

River

Crossings

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Amphibians At Risk

The Global Amphibian Assessment (GAA) conducted by *NatureServe*, *Conservation International* and the *International Union for the Conservation of Nature*, represents the first ever comprehensive assessment of the conservation status of the world's 5,743 known species of amphibians (frogs, toads, salamanders and caecilians). The three year study employed the help of more than 520 scientists from over 60 countries. The study's results provide a baseline for global amphibian conservation, and will be used to design strategies to save the world's rapidly declining amphibian populations. Key GAA findings include the following:

- Nearly one-third (32%) of the world's amphibian species are threatened, representing 1,856 species. By comparison, just 12% of all bird species and 23% of all mammal species are threatened.
- As many as 168 amphibian species may already be extinct. At least 34 amphibian species are known to be extinct, while at least another 113 species have not been found in recent years and are possibly extinct.
- At least 43% of all species are declining in population, indicating that the number of threatened species can be expected to rise in the future. In contrast, fewer than one percent of species show population increases.

- The largest numbers of threatened species occur in Latin American countries such as Colombia (208), Mexico (191), and Ecuador (163). The highest levels of threat, however, are in the Caribbean, where more than 80% of amphibians are



threatened in the Dominican Republic, Cuba, and Jamaica, and a staggering 92% in Haiti.

Although habitat loss clearly poses the greatest threat to amphibians, a newly recognized fungal disease is seriously

affecting an increasing number of species. Perhaps most disturbing, many species are declining for unknown reasons, complicating efforts to design and implement effective conservation strategies.

An in-depth analysis of the GAA results for the New World (i.e. North, Central and South America and the Caribbean) can be found in the report entitled: *Disappearing Jewels: The Status of New World Amphibians*. Overall, 229 scientists contributed to the database that forms the basis of this report. Major Findings include the following:

- The New World is home to more than half of the world's 5,743 known species of amphibians. Its 3,046 species represent 53% of the world total. Brazil and Colombia have the greatest diversity of amphibians in the world, with 731 and 698 species respectively. The top five countries for amphibians (including

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Ecuador, Peru and Mexico) are all in the New World, and Venezuela and the United States are also in the top 10. At the low end of the diversity scale, a number of Caribbean island nations have just one native amphibian species each.

- Nearly two out of five New World amphibians (1,187 species, or 39%) are threatened with extinction, including 337 species that are classified as *Critically Endangered* — on the brink of extinction. Nine species have gone extinct in the past 100 years. Another 117 species are “Possibly Extinct,” meaning that scientists are unaware of any extant population, but have not performed the extensive searching required to place these species in the *Extinct* category. Many of these declines are recent. Since approximately 1980, four species have gone extinct, and 109 species have become possibly extinct. From a regional perspective, amphibians in the Caribbean are most threatened (84% of the region’s 171 species), followed by Mesoamerica (Mexico through Panama) with 52% of its 685 species, South America (31% of its 2,065 species), and North America (21% of its 262 species). These figures compare with the global average of 32.5%.

- With 39% of the species threatened, the risk facing New World amphibians is considerably higher than for either birds (10%) or mammals (16%) in the same region.

- While threatened amphibians occur nearly everywhere, they are concentrated in several places: Haiti; montane south-eastern Chiapas, Mexico through central Guatemala; montane Costa Rica and western Panama; the Andes of Colombia and Ecuador; and the central portion of the Atlantic Forest in eastern Brazil. Amphibians occurring at high elevations, having restricted distributions, and characterized by terrestrial life cycles (rather than those using a mix of aquatic and terrestrial habitats) are more likely to be threatened than are species with other characteristics.

- Two major and several minor threats face amphibians. Habitat loss causes a gradual contracting and fragmentation of populations and is by far the most prevalent threat, affecting 89% of all threatened species. Habitat loss is primarily caused by expanding agriculture, logging, and infrastructure development (for example, industrialization, road

building, and housing developments). A second factor, a recently discovered chytrid fungal disease, has caused or is suspected to have caused precipitous declines in many species, including nearly half (47%) of all *Critically Endangered* and one-quarter of all *Threatened* species. Other important threats include environmental contaminants (26% of species) and intrinsic factors such as restricted range size (23%). Climate change has already begun to affect some species; and a separate analysis predicts that it will become a major threat to amphibians during the 21st century. The Western Hemisphere’s existing system of public and private parks and reserves provides no protection for more than one-third of threatened amphibians (37%), emphasizing the incomplete nature of the protected area system. Even for species that are found in protected areas, management is often not effective at stemming habitat loss. Moreover, threats like climate change or disease transcend park and reserve boundaries.

Recommendations

- *Protected Areas:* Strengthen management and protection at existing reserves, and expand protected areas to cover the ranges of threatened species that are currently unprotected.
- *Public Policy:* Revise and keep updated existing national and subnational lists of threatened species based on current knowledge, and strengthen legislation protecting listed species.
- *Captive Breeding:* Implement captive breeding for species that face a high probability of extinction in the wild, especially those threatened by the chytrid disease.
- *Education:* Enhance outreach activities to educate the public, including school-children, about the plight of amphibians, especially those that are nearby.

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

- *Research:* Accelerate research on the biology of the chytrid disease with an aim toward being able to control it in the wild. Expand population monitoring and increase research on poorly known species and the effects of contaminants on amphibians.

This report leaves no doubt that amphibians are the most threatened animal group in the New World so far examined using IUCN Red List criteria. Further, it points out that extinctions are happening now, and that they will continue unless policy makers, conservationists, land managers, and the public take urgent, directed conservation action now to save these disappearing jewels.

Sources: <http://www.globalamphibians.org/>; and <http://www.natureserve.org/publications/disappearingjewels.jsp>

IUCN Red List

The IUCN - *The World Conservation Union*, through its *Species Survival Commission* (SSC) has for four decades been assessing the conservation status of species, subspecies, varieties and even selected subpopulations on a global scale in order to highlight taxa threatened with extinction, and therefore promote their conservation.

The SSC remains firmly committed to providing the world with the most objective, scientifically-based information on the current status of globally threatened biodiversity. The taxa assessed for the IUCN Red List are the bearers of genetic diversity and the building blocks of ecosystems, and information on their conservation status and distribution provides the foundation for making informed decisions about preserving biodiversity from local to global levels.

The IUCN Red List of Threatened Species provides taxonomic, conservation status, and distribution information on taxa that have been globally evaluated using the IUCN Red List *Categories and Criteria*. This system is designed to determine the relative risk of extinction, and the main purpose of the IUCN Red List is to catalogue and highlight those taxa that are facing a higher risk of global extinction (i.e. those listed as *Critically Endangered*, *Endangered* and *Vulnerable*). The IUCN Red List also includes information on taxa that are categorized as *Extinct* or

Extinct in the Wild; on taxa that cannot be evaluated because of insufficient information (i.e. *Data Deficient*); and on taxa that are either close to meeting the threatened thresholds or that would be threatened were it not for an ongoing taxon-specific conservation program (i.e. *Near Threatened*).

Taxa that have been evaluated to have a low risk of extinction are classified as *Least Concern*. These *Least Concern* assessments did not appear on IUCN Red Lists produced before 2003 (except for 225 cases in 1996) because the main focus has been on threatened species. However, for the sake of transparency and to place threatened assessments in context, all *Least Concern* assessments are now included.

The list of threatened taxa is maintained in a searchable database by the SSC Red List Program as part of the SSC's Species Information Service (SIS). A subset of the records (for all the categories described above) is provided through the *Search and Expert Search* functions on the home page. Taxa not included are species that went extinct before 1500 AD, *Least Concern* species that have not yet been data based, species that have not yet been assessed (i.e. *Not Evaluated*), and taxonomic names that are treated as synonyms.

Sources: <http://www.redlist.org/info/introduction.html>; and http://www.redlist.org/info/categories_criteria.html

Atrazine and Frog Defomities

Dr. Tyrone Hayes, an endocrinologist at the University of California, Berkeley, testified at an October meeting of Minnesota's Environment and Natural Resources Committee that low levels of atrazine "chemically castrate and feminize" male frogs, fish and other wildlife. About 76.4 million pounds of atrazine, a herbicide that inhibits photosynthesis in plants, is used in the U.S. each year on corn, sorghum, sugarcane, wheat, hay and a variety of trees and other grasses.

Hayes said further that his latest, unpublished research found that atrazine, when used in combination with other chemicals, may set the stage for the frog deformities that have been found in Minnesota and elsewhere. Deformities in frogs, including

missing or extra legs, were first discovered by school children in 1995. Studies conducted by the U.S. EPA in 2003 also found that atrazine exposure leads to sexual deformities in frogs. Hayes said that atrazine raises stress hormones and weakens immune systems, which make young frogs more vulnerable to parasites that disrupt normal limb development and cause deformities.

The European Union declined to re-register the herbicide in a move to phase it out. But while the U.S. EPA considered a similar ban last year they determined that the evidence did not support such a definitive conclusion. Hayes criticized the EPA for this, and Minnesota State Sen. John Marty (D/Roseville) said Hayes' testimony "suggested the health risks are very significant here," and that the state should follow the European Union's lead. However, a spokeswoman for *Syngenta Crop Protection* — the country's largest manufacturer of atrazine — said the herbicide is safe and that studies on their own "do not support the conclusions that Hayes is coming to in his own research, particularly at the very low levels of atrazine."

However, Hayes said that others have replicated his frog studies and he cited dozens of papers by other researchers that show sexual development problems in goldfish, smallmouth bass, salmon, alligators and other species exposed to atrazine. Frogs are especially sensitive, he said, and the feminization occurred at atrazine levels as low as 0.1 parts per billion, one-thirtieth of the limit that the EPA considers safe for drinking water. Hayes said studies that found atrazine had no effects on amphibians were funded by the pesticide industry. Studies that found problems were funded by independent sources such as the National Science Foundation, he added.

Sources: Dennis Lien, *St. Paul Pioneer Press*, 10/25/04; Tom Meersman, *Minneapolis Star Tribune*, 10/26/04; and *Greenwire*, 10/27/04

Male Bass in WV Producing Eggs

Male bass in the South Branch of West Virginia's Potomac River are producing eggs, and scientists believe this may be

caused by some sort of unseen pollution, but the exact culprit is still unknown. They speculate that the cause might be chicken estrogen left over in poultry manure, or perhaps human hormones dumped in the river with processed sewage. Chances are, they say, it is not something that federal and state inspectors regularly test for in local waters.

The discovery has made the South Branch the latest example of an emerging national and international problem: Hormones, drugs and other man-made pollutants appear to be interfering with the chemical signals that make fish grow and reproduce. Scientists say it's still too early to tell what these findings will mean for the bass population in the South Branch; they aren't sure whether the affected males are still able to reproduce. And no one is aware of any effects on human health in the Potomac watershed. But scientists believe that fish might be the first to absorb any dangerous chemicals that might later affect humans. "They're likely to be hit first," said Mike Focazio, a researcher with the U.S. Geological Survey (USGS). "Whatever's doing this to the fish may be the canary in the mineshaft," said Margaret Janes, a West Virginia activist with the *Appalachian Center for the Economy and the Environment*.

The situation in West Virginia was discovered by accident, when scientists from the state and the USGS were called in to investigate reports that fish in the South Branch were developing lesions and dying en masse. They dissected dozens of bass caught last summer, mainly smallmouth bass, and found no obvious cause for the lesions or deaths, but did discover that 42% of the male bass had developed eggs inside their sex organs. The study surprised scientists, but the South Branch has been cited for problems with bacteria from poultry manure. "We always have, and still do, look at this as one of our highest-quality fisheries," said Patrick Campbell of the state Department of Environmental Protection. "It's counter-intuitive to think we would have this type of problem out there." But the problem is there. Similar cases of such feminization have been documented in streams elsewhere in the U.S. and in Great Britain.

Sources: David A. Fahrenthold, *Washington Post*, 10/15/04; and *Greenwire*, 10/18/04

Fish May Transport Toxins

Migrating fish may play a role in transporting pollutants hundreds of miles, according to a study published in late September on *Environmental Science & Technology's* Web site. Salmon spend about three years out at sea before migrating up rivers and streams to spawn. Once they begin their migration, they stop eating and deplete their fat stores by almost 95%, for energy use.

Göran Ewald, professor of environmental science at the Technical University of Denmark and author of the new study found earlier that fat-soluble pollutants, such as PCBs and dibenzo-*p*-dioxins, become magnified in salmon during the time of migration. For example, PCB levels in the fat increase up to 9.7 times, depending on the migration run.

In their newest research, Ewald and his colleagues followed the salmon one step further along their migration route by tracking the fish 400 kilometers (km) upstream into a pristine Alaskan lake. Once the spawning lake was reached, the salmon spawned and died. Ewald's group then analyzed levels of chlorinated fatty acids in Arctic grayling, which live in the lakes where salmon spawn and die. These grayling had 5 times the levels of chlorinated fatty acids of similar graylings taken from a lake 2 km away where salmon are not found. Ewald is not certain whether the graylings are acquiring the chlorinated fatty acids by consuming the salmon roe or from feeding on the dead fish themselves.

"It has to be a direct transfer of fatty acids," he says. He adds that the levels of chlorine in the grayling were about 1 microgram per gram of fish, which is not a toxic level. However, the modified fatty acids could have other consequences. "We have research that now shows that the fish can't utilize these fatty acids because the chlorine blocks enzyme digestion," Ewald said.

While biotransport is probably not significant to the movement of large amounts of pollutants on a global scale, it may have important local effects on pollution levels. And biotransport may be more prevalent in the environment than suspected.

Ongoing research in Norway has found that seabird droppings can contaminate

lakes underneath a rookery with organochlorines, and an earlier paper (*Environmental Science Technology*, 1993, 27, 2198–2206) reported that eels transport large quantities of the pesticide *Mirex* out of the Great Lakes and up the Saint Lawrence River, which adjoins both Canada and the United States.

Sources: Paul D. Thacker, *Environmental Science & Technology* online, 9/29/04 and *Greenwire*, 10/1/04

Caviar Imports Continue

The beluga sturgeon's threatened status under the Endangered Species Act does not merit a reduction or ban on caviar imports according to the U.S. Fish and Wildlife Service (FWS). But the decision is temporary and officials said a final rule would be made in January. FWS officials said the decision was meant to "allow trade in products derived from threatened beluga sturgeon as long as that trade is consistent with CITES (i.e., the *U.N. Convention on International Trade in Endangered Species of Wild Fauna and Flora*) regulations." The fish has been on the threatened list for six months.

The U.S. imports about 60% of the world's beluga caviar, and the biggest exporters this year will be Romania with 7,500 pounds and Kazakhstan with 5,190 pounds. CITES suspended beluga exports in late 2001, but resumed nine months later over the protests of environmentalists. Annual quotas remain in place on caviar exports, a move that opponents say has done little to boost sturgeon populations. "Basically what they're (i.e. FWS) doing is deferring to inadequate international controls that have failed to halt the decline of beluga sturgeon," said Lisa Speer, a policy analyst with the *Natural Resources Defense Council* (NRDC). "It's another nail in the coffin of this remarkable fish," she said.

FWS action was in response to legal action taken by a U.S.-based environmental coalition, *Caviar Emptor*, that had petitioned FWS in December 2000 to declare beluga sturgeon an endangered species. The coalition has sought a long-term ban on the international trade of beluga caviar to protect it from extinction. NRDC sued the FWS in 2002 to force the agency to respond to the petition.

Source: John Heilprin, *AP/San Francisco Chronicle*, 10/21/04 and *Greenwire*, 10/22/04

Asian Carp Barrier Funded

The U.S. EPA in mid October announced new legislation funding the construction of a permanent electric barrier to protect the Great Lakes from migrating Asian carp, an invasive species that poses a significant threat to the world's largest freshwater ecosystem. Sens. Mike DeWine (R/OH), Jim Jeffords (I/VT) and others agreed to increase federal funding to \$6.8 million for the Army Corps of Engineers project. Illinois and other Great Lakes states will provide the remaining \$2.3 million to complete the barrier in the Chicago Sanitary and Ship Canal by February 2005.

The canal, completed in the early 1900s to direct Chicago's sewage away from Lake Michigan (see map below) and into the Mississippi River Basin via the Illinois River, provides access for the invasive carp and other species, which can travel up the Mississippi Basin's Illinois and Des Plains rivers to Lake Michigan. The pulsing electric field generated by the new barrier is designed to impede unwanted species from migrating further upstream.

Asian carp pose a "significant threat to the Great Lakes because they are large, extremely prolific and consume vast amounts of food," according to a U.S. EPA statement. The fish are well-suited to the climate of the Great Lakes region, which is similar to their native Eastern Hemisphere habitats. If the fish take hold in Lake Michigan, they would compete for food with other forage fish, and potentially

displace native sport and commercial fish, experts say.

"Asian carp threaten both the ecology and the economy of the Great Lakes system," EPA Administrator Mike Leavitt said, noting that DeWine's proposal received broad support from the Great Lakes congressional delegation as well as from state and local leaders. "Members of Congress have joined us in recognizing the grave threat posed by invasive species such as the Asian carp," added Ohio Gov. Bob Taft (R), who is also chairman of the *Council of Great Lakes Governors*. Officials do not expect the barrier to have any effect on commercial or recreational vessels that use the canal.

"This is a disaster in the making if they're allowed into the system," said Marc Gaden, spokesman for the Great Lakes Fishery Commission. The western end of Lake Erie is the shallowest, warmest, most-prolific area of the Great Lakes for spawning. "If these carp were allowed into the lakes, even over in Chicago, it would be only matter of time before they would show up in Lake Erie," Gaden said.

Mr. DeWine called the upcoming barrier an "innovative solution to the ongoing species problem". U.S. Senator George Voinovich (R/OH) said it's important to be "getting a jump on the menace." "Because the Asian carp can undermine years of work that have gone into protecting and restoring the fisheries in the Lakes, it is crucial that this barrier is constructed as quickly as possible," Sen. Carl Levin (D/MI) said. Sen. Debbie Stabenow (D/MI) said there are "valid fears that it could become the dominant species in the lakes and dramatically alter the ecosystem."

other groups that applauded the decision.

The existing temporary electrical barrier, nearing the end of its expected service life, has been in place in the Chicago Sanitary and Ship since 1996. But officials have enjoyed only mixed results with that barrier, since one tagged common carp is known to have been able to successfully traverse its electrical field. Concern over the spread of Asian carp increased in 2002 when a live bighead carp was collected near the confluence of the Des Plaines and Kankakee rivers 25 miles downstream of the existing barrier (see map below left). These concerns were magnified in mid-November this year when a dead Asian carp was observed floating in the canal within 2 miles downstream of the barrier. Following that sighting, sampling in the canal conducted by state and federal officials failed to locate any additional Asian carp. But a rapid response plan is in place which includes measures to poison the entire canal, if necessary to stop the carp migration from reaching the lake prior to construction of the new permanent barrier. That new barrier will be located a short distance downstream from the existing temporary barrier.

Asian carp which can grow to 100 pounds in weight, have also been spotted in the Champlain Canal, which feeds into Vermont's Lake Champlain. Federal funding for the Great Lakes barrier project was included in the Senate's fiscal year 2005 District of Columbia spending bill, crafted partly by DeWine, chairman of the D.C. appropriations subcommittee. But Jeffords, the ranking member of the Senate Environment and Public Works Committee, initially objected to that funding unless funding was provided for a similar barrier to protect Vermont's Lake Champlain. Jeffords dropped his opposition when DeWine pledged to seek money next year for a similar Lake Champlain barrier.

Source: Tom Henry, *Cleveland Blade*, 10/8/04 and Marty Coyne, *Greenwire*, 10/14/04

Northern Snakehead Found in Lake Michigan

A northern snakehead, the so-called invasive "frankenfish" that has become established in the Potomac River, and that threatens the region's aquatic ecosystem, was recently collected in a Chicago harbor of Lake Michigan. Subsequent test netting



Map of the Cal Sag and Chicago Sanitary and Ship Canal showing the distribution of Asian carp and the location of the aquatic nuisance species barrier.

Emily Green, the *Sierra Club's Great Lakes Programs* director said, "We feel strongly that the barrier is essential to protect the Great Lakes." "It's an example of bipartisan leadership and support [on a critical project]. We need to see more of that in the Great Lakes." The *National Wildlife Federation's* Great Lakes office in Ann Arbor was among

found no indication of other snakeheads in the harbor, but scientists remain concerned. The snakehead can survive several days out of water if kept wet, and can be impossible to eradicate.

"I'm hoping — I've got my fingers crossed — that this is the only northern snakehead in Lake Michigan," said Walter Courtenay Jr., a research fishery biologist with the U.S. Geological Survey in Gainesville, FL and an expert on northern snakeheads. Courtenay said a fish that Matthew Philbin of Tinley Park, IL, said he netted in Burnham Harbor is definitely a northern snakehead. Philbin took several pictures of the fish and posted the images on a local fishing Web site to find out what it was. Those images eventually reached Courtenay.

Philbin said he netted the snakehead while fishing for salmon at Burnham Harbor near downtown Chicago. He said he was on a wall that surrounds the harbor when he saw the fish. "I was 7 or 8 feet above the water when this fish swam up toward the wall where I was fishing," Philbin said. "I honestly thought it was a northern pike....I was curious to see it, so I netted it....But once I got it on shore, that's clearly not what it was." Philbin said he thought immediately that the fish looked "really bizarre" but added he'd never heard of a northern snakehead. Courtenay said the 18 inch long fish was probably about 3 years old.

While it's possible that this is the only snakehead in the harbor, Courtenay conceded that this may not be the case. "Based on past history, the probability of finding another is pretty high," Courtenay said. "But I hope I am wrong." State and Federal biologists hope that Philbin's snakehead was just an aquarium pet released into the wild by an owner who grew tired of feeding it. They don't want to think otherwise, because if a reproducing population of snakeheads has established itself in Lake Michigan, the ecological toll could be huge and never-ending. There is no way to eradicate the fish once a population gets established in a body of water the size of Lake Michigan.

The federal government listed snakehead as an "injurious species" in 2002, and the fish cannot be imported or transported across state lines. The State of Illinois also outlawed possession of live snakeheads, but state biologists fear that plenty of fish purchased before implementation of the 2002 rule are still swimming in private aquariums. The fish, which Wisconsin Department of Natural Resources literature describes as a species possessing a "delicate flesh," is also a popular

food in some Asian cultures. Whether the Chicago snakehead was an erstwhile pet or a food fish that somehow escaped the fryer, Illinois officials said they believe it had a helping human hand. "It didn't swim here from China," said Steve Shults, invasive species specialist with the Illinois Department of Natural Resources.

Meanwhile in the Potomac River, between Maryland and Virginia, near the Nation's capital, nineteen northern snakeheads were caught this summer in a 13-mile stretch where the river widens before reaching Chesapeake Bay. The final and smallest catch, a three-inch fingerling (see photo below), was particularly disheartening. The small fish indicates that the snakeheads are reproducing and establishing populations in the area.



Baby snakehead captured from a tributary of the Potomac River (Virginia Department of Game and Inland Fisheries)

"Obviously, you can't poison the Potomac and you can't drain it," said Courtenay, "and it is too soon to gauge the impact". "What they are going to go for (eat) will be fish that don't try to get away from them and some of the slower-moving species," he said, and primarily the young, "probably shad or perch or bass." He said, "There will likely be changes in populations of some native fishes," but those changes may be over decades. "The fact remains," Mr. Courtenay continued, "this nation does not need predators of foreign origin introduced to any of our waters, no matter the reason or by some accident. Our native fishes are too stressed already due to human activities to face additional threats."

Gary Martel, director of fisheries for Virginia, said that since the snakeheads were collected over a 13 mile reach of the Potomac River, the possibility of catching all the fish and removing them is not practical. But Steven Early, a biologist with the Maryland Department of Natural Resources, is not ready to acknowledge defeat. "I know we've got a juvenile out there, and that probably means we've got more than one juvenile," Mr. Early said. "It doesn't mean that they're

established. Even if they were, that would be a very low level." He added: "I am concerned that....this fish is going to compete directly with largemouth bass — prey on them, compete for food and occupy the same habitat — and....my largemouth bass recreational fishery is very precious." Maybe those who love the fishery can be recruited to try to protect it. "Anglers and fishermen," Mr. Early said, "if well directed and efficient, can fish out a fish; so I think there are a couple of cards yet to be played."

The Potomac "...is one of the top five bass fisheries in the country. It is not just another fishing hole," said Steve Chaconas, 48, of Stratford Landing, who guides Potomac River bass fishing trips. "When you have an invasive species, it really throws the whole food chain out of balance." "If you're a fisherman, I think eventually you will notice the difference," Chaconas said. "This will disturb the food chain. This will cause problems."

Unfortunately, by the time the snakehead was banned under federal law, Courtenay said, the current populations had probably already gained a toehold in the Potomac. The first local snakeheads could have been discarded or intentionally released — perhaps as part of a Buddhist ceremony called prayer animal release, Courtenay said. The same may be true in other parts of the country

Sources: Dennis Lien, *St. Paul Pioneer Press*, 10/14/04; Dan Egan, *Milwaukee Journal Sentinel*, 10/20/04; Michael Hawthorne, *Chicago Tribune*, 10/19/04 and 10/20/04; AP/*Detroit Free Press*, 10/19/04; Felicity Barringer, *New York Times*, 11/3/04; David A. Fahrenthold and Joshua Partlow, *Washington Post*, 10/5/04; and *Greenwire*, 10/5/04 and 10/20/04

Habitattitude™

Habitattitude™ is a promotional campaign recently adopted by the pet industry to promote consumer awareness and responsible behaviors, especially with regard to disposal of unwanted organisms such as the snakehead discussed in the previous article. Ultimately, the *Habitattitude™* campaign seeks to eliminate the transfer and survival of any species outside of enclosed, artificial systems, which otherwise have the potential to cause the loss or decline of native plants and animals.

Representing one of our greatest natural resource challenges, stopping the spread of these species appears simplistic, but global economic linkages complicate the issue. If escaped or released species become established in the wild, they can wreak environmental havoc, degrade aquatic resources and make waters unusable for recreation. This issue is relevant to everyone, *Habitattitude™* says, but especially to those who enjoy aquaria, backyard ponds and water gardens. Increased public scrutiny requires that hobbyists show how they value and protect the environment.

The *Habitattitude™* web site informs hobbyists that if an undesirable aquatic plant or fish species has been acquired for the aquarium or water garden, it is important that these plants or animals not be released into the environment. While most of these organisms will die, some may be able to survive in the wild. And those that do, have the potential to create negative impacts on our natural environment and our wallets and create misperceptions about our hobbies.

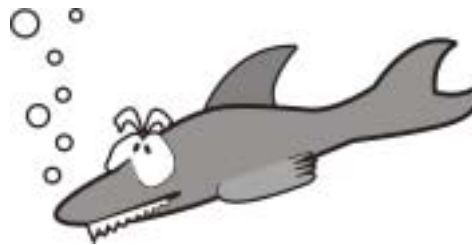
Habitattitude™ recommends that hobbyists take the following actions:

- Educate yourself about your hobby's potential environmental consequences;
- Adopt the following *Alternatives to Release* as responsible consumer behaviors:
 - Contact retailers for proper handling advice or for possible returns;
 - Give/trade with another aquarist, pond owner, or water gardener;
 - Donate to a local aquarium society, school, or aquatic business;
 - Seal aquatic plants in plastic bags and dispose in trash; and
 - Contact veterinarians or pet retailers for guidance about humane disposal of animals
- Model and promote these behaviors within your peer groups as ways for aquarium hobbyists and water gardeners to show our environmental values; and
- Become involved with policy solutions.

Hobbyists are also encouraged to become more informed about invasive species issues. As hobbyists who appreciate the challenge of managing artificial micro-environments, *Habitattitude™* says, it is important for us to understand the larger, potential consequences of our hobbies and how we can minimize them. The *Habitattitude™* Web site is designed to help teach hobbyists about these poten-

tial impacts, particularly the risks associated with released or escaped aquatic plants and animals. The site provides:

- The latest news about the growing invasive species problem;
- Alternatives to releasing unwanted aquatic plants and animals;
- Impacts caused by these species;
- Facts about the more common escapees or unintentionally released species;
- Resources and ideas for you or your club to get involved with prevention efforts; and
- Support materials to help you understand and get involved with modeling and promoting responsible behaviors.



Habitattitude™ also points out to hobbyists that unwanted aquatic plants and fish can:

- Reduce natural biodiversity and native species;
- Degrade ecosystem functions;
- Damage commercial and recreational equipment;
- Make lakes/ivers unusable for recreational and commercial activities;
- Dramatically increase the operating costs of drinking water plants, power plants, dam maintenance, and industrial processes;
- Affect human health;
- Reduce property values; and
- Affect local economies of water-dependent communities

Habitattitude™ is a proactive, forward looking campaign that the pet industry deserves huge credit for, and MICRA adds our support to this important initiative!

Source: <http://www.habitattitude.net/>

Gulf Dead Zone Expanding, Hurricanes Provided Relief

An exceptionally turbulent hurricane season may have helped break up the Gulf of Mexico's "dead zone" early this year. The oxygen-starved dead zone is largely uninhabitable for fish and other aquatic species due to a condition called hypoxia.

The "dead zone" forms annually off the mouth of the Mississippi River and covered some 13,640 square miles in 2002. Oceanographers from Texas A&M University and Louisiana State University discovered that the zone was breaking up when they sailed to the dead zone for a weeklong research cruise in late August. "When we got out there, we saw it was already breaking up," DiMarco said, "In some regions, it looked like it had broken up completely." Marine life typically cannot thrive in the area until late September, when heavy winds mix up the water and restore dissolved oxygen concentrations to normal levels. The recent hurricanes and volatile coastal currents are among the researchers' theories to explain why the dead zone began to disperse more than a month ahead of schedule this year.

The current federal strategy for reducing the dead zone — which grows when excess nutrients cause algal blooms that deplete oxygen content — calls for a 30% reduction in nitrogen reaching Gulf waters through runoff from farms along the Mississippi River and other sources. But a new U.S. EPA report suggests preventing the condition also requires reductions in phosphorous, another nutrient.

Researchers at a conference in August reiterated that unless something is done about the "dead zone," fisheries production in the Gulf will be at risk. In order to protect fisheries, there needs to be a 25% reduction in the amount of fertilizer used in the Mississippi River Basin, said Andrew Solow at *Woods Hole Oceanographic Institution*.

While the dead zone continues to get bigger each year, wetlands that assist in trapping sediment are disappearing. "We're losing 200 million tons of sediment a year into the gulf," said Len Bahr, director of the Louisiana Governor's Applied Coastal Science Program. "We see an imminent collapse (of gulf fisheries) if the coastal marshes keep pulling away".

Meanwhile, the National Oceanic and Atmospheric Administration announced a \$1.2 million grant to Texas State University-San Marcos to develop new methods of monitoring hypoxia.

Sources: *USA Today*, 10/4/04; *Greenwire*, 10/8/04

Zebra Mussels Could be Effecting Lake Erie Dead Zone

A recent expansion of Lake Erie's "dead zone" to nearly one third of the lake has scientists at the U.S. EPA and elsewhere concerned that a complex interaction between the lake's depleted oxygen levels and one of its most persistent invasive species, the zebra mussel, may be at the heart of the problem. Once believed to be linked only to runoff of nitrogen and phosphorus, aquatic "dead zones", such as the one now affecting Lake Erie, are rendered uninhabitable by aquatic life because they are so depleted of dissolved oxygen.

While regulators have focused most of their actions to combat "dead zones" by reducing nitrogen and phosphorus from sewage treatment plants, farms, golf courses and other developments, little attention has been given to the relationship between invasive mussels, which are filter-feeders, and the broader problems associated with dead zones.



The Dead Zone

David Culver, a biologist at Ohio State University, is studying exactly how zebra mussels are changing the chemistry of Lake Erie water and enlarging the dead zone. Culver notes that as heavy "filter feeders," zebra mussels eat algae and other organisms from the water column and excrete phosphorus and nitrogen back into the lake, where it falls to the lake bottom and interacts with bottom-dwelling organisms, often the first links in the aquatic food chain. "It seems the mussels are cycling more phosphorus to the bottom of the lake than might otherwise be there," Culver said.

Culver also wants to know more about the link between zebra mussel nitrogen releases and blue-green algal blooms typically found on the water's surface in areas inhabited by the invasive mussels.

These blooms, while oxygen-depleters themselves, also grow in such thick patches that they block sunlight from penetrating the lake's top layers, further inhibiting oxygen formation.

EPA has budgeted \$2-3 million over the next several years to advance research into the relationship between invasive species and dead zones, and most of that money will be spent in the Great Lakes. Paul Bertram, a scientist in EPA's Great Lakes National Program Office in Chicago, said the research may indeed suggest greater efforts in combating zebra mussels. But doing so will be a challenge. In some parts of Lake Erie, zebra mussel densities are as high as 50,000 per square meter of substrate, and the densities are twice that high in parts of Lake Huron, according to EPA research done in the late 1990s.

As for the Lake Erie dead zone, Bertram cautioned against shifting too much focus from the principal nutrient sources — farms and sewage treatment plants — toward invasive species control. He noted that such pollution sources remain the largest contributors to nitrogen and phosphorus in the Great Lakes Basin.

Source: Marty Coyne, *Greenwire*, 11/15/04

LMR Wetlands Restoration Projects Approved

Construction could begin as early as January on the first of five major lower Mississippi River wetlands restoration projects approved in October by the federal-state Breaux Act Task Force. Two of the projects are aimed at strengthening "landbridges," mostly solid areas of wetlands and firm land south of the levee systems that protect the West Bank New Orleans area.

The task force approved \$59.7 million in federal and state construction money for the projects, using up almost all the Breaux Act money available this year. Another seven projects costing \$95 million went unapproved because federal money is not yet available. The Breaux Act provides \$50-60 million a year for restoration projects in Louisiana and pays 85% of each project, with the state paying the remaining 15%. The Breaux Act will have produced about \$1.1 billion in money through 2009, the end of its congressional

authorization, while projects already approved by the task force will require an additional \$500 million to complete.

The federal-state task force reviewing the LMR projects includes representatives of the departments of Commerce, Interior, Agriculture and Army and the U.S. Environmental Protection Agency. Louisiana has a nonvoting representative on the panel, but wields veto power over each project by deciding whether to match federal dollars for the project's cost.

The five projects approved in October include the following:

- A major section of the Barataria Basin Landbridge project, designed to reduce erosion along 2.6 miles of the west bank of Bayou Perot and north shore of Little Lake, both in Lafourche Parish. A wall of concrete panels and pilings will be built along the bank, with openings to let fish pass into the wetlands it is designed to protect. The project will cost \$10 million, with \$7.4 million approved in October with the rest of the funding transferred from unused money from earlier parts of the project. Construction would begin in June.
- A second landbridge project along Lake Mechant in Terrebonne Parish to create 500 acres of marsh in eight areas, using material dredged from the lake's northern end. It will also plug seven oilfield canals to help block saltwater from the Gulf of Mexico that harms inland freshwater marshes. The project will cost \$27.4 million, and construction is scheduled to begin in February, if agreements are reached in time with oyster leaseholders in the area.
- The armoring of the southern edge of Racoon Island with additional breakwaters and construction of a rock jetty from the island's eastern point. Officials hope the hard structures will reduce the erosion of the sand spit, which was hit hard by Hurricanes Andrew in 1992 and Lili in 2002. More than 12,000 brown pelicans, listed as a threatened species, were hatched on the island this year. Construction would begin in June.
- Construction of a series of culverts and flapgates to allow fresh water to flow south of Louisiana 82 to freshen marshes along the coast in Cameron and Vermilion

parishes. The highway and other human development cut off freshwater flow along the coast, and saltwater intrusion has been slowly killing marshes there. Terraces of wetland plants also will be built in areas that already have become open water. The project, scheduled to begin in June, will cost \$4.3 million.

- Protecting the southern shoreline of White Lake in Vermilion Parish, including the Bear Lake inlet, with a rock breakwater that includes gaps to allow fish to move into wetlands behind it, and the creation of some marsh area behind the new breakwater. Included in this project is a demonstration of techniques that might help keep rock breakwaters from sinking quickly in weak marsh soils, by using sand and geotextile fabrics as a foundation. The project will cost \$14.1 million, and construction will begin in January.

Source: Mark Schleifstein, *New Orleans Times Picayune*, 10/15/04

Cahaba River (AL) Dam Removal

One of the purest and most unaltered rivers in Alabama is regaining populations of fish, snails and other wildlife following removal of a dam or concrete slab that for decades blocked the river. The 194-mile Cahaba River often is called the state's longest undammed river because it flows 154 miles south of the dam at U.S. 280 without major impediment. But for decades there was one forgotten obstruction along that route called the "Marvel Slab". Although not exactly a dam, the huge concrete block plugged the river, with water pouring through 3-foot culverts, and fish couldn't swim upstream to spawn, Cahaba lilies were flooded and the movement of aquatic life through the area was restricted.

No one knows when the Marvel Slab "bridge" was built in the Cahaba, partly because it was planned quietly and without a permit. Adding to the mystery, the land on both sides was owned by a coal company at the time and was not open to public access. Sometime, probably between 1960 and 1965, the company decided it could save 20 miles through mountainous dirt roads if its trucks could cross the Cahaba straight through the shallows near the Bibb County community of Marvel.

"They took a place where a shoal was historically used as a river crossing and put this concrete crossing on top of it," said Randy Haddock, field director for the *Cahaba River Society*. The concrete slab was built with 46 culverts. If enough water pooled behind it, some could slowly cascade downstream. But nothing could travel upstream. "There's no way for fish to go up there," said Paul Freeman, freshwater ecologist for *The Nature Conservancy of Alabama*. "They can't vertically jump upstream." Freeman said he's watched redhorses, bottom-feeding fish known for their stamina and determination, bang their heads against the barrier in futile efforts to get to their ancestral breeding grounds. Occasionally, as after Hurricane Ivan, the area would flood and fish could swim freely. But that wasn't often and rarely came at the right time, Freeman said. "We don't have salmon in our stream that can jump over big barriers," he said.

About 10 years ago, Haddock began talking about removing the dam. But even though the river bottom belongs to the state of Alabama, which was willing to help reclaim the shoals, landowners on both sides of the river would have to cooperate for heavy equipment to be brought in to smash the dam and haul away the pieces. A company that owned land on one side did not want to be involved. Then, three years ago, a unit of the *Presbyterian Church USA* bought that property. Church officials were glad to help with the river's restoration, even allowing the rubble to be buried on its land. "It's what I think God wants us to be doing, which is being good stewards," said the Rev. Robert Hay, associate executive for nurture at the *Presbytery of Sheppards and Lapsley*.

Still, it took three years to pull together the pieces: *The Nature Conservancy* coordinated efforts to get federal money from the U.S. Army, Corps of Engineers and grants from the *World Wildlife Fund*. It was one of the most ambitious river restoration projects in the Southeast, Freeman said, and nearly every aquatic, wildlife and river group within driving distance got involved. By removal time this fall, scientists from Mississippi, Tennessee and Georgia had joined federal, state and other scientists in Alabama.

Local environmental groups, the *Tennessee Aquarium* and Auburn University sent staff to count and identify

species, while experts from the Alabama Department of Conservation and Natural Resources, *The Nature Conservancy* and the U.S. Fish and Wildlife Service snorkeled to move away from the wrecking crew more than 10,000 snails and mussels, including five endangered species found within 10 feet of the bridge.

The Cahaba is one of the most diverse rivers on the continent, with hundreds of species of fish, mussels, snails and insects. *The Nature Conservancy's* survey of rivers found it to be one of eight hotspots of diversity in the United States. But it is also one of the most imperiled. The U.S. Fish and Wildlife lists 64 rare or endangered species on the Cahaba, 13 of them found nowhere else.

Dams are among the most insidious threats to a river, particularly a river adapted for shallow, fast-running water. They not only block spawning fish, but also keep fish from carrying mussel eggs upstream. Without a fish host, mussels in their parasitic egg form cannot move upstream in a river system. Possibly most important to the river itself, the Marvel Slab flooded three of the shallow-water shoals of the sort that once made Alabama famous for its mussels and snails.

The Cahaba lilies disappeared from the area, along with thousands of snails. Upstream, mussels grew fat and old with no young taking their place. Downstream snails and mussels disappeared, possibly drowned, maybe eaten by the fish trapped by the concrete wall. "It's kind of a wasteland of snails below the slab and a paradise for the snails above the slab," Haddock said. Scientists hope lilies will soon repopulate the shoals in the Marvel-area stretch of the Cahaba. They say they are confident that the large rocks soon will be covered by hundreds of snails. And they are satisfied that at a time when habitat loss is said to be the No. 1 environmental problem, one small piece of one special river is back!

Source: Katherine Bouma, *The Birmingham News*, 11/15/04

Concerns About Freshwater Eels

Maine's Sebasticook River once ran so thick with eels that Native Americans could catch thousands just by blocking the river with stones and brush. Eels were also a staple for New England's early

colonists, a high-protein meat that could be eaten every meal of the day, boiled, fried, stewed, or jellied. But over the last several decades the region's eels have been quietly disappearing, a trend largely ignored by environmentalists bent on saving better-known species.

"Eels are the Rodney Dangerfields of our rivers; they don't get any respect," said Naomi Schalit, executive director of *Maine Rivers*, an advocacy group. "If this was happening to striped bass, you would have heard about it." Now, officials from Maine to Florida are slowly starting a push to protect the slimy, bottom-dwelling American eel. The *Atlantic States Marine Fisheries Commission* has asked federal wildlife agencies to evaluate the entire East Coast eel population to see if the fish should be listed under the federal Endangered Species Act.

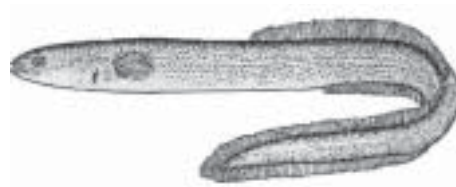
The eel, also native to many rivers of the Mississippi River Basin, is one of many long-neglected animals that have begun to draw attention, as the idea grows that every species in an ecosystem plays an integral role in its health. But gaping holes in historical population data are making it hard for scientists to mount a case that the eel is endangered. No broad studies have been done on U.S. eel populations.

In Europe and parts of Canada, studies have shown some eel populations dropping by 99% over the past 20 years. In Japan, the number of eels is down an estimated 80% since the 1970s. In Lake Ontario, the number of juvenile eels migrating to the lake fell from 27,000 eels per day in 1982 to 274 eels per day in 2004. Based on that evidence and a bottoming-out of the U.S. commercial eel catch in recent years, fishery specialists strongly suspect that the same might be true elsewhere.

Fishing, the culprit in many ocean species' decline, does not appear to be the main cause of the eels' disappearance. So scientists are looking elsewhere: at pollution, changing ocean currents, and, most important, dams. As with other fish species, a dam can disrupt the eel's life cycle. Every freshwater eel in North America and Europe was born in the waters of the Sargasso Sea, a vast mat of seaweed floating between Bermuda and the Azores. Immature eels are carried by currents more than a thousand miles to either Europe or North America, where

they find river mouths and swim hundreds of miles upstream. They live inland, possibly as long as 40 to 50 years, but to breed they must head back downstream. Every autumn an unknown number of eels from North America swim down the rivers and back to the Sargasso Sea, where they spawn and then die.

But dams can interrupt that process in both directions, scientists say. As eels struggle upstream in North American rivers, dams act as walls to all but the hardiest. Although some dams have ladders to help fish such as salmon and shad swim past, the ladders are built to attract surface fish, not the bottom-dwelling eels. Slowly, some dam owners are beginning to install special eel ladders, often no more than an inexpensive ramp that allows eels to wriggle along a wet surface over the dam.



"Freshwater Eel"

But it is when the eels swim back downstream to spawn that hydroelectric dams pose a larger threat. A dam's spinning turbines, located near the bottoms of rivers, can draw in eels during their nocturnal migration and chop up the 2-to-4-foot-long fish before they can reach the sea. In a Canadian government study, two hydroelectric dams on the St. Lawrence River were found to kill some 40% of adult eels trying to swim downstream, possibly more than 200,000 eels a year.

In Maine and Massachusetts, eel turbine deaths are just beginning to be recognized, in large part because of the efforts of Douglas Watts. A recreational fisherman from Augusta, ME, Watts has waged a protracted fight to save the eels from turbines, even bringing their broken bodies to Maine state officials. His brother Tim has launched a campaign in Massachusetts to encourage dam owners to help young eels up the rivers there.

The two petitioned the federal government in early November to list the eel as an endangered species as soon as possible. Watts says he first became aware of the eels' plight four years ago, when he found

chopped-up eels below the *American Tissue Dam* in Gardiner, ME. After years of repeated publicity about the animals' plight, the dam's owners installed barriers this fall to safely redirect the eels.

This fall, Watts and a state biologist went to the Benton Falls Dam on the Sebasticook, about a half-hour north of Augusta, and documented a few hundred eels that had apparently been killed by the turbines. Watts has asked state officials and the Federal Energy Regulatory Commission, or FERC, which regulates hydroelectric dams nationwide, to require Maine dam owners to allow the eels safe passage.

The operator of the Benton Falls Dam, Georgia-based *Arcadia Energy*, agreed in late October to stop running the turbines for two nights, according to George Lapointe, commissioner of the Maine Department of Marine Resources. But Watts says the migration may last as long as eight weeks, so two days provides a safe window for only a fraction of the river's eels. Lapointe says that dam owners will balk at shutting off turbines for so long because they will lose too much money.

Meanwhile, scientists say that no one has yet figured out how to build a proven, cost-effective downstream eel passage. And dam passages may not be enough to save the species. Some scientists suggest that as bottom feeders, the eels may be a casualty of accumulating pollution. Others theorize that changing ocean currents or temperature may prevent eels from coming into rivers. "It could be many things, although dams certainly play a big role," said Caleb Slater of the Massachusetts Division of Fish and Wildlife. Eels "are just beginning to come on the radar screen."

Sources: Beth Daley, *Boston Globe*, 11/18/04 and *Greenwire*, 11/18/04

Human Caused Erosion 10 Times Greater Than Natural Factors

Agriculture and construction combine to cause at least 10 times more erosion than all natural forces, threatening cropland and water quality throughout the world, according to a new analysis by a University of Michigan geologist Bruce Wilkinson. Wilkinson used data on

sedimentary rock distributions to compare and calculate rates of natural erosion versus that caused by human activity.

His findings reveal that while natural forces such as glaciers and rivers erode soil at a rate of about 60 feet every million years, human activity from agricultural activity alone causes 1,500 feet of erosion per million years. Humans eclipsed natural forces as the prime agents of erosion more than a thousand years ago with the onset of plowing and farming, but only recently did the rate of human impact begin its steady increase.

“We now erode areas that we farm 25 times to up to 50 times faster than what nature erodes,” Wilkinson said. “Humans are now an order of magnitude more important at moving sediment than the sum of all other natural processes operating on the surface of the planet.” Farm and cropland erosion accounts for 70% of the human effects as loose soil washes away, according to Wilkinson. Construction projects account for the other 30%.

According to the Agriculture Department more than 41 million acres of cropland and Conservation Reserve Program land in the U.S. are eroding at a rate above five tons per acre per year, nearly doubling the national erosion rate average of 2.6 tons per acre per year. Third-world countries are most at risk to the effects of erosion, according to Wilkinson. “We have a very finite amount of cropland, and we’re losing significant amounts each year as populations continue to rise,” he said. “Almost all potentially arable land is now under plow.”

In this country the rates of erosion are highest in the upper Mississippi Valley, western North Carolina and portions of Iowa and Missouri. In those areas erosion occurs at a rate of at least 8 tons per acre per year. The effects are particularly damaging to the drinking water supply. The U.S. EPA warns that erosion of cropland can dump dangerous levels of arsenic, chromium, mercury, nitrates and herbicides into nearby water bodies.

Wilkinson called the results of his analysis “stunning. ... I thought that if you looked at all the sand and mud that nature moves, it would be at least nearly equal to the impact caused by humans.”

Source: David Loos, *Greenwire*, 11/8/04

Missouri/Canadian Alliance on the Missouri River

Missouri and Canada have joined forces as unlikely allies in keeping North Dakota from pumping Missouri River water over the northern Continental Divide to rural water districts and cities such as Fargo, some 200 miles away. The potential loss of water has long worried downstream states such as Missouri, which rely on the Missouri River far more for commercial uses than do northern states, where the primary uses are flood control and recreation.

In a second front of this “water war”, Missouri is supporting Canada’s efforts to stop a project on Devil’s Lake, North Dakota that is well under way. In that case a \$28 million outlet from the landlocked and currently flooded Devil’s Lake is designed to divert water into the Red River system that flows north toward Hudson Bay. Normally, water flows into Devil’s Lake but not out, and North Dakota wants to end a decade of flooding there. But officials in Canada and other downstream users, including Minnesota and several American Indian tribes, fear that water flowing into the Red River from Devil’s Lake could bring invasive species and diseases that could harm valuable fisheries, increase the river’s salinity and make its waters more turbid.



Missouri officials oppose the project because they think that a Devil’s Lake outlet also could create an inlet for future pumping of Missouri River water into the lake to stabilize its water levels during periods of drought. The projects under fire once were linked under a plan called the Garrison Diversion, designed to irrigate North Dakota’s semiarid plains. Missouri officials and their northern allies met recently in St. Louis as the *Transboundary Water Issues Group* (TWIG). TWIG opposes water diversions from the Mis-

souri Basin, and wants a scientific inquiry into whether the Devil’s Lake outlet meets international treaties.

Federal engineers first proposed projects to harness the Missouri River and irrigate the plains with its water in the late 1800s. By the 1960s, the U.S. Army, Corps of Engineers had tamed the river with \$2 billion in dams, levees and dikes for flood control, navigation and other uses. Then in the 1960s, the U.S. Bureau of Reclamation began building the Garrison Diversion for North Dakota irrigation and drinking water, and to stabilize water levels at Devil’s Lake. However, tight budgets and environmental concerns prompted Congress to halt the uncompleted project in the 1980s.

Missouri officials look at the unfinished Garrison Diversion project and see a pumping station and canals that are still in place designed to carry water at 1,600 cubic feet per second. North Dakotans, by contrast, believe that they were promised a system of canals and a waterway in and out of Devil’s Lake — promises that were not kept. A late amendment to congressional legislation in 2000 brought new money for water diversion under a new name, the Dakota Water Resources Act.

From North Dakota’s perspective, states downstream have realized more than their share of benefits from the management of Missouri River flows, while North Dakota has lost 500,000 acres of prime farmland swallowed up by lakes so that downstream states could have flood control and navigable water, said Dave Koland, manager for the Garrison Diversion Conservation District. “Missouri should be helping us with the building of dams in North Dakota,” Koland said. He said further that, relatively speaking, North Dakota wants but a thimbleful of the river water it once was promised.

One estimate is that water would be pumped from the river at 100 to 200 cubic feet per second. By comparison, the Missouri River this fall was flowing past Kansas City at a rate of about 47,000 cubic feet per second. But any new upstream taps on the Missouri’s water could hasten shipping cutbacks downstream during drought, Mike Wells of the Missouri Department of Natural Resources said. The Corps this year

shortened the barge shipping season because of low water levels in reservoirs caused by the upstream drought.

Upstream states, though, have lakes losing tourism business because water levels have dropped below boat ramps and mud flats have replaced beaches. That has heightened political and legal fights over how the Corps manages the river. North Dakota believes barge shipping is a dying commerce and a waste of water during drought. "We see our lakes depleted, and instead of holding water here, we're flushing it down the Missouri," said farmer Richard Fugleberg, chairman of the Garrison Conservancy District.

Koland said North Dakota's eastern cities are growing and will need more water in the future. But Missouri sees the old Garrison Diversion being built in pieces under a new name, said Dru Buntin, government affairs director for the Missouri Department of Natural Resources. "We think if the reservoirs go down for whatever reason, it will come at our expense."

Meanwhile, only two small barge companies continue to use the Missouri River (primarily between Kansas City and St. Louis) for barge transportation. By far the most barge traffic on the river is by Corps of Engineers barges carrying rock to maintain the project.

Source: Bill Graham, *Kansas City Star*, 10/5/04

UMR Locks Still Not Justified

The National Research Council (NRC) of the National Academy of Science issued a new report in early October saying that the U.S. Army Corps of Engineers (Corps) still has not proven the case for construction of new locks along the Upper Mississippi River (UMR). The NRC's report is the first time the agency has issued an opinion on the project since the Corps tentatively recommended in May that \$1.9 billion be spent on five new UMR locks and two new Illinois River locks. The Corps also recommended spending another \$1.46 billion on ecological improvements.

The NRC said there is no evidence to support the belief that grain exports would depart from their relatively flat level

of the past 20 years, and it renewed a complaint that economic models used by the Corps are inadequate. The NRC added that too little attention has been paid to less expensive, non-structural alternatives to moving grain downriver.

The council's conclusions are similar to a previous report issued in January. And the chairman of the panel says the flaws in the Corps report could be corrected if the agency improves its economic models and uses that new information before construction on new locks begins. The Corps has always acknowledged the shortcomings of its economic models and has said it intends to improve them.

"The important thing is the Corps remains committed to adaptive management," said Dr. John Boland, NRC chairman and professor emeritus of the Department of Geography and Environmental Engineering at Johns Hopkins University in Baltimore. Brig Gen. Robert Crear, the commander of the Corps' Mississippi Valley Division, noted that the NRC acknowledged the Corps can proceed with implementing its recommendations even as those revisions are pursued.

Meanwhile, environmentalists seized on the NRC report as evidence the Corps is jumping the gun. Scott Faber, a water resources specialist with *Environmental Defense*, said it is not likely the Corps will follow through. "In this case, adaptive management is a euphemism for making it up as you go along," he said. "There's no urgency here."

Debate over UMR lock expansion has been simmering for 12 years. The new UMR locks would be built between St. Louis to and the Iowa border. The initial recommendation also calls for mooring facilities to be built at several other locations further upstream. However, the agency's 50-year outlook envisions the Corps going back to Congress to seek permission to extend locks at five other UMR sites, including Locks and Dam 15 in Davenport, IA.

Earlier this year, two bills were introduced in the U.S. House and Senate that would move the matter forward. American agricultural and barge interests have pressed for expansion, saying that lock congestion hampers their ability to compete with other countries. And U.S. Sen. Charles Grassley (R/IA), a co-sponsor of one of the bills, said the economic models the Corps used provided enough

information to advance the issue. "The agriculture, commercial and labor interests in Iowa can't afford to have this legislation stall," he added.

Sources: Ed Tibbetts, *Quad City Times*, 10/7/04; *AP/Chicago Tribune*, 10/7/04; and *Greenwire*, 10/7/04

Scientists Criticize Salmon Recovery

Two hundred and fifty scientists went on record in a late November letter blasting the Bush Administration's new strategy for protecting salmon from large federal hydrodams in the Columbia River Basin. The letter states that the Administration's strategy is scientifically indefensible and will leave the fish worse off than they are now.

The letter asserts that in crafting the new salmon plan, or biological opinion (BO), the Administration arbitrarily and without scientific basis decided not to analyze the survival rates of threatened and endangered fish under a scenario in which there were no dams on the Columbia River. Instead, the National Marine Fisheries Service (NMFS) assumed that all 14 federal dams currently in place were immutable structures and analyzed fish survival only under various dam-operating scenarios.

One scenario involved dams being managed for optimal fish survival, while another examined salmon survival if the structures were operated with less consideration for fish. Ultimately, NMFS determined that the dams pose little jeopardy to protected salmon and steelhead if the structures are properly managed. But the scientists, some of whom have worked on salmon recovery issues alongside federal regulators, said such a finding was misguided.

Among the signatories to the letter are Jim Lichatowich, former assistant fisheries chief for the state of Oregon and chairman of an independent advisory panel to NMFS and the *Northwest Power and Conservation Council*; and Roy Heberger, a retired fisheries biologist in Idaho who worked for 33 years on salmon habitat issues for the U.S. Fish and Wildlife Service.

"This new analysis is an alarming sea change in approach with no supporting

scientific justification,” the letter states. The scientists go on to call for all scientifically sound mitigation options to be considered in the BO, including dam removal. But getting NMFS to reconsider its analysis may be difficult.

The agency’s Northwest regional director, Bob Lohn, said in September that the analysis meets the terms of the Endangered Species Act because his agency is charged with analyzing only actions about which it is consulted. In this case, NMFS was not consulted about dam removal, but rather specific provisions of hydrodam operations. In the past, NMFS had analyzed survival in a free-flowing river only because there was insufficient data to separate out the effects of the dams on fish under different operating scenarios, Lohn said.

The scientists’ letter further criticizes the BO for setting the bar too low on salmon efforts by failing to consider what is needed to ensure their survival and recovery. Rather, the BO simply considers what is needed to keep salmon from going further extinct, the scientists wrote. “This approach defies the principle of sound science by inexplicably allowing the decline of salmon populations to continue, provided the reduction is not subjectively deemed ‘appreciable,’” the letter states.

The letter further criticizes the Bush Administration for relying heavily on the practice of barging and trucking juvenile fish around the dams as they migrate to sea. The scientists say the BO also gives undue weight to recent, relatively higher salmon returns in the basin, which are a result of favorable ocean conditions, without considering new information indicating those ocean conditions may be deteriorating.

Finally, the scientists say that the agencies are relying on expensive technological fixes that are unproven and speculative. Overall, the letter states the new BO is less likely to succeed than the previous one.

Source: Natalie M. Henry, *Greenwire*, 11/24/04

Refuge Expansion and Climate Change

Entergy Corporation announced in late September that it will contribute more than \$1 million to help finance the expansion of the Tensas River National Wildlife Refuge in northern Louisiana. The donation, described as part of a unique partnership between the *Trust for Public Land* and the U.S. Fish and Wildlife Service (FWS), will help pay for the planting of native bottomland hardwood trees in an attempt to reduce carbon dioxide (CO₂) emissions associated with global warming, *Entergy* officials said.

The project will give the New Orleans-based utility carbon sequestration credits. The company can use the credits to meet future requirements to offset emissions at its power plants, or it can sell the credits to other utilities that are unable or unwilling to meet air quality regulations. Wiley Barbour, managing director of the *Environmental Resources Trust*, said that adding forest land is one of the best ways to reduce CO₂ emissions because trees and other vegetation, including stems and roots, naturally trap the pollutants. “It is a win-win proposition,” Barbour said.



Under the agreement, the FWS will buy the 2,209 acres of land from the *Trust for Public Land*, which got the property from *Chicago Mill and Lumber Co.* in February. *Entergy* will provide more than \$1 million for the purchase, replanting and maintenance of the forest land. “This project not only fits in perfectly with *Entergy’s* greenhouse gas stabilization commitment but also helps restore a critical habitat for the threatened Louisiana black bear....” said Mark Savoff, *Entergy’s* executive vice president of operations.

Deputy Secretary of the Interior J. Steven Griles said that with budget limitations, private-public partnerships are the best

way to expand wildlife refuges. “Carbon sequestration partnerships allow us to acquire additional lands for the National Wildlife Refuge System and protect the species and habitats of the Lower Mississippi River Valley,” Griles said.

Don Morrow, senior project manager for the *Trust for Public Land*, said he and other environmentalists have been “confused” by some Bush Administration land management policies because he said they’ve moved away from some of the agency’s traditional strategies to protect natural habitats. But Morrow said the carbon sequestration project is one that both the Bush and Clinton administrations used effectively to protect valuable land resources with little cost to taxpayers.

Entergy in 2001 committed to spending \$5 million a year for five years to finance programs under the company’s *Sustainable Forestry Plan*. *Entergy* announced earlier this year that it had begun to replace trees at its Grand Gulf nuclear power station, near Port Gibson, MS, and replace them with 9,400 cypress, ash and oak trees that grow longer and larger and therefore will, according to the company, capture more CO₂ emissions.

Source: Bruce Alpert, *New Orleans Times Picayune*, 9/29/04

Observed Impacts of Global Climate Change in the U.S.

According to a new report by the nonpartisan *Pew Center on Global Climate Change*, global climate change is already having discernible effects on plant and animal species in the U.S. and is likely to be a significant driver of ecosystem fluctuations in the next century. The just released study entitled, *Observed Impacts of Global Climate Change in the U.S.* by Camille Parmesan and Hector Galbraith draws the following conclusions and makes a series of recommendations (that follow) to mitigate these effects:

1. Sufficient studies now exist to conclude that the consequences of climate change are already detectable within U.S. ecosystems. This report reviews more than 40 studies that associate climate change with observed ecological impacts in the U.S., and, using objective evaluation criteria, finds that more than half provide strong evidence of a direct link. These studies span a broad

range of plant and animal species from various regions of the U.S. Yet despite the diversity among studies, the observed ecological responses are consistent with one another, as well as with the changes that one would expect based on the nature of U.S. climate change observed to date.

2. *The timing of important ecological events, including the flowering of plants and breeding times of animals, has shifted, and these changes have occurred in conjunction with changes in U.S. climate.* If these timing shifts are synchronous across species that normally interact with each other (for example, if adult butterflies and the flowers they depend on for nectar both emerge two weeks earlier), then these species' interactions are preserved, and the system may remain healthy. On the other hand, if responses to temperature increases vary across species (for example, if butterflies emerge before the flowers they depend on for survival), then species' interactions may become out of synchrony and could lead to population declines. Both types of situations have been documented.

3. *Geographic ranges of some plants and animals have shifted northward and upward in elevation, and in some cases, contracted.* One of the most detailed and best-studied examples is the Edith's checkerspot butterfly in the western U.S. As temperatures have increased over the last century, many southern and lower-elevation populations of this species have disappeared entirely. The effect of this shift has been a contraction of the species' range to the north (i.e., it is disappearing from Mexico but thriving in Canada). The red fox, another example, has shifted northward and is now encroaching on the arctic fox's range, threatening its survival. Similar range shifts within the U.S. have also been observed in organisms as diverse as birds, mammals, intertidal invertebrates, and plants. Such major shifts in species' locations alter species' interactions and potentially threaten U.S. biodiversity.

4. *Species composition within communities has changed in concert with local temperature rise.* As species within a community change abundances or, ultimately, are added or lost, the relationships among species also change. In particular, such shifts in composition are likely to alter important competitive and predatory/prey relationships, which can reduce local or regional biodiversity.

A particularly compelling example of this is the change observed over more than 60 years in the intertidal communities of Monterey, CA, where a community previously dominated by northern colder-water species has been "infiltrated" by southern warmer-water species in response to oceanic warming. Similar changes have also been observed in nearby offshore marine fish communities. Thus, many protected lands, such as the marine reserve in Monterey Bay, are experiencing a shift in the communities that they protect.

5. *Ecosystem processes such as carbon cycling and storage have been altered by climate change.* The lengthening of the growing season has altered the annual cycle of carbon-dioxide (CO₂) levels in the atmosphere, because plants are a major intermediary for carbon flow through ecosystems. The Alaskan tundra has switched from being a net sink of CO₂ (absorbing and storing more carbon from the atmosphere than is released) to being a net source of CO₂ (releasing more carbon than is stored), because warmer winters have allowed dead plant matter previously stored in the soil to decompose and release CO₂. Like the tundra, boreal forests have become carbon sources because of reduced growth due to climate-mediated increases in water stress, pest outbreaks, and wildfires. Conversely, many of the forests of the lower 48 states have switched in the opposite direction—becoming carbon sinks in recent decades. This transition is attributed to regrowth of forests following logging and abandonment of agricultural fields. However, it is expected to stop as soon as the forests mature.

6. *The findings that climate change is affecting U.S. biological systems are consistent across different geographic scales and a variety of species, and these U.S. impacts reflect global trends.* Even against a background of apparently dominating forces such as direct human-driven habitat destruction and alteration, a climate "fingerprint" is discernible in natural systems. The most rigorous studies within the US. provide strong evidence that climate change has affected the timing of biological events in at least three taxa (i.e., groups of related species). They also provide strong evidence that at least three taxa have shifted their ranges in response to climate change and that climate change has altered ecological communities and processes. Further, very

few instances of biotic change run completely counter to climate-change predictions, and the findings of many of the U.S. studies are mirrored by studies elsewhere around the world. Climate change has the potential to degrade ecosystem functions vital to global health. If the observed biological changes are merely one phase in a cyclical pattern of warming and cooling periods, then they may not represent a threat to long-term species and ecosystem health. If, however, they are linked to anthropogenic climate change, they will continue along the same path. Thus, it is essential to address the extent to which the U.S. climate change responsible for observed ecological responses can be attributed to global emissions of anthropogenic greenhouse gases.

7. *There is an emerging link between observed changes in wild plants and animals across the U.S. and human-driven global increases in greenhouse gases.* In 2001, the *Intergovernmental Panel on Climate Change* concluded that the global rise in average yearly temperature over the past 50 years was primarily due to increased concentrations of anthropogenic greenhouse gases. U.S. climate trends are consistent with global climate trends. Global biological trends are predicted by (and match) observed climate trends, indicating that anthropogenic global climate change has affected natural systems. Recent research focusing on North America has also shown a significant greenhouse gas signal in North American climate trends over the past 50 years. The combination of strong consistency across climate and biological studies and across scales (from regional to global), coupled with new climate analyses specific to the U.S., links U.S. biological changes to anthropogenic climate change. The implications of this link are that current biological trends will continue over future decades as greenhouse gas emissions continue to rise.

8. *The addition of climate change to the mix of stressors already affecting valued habitats and endangered species will present a major challenge to future conservation of U.S. ecological resources.* Many if not most of the ecosystems and organisms in the U.S. are already suffering from other anthropogenic stressors such as habitat destruction or fragmentation, introduction

of invasive species, and contamination. As yet, scientists do not have a clear idea how climate change might affect this already fragile situation. It is likely, however, that in many cases climate change may exacerbate current conditions, further stressing wild species and their associated ecosystems. There is a growing consensus within the scientific community that climate change will compound existing threats and lead to an acceleration of the rate at which biodiversity is lost.

9. In the future, range contractions are more likely than simple northward or upslope shifts. During historic glacial cycles, range shifts of hundreds to thousands of miles were common, and species extinction was rare. However, achieving such massive relocation is much more problematic across the human-dominated, artificially fragmented landscapes of today. The large reduction in the areas of natural habitats and the growth of barriers to species' dispersal (urban and agricultural zones) make simple range shifts unlikely. Species that are not adapted to urban and agricultural environments are likely to be confined to smaller total geographic areas as climate causes them to contract from their southern and lower boundaries. Already rare or endangered species, or those living only on high mountaintops, are likely to have the highest risk of extinction.

10. Reducing the adverse effects of climate change on U.S. ecosystems can be facilitated through a broad range of strategies, including adaptive management, promotion of transitional habitat in nonpreserved areas, and the alleviation of nonclimate stressors. The protection of transitional habitat that links natural areas might assist in enabling species migration in response to climate change. Meanwhile, promoting dynamic design and management plans for nature reserves may enable managers to facilitate the adjustment of wild species to changing climate conditions (e.g., through active relocation programs). Also, because climate change may be particularly dangerous to natural systems when superimposed on already existing stressors, alleviation of the stress due to these other anthropogenic factors may help reduce their combined effects with climate change.

The report recommends the following actions to help mitigate the effects of

climate change:

1. Reassess species and habitat classifications to evaluate their relative vulnerabilities to climate change.

A species' or habitat's level of endangerment and vulnerability may differ under a stable climate as compared with a changing climate. Reassessment might include placing higher value on populations at the northern range boundary and at the upper elevational limits, because these populations are expected to be least vulnerable to warmer conditions.

2. Design new reserves that allow for shifts in the distributions of target species. Reserve design could include protecting corridors or placing more value on areas with high topographic and elevational diversity.

3. Promote native habitat corridors between reserves. Native corridors, such as those along fence-lines, ditches, streams and other minimally used land, could aid the redistribution of wild species between preserved areas.

4. Practice dynamic rather than static habitat conservation planning. Dynamic habitat planning is particularly important because current climate scenario models do not work well at the small (local) scales on which most plans are based. Thus, empirical adaptive management is likely to be as useful (if not more useful) than detailed scenario modeling.

5. Alleviate the effects of other stressors. Climate change is occurring along with already existing anthropogenic stressors. The fate of a species lies in the net effect of all stressors combined. In some cases, it may be easiest to reduce the overall stress on a species by mitigating some of the non-climate stressors. For example, if both climate change and invasive species threaten a valued resource, it may be most cost-effective to focus attention on reducing the incursions of the invasive species.

In the end, Parmesan said, the study demonstrates that a relatively small amount of warming can have large consequences. "The best, most important thing we can do is to minimize the amount of warming over the next 50 years," she said.

Source: *Observed Impacts of Global Climate Change in the U.S.*; Camille

Parmesan, University of Texas – Austin and Hector Galbraith, *Galbraith Environmental Sciences* and University of Colorado – Boulder; Prepared for the *Pew Center on Global Climate Change*; November 2004

Other Current Climate Change Issues

Research published in an early October edition of the journal *Science*, attributes only about 5% of the Earth's warming to radiation from the sun, far less than previously thought. Scientists had believed that the sun was to blame for 30% of last century's warming trend, but the new assessment, based on studies of sunspots and other stars, leads the paper's authors to shift more blame for climate change onto humans.

"Other things now have to account for 95% (of climate change)," said Tom Wigley of the *National Center for Atmospheric Research* and co-author of the paper. He said those other factors likely include the burning of fossil fuels and changing ocean currents. "In the next 100 years", he said, "the level of carbon dioxide (CO₂) in the atmosphere could double from what it is now." But Sallie Baliunas, a researcher with the *Harvard-Smithsonian Center for Astrophysics*, believes ultraviolet radiation from the sun may still play a larger role than what the paper concludes. "I'm arguing for more science to understand what the future holds," she said.

A second study published in early October in the journal *Science* concluded that a warmer climate could exacerbate the severity and duration of Western droughts and push the region into a "megadrought" similar to those that occurred multiple times in the last 1,200 years. Researchers in this study, examining new tree ring data, found that the current five-year drought "pales in comparison" to past drought events. The most severe droughts occurred between A.D. 900 and 1300, parching about 80% of western North America. These droughts were followed by more abundant rainfall between 1300 and 1920, and aridity has fluctuated since then, with the Dust Bowl of the 1930s and a severe 1950s drought preceding the current event.

"You come to the unfortunate realization that things could be a lot worse," said the study's lead author, Edward Cook of

Columbia University's *Lamont-Doherty Earth Observatory*. "There is the potential for the development of these much more severe periods of aridity and drought that I think would be quite devastating to the western United States." Irrespective of its place in drought history, the current dry period is having wide-ranging effects on the West, with falling reservoir levels and fears that this year's fire season could be the worst on record.

A separate report released this summer by the U.S. Geological Survey suggests that the drought parching the Colorado River Basin could be the worst in 500 years. The next-lowest five-year period occurred more than 400 years ago, from 1590-1594, according to estimates based on tree ring data. The study links the most severe droughts to warmer temperatures and associated conditions in the Eastern Tropical Pacific Ocean during the "Medieval Warm Period." Cook said warm climates promote upwelling of cooler water in the eastern Tropical Pacific Ocean to create "La Nina-like conditions" that suppress precipitation in the West, and the global 20th century warming trend may be leading to such ocean conditions. Computer model simulations also indicate that warming will increase aridity by reducing soil moisture content and increasing evaporation in interior North America

Meanwhile, profound changes that are occurring in Arctic ecosystems are likely to have ramifications for the rest of the planet, according to the multinational *Arctic Climate Impact Assessment (ACIA)* released in early November. The four-year ACIA was a multimillion dollar effort produced under the auspices of the eight-nation *Arctic Council*, which includes Canada, Denmark, Finland, Iceland, Norway, Russian, Sweden and the United States.

The ACIA report paints a picture of a region caught in the grips of rapid change, with rising temperatures causing a cascade of environmental and societal effects at rates at least two times faster than other areas of the globe. "Human-induced changes in Arctic climate are among the largest on earth," the report states. "The changes already underway in Arctic landscapes, communities, and unique features provide an early indication for the rest of the world of the environmental and societal significance of global climate change" and the region's plight "deserves and requires urgent

attention by decision makers and the public worldwide."

The report states that wintertime temperatures in Alaska and western Canada have increased as much as 7 °F in the past 50 years, and average annual temperatures are projected to rise by up to 9 °F during the next 100 years. The report states that annual sea-ice extent has declined by about 8% during the past 30 years, encompassing an area larger than Texas and Arizona combined. Sea-ice is projected to continue to decline by another 10-50% by 2100, with the greatest losses occurring during summer. Some computer models project a complete disappearance of summer sea-ice by the end of the century, potentially opening up a new trade route, but spelling doom for Arctic wildlife such as polar bears that are dependent on the ice for survival.

The ACIA cites models that predict the eventual melting of the entire Greenland Ice Sheet, a nightmare scenario that would raise global sea-level by about 23 feet, inundating coastal nations. By the end of this century the report states that sea level may rise by up to 3 feet, due in part to melting of ice in Alaska and Greenland. In addition to sea level rise, melting of Arctic ice caps may alter global ocean circulation patterns that help set global climate patterns. Loss of ice both on land and in sea will only increase the amount of warming, since ice acts as a cooling agent by reflecting solar radiation back into space. Open water and darker land absorb more of the sun's energy. "The Arctic sets a lot of the feedback processes that establish global climate systems," said Lara Hansen, chief scientist for the *World Wildlife Fund's Climate Change Program*.

Even in remote mountain regions such as Mount Everest, melting glaciers caused by climate change pose an urgent threat, and environmental activists are launching a campaign to protect the Himalayan mountain range and the world's highest peak. Lakes in the region have swollen from runoff, and unless urgent action is taken, many lakes could burst, threatening the lives of thousands of people and destroying the environment, said the campaigners — a collection of mountaineers, Nepalese climbers and the *Friends of the Earth*, an environmental lobbying organization.

Meanwhile, a leading New Zealand scientist has warned that global warming

would make large areas of the world uninhabitable by the end of the century unless the international community cooperates to solve the problem. Professor John Barrett said that, after studying the Antarctic and its climate for 40 years, he is part of a large community of scientists who are alarmed about climate change and its potential effects on the planet. "We know from our knowledge of the ancient past that if we continue our present growth path we are facing the end of civilization as we know it — not in millions of years, or even millennia, but by the end of this century," he said. Professor Barrett specifically identified Europe, the American state of Florida and low-lying countries such as Bangladesh as areas most likely to become uninhabitable. He said the globe was heading by the end of the century for a climate three or four degrees warmer than now, conditions that last existed 30 to 40 million years ago before there were ice sheets in the Antarctic.

The ACIA report firmly links changes that are occurring in the Arctic and that are expected to take place with human greenhouse gas (GHG) emissions. "The strength of the trends and the patterns of change that have emerged in recent decades indicate that human influences, resulting primarily from increased emissions of CO₂ and other GHGs, have now become the dominant factor," the report states. Finally, the ACIA report makes the recommendation that countries reduce the warming threat by cutting GHG emissions.

Potential solutions to global climate change include looking for new energy sources such as wind and nuclear power that do not consume fossil fuels. But according to a study published in the 11/16/04 issue of the journal *Proceedings of the National Academy of Sciences* if only one tenth of the world's energy needs were met with wind-power sources, surface drag of the planet would be increased enough to change wind patterns and also alter the global climate.

However, University of Calgary professor and report co-author David Keith said the effects could reverse those created by GHGs, counteracting GHG-induced warming in polar regions by changing circulation patterns to bring cooler air back to the poles and warmer air to the equator. Stephen Pacala at Princeton University (also a co-author of the report) emphasized the benefits of wind power,

saying wind energy supplying one-tenth of the planet's demand would produce only one-fifth of the CO₂ created by more traditional energy sources.

The researchers simulated the effects of 2 terawatts of wind-turbine generated energy, enough to supply the whole world. "We shouldn't be surprised" Keith said, "that extracting wind energy on a global scale is going to have a noticeable effect. "There is really no such thing as a free lunch." However, Keith warned that the study contains many uncertainties and it is possible that one large wind farm could result in more climate change than is optimal.

Meanwhile, the head of the *Organization for Economic Cooperation and Development* (OECD) said in mid November that a significant worldwide expansion of nuclear power is needed to help stabilize atmospheric CO₂ emissions. OECD Secretary General Donald Johnston told a meeting of nuclear professionals in Washington, D.C., that expansion of renewable energy and other emerging technologies like carbon sequestration will not occur quickly enough to stabilize CO₂ at 550 parts per million, a level scientists have estimated would avert major shifts to the climate regime.

Given the option between continued heavy reliance of CO₂-emitting fossil fuels for power generation and emissions-free nuclear power, the world has little choice but to commit itself more fully to nuclear development, Johnston said. "The real question in my mind", he said, "is do we have time for sufficient nuclear power to come online in order to stabilize CO₂ emissions."



Johnston suggested that several steps could help address what he characterized as a widespread public mistrust of nuclear power — including monitoring of nuclear reactors by independent, nongovernmental organizations that could cross international boundaries to perform inspections. Such monitoring should help to allay concerns that governments cannot adequately police the industry. "I would recommend the surveillance and monitoring of the maintenance and operation of all nuclear facilities by international teams of experts under the jurisdiction of

international organizations such as the [International Atomic Energy Agency]," he said. Johnston acknowledged such an idea would likely meet resistance, including barriers from the U.S. nuclear industry, but he said it remains a critical step to regaining "public confidence" in nuclear power's safety and viability.

Johnston said he is hopeful that nuclear power's other major obstacle — radioactive waste management and disposal — can eventually be resolved. While the United States' massive Yucca Mountain Nuclear Waste Repository remains mired in public controversy and permitting problems, Johnston said other countries are making important strides in resolving waste issues. Finland, for example, has a plan for an underground high-level waste repository that has gained considerable public support.

Sources: John Carey, *Business Week*, 11/22/04; Andrew Freedman, *Greenwire*, 11/8/04 and 11/9/04; Ben Geman, *Greenwire*, 11/16/04; *AP/San Francisco Chronicle*, 11/16/04; *Sydney (Australia) Morning Herald*, 11/18/04; Katy Human, *Denver Post*, 10/1/04; and *Greenwire*, 10/1/04, 11/8/04 and 11/12/04

Meetings of Interest

Jan. 11-13, 2005: *Scaphirynchus* Conference, St. Louis, MO. See: <http://bio.slu.edu/mayden/conferences/sturgeon.html>. Contact: Tom Keevin, thomas.m.keevin@mvs02.usace.army.mil, (314) 331-8462.

Mar. 16-19, 2005: 70th Annual North American Wildlife and Natural Resources

Conference, Crystal Gateway Marriott, Arlington, VA, Contact: The Wildlife Management Institute, 1146 19th Street, NW, Suite 700, Washington, DC 20036, (202) 371-1808, FAX (202) 408-5059

May 22-25, 2005: 9th Annual Missouri River Natural Resources Conference, Ramkota Hotel, Pierre, SD, Contact: Jim Riis, (605) 223-7701, Email:

jim.riis@state.sd.us, Web Site: <http://infolink.cr.usgs.gov/events/05.htm>

Sep. 11-15, 2005: 135th Annual Meeting of the American Fisheries Society, Anchorage, AK. Contact: Betsy Fritz, bfritz@fisheries.org, (301) 897-16, ext. 212.

Congressional Action Pertinent to the Mississippi River Basin

Conservation

S. 2590. Alexander (R/TN) and Landrieu (D/LA). Provides a conservation royalty from Outer Continental Shelf revenues to establish the Coastal Impact Assistance Program, provide assistance to States under the Land and Water Conservation Fund Act of 1965, ensure adequate funding for

conserving and restoring wildlife, assist local governments in improving local park and recreation systems, and for other purposes.

H. R. 2036. Isakson (R/GA). Amends the Internal Revenue Code of 1986 to provide economic incentives for the preservation of open space and conservation of natural resources, and for other purposes.

H. R. 4100. George Miller (D/CA) and Young (R/AK). Establishes a permanent trust fund to get Americans outdoors by providing access to parks and recreation areas in urban and rural communities; preserving historic places; promoting healthy and active lifestyles; and providing for hunting, angling, and wildlife viewing for the people of the United States.

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.

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. 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.

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 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.

H. R. 4475. Graves (R/MO). Amends the ESA to focus conservation efforts under that Act on the 109 species most in danger of extinction, and for other purposes.

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.

S. 2550. Crapo (R/ID) and 2 Co sponsors. Amends the FWPCA and the Safe Drinking Water Act to improve water and wastewater infrastructure in 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.

Floodplain Management

S. 2301. Inouye (D/HI). Improves management of Indian fish and wildlife and gathering resources, and for other purposes.

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 2004. 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. 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. 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.

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 clear-cutting on Federal land and for other purposes.

H. R. 652. Andrews (D/NJ). Assures large areas of land in healthy natural condition throughout the country to maximize wildland recreational opportunities, 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. 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.

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. 3566. Walden (R/OR). Amends the Cooperative Forestry Assistance Act of 1978 establishing a program using GIS technologies to inventory, monitor, characterize, assess, and identify forest stands and potential forest stands, 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) and **H. R. 4067.** Gilchrest (R/MD) and 19 Co sponsors. Provides for scientific research on abrupt climate change, 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.

S. 1164. Collins (R/ME) and 4 Co sponsors. Provides for the development and coordination of a comprehensive and integrated U.S. research program that assists the people of the U.S. and the world to understand, assess, and predict human-induced and natural processes of abrupt climate change.

H. R. 1578. Udall (D/CO). Promotes and coordinates global climate 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 (NANPCA) 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.

S. 2490. Inouye (D/HI) and Stevens (R/AK). Amends the Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990 to establish vessel ballast water management requirements, and for other purposes.

S. 2598. Akaka (D/HI) and 5 Co sponsors. Protects, conserves, and restores public land administered by the Department of the Interior or the Forest Service and adjacent land through cooperative cost-shared grants to control and mitigate the spread of invasive species, 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 issuance of regulations to assure that vessels entering the Great Lakes do not discharge ballast water that introduces or spreads nonindigenous aquatic species and that such ballast water and its sediments are treated through the most effective and efficient techniques available.

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.

H. R. 3122. Miller (R/MI). Amends the NANPCA directing the U.S. Coast Guard to

prohibit vessels with ballast tanks containing more than 5% ballast water from entering the Great Lakes.

Mining

S. 2049. Specter (R/PA); **H.R. 3778.** Petersen (R/PA) and Sherwood (R/PA). Amends the Surface Mining Control and Reclamation Act of 1977 (SMCRA) to reauthorize collection of reclamation fees, revise the abandoned mine reclamation program, and make sundry other changes.

S. 2086. Thomas (R/WY) and Enzi (R/WY); **S. 2211.** Rockefeller (D/WV) and **H.R. 3796.** Cubin (R/WY) and Rahall (D/WV). Amends the SMCRA to reauthorize and reform the Abandoned Mine Reclamation Program, and for other purposes.

S. 2208. Rockefeller (D/WV) and 2 cosponsors. Amends the SMCRA to reduce the amounts of reclamation fees, modify requirements relating to transfers from the Abandoned Mine Reclamation Fund, and for other purposes.

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

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.

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

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.

S. 2188. Feingold (D/WI), McCain (R/AZ) and Daschle (SD/D) and **H.R. 2566.** Kind (D/WI) and 3 Co sponsors. Provides for reform of the Corps of Engineers, 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.

S. 2244. Hutchison (R/TX) and Breaux (D/LA) and **H. R. 2890.** Saxton (R/NJ). Protects the public's ability to fish for sport, and for other purposes.

S. 2301. Inouye (D /HI). Improves the management of Indian fish and wildlife and gathering resources, and for other purposes.

S. 2470. Bond (R/MO) and 7 Co sponsors, and **H.R. 4785.** Hulshof (R/MO) and 17 Cos sponsors. Enhances navigation capacity improvements and the ecosystem restoration plan for the Upper Mississippi River and Illinois Waterway System.

S. 2554. Frist (R/TN) and 4 Co sponsors; **S. 2773.** Inhofe (R/OK) and **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. 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.

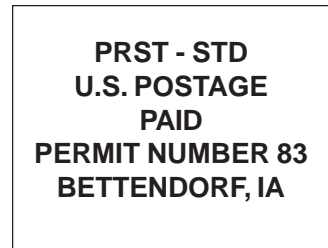
H. R. 1517. Graves (R/MO) and 6 Co sponsors. Amends the Land and Water Conservation Fund (LWCF) to limit the use of funds available from the LWCF Act of 1965 for maintenance.

H. R. 2828. Calvert (R/CA) and 25 Co sponsors. Authorizes the Interior Secretary to implement water supply technology and infrastructure programs aimed at increasing and diversifying domestic water resources.

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>



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