River Crossings

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UMR Navigation Expansion

Historically, expansion of commercial navigation capacity on our Nation's rivers has kept up with technology. Advancement from the relatively shallow draft paddle wheelers of the Mark Twain era to the more powerful, deep draft (12 ft.) tows of today, lead to increased demand, deeper channels, and larger locks. All of this expansion, completed at taxpayer expense, took a heavy toll on the natural ecosystems of most of our large interjurisdictional rivers, converting many of them from diverse riverine ecosystems into single purpose rock-lined channels.

This held true across most of the Intercontinental Waterway System. However, on the Upper Mississippi River (UMR) citizens chose to stand fast against unconstrained navigation capacity expansion in favor of preserving a higher quality river ecosystem. Perhaps the reason for this is that the UMR provides a natural oasis in the middle of a "sea of agricultural lands", and forms the focus of regional recreational, ecological, and natural heritage values. For example, the UMR supports a National Fish and Wildlife Refuge complex that is the longest such refuge system in the Nation, attracting millions of visitors annually. This refuge was established in 1924 by local chapters of the Izaak Walton League of America (Ikes) – six years before the present day navigation locks and dams were proposed.

Congress recognized these values in the mid 1980's when they designated the UMR as a

View of the Upper Mississippi River (UMR at Pike's Peak State Park (IA) overlooking Prairie du Chien,

"nationally significant ecosystem" — putting it on equal status with the River's nationally significant navigation system. At that time Congress also authorized and funded a UMR Environmental Management Program (EMP), which today is working to restore riverine habitats and ecological processes that have been damaged by the aging process of the navigation pools, and by the direct impacts of the operation and maintenance activities necessary to maintain a reliable 9-foot navigation channel.

However, despite the good that has been done to maintain UMR environmental quality, the push continues to expand navigation capacity. It seems as if navigation boosters have a never-ending appetite for expansion, and show little concern for the effects of their actions on the environment. The two interests (environment and navigation) thus remain at odds on the UMR — only giving way to compromise when the interests of one comes into obvious and direct conflict

Inside This Issue

with the other. For example, the EMP was only authorized and funded in 1986 after navigation interests gave way to environmental demands in order to win authorization and funding for construction of a new and larger lock at Alton, IL (Lock and Dam 26). Reconstruction of that lock cost the American taxpayer $1 billion in early 1980's dollars and more than doubled it's capacity — the environmental trade off was the 10-year, $300 million EMP. Environmental interests had held fast against reconstruction of Lock 26 because they felt it was the "keystone" to expansion of navigation capacity upstream. Once it was rebuilt they felt the "bottle-neck" would just be shifted upstream, and one by one - domino fashion - the other upstream locks would need to be expanded until capacity on the entire system was increased.

It seems that those concerns are coming true. It's now time for reauthorization of the EMP and navigation interests are seeking yet another navigation expansion. This time for increasing the capacity of numerous navigation locks from 600 ft. to 1200 ft. - doubling their capacity as predicted in the 1980's, while at the same time doubling the potential impacts on the environment.

In this case, however, navigation interests have experienced a temporary set back. The U.S. Army, Corps of Engineers (Corps) has determined in an early report that large-scale rebuilding of the navigation locks isn't worth the money. This may, however, be only a temporary setback because the Corps' chief project economist, Paul Soyke, said in December that the report only provides a preliminary conclusion and that a later determination could find lock reconstruction economically feasible.

Soyke said that the Corps needs more information on how up-and-down commodity prices affect demand for barge traffic. Further, he said, that the Corps would ask commodity and farm groups for that information, a move which environmentalists question. "Now that they've run the data through their model, they're unhappy with the results," said Mark Beorkrem, a *Sierra Club* volunteer monitoring the lock study. "So they're going back to the groups that'll benefit and asking for better numbers. They might as well be cooking the books."

But Ross Korves, deputy director of public policy for the *American Farm Bureau*, said Soyke asks a good question. Commodity prices at the export elevator don't change despite the cost of transportation, he said, "If we can move a bushel of grain by barge at 40 cents a bushel, or if we can move it by rail at 70 cents a bushel, that means 30 cents more a bushel in the pocket of the producer."

According to the Corps' preliminary economic study, increasing the length of locks to permit more barge traffic would not be economically justified until after 2020. However, small-scale measures such as helper boats and mooring buoys, would be immediately justified. Also, construction of "guidewalls" at locks 20 through 25 may also make economic sense.
Of critical concern is the fact that none of these findings include the environmental costs of traffic expansion. "If the environmental costs of additional traffic are substantial, then the time when longer locks are economically justified is even further away," said Scott Faber, a spokesman for *American Rivers*. The Corps still has a long way to go. But, the preliminary findings support what many have suspected for months — longer locks are not economically justified, and we should instead be focusing on the economic and environmental implications of small-scale measures."

While most UMR locks are 600 feet long, tows typically push 15 barges which are 1,200 feet long. This forces tow operators to lock through in two steps -- a process which can take up to two hours. Eight of the 29 UMR locks were identified by the Corps as being among the 20 locks in the Nation with the highest average delays. Navigation boosters would like to expand the length of 7 of these locks -- 5 on the UMR and 2 on the Illinois River. Barge delays already cost shippers $35 million a year, according to the Corps, and those costs will increase as barge traffic grows to 155 million tons by the year 2050.

River Crossings

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But no one really knows what the economic future will bring. We do know, however, that navigation projects impact the environment in numerous ways, and that the river has only a limited capacity to absorb these environmental perturbations before it loses its ecological integrity. One has to only compare the UMR with one of it's tributaries — the greatly impacted Illinois River — to see the differences between a moderately and a significantly impacted river. Unfortunately, the UMR's capacity for recovery is not known — most studies that have been needed **and requested** to determine and measure the impacts of navigation expansion **have not been funded.** It seem's as if some decision makers are more comfortable not knowing the "condition of the patient" than in "diagnosing and treating the disease".

Compounding that problem, is the reality that navigation boosters have little economic conscience when it comes to meeting their appetite for ever-increasing navigation capacity. This is because the taxpayer continues to foot most of the bill. Although a tax is currently levied on towboat fuel, the amount collected falls far short of the amount needed to replace navigation infrastructure.

Until cost shares and public subsidies for commercial navigation, flood control, and other river impacting activities place more of the economic burden on project sponsors and direct beneficiaries, and less on the taxpayer and the river, there is little hope that the unrealistic demands being placed on our Nation's river ecosystems will lessen.

Source: Christopher Thorne, Associated Press Writer and Staff Writer Ginger Vanderpool, *Mississippi Monitor*, January 1999

Fishes in Navigation Channels

"Expansion of the capacity of the Upper Mississippi River System to support commercial navigation created the need to develop information on potential effects of commercial navigation on fishes. Total densities of larval fishes in the navigation channels generally did not exceed 3 fish/m^3 and tended to be greater in the lower Illinois River than in nearby Pool 26 of the Mississippi River. Larvae of common carp Cyprinus carpio and catostomids predominated in May but in June were replaced by clupeids, primarily gizzard shad Dorosoma cepedianum. Finally, freshwater drum Aplodinotus grunniens larvae predominated ichthyoplankton drift in late June and early July. Total minimal densities of fish longer than 10 cm total length averaged 157 and 177 fish/ha during 1996 and 1997, respectively, in the lower Illinois River, and 109 and 55, respectively in Pool 26 of the Mississippi River. The assemblage of these larger fishes was dominated by freshwater drum, gizzard shad, channel catfish Ictalurus punctatus, and smallmouth buffalo Ictiobus bubalus. Additionally, shovelnose sturgeon Scaphirhynchus platorhynchus were common in the upper portion of Pool 26, but totally absent from the Illinois River. The core assemblage of larval fish taxa and larger fish species present in Pool 26 of the Mississippi River and in the lower Illinois River was similar between years, but substantial variability in seasonal timing of appearance and in observed density of these fishes in the navigation channel exists. However, due to the short duration of the study, the potential magnitude of year-to-year changes in the density and seasonal appearance of fishes in the navigation channel could not be determined, leaving substantial uncertainty as to how representative the estimates of entrainment losses might be.

Lake sturgeon found floating in Pool 15 of the Upper Mississippi River in the 1980's apparently

"Results from 41 entrainment samples suggest that an average of 9.5 adult gizzard shad are killed or seriously injured by entrainment through towboat propellers per kilometer of tow travel, with an 80% confidence interval of 3.8-22.8 adult fish/km of tow travel. The utility of this estimate is limited by the substantial width of the confidence interval and the short duration of the study, which included only one fall-winter period. Entrainment kills were observed only during the fall and early winter of 1996, suggesting a seasonal effect, but lack of seasonal replication leaves this uncertain. Because gizzard shad were the only species observed killed in the entrainment sampling, this estimate also represents the total kill for all species within the entrainment sampling design. However, in 110 ambient samples, which were conducted to estimate abundance of live fish, fresh entrainment kills of one adult smallmouth buffalo and one adult shovelnose sturgeon were also observed. This result is entirely plausible because rarer entrainment kills might go undetected in 41 entrainment samples, but show up in the more numerous ambient samples. The ambient samples were more numerous because, given the prevailing traffic rates and logistic constraints, approximately 2-3 ambient samples can be completed for each entrainment sample. A statistical method was developed to estimate the entrainment mortality rate for shovelnose sturgeon and smallmouth buffalo from the combined entrainment and ambient samples. These ancillary entrainment mortality estimates for shovelnose sturgeon and smallmouth buffalo are each 2.4 adult fish/km of tow travel, with 80% confidence intervals of 0-6.0 fish/km of tow travel. This ancillary mortality estimator is shown to be essentially unbiased. Because the confidence intervals for these species include zero, it is reasonable to conclude only that entrainment mortality cannot be eliminated as an important component of their dynamics in the navigation channels of the Upper Mississippi River System. The ancillary estimates create a paradox because there are now two estimates of the total entrainment mortality rate for all species combined. The first is the estimate of 9.5 fish/km from the entrainment sampling, which is unbiased within that sampling design. The second is the sum of entrainment-sampling estimate plus the ancillary estimates for shovelnose sturgeon and smallmouth buffalo. This second augmented mortality estimate is 14.3 adult fish/km of tow travel with an 80% confidence interval of 0-26.7 fish/km of tow travel."

Using the second augmented mortality estimate immediately above, we can say that

a typical tow traveling from St. Louis to the

Twin Cities (670 mi. or 1081 km.) might be expected to kill 15,458 adult fish (with an 80% confidence interval of 0 to 28,863 fish).

Source: Abundance of Fishes in the Navigation Channels of the Mississippi and Illinois Rivers and Entrainment Mortality of Adult Fish Caused by Towboats; Steve Gutreuter, U.S. Geological Survey, Upper Midwest Environmental Sciences Center, 2630 Fanta Reed Road, La Crosse, Wisconsin 54603; John M. Dettmers, Illinois Natural History Survey, Lake Michigan Biological Station, 400 17th Street, Zion, Illinois 60099; and David H. Wahl, Illinois Natural History Survey, Kaskaskia Biological Station, R.R. 1, Box 157, Sullivan, Illinois 61951. Abstract of Project Completion Report, 7 December 1998, Submitted by the U.S. Geological Survey and Illinois Natural History Survey to the U.S. Army Corps of Engineers in fulfillment of Contract Number NCR-94-175.

Caviar Bust/ Sturgeon Fingerprinting/Meat

The U.S. government on 12/18/99 indicted three people on charges of smuggling millions of dollars worth of endangered sturgeon caviar from Poland to New York, in violation of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). Eugeniusz Koczuk and Wieslaw Rozbicki of the Stamford, CT-based Gino International and Andrezej Lepkowski of Warsaw, Poland, were each charged with seven counts related to smuggling endangered wildlife into the U.S. The federal indictment is the first to enforce a new provision in CITES listing caviar-producing sturgeon as an endangered species.

Economic turmoil in the former Soviet Union and rising U.S. demand for caviar have conspired to create tough times for sturgeon, the ancient fish from which the tasty fish eggs are harvested. Overfishing in the Caspian Sea, where most of the world's caviar originates, has driven many of the sturgeon's 25 species close to extinction. Several nations, however, are working to devise quotas that will protect the fish. Overall, U.S. caviar imports have doubled since 1991.

In anticipation of new rules, scientists are turning to the fish equivalent of DNA fingerprinting to determine which species is contained in any given caviar sample. Researchers from the American Museum of Natural History in New York described the approach in the August issue of Conservation Biology. "I think if Caspian sturgeon can be saved, it's through the establishment and adherence of species-level quotas," says Stephen R. Fain, genetics supervisor at the U.S. Fish and Wildlife Service's (FWS's) forensics laboratory in Ashland, OR. Genetic tests will help investigators track harvested eggs from individual species and detect poaching, he says. To trace caviar's origin, scientists cannot rely on sight alone. Traders market the salty delicacy in only three major categories--beluga, sevruga, and osetra (or Russian) -- distinguished by egg size. Certain species tend to produce eggs of a given size and are traditionally included in a category. Taste is not a reliable indicator of species, says Vadim J. Birstein, a coauthor of the Conservation Biology report.

The scientists say they sampled 95 lots, mostly purchased in New York City stores, and found that about 25% contained species of sturgeon different from those that buyers would expect. These included three lots of beluga, which can fetch prices of $90 an ounce. Unless they use genetic testing, importers can be tricked by their suppliers, Birstein says. However, after examining 105 samples purchased on the East and West Coasts, Fain suggests that only about 3% of the lots are mislabeled. According to Fain and Frank Chapman, a sturgeon researcher at the University of Florida at Gainesville, categories of caviar can legitimately contain more than one species, so Birstein and his colleagues may have overstated the degree of mislabeling. Birstein retorts that each of the major categories should contain eggs of only one species.

Birstein told Science News that he and his colleagues offered their test to the FWS, which monitors U.S. imports for compliance with the new international rules. However, they asked the agency to pay royalties for the use of the technique's patented parts, which identify DNA sequences unique to certain sturgeon species. The agency instead developed its own test, which is based on sequencing one section of DNA common to all sturgeon species, says Kenneth W. Goddard, director of the forensics lab. This approach, yet to be published, uses characteristic variations in the genetic code to identify individual species. The agency wanted a tool it could share with enforcement agencies in other nations without bothering with fees, Goddard says.

On another "sturgeon front", FWS officials on 12/10/98 found, during a routine inspection of airline manifests, that a hotel in Las Vegas, NV had imported a commercial shipment of sturgeon meat (171 lbs.), valued at $4,126. The air waybill listed "smoked salmon" which, as seafood for human consumption, is exempt from regulations. However the supporting invoice listed "sturgeon", thus negating the seafood exemption. Chicago is one port in the country that routinely reviews airline manifests for undeclared wildlife. The sturgeon was illegally exported by a company in Seattle.

Sources: Molly O'Neill, *New York Times*, 12/19/98; *Baltimore Sun/other*s, 12/19/98; National Journal's GREENWIRE, *The Environmental News Daily*, 12/21/98; Jeffrey Brainard, Science News, Vol.154(8):116, 8/22/98 , and USFWS Region 3 Staff Notes, 1/21/99

Bighead Carp Gamefish or Nuisance

A homely fish most people have never heard of has suddenly gained a degree of prominence in Arkansas (and elsewhere). The bighead carp, an Asian import used to control aquatic vegetation, is known to be present in modest numbers in the Arkansas and White rivers; and in growing numbers in the Upper Mississippi and Missouri rivers. The fish is also getting attention from some fish and nutrition advocates as a possible replacement for tuna, since tuna numbers are declining in the oceans.

On 4/3/98, Jeff Hamrick of Little Rock set a new Arkansas record, when he caught a 50 lb., 7 oz. bighead carp by snagging below Murray Lock and Dam on the Arkansas River at Little Rock. Hamrick's fish broke the record of 47 pounds set by Michael Scott Perrigan of Jacksonville, also taken by snagging just below Murray Lock and Dam on the Arkansas River.

Hamrick's friend, Cody Wheeler, also caught a 40-pound bighead carp on the same outing. This was just a day after another angler brought a 43-pound, 5-ounce bighead to Arkansas Game and Fish Commission headquarters for a try at the state record. It, too, came by snagging on the Arkansas River. Wheeler had his appetite whetted. After the record weighing and certifying

process was completed for Hamrick at Game and Fish Commission headquarters, Wheeler went fishing again and caught another bighead carp. This one also was taken to the Game and Fish building, and it weighed 48 pounds, 10 ounces, falling short of Hamrick's new record by less than two pounds.

Meanwhile, researchers from the U.S. Department of Agriculture (USDA) and the University of Arkansas say consumers in a test ranked canned bighead carp as better then or equal in taste to canned tuna. That is quite a feat, considering that common carp are scavengers so ill-liked that some anglers won't even throw them back into the water. Bigheads are a different species but still have an image problem," says Donald Freeman, director of the USDA's ARS Aquaculture Systems Research Unit In Pine Bluff, AR.

"Bighead carp"

"If we called this carp on the can, no one would purchase it", he says. So researchers are considering, seeking a name change. One possibility is "noble fish", a play on the formal species name, "Hypophthalmichthys noblils." Another Idea is "lake fish". Farmers now grow bighead carp mainly for ethnic markets, but the, bony fresh fish aren't palatable to broader U.S. tastes. So canning, which gets rid of the bone problem, is key to expansion.

"The bighead-carp is like the silver carp and the white amur; they came over here from China and have been used to reduce vegetation and algae in lakes, sewage lagoons and other places," said Allen Carter, Chief of Fisheries for the Arkansas Game and Fish Commission. Carter added, "The bighead carp is not common in Arkansas. These fish are probably escapees from an aquaculture facility, and what's notable is they have grown to those big sizes by feeding on plankton, microscopic plant organisms in the water. That's all a bighead carp will eat, plankton."

Bighead carp are found only in major rivers, and fishermen rarely catch them because they don't take large baits. A distinctive feature of the fish is eyes low on each side of the head instead of high on the head like most other fish (note photo above). The bighead carp's keel or belly plate is short and near the rear instead of extending all the way underneath the fish as with a silver carp.

Meanwhile, bighead carp aren't so popular in states along the lower Missouri River (Missouri, Iowa, Kansas, Nebraska, and South Dakota). These states have raised concern that the species, first documented in the early 1980's, may have significant negative impacts on native plankton feeding fish such as the bigmouth buffalo (Ictiobus cyprinellus) and paddlefish (Polyodon spathula). The bighead carp and its Asian cousins, the silver carp (Hypophthalmichthys molitrix) and black carp (Mylopharyngodon piceus), have all been introduced into this country for aquaculture purposes, and have apparently escaped into the wild, becoming significant aquatic nuisance species, impacting many of our native fish species.

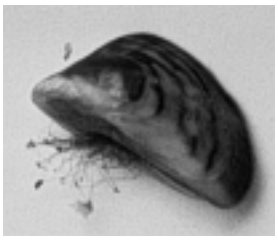
This subject was discussed at length at MICRA's winter meeting, held on 12/8-9/98 in Cincinnati. As a result several of the Missouri River states will be participating in a multi-state study to determine the present distribution of Asian carp, their extent of spread, and their food habits in the wild to assess the magnitude of impact on native fishes. Funding for this work will likely come from the taxes that are levied on the sale of sport fishing equipment. The latter raises the ethical (if not legal) issue of the responsibility of one party (the aquaculture industry) potentially impacting the interests of another (the sport fishing industry). Similar conflicts were raised between the maritime industry, who brought us the zebra mussel, and the boating and recreational fishing industries who are being significantly impacted by the mussel.

Conflicts such as these will likely only escalate as we move into the next millennium. As human populations continue to grow while natural resources continue to decrease, the actions of one are more likely to effect the interests of another. This will also increase the need for interjurisdictional groups like MICRA to maintain an active forum for discussion and debate of aquatic nuisance species issues.

Sources: Arkansas Game & Fish Commission, *Arkansas Outdoors*, 4/8/98; *The LMRCC Newsletter*, Vol. 5, No. 3, 12/98; and *The Wall Street Journal*, 1/7/99.

Natural Enemies of Zebra Mussels

"This paper reviews the international literature on the natural enemies of Dreissena spp. and discusses the biology and ecology of organisms known to be involved in their predation (176 species), parasitism (34 species), and competitive exclusion (10 species). Research on natural enemies, both in Europe and North America, has focused on predators, particularly birds (36 species) and fish (15 and 38 species eating veligers and attached mussels, respectively). Other field- documented predation includes consumption of pelagic larvae by copepods and coelenterates, and consumption of attached mussels by leeches, crabs, crayfish, and rodents. Cannibalism of veligers by adult zebra mussels has also been reported. Ciliates and trematodes are the most commonly reported obligate parasites, with occasional records of suspected bacterial or ascetosporan infection. Mites, nematodes, Ieeches, chironomids, and oligochaetes have been observed to be associated symbiotically within the mantle cavity, but with few to no adverse effects. Organisms capable of competitively displacing zebra mussels from hard substrates include sponges, amphipods, algae, bryozoans, hydrozoan coelenterates, and other bivalve species (including interspecific competition among Dreissena spp.).



"Zebra mussel" (Deissena spp.) 2-3X

"Although the vast majority of the organisms that are natural enemies in Europe are not present in North America, ecologically similar species do exist on this continent, and zebra mussels represent a novel and abundant organism for these native predators, parasites, and ecological competitors — the new natural enemies of Dreissena. However, the idea that these organisms could eliminate zebra mussel populations, even in limited areas of North America, is far more hopeful than realistic. As in Europe, there will likely be isolated reports of major impacts by natural enemies and on the whole we will likely see a cumulative effect of a suite of enemies having a constant. but limited, role in suppressing zebra mussel populations."

Source: Natural Enemies of Zebra Mussels: Predators, Parasites, and Ecological Competitors; Daniel P. Molloy, Alexander Y.

Karatayev, Lyubov E. Burlakova, Dina P. Kurandina, and Franck Laruelle; *Reviews in Fisheries Science*, 5(1): 27-97 (l 997)

Fish Passage on the Colorado River

Completion of modification to the Grand Valley Irrigation Company's diversion dam on the Colorado River just upstream of Palisade, CO has given native and endangered fish year-round access to an additional three miles of Colorado River habitat. The dam is the oldest major irrigation project in the Grand Valley, having gone into operation in 1883.
The first fish passageway was completed in 1996 at the Redlands Diversion Dam. This ladder has been used by 42 endangered fish and more than 26,000 other native fish. The Grand Valley Irrigation Company completed the project ahead of schedule and below budget. The final cost was $590,000, nearly $200,000 below preliminary estimates. Funding for the project was provided through the Upper Colorado River Endangered Fish Recovery Program.

Construction required making a notch in the existing dam and arranging large rocks in the downstream river channel in a 475-foot zigzag pattern. The configuration simulates natural pools and riffles and makes it easier for fish to swim through. Completing this passageway is the first step in restoring endangered fish access to approximately 50 miles of additional Colorado River habitat upstream from Palisade to Rifle, CO.

Two upstream structures, the Grand Valley Project Diversion Dam and Price Stubb Dam, also impede fish migration. The Recovery Program currently is evaluating whether to construct passage structures at these other dams.

Source: Jone Wright, Bureau of Reclamation, Upper Colorado River Endangered Fish Recovery Program, Fall/Winter 1998

Fish Passage in Australia

In New South Wales a review of all the weirs in the state is being undertaken. This review is to assess which weirs are providing a positive useful benefit, and whether a fishway may be incorporated into their design. Those weirs that are not providing benefit are being removed, with subsequent environmental benefits.

The State's fishways group has recently completed two new fishway structures on the Nepean River near Camden. These structures are innovative projects, as they are constructed around the weirs rather than on the weirs. This means that they do not affect the operational integrity of the weirs. The fishways have been constructed using the "keyed in boulder" technique, with the final appearance of the structure looking like a complicated series of natural riffles.

The configuration of the fishway ensures that the fish do not get lost when they reach the weir. No, they do not have signposts! The fish are attracted to the fishway because the entrance is located reasonably close to the weir face, and fish are naturally attracted to the higher velocity areas. Even smaller fish can traverse the fishway without difficulty. The new fishways provide fish passage for at least 90% of the time. (The other 10% are during periods of very high flow and the fish can normally migrate in these times with the weirs in place.)

Another positive impact is on water quality, which is improved because it is aerated by entrainment of air in the riffles. Importantly, the technique works, does not require maintenance, and is cheaper than most other methods.

For more information contact: Mr. Peter Wem, Riverine Corridor Program, Department of Land and Water Conservation, P.O. Box 3720, Parramatta, New South Wales 2124; Tel: (02) 9895 7029; Fax: (02) 9895 7845; pwem@dlwc.nsw.gov.au

Source: *Riprap*, Issue #11, 12/98, Land & Water Resources Research & Development Corporation, Canberra, Australia

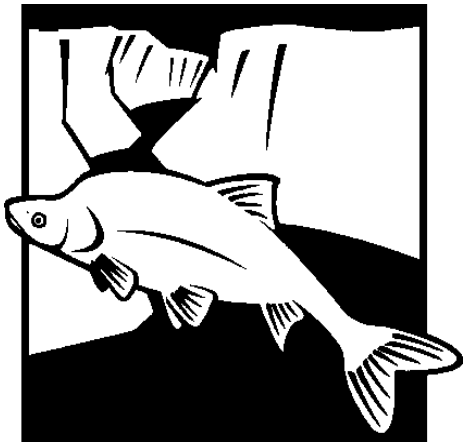
Riverside Wetlands and Endangered Fish

The U.S. Fish and Wildlife Service and Bureau of Reclamation are working to acquire access to riverside wetlands for endangered fish habitat along the Colorado River for endangered fish recovery. Priority properties are those immediately adjacent to the river in areas where flooding is most likely to occur. The Upper Colorado River Endangered Fish Recovery Program spent about $75,000 for this purpose in FY 98 and has set aside about $1.7 million for FY 99.

Key points of this initiative are:

• The project is strictly voluntary. Landowners are under no obligation to participate but would be compensated at fair market value for property rights if they choose to sell.

• The preferred agreements involve using easements, not actually buying the land. This allows original landowners to maintain their property title. Other activities such as grazing, farming, fishing and hunting are allowed on the property as long as these actions did not harm endangered fish.



UPPER COLORADO RIVER ENDANGERED FISH RECOVERY PROGRAM

• Landowners are not required to provide public access to their land.

• The project helps achieve progress toward recovery of endangered fish, which in turn allows the states of Colorado, Utah and Wyoming to develop more water for human purposes while complying with the Endangered Species Act.

• The project involves easements for up to 5,750 acres along the Green River; 3,500 acres along the Colorado River; and 750 acres along the Gunnison River.

• Wetlands are believed essential to recovery of endangered fish such as the razorback sucker and Colorado squawfish. These areas provide warmer, slower-moving water and an abundance of microscopic food. Young endangered fish grow significantly faster in these areas, which may then enable them to become large enough to fend for themselves in the main river channel and escape predation by other adult fish.

• Wetlands also help control flooding, filter water pollutants, replenish groundwater supplies and provide habitat for hundreds of species of plants and wildlife. In fact, wetlands produce more plant and animal material than any other habitat type on earth, including Brazilian rain forests.

• Riparian, or riverside, areas have been called "streams of life" and the "lifeblood" of the arid West. Scientists estimate that 60 to 90% of all terrestrial wildlife species require wetlands for their survival.

• Wildlife that commonly use wetlands along the Colorado River basin include deer, elk, rabbits, raccoons, squirrels, muskrats, beavers, mink, foxes, coyotes, fish, frogs, turtles, snakes, ducks, geese, songbirds, shorebirds, quail, pheasants, owls, hawks and eagles.

• Biologists believe boosting riverside wetlands may help keep other native fish, birds, plants and mammals from becoming endangered.

• Restoring wetland habitats also can help replenish native willows and cottonwood trees, which can provide roosting areas for eagles, herons and many other birds.

• Historically, upper Colorado River basin floodplains frequently were inundated during spring runoff. Today in the upper Colorado River basin, stream-side wetlands have been drained or cut off from the river by dikes, and many of the rivers' "backwaters" have disappeared. Habitat loss is one of the key reasons for the decline of many fish and wildlife species.

The Upper Colorado River Endangered Fish Recovery Program has established a site on the World Wide Web with more than 60 color photos of the Colorado River basin, endangered Colorado River fish, hatchery facilities, researchers at work and historical photos of the fish from the early l900s. The site also explains why the fish are endangered, describes the Upper Colorado River Recovery Program, and tells what's being done to recover them. The site is located at: www.r6.fws.gov/colorado river

Source: Upper Colorado River Endangered Fish Recovery Program, Fall/Winter 1998

Mountain Top Removal

A "landmark court settlement" between environmentalists and federal regulators will require new studies on the environmental impacts of mountaintop-removal mining operations. The agreement between the *West Virginia Highlands Conservancy* and federal agencies, including the US EPA, U.S. Office of Surface Mining (OSM) and U.S. Fish and Wildlife Service, settles a federal lawsuit brought by the group over mountaintop removal practices in 7/98.

The agreement requires the agencies to study the environmental impacts of mountaintop removal to determine the rules needed to limit environmental damage. Until the study is complete, smaller-scale environmental studies will be required for each new mine permit that proposes filling in streams with drainage areas of 250 acres or more. The agreement exempts *Arch Coal Inc.*'s proposed Dal-Tex mining complex expansion permit near Blair, WV. The EPA said the company has proposed to reduce the mine's stream fills from 12 acres to 7.4 acres. However, the *WV Highlands Conservancy* refused to sign off on the granting of the Dal-Tex permit, maintaining their right to challenge it in court. The group also refused to drop separate allegations in their lawsuit against the West Virginia Division of Environmental Protection.

A December report by the OSM condemned several mountaintop removal strip mines as illegal and "blamed vague laws for speeding the growth of the practice." The report, culminating ten months of study by the OSM, found that coal operators are "indiscriminately dumping" mine fills into valleys to avoid the expense of rebuilding hilltops; that mountaintop mines in West Virginia have received mining permits from state environmental officials without meeting federal environmental requirements; and that vague legal definitions have prevented the enforcement of laws requiring that mountains be restored by coal operators to resemble their appearance before mining. The report also recommends that the West Virginia Division of Environmental Protection adopt stricter laws to mirror federal standards for the practice and that the DEP review "hundreds of permits" granted to rectify various "illegal provisions". Copies of the report can be downloaded from the OSM Web page.
Meanwhile, a bipartisan group of West Virginia state lawmakers has recommended a package of eight bills addressing the environmental effects of mountaintop removal mining, including one that would repeal a law passed last year allowing coal companies to fill larger areas with mine waste. The lawmakers also recommended increasing buffer zones between active mines and residents from 300 to 1,000 feet and other measures to reduce blasting damage.

The *West Virginia Native American Coalition* has published an anti-mountaintop removal pamphlet called *"The Hills Are Exploding,"* and it is organizing protests against the practice . *Lexington [KY] Herald-Leader* columnist Bill Bishop writes that "changes in mine safety laws and environmental regulations" will come "when we make a political statement that we're not willing to flatten or impoverish Appalachia just so it's cheaper to run a toaster or an espresso machine" (12/9).

Sources: Ken Ward, Charleston [WV] Gazette, 12/17 and 12/31/98; and 1/3/99; *AP/Lexington (KY)* Herald-Leader, 12/7/98; Greg Stone, *Charleston (WV) Gazette*, 12/8/98 and National Journal's GREENWIRE, *The Environmental News Daily*, 12/8, 12/11, 12/17, 1/5, and 1/21/99

Gulf of Mexico Hypoxia Problem

Deepening concern about the hypoxic (low oxygen) conditions that plague the Gulf of Mexico and threaten the livelihood of regional fishermen sparked the formation of the Mississippi River/Gulf of Mexico Watershed Nutrient Task Force in 12/97. The Task Force is charged with developing solutions to the nutrient over enrichment that depletes oxygen in portions of the northern Gulf of Mexico.

At the Task Force's most recent meeting in September, preliminary assessments were unveiled by members working on scientific assessment of the problem. The goals are to 1) document the state of knowledge of the extent, characteristics, causes and effects (both ecological and economic) of hypoxia in the Gulf, and 2) compile existing information on the nutrient sources, identify alternatives to reducing nutrient loads, and examine the costs and benefits of reducing nutrient loads.

The Task Force is developing six interrelated reports on various aspects of these issues:

• Characterization of the distribution, dynamics and causes of hypoxia in the Gulf, including the relationship of hypoxia to nutrient loadings, and the relative contributions of human and natural factors;

• Ecological and economic consequences of

nutrient loading, including the impacts on the Gulf fisheries and the regional and national economy;

• Sources and loads of nutrients transported to the Gulf from within the Mississippi/ Atchafalaya River system, including identification of the most significant nutrient loads to the basin's surface water and estimation of the relative impact of human versus natural sources of nutrients;

• Effects of reducing nutrient loads on water quality, primary production, and hypoxia within the basin and Gulf. Modeling will estimate the magnitude of load reductions necessary to significantly affect hypoxic conditions;

• Evaluation of methods to reduce nutrient loads to surface water, ground water, and the Gulf. Analysis will include reduction of source contributions as well as the effects of alterations to the system, such as hydraulic transport modifications; and

• Evaluation of social and economic costs and benefits of nutrient reduction methods.

At the September meeting, Don Goolsby of the USGS provided an overview of the sources and loadings of nitrogen and phosphorus to the Mississippi River basin and outlined human activities that contribute to the loadings. An upward trend of nitrogen, primarily in the form of nitrate, in the 1970s was followed by a steady level from 1983 to 1996. From 1980 to 1996, the average load of total nitrogen to the basin was 1,567,900 metric tons per year. According to Goolsby, highly variable yields of nitrogen from year to year suggest the presence of soils with a large storage capacity. Sources of loadings include fertilizer applications, air deposition, manure, and legumes. Goolsby estimated that 17% of the total loadings are from municipal and industrial point sources, and Iowa and Illinois lead the basin states in total estimated nitrogen load contributions.

Bill Mitsch, Ohio State University, discussed potential approaches for reducing nutrient loads to the basin. Suggested approaches include modifying agricultural practices, improving point source control technologies, restoring landscapes (including wetlands and riparian corridors) in rural areas, implementing urban nonpoint source controls, restoring the Mississippi River Delta and other streams and rivers in the basin, and implementing and improving atmospheric pollution controls. Modeling scenarios predict that approximately 10 million acres of wetlands and riparian areas would have to be restored or created in the basin in order to decrease nitrogen loads significantly. The science team will most likely recommend a combination of control efforts.

Otto Doering of Purdue University reported on progress in evaluating the social and economic costs and benefits of methods for reducing nutrient loads. About 80% of total U.S. acres in major crop production of wheat, corn, soybeans, and hay are in the Mississippi River basin, making agricultural nitrogen an important target for reduction strategies. Several economic scenarios focus on reducing nitrogen from nonpoint sources, particularly cropland. One scenario included point source-nonpoint source trading where point sources would support efforts by agricultural producers to reduce nitrogen loads.

Another modeling scenario included the economic and environmental effects of reducing nitrogen use. Still another predicted the effect of moving high-nitrogen-use crops to land areas that do not drain to the Mississippi River Basin. The models indicate that a 60% reduction of nitrogen input to the Gulf would create significant economic disruptions to the agricultural sector in the Mississippi River Basin. A 20% reduction, considered more realistic, would avoid causing a significant economic impact. The science teams will submit their final reports next year.

The Task Force also drafted a "win-win" strategy for identifying near-term actions needed to reduce nutrient loads. The strategy, which would modify existing programs to reduce impacts to the hypoxic zone, is based on the premise that improving water quality "up-river" will benefit the Gulf of Mexico as well as landowners and the environment throughout the Basin. Most strategy actions focus on nutrient management and habitat restoration and build on existing programs and the Clean Water Action Plan.

Meanwhile a team of Illinois scientists blames the hypoxia zone, in part, on channelization of the lower Mississippi River and the resultant isolation of the River from it's historic coastal wetlands. They say the channelized ship canal carries the River's nutrient laden waters directly out to the continental shelf, bypassing the nutrient stabilization capability of the River's natural coastal wetlands, injecting them right into Gulfs deep coastal waters. The analogy likens the ship canal to a hypodermic needle, and the Gulf to a person involuntarily being injected with drugs. This hypothesis makes sense to many, and it's obvious that the Midwestern states and the agricultural industry are not going to play dead and accept full responsibility for the hypoxia problem. Like Pogo, "We have identified the enemy – it is all of us!" And given that, all contributing parties will have to cooperate to solve this problem.

Meanwhile, P.L. 105-383, the Coast Guard Authorization Act of 1998 and 1999, enacted on 11/13/98, includes Title VI the "Harmful Algal Bloom and Hypoxia Research and Control Act of 1998". It provides for assessments of ecological and economic consequences of harmful algal blooms and hypoxia; and requires a plan for controlling hypoxia in the northern Gulf of Mexico by 3/ 30/00.

The next meeting of the Nutrient Task Force is planned for 2/11/99, in Memphis, TN.

For more information contact: Mary Belefski, U. S. EPA, 4503F, 401 M St. SW, Washington, DC 20460; (202) 260-7061; belefski.mary@)epa.gov; www.epa.gov/surf/ surf98/Mississippi/msrhp. html

Source: *NonPoint Source News Note*s, Issue #55, December 1998

Ag Waste Update

The US EPA and U.S. pork producers on 11/ 25 reached an agreement that will allow hog farmers to devise a voluntary program "to curb water pollution". Under the deal, hog farmers who have their farms inspected under the *National Pork Producers Council's* (NPPC) EPA-approved odor and water quality assessment program will be eligible for reduced penalties for any Clean Water Act violations discovered and then corrected. Fines of up to $27,000 a day will now be capped at $40,000 per farmer

Meanwhile, a report released by the *Clean Water Network* (CWN) and *Natural Resources Defense Council* (NRDC) in December said that federal and state environmental regulations are failing to keep pace with pollution stemming from the "rapid growth of factory farms." The report documents environmental "disasters" in 30 states "spawned" by "animal factories." The increase in factory farming, inadequate pollution control technology, and lax regulation have resulted in "serious pollution

problems around the country," according to the groups. US EPA data shows that groundwater in 17 states is impaired by feedlot manure, and the U.S. Fish and Wildlife Service estimates 60,000 miles of streams in the U.S. are contaminated by manure runoff. The groups criticize the EPA's enforcement citing, a 1992 General Accounting Office report that said only 30% of 6,600 farms large enough to require a federal permit actually obtained one. None of the state programs that were evaluated "have been effective in curbing" pollution, the groups say. In fact, many states continue to take "aggressive" steps to attract factory farms through government benefits, and several states don't have a permitting system in place. The groups recommend establishing a moratorium on Clean Water Act permits for new or expanding factory farms until all existing facilities have obtained permits and standards are upgraded. They also call for banning massive open-air manure lagoons, spraying of manure and urine onto crops, and regulating the poultry industry like other animal operations.
Andy Baumert of the NPPC disputed the report's conclusions and said that in the last two years, "all" the states with the most hog farming "have seen new legislation or regulation". But the environmentalists panned the agreement between EPA and NPPC allowing farms to be inspected under an EPA-approved, industry-run program. Robbin Marks of the NRDC said, "With this agreement, EPA is admitting ... that violations of the Clean Water Act by animal factories are rampant. The question is why doesn't EPA beef up their enforcement?"

The *American Farm Bureau Foundation for Agriculture* (AFBF) in early December said it would help finance a number of research projects assessing agricultural waste and runoff issues. *Mississippi State University* researchers will examine modifying swine diets to reduce pollution, while USDA scientists will study cutting nitrate pollution by using organic matter in drain water. At the *University of California-Davis*, researchers will study stream temperature and sediment loading monitoring.

Also in December, National poultry industry representatives approved a sweeping, voluntary plan to limit runoff from chicken farms, but their enthusiasm for it was countered by doubt from the US EPA and environmentalists that the move would have any impact. The fear is that small farmers rather than big chicken companies will be expected to bear the costs, and without government subsidies that won't happen.

Meanwhile, The *Ag-Earth Task Force*, a nationwide group of agricultural companies and associations, on 11/30 announced a redesigned website to launch its drive to increase public awareness about conservation and environmental stewardship in U.S. agriculture. The effort will culminate with 1999 Earth Day activities on the National Mall. The website can be accessed at www.nasda-hq.org.

Iowa: EPA and Agriculture Dept. officials met with the *Animal Agriculture Consulting Organization* and Iowa environmental representatives on 12/3, the same day that the *Clean Water Network* and the *Natural Resources Defense Council* released their report. Darrell McAllister, Iowa's top water-quality official, told the EPA that Iowa wouldn't have the funds to implement future federal regulations because it can't afford to implement existing state laws. Meanwhile, Sen. Tom Harkin (D/IA) said at a 12/4 public hearing that he wants to ensure that the pork industry continues to thrive in the state, but Iowa must improve water and air quality.

Maryland: Delegates to the December *Maryland Farm Bureau* convention rejected a controversial proposal to stop the application of nutrient-laden sewage sludge on their fields. Some opponents said removing the option of sludge application would force them to apply more commercial fertilizer containing chemicals. Members then voted to approve the formation of a political action committee, breaking the group's "83-year history of political neutrality". Farmer Daniel Shortall said producers need a stronger voice in dealing with the legislature because few politicians have agricultural backgrounds. The PAC's goal is to raise $50,000 a year to support farm-friendly legislators. He noted that farmers "came out on the short end" of the *Pfiesteria piscicida* debate, saying there is no proof that nutrient runoff from farms is linked to the outbreak of the toxic microbe.

Missouri: Missouri State Attorney General Jay Nixon (D) on 1/19 sued the Kansas-based *Premium Standard Farms* for not reporting 11 manure spills in 1996 and 1997 until 12/98. Nixon is asking the Jackson County Circuit Court to order the nation's third-largest pork producer to stop all breeding operations until the company implements a court-approved waste management plan.

Montana: Environmentalists argued on 12/3 that Montana's program for regulating water pollution from factory farms is "weak" and could encourage a proliferation of these farms in the state. Although state regulations require permits for the farms, the *Northern Plains Resource Council* and *MontanaPeer* said the Dept. of Environmental Quality issues them only when an operator voluntarily seeks one or when someone complains about an operation.

Nebraska: The Nebraska Game and Parks Commission is concerned that runoff from a proposed 84,000-hog confinement facility near Long Pine Creek in north-central Nebraska could threaten the state's longest self-sustaining trout stream and diminish wildlife along the creek. In addition, streams along the creek sustain a bottled-water plant and provide drinking water to neighboring towns.

North Carolina: The *North Carolina Environmental Defense Fund* has launched an unusual new Web site as part of its Hog Watch campaign to clean up factory hog farms in the state. The site includes data on each of the state's more than 2,500 hog farms, information about the public health effects of the industry, and a "poop counter" tracking the amount of hog waste being disposed of in North Carolina "every second of every day". Meanwhile, the U.S.'s largest hog-processing plant increased daily production at its Bladen County, NC, plant to 28,000 hogs -- 4,000 more than North Carolina officials say is allowed. But *Smithfield Foods* officials say their hog waste discharge permit sets no daily limit on the number of hogs it can slaughter. Meanwhile, according to state Division of Soil and Water Conservation (DSWC) officials, hundreds of abandoned animal-waste lagoons in North Carolina

pose an environmental threat and may require an expensive cleanup. DSWC Director Dewey Botts said fewer than 80 abandoned lagoons have been cleaned up out of 766 identified by inspectors. The North Carolina General Assembly is expected this year to enact new cleanup standards, and the DSWC will ask for an additional $10 million to help pay the cleanup costs. And at a time when most hog farmers are being cast as "environmental villains," Cabarrus County, NC, hog farmer Tommy Porter is being hailed as an "ecological hero." The *North Carolina Assn. of Soil and Water Conservation Districts* named Porter and his family the state "Conservation Farm Family of the Year" for not having a single complaint filed against their 2,000-sow farm in the past five years.

Oklahoma: The Texas-based *Consortium Service Management Group* wants to build the first-of-its-kind U.S. treatment plant in Oklahoma that can convert hog waste into organic fertilizer and methane. The technology eliminates the need for waste lagoons as the manure is pumped through pipes to the plant where it is processed. The methane could be used to generate electricity and heat the plant, and water is recycled for reuse on the farm

Texas: The US EPA and the Dept. of Agriculture last fall announced a clean water plan meant to guide states in developing their own regulations for concentrated animal farms. But the Texas Natural Resource Conservation Commission early this year released draft feedlot operation rules that "didn't even mention" runoff pollution. State officials and farm groups aren't "enthusiastic" about the federal guidelines because they fear they would discourage the use of manure as fertilizer. The 140 feedlots in Texas produce 6-9 million tons of manure each year, almost all of which is given to farmers for use as fertilizer. But scientists in the EPA Region VI office have proposed that farmers limit the use of manure fertilizer if their soil has more than 130 pounds an acre of phosphorous.

Utah: Iron County, UT, planners are expected to approve the expansion of *Circle Four Farms* hog production over the next 3-5 years from 600,000 to 900,000 annually. The expansion would add 35,000 sows to the company's Blue Mountain complex near Milford, the largest in the U.S.

Virginia: The Virginia House of Delegates in late January unanimously passed a bill that would create a permit program for

\\\poultry waste similar to programs for hog, beef and diary operations. The measure, which would require management plans to prevent runoff from polluting waterways, is expected to be signed by Gov. James Gilmore (R). The state Senate unanimously approved the measure. The Virginia Dept. of Conservation and Recreation reported that from 1988 to 1998, the voluntary "best management practices" followed by a growing number of farmers reduced by several million pounds the nutrients and soil flowing into waterways. The department said that nitrogen losses were cut by 12.6 million pounds, phosphorous was reduced by 2.3 million pounds and soil erosion losses were cut by 2.2 million. Meanwhile in Halifax County, the Board of Supervisors on 12/7 voted to bar new hog farms for an indefinite period of time.

Sources: *Wall Street Journal*, 11/27/98; *AP/Washington Post/others*, 11/26/98; *CWN/NRDC* report, 12/98; *AP/Boston Globe*, 12/4'98; *CWN* release, 11/30/98; *AFBF* release, 12/8/98; Peter Goodman, *Washington Post*, 12/10/98; Perry Beeman, *Des Moines Register*, 12/4/98; Chris Clayton, *Omaha World-Herald*, 12/5/98; Jim Gransbery, *Billings Gazette*, 12/4/98; Ted Shelsby, *Baltimore Sun*, 12/10/98; Ted Shelsby, *Baltimore Sun*, 12/8 and 129/98; Bill Bell, *St. Louis Post-Dispatch*, 1/20/99; Paul Hammel, *Omaha World-Herald*, 1/4/99;.*NCEDF* release, 12/9/98 ;*USA Today*, 12/9/98; *AP/Charlotte Observer*, 1/5/99; Kerry Prichard, *Charlotte Observer*, 1/6/99; Danny Boyd, *Oklahoma City Daily Oklahoma*, 1/3/99; Patrick Barta, *Wall Street Journal*, (Texas edition) online 1/20/99, Lesley Mitchell, *Salt Lake Tribune*, 12/2/98, AEP release, 11/30/98; *Richmond Times-Dispatch*, 1/20/99; Greg Edwards, *Richmond Times-Dispatch*, 12/9/99; Jamie Ruff, *Richmond Times-Dispatch*, 12/9/98; National Journal's GREENWIRE, *The Environmental News Daily*, 11/30, 12/4, 12/8, 12/9, 12/10 1/6, and 1/21/99

Sediment Storage Capacity of Grass Buffer Strips

The performance of grass buffer strips alongside streams in trapping and storing sediment and nutrients, is generally considered in relation to sediment transport capacity. Grass strips have a low sediment transport capacity because of the hydraulic roughness of the grass stems, but as deposition takes place and the grass is progressively buried, hydraulic roughness decreases and sediment transport capacity increases until no more sediment is deposited.

As an alternative to the sediment transport approach, a recent study used the storage capacity of buffer strips as a measure of their effectiveness. Backwater storage, just upslope of the grass buffer strip, is important in this respect, especially at lower slopes. A backwater is an area of deep, slow-flowing water, that occurs behind a grass buffer strip. Sediment is deposited because the slow-flowing water is unable to carry its load, the same process that causes deposition within the grass. The effectiveness of grass buffers can, therefore, be measured in terms of the total amount of sediment that can be stored in the backwater and the buffer itself.

A recent study has shown that with shallow, evenly distributed overland flow, relatively narrow grass buffer strips can have a considerable storage potential, especially on slopes less than 18%. This is because the grass effectively acts as a permeable weir. The water backing up behind the grass provides a deposition area, as does the grass itself. Backwater storage tends to result in upslope extension of buffer strips, after grass has grown over the sediment deposit. Importantly, sediment trapping can be repeated because grass seeds in deposits germinate and grass grows through earlier deposits. On a 6% slope, the backwater can trap 41 kilograms/meter length of grass buffer, while on a 27% slope only 5 kilograms can be trapped in this way.

Under ideal conditions of weak flow convergence, backwater and narrow dense grass buffers can provide efficient sediment control. These findings highlight the importance of understanding the dynamics of sediment trapping in grass buffer strips as they provide a simple, effective and environmentally friendly measure to trap sediment and prevent stream pollution, even on steep slopes.

For more information contact: Linda Karssies CRC for Catchment Hydrology and CSIRO Land and Water, GPO Box 1666, Canberra ACT 2601, Tel: (02) 6246 5858, Fax: (02) 6246 5845, linda.karssies @cbr.clw.csiro.au

Source: *Riprap*, Issue 11, December 1998, Land and Water Resources Research and Development Corporation., Canberra, Australia

Wooded Buffer Strips Provide Profit and Protection

Oregon farmer Rob Miller planted his first buffer strip of native cottonwood 25 years ago along the riverbanks adjacent to his cropland. Since then, "working" buffer strips have not only protected his valuable farmland from erosion, but have also provided a profitable wood crop. They are now an integral part of a diversified farming operation that includes row crops, a research and production nursery, and specialty crops.

Mt. Jefferson Farms, owned by second-generation farmer Rob Miller, produces a variety of row crops on about 200 acres of fertile alluvial soil along the North Santiam River in the Willamette Valley south of Salem. According to Miller, the farm originally had 600 acres of irrigated cropland along the river, but lost 400 acres to erosion and siltation from periodic flooding. The remaining acreage has been saved by the planting of riparian buffer strips.

In the mid-1960s, Miller procured cuttings of 100 hybrid clones for testing on the family farm. He planted the first buffer strips of native black cottonwood (*Populus trichocarpa*) and hybrid poplars in 1970. The original plantings have withstood several major floods, and portions of it have since been harvested several times for high-value wood products. "My aim is to show landowners that buffer strips can be profitable," Miller says, "or at least a break-even proposition."

The original planting of native black cottonwood was commercially thinned in 1980 and 1994. The 1994 harvest yielded 10,000 board feet per acre, almost all of which was sold for veneer peeler logs at a value of $350 per thousand board feet. The harvest produced a total gross return of $70,000. Miller says that other sites on his farm planted with black cottonwood in the mid-1970's have yielded 20,000-25,000 board feet per acre of veneer grade logs.

Miller has also planted poplars and cottonwoods in upland areas of his farm where the soils are too poor to grow economic yields of row crops or grass seed. In a 10-year-old test planting that includes native black cottonwood and several clones of hybrid poplar, the native cottonwood has grown about half as fast as the hybrid poplar. However, where Miller has planted native cottonwoods on better soils adjacent to the riverbank, they have attained merchantable size for veneer in as little as 12-15 years.

Miller sees the use of riparian buffer strips to protect water quality as a proactive step to meet expected future regulation which may mandate controls on farming operations near riparian areas. He has about 200 acres of multipurpose riparian buffer at *Mt. Jefferson Farms*, managing it as a profitable wood crop, protecting his farmland from erosion and flooding, and preventing excess nutrients and agricultural chemicals from reaching the river. The plantings range from 200 to 1,000 feet wide along two miles of river frontage. Miller's aim is to harvest and

replant portions of the buffer strips every year to achieve an annual sustained yield of timber while maintaining their protective capacity.

In addition to the riparian buffer strips of cottonwood and poplar, Miller has effectively used several bioengineering practices to prevent streambank erosion. Both poplars and willows are densely planted as "live stakes," and cuttings are used to construct fascines and brush mattresses to help protect the river banks. Buffer strips, combined with bioengineering measures, reduced erosion and siltation of Miller's farmland during recent floods while large barriers of rock rip-rap installed to protect the neighboring farm on the opposite side of the river were not successful.

Miller uses a zonal design to establish riparian buffer strips at *Mt. Jefferson Farms*. In the zone closest to the river, native cottonwood and native understory plants are established. In some areas with suitable soils, hybrid poplars are densely planted (one per square foot) near the riverbank, both to control erosion and as a stool bed for cuttings. In the next zone away from the river, a variety of trees are more widely spaced for timber production. In addition to hybrid poplar, Miller is also planting Knobcone-Monterey hybrid pine and leyland cypress for wood production on a sustainable cycle of harvest and coppicing or replanting.

Mt. Jefferson Farms is Oregon's first and largest hybrid poplar nursery. The company has growing grounds and greenhouse facilities near Salem. Every year, the nursery produces millions of dormant cuttings for landscaping, farmland plantings, and industrial fiber plantations. The nursery also does selection, breeding and genetic improvement of hybrid poplars for private industry and public agencies. Many new poplar clones, obtained from *Washington State University*, *University of Washington* and other sources, have been screened in greenhouse and field trials. Clones are tested not only for growth, but also for their capacity to take up nutrients such as nitrogen and phosphorus. Clones that are highly efficient at absorbing excess nutrients will be used for "phytoremediation" treatment of wastewater.

In 1992, Miller began selecting and custom-propagating a variety of other native tree and shrub species for ornamental and environmental purposes, e.g., wastewater treatment, filter strips, bioengineering, and watershed revegetation. Customers for contract propagation include both public agencies (e.g., USFS, BLM) and private companies. The aim is to propagate plant material for replanting in the same watershed or zone where it originated. Miller says that the practice of using locally-collected native plants, rather than introducing off-site genetic material, improves the survival rate for revegetation projects. The nursery has propagated spirea, alder, cottonwood, rose, berries, conifers, willow, cypress, and grasses.

For more information contact: Rob Miller, *Mt. Jefferson Farms*, P.O. Box 12708, Salem, OR 97309.

Source: *Temperate Agroforestry*, 203 ABNR, University of Missouri, Columbia, MO 65211. Website: www. missouri.edu/ ~afta/afta_home. html.

Buffer Strips Misunderstood by the Public

Focus groups organized by the Maine Department of Environmental Protection's Nonpoint Source Program in 1998 examined marketing non-point source controls to the general public. Several findings concerned buffer strips. They found that the term "buffer" carries a different meaning for the public than the one intended by water quality agencies. One member of the focus group said that "a buffer was a product used to wax a car."

In addition, the public is more interested in advantages like privacy, noise reduction, and attracting birds and wildlife. They are less interested in "intangibles" like protecting water quality. The groups recommended avoiding "technoese," by telling people, for example, "plant trees and shrubs, instead of "plant a buffer." They also advocated picking selling points with the public concerns in mind, rather than that of the agency.

Asking people to plant a buffer for water quality does not appeal to individual needs and societal values. Future campaigns should include slogans like "plant trees and shrubs, screen out noise, increase privacy, attract wildlife, and protect water quality," the groups recommended.

Source: *NonPoint Source News Notes*, November, 1998, Issue #54

Miscellaneous River Issues

Acid Mine Drainage: The U.S. Office of Surface Mining (OSM) on 1/4 announced a new initiative, the Watershed Cooperative Agreement Program, to provide funding for local organizations to undertake acid mine drainage projects. More than $700,000 will be made available to fund cooperative agreements between the OSM and non-profit groups under the office's FY 99 Appalachian Clean Streams Initiative. Sources*: OSM* release, 1/4/99; and National Journal's GREENWIRE, *The Environmental News Daily*, 1/5/99

Arkansas River Shiner Listed: The U.S. Fish and Wildlife Service (USFWS) in late November listed the Arkansas River shiner as threatened under the Endangered Species Act and said the small silver minnow is likely to become endangered in the foreseeable future. To protect the fish, the USFWS will encourage Texas, Oklahoma and New Mexico to improve irrigation efficiency and water conservation. Some Army Corps of Engineers reservoirs also may need to be modified. A recovery plan for the species will be drafted over the next two years. Sources: *AP/Dallas Morning News*, 11/26/98; and National Journal's GREENWIRE, *The Environmental News Daily*, 12/1/98

Chicago River Snow Dumping: Chicago officials have opted not to dump excess snow into the Chicago River or Lake Michigan as has been done in past winters, due to fears that contamination from city streets will "foul" waters that the city has worked for 10 years to clean up. The US EPA does not prohibit dumping snow in a river, and many cities do it. But Chicago officials want to avoid past "mistakes" like the incident in 1979 when a junk car was tossed into the lake with the snow. Sources: Debbie Howlett, *USA Today*, 1/15/99; and National Journal's GREENWIRE, *The Environmental News Daily*, 1/15/99

DNA Testing for Pollution: A new method of DNA testing that determines genetic diversity of fish populations can reflect the amount of pollution in waterways. The method developed by *Wright State University* molecular biologist Dan Krane, is similar to one that Virginia officials are using to find water pollution sources. Krane has performed tests on crayfish in Ohio rivers, where he noticed a difference in the amount of genetic diversity in different streams. A high number of closely-related species suggests high pollution levels because less-closely related animals cannot endure the conditions, said Krane. The US EPA's Region V office has been using similar testing for several years, but the testing has not been adopted agency-wide. Krane believes similar methods could be used to detect pollution on land. Sources: James Hannah, *Cleveland Plain Dealer*, 1/10/99; and National Journal's GREENWIRE, *The Environmental News Daily*, 1/13/99

Fox River Cleanup: A judge on 12/4 lifted a restraining order that had prevented the state from hauling PCB-contaminated silt from the Fox River to a Winnebago County landfill. The county will now accept dried-out silt with PCB concentrations below 50 ppm, while silt with the highest concentration of PCBs will be shipped to a dump near Detroit, MI. Sources: *AP/Milwaukee Journal-Sentinel*, 11/7/98; and National Journal's GREENWIRE, *The Environmental News Daily*, 12/9/98

HCPs/Captive Breeding Criticized: A new report on federal habitat conservation plans (HCPs) for endangered species raises questions about the way the plans are created. More than 100 scientists from eight universities examined 208 HCPs nationwide in a study, sponsored by the *American Institute of Biological Sciences* (AIBS) and the *National Center for Ecological Analysis and Synthesis* (NCEAS). They conclude that the HCPs lacked "adequate" species impact assessments and that mitigation measures lacked supportive data. They said provisions to monitor the success of HCPs were often nonexistent. "In many cases, we found that crucial, yet basic information on species is unavailable for the preparers of HCPs." The *American Lands Alliance* (ALA) and the *Defenders of Wildlife* said the new study bolsters their view that "policy deficiencies" allow "significant habitat degradation." The captive breeding and reintroduction of rare species is also coming under fire "as a costly, often futile exercise" that fails to address key problems like habitat loss. Despite some success stories, critics say the reintroduction programs are "wasteful of individual species," many of which die in the wild. They also say policymakers lack the space and resources to sustain the reintroduced species indefinitely. In a 1994 study of 145 documented reintroduction efforts worldwide, only 16 were found to have produced viable, self-sustaining populations in the wild. The AIBS/NCEAS sponsored report is available online at http://www.nceas.ucsb.edu. Sources: *ALA release*, 1/16/99; Mark Derr, *New York Times*, 1/19/99; and National Journal's GREENWIRE, *The Environmental News Daily*, 1/19/99

Logging Road Lawsuit: The U.S. Forest Service (USFS) has agreed to pay $440,000 for "old and continuing damages" from a logging road to the ranch of a Montana family. The family sued the agency after two major landslides dumped sediment into a creek on their land. According to the court settlement, the USFS has until the end of 2005 to bring the road into compliance with the National Environmental Policy Act. Sources: *AP/Billings Gazette*, 1/7/99; and National Journal's GREENWIRE, *The Environmental News Daily*, 1/7/99

Little Tallahatchie River Restoration: The Army Corps of Engineers is considering an environmental restoration project on a 23-mile stretch of the Little Tallahatchie's old river bed that the Corps admits is "environmentally degraded" because of its work. The rechannelization would allow for

repopulating more than 80 species of fish and restoring wildlife habitat as well as cleaning up much of the water that flows into Sardis Lake. Sources: *AP/Biloxi Sun Herald*, 12/3/98; and National Journal's GREENWIRE, *The Environmental News Daily*, 12/8/98

Mississippi River National Park: Authors and historians Stephen Ambrose and Douglas Brinkley propose the establishment of a Mississippi River National Park to "teach individual and corporate citizens how to appreciate, respect and cherish our national river." The two write that the river in recent decades "has been used as a giant sewer" of PCBs, pesticides, oils, heavy metals and dioxin, but the establishment of the park "would foster public appreciation of the great waterway." "Once people are brought to understand the broad historical and ecological significance of the river, they cannot help but appreciate it and, one hopes, choose to protect it", they said. Sources: *Wall Street Journal*, 1/14/99 and National Journal's GREENWIRE, *The Environmental News Daily*, 1/14/99

Montana Water Regs: The US EPA on 12/24/98 ordered Montana to revise state water regulations within 90 days and condemned "the weakening" of the program. The EPA examined the state's water laws in response to a lawsuit that several environmental groups brought against the EPA in 7/98 for allegedly failing to review changes made to Montana's water-quality standards in 1993 and 1995. In a letter to Gov. Marc Racicot (R), the EPA said it "disapproves" of changes to state law that allow short-term exemptions from water-quality standards, exclude certain activities from non-degradation requirements and define water degradation in a way that may not provide sufficient protection for waters around national parks and wilderness areas. Montana Environmental Quality Director Mark Simonich said that the EPA is in some cases "dead wrong" in its recommendations for changes, but the state has found some areas that can be "fixed fairly easily". Sources: Erin Billings, *Billings Gazette*, 1/7/99; and National Journal's GREENWIRE, *The Environmental News Daily*, 1/7/99

Nebraska Water Rights: Gov.-elect Mike Johanns (R) on 12/1/98 pledged to take a strong role in setting state water policy and "aggressively defend" the state's water rights in disputes with other states. At the joint annual meeting of the *Nebraska State Irrigation Assn.* and the *Nebraska Water Resources Assn.*, Johanns said that defending water rights "has to be a priority for the state". Meanwhile, the U.S. Supreme Court on 1/19/99 invoked "original jurisdiction" and agreed to resolve a dispute between Kansas and Nebraska over the use of water from the Republican River. Nebraska, Colorado and Kansas in 1943 signed a pact allocating the river's water, but in a suit filed last year, Kansas claimed that Nebraska has been "siphoning off" more water than it is entitled to. Sources: Julie Anderson, *Omaha World-Herald*, 12/2/98; *AP/Wichita Eagle*, 1/20/99; and National Journal's GREENWIRE, *The Environmental News Daily*, 12/3 and 1/21/98

Ohio Farmland Preservation: Acting Ohio Gov. Nancy Hollister (R) on 1/4/99 signed legislation allowing counties to pay farmers for not selling their land to developers, handing planners a tool to stem urban sprawl. The measure allows local governments to pay farmers the difference between the development value and the agricultural value of their farmland. The property would continue to be used for agriculture. Local officials would have to ask voters to raise the sales tax or pass a bond issue to pay farmers, which could be a "tough sell." But Larry Long, head of the *County Commissioners Assn. of Ohio*, said "there's an amazing amount of interest in the issue of farmland preservation". Sources: Paul Souhrada, *AP/Cleveland Plain Dealer*, 1/5/99; and National Journal's GREENWIRE, *The Environmental News Daily, 1/6/99*

Pennsylvania Protected Fish: A Pennsylvania Fish and Boat Commission proposal to increase the number of fish species listed in the state as endangered or threatened has been delayed by objections from the river dredging, paving, coal and home-building industries. Industry lobbyists are concerned that new habitat protections would stop or limit development and increase state permit costs. But a state Dept. of Environmental Protection analysis finished in November found that the proposed listings would have "scant impact" on the approval or cost of new permits. The commission's proposal is based on a *Penn. State University* study and on a new standardized method of ranking the status of fish species. Under the new method, 56 species are eligible for endangered, threatened or "candidate" listing. A vote on the new listings has been delayed three times by industry requests for extensions of the public comment period, and is now expected no earlier than 5/99. Source: Paul Nussbaum, *Philadelphia Inquirer*, 1/12/99; Hopey/Shelly, *Pittsburgh Post-Gazette*, 1/11/99; and National Journal's GREENWIRE, *The Environmental News Daily*, 1/12/99

Platte River Habitat Preservation: The *Central Nebraska Public Power and Irrigation District* has signed an agreement to preserve nearly 4,000 acres of "prime Platte River bottomland" as wildlife habitat. The land will help fulfill the company's obligation to obtain 4,200 acres of wildlife habitat along the river as a power plant licensing condition. Sources: Paul Hammel, *Omaha World-Herald*, 1/6/99; and National Journal's GREENWIRE, *The Environmental News Daily*, 1/6/99

Southern Water Pact: Hope is fading that negotiators from Florida, Georgia and Alabama will strike a court ordered agreement on a water-sharing plan for the Chattahoochee River. Georgia seeks to retain more water upstream in Lake Lanier, but Alabama and Florida "want the water to keep coming." Only once before on the East Coast have states tried to divide their shared waters, "and never on this scale." After eight years of talks, the states are stuck in a stand-off. At risk is "one of the most diverse ecosystems in the world," according to Constance Hunt of the *World Wildlife Fund* (WWF). WWF VP William Eichbaum wrote in a letter to the editor of *USA Today* that unchecked urban growth is "stripping this biological treasure chest" of its water and that "the entire regional river system is under critical stress" (12/1). WWF has launched a project to conserve the rivers of the Southeast, which it says are threatened by habitat degradation and invasive species as well as changes in water quantity. Source: *WWF release*, 12/1/98

Tax Breaks for River Protection: Restructuring of the electricity industry and a proposed pilot program that would grant tax credits to property owners who agree to protect riverbanks along "scenic" waterways are among the top issues facing Mississippi lawmakers in 1999. Sources: Reed Branson, *Memphis Commercial Appeal*, 1/4/99; and National Journal's GREENWIRE, *The Environmental News Daily*, 1/6/99

Tennessee Permit System: Saying that their policies "don't always work," Tennessee Dept. of Environment and Conservation (DEC) regulators plan to change the way permits are issued to developers whose projects damage streams. DEC official Paul Davis said even when developers comply, streams and surrounding habitat often deteriorate. He supports establishing a comprehensive, or county-wide permit

system. Sources: Tom Charlier, *Memphis Commercial Appeal*, 12/1/98; and National Journal's GREENWIRE, *The Environmental News Daily*, 12/4/99

Texas Aquifer Pumping: A Texas judge has ruled that the *Edwards Aquifer Authority* illegally adopted water pumping limits that ration water among municipalities. State District Judge Joseph Hart said the aquifer authority failed to follow the Texas Administrative Procedure Act by not writing an order giving "reasoned justification" for the rules when it adopted them on 1/20/99. The ruling implements an interim pumping authorization that allows all aquifer users to pump as much water as they ever did in one year between 1972 and 1993. The *Sierra Club* previously has said that without pumping limits, the springs that support endangered wildlife, including fish and salamander species, are threatened. Sources: *AP/Dallas Morning News*, 12/3/98; and National Journal's GREENWIRE, *The Environmental News Daily*, 12/8/98

Timber to Textbooks: A new formula that directs revenues to Ohio schools from timber sales in state forests has environmentalists worried that the stronger "timber to textbooks" link will mean more logging. Schools in forested areas of Ohio in 1998 received a "windfall" of more than $500,000 from the Ohio Division of Forestry under the program that distributes 40% of gross logging revenues to local schools. Before the formula was revised in 1996, schools received no logging revenues. The changes in Ohio come at a time when the U.S. Forest Service has proposed to pay a flat rate to communities from timber sales in national forests, a move applauded by environmentalists for eliminating logging incentives. Sources: Randall Edwards, *Columbus Dispatch*, 1/10/99; and National Journal's GREENWIRE, *The Environmental News Daily*, 1/13/99

TVA Environmental Cleanup: Tennessee Valley Authority (TVA) Chair Craven Crowell wants the federal utility to "show leadership in cleaning up the environment" and "set the benchmark." TVA plans to examine its options for the partially completed Bellefonte nuclear plant in Alabama following Energy Secretary Bill Richardson's decision in December not to use it for producing tritium. One option is to convert the Bellefonte facility into a gas-fired plant. The *Lexington Herald-Leader* lauded TVA's pledge to maintain its Land Between the Lakes nature preserve as "good news to all who treasure the beautiful preserve". Sources: *AP/Lexington Herald-Leader/ others*, 1/4/99; and Rachel Zoll, *AP/ Birmingham News* online, 1/4/99; and National Journal's GREENWIRE, *The Environmental News Daily, 1/6/99*

USFS Grazing Policy Changes: "Spurred by lawsuits from without and new leadership from within," the U.S. Forest Service (USFS) is changing its land management practices to "better protect ecologically sensitive" areas, a shift that is having "a dramatic impact on Southwest ranchers". With USFS environmental assessments calling for many ranchers to minimize the effects of grazing on public land by reducing their herds, several ranches find "their very survival is now in question." But cattle ranches that depend on federal land for grazing represent a small segment of the economy of the West, according to *University of Montana* economist Thomas Michael Power. He said 11 western states get nearly one-eighth of their livestock feed from federal lands, and nationally, 2% of cattle feed comes from federal grazing lands. Now "vast tracts of publicly owned forest and plains are viewed as more valuable for recreation, wildlife and aesthetics," and "some have suggested that tourism is the future" for private ranches that have long utilized large grazing allotments. Meanwhile, in New Mexico elk grazing may be causing as much damage to environmentally sensitive areas as livestock, said a USFS environmental assessment. The USFS said elk management in the Gila is a major issue because elk eat the same amount of forage as a yearling cow. The number of elk has increased steadily since the 1970's and current populations could nearly triple in 10 years if no control measures are taken. To address the growth, the USFS is working with the New Mexico Dept. of Game and Fish to develop hunting strategies. Cattle ranchers were pleased with the report because the elk damage streamsides and cause problems for ranchers, said Caren Cowan of the *New Mexico Cattle Growers Assoc*. However, the environmentalist group *Forest Guardians* disagrees with the report, saying the USFS is blaming elk for problems caused by livestock. Like elsewhere, New Mexico ranchers fear that an honest look at how grazing has harmed New Mexico's rivers will result in cattle being removed from public lands. The U.S. Bureau of Land Management agreed to study how to manage land along New Mexico's rivers to settle a 1996 lawsuit. The study will result in four habitat management plans for different areas. Sources: Tom Kenworthy, *Washington Post*, 11/29/98; *AP/Albuquerque Journal*, 12/4/98; Ben Neary, *Santa Fe New Mexican*, 12/6/98; and National Journal's GREENWIRE, *The Environmental News Daily*, 11/30 and 12/7/98

Virginia's Rivers Cleanup: Virginia environmental officials should have included "scores" of additional waterways and the Chesapeake Bay on its 4/98 list of polluted waters, according to the US EPA, which says it will expand the list. The agency in November told Virginia officials that it will add about 100 sections of rivers and estuaries to the state's list of about 240. Once a waterway goes on the list, the state must prepare a plan for pollution reduction. Meanwhile, Virginia Gov. James Gilmore (R) in early December announced that he will ask the General Assembly to spend $48 million to fight pollution in Virginia's rivers. Environmentalists are pleased with Gilmore's announcement. They attacked former-Gov. George Allen's administration for its poor environmental policy and Gilmore had served as attorney general under that administration. If the General Assembly approves the plan, $24 million would be spent to reduce pollution from factories and sewage plants along the Rappahanock, York and James rivers. The cities of Richmond and Lynchburg would receive $11.3 million to improve their sewers which overflow during heavy storms. The Virginia Dept. of Conservation would receive $9.8 million to fight problems like nutrient runoff. The rest of the funds would be spent on smaller water-quality projects.

Sources: *AP/Lexington Herald-Leader/ others*, 1/4/99; Rachel Zoll, *AP/Birmingham News online*, 1/4/99; Rex Springston, *Richmond Times-Dispatch*, 12/2/98; R.H. Melton, *Washington Post*, 12/8/98; Springston/Hardy, *Richmond Times-Dispatch*, 12/8/98; Larry O'Dell, *Washington Times*, 12/8/98; and National Journal's GREENWIRE, *The Environmental News Daily*, 12/2 and 12/8/98

Clean Water Action Plan Update

Since the Clean Water Action Plan (CWAP) was released by President Clinton and Vice President Gore last February, several significant milestones have been reached. Summaries of some key CWAP milestones follow:

Joint Animal Feeding Operation (AFO) Strategy: The draft strategy proposes a

national performance expectation for all AFOs to develop and implement Comprehensive Nutrient Management Plans (CNMPs). CNMPs would establish clearly defined nutrient management goals and address feed management, manure handling and storage, land application of manure, record keeping, and other manure utilization options. The vast majority of AFOs would develop and implement CNMPs through voluntary programs, while high risk operations would be required to obtain permits through the Clean Water Act permit program implemented by the states and US EPA. A key component of the strategy is the identification of technical and financial assistance to help AFO owners and operators develop and implement sound CNMPs. The public comment period on the draft strategy ended on 1/15/99.

Final Unified Watershed Assessments: The Plan calls upon states and tribes to work in cooperation with federal, interstate, and local agencies, watershed-based organizations, and the public to identify watersheds most in need of restoration and to develop restoration action strategies. Last June, US EPA, USDA, and other federal agencies developed a framework to assist states and tribes in preparing unified watershed assessments (UWAs), the first step in identifying watersheds in need of action. States were encouraged to draw from existing water quality data and piece together what this information says about overall watershed conditions. After receiving feedback on drafts from an interagency workgroup and the public, 56 states and territories, the District of Columbia, and 13 tribes submitted final UWAs in October. The next step will be to map the results of these UWAs. A large part of the new resources proposed by the President's FY 99 budget will be used to implement the resulting restoration strategies. For more information, visit EPA's website at www.epa.gov/owowwtr1 /cleanwater/ uwafinal/uwa.html.

State Coastal Polluted Runoff Control Programs: The Plan calls for improved efforts to address polluted runoff in sensitive coastal watersheds. The National Oceanic and Atmospheric Agency (NOAA) and US EPA conditionally approved all 29 of the submitted State Coastal Nonpoint Pollution Control Programs in June 1998. All programs were to be fully approved by December 1999 with appropriate state-enforceable policies.

Conservation Reserve Enhancement Program (CREP) Guidance: The Farm Services Agency released final guidelines on the CREP program, a state-federal conservation partnership program targeted to address significant water quality, soil erosion, and wildlife habitat issues related to agricultural land use. The program uses financial incentives to encourage farmers and ranchers to voluntarily enroll in contracts of 10 to 15 years in duration to remove lands from agricultural production. For more information, visit the CREP website at www.fsa.usda.gov/ dafp/cepd/crep/ crephome.htm.

Contaminated Sediment Strategy: Last April, US EPA released a Contaminated Sediment Management Strategy that summarizes the Agency's understanding of the extent and severity of sediment contamination and describes a framework to reduce ecological and human health risks posed by sediment contamination. EPA estimates that 10% of the Nation's lakes, rivers, and bays have sediment contaminated with toxic chemicals that can kill fish living in those waters or impair the health of people and wildlife who eat contaminated fish. For more information, visit EPA's website at www.epa.gov/OST/ cs/stratndx.html.

Plan for Wetlands Status and Trends Reporting: The interagency group on wetlands issued a final plan for developing a single, improved wetlands status and trends report. This report should be issued by 2000. The leads for this project are the White House and the Wetlands Working Group.

Fish Consumption Safety: Last July, US EPA sent letters concerning fish consumption advisories to state environmental, public health, and natural resource management agencies and to all tribes that operate the national water program. The letters emphasized the importance of a risk-based fish consumption advisory program and asked states and tribes to compare their existing fish advisory programs with US EPA's National Guidance on Fish Consumption Advisories.

Nutrient Assessment Strategy: Last June US EPA released a national strategy for the development of water quality criteria and standards for nutrients. CWAP calls for EPA to publish criteria (i.e., scientific information concerning harmful levels of a pollutant) for nutrients by the year 2000. These criteria will be used by states to develop numeric nutrient provisions of state water quality standards. The new strategy describes the process for developing criteria that are appropriate for various types of waterbodies and different regions of the country.

Source Water Assessment Agreement: A key element of CWAP is the integration of public health and aquatic ecosystem goals. Under an agreement yet to be signed, 10 federal agencies will commit to helping states, tribes, and local communities design and implement their drinking water source assessment and protection programs within a watershed framework. The State Source Water Assessment and Protection Program, developed under the mandate of the Safe Drinking Water Act Amendments of 1996, requires all states to complete assessments of their public drinking water supplies to determine susceptibility to potentially significant contaminant sources within their source water areas. The federal agencies will direct program authorities, technical assistance, data, and enforcement resources to help integrate source water goals with watershed restoration priorities. The agencies will agree to:

- Create partnerships between federal and state regional and field offices;
- Improve access to data held by the different agencies and work cooperatively to develop a clearinghouse for information on these databases;
- Coordinate drinking water source assessment and protection efforts with related CWAP action items; and
- Develop performance measures.

National Contingency Plan for Harmful Algal Blooms: The National Oceanic and Atmospheric Administration (NOAA), US EPA, the Food and Drug Administration, the U. S. Geological Survey, and the Centers for Disease Control, are developing a detailed federal response plan for harmful algal blooms and other major events in coastal waters. NOAA, the coordinating agency, has received comments from state and federal agencies and is working to finalize the plan. The plan provides individual states with federal expertise and support to immediately respond to *Pfiesteria* outbreaks, fish lesions, and fish kills; and to associate threats to public health.

National Harmful Algal Blooms Research and Monitoring Strategy: This strategy serves as a framework to coordinate all scientific and management activities related to *Pfiesteria*-like organisms. Implementation of the strategy is comprised of many ongoing efforts, including completion of the National Contingency Plan for Harmful

Algal Blooms and operation of the multi-agency program on the Ecology and Oceanography of Harmful Algal Blooms (ECOHAB). Research funding through ECOHAB is currently being dispersed and funding opportunities for next year will be announced later.

Information about the budget and major CWAP milestones can be found at: www.cleanwater.gov/

Source: *Watershed Events*, EPA 840-N-98-002, Fall 1998

Clean Boating Partners Program

Next July, marinas, boatyards, and marine dealers will be able to proclaim their dedication to clean water by flying a colorful flag. Leading recreational marine organizations met in Fort Lauderdale, FL, on 11/3 to develop an awards program for publicly recognizing marinas, boatyards, and marine dealers who voluntarily take the pledge to practice and promote clean boating. Named the National Environmental Excellence Awards Program, it builds on the National Clean Boating Campaign launched by the *Marine Environmental Education Foundation* (MEEF) in 1998. The Clean Boating Campaign now has 618 partners, and interest is swelling, according to MEEF's president, Neil Ross.

The excellence awards will recognize those partners who have gone beyond implementing clean practices to promoting them to their customers. According to Ron Stone, chair of the awards task force, participants who agree to follow recommended clean boating practices will qualify for a certificate of recognition and the right to fly a distinctive flag identifying them as award winners. Compliance, though completely voluntary, will be subject to verification and periodic review by MEEF's regional representatives.

Award criteria, a pledge, and the flag will be ready for the 1999 boating season, which MEEF will officially kick off with the 1999 Clean Boating Week, July 10-18. "The marina and boat- uilding industries have long recognized that clean water is good for business, and the flag program is a good way to recognize their efforts and to publicize the need for clean boating practices." says Stone.

Recommended practices for Clean Boating Partners include the following:

- Arrange for recycling service on used oil solvents and oil filters;
- Demonstrate economic and environmental benefits of using dustless sanders and grinders;
- Offer free pump-outs to all boaters during National Clean Boating Week, 7/10-18/99, and register to be on MEEF's national pump-out publicity list;
- Install a national pump-out sign showing the new logo and slogan;
- Designate a pet walk area for dogs;
- Post signs describing how to dispose of litter and fish cleaning waste and clearly mark disposal areas;
- Post signs showing boaters clean fueling techniques; and
- Organize on-site training for marina managers and staff on best management practices; give certificates of training.

For more information contact: MEEF/ NCBC, P.O. Box 37, Kingston, Rl 02881, (401) 792-9025, Fax (401) 782-2116, neil.ross@worldnet.att.net; or on the Web Site at www. clean boating.org/info/ boat5b.htm.

Source: *NonPoint Source New Notes*, December 1998, Issue #55

Save Our Streams Workshops

Several wetlands workshops are being offered around the country by the *Izaak Walton League of America* (IWLA) as part of the League's Save Our Streams (SOS), Wetlands Conservation and Sustainability Initiative. The goal of SOS's wetlands initiative is to encourage citizens to take a proactive role in conserving and restoring wetlands.

The one- and two-day workshops are geared toward citizens, educators, community and business leaders, and others with a non-science background. Morning sessions consist of classroom lectures on local wetland hydrology, vegetation, and soils; relevant regulations; using resources such as plant keys; and wetland functions and values. Afternoons will be devoted to field training sessions in which participants will see examples of plant adaptations, explore differences between upland and wetland soils, examine the effects of human impacts on wetlands and identify vegetation.

In the two-day workshops, participants also will learn techniques for setting up transects, monitoring vegetation, and sampling soils. Each participant will receive a copy of the *Handbook for Wetlands Conservation and Sustainability*. The handbook is also offered through SOS for $35.00 plus $5.00 shipping and handling by calling (800) BUG-IWLA (284-4952) or by e-mail sos@iwla.org.

The one-day workshops will be offered in conjunction with *Terrene Institute's* Communities Working for Wetlands conferences. These conferences will be held in New Orleans (February 18-20), San Francisco (March 18-20), Indianapolis (April 8-10) and Boston (May 6-8). SOS workshops will take place on the day before each conference. In addition, IWLA is seeking groups that are interested in hosting a workshop. For more information, call Leah Graff, SOS Technical Coordinator; or Julie Middleton, SOS Program Director, at (800) BUG-IWLA (284-4952).

Climate Change Update

Last year was the "hottest" year on record, and rising temperatures are further evidence of global warming, according to reports released in early January by NASA and the National Oceanic and Atmospheric Admin. (NOAA). The global mean temperature in 1998 was 58.1 °F, 1.2 °F above the long-term average value of 56.9. This was the 20th consecutive year with a global mean temperature exceeding the long-term average. The findings are based on data collected from thousands of land- and ocean-based meteorological stations by NOAA's National Climate Data Center in North Carolina. Last year's warmth was linked in part to a particularly strong bout of the El Nino weather phenomenon. And according to NASA, the most unusual temperature readings in 1998 were in North America. The U.S.'s average temperature in 1998 was 54.62 ° F, creating a virtual tie with the warmest year on record, 1934.

For the first time, however, a team of government and university scientists has found a high- resolution, 15,000 year record of rain-induced erosion in sediment layers of an Ecuadorian lake that indicates El Nino-like climate fluctuations became more common about 5,000 years ago. Writing in the current issue of *Science*, the researchers found that a core sample of layers of sediment deposited during severe storms in Lake Pallacacocha in southwestern Ecuador closely correlates with El Ninos that are known to have occurred over the past 200

years.

"The full sediment record indicates that 15,000 years ago severe El Nino-like storms occurred at least about every 15 years, and that they have since occurred with progressively increasing frequency. Over the past 5,000 years, storms from El Nino-like climate fluctuations have occurred about every 2 - 8.5 years, possibly due to enhanced trade winds," said the study's lead author, Donald T. Rodbell of *Union College*, Schenec-tady, NY. The authors point out that there are proxy records of prehistoric El Ninos in a variety of natural archives, including corals, ice cores, tree rings, flood deposits, beach ridges, archeological middens and soils. But high-resolution records in corals and ice cores are limited to the past 2,000 years, while longer records are not continuous.

Sea surface temperatures near this part of Ecuador are among the first to warm in the region during the onset of an El Nino, when rainfall greatly increases. Since extreme El Nino-driven storms are known to deposit organic and inorganic debris in coastal basins, the scientists analyzed a 9.2-meter-long core of sedimentary rock obtained in June 1993 from Lake Pallacacocha, which is about 75 kilometers from the Pacific Ocean. These layers of sediment, known as clastic laminae, are made up of fragments of vegetation that were washed into the lake from the surrounding landscape during torrential rain storms.

The sediment record from 1800 to 1976 A.D. reveals a close match between the layers of clastic laminae and moderate to severe El Ninos. Of the 17 El Ninos that occurred in this time period, 11 correlate within two years of major layers of clastic laminae, and one is within three years. The other five severe El Ninos during this period occurred within two years of relatively minor layers of clastic sediment. The eight severe El Ninos of the past 100 years correlate precisely with clastic laminae in the core.

In addition to Rodbell, authors of the *Science* paper are J. H. Newman, Department of Geology, *Union College*, Schenectady, NY; G. O. Seltzer, Department of Earth Sciences, *Syracuse University*, Syracuse, NY; D. M. Anderson, National Environmental Satellite, Data and Information Service, NOAA, Boulder, CO; M. B. Abbot, Department of Geosciences, *University of Massachusetts*, Amherst, MA; and D. B. Enfield, Atlantic Oceanographic and Meteorological Lab., NOAA, Miami, FL.

A second new study by U.S. government researchers concludes that there is little evidence that global warming has made floods or droughts more common along U.S. streams. "If anything, the trend since at least the 1940s, ... is that the continental U.S. is getting wetter, but less extreme," said Harry Lins, a hydrologist with the USGS and co-author of a report published in *Geophysical Research Letters*. The researchers looked at daily stream flow records of 395 relatively natural streams going back as far as 1914. The data showed that daily average stream flows and the annual minimum increased at nearly a third of the gauges. But the highest flows increased at only 4% of the gauges and fell at 5%.

"Most experts believe the increased flood damage and vulnerability to drought [seen in the 1990s] have been the result of people building more structures on flood plains and moving to areas with less reliable water supplies than drastic changes in weather patterns".

Sources: Seth Borenstein, *Philadelphia Inquirer/others*, 1/12/99; NOAA release, 1/12/99; *AP/Boston Globe/others*, 1/12/99; Lee Bowman, *Scripps-Howard News/ Washington Times*, 1/14/99; and National Journal's GREENWIRE, *The Environmental News Daily*, 1/12 and 1/14/99

NOTE: All NOAA press releases, and links to other NOAA material, can be found on the Internet at http://www.noaa.gov/public-affairs.

Matters of Scale

- Number of people killed in international terrorist attacks in 1997 - 221
- Number of people killed by human-exacerbated floods in the past 8 months - 10,914
- Population of the United States - 270 million
- Number of the 400 million people living in China's Yangtze River watershed who lost crops, were forced out of their homes or businesses, or suffered other damages from the flooding of the Yangtze River in 1998 - 240 million
- Population of Italy - 57 million
- Number of people flooded out of their homes in China in 1998 - 56 million

Source: *World Watch*, November/ December 1998

A Focus on Sustainability - Missouri River Conference

Sustaining the Missouri River for Future Generations is the theme for the 3rd Annual Conference on the Natural Resources of the Missouri River Basin. The conference continues a tradition initiated in 1997 to provide a forum for information exchange on the stewardship, ecology, and management of the Missouri River and its flood plain.

The Conference begins with a field trip on Sunday to Oahe Dam and Powerhouse. At the evening social Stephen Kinsey from the *Environmental System Research Institute* (ESRI) will give a special multi-media GIS historical-biographical presentation on Captain Grant Marsh, Missouri River pilot from 1840-1880. The Plenary on Monday includes Native American perspectives from Gregg Bourland, Cheyenne River Sioux Tribe Chairman, Eagle Butte, SD, and Wes Martel, President of *Wind River Associates*, Fort Washakie, WY. The historical perspective of sustainability will be discussed by Daniel Botkins of the *Center for the Study of the Environment* in Arlington, VA, in his presentation on *Natural History Lessons of Lewis and Clark: Pre-settlement Landscapes and Modern Uses of Science.* Ed Whitelaw from *ECONorthwest* in Eugene, OR, will introduce economic considerations with his talk and Richard Marzolf from the USGS will share his experiences with the Glen Canyon Dam Experiment. Tuesday's panel includes representatives from economic development, recreation, tribes, environment, public works, tourism, and bank stabilization. Discussion will address: 1) How does your interest affect sustainability of the river for multiple use?; and 2) How do other uses of the river affect the sustainability of your interest?

Over forty paper presentations will be made at the conference covering a wide range of Missouri River topics. The Monday evening social includes a newly updated Missouri River slideshow from Gene Zuerlein, Nebraska Game and Parks Commission, showing the entire extent of the river and

highlights its diversity. Tony Dean, outdoor writer, television and radio producer, multi-species angler, and river/reservoir system expert, will be the banquet speaker Tuesday night.

Contact: See **Meetings of Interest.**

Web Based Water Management Course

Beginning with the Spring 1999 semester *Kansas State University* will begin offering a Water Resource Management courses via the World Wide Web. For more detailed information about visit the KSU Web site at http://www.dce. ksu.edu/dce/distance / waterquality. html.

Meetings of Interest

March 2-4: International Symposium on Geographic Information Systems in Fishery Sciences, Seattle, WA. Contact: Tom Nishida, 011/81–543-366043, tnishida@enyo.affrc.go.jp

March 3-4: Applied River Geomorphology and Biotechnical Engineering Workshop, Horizon Convention Center, Muncie, IN. Sponsored by the Indiana Chapter of the American Fisheries Society. Contact: (765) 285-8845 or (765) 285-8825, tmccomis@bsu.eduortlauer@ bsu.edu.

March 9-11: 55th Annual UMRCC Meeting, Radisson Hotel, La Crosse, WI. Contact: Ron Benjamin, Wisconsin Dept. of Natural Resources, 3550 Mormon Coulee Road, La Crosse, WI 54601, (608) 785-9012.

March 15-17: State of the Rivers: A conference on American Southeastern Rivers, Chattanooga, TN. Sponsored by World Wildlife Fund, this conference will discuss the biological importance and imperilment of southeastern rivers. A joint plenary session with the Tennessee Aquarium's Freshwater Mollusk Symposium will occur on the 17th. Contact: Quinn McKew, (202) 861-8369, or Quinn.McKew@wwfus.org.

March 16-19: Ecosystem Effects on Fishing, Montpellier, France. Contact: Henrik Gislason, 011/45-33963361, hg@dfu.min.dk

March 17-19: Freshwater Mollusk Conservation Society 1st Annual Symposium, Clarion Hotel, Chattanooga, TN. Contact: Paul Johnson, (423) 785-4074, pdj@tennis.org, http:// www.sari.org.

March 21-24: Sustaining the Missouri River for Future Generations, 3rd Annual Missouri River Conference, Ramkota Inn River Centre, Pierre, SD. Contact: Jeanne Heuser, USGS-BRD, Environmental and Contaminants Research Center, 4200 New Haven Road, Columbia, MO 65201, (573) 876-1876, FAX (573) 876-1896, jeanne_ heuser@usgs.gov.

March 22-27: Wetlands Engineering and River Restoration Conference, Denver, CO. Sponsored by the American Society of Civil Engineers. Contact: ASCE, Conferences and Expositions, P.O. Box 832, Somerset, NJ 08875-0832, (800) 548-ASCE w/in the U.S., and (703) 295-6050 outside the U.S., or FAX (703) 295-6333.

March 26-30: 64th North American Wildlife and Natural Resources Conference, Hyatt Regency San Francisco Airport, Burlingame, CA. Contact: Richard Mc Cabe, (202) 371-1808.

April 6-8: Environmental Monitoring and Assessment Program Symposium on Western Ecological Systems: Status, Issues, and New Approaches, Holiday Inn Fisherman's Wharf, San Francisco. Contact symposium coordinator, (781) 544-0026, symposium@ tpmc.com.

April 12-15: EPRI Conference on Power Plant Impacts on Aquatic Resources, Renaissance Waverly Hotel, Atlanta, GA. Contact: Cindy Layman, Conference Coordinator, P.O. Box 10412, Palo Alto, CA 94303-9964, (650) 855-8763, or FAX (650) 855-2166.

April 14-15: MICRA Executive Board Meeting, St. Louis, MO.

April 22-23: Mississippi River Research Consortium Annual Meeting, Yacht Club Resorts, La Crosse, WI. Contact: Richard Anderson, (309) 298-1553, randerson@wiu.edu.

April 26-30: 9th International Zebra Mussel and Aquatic Nuisance Species Conference, Duluth Entertainment Convention Center, MN. Contact: Elizabeth Muckle-Jeffs, (800) 868-8776, profedge@renc.igs.net.

May 9-14: 15th International Symposium on Biotelemetry, Juneau, AK. Contact: John H. Eiler, (907) 789-6033, john.eiler@noaa.gov.

May 10-11: 6th Annual LMRCC Meeting, Holiday Inn Memphis East, Memphis, TN. Contact: Ron Nassar, LMRCC Coordinator, (601) 629-6602.

May 13-14: 26th Annual Conference on Ecosystem Restoration and Creation, Tampa, FL. Contact: Frederick J. Webb, (813) 757-2104, webb@ mail. hcc.cc.fl.us.

May 16-19: National Watershed Coalition's 6th National Watershed Conference, Austin, TX. Conference theme is "Getting the Job Done at the Ground Level". Contact: John W. Peterson, Executive Director, National Watershed Coalition, 9304 Lundy Court, Burke, VA 22015-3431, (703) 455-6886, FAX (703) 455-6888, jwpeterson@erols.com.

May 23-28: 10th International Soil Conservation Organization Conference – Sustaining the Global Farm, Local Action for Land Stewardship, Purdue University, West Lafayette, IN. Contact: Mark Nearing, Purdue University, 1196 SOIL Bldg., West Lafayette, IN 47907-1196, (765) 494-8673, FAX (765) 494-5948, isco99@ecn.purdue. edu.

May 25-28: 47th Annual Meeting of the North American Benthological Society, Duluth, MN. Contact: Stephen W. Golladay, (912) 734-4706, http:// www.benthos.org.

June 1-4: Evaluating the Benefits of Recreational Fishing, The Fisheries Centre, University of British Columbia, Vancouver, BC. Contact: Gunna Weingartner, (604) 822-0618, events @fisheries.com.

August 29-Sept. 2: 129th Annual Meeting of the American Fisheries Society, Adam's Mark Hotel, Charlotte, NC. Contact: Betsy Fritz, (301) 897-8616, ext. 212, bfritz@fisheries. org

Congressional Action Pertinent to the Mississippi River Basin

Nothing to report.