

River Crossings

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Effective Control Measures Tested for Pond Snails

USDA scientists at the Agriculture Research Service (ARS) in Arkansas have found hydrated lime and copper sulfate to be effective tools in controlling infestations of snails in fish ponds. The snails provide an intermediate host for a parasite that infects farm-raised catfish flesh and reduces their commercial value. Fish farmers imported black carp (*Mylopharyngodon piceus*) to control the snails, but now it seems that other methods may be just as effective or even more so.

USDA/ARS pond trials were conducted from 2003 through 2005 using slurried-hydrated lime and copper sulfate applied at a rate of 4 lbs. and 80 lbs., respectively, per 100 ft. of shoreline in a 6-ft. swath. Trials were run under conditions of variable wind speeds (0 to 16 mph) and treatment temperatures (24 to 32 °C). Both treatments effectively lowered the snail populations in test cages. Copper sulfate was more effective than lime in most trials. Hydrated lime treatments appeared to increase in effectiveness at higher temperatures (32 °C vs 25 °C). And strong winds negatively impacted both treatments. Snail survival under all conditions in four trials ranged from an average of 3.4% to 27.8% and 10.4% to 41.5% for copper sulfate and hydrated lime, respectively.

In a separate study, trials were conducted using only hydrated lime treatments at temperatures of 24 to 26 °C under low wind conditions. In one trial the rate of

hydrated lime was increased to 175 lbs. per 100 ft. of shoreline in a 6-ft. swath. At that rate, effectiveness was increased and snail survival was less than 2%. Further optimization of the hydrated lime treatment was made by narrowing the treatment swath to 3 ft. and reducing the amount of lime to 80 and 100 lbs. per 100 ft. of



Black carp collected in Horseshoe Lake, IL

shoreline. Average snail survivals for the 80 and 100 lb. treatments were 13.3% and 2.7%, respectively. The optimum pond shoreline treatment with slurried hydrated lime is 100 lbs. of lime per 100 ft. of shoreline applied in a 3-ft. swath.

Additional studies were conducted at Mississippi State University to evaluate the toxicity of copper sulfate to ram's horn snails. Laboratory tests showed copper

sulfate crystals had a 24-hour LC50 of 0.6 mg/L of copper and, based on the alkalinity of the test water, was below the level considered toxic to fish. Also, alkalinity at the levels tested (0 to 200 mg/L CaCO₃) was not shown to effect to the toxicity of copper to snails.

Field trials were also conducted in both 0.25 acre ponds and in a 13.0 acre commercial catfish production pond. Results of the commercial field trial were comparable to tests conducted in the experimental ponds where application of copper sulfate at 1.25 mg/L was shown to be effective in killing snails. Average mortality of snails confined in cages ranged between 95.4 and 97.7%. The treatment was also shown to be effective against natural populations of snails along the margins of the pond. The average number of snails per ft. of pond bank decreased from 21.5 snails to 0.18 snails 24 hours after treatment, representing a 99% reduction in viable snail populations along the pond bank. Treatment of the commercial pond resulted in changes in fish behavior and

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mortality that was likely related to the copper treatment. Within 4 hours of treatment application, an increase in the number of moribund fish were observed. Affected fish appeared lethargic or exhibited a spiraling swimming pattern. However, it is not thought that these observations were solely related to the chemical treatment.

Prior to treatment, moribund and dead fish were present in the pond that was diagnosed with bacterial (*Edwardsiella ictaluri* and *Flavobacterium columnare*) and parasitic (*Bolbophorus sp.*) infections. Moribund fish also exhibited clinical symptoms consistent with visceral toxicosis of catfish. Mortality rates in the pond were characterized as chronic and were estimated to be 150 to 200 fish per day. Farm management estimated total mortality in excess of 20,000 lbs. Following treatment, fish mortality increased within the first 24 hours. It was estimated that approximately 2,000 lbs. of fish were lost following treatment, however, a majority of the fish had clinical signs of enteric septicemia. In addition to infectious disease, analysis of water quality 2 hours after treatment revealed low chloride to nitrite ratios and examination of fish gills and blood indicated acute nitrite toxicosis. On the day of treatment, salt was added to the pond water and, after the first 24 hours, the daily mortality rate returned to pretreatment levels. It was concluded that a low-dose, full-pond treatment with copper sulfate was developed to safely eradicate the ram's horn snail.

Tests were also conducted at both Mississippi State University and Southern Illinois University to evaluate the effectiveness of blue catfish and redear sunfish in controlling snail infestations. In aquaria tests the fish were given an initial "conditioning diet" which consisted of only one of the following: fish food – insect larvae, ram's horn snails or red-rimmed melania snails. After 2 weeks of feeding the "conditioning diets," 100 fish of each species were stocked into eight separate aquaria (16 aquaria total) and offered a known amount of their conditioning diet and a known amount of one of the other conditioning diets used above. Prey selection studies with the blue catfish revealed that regardless of the training or conditioning diet, blue catfish readily converted to catfish feed when it was offered. Redear sunfish preferentially consumed snails when available. Even

redear sunfish trained to eat commercial fish food readily consumed snails and chironomids when available.

Then in 2004 and 2005 at Southern Illinois University redear sunfish (small, medium, and large) were stocked at a rate of 300 fish/acre into four, experimental ponds (12 ponds total) also stocked with channel catfish at a production rate of 8,000 lbs./acre. Water quality variables such as dissolved oxygen, temperature, alkalinity, carbon dioxide, ammonia, and pH were measured on a daily basis. The number of dead fish (catfish and sunfish) was recorded, and in September, the ponds were seined and harvest size channel catfish removed. The number of surviving individuals of each species was recorded, and the ponds were under stocked with 5-inch fingerlings to replace the fish removed for market. Survivability of redear sunfish was analyzed to determine if any correlation with water quality variables exist. The number of redear sunfish that died due to seining was recorded. In the spring of 2004, the ponds were seined

and all redear were counted and weighed. Harvest size catfish were removed and 5-inch fingerlings were stocked to replace those removed.

In the 2004 study, ponds containing redear sunfish had significantly fewer snails than ponds without sunfish. The number and type of snails remaining in the ponds did not differ significantly when medium size or large sunfish were stocked. Redear sunfish trained to eat snails did not remove significantly higher numbers of snails than fish not trained or conditioned to snail diets. Survival of the redear sunfish was 100 percent in all ponds. The incidence of trematode infestation was still evident on channel catfish. Approximately, 25% of the catfish had trematodes on the gills and in some cases within the flesh.

In the 2005 study, the water temperatures in the ponds at Southern Illinois University averaged 5 °C higher than in 2004. Catfish survival in all ponds was greater than 98%. Survival of redear sunfish was strongly cor-

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related with the decreased dissolved oxygen and increased temperature in the ponds. Ponds that routinely had dissolved oxygen concentrations of 3 mg/L and temperatures of 32 °C at sunrise had significantly higher mortality rates than ponds with higher morning dissolved oxygen concentrations. No significant correlations between alkalinity, carbon dioxide, ammonia, nitrite, or pH on survival of redear sunfish were observed. The incidence of trematode infestation was still evident on channel catfish. Approximately, 31% of the catfish had trematodes on the gills and in some cases within the flesh. The increase observed in the number of channel catfish with trematodes visible on the gills or in the flesh is likely due to the decrease in redear sunfish numbers in the ponds due to mortalities.

So it appears that viable alternatives do exist to the use of the black carp in the control of snails in catfish ponds. Use of black carp has been highly controversial because of the fear that the carp will escape captivity and establish wild populations. Several black carp; which can grow to 4 feet in length, reach weights of 150 lbs, and consume huge volumes of native snails and mussels; have already been captured in the wild in Illinois and Louisiana. MICRA petitioned the U.S. Fish and Wildlife Service in 2000 to list the black carp as an injurious species under the federal Lacey Act in order to stop interstate shipments of the invasive species and prevent further escapement to the wild. The survival of many species of native snails and mussels is already threatened or endangered by human activities and listing of the black carp under the Lacey Act would go a long way toward protecting these species. To date, no action has been taken on the MICRA petition.

Source: Southern Region Aquaculture Center. 2005. *Eighteenth Annual Progress Report*, P.O. Box 197, Stoneville, MS 38776. pp. 25-30.

Southeastern Waterways Critical for Mussels

The U.S. Fish and Wildlife Service (FWS) announced in early June plans to designate roughly 1,200 miles of streams and rivers in Georgia, Florida and Alabama as critical habitat for seven species of freshwater mussels protected under the Endangered Species Act (ESA). FWS officials said in a *Federal Register* announcement that the agency would seek to protect habitat “that has features

essential for the conservation” of the freshwater mussel species, which were once abundant in the Southeast, but have been seriously denuded by dredging and the construction of dams for electric power generation.

FWS is pursuing the critical habitat designation under a court order stemming from a lawsuit brought by the nonprofit *Center for Biological Diversity*. Jerry Zeiwitz, a biologist with FWS’s Panama City, FL, field office, said the critical habitat designation “simply adds another dimension to the consultations we already have going with federal agencies in these watersheds.” All stream miles designated for critical habitat support at least one, and possibly more, of the protected mussels, FWS said. The seven species targeted by the rule are the fat threeridge, shinyrayed pocketbook, Gulf moccasinshell, Ochlockonee moccasinshell, oval pigtoe, Chipola slabshell and purple bankclimber. The seven mussels were placed on the endangered species list in 1998. Since then, they have been characterized as “stable” or “declining,” according to Zeiwitz. The Ochlockonee moccasinshell is the rarest of the affected species, he said.

The primary watersheds affected by the proposed rule are the Apalachicola-Chattahoochee-Flint (ACF) River drainage, which encompasses parts of all three states, as well as Ochlockonee River in Georgia and Florida, and the Econfina Creek and Suwannee River drainages in Florida. Each of these watersheds contains physical and biological features considered favorable for mussels, according to FWS. Under the critical habitat provision of the ESA, any new activity along these stream miles requiring federal funds or permits would be subject to increased regulatory scrutiny. Existing developed sites, including roadways, private homes, commercial buildings and the like would not be included under the critical habitat designation, according to the agency.

Activities most likely to be affected by the rule are the maintenance and operation of dams by the Army Corps of Engineers, especially on the ACF River drainage. “The ACF runs the gamut from areas that are relatively unaffected by human activities to those that are totally altered,” Zeiwitz said. The lower portions of the ACF rivers have been dredged for navigation in the past, but Zeiwitz said

much of the traffic on those rivers has dropped off in recent years. The other basins where habitat is to be designated are characterized mostly as farming areas, although at least one stream portion flows through an urban area near Tallahassee, Zeiwitz said.

In crafting a final rule, FWS will take into account both the ecological and economic impacts of its designation, the agency said, and regulators may exclude from critical habitat certain areas where economic effects are considered to exceed the environmental benefits associated with conservation.

The streams of the Southeastern U.S., many of which lie in the Mississippi River Basin, are some of the most diverse in the Nation and provide critical habitat to many species of endangered and threatened mussels and snails. This was a major concern when MICRA petitioned the FWS to list the black carp as an injurious species of fish in 2000. Under such listing, federal law would prohibit the interstate shipment of the species.

The black carp was imported into the U.S. by and for commercial fish farmers to eat snails that reside in their fish ponds and provide an intermediate host for a parasite that infects pond-raised catfish. MICRA was and continues to be concerned that black carp stocked in these ponds will escape captivity and establish wild populations in southeastern streams and rivers where many threatened and endangered mussels reside. Such escapement is a common occurrence for all but the most secure and monitored ponds. The black carp can grow up to 150 lbs in weight and can consume large numbers snails and mussels. The FWS has not yet acted on MICRA’s petition to so list the black carp.

Source: Daniel Cusick, *Greenwire*, 6/6/06

Asian Carp Dieoff

Thousands of Asian carp mysteriously died in early June on a 110 mile stretch of the Illinois River between Starved Rock State Park and Havana. Wayne Herndon, Illinois Dept. of Natural Resources biologist reported seeing dead carp weighing up to 50 lbs. One observer said a person could walk across the river on the backs of the fish bodies.

When the kill first occurred, some observers believed the *spring viremia virus* might have been responsible. It's fatal to the carp, but can also affect gamefish species. But Larry Willis, microbiologist at of the Jake Wolf state fish hatchery near Manito, said the die-off did not progress as a viral infection would be expected to.

Willis now believes that stress caused by overpopulation, the spawning season, or other reasons caused the fish kill. He says biologists are still testing for bacterial infections that might have been responsible. The U.S. Fish and Wildlife Service has worked with the state to help determine the reason for the kill. Estimates are that 1,000 fish per mile died.

Sources: Gary Wisby, *Chicago Sun-Times*, 6/6/06

Snakeheads Tracked for Vulnerabilities

John Odenkirk, Virginia Department of Game and Inland Fisheries, is in the midst of a study tracking the movements of 20 snakeheads tagged with radio transmitters. Most of the fish have done what Odenkirk would expect — stay in the shallow, stagnant water of Dogue Creek, a Potomac River tributary that has been the epicenter of the snakehead invasion since they were discovered there in 2004. But a few have moved out, swimming across the Potomac, despite the species' dislike of moving water, and settled in Piscataway Creek on the Maryland side of the river. Since making the long trek to Piscataway, the fish has barely budged on Odenkirk's weekly tracking surveys.

Steve Minkkinen, a project manager with the U.S. Fish and Wildlife Service who is developing a snakehead management plan, said the goal in the Potomac should be control rather than eradication. "These fish unfortunately have a lot of the traits to enable them to be successful" in the Potomac and elsewhere, Minkkinen said. While snakeheads have proven their adaptability, the assumption has been that they would not tolerate the salinity of the tidal Potomac, preventing their spread into Chesapeake Bay.

But Minkkinen said more recent research shows snakeheads can tolerate salinity at levels similar to what is found at the mouth of the Potomac at certain times of the year.

"I'm not at all convinced there's a salinity barrier for snakehead in the Potomac," Minkkinen said.

Part of the problem is that there has been little research on the snakehead. Also, much of what has been done has never been translated into English, Minkkinen said. The lack of information makes studies like Odenkirk's all the more valuable. And so far, Odenkirk's radio tracking study shows that the fish fall into fairly predictable patterns. Most have stayed in Dogue Creek, and Odenkirk finds more than half the fish in roughly the same spot week after week. Usually they seek shallow, stagnant water and cover from the sun — many like to hang out underneath boat docks. In two years of studying snakeheads, Odenkirk has learned all their favorite hiding spots. He and fellow fisheries biologist Steve Owens never fail to catch a snakehead when they set out to do so. One of their favorite spots is in the shallow waters where Little Hunting Creek butts up against the backyards of multimillion dollar homes near George Washington's Mount Vernon estate.

Odenkirk uses an electroshocker to collect snakeheads. But unlike other fish that are stunned and float to the surface after the electric shock hits them, snakeheads react differently. When the electric current strikes them, they dive violently to the bottom of the creek in a muddy splash, making them difficult to collect. "If you don't get 'em the first time, they're gone," he said.

Odenkirk is frank in his assessment that it will be difficult for humans to sharply curtail snakehead populations. If there is any chance, though, it requires knowing as much as possible about the fish's life cycle, which is why he believes the radio tracking is worthwhile.

Still, there are some reasons for optimism. Last fall, the fish seemed to migrate en masse up Dogue Creek, to a spot near the site where George Washington once operated a grist mill and whiskey distillery. If the radio tracking shows a similar migration this fall, biologists and anglers might be able to take advantage and round up vast numbers of snakeheads. "They were stacked up like cordwood," Odenkirk said, recalling the fall migration, when he once caught 60 in a one-hour period. "That could be a golden opportunity," he said.

Source: Matthew Barakat, *WUSA9.com*, 7/8/06

Didymo - No Laughing Matter

Didymo is no laughing matter to biologists and fishermen who are watching its steady spread. Didymo is short for *Didymosphenia geminata*, a one-celled freshwater diatom (type of algae) that clings to river bottoms and develops brownish-white mats of trailing moss-like material that blankets rocks and smothers plants. One angler described it as looking like wet toilet paper. Other nicknames are less than endearing — bubble gum, cotton candy and (snicker) rock snot. No matter what you call it, it's a mess.



Didymo attached to a stick in the river. (Biosecurity New Zealand Photo)

"It's an international issue," said Paul Bugas, fisheries biologist with the Virginia Department of Game and Inland Fisheries (VDGIF). New Zealand officials first raised alarms after its discovery there in 2004 and have declared it an unwanted organism. Other countries have reported problems, and it's started to proliferate in the lower 48 states, Bugas said. Fishermen, particularly members of *Trout Unlimited*, helped red-flag its growth, and officials are concerned enough that VDGIF and the U.S. Forest Service have developed a "Don't Spread Didymo" flier that will be posted at key river access points and available to anglers and others. It gives pointers about cleaning equipment and boats so didymo won't be transferred from one river system to another.

Dawn Kirk, Forest Service fisheries biologist was unaware of the organism until last year, when someone who'd been on the Jackson River tailwater brought her a sample. Tailwaters suit didymo because clear, cold waters with stable flows make the best habitat for colonization, Bugas said. In Virginia didymo dates at least to 2004, when anecdotal reports surfaced from the Smith River, a venerable trout stream that flows from Philpott Dam near Bassett. Now, "the moss has spread throughout the river," Al Kittredge, a fly-fishing guide on the Smith, said in one of his river reports. The Smith and Jackson are the only two rivers where didymo has been confirmed in Virginia, but colonies have also been reported in Tennessee, Arkansas, West Virginia, North Carolina, and South Dakota.

Didymo poses no known threat to human health and it does not appear to affect fish directly, but it does impact the food chain and occupies space that could be used by macroinvertebrates [bugs] and fish. "I look at it kind of as the same type of effects that heavy sedimentation would have on a river," Bugas said. He cited a study done on Rapid Creek, a wild trout stream in the Black Hills of South Dakota where biologists noted a rapid decline in the trout population in 2002 that coincided with the appearance and proliferation of didymo.

That infestation has now spread to Castle Creek near Mystic according to South Dakota Game, Fish & Parks Department (GFPD) fisheries biologist Jeff Shearer. GFPD stream surveys in 2005 didn't detect any signs of the algae in other Black Hills streams — including Spearfish, Spring and Castle creeks, although the algae was found in Rapid Creek at Silver City, above Pactola. "Our initial thoughts were didymo could only survive under the conditions unique to Rapid Creek after our testing in 2005," Shearer said. "However, the recent discovery in Castle Creek verifies that didymo can occur, at least in benign levels, in other Black Hills streams." Shearer said it remains to be seen whether the didymo growth in Castle Creek will expand to nuisance levels that could hurt the trout population there.

Ev Hoyt of Rapid City, a board member and treasurer of the *Black Hills Fly Fishers*, said that the ecosystem in Castle Creek was similar enough to Rapid Creek to indicate to him that didymo could be a problem there. "It wasn't entirely

unexpected to find it in Castle. It's the type of stream, like Rapid Creek, where you might find it — low nutrients, cold water, relatively shallow, lots of ultraviolet penetration, just the kind of things it needs to thrive," he said.

Hoyt recently attended a conference on didymo in Bozeman, MT, that gave him hope that there might be ways to fight the algae. A team of scientists is planning an experiment on a stream in British Columbia this summer that could be useful in developing methods to battle didymo in the Black Hills, Hoyt said.

The secret might be making slight changes in the water chemistry by adding nutrients that stimulate the growth of invertebrate life and retard the growth of didymo, Hoyt said. So far, didymo has not been found in Rapid Creek below Canyon Lake Dam, and it's possible that nutrients are the reason, he said. "The nutrient level below the lake is much higher, because of the enrichment from ducks and geese and fertilization of the golf course," Hoyt said. "It seems axiomatic that if Didymo doesn't like nutrients, adding nutrients would help."

The *Black Hills Fly Fishers* will provide \$5,000 for the Canadian research. Hoyt hopes the GFPD and the state Dept. of Environment and Natural Resources will help as well. Meanwhile, he and other anglers are hoping didymo doesn't appear in Spearfish Creek, a popular stream with blue-ribbon trout fishing.

Anglers can help prevent the spread of the algae by soaking their wading boots with a 2-percent mix of water and bleach. Research indicates that didymo can survive out of the water in the felt soles of untreated wading boots for up to 30 days, Hoyt said. Anglers moving from one watershed to another could move the algae, he said. "It looks like we've been our own enemy on this," he said. "Rather than just allowing the boots to dry for a couple of days, we need to soak them in the bleach solution."

Sources: Lee Graves, *Richmond (VA) Times-Dispatch*, 6/30/06; and Kevin Woster, *Rapid City Journal*, 7/18/06

WV Trout Streams Lose Protection

One hundred forty-one (141) of West Virginia's most productive trout streams are being dropped from a Department of

Environmental Protection (DEP) list designed to give streams able to support trout reproduction special protection. A total of 444 creeks and rivers in 35 counties were initially selected for protection as "Tier 2.5" streams under state legislation passed in 2001. Following an extensive public comment and review period, the DEP announced that it planned to drop 141 of the streams, leaving 303 up for consideration by the 2007 Legislature. Of the 141 streams excised from the list, 35 were removed due to "coal reserve development" either planned or underway, while another 20 were tossed for unspecified "planned or ongoing development."

"It seems as though many of the streams are being removed from the list for the very reason they should be on it," said Larry Orr, chairman of the *West Virginia Council of Trout Unlimited*. Among trout streams removed from the list due to development plans are all 31 miles of Glady Fork in Randolph and Tucker counties; all 20 miles of Loop Creek in Fayette County; most of Elkhorn Creek in McDowell County; all of Big Spring Fork of Elk River in Pocahontas County; an 11-mile stretch of Hominy Creek in Nicholas County; a nine-mile segment of the South Fork of Cherry River east of Richwood; and the six-mile stretch of Glade Creek that flows through the New River Gorge National River in Raleigh County.



West Virginia Trout Stream

In addition to the 55 streams dropped due to development plans, 28 high-quality "reference" streams were taken off the list because they didn't contain reproducing trout populations or didn't flow through public lands. Most of the remaining delisted streams were removed for "technical reasons," including an absence of documented trout reproduction.

The 303 streams remaining on the Tier 2.5 list, making up 1,158 stream miles in 30 counties, include many of the state's premiere trout waters, including long

segments of the Cranberry, Williams and Elk rivers; the entire length of the West Fork of the Greenbrier River; all of Gandy Creek in Randolph County; and the length of Seneca Creek in Pendleton County.

The Tier 2.5 program was designed as a compromise to allow limited development in areas drained by clean streams. The 2.5 category is a step below Tier 3, in which no degradation of water quality is allowed. Streams on West Virginia's Tier 3 list are found only in the state's federally designated wilderness areas. A Tier 2.5 rating, while more restrictive than a Tier 2, allows development that diminishes a stream's assimilative capacity — the capacity to safely dilute pollution — by up to 10 percent.

"Tier 2.5 was a compromise to begin with, and it didn't include hundreds of trout streams that didn't make the list," said Orr. "I thought the initial list of 444 streams was a good starting point. I was surprised that one out of three of these streams were dropped." The state chapter of *Trout Unlimited* is asking its members to contact the DEP to voice their objections to the removal of 141 streams.

"It took two or three years to add one stream — Watkins Run in Preston County — to the list, but it looks like it's fairly easy to remove streams by saying you are planning some development," Orr said. He said further that he fished two of the recently delisted streams — Camp Creek in Webster and Braxton counties and Loop Creek in Fayette County — last weekend. "I caught and released 20 trout in Camp Creek in four different age categories, showing that it's obviously a year-round holdover trout stream," Orr said.

"I have found young fish there that could have come from nowhere else," he said. "Loop Creek is the same way. I fished Elkhorn Creek yesterday and caught and released 54 trout, including three young of the year, but it's being taken off the list due to coal reserve development. "West Virginia may be open for business, but maybe not the business of recreation and tourism." The proposed list, along with the DEP's response to previous comments, is available online at www.wvdep.org/antideg or by calling (800) 654-5227.

Source: Rick Steelhammer, *Charleston Gazette*, 6/26/06

Mountaintop Removal Permits Put On Hold

Federal regulators have suspended four mountaintop removal mining permits, saying they need to further study a lawsuit that alleges the permits are illegal. Lawyers for the U.S. Army Corps of Engineers (Corps) announced the action in early June. All four permits are for new or expanded mines proposed by Richmond, Va.-based *Massey Energy*.

West Virginia environmental groups are suing the Corps in the U.S. District Court in Huntington in an effort to stop the latest round of mountaintop mining in the state over fears that the technique has harmful effects on forests and streams. A trial in the lawsuit, which raises broad issues about mountaintop removal, had been scheduled to start on June 20. In that trial, environmental groups had planned to offer a broad range of new expert testimony about mountaintop removal's effects on forests and streams.

The Corps' surprise permit suspensions block further operations at the mines, and call into question plans for other large surface mines to expand. "We are very glad to see that destructive mining practices at these mines will stop at least for now," said Vivian Stockman, a spokeswoman for the *Ohio Valley Environmental Coalition*, one of the groups that brought the suit. "But it is unfortunate to see that a flawed process that the Corps has used to approve these mines has shown to be so ineffective," Stockman said. "By allowing mining at the wrong sites and violating the law, jobs could be lost and economies could be hurt by the blatant disregard of the U.S. Army Corps of Engineers."

In mountaintop removal, coal companies use explosives to blast apart entire hilltops to uncover valuable, low-sulfur coal reserves. Huge shovels and trucks move in to haul away the coal. Leftover rock and dirt — the stuff that used to be the mountain — is shoved into nearby valleys, burying streams. Since 1999, two different federal judges in West Virginia have issued rulings to curb or more strictly regulate mountaintop removal. But both have been overruled by the 4th U.S. Circuit Court of Appeals in Richmond.

In February, two West Virginia judges who sit on the 4th Circuit, Robert B. King and

M. Blane Michael, issued a dissent that lamented mining damage to "the oldest mountain chain in the world" and "one of the nation's richest, most diverse and most delicate ecosystems." Now, two cases over mountaintop removal are again being heard in U.S. District Court in Southern West Virginia. In one case that is back before U.S. District Judge Joseph R. Goodwin, environmental groups want to block the Corps from approving new mining operations through a streamlined permitting process. In the other, citizen groups want Chambers to force the Corps to do more detailed studies before it approves new mines through the agency's more traditional Clean Water Act permit review process.

Source: Ken Ward Jr., *Charleston (WV) Gazette*, 6/9/06; and *Greenwire*, 6/9/06

Federal Permit System Proposed For Large Livestock Operations

Farms with large livestock operations that discharge into waterways must apply for wastewater permits, under rules proposed in late June by the U.S. Environmental Protection Agency (EPA). The proposed regulations, which come in response to an appeals court ruling last year, would revise National Pollutant Discharge Elimination System (NPDES) permitting requirements for concentrated animal



Inside a large hog confinement operation.

feeding operations (CAFOs), including large-scale beef, poultry and hog farms. While farms that discharge pollutants into streams, rivers and other waterways would be required to apply for a permit, what constitutes a discharge would be left to CAFOs. But environmental groups said leaving that distinction up to the facilities poses a threat to public health and the environment. "We can't reduce

and prevent pollution when the EPA is giving polluters a free pass,” said Melanie Shepherdson of the *Natural Resources Defense Council* (NRDC). “The agency is abdicating its responsibility to protect the public.”

But industry officials said that while they are still assessing the 150-page rule, it appears to them that EPA closely followed the court’s directive in crafting the proposal. “The court was explicit in what it wanted the agency to do,” said Don Parish, a regulations specialist for the *American Farm Bureau*. “It’s a pretty broad regulation, and one that is fairly protective of the environment.”

EPA says 18,800 CAFOs are responsible for 60 percent of all manure generated by animal operations nationwide. NRDC says these farms generate 500 million tons of manure a year. If allowed to wash into surface water, that waste poses a serious water quality threat, the agency says. CAFOs seeking a permit under the proposal would be required to submit a nutrient management plan that would be reviewed by EPA and made available for public comment.

“Large animal feedlots are an environmental priority,” said EPA’s chief water administrator, Ben Grumbles, in a statement. “These mid-course revisions to the CAFO rule will lead to long-term, sustainable results. The president wants us to find common ground to accelerate environmental protection and we believe the proposal does that.”

The 2nd U.S. Circuit Court of Appeals in New York ruled last year that the Bush administration regulations for managing animal waste from large agricultural operations were illegal, but the three-judge panel stopped short of requiring permits for stormwater runoff from fields treated with animal waste. At issue were challenges by environment and farming organizations that filed lawsuits claiming the Bush administration’s 2003 revision of CAFO rules did not adequately protect public health and the environment or farmers’ rights.

The American Littoral Society, NRDC, *Sierra Club* and *Waterkeeper Alliance* argued that under the rules, EPA allowed large facilities to violate federal water quality standards and Clean Water Act permitting requirements for the land application of animal waste, which when

applied improperly can be washed by storms into waterways. But the *American Farm Bureau Federation*, *National Chicken Council* and the *National Pork Producers Council* argued that the rules authorize EPA to overextend its authority by requiring all CAFOs to apply for pollution discharge permits.

EPA’s proposed rule is expected to be published in the *Federal Register* within the next few weeks, opening a 45-day public comment period.

Source: David Loos, *Greenwire*, 6/23/06

Proposed Rule Would Exempt Water Transfers From EPA Permit Process

U.S. EPA would not require pollution permits for water passing from one water body to another through flood gates, canals, tunnels or natural stream courses under a proposal announced in early June. The proposed rule, which is subject to 45 days of public review and comment, would exempt “water transfers” from provisions of the Clean Water Act (CWA) requiring National Pollutant Discharge Elimination System (NPDES) permits. Such permits are required for virtually all industrial, commercial and agricultural discharges.

EPA says water users would no longer need a federal permit when moving water from one basin to another so long as there was no intermediate use by a manufacturer, a farmer or a municipality. States, however, could choose to regulate such transfers. “This rule is about taking the most holistic reading of the CWA, while retaining environmental safeguards and states’ rights,” EPA’s top water administrator, Ben Grumbles, said in a press briefing. Grumbles added, “President Bush is committed to cleaning and protecting the nation’s water resources, and this rule keeps the CWA focused on water pollution, not water allocation.”

The EPA proposal undermines the primary contention of two major lawsuits brought by environmental advocates and the Miccosukee Tribe against the South Florida Water Management District, which for years has pumped polluted water from farms and urban areas into the Everglades and Lake Okeechobee. Water

quality advocates, particularly in South Florida, denounced the proposal as “government caving in to the wishes of polluters” who want to move polluted stormwater quickly off city streets and farms. “If this [rule] gets adopted, basically all the dirty stormwater canals in South Florida can be dumped directly into the Everglades, pretty much whenever and however they want,” said Dexter Lehtinen, a former U.S. attorney who represents the Miccosukees in their litigation against the water management district.

The Miccosukees, along with environmental groups, have filed two federal lawsuits to try to force the district to obtain NPDES permits for pumping operations in Miami-Dade County and along the south shore of Lake Okeechobee. The district contends it should not be subject to the CWA provision because the water is moving within the same broad basin. In August 2005, EPA entered the Okeechobee lawsuit on the side of the district, citing its broad authority over wastewater permitting issues. The current rulemaking essentially codifies EPA’s position in that lawsuit. Grumbles, in a statement, said the proposed rule “gives communities needed flexibility to protect water quality, prevent costly litigation and promote the public good.” He noted in his briefing that “recent court rulings have created some uncertainty” over the issue of whether such interbasin transfers require pollution permits.

But environmentalists said the rule was rushed through to undermine the Florida court cases, and if finalized would exempt a broad class of polluters. “The EPA is trying to disguise disposal of polluted water as allocation of water for later public use,” *Earthjustice* attorney David Guest said. Grumbles acknowledged that the agency worked “expeditiously” on the rule. “There was a lot of concern among irrigation districts and large cities, and this was needed to clarify the rules.”

Source: David Loos and Daniel Cusick, *Greenwire*, 6/2/06

State Timber Industry Exempted From ESA

The federal government in early June agreed that state timber harvest rules in the state of Washington, designed to protect water quality and fish, are strong

enough to protect some 70 species of fish and amphibians on 9.3 million acres of land, including several endangered salmon species. The deal, known formally as a *Habitat Conservation Plan* (HCP), was the brainchild of a developer's lawyer. It allows the government to promise not to prosecute violations of the Endangered Species Act (ESA) if landowners take steps to help the imperiled species. Plan organizers were praised by officials from the state, the U.S. Fish and Wildlife Service (FWS) and the National Marine Fisheries Service (NMFS), who consider it the only way to ensure salmon and timber harvesting can both survive in rural Washington.

The HCP covers more land and more critters than any other approved in the nation, said Bob Lohn, regional director of NOAA Fisheries Services. The plan grew out of the *Forests and Fish Act* approved by the 1999 state Legislature and 2001 forest practices rules adopted by the state Board of Natural Resources and enforced by the state Department of Natural Resources. The *Forests and Fish Act*: requires wider buffers along 60,000 miles of streams, puts timberland owners on a timetable to abandon and repair old logging roads that leak sediment into salmon-bearing streams and limits logging on unstable slopes. In exchange, the government will give the state's thousands of participating landowners assurances that they won't be required to further restrict use of their land to save fish.

The pact requires timber companies to fix forest roads that disgorge sand and muck in the rain, clouding streams. They also must leave larger buffers of trees alongside some streams important to salmon. And they must fix places where roads cross over streams so that long-blocked-off salmon spawning habitat is reopened. In exchange, the federal government promised not to prosecute timber companies that are in compliance with the rules the state Forest Practices Board adopted to put the deal into effect. This approval, however, doesn't prevent environmentalists from going to court to enforce the ESA, but it makes proving a violation much more difficult.

Small-timberland owners get special treatment under the Plan in two basic ways. First, their requirements for fixing roads are not as rigorous as for larger property owners. And the buffers they

have to leave beside streams and lakes are smaller than those required of larger landowners. In addition, there are programs to reimburse some or all of the cost of the stream-crossing fixes for small landowners, and for some of the value of waterside timber they are required to leave standing. The rationale behind going easy on smaller timberland owners is this: If holding land in timber becomes too onerous, they are likely to sell to developers. And development is far worse for salmon — at least the way it's widely practiced now — than even heavily logged forest lands.

But Billy Frank Jr., chairman of the *Northwest Indian Fisheries Commission*, expressed concern because of the uncertainty over small-forest-landowner exemptions. He also complained that the agreement fails to take into account the effects global warming will have on salmon over the next half-century. Also, Indian tribes citing their on-the-ground look at it in portions of the state, objected to the agreement and warned that up to 35 percent of the land supposedly protected might not be.

Terry Williams, a Tulalip tribal official and member of the Indian Fisheries Commission, described tribes as "apprehensive" about the pact. "It's pretty scary," Williams said. "What we're trying to do is remind people that this is our property right — the fish are our property right. The Supreme Court has upheld our right to the fish. It's an ownership thing we share with the U.S." He compared the deal to the federal government giving the timber industry "a 50-year get-out-of-jail-free card, without taking all the impacts into consideration."

Also two reviews by panels of scientists — one by the state, the other by two professional science societies — faulted the plan, with one calling the pact "ill-informed." Twenty-eight independent scientists also wrote to then-Gov. Gary Locke that as far as saving salmon go, the plan had "a low probability of achieving its goals." And Phil Millam, an Environmental Protection official involved in the original talks who has since retired, has acknowledged, "Clearly, this is not a scientific judgment, but a political and economic one."

"We don't have a solid answer" about how much acreage won't be subject to the improved conservation measures, ac-

knowledged Bob Turner, the NMFS executive who shepherded the deal to approval. "That's where the uncertainty lies. ... We want to watch it, and we will." Proponents promised that a series of uncertainties known at the time of the original deal — uncertainties still not settled — will be dealt with through a series of studies. If the protections need to be increased to better protect salmon, they will be, said the pact's proponents. State Sen. Debbie Regala, D-Tacoma, a legislator who helped pass the deal, said there could be more surprises in store if the industry and government stick honestly to the provisions requiring tighter rules if studies show salmon need them. "The truth is, sometimes science takes us in a direction we'd rather not go," she said.

At the same time, supporters and critics of the HCP alike acknowledged that monitoring and scientific studies could lead to changes in the forestry rules, something called adaptive management. Changes could lead to more, or less, habitat protection or timber harvesting. "Adaptive management is a path meant to take us where the science leads," said Regala. "This, too, is a path not often traveled because it is daring and difficult."

Environmentalists, who backed out of initial negotiations seven years ago claiming their positions would never be seriously considered, remain deeply skeptical that the program will work as designed. "Our concern is that it is nowhere near protective enough," said Glen Spain, of the *Pacific Coast Federation of Fishermen*. "Will this adequately protect the state's fish runs? That's a big open question." Miguel Perez-Gibson, a policy adviser for a collection of conservation groups known as the *Forest and Fish Conservation Caucus*, said, "while this plan is a step in the right direction, we want it to be able to adjust to new biology and new science."

Even some landowners are concerned that the package was geared more toward helping the state's largest landowners. Sherry Fox, spokeswoman for the *Washington Farm Forestry Association*, said small foresters are hit harder because they can't shift logging away from fish habitat as easily as major landowners. Her group is working with regulators to develop long-term permits. Also, Ken Miller, who hosted the signing ceremony at his 40-acre tree farm, said many family

forestland owners say the new rules are complex and hard to interpret, especially for timberland owners who don't have the scientists on the payroll that big timber companies have. "Personally, I'm fearful that I will unintentionally break some of the rules," he said.

Sources: *Seattle Times*, 6/6/06; John Dodge, *The Olympian*, 6/6/06; Robert McClure, *Seattle Post-Intelligencer*, 6/6/06; and *Greenwire*, 6/6/06

Sensitive LA Wetlands Protected

A Louisiana landowner seeking a federal permit to clear 200 acres of cypress trees along sensitive wetlands is not exempt from Clean Water Act (CWA) regulations, according to the U.S. Environmental Protection Agency (EPA) unless he can prove the trees will grow back. EPA's decision came in response to the U.S. Army Corps of Engineers' (Corps) request for input in the case of Steve Buratt, who had sought a Corps permit because of wetlands located on his property in Livingston Parish, near Baton Rouge.

Buratt's forest stewardship management plan (FSMP) called for logging "strips" of trees between 200- and 400-feet wide, leaving smaller sections of seed trees for regeneration. The Corps wanted to know whether CWA exemptions for silviculture would apply for Buratt's cypress stand. "Because the site is regularly inundated, it is subject to extensive and long-term soil damage, making effective restoration of the site extremely difficult," EPA's director of water quality protection, Miguel Flores, told the Corps in a recent letter. "For the exemption to apply, the FSMP would need to be revised to address each of the recommendations included in this letter." Buratt must include proof of reasonable assurance cypress would be re-established in harvested areas, as well as implement management measures for the effective regeneration of the trees, which are vulnerable to animals such as nutria and other invasive species, EPA says.

Environmental groups praised EPA's decision, saying that while it may not prevent logging in all cypress wetlands, it could force landowners to produce better sustainability plans. "It is significant, and it is necessary," said Doug Daigle of the *Mississippi River Basin Alliance*. "The alternative is rolling the dice and hoping the trees grow back, which could have

huge consequences for the landowner and surrounding communities." EPA said conditions for CWA exemptions are common-sense measures necessary to protect wetland buffers. "We want to work with landowners to ensure sustainable forestry," EPA's chief water administrator, Ben Grumbles, said. "For me, sustainable forestry means that there be a demonstration that there is a regeneration of the cypress trees."

Corps spokesman David Hewitt said the agency often works with EPA on such permitting issues, and all decisions are made case-by-case. "You can't make any blanket assumptions about what the outcomes will be," he said.

Source: David Loos, *Greenwire*, 6/16/06

Water Bought to Save Minnow

The city of Santa Fe, NM will sell 2,500 acre-feet of its water stored in Abiquiú Lake to the U.S. Bureau of Reclamation (USBOR) this summer to help keep the Rio Grande flowing with enough water to support the endangered silvery minnow. The USBOR will likely release the water downriver in the next few months, according to bureau spokeswoman Mary Perea Carlson.

The minnow has been on the brink of extinction since 1996 when a drought plagued the region, desiccating much of the river. The fish's habitat has been threatened since the 1970s and the minnow is now found only in a 176-mile area of the Rio Grande. A 2003 U.S. Fish and Wildlife Service biological opinion governs how much water must flow in the river to ensure survival of the tiny minnow, and with this year's drought, the agency has sought to purchase extra water to meet requirements. The City Council approved selling its unused water to the federal agency for \$100 an acre-foot.

The city is one of several governments and tribes that have contracted rights to San Juan-Chama Project water. That water is pumped from the upper San Juan River tributaries through concrete-lined tunnels under the Continental Divide to Heron Lake. Unless they have a waiver, the contractors must remove their allotted water by December each year and either use it or store it.

Once the purchased water is released into the Rio Grande, it will help supplement the river's natural flows, Carlson said. The state and USBOR are obligated to keep the river from Cochiti to Elephant Butte flowing from early spring through June 16 each year. Up to a four-mile stretch can go dry after June, but it must be a "managed recession," Carlson said.

The Rio Grande silvery minnow needs a certain flow for spawning, larvae dispersal and migration, according to biologists. When it appeared that drying stretches of the river threatened the minnow's survival, environmental groups took the federal government to court in 1999 and won a decision three years later requiring certain habitat and river-flow protection on a 157-mile stretch from the San Acacia Dam to the Isleta Diversion Dam.

Interagency teams work each summer to rescue minnows from dry-river reaches and deposit them in wetter stretches. A paltry snowpack runoff this year, combined with river diversions that kicked in on July 1, has left standing pools of water instead of a river in some reaches of the river bed, prompting rescue teams to move the tiny fish to wetter reaches. Rescue teams saved more than 20,000 fish from April until early July, when rain began to pick up again, Carlson said. But already the levels are dropping again, and the teams will probably resume work soon, she said.

Besides purchasing water from Santa Fe, the USBOR has purchased one-time-use rights to 6,000 acre-feet of water from the Jicarilla Apache, 2,000 acre-feet from San Juan Pueblo, 1,200 acre-feet from Los Alamos County, 450 acre-feet from Belen and 66 acre-feet from Red River. The agency also is negotiating to buy 48,000 acre-feet of San Juan-Chama water from the Albuquerque-Bernalillo County Water Authority. Santa Fe County hasn't been approached for its 375 acre-feet, "but they're on our radar," Carlson said.

In other efforts to support the silvery minnow without cutting off water users: A minnow refugium was built in the Albuquerque Biological Park; more than 20 pueblos and municipal, state and federal agencies currently work through a collaborative program to restore habitat; and environmental groups signed an agreement with Albuquerque to lease 30,000 acre-feet of space in Abiquiú

Reservoir to eventually store water for the minnow.

Staci Matlock, *Santa Fe New Mexican*, 7/14/06; and *Greenwire*, 7/18/06

Lake Trout - An Aquatic Nuisance Species

Discovered in Yellowstone Lake in 1994, lake trout feed on the young of other fish, including Yellowstone cutthroat trout. One lake trout can eat 50 to 60 cutthroat each year. Many fish experts consider the cutthroat threatened due to invasive species, in addition to habitat loss and hybridization with other trout species. Now scientists working in Yellowstone National Park have unraveled clues to the mysterious appearance of the predatory lake trout in one of the nation's most important cutthroat trout ecosystems.



Yellowstone Lake Cutthroat Trout (NPS Photo) above. Lake Trout (Joseph Tomelleri drawing) below. Lake trout grow to much larger sizes than do cutthroat trout.

Biologists from Australia, Oregon, and Montana examined small stones, called otoliths, found in the heads of lake trout in an effort to determine when the first members of the invasive species established a population in the previously pristine waters of Yellowstone Lake. Their research led them to conclude that the fish likely were transported from nearby Lewis Lake – on the other side of the Continental Divide – in 1989 and in 1996. But scientists have not concluded how the fish got over the divide.

Andrew Munro, Thomas McMahon, and James Ruzycki, from the University of Adelaide, Montana State University, and the Oregon Department of Fish and Wildlife respectively, gathered archived otoliths from older lake trout caught from Yellowstone Lake between 1996 and 1997.

For comparison, the researchers also gathered otoliths from Heart and Lewis Lakes.

Otoliths, which are composed of calcium carbonate and an organic matrix, sit in the head of bony fishes and act as part of a system that helps fish with orientation, balance, and hearing that is similar to the human inner ear. The researchers measured the chemical composition of the otoliths, looking at the relative amounts of the elements calcium and strontium to determine when the first fish were moved from their native habitats. Measuring these elements works because, as the fish ages, the otolith continues to grow, adding successive layers like rings on a tree. During this growth, strontium can replace calcium if the element is present in a high enough concentration in the surrounding water. A lake trout that grows in the same lake all its life will most likely have a consistent strontium/calcium ratio throughout the early growth areas and late growth areas of the otolith.

However, if a fish is moved from one lake to another, the strontium/calcium ratio changes rapidly on the outer edge of the otolith as it grows. Because of the differences in chemical composition between each lake, the scientists could tell if the fish spent all its life in one lake, or if it moved by comparing the strontium/calcium amounts in the “early-growth zone” to those in the “edge zone.” Further, by determining the age of the fish and comparing that age with the location of change in the otolith, the scientists could figure out when the fish moved from one lake to the other.

Eighteen of the 20 fish that the scientists suspected were transplants because of their age (between 13 and 32 years of age) showed a substantial increase in the strontium/calcium ratios between the early-growth and edge zones. The two fish that did not show this increase were two of the younger suspected transplants. By comparing the age of the fish to the location of change in the otolith, the scientists found that lake trout most likely moved from their original habitat twice, once in 1989 and again in 1996. Further, by comparing the early strontium/calcium levels of suspected transplants with fish that lived their whole lives in either Lewis or Heart lakes, the scientists concluded that the source of the Yellowstone Lake lake trout was most likely Lewis Lake.

Earlier research suggested that roughly three hundred lake trout were moved into Yellowstone Lake. By 1996, scientists estimated that the lake trout population had grown to several thousand.

Six years ago when biologists went to the north shore of Yellowstone Lake to look for spawning Yellowstone cutthroat trout they found more than 2,300 at Bridge Creek. But at the same spot in 2005, they didn't find any. On the eastern shore, where more than 70,000 spawning cutthroat were counted in the late 1970s on Clear Creek, only 917 were seen — the lowest number since record keeping began in 1945. The situation was similar at other places along the shore. “It's dismal,” said Todd Koel, lead fisheries biologist in Yellowstone National Park.

But there are subtle signs of hope. The increasing number of young cutthroat spotted in Yellowstone Lake in recent years should be getting old enough to spawn in the next year or so, Koel said, which could help rebuild the population. Also, a decent snowpack in Yellowstone this winter, closer to long-term averages than the last several years, should increase the flow of the park's waterways, possibly reconnecting some drought-stricken streams with the lake again and cooling water temperatures, which might impede the advance of whirling disease. And, an aggressive gillnetting program that kills thousands of lake trout each year at Yellowstone Lake may also be paying dividends as evidenced by declining numbers of the non-native trout being hooked by anglers.

“We're encouraged. That's what we need to see,” Koel said. There are still probably tens of thousands of Yellowstone cutthroat trout in Yellowstone, Koel said. A fraction of the population that once numbered in the millions, but anglers are still catching and releasing cutthroat, Koel said. The biggest trouble has been the invasive lake trout. But since 1994, more than 100,000 lake trout have been caught in gillnets on Yellowstone Lake and killed. Several thousand have been caught already this year, Koel said. And fisheries biologists are hoping to refine their methods in the coming years, including learning more about where the lake trout are during certain times of the year so gillnetting operations can target those areas. Biologists are also discussing the possibility of researching synthetic pheromones to attract lake trout so they

can be caught, Koel said. Such a discovery would also help reduce lake trout numbers elsewhere in the West, including at Swan Lake, Lake McDonald in Glacier National Park and Lake Pend Oreille in northern Idaho.

Unless the lake trout are controlled, the cutthroat population could continue to decline precipitously in the coming decades. "Right now, we're in a situation where we can't let up," Koel said. The loss of cutthroat could also affect other species in the park, including grizzly bears, eagles and other animals that feed on the spawning fish and thrive on the protein.

But earlier this year, the U.S. Fish and Wildlife Service denied a petition to protect the cutthroat under the Endangered Species Act. The agency said that despite shrinking habitat and threats to the fish, there wasn't enough evidence to indicate the fish will disappear in the next 20 to 30 years in the West.

Sources: Cory Hatch, Jackson Hole News and Guide, 7/5/06; and Mike Stark, Billings Gazette, 6/10/06

Gulf and Mississippi River Delta Restoration

The Interior Department will spend an additional \$256 million to help restore vital Gulf Coast wetlands that provide nature's best defense against hurricane storm surges, officials announced on July 18. Texas, Louisiana, Mississippi, Alabama and Florida will share the supplemental appropriation. Most of the money will go toward wetland restoration on federal lands, including national wildlife refuges and National Park Service properties.

Interior Secretary Dirk Kempthorne stressed the importance of wetlands to both people and wildlife in the region, particularly for dozens of fishing communities that occupy the outermost edges of the Gulf Coast. "People cannot live there if the Delta dies. It's as simple as that," Kempthorne said after a morning survey of hurricane-scoured areas near the mouth of the Mississippi River. "Restoring a sustainable wetland ecosystem must be a part of any rebuilding plan if we are to address future risks to human safety."

Much of the new funding will be spent to restore 10 national wildlife refuges

battered by hurricanes Katrina and Rita. According to the Interior Department, Louisiana contains 45 percent of the nation's coastal wetlands, including 310,000 acres of federally owned marsh managed mostly for wildlife and recreation.

While small compared to the billions being spent by the U.S. Army Corps of Engineers to repair Katrina-damaged levees and floodwalls around New Orleans, the Interior Department commitment is significant because it recognizes the vital role that wetlands have in buffering inland areas against storm surges. Tropical systems rely on warm ocean water to maintain their energy and intensity as they approach landmasses, and experts note that hurricanes lose strength as they pass over near-shore marsh areas. Louisiana's marshes have been eroding for decades due to a variety of causes, including the dredging and maintenance of canals to support oil and gas production.

Experts say Katrina's storm surge carried huge volumes of water into wetland-rich areas of Plaquemines and St. Bernard parishes, resulting in the loss of 118 square miles of coastal wetlands. "The damage to this coastal ecosystem has accelerated wetland losses, endangering communities across the coast and threatening nationally significant fish and wildlife resources and important on-shore facilities." The Bayou Sauvage refuge sustained major, long-term damage from saltwater intrusion during and after Katrina, including the loss of marshes within the levees that ring the refuge.

A breakdown of Interior's Gulf Coast funding follows:

- \$162.4 million to restore national wildlife refuges.
- \$74.4 million to repair structures and restore conditions at national parks.
- \$31 million to aid the Minerals Management Service, which had to relocate its New Orleans regional headquarters after Katrina.
- \$15.5 million to replace U.S. Geological Survey stream gauges and other water monitoring equipment.
- \$43 million for grants to states for historic preservation.

Source: Daniel Cusick, *E&ENews PM*, 7/18/06

Climate Change Update

Temperatures in the U.S. between January and June were the warmest ever been recorded, according to preliminary data reported by scientists at the National Climatic Data Center in Asheville, NC. The average temperature was 51.8 °F over the past six months — 3.4 degrees above the 20th century average. Kansas, Missouri, Nebraska, Oklahoma and Texas saw record warmth for the period, while no state was near or cooler than average, the report said. Globally, January to June this year was the sixth-warmest first half of a year on record, about 0.90 degrees above normal, according to the center

Greenhouse gases (GHGs) have also been on the rise. Rich nations such as the U.S. emitted more GHGs in 2004 than they did in 1990, according to data released in late May by the U.N. Climate Secretariat. Of 33 countries that submitted data, emissions were 15.1 billion metric tons in 2004, compared to 14.5 billion in 1990. Total U.S. emissions rose 1.7 percent from 2003 to 7.07 billion metric tons in 2004, beating the previous record of 6.98 billion in 2000. According to U.S. EPA figures, total U.S. emissions rose by 15.8 percent from 1990 to 2004.

Meanwhile, two new studies have emerged that seek to draw a conclusive link between global warming and the rash of powerful storms over the last decade. One by Massachusetts Institute of Technology (MIT) climatologist Kerry Emanuel and another by researchers at Georgia Tech prompted swift disagreement from government forecasters and others who have instead pinned the above-average storm activity on a natural weather pattern, called the Atlantic Multidecadal Oscillation (AMO).

But researchers at Purdue University are preparing to publish a study in *Geophysical Research Letters* that they say offers independent confirmation of Emanuel's work. Matthew Huber and graduate student Ryan Srivar examined the destructive power of hurricanes and found it has more than doubled over the last 40 years, with rising sea surface temperatures partly responsible. That the two research groups obtained similar results using different climate data sets and slightly different methods is strong evidence of a link between global warming and hurricane strength, Huber said in a statement. "Dr. Emanuel ... looked specifically at the

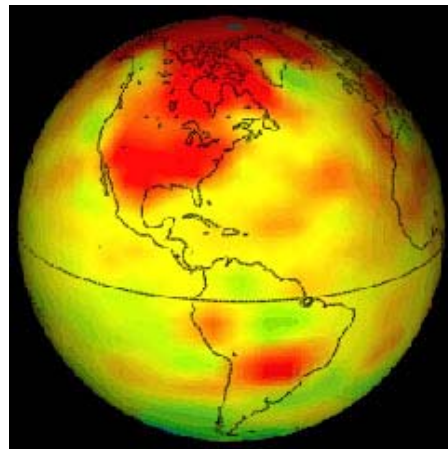
Atlantic and western Pacific oceans, whereas we looked at the entire world,” he said. “Nevertheless, we got the same results that he did, the same basic trends.”

In another study, scientists who are beginning to plumb the links between industrial pollution and warming in the polar region, say the effects of smog and ozone might explain why the Arctic is warming much faster than the rest of the Earth. Dan Lubin, a research physicist at *Scripps Institution of Oceanography* in La Jolla, CA who studies climate change at the poles, says that air circulation patterns tend to trap sulfates, nitrates and other aerosol pollution over the Arctic during winter months — a phenomenon known as “Arctic haze” that was first identified in the 1950s by U.S. Navy jets flying reconnaissance missions. His analysis of six years of atmospheric data collected by Energy Department instruments on Alaska’s North Slope show aerosols’ influence on Arctic warming is nearly as great as that of industrial carbon dioxide (CO₂) emissions.

Lubin noted that the expense of obtaining precise climate data from polar regions has hampered scientists’ understanding of the Arctic climate — a situation that is just now beginning to change. That improved data also suggest that another industrial pollutant, ozone, could account for up to 40 percent of warming in the polar region, said Drew Shindell, a researcher at NASA’s Goddard Institute for Space Studies in New York City. Scientists had long considered ozone — produced by a wide range of natural and human processes, including lightning, forests, the burning of fossil fuels, industry, animal husbandry and rice cultivation — to be a minor player in global climate change, in large part because the gas is broken down quickly by sunlight. But according to a recent analysis by Shindell and his NASA colleagues, global air patterns tend to push ozone produced by sources at high latitudes — largely in Europe and Asia — toward the Arctic. In winter months, when there is less sunlight, the gas builds in the lower atmosphere, absorbing reflected radiation and heating the air — a hypothesis the scientists have successfully tested by plugging climate data from the last 100 years into NASA climate models to gauge the influence of ozone in the Arctic relative to GHGs and other factors.

“Pollution is having a profound effect in the Arctic,” Shindell said, adding that his work and others’ could have major implications for public policy. “Targeted pollution controls could have a positive, rapid effect there because [ozone] is so short-lived,” Shindell said. Likewise, Lubin said that a similar message could be taken from his aerosol study. “The obvious remedy is for Europe to cut down its emissions,” he said. “Maybe in a few decades, there could be an effect [to reduce warming at high latitudes].”

In another new study published in the June 16 issue of *Science*, researchers suggests that the melting of permafrost in Russia’s Siberia could release enough CO₂ into the atmosphere to push the average global temperature 15 degrees higher by the end of the next century. Covering an area two-thirds the size of Alaska and 80 feet deep, Siberia’s layer of permafrost could eject about 500 billion tons of CO₂ into the atmosphere if global temperatures continue to rise. By comparison, the atmosphere currently contains about 700 billion tons of GHGs.



Climate Change (NOAA Image)

Experts said they can’t be certain how large the impact might be, because they can’t accurately estimate how much of the extra GHGs will be absorbed by plants and the oceans. One of the more frightening possibilities is that the permafrost-caused warming could feed on itself in what one scientist called a “vicious cycle” That is, it could trigger the melting of additional ice, which would unleash more GHGs and thus cause more warming, in a self-repeating cycle for no one knows how long. “...I would say this could make global warming significantly worse” than expected, said E.A.G. “Ted” Schurr, a former University of California-Berkeley doctoral student who is one of the article’s three authors. The other authors are

Sergey A. Zimov of the Russian Academy of Sciences and Terry Chapin of the University of Alaska at Fairbanks.

Schurr extracted permanently frozen ground rich in carbon-laden dust particles that have accumulated over a million and a half years from up to 10 feet beneath the ground, and hauled them back to the lab ensuring that they didn’t melt en route. He then allowed the permafrost to melt in his lab where microbes attacked and absorbed the carbon, transforming much of it into CO₂ gas. Schurr measured the rate of CO₂ emission by shining an infrared beam through it. The estimate of 500 billion tons in extra GHG emissions was derived partly from this analysis.

Unfortunately, leading climate models haven’t incorporated the possibility of a major new GHG source from Siberia, so the new report “makes it kind of scary — it means there’s a form of climate risk that we really haven’t got a good handle on,” said Chris Field, director of the Carnegie Institution’s Department of Global Ecology at Stanford. Kevin Trenberth, one of the nation’s top climate modelers, said it’s “hard to say” how much the findings could affect forecasts of global warming, but the effects are “likely nontrivial,” he said.

Meanwhile in Greenland, an average temperature increase of 2.7 degrees over the past 30 years, while twice the global average, is bringing benefits to the island that include new wildlife and plants and more water that can be used for hydroelectricity. Greenlanders are reveling in improved crop production, fatter animals and abundant fishing opportunities. The growing season has increased by two weeks since the 1970s, and farmland devoted to growing crops has increased from an average of 620 acres to 2,500 acres since 1980. Commercial fishermen say cod populations are booming; one fisherman expects to catch up to 440,000 pounds this year, up from 3,000 pounds two years ago. While shrimp, Greenland’s largest export, could decline because they thrive in colder water and are eaten by cod, the increased cod harvest would likely offset any losses in shrimp profits, according to the *Arctic Climate Impact Assessment*.

But the Danish Meteorological Institute projects temperatures could rise on Greenland another 14 degrees by the end of the century, which worries some

officials. If Greenland's glaciers melt, they could interfere with the North Atlantic gulf stream and make Britain's mild winters colder, according to another new study published in the journal *Science*. University of East Anglia researchers found that the North Atlantic current previously slowed down 8,200 years ago when a freshwater lake that came from melting glaciers overflowed into the sea, diluting the ocean's surface water and slowing down warm currents. "Our records show a sequenced pattern of freshening and cooling of the North Atlantic sea surface and a change in the deep ocean circulation, all key factors ... in controlling ... northern hemisphere climate," said palaeoclimatologist Mark Chapman, who produced the findings by extracting a core of seabed sediment from the south of Iceland.

Climate change is also melting glaciers in the mountains of the entire world at the fastest rate in the past 5,000 years, according to a new study in *Proceedings of the National Academy of Science*. Researchers cited three pieces of evidence for dramatic melting in the Andes and Himalayas: a change in the chemical isotopes of the ice cores, the widespread retreat of glaciers and the uncovering of plants that had been frozen for thousands of years. These three lines of evidence argue that the present warming and associated glacier retreat are unprecedented in some areas for at least 5,200 years," the study said.

Ohio State University professor and lead researcher Lonnie Thompson said the data came from almost 50 scientific expeditions to seven glaciers over the past three decades. "We have a record going back 2,000 years and when you plot it out, you can see the medieval warm period [from 1000 to 1300] and the little ice age [from 1600 to 1850]. And in that same record, you can clearly see the 20th century and the thing that stands out is how unusually warm the last 50 years have been. There hasn't been anything like it, not even in the medieval warm period".

In order to spot changes in tundra vegetation in the mountains caused by climate change, scientists are installing permanent monitoring plots atop three peaks within the city of Boulder, CO watershed, along the Continental Divide. The University of Colorado biologists began installing the alarm system this

summer on peaks ranging from 12,000-13,000 feet elevation. The peaks were selected in part because their watersheds are closed to the public, so summit-area vegetation is relatively untrammelled. Sixteen one-square-meter plots were staked out in the alpine tundra just below the summit of each peak — four in each of the four cardinal directions. Temperature and vegetation will be monitored periodically.

The *National Science Foundation* provided \$7,000 this year to install the plots, and similar mountaintop plots will be set up on peaks in southwestern Colorado's San Juan Mountains said Chris Landry, executive director of the *Center for Snow and Avalanche Studies* in Silverton. The Colorado peaks will be part of an international network of long-term alpine monitoring sites called GLORIA, which stands for Global Observation Research Initiative in Alpine Environments. Established in 2001, the program has grown to more than 30 sites around the world, from the poles to the tropics.

The alpine tundra community is a ground-hugging mix of some 350 species of grasses, sedges, wildflowers and other forbs, mosses, lichens and low shrubs such as dwarf willow and birch. Early indications of a response to warming could include upward migration of shrubs and nonnative weeds such as dandelions. The number of tundra species might increase initially, as intruders move into previously inaccessible areas. But as the decades pass, extinction of alpine plants is possible, accompanied by a decline in alpine species, William Bowman, director of CU's Mountain Research Station at Niwot Ridge said. That decline, in turn, could affect wildlife that rely on tundra plants for sustenance.

Climate change may also be having a major impact on wine production by expanding the range of wine-producing regions worldwide, while threatening older, established grape-growing regions like California's Napa Valley. In Europe, regions that had no wine-production since the Medieval Warm Period, which ended around 1300, are producing wine again, including parts of Wales and England. Wineries in France and Germany claim the last 10 years have produced some of the best wines they have ever made.

But in regions like Napa and France's Burgundy region the opposite is true. California may lose 81 percent of its

premium wine grape growing acreage by 2100, with the greatest losses on the West Coast and the Southwest, according to a study published on July 10 in the *Proceedings of the National Academy of Sciences*. The study concludes that production in the Napa and Sonoma valleys and Santa Barbara County would essentially be eliminated by the late 21st century. The only areas in California that would remain suitable are the narrow coastal bands and the Sierra Nevada.

Growing premium wine grapes requires hot temperatures during the day and cool at night. Temperature extremes can ruin otherwise good wine grapes, and were the focus of the study, which was funded by the *National Science Foundation*, NASA and Purdue University. Gregory Jones, a climatologist who specializes in viticulture at Southern Oregon University in Ashland, said grapes often ripen in August rather than September, when it's hot enough for spontaneous fermentation. "People are having to harvest their fruit in the middle of the night to get their fruit in when it's cool," he said.

Also along the California coast, gray whales have shown a sharp increase in birth rates this spring, National Oceanic and Atmospheric Administration (NOAA) scientists announced in late June, attributing it to a reduction in sea ice. Scientists counted 1,018 gray whale calves this year, up from 945 last year and 300 to 500 between 1999 and 2001. Warm-to-cold cycles in the Arctic Ocean are normal, NOAA biologist Wayne Perryman said, and do not necessarily reflect global warming. "For gray whales, reduced ice provides greater access to prey, just the opposite of what we see with polar bears, where reduced ice means reduced access to prey," Perryman said.

In Canada, a panel of scientists recommended in mid June that the country begin developing policies for the Northwest Passage when it inevitably becomes ice-free. The group said that when the melting of Arctic ice opens the passage for summer marine navigation, issues such as pollution and smuggling will need to be addressed. "The debate has moved from if it is going to happen to when," said John Falkingham, the chief of ice forecasting services for Environment Canada. "There is no need for panic. We can take some time, but not a lot, to put policies in place." The summer range of Arctic ice is shrinking at about 70,000

kilometers per year, scientists said. There is still no consensus on when the passage will open up, with estimates ranging from 2010 to 2100.

Meanwhile in Antarctica, trees and bushes could begin growing within a century as the ice on that continent continues to melt because of global warming, Stanford University professor Robert Dunbar told delegates at a conference in Tasmania in mid July. He said Antarctica could end up looking how it looked 40 million years ago.

In the ocean, CO₂ emissions are slowly making the water more acidic and threatening the coral reefs that are the base for most ocean ecosystems, according to a report released by the *National Center for Atmospheric Research* and NOAA on July 7. Once absorbed in seawater, CO₂ forms carbonic acid and lowers ocean pH, making it harder for corals, plankton and tiny marine snails [called pteropods] to form their body parts. While ocean absorption of CO₂ was once considered a means to curtail global warming, the taking of one-third of the atmosphere's CO₂ resulted in a one-tenth drop from the ocean's normal pH level of 8.0 over the last 200 years. Scientists expect ocean pH levels to drop by another 0.3 units by 2100, which could seriously damage marine creatures that need calcium carbonate to build their shells and skeletons. What we're doing in the next decade will affect our oceans for millions of years," said Ken Caldeira, a chemical oceanographer at Stanford University.

But in the Baltic Sea runoff from melting snow and ice in its watershed is lowering overall salinity and releasing decades-old pollution from the almost landlocked body of water, a leading expert said in May. "The Baltic Sea is already in bad shape ... life there is in a very delicate balance," said Hans von Storch, a professor at the *Institute of Coastal Research* in Germany who chairs a group of 80 scientists from 12 nations studying the Baltic Sea. Storch said the lowered salinity could prevent many saltwater fish species, including cod and herring, from surviving past the larval stage. Additionally, the melting ice and snow increases the pollution runoff from farmland. He explained that in many ways, the Baltic Sea is an estuary, and because of this, a brew of toxins like cadmium and dioxins left behind from the Soviet Union

could be stirred up by the added water and allowed to escape to the open seas.

Rising sea levels caused by global warming is posing a threat to the world's mangroves and therefore communities in Pacific island nations, according to United Nations studies. Low-lying Pacific nations, many of which are less than four meters above sea level, could lose half their mangroves by the end of the century unless action is taken now, the report claims. Half the world's mangroves have been lost in the last century, with a third of this loss happening since 1986. Achim Steiner, executive director of the United Nations Environment Program, said governments should not underestimate the economic value of mangroves. "Studies show they are worth about \$900,000 per square kilometer a year," he said. Mangroves are important nurseries for fish, they filter coastal pollution and are sources of timber and construction materials for local communities. They also reduce wave energy by up to 75% over 200 m of forest. Pacific islanders also harvest dyes from mangroves to treat textiles, nets and fish traps.

In Washington, D.C., complaints about vine infestation have increased tenfold in the past decade, corroborating a recent Duke University study that found over six years that poison ivy grew 118 percent faster than trees and other woody plants in high-CO₂ areas of forests. Duke scientists raised the CO₂ concentration in a section of the Duke Forest to the projected levels estimated to occur by 2050. Over six years, trees and other woody plants in the high-CO₂ area grew about 31 percent faster. But poison ivy grew 149 percent faster — and concentrations of urushiol, the substance that causes rashes, increased by 153 percent. Duke botanist William Schlesinger said the ivy thrived because more CO₂ stimulates photosynthesis, and that process favors vines over trunks because vines can support themselves on other structures and use the increased CO₂ to grow leaves.

Carole Bergmann of the Maryland-National Capital Parks and Planning Commission said poison ivy and other vines, including Japanese honeysuckle and kudzu, are disrupting bird habitats, ruining brickwork and clogging paths, ponds, air conditioners and electronic equipment. Additionally, species like kudzu that could not survive in the

Washington, D.C. area 15 years ago are thriving as far north as New York, indicative of climate change.

In a public opinion poll of 800 voters surveyed in May, indicated that 47 percent expect to be alive to see global warming's effects. That ranks below a terrorist attack (80 percent) and a disease pandemic (74 percent), but ahead of the 31 percent who said they expect an asteroid will strike Earth. Republican pollster Bill McInturff of *Public Opinion Strategies* and Democrat Anna Greenberg of *Greenberg Quinlan Rosner Research* conducted the survey on behalf of *NBC News* and the *Sci-Fi Channel*. The pollsters used random telephone sampling to rank the four so-called disaster scenarios.

Reaction on all of the global warming poll questions trended along partisan lines, with 56 percent of Democrats and 55 percent of independents saying they expect to see its effects during their lifetime. Thirty six percent of Republicans polled said they will witness climate change. Asked whether the U.S. is prepared for global warming, 34 percent responded that the nation was ready. A slightly lower number (32 percent) said they were personally prepared. Broken down by political affiliation, 73 percent of independents said the country is not ready for global warming. That compares with 62 percent of Republicans and 68 percent of Democrats who said the U.S. is not prepared. According to the pollsters, the survey has a margin of error of plus or minus 3.46 percent.

Meanwhile, *Lloyd's of London* has taken note of climate change in a report issued in early June which advises its members to increase insurance premiums in anticipation of future claims of damage caused by global warming. "Although it's almost two decades since the U.N. recognized that climate change was a catastrophic threat to the Earth, it's clear that the insurance industry has not taken catastrophe trends seriously enough," *Lloyd's* director Rolf Tolle said. "Climate change is today's problem, not tomorrow's. If we don't take action now to understand the changing nature of our planet we will face extinction."

The report said that *Lloyd's* did not want to enter the debate on how much global warming was induced by human activity, but it would accept the "growing body of

opinion” on the issue. The report recommended constantly updating catastrophe estimates based on scientific evidence rather than historical data. Some catastrophic risks might lose their coverage because of GHGs gases and rising sea levels, the report warned. “In the long term, strategists will want to consider the future insurability of weather-related risk,” the report said. A rise of 4 meters in global water levels would flood almost every coastal city, the report said, suggesting insurers consider withdrawing or restricting coverage in such areas.

Several of the largest home owners insurance firms in the U.S. follows *Lloyd's* lead announcing that they are canceling the policies of customers in coastal counties, citing the need to protect themselves from destructive storms. *Allstate Insurance Corp.* and *Nationwide Mutual Insurance Co.* are no longer writing new policies for coastal areas, and *MetLife Inc.* has stated that it will require extra inspections and expensive storm shutters for new customers living within five miles of the ocean before it will issue coverage.

Along these same lines, a group of 27 investors who together manage more than \$1 trillion in assets have asked the Securities and Exchange Commission to require that companies disclose how financially vulnerable they are to the effects of climate change. In a letter to SEC chairman Christopher Cox, the investors asked that climate change issues be addressed in routine corporate financial reports. The letter, also signed by several New York officials and environmental groups, defines risk broadly. “Investors have a right to know if a company’s buildings are in the path of hurricanes that might be exacerbated by climate change, or if it will face high costs when GHGs emissions are regulated,” said James Coburn, a policy adviser at *Ceres*.

Pharmaceutical giant, *Johnson & Johnson* (J&J), since pledging to mirror the Kyoto Protocol and reduce its emissions by 7 percent from its 1990 levels by 2010, has become a world alternative energy leader that has boosted profits as well. In 2003, the then-struggling J&J decided to take on global warming, in part for public-relations reasons. “We’re a health care company and we feel a responsibility not to contribute to climate change or pollution that would negatively impact the health of people in the world,” said Dennis

Canavan, J&J’s executive director of worldwide energy management. By 2005, the company hit its target five years early and had already reduced its CO₂ tonnage by 11 percent. The company’s green pursuits attracted the interest of environmentally minded investors, according to *Innovest Strategic Value Advisors*, who steers such investors to companies that are environmental overachievers.

Weyerhaeuser Co. (WC), in late June, outlined plans to cut GHG emissions from its pulping facilities by 40 percent by 2020 through an increased use of alternative fuels such as biomass products. WC Senior Vice President Ernesta Ballard said that the move will not only save the company money, it “will also make a significant contribution to *Weyerhaeuser’s* environmental performance.” The company said in the report that the 40 percent reduction from 2000 emission levels would be the equivalent of taking 700,000 cars off the road. John Swaan, the executive director of the *Wood Pellet Association of Canada*, said the move was a shrewd one because the Canadian government is proposing to introduce a tax on hydrocarbons in accordance with the nation’s participation in the U.N. Kyoto Protocol, which allows CO₂ to be released from biomass burning and not fossil fuel burning. “Sooner or later, there will be rewards for those that are generating green power of any sort,” Swaan said.

In Oregon, Gov. Ted Kulongoski (D) in mid June appointed a group of 21 people to study how climate change will affect residents, businesses and the environment. The *Climate Change Integration Group* includes business leaders, scientists and sustainability experts. “It is very important to the economic and physical health of our state that we understand and address problems associated with climate change,” Kulongoski said.

California’s Gov. Arnold Schwarzenegger (D) and New Mexico Gov. Bill Richardson (D) have shared leadership in pushing the *Western Governors’ Association* to adopt landmark goals for clean power and efficiency, but it is New Mexico that has declared itself “THE Clean Energy State.” “We are a huge coal, oil and natural gas state that’s making a dramatic transition,” said Craig O’Hare, special assistant for renewable energy in New Mexico’s

Energy, Minerals and Natural Resources Department. “We are positioning New Mexico to be a leader in the new energy economy,” he said. Among policies that have been put into effect is a 10 percent renewables portfolio standard by 2011 that has already been exceeded by the state’s largest regulated utility, *Public Service Company of New Mexico* (PNM). “We’ve asked that the utilities voluntarily increase that to 20 percent by 2020,” said Ben Lujan, president of the Public Regulation Commission. Richardson last year also issued an executive order targeting a reduction to 2000 levels of GHG emissions by 2012, 10 percent below those levels by 2020 and 75 percent below by 2050.

These goals have been backed up with other actions, such as when New Mexico this year became the first state to join the *Chicago Climate Exchange* (CCE) and Richardson committed state agencies to reduce GHGs by 4 percent this year, with the potential for another 2 percent reduction by 2010. Richardson also joined with Arizona Gov. Janet Napolitano (D) to create a *Southwest Climate Change Initiative* program. Sandra Ely, environmental and energy policy coordinator for the state Environment Department, said we want to show leadership, and we are looking for homegrown solutions.”

Meanwhile at the federal level, two appellate court judges are facing questions about their 2002 trip to a Montana resort where they heard from free-market advocates and climate change skeptics and then later rejected litigation seeking U.S. EPA regulation of GHGs from new motor vehicles. Chief Judge Douglas Ginsburg and Judge David Sentelle, both based on the U.S. Circuit Court of Appeals for the District of Columbia, were among a dozen federal judges who traveled to the *Gallatin Gateway Inn* outside Bozeman, MT, in July 2002 for a seminar titled “*Understanding the Ecology, Economics and Ethics of Climate Change*.” The Montana-based *Foundation for Research on Economics and the Environment* (FREE) sponsored the five-day conference, which included discussions on the “deep uncertainty around global warming,” natural temperature variations and the potential for new markets for grasslands and forests as carbon sinks, according to an article published by FREE’s program coordinator, John Downen.

Judicial trips are not prohibited under the official Code of Conduct for judges, but some outside groups have raised questions about possible conflicts of interest. One group, the nonprofit Washington law firm *Community Rights Council* (CRC), released documents in April showing that FREE is funded in part by *Exxon Mobil Corp.*, *Philip Morris* and *R.J. Reynolds Tobacco*. The CRC also issued a report that said 349 federal judges took 1,158 trips between 1992 and 2004.

Also under criticism, NASA has admitted in letters sent to leaders of the Senate Homeland Security and Government Affairs Committee that they inappropriately censored climatologist James Hansen on one occasion. "An internal inquiry has revealed that one recent media request to interview Hansen, of the *Goddard Institute for Space Studies*, was inappropriately declined," Brian Chase, assistant administrator of NASA's Office of Legislative Affairs, wrote to the panel's ranking member, Sen. Joe Lieberman (D/CT). But the incident does not seem to be part of a larger pattern, Chase wrote. It "was contrary to NASA policy [and] did not spring from any change in policy or in any way change NASA's commitment to fully and transparently communicate its findings, programs, and activities to the public." NASA also sent a copy of the letter acknowledging the incident to the committee's chairman, Sen. Susan Collins (R/ME).

Collins and Lieberman are among several lawmakers who have taken an interest in Hansen's allegations of scientific censorship, which he first aired in February interviews with the *New York Times* and *Washington Post*. According to Hansen, NASA's public affairs office handed down a gag order after he advocated cuts in GHG emissions during a speech before the *American Geophysical Union*. His allegations prompted a probe of NASA's press office policies by the House Science Committee and the firing of George Deutsch, a 24-year-old political appointee who issued the gag order.

But now, to the dismay of many NASA employees, the agency has deleted the phrase "to understand and protect our home planet" from its mission statement in this year's budget and planning documents. This leaves some to believe that the agency's research focus will shift

away from projects designed to improve mankind's understanding of climate change. Phillip B. Russell, a NASA scientist and atmospheric chemist at the Ames Research Center, said that he and many of his colleagues are upset that the change to the statement was made without the consultation of the agency's 19,000 employees. "We refer to the mission statement in all our research proposals that go out for peer review, whenever we have strategy meetings," he said. "As civil servants, we're paid to carry out NASA's mission. When there was that very easy-to-understand statement that our job is to protect the planet, that made it much easier to justify this kind of work." But NASA spokesman David E. Steitz said that while the agency may need to improve its internal communications, there was no "mal-intent or idea of exclusion" involved in the decision to remove the phrase.

Meanwhile, soil scientists say no-till farming offers an easy, inexpensive first step to address global warming. By combining no-till with other conservation practices — such as planting cover crops, improving grazing and reforestation — scientists say soils worldwide could offset 5 to 15 percent of global GHG emissions. Agriculture advocates say the world's soil resources are in a prime position to play an immediate, effective role in the global warming debate, particularly at a time when billions of dollars are being spent in the U.S. alone on research and development of cutting-edge technologies such as renewables, coal gasification, underground carbon storage and nuclear power.

North America lost about 50 percent of the organic carbon stored in its soil when 19th century homesteaders cleared forests and plowed fields. Now no-till can return much of that lost carbon to the ground. No-till farmers leave corn stalks and other post-harvest plant materials on the ground where it decomposes into rich organic matter. Besides the plant leavings, which earned no-till the nickname of "trash farming," a no-tilled field also has darker soil, a sign of more carbon build up. If you walk onto a no-till field after a rain it feels as though you are squishing around on a fresh, wet sponge. Dig down a couple inches and you will find a community of earthworms and weeds. It's no wonder foxes, hawks and other animals thrive on no-till farms, say no-till advocates.

While it is easy to see the smorgasbord that no-till fields lay out for wildlife, assessing their potential as carbon banks is much more complicated. No-till will not work in every type of soil or with any crop. Keith Paustian, a professor at Colorado State University, said soils with the highest potential for carbon sequestration stretch from southern Minnesota across the Midwestern Corn Belt — Iowa, Illinois, Indiana, southern Michigan and western Ohio. Lands along the Mississippi River to the Gulf of Mexico also have areas with high sequestration potential. And models show benefits from soils in Kansas, Oklahoma, eastern Colorado, Nebraska, Texas, North Dakota, South Dakota and across the Southeast. California researchers are also assessing how to use no-till on their state's fruit and vegetable farms.

The conversion of all U.S. farmland to continuous and permanent no-till, along with other improved farming practices, could offset about 300 million metric tons of carbon per year — or more than 4 percent of the nation's annual emissions, Rataan Lal, a soil scientist at The Ohio State University said. Globally, Lal said carbon storage potential for all soils through no-till and other land practices is between 600 million and 1.2 billion tons of carbon per year — enough to offset between 5 and 15 percent, respectively, of global GHG emissions.

But there are some complications for farmers. Crop yields are lower in the first few years of transition from conventional plowing, and farmers must buy some new equipment. For example, a powerful drill to punch seeds through organic residue on a no-till field, can cost about \$100,000 for a 2,000-acre farm. But while global warming has not been a significant factor in a farmers' no-till decisions until now, many think the approach could take off if a mandatory U.S. emissions-trading market opened.

The voluntary Chicago Climate Exchange (CCX) allows no-till farming, as well as reforestation and methane capture in its list of available credits for members who cannot meet their emission targets. In one of the biggest payouts to date, about 500 no-till farmers in Iowa, Kansas, Nebraska, Minnesota and South Dakota collected a total of about \$750,000 last year selling credits for their efforts. Recent studies show a carbon price of \$10 a ton has just a

slight effect on farmer's enthusiasm for no-till, but eagerness to abandon the plow would rise rapidly if the price were to exceed \$50 a ton.

Meanwhile, a jellylike sea creature about the size of a human thumb also does its part to reduce CO₂ emissions. The creature consumes the GHGs and deposits them on the ocean floor through its feces, according to research published in the May issue of *Deep Sea Research*. The species, a phytoplankton called salp, consumes CO₂ from air and water when it grows. The gas is excreted in fecal pellets that fall to the ocean floor where it cannot re-enter the atmosphere. A team led by marine biologists Laurence Madin of Woods Hole Oceanographic Institution and Patricia Kremer of the University of Connecticut found a "hot spot" off New England in 2002 that covered about 38,600 square miles. According to the team, that size swarm could drop as much as 4,000 tons of CO₂ to the ocean floor per day.

With regard to CO₂ sequestration in underground storage facilities, dangerous emissions from volcanoes offer a grim example of what might happen if the carbon emissions stored underground

somehow escape. Critics of underground carbon storage fear that injecting CO₂ deep underground in porous rocks would only create an artificial version of these natural CO₂ pockets, posing a great threat to anyone who may live near them. "There may be massive public resistance, as we've seen with nuclear power," Bert Metz, co-chair of a 2005 U.N. report on carbon sequestration, said during a conference on carbon technologies in Trondheim, Norway, in late June.

In 1986, 1,700 people died after a catastrophic release of 1.2 million metric tons of CO₂ from the depths of Lake Nyos in Cameroon, according to the International Energy Agency. Also just this past April, three ski patrol members died at Mammoth Mountain, CA, when they were overcome by CO₂ while trying to fence off a dangerous volcanic vent.

Sources: *AP/MSNBC online*, 7/14/06; *E&ENews PM*, 7/14/06; Janet Wilson, *Los Angeles Times*, 6/16/06; Keay Davidson, *San Francisco Chronicle*, 6/16/06; Steve Connor, *London Independent*, 6/27 and 6/30/06; Elizabeth Weise, *USA Today*, 6/1/06; Jane Kay, *San Francisco Chronicle online*, 7/11/06; Charlie Emrich,

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Meetings of Interest

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

Oct 10-13: Managing Agricultural Landscapes for Environmental Quality - Strengthening the Science Base. Soil and Water Conservation Society, Westin Crown Center Hotel, Kansas City, MO. See: www.swcs.org/en/swcs_international_conferences/managing_agricultural_landscapes

Nov 2-3: 3rd Annual Conference on Ecosystems Restoration and Creation, Plant City, FL. Contact: Patrick Cannizzaro, pcannizzaro@hccfl.edu, (813) 253-7523.

Nov 5-8: 60th Annual Southeastern Association of Fish and Wildlife Agencies Conference: Wildlife Management in the Next New World, Norfolk, VA. See: <http://seafwa2006.org>.

Nov 8-10: North American Lake Management Society's 26th Annual International

Symposium: Making Connections—People, Lakes, Watersheds, Indianapolis, IN. See: www.nalms.org. Contact: Carol Winge, winge@nalms.org, 608/233-2836.

Dec 3-6: 67th Midwest Fish and Wildlife Conference, Omaha, NE. See: www.midwest2006.org. Contact: Mark Porath, Mark.Porath@ngpc.ne.gov, 402/471-7651.

Dec 15-19: Ninth Biennial Conference of the International Society for Ecological Economics, Delhi, India. See: www.ISSE2006.com.

Jan 7-9: Coolwater Fish Culture Workshop, Allamuchy, NJ. Contact: hatchery0@comcast.com.

Feb 7-11: Southern Division of the American Fisheries Society and Tennessee Chapter of AFS, Memphis, TN. See: www.sdafs.org/meetings/2006.

Feb 18-23: Sixth International Symposium on Ecohydraulics, Christchurch, New Zealand. See: www.conference.co.nz/

echohydraulics 2007. Contact: Rachel Cook, rachel@conference.co.nz.

Jun 6-9: Fourth International Reservoir Symposium: Balancing Fisheries Management and Water Uses for Impounded River Systems, Atlanta, GA. See www.sdafs.org. Contact: Mike Colvin, Mike.Colvin@mdc.co.gov.

Aug 22-27, 2007: 2nd National Conference on Ecosystem Restoration, Hyatt Regency Crown Center, Kansas City, MO. See: <http://conference.ifas.ufl.edu/NCER2007/>

Sep 2-6, 2007: American Fisheries Society, 137th Annual Meeting, San Francisco, CA. Contact: Betsy Fritz, bfritz@fisheries.org, 301/897-8616, ext. 212

Sep 16-19, 2007: International Symposium: WILD TROUT IX, West Yellowstone, MT. See: www.wildtrout-symposium.com/. Contact: Dirk Miller, Dirk.Miller@wgf.state.wy.us, (307) 777-4556

Congressional Action Pertinent to the Mississippi River Basin

Climate Change

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

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

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

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

S. 887. Hagel (R/NE) and 6 Co-Sponsors. Amends the Energy Policy Act of 1992 to direct the Secretary of Energy to carry out activities that promote the adoption of technologies that reduce GHG intensity and to provide credit-based financial assistance and investment protection for projects that employ advanced climate technologies or systems, and for other purposes.

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

H. R. 955. Olver (D/MA) and Gilchrest (R/MD). Amends the Clean Air Act to

establish an inventory, registry, and information system of U.S. GHG emissions, and for other purposes.

H. R. 2828. Inslee (D/WA) and 14 Co-Sponsors. Ensures that the U.S. leads the world in developing and manufacturing next generation energy technologies, to grow the economy, create new highly trained, highly skilled American jobs, eliminate American over-dependence on foreign oil, and address the threat of global warming.

Conservation

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

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

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

S. 964. Alexander (R/TN) and 3 Co-Sponsors. The "American Outdoors Act of 2005" provides a conservation royalty from Outer Continental Shelf revenues to establish the Coastal Impact Assistance Program, to provide assistance to States under the Land and Water Conservation Fund Act of 1965, to ensure adequate funding for conserving and restoring wildlife, to assist local governments in improving local park and recreation systems, and for other purposes.

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

H. R. 5539. Pombo (R/CA) and 6 Co-Sponsors. Reauthorizes the North American Wetlands Conservation Reauthorization Act.

Endangered Species Act (ESA)

S. 2110. Crapo (R/ID) and 3 Co-Sponsors. Amends the ESA to enhance the role of States in the recovery of endangered and threatened species, to implement a species conservation recovery system, to establish certain recovery programs, to provide Federal financial assistance and a system of incentives to promote the recovery of species, and for other purposes.

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

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

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

H. R. 2779. Herger (R/CA). Amends the ESA to enable Federal agencies responsible for the preservation of threatened and endangered species to rescue and relocate members of any of those species that would be taken in the course of certain reconstruction, maintenance, or repair of Federal or non-Federal man-made flood control levees.

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

H. R. 3824. Pombo (R/CA) and 13 Co-Sponsors. Amends and reauthorize the ESA to provide greater results in conserving and recovering listed species, and for other purposes.

H. R. 4857. McMorris (R/WA) and 5 Co-Sponsors. Better informs consumers regarding costs associated with compliance for protecting endangered and threatened species under the ESA.

H. R. 5381. Saxton (R/NJ) and Kind (D/WI). Establishes a volunteer program and

promotes community partnerships for the benefit of national fish hatcheries and fisheries program offices.

Energy

S. 1860. Domenici (R/NM) and 5 Co-sponsors. Amends the Energy Policy Act of 2005 to improve energy production and reduce energy demand through improved use of reclaimed waters, and for other purposes.

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

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

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

H. R. 3263. Wamp (R/TN) and 10 Co-Sponsors. Reduces the growth of energy use in the U.S., limits the impact of growing energy use on the economy, environment, and national security of the U.S. through reductions in energy demand and for other purposes.

Federal Water Pollution Control Act (FWPCA) Amendments:

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

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

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

Invasive Species

S. 363. Inouye (D/HI) and 3 Co-Sponsors and **H. R. 5030.** Miller (R/MI). Amends the Nonindigenous Aquatic

Nuisance Prevention and Control Act of 1990 to establish vessel ballast water management requirements, and for other purposes.

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

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

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

S. 1541. Akaka (D/HI) and 3 Co-Sponsors. Protects, conserves, and restores public land administered by the Department of the Interior or the Forest Service and adjacent land through cooperative cost-shared grants to control and mitigates the spread of invasive species, and for other purposes.

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

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

H. R. 3049. Green (R/WI). Amends section 42 of title 18, U.S. Code, popularly known as the Lacey Act, to add certain species of carp to the list of injurious species that are prohibited from being imported or shipped.

Mining

S. 961. Rockefeller (D/WV) and **H. R. 1600.** Cubin (R/WY) and 4 Co-Sponsors.

Amends the Surface Mining Control and Reclamation Act of 1977 to reauthorize and reform the Abandoned Mine Reclamation Program, and for other purposes.

S. 1701. Thomas (R/WY) and Enzi (R/WY). Amends the Surface Mining Control and Reclamation Act of 1977 to improve the reclamation of abandoned mines.

S. 2616. Santorum (R/PA) and Specter (R/PA). Amends the Surface Mining Control and Reclamation Act of 1977 and the Mineral Leasing Act to improve surface mining control and reclamation, and for other purposes.

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

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

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

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

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

Public Lands

S. 1897. Corzine (D/NJ) and Dodd (D/CT). Amends the Forest and Rangeland Renewable Resources Planning Act of 1974 and related laws to strengthen the protection of native biodiversity and ban clear-cutting on Federal land, and for other purposes.

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

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

H. R. 1796. McCollum (D/MN) and 7 Co-Sponsors. Amends National Trails System Act to designate the route of the Mississippi River from its headwaters in the State of Minnesota to the Gulf of Mexico for study for potential addition to the National Trails System.

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

Water Resources

S. 232. Smith (R/OR). Authorizes the Secretary of the Interior, acting through the Bureau of Reclamation, to assist in the implementation of fish passage and screening facilities at non-Federal water projects, and for other purposes.

S. 353. Conrad (D/ND) and Dorgan (D/ND). Amends the Water Resources Development Act of 1999 to direct the Secretary of the Army to provide assistance to design and construct a

project to provide a continued safe and reliable municipal water supply system for Devils Lake, ND.

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

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

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

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

S. 2288. Feingold (D/WI) and McCain (R/AZ). Modernizes water resources planning, and for other purposes.

H. R. 109. Herseth (D/SD). Provides compensation to the Lower Brule and Crow Creek Sioux Tribes of South Dakota for

damage to tribal land caused by Pick-Sloan Projects along the Missouri River.

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

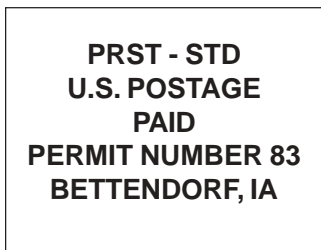
H. R. 391. Leach (R/IA). Directs the Secretary of the Army to convey the remaining water supply storage allocation in Rathbun Lake, IA, to the Rathbun Regional Water Association.

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

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

H. R. 4588. Doolittle (R/CA). Reauthorizes grants for and requires applied water supply research regarding the water resources research and technology institutes established under the Water Resources Research Act of 1984.

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