. Some limited options are available for detecting individuals and culling them after failed bioconfinement. In plants, the report says, a failure might be signaled by a distinctive phenotypic trait, such as the presence of flowers on plants that have been engineered to lack them, so workers could cull abnormal plants.

The failure of many bioconfinement methods, however, will be much more difficult to detect. For example, elaborate experiments would be needed to determine whether a repressible seed-lethal transgene is functioning properly. Also, the report says, many bioconfined plants will be grown on such large areas of land that repeated comprehensive inspections will be impractical. The report speculates that in the future, DNA "fingerprints" could be linked to bioconfined transgenes to function as "biobarcodes" that could be detected and used to cull GMOs. Also remote sensing approaches might be available to detect GMOs.

The report says that it is feasible to detect and then cull individual fish in which triploid sterilization induction fails before they are transferred from secure hatcheries to much less secure facilities, such as outdoor ponds or open-water cages. While this is easier said than done, as proven with the grass carp, the report suggests that economies of scale and possible automation could reduce the cost of such efforts. To detect and cull failures in bioconfinement of fish, shellfish, or insects, the report says, one could also screen for proteins expressed by the key gene involved or for a co-inserted marker gene.

Nonlethal detection, the report says, might be possible for larger organisms or with such marker genes as green fluorescent protein; detection in smaller organisms especially insects—would more likely require lethal sampling. The report says that it is not currently possible to detect or cull microbes if bioconfinement fails. The committee did not speculate about cost-effectiveness because genetic engineering-based bioconfinement methods are theoretical or at an early stage of development.

In conclusion, the NAS report summarizes the issue as follows:

- the current lack of quality data and science is the single most significant factor

limiting our ability to assess effective bioconfinement methods;

- bioconfinement should be evaluated case by case, considering worst-case scenarios and the probability of their occurrence;
- evaluation of whether and how to confine a GMO should be an integral part of its development, and the need for bioconfinement should be considered early in the process;
- before a GMO is released the techniques to be used should be tested in a variety of appropriate environments and in representative genotypes under development, and the reproductive biology of the GMO should be understood relative to that of its progenitor;
- if a bioconfinement method is applied, an integrated confinement system should be put in place; and
- bioconfinement must be supported by a rigorous and comprehensive regulatory regime empowered with inspection and enforcement.

Finally, in order to implement effective bioconfinement of GMOs, the report recommends support for additional scientific research that:

- characterizes as completely as possible the potential ecological risks and consequences of a failure in bioconfinement;
- develops reliable, safe, and environmentally sound bioconfinement methods, especially for GMOs used in pharmaceutical production;
- designs methods for accurate assessment of the efficacy of bioconfinement;
- integrates the economic, legal, ethical, and anti-social factors that might influence the application and regulation of specific techniques; and
- models (using models that are calibrated and can be verified experimentally) the dispersal biology of organisms targeted for genetic engineering and release, where sufficient information does not exist.

Interdisciplinary research, the report says, will improve the future of biotechnology by developing new confinement methods that minimize the potential for unintended damage to human health and the environment. The success of these efforts will do much to bolster public confidence in the continued growth, development, and opportunities presented by biotechnology.

GM crops are currently grown commercially or in field trials in over 40 countries and on 6 continents. Countries that grew 99% of the global transgenic crops in 2000 were the United States (68%), Argentina (23%), Canada (7%), and China (1%). Although growth is expected to plateau in industrialized countries, it is increasing in developing countries. Production figures for 2000 showed that about 109.2 million acres were planted with transgenic crops including:

- herbicide- and insecticide-resistant soybeans, corn, cotton, and canola;
- a sweet potato resistant to a virus that could decimate most of the African harvest;
- rice with increased iron and vitamins that may alleviate chronic malnutrition in Asian countries; and
- a variety of plants able to survive weather extremes.

On the horizon are:

- bananas that produce human vaccines against infectious diseases such as hepatitis B;
- fish that mature more quickly;
- fruit and nut trees that yield years earlier; and
- plants that produce new plastics with unique properties.

California, Oregon, Maryland and Washington have passed laws that prohibit genetically modified fish from being raised in state waterways. With regard to federal regulations, Meghan Thomas, a spokeswoman for the USDA's Animal and Plant Health Inspection Service (APHIS) said, "We believe we have a strong system in place, but we need our regulations to keep up with the science."

Critics warn that the escape and spread of viable, reproducing GMOs could be the bionightmare of the future!

Sources: The National Academies, *Press Release* (http://national-academies.org), 1/20/04; U.S. Department of Energy Office of Science, Office of Biological and Environmental Research, *Human Genome Program*; *Greenwire*, 1/21/04; Justin Gillis, *Washington Post*, 1/21/04; Andrew Pollack, *New York Times*, 1/21/04; Elizabeth Weise, *USA Today*, 1/21/04; Michael Hawthorne, *Chicago Tribune*, 1/21/04

FDA Won't Regulate GM *GloFish*

The federal Food and Drug Administration (FDA) formally announced in early December that it will not regulate the nation's first genetically engineered *GloFish*, discussed in the last issue of *River Crossings.* "Because tropical aquarium fish are not used for food purposes", an FDA Press Release states, "they pose no threat to the food supply. There is no evidence that these genetically engineered zebra danio fish pose any more threat to the environment than their unmodified counterparts which have long been widely sold in the United States. In the absence of a clear risk to the public health, the FDA finds no reason to regulate these particular fish."

"The food supply argument is disingenuous because the fish would have been regulated as an animal drug, the same provision the agency is using to extensively review genetically modified salmon that are intended for human consumption", said Andrew Kimbrell, executive director of *The Center for Food Safety* (CFS). That group along with the *International Center for Technology Assessment* (ICTA) sued the federal government in an effort to stop the sale of *GloFish*, one of the country's first genetically engineered pets.

Glofish™

The ICTA and CFS, advocacy groups that examine how production methods affect the food supply, said the FDA is ignoring its duty to regulate all genetically engineered animals, whether or not they're intended to be eaten. "If the FDA does not regulate the *GloFish* because it's not a food animal, they're opening the door to all nonfood animals coming in unregulated," said Peter Jenkins, an attorney for both organizations. He cited a federal study conducted by the White House's Office of Science and Technology Policy and the Council on Environmental Quality that concluded that a genetically engineered goldfish should be subject to FDA rules. That study said researchers are using genetic technology to develop goldfish that can tolerate colder water and concluded that that could disrupt native species.

The groups want the FDA to bar the sale of *GloFish* and other genetically altered creatures until regulations, including mandatory environmental-impact studies, are in place. FDA officials declined to comment, saying they could not talk about pending litigation. *Yorktown Technologies*, the Austin, Texas, company that sells the *Glofish*, said that they consulted with scientists and regulatory agencies for two years before bringing the *GloFish* to market and that it was found to be safe. The most exhaustive review of the *GloFish's* possible environmental impact came in California, where state scientists determined last year that the fish were unlikely to survive or cause problems if released into the wild. But California's Fish and Game Commission (CFGC) banned their sale anyway. Some conservationists and food-safety groups oppose introduction of the fish as pets because they might get flushed down toilets and breed in waterways, exposing the larger gene pool to modified genes.

But now that *Glofish* are on the market, consumers and store owners are finding that the fish designed to glow in the dark are not nearly as dazzling as they thought. "They don't have phosphorescence," said Montrose, Texas, aquarium store owner Don Scott. "It's going to be a flash in the pan ... and in the long run, people are going to be disappointed." *Yorktown* officials said the *GloFish* are not designed to glow of their own accord, they need a blacklight to glow, they reflect light and appear to glow in the dark.

A *Baltimore Sun* (12/22/04) editorial said, "…this first genetically engineered entertainer won't be the last — researchers already are working on allergen-free cats as well as more colors of zebra fish. As regulators ponder the worth of releasing salmon bred to offer more food and rice altered to grow faster into the greater, non-penned environment, they also should weigh the risks of introducing purely ornamental species into the world. If the sole benefit is profit, is it worth the risk?"

Sam Schuchat of the CFGC explained the California position in a *San Francisco Chronicle* Op-Ed: "California found itself in the national spotlight earlier this month when it became the only state to ban the sale of a genetically engineered pet fish called the *GloFish*. As a member of the state Fish and Game Commission that made this decision, I caught some flak afterward: Who were we, critics said, to interfere with the right of consumers to purchase a glow-in-the-dark fish? This wasn't the first time the commission dealt with transgenic organisms...Earlier this year, the commission voted to allow transgenic organisms only for research purposes, with a permit issued under stringent precautions by the state Department of Fish and Game. Certainly there is tremendous potential in this technology to improve the quality of human life. But at the same time, California has a rich and irreplaceable biological heritage that must be safeguarded. Imagine the damage if some new genetically engineered creature got loose in our environment — and devoured or crowded out a unique native species...Zebra fish are a tropical freshwater species unlikely to survive in California's chilly waters. Moreover, being bright red, they would be easy prey. But we decided to ban the *GloFish* anyhow. Why? For the three of us who voted no, it was a decision based on values. Moving a gene from one species to an entirely different species is an awesome display of human ingenuity and power over nature and should not be done for trivial purposes. It is not the same as breeding farm animals: Cows don't mate with pigs. In instances where a transgenic organism can help feed the hungry, heal the sick or clean up the environment, the benefits may justify some level of risk. But creating a novelty pet is a frivolous use of this technology. No matter how low the risk is, there needs to be a public benefit that is higher than this. Some people have criticized the commission for injecting values and ethics into this debate. In fact, the Fish and Game Commission has always dealt with ethics. It was created in part to ensure that hunting was practiced ethically. We still grapple with the issue of "fair chase" in hunting and have rules based on notions of what is ethical in the treatment of animals. I don't think that it is possible to make policy without values, and I know that I would not want to live in a country that divorced values from policy making. Science only tells us what we can do, not what we should do. Scientists seldom speak in certainties, and even proponents of the commercial sale of transgenic fish will admit that low risk is not the same as zero risk, and zero risk is impossible to attain. Because selling transgenic zebra fish as pets has no public benefit, and there is always some risk, the commission voted not to start down the path toward genetically modified pets. Transgenic organisms are beginning to make their mark on daily life. We need to proceed carefully, because creating new organisms is not like building a new car. Creatures escape or are released into our environment, and there they can reproduce, affecting us and every living thing. This is an area that ought to be regulated by the federal government, if not by international treaty. Unfortunately, no single federal agency has taken responsibility for regulating this technology, nor do there seem to be any international covenants. Someone needs to take a thoughtful look at the implications of creating transgenic organisms — what it means for our society, our environment and for future generations. I urge the federal government to tackle this knotty issue. But until they do — it's up to us."

Many biologists support California on this issue and feel that the CFGC should be commended for their foresight and integrity in taking this positon!

Sources: Food and Drug Administration *Press Release*, 12/9/03; Don Thompson, *Contra Costa Times and AP*, 12/10/03; Kenneth R. Weiss, *Los Angeles Times*, 12/10/04; Dina Cappiello, *Houston Chronicle*, 12/22/04; *Greenwir*e, 12/10 and 12/22/03 and 1/15/04; John Keilman, *Chicago Tribune*, 1/15/04; *Baltimore Sun Editorial*, 12/22/04; and *San Francisco Chronicle Op-Ed*, 12/17/04

Korean Fish — Malaria Fighter or Potential Invasive Species

Scientists in South Korea have found a local fish that could help control the spread of malaria. The fish, called the muddy loach, eats mosquito larvae and can completely remove them from rice fields. The research was presented at the annual meeting of the *American Society for Tropical Medicine and Hygiene* in Philadelphia.

The concept of the muddy loach is simple: find fish which eat mosquito larvae, and put them in lakes and fields where larvae live and adult mosquitoes breed. Researchers experimented with the fish in several locations in South Korea, in rice fields farmed both organically and conventionally. They found that by putting enough fish in a field, all the mosquito larvae would be eaten within a day. Muddy loaches are omnivorous and hardy, which the researchers say make them ideally suited to the job.

The idea of using fish in this way dates back a century or so, but in recent decades it has fallen out of favor as more modern techniques for combating malaria, such as chemical insecticides, drugs and bednets have taken precedence. But the researchers say muddy loaches could make a significant

impact on malaria in East Asia. And at the end of the malaria season, farmers get to eat the fish as well, fat with all the larvae they have been consuming.

The scientists went on to say that the muddy loach could help with the malaria fight in other parts of the world as well, whether in rice fields or in lakes and ponds. The problem with that is that someone will undoubtedly read this article and attempt to import the muddy loach into the U.S. for similar purposes, when we already have species which do the same thing. Species such as gambusia (mosquito fish) and killifish, like the muddy loach, feed on mosquito larvae. In fact, almost all young gamefish rely on mosquito larvae for food during their early life stages.

Biologists need to be watchful for this species because unlike many of the tropical loaches which can already be found in the aquarium trade, this one is not a tropical fish. It comes from South Korea and will undoubtedly be able to survive in most reaches of the Mississippi River Basin where it could be a significant invasive competitor with other native species.

Source: Richard Black, *BBC Online*, 12/7/03

Scientists Urge Passage of National Invasive Species Act

More than 700 scientists and environmentalists signed a letter urging Congress and the Bush administration to take immediate action to halt the spread of invasive species, which they say pose serious threats to the U.S. environment, economy and human health. The letter distributed to lawmakers by the *Union of Concerned Scientists*, marks the 10th anniversary of a landmark Office of Technology Assessment report that brought the issue of invasive species to the fore.

While progress has been made combating invaders such as the zebra mussel and salt cedar, scientists with the *National Environmental Coalition on Invasive Species* said that more must be done to halt the spread of invasive species already here and to thwart the arrival of new nonnative species. The coalition includes representatives from *The Nature Conservancy* (TNC), *National Wildlife Federation*, *American Lands United* (ALU) and other groups. Invasive species "…are a form of pollution that increases as global trade increases," noted David Lodge, professor of biology at the University of Notre Dame.

Nonnative plants, animals and microorganisms comprise the second-largest threat to global biodiversity after loss of habitat, and cost the United States at least $137 billion annually, according to federal statistics. Up to 46% of the plants and animals listed under the Endangered Species Act have been negatively impacted by invasive species that enter the country in myriad ways — beetles hide in wood packaging, plants hitchhike on nursery shipments, aquatic invaders flush free in ballast water, and others are brought in intentionally for profit.

Foremost, signatories of the letter are calling on Congress to pass the National Aquatic Invasive Species Act of 2003 (H.R. 1080 and S. 525), as well as to allocate funds for a program to detect and respond to new nonnative species while their populations are small and the costs of eradication are manageable. The aquatic species legislation, sponsored by Rep. Wayne Gilchrest (R/MD) and Sen. Carl Levin (D/MI), would amend the Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990 to establish aquatic invasive species prevention requirements for all vessels operating in U.S. waters. Among its major provisions, H.R. 1080 (S. 525) would require the U.S. Coast Guard to promulgate regulations for ballast water management, as well as prohibit the importation of live aquatic organisms not in trade without specified screening and approval.

The bill also calls for the construction of a national dispersal barrier program to prevent the spread of invasive species in U.S. waterways. If implemented, the legislation would cost $164 million annually in its first two years, and $171 million annually in years three through five, said Ann Bartuska, an invasive species specialist with (TNC). The coalition is also calling on President Bush to:

- ensure that federal agencies begin screening imported species for potential problems,
- negotiate strict standards to limit imported plant pests, and
- begin a campaign to increase public awareness about the accidental release of invasive species.

Effective change must also include clearly explaining environmental impacts in household economic terms, as well as a greater commitment by industries to cut back on the known importation of invasives, said Faith Campbell, director of ALU's invasives program. "Industries and agencies need to stop tinkering ... and begin thinking about entirely changing the way they do things," Campbell said.

Source: Michael Burnham, *Greenwire*, 12/19/03

Michigan Considers Tough New Invasive Species Law

Under a bill approved in legislation that passed the Michigan state House in late December anyone caught with or trying to release certain fish into the Great Lakes and its tributaries faces fines of up to $250,000 and prison terms of up to five years. The targeted fish include the bighead carp, bitterling, black carp, ide, Japanese weatherfish, rudd, silver carp, tench, and any fish in the snakehead fish family. The bill, sponsored by state Rep. Dan Acciavatti, R/Chesterfield Township, will go to the state Senate, which is considering a similar measure.

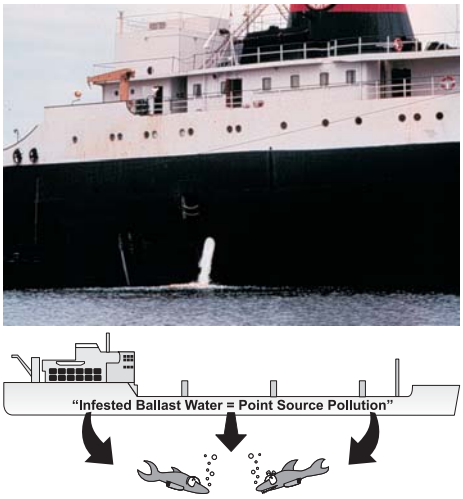
Invasive species have been a problem in the Great Lakes and in Lake St. Clair for 20 years, with the introduction of exotic species such as the zebra mussel, round goby and river ruffe. Frank Schoonover, 73, of Harsens Island said he welcomes the legislation but thinks a more serious threat is posed by foreign freighters discharging their ballast waters into the Great Lakes. "They should be chlorinating their ballast waters to kill invasive species they pick up in foreign waters," Schoonover said. Legislation covering foreign ships has also been proposed in Lansing.

Source: Gene Schabath**,** *The Detroit News*, 12/22/03

Ballast Water Lawsuit

Three environmental groups filed a lawsuit against the USEPA in late December, seeking regulation of ships' ballast water discharges, which serve as largely unchecked entry points for aquatic invasive species into the nation's ports. The lawsuit filed in U.S. District Court, Northern District of California, asks the court to find that a 1973 EPA regulation that exempts ballast water discharges from Clean Water Act (CWA) permits is inconsistent with the act.

Plaintiffs, including *The Ocean Conservancy* (TOC), *Waterkeepers of Northern California* (WNC) and *Northwest Environmental Advocates*, are seeking an immediate repeal of the regulation, contending that it allows shippers to illegally circumvent the CWA's permitting program, which the nation's point source discharges are subject to. "If we as a nation can have a permit system for stormwater, we certainly can have a permits system for ballast water discharges," said Linda Sheehan, an attorney with TOC.



Ultimately, the plaintiffs want the EPA to use its expertise to aid the U.S. Coast Guard's ballast water control program. Moreover, they want ballast water discharges to be subject to permits issued at either the federal state or local level, said Leo O'Brien, executive director of WNC. "Ballast water is one of the most harmful forms of pollution, and it's literally shredding the biological tapestry here in San Francisco Bay and its delta," O'Brien said.

More than 21 billion gallons of ballast water from international ports is discharged in U.S. waters annually, bringing in nonnative species that thrive without natural predators. San Francisco Bay is one of the most heavily affected ports, with a new invasive species arriving every 14 weeks, O'Brien said. The nation spends hundreds of millions of dollars annually on the control of aquatic invasive species. While most money is spent on prevention, controlling invasive species costs $200 to $2,000 per lake-acre each year, according to EPA data.

EPA officials would not comment on the latest lawsuit. However, in September 2003 the agency denied a 1999 petition, which also called on the agency to withdraw its regulation exempting ballast water from CWA permits. The three plaintiffs in the new lawsuit were among 15 signers of the petition. "We believe that the decision we made in September is reasonable in light of the many ongoing activities that we, the Coast Guard and other federal agencies are doing to prevent the introduction of invasive species to aquatic ecosystems through ballast water discharges," said EPA spokeswoman Cathy Milbourne. "The EPA is working with other agencies, including the Coast Guard, the National Oceanic and Atmospheric Administration and the Department of Defense to increase public awareness and the capabilities of ballast water control programs."

Source: Michael Burnham, *Greenwire*, 12/24/03

FWS Reasserts Missouri River Opinion

The U.S. Fish and Wildlife Service (FWS) in mid December issued a new biological opinion on endangered fish and birds in the Missouri River, including a controversial provision asking the U.S. Army Corps of Engineers (Corps) to lower the Missouri's summer flows to aid fish spawning and expose sandbars for nesting birds.
The FWS opinion stunned many on both sides of the long controversy because last summer the Bush Administration had refused to accept flow changes as a way out of violating the Endangered Species Act (ESA).

Bush opposed a court injunction in July requiring lower water in the river, but the administration eventually complied with that injunction, but only for three days in August. Surprisingly, the new FWS opinion even went beyond the 2000 opinion saying that water needs to be added to the river in two spring "pulses" each year instead of one every three years. The biologists' rulings carry weight because the FWS enforces the ESA, and the Corps must heed its determinations in finishing its Master Manual that will guide river operations in the future.

The new FWS opinion answers a number of issues raised by the Corps in its own recent Missouri River biological assessment. In that document, the Corps maintained that keeping flows at roughly 30,000 cubic feet per second (cfs) to support barge traffic would not jeopardize the endangered least tern, piping plover and pallid sturgeon. But the FWS disagreed, recommending instead that flows be reduced to 25,000 cfs during critical times of the year so that young sturgeon in the lower reaches of the river can more easily migrate upstream.

Corps spokesman Paul Johnston declined to comment on the biological opinion, noting that his agency is still reviewing the 300-page document. Johnston said he expects an official Corps reaction early this year. But industry officials are not pleased. Randy Asbury, executive director of the *Coalition to Protect the Missouri River*, called the decision "the final nail in the coffin of all navigation" on the river. Asbury said the recommended low summer flow would leave too little water for barge traffic 60% of the time. Ensuring continually adequate flows for barges requires a flow of roughly 28,500 cfs, Asbury added. He also argued that continued low flows in the river, exacerbated by the current Missouri drought, would force power plants to reduce their electricity output to stay in compliance with federal water quality standards for temperature.

The coalition is still reviewing details of the FWS opinion and has not decided on what recourse it may have to contest with the agency's findings, Asbury said. "I think we're done on the Missouri River," said Chris Brescia, president of the *MARC 2000* trade association in St. Louis. "If we have to operate under a system that's so unreliable, it's not going to happen. We'll just go to the Mississippi."

Environmentalists, who have battled the Corps for years over management of the river, said the new FWS opinion reinforces the point that immediate action is necessary to recover the Missouri River species. Some activists feared that the FWS would concede to the Corps' higher-flows assessment after a number of key agency scientists who had been working on Missouri River issues were transferred this fall by the Bush administration to other projects and replaced with a high-level policy team (see the November/December issue of *River Crossings* for details).

"We are heartened that even a team of

scientists picked and pressured to obtain a different result cannot escape the conclusion that the immediate restoration of more natural flows to the Missouri River is essential to reverse the decline of the river [and] prevent the extinction of species that live in it," a joint statement from *American Rivers*, the *Izaak Walton League of America*, the *National Wildlife Federation* (NWF) and *Environmental Defense* said.

While environmentalists were heartened by FWS' findings for the sturgeon's survival, they did not like everything they saw in the opinion, including a difference of 4,000 cfs from what the former FWS scientists called for in the low summer flow regime. The "flow changes outlined in this document are smaller and implementation is delayed," the groups charged. Therefore, the new opinion is less likely to result in the benefits for wildlife compared to the earlier 2000 opinion. And there is always the concern that the Corps will simply ignore the opinion as it has done in the past, said John Kostyack, an NWF attorney. "Based on the track record of the Corps, we don't have much confidence," Kostyack said. David Hayes, deputy Interior secretary during the Clinton Administration and the lawyer who represented the environmental groups in the lawsuits that forced the Corps to adhere to the 2000 biological opinion, said, "I would hope the Corps finally accepts the science" and takes swift action to protect Missouri River species.

Richard Opper, executive director of the *Missouri River Basin Association* — an alliance of states — said that the FWS conclusions further diminish the ability of states to decide the river's future. "Can states affect the outcome of this any more? I think the answer is no. No longer are they the main players. I think that we as a basin, some states more than others, have underestimated the strength of the ESA," he said. Rather than cooperating to find solutions, the states from the upper and lower basin likely will compete with one another even more fiercely for river water.

That likelihood showed when Senate Minority Leader Tom Daschle, D/SD, praised the biologists' opinion, while Missourians reacted with dismay. Michael Wells, chief of water resources in the Missouri Department of Natural Resources, said Missourians will have to get used to a different sort of river in the summer, particularly if drought persists.

Meanwhile, North and South Dakota officials have already faced a drinking water crisis, in part, because of current flow management policies in the Missouri River. In early December North Dakota Gov. John Hoeven (R) ordered the National Guard to deliver drinking water to residents of the upper Missouri River Basin whose water supply has dwindled due to chronically low Missouri River flows. The governor also issued a water emergency proclamation for residents below both Lake Oahe and Lake Sakakawea, including Fort Yates, home of the Standing Rock Sioux Reservation, and the city of Parshall. "Because of the [Corps'] mismanagement of the river, more than 10,000 North Dakotans are confronting a risk to the health and security of their drinking water supply on both major North Dakota reservoirs," Hoeven said. He noted that schools, businesses and a hospital in Fort Yates would be closed for a week due to the clogging of water intake pipes with river bottom sediments.

The problem, Hoeven said, is "the result of low water levels in Lake Oahe," a drinking water reservoir that has been drawn down by the Corps to provide flows for downstream navigation. But Corps spokesman Johnston dismissed the notion that the Corps was responsible for drinking water supply problems. "The reason for the problems in North Dakota is that is has not snowed in four years," Johnston said. The governor acknowledged in a letter to the Corps that natural conditions have played a role in low flows. But Hoeven told Brig. Gen. William Grisoli, the Corps official in charge of Missouri River operations, that the clogged intake pipe is just the latest problem affecting the upper reaches of the Missouri River due to federal activities in the basin.

The state has estimated the cost of revamping drinking water systems in Fort Yates and Parshall at a combined $11 million. By comparison, the Corps estimates the value of downstream barge traffic at $7 million annually. Johnston said the Corps and the Interior Department plan to install two pumping stations to help boost water supply to area residents and dredge the sediment that is blocking existing pipes. But Hoeven called the project inadequate because it does not address the long-term water supply needs of Parshall and will not help the other communities. Hoeven and Sen. Byron Dorgan, D/ND, said the Corps needs to pay for a permanent solution because the agency has mismanaged the Missouri River. Hoeven said a pipeline must be extended about nine miles to deep water, and such a permanent pipeline extension could cost $4 million.

NWF's Kostyak said water supply concerns on the northern stretches of the river "is an interesting twist in the debate, because objections to the low flow regime [implemented by the Corps] have typically been downstream" of the Dakotas.

Also in late December North Dakota officials filed a request for the U.S. Supreme Court to review whether recreation or navigation should take precedence in controlling Missouri River flows. North Dakota Attorney General Wayne Stenehjem (R) said that he has asked the court to overturn an 8th U.S. Circuit Court of Appeals ruling permitting the Corps to release water from the river to ease commercial traffic downstream. "The 8th Circuit was plain wrong when it ruled the Flood Control Act gives navigation priority over recreation," Stenehjem said. "I think if the Supreme Court takes (the case), it will rule that all of the uses of the Missouri River are to be given equal consideration, after you talk about flood control and municipal water use," he said. "I think that the legislative history is clear on that."

However, Paul Wilson, deputy chief of staff for Missouri Attorney General Jay Nixon, said Missouri would oppose a Supreme Court review of the ruling. The federal law that governs the case (Flood Control Act), "not only permits the Corps to manage the river for flood control and navigation but requires that it do so," Wilson said. Northern states "have concluded that the plain language of the 1944 Flood Control Act really should be ignored, so that the Corps is required to serve the relatively minor interests of recreation," he said.

Stenehjem said the national implications of the case are tremendous. "It's a dispute between states and involves the federal government as well," he said. "Those are the kinds of things the Supreme Court does

tend to be interested in, but the odds are long." It likely will be several months before the court rules on whether it will hear the case. If the high court decides to hear the case, briefs and arguments could come late next year. Stenehjem said the deadline for doing anything was up and we had to make a decision. Corps spokesman Johnston said the courthouse is available for all parties, noting there are lawsuits representing all sides in the river management dispute.

If the newly prescribed summer water flow of no higher than 25,000 cfs are adopted for reaches downstream from Gavins Point Dam in South Dakota, water levels in that reach will drop by a few feet. This may mean that some downstream riverside communities will need to install new pumps for drinking water, a step already taken in Jefferson City, Missouri. On the other hand, the lower, slower water will be more desirable for canoeists and people who in the past have feared using the Missouri River because of the treacherous flows that had been maintained artificially to scour the channel's sediments in order to maintain a guaranteed 9-foot deep navigation channel. Commercial barge traffic on the river in recent years has become almost nonexistent with no more than 2 or 3 barge companies attempting to use it.

And so, the beat goes on!

Sources: Marty Coyne, *Greenwire*, 12/2 and 12/19/03; Andrea Domaskin, *AP/Aberdeen News*, 12/2/03; Bill Lambrecht, *St. Louis Post Dispatch*, 12/21/03; Richard Hinton, *Bismarck Tribune*, 12/31/03; *AP/Grand Forks Herald*, 12/31/03; *Greenwire*, 1/05/04

Upper Mississippi River Lock Plan Criticized

The *National Research Council* of the *National Academies of Science* (NAS) in mid December issued a blistering report (for the second time in two years) ripping the credibility of a U.S. Army Corps of Engineers (Corps) study to justify building bigger new locks on the Upper Mississippi River and Illinois Waterway system. "Something's got to give, either the time or your confidence in the study," said NAS committee member Lester Lave of Carnegie Mellon University in Pittsburgh.

In stern words, the NAS directed the Corps to slow down any plans for the multi-billion dollar project until the following basic shortcomings could be addressed:

- lack of an economic model that is "widely accepted by economics experts";
- inability to "adequately" evaluate benefits from lock extensions; and
- failure to follow the recommendations from an earlier NAS report.

The current NAS report further recommended that the Corps:

- Devise a new economic model for predicting grain shipments on the river;
- Devise realistic barge traffic forecasts. The panel said it was skeptical because four out of five traffic scenarios used in the study project significant traffic growth over the next 50 years, despite stagnant levels in the past two decades.
- Immediately (before proceeding with any expansion) implement new lock fees for barges during peak congestion periods and other methods of easing barge congestion.
- Provide a more detailed rationale for proposed environmental restoration projects.
- Delay the schedule for completing the study, because it would be impossible to follow the panel's recommendations and still meet an April deadline.

Lt. Gen. Robert B. Flowers, the Army's chief of engineers, said he welcomed the NAS comments and "will use their input to improve the quality and content of our study." Also, Corps spokesman Ron Fournier said that a broad range of options are being considered and that no decision has been reached. "You can't say the Corps is going down the road of locks and dam construction," he said. "Right now we are still in the evaluation stage."

But environmental groups say Corps officials are bent on seeking new major construction and are not heeding the advice of NAS experts and others. "In the bluntest way, the [report] is telling the Corps to pull the plug on the Upper Mississippi study," said Jeff Ruch, Executive Director for *Public Employees for Environmental Responsibility* (PEER), a nonprofit group that recently sued the Corps contending that it has relied on a biased economic model. "Unfortunately, the pork dynamics are too powerful and, given the seamy history of this project, the Corps will shamelessly ignore the NAS and recommend a multi-billion authorization...", PEER said.

The lawsuit was filed in Washington, saying that the Corps is relying on the same economic model discredited by federal whistle-blower, Donald Sweeney, three years ago. Sweeney, a Corps economist in St. Louis, accused top Corps officials of "cooking the books" to support a $1.5 billion navigation expansion. Investigations by the Corps inspector general and NAS verified Sweeney's allegations. PEER wants the so-called "tow-cost" model being used by the Corp to make their navigation traffic predictions thrown out. "The tow-cost model is designed so every project it analyzes is justified," said Ruch, "It would find the benefits outweigh the costs of a turkey of a project."

Fournier said the Corps stands behind the tow-cost model, even though officials recognize improvements are needed. "It's not a discredited model," he said. "Right now, the tow-cost model is the best model the Corps has that's tried and true." The problem with the model, according to Ruch, is that it assumes that farmers would be

forced to use rail, rather than cheaper barge shipping, if delays continue. Sweeney had been developing an alternative model when he filed his allegations against the Corps. His new model took into consideration that farmers might find some other market for their grain. Sweeney's alternative model was widely recognized as an improvement, but Fournier said it remains incomplete.

Sweeney says that the Corps is still conducting its research in a way that greatly overestimates how much barge traffic the river will sustain in coming years. "With each passing month, the Corps forecasts veer farther and farther from reality," stated Ruch. Upper Mississippi River barge traffic declined again in 2003, continuing a fifteen-year trend of stagnation, according to the latest Corps figures released in late January by PEER. The Corps' data shows large, cumulative decreases in barge traffic at nearly all locks, with the most heavily utilized locks exhibiting fully a one-quarter reduction in traffic.

In sharp contrast with these data, PEER says, that the Corps has embraced wildly optimistic traffic forecasts in their continuing attempt to justify this project. PEER also points to other economic factors such as continuing barge industry consolidation, the near end of commercial barging on the Missouri River, and new value-added uses for grain production, such as ethanol, that do not require shipment down the river to New Orleans. All of these, PEER says, are contributing factors that will likely extend the traffic slump through at least the next decade.

The NAS report is a setback for farmers, barge owners, and some Midwestern lawmakers who have been pursuing river improvements for more than a decade. They want to double the size of locks so that long barge tows can get through without decoupling, a time-consuming process. Chris Brescia, president of the navigation group *MARC 2000*, said he was disappointed with the NAS report. "This wasn't an independent review," Brescia said. "They've already made up their minds."

But environmental groups said the report is simply pointing out the same problems noted in 2000 by Sweeney. "This really is a stinging rebuke of the Corps' continued reliance on economic tools that produce inaccurate results," said Scott Faber, a water resources specialist with *Environmental Defense*, a Washington-based environmental group. "In light of the fact that traffic hasn't increased in two decades, there's no need to rush to judgment."

But Fournier said it could take several years to develop a new economic model, a delay Congress might not tolerate. He also said that traffic forecasts were developed by an independent contractor who looked at the past 50 years. But the NAS report says that, "Although there is a need to move forward with the study, that need should be balanced with a similar need for credible and thorough analytical procedures." "Right now", Ruch said, "the Corps is thrashing around to find any way to justify this mega-project that passes the straight face test".

The Corps' project contains six options for improving navigation, and five options for ecosystem restoration. The project's estimated price tag for navigation improvements is $2.3 billion, and an even greater amount ($5.3 billion) is estimated for "environmental restoration". This makes the overall package total a whopping $7.6 billion, the second most expensive public works project in Corps history (second only to the $8 billion Everglades Restoration). Since the Corps is not known for promoting ecology, some speculate that the project's environmental restoration component is intended as mitigation for navigation impacts, or simply as a "buy-off" or "bribe" to get environmental interests to support the project. The Corps is expected to formally announce its final project recommendations to the public in April.

Sources: Sara Shipley, *St. Louis Post-Dispatch*, 12/9 and 12/12/03, Eric Pianin, *Washington Post*, 12/12/03, Public Employees for Environmental Responsibility, *Press Release*, 12/11//03 and 1/22/04; *Greenwire*, 12/10 and 12/12/03

Arkansas/Oklahoma Reach Phosphorous Agreement

Arkansas and Oklahoma have reached a USEPA approved agreement on a deal that gives Arkansas 10 years to meet Oklahoma's standards for phosphorous limits in rivers shared by the two states. The water quality of rivers that flow from poultry farms in northwestern Arkansas into eastern Oklahoma have been a long fought issue between the two states.

A 1992 Supreme Court decision, which said upstream states are subject to downstream rules, forces Arkansas to comply with Oklahoma's phosphorus limit. Oklahoma submitted its new standard to the USEPA in late 2002, limiting phosphorus in six of the state's scenic rivers to 0.037 milligrams per liter (mgl) of water. Arkansas officials said it would be impossible for the state to reach that standard, but Arkansas Gov. Mike Huckabee said the 10-year time frame will give the state adequate time to develop methods to reduce phosphorus pollution.

The agreement mandates that the five biggest cities in Northwest Arkansas — Bentonville, Fayetteville, Rogers, Siloam Springs and Springdale — reduce phosphorous discharges to 1 part per billion, and that smaller cities implement voluntary controls. All five cities discharge into tributaries of the Illinois River, except for Bentonville, which plans to do so once a new plant is constructed. "This is a major step for us, a culmination of a lot of things that came together," said Duane Smith, Executive Director of the Oklahoma Water Resources Board. "It's very satisfying to have it in place to protect our scenic rivers, and I think we'll see a tremendous benefit in our water quality." The two states will work together to implement the regulations, while the EPA oversees the process, said Sharon Parrish, head of the water management division at EPA's Dallas office. "The states are taking the lead here, but we will be in discussions with both sides to monitor things," Parrish said.

Randy Young, Arkansas Soil and Water Conservation Commission Executive Director, said the state has already started working with farmers to reduce agricultural pollution by working with Oklahoma officials to burn their fertilizer for use as methane gas and trying to develop a method to use the energy from fertilizer to heat farmers' homes.

Marcus Devine, director of the Arkansas Department of Environmental Quality, said "we still think that the phosphorous limit is unachievable, but we're satisfied that we have something that is an amicable solution. This is part of the beginning." "It's an early part of the process for me, and the EPA's approval is a blessing of the things we intend to do on this side of the border," he said. The EPA regulation also covers other nutrients such as nitrogen, Devine said. The 0.037 mgl phosphorus standard is the first numerical standard of its kind in the nation, he said. The next step is gathering data and planning for implementation of the regulations, Smith said. "The whole implementation issue is still looming out there, there's still plenty of work to be done."

Northwest Arkansas' poultry and city utility officials have been concerned about the limit since it was first proposed about two years ago. Stormwater runoff from farms and wastewater-treatment plants that discharge into streams are two major sources of phosphorus. Phosphorus at high levels promotes excessive algae blooms in streams, which causes water to appear green, threatens aquatic life, and can lead to taste and odor problems in downstream reservoirs.

During the late 1980s and early 1990s, Oklahoma challenged Fayetteville's plans to discharge half its treated wastewater into a tributary of the Illinois River. The U.S. Supreme Court ruled in 1992 that Fayetteville could discharge treated sewage into the stream, but also said upstream states can be required to meet the quality standards of downstream states. Later, the city of Tulsa sued *Tyson Foods* and other Northwest Arkansas poultry producers, claiming that excess phosphorus from chicken litter was

degrading water quality in the Eucha-Spavinaw watershed from which Tulsa draws its drinking water.

Time will be critical in working toward Oklahoma's goal, said Otis Cluck, an Arkansas man who raises turkeys in five houses north of Summers in Washington County. "It'll be a different ball game from here on, "Cluck said." Farmers understand what we are going to have to do. "The water is going to improve. The management of the litter is going to improve. I believe that. I had more faith when they gave us 10 years to do it."

The agreement between the states also calls for the establishment of a so-called litter bank. The bank will help coordinate the movement of litter from farms where phosphorus levels in soil are high to places where it can be used outside the scenic river watersheds. The two states also are designing a phosphorus index. That index will help determine where poultry litter can be spread on fields.

Sources: Rob Moritz, *Southwest Times Record* (Ft. Smith, AR), 12/18/03; Laura Kellams, *Arkansas Democrat-Gazette*, 12/17/03; Davis/Moritz, *Morning News of Northwest Arkansas*, 12/18/03; Dan Craft, *Morning News of Northwest Arkansas*, 12/31/03; Robert J. Smith, *Arkansas Democrat-Gazette*, 12/31/03; *Arkansas Democrat-Gazette*, 1/21/04 and *Greenwire*, 12/19/03

Everglades Pumping Case Could Impact Western States

A ruling by the U.S. Supreme Court involving a water pumping station in the Florida Everglades could significantly limit water diversions across much of the country, including the water-starved Western states. At issue in the case is the water management district's use of a pumping station to move water that accumulates in the heavily populated Broward County through two channels westward to a water conservation area next to Everglades National Park.

The Miccosukee Indian Tribe sued the South Florida Water Management District in federal district court, alleging that the transfer of water is a discharge from a point source under the Clean Water Act (CWA) and requires a national pollutant discharge elimination system permit. In its ruling, which was later upheld by the 11th U.S. Circuit Court of Appeals, the district court concluded that "an addition of pollutants exists because undisputedly water containing pollutants is being discharged" through the canals operated by the water district.

"The case will, without a doubt, have impact around the country on anybody who manages water," said Scott Glazier, the district's litigation manager. "All we're doing is moving water through a pipe with a pump...We're not adding any of these pollutants to the water. This is stuff already in the water when we get it." But with most of the West's water transferred from other locations, Western officials said they are concerned that the Supreme Court ruling would force Western authorities to secure numerous federal water pollution permits.

Water managers in California worry that the ruling could greatly complicate, if not limit, the region's massive water diversions. Basically all our water is transferred," said Jeffrey Kightlinger, general counsel of the Metropolitan Water District of Southern California. Massive quantities of water are imported to Southern California from the Northern portions of the state, as well as from the Colorado River basin outside of the state. "Perhaps just moving that water and putting it into reservoirs" would require a federal water pollution permit, he said.

Colorado and New Mexico have filed a brief in the case stating, "At risk ... is the continued ability to divert freely water from one basin for delivery to another basin in order to meet municipal, agricultural and industrial demands." But environmentalists said that when water is moved from one area to another, some type of pollution often occurs. "The thing that worries us the most is, there could be a blank check to pump dirty water around to much cleaner or pristine water," said *Earthjustice* attorney Howard Fox.

The Supreme Court has been showered with written arguments in the case, including some from the U.S. solicitor general's office. It initially urged the court not to take the case and then sided with the Florida water district. The federal arguments have been criticized by environmental groups and some former officials of the USEPA, who say it could narrow the reach of the CWA, exempting discharges between waterways. "The position of the Bush administration is, you could take salt water and pump it into a pristine mountain lake, killing all the fish in the lake and contaminating a drinking water supply and that wouldn't violate the CWA," contended Michael Wall, an attorney with the *Natural Resources Defense Council*. "That would carve a huge hole in the act."

The solicitor general's office declined to comment, but in its September Supreme Court brief said that Congress had never intended that facilities merely transferring water or connecting waterways should have to get water pollution permits. In a brief submitted with four other former agency officials, former USEPA administrator Carol Browner dismissed the notion that the West's vast water transfer networks would suddenly need pollution permits if the appeals court decision were upheld.

But water agency attorneys say water diversions routinely made in the West — such as those from western to eastern Colorado or from Northern to Southern California — could easily trigger a permit requirement if the Florida ruling stands. "If you take water from one watershed to another, it has different temperatures and different constituents," said Jennifer Spaletta, who represents several California water districts. "It's very unusual that you would not have something that could be called a pollutant." Similarly, Colorado water attorney Peter Nichols said that, during thunderstorms or times of heavy spring runoff, the headwaters pumped from the west side of the Rocky Mountains to reservoirs on the east contain high sediment levels that could be considered pollutants. Water managers say that in some cases they may not be able to meet water quality standards if permits are required, or would have to treat the water before transferring it. Even if they could get a permit, they said, the application process could be slow and cumbersome.

The California attorney general's office was asked by both sides in the case to file briefs but declined to take a stand. "The office just realizes there are good arguments on both sides and … we don't feel comfortable signing on to either," spokesman Tom Dresslar said. Sean Hecht, executive director of the *UCLA Environmental Law Center*, said the effect of the Supreme Court ruling — expected the middle of next year — would depend on how narrowly or broadly the opinion is framed. "I do think that it's likely that many water diversions will require permits if the court rules in the environmentalists' favor in this case," Hecht said. "But wide-ranging permitting programs have been developed before, and I don't see development of another one as apocalyptic."

If the Supreme Court takes the opposite position and holds that polluted water can be dispersed without a permit to other waterways covered by federal environmental laws, Hecht said, that "would be a big deal," because it could affect more than water transfers. "But the court," he added, "often has a way of managing to base its decision on a very narrow ground and to frame its questions narrowly, so as to leave the hardest questions and the profoundest implications for another day."

Sources: Bettina Boxall, *Los Angeles Times*, 12/22/03; *Greenwire*, 12/23/03

Florida/Alabama Urge Court to Block Georgia/Corps Deal

Attorneys for Florida and Alabama have charged that the state of Georgia and the U.S. Army Corps of Engineers (Corps) have plotted to take inordinate amounts of water from a major state reservoir to meet Atlanta's drinking water needs, all the while thwarting federal laws and ignoring economic and ecological needs of downstream states. After more than a decade of on-and-off negotiations, the long-running water dispute between the three states spilled into the U.S. district court in Washington, where Judge Thomas Penfield Jackson is expected to rule on the legality of the deal.

Tri-state water compact negotiations broke down four months ago over concerns by Georgia officials that its water needs for metropolitan Atlanta would not be met. Atlanta is one of the nation's fastest-growing urban areas, registering nearly 39% population growth between 1990 and 2000. Florida has charged that Georgia's drawdown on Lake Lanier, a state reservoir on the Chattahoochee River, would rob Apalachicola Bay on Florida's Gulf Coast of freshwater needed to sustain the state's oyster harvests. Alabama, meanwhile, argues that Georgia's water use will impede economic development, agriculture and navigation on its portions of the river.

Lawyers for Florida and Alabama argued that Georgia's effort to strike a separate water supply deal with the Corps was a major factor in the collapse of compact talks last year, and they are asking Judge Jackson to rescind the deal. The Georgia/Corps agreement gives the state access roughly to 240,000 acre feet of Lake Lanier water for at least 10 years, provided the state complies with the National Environmental Policy Act (NEPA) and Endangered Species Act requirements. NEPA is aimed at preventing federal projects like the operation of Buford Dam, built in the 1940s to create Lake Lanier, from harming the environment. "We were left out of this agreement ... without regard to the rights of Alabama and Florida," Florida Department of Environmental Protection attorney Jonathan Glogau told Jackson. Alabama attorney Buddy Cox echoed Glogau and urged the court to reject the agreement, which stemmed from an earlier Georgia lawsuit against the Corps. But Bruce Brown, Georgia's chief lawyer in the case, told Jackson that Florida and Alabama were contacted, but "showed no interest" in the deal.

Cox said the agreement clearly changes the original purpose of the Buford Dam project — which Corps documents show was built for flood control, navigation and consumptive use. The agreement would shift operation of the dam so that the primary users of Lake Lanier water would be Atlanta area residents and businesses. Such a change, Florida and Alabama contend, would require special permission from Congress.

Glogau and Cox also asserted that the agreement violates NEPA. "There's no record at all" that proper environmental determinations were made, the lawyers said. Jackson acknowledged that under the agreement, the water supply contract between the Corps and Georgia is null and void if NEPA compliance is not achieved. But Cox countered that the NEPA language of the agreement is "drawn so narrowly" that the outcome of any NEPA analysis is "preordained" and will support the water allocation in the agreement without serious consideration of any alternatives to Georgia's request.

Ruth Ann Storey, the Justice Department lawyer representing the Corps in the case, countered that the NEPA provisions in the agreement with Georgia is standard language that the agency uses in all its projects. Brown told Jackson that the fundamental claims by Florida and Alabama are water rights claims that are outside the district court's jurisdiction and may only be decided by the Supreme Court. Florida Department of Environmental Protection spokeswoman Deena Wells said the state still plans to ask the Supreme Court to settle the interstate water allocation dispute. Jackson is expected to rule on the agreement within the next several months.

Source: Marty Coyne, *Greenwire*, 1/21/04

Judge Bans Pesticide Use to Protect Salmon Streams

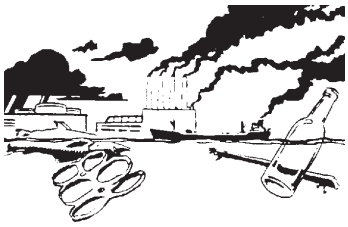
Judge John Coughenour of the U.S. District Court for the Western District of Washington on January 22nd banned ground spraying of 38 types of pesticides within 20 yards and aerial spraying within 100 yards of any stream that could be important to salmon or steelhead populations.

The ruling grants nearly all of the immediate protections for fish sought by conservation and fishing groups that sued the USEPA three years ago, and it sets a precedent for several related lawsuits nationwide seeking to impose strict limits on pesticide use under the federal Endangered Species Act (ESA). But since the buffers will do little to curb the flow of pesticides in urban areas where concrete and other impervious surfaces dominate the landscape, the judge also ordered pesticide producers to post notices in stores near urban salmon streams, warning consumers that the products pose a threat to fish.

Pesticides commonly commonly used in urban areas and found in urban waterways which impact fish and aquatic life include the following:

- Carbaryl — an insecticide found in *Adios, Bugmaster, Septene* and *Sevin*; moderately toxic to aquatic life
- 2,4-D — a herbicide in *Barrage, Lawn-Keep, Savage, Salvo* and *Weed & Feed*, *Weedone*; used on broadleaf weeds; can be highly toxic to fish
- Diazinon — an insecticide in *Gardentox, Knox Out* and *Spectracide*; kills cockroaches, ants and fleas; highly toxic to fish
- Diuron — a herbicide in *Direx* and *Karmex*; used on mosses and broadleaf and grassy weeds; moderately toxic to fish, highly toxic to aquatic invertebrates
- Malathion — an insecticide found in *Celthion, Fyfanon* and *Maltox*; kills mosquitoes, flies and lice; can be highly toxic to fish
- Triclopyr BEE — a herbicide in *Access, Crossbow, Garlon* and *Redeem*; used on woody and broadleaf plants; low toxicity for fish
- Trifluralin — a herbicide in *Trefanocide, Treficon* and *Trust*; kills annual grasses and broadleaf weeds; highly toxic to fish and other aquatic life

The court order comes after a two-year legal battle over the USEPA's failure to adequately assess the impact that pesticides may be having on threatened fish runs. Federal scientists knew through studies that pesticides could affect the ability of salmon to smell, reproduce, avoid predators, swim or detect prey. In 2001, Judge Coughenour found that EPA had persistently violated the ESA by not guiding pesticide use with an eye to the potential effects on fragile Northwest salmon species. In July 2002, he ordered the agency to consult with the National Marine Fisheries Service, which oversees salmon recovery, on the effects of 54 pesticides suspected of harming fish. He also ruled that the EPA had failed to consult with the U.S. Fish and Wildlife Service (FWS) as required by the ESA, when writing rules for pesticide use near rivers and streams. Then last summer, he ordered the creation of buffers. The January ruling marks their official adoption.



Spraying to control mosquitoes and noxious weeds is exempted from the court order restrictions. The ruling will cease to apply to uses of pesticides that are deemed safe by the FWS. The groups that sued the EPA included the *Northwest Coalition for Alternatives to Pesticides* (NCAP), *The Washington Toxics Coalition* (WTC), *Earthjustice*, *Pacific Coast Federation of Fishermen's Associations* and *Institute for Fisheries Resources*. Similar cases are proceeding in Oregon, Alaska, California and the District of Columbia.

Environmentalists hailed the decision. "This ruling gives salmon a much-needed break from the toxic soup of pesticides they've been facing," said Erika Schreder, staff scientist with the WTC. "EPA is vulnerable," said *Earthjustice* attorney Patti Goldman, who won the lawsuit in Seattle. Goldman said the agency has "routinely" made rulings of no harm on pesticides that affect endangered species. "I would imagine other cases would cite this precedent, and other judges would follow suit," Goldman said. Aimee Code with the NCAP said point-of-sale labeling of bug spray and weedkillers will allow consumers to make informed decisions about which products to buy.

Meanwhile, industry groups said the ruling would harm agricultural production in the three states. "The court's final order is devastating to agriculture and pest control in the Pacific Northwest," said the pesticide industry group *CropLife America* (CLA). In a prepared statement CLA said that the threat to salmon from pesticides is "nonexistent,"

Pesticides requiring protective buffers include the following:

- acephate
- azinphos-methyl
- bnsulide
- bromoxynil
- captan
- carbaryl
- carbofuran
- chlorothalonil
- chlorpyrifos
- coumaphos
- 2,4-D
- diazinon
- 1,3-dichloropropene
- diflubenzuron
- dimethoate
- disulfoton
- diuron
- ethoprop
- fenamiphos
- fenbutatin-oxide
- lindane
- linuron
- malathion
- methamidophos
- methidathion
- methomyl
- methyl parathion
- metolachlor
- metribuzin
- naled
- oxyflourfen
- pendimethalin
- phorate
- prometryn
- propargite
- tebuthiuron
- triclopyr BEE
- trifluralin

and that all the products named in the court order have undergone scientific scrutiny and approval by the EPA to protect people and wildlife. "These severe restrictions on agriculture, small-business and consumer use of pest control products hurt farmers, foresters, homeowners and retailers in Washington, Oregon and California," CLA said. "It will have a very devastating impact on many farmers in Washington, Oregon and California," said Dean Boyer, a spokesman for the *Washington Farm Bureau*. Boyer said the burden might be highest on fruit growers in the Columbia River Basin, because many orchards are small and located along waterways with a dozen threatened or endangered salmon stocks.

A U.S. Department of Agriculture study submitted to the court suggested, in the worst-case scenario, streamside pesticide buffers could result in farmers ripping out fruit crops near streams, and causing losses of $100 million a year in Washington and Oregon alone. But an EPA study found the financial impact would more likely be less than $5 million in all three states — with most of that coming from rice farms in California. Both conclusions were reached when it was expected that the judge's order would apply to 54 pesticides; 16 since have been determined by the EPA to be unlikely to harm listed fish. Mike Willett of the *Northwest Horticulture Council* said it is difficult to predict how the agriculture community will deal with the new ruling. It is a "one-size-fits-all ruling that doesn't make any sense," Willett said.

Oregon and Washington already have buffer zones of various widths and California has voluntary buffer zones ranging from 20 yards to 1 mile. "The buffers are considered a best management practice for growers, but that doesn't mean the growers use them. We still find pesticides in our streams," said WTC's Schreder. The EPA will be responsible for enforcing the buffer zones, and the order will remain in place until the agency adopts permanent rules to protect fish.

Numerous dying salmon, full of eggs and struggling to survive in some Puget Sound-area waterways, have been found by volunteers and researchers patrolling local creeks. Pesticides are among the pollutants scientists believe might be prematurely killing the fish. And the concern isn't just for pesticide exposures that are lethal outright. Internationally, scientists have found that certain pesticides at nonlethal levels can disrupt basic functions in fish by deadening their ability to smell. In salmon, that sense is key to basic functions, such as avoiding predators, hunting prey, finding their birth streams and triggering spawning.

In the Seattle area, federal researchers have measured pesticides in suburban streams at levels that can harm aquatic life. Twenty-five different pesticides and related compounds were found in samples collected in 2000. The water was most often toxic after rainstorms, leading researchers to suspect that the chemicals were washing off yards and landscaping.

Sources: Joe Rojas-Burke, *Portland*

Oregonian, 1/23/04; Lisa Stiffler, *Seattle Post-Intelligencer*, 1/23/04; Gene Johnson, *AP and San Francisco Chronicle*, 1/22/04; Craig Welch, *Seattle Times*, 1/22/04; Extension *Toxicology Network*; *Greenwire*, 1/2304

Hormones, Rivers and Cattle Feedlot Effluents

Scientists reported in mid December, in the online version of the journal *Environmental Health Perspectives*, that effluents from cattle feedlots are hormonally active and effect the sexual characteristics of fish living in downstream waters. Male fish in the effected stream were demasculinized (showing lower testicular testosterone synthesis, altered head morphometrics, and smaller testis size). Defeminization of females, as evidenced by a decreased estrogen/androgen ratio of in vitro steroid hormone synthesis, was also documented. Female fish had about 20% less estrogen than normal and 45% more testosterone than females from uncontaminated areas of the same stream. Scientists did not observe characteristics in either male or female fish indicative of exposure to environmental estrogens.

Researchers from five institutions led by the University of Florida studied fathead minnows living in a Nebraska stream that receives effluents (containing androgens and estrogens) from a cattle feedlot. Adult fathead minnows were studied because the species is a well-characterized toxicological model and native to the study region. The researchers said that future studies are needed to further investigate the effects of agricultural runoff and to identify the biologically-active agents, whether natural or pharmaceutical in origin.

Over the last decade, research has examined the endocrine disrupting action of various environmental pollutants including hormones, pharmaceuticals, and surfactants in sewage treatment plant effluents. But this is the first study demonstrating that the endocrine and reproductive systems of wild fish can be adversely affected by feedlot effluents. But cattle industry officials discounted the report. "It's very suspicious that they would indicate it is from feedlots, because there are long-standing regulations prohibiting discharge," said Gary Weber, Executive Director of regulatory affairs for the *National Cattlemen's Beef Association*. "Feedlots are not allowed (under state and federal laws) to discharge into waters, so that raises the question of where are these materials really coming from?"

While a great deal of research examining the endocrine disrupting action of various environmental pollutants has been completed, studies have just begun to focus on hormones released from animal waste that is used to fertilize agricultural fields. Significant concentrations of estrogens and androgens have been reported in ponds or streams receiving runoff from fields fertilized with chicken litter. In fact, depending on application rate, concentrations in runoff have been measured as high as 1,280 ng/l.

Natural hormones, such as estradiol, have also been reported in ponds below cattle holding facilities and contamination of water systems with endogenous hormones is not limited to surface waters, as estradiol has been reported in spring water from mantled karst aquifers in agricultural areas. The presence of endogenous and pharmaceutical estrogens in sewage effluent has also been studied. Work performed below sewage treatment plants in Great Britain has documented a significant number of intersex fish when compared to rivers with less effluent. Furthermore, these studies have reported that many males had elevated levels of estrogen-induced vitellogenin in their blood. This protein does not normally occur in males. Similar research in other countries has supported these observations.

A wide array of pharmaceutical agents, including hormonal mimics, have been reported in sewage and open waters in various countries. These agents include drugs commonly prescribed for the treatment of heart disease, stress, inflammation, bacterial infections (antibiotics) and birth control. Further, although veterinary drugs, such as growth promoters and antibiotics, are used extensively in agriculture, few studies have examined their presence in the environment. Some studies have, however, recently reported the presence of these compounds in ground water near farms.

In the United States, hormone supplements are used in the production of approximately 90% of beef cattle. These supplements promote rapid growth and increase the conversion of feed to muscle mass. Recent studies had indicated that there is a basis for concern about the ecological effects of these pharmaceutical supplements.

Sources: Marla Cone, *Los Angeles Times*, 12/11/04; *Greenwire*, 12/15/03; and Orlando, E.F. et al. 2003. Endocrine disrupting effects of cattle feedlot effluent on an aquatic sentinel species, the fathead minnow. *Environmental Health Perspectives*.

Climate Change and Extinctions

The year 2003, marked by a sweltering summer and drought across large swaths of the planet, tied with 2002 as the world's second warmest year in nearly 150 years of record keeping according to the *National Climatic Data Center* (NCDC). NCDC said the 2003 average global temperature was 58.03 °F, about 1 degree higher than the average since 1880. Climatologists originally expected 2003 to rank as the world's third-warmest year, but a mild December pushed it up to equal 2002's numbers.

Officials said the warmer weather could not be attributed to any single cause but was part of a trend that global warming was likely to prolong. The *World Meteorological Organization*, which collects data worldwide, said the three hottest years since accurate records began to be kept in 1861 had all been in the last six years. The hottest was 1998, when the average temperature was up 0.99 degrees. ''The rhythm of temperature increases is accelerating,'' said the agency's deputy secretary general, Michel Jarraud.

Professor Phil Jones, of the *Climatic Research Unit*, University of East Anglia, UK, said: "The summer (2003) over much of central Europe was the warmest ever recorded, not just in the instrumental record which goes back to 1781, but also in documentary-based extensions that go back to 1500." During the past century, global surface temperatures have increased at a rate near 1.0 °F/Century, but the trend has been three times larger since 1976, with some of the largest temperature increases occurring in the high latitudes. In 2003, warmer

temperatures and shifts in atmospheric circulation patterns also contributed to a second straight year of extremely low Arctic sea ice extent in September, according to the *National Snow and Ice Data Center*.

If these trends continue, experts predict that top summer temperatures in Midwestern states like Iowa will be as much as 22 degrees warmer in the next 100 years. According to a report released on January 6 by the *Union of Concerned Scientists*, Iowa's summer climate will resemble that of northwest Mississippi by 2100, with as many heat waves as the state saw during the Dust Bowl of the 1930s. The report, which places the blame on America's reliance on fossil fuels, warns of an increase in severe storms and flooding, damage to crops and property, and more heat-related deaths and illnesses. Computer models, using 100 years of Iowa climate data, simulated future weather patterns, said Susanne Moser, a scientist at the *National Center for Atmospheric Research* in Boulder, Colorado, and the lead author of the report. "This warming is more dramatic than the warming seen since the last ice age" 12,000 years ago, the report said. Scientists said seasonal precipitation could change dramatically, with winter and spring rain and snowfall up 30%, and summer rainfall down as much as 35%.

At the same time, global climate change could alter Atlantic Ocean currents and paradoxically cause parts of North America and Europe to cool dramatically, according to a study published in a new book entitled: "*Global Change in the Earth System: a planet under pressure.*" In this book Stefan Rahmstorf of the *Potsdam Institute for Climate Impact Research* in Germany warns that freshwater from melting polar ice sheets could disrupt the Gulf Stream, possibly shutting the current down altogether. The Gulf Stream is a current of warm water that helps warm the climate of the eastern United States as well as much of Europe. "This would trigger a regional cooling, but not an Ice Age," Rahmstorf said.

He said the Gulf Stream was halted nearly two dozen times in the past 100,000 years, most recently about 8,000 years ago following the end of the last ice age. If the current were to stop, average temperatures in some areas of Europe could plummet as much as 10-20 ^{o}F, despite the prediction that climate change caused by greenhouse gas emissions will raise average global temperatures by up to 5.8 ^{o}C by 2100. "The Eastern Coast of Canada and the United States also would be affected. This is sometimes wrongly perceived as a European problem by American politicians," Rahmstorf said. "A major finding is that change will not be progressive. There will be abrupt changes and tipping points," said Will Steffen, Executive Director of the *International Geosphere-Biosphere Program* that published the book. "Never before have we seen the range of change or the rate of change at the same time."

In another study, entitled: *Extinction Risk From Climate Change*, published in the January 8 issue of the journal *Nature*, researchers say that global warming at currently predicted rates will drive 15 to 37% of living species toward extinction by mid-century. Dismayed by their results, the researchers called for "rapid implementation of technologies" to reduce emissions of greenhouse gases and warned that the scale of extinctions could climb much higher because of mutually reinforcing interactions between climate change and habitat destruction caused by agriculture, invasive species and other factors. "The midrange estimate is that 24% of plants and animals will be committed to extinction by 2050," said ecologist Chris Thomas of Britain's University of Leeds. "We're not talking about the occasional extinction — we're talking about 1.25 million species. It's a massive number."

The study marks the first time scientists have produced a global analysis with concrete estimates of the effect of climate change on habitat. Thomas led a 19-member international team that surveyed habitat decline for 1,103 plant and animal species in five regions: Europe; Queensland, Australia; Mexico's Chihuahuan Desert; the Brazilian Amazon; and the Cape Floristic Region at South Africa's southern tip. The five regions encompass 20% of the Earth's surface and "include a fair range of terrestrial environments," Thomas said. "Obviously, it would be valuable to expand the scope, but there's no reason to think that doing so would change our results tremendously", he said.

Researchers said the wide geographical scope also overcame outside factors that might affect a single region only. "A prolonged drought might cause one instance of a dieback" but be offset by changes elsewhere, acknowledged climate change biologist Lee Hannah, who worked in South Africa. "When you see the broader context, the regional blips drop out." The authors say, "Many of the most severe impacts of climate change are likely to stem from interactions between threats, factors not taken into account in our calculations, rather than from climate acting in isolation." They singled out as examples habitat fragmentation and loss, and competition from new invasive species.

The study used U.N. projections that world average temperatures will rise 2.5-10.4 ^{o}F by 2100. The trick for the study, Thomas said, was to marry the maps of projected climate change in particular regions with maps describing the habitat — especially the climate needs — of plants and animals in the same area. For this, "we needed to get the people together who knew where the species lived," Thomas said. These were the conservationists on the research team — ecological experts who study extinctions by looking at traditional culprits: destruction of habitat through agriculture, industry or human settlement; invasive species shoving aside native plants and animals; hunting; and extermination of pests.

"Obviously, plants and animals depend on climate for survival, but we figured that if we protect them in place, they would be all right," Hannah said. "But now we realize that we have to take care of them not only where they are now, but where they might have to go." The team calculated the effects of climate change on extinctions by using what ecologists J. Alan Pounds and Robert Puschendorf, in an article accompanying the study, called "one of ecology's few ironclad laws" — that shrinking habitat supports fewer species. The study considered a range of possibilities based on the ability of each species to move to a more congenial habitat to escape warming. If all species were able to move, or "disperse," the study said, only 15% would be irrevocably headed for extinction by 2050. If no species were able to disperse, the extinction rate could rise as high as 37%. Reality, of course, will fall somewhere in between," Thomas said.

One skeptic, William O'Keefe, president of the *George C. Marshall Institute*, a conservative science policy organization, criticized the *Nature* study, saying that the research "ignored species' ability to adapt to higher temperatures" and assumed that technologies will not arise to reduce emissions. Other critics said that there are too many unknown factors to predict results 50 years from now. "You have to take the numbers they give with a grain of salt," said Lewis H. Ziska, a weed expert with the U.S. Agricultural Research Service in Beltsville, MD who studies the effects of climate change on invasive plants that damage crops. The study

warns that projected extinction rates should not be "taken as precise predictions." Thomas noted that some scientists argue that species have adapted to rapid climate change before — as in a warming after the last Ice Age. But he said that humans had now taken over much of the planet, adding to pressures this time round.

Pounds called the study's results "if anything, too conservative." The adverse effects of natural roadblocks would be compounded by "interaction with other changes" such as agriculture, human settlement or invasive species, he said. "There are different ways you can lose area," Pounds said. "One is to have the habitat directly destroyed. Climate change does the same thing." Alastair Fitter, a University of York ecologist who was not involved in the research, said climate change could hasten the effects of deforestation and the impact of invasive, nonnative species. "I think this is going to be third horseman in that particular apocalypse," said Fitter. Terry Root, an ecologist at Stanford University's *Center for Environmental Science and Policy* said, "I think the point is to get people talking about the fact that we're standing at the brink of a massive extinction, and we have to start thinking about what that means". I think it's a fantastic study," he said, "It's the synergistic effects of these things that is really quite scary."

Dr. Klaus Toepfer, the head of the *United Nations Environment Programme*, said: "If one million species become extinct... it is not just the plant and animal kingdoms and the beauty of the planet that will suffer. "Billions of people, especially in the developing world, will suffer too as they rely on Nature for such essential goods and services as food, shelter and medicines". I don't think anyone would argue that climate change is having an impact — the question is how soon and how much," said Jerry Michael Melillo, co-director of the *Ecosystems Center* at the Marine Biological Laboratory in Woods Hole, Mass.

Yet another study published in the December issue of the journal, *Climatic Change*, points out that human activities going back 10,000 years have altered the Earth's climate, and human activity may have actually prevented a possible Ice Age in the past. William Ruddiman, a professor emeritus at the University of Virginia, said that natural fluctuations in carbon dioxide and methane concentrations have led to natural climate changes throughout history. He said computer models show that without human activities a new Ice Age would have commenced about 4,000-5,000 years ago. But measurements of ancient air bubbles trapped in Antarctic ice offered evidence that humans have been changing the global climate since thousands of years before the industrial revolution.

Beginning 8,000 years ago, atmospheric levels of carbon dioxide began to rise as humans started clearing forests, planting crops and raising livestock, Ruddiman said. Atmospheric methane levels started increasing 3,000 years later, likely the product of cultivating rice fields in southeast Asia. The combined increases of the two greenhouse gases implicated in global warming, he said, were slow but steady and staved off what should have been a period of significant natural cooling. The changes also disrupted regular patterns that dominated the 400,000 years of atmospheric history that scientists have teased from samples of ancient ice. "You have 395,000 years of history, which sets some rules, and 5,000 years that break those rules," Ruddiman said. He said that activities such as agriculture caused carbon dioxide and methane gases to rise, preventing a cooling period. Previous studies have shown humans began changing the climate at the beginning of the industrial age, but Ruddiman's work demonstrates past changes in carbon dioxide and methane levels were not entirely natural. "It's a great new idea we need to talk about and evaluate," said Bette Otto-Bliesner, a climate expert at the *National Center for Atmospheric Research*.

Despite all of the evidence of global warming and man's impact on it, some remain unconvinced about the arguments and the needs for international accords such as those proposed by the United Nations Kyoto Protocol. For example, U.S. Senator James Inhofe, who chairs the Senate Committee on Environment and Public Works, says it (the Kyoto Protocol) is inconsistent with freedom, prosperity and environmental policy progress. "I'm becoming more and more convinced... that global warming is the greatest hoax ever perpetrated on the American people and the world," he told a conference briefing. The BBC's David Bamford in Washington says Mr. Inhofe's view fits neatly with the majority view in the U.S. Congress — that America should do nothing about the issue. Obliging industrial plants to reduce emissions would be a vote loser, because most Americans would assume it meant a reduction in production, job losses and a rise in household energy bills. The last attempt in October to introduce such a bill failed in the Senate, even though it was cosponsored across party lines by Democrat Joe Liebermann and Republican John McCain.

Sources: Alister Doyle, *Reuters*, 1/21/04 and 1/6/04; *Yahoo News*, 1/22/04; *NOAA Press Release*, 12/16/03; *New York Times*, 12/1703; Alex Kirby, *BBC News Online*, 12/16/03 and 1/7/04; Guy Gugliotta, *Washington Post*, 1/8/04; Robert Davis, *USA Today*, 1/7/04; Dennis O'Brien, *Baltimore Sun*, 1/8/04; Kenneth Chang, *New York Times*, 12/9/04; Andrew Freedman, Andrew Bridges, *AP/San Francisco Chronicle*, 12/10/04; *AP/Omaha World Herald*, 1/7/04; *BBC News Online*, 12/11/03; Seth Borenstein, *Philadelphia Inquirer*, 1/16/04; Andrew Freedman, *Greenwire* 12/12 and 22/03; and *Greenwire*, 1/16/04 and 1/22/04

Faith Based Parks

Several geological organizations have asked Grand Canyon National Park officials to remove a book from the park's bookstore that argues that the canyon was created during the Old Testament flood and is no more than a few thousand years old. Park officials have always told visitors that the Grand Canyon is 5-6 million years old and was created by the Colorado River, although no scientific consensus has ever been reached on its origin. The book called "Grand Canyon: A Different View," which went on sale during the summer, was written by Colorado River guide Tom Vail and also includes essays from various creationists and theologians.

"For years, as a Colorado River guide I told people how the Grand Canyon was formed over the evolutionary time scale of millions of years. Then I met the Lord," Vail wrote in the introduction to the book. "Now, I have a different view of the Canyon, which according to the biblical time scale, can't possibly be more than a few thousand years old."

Reaction to the book has been sharply divided. The *American Geological Institute* and seven geoscience organizations want the book pulled off of the Park's bookshelves. So far, park officials have only moved the book from the natural sciences section to the inspirational reading section. "I've had reactions from the staff all over the board on it," said park Deputy Supt. Kate Cannon. "There were certainly people on the interpretive staff that were upset by it. Respect of visitors' views is imperative, but we do urge our interpreters to give scientifi-

cally correct information." Grand Canyon's superintendent, Joe Alston, has sought guidance from National Park Serive (NPS) headquarters in Washington, but in the meantime, the book has sold out and is being reordered. NPS spokesman David Barna, based in Washington, said each park determines which products are sold in its bookstores and gift shops, and the creationist book at the Grand Canyon was unanimously approved by a new-product review panel of park and gift shop personnel.

The flap at the Grand Canyon highlights what officials say is a dilemma for the national park system: how to respect visitors' spiritual views that may contradict the agency's accepted scientific presentations and maintain the division of church and state. "We struggle. Creationism versus science is a big issue at some places," said Deanne Adams, the NPS chief of interpretation for the Pacific Region. The question, she said, comes up most often at Western parks where geology is often highlighted. She singled out John Day Fossil Beds Monument in Oregon as a place where scientifically determined dates have been challenged. "We like to acknowledge that there are different viewpoints, but we have to stick with the science. That's our training," Adams said. She said there is no federal guideline on how to answer religious inquiries. "Every fundamentalist or Christian group has a take on how they interpret the Bible. They are entitled to believe whatever they believe. It's not our job to change their minds."

In another instance last summer, NPS officials ordered reinstatement of three plaques bearing Bible verses that had been erected at Grand Canyon National Park in 1970 by a group called the *Evangelical Sisterhood of Mary*. Alston called for their removal last summer after a complaint was filed by the *American Civil Liberties Union*. But NPS Deputy Director Donald Murphy, who once ran the California State Parks Department, ordered the brass plaques returned and sent the group a letter apologizing for "any intrusion." The plaques are affixed to buildings at Hermits Rest, Lookout Studio and Desert View Tower, all popular tourist stops along the South Rim. They quote verses from the Book of Psalms, including "Sing to God, sing praises to His name, lift up a song to Him who rides upon the clouds. His name is the Lord, exult before Him!"

Barna said Murphy overruled the Grand Canyon superintendent because he and the agency's regional attorney were not sufficiently versed in constitutional law. "We contend that our superintendent knows a lot about wilderness protection but not enough about separation of church and state," Barna said. Critics say that by condoning religious material in the park, the federal government is endorsing a particular spiritual point of view.

Meanwhile, at the Lincoln Memorial in Washington, D.C., the NPS, under pressure from conservative groups, announced that it would alter an eight-minute video containing photos and footage of demonstrations and other events. Conservative groups have asked NPS to cut out footage of gay rights, pro-choice and anti-Vietnam War demonstrations because it implies that "Lincoln would have supported homosexual and abortion 'rights' as well as feminism." The Park Service has promised to develop a "more balanced" version that include rallies of the Christian group *Promise Keepers* and pro-Gulf War demonstrators, though these events did not take place at the Memorial.

The NPS is also engaged in an extended legal battle to continue displaying an eight-foot-tall cross, planted atop a 30-foot-high rock outcropping in the Mojave National Preserve in California. *Public Employees for Environmental Responsibility* (PEER) Board Member and former-Park Service manager Frank Buono filed suit to force removal of the cross. That suit is now pending before the U.S. Ninth Circuit Court of Appeals. "The Bush administration appears to be sponsoring a program of faith-based parks," said Jeff Ruch, Executive Director of PEER. "Any time a question arises, the professionals and lawyers are reversed and being told to respect the displays of religious symbols. We believe the actions by these officials violate their oath of office to defend the Constitution."

Ruch summarized the situation this way: "NPS employees from across the country are concerned that Bush administration political appointees are taking our national parks in a new, dangerous direction". He says that concerted attempts have been made to:

- Prevent Park Service employees from talking to the public about what the "best available science" shows and debunking creationist myths that lack any scientific foundation;
- Censor Park Service videos, brochures and other public educational material to insert a conservative partisan "spin" on history even to the point where the materials no longer reflect actual events; and
- Use tax dollars to erect and defend Christian symbols, from crosses to Bible verses, in national parks.

"A number of fundamentalist Christian and socially conservative groups are claiming credit for these actions", Ruch said, "and touting their new direct and personal access to Bush Administration officials."

Sources: *PEER News Release*, 12/22/03 and 1/27/04; Julie Cart, *Los Angeles Times*, 1/7/04; *Greenwire*, 1/9/04

Rivers Institute on the Ohio River

A small Indiana liberal arts college overlooking the Ohio River will use an $11.4 million grant from *Lilly Endowment* to become an epicenter for the study of rivers. Hanover College's *Rivers Institute* will examine how rivers influence people's quality of life, culture, ecosystems and economies, and will recommend actions to protect and better use them.

"We need an ethic — a land, water and air ethic — based on good science to develop sustainable strategies for the use of freshwater systems," said Daryl N. Karns, a biology professor involved in crafting the proposal. "The *Rivers Institute* will enable Hanover to build on its historic connections to the Ohio River in imaginative ways," said Sara B. Cobb, vice president for education for the endowment. The institute will serve as a worldwide resource by building partnerships with organizations, agencies and businesses. It will conduct research, offer forums, provide consulting services and develop curricula for schools.

"We think this niche is unique," Hanover President Russell Nichols said. Research could focus on such issues as how to balance economic development in riverfront towns with water-quality needs, said Rick Haskins, Hanover's vice president for college advancement. Funds will be spent over the next 51/2 years to pay six faculty members, including three from Hanover, as well as a visiting fellow and eight student fellows. Six institute staff members also will be hired, and $2 million will be spent on a new or renovated facility. Hanover officials expect the institute to become self-sufficient from gifts and research.

Source: Barb Berggoetz, *Indianapolis Star*, 1/15/04

Meetings of Interest

Mar. 3-5: 7th National Mitigation and Conservation Banking Conference, New Orleans, LA. See: www.mitigationbanking conference.com. Contact: Carline Bahler, cbahler@erols.com, (800) 726-4853

Mar. 16-18: AIBS 2004 Annual Meeting: Invasive Species: The Search for Solutions, Wash., D.C. See: www.aibs.org/annual-meeting-2004/. Contact: rogrady@aibs.org

Apr. 26-28: Forest Land - Fish Conference II, Edmonton, Alberta, Canada. See: www.tucanada.org/forestlandfish2/. Contact: 250/371-3955

May 2-6: AFS, 4th World Fisheries Congress - Reconciling Fisheries with Conservation: The Challenge of Managing Aquatic Ecosystems. Vancouver, BC. See www.worldfisheries2004org. Contact: fish2004@advance-group.com, (800) 555-1099

May 3-7: River Voices, River Choices. River Management Society's 7th biennial symposium, Lake Tahoe, CA. Contact: rms@river-management.org. See: www.river-management.org

May 5-7: First Annual Southeastern Ecology and Evolution Conference. Atlanta, GA. See: www.biology.gatech.edu/SEEC/SEEC. html. Contact: Alan Wilson, alan.wilson @biology.gatech.edu, (404) 894-8293

May 22-26: Missouri River Natural Resources Conference, Columbia, MO. See: www.infolink.cr.usgs.gov

Jun. 28-30: Riparian Ecosystems and Buffers: Multi-scale Structure, Function, and Management, Olympic Valley, CA. See: www.awra.org

Jul. 21-23: Climate Change and Aquatic Systems: Past, Present and Future. Plymouth, U.K. See: www.biology.plymouth.ac.uk/climate/climate.htm. Contact: Martin Attrill, matrill@plymouth.ac.uk

Aug 21-26: 134th Annual Meeting of the American Fisheries Society**.** Madison, WI. The Gathering: Leopold's Legacy for Fisheries. Contact: Betsy Fritz, bfritz@fisheries.org, (301) 897-8616

Sept. 12-17: 5th International Symposium, ECOHYDRAULICS, Madrid, Spain. The main focus will be restoration of aquatic habitats. Contact: Dr. Diego García de Jalón, ecohydraulics@montes. upm.es or Secretariat: ecohydraulics @tilesa.es. See: www.montes.upm.es/congresos/ecohydraulics, www.tilesa.es/ecohydraulics

Congressional Action Pertinent to the Mississippi River Basin

Endangered Species Act (ESA) of 1973

S. 369. Thomas (R/CA). Amends the ESA to improve the processes for listing, recovery planning, and delisting, and for other purposes.

S. 1178. Enzi (R/WY). Amends the ESA to require the Federal Government to assume all costs relating to implementation of and compliance with that Act.

H. R. 1194. Herger (R/CA). Amends the ESA to enable Federal agencies to rescue and relocate any endangered or threatened species that would be taken in the course of certain reconstruction, maintenance, or repair of man-made flood control levees.

H. R. 1235. Gallegley (R/CA) and Gibbons (R/NV). Provides for management of critical habitat of endangered and threatened species on military installations in a manner compatible with the demands of military readiness, and for other purposes.

S. 2009. Smith (R/OR) and **H. R. 1662.** Walden (R/OR) and 18 Co sponsors. Amends the ESA to require the Secretary of the Interior to give greater weight to scientific or commercial data that is empirical or has been field-tested or peer-reviewed, and for other purposes.

H. R. 1835. Gallegley (R/CA) and 3 Co sponsors. Amends the ESA to limit designation as critical habitat areas owned or controlled by the Department of Defense, and for other purposes.

H. R. 1965. Gibbons (R/NV). Limits the application of the ESA with respect to actions on military land or private land and to provide incentives for voluntary habitat maintenance, and for other purposes.

H. R. 2602. Otter (R/ID). Amends the ESA to make the authority of the Secretary to designate critical habitat discretionary instead of mandatory, and for other purposes.

H. R. 2933. Cardoza (D/CA) and 17 Co sponsors. Amends the ESA to reform the process for designating critical habitat under that Act.

Energy

H. R. 1013. Radanovich (R/CA), Hastings (R/WA), and Walden (R/OR). Amends the Federal Power Act to provide for alternative conditions and alternative fishways in hydroelectric dam licenses, and for other purposes.

Federal Water Pollution Control Act (FWPCA) Amendments:

S. 170. Clean Water Infrastructure Financing Act of 2003. Voinovich (R/OH) and **H.R. 20.** Kelly (R/NY) and Tauscher (D/CA). Amends the FWPCA to authorize appropriations for State water pollution control revolving funds, and for other purposes.

S. 473. Feingold (D/WI) and 3 Co sponsors and **H.R. 962.** Oberstar (D/MN) and 21 Co sponsors. Amends the FWPCA to clarify the jurisdiction over waters of the U.S.

H. R. 738. Pallone (D/NJ) and 16 Co sponsors. Amends the FWPCA to clarify that fill material cannot be comprised of waste.

H. R. 784. Camp (R/MI) and 17 Co sponsors. Amends the FWPCA to authorize appropriations for sewer overflow control grants

H. R. 1560. Duncan (R/TN) Amends the FWPCA to authorize appropriations for State water pollution control revolving funds, and for other purposes.

H. R. 1624. Pallone (NJ/D). Amends the FWPCA to improve enforcement and compliance programs.

Floodplain Management

H. R. 67. Flake (R/AZ) and Hayworth (R/AZ). Provides temporary legal exemptions for certain management activities of the Federal land management agencies undertaken in federally declared disaster areas.

H.R. 253. Two Floods and You Are Out of the Taxpayers' Pocket Act of 2003. Bereuter (R/NE) and Blumenauer (D/OR). Amends the National Flood Insurance Act of 1968 to reduce losses to properties for which repetitive flood insurance claim payments have been made.

Forestry

S. 32. Kyl (R/AZ) and 4 Co sponsors and **H.R. 460.** Hayworth (R/AZ) and 7 Co sponsors. Establishes Institutes for research on the prevention of, and restoration from, wildfires in forest and woodland ecosystems of the interior West.

S. 1208. Collins (R/ME) and Reed (D/RI). Amends the Cooperative Forestry Assistance Act of 1978 to provide assistance to States and nonprofit organizations to preserve suburban forest land and open space and contain suburban sprawl, and for other purposes.

S. 1453. Leahy (D/VT) and Boxer (D/CA) Expedites procedures for hazardous fuels reduction activities and restoration in wildland fire prone national forests and for other purposes.

H. R. 1042. Udall (D/CO) and Udall (D/NM). Authorizes collaborative forest restoration and wildland fire hazard mitigation projects on National Forest System lands and on other lands, to improve the implementation of the National Fire Plan, and for other purposes.

Global Warming

S. 17. Daschle (D/SD) and 15 Co sponsors. Initiates responsible federal actions that will reduce global warming and climate change risks to the economy, the environment, and the quality of life and for other purposes.

S. 139. Lieberman (D/CT) and McCain (R/AZ). Provides for scientific research to accelerate reduction of U.S. greenhouse gas (GHG) emissions by establishing a market-driven system of GHG tradeable allowances; limit U.S. GHG emissions; and reduce dependence on foreign oil, and ensure benefits to consumers from the trading in such allowances.

H. R. 1578. Udall (D/CO). Promotes and coordinates global change research, and for other purposes.

Invasive Species

S. 144. Craig (R/ID) and 9 Co sponsors and **H.R. 119.** Hefley (R/CO). Requires the Interior Secretary to establish a program to provide assistance through the States to eligible weed management entities to control or eradicate harmful, nonnative weeds on public and private land.

S. 525. Levin (D/MI) and 15 Co sponsors and **H. R. 1080.** Gilchrest (R/MD) and 67 Co sponsors. Amends the Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990 to reauthorize and improve it.

S. 536. DeWine (R/OH) and 5 Co sponsors and **H.R. 266.** Ehlers (R/MI) and Gilchrest (R/MD). Establishes the National Invasive Species Council, and for other purposes.

H.R. 273. Gilchrest (R/MD) and Tauzin (R/LA). Provides for the eradication and control of nutria in Maryland and Louisiana.

H. R. 989. Hoekstra (R/MI). Requires the issuance of regulations to assure, to the maximum extent practicable, that vessels entering the Great Lakes do not discharge ballast water that introduces or spreads nonindigenous aquatic species and treat such ballast water and its sediments through the most effective and efficient techniques available, and for other purposes.

H. R. 1081. Ehlers (R/MI) and 67 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.

H. R. 2310. Rahall (D/WV) and 17 Co sponsors. Protects, conserves, and restores native fish, wildlife, and their natural habitats through cooperative, incentive-based grants to control, mitigate, and eradicate harmful nonnative species, and for other purposes.

Mining

H. R. 504. Udall (D/CO). Provides for the reclamation of abandoned hardrock mines, and for other purposes.

Public Service

S. 89. Hollings (D/SC) and **H.R. 163**. Rangel (D/NY) and 5 Co sponsors. Provides for the common defense by requiring that all young persons in the U.S., including women, perform a period of military service or civilian service in furtherance of the national defense and homeland security, and for other purposes.

H. R. 2566. Kind (R/WI) and 3 Co sponsors. Reforms the Army Corps of Engineers.

Public Lands

S. 124. Roberts (R/KS). Amends the Food Security Act of 1985 to suspend the requirement that rental payments under the conservation reserve program be reduced by users, through the establishment of a National Forest Ecosystem Protection Program.

S. 1449. Crapo (R/ID) and Lincoln (D/AR) and **H. 1904.** Cochran (R/MS). Improves the capacity of the Agriculture and Interior secretaries to plan and conduct hazardous fuels reduction projects on National Forest System and Bureau of Land Management lands and for other purposes.

S. 1938. Corzine (D/NJ) and 3 Co sponsors. Amends the Forest and Rangeland Renewable Resources Planning Act of 1974 and related laws to strengthen the protection of native biodiversity and ban clearcutting on Federal land and for other purposes.

H. R. 380. Radanovich (R/CA). Provides full funding for the payment in lieu of taxes program for the next five fiscal years, to protect local jurisdictions against the loss of property tax revenues when private lands are acquired by a Federal land management agency, and for other purposes.

H. R. 652. Andrews (D/NJ). Assures that the American people have large areas of land in healthy natural condition throughout the country to maximize wildland recreational opportunities for people, maximize habitat protection for native wildlife and natural plant communities, and to contribute to the preservation of water for use by downstream metropolitan communities and other users, through the

establishment of a National Forest Ecosystem Protection Program.

H. R. 749. Udall (D/CO). Directs the Secretary of the Interior to establish the Cooperative Landscape Conservation Program.

H. R. 2169. Leach (R/IA) and 89 Co sponsors. Saves taxpayers money, reduces the deficit, cuts corporate welfare, protects communities from wildfires, encourages Federal land management agency reform and accountability, and protects and restores America's natural heritage by eliminating the fiscally wasteful and ecologically destructive commercial logging program on Federal public lands, restoring native biodiversity in our Federal public forests, and facilitating the economic recovery and diversification of communities affected by the Federal logging program.

H. R. 3324. Shays (R/CT) and 7 Cosponsors. Provides compensation to livestock operators who voluntarily relinquish a grazing permit or lease on Federal lands, and for other purposes.

Water Resources

S. 323. Landrieu (D/LA) and Breaux (D/LA). Establishes the Atchafalaya National Heritage Area, Louisiana.

S. 531. Dorgan (D/ND) and Johnson (D/SD). Directs the Interior Secretary to establish the Missouri River Monitoring and Research Program, to authorize the establishment of the Missouri River Basin Stakeholder Committee, and for other purposes.

S. 561. Crapo (R/ID) and 5 Co sponsors. Preserves the authority of States over water within their boundaries, and delegates to States the authority of Congress to regulate water, and for other purposes.

S. 993. Smith (R/OR). Amends the Small Reclamation Projects Act of 1956, and for other purposes.

H.R. 30. Bereuter (R/NE). Amends the Water Resources Development Act of 1992 to authorize the Secretary of the Army to pay the non-Federal share for managing recreation facilities and natural resources on water resource development projects if the non-Federal interest has agreed to reimburse the Secretary, and for other purposes.

H. R. 135. Linder (R/GA) and 3 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. 961. Kind (D/WI) and 5 Co sponsors. Promotes a Department of the Interior effort to provide a scientific basis for the management of sediment and nutrient loss in the Upper Mississippi River Basin, and for other purposes.

H. R. 1517. Graves (R/MO) and 6 Co sponsors. Amends the Land and Water Conservation Fund (LWCF) to limit the use of funds available from the LWCF Act of 1965 for maintenance.

H. R. 2557. Young (R/AK) and 4 Co sponsors. Authorizes the Secretary of the Army to construct various projects for improvements to rivers and harbors of the U.S., and for other purposes.

H. R. 2890. Saxton (R/NJ). Protects the public's ability to fish for sport, and for other purposes.

Wild and Scenic Rivers

H. R. 987. Herger (R/CA) and Doolittle (R/CA). Amends the Wild and Scenic Rivers Act to ensure congressional involvement in the process by which a river that is designated as a wild, scenic, or recreational river by an act of the legislature of the State or States through which the river flows may be included in the National Wild and Scenic Rivers System, and for other purposes.

Source: *U.S.. Congress On Line; http://www.access.gpo.gov/congress/cong009.html*

River Crossings

Mississippi Interstate Cooperative Resource Association
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