U.S. Department of Transportation
Federal Highway Administration

Keeping it Simple

Easy Ways to Help Wildlife Along Roads

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Federal Highway Administration

Keeping it Simple

Easy Ways to Help Wildlife Along Roads

Doing the right thing - *simply*

"Keeping it simple" is more than a concept. It's a commitment.

It means using simple solutions when simple solutions will work.

It involves going beyond "compliance" to identify easy ways of helping fish and wildlife.

It means doing the right thing just because it's the right thing to do and because one has an opportunity to do it.

"Doing simple things for wildlife when we get the chance is common sense," says Mary Peters, FHWA Administrator. "Something as simple as installing a peregrine falcon box can make a tremendous difference."

This brochure highlights more than 100 simple, successful activities from all 50 states and from FHWA's Western Federal Lands Division.

All these activities are "easy." Most are low- or no-cost. All benefit fish or wildlife or their habitat.

Many activities were done only once—to protect specific species in specific environmental conditions. Others have been done repeatedly and are still being done.

Some activities are performed routinely because research has proven them effective. Others are new innovations, "best practices," or state-of-the-art strategies.

Some activities—for example, modifying mowing cycles and installing bluebird boxes—are activities common to a large number of states. Others represent a simple solution to a site-specific environmental challenge.

We invite you to explore them all. We encourage you to find out for yourselves, through this brochure, how transportation professionals are working with others to do the right thing for wildlife and, wherever possible, to do it "simply."

Keeping it simple along roads

Every year cars, vans, and trucks traveling on America's public roads kill millions of animals. Highway construction, like urban and residential development, often destroys or fragments their habitat. ***Critter Crossings: Linking Habitats and Reducing Roadkill*** (www.fhwa.dot.gov/environment/wildlifecrossings) highlights some successful overpasses, underpasses, and resource management approaches that are helping to meet this challenge.

On these ***Keeping It Simple*** pages you'll read about numerous "easy," complementary strategies that help make roads more wildlife friendly. You'll also read about simple ways states are managing roadside habitats...minimizing highway construction's impact on sensitive species...controlling highway runoff so it doesn't pollute water and harm aquatic life...and improving roadside lighting so it doesn't disrupt the flight pattern of migratory birds.

"Watch out for elk" signs get motorists to slow down

If you drive along the heavily forested mountain segments of State Route 260 between Payson and Showlow, Arizona, you'll notice this four-part warning sign: "Keep your eyes open and your speed slow. Watch out for elk as you go." To increase motorist awareness about a high elk population along this stretch of SR 260 and to decrease the spiraling number of vehicle-wildlife accidents, the Arizona Department of Transportation placed *Burma Shave*-style signs like these on both sides of the highway, each part of the message 500 feet apart from the next. The slogans, created by the Department and local school children, have reduced driving speeds on this mountain road and have helped decrease the number of vehicle accidents involving elk and other large game animals.

U.S. Department of Agriculture

Bull elk

Bruce Eilerts, (602) 712-7398 or beilerts@dot.state.az.us

Sturdy fence cuts tortoise roadkill by 75%

Federally endangered desert tortoises of the Mojave and Sonoran Deserts spend most of their lives in underground burrows. When they emerge in the spring to migrate, their migration path often takes them across roads. Along a 2-mile stretch of Arizona State Route 86 on the Tohono O'odam Reservation, a simple fence has reduced the number of annual desert tortoise deaths by 75 percent. Arizona Department of Transportation maintenance crews installed the 24" welded-wire fencing onto the bottom of a right-of-way fence on both sides of the highway. Six inches of the new fence were buried below ground so migrating tortoises could not crawl under it, and the fence was secured to an existing culvert through which the tortoises could cross back and forth under the highway.

National Park Service

Sonoran desert tortoise

Bruce Eilerts, (602) 712-7398 or beilerts@dot.state.az.us

Less mowing of roadside "transition zones" creates new wildlife habitat

A few years ago the Arkansas Highway and Transportation Department established "transition zones" - areas mowed only once a year - along non-Interstate highways and on approximately 200 Interstate interchanges. Creating these infrequently mowed, 25- to 75-foot-wide zones next to high-maintenance areas immediately adjacent to the roadside has increased habitat for ground-nesting birds such as Eastern meadowlarks, mourning doves, and ovenbirds (ground warblers known for their chant-like singing). There's new habitat, too, for rodents such as harvest mice, deer mice, and cotton rats, which provide food for predatory birds like the red-tailed hawk.

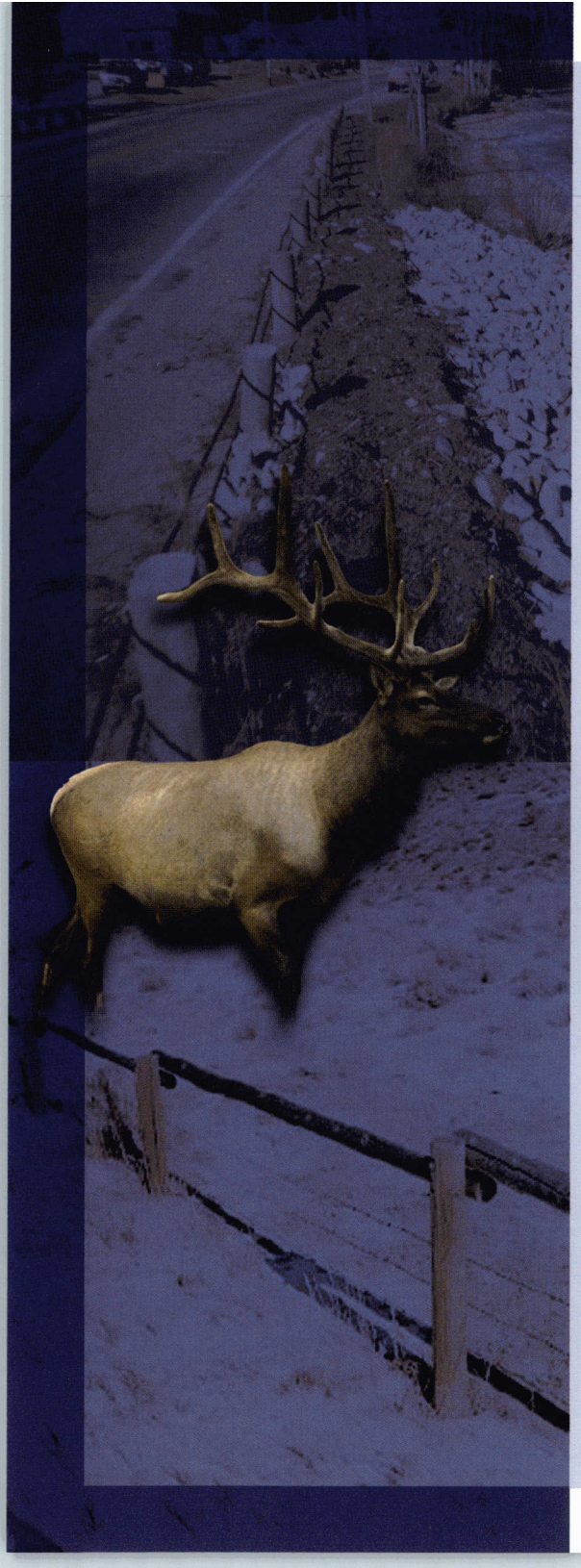
U.S. Fish and Wildlife Service

Ovenbird

U.S. Geological Survey

Eastern meadowlark

Phillip Moore, (501) 569-2281 or phillip.moore@ahtd.state.ar.us



Not mowing "excess" right of way benefits wildlife

U.S. Fish and Wildlife Service

Eastern fox squirrel

When the Arkansas Highway and Transportation Department revised its mowing schedules a few years ago, it established roadside "high maintenance zones" and "transition zones." On particularly wide rights of way the Department also created "natural zones" just beyond the "transition zones." These natural areas are never mowed. The no-mowing policy has helped increase available wildlife habitat on more than 30,000 acres throughout the state. Birds and butterflies flock to the now-flourishing native wildflowers in these natural zones, and fox squirrels, whitetail deer, and other animals eat the nuts and acorns of the 370,000 hardwoods planted by the Department.

Phillip Moore, (501) 569-2281 or phillip.moore@ahtd.state.ar.us

Saving non-economic "remnants" along roads for wildlife habitat

National Park Service

Bobcat

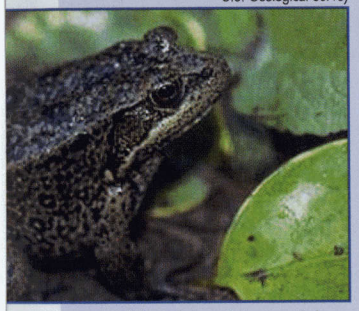
When highway construction divides private property and makes one side inaccessible, the Arkansas Highway and Transportation Department usually pays damages to the landowner for lack of access to the property. On the Pine Bluff Bypass along Bayou Bartholomew in Jefferson County, the Department purchased and retained approximately 200 acres of remnants along the bayou for their natural wetland and floodplain values and for wildlife habitat. Leaving this "greenway" in its natural state has preserved the habitats of squirrels, possums, foxes, bobcats, whitetail deer, and other species. The City of Pine Bluff is currently constructing a pedestrian walkway through the greenway.

Phillip Moore, (501) 569-2281 or phillip.moore@ahtd.state.ar.us

Clearing vegetation protects red-legged frog

Urban and rural development, introduced predators like the bull frog, human disturbances to watersheds, and other factors have caused the federally endangered California red-legged frog to disappear from 99% of its habitat in California's Central Valley. So when U.S. Highway 50 had to be bridged over a creek near Placerville, California, the California Department of Transportation took a simple and proactive step. Although no frogs had been seen on the construction site, they had been spotted within 5 miles of the site, so maintenance crews removed vegetation (blackberry shrubs and non-native grasses) that might have attracted the frogs to the construction site where foundation-drilling would have put them at risk of injury or death. Drill rigs were not brought in until the entire area was cleared, and drill crews checked under their equipment before starting work. No red-legged frogs were ever seen on the site.

U.S. Geological Survey



California red-legged frog

Jennifer Gillies, (916) 653-6976 or jennifer_gillies@dot.ca.gov

Training helps keep desert tortoises safe

A few hours of training have gone a long way towards protecting the federally threatened desert tortoise in California's San Bernadino County. On Interstate 15 and other highway-construction sites next to desert-tortoise habitat, the California Department of Transportation briefed contractors on the importance of doing these simple things to protect the tortoises: keeping garbage cans tightly closed and emptying trash regularly (ravens - the major predator of desert tortoises - are attracted to garbage)...avoiding handling the tortoises (handling can cause the animals to dehydrate and die)...frequently checking under vehicles and equipment carefully checking potential excavation "traps"...prohibiting pets at the project sites...and putting up temporary fencing to keep tortoises away from heavy machinery or activities that could injure them.

Paul Gonzales, (909) 388-7028 or paul_gonzales@dot.ca.gov

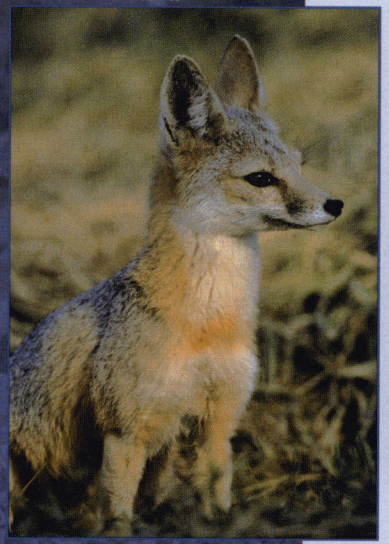
William Boarman

Desert tortoise

Small measures protect a little fox - *big time*

The San Joaquin kit fox weighs only 5 pounds and is just 29 inches long (including its fluffy tail). It's also federally endangered. That's why the California Department of Transportation held pre-construction training sessions on the species.

U.S. Fish and Wildlife Service



kit fox

Engineers, contractors, and sub-contractors learned how to distinguish the kit fox from the red fox, gray fox, and coyote and how to identify potential kit fox dens and tracks. They also learned easy ways of protecting the kit fox - from removing food trash from the site each day to covering steep-walled holes and ditches to inspecting pipes wider than 4 inches. The training was repeated on lengthy jobs for new personnel. On job sites like State Route 99 near Bakersfield, where workers rightly guessed an enlarged squirrel hole was a kit fox den, a 24-hour on-call biologist came to the scene to seal the hole once the fox had left. About 60 kit foxes have been seen on central-California highway projects since the training, and none have been harmed by construction activities.

Perry Coy, (559) 243-8194 or Perry_Coy@dot.ca.gov

Dimmer lights mean safer flights for shorebirds

(c) Jack Jeffrey Photography

Newell's shearwater

Bright lights are bad news for migratory seabirds. As they fly inland to nesting areas, the birds can become disoriented by the lights and fly into cars or buildings. On the Hawaiian islands of Kauai and Hawaii, migrating seabirds like the endangered dark-rumped Petrel and threatened Newell's Shearwater now fly at much less risk of injury or roadkill thanks to a proactive lighting policy set up by the Hawaii State Department of Transportation. Light poles are now limited to a height of 25 feet, lights must be low-wattage and directed downward, lights must be shaded to prevent light from escaping horizontally, and muted colors must be used instead of bright white.

Pat Phung, (808) 541-2700 or pat.phung@fhwa.dot.gov

Culvert ledges offer phoebes more nest options

Since the 1970s, every time Illinois Department of Transportation workers have replaced a box culvert, they have added a concrete ledge for Eastern phoebes, just to increase their habitat. The sparrow-sized, fly-catching birds prefer to nest on flat surfaces such as bridges, cliffs, and yes ledges. Culvert inspectors verify that the birds are indeed using the culvert ledges for their nests and that the nests are successful.

Scott Marlow, (217) 782-4073 or marlows@nt.dot.state.il.us

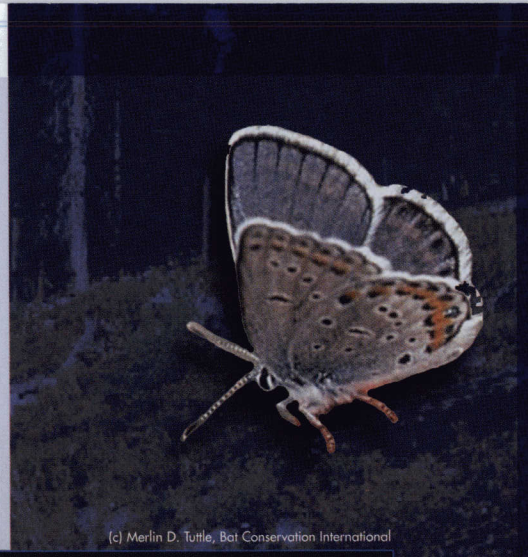
Peter Wallack

Eastern phoebe

Bugs go up, bats go up, thanks to taller lights

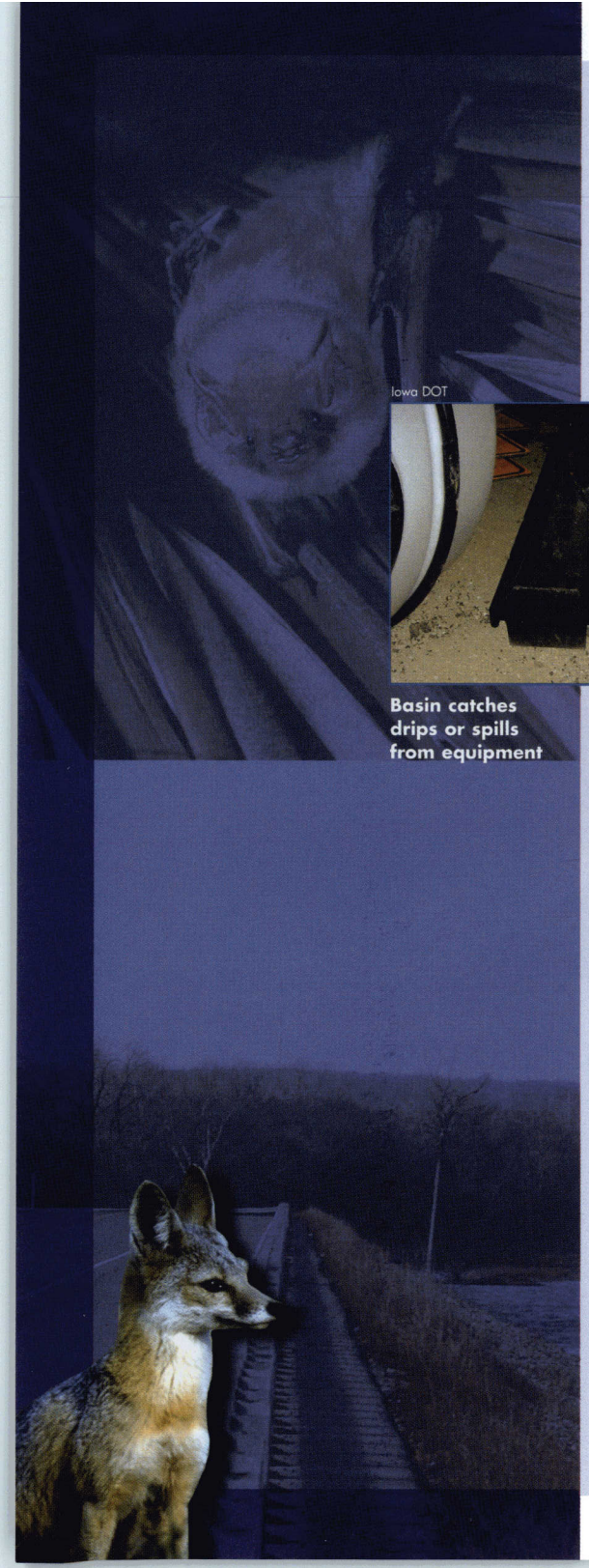
When Indiana bats aren't hibernating in caves, they're often roosting in dead trees. In Indiana, many of these dead-tree bat roosts are in wooded areas near busy highways. To keep the endangered bats from flying into traffic as they chase insects, Indiana Department of Transportation biologists came up with an easy solution. At the I-64 Lanesville Rest Area and other Indiana bat locations, workers put up tall, "high-mast" lighting. When the insects fly high - above the traffic - so do the bats. Thanks to the taller lights, both the bats and their food supply are protected.

Jim Juricic, (317) 232-5305 or jjuricic@indot.state.in.us



(c) Merlin D. Tuttle, Bat Conservation International

Indiana bat



Catch basin keeps road chemicals away from wildlife

Road equipment left on roadsides during work breaks can cause problems for wildlife. Emulsion oils used to seal cracks in asphalt can stick to animals' feet, fur, and feathers. It can plug pores in reptiles and insects. Diesel fuel used to clean the emulsion "distributor bars" can destroy the waterproof coating on bird feathers, leaving birds vulnerable to hypothermia. Iowa Department of Transportation maintenance crews prevent such occurrences simply by placing a long plastic catch basin under the equipment. They then pour the collected emulsion and fuel into a waste barrel and dispose of them.

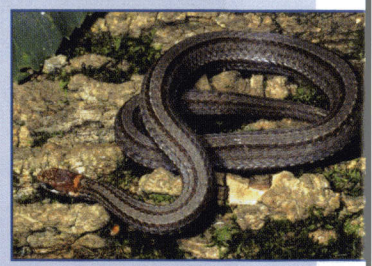
Iowa DOT

Basin catches drips or spills from equipment

Mary Kay Rogge, (515) 239-1741 or MaryKay.Rogge@dot.state.ia.us

Rock-brush piles create safe home for little snake

The small, crimson-colored Northern Red-bellied Snake never bites. When this threatened non-poisonous snake is around, it's the sign of a healthy environment. So when the City of Leavenworth made plans to build the 20th Street Trafficway through potential Redbelly habitat, city officials purchased a nearby large tract of land with high potential as snake habitat. There, the City worked with the Kansas Department of Transportation to enhance existing snake habitat and create new habitat. They put in three lines of flat rocks (from 4-foot boulders to 12-inch stones) and filled in the crevices with tree debris gathered from felled trees on the construction site. The rock-brush piles protect the little snake from predators and allow it to crawl below the frostline for its winter den. The land was fenced and added to the list of parks managed by the Kansas Wildlife and Parks Department, protecting it as a sanctuary.



Northern red-bellied snake

Mike McDonald, (913) 684-0375 or mmcdonald@firstcity.org

Endangered woodpeckers move into human-made homes

Federally endangered red-cockaded woodpeckers need mature (30 years or older) pine trees for nesting and feeding. The birds prefer older pines because the soft wood is easy to penetrate and because the holes they hammer out cause the trees' resin to flow - resin that deters crawling predators. When the Louisiana Department of Transportation and Development made plans to widen U.S. 165 South in Rapides Parish, biologists carved "look-alike" cavities for red cockadeds in the vicinity. They drilled entrance-holes in 38 blocks of wood - each entrance the same size as the entrance to a natural cavity. Then they installed the blocks on trees in the project area and in nearby old-growth pine forests, scraping off a little bark to match the red color of the natural cavities and making a few small cuts to resemble resin wells. The strategy worked. The birds had no trouble finding the ready-made lodgings and settling in.

Jan Grenfell

Worker cuts opening for artificial cavity

Jan Grenfell, (225) 248-4183 or jangrenfell@dotd.state.la.us

Two trenches protect lake fish from highway runoff

When historic buildings, a parking lot, and a public beach prevented the construction of standard highway-runoff controls along Route 35/37 at Lake Keoka outside Waterford, Maine, Maine Department of Transportation crews came up with a simple solution to the limited-space problem. They dug two trenches between the parking lot and the beach, filling them with geotextile fabric topped with crushed stone and bark mulch. They also planted a vegetative buffer of native plants on the lake-side of the trenches to provide shade for coldwater fish. The trench "infiltrators" have significantly reduced the amount of runoff entering the lake, preventing oxygen depletion and protecting the habitats of the lake's coldwater fish species and warmwater perch and pickerel.

Alex Wong, (207) 624-3080 or alex.wong@maine.gov

Maine DOT

Installation of trench "infiltrators"

Natural berm controls runoff in a small space

Route 5 along Maine's Little Ossippee Lake is a narrow causeway. To keep highway runoff from entering the lake, the Maine Department of Transportation found a non-standard solution that would work in a narrow space. Maintenance crews installed a 3-foot-high by 250-foot-long bark mulch berm between the edge of the highway and the lake. They also braced the shoreline with riprap, topping it with bark mulch to prevent the sun from heating the rocks. The berm visibly collects road sand, litter, and other "debris" later removed by the lake association, and the riprap offers the lake's trout and other fish species shaded "nooks and crannies" for foraging.

Maine DOT

Bark mulch berm along Route 5

Alex Wong, (207) 624-3080 or alex.wong@maine.gov

Silt fence, buckets, and volunteers prove curb is safe for salamanders

(c) Richard E. Glor

Spotted salamander

A 7-inch curb on a road in rural Montgomery County, Maryland is no problem for migrating spotted salamanders. When the curb was installed on Route 109 to control runoff and prevent erosion, the Maryland State Highway Agency put up salamander "trap lines" - a silt fence and plastic buckets buried at 50-foot intervals - to verify the curb was not a barrier to the amphibians. The salamanders climbed the sloped face of the curb and moved along the fence till they fell into a bucket. Environmental science students from nearby Poolesville High School monitored the trap lines with local residents, collecting the salamanders they found and releasing them to continue their journey to and from favorite breeding ponds.

Rob Shreeve, (410) 545-8644 or rshreeve@sha.state.md.us

Fence with an "angle" protects gopher tortoises

Constructing the State Route 63 Bypass around the City of Lucedale, Mississippi, meant protecting a nearby colony of gopher tortoises - a federally threatened species. To keep the tortoises from leaving their sandy habitat and wandering onto the four-lane highway, Mississippi Department of Transportation contractors placed a three-foot-high chain-link fence at the edge of the highway right-of-way. They buried one foot of the fence in the ground and used a fence made of heavy gauge wire so it would last a long time. To redirect tortoises back into the area from which they had come, a "turnaround" was constructed at each end of the fence with the first corner placed on a 90-degree angle and the second on a 45-degree angle. State Route 63 is monitored frequently and not a single gopher-tortoise casualty has been recorded.

U.S. Fish and Wildlife Service

Gopher tortoise

Ferruginous hawk nest is relocated and rebuilt

Rust-colored ferruginous hawks - the largest hawks in North America - often reuse their nests from year to year. So when Montana Department of Transportation biologists relocated a ferruginous hawk nest because of its close proximity to a US 89 highway construction project, they reused the sagebrush-stick nest material to make two new nests on artificial nesting platforms. They mounted the platforms on poles, placing them about three quarters of a mile from each other and from the original nest location. Every year since 1997, the hawks have been using one of the new nesting sites, and they've successfully fledged 17 young. Relocating and "recycling" the original nest has also prevented costly construction delays during the nesting season.

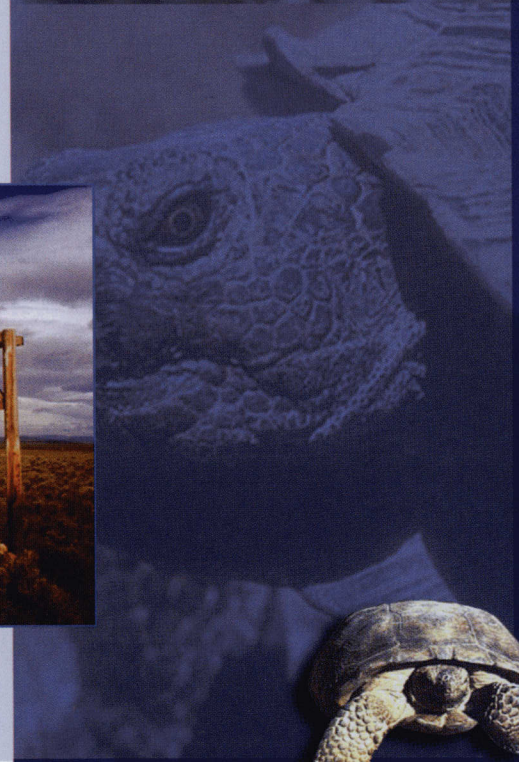
Kirk Eakin

Ferruginous hawk nestlings

Kirk Eakin, (406) 457-2902 ext 6 or kirk_eakin@urscorp.com

Kirk Eakin

Artificial nesting platform for ferruginous hawks



Nesting platforms protect osprey nests near road construction

Ospreys are migratory birds known for their huge wingspan and their ability to plunge feet-first into water (their feet are specially adapted for catching and carrying fish). Historically, they've chosen obstacle-free nesting and roosting places, so they are often seen atop power poles. Activities to protect ospreys and other raptors along highways are part of an ongoing program in the Montana Department of Transportation. To date, the Department has partnered with resource agencies and utility companies to relocate 20 nests away from highway construction work in the western half of the state and to raptor-proof power poles in the vicinity. Workers have relocated the nests to artificial nesting platforms that include horizontal perching poles similar to power-pole cross arms. In the new locations, the ospreys are building as many nests as before.

Montana DOT

Osprey nesting platform near Flathead River

Deb Wambach, (406) 444-0461 or dwambach@state.mt.us

"Living snow fences" benefit both wildlife and motorists

Roads in Lewis County, New York typically get more than 300 inches of snow a year. On one stretch of New York State 177, the first winter storm of 2002 dropped 118 inches of snow within 48 hours. In severe snow conditions like these, "living snow fences" - vegetative barriers that trap blowing and drifting snow - create safer driving conditions for motorists and provide a winter food source for wildlife. At high snow-drift locations and 100 feet from the centerline, New York State Department of Transportation workers sometimes plant a natural barrier of native shrubs, grasses, and purpleosier willows. They also plant willows along waterways to create shade for fish and cover for beavers, muskrats, rabbits, rodents, birds, and deer. Prunings from the living snow fences are "recycled" to help stabilize the banks of large trout streams disturbed by construction or maintenance activities.

New York State DOT

Native plants create a living snow fence

John Falge, (315) 785-6446 or jfalge@gw.dot.state.ny.us

Nest boxes create more homes for kestrels, wood ducks, and other native species

New York State DOT

Volunteers maintain and monitor the nest boxes

American kestrels - small, colorful falcons known for their ability to "hover" - hunt in meadows and nest in tree cavities. They often have to compete for nesting space with invasive European starlings. To create more nesting space for kestrels, New York State Department of Transportation workers installed 25 nest boxes on highway signposts along the Lake Ontario State Parkway in Monroe and Orleans Counties. They also put up six wood duck boxes on right-of-way trees next to the water. During the nesting season, the boxes are used by kestrels, wood ducks, tree swallows, house wrens, and great crested flycatchers. In winter, screech owls use them for roosting. And the pesky starlings? The Adopt-a-Nest-Box volunteers who maintain and monitor the boxes each week in the spring make sure the invaders don't take over the boxes.

Amy Kahn, (585) 272-4825 or akahn@gw.dot.state.ny.us

Ground-nesting birds gain habitat along a state parkway

It took one person just two days to convert 41 acres of scrub-shrub vegetation to meadow along New York's Lake Ontario State Parkway. The simple clearing activity by the New York State Department of Transportation re-established open meadow for such ground-nesting birds as bobolink, meadowlark, and the threatened upland sandpiper and Henslow's sparrow. The Department also revised mowing schedules in the new meadow areas to mow only after September 1st (the end of the nesting season). At another location along the parkway, Department crews selectively thinned 2.5 acres of non-native vegetation, replacing it with native fruit- and nut-bearing trees and shrubs. These plantings will provide food and shelter for migrating birds on the Lake Ontario migration route and wintering birds like the cedar waxwing and the endangered loggerhead shrike (a non-game bird that feeds on insects and small mammals).

Amy Kahn, (585) 272-4825 or akahn@gw.dot.state.ny.us

New York State DOT

Open meadow habitat along Lake Ontario State Parkway

"Perch poles" give bald eagles a bird's eye view of the river

When the Neosho River began to cut into the roadbed of State Highway 80 north of Fort Gibson, Oklahoma, Oklahoma Department of Transportation workers realigned the road, stabilized the riverbank, and installed three riverside perch poles for the region's bald eagles. They placed the poles about 1,000 feet apart - ideal separations for a "loner" species like the bald eagle. To make the perches appealing to the birds and long-lasting, the DOT crews made bundles of Osage Orange branches and clamped them onto the tops of telephone poles. The rot-resistant Osage Orange is known habitat for bald eagles and its bark becomes so hard over time even a nail can't penetrate it. Bald eagles have been using the sturdy new perches ever since they were installed.

Oklahoma DOT

Eagle perches along the Neosho River

John Dyer, (405) 522-3330 or jdyer@odot.org

"Quiet" guardrails protect spotted owls from percussive noise

If you think the sound of heavy pounding is hard on human ears, imagine what it's like for a bird. Bald eagles, northern spotted owls, marbled murrelets, and other state and federally listed species, are so sensitive to percussive noise they may leave their nests, abandoning their eggs or young, if the noise gets too bad. So regulatory agencies require that actions like pile driving and guardrail-post pounding be done only during certain seasons if the noise is likely to disturb nearby protected bird species. Rather than delay guardrail installation at these locations, the Oregon Department of Transportation specifies that guardrail posts be augured instead of driven. Auguring causes no percussive noise and can be done any time of the year.

U.S. Fish and Wildlife Service

Spotted owl

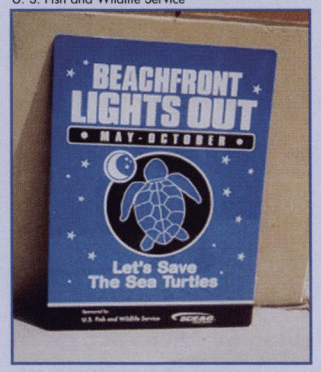
Molly Cary, (503) 986-3484 or Molly.A.Cary@odot.state.or.us

Donated signposts help protect migrating turtles

"Beachfront lights out May through October. Let's save the sea turtles."

The South Carolina Department of Transportation donated the steel posts for these U.S. Fish and Wildlife Service signs posted all along South Carolina's southern coastline. The colorful 24-inch by 18-inch signs urge visitors and vacationers to dim the lights on the porches and interiors of their beachfront rental homes so the lights won't disrupt the migration behavior of endangered loggerhead sea turtles. Since newly hatched loggerheads depend on the moon to find their way to the ocean, lights on the beach can disrupt their innate orientation, causing them to move inland where they may be attacked by predators or get caught in weeds or behind dunes. Thanks to the signs, fewer hatchlings are mistakenly migrating inland instead of back into the water.

U. S. Fish and Wildlife Service



Sea turtle sign

Wayne Hall,
(803) 737-1872 or
halljw@dot.state.sc.us

No roadside mowing during nesting season protects game birds

In South Dakota, native sharp-tailed grouse and prairie chickens and non-native Hungarian partridges and Chinese ring-necked pheasants build their nests in the tall, dense grass that grows along highways. Thanks to a policy that restricts mowing on public roads until the end of the nesting season, the nests of these upland game birds are protected. The South Dakota Department of Transportation limits mowing on all state highways and interstates - a distance of more than 8,000 miles. East of the Missouri River, mowing cannot occur along the right-of-way until after July 10; west of the Missouri, mowing is not permitted until after June 15.

National Park Service

Sharp-tailed grouse

Dave Graves, (605) 773-5727 or
dave.graves@state.sd.us

Not trimming palm fronds saves baby bats

Sometimes not doing a particular thing is the best way to protect wildlife species or wildlife habitat. The Texas Department of Transportation is protecting baby southern yellow bats by not trimming palm fronds inhabited by the threatened species. The southern yellow bat likes to nest on Sabal and Washington palms - palms found along US 77, 83, and 281 in Cameron County, Texas. When the fronds on these palm trees are about to die, they hug the tree, creating the dark habitat bats prefer. The palms also house insects, which the bats eat. Leaving fronds with nesting bats untrimmed keeps the young bat families safe - and the trimming of other palm fronds nearby does not disturb them.

(c) Merlin D. Tuttle, Bat Conservation International

Southern yellow bat

Mark Iglesias, (956) 702-6150 or miglesia@dot.state.tx.us

Turning a *box* culvert into a *bat* culvert

A Texas Department of Transportation Bats and Bridges Study recognizes how bats benefit society by preying on flying pests and crop-eating insects. According to the study, more bats are likely to inhabit culverts in Webb County, Texas, than in any other county in the state. So in 1999, Department engineers modified plans for a drainage culvert under U.S. 83 in Webb County to Include bat roosts. The new design called for five recessed, square "domes" built into the ceiling of the culvert and a rough-textured roosting surface made with recycled plywood forms. The culvert, now built, houses about 200 Mexican free-tailed bats and may house as many as 200,000 bats once the species becomes familiar with the roosts. Retrofitting the culvert was easy, and planning ahead saved taxpayers more than $300,000.

Texas DOT

"Bat-dome" culvert on San Idelfonso Creek

Melissa Montemayor, (956) 712-7456 or mmontema@dot.state.tx.us

Bringing back quail with native grasses

U.S. Fish and Wildlife Service

Bobwhite quail

In Virginia, bobwhite quail have got a new lease on life, thanks to a little bit of proactive planting by the Virginia Department of Transportation. The quail nest in tall native grasses that emerge in warm weather, but with increased development throughout the state, these grasses are often replaced with uninhabitable short turf grass. Since the birds can't survive in short grass, their population has been steadily declining. So tall, warm-season grasses have been planted in large open spaces near roadside interstates - spaces where there is plenty of land on which to nest and forage. In spring and summer it's a common sight to see bobwhites flocking to these spaces.

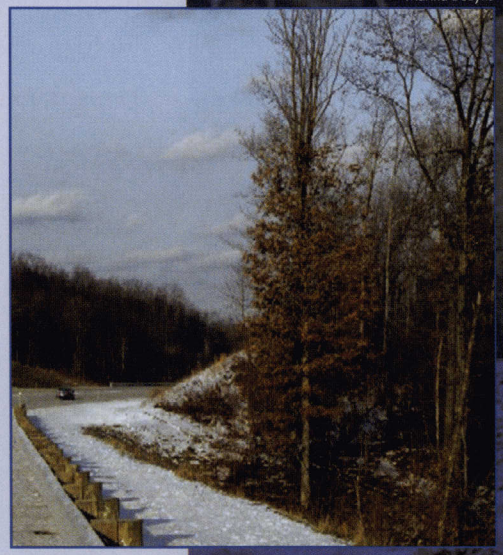
Tamara Neale, (804) 786-6458 or tamara.neale@virginiadot.org

New roadsides get less clearing, more wildlife habitat

In West Virginia, construction of new highways used to begin with "clearing and grubbing" - getting rid of woody material above and below the ground - all along the new right of way. Because of the state's rugged topography and irregular configuration of rural property parcels, rights-of-way acquired for new highway projects often far exceeded the actual land needed for construction, and the extra clearing and grubbing resulted in loss of habitat for black bears, whitetail deer, barred owls, and many other wildlife species. A few years ago, the West Virginia Department of Transportation discontinued the practice. Today, construction crews limit the clearing and grubbing to only the area needed for construction. This simple revision of a highway operations practice has preserved wildlife habitat throughout the state - habitat that would otherwise be lost.

Norse Angus, (304) 558-2885 or nangus@dot.state.wv.us

Martha DoByns



Less clearing preserves habitat along Appalachian Corridor H

Planting a few seeds pays off for an endangered butterfly

The state of Wisconsin supports the largest and most widespread populations of Karner blue butterflies in the world, and the species is endangered because its sole host plant - wild blue lupine - has become scarce. The Wisconsin Department of Transportation has joined 22 public and private organizations across the state to preserve existing lupine patches and encourage new lupine growth. For example, in Jackson County the Department seeded an I-94 rest area with lupine and other native prairie plants. Three years later (it takes lupine three years to mature and flower) the area was a solid wall of blue flowers and Karner blue butterflies were everywhere. In addition to planting lupine seeds, the Department has modified its mowing cycles along 500 miles of state highway rights-of-way where the endangered butterfly lives.

U.S. Fish and Wildlife Service

Karner blue butterfly

Gary Birch, (608) 266-1017 or gary.birch@dot.state.wi.us

Wood tops on deer fences reduce injury and death

Wyoming DOT

Woodtops on right-of-way fence, WYO 135

In the past, when mule deer tried to jump over one of the high right-of-way fences along WYO 135 southeast of Riverton, Wyoming, they often misjudged the fence's height and jumped too low, hitting the fence full-force. Typically, the impact flipped the animals over and onto the ground, breaking their necks or severely injuring them. So the Wyoming Department of Transportation did the right thing - and a simple thing. Maintenance crews replaced the wire on top of the fences with horizontal wood poles. The highly visible wood tops enable the deer or antelope to correctly judge the height of each fence and to jump over it - or entirely avoid it - more easily.

Rod Vaughn, (307) 772-2004 or Rodney.Vaughn@fhwa.dot.gov

Innovative revegetation methods create wildlife habitat and "natural" roadside

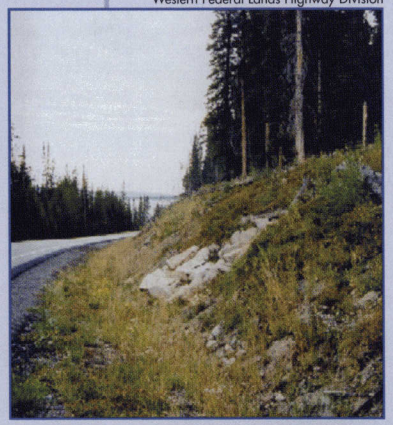
Along Yellowstone National Park's East Entrance Road, a resourceful combination of topsoil and on-site organic material has restored native vegetation, ground cover, a natural setting, and roadside habitats for birds and small mammals. When biologists from the Western Federal Lands Division of the Federal Highway Administration, in partnership with the National Park Service, revegetated the disturbed slopes along Yellowstone National Park's East Entrance Road, they didn't lose scarce topsoil to construction "cut and fill," and they didn't have to truck in soil supplements. They accomplished the revegetation by saving the construction-site topsoil, storing it in mounds just beyond construction limits, and later combining it with forest duff, boulders, and tree snags and trimmings to spread on the road's roughened slopes.

Allan Stockman, (360) 619-7751 or allan.j.stockman@fhwa.dot.gov

Western Federal Lands Highway Division

Tree snags create habitat diversity along roadside

Western Federal Lands Highway Division



Roadside landscape with diverse native vegetation

Keeping it simple on or near bridges

Low bridge rails can put some bird species at risk of flying into traffic, and bright lights on bridges can slow the passage of some fish species. Clay, sand, and other sediment suspended in water during bridge construction can also kill aquatic organisms or degrade important aquatic habitat. The runoff from bridges caused by traffic and maintenance activities can adversely affect aquatic organisms, too, when pollutants enter the water in sufficient concentrations to do harm. And some wildlife species are sensitive to disturbance resulting from bridge and road construction work in their vicinity.

Here are some things state transportation agencies have done to prevent these problems from occurring:

Alabama DOT

Elevated boardwalk protects beach mouse habitat

An endangered mouse gets help from a *boardwalk*

"Perdido" may mean "lost" in Spanish, but the federally endangered Perdido Key beach mouse is simply hidden from view, and thanks to an elevated boardwalk over its habitat, protected from crushing human feet. Alabama Department of Transportation maintenance workers constructed the 300-foot boardwalk in less than two weeks, to mitigate for potential impacts to the mouse from a new bridge over Perdido Bay Inlet in Baldwin County. The project, which begins at the cordoned-off Perdido Key parking lot, keeps visitors to Orange Beach from making their own way across the sand through the fragile dunes where the Perdido Key beach mice live and feed on the seeds of sea oats and beach grass. Indeed, very few beachgoers have taken unwanted paths through the dunes since the boardwalk was constructed.

U.S. Fish and Wildlife Service

Perdido Key Beach Mouse

John Shill, (334) 242-6132 or shillj@dot.state.al.us

Insulation fabric and plastic drainage covers protect migratory birds from bridge-construction disturbance

Pigeon guillemots and rough-winged swallows - two species protected by the Migratory Bird Treaty Act - like to nest in the hollow undersides of bridges beside drainage "weep holes." So before the nesting season and scheduled construction on two bridges, California Department of Transportation contractors took these easy steps to protect the birds: To deter pigeon guillemots from nesting on the Noyo River Bridge near Fort Bragg while a new bridge was being built around the existing bridge, they plugged the weep holes with fiberglass insulation material. To keep rough-winged swallows from nesting on the American River Bridge near Sacramento during hinge-replacement work, they plugged the holes with removable plastic drainage covers. In each case, the birds were well protected from all construction disturbances - and with minimal effort and expense.

(c) W. D. Curtis

Northern rough-winged swallow

Jennifer Gillies, (916) 653-6976 or jennifer_gillies@dot.ca.gov

Peregrine falcons "relocate," thanks to human-made nest boxes on bridge piers

In Bridgeport, Connecticut, one of only two peregrine falcon pairs in the state has moved from a bridge catwalk to a bridge pier. In early 2001 when the Interstate 95 P.T. Barnum Bridge had to be expanded and the span and falcon nest removed, the Connecticut Department of Transportation built two nest boxes on Pier 11 and Pier 16 under the bridge and a third nest box on Pier 13, the pier closest to the original nesting site. The falcon pair returned to the bridge and nested in the box on Pier 13, where they produced two healthy chicks. Since falcons eat pigeons, the new nest boxes also help keep unwelcome pigeons (and pigeon droppings) off the bridge.

Mark Alexander, (860) 594-2931 or mark.w.alexander@po.state.ct.us

Connecticut DOT

Nest box before installation

Connecticut DOT

Peregrine falcon chick in nest box on P. T. Barnum Bridge

Bird-deterrent netting protects swallows from bridge-construction work

Barn swallows live in the tidal marshes surrounding Humpback Bridge - a bridge crossing Muddy Branch creek near Leipsic, Delaware. Delaware Department of Transportation maintenance workers weren't surprised to find 18 barn-swallow nests underneath the bridge when they inspected it at the end of the nesting season before work began to replace the old bridge with a new one. To keep barn swallows out of harm's way both before and during construction, they installed black polyethylene netting specifically sized to deter barn swallows under the bridge and around the piers, attaching the netting with a cable and lug rings and stretching it taut to prevent sagging. Installing the netting took just two days and cost $3,000 - far less than the manufacturer's installation charge. The swallows were successfully kept away while the old bridge was being replaced, and now they're back, nesting under the bridge as before.

Joy Ford, (302) 760-2107 or Jford@mail.dot.state.de.us

Longer bridge spans, more space for wildlife passage

South Florida Water Management District

Florida Panther

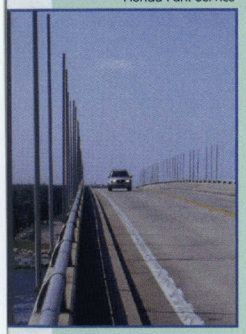
Since many animals use floodplains and water bodies to move from one wildlife corridor to the next, it's logical - and easy - to design bridge ends to extend farther beyond the floodplain or water body than is required. Longer bridge spans also cost far less than a separate wildlife crossing under an existing roadway. Over the last few decades the Florida Department of Transportation has designed and built extended bridges on I-75 (Alligator Alley) in Collier County and in other locations throughout the state. The efforts are paying off. Florida panthers and other wildlife are using the bridges to safely cross roads and to move back and forth between wildlife corridors.

Leroy Irwin, 850-410-5899 or Leroy.Irwin@dot.state.fl.us

Metal bridge poles cut seabird deaths by nearly 64%

Marine birds wintering in southeast Florida near Melbourne Beach fly safely over a high bridge across Sebastian Inlet at the juncture of Brevard and Indian River Counties, but that hasn't always been the case. From 1989 to 1992 roadkill surveys documented bridge deaths of at least 84 royal terns, 11 brown pelicans, two sandwich terns, and one black skimmer. Most of the dead birds were about six months old - too young to judge safe flying heights. To prevent further roadkill of the migratory birds, the Florida Department of Transportation partnered with the Florida Department of Environmental Protection to attach 122 vertical metal poles, each 9.3 feet long, to both sides of the bridge. The silver-colored poles were placed close together to discourage the birds from flying between them. Although a few of the poles were lost to tropical storms, hurricanes, and metal stress, the remaining poles successfully directed marine birds over and away from traffic. In fact, studies show the poles have reduced deaths by close to 64 percent.

Florida Park Service



Sebastian Inlet Bridge

Alice Bard, (407) 884-2000 or alice.bard@dep.state.fl.us

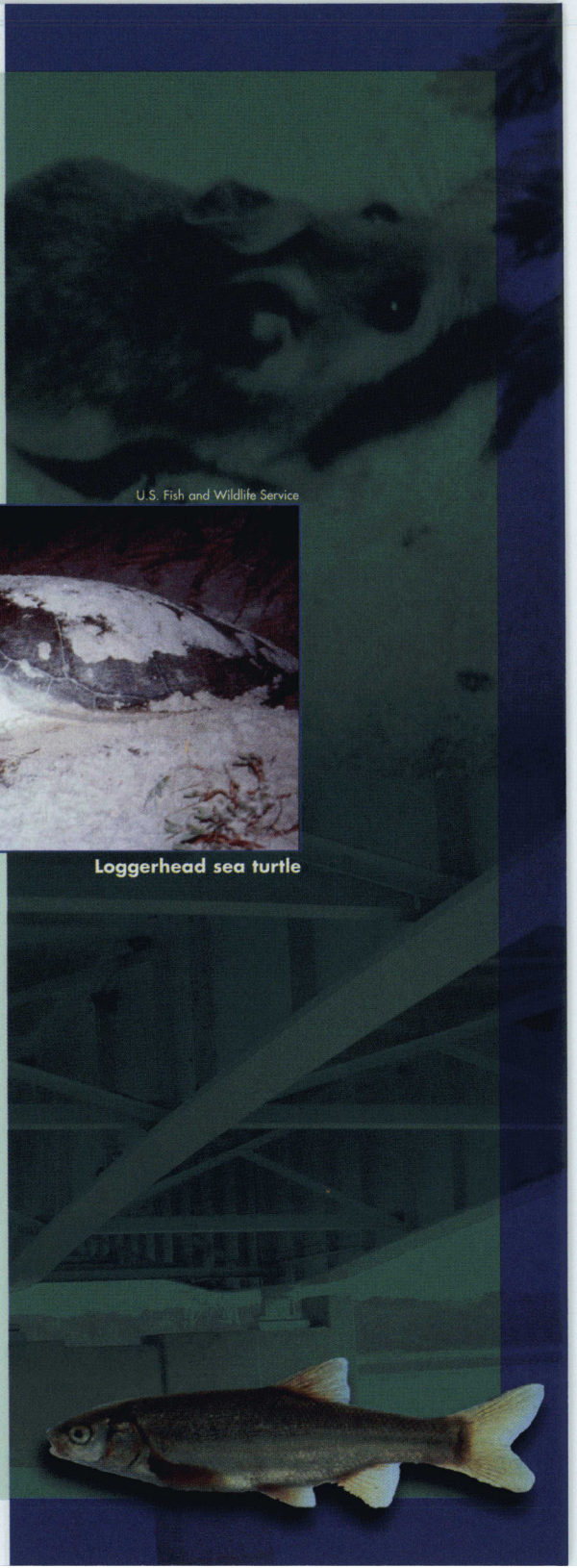
Installing sea turtle-friendly lights on a bridge

Federally endangered loggerhead sea turtles lay their eggs on beaches, and the beaches on Georgia's barrier islands south of Savannah are no exception. After the young are hatched, they migrate back to the water during the night, using the moon for guidance. To keep lights on the 4,000 foot-long, cable-stayed Sidney Lanier Bridge from disorienting the migrating turtles, the Georgia Department of Transportation worked with the U.S. Coast Guard and the U.S. Fish and Wildlife Service to install a minimum number of lights on both the bridge deck and the approach road and to use shielded low-sodium, low-wattage lights that cut glare and light scatter. Since every season there are an estimated 100-120 turtle eggs laid in each nest on the island beaches and on average approximately 64,000 of the nestlings make it to the water, the lights may protect a large number of turtles.

U.S. Fish and Wildlife Service

Loggerhead sea turtle

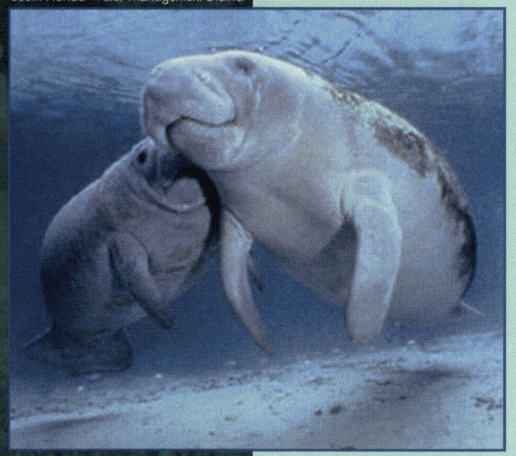
Lisa Westberry, (404) 699-4433 or lisa.westberry@dot.state.ga.us



Protecting aquatic habitat by including special measures in project contracts

Surrounding bridge work platforms with barriers to keep falling construction debris out of the water...Using explosives only in dewatered "coffer dams" (containers in a body of water to keep water out of a construction area)...Delaying construction until after the mating season or life cycle of the species. These are the kinds of protective measures the Georgia Department of Transportation routinely puts into contracts for projects in water environments. The measures have paid off again and again, protecting manatees near coastal-area projects and numerous threatened and endangered fish species in North Georgia and elsewhere in the state.

South Florida Water Management District



Manatees

Lisa Westberry, (404) 699-4433 or lisa.westberry@dot.state.ga.us

Septic tanks preserve water quality and fish habitat during bridge construction

When Georgia Department of Transportation construction crews prepared to widen the State Route 2 bridge over the Cartecay River in Gilmer County, they had to preserve the water quality for a threatened fish species called the goldline darter (named for the gold stripe on its belly). But they didn't have enough space on the steep, narrow project site to construct a traditional sediment basin for trapping and filtering bridge-construction runoff. So they used a "portable" sediment basin: three 10-foot wide concrete septic tanks linked together and surrounded by gravel. The pipe carrying the filtered water from the third tank back into the river was covered with filter fabric. The innovative solution worked well and took less than a day to install.

Georgia DOT

Installation of sediment basin

Wesley King, (706) 635-5551 or wesley.king@dot.state.ga.us

"Roughening" a creek bed creates habitat for Topeka shiner

The federally threatened minnow called the Topeka shiner lives in portions of six states - Iowa, Kansas, Minnesota, Missouri, Nebraska, and South Dakota. Replacement of the Carey Creek Bridge near Herington, Kansas, and associated channel clearing created a "slick" geometric creek bed with little or no habitat for the minnow. So the Kansas Department of Transportation contractors dug shallow pits in the creek bed and piled rocks there for diverse habitat. Topeka shiners and other fish swam into the new channel almost immediately.

Patrick Arno, (785) 267-7299 ext 307 or patrick.m.arno@fhwa.dot.gov

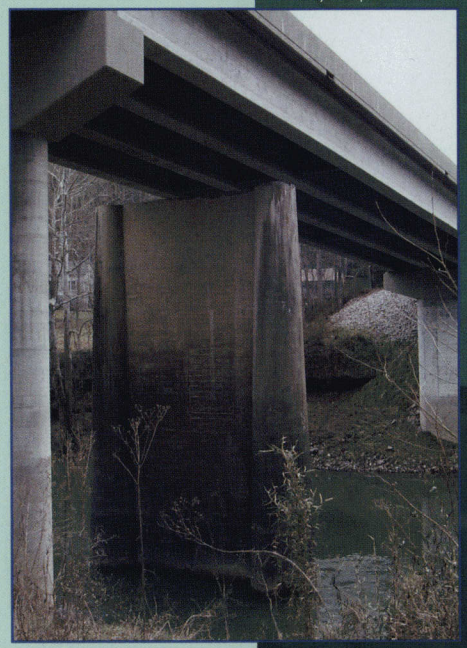
(c) Garold Sneegas

Topeka shiner

Saving old bridge pier helps protect mussel habitat

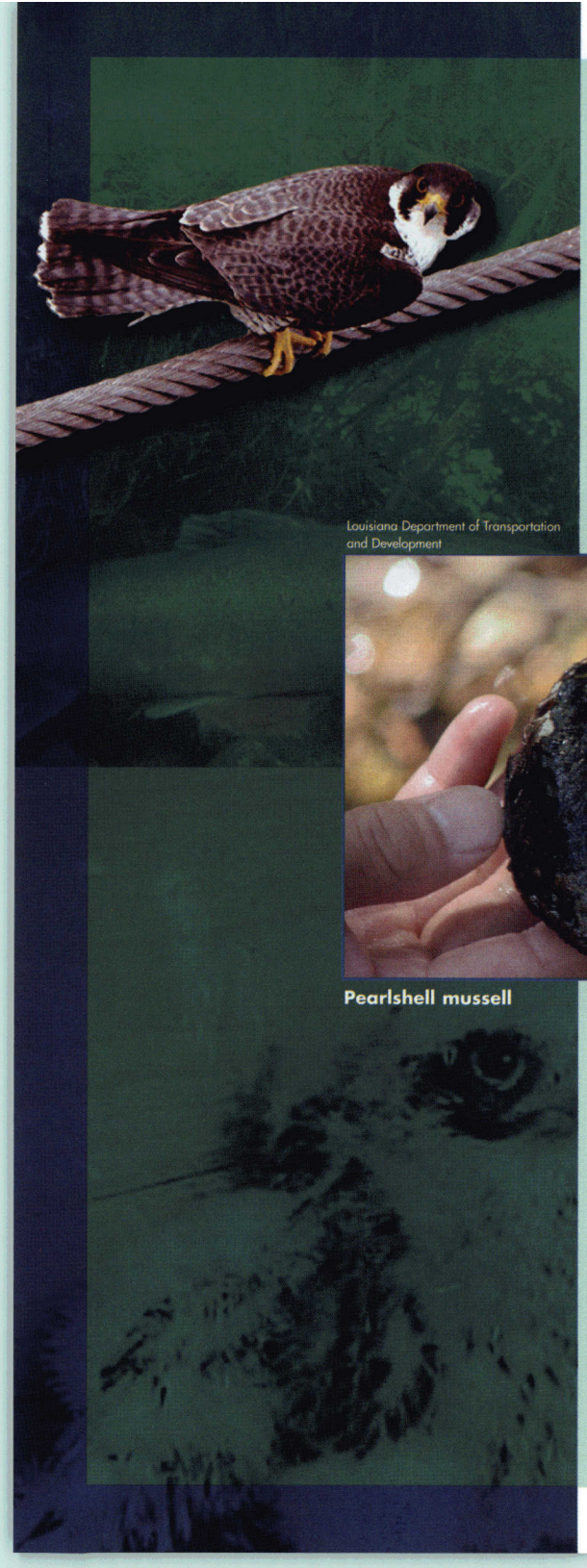
When you're taking apart an old bridge, you don't have to demolish all of it. After Kentucky Transportation Cabinet construction crews learned about a population of Cumberland bean pearly mussels downstream from a bridge crossing the Rockcastle River in Laurel and Rockcastle Counties, they took some simple steps to prevent demolition and construction activities from disturbing the endangered species. Throughout the project to demolish the old bridge and build a new one, they kept heavy equipment out of the water, and they left one of the original in-stream piers in place. These precautions, combined with strict erosion control measures, preserved the stream channel and prevented silt from floating downstream and over the mussel beds.

Kentucky Transportation Cabinet



Old bridge pier left in place protects mussels

Dale Noe, (502) 564-7250 or dnoe@mail.kytc.state.ky.us



Hands, buckets, and a safe new spot for endangered mussels

In Grant Parish, Louisiana, when engineers prepared to replace an existing bridge on State Highway 122 over Swafford Creek, they noticed the only place for driving the piles of the proposed new bridge was in a bed of federally endangered pearlshell mussels. Biologists from the Louisiana Department of Transportation and Development, the U.S. Fish and Wildlife Service, Louisiana University, and the Louisiana Department of Wildlife and Fisheries picked up the mussels, put them in buckets, and relocated them in good habitat upstream of the proposed construction. The mussels survived the relocation process and adapted well to their new environment.

Louisiana Department of Transportation and Development

Pearlshell mussell

Lei Jin, (225) 248-4173 or ljin@dotd.state.la.us

Bridges over salmon streams get first priority for sand removal

U.S. Fish and Wildlife Service

Atlantic salmon

Priority scheduling of winter sand removal that's what the Maine Department of Transportation does to protect the habitat of federally endangered Atlantic salmon from the effects of sand buildup in the water. Since winter sand can flow directly into the river after a spring runoff and hurt or destroy salmon habitat, sand is removed first from bridges and bridge approaches on the main stem and the West Branch of the salmon-filled Sheepscot River on the state's central coast. The Department has also built catch basins on five "priority" state highway bridge sites identified by the Sheepscot River Watershed Council under a grant from the Fish America Foundation. The simple erosion-control devices are doing a good job in trapping winter sand and keeping it out of the river.

Peter Newkirk, (207) 624-3072 or peter.Newkirk@state.me.us

Black tarp shields nesting eagles from the sight of construction

On the M-55 Bridge over the Pine River in Manistee County, Michigan, a porous black tarpaulin was all that was needed to keep a pair of nesting bald eagles from seeing bridge construction work and possibly abandoning their nest. Michigan Department of Transportation crews suspended the 30-foot-high, 150-foot-long tarp from poles above the bridge railing, periodically moving the tarp as work progressed so the eagles would be continually shielded from the sight of construction activities.

Gerri Ayers, (517) 373-2227 or ayersg@michigan.gov

U.S. Fish and Wildlife Service

Bald eagle

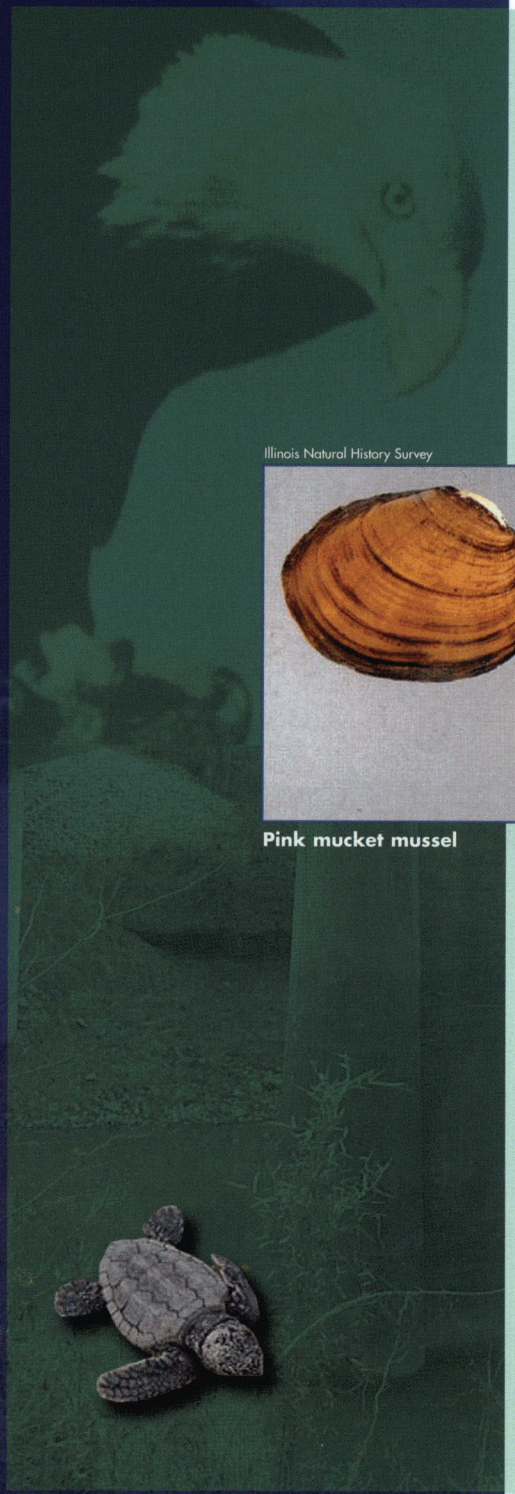
Tarp and timing protect bridge swallows

For at least two nesting seasons prior to reconstruction of the US-127 Bridge over St. Joseph Creek in Hillsdale County, Michigan, the swallows had been nesting under the bridge. The following season, to prevent them from nesting there and being disturbed by construction activities, Michigan Department of Transportation crews suspended a plastic tarpaulin from the bridge railing. A wooden "float" allowed the tarp to rest on the water. The tarp deterred the swallows from nesting under the bridge before construction, and activity on and around the bridge kept them off during construction. The swallows are now back, nesting once again under the bridge.

Gerri Ayers, (517) 373-2227 or ayersg@michigan.gov

Al Westover

Tarp keeps swallows from nesting under bridge during construction



"Recycling" a bridge work platform for mussel habitat

When Missouri Department of Transportation engineers completed improvements on two Meramec River bridges near St. Louis, they left the bottom foot of the work platform intact to benefit federally endangered pink mucket mussels and more than 25 other mussel species which had been relocated to safer habitat upstream of the bridges. Scuba divers report that sand, small gravel, and other substrate materials have accumulated between the rock rubble, creating favorable mussel habitat, and that the pink muckets and other species are recolonizing this part of the river. Not removing all of the work platform also meant less disturbance to the river bottom and therefore less sediment to drift downstream

Illinois Natural History Survey

Pink mucket mussel

Gene Gardner, (573) 751-4115 or gardng@mdc.state.mo.us

Gel keeps swallows off bridge during construction

Cliff swallows - one of many bird species protected under the Migratory Bird Treaty Act - have adapted to nesting and roosting on bridges. So Montana Department of Transportation biologists weren't surprised to find abandoned swallow nests on two bridges nominated for rehabilitation - a Yellowstone River bridge in Park County and a Madison River bridge in Gallatin County. Before construction work began and before the swallows returned from their winter habitats, and in cooperation with the U.S. Fish and Wildlife Service, maintenance crews removed the empty nests. Using a pneumatic caulk-gun, they applied a gel made by Bird-X to all areas of the bridges frequented by cliff swallows. The non-toxic gel made the "landing strips" sticky, like Vaseline, and when the birds returned and approached the bridges, they flew on to new nesting and roosting spots. Once construction was completed and the gel residue removed, the swallows returned and once again colonized the two bridges.

Montana DOT

Workers remove abandoned swallow nests from bridge

Deb Wambach, (406) 444-0461 or dwambach@state.mt.us

Native plant *poles* and *plugs* help protect minnow habitat

When replacement of three bridges over the Rio San Jose in Cibola County, New Mexico threatened prime habitat for a minnow called the Rio Grande chub, crews from the New Mexico State Highway and Transportation Department protected the minnow's habitat with more than the usual erosion control measures. On the steep slopes they hand-planted a combination of native riparian, wetland, and upland species - a combination known to stabilize soils. They planted native willow and cottonwood poles, fencing each pole to protect it from beavers, and they planted seedlings of wild rose and other native woody species. The crews also used native plant "plugs" - tiny plantings of rushes, watercress, salt grass, and other herbaceous species. The plantings survived, and within a year the new vegetation was flourishing and the banks were stable.

American Fisheries Society

Rio Grande chub

Steve Reed, (505) 827-5254 or steve.reed@nmshtd.state.nm.us

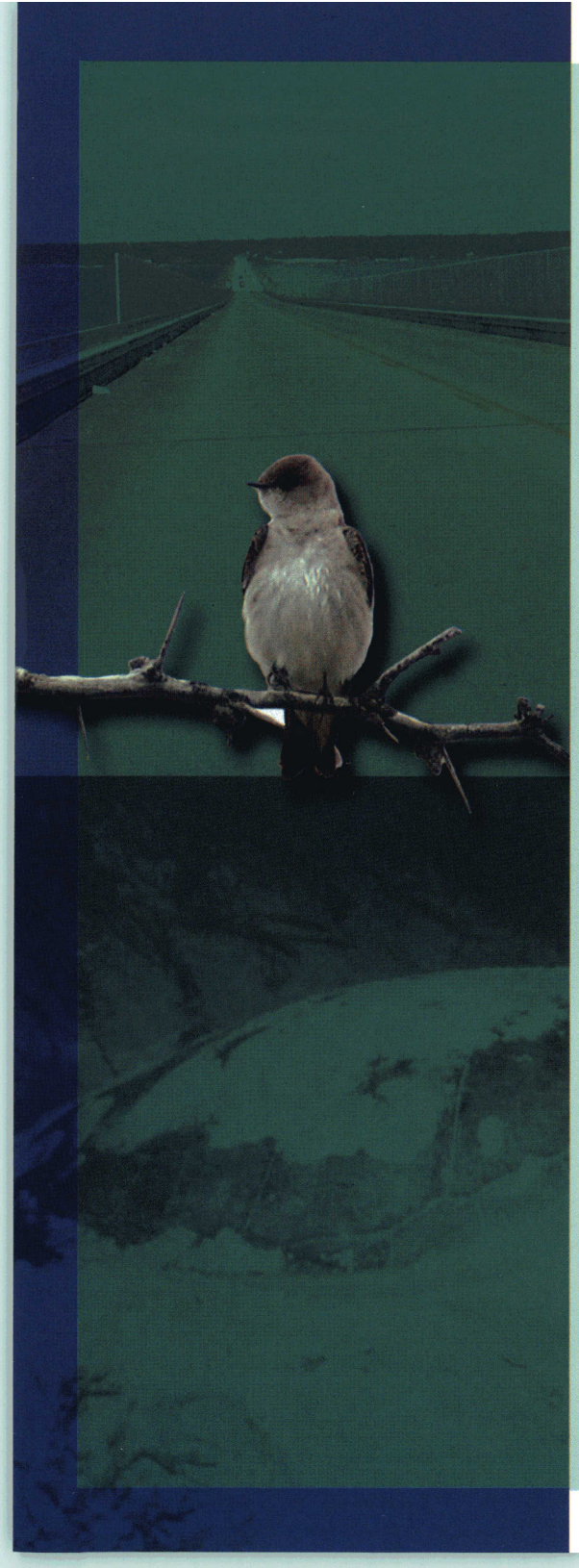
Bridge nesting boxes boost state's growing peregrine falcon populations

In 1983, after decades of absence in New York, the first pair of peregrine falcons returned to nest on New York City bridges, and peregrine populations have been increasing ever since. In 1998, when New York State Department of Transportation workers noticed peregrines nesting above a pier on the Dunn Memorial Bridge - a bridge spanning the Hudson River between Albany and the City of Rensselaer - they took steps to protect the pair. Before the bridge deck was reconstructed, they built nesting boxes on two piers in the center of the bridge. For three successive years following the construction, the endangered birds have returned to the bridge - each time to the same nesting box - and have successfully hatched and fledged chicks.

U.S. Fish and Wildlife Service

Peregrine falcon

Steve Radzyminski, (518) 485-0969 or radzyminski@gw.dot.state.ny.us



Piece of cloth protects mussel habitat

Upstream and downstream of Crooked Creek Bridge, on Ferrell Bridge Road in Franklin County, North Carolina, beds of federally endangered dwarf-wedge mussels were undisturbed during and after bridge replacement. North Carolina Department of Transportation workers removed the bridge in sections to keep debris out of the water. At the end of each day's construction, they spread filter fabric over the fill dirt of the bridge approach roads, to control erosion and keep sediment from washing into the creek and onto the mussel beds. The simple technique worked, and the mussels are still there.

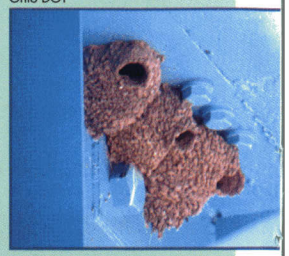
Tim Savidge, (919) 733-7844 ext 313 or tsavidge@dot.state.nc.us

U.S. Fish and Wildlife Service

Dwarf wedge mussel

"Being careful" and "being specific" protects swallow nests on bridges

Ohio DOT



Cliff swallow nests

When Ohio Department of Transportation construction crews prepared to put the finishing touches on the newly built Putnam Street Bridge in Washington County, they discovered about 25 cliff-swallow nests on the underside of the bridge. The eggs in the nests had hatched, and in a few weeks the young birds would leave the nests and fly away. The workers made sure no construction work occurred near any occupied nests, and since sandblasting is a rather-slow process, they were able to continue working without frightening-off the birds and without delaying the project. On another project - reconstruction of the County Line Road Bridge in Franklin County and a popular bridge-nesting site for cliff swallows - the Department specified the date in project bidding documents on which construction work could begin. In both cases, cliff swallows continue to return to the bridges, building their nests in the corners and crevices of the bridges' undersides and successfully fledging their young.

Tom Linkous, (614) 466-5075 or tlinkous@dot.state.oh.us

Plugging bridge-deck drains creates cleaner water for fish

Bridge-deck drains - "scuppers" - were required on Oregon bridges of the 1920s and 30s. The scuppers kept excess water off the bridge, but when it rained, oils, dirt, and other road-surface runoff often washed directly into the waterway through the scuppers. The Oregon Department of Transportation has come up with a simple solution to this problem on bridges that are sloped enough to let water run off the ends. On these bridges, maintenance crews plug the scuppers with a stiff, fast-setting grout, enabling runoff to spill off the ends of the bridge onto filtering vegetation. On bridges with little or no slope, the crews sometimes spray foam into the scuppers. In severe rain the scupper can be opened quickly and easily for temporary drainage. Both methods are doing a good job in preserving water quality and protecting aquatic life on Oregon waterways.

Oregon DOT

Plugging bridge-deck drains prevents runoff from flowing directly into the waterway

Molly Cary, (503) 986-3484 or Molly.A.Cary@odot.state.or.us

"Turbidity barrier" protects lake fish from excessive sediment

When South Carolina Department of Transportation work crews expanded Lake Murray in Lexington County by replacing a causeway with a bridge, they stretched floating and weighted turbidity barriers across the lake on both sides of the construction, leaving space at the bottom for fish to pass underneath. Most of the suspended sediment was trapped by this thick "curtain" and deposited on a small area of the lake bottom. Thanks to the simple device, Lake Murray's bream, crappie, and famed striped bass were protected from potentially damaging sedimentation.

Wayne Hall, (803) 737-1872 or halljw@dot.state.sc.us

Limiting blasting near bat caves protects baby bats

Blasting rock for bridge or highway construction results in ground vibrations that can cause baby bats in nearby caves to fall to the cave floor and die. If the blasts cause cracks in the walls or create a wider opening to the cave, the resulting change in the constant temperatures inside the cave can also cause baby bats to die. So when Tennessee Department of Transportation biologists learned that caves with maternity colonies of federally endangered gray bats were located near planned construction on the State Route 30 bridge over Town Creek in Rhea County, they took a critical and simple step to protect the baby bats. They restricted blasting so vibrations would not be felt beyond 600 feet from the project limits. Thanks to this precaution, no bats were hurt by the blasting.

(c) Merlin D. Tuttle, Bat Conservation International

Gray bat

Lilah Miller, (615) 741-6835 or Lilah.Miller@state.tn.us

Stabilizing stream banks by not "pushing over" trees when cutting them

When a certain number of trees have to be removed for the construction of a new bridge, they're typically pushed over with a bulldozer. This method can de-stabilize the stream bank and cause it to erode and release clogging sediment into the water. Instead of pushing over trees that need to be removed, the Tennessee Department of Transportation cuts them near the roots. Leaving the tree roots in place as long as possible helps hold the soil, reducing sedimentation. The payoff for fish is often enormous. For example, when bridge-construction crews used this technique at the State Route 29 bridge over White's Creek in Rhea and Roana Counties, they protected a federally endangered minnow called the spotfin chub from its arch-enemy: mud.

Lilah Miller, (615) 741-6835 or Lilah.Miller@state.tn.us

Higher bridge rails mean safer flying for purple martins

Like the cliff swallows in the song "When the Swallows Come Back to Capistrano," graceful purple martins return every spring to favorite, familiar places. They roost on steel beams under bridges such as the US 190 Bridge over Trinity River in Polk County, Texas. In the past, as the birds flew up and over this bridge, many cleared the bridge rail only to be hit by oncoming traffic. Not anymore. The Texas Department of Transportation added a 6-foot-high chain link fence to the top of the bridge rail on both sides of the bridge. Thanks to this simple solution, the bridge's purple martins now fly high and safe.

Texas DOT

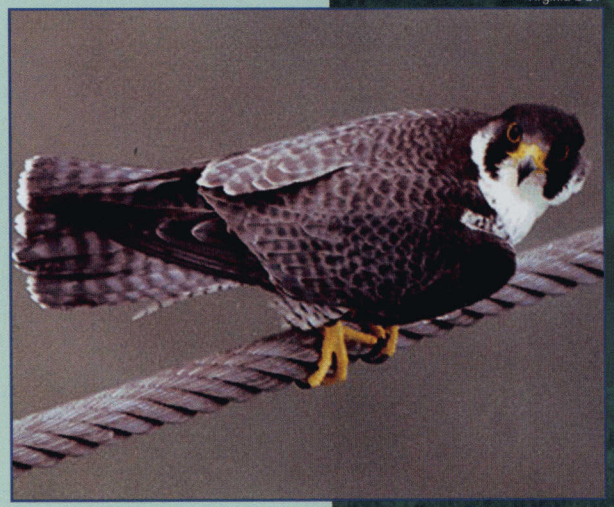
Chain link fence prevents purple martins from flying too low

John Miller, (936) 633-4302 or jmiller@dot.state.tx.us

Bridge nest boxes replace lost peregrine-falcon habitat

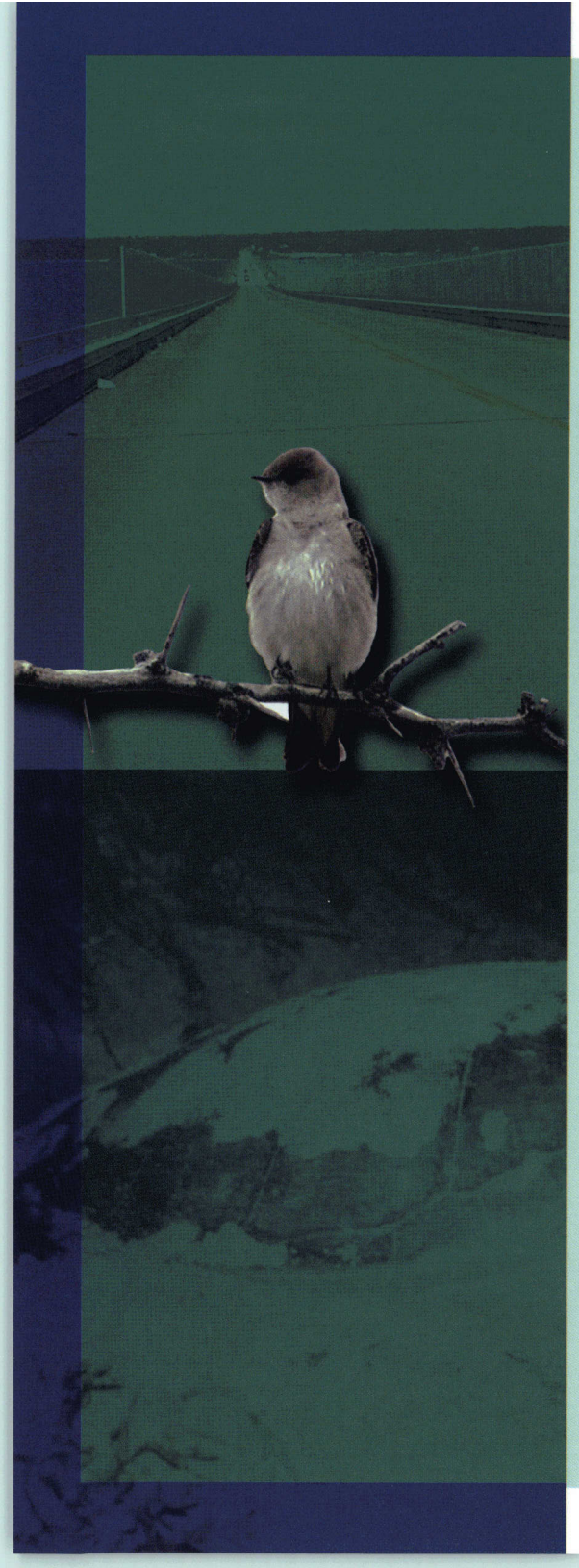
Conservation students from the College of William and Mary worked with the Virginia Department of Transportation to place peregrine-falcon boxes on eight bridges throughout the state: Norris Bridge (Whitestone); Coleman Bridge (Yorktown); Benjamin Harrison Bridge (Prince George); Varina-Enon Bridge (Henrico County); Godwin Bridge (Suffolk); James River Bridge (Newport News); and Berkley and West Norfolk Bridges (Norfolk/Portsmouth). The lucky birds that have lost homes elsewhere now have safe havens in which to raise their chicks. The boxes have been highly successful. In the spring of 2003, 11 chicks hatched from mated falcons in four bridge nests, and the trend continues. The chicks have also been successfully relocated to their natural habitat.

Virginia DOT



Adult peregrine falcon on the James River Bridge

Tamara Neale, (804) 786-6458 or tamara.neale@virginiadot.org



"Lampshades" on bridge lights protect young salmon

Lighting on a section of the Cedar River Trail - the pedestrian crossing under the I-405 Bridge over Cedar River - used to cause problems for migrating salmon fry. The lights shone down on the river, slowing the passage of the young salmon and making them more visible to predators. To meet this challenge, Washington State Department of Transportation technicians mounted custom-made black rubber shields onto the bridge trail lights. Now the young salmon can swim quickly and with much less risk of predation.

Kurt Schleichert, (425) 339-1777 or schlekm@wsdot.wa.gov

Washington State DOT

Fully shielded light fixture on the I-405 Bridge

Keeping it simple on or along waterways

Highways and bridges take us over scenic bays and rivers and across picturesque lakes and streams. Yet the wildlife and fish sometimes pay a price for our enjoyment of these natural waterways. Highway, bridge, and culvert construction can cause severe impacts to stream habitats – especially when the stream channel has to be relocated. Sediment from construction activities can cloud the waters of a stream, making it harder for fish to find food and occasionally covering fish eggs or mussel beds. De-stabilizing stream banks and removing stream-bank vegetation can destroy wildlife habitat and eliminate shade-cover for fish and aquatic insects (food for fish, birds, and bats). Improper culvert design can also affect how freely fish can move up and down the stream corridor to successfully carry out their life cycles.

The examples that follow highlight some simple methods state transportation agencies are using to counter the effects of stream relocation and to correct barriers to fish passage. The examples also illustrate the easy things these organizations are doing just to enhance wildlife and fish habitats along waterways. The efforts they're making do more than help protect habitats – they help protect the entire food chain.

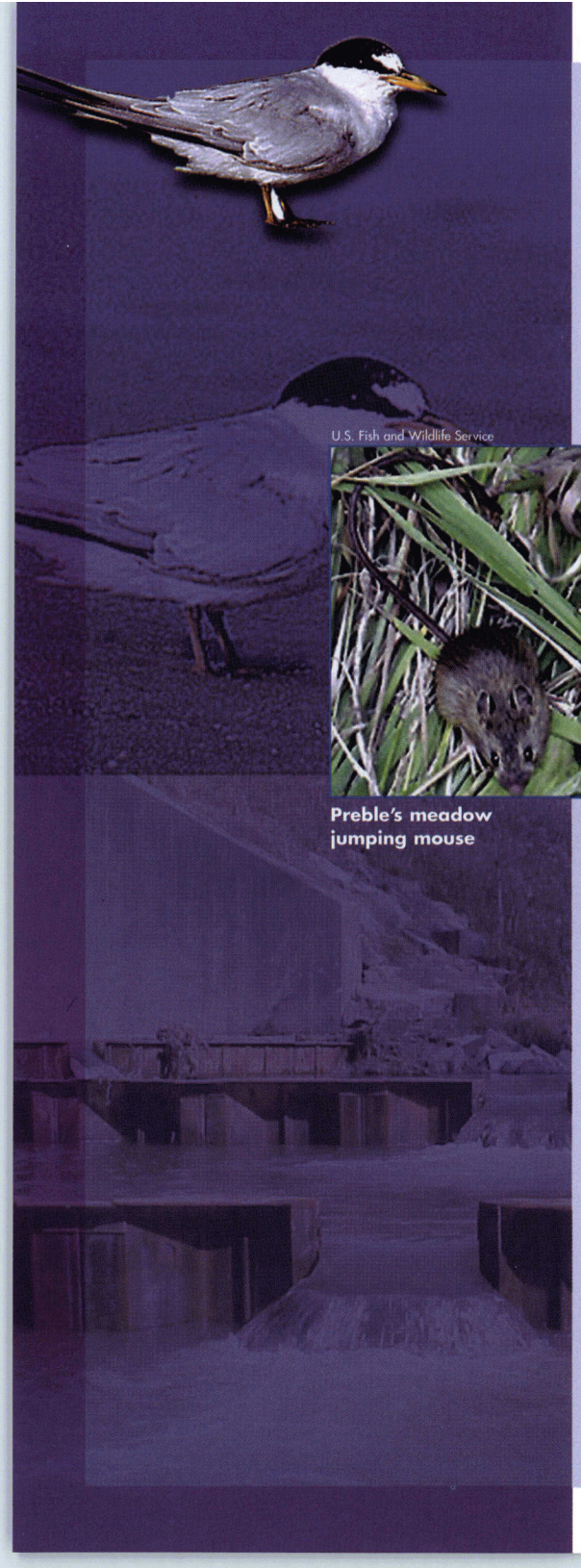
Bid-plan specifications safeguard "unprotected" wildlife habitat

If you want to save certain trees and shrubs for wildlife habitat, and that habitat is not protected by any law or regulation, one simple solution is to do what the Colorado Department of Transportation does whenever the vegetation in a project area provides wildlife habitat. For these projects, the Department includes standard specifications on "the protection of existing vegetation" in bid plans to the contractor. Among the specifications are requirements that vegetation areas designated for protection be fenced, as shown in the plans, and that trees or shrubs damaged during construction be replaced. The specifications - and the resulting precautions taken by the contractor - have saved wildlife habitat in places like Middle Bijou Creek in Arapahoe County, home to mourning doves, great blue herons, black-crowned night herons, and other migratory birds.

Kris Meiring, (303) 757-9790 or kris.meiring@dot.state.co.us

Colorado DOT

Fencing protects trees during construction near Middle Bijou Creek



Raising groundwater levels helps restore the habitat of a threatened mouse

U.S. Fish and Wildlife Service

Preble's meadow jumping mouse

The long-legged, long-tailed Preble's meadow jumping mouse used to inhabit the entire South I-25-East Plum Creek right of way in Castle Rock, Colorado. But development in the drainage altered stream runoff and caused "downcutting" of the channel, which threatened to destroy the mouse's habitat. When the creek was forced to carry more water during runoff than the channel could handle, deep gullies formed in the middle of the creek, taking water away from the streamside vegetation. Lower water levels caused willow patches to die and wetland sedges to dry up. To fix the problem, the Colorado Department of Transportation installed three sheet metal "check dams" 25-feet deep into the soil of the creek. The dams, which look like little waterfalls, allow an even flow of water in the creek and elevate water levels on land so vegetation can once again thrive. The project is part of a statewide, interagency conservation bank to protect the federally threatened mouse.

Debra Angulski, (303) 757-9111 or debra.angulski@dot.state.co.us

Combining sea oats with beach rubble creates nesting habitat for seabirds

Peter Wallack

Least tern

On St. George Island off Florida's Emerald Coast, migratory birds like the least tern, black skimmer, and American oystercatcher are benefiting from some simple erosion control measures. When the beach along the island's causeway was eroding into the roadway and Florida Department of Transportation crews fixed the problem by bracing the shoreline with shell, sand, and stone rubble and plantings of sea oats and other native grasses, they created the "roughened" environment these birds prefer for nesting. The birds immediately flew to the causeway site and built nests there, and the Department protected the baby birds with roadside silt fencing and signs keeping cars and people off the roadway shoulder. Eventually, when a new bridge is built connecting St. George Island to the mainland, the old bridge linking the causeway with the mainland will be removed and the causeway returned to the birds. Thanks to the routine shoreline-stabilizing activities, the birds are off to a good start.

Bill Phillips, (850) 638-0250 ext 507 or william.phillips@dot.state.fl.us

Small sign helps protect wildlife during routine construction and maintenance work

It can be a tough job identifying environmentally sensitive areas (ESAs) and the habitats of protected species, especially if the species are hard to see. To make it easier for construction and maintenance crews to recognize these areas, the Georgia Department of Transportation installs permanent ESA signs on project sites where there are threatened or endangered plant communities or wildlife species. Notations on construction plans prevent highway contractors from staging and storing equipment on these sites or conducting certain undesired activities - for example, spraying herbicides or clearing vegetation. The signage has particularly benefited such protected fish and mussel species as the blue shiner, the Conasauga logperch, the goldline darter, the amber darter, and the upland combshell mussel.

Georgia DOT

ESA sign helps protect fish and mussels in the Cartecay River

Lisa Westberry, (404) 699-4433 or lisa.westberry@dot.state.ga.us

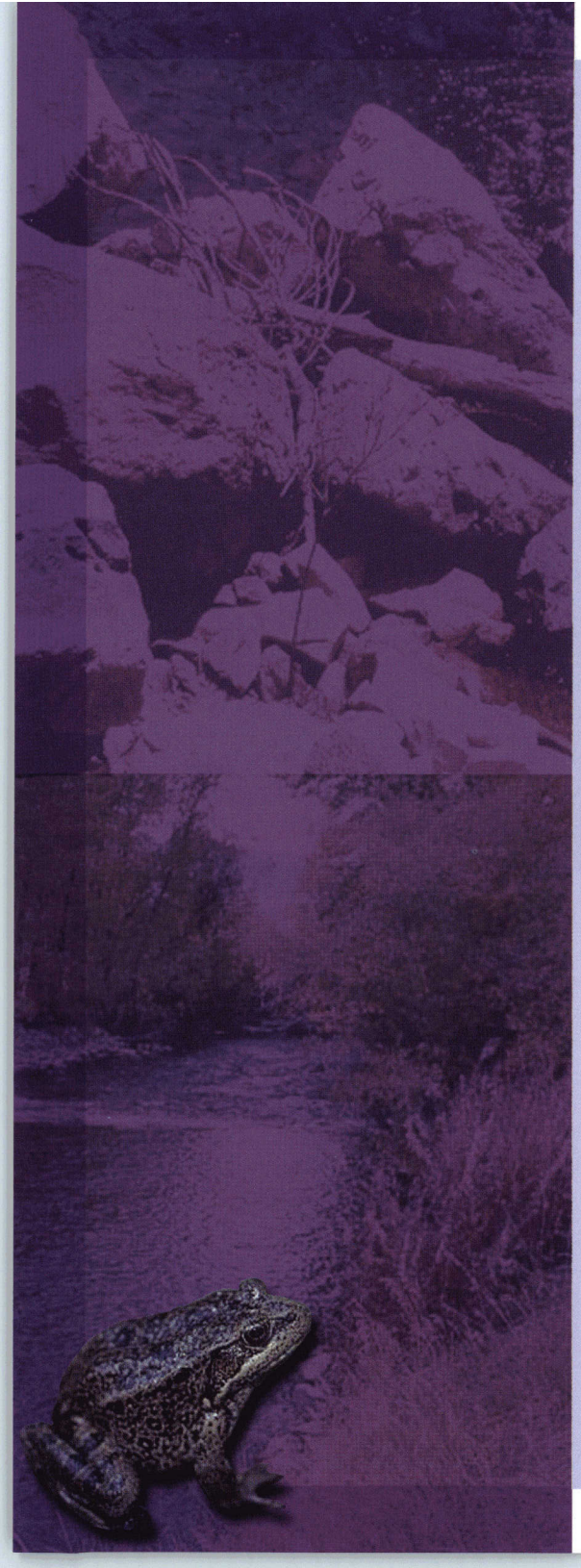
Rock vortex weirs give tired fish a break

"V" formation is the critical feature of rock vortex weirs used to increase fish habitat. The Idaho Transportation Department built several of these weirs in a swift reach of the Lemhi River along State Highway 28 north of Tendoy. The vortex or "V" of each channel-wide weir points upstream, forcing water and energy towards the center of the weir and creating holding areas below. The deepest holding area is a "plunge pool" - a favorite resting spot for fish on hot summer days. Together, the pools and holding areas help the river's migratory and resident fish, especially Steelhead and Chinook salmon that have come all the way from the ocean some 750 miles away.

Idaho Transportation Department

Rock vortex weir, Lemhi River

Tim Cramer, (208) 745-5602 or tcramer@itd.state.id.us



Sonar "startle" devices keep herring away from blasting

How do you blast bedrock for an underwater tunnel alignment without injuring or killing nearby fish? You use an electronic fish-startle system to rouse them into leaving the blast area, as Central Artery/Tunnel Project contractors did when they began constructing the alignment of the I-90 Ted Williams Tunnel across Boston's Inner Harbor. Minutes before each blast, they lowered transducers into the water at the blast site and used generators and amplifiers to send high frequency signals into the water through the transducers. The system temporarily rerouted 96% of the blast area's blueback herring and other migrating fish species. The fish stayed out of harm's way, returning to the area 20 minutes after the blasting was completed.

Ronald Killian, (617) 556-2453 or rskillia@bigdig.com

Streambank "platform" lets fish take cover

Fish - especially trout and salmon - can't maintain their position in swift water very long. They need predator-free hiding places along the stream bank where they can rest before making forays into swifter water for food. Natural fish cover was in short supply at an M-89-Sand Creek culvert in Allegan County, Michigan, so Michigan Department of Transportation contractors built a cover device out of two sheets of exterior plywood laid end to end on posts and covered with a layer of sod. To slow the current, they placed large boulders in the stream near the devices. The result? More trout and salmon are present in this stream section than ever before

Michigan DOT

Sod-topped fish cover device on Sand Creek

Gerri Ayers, (517) 373-2227 or ayersg@michigan.gov

Improving trout habitat with "lunker structures"

White Pine River along Highway 33 north of Cloquet, Minnesota, is prime habitat for brown and brook trout. When the river had to be re-channelized, Minnesota Department of Transportation biologists placed "lunker structures" at the outside bends of the new channel to create cover runs for the trout. The structures look like giant rock-topped oak pallets with a cantilevered side buried inside the bank. Locating them at the river bends enables the current to clean the area between the "pallet" floor and roof. In the straight sections, log drop structures create small waterfalls and deep-water resting pools. Together, the two habitat-improvement devices are working well to protect trout from predators and to keep the river channel stable.

Greg Busacker, (651) 284-3759 or greg.busacker@dot.state.mn.us

Keeping out carp protects a lake's aquatic life

Freshwater carp severely reduce the numbers of aquatic plants and animals in lakes like the one along Highway 5 near Chanhassen, Minnesota. When feeding carp root around in the shallow waters of the lake, they stir up the mud on the lake bottom. The disturbance clouds the water, making it harder for fish to see the beetles, crustaceans, and other plants and animals they need for survival. So to keep carp from migrating into the lake, Minnesota Department of Transportation workers constructed an insurmountable gradient in the stream entering the lake. The carp can't swim over this concrete "hill," the water quality is improved, and thanks to increased sunlight penetrating the water, there's a greater diversity of aquatic plants and animals for the resident bass, bluegill, and other fish species.

Greg Busacker, (651) 284-3759 or greg.busacker@dot.state.mn.us

Michigan DOT

Carp barrier on Riley Creek

Small water quality basin is a big gift to future fish

At White's Creek along U.S. 395 south of Reno, a 2.04-acre water quality basin built by the Nevada Department of Transportation offers long-term benefits for fish throughout the watershed. During spring runoff, White's Creek flows over its banks and into the basin, where the water is filtered and returned to the creek. White's Creek drains to the Truckee River - a pristine trout fishery - and the river flows to Pyramid Lake - home to the threatened Lahontan cutthroat trout and the endangered cui-ui sucker-fish. The basin removes granite-soil sediment that would otherwise end up in the river and, over time, bury fish-gravel spawning beds and deplete oxygen supplies for fish and other aquatic life. What's more, the basin has retained surface water year-round, stimulating the growth of cattails and other native plants. The project has turned a tumbleweed-infested dust bowl into a lush oasis for mallards, muskrats, western toads, and other wildlife species.

California Department of Fish and Game

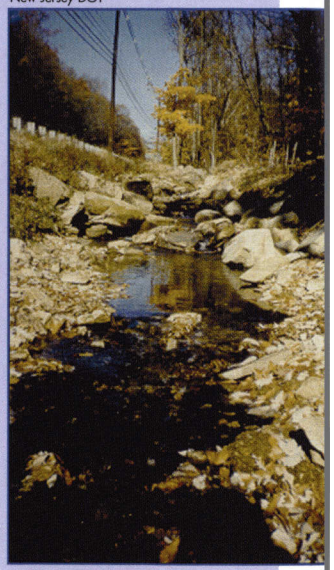
Lahontan cutthroat trout

Christopher Ennes, (775) 888-7690 or cennes@dot.state.nv.us

Preserving natural stream conditions helps bring back trout

Wild brown, brook, and rainbow trout are thriving in a section of New Jersey's Flanders Brook, thanks in part to a couple of simple strategies. When New Jersey Department of Transportation crews relocated a section of the stream to improve safety on Route 206, they removed as few trees as possible, allowing the stream bank to remain shaded and the water to stay cool (an important factor for coldwater species like trout). They also "recycled" boulders from the old stream section, placing them where they would form step pools and riffle areas. And they created a natural stream bottom just by allowing small streambed materials upstream of the project to settle out downstream after storms.

New Jersey DOT



Limited tree removal along relocated Flanders Brook

Paula Scelsi, (609) 530-5464 or paula.scelsi@dot.state.nj.us

Fish-ladder "lips" protect trout from parasitic sea lamprey

Saltwater and freshwater sea lampreys look like eels, but unlike eels, they feed on large fish, attaching themselves to the fish with a sucking disk and sharp teeth. Under some conditions, only one of seven fish attacked will survive. That's why the New York State Department of Transportation welded steel "lips" or overhangs onto the top edges of five fish ladders on Spooner Creek near NYS Route 39 in Erie County. When migrating sea lampreys creep along the horizontal lips towards the fish ladders, they can't pull themselves up over the vertical ladders. The result? The sea lampreys are prevented from reaching upstream spawning grounds they share with Lake Erie steelhead trout.

Thomas Moore, (716) 847-3811 or tmoore@gw.dot.state.ny.us

New York State DOT

Steel overhangs on Spooner Creek fish ladders

Stabilizing a stream bank with willows and dogwoods

Native willows and dogwoods make good stream-bank stabilizers because they grow quickly, form thickets, and adapt easily to wet conditions (they merely "flatten" during flooding). So the New York State Department of Transportation planted cuttings from dormant willows and dogwoods along a 1,000-foot section of Sawyer Creek, which had been relocated for the widening of Niagara Falls Boulevard. Cuttings were layered on the stream bank and fascines (stems and branches of rootable plant material tied together in long bundles) were placed in shallow trenches and anchored with live stakes. Most of the plantings survived, and the vegetated, stabilized stream bank has helped keep runoff and sediment from entering the water, benefiting the creek's Northern pike, brown bullhead, and other warmwater fish species. The willow-dogwood "buffer" has also provided habitat for wood and mallard ducks.

Thomas Moore, (716) 847-3811 or tmoore@gw.dot.state.ny.us

New York State DOT

Crews install willow and dogwood fascines along Sawyer Creek

Logs and root wads make a "lifeless" stream habitable

Imagine what a stream looks like after it has been dredged for gravel. Picture piles of gravel debris pushed up against the stream bank. That was the scene at Seeley Creek in Chemung County, New York, when the New York State Department of Transportation began to reconstruct a section of State Route 14 next to the creek. To stabilize the stream bank and reduce erosion and to create aquatic habitat (no aquatic life was evident at the time), contractors placed large logs with intact root wads in trenches cut into the stream bank. They overlapped the logs and braced them with stone to ensure bank stability. The technique worked. Seeley Creek now has a stable bank...minnows are swimming in the pools around the logs and root wads...and there's plenty of habitat for small fish and aquatic organisms.

New York State DOT

Logs and root wads help stabilize Seeley Creek

Tom Markel, (607) 324-8370 or tmarkel@gw.dot.state.ny.us

Oversized culverts with "natural" bottoms give fish a break

In concrete-bottom stream culverts, water flows fast over the smooth bottom, making fish passage difficult or impossible. State transportation agencies are replacing these culverts with new, oversized ones. They're burying the inside bottom of the culvert below the streambed and creating a bottom with naturally occurring streambed materials. The New York State Department of Transportation has been using this technique on numerous trout-spawning tributaries to the Delaware River and its branches in the New York City watershed. For example, at Route 10 over Steele Brook in Delaware County, contractors buried the bottom of a culvert deep enough so the natural streambed materials wouldn't wash away in high water. Using small-sized construction equipment, they made a long-lasting new bottom with a thick layer of stockpiled cobbles and finer material. The new bottom has stayed intact, providing habitat for a variety of aquatic species and lowering water velocities so brook trout and other fish can swim through the culvert.

New York State DOT

Oversized culvert with natural with natural bottom, Route 10 over Steele Brook

Steve Cammisa, (607) 721-8166 or scammisa@dot.state.ny.us

Box-culvert "lip" creates deeper water for fish passage

North Dakota DOT

Double box culvert with "lip" to divert low flows into single barrel

In North Dakota, spawning Northern pike and other fish often run up feeder creeks fed by runoff from melting snow. Although the volume of this runoff can be quite large, it usually doesn't last long, so highway drainage structures sized for spring flows can become a barrier to spawned fish once the runoff has subsided and water levels are low. To correct this situation at Turtle Creek south of Washburn, North Dakota, the North Dakota Department of Transportation installed a 6-inch "lip" in one barrel of a two-barrel box culvert. The lip diverts low flows into the other barrel, maximizing the water depth to allow fish passage. Thanks to this simple measure, the culverts neither restrict the passage of spawning fish nor prevent young fry from returning to the Missouri River.

Mark Schrader, (701) 250-4343 ext 111 or mark.schrader@fhwa.dot.gov

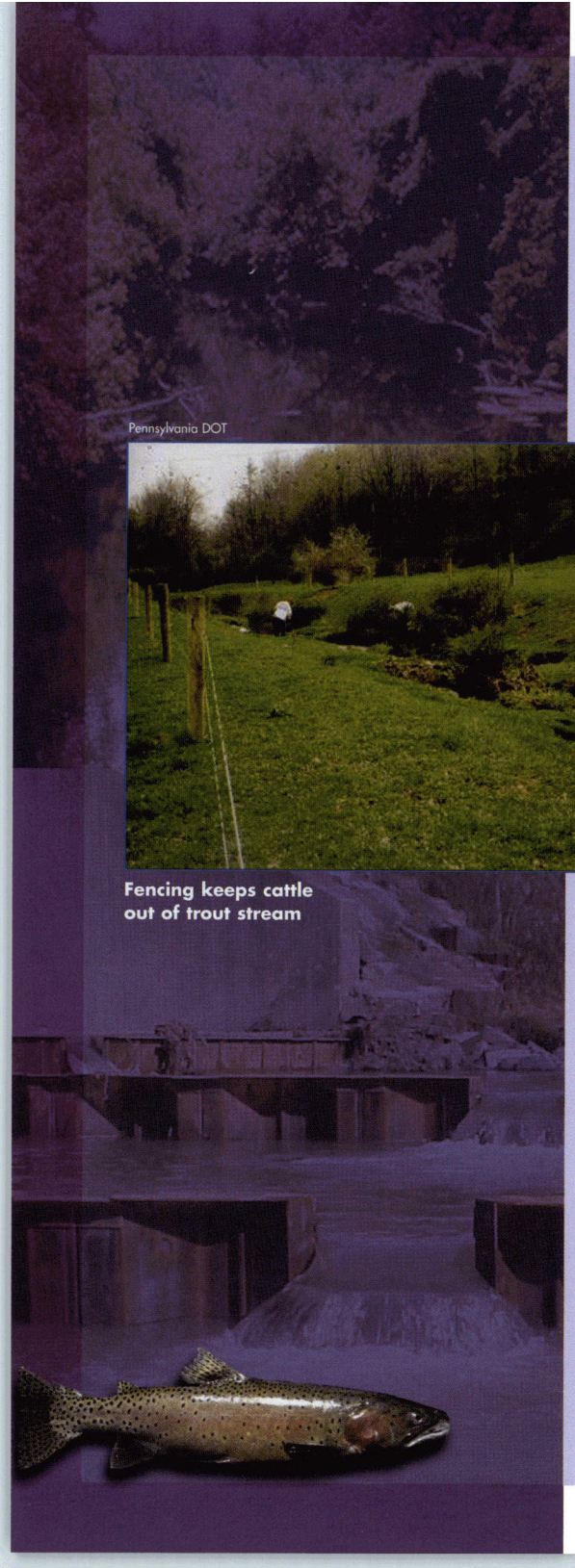
Ledge gives small animals safe passage through stream culverts

When small mammals and amphibians are moving along a stream and come up to a culvert, they have to crawl up the road fill and cross the highway to get around the culvert. Often, they're killed as they try to cross the highway. At numerous highway-stream crossings throughout Oregon - for example, an unnamed tributary of the Siuslaw River west of Eugene - the Oregon Department of Transportation is creating a way for these small animals to go through the culvert rather than around it. Along one side of a culvert spanning the width of the stream, contractors are building a natural rock ledge that's wide enough for both small and medium-sized animals. They're using rock because it's "natural," close to the culvert, and doesn't need to be attached to the culvert wall. Shrews and raccoons have been observed on the ledges, and bobcats, tree frogs, western pond turtles, and other species may also be using them to move up and down the stream corridor. They stay dry as they move along the ledge or only get a little wet - and they don't run the risk of a collision with a vehicle on the highway above.

Randy Reeve, (541) 563-7974 or randall.n.reeve@odot.state.or.us

Oregon DOT

Rock ledge creates "walkway" through culvert



Keeping cattle out of trout streams

How do you keep cattle out of trout streams? How do you prevent them from tramping down the banks? Working cooperatively with area farmers, the Pennsylvania Department of Transportation met both challenges with a simple solution: streambank cattle fencing. Along two sections of a trout stream in Somerset and Huntington Counties - off of US 219 near Meyersdale and at Truck Route 22 near the Village of Water Street - workers fenced both sides of the stream with five strands of high tensile wire and treated posts. The water quality improvement was dramatic. Within 3 years, populations of trout moved into what had been a significantly polluted stream.

Pennsylvania DOT

Fencing keeps cattle out of trout stream

Dain Davis, (814) 696-7223 or josedavis@state.pa.us

Streambank "walkways" help frogs and other animals

Thanks to early planning and a simple innovation, mice, green frogs, and other small animals can continue their movements along the banks of a stream in Pawtucket, Rhode Island's historic Slater Mill Park. When a Rhode Island Department of Transportation design team planned a modified box culvert to carry the Ten-Mile River Bikeway across the stream, they added shelves to the inside of the culvert, slightly above the water surface and parallel to the stream. Wildlife species can continue their path along the water, and since the shelves were added to the culvert design before construction - not added later after the culvert was built - they contributed very little to the project cost.

Rhode Island Department of Transportation

Shelves inside box culvert provide "wakways" for wildlife

Emilie Holland, (401) 222-2023 ext 4051 or eholland@dot.state.ri.us

Preserving tree canopy along river means more insects for bats

Federally endangered gray bats forage for insects along Calfkiller River next to State Route 111 in White County, Tennessee. So when the highway needed to be widened and a few trees removed, the Tennessee Department of Transportation limited the number of trees that could be removed along the stream. Maintaining the tree canopy helped keep the stream water temperature in a range tolerable for the midges, mayflies, stoneflies, craneflies, and other aquatic insects on which the area's gray bats feed.

Lilah Miller, (615) 741-6835 or Lilah.Miller@state.tn.us

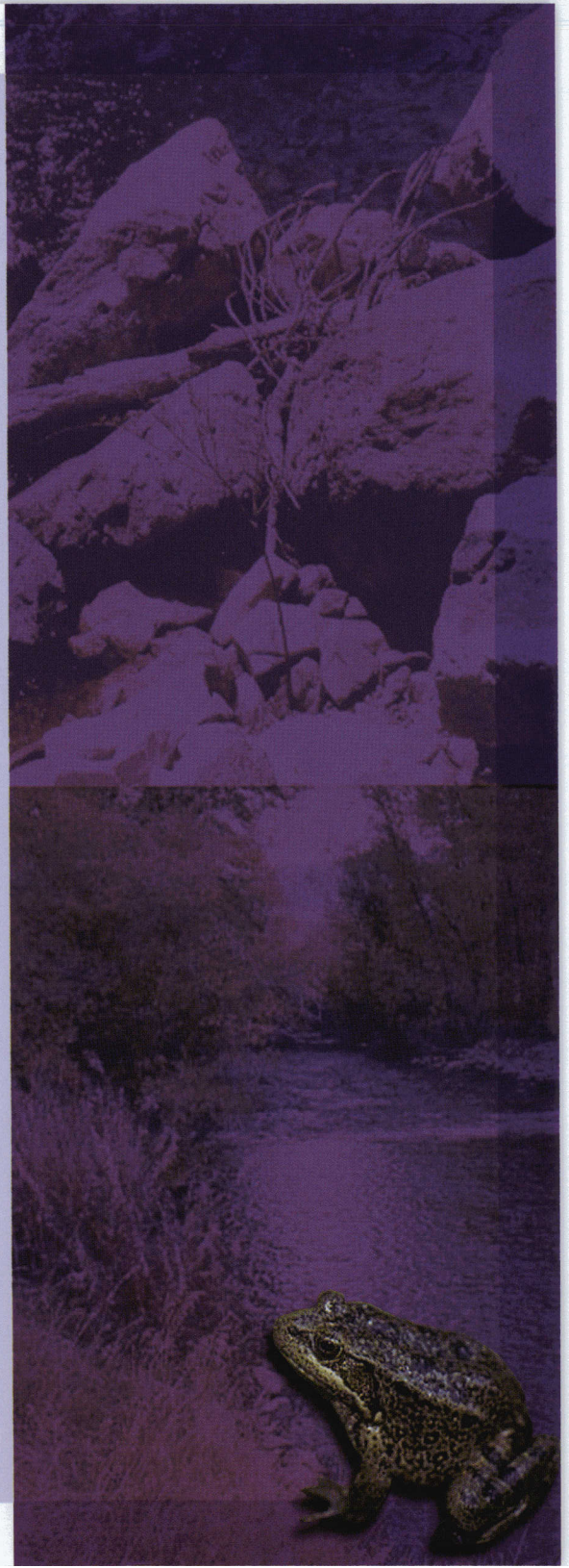
FHWA, Tennessee Division

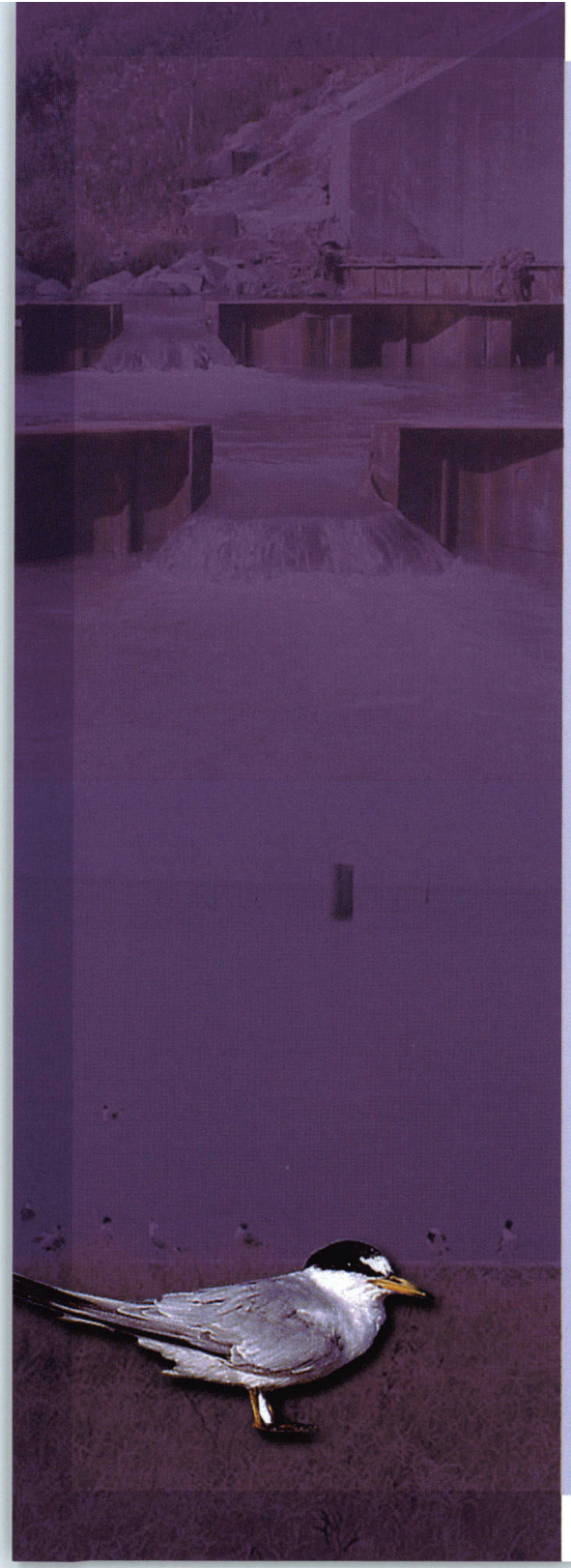
Calfkiller River

Avoiding in-stream construction when fish are spawning

Sediment from bridge-pier or other in-stream construction work can cover fish eggs or damage young fish. It can also significantly reduce the ability of some species to forage and severely degrade their habitats. Thus, for projects requiring in-stream construction where protected fish are known to occur, the Tennessee Department of Transportation includes in the project plans a set of dates during which construction is not permitted. Each set corresponds to the spawning season for the particular species being protected. When contractors know these dates ahead of time, they can adjust their work schedules to complete the projects with little or no delay. Limiting construction activities to periods outside the spawning season has helped protect such threatened and endangered species as the boulder darter, the spotfin chub, Barren's topminnow, and the ashy darter.

Lilah Miller, (615) 741-6835 or Lilah.Miller@state.tn.us





"Rock spurs" stabilize river bank and make fish passage easier

If you drive on State Road 35 along the winding Provo River in Summit County, Utah, you may notice what look like small angled dikes or jetties extending out into the water. The 8-foot-long structures are rock spurs installed by the Utah Department of Transportation to control erosion. During spring runoff, high river flows used to threaten the structural integrity of the roadway and the stability of the river bank. The angled spurs solved the problem by directing excess flow towards the center of the river instead of towards the bank. In addition to stabilizing an estimated 1,000 feet of river bank, the rock spurs have made the slower-moving waters at the river's edge more habitable for wild brown trout, cutthroat trout, rainbow trout, and other fish species.

Utah DOT

Rock spur on Provo River

Jerry Chaney, (801) 965-4317 or jchaney@utah.gov

Keeping it simple on wetlands & uplands

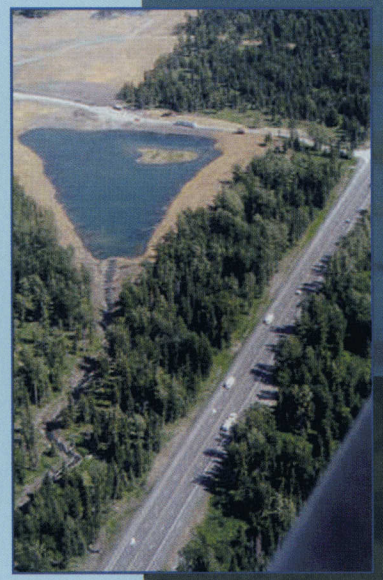
Wetlands and adjoining uplands provide habitat for about one third of all federally endangered and threatened plant and animal species and nesting spots for more than half of the country's birds. Since colonial times, these valuable wetlands have been disappearing. Twenty-two states have lost at least half of their original wetlands; several states have lost more than 90 percent of their wetlands. Reversing the trend of disappearing wetlands and enhancing the values and functions of new and existing wetlands involves "complex" solutions like wetland mitigation banking and tailoring clean-water strategies to specific watershed conditions. Reversing the trend also has a lot to do with applying "simple" strategies that protect, enhance, or even create wetlands. In the examples highlighted below, you'll read about simple efforts ranging from building a nesting box to creating bird perches and small-animal habitats to avoiding practices that interfere with "natural" vegetation growth.

Creating fish habitat out of a gravel pit

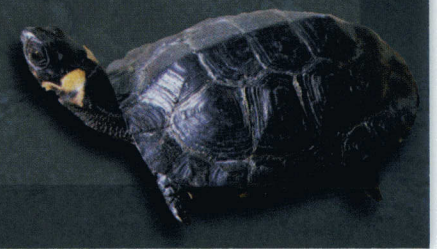
When the Alaska Department of Transportation and Public Facilities contractors dug gravel from a forested area for a new highway project, they only had to enlarge the hole to tap into ground water and create an 8.5-acre fish pond. Using a backhoe excavator, a team of biologists and contractors connected the pond to nearby Quartz Creek (a tributary of the Kenai River). They made the outlet stream look "natural" with features such as meanders, boulders, tree trunks, and root wads. Within months, five species of salmon and trout were spawning and rearing there, and hundreds of juvenile char and salmon had found their way into the pond. Today, the site is home not just to fish but also to coyotes, brown bears, waterfowl, and shorebirds.

Carol Sanner, (907) 269-0531 or Carol_sanner@dot.state.ak.us

Alaska Department of Transportation and Public Facilities



Aerial view of Quartz Creek Pond



Old Christmas trees create "instant" fish habitat

In Little Rock, Arkansas, and other cities throughout the state, discarded Christmas trees don't go to waste. Biologists from the Arkansas Highway and Transportation Department collect the trees from various city locations and place them in newly created borrow-pit ponds to provide cover for fish. They've put the trees into 20-60-foot-deep ponds connected to Rixey Bayou in Pulaski County and at several other sites. To drop the trees to the bottom of the pond, they tie 12-13 trees together, attach them to pieces of cement block, and lower them into the water from a flat-bottom boat. The woody debris of the Christmas trees make excellent spawning habitat and create a safe haven from predators for the ponds' perch, catfish, largemouth bass, and other fish species.

Arkansas State Highway and Transportation Department

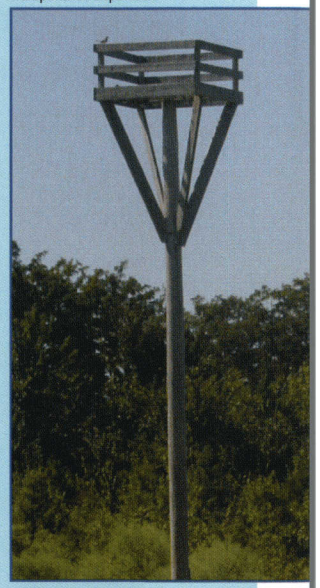
Old Christmas trees are sunk into a pond near Rixey Bayou

Phillip Moore, (501) 569-2281 or phillip.moore@ahtd.state.ar.us

Wetlands raptor platforms: "Build it and they will come"

Raptors - birds of prey - have three distinguishing characteristics: a hooked beak, excellent long-range vision, and strong feet with sharp talons. If you visit any of three large wetland mitigation sites owned by the Arkansas Highway and Transportation Department - the Brushy Lake site in Monroe County, the Middle Ouachita River site in Clark County, and the Rixey Bayou site in Pulaski County - you may notice a red-tailed hawk, a red-shouldered hawk, or other raptor perched on a "platform in the sky." The box-like wooden structures attached to the tops of telephone poles were installed by the Department to enhance wildlife habitat on the sites. They make ideal "stages" for hawks' hunting and feeding when on-site natural raptor perches are not present.

Arkansas State Highway and Transportation Department



Raptor platform at the Rixey Bayou Wetland Mitigation Area

Phillip Moore, (501) 569-2281 or phillip.moore@ahtd.state.ar.us

Healthy mangroves, healthy ecosystems

Red mangroves are fast-growing and have extensive, loosely-woven "stilt" roots, so they're ideal plants for stabilizing shorelines and protecting intertidal zone ecosystems. When bridge construction destroyed mangroves along US-1 in the Florida Keys, Florida Department of Transportation crews collected mangrove seedlings, which had dropped off the parent plant and were floating in shallow water. They placed the seedlings in the ground, protecting them from tides and waves with a rock berm. The plants rapidly established themselves and now provide nutrients and cover for young fish and other marine organisms. When the mangroves reach maturity they'll be breeding and gathering spots for a variety of wading birds.

U.S. Fish and Wildlife Service

Red mangroves

Leroy Irwin, 850-410-5899 or Leroy.Irwin@dot.state.fl.us

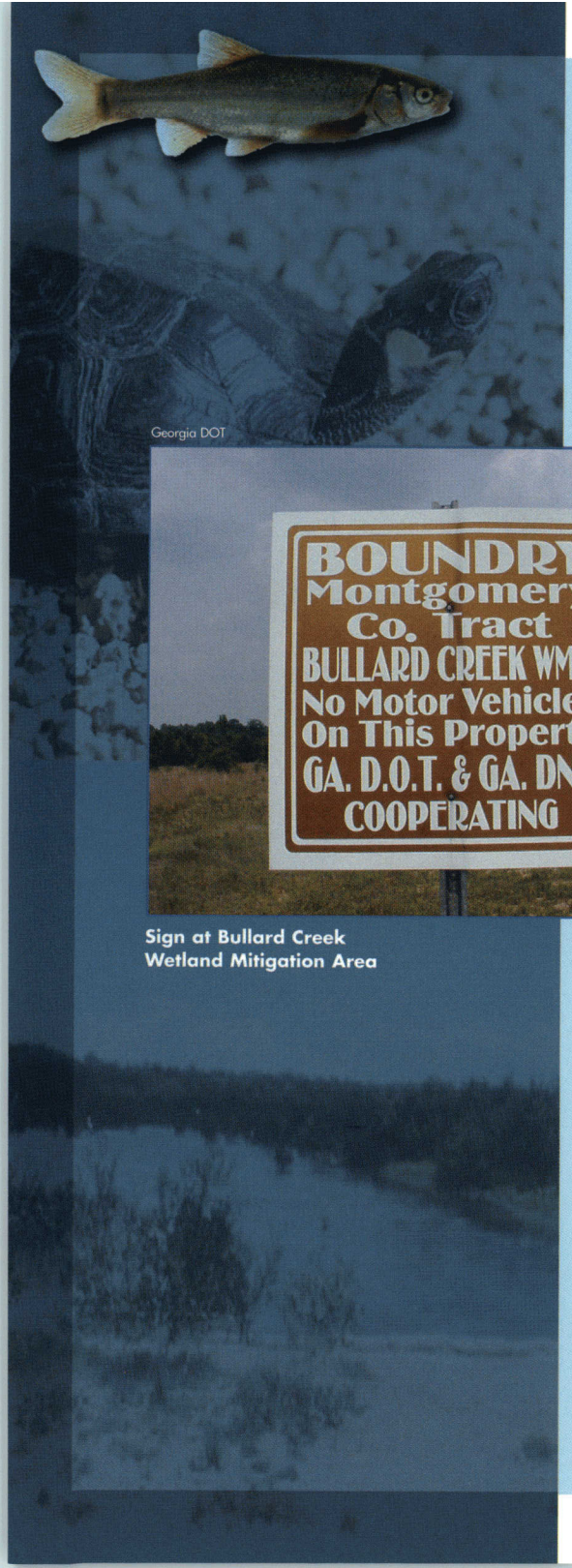
Transforming "dead" tidal flats just by adding culverts

In the early to mid 1900s, US-1 and other roads in the Florida Keys were constructed across natural channels, significantly reducing or eliminating tidal circulation to biologically productive flats. Over time, these flats became virtual wastelands. As part of a 1980's "Keys Bridges Replacement Program," the Florida Department of Transportation restored tidal circulation to several flats simply by installing an extra culvert here and there. In less than a year, mangroves reappeared on the flats and fish and other wildlife began to return.

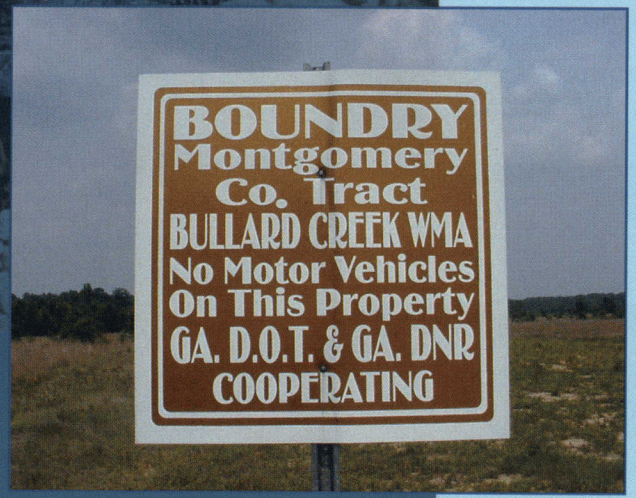
Florida DOT

Florida Keys tidal flats after installing more culverts

Leroy Irwin, 850-410-5899 or Leroy.Irwin@dot.state.fl.us



Georgia DOT



Sign at Bullard Creek Wetland Mitigation Area

Transferring management responsibilities on wetland sites helps wildlife

Wood storks, sand hill cranes, Florida water rats, and other wildlife species in Georgia have gained new habitat thanks to a strategic approach to land management. Whenever possible, the Georgia Department of Transportation locates wetland mitigation sites next to lands managed by the state's Department of Natural Resources, creating an easier-to-manage continuous green space. Rangers expand their patrolling of currently managed lands to include the newly added mitigation sites and they conduct controlled burns, selective timbering, and other activities that have had a positive effect on the success rate and quality of mitigation sites. The strategy reduces the Department's site-management and monitoring costs and allows the resource agency to offer the increased acreage to the public for hunting and fishing.

Lisa Westberry, (404) 699-4433 or lisa.westberry@dot.state.ga.us

Using proven planting methods for longer-lived hardwoods

Deer, turkey, possum, and other wildlife feed on the nuts and berries of hardwood trees, so it's standard practice to plant bottomland hardwoods on wetland mitigation sites. By observing thousands of tree plantings on these sites over a span of 10-15 years, Georgia Department of Transportation biologists have increased their expertise in planting hardwoods that grow well and survive a long time. They've identified the hardiest stock as stock not less than 3/8 inch in diameter and 32 inches in height and with a robust root system of 4 to 6 primary lateral roots. They've also learned the value of root-pruning so stock can be planted into a shovel hole without bending the roots and without having to excavate large holes. On wetland mitigation sites throughout the state, stock with these characteristics have outperformed very young plants, large-container plants, and burlap-wrapped plants, which are easily overwhelmed by shock.

Lisa Westberry, (404) 699-4433 or lisa.westberry@dot.state.ga.us

"Aviation balls" on power lines protect flying storks

Orange balls on power lines work for big birds as well as big planes. To deter federally threatened wood storks from flying into power lines on the Millen Bypass Mitigation Site in Jenkins County, Georgia, the Georgia Department of Transportation partnered with Georgia Power to install eight bright-orange fiberglass balls onto the power lines. Minimal labor and about $4,000 have kept wood storks safe on their way to the site's wetland ponds.

Georgia DOT

Orange aviation balls, Millen Bypass Mitigation Site

Lisa Westberry, (404) 699-4433 or lisa.westberry@dot.state.ga.us

River otters get new homes thanks to scrap metal and a few dollars

In anticipation of a Maryland Department of Natural Resources project to reintroduce river otters into western Maryland, biologists from the Maryland State Highway Administration built "dens" on a newly-created wetland in Allegheny County - a site designed for the habitat needs of the river otter. They built the denning structures out of scrap corrugated pipe, crimping the pipe at one end and burying it into the slopes of the wetland. When the otter reintroduction project lost its funding, Maryland State Highway Administration provided the money to transport 25 otters from the eastern shore to the Allegheny County site. The released otters have thrived in their new location and expanded their population to other watersheds.

Maryland State Highway Administration

River otter released at Allegheny County wetland site

Bill Branch, (410) 545-8626 or wbranch@sha.state.md.us

Rough pond-bottoms and inverted root wads increase wildlife diversity on wetlands

Typically when water quality treatment ponds are constructed, an effort is made to smooth the bottom and sides to get rid of ruts, bulldozer tracks, and bucket scars. However, the Minnesota Department of Transportation leaves the ponds they build in a rough condition to increase the ponds' bottom-surface area and to encourage the growth of a wide variety of wetland plants and resulting wildlife diversity. Minnesota Department of Transportation biologists used this technique on Highway 10 and County Road H wetlands sites in Mounds View, Minnesota. They also put inverted tree-root wads on the sites for songbirds to use as perches and geese to use as nesting habitat. Trees cut off 5-6 feet above ground were the starting point. The biologists pushed the remaining stumps from the soil, placing them upside down in the wetland.

Minnesota DOT

Inverted tree-root wad

Dwayne Stenlund, (651) 284-3787 or dwayne.stenlund@dot.state.mn.us

"Making waves" enhances habitat and wildlife diversity

In less than a day and with just a steel-tired tractor and a push blade, the Nebraska Department of Roads created undulated surfaces on 50 acres of the Tarnov Wetland Bank Site near Platte City, Nebraska. The small rises and declines - from six inches above to six inches below the design elevation - helped set up the specific moisture conditions needed for diverse vegetation that would appeal to a wide variety of aquatic insects and wildlife species. In just two growing seasons, the site changed from bare ground to a canopy of sedges, cattails, duckweed, spikerush and other wetland plants. The wetland attracts such wildlife species as deer, snow geese, white egrets, great blue herons, and mallard and blue-wing teal ducks.

Nebraska Department of Roads

Undulating topography, Tarnov Wetland Bank Site

Cindy Veys, (402) 479-4410 or cveys@DOR.state.ne.us

Introducing mosquito-eating fish to wetland eliminates the need for spraying

Nevada DOT

Washoe Lake Wetlands Mitigation Site

When Nevada Department of Transportation biologists captured mosquito-eating tui chub from Spooner Lake near Lake Tahoe and relocated them to ponds on nearby Washoe Lake Wetlands Mitigation Site - a popular bird-watching park and school-trip site - they solved two problems at once: They relieved the lake of its over-population of tui chub and they eliminated the need for helicopter-applied spraying to kill mosquitoes. Indiscriminate chemical spraying of the wetland site would destroy beneficial species like snails and dragonflies and would harm the food chain for all wildlife in the immediate area. Introducing the native tui chub to the site has controlled the mosquitoes, and it has enhanced the food chain by adding a food source for the egrets, herons, pelicans and other birds that frequent the site.

Gail Bellenger, (775) 888-7889 or gbellenger@dot.state.nv.us

Turtles get nesting habitat when sandy soil is left intact

Sunny, sandy forest openings near open water are necessary for turtles to successfully reproduce, and such habitats are scarce in New Hampshire and throughout the country. But if you visit a created wetland site off of Pine Road in Brentwood, New Hampshire, you're likely to see hatched turtle shells, thanks to the New Hampshire Department of Transportation. When Department wetland specialists created the site, they left a small section of sandy soils intact rather than replacing the sand with organic-rich topsoil. Simply "leaving nature alone" resulted in wildlife habitat diversity and nesting habitat for spotted turtles, eastern box turtles, and other turtle species.

New Hampshire DOT

Sandy soil along shoreline provides turtle habitat

Den Danna, (603) 271-4046 or ddanna@dot.state.nh.us

Centrally located nesting box attracts birds and aids monitoring

Like many newly-created wetlands, a new site off of NH Route 11 in Andover, New Hampshire, lacked nesting features to attract birds. So biologists from the New Hampshire Department of Transportation mounted a nesting box on metal posts and placed it in the center of one of the site's wetland monitoring areas to serve as a highly visible marker for monitoring crews. As soon as the birdbox was installed, a pair of barn swallows occupied it and established a nest. They've been coming back regularly ever since.

New Hampshire DOT

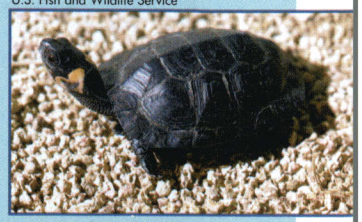
Nesting box attracts birds to wetland mitigation site

Den Danna, (603) 271-4046 or ddanna@dot.state.nh.us

Improving a culvert keeps turtles on the wetland - and off the road

At County Road in Sussex County, New Jersey, a few simple modifications to a culvert linking two wetlands have created a tunnel for bog turtles. The endangered turtles couldn't use the culvert to get from the "breeding" wetland to the "hibernating" wetland because large rocks blocked one opening to the culvert and there was a steep drop at the other opening. New Jersey Department of Transportation crews fixed the problem by removing the rocks and cutting banks, supporting them with gabion baskets (stone-filled wire "cages"). They also put a concrete pad at the same level as the culvert to create a level entrance, and they installed a one-foot high fence along the road to channel the turtles into the tunnel. Thanks to the "renovated" culvert, bog turtles and other small animals can now safely access the two wetlands on opposite sides of the road.

U.S. Fish and Wildlife Service



Bog turtle

Robert Bird, (609) 530-4239 or robert.bird@dot.state.nj.us

Creating a new wetland by not filling-in an old stream channel

Ohio DOT

Created "oxbow" wetland

The Ohio Department of Transportation created wetland habitat for birds and amphibians simply by not filling in part of an old stream channel. When the new, 15-mile-long Ravenswood Connector in Meigs County required 200 feet of Nease Creek to be realigned, Department biologists saw an opportunity. They recognized that once the project was finished, the small section would still receive water from overflowing streams and might become an "oxbow wetland" - a wetland formed when a waterway changes its course and flows into a new channel. So they instructed contractors to leave the section unfilled. The biologists were right. The abandoned stream-channel section did become an oxbow wetland, now regularly used by wood ducks, great blue herons, American toads, and other wildlife species.

Michael Austin, (740) 373-0212 ext 704 or michael.austin@dot.state.oh.us

Creating "bunny condos" where forests join fields

When a terrestrial mitigation project requires border cutting for improved wildlife habitat, it's easy and cheap to construct a brush pile "bunny condo" for small animals. Pennsylvania Department of Transportation biologists have created habitat structures like these on 50 sites in Blair, Huntingdon, and Somerset Counties. To make the tepee-like structures, the biologists combined on-site cut tree limbs, large and small, with stone and brush, stacking them together as a pyramid and topping the pyramid with brush for additional cover. Each structure was built in just one hour and cost only $20. Rabbits, shrews, lizards, skunks, weasels, black snake, wood thrush, and lots of other small mammals, reptiles, and birds have been using the new residences.

Pennsylvania DOT

"Bunny condo"

Dain Davis, (814) 696-7223 or josedavis@state.pa.us

"Doing nothing" creates diverse habitats for wetland wildlife

When planted shrubs, saplings, and grass seed failed to survive wet conditions on a restored freshwater swamp off of Route 7 near Smithfield, Rhode Island, biologists from the Rhode Island Department of Transportation let "nature" solve the problem. After observing that sedges, rushes, steeplebush, wool grass, Joe Pye weed, and other wet-meadow species were emerging from the native soil (soil that had been buried under fill) and beginning to colonize the site, the biologists left the native vegetation undisturbed. The resulting habitats were more diverse than what had been planned, attracting white-tailed deer, small mammals, and birds such as robins, killdeer, yellow warblers, and red-tailed hawks.

Rhode Island DOT

Route 7 Wetlands Mitigation Area

Emilie Holland, (401) 222-2023 ext 4051 or eholland@dot.state.ri.us

"Mound-planting" wetland oak seedlings for better survival

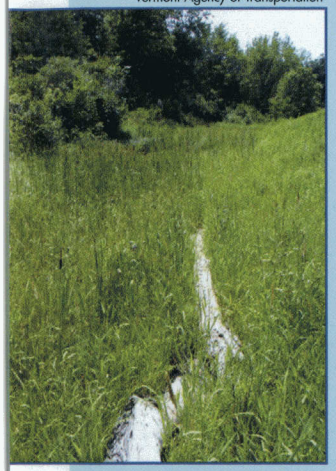
On seasonally inundated wetlands, planted oak seedlings are often washed away by back-water flooding before they can establish a root system. To prevent this from happening on the Spring Creek Wetland Mitigation Site in Carroll County, Tennessee, biologists from the Tennessee Department of Transportation test-planted seedlings by planting the young trees in mounds 2 feet across by 6 inches high. After letting the water in the mound drain, they used a hand-held "dibble bar" to make a hole for the seedling. In some cases, when water didn't drain from the mound, they made the mound higher by adding dry soil. Most of the seedlings survived, and in a few years the site's deer, turkey, squirrels, possums, mallards, and other animals will have plenty of acorns from the planted oaks.

Bill Brode, (615) 741-6834 or bill.brode@state.tn.us

Randomly placed rocks and fallen trees draw wildlife to new wetland areas

If you were to visit new wetlands along Vermont's Route 2, Route 7, and Barney Road (near Bennington), you might see a turtle sunning itself on one rock and a wood duck watching for predators from another rock. You might catch a glimpse of a hawk on a dead-tree "perch" or a rabbit or chickadee underneath a blown-down tree. A wide variety of animals are attracted to the wetlands because the Vermont Department of Transportation has made them look natural by randomly placing boulders, standing dead trees, and fallen trees in the area. The fallen trees are at least 16 inches wide and 16 feet long (grouse won't mate under smaller trees). Many of these trees were laid end to end and left with their root mass and crown attached, offering added habitat "structure" for animals seeking cover.

Vermont Agency of Transportation



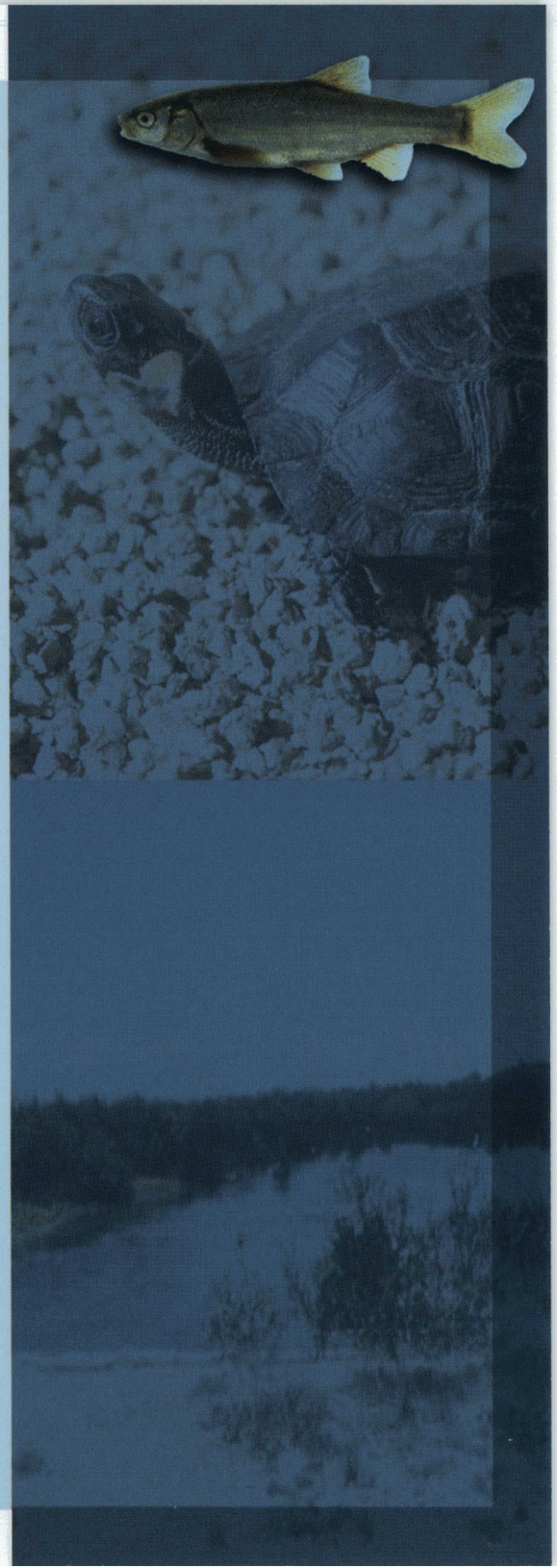
Fallen tree creates habitat structure for small animals

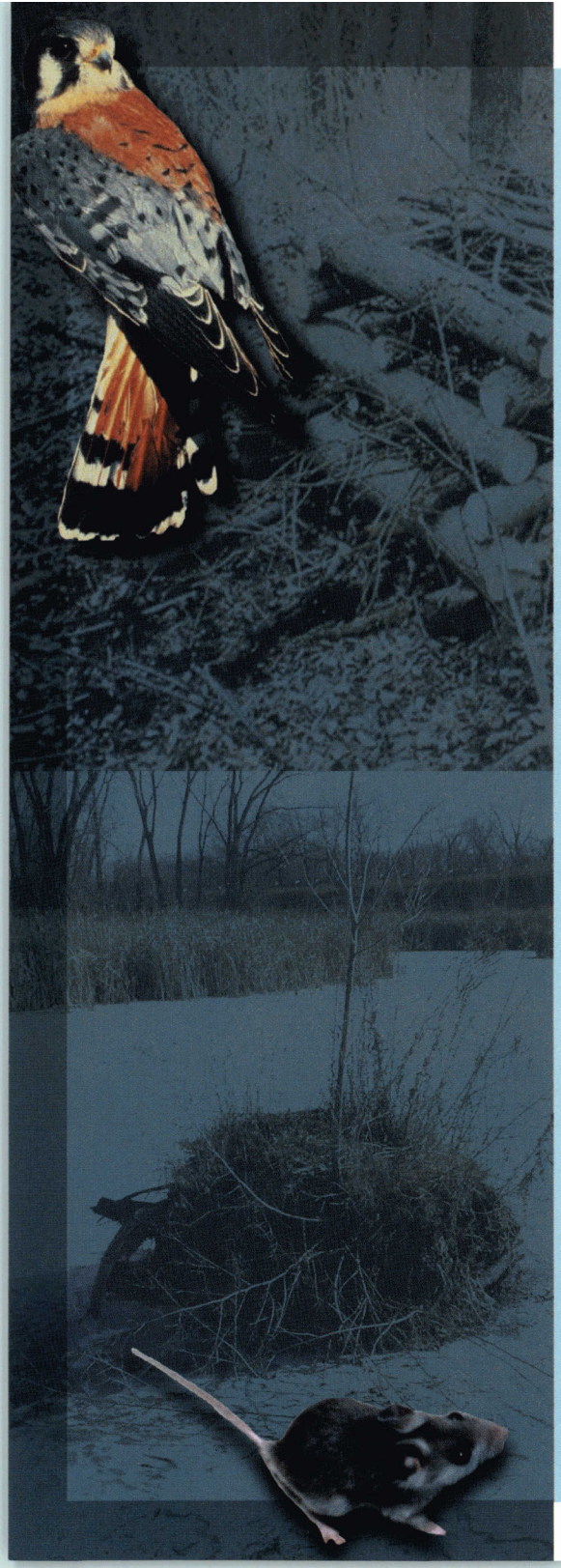
John Lepore, (802) 828-3963 or
john.lepore@state.vt.us

Letting nature take its course along a stream bank

When work began to reconnect a stream to an estuary on a Bainbridge Island wetland mitigation site, landscape architects from the Washington State Department of Transportation observed that plants along the newly-graded site were coming up on their own. So they abandoned their stream-bank revegetation plan, opting instead to remove invasive plants and noxious weeds and to plant new vegetation only when necessary. The "natural" plant communities grew quickly, covering the stream bank in only one growing season and just in time for the stream reconnection and the arrival of coho and chum salmon.

Mark Maurer, (360) 705-7242 or
maurerm@wsdot.wa.gov





Creating small-animal habitat from logs and brush

On the Bow Wetland Mitigation Site in Bow, Washington, mice, robins, blackbirds, sparrows, chickadees, and other small mammals and birds are using habitat structures created by the Washington State Department of Transportation. The structures are made of brush and tree limbs cut during clearing activities on the site and stockpiled - small logs, 4 to 6 inches in diameter by 6 to 8 feet long, criss-crossed and topped with smaller branches and brush, also criss-crossed. Since the habitat structures are 6 to 8 feet tall, there's plenty of space for small animals to get in and move about. The log-brush structures solved two problems at once: They replaced lost habitat with new habitat, and they reduced the amount of waste generated during the clearing activities.

Mark Maurer, (360) 705-7242 or maurerm@wsdot.wa.gov

Washington State Department of Transportation

Brush pile at Bow Wetland Mitigation Site

About this brochure

KEEPING IT SIMPLE: Easy Ways to Help Wildlife Along Roads was created by the Federal Highway Administration's Natural and Human Environment Office, 400 7th Street N.W., Washington D.C. 20590.

The purpose of this brochure is to highlight—for the transportation community and for the traveling public—easy ways of reducing highway impacts on wildlife.

About the website

(www.fhwa.dot.gov/environment/wildlifeprotection)

Every few days, the KEEPING IT SIMPLE website displays a "featured article" on the Home Page. The site also allows users to search by state and by category, and it provides contact information for sending new "keeping it simple" success stories to be added to the site.

For more information on KEEPING IT SIMPLE, contact Ginny Finch at 202-366-4258 or ginny.finch@fhwa.dot.gov.

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