



**FISH AND WILDLIFE EFFORTS  
IN OSM'S  
MID-CONTINENT REGION**

**AUGUST 2006**

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*Cover page is a photo of two parent Canada geese with five newly hatched goslings on an Iowa AML site.*

## EXECUTIVE SUMMARY

State personnel employed by all the Mid-Continent states encourage development of fish and wildlife resources on both Title IV and Title V sites throughout the Mid-Continent Region. Environmental factors, such as the arid conditions in west Texas, and landowner preferences for grazing land in plains states such as Kansas and Oklahoma, impact efforts to reclaim mine sites to a fish and wildlife habitat post mining land use. Establishing a prairie ecosystem or planting trees and shrubs typically adds to the cost of reclamation, and this has a negative effect toward making native prairie or forestland a choice for reclamation. Even so, a very conservative estimate of fish and wildlife acres at Title IV sites and Phase III bond released acres at Title V sites is 100,000 acres, but the actual acreage may be twice that amount. Available data indicate that in most, if not all Mid-Continent states, more fish and wildlife habitat acreage exists post mining than existed pre-mining.

Fish and wildlife reclamation efforts on mined land in the Mid-Continent Region began long before passage of the Surface Mining Control and Reclamation Act (SMCRA) in 1977, also referred to as the Act. Historically, fish and wildlife reclamation focused more on establishment of aquatic resources and tree and shrub planting. On abandoned mine lands (AML) sites, natural succession has been a significant factor in development of fish and wildlife habitat. This is a biological force that happens to all land that is not carefully managed to maintain an artificially induced land use. On AML sites, where a specified vegetative cover is not maintained, native species randomly invade and ultimately convert these sites to wildlife habitat.

Government agencies and coal operators were often responsible for tree and shrub plantings at many previously mined sites in the Mid-Continent Region, dating back to the 1920s. By 1973, most states in the Mid-Continent Region had laws that regulated coal mining. These laws created variable but definite bonding and reclamation requirements that significantly reduced the adverse impacts of mining, and thus created a less toxic post-mining environment. However, rough graded, toxic, and ungraded areas were often inaccessible to farm equipment and livestock. Because of the inconvenience, these “odd areas” were poorly managed or not managed at all, and a final vegetative cover on these areas was eventually achieved by natural succession. To encourage a post mining land use of wildlife habitat some state laws had lesser reclamation requirements if the land was reclaimed for wildlife purposes.

Research on fish and wildlife species and trees that may be impacted or used for reclamation on post-Act Title IV and Title V sites began soon after passage of the Act in 1977. Numerous studies have been conducted and recovery plans were developed on the endangered Gray Bat and Indiana Bat. A study of tree growth rates on Title IV and Title V sites documented excellent growth rates on ungraded spoil material, but slower tree growth on post-Act graded and topsoiled land due to soil compaction caused during the reclamation process. Several studies have been conducted on the Interior Least Tern and Henslowe’s Sparrow, both endangered species. Several Tern pairs were reported to have

nested successfully on two mines in Texas, and Henslowe's Sparrow is making a comeback on large surface mines reclaimed to native grasslands.

Research on and interest in fish and wildlife habitat on Title IV and Title V mines are by no means limited to previously mentioned work. OSM has co-sponsored at least five interactive forums on endangered species and reforestation since 2000. The presenters in these forums represented a wide range of disciplines including researchers, regulators, coal mine operators, and consultants. OSM also sponsored a first ever Wildlife Summit to provide an opportunity for regulatory officials, coal operators, State and Federal fish and wildlife agencies, private fish and wildlife conservation groups, and interested citizens to evaluate existing regulatory mechanisms and identify incentives and impediments to increasing the quantity and quality of fish and wildlife habitat in coal mine reclamation.

## **I. INTRODUCTION**

The purpose of this report is to provide an update on major fish and wildlife accomplishments within the Mid-Continent Region and a general discussion on current and historical fish and wildlife reclamation efforts, both on Title IV (AML) project sites and Title V (regulatory) mine sites in all 11 states in the Mid-Continent Region. It is not the intent of this report to include a comprehensive list of all accomplishments. The states within the Mid-Continent Region are: Alabama, Arkansas, Illinois, Indiana, Iowa, Kansas, Louisiana, Mississippi, Missouri, Oklahoma, and Texas.

## **II. METHODOLOGY**

The information contained in this report was collected by the Birmingham and Tulsa Field Offices and the Alton Field Division. This information included data already compiled by OSM, the states, mine operators, and any other available information that proved relevant. An extensive data search was not conducted. This report on “Fish and Wildlife Efforts in the Mid-Continent Region” also includes, as an integral part of fish and wildlife habitat, woody and herbaceous plantings, reforestation, and developed aquatic resources such as ponds, impoundments, and wetlands. Mississippi and Louisiana are not included in the “Title IV Efforts” section because neither state has implemented a Title IV construction program.

## **III. POST SMCRA FISH AND WILDLIFE EFFORTS**

### **A. Title IV Efforts**

#### **Alabama**

To provide fish and wildlife enhancements on its AML sites, the Alabama Department of Industrial Relations (ADIR) plants saw tooth oaks (which bear acorns in one-two years), sericea lespedeza (for seed-eating wildlife), and grasses (for turkey forage). Their projects, while not specifically reclaimed for fish and wildlife purposes, provide immediate benefits by reducing or eliminating sediment into nearby streams and by returning the land to a productive state. From 1976 through 2004, ADIR, first under grants from the Tennessee Valley Authority’s Orphan Mine Land Reclamation Program (1976 through 1980) and then as an OSM grantee under the AML Program, supervised the planting of 1.9 million wildlife shrubs and 173,000 hardwoods on abandoned coal mine sites in Alabama. During the 2004-5 planting season, an additional 2,400 cherry bark oaks and 2,200 saw tooth oaks were planted on nine abandoned coal mine sites. (The photo



above shows a heavily vegetated drainage area on the Piper Project that was reclaimed by ADIR in 1997.)

### Arkansas

Landowners in Arkansas are most interested in having abandoned mine sites reclaimed to pasture. The State reported that 45 acres of open water have been left as permanent impoundments for fish and wildlife. (The photo left shows a permanent impoundment and associated wetlands.) On sites reclaimed to pasture, 25 acres of bottomland hardwood trees and shrubs have been planted along waterways as riparian habitat within the project areas. The State estimates



that 120 acres of wildlife habitat have been established on Title IV projects in Arkansas. (The photo right shows a Title IV mine site in Arkansas planted to pine trees.) A prime example of restoration and enhancement of fish and wildlife habitat is the restoration of Cherokee Creek in the Huntington area of western Arkansas. The creek was re-established in its original location and was reconstructed with meanders, riffles, and pools. Native species of shrubs and trees were planted in riparian areas. Diversity of aquatic habitat was further improved by increasing the depth of an upstream backwater pool area. (The bottom photos show before and after reclamation of the stream and surrounding spoil piles on the Huntington Town West Project.)



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## Illinois

Illinois has reclaimed a total of 8,781 acres to fish and wildlife habitat, including forestland and developed water resources. This includes 7,831 acres for wildlife habitat and 772 acres for fish and other aquatic life habitat. Twenty sites covering a total of 178 acres have been specifically reclaimed to forest. There have been



two significant reforestation sites. Approximately 50 acres were planted with trees at the Osage Coal AML project in 1985. At the on-going Sahara #6 project, 20 acres are currently planted with trees. (The two photos are the before and after reclamation on a wetland restoration project.)

## Indiana

The Indianapolis Area Office (IAO) reported that approximately 90% of non-emergency AML reclamation projects in Indiana serve as fish and wildlife habitat. The vast majority of AML projects are planted in woody and herbaceous vegetation in addition to trees which provides excellent biodiversity and wildlife habitat. The Indiana AML Program moved away from monocultures long ago, and is planting warm season and cool season grasses and a variety of forbs on AML sites that provide excellent food and shelter for wildlife. By reclaiming an AML site, the State generates major improvements to the general environmental



health of the area, which translates to improved and often increased acres of fish and wildlife habitat. But the Indiana AML Program usually does more, and there are several methods it employs to accomplish this. One concept it uses to improve fish and wildlife habitat at reclamation projects is to avoid disturbance of existing high quality habitat contiguous or adjacent

to the project. This may include forests, waterways, impoundments, wetlands, or even a single rock pile or tree. Native warm season grasses and forbs that provide

tremendous value to wildlife are used as often as possible. Construction of brush and rock piles in Indiana is a surprisingly effective way to improve fish and wildlife habitat. Another major technique the State incorporates to enhance biodiversity and habitat is the construction of wetlands. Instead of leaving borrow areas as steep-sided pits, they are reclaimed to maximize fish and wildlife potential. An example is construction of a shallow water wetland with a series of brush piles, islands, and berms designed to increase water flow through the wetland. By making these simple modifications, contractors obtain all the borrow material they need while dramatically improving fish and wildlife habitat and the general biodiversity of the area. It has been said that there are few greater joys in life than returning to reclamation projects years after the fact and witnessing the thriving flora and fauna that now frequent these once highly degraded and toxic sites. (The photo on the previous page is a White-tailed doe and her fawn feeding in a shallow water wetland on a reclaimed AML site.)



Information provided by the Indiana Department of Natural Resources shows that 981,400 trees were planted on a total of 1,248 acres at 55 different AML and bond forfeiture reclamation sites from 1999 through 2005. Planned plantings for 2006 include 113,200 trees on 150 acres at 11 AML sites. In evaluation year (EY) 2002, the Indianapolis Office conducted an evaluation of AML tree planting success. The review found that Indiana's AML tree planting efforts were generally successful. (The photo above on the right shows tree plantings at the Burris - Hanson AML site.)



The Indiana AML program has been very active with regard to protecting the endangered Indiana Bat. Numerous bat gates have been erected over the past several years, including one in Turkey Run State

Park, which is the second most popular State Park in Indiana. (The photo above left is a bat friendly gate constructed over an abandoned mine entrance to protect



the summer roosting habitat of the Indiana Bat. Bats are able to pass through the horizontal bars unencumbered.)

## Iowa

Information provided by the Iowa Division of Soil Conservation shows that the Iowa Title IV program has reclaimed 1,388 acres. Of these, 1,083 acres have been reclaimed to provide fish and wildlife habitat, including



wetlands, open water, prairies, forestland, etc. Another 44 acres have been planted with trees, the goal being establishment of commercial forest land. A valuable consequence of tree plantings is that the forest itself and the edge effect it creates provide prime habitat for an abundance of animal and plant species. Approximately 197 acres of wetlands and permanent impoundments are strategically located throughout the reclaimed AML sites for maximum benefit to the fish and wildlife resource. (The top right photo depicts established native grasses and forbs in the foreground, with forestland and edge habitat establishing in the background, on the Hull AML Reclamation Project. The photo left above is a wetland site at the Bluff Creek AML Reclamation Project with a leopard frog in the foreground. The bottom photo is a Mallard Drake on an Iowa AML impoundment.)

## Kansas

The Kansas Department of Health and Environment Surface Mining Section reported that an estimated 810 acres have been reclaimed to fish and wildlife habitat. Approximately 65 acres of open water (permanent impoundments) and another 65 acres of wetlands were created during the reclamation process. The remaining 680 acres have been established in warm season grasses and forbs

native to Kansas. Kansas does not keep historical information on reforestation, but the Kansas Department of Health and Environment Surface Mining Section was able to report that 10,045 trees have been planted on approximately 23 acres at AML sites since 2001. (The photo below right shows a permanent



impoundment stocked with fish and adjacent tree plantings at the Overman AML Project in Cherokee County. The photo above left shows a Northern Water Snake sunning in a wetlands site on the Quail Farm II Reclamation Project located in Crawford County, Kansas.)

## Missouri

The Missouri Land Reclamation AML Program reported that fish and wildlife enhancement plays a major role in reclamation at its Title IV reclamation projects. Deer, turkey, rabbits, and numerous other wildlife species are commonly found on an estimated 4,000 acres of reclaimed AML projects throughout Missouri. (The photo left is a cottontail rabbit on the Ellis AML Project.) The Bison AML Project is located within Prairie State Park in southwest Missouri. Reclamation of this



120 acre site eliminated dangerous high walls, acidic impoundments, and vertical mine openings that adversely affected the native plant and animal communities and was vegetated with warm season native grasses and forbs. Today this area is home to the American Bison, Greater Prairie Chicken, and many other prairie species. (The photo right is a Greater Prairie Chicken that roams Prairie State Park and may be found on the Bison AML Project.)



Although data concerning tree planting was not readily available, some information was available in Missouri's 1991 Annual Report. This report noted that for the period 1984 through 1991, a total of 532,089 tree seedlings were planted on 403 acres at project sites located in six Missouri counties. In the past, a major problem was use of project sites for pasture by the landowner after trees were planted, resulting in a loss of the trees. The State now plants trees on project sites only where landowners want them, and also where riparian corridors cross project areas. Documentation of Missouri's commitment to reforestation can be found in the Missouri Land Reclamation Program's publication entitled, "Upper Cedar Creek Clean Streams/319 Project." This publication states that over 200,000 trees have been planted at this Title IV project site. (The photo above is a surprised White-tailed doe on the Perche Creek AML Project.)



## Oklahoma

The Tulsa Field Office reported that Oklahoma's Title IV Program encourages fish and wildlife enhancement of reclaimed project sites, but these efforts are often impacted by landowner preferences for reclamation. Most Oklahoma landowners, when given a choice, favor pasture land for haying and grazing cattle over fish and wildlife habitat.

On completed AML projects since February 25, 2000, there were 29 open water impoundments totaling 37 acres left as fish and wildlife habitat. On the Club Lake West Project, 300 water plants and 65 pounds of wetland grass seed were planted as part of a wetland mitigation plan.



Approximately 6,650 trees have been planted on a total of about nine acres at two project sites. (The photo is a permanent impoundment on the Club Lake West Project that includes an open water area and shallow wetland areas.)

## Texas

Nearly all of the AML project sites in Texas have been located in the western part of the state. This is an arid region where fish and wildlife enhancement is not a practical option. Through natural succession, reclaimed sites usually revert to native brush species within a few years after reclamation is completed. Sediment ponds and other water bodies are sometimes left as permanent impoundments for livestock watering. These are often stocked with fish, and are commonly used by the local wildlife and migrating birds. Texas has a very sophisticated bat conservation program that has successfully protected numerous bat species with bat friendly closures on dozens of caves throughout the state. (This is a photo of a bat friendly closure over a cave entrance at the Buena Suerta District-Chanita Mountain AML Project in Brewster County.)



## B. Title V Efforts

### Alabama

Statistics from the Alabama Surface Mining Commission's database for the previous five calendar years (2000 – 2005) show that 57 permits were issued. Of these, 38 permits involved some acreage devoted to fish and wildlife enhancement (470 acres). This amount of acreage was 2.3 percent of the total permitted acreage. Five of the permits involved the forestland post mining land use for a total of 1,394 acres (6.7 percent of total permitted acreage). Fifty-seven of the permits indicated that either all or part of the permit would have a post-mining land use of undeveloped. Most of the sites with "undeveloped" as a post mining land use are reclaimed to fish and wildlife habitat. Permanent water impoundments are the most common example of fish and wildlife habitat. A 2003 Excellence in Surface Coal Mining Reclamation award recipient, Drummond Company Cedrum #4 mine, constructed 50 acres of wetlands and relocated 8,900 feet of a perennial stream including reconstructing 2,800 feet of streambed by adding riffles, meanders, and replacing a mud bottom with rock.



This was accomplished while preventing impacts on possible habitat for an endangered species. A small area of upland wetland was not mined to preserve its wetland values. (The February 2004 photo above depicts the wetlands constructed by Drummond Company.)

## Arkansas

Mine operators in Arkansas reclaim sites in accordance with landowners' wishes. Most often, the landowners want land returned to pasture after mining is completed. The State reported that approximately 275 acres have been reclaimed as permanent open water impoundments for livestock watering and fisheries. An additional 60 acres have been reclaimed to other wildlife habitat. The State Regulatory Authority considers pines an invasive species because they often encroach on mined land that has been reclaimed to a pasture post-mining land use. However, some Title V sites have been planted to pine trees, and State personnel encourage reforestation, especially on areas with rocky soil. (The photo above is a permanent impoundment with wetland areas along the shoreline and adjacent tree and other woody and herbaceous wildlife plantings.)



## Illinois

Due to the greater than average depth and fertility of topsoil in Illinois, the State has emphasized reclamation to cropland. In the permanent regulatory program, Illinois has conducted Phase III bond release on 4,100 acres of open water, 4,700 acres of herbaceous wildlife, 2,700 acres of woody wildlife, and 8,700 acres of wetlands. Data on a substantial number of acres of land reclaimed to wildlife that is still going through the bond release process was not available. Illinois has reclaimed a total of 21,300 acres to fish and wildlife habitat, including forestlands and developed water resources. (The photo above is a flock of migrating snow geese feeding and resting on surrounding wildlife habitat next to a



permanent impoundment at the Peabody Randolph Mine.) Acquisition of approximately 18,000 acres of an Arch Minerals Mine made Pyramid State recreation Area the largest State Recreation Area in Illinois. Pyramid has more than 500 acres of water that form lakes varying in size, the largest being 276 acres. This area excels in biodiversity with meandering streams, dozens of lakes, mature forestlands, and numerous other fish and wildlife enhancements. Many species of wildlife are frequently observed on the site including deer, rabbits, squirrels, songbirds, turkeys, and waterfowl. The lakes are stocked with largemouth bass, bluegill, and channel catfish. These fish and wildlife resources all make hunting, fishing, hiking, and bird watching favorite pastimes at Pyramid. (The photo left shows successful tree planting at Consolidation Coal, Co., Burning Star #5 Mine in southern Illinois.)



## Indiana

The Indiana Regulatory Program began a database for final bond release acreage in 1996. Information in the database documents that 25,366 fish and wildlife acres, including 7,756 acres of trees have achieved final bond release since 1996.

Although the Regulatory Program does not track what happens to the land after bond release, the belief is that the majority of reclaimed fish and wildlife acres remain as fish and wildlife habitat. The Indiana Program has conducted extensive research with regard to the Copper Belly Water Snake. A conservation plan



was developed and implemented in cooperation with the US Fish and Wildlife Service. (The photo above is a Copperbelly Water Snake.) A good indicator of Indiana's fish and wildlife efforts and accomplishments is the fact that the annual Surface Mined Land Reclamation Technology Transfer Seminar sponsored by the Indiana Society of Mining and Reclamation, usually includes presentations on fish and wildlife issues. The Executive Board of this group selects the topics for this annual seminar based on Industry and public interest. One such presentation that comes to mind was given by Dr. Steven Lima, Indiana State University, in 1998 concerning "Reclaimed Surface Mine Grasslands and Avian Conservation." His research showed that some bird species that have been on the decline for quite some time because of dwindling habitat, are making a comeback on large surface

mined lands reclaimed to grassland, largely with native grasses. Notable among those bird species is the endangered Henslowe's Sparrow. The large Peabody Universal Mine site in Indiana is an excellent example of these grasslands.

The Indiana Program has for some time been working with the US Fish and Wildlife Service developing an Indiana Bat Conservation Plan. Although it has not been finalized, the State is implementing the plan anyway through its inspection and enforcement program. (The photo right is the endangered Indiana Bat.) Peabody Energy has planted American chestnut trees at several of its Black Beauty Coal Company mine sites. The tree stock used was hybrid American Chestnut/Chinese Chestnut "backcrossed" several times to American Chestnut to increase the percentage of American Chestnut in the new strain while maintaining the blight resistance of the Chinese Chestnut. A paper concerning hybridized "backcross" of the American Chestnut on an Indiana mine entitled, "American Chestnut as a Future Resource to Enhance Mine Reclamation Productivity," was presented by Douglass F. Jacobs at the 2005 National Meeting of the American Society of Mining and Reclamation in July 2005. Another paper that exemplifies the interest in reforestation in the Mid-Continent Region entitled, "Status of Reforested Mine Sites in Southwestern Indiana Reclaimed under the Indiana Mining Regulatory Program," is a product of research jointly conducted by Purdue University and Southern Illinois University at Carbondale.



The Indiana Department of Natural Resources Divisions of Reclamation and Forestry have joined together to help promote reforestation on mined land through a program called "Reclamation Re-leaf." Landowners are given assistance in planting trees on land that was mined and reclaimed after 1977 and where all bond has been released. For the period 2002-2005, this program has accounted for the planting of 295,100 trees on 411 acres. (The photo right shows trees planted at Peabody Turpin Hill Mine.)



## Iowa

Within the last five years, ten permitted sites have been successfully reclaimed in Iowa. These bond forfeiture reclamation sites had a combined total area of about one thousand, one hundred thirty acres. All of these sites were reclaimed to include wildlife habitat. About fifty-five percent of the total acreage was seeded

with various wildlife seed mixes, including native varieties. Forty acres of surface water including ponds, wetlands, and stream channels were improved or created by removing high walls and adjacent spoil piles. Iowa used stream bank stabilization measures on several sites to significantly reduce sediment loading and improve aquatic habitat. None of the sites have been reforested yet, but Iowa plans to begin reforestation efforts on bond forfeiture sites in 2007. (The photo right is a Canada goose nest in a wetland area at an Iowa Title V mine.)



## Kansas

In Kansas, all land uses are evaluated for their potential pre-mining contribution to the overall wildlife value of a permit area. The information is presented in the



Fish and Wildlife Resources section of the permit application package. The evaluation includes a numerical site rating based on standards set by the Kansas Department of Wildlife and Parks. The post mining goal is to meet or exceed the pre-mining rating through the use of water structures, vegetative species and

enhancement plantings. Permanent impoundments are designed to be multi-purpose to meet the needs of the landowner and the enhancement of habitat values. Minimum depths are maintained to protect fisheries. The impoundments are stocked early in the bond liability period, but not before the watersheds are stable. (The photo above shows a final impoundment on Continental Coal, Inc. being stocked with fathead minnows, channel cat, largemouth bass and bluegill.) Enhancements around impoundments include plantings of woody species in clump arrangements. Although they have a longer establishment time, warm season native grasses are used on a regular basis to mitigate for lost wildlife value. (The photo at the right shows staff members and a mining consultant evaluating a warm season native grass pasture area.)





The initial costs for native species are higher and availability can vary from year to year, however the careful placement of these plantings does increase the value of a mine site for wildlife by breaking up large tracts of introduced cool season grass species.

## Louisiana

Surface coal mines in Louisiana routinely incorporate fish and wildlife enhancements into the reclamation practices. They are integral to post mining land use considerations for both mines in Louisiana. Fish and wildlife enhancement plots are included throughout the reclaimed portions of the Dolet Hills Mining Company mine site on hilltops, slopes, and bottomlands. Plantings included several oak species, autumn



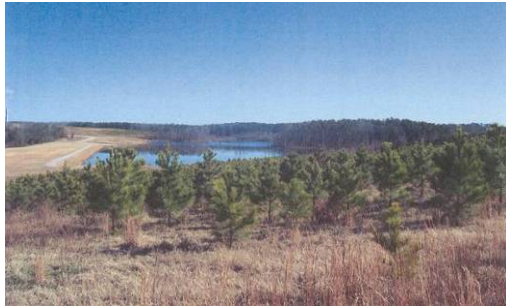
olive, and a number of other woody species that produce food and shelter for wildlife. Several bottomland plots contained ponds surrounded by wetland vegetation. In its 25<sup>th</sup> anniversary nomination for the Excellence in Surface Coal Mining Reclamation Award, the Red River Mining Company described fish and wildlife enhancements performed on the mine site. In addition to its primary post mining land use of forestland, the permittee also planted small areas in pastureland and developed permanent ponds. Pond features included the planting of hardwoods, forbs, and grassland species to provide shelter and food supplies for waterfowl, deer, and other wildlife. Through 2005, out of 2,756 bonded acres on Red River Mining Company's Oxbow Mine, 337 acres have been planted in trees. Although most of this acreage has been planted in pines, a few mixed hardwood areas have been planted for wildlife enhancement. On the Dolet Hills Mine 16,115 acres have been bonded. Of these, 5,627 acres have been reclaimed to forest lands. (The photos above are of wildlife plantings and a pond with wetland vegetation.)



## Mississippi

The Mississippi Lignite Mining Company has incorporated fish and wildlife enhancements into its reclamation practices at the Red Hills Mine. The mine site has been planted (in addition to forestland planting of pine seedlings) with mixed hardwoods along drainage bottom corridors, forest openings on ridge tops have

been established, small wetlands have been developed in drainage bottoms, and the company has worked with landowners who requested that sediment ponds be retained as permanent post mining fish ponds. The pre- and post-mining land



uses for the Mississippi Lignite Mining Company Red Hills Mine, the only coal mine in the state, are predominately forestlands. (The photo above left shows standing timber in the pond and surrounding established vegetation.) Currently, pine seedlings have been planted on 247 acres at a stocking rate of 802 seedlings per acre. Natural succession under the growing pine trees is replacing under-story Bermuda grass with native vegetation. (The January 2006 photo above right shows pines planted in 2002.)

## Missouri

Fish and wildlife efforts by Peabody Coal Company, Pittsburg and Midway Coal Company (P&M) and Associated Electric Cooperative, Inc. (AECI), at Title V mines in Missouri have been extensive. These companies reclaimed a significant amount of acreage to native grasses, wetlands, permanent impoundments, and trees and shrubs. This reclamation afforded excellent habitat for many species of wildlife found on the Peabody, P&M, and AECI mines including deer, squirrels, beavers, rabbits, turkeys, bobcats, raccoons, opossums, coyotes, songbirds, birds of prey, and waterfowl. Specific acreage figures are not readily available because most of the Phase III bond has been released and the companies are no longer active in the state.

The Peabody Tebo Mine is an especially unique area that was mined and reclaimed during a period beginning with no mining laws and ending under SMCRA. The results were a unique biodiversity in various fish and wildlife habitats including barren acid spoils, wooded swamps and other wetland types, ungraded, but well vegetated spoil piles, tall grass prairie, forested areas, and the 100-acre Tebo Lake and numerous smaller impoundments, some retaining pre-law high walls. (In the photo above the Bald Eagle represents the scores of migrating Bald Eagles and Ospreys fishing on Tebo Lake and smaller nearby impoundments.) Areas reclaimed to pasture also



have fish and wildlife enhancement features such as ponds, wetlands, tree plantings, and wildlife corridors spaced throughout. Some outbuildings that have been left undisturbed are Mecca's for wildlife. These abandoned structures are a long term attraction for many wildlife species including the Bull Snake, Woodchuck, Raccoon, Opossum, Barn Swallow, and Turkey Vulture. (The two pictures below show an outbuilding and one of two young Turkey Vultures that were hatched and raised inside.)



Bass Pro recognized the intrinsic value this large contiguous tract of land (4000 acres) possessed for development of the fish and wildlife resource and quickly purchased the site, even before the bond was released. It has since been developed into a virtual hunting and fishing paradise. Bald Eagles and Ospreys are often observed fishing on the numerous large impoundments as they migrate



through this area during the winter months. (In the above left photo two young coyotes are relaxing in the morning sun at Peabody Tebo Mine. As seen in the above right photo, even the shoulder of a rock access road is acceptable real estate for the Killdeer's nest at P&M Midway Mine. The photo right shows tree and shrub plantings and edge habitat surrounding a permanent impoundment at AECI.)



Although AECI is no longer producing coal, there are still approximately 6,500 acres in various stages of reclamation. Several

thousand acres have already been reclaimed to fish and wildlife habitat post mining land use and received total liability release. The reclaimed areas are usually open to company employees and invited guests to hunt, fish, and trap during the respective seasons. A Great Blue Heron rookery of approximately 50 nests has become well established in a seasonally flooded swamp along the Chariton River where it meanders through Prairie Hill Mine. An adjacent chain of eight shallow and several deep impoundments provide suitable year-round habitat for the heron's total welfare.

AECI reported that approximately 1,700,000 trees were planted on about 1,900 acres at its three mine sites. More than 50 miles of edge habitat have been created adjacent to streams, surrounding impoundments, along roads, and next to pasture lands and native prairie. Trees were recently planted along a restored stream channel at another recently reclaimed mine in southwestern Missouri.

### Oklahoma

The Tulsa Field Office reported that most Oklahoma landowners, when given a choice, favor pastureland for haying and grazing cattle to fish and wildlife habitat. Additional time and cost required to establish native grass prairie or forestland habitats are also factors considered by coal companies in the reclamation process. (The photo right is a Scissortail Flycatcher at a Peabody Coal Company mine. The bottom photo is an area on a Farrell- Cooper mine that is being reclaimed to wildlife habitat). Final impoundments that serve as a water source for livestock are a common site on Title V reclamation to a pastureland post mining land use. These are often small shallow structures constructed with little consideration for enhancement of fish and wildlife habitat. Even so, livestock watering ponds provide at least some benefits to wildlife, especially for migrating waterfowl. In the last five years, there have been portions of several permits that have been reclaimed to some type of fish and wildlife habitat.



Portions of three permits have been reclaimed to a total of approximately three-fourths mile of bottomland hardwood/stream habitat. Five ponds on three permits have been reclaimed to wildlife enhancement wetlands totaling five acres. Seven ponds on five permits have been designed and constructed with shallow areas, peninsulas, and islands for a total of twenty acres of fish and wildlife

habitat. Native prairie grasses have been established on nine permits for a total of 500 acres. There are several examples of successful reforestation on permanent program permits in Oklahoma. Forestland and the edge effect it creates are the

type of environment and biodiversity that is essential for the life and growth of many species of plants and animals. Approximately 675 acres of a 700 acre permit were planted completely to pines in the 1980s, and a pine forest has become established. A mix of deciduous and coniferous species was established on 10 of 37 acres of another permit, and another pine forest of about 40 acres has been successful on a 52 acre permit.

## Texas

Figures from “The Railroad Commission of Texas Summary Report “on acres released from Phase III bond through February 1, 2006, show that of 23,115 acres

released from bond, 2,600 acres (11.25 percent) had a fish and wildlife post-mining land use and 1,123 acres (4.86 percent) were reclaimed to a water post mining land use. Most of the developed water resources were constructed with shallow areas and with shorelines that were vegetated to enhance fish and wildlife habitat.



(If you look closely, the floating log in the above photo is actually a seven foot alligator on a Texas mine waiting patiently for other wildlife to come drink at the pond.)

In addition, 980 acres (4.24 percent) had a post mining land use of forestry. Usually, a portion of fish and wildlife habitat will have been planted to woody species. (The photo on the right shows a developed water resource with shallow areas and wildlife plantings for fish and wildlife enhancement at the TXU Thermo Mine. The photo below shows



successful tree and shrub plantings and a permanent impoundment at the TXU Martin Lake Mine.) The Tulsa Field Office (TFO) said that current reclamation efforts are becoming more directed toward a forest post mining land use. An example of this is a permit issued for 30,529 acres, with 10,117 acres having an approved post mining land use of forestry. Only 2,323 acres of the permit had a pre-mining forestry land use. A



comparison of “The Railroad Commission of Texas Summary Report” and OSM’s “EY2005 Texas Post Mining Land Use Oversight Report” show a

significant trend toward an increased percentage of mined acres being reclaimed to fish and wildlife habitat. The summary report on Phase III bond releases indicates that fish and wildlife habitat for the post mining land use occurred on approximately 10 percent of the acres released. In OSM's oversight review of nine more recent still active permits, approximately 30 percent of the disturbed acres were reclaimed or proposed for reclamation to a fish and wildlife post mining land use. Compared with older reclaimed sites, this represents a 20 percent increase in fish and wildlife habitat on new reclamation. TFO also noted that most post mining land use plans contain fish and wildlife enhancement features such as ponds, wetlands, tree plantings, and corridors interspersed throughout the most common post mining land use, pasturelands. These features are counted as pastureland acres and not separately as a fish and wildlife or a developed water resource post mining land use. Reclamation on some of the mines in Texas have inadvertently produced habitat suitable for federally endangered Interior Least Tern nesting sites. Nesting sights are located on two mines so far. As they occur, the nests and surrounding areas are cordoned off to protect the terns and their nests while the company continues with reclamation nearby. (The photo above is an Interior Least Tern nest with chick and eggs at a Texas mine.



#### **IV. PRE-SMCRA FISH AND WILDLIFE ACCOMPLISHMENTS**

Fish and wildlife efforts on mined land in the Mid-Continent Region began long before passage of SMCRA. Among the numerous pieces of information provided by the Field Offices are several references to pre-Act development of fish and wildlife resources by government agencies and other entities, including mining companies. During this time, reclamation was focused more on fish and wildlife enhancements such as aquatic resources (impoundments and wetlands) and tree and shrub plantings. Historically, government agencies and coal operators were often responsible for tree and shrub plantings at many previously mined sites in the Mid-Continent Region, dating back to the 1920s. Though some small forest plantings occurred earlier, an organized afforestation program on coal mine spoils was launched in Indiana in 1928. The Civilian Conservation Corps (CCC) program, under the direction of the U.S. Forest Service, was responsible for planting more than one million trees in the Mid-Continent Region on coal mine spoils in the 1930s. Discontinuation of the CCC in the late 1930s made surplus trees more available for coal operators to purchase and plant on mine spoils. In 1939 the Illinois Coal Strippers Association made an arrangement with the Illinois Forestry Division to

plant an equal amount of acreage that was stripped annually by the coal companies. The results were over seven million trees and shrubs planted in Illinois from 1941 to 1945.

Over time, many of these abandoned mine lands went through a process known as natural succession. Natural succession is a biological force that happens to all land that is not carefully managed to maintain an artificially induced land use. On areas where seeding to a desired vegetative cover did not occur or where planted vegetation was not maintained, native species started to invade these areas, and through the natural succession process they were eventually converted to wildlife habitat.

The extent of pre-SMCRA development of the fish and wildlife resource is illustrated by figures in a “Nomination for Excellence in Mining and Reclamation Award” package recently submitted to OSM by Peabody Coal Company for its Lynnville Mine in southern Indiana. The nomination states that 6,847 acres of forest and 2,986 acres of wildlife habitat were planted with 6,730,789 trees during the life of the mine from 1958-2005. In addition, it states that, historically, 9,301 acres were planted with 7,225,250 trees at three pre-SMCRA mines where mining operations spanned the years 1942-1964. Collectively, 19,134 acres were planted with 13,956,039 trees at just four mine sites in Indiana. Similar reforestation efforts were exerted by Peabody Coal Company in several states in the Mid-Continent Region where the company conducted extensive operations; specifically, Alabama, Illinois, Indiana, and Missouri. Perhaps more for economic reasons than fish and wildlife enhancement, these companies also left thousands of acres in final pit impoundments and wetlands. The results often translated into excellent fisheries and high quality habitat for wildlife.

Several states in the Mid-Continent Region had laws that regulated coal mining by 1973. These laws created variable but definite bonding and reclamation requirements that significantly reduced the adverse impacts of mining, and thus created a less toxic environment for the post mining land use, most often pasture. The rough graded and ungraded areas were often inaccessible to farm equipment and livestock. Because of the inconvenience, these odd areas were poorly managed or not managed at all, and final reclamation of the site was eventually achieved by natural succession. To encourage a post mining land use of wildlife habitat, some state laws had lesser reclamation requirements “...if the land is reclaimed for wildlife purposes.”

## **V. FISH AND WILDLIFE RESEARCH**

Fish and wildlife research on post-SMCRA sites began soon after passage of the Act in 1977. Richard L. Clawson, Wildlife Research Biologist for the Missouri Department of Conservation and Team Leader, Indiana Bat Recovery Team, conducted a study on “Implementation of a Recovery Plan for the endangered Indiana Bat.” His study documented the need to determine the causes for observed declines in the southern portion of the Indiana Bat’s range. The study underscored the need to protect bats in mines and caves during hibernation, and manage summer colonies by enhancing or restoring surface habitat to conditions favorable for the species. J. R. Choate, Director of Museums, Fort Hays University, Hays Kansas, conducted a study on “Critical Habitat of

the Endangered Gray Bat in Kansas.” Specimens from a Gray Bat colony in a storm sewer were trapped and marked to map flyways and foraging areas. His findings documented that bats usually remained near water and dense floodplain vegetation. Areas were suggested for protection as critical habitat. Jack R. Nawrot, Senior Scientist, Southern Illinois University at Carbondale, Illinois, conducted studies to address the feasibility of direct establishment of wetlands in slurry basins at Associated Electric’s BeeVeer Mine and measure the success of the direct seeding of the slurry basins. Determinations were that direct establishment of wetlands in the slurry impoundments was feasible and finally that establishment of wetlands in the slurry basins was fully successful. W. C. Ashby, forest ecologist and Professor Emeritus, Southern Illinois University – Carbondale, Illinois, conducted a study of experimental tree plantings on pre-SMCRA mined land, post-SMCRA mined land with and without subsoil and topsoil replacement, and unmined reference areas. Dr. Ashby’s work with tree growth on unreclaimed pre-SMCRA mined land documented excellent growth rates on ungraded spoil material. His findings also documented slower tree growth on post-SMCRA graded and topsoiled land due to soil compaction caused during the reclamation process.

Extensive research has been conducted on development of an American Chestnut/Chinese Chestnut hybrid that is blight resistant and yet maintains the superior qualities of the American Chestnut. Several studies have been conducted on the life, range, and habits of the Copperbelly Water Snake that have resulted in its proposal for listing as a Federally threatened species.

Numerous studies have also been conducted in the Mid-Continent on the endangered Interior Least Tern. The TFO reported that several pairs of Interior Least Terns have nested successfully on two mines in Texas. The nest sites were on areas that were recently mined and reclaimed. A recovery plan has been developed by the US Fish and Wildlife Service that describes actions needed to help this species survive. Henslowe’s Sparrow is another endangered species in the Mid-Continent Region that has been on the decline for quite some time because of dwindling habitat. It has recently started to make a comeback on large surface mines reclaimed to grasslands, largely with native grasses.

Research on and interest in fish and wildlife habitat on Title IV and Title V mines are by no means limited to previously mentioned work. OSM has co-sponsored interactive forums entitled, “Bat Conservation and Mining: A Technical Interactive Forum,” “Bat Gate Design: A Technical Interactive Forum,” “Indiana Bat and Coal Mining: A Technical Interactive Forum,” and “Enhancement of Reforestation at Surface Coal Mines,” and “Market Based Approaches to Mined Land Reclamation.” During the three bat forums, 21 presentations were made concerning bat conservation techniques in six of the eleven states in the Mid-Continent Region. During the two reforestation forums, 13 presentations were made concerning reforestation in seven of the eleven states in the Mid-Continent Region. The presenters in these forums represented a wide range of disciplines including researchers, regulators, coal mine operators, and consultants. OSM also sponsored a first ever Wildlife Summit in 2005 to provide an opportunity for State and Federal regulatory officials, the coal industry, State and Federal fish and wildlife agencies, private fish and wildlife conservation groups, and interested citizens to evaluate



existing regulatory mechanisms and identify incentives and impediments to increasing the quantity and quality of fish and wildlife habitat in coal mine reclamation.

## **VI. CONCLUSIONS**

Personnel associated with the Title IV and Title V Programs of all the states in the Mid-Continent Region are interested in the enhancement of biodiversity and encourage the expansion of fish and wildlife efforts in their states. Title IV and Title V projects not specifically reclaimed for fish and wildlife purposes, generally incorporate some fish and wildlife enhancement features such as ponds, wetlands, tree plantings, and corridors interspersed throughout the post mining land use. This is most often the case with pasturelands. Environmental factors, such as the arid conditions in west Texas, and landowner preferences for grazing land in plains states such as Kansas and Oklahoma, often impede establishment of fish and wildlife habitat for a post mining land use. Establishing a prairie ecosystem or planting trees and shrubs typically adds to the cost of reclamation, and this has a negative effect toward making native prairie or forestland a choice for reclamation. A very conservative estimate of fish and wildlife habitat acres at completed Title IV sites and Phase III bond released acres at Title V sites is 100,000 acres, but the actual acreage may be twice that amount. Available data indicate that in most, if not all Mid-Continent states, more fish and wildlife habitat acreage exists post mining than existed pre-mining.

## **VII. FIELD OFFICE SOURCE MATERIAL**

### **Support Material Received from the Birmingham Field Office**

#### **Alabama – Title IV**

“Fish and Wildlife Enhancement on Title IV and Title V Mined Lands”

“Alabama’s Reforestation of Abandoned Mine Lands,” Alabama’s Treasured Forests, spring 2005

EY99 and EY00 OSM oversight studies, entitled “Success in Revegetation and Tree Planting – Phase I” and “Success in Revegetation and Tree Planting Study – Phase II”

Annual Reports from the Walker County Soil and Water Conservation District Board Concerning Tree Planting

“Reforestation of Alabama’s Abandoned Mine Lands” by Dr. E. S. Lyle, Sr., and J. L. Kitson

Photograph

**Alabama – Title V**

OSM Excellence in Surface Coal Mining Reclamation Awards

Photograph

**Louisiana – Title V**

“Fish and Wildlife Enhancement on Title IV and Title V Mined Lands”

OSM Excellence in Surface Coal Mining Reclamation Awards

Photographs

**Mississippi – Title V**

Photographs

**Support Material Received from the Indianapolis Area Office**

**Illinois – Title IV**

Information supplied by the Illinois Title IV Program

Photographs

**Illinois – Title V**

Information supplied by the Illinois Title V Program

Photographs

**Indiana – Title IV**

Information provided by Indiana’s Title IV Program

“The Use of Wildlife Enhancement Techniques by the Indiana Program” by Mark Stacy

”Peabody Energy Lynnville Mine – Permit #S-00330, Nomination Package for Excellence in Mining and Reclamation Award

EY 2002 OSM oversight study entitled, “Indiana AML Tree planting Success”

Photographs

**Indiana – Title V**

Information provided by Indiana’s Title V Program

Information on the Copperbelly Water Snake

“American Chestnut as a Future Resource to Enhance Mine Reclamation Productivity” by Douglas F. Jacobs

Peabody Energy Lynnville Mine – Permit #S-00330, Nomination Package for Excellence in Mining and Reclamation Award

“Reclamation Re-leaf” brochure published by the Indiana Department of Natural Resources – Divisions of Reclamation and Forestry

“Status of Reforested Mine Sites in Southwestern Indiana Reclaimed under the Indiana Mining Regulatory Program,” by Ron Rathfon, Stephen Fillmore, and John Groninger

Photographs

**Iowa Title IV**

Information provided by Iowa’s Title IV Program

Photographs

**Iowa Title V**

Information provided by Iowa’s Title V Program

Photographs

**Missouri Title IV**

Information provided by Missouri’s Title IV Program

Missouri Land Reclamation Program’s 1991 Annual Report

Document entitled, “Upper Cedar Creek Clean Streams/319 Project” published by the Missouri Department of Natural Resources - Land Reclamation Program

Photographs

**Missouri Title V**

Information provided by the Missouri Land Reclamation Program

Reforestation information provided by Associated Electric Cooperative, Inc.

Wetland Study by Jack R. Nawrot provided by Associated Electric Cooperative, Inc.

Photographs

**Support Material Received from the Tulsa Field Office**

**Arkansas Title IV**

Information provided by Arkansas' Title IV Program

Photographs

**Arkansas Title V**

Information provided by Arkansas' Title V program

Photographs

**Kansas Title IV**

Information provided by Kansas' Title IV Program

Photographs

**Kansas Title V**

Information provided by Kansas' Title V Program

Photographs

**Oklahoma Title IV**

Information provided by Oklahoma's Title IV Program

Photographs

**Oklahoma Title V**

Information collected in the Tulsa Field Office

Photographs

**Texas Title IV**

Information collected in the Tulsa Field Office

Photographs

**Texas Title V**

Information collected in the Tulsa Field Office

OSM's EY 2005 Texas Post Mining Land Use Oversight Report

EY 2005 OSM oversight study entitled, "Texas Post-mining Land Use"

Railroad Commission of Texas Summary Report of Coal Mining Phase III Bond Release Actions through February 1, 2006

Photographs