River Crossings

Volume 3 | January/February 1994 | Number 1

The Floods of 1994??

National Weather Service (NWS) meteorologists are more upbeat than they were a few months ago about the prospects of another midwest flood this summer. According to Frank Richards, NWS hydrometeorologist, reasons for optimism that a second flood will not occur include the facts that 1) the Missouri River is flowing at normal levels, 2) the Mississippi River is below normal in St. Louis, 3) soil measurements indicate that the ground is drying, 4) and the 90-day weather outlook for the region calls for less-than-normal precipitation.

Changes in soil moisture and river levels occurred because precipitation in the upper Missouri and Mississippi river basins was less than normal at the end of 1993. The prospects for flooding now hinge on winter snow pack and spring rains. Everything depends on timing, if snow melt and spring rains coincide, "...they're in trouble", Richards said.

The threat of a 1994 flood caused government officials to act fast last fall to provide funding for emergency repairs to all federal levees. We understand these repairs are now complete, awaiting only the phase two "dressing up procedure", scheduled for this spring. In the meantime, according to a January 12th article in the Kansas City Star, Senator Kit Bond, Missouri, is leading an effort to get federal funding to repair all of the nonfederal levees (mainly along the Missouri River) which would otherwise be ineligible for government support.

According to the Star article, there are 482 nonfederal levees that Bond says need repairs. The Clinton Administration opposed full-scale repairs of nonfederal levees. But after considerable wrangling with Bond and Representative Pat Danner of Missouri, the Administration authorized $18 million for nonfederal levee repairs.

In late January, after the Los Angeles earthquake, moves were reportedly afoot to fund repair of these levees as part of an earthquake supplemental appropriations bill. Missouri Governor Carnahan, reportedly, also paid a visit to Washington in late January seeking funding for repair of some 160 nonfederal levees, recommended for repair by an interagency state task

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force. Cost of these recommended repairs were estimated at $53 million.

Source: "Flood Threat Diminishing in Midwest" by James Kuhnhenn, Kansas City Star, January 12, 1994.

White House Interagency Floodplain Management Review Committee Established

The Clinton Administration has established an Interagency Floodplain Management Review Committee (Committee) to evaluate the consequences of the 1993 floods. The Committee, operating under direction of the Interagency Floodplain Management Task Force (established earlier to handle disaster relief and other immediate post-flood responses), will:

- undertake an intensive review to determine the major causes and consequences of the 1993 flood;
- evaluate the performance of existing floodplain management and related watershed management programs; and
- make recommendations as to what changes in current policies, programs, and activities would most effectively achieve risk reduction, economic efficiency, and environmental enhancement in the floodplain and related watersheds.

As appropriate, the Committee is expected to identify legislative initiatives that might be needed. A draft report is scheduled for May 1, 1994, with a final report due by June.

Because floodplain management involves a complex intergovernmental system of Federal, State, tribal, and local responsibilities; the Committee will conduct outreach to, and consultation with, all levels of government and the public. Its operations will be conducted in an open environment.

The Committee includes a multi-disciplinary, interagency group of experts in fields relevant to floodplain management. Assistance is being provided by the staff of the Council of Economic Advisors, the Office of Science and Technology Policy, and the Justice Department. An element of the Committee, the Scientific Assessment and Strategy Team (SAST), headquartered in Sioux Falls, South Dakota at the U.S. Geological Survey EROS Data Center, is gathering and analyzing data related to the flood and its impacts.

The Committee, based in Washington, D.C., is headed by Brigadier General Gerald E. Galloway, formerly of the Corps of Engineers and presently serving as Academic Dean of the U.S. Military Academy at West Point. Other Committee members have been drawn from locations throughout the affected area as well as from Washington, D.C. Jerry Rasmussen, MICRA Coordinator/Executive Secretary and Fish and Wildlife Service biologist is one of thirteen Committee members serving on a temporary assignment with the Washington-based group.

For additional information on the Committee contact: BG Gerald E. Galloway, Interagency Floodplain Management Review Committee, 730 Jackson Place NW, Washington, D.C. 20503, (703) 395-3377.

River Crossings

Published by

Mississippi Interstate Cooperative Resource Agreement (MICRA)
608 East Cherry
Columbia, MO 65201

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

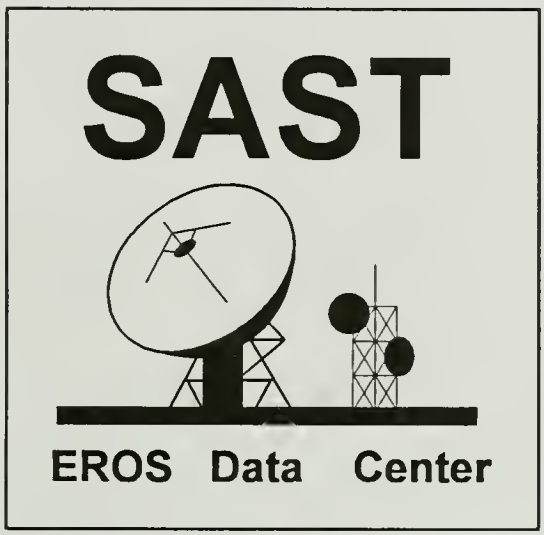
Wetland Restoration Workshop Held in St. Louis

A state/federal technical workshop, entitled, "Identifying Potential Post Flood Floodplain/Wetland Restoration Sites For The Mississippi Basin (including the Missouri and Other Tributaries)", was held at the Sheraton Westport Inn, St. Louis, MO on January 13-14, 1994. The Workshop was hosted by John Kuslar of the Association of State Floodplain Managers.

Bill Dieffenbach and Gordon Farabee showed the group slides of 64 scour holes, created along the Missouri River as a result of the flood. These scour holes vary in size from a few acres up to 100 or more acres, range in depths up to 65 feet, and remain hydrologically connected to the River. Dieffenbach said this was just "the tip of the iceberg" in relation to the larger number of scour holes in the floodplain which do not remain hydrologically connected to the River. He said, as a minimum, these scour holes should be acquired by government agencies, or otherwise protected from destruction.

Many options for wetland restoration were discussed by workshop attendees. The following points were made regarding highest priority actions needed immediately:

1) Establish a clearing house of information on funding sources so that red tape can be cut, and money can be merged and used efficiently.
2) Appoint a flood Czar to integrate and defragment government operations.
3) Increase funding for the Wetland Reserve Program (WRP), Emergency Wetland Reserve Program (EWRP), Fish and Wildlife Service acquisition programs, etc. so wetlands can be preserved before opportunities are lost (prairie wetlands should not be overlooked).
4) Establish tax breaks for land owners involved in wetland/ floodplain restoration projects.
5) Improve coordination of projects and monies (private and federal), and establish a federal lead for acquisitions and prioritization; highest priority should be placed on lands where levee restoration is not needed, and where large land units can be acquired.
6) Formalize the "letter of intent" process to more readily involve Non-Governmental Organizations.
7) Encourage States' gubernatorial/ Congressional support to ensure that the Science Assessment and Strategy Team (SAST), located in Sioux Falls continues beyond current time limitations involving both USGS and Corps of Engineers.



8) The SAST needs to succeed in demonstrating that science can be understandable/useable, and thus involved in education and decision/policy making at all levels of government.
9) Ensure that SAST activity is tied to ecosystem management concepts to develop a better understanding of how the river system works, evaluate flood control structures (what worked and what didn't), incorporate biological as well as physical elements at the highest resolution possible; and ultimately improve science to improve policy so that it reflects science.
10) Ensure that SAST data is translatable between levels of geographic coverage and scale.
11) Focus funding on the Missouri River, and encourage the Corps to cooperate with SAST.
12) Institutionalize the Corps' 1135 Program so that cost sharing partners can be easily found.
13) Make a clear distinction between floodplain acquisition and wetland restoration.
14) Establish a centralized regulatory authority.
15) Conduct studies to evaluate blue holes and look at their succession so that management recommendations can be made to the Corps on how regulatory works can be modified to retain them.
16) Change Upper Mississippi River Environmental Management Program (EMP) policies so land acquisitions can be funded with EMP money.
17) Change ag policy so that lands do not have to be cropped in last 5 years to go into WRP program.
18) Focus FEMA efforts on avoidance of disaster payments.
19) Develop a Great Flood Recovery document to track actions, progress, etc. to keep coordination and momentum going.
20) Conduct a unified effort to specifically brief Congress and the public so data won't be misused/ abused and everyone understands its potential inaccuracies.
21) Conduct a comprehensive inventory and risk analysis of mainstem and tributary levees.
22) Take actions to hold water where it falls on the watersheds.
23) Develop a series of wetland restoration (water) projects for inclusion in Water Bills which will most likely be forthcoming in the current legislative session.
24) Look at restoration efforts from the perspective of "what is needed/ wanted" rather than just from the perspective of "what is available" for buyout.

Survey of Floodplain Farmers and Levees

The Midwest Area River Coalition 2000 (MARC 2000); a group of agribusinesses, agricultural shippers, producers, carriers, and other interests; completed a survey in November entitled, "Flood of 1993 Survey of Levee Repair & Options". While the report admits it was not scientifically conducted, farmer opinions on various issues flood related issues are presented.

The survey was conducted in cooperation with the National Corn Growers, USDA Soil Conservation Service, Missouri Corn Growers, and Illinois Farm Bureau.

Some 165 farmers, mostly located in Missouri and Illinois, along either the Missouri or Mississippi rivers were included in the survey. The average respondent was "a Missouri farmer, located along the Missouri River, on 1,166 acres, who expects to farm 99 out of 658 acres of bottomland this year."

According to the report:

- almost all the respondents produce corn and soybeans with 65 percent producing corn, soybeans, and wheat;
- although farmers still seek federal assistance to rebuild levees, about 85 percent of respondents indicated they would rebuild even if federal funds are not forthcoming;
- almost 82 percent of respondents would not sell land into wetlands (as programs are now defined);
- over 62 percent of respondents would not move their levees back in exchange for federal assistance; and
-over 80 percent of respondents opposed accepting a federal easement allowing their land to be flooded while continuing to farm in alternate years.

An interesting survey result, however, was that 65 percent of farmers with over 700 acres protected by private levees were willing to move their levee back in exchange for assistance, while only 15 percent of private levee farmers with less than 700 acres were willing to move their levees back. Also 52 percent of farmers along the Missouri River said they would consider moving their levees back, compared to only 13 percent along the Mississippi.

The report speculated that the reluctance of smaller farmers to move levees back was related to the fact that doing so would take too large a portion of their farm out of production. Also, farmers along the Mississippi, many with public levees, aren't necessarily interested in the same thing as farmers along the Missouri, most of which have private levees.

The survey concludes that "any future floodplain plan, must take into account the variety of opinions and needs of farmers."

For more information contact: Jim Wilson or Chris Brescia, MARC 2000, 200 N. Broadway, Suite 1725, St. Louis, MO 63102, (314) 436-7303.

Floodplain Management in Canada

Canada began restricting development in floodplains 20 years ago, and evidence suggests that the policy has greatly reduced the amount of flood damages there.

Canada's Flood Damage Reduction Program is not meant to stop all use of the floodplain but to encourage practical uses, such as greenbelts, parks and agriculture, that are not apt to be completely devastated if the area is flooded. When Canadian rivers overflow into their floodplains, they often swamp campsites, golf courses, roads and farmlands but cause little or no permanent damages.

For more information on Canadian floodplain policy and scientific studies of its impact contact: Water Planning and Management Branch, Inland

Waters Directorate, Environment Canada, Ottawa, Ontario, K1A OH3.

Source: The Missouri River Report, The Official Publication of the Missouri River Basin Association, P.O. Box 9193, Missoula, MT 59807.

Nuclear Power Plant Near Omaha Threatened by the Flood of 1993 - A Follow-Up

The article, of this title, which ran in the last issue of *River Crossings*, not surprisingly, generated a response from the Nebraska Public Power District (NPPD), owners and operators of the plant.

NPPD informed us that there were inaccuracies in our story which they wanted to clear up. Our story was based on information provided by Dr. Jack F. Shroder, Jr., Professor and Chairman of the Department of Geography and Geology at the University of Nebraska at Omaha.

In their letter to *River Crossings* NPPD provided the following information:

"The facts are that the threat of flooding was well reported in the media and that the Missouri River

water was never higher than approximately two feet of overtopping the Station levee. The plant was not abandoned, though not generating electricity; and, in fact, had two full crews on site at all times–further our station procedures and technical specifications require prompt action, such as reactor shutdown, to be taken to preclude adverse consequences from flooding conditions (despite the statement attributed to Dr. Shroder that the plant could not be shut down on such short notice). Cooper Station has been afforded a very high level of protection from Missouri River flooding and the plant was never in jeopardy and was never threatened. You also might be interested to know that an upstream levee was breached by river water–not by workers--which did relieve some pressure on downstream flooding."

Conflicts in viewpoint as to what did or did not happen as a result of the 1993 flood were not peculiar to this incident. The effects of levees on flood heights, and the "myth" or "fact" that levees cause or prevent flooding continues to be debated in the aftermath of the flood.

If the Cooper Nuclear Power Plant was in any jeopardy, as suggested by Dr. Shroder, we as a society need to help NPPD upgrade its level of protection, and perhaps, be more realistic about the level of protection afforded ag lands. Future floods will certainly come, and in that event we need to be prepared to protect our critical infrastructure.

The complete loss of water supply to both Des Moines, IA, and St. Joseph, MO is all too fresh in the memory of those impacted. The impacts of the flooding at a nuclear power plant could be far more severe and wide spread, and should be avoided at all costs.

The bottom line is that we all need to work together to achieve better protection for key infrastructure such as power, water, and waste facilities; as well as for our natural resources. All of these interests are vital to our society as well at to each of us individually!

After the Flood - EPA Actions

According to Raj Rajagopal, professor and chair of the geography department at the University of Iowa, two herbicides were found in Iowa rivers and streams in higher than normal amounts during the floods of 1993. Comparing his recent data with previous USGS data, Dr. Rajagopal estimated that the Mississippi River carried 175 metric tons of atrazine and 20 metric tons of alachlor into the Gulf of Mexico between July 7 and August 12. "This is more than the 160 metric tons of atrazine and 18 metric tons of alachlor that flowed into the Gulf during all of 1991," wrote Dr. Rajagopal. "The long-term implications of such short-term shock inputs of chemicals into the aquatic ecosystems of rivers and oceans remain to be answered."

According to the Des Moines Register (January 13), the 1993 floods inundated more than two dozen hazardous chemical sites in Iowa, causing problems at more than 260 water treatment plants and sending hundreds of chemical drums and fuel tanks down rivers. However, according to Alan Stokes, Iowa Department of Natural Resources, most facilities are back to normal operation, and there are no lingering pollution problems caused or aggravated by the flood.

The Des Moines Register, referring to an EPA report says:

- 22 facilities that use or produce hazardous chemicals were flooded in Iowa. A half dozen superfund dump sites were hit.
- 176 public drinking water systems and 88 sewage treatment plants flooded. Of the four states in EPA's Midwest Region, Iowa had by far the most drinking water systems affected. Missouri had 76, Kansas 61, and Nebraska 32. Iowa had the second highest number of sewage systems flooded. Missouri had 149, Kansas 75, and Nebraska 51.
- EPA contractors pulled 777 stray chemical drums from Iowa's waterways and their banks. Missouri had 15,272, Kansas 630, and Nebraska 1. EPA had no specific information on what the barrels contained, but they were tested for flammability and other characteristics and disposed of at special hazardous waste sites.
- Workers pulled 149 propane tanks and 23 other fuel storage tanks from Iowa rivers.
- In a sweep of the 11 hardest hit counties, EPA contractors collected 26 tons of paint, pesticides, solvents and other hazardous wastes from homeowners. By comparison 9 tons were collected in Missouri and 4 tons in Nebraska. Kansas wasn't listed.

The EPA is coordinating a special monitoring program to help identify contamination and sediments in surface waters that pose a threat to human health and the environment. The program covers all nine states eligible for flood disaster assistance.

"These supplemental monitoring programs will assist the affected states by filling gaps in contamination identification not covered by ongoing monitoring programs or other special flood activities," said Mary Belefski, chairperson of the EPA Water Workgroup. "In addition to identifying immediate health and environmental threats, results of this monitoring will help the states identify their longer-term water quality concerns brought on by the flood."

Some EPA-assisted monitoring has already been initiated. For instance, at the request of the Missouri Department of Natural Resources, EPA Region 7 has collected and analyzed 46 river samples and seven samples each of raw and finished drinking water at cities using surface water for their primary supply.

Source: Nonpoint Source News-Notes, November-December 1993, #33, c/o Terrene Institute, 1717 K. Street, NW, Washington, D.C. 20006 and The Des Moines Register, January 13, 1994.

More Rigid Enforcement in Iowa–The E-Team

Less than a year ago, an Iowa criminal jury trial returned guilty verdicts on charges of water pollution and unlawful storage and disposal of hazardous wastes against the owner of a metal stripping business in Muscatine. The defendant was sentenced to jail by the trial judge, despite having no prior criminal history.

The verdict marked a milestone in the development of environmental prosecution in Iowa. It sent a clear signal that in certain circumstances, people in the community are willing to hold polluters criminally responsible for their actions.

Factors cited by the court included the defendant's disregard for the safety of others in the community and the seriousness of acts of pollution. The court stated that, unlike a theft in which money is taken from one individual or company, the defendant had taken something from all of us which cannot be given a simple dollar value.

The jury's verdict and the jail sentence were important achievements of Iowa's fledgling "E-Team", which had filed its first case less than a year earlier. This special prosecution unit was created by Attorney General Bonnie Campbell in a joint effort with the Department of Natural Resources to investigate and prosecute environmental crime.

One of the crucial challenges in environmental prosecution is to find out about pollution acts in time to gather evidence necessary for prosecution. Criminal evidentiary standards are higher than those required in administrative or civil actions. In order to meet that challenge, greater awareness was needed on the part of the public, law enforcement, regulatory personnel, and other professionals that environmental crimes exist, that they will be investigated and prosecuted, and how to report them.

Several months were devoted to presentations and meetings around the state to create awareness of the program and to solicit ideas and tips.

Another challenge to the prosecution of environmental crime is the attitude that such cases "aren't really criminal." Educational efforts, along with the public's rising concern about the environment, are helpful in addressing this challenge.

Public opinion polls in Iowa are now showing that the environment is of top public concern. Citizens are beginning to consider environmental abusers as criminals, just as they do armed robbers and drug pushers.

Cases to date have resulted from acts reported by employees, firefighters, law enforcement, and Department of Natural Resources personnel. Teamwork is required in discovering and reporting acts of pollution, and it is essential to the investigation which must "make a case" that meets the higher burden placed on the state in criminal cases. Both the scientific and law enforcement aspects of an investigation are crucial and they must be coordinated.

The scientific or regulatory part of an investigation is normally performed by environmental specialists and others in the Department of Natural Resources. The law enforcement aspect of the investigation is carried out by special agents from the Division of Criminal Investigation, the U.S. Coast Guard, and local law enforcement agencies.

On December 30, 1991, the E-Team filed its first and largest case against a riverboat, the Mississippi Belle II, for dumping untreated sewage into the Mississippi River. The company and its boat manager paid fines and penalties totalling $201,000.

Since then, the E-Team has prosecuted cases resulting in approximately half a million dollars in fines and penalties. Most of the cases involved water pollution charges. They span industries as diverse as

river transportation, construction, recreation, printing, stripping, livestock production, manufacturing, and meat processing.

In most of the cases, companies have been charged, but in some cases, individual officers or managers have also been charged. The factors considered in the decision to personally charge an individual include, but are not limited to:

-the individual's degree of involvement in the day-to-day activities of the business,
- the capacity to prevent the acts of pollution,
-the individual's level of knowledge of negligence, and,
- generally speaking, the egregiousness of the individual's acts.

Generally speaking, violations are first screened for criminal potential before seeking administrative or civil penalties. Factors considered in the screening process include the following:

- Deception: If an individual or business has been dishonest with a regulatory inspector, it may indicate that an attempt is being made to hide a serious act of pollution.
- Environmental impact or impact to health and safety: It may be difficult to prove the immediate and direct impact of a discharge into the Mississippi River, because of the river's great volume of water. Under certain circumstances, expert testimony may be used to demonstrate the effect on water quality and the result of pollution acts. Although it is not necessary to be able to demonstrate such impact, it is one factor which is weighed in the screening process.
- The offender's violation history: The seriousness of a first-time offender's action or failure to act may outweigh the absence of a prior violation history.

Source: Groundwater Quarterly, Vol. 4 No. 3, September 1993; For further information, contact Kathleen M. Deal, Assistant Attorney General, Department of Justice, Iowa, Des Moines, IA 50319.

Missouri River Master Manual Update

Revision of the Corps of Engineer's Master Water Control Manual (Master Manual) for operation of their main stem Missouri River dams is coming to a conclusion. The last interagency planning meeting has been held, and distribution of a draft EIS is expected in the Spring.

Both environmental and economic alternatives have been reviewed, but the recommended alternative awaits a final Corps' decision. Implementation of an alternative which favors some form of environmental restoration is critical to ecosystem recovery and to the potential productivity of scour holes and wetlands left behind by the 1993 floods.

Four new developments came out of that final interagency meeting:

1) A new alternative was presented by the Corps which was developed to maximize environmental values, while minimizing impacts on economics -- particularly impacts on the navigation industry.

2) The Indian tribes, through the Mni Sose Tribal Water Rights Coalition, played a major role in the meeting. The tribes coordinated their testimony and their presentations, a tribute to the success of the Mni Sose at building a representative coalition of the Indian tribes of the Missouri River.

3) Hydropower and water supply dwarf other economic benefits of the Missouri River system such as navigation and recreation. Since changes to system operations have little impact on hydropower or water supply, most of the alternatives are a wash economically. Therefore, according to Col. Schaufelberger, Commander of the Corps' Missouri River Division (MRD), environmental considerations may well drive the system ultimately.

4) The politicization of the Master Manual review process has caused a greater degree of scrutiny of the Corps' MRD office by the Corps' Washington headquarters. The possibility exists that headquarters may not allow MRD to identify a preferred alternative in the forthcoming EIS. Almost all participants at the final meeting questioned the value of publishing an EIS that fails to indicate how the Corps prefers to operate the river system in the future.

Source: The Missouri River Report, The Official Publication of the Missouri River Basin Association, P.O. Box 9193, Missoula, MT 59807.

Mississippi/Illinois River System Navigation Study Update

A study of the impacts of navigation on the Upper Mississippi and Illinois rivers has been a contentious issue since the early 1970's. It was thought that development of a Master Plan for the Management of the Upper Mississippi River System in the early 1980's would resolve those issues.

However, the Master Plan was completed and resolution of navigation impacts issues was deferred to the Corps of Engineers who, with the assistance of an interagency team, developed a Plan of Study (POS) for evaluating those impacts. Implementation of that POS has been on hold ever since.

This is an issue which has implications around the Mississippi River Basin because studies completed on the Upper Mississippi and Illinois rivers would have application throughout the Basin, in both pooled and unpooled navigation systems. Some believe this may be

one of those issues where the Corps simply doesn't want to ask the question they don't want to know the answer to.

Upper Mississippi River Conservation Committee (UMRCC) biologists contend that operation and maintenance of the navigation system itself, as well as the movements of the vessels have serious impacts on the rivers' fisheries resources. In many reaches, the nine-foot diameter, mainline towboat props (acting like huge blenders) process the entire water column – fish eggs, fish larvae, and all. The severe shear forces produced by towboat props are believed to destroy millions of fish eggs and larvae.

According to the November/December issue of *The UMRCC Newsletter* "The Plan of Study is Dead?". "In separate letters to the U.S. Fish and Wildlife Service, one from the Corps of Engineers headquartes in Washington, D.C. and another from the Lower Mississippi Valley Division Engineer, the Corps has stated that the POS is no longer a separate initiative for funding within the Corps. Both letters state that the POS has been absorbed into the current navigation (system rehabilitation) study."

Many UMRCC biologists believe that this is a clear statement from the Corps that it does not intend to conduct key navigation impact studies. The present "...combined Mississippi and Illinois River navigation study plan includes only Corps' selected elements of the POS, previously agreed to (by all five states, the Corps, the U.S. EPA, and the U.S. Fish & Wildlife Service".

According to *The UMRCC Newsletter* the Corps' primary interest is in adding 1200-foot long locks to approximately seven locks and dams on the Illinois and Mississippi rivers. This would double lock capacity and make it possible to put twice as many tows on the system. Placing twice as many tows on the system would have the potential of destroying twice as many fish eggs and larvae.

One of the major issues now confronting the interagency Navigation Environmental Coordinating Committee (NECC) is the definition of "significance". "There is no disagreement from anyone on this point." The Corps will be responsible for mitigating any significant impacts that result from increased navigation capacity.

The problem is the lack of a precise definition of what is a significant impact. In the three impact study workgroups that have met thus far (mussels, adult fish, and larval fish) there is a general consensus that relative impacts upon a resource can probably be determined.

For example with a good study design, we theoretically might determine that a 10% loss of larval walleye might occur as a result of increased navigation over some time period. Someone must then decide whether this 10% loss is significant and from an overall public perspective, whether or not mitigating it is justified.

- One opinion might argue that this loss is of no consequence, since most larvae would not survive to adulthood anyway. The loss is therefore not significant.
- Another opinion might argue that the 10% loss is significant ecologically, though maybe not economically.
- Even another argument can be made that this event cannot be considered in isolation - impacts are cumulative. In other words many factors are impacting survival of walleye eggs and larvae, and an additional 10% loss may just be the "straw that breaks the camel's back".

Scientific investigations to settle these arguments would be expensive and may not resolve the issue. These questions will thus probably have to be answered in the political arena. According to *The UMRCC Newsletter*, the NECC is now looking for guidance from others who have had to resolve similar dilemmas.

However, the NECC need look no further than the history of their own Upper Mississippi River System Master Plan. It and its offspring, the Upper Mississippi River Environmental Management Program (EMP), are products of just such a compromise. Panels of experts were assembled, and expert opinions were used to justify the EMP. In the final days of

the Master Plan, the debate came down to a simple question between navigation and environmental interests: "We need this, what do you need?" Both recommended needs (a second 600-foot lock at Lock and Dam 26 and a 10-year environmental program) went forward to Congress. Each recommendation was supported by separate constituencies, and both were authorized and funded. The lock is/or is nearly complete, and the EMP is in its seventh year of implementation.

According to *The UMRCC Newsletter*, the Corps is presently attempting to contract with an independent panel/committee of ecological experts to provide guidance concerning the technical aspects of the navigation impacts analyses. The National Academy of Sciences may perform such an overview.

Source: The UMRCC Newsletter, November/December 1993.

USDA Authorizes Cost-Sharing on Riparian Buffer Strips

The USDA Agricultural Stabilization and Conservation Service (ASCS) has authorized a new cost-sharing practice for eligible agricultural lands. The practice, Riparian Buffer Strips, or WP7, removes nutrients, sediment, organic matter, and pesticides from surface and subsurface flow with vegetation planted adjacent to permanent and intermittent streams or waterbodies.

The vegetation removes pollutants by deposition, absorption, plant uptake, denitrification, and other processes. It reduces pollution and protects water quality while enhancing the ecosystem.

According to the ASCS, land eligible for WP7 must be adjacent to or surrounding permanent or intermittent streams, lakes or ponds; any intermittent or permanently flooded wetland, or sinkholes; Karst areas; and other groundwater recharge areas. In addition, the adjacent contributing land must be cropland, pasture, hayland, or rangeland. The practice must meet all requirements of federal, state, and local environmental laws.

Cost-sharing is authorized for establishment of vegetation suited for site conditions; and for fencing and development needed to keep cattle and livestock from grazing the area. Local SCS offices will provide technical assistance in evaluating sites.

Source: Nonpoint Source News-Notes, November-December 1993, #33, c/o Terrene Institute, 1717 K. Street, NW, Washington, D.C. 20006. For additional information, contact your local ASCS office.

A Cowboy's Viewpoint: Stewardship from the Saddle

Grazing and rangeland management, a hot topic in the west during 1993, is expected to continue to be controversial in 1994. According to *The Land Letter*, the 1993 debate included an early November call for Interior Secretary Babbitt's resignation by the National Inholders Association.

Reeves Brown, a cattleman, member of the Colorado Cattlemen's Association, and participant in the activities of the Colorado Riparian Association provided the following views on the rancher's role in land stewardship in the Terrene Institute's Non-Point Source News Notes:

Ranching and Riparian Management:

Livestock operators have an inherent interest in good riparian management because 1) their livelihood depends on availability of clean and abundant water; and 2) unlike many other users of riparian areas, livestock operators, and most likely their children, must live with the consequences of today's management practices for many years to come. This holds true on both private and public lands for any multigenerational ranching operation. The average Colorado range has been in the same family for 67 years.

Reeves says that livestock operators have an inherent vested (continued) interest in good riparian management. It is to their advantage to take the best care of riparian areas possible. Good management not only yields increased short-term profitability, but also pays long-term dividends in the form of improved resource productivity.

He says it's important for the livestock community to recognize that riparian management, like any other form of resource management, is not something to be suspicious of. It's equally important for riparian resource managers, both public and private, to recognize that riparian management is not synonymous with fencing off riparian corridors. Good riparian management means evaluating the specific needs and characteristics of each riparian and upland watershed, understanding the goals of all parties involved, and incorporating a flexible management policy that works with existing riparian uses to enhance recognized resource values.

Wildlife Habitat vs. Golf Courses

In the big picture of resource management (riparian, watershed, wildlife, and otherwise), Colorado's livestock producers play a more important role than simply serving as on-site resource stewards.

Livestock producers (and private landowners in general) provide habitat and on-site habitat management. Certainly, some landowners provide better management than others, but they all provide habitat. Because

these ranching units require open space, hay meadows, and pasture land, livestock producers and their desire to maintain their families' way of life are often the only things standing between migratory big game routes and 18 hole golf courses in Colorado's valuable, aesthetic mountain valleys.

There are as many different opinions on how private landowners should best manage habitat as there are environmentalists; however, regardless of the quality of the management, the landowner in all cases ultimately provides the habitat. Therefore, the answer to achieving optimum habitat management is not to remove livestock producers from the picture, but rather to help them carry out this management function more effectively, and in a way that helps them achieve their goals (both economic and social) as landowners.

For those who would argue that the best livestock operators are no livestock operators, Reeves suggests that someone is going to own these private parcels of critical mountain valley habitat, and if this someone is not a rancher who requires open space for his existence, then it will be the highest bidder for the property. Given the inherent value of Colorado's aesthetic mountain valleys, this highest bidder is not likely to be another fourth-generation rancher. The new owner is more likely to be a real estate developer, land speculator, or urban professional seeking a summer vacation home. In any of these cases, the habitat once managed by the rancher as a by-product of commodity production will now be replaced by smaller 20-acre ranchettes and golf courses, both of which spell habitat fragmentation and disappearance of migratory corridors.

Community Stability

A rarely recognized function livestock operators play in our overall landscape goals, according to Reeves, is maintaining community stability. Most of Colorado's rural communities depend heavily on land-based industries such as agriculture for their base economic activity. Most of these communities do not have a Reebok shoe factory or a business college to help sustain their economy. While the recreation and tourism traffic contributes a solid short-term injection into these

economies, such sources are primarily seasonal and do not sustain the longer-term multigenerational aspects of rural communities.

Much of what we value about our western Colorado landscape has more to do with culture than anything else. Without the base economy and spirit of community that ranching families support, rural western Colorado would either be devastated economically or converted to bedroom communities like Vail . . . where the closest thing to culture is found in imported yogurt.

In summary, Reeves believes there's room for improvement in all areas of land management, including within the livestock industry. He also believes that for this improvement to be realized and new ideas to be accepted, we need to recognize and appreciate the traditional values that current stewards and societies place on these lands. Maintaining sustainable ecosystems means much more than simply increasing ground cover on a riparian streambank; it also means preserving our cultural heritage and maintaining a balance between us and our environment.

For more information on the Colorado Riparian Association, contact: Karen Hamilton, President, Colorado Riparian Association, 2060 Broadway, Suite 230, Boulder, CO 80302.

Source: Nonpoint Source News-Notes, November-December 1993, #33, c/o Terrene Institute, 1717 K. Street, NW, Washington, D.C. 20006 and Land Letter, The Newsletter for Natural Resource Professionals, November 20, 1993, Vol. 12, No. 31.

Managing Change: Grazing on Western Riparian Areas

EPA's Denver-based office (Region 8) has produced a new report: "*Managing Change--Livestock Grazing on Western Riparian Areas*". The report is meant for use by ranchers and others concerned with the conservation and wise use of western range lands.

Its publication is particularly apt at this time when the Clinton Administration seeks to introduce new approaches to the preservation, restoration, and environmentally sound use of these lands.

In 1990, EPA published the original "*Livestock Grazing on Western*

Riparian Areas", providing a broad view of the functions and values of western riparian areas and causes and effects of degraded riparian areas and water quality.

The current report, a sequel and companion piece, indicates that together the two reports are designed to foster broader understanding of how improved grazing management on western riparian areas can enhance water quality and overall productivity of rangeland watersheds. The publication was written by Ed Chaney, Wayne Elmore and Bill Platts of the Northwest Resource Information Center in Eagle, Idaho.

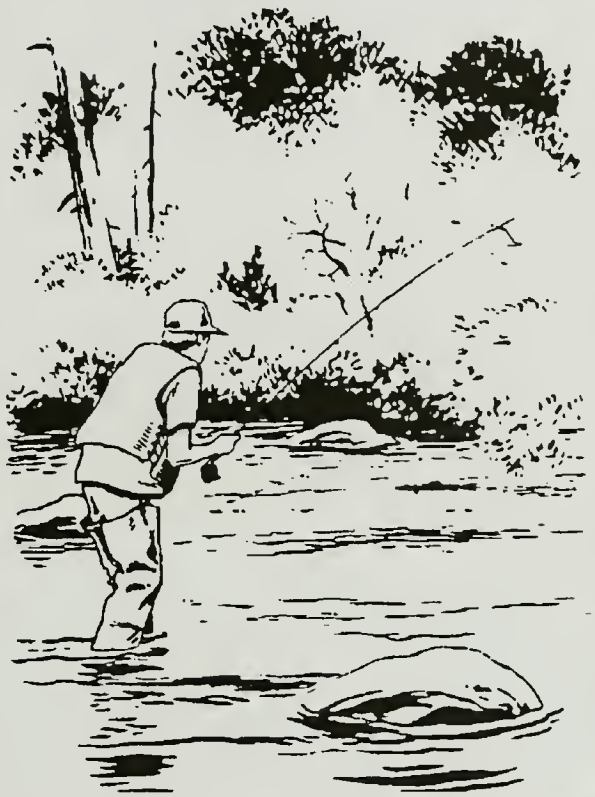
Copies can be obtained by sending a postcard to one of the following sources: Brad Lamb, EPA Region 6, 1445 Ross Avenue, Suite 1200, Dallas, TX 75202-2733; Julie Elfing, EPA Region 7, 726 Minnesota Avenue, Kansas City, KS 66101; Roger Dean, EPA Region 8, 999 18th Street, Suite 500, Denver, CO 80202-2466; Robert Goo, EPA (4503), 401 M Street, SW, Washington, DC 20460; Don Pritchard, BLM Service Center, P.O. Box 25047, Lakewood, CO 80225; Craig Whittekiend, Forest Service Region 2, P.O. Box 25127, Denver, CO 80225-5127; or Keith Wadman, Soil Conservation Service, P.O. Box 2890, Washington, DC 20013.

Source: Nonpoint Source News-Notes, November-December 1993, #33, c/o Terrene Institute, 1717 K. Street, NW, Washington, D.C. 20006

Trout Stream Therapy

The University of Wisconsin Press has published *Trout Stream Therapy*, a book by Robert L. Hunt.

Trout Stream Therapy is a fully illustrated field guide to improving trout habitat in streams damaged by human activities associated with agriculture, forestry, and urbanization. Over the past four decades state and federal natural resource management agencies in the Midwestern region have devised, tested, and refined a variety of techniques intended to restore healthy living conditions for



trout. Leading the way in this regional effort has been the innovative and aggressive program of the Wisconsin Department of Natural Resources (DNR).

For 35 years Robert L. Hunt has been a research biologist with the Wisconsin DNR. In this role he has carried out many of the pioneering field evaluations of the techniques developed to reestablish healthy wild trout populations, and improve the sport fisheries that depend on those populations.

Trout Stream Therapy provides twenty-one of the most up-to-date, successful, field-tested techniques applicable not only to Midwestern streams, but also to physically similar streams elsewhere in the United States and in other countries. According to the publishers professional fisheries biologists and administrators responsible for rehabilitating trout habitats will find this manual an invaluable reference in the field and the in the office.

The many sketches and color photographs will be particularly helpful to those interested in restoring trout streams, but lacking scientific training.

Cost of the book is $39.95 (cloth) and $19.95 (paperbound). Order from The University of Wisconsin Press, 114 North Murray St., Madison, WI 53715-1199.

Quality Criteria for Water

A new government document entitled, *Quality Criteria for Water* provides environmental regulators and technical personnel with Environmental Protection Agency (EPA) guidance on instream concentrations for more than 85 toxicants. It also summarizes tolerance levels for: aquatic life, human health, temperature, dissolved oxygen, color, pH, and hardness.

Summaries are arranged alphabetically by chemical and usually include the numerical limits both for exposed populations of aquatic life and for human health. EPA guidance on limits cited in this book is frequently adopted as state water quality standards. Each listing also

includes the Federal Register number so users can easily research additional information about a particular chemical. Subscription service includes the basic manual and one supplement. The material is punched for your 3-ring binder.

To order ask for: List ID QUCW from Superintendent of Documents, P.O. Box 371954, Pittsburgh, PA 15250-7954. Price is $23.00.

Source: AIFRB Briefs, Vol. 22, No. 6, December 1993.

Lead Sinkers Targeted

Last fall the Environmental Defense Fund (EDF), North American Loon Fund (NALF), Trumpeter Swan Society (TSS), and the Federation of Fly Fishers (FFF) submitted a letter to the Secretary of the Interior petitioning the Department to prohibit, by regulation, the use of lead weights for fishing on any Fish and Wildlife Service (FWS) Refuge and National Park Service (NPS) land where the common loon or trumpeter swan breed- or may stop over during migration. This action was based on mounting evidence that waterfowl are ingesting fishing sinkers and dying of lead toxicosis.

The birds may pick up the sinkers as they ingest grit to aid in digestion, or when taking live or discarded bait they artificially ingest the hook, line, and sinker! The FWS assisted Tufts University School of Veterinary Medicine in studying the mortality of common loons on their breeding waters in New England. Many of the common loons had ingested lead fishing sinkers and appear to have died of acute lead poisoning.

In June the FWS and the NPS published the petitioner's letter and solicited public comments on its merits. The comment period ended 2 September 1993.

The EDP, NALF, TSS, and FFF have also filed a lawsuit against the EPA requiring that they establish lead as a toxic substance under the Toxic Substances Control Act (TSCA). EPA has already "made a preliminary determination that certain lead fishing sinkers present an unreasonable risk of injury to waterfowl" and that banning the production and use of certain lead sinkers was "necessary to adequately protect against that risk". EPA agreed to announce a ruling which would detail a ban by next January.

Under TSCA S6, EPA has the authority to "prohibit or otherwise regulate any manner or method of commercial use" of lead fishing sinkers. The poisoning of mute swans in England persuaded the legislature to ban lead fishing sinkers there in 1987.

The FWS, Migratory Bird Management Office (MBMO) has prepared a briefing statement on the issue for the Director. The Division of Environmental Contaminants along with MBMO, Division of Refuges, and Federal Aid has prepared a Decision Document for the Director, including options for dealing with lead fishing sinker related mortality in migratory birds.

There are six strategies described which extend the continuum from no action, to a Refuge and Park Service Unit ban, to a nationwide ban of the recreational use of lead fishing weights, and obviously choices in between.

The tackle manufacturers appear willing to accept a ban, but for competition and manufacturing reasons, expressed a preference for a national ban rather than a site by site ban.

In the meantime the race is on to find a suitable substitute, a number of which are already available. In England, the most popular substitute is a tin split shot made by Dinsmores (also available in the US). In Canada Bi Logic Tackle has produced an "environmentally friendly fishing sinker" made from bismuth ("99.99% lead free"). Here in the US, Water Gremlin, Inc. (which has almost 80% of the lead sinker market); is merchandising "environmentally friendly unleaded fishing sinkers" made of tin for split shot or a plastic compounded with iron and tungsten for swivel sinkers, egg sinkers, and needle nose worm weights.

Temporal and Spatial Distribution of Interior Least Tern Nesting Habitat Along the Lower Mississippi River

The interior population of the least tern, Sterna antillarum athalassos, is a migratory shore bird population that was listed as federally endangered in June 1985. The primary concern prompting the endangered classification was loss of the bird's river sandbar breeding and nesting habitat as a result of river development, and the effects of regulated flows on nesting habitat availability.

Management of flows and sandbar habitats for least terns can be in conflict with in some habitat needs of the federally endangered pallid sturgeon, especially in the reaches between the large Missouri River reservoirs. Along the Lower Mississippi River (LMR), the least tern breeds, nests, and rears its young on sandbars and islands in the channel from about May through August. The least tern population is concentrated along the northern 500 miles of the LMR where 37 to 72 sandbars are utilized annually.

LMR sandbar habitats are dynamic, and significant shifts in sandbar morphology and location may occur over time, as a result of shifts in the hydrologic regime and channel geometry. As sediments are transported through the river system, they are alternately stored on point bars and middle bars during low flows and transported downriver during

flood events. Both long-term and short-term LMR sandbar habitat dynamics are major factors which must be considered in evaluating system-wide least tern nesting habitats. Dense stands of sandbar and black willow may become established on the higher portions of sandbars.

Sandbar habitat quantities, vegetation encroachment, and access of predators and humans to sandbars are of concern with regard to LMR least tern protection. Least tern Recovery Plan Task 21 recommends the need to "Determine breeding habitat requirements and status". To address these habitat concerns and to evaluate effects of river engineering works on the least tern, the Lower Mississippi Valley Division, U. S. Army Corps of Engineers initiated a series of sandbar habitat studies in 1992. General objectives of these studies are to:

1) Quantify system-wide trends in the quantity, and temporal and spatial distribution of sandbar habitats along the northern 650 miles of the LMR;

2) Determine the effect of hydrologic variables such as river stage frequencies and durations on the quantity of emergent sandbar habitat available to the least tern during the nesting season along the LMR;

3) Determine temporal trends in woody vegetation establishment and distribution on LMR sandbars;

4) Evaluate relationships between hydrologic factors (e.g. frequency and duration of river stage and discharge, and the lowest elevations to which woody vegetation extend down-slope on LMR sandbars); and

5) Evaluate relationships between hydrologic, soils, and sandbar morphologic variables and the age, date of colonization, stem density, stem height, and other population characteristics of sandbar willow tree stands in the LMR.

The LMR geographic information system (LMRGIS), operating on GRASS software and Intergraph CADD workstations, will be used for most of the sandbar habitat analyses. The LMRGIS contains aquatic macrohabitat and elevation map layers for four time periods (1940's, 1960's, 1970's, 1980's). Data generated from these layers will be used to quantify system-wide trends in the spatial and temporal distribution of sandbar habitats. In addition, digital elevation models (DEMS) developed from hydrographic survey data using Intergraph Corporation's Terrain Modeler software will be used to evaluate detailed changes in individual sandbar size, elevations, and slopes. River stage-sandbar area relationships will be derived and used to evaluate effects of river stage frequencies and durations on the amount and availability of emergent sandbar habitat during the least tern nesting season.

Annual aerial photography from 1950 to the present will be used to map sandbar vegetation stands for several representative LMR sandbars. The 1982 and 1992 forest map layer in the LMRGIS will also be used. Temporal changes in vegetation will be related to hydrologic variables and sandbar morphology.

Detailed ecological studies of black and sandbar willow tree stands on sandbars will consist of making quantitative measurements of stand variables along transects oriented perpendicular to river flow across individual sandbars. The age of discrete willow tree stands will be determined from tree borings. Soil core samples will also be collected. DEMS will be used to derive sandbar slope, elevation, and aspect data. Analyses of relationships between willow tree stand variables and hydrologic, elevation, and soils data will be conducted to evaluate factors affecting initial colonization as well as stand growth. Elevation of the willow tree line at about 100 points located on sandbars along the LMR will be surveyed. These data will be used to develop relationships between the down-slope extent of willow tree stands and hydrologic variables such as river stage and discharge. This information will be used to determine what areas of LMR sandbars will remain free of woody vegetation because they are inundated too frequently or for too long during periods that are critical for the survival of willow tree species.

Information from the sandbar habitat investigations will be used in conjunction with the least tern population census data being gathered by the Corps' Memphis District office and other data to develop a biological assessment for the LMR least tern.

Contact: Stephen P. Cobb, U.S. Army Corps of Engineers, Lower Mississippi Valley Division, P. O. Box 80, Vicksburg, MS 39180, (601) 634-5854, FAX (601) 634-5468.

February 26-March 1: 1st Annual Meeting of the Lower Mississippi River Conservation Committee, Camelot Hotel, Little Rock, AR. Contact: Mike Armstrong, Arkansas Game and Fish Commission, 2 Natural Resources Drive, Little Rock, AR 72205. The Lower Mississippi River Conservation Committee (LMRCC) will be holding their First Annual Meeting in conjunction with the Southern Division of the American Fisheries Society Mid-Year Technical Session. The LMRCC is a recently formed organization of state conservation agencies bordering the lower Mississippi River (confluence of the Ohio River to the Gulf), and a cooperator of MICRA's.

March 1-4: Human Dimensions in Ecosystem Management (short course), Pullman, WA. Contact: WSU Conferences and Institutes, 208 Van Doren Hall, Washington State University, Pullman, WA 99164-5222. (509) 335-3530. FAX: 335-0945. Cost: $495. Topics may include evolution of ecosystem management as a social/ political phenomenon, legal framework, social impacts, institutional barriers, role of collaboration, relationship between ecosystem management and culture (including Native American concerns), and social assessment.

March 3-5: NALMS 3rd Annual Southeastern Lakes Management Conference--Watershed Management: From Concept to Implementation, Columbia, SC. Contact: Kathy Stecker, Water Quality Monitoring, SCDHEC, 2600 Bull Street, Columbia, SC 29201. (803) 734-5402. FAX: 734-5216. Topics: regional issues, developing watershed management strategies, reservoir interactions, education, lake studies and assessment, conflict resolution, building coalitions.

March 6-9: Innovative Solutions for Contaminated Site Management, Miami, FL. Contact: Nancy Blatt, Water Environment Federation, 601 Wythe Street, Alexandria, VA 22314-1994. (703) 684-2400.

March 7-10: National Pesticides Management Conference, St. Louis, MO. Contact: Lynn Kirschner, CTIC, 1220 Potter Dr., West Lafayatte, IN 47906. (317) 494-9555. FAX: 494-5969.

March 7-11: The Role and Meaning of Economics in Resource and Ecosystem Management Decisions (short course), Pullman, WA. Contact: WSU Conferences and Institutes, 208 Van Doren Hall, Washington State University, Pullman, WA 99164-5222. (509) 335-3530. FAX: 335-0945. Cost: $595. Topics include economic and ecological approaches to sustainable resource management, resolving public and private legal and economic interests and objectives, methods for predicting economic cost of saving resources and ecosystems such as salmon habitat, and assessing tradeoff choices.

March 12-15: Uses and Effects of Cultured Fishes in Aquatic Ecosystems, Albuquerque, NM. Contact: Delano Graff, Pennsylvania Fish Commission, Bureau of Fisheries, 450 Robinson Lane, Bellefonte, PA 16823-9616. (814) 359-5154, FAX (814) 359-5153. This symposium will examine the roles of hatcheries and genetics in fisheries management.

March 14-18: Water Quality and Aquatic Ecosystems (short course), Pullman, WA. Contact: WSU Conferences and Institutes, 208 Van Doren Hall, Washington State University, Pullman, WA 99164-5222. (509) 335-3530. FAX: 335-0945. Cost: $895. Includes overview of physical, chemical and biological aspects of aquatic ecosystems; hydrological cycle; watershed and stream interactions; eutrophication; effects of point and nonpoint source pollutants; geomorphic alterations; fish habitat impacts; field study; laboratory processing and land management.

March 15-17: 50th Annual Meeting of the Upper Mississippi River Conservation Committee, Radisson Hotel, LaCrosse, WI. Contact: Kurt Welke, Wisconsin Dept. of Natural Resources, 111 West Dunn St., Prairie du Chien, WI 53821. (608) 326-0233. The Upper Mississippi River Conservation Committee (UMRCC) is one of the oldest, if not the oldest, standing interstate/interagency cooperative group in the nation dealing with river management issues. The UMRCC is a MICRA cooperator, and much of the MICRA organization is patterned after tried and proven UMRCC procedures. The UMRCC deals with Mississippi River management issues from the confluence of the Ohio River upstream to the Twin Cities.

March 15-18: The International Erosion Control Association 25th Annual Conference and Trade Exposition, Reno, NV. Contact: IECA, PO Box 4904, Lincoln Avenue, Suite 103B, Steamboat Springs, CO 80477-4904. (303) 879-3010. FAX: 879-8563.

March 27-30: Second International Conference on Groundwater Ecology, Atlanta, GA. Contact: John Simons, General Chairperson, EPA, Ground Water Protection Div., (4602), 401 M St., SW, Washington, DC 20460. (202) 260-7091.

March 31-April 1: Aquatic Fauna in Peril: The Southeastern Perspective, Holiday Inn-Chatanooga Choo Choo, Chattanooga, TN. Contact: Tennessee Aquarium, Attn: Janet Allen, P.O. Box 11048, Chattanooga, TN 37401-2048. The two day conference will focus on problems facing imperiled aquatic fauna of the

southeast. The conference is designed to provide a thorough historical review of the imperiled aquatic animals of the southeast as well as a review of management efforts aimed at conserving and restoring these faunas. Presentations will also address management of aquatic ecosystems in the southeast, roles of government and the public in aquatic conservation, and formulation of a unified practice of resource management. Sessions will cover imperiled insects, crustaceans, mollusks, fishes, amphibians, reptiles, birds, and mammals, and management of aquatic resources. Preregistration fee is $80, after March 1, 1994, it is $100.

April 10-13: Toxic Substances and the Hydrologic Sciences, Austin, TX. Contact: AIH, 3416 University Ave., SE, Minneapolis, MN 55414-3328. (612) 379-1030. FAX: 379-0169. Sponsored by the American Institute of Hydrology. Topics include USGS's Toxic Substances and Hydrology Program, estuarine hydrodynamics and water quality, field methods in contaminated hydrogeology, aquifer remediation in the presence of NAPLs, toxic substances in surface waters, the hydrology of the 1993 Mississippi Flood, watershed hydrology, hydrogeology of low-level radioactive waste management, and the Edwards Aquifer of central Texas.

April 17: The International Erosion Control Association 25th Annual Conference and Trade Exposition, Reno, NV. Contact: IECA, P.O. Box 4904, Lincoln Avenue, Suite 103B, Steamboat Springs, CO 80477-4904. (303) 879-3010. FAX: (303) 879-8563. Topics include innovative applications for solving erosion control problems; soil bioengineering methods and techniques; wind erosion in arid environments; erosion control for urban construction sites; streambank and shoreline stabilization; steep slope stabilization; how to meet permit requirements; erosion control in the third world; and research and development.

April 17-20: Responses to Changing Multiple-Use Demands: New Directions for Resources Planning and Management, Nashville, TN. Contact: Ralph H. Brooks, General Chairperson, Tennessee Valley Authority, Water Management, Evans Bldg., Rm. IW 141, Knoxville, TN 37902. (615) 632-6770. Topics will include water use trends, water resources forecasting, hydrologic modeling, GIS tools, water pricing policies, water allocation, water law, BMPs, environmental impact mitigation, reservoirs, and hydropower licensing.

April 19-22: Rivers Without Boundaries, The Second Bi-annual ARMS Symposium on River Planning and Management, Holiday Inn, Grand Junction, CO. Contact: Caroline Tan, ARMS Program Director, (510) 655-5844. The American River Management Society (ARMS) believes that rivers should no longer be managed in terms of boundaries, be they administrative, property or special interest. The conference will explore solutions for coordination, cooperation and consensus in the management of river systems.

April 20-22: Second Environmentally Sound Agriculture Conference, Orlando, FL. Contact: Wendy Graham, University of Florida, PO Box 110570, Gainesville, FL 32611-0570. (904) 392-9113. FAX: 392-4092. Topics include surface and ground water management, wildlife and habitat preservation, air pollution, and the urban/agriculture relationship.

April 25-29: The International Land Reclamation and Mine Drainage Conference and the 3rd International Conference on Abatement of Acidic Drainage, Pittsburgh, PA. Contact: Debbie Lowanse/Bob Kleinmann, U.S. Bureau of Mines, PO Box 18070, Pittsburgh, PA 15236. (412) 892-6708. FAX: 892-4067. Topics include acid mine drainage prediction, chemical and biological treatment of AMD, geotechnical engineering in mined areas, mine closure/bond release, mine chemistry, mine hydrology and groundwater protection, mine soil productivity, mine subsidence, mine waste management and characterization, regulations and policy issues, reclamation of derelict/abandoned mined lands, revegetation case studies, slope stability/erosion control, wetlands on mined lands, and wildlife/habitat restoration.

April 28-29: 26th Annual Meeting of the Mississippi River Research Consortium, Holiday Inn, LaCrosse, WI. Contact: Charles Theiling,

Mississippi River Research Consortium, Inc. (MRRC), 575 Lester Avenue, Onalaska, WI 54650. (618) 259-9027. The MRRC is a non-profit regional scientific society concerned with the ecology and management of the Mississippi River. The purposes of the MRRC are to encourage communication between the scientific community and the public, encourage pure and applied research concerning the water and land resources of the Mississippi River Valley, and hold an annual meeting where research results can be presented and common problems can be discussed.

May 23-25: Evolution and the Aquatic System, Doubletree Hotel, Monterey, CA. Contact: Jennifer Nielsen, Department of Molecular and Cell Biology, 401 Barker Hall, AC Wildon Laboratory, University of California, Berkely, CA 94720. (510) 642-7525. Recently the term "Evolutionarily Significant Unit" (ESU) has entered the regulatory arena in an effort to describe subunits of fish species for conservation purposes. ESU's are already established as criteria for petitions for listings by the National Marine Fisheries Services (NMFS). NMFS used genetic and other data to examine ESU's in recently petitioned fish stocks (Redfish Lake sockeye, Illinois River steelhead, and Sacramento River chinook). To define significant units in population conservation with the scientific and regulatory communities, the American Fisheries Society and other cosponsors are hosting this three day conference.

June 12-14: Multidimensional Approaches to Reservoir Fisheries Management, Chattanooga Marriott and Convention Center, Chattanooga, TN. Contact: Steve Miranda, Third Reservoir Fisheries Symposium, Mississippi Cooperative Fish & Wildlife Research Unit, P.O. Drawer BX, Mississippi State, MS 39762, FAX (601) 325-8726.

June 12-16: High Performance Fish - An International Fish Physiology Symposium, University of British Columbia, Vancouver. Contact: Don MacKinlay, Fisheries and Oceans, 555 West Hastings Street, Vancouver, Canada V6B 5G3, (604) 666-3520, FAX (604) 666-3450. The purpose of this symposium if for researchers and practitioners to exchange information on the present state and future needs of basic fish biology.

July 12-15, International Large Rivers Conference - Sustaining the Ecological Integrity of Large Floodplain Rivers: Application of Ecological Knowledge to River Management, La Crosse, WI. Contact: Ken Lubinski, National Biological Survey, Environmental Management Technical Center, Onalaska, WI 54650. (608) 783-7550, Ext. 61.

July 18-19, Applying Ecological Integrity to the Management of the Upper Mississippi River System, La Crosse, WI. Contact: Ken Lubinski, National Biological Survey, Environmental Management Technical Center, Onalaska, WI 54650. (608) 783-7550, Ext. 61.

August 3-6: Sixth International Symposium On Regulated Streams (SISORS II). The University of South Bohemia, Ceske Budejovice, Czech Republic. SISORS II is the sixth in an on-going series of International Symposia devoted to scientific research of rivers modified by large dams, weirs, channelization and flow diversion schemes. Contact: Professor G.E. Petts, Department of Geography, University of Technology, Loughborough, Leicestershire, LEll 3TU, UK.(Fax: 509 262192), or Dr. K. Prach, Faculty of Biological Sciences, Jihoceska Univerzita, Branisovska 31, 37005, CESKE BUDEJOVICE, Czech Republic. (Fax: 038 45985).

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