SURFACE-MINING RECLAMATION APPROACHES to BOND RELEASE:

WILDLIFE HABITAT CONSTRUCTION and WILDLIFE USE of RECLAIMED LANDS in the ARID and SEMI-ARID WEST

August 27 through 31, 2001
CAM-PLEX
1635 Reata Drive
Gillette, Wyoming

Co-sponsored by

Office of Technology Transfer
Western Regional Coordinating Center, Office of Surface Mining
Denver, Colorado

Department of Renewable Resources
Department of Zoology and Physiology
Office of Research
University of Wyoming
Laramie, Wyoming

Land Quality Division
Wyoming Department of Environmental Quality
Cheyenne, Wyoming

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Wildlife Programs at the TransAlta Centralia Mine – Tim LeDuc and Phil Berry, TransAlta, Centralia Mine, Washington

Wildlife Surveys/Long-Term Monitoring Methods, John Kern, Spectrum Consulting Services, Inc.

Permitting and Construction of an Important Wildlife Habitat Feature: A Case Study – Scott Benson, Buckskin Mine

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The Focus of Bond-Release Forums

Joe Galetovic
Technical Coordinator, Office of the Regional Director
Western Regional Coordinating Center
Office of Surface Mining

Why conduct bond-release forums? The simple answer to this question is: because Western States and their representatives on the Western Regional Technical Team asked for them. The law tells us what we have to do to achieve bond release–with very little guidance on how to do it. What we have heard from the Western State representatives is that these "get-togethers" help build consensus among all the parties involved in permitting, operating, and completing mining operations regarding how we evaluate individual aspects of reclamation/bond release, how we measure them, how we report them, how we ascertain that there is no liability regarding them, and how we release the bonds ensuring them.

When did the Office of Surface Mining (OSM) start conducting interactive technical forums? In 1991, Linda Wagner organized and conducted the first Western bond-release forum. It was followed by the 1992 sediment-control forum and the 1995 Bozeman forum on erosion control, both of which dealt with release from liability and the achievement of conditions equal to, or better than, those existing prior to mining. In 1996, OSM sponsored a forum on bond-release regulations and guidelines, in 1998, a forum on the use of statistical analysis in bond release, in 1999, a revegetation and reclamation bond-release issues forum, in 2000, a cumulative hydrologic impact assessment and hydrology topics bond-release forum, and this year's bond release topic is wildlife habitat construction and wildlife use of reclaimed lands. The last bond-release forum in this series will be conducted in Bismarck, North Dakota, August 26 through 30, 2002. The topic of this forum will be postmining land uses.

OSM's Office of Technology Transfer (OTT) was started as part of the old Western Field Operations's Technical Assistance Division. Its mission was to "catch the stuff falling through the cracks among the various disciplines" or, as we liked to say, "to facilitate seeing the whole picture." For example, the successful reestablishment of plant life following mining depends upon many things: viable seeds, the arena of plant biologists; suitable soils, the arena of soils scientists and geochemists; appropriate soil placement, the arena of engineers; appropriate seed placement, the arena of revegetation specialists; the absence of predators, the arena of wildlife scientists; and the presence of moisture, the arena of hydrologists and climatologists. The experiences of all of these experts evaluated and implemented together contribute to ensuring a successful postmining plant community.

By training, I am a geologist, and I will not lecture the experts in wildlife issues. We will ask you questions similar to those we asked hydrologists, revegetation specialists, and geomorphologists attending previous forums about their areas of expertise: "What consideration in evaluating the postmining success of wildlife have you given to the facts that soils have been replaced, topography has been reconstructed, vegetation has reestablished, and previously present features are now absent (or, as some of you will see on the half-day mine field trip, previously absent features are now present)?"

When we hear that game has eaten all the woody-stem materials to the nub at Glenrock Coal Company's reclamation areas in Wyoming, or that such an incident could have been reported by Trapper mine in Colorado, and then we hear that large numbers of big game are not touching woody-stem materials on reclaimed lands at the No-Name mine, we should think of parent material. What does the replaced growth medium at Glenrock Coal's reclamation areas have that replaced growth medium at the No-Name mine does not have (or vice versa)? Is it a pleasant tasting and much-needed nutrition component? Or, is it "yucky" stuff that makes other vegetation, like forbs and grasses, or the same vegetation but located somewhere else taste "less bad?" Had the incident at the reclamation areas been reported by a revegetation specialist, he or she might have interpreted it as heavy grazing use by big game (as distinguished from no grazing). Reasoning on the basis of a report like this, an interpreter at the office might have concluded that the situation at the No-Name mine was a case of "no game at No-Name."

One of last year's field trips for the hydrology bond-release forum was to a minesite in Montana, a place that I considered as having the happiest porcupine population ever: over 60 percent of pine trees were striped of bark, dead, or dying! An inspector, on the other hand, may have seen the same site as a place that obviously has not met the tree-density standard.

Also last year, we took Environmental Protection Agency (EPA) personnel to a mine south of Gillette, and, lo and behold, the reclaimed land is easy to dig in. Within a 2,500-foot area, we saw six badger dens (or maybe six entrances to a single den?). Our inspector, however, would have seen six areas, of 80 to 140 feet each, devoid of vegetation: big holes in the ground with dirt piled around them!

In July of 2000, we went to an equipment yard at a minesite in Wyoming where there were dozens of jackrabbits hopping around; if we had Dr. Doolittle with us to interpret, he might have heard and translated "those equipment hoses really taste good." We learned this spring that the mine hired Thunderbird Wildlife Consulting, Inc., to trap the rabbits and get rid of them by transporting them to a location at a considerable distance away.

How many of you knew all these anecdotes? If we had time, we would ask you to write down your answer to the same questions for each anecdote: was this a wildlife success story? Why did the success occur at this particular mine? And, most important, if 12 years had passed since the dirt was moved to approximate original contour, would you release that mine's bond?

Rather than listen to me, we will bring on the presenters, and, from a wildlife specialist, you will hear about the sighting of eight bears in 1 day on a single reclaimed minesite. From another, you will hear about the absence of a certain species of bird on reclaimed lands where it was present premining. This presenter will also mention that we did learn that it takes about 20 to 30 years to grow the trees and shrubs to the size and density that those absent birds like/need. You will hear about the ups and downs of raptor populations and the 10-year cycles in nature. And, I hope, you will hear about the fact that a grouse's flying range is 150 miles (how many mines do you know that are either 150 miles long or 150 miles wide?). We cannot help but wonder about fire that devastates a grouse habitat for the next 15 to 20 years minimum, not a prescribed burn or a fire at a minesite, but a wild fire 10 or 20 or 50 or 80 miles away. You will hear about how we improve our census taking: a month after seeding, when you walk on a site, you see a bear or a

mule deer; they are there. However, a snake or a lizard–it may take 3 or 4 years for us to see them. Yet they were probably there at the same time the mule deer and bear were, only not in great numbers. The size of a species can affect our perception of it: the small species have to be there in numbers to be seen. You will also hear that "Bambi" is no longer safe on many minesites; mule-deer numbers have to be managed, and some mines now allow special categories hunting on reclaimed areas. For 3 years in a row on a weekend in October, the Denver Zoo has sponsored an exhibit on wildlife use of reclaimed mine lands. This exhibit features photography of ducks, geese, deer, birds, owls, rabbits, and antelope taking advantage of new reclamation. In many cases, the presence of new water bodies on a reclaimed site–coupled with occupying species' intuitive knowledge to the effect that "we are safer here; these guys don't allow hunting"–actually might help the wildlife reestablishment effort. The early emerging weeds are browsed, giving a fair chance to competing grasses and forbs. You will also hear that, when a new habitat niche opens up–bare ground–, as happens in surface mining after brush removal and prestripping but before seeding and reclamation, a species finds it sooner rather than later.

A few words about putting this forum together: industry, consultants, State government, Federal government, academicians–as the direct result of streamlining, reductions, layoffs, and technological advances, we all have less time in which to do our everyday work. We need to thank all of you for attending, as well as all of the presenters who thought that it was important that you hear their stories and so made arrangements in their busy schedules to tell them here. Even the university professors that have started teaching this fall's courses made arrangements to come!

A word about the ever-changing agenda: in May of this year, we wrote a letter of invitation to the U.S. Fish and Wildlife Service (USFWS) expressing our interest in a Mountain plover presentation. USFWS's Lou Hanebury offered resource-person Pat Deibert to give this presentation. As it turned out, Pat couldn't come, but she did provide us the guidelines enclosed in your conference packet. And, in fact, seven of our scheduled presenters actually had to bow out. **Chet Skilbred's** co-worker broke his leg, and they together are the only two in charge of reclamation operations at the Glenrock Coal Company Dave Johnston mine. **Allan Cox** is a captain of a fire team and was called last Wednesday to fight the Fridley Forest fire (near Emigrant, Montana). **Scott Gamo**, now with Idaho Game and Fish, had a field project that could not be stopped. **Jeff Hamerlinck** had a meeting in Fort Collins with USFWS on a final report. **Tom Kohley** has a cooperative research and development agreement meeting with the U.S. Geological Survey (we hope this meeting will result in some Federal funding for Beartooth Mapping). And **Norm Hargis** with Bridger Coal is down to a one-and-a-half person reclamation department. Finally, **Peter Chandler**, with the Army Corps of Engineers Omaha District, had to bow out (but, lucky for you, part of the daylong mine field trip will be to reconstructed riparian habitat and reconstructed wetlands, and the whole half-day field trip is about reconstructed wetlands).

Some of you might be subscribing to the U.S. Forest Service's (USFS's) "Stream Notes," published out of Fort Collins, Colorado. I would like to read you an excerpt from a recent article from that publication–"Let the Rivers Teach Us," by Dr. Luna Leopold, Professor Emeritus at UCLA, Berkeley–about river restoration

> "There are a lot of people harming rivers. There are also people who are improving them. But we do not know who is doing what. We are all trying as best we know how to do effective maintenance and improvement work. But there is no attempt to learn from each other. No doubt mistakes are repeated. No doubt success gets unnoticed. We have a problem in river restoration that presently is leading to serious consequences but is also possible of solution. The problem is lack of communications and trading of experience. As a result, successes in field restoration are little known, while mistakes are repeated indefinitely.
>
> "There are many handbooks, instruction manuals, and how-to-do-it pamphlets on channel improvement. There are none I have seen that makes an evaluation of different techniques with explanation of the initial condition, the recommended solution, and the result of the treatment. What is needed is a gradually accumulating file of case studies, describing with text the illustration of the original condition, an assessment of the basic cause of the problem, the techniques and construction details of treatment, and an objective analysis of the result. If such a file was initiated and all operatives urged to contribute, it is certain that we would learn from each other and our techniques would become more closely tailored to the type of river and the type of problem.
>
> "I propose an expanded effort that hopefully would involve federal and state personnel, consultants, and academics. Who or what organization should take the lead is not specified. But one thing seems clear. We must let the river teach us. Not just a few of us. Let the river teach all of us."

If we took the liberty to replace the word "river" six times in Dr. Leopold's statement with "wildlife/wildlife habitat," we could say with certainty that we are already doing it: "the wildlife **are** teaching all of us," and we are the better for it.

So, with this in mind, here are a few rhetorical questions: when big game animals become so successful on a reclaimed minesite that they start impacting neighboring landowners, is the miner obligated to erect a fence to prevent them from moving off onto adjacent lands? No-Name Lake–is it a hole in the ground or a water resource for game and fish? To protect nitrogen-rich seedlings, does an operator have to deny the food to mule deer by fencing off their access to these? When is an impoundment too deep?

The proliferation of organizations like the Wild Turkey Federation, the Rocky Mountain Elk Foundation, Pheasants Forever, and Ducks Unlimited attests to success of wildlife-habitat restoration in the American West. That they continue in business in Wyoming attests to wildlife success on reclaimed mine lands there.

Next year's forum is going to be held in Bismarck, North Dakota. Its topic will be postmining land use. Unfortunately, the month will be August again, because the prices were cheap and a major hotel was available. The 2003 forum will be held in late March or early April in Denver.

Our intention is to capture the presentations from this 2001 forum on a CD-ROM version of its proceedings. As you will see, if you look in your conference package, we have all but two

abstracts for the upcoming presentations, and those last two have been promised. The CD-ROM will provide you with links to the Nature Conservancy, Montana State's Library's Natural Resource Information System, Wyoming's Natural Diversity Database, and the extensive USFS wildlife publications list. Examples of electronically submitted annual reports containing wildlife data from Wyoming, Montana, and Peabody Energy, Arizona, will also be available on this CD-ROM.

The CD-ROM will provide information about this year's OSM reclamation award winner. It will show critical habitat reestablishment at Spring Creek and reclaimed lands that are part of the Rochelle Hills elk herd's wintering range at Jacobs Ranch mine. (Our hope is that these last will demonstrate that it is not as simple as "**plant forbs and shrubs and they will come**.")

A word about forum rules: remember this is an interactive forum, which means that it is okay for you to interrupt the proceedings, if you are providing examples, asking clarification questions, or offering a different slant on or result regarding a situation that is the same as or similar to the one under discussion. The fact that you are here tells others you are willing to learn; and what better way to do it than by asking a question?

Summary and Closing Remarks

Chris Yde
Wildlife Biologist, Industrial and Energy Minerals Bureau
Montana Department of Environmental Quality

We have had a wide variety of speakers at this forum. The common thread among them has been the interest in what we are doing as a group, and the efforts to improve the final, on-the-ground reclamation product. What I have heard from the presenters at the forum is: this is where we are today, but we need to continue to improve our overall reclamation as we proceed into the future. We are not saying this is where we're at, we are doing a good job, and we're done! We are saying that we want and need to do a better job. We have heard a variety of presentations on small mammals, songbirds, sharp-tailed grouse, sage grouse, raptors, and fish, all with many interesting points.

It became evident the first day, during Scott Benson's presentation, that we don't really need to change the law and rules. Instead, we need to look at how we apply and interpret the existing rules and regulations. In many cases, we have been very conservative and unduly restrictive in our approach to reclamation in order to avoid both real and perceived problems. In trying to avoid making mistakes and encountering potential problems, it is quite possible that we made a fairly large mistake – creating reclamation that does not adequately provide for the wildlife community that existed on the site prior to mining. We need to remember that, in reclamation, we are dealing with an imprecise science. We are not going to do everything right the first time, and we may not do it right the second time. On a case-by-case basis, we need to determine what we did wrong and what we did right, thereby increasing our understanding of successful reclamation. What we have done may or may not be "correct," but it will only be a mistake if we don't learn from it.

I keep hearing about history: this is how we did it; we've always done it this way. For 25 years, equipment operators have been told to grade flat and smooth. We now want slopes broken up with a variety of topographic features and surfaces left in a roughened condition. We have to let go of a bit of history. Today is today; we are headed forward, realizing that what we have done in the past is not necessarily what we will do or need to do in the future. Darrel Myran talked about our 20 years of reclamation and how future reclamation is going to have a different standard from what was reclaimed yesterday or today. The standard will keep bumping up as we go, because we will be constantly increasing our knowledge about reclamation technology and creating a better post-mine landscape and vegetative community.

Olin Oedekoven told us that too much or too little of any reclamation feature is probably not good. For example, too much grassland, and not enough shrubs or woody draws, is probably not good, unless you are a cattle rancher, and all you are looking at is cattle production. Looking at spring songbirds and small mammal trends on reclaimed grasslands gives us encouragement. We are seeing a good match at the end of the 10-year responsibility period. As a wildlife biologist, I'm excited about that. But when we look at the more complex types, like sage grasslands, woody draws, mixed shrub communities, and conifer, we have many variables that

are missing. These types require longer time periods to reach maturity. In the arid West, we have a 40- to 50-year rotation on shrubs. At the end of 10 or 20 years, these complex types are not going to be approaching maturity unless the mining is occurring in areas like North Dakota where 16 inches of annual precipitation is sufficient for good tree growth. Washington State is another example where ample rainfall occurs to support rapid re-establishment of trees and shrubs. In the arid West, these important habitat types will be in an earlier seral stage than adjacent native reference areas at the end of the 10-year bond liability period. Therefore, how do we develop a standard for those types?

We are seeing many new things happening on a lot of the minesites. Companies are becoming more progressive and creative during the regrade processes. The final regrade is much more diverse, creating a variety of micro-sites that in turn encourages diversity in both the vegetative and wildlife communities. Companies are even matching substrate, of a proper depth, with diverse seed mixes and selective plantings in the proper places!

How do we approach bond release from a wildlife perspective? I have a few questions for you to think about as you leave here. Should we look at final bond release from a field, a management-unit, a mine, or a regional perspective? Information presented here supports any of these points of view. To look at reclamation success for wildlife from a regional perspective is a concept that, had I proposed it a few years ago might have gotten me thrown out of here! Companies are discovering that they can cooperate and do joint surveys and share data, developing a stronger regional data base. Political boundaries, such as permit boundaries, are not respected by wildlife, therefore, it is good to cross these boundaries when collecting and analyzing data. As discussed during several of the presentations, we are starting to take a regional approach for songbird and small mammal surveys. If we can show positive regional trends, maybe each mine won't have to do site-specific surveys for each species group in each habitat type. It may be possible to develop regional technical standards that need to be met prior to bond release.

Should we monitor or demonstrate success with <u>each</u> species and species group? Or, should we focus on <u>specific</u> species and species groups, in an effort to demonstrate regional trends? Do we attempt to determine what is going on using a holistic approach with the whole wildlife community? Or, do we select certain species or species groups to monitor more intensively for success; again, focusing our efforts instead of looking at everything? For instance, in Montana we have eliminated many of the big-game surveys, because big game is and will be present in large, probably overabundant, numbers. Other species groups, which are often less visible, are better indicators of reclamation success and are be the basis for annual wildlife monitoring efforts.

Should we be looking at more offsite mitigation? For example, the Trapper Mine in Colorado has tree and shrub degradation, attributable to an increasing and over-abundant elk herd on the mine. Because of the security of the site and the abundant available forage, the resident elk population continues to grow, becoming a detriment to reclamation success. As Wanda Burget suggested in her opening remarks, maybe we need to look beyond the boundaries of the mine. To reduce degradation of the trees and shrubs in reclamation, a viable mitigation may be to enhance off-site habitats to encourage the elk to spread out and spend more time off of reclamation.

Another question that is frequently asked is: why go to all this effort, if there is a high potential for the post-mine landowner to plow up the reclamation and convert it to grassland or cropland? Maybe we should be looking at conservation easements that would allow for long-term maintenance of wildlife habitat with an opportunity for funds to maintain them.

To support a more diverse wildlife habitat, we have to be cognizant of what is around us and what our targets are. You've heard the saying "build it and they will come," but the challenge for us is to build it. Some wildlife will come to any field, but, to get the entire wildlife community to return, all the required components have to be incorporated into the reclaimed area. We may not be able to entirely restore or replicate pre-mine conditions, but we can get a lot closer.

Again, I want to thank everyone for coming and sharing in the really good discussions held here in the auditorium, in the hall, and over dinners. This was the most interactive forum that we have had.

AGENDA

BOND RELEASE INTERACTIVE FORUM 2001

Approaching Bond Release:
Wildlife Habitat Construction and Wildlife Use of
Reclaimed Lands in the Arid and Semi-Arid West

August 27 through 31, 2001

CAM-PLEX, 1635 Reata Drive, Gillette, Wyoming

This technical forum is co-sponsored by the Wyoming Department of Environmental Quality, Land Quality Division; the University of Wyoming, Office of Research, Department of Zoology and Physiology and Department of Renewable Resources; and the Office of Technology Transfer (OTT), Western Regional Coordinating Center (WRCC), Office of Surface Mining (OSM), Denver, Colorado.

Monday, August 27th

Monday Workshop
8:30-5:00
GIS: Integration Capabilities for Habitat Measurement and Population Comparisons
Michael J. Price, Mining and Earth Sciences Solutions Manager, ESRI, Redlands, CA 92373

Identification, analysis, and management of biological issues are critical to a surface-mining operation. Species of concern or threatened and endangered species living on or near a minesite mean additional data collection, planning, and mitigation for the operator, both during and after mining. Geographic Information Systems (GIS) provide essential spatial and database tools for environmental scientists and reclamation specialists as they plan, manage, and remediate habitat issues on and near a surface coal mine. This 1-day workshop introduces the environmental and mining professional to GIS theory and teaches many valuable spatial concepts and procedures now applied in mining. Actual mine data, occasionally modified to protect sensitive issues, provide examples of faunal and floral issues at today's coal mine.

Geographic Information Systems and Industrial Minerals – Mike Price, ESRI

Mining Industry Solutions – Mike Price, ESRI

Tuesday, August 28th

8:30-5:00

Welcome	Brent Wahlquist, Director, Western Regional Coordinating Cente
Opening Remarks	*Wildlife Management: Beyond Boundaries* Wanda Burget, Peabody Energy Corp.
Forum Scope	Joe Galetovic, Western Regional Coordinating Center

Postmining Land Use: The Wyoming Approach
Vern Stelter, WY Game and Fish Department

Wyoming Natural Diversity Database
Gary Beauvais, WY Natural Diversity Database

Regulatory Obstacles to Reclaiming Wildlife Habitat in Wyoming
Scott Benson, Buckskin Mine

Bats: Their Presence and Importance at Montana's Coal Mines
Chris Yde, MT Department of Environmental Quality

Trends in Bird Use of Reclaimed Habitats at Westmoreland Resources, Inc.'s, Absaloka Mine, Montana
Patrick Farmer, Westech Environmental Services, Inc.

Wildlife Use of Reclamation: Implications for Bond Release
Gwyn McKee, Thunderbird Wildlife Consulting, Inc.

Wildlife Use of Reclaimed Lands at Trapper Mine in Northwest Colorado
Forrest Luke, Trapper Mining, Inc.

Long-Term Monitoring Techniques to Evaluate Wildlife Use of Reclaimed Areas
Kelly Krabbenhoft, Coteau Properties Company

Closing presentation of related interest:

GPS: Machine Guidance in Mining Activities
Tim Kerr, Leica Geosystems, Inc.

Wednesday, August 29th
8:30-5:00

The Use of Closed Basin Habitats as Wildlife Refugia on Reclaimed Mine Lands
Bryce L. Marshall, SWCA, Inc., Environmental Consultants

Habitat Enhancements New Mexico Reclamation
Dave Clark, NM Mining and Minerals Division

Habitat Concepts to Consider When Reclaiming Mine Lands for Wildlife
Richard Olson, University of WY

Sharp-Tailed Grouse Response to the Development of a Large-Scale Surface Coal Mine in Southeastern Montana
Bruce Waage, Western Energy Mine, MT

Importance of Coal-Mine Reclaimed Lands to the Columbian Sharp-Tailed Grouse
Sandy Brown, CO Div. of Minerals and Geology

Sage-Grouse Population Trends in Northeast Wyoming
Olin Oedekoven, WY Game and Fish Department

Reclaiming Wildlife Habitat at the Buckskin Mine
Scott Benson, Buckskin Mine

Mitigation for Culverting a Stream Used by Colorado River Cutthroat Trout
Paul Baker, UT Div. Oil, Gas and Mining

Consequences of Mining, Reclamation, and Mitigation for Raptors in the Powder River Basin of Wyoming
Kort M. Clayton, Thunderbird Wildlife Consulting, Inc.

Reclaiming Wetlands in North Dakota
Guy Welch, ND Public Service Commission

Creating Wetlands for Wildlife on Mined Lands: Lessons from Bentonite Mining
Mark McKinstry, WY Coop Fish and Wildlife Research Unit

SMCRA Bond Release: The Final Steps at San Juan Mine
O. J. Estrada, BHP Coal NM

Wednesday Evening Workshop

6:30-9:00

Hydrology and Reclamation Tool for Mining Applications
Richard Warner, Ph.D., Associate Extension Professor, University of Kentucky, Biosystems and Agricultural Engineering Department, Lexington, KY, and Mike Anderson, GIS Analyst, FMSM Engineers, Lexington, KY

The workshop will introduce the SEDCAD pre-processor (SedPrePro) ArcView 3.2 GIS program. Each step is conceptualized with easy-to-follow, wizard-type interfaces, dialog specific help, and multiple error checks. A surface-mining example will be used to illustrate step-by-step SedPrePro inputs and a complete design of structures including channels, culverts, retention basins, and plunge pools. The workshop will also demonstrate a new GIS-based data management tool for coal mine reclamation--The Reclamation Management Tool (RMT).

Thursday, August 30th
8:30-5:00

Managing Wildlife Habitats in Reclamation: Terrestrial Habitats
Mark Rumble, U.S. Forest Service

Endangered Species Management on Private Lands: Interior Least Tern
Andy Kasner, Texas A&M

Songbird Response to Woodland Reclamation
Kelly Krabbenhoft, Coteau Properties Company

Sage Grouse
Matthew Holloran, WY Coop Fish and Wildlife Research Unit

Wildlife Programs at the TransAlta Centralia Mine
Tim LeDuc and Phil Berry, TransAlta, Centralia Mine, WA

Wildlife Surveys/Long-Term Monitoring Methods
John Kern, Spectrum Consulting Services, Inc.

Permitting and Construction of an Important Wildlife Habitat Feature: A Case Study
Scott Benson, Buckskin Mine

Special Features within Reclamation
John Berry, Decker Mine, MT

Habitat Restoration Plan Review
Chris Yde, MT Department of Environmental Quality
Darrel Myran, Westmoreland Resources, Inc.
Bob Montgomery, Western Energy Company
Reg Hoff, Big Sky Coal Company
John Berry, Decker Mine
Spring Creek Coal Company

Bond Release Panel Discussion on How to Assess the Adequacy of Wildlife Success

Chris Yde, MT Department of Environmental Quality
Bob Giurgevich, WY Department of Environmental Quality
Dave Clark, NM Mining and Minerals Division
Paul Baker, UT Division Oil, Gas & Mining
Sandra Brown, CO Division Minerals and Geology
Guy Welch, ND Reclamation Division

Closing Remarks

Chris Yde, MT Department of Environmental Quality

Friday, August 31st

Friday Field Trips: 8am – Noon, and 8am – until late in the day

First Field Trip: Half Day - Reclaimed Bentonite Mines: Wetlands for Wildlife

Trip Leaders: Mark McKinstry, Tim Richmond, and Lyndon Bucher

Second Field Trips: Full Day – Caballo Mine - Wildlife Habitat Enhancements
– North Antelope/Rochelle Environmental Programs

Trip Leaders: Karen Werner, Bryan Hansen, Scott Durgin, and Steve Storie

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ABSTRACTS

GIS - Integration Capabilities for Habitat Measurement, and Population Comparisons

Michael J. Price[1]

ABSTRACT

Identification, analysis, and management of biological issues are critical to a surface mining operation. Species of concern, threatened and endangered species living on or near a mine site mean additional data collection, planning, and mitigation for the operator, both during and after mining. Geographic Information Systems (GIS) provide essential spatial and database tools for environmental scientists and reclamation specialists as they plan, manage, and remediate habitat issues on and near a surface coal mine. This one-day workshop introduces the environmental and mining professional to GIS theory and teaches many valuable spatial concepts and procedures now applied in mining. Actual mine data, occasionally modified to protect sensitive issues, provide actual examples of faunal and floral issues at today's coal mine.

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Wildlife Management: Beyond Boundaries

Wanda I. Burget[1]

ABSTRACT

Wildlife is a resource not always easily or adequately defined within boundaries or borders. The surface-mining regulations acknowledge limits with respect to wildlife monitoring. Surface coal-mine operators have extensive information about the wildlife resources within the regulated study limits.

This discussion describes an innovative opportunity for wildlife management that looks beyond these traditional boundaries. Some of the mine operators in Wyoming's Powder River Basin have joined other private landowners in efforts to develop a comprehensive land-management program focusing on multiple wildlife species, with no artificial boundaries.

Paper presented at the Interactive Forum on Surface-Mining Reclamation Approaches to Bond Release: Wildlife Habitat Construction and Wildlife Use of Reclaimed Lands in the Arid and Semi-Arid West

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Postmining Land Use: The Wyoming Approach

Vern Stelter[1]

ABSTRACT

In Wyoming, the Wyoming Game and Fish Department acts as an adjunct member of the Wyoming Department of Environmental Quality, Land Quality Division, program by providing input on wildlife issues. Wildlife use is a premining land use on virtually all minesites in Wyoming, and thus the minesites must be reclaimed to wildlife-habitat quality that is equal or better than pre-mining conditions. Over the last 20 years, there has been much progress in wildlife-habitat reclamation on minesites, owing to the many efforts of mine personnel, agencies, consultants, and academia. The approach used for determining adequacy of wildlife reclamation is a habitat approach. This was viewed from the early days of the program both as much more measurable and meaningful, and as less contentious, than a species-diversity or population approach. The Wyoming Game and Fish Department provided much input into the revegetation portions of mine-reclamation plans, to help ensure adequate habitat development. Now that more mines have areas that can undergo final revegetation bond release, we are able to take a comprehensive look at habitat reclamation, and ask whether or not our initial direction was sufficient and what, if any, changes should be implemented based on the evaluation of habitat quality.

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Wyoming Natural Diversity Database

Gary P. Beauvais, Ph.D.[1]

ABSTRACT

The Wyoming Natural Diversity Database (WYNDD) is a service and research unit of the University of Wyoming dedicated to the collection, organization, and distribution of scientific information on vegetation communities, rare plants, and rare animals in Wyoming. WYNDD operates under the philosophy that the best decisions regarding the management of Wyoming's natural resources will occur only when all interested parties have access to complete and objective information about those resources. WYNDD employs five full-time, professional scientists plus six to ten assistants, all with expertise and experience specific to the biota of Wyoming.

WYNDD provides a variety of products and services, including GIS maps of documented occurrences of rare plants and animals, spatially-explicit habitat models, in-depth reports on the biological values of specific areas, and targeted field surveys and monitoring projects. All products and services are based on information maintained in a series of biological databases at WYNDD. Although WYNDD scientists have collected much of the information in these databases through their own fieldwork, the majority of the information was originally collected by biologists working in a variety of credible outside organizations such as the Wyoming Game and Fish Department, the U.S. Department of the Interior's Bureau of Land Management, and regional universities and research centers. These organizations recognize the value of having their data housed in one central and complete repository so that they can be evaluated in the context of all other data pertaining to similar species and habitats.

WYNDD is part of a continent-wide network of similar programs, each dedicated to maintaining high-quality biological data for its respective State or province. Each program in the network utilizes similar database formats and data standards to facilitate the compilation of data sets for users interested in large areas involving multiple States or provinces.

Paper presented at the Interactive Forum on Surface-Mining Reclamation Approaches to Bond Release: Wildlife Habitat Construction and Wildlife Use of Reclaimed Lands in the Arid and Semi-Arid West

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Regulatory Obstacles to Reclaiming Wildlife Habitat in Wyoming

Scott Benson[1]

ABSTRACT

Office of Surface Mining (OSM) regulations specify that fish and wildlife habitat enhancement measures cannot be limited to just revegetation efforts. OSM regulations also require that surface-mining activities avoid, enhance where practicable, or restore habitats of unusually high value for fish and wildlife. The Wyoming Environmental Quality Act (WEQA) defines fish and wildlife habitat as "land dedicated wholly or partially to the production, protection or management of species of fish or wildlife." WEQA defines reclamation as "the process of reclaiming an area of land affected by mining to use for grazing, agricultural, recreational, wildlife purposes, or any other purpose of equal or greater value."

WEQA and the Wyoming Coal Rules and Regulations contain numerous other requirements for the reclamation of wildlife habitat. However, these requirements are often contradicted by other requirements. Historically, the Wyoming Department of Environmental Quality, Land Quality Division, has tended to place more emphasis on requirements that act to impede the reclamation of wildlife habitat than they have on requirements that restore and/or enhance wildlife habitat. The State of Wyoming also has a vast collection of "guidelines," "SOP's," "instruction memoranda," a "coal permitting handbook", and written or unwritten statements of "Administrator policy" regarding reclamation. This presentation will detail the specific regulations and guidelines dealing with reclamation of wildlife habitat and suggest permitting strategies to overcome many of these conflicting requirements.

Paper presented at the Interactive Forum on Surface-Mining Reclamation Approaches to Bond Release: Wildlife Habitat Construction and Wildlife Use of Reclaimed Lands in the Arid and Semi-Arid West

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Bats: Their Presence and Importance at Montana's Coal Mines

Chris Yde[1]

ABSTRACT

Montana established a coal-mining regulatory program in 1973. For every coal mine, a requirement of the program has been comprehensive wildlife surveys throughout the life of the mine, from prior to the permitting stage through final bond release. Until the mid-1990's, only limited bat surveys were conducted and minimal data concerning the presence of bats at the coal mines had been collected. Casual observations and limited collections were the only sources of data on bat presence and distribution at the coal mines. During the mid-1990's, Montana's Department of Environmental Quality issued fish-and-wildlife guidelines, changing the focus of the wildlife survey efforts by placing more emphasis on amphibians, reptiles, land birds, and small mammals, including bats. The Department considers these species groups as better indicators of habitat conditions than the omnipresent big-game species. In addition, several species within these groups are of special concern and are potential candidates for listing as threatened and endangered species.

Currently, five bat species are listed as species of special concern in Montana. They are fringed myotis (*Myotis thysanodes*), northern myotis (*Myotis septentrionalis*), spotted bat (*Euderma maculatum*), Townsend's big-eared bat (*Corynorhinus townsendii*), and pallid bat (*Antrozous pallidus*). Another species, Yuma myotis (*Myotis yumanensis*), is on the "watch list" for species of special concern, indicating that it may be listed as a special-concern species in the future. Three of the bat species of special concern have been observed at coal mines in Montana and are considered to be residents of the area. Annual wildlife monitoring at each of the six active coal mines in the State provided data on species occurrence, distribution, and habitat use. This information is used to develop mitigation plans for implementation during the mining and reclamation phases at the mines. The information is also used to determine special habitats, habitat conditions, and habitat features that need to be incorporated into reclamation efforts, ensuring they are part of the postmine vegetation community and landscape. Moreover, by conducting regular wildlife surveys, including those for bats, the Montana coal program has been able to address issues such as threatened and endangered species in an expedient manner prior to mining disturbance.

Paper presented at the Interactive Forum on Surface-Mining Reclamation Approaches to Bond Release: Wildlife Habitat Construction and Wildlife Use of Reclaimed Lands in the Arid and Semi-Arid West

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Trends in Bird Use of Reclaimed Habitats at Westmoreland Resources, Inc.'s, Absaloka Mine, Montana

Patrick Farmer[1]

ABSTRACT

Sixteen years (1985–2000) of monitoring avian use of reclaimed and adjacent undisturbed habitats at Westmoreland Resources, Inc.'s (WRI's), Absaloka mine has suggested four trends: (1) as the amount of reclaimed habitat available to birds increases over time (reclaimed habitat monitored at the Absaloka mine increased from about 410 acres in 1985 to about 1,950 acres by late 1999), the number of species using this habitat for some aspect of their ecology (e.g., foraging, nesting) also increases; (2) depending upon the conditions available in adjacent undisturbed habitats, reclaimed areas can provide "unique" conditions that support certain bird species at greater densities than they occur in undisturbed habitats; (3) as reclaimed grassland ages and stabilizes, avian diversity and density per unit area also tends to stabilize, and, as reclaimed tree and shrub habitats age, avian diversity tends to increase; and (4), over time, avian diversity observed in reclaimed habitats tends to approach the diversity expected to occur in those habitats (this expectation being based upon their occurrence in similar, adjacent, undisturbed habitats). This last trend may be of particular use in establishing parameters to evaluate reclamation success and bond release on a mine-by-mine basis.

Paper presented at the Interactive Forum on Surface-Mining Reclamation Approaches to Bond Release: Wildlife Habitat Construction and Wildlife Use of Reclaimed Lands in the Arid and Semi-Arid West

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Wildlife Use of Reclamation: Implications for Bond Release

Gwyn McKee[1]

ABSTRACT

Livestock grazing and wildlife habitat are the most commonly proposed postmining land uses for surface coal mines in the Powder River Basin of northeast Wyoming. Bond-release conditions for these land uses are based on vegetative parameters. Results from postmining vegetation sampling may not always provide clear evidence that standards for wildlife habitat have been achieved. In those cases, data revealing long-term use of reclaimed areas by wildlife can be used to document that wildlife habitat has been successfully restored. Results from required and voluntary long-term studies at several mines in the Powder River Basin of Wyoming demonstrate that numerous wildlife species regularly forage and/or nest in reclaimed areas. The degree to which reclamation is used by wildlife can be influenced by many factors, including the wildlife species present and their habitat preferences, the areal extent of contiguous reclamation, the vegetative characteristics (e.g., height, density, composition) of reclaimed lands, the presence/absence of water, and the proximity of reclaimed and native habitats. To date, the composition of bird and mammal communities differs to some degree between reclaimed and native habitats. However, overall species richness and abundance are often comparable, especially for breeding-bird and small-mammal populations. Differences in species composition may diminish over time as areal extent and stand maturity of reclaimed lands increase, especially in reclaimed shrublands.

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Wildlife Use of Trapper Mine Reclaimed Lands

Forrest V. Luke[1]

ABSTRACT

The Trapper mine is a surface coal mine located in northwest Colorado just south of town of Craig. Trapper mines about two million tons of sub-bituminous coal each year that is transported directly to the adjacent Craig Station powerplant. Mine-reclamation activities began in earnest at Trapper during the early 1980's. With some reclaimed areas now approaching 20 years old, this presentation gives an historical evaluation of wildlife use of the mine and adjacent lands.

Baseline aerial winter surveys of big-game animals in the Trapper mine study area were conducted in the mid-1970's. Aerial surveys were again carried out in the mid-1980's and most recently during the winters of 1999-2000 and 2000-01. Survey results indicate that overall big-game use within the study area has increased dramatically. Elk numbers have increased by several orders of magnitude, while pronghorn antelope have become a significant presence, and mule deer numbers have remained stable. Not only have big-game animals increased in the study area within and surrounding Trapper mine, but they are preferentially selecting reclaimed lands as a forage base. Heavy grazing of reclaimed lands by elk appears to have a negative impact on the establishment and vitality of some shrub and forb species, a potential bond-release issue of concern.

While Columbian sharp-tailed grouse continue to decline across much of their historical range in the Western U.S., recent research by the Colorado Division of Wildlife (DOW) shows that they are increasing and generally flourishing on northwest Colorado mine reclamation. Northwest Colorado mines joined Colorado DOW and other area stakeholders to develop a regional Columbian sharp-tailed grouse conservation plan. Mine operators are also cooperating with Colorado DOW and the University of Idaho in conducting ongoing research of Columbian sharp-tailed grouse use of reclaimed and adjacent lands. Research results will aid mine operators in further refining reclamation plans to benefit this species' habitat. Success of the species on mine reclamation, the development of a regional Columbian sharp-tailed grouse conservation plan, and the ongoing Columbian sharp-tailed grouse research were all instrumental in a recent U.S. Fish and Wildlife Service decision to not place this species on the Federal threatened and endangered species list.

Paper presented at the Interactive Forum on Surface-Mining Reclamation Approaches to Bond Release: Wildlife Habitat Construction and Wildlife Use of Reclaimed Lands in the Arid and Semi-Arid West

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Long-Term Monitoring Techniques to Evaluate Wildlife Use of Reclaimed Areas

Kelly Krabbenhoft[1]

ABSTRACT

Long-term monitoring of wildlife within various reclaimed and native habitats provides valuable insight into temporal and spatial trends. Wildlife monitoring is accomplished at The Coteau Properties Company's Freedom mine, near Beulah, North Dakota, in the following ways: semi-annual aerial surveys, spring waterfowl counts, surveys of sharp-tailed grouse leks, hunter harvest survey results, and incidental wildlife observations. Aerial surveys are usually conducted in January and September to primarily count deer and antelope, respectively. However, observations of other wildlife (i.e. coyote, fox, grouse, etc.) are noted when seen. By flying similar transects yearly, the data collected provides details into wildlife population trends within native and reclaimed areas. Spring waterfowl inventories on reclaimed wetlands are conducted annually to record total counts and species diversity utilizing this habitat. Shorebirds and other bird species within the reclaimed wetlands are also recorded. During migration, courtship, and brood raising, waterfowl use of reclaimed habitats is temporally dynamic. Yearly fluctuations of precipitation play a large role in waterfowl numbers and their distribution on reclaimed wetlands. Leks of sharp-tailed grouse are visited annually to observe and count displaying males. Data collected are easily interpreted and long-term trends established. Each employee that hunts on the mine fills out a hunter harvest survey. This not only encompasses game that was harvested but also wildlife that was observed during the outing. Data are summarized yearly with graphs and/or tables used to display the results. Incidental wildlife observations are used to fill in gaps in those species that are not directly counted through the previous methods. These include eagles and other raptors that often migrate through the area during the spring and fall, nests of songbirds encountered during fieldwork, and other unique observations that often occur during annual migrations. The variability inherent in wildlife populations within the Northern Great Plains is recorded by following these methodologies. Assessment of successful wildlife use of reclaimed habitats can be measured by comparisons to these long-term trends.

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The Use of Closed Basin Habitats as Wildlife Refugia on Reclaimed Mine Lands

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ABSTRACT

The reconstruction of postmining reclamation lands provides an excellent opportunity for land managers to incorporate habitats previously unavailable for wildlife or to improve habitat conditions. Closed basins may be one such habitat-improvement method. At Peabody Western Coal Company's Black Mesa and Kayenta mines in northern Arizona, biological monitoring activities have documented numerous species of waterfowl, herpetiles, raptors, large ungulates, small mammals, and bats utilizing closed basins for wintering, foraging, and breeding habitat. We found significant differences in the small-mammal and bat assemblages within closed basins as compared to adjacent reclaimed habitat and pinyon-juniper woodland. Of five species of small mammals captured, one special-status species, the Navajo Mountain Mexican vole (*Microtus mexicanus navaho*), was found exclusively within closed basins and was never trapped on control plots on adjacent reclamation. Similarly, bat diversity was greater on closed-basin habitats as compared to pinyon-juniper control plots. The Mexican free-tailed bat (*Tadarida brasiliensis*), Western pipistrelle (*Pipistrellus hesperus*), and big free-tailed bat (*Nyctinomops macrotis*) were documented during acoustic surveys of closed basins but were not documented during survey of adjacent pinyon-juniper woodland. Incorporating closed-basin habitats into reclamation increases the faunal, floral, and community diversity found on mine reclamation, and the use of closed basins may boost the productivity of those lands. Further studies should focus on determining if closed basins show source-sink dynamics and should identify potential deleterious effects (i.e., biomagnification of naturally occurring elements) on wildlife.

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Habitat Enhancements on New Mexico Coal Mine Reclamation

Dave Clark[1]

ABSTRACT

This paper presents five techniques that are being used at New Mexico coal mines to enhance or preserve wildlife habitat. These techniques are cliff reclamation, small-area depressions, complex reclamation topography, wetland replacement, and minimization of drainage-bottom disturbance.

Since its inception, the New Mexico coal regulatory program has recognized that the provisions of the Surface Mining Control and Reclamation Act of 1977 (SMCRA) that relate to eliminating all highwalls and returning disturbed lands to their approximate original contour create conflicting requirements for the mining districts of New Mexico. Sandstone- and lava-capped plateaus, mesas, and questas (hogback ridges) are common and dramatic features that are important to both plant and animal diversity, as well as to the aesthetic value of the landscape. The State's initial regulations provided design criteria detailing procedures and applicability for highwall retention. The Office of Surface Mining (OSM), administering SMCRA, required justification of the regional differences prior to approval of the State program. New Mexico provided a five-page response that described the geography and geology of New Mexico, the vegetation and animal species that benefit from cliff habitats, and the aesthetic value of cliffs. OSM approved the New Mexico regulatory program in December 1980, with the stipulation that the State clarify that the reconstructed cliffs should not exceed premine cliffs in length. Several highwall segments have since been retained as replacement cliff habitat. The most recent example is at the Ancho mine in the northwest part of the State, where a raven established a nest on a reclamation cliff before grading operations had been completed. Cliffs may also enhance moisture accumulation by trapping snow in leeward banks. Runoff from rock surfaces concentrates precipitation and enhances soil moisture at the base of cliffs. The increased soil moisture often results in tree and shrub establishment, and a depression created at the base of the cliff will often provide a temporary water source.

Small-area depressions are frequently used to provide temporary drinking water, control erosion, and create vegetation diversity on reclaimed land. Depressions must be completely incised and have gentle slopes, and they are resoiled consistent with adjoining areas. Depending on the climate of the site, these small-area depressions may vary from Western wheatgrass-dominated communities to seasonal wetlands.

Revegetation can take several seasons to fully establish in New Mexico. A long period during which surface roughness, mulch, and sparse annual weed cover are the only impediments to erosion is thus a concern. Cut and fill terraces are sometimes used to limit erosion, but the long-

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term stability of terraces is doubtful. Complex slopes, talus slopes, and substrates with high, coarse rock-fragment concentrations are being used as alternatives to terraces for steep-slope reclamation. On complex slopes, erosion control is achieved by effectively shortening slopes through the creation of dendritic drainage patterns. Slopes have an overall concave longitudinal profile, so that gradients are reduced where runoff accumulates. Sinuosity within low-flow channels is used to reduce drainage gradients. In the larger drainages, wider flood stage channels are added to spread and slow the runoff from large precipitation events.

Wetland mitigation is required when springs or other wetland habitat will be impacted by mining. An example of spring-fed wetland replacement was recently constructed at the Lee Ranch mine. Low-volume artesian flow was a fortuitous geological occurrence at this site. A well was drilled and cased, and a shallow, 1/3-acre depression was excavated. A 2-foot liner of clay soil and a 1-foot topdressing of direct hauled wetland soil were emplaced. Two livestock watering tanks and a flow-control valve were connected to the well head. Barbed-wire fence was installed on three sides of the depression, with pipe fence and hog wire placed on the fourth side to exclude livestock from the pond shore.

The Gachupin-Brackett unit of the Ancho mine is a truck/shovel operation that strip mines the ridges of a highly dissected plateau. Sediment control is thus required in every highly productive drainage bottom that is intercepted by the operation. To avoid the habitat disturbance that results from impoundment construction, the operator has proposed alternate sediment-control structures, including vegetative filters, silt fences, and rock-check dam/silt fence combinations. These alternatives have been very effective in minimizing habitat disturbance while maintaining sediment control and preventing pollution of perennial streams.

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Habitat Concepts to Consider When Reclaiming Mined Lands for Wildlife

Rich Olson[1]

ABSTRACT

Wildlife abundance and diversity are dependent on the quality and quantity of available habitat, which includes food sources, available water, living space, and vegetation cover. Among these essential habitat components, consideration to diversify vegetation re-establishment at both the community and landscape scales, prior to reclamation work, will provide options for reclamation specialists to enhance wildlife abundance and diversity on mined lands. Increasing both plant-species diversity (patchiness), and plant-height diversity (structure) are techniques often used to diversify wildlife habitat at the plant-community scale are. At the landscape scale, enhancing edge area (plant community interfaces) and interspersion (proportionality of plant community types) improves wildlife habitat quality. Adding special habitat features such as wetlands, brush piles, rock piles, highwalls, and shrub/tree plantings creates additional habitat diversification at the landscape scale. Wetland development that includes considerations of basin contour, shoreline configuration, proportionality of wetland plant communities, ratio of wetland to upland vegetation areas, and island design further increases community and landscape habitat diversity. Strategic location of brush piles, rock piles, highwalls, and shrub/tree plantings provides additional elements of landscape diversification. Recently completed research on the relationship of small mammal populations to plant community characteristics within big sagebrush (*Artemisia tridentata)* and Russian knapweed (*Centaurea repens*) communities shows that small mammal abundance and diversity are strongly correlated with plant species diversity. Within the limitations imposed by bond-release requirements and environmental constraints, mined-land reclamation specialists should consider the feasibility of diversifying vegetation at the community and landscape scales to enhance postmining habitat quality for wildlife.

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Sharp-tailed Grouse Response to the Development of a Large-Scale Surface Coal Mine in Southeastern Montana

Bruce Waage[1] and Chris Yde[2]

ABSTRACT

Sharp-tailed grouse (Tympanuchus phasianellus) inhabit all the permitted surface coal mines in Montana. Western Energy Company (WECO) is a large surface coal-mining company annually disturbing approximately 350 acres. Since WECO started mining sub-bituminous coal from its Rosebud mine during the 1960's, 13,170 acres of land have been disturbed, with a subsequent 6,445 acres reclaimed. A large portion of this land is sharp-tailed grouse habitat. At the same time, reclamation activities produce postmine topography that initiates revegetation of the disturbed lands. The Rosebud mine lies within the eastern ponderosa pine vegetation formation, as described by Kuchler (1964). Early premine wildlife surveys identified the area as excellent sharp-tailed grouse habitat (ECS, 1973). In order to reclaim the area to the premine land use of livestock grazing and wildlife habitat, WECO has focused reclamation activities on the upland grassland, big sagebrush/grassland, silver sagebrush/grassland, skunkbush sumac/grassland, and ponderosa pine habitat types. WECO is also working toward the replacement of premine agricultural acres. Wildlife monitoring studies have been conducted annually since 1973. Review of the long-term data from the Rosebud mine indicates that, as sharp-tailed grouse habitat is mined through, there is a shift in the grouse population. However, as disturbed areas are reclaimed, grouse repopulate the available habitats and establish dancing grounds in proximity to the historic locations or where none existed before. In order to obtain bond release, reclaimed fields are managed to promote vegetative production and diversity. Therefore, the majority exhibit healthy stands of vegetation conducive to daily and seasonal use by sharp-tailed grouse. As reclamation proceeds, it appears that sharp-tailed grouse populations return to levels approximating those in adjacent native habitats, thus meeting one of the wildlife objectives for bond release. A discussion of premine and postmine dancing ground locations, land-management implications, reclamation habitat development, and interactions with the surrounding native landscape is presented. If the reclaimed vegetation is not designed to provide complete sharp-tailed grouse habitat (i.e., a good mixture of grass, forbs, and deciduous shrubs and trees), impacts to the sharp-tailed grouse populations may result.

Paper presented at the Interactive Forum on Surface-Mining Reclamation Approaches to Bond Release: Wildlife Habitat Construction and Wildlife Use of Reclaimed Lands in the Arid and Semi-Arid West

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The Importance of Coal-Mine Reclaimed Lands to the Columbian Sharp-Tailed Grouse

Sandra L. Brown[1]

ABSTRACT

In the majority of the Colorado coal-mine permits, wildlife habitat is either the primary or secondary postmining land use. Coal-mine reclamation plans are designed to restore habitat for wildlife species. The Colorado Division of Minerals and Geology (DMG), in cooperation with the Division of Wildlife (DOW), the U.S. Fish and Wildlife Service (USFWS), and coal-mine operators, has evaluated and continues to evaluate reclamation techniques that will improve the mined lands for wildlife species.

With approximately 20 years of reclamation completed under the requirements of the Colorado Surface Coal Mining Law, it is apparent that the wildlife are using reclaimed lands in large numbers. Forrest Luke of Trapper Mining will discuss big-game utilization of reclaimed lands. I am going to focus on recent research regarding the importance of reclaimed lands to the Columbian sharp-tailed grouse.

In 1995, a petition was filed with USFWS to list the Columbian sharp-tailed grouse as a threatened species. In October 1999, USFWS determined that the petition was sufficient to warrant a full assessment of the species' status. In October 2000, USFWS made a finding that the petition was not warranted. However, USFWS retained the option to list the Columbian sharp-tailed grouse as threatened, or instead to list discrete populations as threatened, if future information indicates that such a listing is warranted.

The USFWS finding not to list the Columbian sharp-tailed grouse in Colorado was based on Colorado Division of Wildlife population surveys and a conservation plan prepared by Rick Hoffman of DOW. Intense surveys were initiated in 1997 to determine the extent of this species' population in northwest Colorado. Contrary to the situation throughout most of its historic range, the population in northwestern Colorado is thought to be stable or even increasing (Collins, 2001; Hoffman, 2001). This is attributed to recent increases in both reclaimed surface coal-mine lands, and Conservation Reserve Program lands. Mine-reclamation lands are important breeding habitat for the Columbian sharp-tailed grouse. The reclaimed mine lands contribute less than 1 percent of the area within the occupied range in Colorado, but they support about 18 percent of the species' population.

Two graduate students, Jennifer Boisvert and Cameron Collins, are currently studying the ecology of Columbian sharp-tailed grouse using mine-reclamation lands. This presentation gives the preliminary results of their study.

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Paper presented at the Interactive Forum on Surface-Mining Reclamation Approaches to Bond Release: Wildlife Habitat Construction and Wildlife Use of Reclaimed Lands in the Arid and Semi-Arid West

Sage Grouse Population Trends in Northeastern Wyoming

Olin O. Oedekoven[1]

ABSTRACT

The Sheridan Region of the Wyoming Game and Fish Department includes Sheridan, Johnson, and Campbell Counties along with portions of Crook, Weston, and Converse Counties. Sage grouse are found throughout the sagebrush grasslands habitats of the Sheridan Region, with most of the area east of the Big Horn Mountains considered occupied habitat for sage grouse. Except for pockets of forested lands, occupied habitat for sage grouse is fairly contiguous east of the Big Horns to the Black Hills and from the Montana border south to Antelope Creek.

Data collection efforts for sage grouse focus on lek counts and surveys, which have been conducted each spring within the region since the late 1960's. Lek counts include those lek observations conducted three to four times each spring, about a week to 10 days apart. Lek counts are conducted to identify trends in the population based on the average peak male attendance. Lek surveys include a single visit to a lek every 2 to 3 years and are designed to primarily determine general lek status. Lek search results along with harvest information are used to estimate sage-grouse population numbers and trends.

The trend in sage-grouse populations for the Sheridan Region suggests about a 10-year cycle with periodic highs and lows. Of concern, however, is that each subsequent peak in the population is lower than the previous peak. This suggests a steadily declining sage-grouse population within the Sheridan Region.

It appears that the most recent peak in sage-grouse numbers occurred in 1999-2000. Drought conditions in 2000 may have resulted in poor brood survival and recruitment into the spring 2001 breeding population. Drought conditions for 2001 may further reduce the grouse population, because of poorer quality nesting/brood rearing habitats. This, in turn, will impact recruitment for 2002.

Management of these game birds within the Sheridan Region includes protection of their habitats and protection of the lek areas during the breeding season through the environmental review process. All Federal projects and some local projects are routed to regional personnel for analysis and comment. Sage grouse are given consideration through this process, with emphasis on minimizing disturbance during the breeding season on and around the lek areas.

Paper presented at the Interactive Forum on Surface-Mining Reclamation Approaches to Bond Release: Wildlife Habitat Construction and Wildlife Use of Reclaimed Lands in the Arid and Semi-Arid West

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Reclaiming Wildlife Habitat at the Buckskin Mine

Scott Benson[1]

ABSTRACT

Wyoming Department of Environmental Quality, Land Quality Division (WDEQ/LQD), Rules and Regulations mandate that a plan be prepared and implemented to protect and enhance important habitats for fish and wildlife. The regulations further require that wildlife habitat be restored commensurate with or superior to habitat conditions that existed before the land became affected. "Important habitats" are defined by WDEQ/LQD regulations as habitat that, in limited availability, supports or encourages a maximum diversity of wildlife species or fulfills one or more living requirements of a wildlife species. Specific examples of important habitats listed by WDEQ/LQD include, but are not limited to, playas, wetlands, riparian areas, rimrocks, areas offering special shelter or protection, reproduction and nursery areas, and wintering areas. Baseline inventories of the Buckskin mine concluded that no critical habitat or crucial habitat existed within or adjacent to our permit boundary. While no specific inventory of "important habitats" was conducted during wildlife baseline inventories, habitat currently defined as "important" did occur in various locations within the Buckskin mine permit boundary. Much of this important habitat consisted of erosional landforms, including badlands, gullies, cut banks, head cuts, incised streambeds, rough breaks, cliffs, rimrocks, and steep slopes. A major goal of the Buckskin mine's reclamation plan is to reestablish topography, vegetation, and landscape features that enhance wildlife habitat. Important erosional landforms, including badlands, gullies, cut banks, head cuts, incised streambeds, rough breaks, cliffs, rimrocks, and steep slopes, will be reclaimed when possible. This presentation will present the Buckskin mine's permitted reclamation plan to accomplish this goal.

Paper presented at the Interactive Forum on Surface-Mining Reclamation Approaches to Bond Release: Wildlife Habitat Construction and Wildlife Use of Reclaimed Lands in the Arid and Semi-Arid West

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Mitigation for Culverting a Stream Used by Colorado River Cutthroat Trout

Paul B. Baker[1]

ABSTRACT

The Colorado River cutthroat trout is classified as a U.S. Forest Service Region 4 sensitive species, and there is a petition to list it as threatened or endangered. In 1997, Genwal Resources, Inc., culverted a section of Crandall Creek that was being used for spawning habitat by the only population of Colorado River cutthroat then known to exist on the Wasatch Plateau in central Utah. Money from the mine operator was used to move the entire population out of Crandall Creek to a temporary holding area, make improvements to a section of creek above the mine, test the fish for genetic purity, and then bring back the most genetically pure fish. The money has also been used to test other fish populations in the area, install migration barriers, and make various improvements to riparian habitat.

Paper presented at the Interactive Forum on Surface-Mining Reclamation Approaches to Bond Release: Wildlife Habitat Construction and Wildlife Use of Reclaimed Lands in the Arid and Semi-Arid West

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Consequences of Mining, Reclamation, and Mitigation for Raptors in the Powder River Basin of Wyoming

Kort M. Clayton[1]

ABSTRACT

Large-scale surface coal mining was occurring in the Powder River Basin of northeast Wyoming by the early 1980's. Nesting raptors and other wildlife were inventoried during initial baseline studies and monitored in subsequent years. Those surveys have yielded a long-term record of raptor nests, nest attempts, and productivity in the vicinity of many coal mines. Since the early 1980's, the number of raptor nests in the vicinity of several mines has remained relatively stable; the number of active raptor nests each year has been more variable. Most important, neither measure of raptor abundance has exhibited an overall decline. Annual fluctuations in nesting attempts and productivity are consistent with trends in lagomorph abundance. The expansion of mines over the years has often resulted in conflicts with either nesting pairs of raptors or their inactive nests. To mitigate those conflicts, mining companies have relocated existing nests and created many artificial nests. Those efforts have prevented the wholesale destruction of raptor nests, maintained the primary nest site of affected raptor pairs, and minimized the impact of visual and auditory mining disturbances on raptor reproductive success. As mining has progressed, many acres of land have also been reclaimed. Reclaimed areas have provided sites for relocating natural nests and creating artificial ones for mitigation purposes, some of which have been used by raptors. Reclamation also offers potential nesting and foraging habitat, as well as adequate perching sites for many raptorial species.

Paper presented at the Interactive Forum on Surface-Mining Reclamation Approaches to Bond Release: Wildlife Habitat Construction and Wildlife Use of Reclaimed Lands in the Arid and Semi-Arid West

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Reclaiming Wetlands in North Dakota

Guy Welch[1]

ABSTRACT

In the prairie pothole region of North Dakota, wetlands are extremely valuable for wildlife habitat. They also serve to store floodwaters, recharge ground water, and retain sediment and agricultural chemicals. There are 1,257 acres of seasonal or more permanent wetlands on lands permitted for surface coal-mining activities in North Dakota. Wetlands are required to be replaced on an acre-for-acre basis if disturbed by mining. Wetlands are classified according to their water and vegetation characteristics. In the process of reclaiming mined lands, temporary wetlands are replaced, but they are usually not considered a separate land use. Seasonal and more permanent wetlands are considered fish and wildlife habitat and must be designed to ensure that their watersheds provide enough runoff to maintain the desired degree of permanence. Seasonal and semi-permanent wetlands are typically designed to retain water to a depth of 3 and 5 feet, respectively. Wetland soils are separately salvaged and respread in constructed basins, and they are not usually seeded.

There are no specific bond-release performance standards for temporary wetlands, but more permanent wetlands must exhibit vegetation zonation appropriate for the intended wetland class. To date, 35 seasonal and semi-permanent wetlands comprising over 230 acres have been reconstructed on reclaimed mined lands reclaimed in North Dakota after passage of the Surface Mining Control and Reclamation Act of 1977. Preliminary data suggest that the reconstructed wetlands are functioning similar to undisturbed wetlands. Hydrophytic vegetation is establishing and waterfowl are utilizing the wetlands.

Paper presented at the Interactive Forum on Surface-Mining Reclamation Approaches to Bond Release: Wildlife Habitat Construction and Wildlife Use of Reclaimed Lands in the Arid and Semi-Arid West

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Creating Wetlands for Wildlife on Mined Lands: Lessons from Bentonite Mining

Mark C. McKinstry[1]

ABSTRACT

Over 1,200 wetlands have been created in northeastern Wyoming as a by-product of bentonite mining activities. Most of these wetlands were created or enhanced as a result of the reclamation of abandoned bentonite surface mines by the Abandoned Mine Land Division of the Wyoming Department of Environmental Quality (WAML). Beginning in 1985, and eventually using over $40.6 million from fees collected for abandoned mine reclamation under the Federal Surface Mining Control and Reclamation Act of 1977, WAML reclaimed over 3,320 hectares (ha) of terrestrial habitat and 180 ha of wetland habitat at 236 abandoned mine land sites. These reclamation activities included enhancing existing wetlands and creating new wetlands to mitigate for the destruction of jurisdictional (Section 404c of the Clean Water Act) wetlands that were deemed hazardous. Enhancement and creation activities produced small ($\bar{x}$=1.2 ha) and shallow (<2 meters deep) wetlands, designed to provide maximum habitat benefits for migrating and breeding waterfowl. The Wyoming Cooperative Fish and Wildlife Research Unit of the University of Wyoming examined 92 wetlands that had been enhanced or created under WAML. Our objectives were to identify physical variables that were important to waterfowl and could be manipulated during the construction process. In general, waterfowl use wetlands that are >1.0 ha in size, have abundant emergent and submersed vegetation, and are located within complexes of >5 wetlands within a 1 kilometer radius. Soil qualities on abandoned bentonite sites are generally heavily clay in texture, with high exchangeable sodium percentages; such soil requires physical and chemical amendments to facilitate vegetative growth. Wetland plants have been slow to establish at these created wetlands because of the poor soils and a lack of suitable propagules; natural wetlands within this region are almost nonexistent and are mostly limited to seasonal playas and small creeks. Ongoing research, including both greenhouse experiments and field trials, has been focused on improving aquatic plant establishment and growth. Techniques to improve bentonite wetlands will be useful not only in future WAML activities but to bentonite mining companies as well.

Paper presented at the Interactive Forum on Surface-Mining Reclamation Approaches to Bond Release: Wildlife Habitat Construction and Wildlife Use of Reclaimed Lands in the Arid and Semi-Arid West

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SMCRA Bond Release:
The Initial Steps at the San Juan Mine

Orlando Estrada[1]

ABSTRACT

San Juan Coal Company has submitted, to the State of New Mexico's Mining and Minerals Division, the final phase-III bond-release application for the approval and release from bond of 241 acres of permitted lands at its San Juan mine, which is located in San Juan County, New Mexico. The Surface Mining Control and Reclamation Act and New Mexico's Surface Coal Mining Regulations mandate a minimum 10-year liability period following final reclamation of an area for which bond release is sought, during which period no additional treatments other than approved postmining land uses and approved interseedings may be applied to the area. Site-specific revegetation success standards must be met for 2 of the last 4 years of liability, beginning no sooner than year 8 of the bonding period. Successful reclamation of the site was demonstrated by exceeding cover, production, shrub density, and diversity standards while supporting the primary postmining land use of livestock grazing.

Paper presented at the Interactive Forum on Surface-Mining Reclamation Approaches to Bond Release: Wildlife Habitat Construction and Wildlife Use of Reclaimed Lands in the Arid and Semi-Arid West

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Hydrology and Reclamation Tool for Mining Applications

Richard Warner, Ph.D.[1] and Mike Anderson[2]

ABSTRACT

The workshop will introduce the SEDCAD pre-processor (SedPrePro) - ArcView 3.2 GIS program will be demonstrated. Each step is conceptualized with easy to follow wizard type interfaces, dialog specific help and multiple error checks. A surface mining example will be used to illustrate step-by-step SedPrePro inputs and a complete design of structures including channels, culverts, retention basins and plunge pools. The workshop will also demonstrate a new GIS-based data management tool for coal mine reclamation - the Reclamation Management Tool or RMT.

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Managing Wildlife Habitats in Reclamation: Terrestrial Habitats

Mark A. Rumble[1], Shawn C. Fritcher[2], and Lester D. Flake[3]

ABSTRACT

Wildlife communities are direct responses to the structure of vegetation. Vegetation structure is a direct result of vegetation type and successional stage. Reclaimed mined lands usually provide early seral vegetation communities of grassland vegetation types. Woodland or riparian vegetation types are reestablished in some landscapes. Tree nesting and shrub nesting species are associated with late seral woodland vegetation communities. In shrub-steppe vegetation communities, the wildlife community varies among grasslands, sagebrush grasslands, and sagebrush grasslands with scoria outcrops. In mixed-grass prairie regions, the bird and small-mammal community varies among seral stages. Once wildlife communities are linked to seral stages of vegetation communities, resource managers have ecological tools to manipulate vegetation and wildlife populations.

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Endangered-Species Management on Private Land: Interior Least Tern

Andrew C. Kasner[1], J. Matthew Tanner[2], and R. Douglas Slack[3]

ABSTRACT

Endangered-species conservation efforts have focused primarily on public land. The logistics and legal ramifications of endangered-species management on private land are difficult to overcome; however, conservation efforts on private land may still be successful. Recent expansion of the breeding range of interior least terns (*Sterna antillarum athalassos*) in Texas has many implications for species management on private lands. The Interior Least Tern Recovery Project of TXU Mining Company's Big Brown mine in Freestone County, Texas, serves as an example of successful management efforts on private land. Interior least terns first nested on reclaimed mine spoil at Big Brown mine in 1997. In order to avoid future conflicts with mining goals, a 5-year management plan was written by environmental personnel within the company and implemented prior to the 1998 nesting season. Management objectives were to provide suitable nesting and foraging habitat for terns while seeking to reduce the risk of interference with mining activities. Since 1997, an average of 29 nests per year have occurred on artificial sites created for tern nesting, with average annual nest success 49 percent, hatching success 47 percent, and fledging success 46 percent. Average annual reproductive success (fledglings per nest) is 0.40. Successful management on private land is critically important for the conservation of endangered species and is a feasible goal. Scientists, private land owners, industry, and conservation agencies must continually seek ways to successfully manage endangered species on private as well as public lands.

Paper presented at the Interactive Forum on Surface-Mining Reclamation Approaches to Bond Release: Wildlife Habitat Construction and Wildlife Use of Reclaimed Lands in the Arid and Semi-Arid West

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Songbird Response to Woodland Reclamation[1]

Kelly Krabbenhoft[2]

ABSTRACT

A total of 111 woodland sites encompassing 242 acres have been established on 1979 law areas at the Glenharold mine near Stanton, North Dakota. Breeding songbird populations were censused on two native woody draws (WD-10a [13.6 acres] and WD-11 [26.1 acres]) and two reclaimed wooded-draw demonstration sites (WDDS-2 [5.8 acres] and WDDS-3 [7.6 acres]) using the international spot-map method. WDDS-2 and WDDS-3 were planted in 1982 and 1984, respectively, and are representative of the oldest reclaimed woodland sites within the mine area. Although some tree species are present, both reclaimed sites are considered tall-shrub communities based on physical structure. Songbird community characteristic trends reflect the changes in plant growth during succession within reclaimed woodlands. Notably absent during early stages of reclaimed woodland development are certain representatives of the *parulidae* (yellow warbler, yellow-breasted chat, and common yellowthroat), *mimidae* (brown thrasher and gray catbird), and *fringillidae* (rufous-sided towhee and song sparrow) families. As these reclaimed woodlands developed dense habitat characteristics, they became more conducive to use by these types of songbirds, considered indicative of tall shrub woodland habitat. Bird species diversity (BSD), species richness, and breeding bird densities between native and reclaimed woodland sites were compared over time. WDDS-2 and WDDS-3 have been censused 13 and 9 years, respectively. The native woodland sites were sampled concurrently with the reclaimed woodlands. BSD was calculated according to the Shannon Formula (H'). Diversity levels in the native and reclaimed woodlands have been fairly constant over the past 10 years. The numbers for breeding species and territorial males within the reclaimed woodlands have trended upward during this same time period. Following the 10-year responsibility period, numerous songbirds indicative of mature structured woodland may not be present. However, data show improved species diversity, richness, and increased territorial pairs as reclaimed woodland structural characteristics change over time. After 20 years of monitoring songbird use in reclaimed woodlands, trend data show positive changes in songbird communities that indicate successful woodland reclamation. These data demonstrate short- and long-term impacts of surface mining.

Paper presented at the Interactive Forum on Surface-Mining Reclamation Approaches to Bond Release: Wildlife Habitat Construction and Wildlife Use of Reclaimed Lands in the Arid and Semi-Arid West

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Sage Grouse Habitat Selection and Responses to Mineral Development

Matthew J. Holoran[1]

ABSTRACT

Historically, sage grouse were abundant throughout Wyoming's sagebrush habitats. However, between 1975 and 1993, statewide sage-grouse harvest declined 40 percent, and, between 1985 and 1995, the number of males counted per lek decreased 17 percent. Lower nesting success and chick survival have been proposed as factors contributing to the decline in sage-grouse numbers.

Sage grouse in Wyoming select nesting habitat with higher total shrub canopy cover, residual grass cover, and residual grass height than is typical of available habitat. Nest success is related to the herbaceous understory, specifically greater total forb cover; residual grass cover and height increase the probability of a successful hatch. Sage-grouse nesting habitat exhibits sagebrush canopy cover between 19 and 42 percent, with an average of 30 percent; sagebrush heights between 20 and 43 centimeters, with an average of 32 centimeters (13 inches); and average total herbaceous ground cover of 20 percent. When 20 to 30 percent of the herbaceous cover within nesting habitat consists of forb species, and residual grass heights are ≥ 12 centimeters (5 inches), hatching probabilities increase.

To raise their chicks during the first month post hatch, sage grouse in Wyoming move from nesting habitat to areas with lower sagebrush canopy cover and height and higher total herbaceous and forb cover. Early brood-rearing habitat exhibits sagebrush canopy cover between 16 and 32 percent, with an average of 24 percent; sagebrush heights between 19 and 39 centimeters, with an average of 29 centimeters (11 inches); and average total herbaceous ground cover of 26 percent, with 20 to 40 percent of the herbaceous cover consisting of forbs. Areas used as late brood-rearing habitats have succulent herbaceous vegetation throughout the summer and are typically in close association with upland sagebrush dominated habitats. Mesic area distribution and extent are important to reduce grouse concentrations and predation probabilities.

The upgrade of haul roads associated with surface coal-mining activity in North Park, Colorado, resulted in decreased sage-grouse populations relative to surrounding populations. The decline was attributed to decreased recruitment of yearling males. Failure to recruit yearling males resulted from dispersal, poor nesting success, decreased survival of young, and/or acoustical or physical factors that deterred yearlings from becoming established on the lek. In addition, hens disturbed prior to becoming sedentary during the nesting season (disturbance was largely road-related and occurred during lek attendance) exhibited lower nest initiation rates and greater lek-to-nest distances than those of undisturbed leks in northwestern Wyoming. The construction of transmission-line structures located within 200 meters of an active sage-grouse lek and between the lek and male day-use areas in northeastern Utah resulted in a 72 percent decline in the mean

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number of strutting males and an alteration in daily dispersal patterns during the breeding season. The frequency of raptor/sage grouse interactions during the breeding season increased 65 percent, and golden eagle interactions increased 47 percent, between pre- and post-transmission line construction. Reduced initiation rates, when combined with inherently low probabilities of reproductive success in sage grouse, could potentially lower annual productivity rates below sustainable levels, as indicated by the absence of yearling cock recruitment in Colorado. In addition, sage-grouse lekking behavior and annual nest-site fidelity that carries through to female offspring results in relatively clumped nest distributions; thus, isolated habitat-altering disturbances has the potential to impact a relatively large number of individuals.

Sagebrush reestablishment that results in a mosaic of dense sagebrush stands for nesting and in more open brood-rearing areas is required for reclamation aimed at providing sage-grouse habitat. Wyoming big sagebrush (*Artemisia tridentate wyomingensis*) and mountain big sagebrush (*A. t. vaseyana*) subspecies provide the cover necessary for nesting, brood-rearing, and wintering sage grouse. Because of its growth form, basin big sagebrush (*A. t. tridentata*) is rarely selected as nesting habitat, but may provide wintering habitat. Native perennial bunch-grass species provide better ground cover for nesting sage grouse that do to rhizomatous annuals. Forb species important as food items for sage grouse include winterfat (*Eurotia lanata*), fringed sagewort (*Artemisia frigida*), common dandelion (*Taraxacum officinale*), curlycup gumweed (*Grindelia squarrosa*), Western salsify (*Tragopogon dubius*), Western yarrow (*Achillea lanulosa*), prickly lettuce (*Lactuca serriola*), cudweed (*Gnaphalium palustre*), fleabane (*Asteraceae* spp.), sweetclover (*Melilotus officinalis*), milkvetch (*Astragalus bisulcatus*), and alfalfa (*Medicago sativa*). These species should be provided following sagebrush reestablishment.

Paper presented at the Interactive Forum on Surface-Mining Reclamation Approaches to Bond Release: Wildlife Habitat Construction and Wildlife Use of Reclaimed Lands in the Arid and Semi-Arid West

Wildlife Programs at the TransAlta Centralia Mine

Tim LeDuc[1] and Phil Berry[2]

ABSTRACT

The TransAlta Centralia mine (TCM) is located approximately 50 miles inland from the Pacific Ocean in the southwest portion of Washington State, 6 miles northeast of the town of Centralia in the Big Hanaford Valley. The climate in the area is very mild with moderate temperatures and high winter rainfall. Temperatures range from 20°F to 90°F throughout the year. The mine receives significant precipitation in the range of 34 to 62 inches annually (24-hour events ranging from trace to 4.5 inches) with most occurring between October and April.

Habitat at the mine is typical of the western foothills in the Cascade Mountain Range of Western Washington. Elevation ranges from 200 to 800 feet above sea level with moderate slopes and heavy vegetation. Land use generally consists of upland forest, lowland forest (wetlands), and farming (hay production). Commercial timber production dominates the upland areas and higher elevations and is the predominate postmining land use at the mine. Lowland forest occurs in most perennial and ephemeral drainages, whereas farming is generally limited to large, wide drainages.

The lush vegetation and diversity of habitat support a wide range of wildlife. Coastal black-tailed deer and Rocky Mountain elk, along with black bear and cougar, are the predominant large mammal species. The many lowland areas support a variety of small mammals such as beaver, otter, mink, skunk, and muskrat. Many avian species utilize the site with an abundance of waterfowl present throughout most of the year.

TCM has a long and active history of managing and enhancing the wildlife resource at the mine. During reclamation, units are designed to enhance habitat for all types of wildlife present. Hunting programs for elk and waterfowl help to manage the populations. Community programs through numerous entities help to enhance the wildlife and build stronger relations. Various programs help to manage negative impacts from wildlife.

Paper presented at the Interactive Forum on Surface-Mining Reclamation Approaches to Bond Release: Wildlife Habitat Construction and Wildlife Use of Reclaimed Lands in the Arid and Semi-Arid West

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Wildlife Surveys/Long-Term Monitoring Methods

John Kern[1]

ABSTRACT

Wildlife monitoring studies are intended to evaluate adequacy of wildlife success on reclaimed lands. In contrast to abiotic media, it may not be clear what species should be studied, what endpoints should be measured, nor what time-periods should be considered. For example, variation in abundance, reproductive success, habitat utilization, predator vulnerability, and resource habituation may all be important biotic endpoints. Are certain species of greater importance than others? At what scale are effects biologically important? These issues are not likely to be resolved; however, some experiences can be useful to help evaluate how wildlife may be affected by mining, and how those impacts might be quantified. In this presentation, a series of wildlife study designs and analysis methods are discussed in the context of evaluation of wildlife success on reclaimed lands. The examples include resource selection studies, abundance surveys, utilization estimation, and trend monitoring studies for contaminant exposure.

Paper presented at the Interactive Forum on Surface-Mining Reclamation Approaches to Bond Release: Wildlife Habitat Construction and Wildlife Use of Reclaimed Lands in the Arid and Semi-Arid West.

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Permitting And Construction of an Important Wildlife Habitat Feature: A Case Study

Scott Benson[1]

ABSTRACT

The Buckskin mine's permitted postmining land uses are wildlife habitat, grazingland, cropland, pastureland, industrial/commercial (agriculture), and developed water resources. As such, we are required to restore wildlife habitat commensurate with or superior to habitat conditions that existed before the land became affected. Much of the important habitat at the Buckskin mine consisted of erosional landforms, including badlands, gullies, cut banks, head cuts, incised streambeds, rough breaks, cliffs, rimrocks, and steep slopes. The Buckskin mine submitted a non-significant permit revision in early August 2001 to revise our postmining topography to incorporate a 2:1 steep slope and a cliff habitat. Both of these features will approximate the original topography and restore and enhance important wildlife habitat. This presentation will discuss the trials and tribulations associated with permitting such habitat-enhancement features.

Paper presented at the Interactive Forum on Surface-Mining Reclamation Approaches to Bond Release: Wildlife Habitat Construction and Wildlife Use of Reclaimed Lands in the Arid and Semi-Arid West

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Special Features within Reclamation

John Berry[1]

ABSTRACT

Decker Coal Company has been reclaiming land since 1975. Early reclamation was directed at creating a suitable seedbed and establishing a ground cover (usually for the purpose of livestock grazing). Over the years, the reclamation process has evolved from this early basic concept to a more sophisticated procedure that includes the creation of special features. Decker looks at establishing special features from two perspectives—topography and vegetation. With respect to topography: A-Hills is a bluff extension created recently that allowed Decker the opportunity to move lesser amounts of dirt while at the same time creating a unique feature. This presentation describes the process involved with the permitting and building of the A-Hills feature. With respect to vegetation: Decker also conducted a study (shrub establishment on steep slopes) that allowed the mine to disturb land that had been designated critical mule deer habitat. The presentation goes on to describe the process involved with this study. Overall, the presentation will address topics as follows:

A. Special feature creation has been a learning process
   1. Early special features: What's a special feature?
   2. Intermediate reclamation: Diversity gets a chance
   3. Reclamation today: Looking at topography *and* vegetation diversity
B. Two approaches to special features—topography and vegetation
   1. Topographic features (A-Hills Bluff creation)
      a. A unique opportunity recognized by Decker and the Montana Department of Environmental Quality (DEQ)
      b. Process involved
         i. Was the concept viable (could it be built)?
         ii. Show premine features existed
         iii. Show how postmine feature would fit in with surrounding area
         iv. Build—in stages to show Montana DEQ (and ourselves) that it would work
      c. Results
   2. Vegetation (Critical mule deer habitat replacement)
      a. Delineation (our problems began)
      b. Agency overlap—Montana DEQ and Montana Department Fish, Wildlife, and Parks
      c. Study plan developed
      d. Results—successes and failures
      e. Applications
         i. Shrub density and bond release
C. Review and conclusions

Paper presented at the Interactive Forum on Surface-Mining Reclamation Approaches to Bond Release: Wildlife Habitat Construction and Wildlife Use of Reclaimed Lands in the Arid and Semi-Arid West

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Appendices

Reference to Fish and Wildlife 30 CPR 700 to END
Reclaimed Bentonite Mines: Wetlands for Wildlife
Mountain Plover Survey Guidelines

References to Fish and Wildlife 30 CFR 700 to End

REFERENCES TO FISH AND WILDLIFE
30 CFR 700 TO END (Current through 5/11/2001)
Revised 5/31/2001

Sect. 701.5 – Definitions

Best technology currently available means equipment, devices, systems, methods, or techniques which will (b) minimize, to the extent possible, disturbances and adverse impacts on **fish, wildlife** and related environmental values, and achieve enhancement of those resources where practicable. The term includes equipment, devices, systems, methods, or techniques which are currently available anywhere as determined by the Director, even if they are not in routine use. The term includes, but is not limited to, construction practices, siting requirements, vegetative selection and planting requirements, animal stocking requirements, scheduling of activities and design of sedimentation ponds in accordance with 30 CFR parts 816 and 817. Within the constraints of the permanent program, the regulatory authority shall have the discretion to determine the best technology currently available on a case-by-case basis, as authorized by the Act and this chapter.

Land use means specific uses or management-related activities, rather than the vegetation or cover of the land. Land uses may be identified in combination when joint or seasonal uses occur and may include land used for support facilities that are an integral part of the use. Changes of land use from one of the following categories to another shall be considered as a change to an alternative land use which is subject to approval by the regulatory authority.

(h) **Fish and wildlife habitat**. Land dedicated wholly or partially to the production, protection, or management of species of fish or wildlife

Significant, imminent environmental harm to land, air or water resources means --

(a) An environmental harm is an adverse impact on land, air, or water resources which resources include, but are not limited to, **plant and animal life**.

Sect. 715.13—Postmining Use Of Land	(c) Land-use categories. Land use is categorized in the following groups. Change from one to another land use category in premining to postmining constitutes an alternate land use and the permittee shall meet the requirements of paragraph (d) of this section and all other applicable environmental protection performance standards of this chapter. (10) **Fish and wildlife** habitat and recreation lands. Wetlands, fish and wildlife habitat, and areas managed primarily for fish and wildlife or recreation. (d) Criteria for approving alternative postmining use of land. An alternative postmining land use shall be approved by the regulatory authority, after consultation with the landowner or the land-management agency having jurisdiction over State or Federal lands, if the following criteria are met. Proposals to remove an entire coal seam running through the upper part of a mountain, ridge, or hill must also meet these criteria in addition to the requirements of § 716.3 of this chapter. (8) Necessary approval of measures to prevent or mitigate adverse effects on **fish and wildlife** has been obtained from the regulatory authority and appropriate State and Federal fish and wildlife management agencies. (9) Proposals to change premining land uses of range, **fish and wildlife** habitat, forest land, hayland, or pasture to a postmining cropland use, where the cropland would require continous maintenance such as seeding, plowing, cultivation, fertilzation, or other similar practices to be practicable or to comply with applicable Federal, State, and local laws, shall be reviewed by the regulatory authority to assure that- (i) There is a firm written commitment by the permittee or by the landowner or land manager to provide sufficient crop management after release of applicable performance bonds to assure that the proposed postmining cropland use remains practical and reasonable; (ii) There is sufficient water available and committed to maintain crop production; and (iii) Topsoil quality and depth are shown to be sufficient to support the proposed use. (10) The regulatory authority has provided by public notice not less than 45 days nor more than 60 days for interested citizens and local, State and Federal agencies to review and comment on the proposed land use.

Sect. 715.17—Protection of the Hydrologic System

The permittee shall plan and conduct coal mining and reclamation operations to minimize disturbance to the prevailing hydrologic balance in order to prevent long-term adverse changes in the hydrologic balance that could result from surface coal mining and reclamation operations, both on- and off-site. Changes in water quality and quantity, in the depth to ground water, and in the location of surface water drainage channels shall be minimized such that the postmining land use of the disturbed land is not adversely affected and applicable Federal and State statutes and regulations are not violated. The permittee shall conduct operations so as to minimize water pollution and shall, where necessary, use treatment methods to control water pollution. The permittee shall emphasize surface coal mining and reclamation practices that will prevent or minimize water pollution and changes in flows in preference to the use of water treatment facilities. Practices to control and minimize pollution include, but are not limited to, stabilizing disturbed areas through grading, diverting runoff, achieving quick growing stands of temporary vegetation, lining drainage channels with rock or vegetation, mulching, sealing acid-forming and toxic-forming materials, and selectively placing waste materials in backfill areas. If pollution can be controlled only by treatment, the permittee shall operate and maintain the necessary water-treatment facilities for as long as treatment is required.

(d) Stream channel diversions.

(iii) **Fish and wildlife** habitat and water and vegetation of significant value for wildlife shall be protected in consultation with appropriate State and Federal fish and wildlife management agencies.

Sect. 715.20 – Revegetation	(e) Methods of Revegetation. (4) Where **wildlife** habitat is to be included in the postmining land use, the permittee shall consult with appropriate State and Federal **wildlife** and land management agencies and shall select those species that will fulfill the needs of **wildlife,** including food, water, cover, and space. **Plant** groupings and water resources shall be spaced and distributed to fulfill the requirements of **wildlife.**
Sect. 731.14 – Content Requirements for Program Submissions	(g) Narrative descriptions, flow charts or other appropriate documents of the proposed systems for- responsibility for the protection or management of **fish and wildlife** and related environmental values.
Sect. 732.13 – Decisions By the Secretary	(b) A program shall not be approved until the Secretary has- Administrator of the Environmental Protection Agency, the Secretary of Agriculture, and the heads of other Federal agencies concerned with or having special expertise relevant to the program as proposed; and
Sect. 736.22 – Contents of a Federal Program	(a) In promulgating or revising any Federal program for a State, the Director shall- (2) Include any provisions that are necessary to implement the requirements of the Endangered Species Act of 1973, as amended (16 U.S.C. 531 et seq.), the **Fish and Wildlife** Coordination Act, as amended (16 U.S.C. 661-666c), the National Historic and Preservation Act of 1966 (16 U.S.C. 470), the Archaeological and Historic Preservation Act of 1974 (16 U.S.C. 469a), and other relevant Federal laws imposing duties upon the Secretary;
Sect. 745.11— Application and agreement	(e) Before the expiration of the comment period, OSM shall consult with the Bureau of Land Management, **Fish and Wildlife** Service, and Federal land management agencies, as appropriate, with respect to the proposed cooperative agreement.

Sect. 745.13—Authority Reserved by the Secretary.	The Secretary shall not delegate to any State, nor shall any cooperative agreement under this part be construed to delegate to any State, authority to – (b) Comply with the National Environmental Policy Act of 1969, as amended, 42 U.S.C. 4321 et seq., and Federal laws and regulations other than SMCRA;
Sect. 750.12—Permit Applications	(c) (3) (ii) (B) OSM shall determine if the application for revision is complete and if the proposed revision is significant. OSM shall consider the following factors as well as other relevant factors in determining the significance of a proposed revision: (1) Changes in production or recoverability of the coal resource; (2) the environmental effects; (3) the public interest in the operation, or likely interest in the proposed revision; and (4) possible adverse impacts from the proposed revision on **fish or wildlife,** endangered species, bald or golden eagles or cultural resources.
Sect. 761.5—Definitions	Significant recreational, timber, economic, or other values incompatible with surface coal mining operations means those values to be evaluated for their significance which could be damaged by, and are not capable of existing together with, surface coal mining operations because of the undesirable effects mining would have on those values, either on the area included in the permit application or on other affected areas. Those values to be evaluated for their importance include: (d) Scenic, historic, archeologic, esthetic, **fish, wildlife, plants** or cultural interests.
Sect. 761.11—Areas Where Surface Coal Mining Operations Are Prohibited Or Limited.	You may not conduct surface coal mining operations on the following lands unless you either have valid existing rights, as determined under § 761.16, or qualify for the exception for existing operations under § 761.12: (a) Any lands within the boundaries of: (2) The National **Wildlife** Refuge System;

Sect. 761.16—Submission And Processing of Requests for Valid Existing Rights Determinations.

(a) Basic framework for valid existing rights determinations. The following table identifies the agency responsible for making a valid existing rights determination and the definition that it must use, based upon which paragraph of § 761.11 applies and whether the request includes Federal lands.

[table]

Paragraph of § 761.11 that provides	Protected feature	Type of land to which request pertains	Agency responsible for determination	Applicable definition of valid existing
(a)	National parks, **wildlife** refuges, etc.	Federal	OSM	Federal fn1
(a)	National parks, **wildlife** refuges, etc.	Non-Federal	Regulatory authority	Federal fn1

Sect. 762.5—Definitions

For purposes of this part:

Fragile lands means areas containing natural, ecologic, scientific, or esthetic resources that could be significantly damaged by surface coal mining operations. Examples of fragile lands include valuable habitats for **fish or wildlife,** critical habitats for endangered or threatened species of **animals or plants,** uncommon geologic formations, paleontological sites, National Natural Landmarks, areas where mining may result in flooding, environmental corridors containing a concentration of ecologic and esthetic features, and areas of recreational value due to high environmental quality.

Sect. 764.21—Data Base and Inventory Requirements.	(b) The regulatory authority shall include in the system information relevant to the criteria in § 762.11 of this chapter, including, but not limited to, information received from the United States **Fish and Wildlife** Service, the State Historic Preservation Officer, and the agency administering section 127 of the Clean Air Act, as amended (42 U.S.C. 7470 et seq.).
Sect. 773.12—Regulatory Coordination With Requirements Under Other Laws.	Each regulatory program shall, to avoid duplication, provide for the coordination of review and issuance of permits for surface coal mining and reclamation operations with applicable requirements of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.); the **Fish and Wildlife** Coordination Act, as amended (16 U.S.C. 661 et seq.); the Migratory Bird Treaty Act of 1918, as amended (16 U.S.C. 703 et seq.); The National Historic Preservation Act of 1966, as amended (16 U.S.C. 470 et seq.); the Bald Eagle Protection Act, as amended (16 U.S.C. 668a); for Federal programs only, the Archeological and Historic Preservation Act of 1974 (16 U.S.C. 469 et seq.); and the Archaeological Resources Protection Act of 1979 (16 U.S.C. 470aa et seq.) where Federal and Indian lands covered by that Act are involved.
Sect. 773.13—Public Participation in Permit Processing.	(a)(3)(ii)) All Federal or State governmental agencies with authority to issue permits and licenses applicable to the proposed surface coal mining and reclamation operation and which are part of the permit coordinating process developed in accordance with section 503(a)(6) or section 504(h) of the Act, or § 773.12; or those agencies with an interest in the proposed operation, including the U.S. Department of Agriculture Soil Conservation Service district office, the local U.S. Army Corps of Engineers district engineer, the National Park Service, State and Federal **fish and wildlife** agencies, and the historic preservation officer.
Sect. 779.19—Vegetation Information.	(a) The permit application shall, if required by the regulatory authority, contain a map that delineates existing vegetative types and a description of the **plant** communities within the proposed permit area and within any proposed reference area. This description shall include information adequate to predict the potential for reestablishing vegetation. (b) When a map or aerial photograph is required, sufficient adjacent areas shall be included to allow evaluation of vegetation as important habitat for **fish and wildlife** for those species of **fish and wildlife** identified under 30 CFR 780.16.

Sect. 779.25—Cross Sections, Maps, and Plans	(a) The application shall include cross sections, maps, and plans showing— (2) Elevations and locations of monitoring stations used to gather data for water quality and quantity, **fish and wildlife**, and air quality, if required, in preparation of the application;
Sect. 780.14—Operation plan: Maps and plans.	(b) The following shall be shown for the proposed permit area: (9) Each facility to be used to protect and enhance **fish and wildlife** and related environmental values;
Sect. 780.16—**Fish and Wildlife** Information.	(a) Resource information. Each application shall include **fish and wildlife** resource information for the permit area and adjacent area. (1) The scope and level of detail for such information shall be determined by the regulatory authority in consultation with State and Federal agencies with responsibilities for **fish and wildlife** and shall be sufficient to design the protection and enhancement plan required under paragraph (b) of this section. (2) Site-specific resource information necessary to address the respective species or habitats shall be required when the permit area or adjacent area is likely to include: (i) Listed or proposed endangered or threatened species of **plants or animals** or their critical habitats listed by the Secretary under the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.), or those species or habitats protected by similar State statutes; (ii) Habitats of unusually high value for **fish and wildlife** such as important streams, wetlands, riparian areas, cliffs supporting raptors, areas offering special shelter or protection, migration routes, or reproduction and wintering areas; or (iii) Other species or habitats identified through agency consultation as requiring special protection under State or Federal law.

Sect. 780.16—
Fish and Wildlife
Information. (cont.)

(b) Protection and enhancement plan. Each application shall include a description of how, to the extent possible using the best technology currently available, the operator will minimize disturbances and adverse impacts on **fish and wildlife** and related environmental values, including compliance with the Endangered Species Act, during the surface coal mining and reclamation operations and how enhancement of these resources will be achieved where practicable. This description shall-

(1) Be consistent with the requirements of § 816.97 of this chapter;

(2) Apply, at a minimum, to species and habitats identified under paragraph (a) of this section; and

(3) Include-

(i) Protective measures that will be used during the active mining phase of operation. Such measures may include the establishment of buffer zones, the selective location and special design of haul roads and powerlines, and the monitoring of surface water quality and quantity; and

(ii) Enhancement measures that will be used during the reclamation and postmining phase of operation to develop aquatic and terrestrial habitat. Such measures may include restoration of streams and other wetlands, retention of ponds and impoundments, establishment of vegetation for **wildlife** food and cover, and the replacement of perches and nest boxes. Where the plan does not include enhancement measures, a statement shall be given explaining why enhancement is not practicable.

(c) **Fish and Wildlife** Service review. Upon request, the regulatory authority shall provide the resource information required under paragraph (a) of this section and the protection and enhancement plan required under paragraph (b) of this section to the U.S. Department of the Interior, **Fish and Wildlife** Service Regional or Field Office for their review. This information shall be provided within 10 days of receipt of the request from the Service.

Sect. 795.9—Program Services And Data Requirements.

(b) The program administrator shall determine the data needed for each applicant or group of applicants. Data collected and the results provided to the program administrator shall be sufficient to satisfy the requirements for:

(6) The collection of site-specific resources information, the production of protection and enhancement plans for **fish and wildlife** habitats required by §§ 780.16 and 784.21, and information and plans for any other environmental values required by the regulatory authority under the act.

Sect. 810.2—Objective.

The objective of this subchapter is to ensure that coal exploration and surface coal mining and reclamation operations are conducted in manners which are compatible with the environmental, social, and esthetic needs of the Nation. Accordingly, the performance standards and design requirements in this subchapter will provide for-

(e) Minimizing, to the extent possible using the best technology currently available, disturbances and adverse impacts on **fish, wildlife,** and other related environmental values, and enhancement of such resources where practicable;

Sect. 815.15—Performance Standards for Coal Exploration.

(a) Habitats of unique or unusually high value for **fish, wildlife,** and other related environmental values and critical habitats of threatened or endangered species identified pursuant to the Endangered Species Act of 1973 (16 U.S.C. 1531 et seq.) shall not be disturbed during coal exploration.

Sect. 816.13—Casing and Sealing of Drilled Holes: General Requirements.

Each exploration hole, other drill or borehole, well, or other exposed underground opening shall be cased, sealed, or otherwise managed, as approved by the regulatory authority, to prevent acid or other toxic drainage from entering ground or surface waters, to minimize disturbance to the prevailing hydrologic balance, and to ensure the safety of people, livestock, **fish and wildlife**, and machinery in the permit area and adjacent area. If these openings are uncovered or exposed by surface mining activities within the permit area they shall be permanently closed, unless approved for water monitoring, or otherwise managed in a manner approved by the regulatory authority. Use of a drilled hole or borehole or monitoring well as a water well must meet the provisions of § 816.41 of this part. This section does not apply to holes solely drilled and used for blasting.

Sect. 816.15—Casing and Sealing of Drilled Holes: Permanent.	When no longer needed for monitoring or other use approved by the regulatory authority upon a finding of no adverse environmental or health and safety effect, or unless approved for transfer as a water well under § 816.41, each exploration hole, other drilled hole or borehole, well, and other exposed underground opening shall be capped, sealed, backfilled, or otherwise properly managed, as required by the regulatory authority, under § 816.13 and consistent with 30 CFR 75.1711. Permanent closure measures shall be designed to prevent access to the mine workings by people, livestock, **fish and wildlife,** and machinery, and to keep acid or other toxic drainage from entering ground or surface waters.
Sect. 816.71—Coal Mine Waste: Refuse Piles.	(e) Placement of excess spoil. (4) No permanent impoundments are allowed on the completed fill. Small depressions may be allowed by the regulatory authority if they are needed to retain moisture, minimize erosion, create and enhance **wildlife** habitat, or assist revegetation; and if they are not incompatible with the stability of the fill .
Sect. 816.83—Coal Mine Waste: Refuse Piles.	Refuse piles shall meet the requirements of § 816.81, the additional requirements of this section, and the requirements of §§ 77.214 and 77.215 of this title. (c) Placement. (1) All vegetative and organic materials shall be removed from the disposal area prior to placement of coal mine waste. Topsoil shall be removed, segregated and stored or redistributed in accordance with § 816.22. If approved by the regulatory authority, organic material may be used as mulch, or may be included in the topsoil to control erosion, promote growth of vegetation or increase the moisture retention of the soil. (3) No permanent impoundments shall be allowed on the completed refuse pile. Small depressions may be allowed by the regulatory authority if they are needed to retain moisture, minimize erosion, create and enhance **wildlife** habitat, or assist revegetation, and if they are not incompatible with stability of the refuse pile.

Sect. 816.97—Protection of **Fish, Wildlife,** and Related Environmental Values.

(a) The operator shall, to the extent possible using the best technology currently available, minimize disturbances and adverse impacts on **fish, wildlife,** and related environmental values and shall achieve enhancement of such resources where practicable.

(b) Endangered and threatened species. No **surface mining** activity shall be conducted which is likely to jeopardize the continued existence of endangered or threatened species listed by the Secretary or which is likely to result in the destruction or adverse modification of designated critical habitats of such species in violation of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.). The operator shall promptly report to the regulatory authority any State- or federally-listed endangered or threatened species within the permit area of which the operator becomes aware. Upon notification, the regulatory authority shall consult with appropriate State and Federal **fish and wildlife** agencies and, after consultation, shall identify whether, and under what conditions, the operater may proceed.

(c) Bald and golden eagles. No **surface mining** activity shall be conducted in a manner which would result in the unlawful taking of a bald or golden eagle, its nest, or any of its eggs. The operator shall promptly report to the regulatory authority any golden or bald eagle nest within the permit area of which the operator becomes aware. Upon notification, the regulatory authority shall consult with the U.S. **Fish and Wildlife** Service and also, where appropriate, the State **fish and wildlife** agency and, after consultation, shall identify whether, and under what conditions, the operator may proceed.

(d) Nothing in this chapter shall authorize the taking of an endangered or threatened species or a bald or golden eagle, its nest, or any of its eggs in violation of the Endangered Species Act of 1973, as amended, 16 U.S.C. 1531 et seq., or the Bald Eagle Protection Act, as amended, 16 U.S.C. 668 et seq.

(e) Each operator shall, to the extent possible using the best technology currently available-

(1) Ensure that electric powerlines and other transmission facilities used for, or incidental to, **surface mining** activities on the permit area are designed and constructed to minimize electrocution hazards to raptors, except where the regulatory authority determines that such requirements are unnecessary;

Sect. 816.97—Protection of **Fish, Wildlife,** and Related Environmental Values. (cont.)

(2) Locate and operate haul and access roads so as to avoid or minimize impacts on important **fish and wildlife** species or other species protected by State or Federal law;

(3) Design fences, overland conveyors, and other potential barriers to permit passage for large mammals, except where the regulatory authority determines that such requirements are unnecessary; and

(4) Fence, cover, or use other appropriate methods to exclude **wildlife** from ponds which contain hazardous concentrations of toxic-forming materials.

(f) Wetlands and habitats of unusually high value for **fish and wildlife.** The operator conducting **surface mining** activities shall avoid disturbances to, enhance where practicable, restore, or replace, wetlands, and riparian vegetation along rivers and streams and bordering ponds and lakes. **Surface mining** activities shall avoid disturbances to, enhance where practicable, or restore, habitats of unusually high value for **fish and wildlife.**

(g) Where **fish and wildlife** habitat is to be a postmining land use, the **plant** species to be used on reclaimed areas shall be selected on the basis of the following criteria:

(1) Their proven nutritional value for **fish or wildlife.**

(2) Their use as cover for **fish or wildlife.**

(3) Their ability to support and enhance **fish or wildlife** habitat after the release of performance bonds. The selected **plants** shall be grouped and distributed in a manner which optimizes edge effect, cover, and other benefits to **fish and wildlife.**

(h) Where cropland is to be the postmining land use, and where appropriate for **wildlife**- and crop-management practices, the operator shall intersperse the fields with trees, hedges, or fence rows throughout the harvested area to break up large blocks of monoculture and to diversify habitat types for birds and other **animals.**

(i) Where residential, public service, or industrial uses are to be the postmining land use, and where consistent with the approved postmining land use, the operator shall intersperse reclaimed lands with greenbelts utilizing species of grass, shrubs, and trees useful as food and cover for **wildlife.**

Sect. 816.102—Backfilling and Grading: General Requirements.	(h) Small depressions may be constructed if they are needed to retain moisture, minimize erosion, create and enhance wildlife habitat, or assist revegetation.
Sect. 816.111—Revegetation: General Requirements.	(b) The reestablished **plant** species shall- (4) Be compatible with the **plant and animal** species of the area; and
Sect. 816.116—Revegetation: Standards for Success.	(b) Standards for success shall be applied in accordance with the approved postmining land use and, at a minimum, the following conditions: (3) For areas to be developed for **fish and wildlife** habitat, recreation, shelter belts, or forest products, success of vegetation shall be determined on the basis of tree and shrub stocking and vegetative ground cover. Such parameters are described as follows: (i) Minimum stocking and planting arrangements shall be specified by the regulatory authority on the basis of local and regional conditions and after consultation with and approval by the State agencies responsible for the administration of forestry and **wildlife** programs. Consultation and approval may occur on either a programwide or a permit-specific basis.
Sect. 816.150—Roads: General.	(b) Performance standards. Each road shall be located, designed, constructed, reconstructed, used, maintained, and reclaimed so as to: (2) Control or prevent damage to **fish, wildlife,** or their habitat and related environmental values; (6) Prevent or control damage to public or private property, including the prevention or mitigation of adverse effects on lands within the boundaries of units of the National Park System, the National **Wildlife** Refuge System, the National System of Trails, the National Wilderness Preservation System, the Wild and Scenic Rivers System, including designated study rivers, and National Recreation Areas designated by Act of Congress;

Sect. 816.181—Support Facilities.	(b) In addition to the other provisions of this part, support facilities shall be located, maintained, and used in a manner that- (2) To the extent possible using the best technology currently available- (i) Minimizes damage to **fish, wildlife,** and related environmental values; and
Sect. 827.12 Coal Preparation plants: Performance Standards.	Except as provided in § 827.13 of this part, the construction, operation, maintenance, modification, reclamation, and removal activities at coal preparation plants shall comply with the following: (f) **Fish, wildlife**, and related environmental values shall be protection in accordance with § 816.97 of this chapter.
Sect. 828.11—In Situ Processing: Performance Standards.	(c) Each person who conducts in situ processing activities shall submit for approval as part of the application for permit under 30 CFR 785.22, and follow after approval, a plan that ensures that all acid-forming, toxic-forming, or radioactive gases, solids, or liquids constituting a fire, health, safety, or environmental hazard and caused by the mining and recovery process are promptly treated, confined, or disposed of, in a manner that prevents contamination of ground and surface waters, damage to **fish, wildlife** and related environmental values, and threats to the public health and safety.
Sect. 884.13—Content of Proposed State Reclamation Plan.	Each proposed State reclamation plan shall be submitted to the Director in writing and shall include the following information: (f) A general description, derived from available data, of the conditions prevailing in the different geographic areas of the State where reclamation is planned, including- (3) Endangered and threatened **plant, fish, and wildlife** and their habitat.

Reclaimed Bentonite Mines: Wetlands for Wildlife

WYOMING DEPARTMENT OF ENVIRONMENTAL QUALITY
ABANDONED MINE LAND DIVISION
Evan J. Green, Administrator

ABANDONED (PRE-SMCRA) BENTONITE MINE RECLAMATION

Wyoming Abandoned Mine Land Program (AML)

Established in 1983 under Title IV of the federal Surface Mining Control and Reclamation Act of 1977 (SMCRA).

Funded by a fee (tax) on coal production, 35¢/ton from surface mines, 15¢/t from underground mines, 10¢/t from lignite mines. 50% of the AML tax collection is supposed to be returned to the State/Tribe of origin. In recent years, the Wyoming AML Program has received in the neighborhood of $20-25 million per year, or about half of the State's proper share.

The Program's mission is to eliminate hazards to public health and safety resulting from abandoned mines; to control and mitigate off-site environmental degradation caused by unreclaimed, or inadequately reclaimed, abandoned mines; to repair, or construct new public facilities in communities impacted by mining; and to support coal mine reclamation research.

AML eligible sites must have been mined prior to the passage of Wyoming's 1969 Open Cut Reclamation Act, or may have been mined and left in an inadequate reclaimed condition after 1969 but before the effective date of SMCRA, August 3, 1977 (August 28, 1974 on National Forest lands or November 26, 1980 on Bureau of Land Management lands).

Abandoned Bentonite Mine Setting

Overburdens associated with bentonite deposits are usually high in sodium. Sodium Adsorption Ratios (SAR) as high as 47.8 and Exchangeable Sodium Percentages (ESP) as high as 56.4 have been observed. Acceptable SARs are 8 and acceptable ESPs are 15.

Sodium causes the soil surface to swell and seal when wet, preventing water from infiltrating into the soil profile, limiting moisture available to vegetation. Upon drying, an impenetrable crust is formed, preventing seedling emergence or root penetration. Barren, unvegetated overburden piles are highly erosive, resulting in the degradation of adjacent off-site lands with sodic sediments.

Bentonite mine pits often become filled with water from intercepted run-off or from ground water sources and develop wetland vegetation and characteristics. Overburdens with a high bentonite content and bentonite cleanings left after mining often become saturated. Bentonite can absorb as much as 150 times its volume of water, resulting in accumulations of a quicksand-like muck in the bottoms and along the shores of these water bodies. These "mucky" wetlands, attractive to wildlife and domestic livestock, become entrapment hazards that often result in death to the animals that have become mired.

Reclamation Approach

The primary objective of the AML reclamation program is to establish geomorphic and erosional stability. This is achieved by minimizing steep slopes, maximizing drainage channel density, and armoring steep, high velocity channels with rip-rap.

The elimination of bentonitic muck is a high priority to reduce or eliminate entrapment hazards to livestock and wildlife. Where possible, muck is mixed with low bentonite-content overburden and disposed in the dry, upland portions of the reclaimed site. When necessary, and as a last alternative, muck areas are fenced. Safe livestock and wildlife access may be provided to mucky water sources where necessary.

Flooded bentonite pits and blocked ephemeral drainage channels qualify for protection under the "no net loss" provisions of the wetlands preservation requirements. Wetlands lost or affected by reclamation have to be mitigated. Initially, a model developed by a wildlife consultant and a Wyoming Department of Game and Fish employee was used to evaluate wetland habitat value prior to AML reclamation, and as a planning tool to incorporate adequate replacement habitat value into the reclaimed wetlands. Current wetland replacement criteria are based upon an arbitrary ratio for replacement such as 1.25 acres of reclaimed wetland for every one acre of original wetland, or perhaps a greater ratio if a wetland is determined to be of a higher critical concern.

Mitigation of the sodium problem is critical for revegetation of the disturbed sites and the overall success of reclamation. Topsoil is generally not available as none had been salvaged and stockpiled by the early mining operations. The borrowing of topsoil from off-site sources is impractical for many reasons, including cost. A soil amendment prescription based upon the research of Dr. Gerald Schuman, et.al., USDA-ARS and the University of Wyoming, and by Douglas Dollhopf, et.al., Montana State University, utilizing woodchips and calcium amendments was developed and has become the standard for all Wyoming AML bentonite reclamation projects.

Past AML reclamation made no effort to place surface soils, when they were available, below the normal pool elevation of reclaimed wetlands, as it was perceived to be more valuable elsewhere in the reclamation. Likewise, soil amendments were also not applied to permanent pool areas. Research by Mark McKinstry of the University of Wyoming's Cooperative Fish and Wildlife Research Unit has shown that AML reclaimed bentonite mine wetlands are not developing as anticipated. Further research work is progressing toward finding a practical approach for wetland vegetative establishment on reclaimed bentonite mines. An experimental practice was undertaken by the Wyoming AML Program in the fall of 2000 of salvaging wetland soils and muck from ponds that would be affected by reclamation and placing that material at the normal pool elevation of some reclaimed ponds. Initial response is promising.

Amendment Prescription

Woodwaste is applied at 132 cubic yards per acre (equivalent to 20 tons dry weight) to improve the physical characteristics of the regraded overburden (minesoil) to break up the surface crust and to provide conduits for moisture penetration. Wood waste is obtained from local area sawmills and consists of more than 50% wood chips and/or bark, and not more than 25% as sawdust. The woodwaste amendment is used in the high clay content soil materials with >30% clay.

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Nitrogen fertilizer is used to accommodate the nutrient needs for the woodwaste decay organisms An average of 290 pounds of N is applied per acre.

Calcium amendments are used in all AML bentonite reclamation projects in the form of gypsum, gypsum and calcium chloride mixed, and occasionally as phosphogypsum. Where gypsum and calcium chloride is used together, the proportion of gypsum to "chloride" is variable. The calcium chloride is more soluble than the gypsum, and is used to provide a quicker response than what just the gypsum alone will provide. The target application rate of the calcium amendments is to reduce the exchangeable sodium percentage (ESP) in the surface 12 inches to 10. The rate is determined by soil sampling and analysis of the final graded surface before revegetation is performed. Mine soils with an ESP less than 10 are not treated with the calcium amendments.

Acid conditions are occasionally encountered, in addition to the high sodicity. Where needed, lime is used to mitigate these acid conditions.

Special handling and placement of unsuitable soil materials at least two feet below the final graded surface is an integral part of the reclamation activity. Unsuitable materials most often include highly sodic materials, bentonite cleanings, muck, and occasional occurrences of low pH, or acidic, soils.

Amendment incorporation consists of surface application of all of the amendments, generally by heavy duty fertilizer spreader equipment. Liquid applications of calcium chloride may be made on occasion. Deep ripping, at least to 18 inches, is done to break up compaction and to introduce the amendments to depth. Discing to 12 inches follows, with the goal of thoroughly mixing the bulk of the amendments into the surface soils, and to prepare an appropriate seedbed. Rocks are generally not a problem.

Revegetation

Seeding technique includes drill seeding and hay mulch as well as the generally preferred method of pitting and broadcast seeding. Pitting results in from 6000 to 10,000 "dimples" per acre, approximately 12 to 16 inches in diameter and 4 to 6 inches deep. The pitting is believed to provide greater on-site moisture retention for calcium amendment enhancement, as well as to provide greater micro-site opportunities for multiple species seed germination. Broadcast seeding is generally done as part of the pitting operation.

Species and seeding rates are variable depending upon the specific project needs, landowner concerns, and other factors. Research has shown that sod-forming grasses generally has higher performance than bunch-grasses, especially in the heavy clay soils. Seed mixtures generally favor these species. Yellow sweetclover (*Melilotus officinales*) was used for nitrogen fixation, but has been generally replaced by purple prairieclover (*Dalea purpurea*). Shrubs commonly used include gardner saltbush (*Atriplex gardneri*) and rubber rabbitbrush (*Chrysothamnous nauseosus*).

A fall, 2000 seeding in the Weston County area included the following species and rates:

Common Name	Scientific Name	Variety	lbs/Acre PLS
Slender wheatgrass	*Elymus trachycaulus*	Revenue	4
Thickspike wheatgrass	*Elymus lanceolatus*	Critana	4
Western wheatgrass	*Pascopyrum smithii*	Rosana	6
Streambank wheatgrass	*Elymus lanceolatus spp riparium*	Sodar	3
Intermediate wheatgrass	*Elytrigia intermedia spp intermedia*	Tegmar	4
Green needlegrass	*Stipa viridula*	Lodorm	2
Purple prairieclover	*Dalea purpurea*	Kaneb	2
Total			**25**

Reclamation Costs

The reclamation of abandoned bentonite mines by the Wyoming AML has ranged from $4,200 per acre to slightly over $6,000 per acre. Earthwork (grading and shaping) is the most costly activity at 47% of the average cost, and revegetation, including amendments, incorporation, and seeding, makes up 24% of the total cost. Woodwaste and the calcium amendments, where used, amount to 11% of the total cost. Other elements of the reclamation cost include mobilization and demobilization, muck management and handling, erosion control, topsoil/coversoil placement, fencing, and access road maintenance.

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Mountain Plover Survey Guidelines

MOUNTAIN PLOVER SURVEY GUIDELINES
U.S. Fish and Wildlife Service
2001

The mountain plover (*Charadrius montanus*) is a small bird (17.5 cm, 7 in.) about the size of a killdeer (*C. vociferus*). It is light brown above with a lighter colored breast, but lacks the contrasting dark breast-belt common to many other plovers. During the breeding season it has a white forehead and a dark line between the beak and eye, which contrasts with the dark crown.

Mountain plover breeding habitat is known to include short-grass prairie and shrub-steppe landscapes; dryland, cultivated farms; and prairie dog towns. Plovers usually nest on sites where vegetation is sparse or absent, due to disturbance by herbivores, including domestic livestock and prairie dogs. Vegetation at shortgrass prairie sites is less than 4 inches tall, while shrubs visually predominate nest sites within the shrub-steppe landscape. Usually, nest sites within the shrub-steppe are on active prairie dog towns. Nests are commonly located near a manure pile or rock. In addition to disturbance by prairie dogs or livestock, they have also been found on oil drill pads. Mountain plovers are rarely found near water. They may be found on heavily grazed pastures throughout their breeding range and may selectively nest in or near prairie dog towns. Positive indicators for mountain plovers therefore include level terrain, prairie dogs, bare ground, *Opuntia* pads, cattle, widely spaced plants, and horned larks. It would be unusual to find mountain plovers on sites characterized by irregular or rolling terrain; dense, matted vegetation; grass taller than 4 inches, wet soils, or the presence of killdeer .

These guidelines were developed by Service biologists and Dr. Fritz Knopf, USGS-BRD. Keep in mind these are guidelines - please call the local Fish and Wildlife Service, Ecological Services office, if you have any suggestions.

GENERAL GUIDELINES FOR SURVEYS

On February 16, 1999, the Service proposed the mountain plover for federal listing as threatened. Because listing of this species is proposed, the Service may recommend surveys for mountain plovers to better define nesting areas, and minimize potential negative impacts. The Service recommends surveys for mountain plovers in all suitable habitat, as well as avoidance of nesting areas, to minimize impact to plovers in a site planned for development. While the Service believes that plover surveys, avoidance of nesting and brood rearing areas, and timing restrictions (avoidance of important areas during nesting) will lessen the chance of direct impacts to and mortality of individual mountain plovers in the area, these restrictions do nothing to mitigate indirect effects, including changes in habitat suitability and habitat loss. Surveys are, however, a necessary starting point. The Service has developed the following 3 survey guidelines, depending on whether the intent is to determine the presence or absence of plovers at a

site during the nesting season for permanent and short term projects, or to determine the density of nesting plovers at know nesting sites.

Survey Protocol

Two types of surveys may be conducted: 1) surveys to determine the presence/absence of breeding plovers (i.e., displaying males and foraging adults), or 2) surveys to determine nest density. The survey type chosen for a project and the extent of the survey area (i.e., beyond the edge of the construction or operational ROW) will depend on the type of project activity being analyzed (e.g., construction, operation) and the users intent. One methodology outlines a breeding survey that was used in northeastern Colorado to establish the density of occupied territories, based on displaying male plovers or foraging adults. The other was developed to only determine whether plovers occupy an area.

Techniques Common to Each Survey Method

Conduct surveys during early courtship and territorial establishment. Throughout the breeding range, this period extends from approximately May 1 through early July. However, the specific breeding period, and therefore peak survey days, depends on latitude, elevation, and weather.

Conduct surveys between local sunrise and 1000 and from 1730 to sunset (periods of horizontal light to facilitate spotting the white breast of the adult plovers).

Drive transects within the project area to minimize early flushing. Flushing distances for mountain plovers may be within 3 meters for vehicles, but plovers often flush at 50 to 100 meters when approached by humans on foot.

Use of a 4-wheel drive vehicle is preferable where allowed. Use of ATVs has proven highly successful in observing and recording displaying males. Always seek guidance from land management agencies regarding use of vehicles on public lands, and always obtain permission of private landowners before entering their lands.

Stay in or close to the vehicle when scanning. Use binoculars to scan and spotting scopes to confirm sightings. Do not use scopes to scan.

Do not conduct surveys in poor weather (i.e., high wind, precipitation, etc.).

Surveys conducted during the courtship period should focus on identifying displaying or calling males, which would signify breeding territories.

For all breeding birds observed, conduct additional surveys immediately prior to construction activities to search for active nest sites.

If an active nest is located, an appropriate buffer area should be established to prevent direct loss of the nest or indirect impacts from human-related disturbance. The appropriate buffer distance will vary, depending on topography, type of activity proposed, and duration of disturbance. For disturbances including pedestrian foot traffic and continual equipment operations, a 1/4 mile buffer is recommended.

SURVEY TO DETERMINE PRESENCE/ABSENCE

Large scale/long term projects

1. Conduct the survey between May 1 and June 15, throughout the breeding range.

2. Visual observation of the area should be made within 1/4 mile of the proposed action to detect the presence of plovers. All plovers located should be observed long enough to determine if a nest is present. These observations should be made from within a stationary vehicle, as plovers do not appear to be wary of vehicles. Because this survey is to determine presence/absence only, and not calculate statistical confidence, there is no recommended distance interval for stopping the vehicle to scan for birds.

3. If no visual observations are made from vehicles, the area should be surveyed on ATV's. Extreme care should be exercised in locating plovers due to their highly secretive and quiet nature. Surveys by foot are not recommended because plovers tend to flush at greater distances when approached using this method. Finding nests during foot surveys is more difficult because of the greater flushing distance.

4. A site must be surveyed 3 times during the survey window, with each survey separated by at least 14 days.

5. Initiation of the project should occur as near to completion of the survey as possible. For example, seismic exploration should begin within 2 days of survey completion. A 14 day period may be appropriate for other projects.

6. If an active nest is found in the survey area, the planned activity should be delayed 37 days, or one week post-hatching. If a brood of flightless chicks is observed, activities should be delayed at least seven days.

Short-term, linear projects

For short-term, linear projects such as pipelines, fiber optic cables, and seismic exploration, the presence/absence guidelines above should adhere to the dates below.

1. **Before April 10 -** All ROW surveying activity should be completed before April 1. If ROW surveying of these areas cannot be completed before April 1, surveyors will need to coordinate with the lead Federal agency before entering these areas, and a plover survey would be required prior to activity.

2. **April 10 through May 7 -** a plover survey will need to be completed 1 - 3 days prior to any construction activity, including initial brush clearing. If there is a break in construction activity in these areas of more than 3 days (for example between pipe stringing, trenching, or welding), an additional plover survey is necessary before construction activity can resume after that break in activity.

3. **May 8 through July 10 -** A plover survey will need to be completed 3 - 7 days prior to any construction activities. If there is a break in construction activity in these areas of more than 10 days, an additional plover survey is necessary before construction activity can resume after the break in activity.

Should breeding plovers be discovered during any of the surveys, no construction activity would be allowed until the young have fledged.

SURVEY TO DETERMINE DENSITY OF NESTING MOUNTAIN PLOVERS

We are assuming people will have received training on point counts in general before using this specialized point count technique adapted to mountain plovers.

Establishing Transects

1. Identify appropriate habitat and habitat of interest within geographic areas of interest.

2. Upon arriving in appropriate habitat, drive to a previously determined random starting point.

3. For subsequent points, drive a previously determined random distance of 0.3, 0.4 or 0.5 miles.

4. Each transect of point counts should contain a minimum of 20 points.

Conducting The Point Counts

1. Conduct counts between last week in June to July 4th at eastern plains elevation in Colorado.

2. Only 1 counter is used. Do not use a counter and recorder or other combinations of field help. Drivers are okay as long as they don't help spot plovers.

3. If an adult mountain plover is observed, plot occupied territories on a minimum of 1:24,000 scale map and on a ROW diagram or site grid (see attached). The ROW diagram will be at a greater level of detail, depicting the location of breeding birds (and possible nest sites) relative to ROW centerline, construction boundary, and applicable access roads.

4. Estimate or measure distances (in meters) to all mountain plovers. Method used should be noted, e.g., estimates w/distance training, estimates w/o distance training, rangefinder or measured with tape measure, etc.

5. Record "fly-overs" as "FO" in the distance column of the data sheet.

6. If you disturb a mountain plover while approaching the point, estimate the distance from point-center to the spot from which the bird was flushed.

7. Conduct counts for 5 minutes with a 3 minute subsample to standardize with BBS.

8. Stay close to your vehicle while scanning.

Recording Data

Record the following information <u>AT EVERY POINT, EVERY DAY</u>.

start time
unique point code (don't duplicate within a field crew or across dates)
number of mountain plovers and distance to each
land use and/or habitat type (e.g., fallow wheat, plowed, shortgrass)
temperature, Beaufort wind, and sky conditions (clear, partly cloudy, overcast)
Information on the data sheet somewhere.
your name and address
date
Record for each point at some point during the census.

detailed location description of each point count including road number, distance to important intersections.
record transect and point locations on USGS county maps.
Universal Transverse Mercator from maps or GPS are useful.

GENERAL HABITAT INDICATORS

Positive habitat images

Stock tank (non-leaking, leaking tanks often attract killdeer)
Flat (level or “tilted”) terrain
Burned field/prairie/pasture
Bare ground (minimum of 30 percent)
“Spaced” grass plants
Prairie dog colonies
Horned larks
Cattle
Heavily grazed pastures
Opuntia pads visible

Negative habitat images

Killdeer present (indicating less than optimal habitat)
Hillsides or steep slope
Prominent, obvious low ridge
Leaky stock tanks
Vegetation greater than 4 inches in height
Increasing presence of tall shrubs
Matted grass (i.e., minimal bare ground)
Lark buntings