

**WILDLIFE MONITORING PLAN  
FOR POST CLOSURE-  
TYRONE MINE**

*Submitted to:*

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Tyrone, New Mexico*

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## **1.0 INTRODUCTION**

Phelps Dodge Tyrone, Inc. (Tyrone) operates an open pit copper mine and solution extraction/electrowinning plant about 10 miles west of Silver City, New Mexico (Figure 1). This report describes a post-closure wildlife monitoring plan for reclaimed lands as required by Condition N-3 of Permit Revision 01-1 to Permit GR010RE issued by the Mining and Minerals Division (MMD) of the New Mexico Energy, Minerals, and Natural Resources Department. The permits requires that Tyrone conduct deer pellet group counts and bird diversity surveys beginning 3 years after seeding. The surveys must be conducted every year thereafter throughout the permit bond release period. These efforts are intended to aid in the understanding of wildlife use trends during establishment of the reclaimed areas, but are not a condition for bond release.

This monitoring plan provides a description of the proposed reclamation plan as it applies to wildlife and wildlife habitat, an overview of the existing wildlife species and wildlife habitat near the Tyrone Mine, and the proposed methods for deer pellet group counts and bird diversity surveys. This plan was developed in consultation with the New Mexico Department of Game and Fish (NMDG&F) and MMD. Input on the study design from the NMDG&F and MMD was received during a December 13, 2004 meeting and in subsequent correspondence associated with the wildlife monitoring plan prepared for Chino Mines Company.

Two major reclamation units can be delineated at the Tyrone Mine. The large tailing impoundments occur north in the Mangas Valley, while the stockpile unit occurs to the south near the open pits. Reclamation has been initiated on the tailing impoundments and portions of the stockpiles.

## **2.0 THE EXISTING PROJECT AREA**

This section discusses the general environmental setting of the Tyrone Mine. Additional information can be obtained in the Closure/Closeout Plan and supporting studies that have been developed for Tyrone.

### **2.1 Geology**

The Tyrone Mine Area straddles the Continental Divide between the Big Burro Mountains and Little Burro Mountains. The Little Burro Mountains are situated northeast of the Big Burro Mountains and are separated from the Big Burro Mountains by the mine and the Mangas Valley (Figure 1). The Mangas Valley and the Little Burro Mountains are located within a structurally controlled regional linear topographic feature that trends northwest to southeast.

The geology of the Tyrone copper deposit and surrounding area has been summarized by DuHamel et al. (1993); Kolessar (1982); Paige (1922); and Hedlund (1978). The Tyrone deposit is considered to be a porphyry copper deposit that is generally confined to a triangular area at the southeastern end of the Big Burro Mountains and is bounded by the Burro Chief and West Main Fault systems on the west, Sprouse-Copeland Fault on the east, and San Salvador fault system on the south.

The rocks that crop out in the Big Burro and Little Burro Mountains range in age from Precambrian to Quaternary. The Big Burro Mountains are dominantly composed of the Precambrian Burro Mountain granite; this batholith was subsequently intruded by the Tyrone stock nearly 56 million years ago (Kolessar, 1982).

Exposures of Cretaceous rocks are limited to the Little Burro Mountains. The Cretaceous units are predominantly sedimentary rocks that include the Beartooth quartzite and the Colorado Formation. The Beartooth quartzite is a thin-bedded to massive fine-grained sandstone that unconformably overlies Precambrian granite. The Colorado Formation is a sandy shale that conformably overlies the Beartooth quartzite (Kolessar, 1982). Cretaceous and Tertiary volcanic rocks, primarily andesites and rhyolites, overlie the Cretaceous sedimentary units.

The youngest rocks in the area are of late Tertiary and Quaternary age and consist mostly of sands, gravels, and conglomerates. The Gila Conglomerate Formation, the oldest of the younger sedimentary rocks, is a semi-consolidated unit that was deposited as bolson fill and fan sediments

derived from late Tertiary and earlier uplifts. The youngest sedimentary units are unconsolidated and were deposited unconformably on Gila Conglomerate and as valley fill along present-day drainages. The main geologic structures in the Big Burro Mountains, Mangas Valley, and Little Burro Mountains are northeast- and northwest-trending faults. The Mangas Fault is a normal fault that separates the Little Burro Mountains from the Big Burro Mountains. Along the fault trace, Gila Conglomerate and bolson fill deposits have been juxtaposed against the older rocks of the Little Burro Mountains (Kolessar, 1982).

## **2.2 Climate**

The Tyrone Mine is located in a semi-arid region in southwestern New Mexico, with elevations ranging from about 5,100 to 6,500 feet above mean sea level. The climate at Tyrone is warm and dry, with mean annual precipitation ranging from 14 to 18 inches and a mean annual temperature near 50°F. Precipitation falls mainly as rain, but snow may occur from November to March. Most of the precipitation in the area falls during July through October in the form of rain during short, intense, thunderstorms. About 60 percent of the precipitation falls during the summer months. Precipitation is characterized mostly by small magnitude events ranging from less than 0.1 to 0.25 inches per day. Larger magnitude rainfall events (greater than 1 inch) also occur in the summer months, but at a much lower frequency.

## **2.3 Soils and Vegetation**

The Soil Conservation Service (Parnham et al. 1983) mapped the soils in the Tyrone Mine Area, and Daniel B. Stephens & Associates, Inc. (DBS&A, 1997) further characterized both the soils and vegetation as part of the closure/closeout studies conducted for the Tyrone Mine. The distribution of soils at the Tyrone Mine is controlled by the climate, geology, age of the land surfaces, and physiography of the area. The vegetation is indicative of the regional climate modified by soil and topographic factors. The distribution of the existing vegetation is locally complex and reflects the influence of both environmental gradients and land management practices. Vegetation in the permit area is not unique relative to the surrounding area and represents a minor fraction of plant communities that are locally and regionally extensive. No threatened or endangered plant species are recognized as occurring in the permit area.

Four soil-vegetation associations were identified within the mine permit area: (1) alluvial grassland association, (2) piedmont scrub savanna association, (3) mountain slope scrub savanna

association, and (4) mountain slope mixed evergreen woodland association. These soil-vegetation associations are described below.

### 2.3.1 Alluvial Grassland Association

The dominant soils in the alluvial grassland association include coarse-loamy and sandy families of Haplustolls. The soils are very deep, nonsaline, nonsodic, and coarse-textured, and were formed in thick, stratified alluvial deposits composed predominantly of mixed igneous rocks. This association includes two consociations that occupy the nearly level to gently sloping floodplains and alluvial terraces of the major drainages (e.g., Mangas Wash and Oak Grove Wash) in the permit area (Figure 2). The vegetation in this map unit is representative of an alluvial grassland with a minor riparian component dominated by desert willow (*Chilopsis linearis*). The existing vegetation is dominated by a variety of annual and perennial grasses and forbs. Sideoats grama (*Bouteloua curtipendula*) and purple threeawn (*Aristida purpurea*) are the dominant perennial grasses, while honey mesquite, Apache plume (*Fallugia paradoxa*), and California bricklebrush (*Brickellia californica*) are important shrubs. Mat muhly (*Muhlenbergia torreyi*), cholla (*Opuntia* spp.), and Russian thistle (*Salsola kali*) are locally prevalent in disturbed areas. Desert willow is primarily restricted to the Wind Canyon drainage upstream of its confluence with Mangas Wash.

### 2.3.2 Piedmont Scrub Savanna Association

The soils in the piedmont scrub savanna association are included in loamy-skeletal, clayey-skeletal, and fine families of Aridic Haplustalfs. The soils are very deep, nonsaline, nonsodic, medium- to fine-textured, and calcareous in the lower solum and substratum. These soils were formed in residuum composed of regionally derived Gila Conglomerate and local fan terrace deposits from the Little Burro Mountains. This association includes three consociations that occur on the gently sloping to steep pediments and fan terrace remnants north and east of the mine pits and stockpiles. The scrub savanna vegetative community at the Tyrone Mine is characteristic of the transition between an open grassland and mixed evergreen woodland. Currently, the dominant perennial grasses are sideoats grama, hairy grama (*B. hirsuta*), rough bentgrass (*Agrostis scabra*), and tobosa (*Hilaria mutica*). Honey mesquite, gray oak, beargrass (*Nolina microcarpa*), broom snakeweed (*Gutierrezia sarothrae*), and catclaw mimosa (*Mimosa biuncifera*) constitute the primary shrub species. Pinyon pine, oneseed and alligator

juniper, and Emory oak are important woody species on slopes with north- and east-facing aspects.

### 2.3.3 Mountain Slope Scrub Savanna

The soils in the mountain slope scrub savanna association are comprised largely of loamy skeletal Haplustalfs. The soils are shallow, medium-textured, and contain relatively high amounts of coarse fragments. These soils formed in residuum and colluvium from quartzite and mixed igneous rocks. This association includes a single consociation that is restricted to the steep and very steep western slope of the Little Burro Mountains. The vegetation in this map unit represents the kinds of vegetation found on high-gradient, west-facing slopes. The existing vegetation is characterized by a relatively open shrub canopy. Rough bentgrass, sideoats grama, and blue grama (*B. gracilis*) are the dominant perennial understory grasses. The overstory is dominated by Emory and gray oak, beargrass, sotol, and one-seed juniper, with a minor representation of honey mesquite and pinyon pine.

### 2.3.4 Mountain Slope Mixed Evergreen Woodland

The soils in the mountain slope mixed evergreen woodland association are mostly loamy-skeletal Haplustolls. These soils are shallow, noncalcareous, and medium- to coarse-textured with moderate to high amounts of coarse fragments. These soils formed in residuum and colluvium from competent igneous rocks composed of quartz monzonite and granite. Minor areas of bedrock are exposed at the surface in this map unit. This association corresponds to a single consociation map unit that occupies the strongly sloping to very steep backslopes and ridges of the Big Burro Mountains. Vegetation within the mountain slope mixed evergreen woodland association represents the lower elevation ranges of this community regionally. Ponderosa pine (*Pinus ponderosa*) and Gambel oak (*Quercus gambelii*) are locally important subordinates in this community that may dominate minor sheltered topographic positions. The riparian corridor associated with the upper reaches of Deadman Canyon is included in this association. Fremont cottonwood (*Populus fremontii*) may occur as an incidental species in this map unit.

## **2.4 Wildlife**

The habitat near the Tyrone Mine supports a diversity of wildlife species. Species that are expected to occur within Grant County are listed in Appendix A. Because the range of habitats in Grant County is greater than occurs at the mine, fewer species are expected to occur around the

mine and in the reclaimed areas. Previous studies in the Tyrone Mine Area have recorded at least 18 mammals, 79 bird species, and 5 reptiles (DBS&A 1997; Metric Corporation 1993 and 1996; and Dames & Moore 1994).

Metric Corporation (1993 and 1996) conducted surveys to identify federal and state threatened, endangered, and special status wildlife species in the Tyrone Mine Area, although no threatened, endangered, or special status wildlife species were detected.

## **2.5 Existing Habitat**

The habitat around the mine is composed predominantly of pinon-juniper woodland with a substantial oak component. Within this major habitat type are patches of riparian vegetation, ponderosa pine woodland, and rock outcrop. Large grassland areas are absent from the project area, but several grass species are prevalent providing ground cover within the woodland and in forest openings. The mine stockpiles are currently characterized by sparsely vegetated seral communities of volunteer vegetation. The reclaimed area will be dominated by grasses, forbs, and shrubs, and will increase the diversity of the area.

## **2.6 Post-closure Habitat for Wildlife**

The main goals for reclamation at the Tyrone Mine are to stabilize the tailing impoundments and stockpile areas from erosion, reduce water entry into the underlying wastes, and support the development of a self-sustaining ecosystem. The entire area of tailing and selected areas of the mine and stockpiles will be covered with suitable soils and seeded with native and adapted grasses, shrubs, and forbs (Table 1). During the bond-release period, the vegetation on the reclaimed areas is expected to represent a grass-shrub plant community. Initially, the contrast in vegetation between the reclaimed lands and surrounding undisturbed lands will provide edge habitat. Over time, the vegetation on the reclaimed areas will become more complex, both structurally and compositionally, which may increase habitat diversity for wildlife.

In the near-term, wildlife features will be constructed of locally available materials (e.g., rock or slash) on the tailing and stockpile reclamation areas to provide additional cover and vertical diversity for wildlife. These wildlife features may provide cover and nest sites for wildlife in the reclaimed areas. Where possible, power poles and other structural features may be left on site for use by raptors.



### **3.0 SURVEY METHODS**

This section provides the methods for conducting the deer pellet group count (Section 3.1) and bird diversity surveys (Section 3.2). On December 13, 2004, Phelps Dodge personnel met with the NMDG&F and MMD staff to discuss sampling designs. The discussion centered on the relative merits of random, systematic, and judgmental methods for establishing the transect locations. As a result of this consultation, Phelps Dodge agreed to locate the transects using a judgmental approach based on terrain, land use, potential animal travel paths, and other pertinent considerations. The transect locations will be determined following the completion of the seeding and in collaboration with the NMDG&F and MMD. A map showing the agreed upon location of the transects will be prepared for MMD and NMDG&F approval, prior to initiating the surveys.

#### **3.1 Deer Pellet Group Count Survey**

Pellet group counts are a standard, cost-effective way to determine relative abundance estimates and distribution of ungulates (Anderson et al., 1972; Eberhardt and Van Etten, 1956; Freddy and Bowden, 1983a and 1983b; Fuller, 1991 and 1992; Neff, 1968; White, 1992). This method will be used to assess deer activity on the reclaimed areas at Tyrone. As required by MMD, the monitoring program will begin 3 years after reclamation to allow for the initial establishment of vegetation and continue annually throughout the permit bond release period.

Condition N-3 of the MMD permit specifies quarterly monitoring; however, because deer pellets decompose slowly under arid conditions, there is limited value in conducting the pellet surveys more than once each year. Following the December 13, 2004 meeting, the NMDG&F and MMD agreed that annual, rather than quarterly, monitoring was adequate for the deer pellets group counts. Thus, the surveys will be conducted at approximately the same time each year, with the starting date varying slightly to accommodate field conditions. Because vegetation growth may obscure pellets from view, the surveys will be timed to occur just before the peak growing season in late May or early June. The pellet counts will coincide with the spring bird surveys proposed in Section 3.2.

At final closure, the study area will cover roughly 3,000 acres of reclaimed tailing impoundments and 3,000 acres of reclaimed stockpiles. To account for variability in pellet distribution, multiple transects (three to five) will be conducted in the major reclamation units (Figure 3). As discussed earlier, the transect locations and directions will be chosen in consultation with the NMDG&F

and MMD based on pertinent environmental considerations following the initial seeding. The location and compass direction of the transects will be surveyed and plotted. Once established, the transect origin will be marked in the field to eliminate the need to re-establish the transects for subsequent sample periods. The individual transects will be 202-meters (m) long and 2-m wide for a total sample area of 404 square-meters (approximately 0.1 acre).

A topographic map that shows the transect locations and major land features will be used during the field surveys. Standard datasheets will be used to record the survey information. At a minimum, the forms record the date; weather; start time; finish time; names of the observers; transect number; GPS locations for the start and end points; habitat type; species four letter codes (e.g., mule deer = MUDE); and location of the pellet groups. In addition, information will be collected concerning incidental wildlife sightings, tracks, scat, nests, burrows, and other signs of wildlife. Supplies that may be used during the survey include a map of suitable scale, GPS unit, compass, 2-m rod or stick, clip board, and camera.

One surveyor can perform a pellet group survey, though two surveyors per team can be more efficient by having one person looking for pellets, the other recording the data. Surveyors should be familiar with what constitutes a pellet group and how to distinguish between recent versus older pellet groups (only pellet groups from the current year are of interest). The NMDG&F will be consulted if there is any need for clarification.

Pellet count surveys may be conducted during any part of the day. Surveyors will walk each transect with a 2-m rod held perpendicular to the transect and level with the ground surface. All pellet groups that are found within 1 m on either side of the center line will be counted as a pellet group. Pellet groups that fall partly or wholly within the transect area will also be counted. As each pellet group is encountered, the survey information is recorded (transect number, habitat type, species, GPS location of the pellet group, and any wildlife sightings). After the count has been recorded, the pellets will be cleared from the transect area to avoid recounting in subsequent years. At completion of the field survey, the total number of pellet groups per transect and the total pellet groups for all transects in the reclamation unit will be tallied.

Pellet group density will be calculated for each transect within each area to provide a mean and variance for the area. Pellet group density is the number of pellet groups divided by the area of the transect. The pellet locations provide an indication of use patterns. These relative abundance estimates and pellet locations can be compared between and among years, and among areas to

assess changes in ungulate abundance and distribution patterns within the Tyrone Mine Area. Wildlife use trends will be determined by comparing data from preceding years.

### **3.2 Bird Diversity Surveys**

The purpose of this study is to provide an estimate of bird species diversity and relative abundance on the reclaimed Tyrone Mine Area. A combination of standard point count and transect count techniques are recommended as they provide accurate information using methods that are repeatable, unbiased, and simple to execute (Ralph et al., 1995 and Verner, 1985).

Survey sessions will be scheduled twice per year: once in January for overwintering species and once during the peak breeding season of late-May to early June, beginning Year 3 after seeding and annually throughout the permit bond release period. Two survey periods each year are sufficient to assess species diversity and relative abundance changes over time. Tyrone agrees to conduct replicate surveys during the seasonal survey periods in response to a request from the NMDG&F. Thus, the transect sites will be monitored over 3 consecutive days during both the winter and spring survey periods.

The transect locations will be the same as for the pellet group surveys. One or more locally experienced biologists will perform the surveys. Appendix A contains a comprehensive list of bird species found in Grant County and that may be encountered during the surveys.

A topographic map that shows the transect locations and major land features will be used during the field surveys. At a minimum, the field survey forms will be used to record the date, weather, start time, finish time, names of the observers, species encountered, and distance of the bird from the observer. Additional information concerning wildlife sightings (e.g., scat, tracks, and burrows) will be recorded. Supplies that may be used during the survey include a compass, clipboard, field glasses, camera, and tape recorder.

Each daily survey will be started 30 minutes before dawn and completed by mid-morning (approximately 9:30 or 10:00 AM). Survey teams may start on either end of the transect line, but each transect should be located as far as possible from the next transect that is to be surveyed. This reduces the chances of affecting the results at other survey sites if birds were flushed during the previous survey.

At the start of the transect, a fixed-distance circular point count will be completed before walking through the transect and flushing the birds. Standard point counts are 5-minute counts within a 100-m radius, where all birds are identified by sight and/or sound (Ralph et al., 1995). Distance of the bird from the observer and the time of the observation will be recorded. Counts will not be conducted in rain or high winds, as inclement weather could affect detection of birds.

Once the point count is completed, the transect line will be walked at a normal pace and all birds that can be seen or heard will be recorded. Species, sex (if known), distance from observer, behavior, and location will be recorded. If the birds cannot be identified immediately, an accurate description of the bird's physical features and characteristics will be used to identify the birds at a later time.

### **3.3 Wildlife Sightings**

Phelps Dodge agreed to provide information on wildlife sighting in response to a request from the NMDG&F for Chino Mines Company, even though it was beyond the scope of the permit requirements. Tyrone expects a similar request and proposes to conduct wildlife sighting surveys in the 2-hour period before sunset on the days that deer pellet count and bird diversity surveys are being conducted. As the amount of reclamation, and therefore number of transects, increases over time, it may become difficult to conduct this additional work in an efficient manner. Thus, Tyrone may ultimately select a limited number of primary transects to monitor to allow a balance of the quality of the surveys and number that can be conducted within the constraints of the time allotted for the pellet and bird diversity surveys. As indicated in the plan, wildlife sighting made during the pellets and bird diversity surveys will be recorded in the daily notes.

#### **4.0 SCHEDULE AND DELIVERABLES**

The schedule for wildlife surveys is linked to the reclamation of particular facilities. As required by the MMD permit, wildlife surveys will be initiated 3 years after seeding. Reclamation activities have been initiated on the tailing impoundments and portions of the stockpiles. Tyrone expects to complete the tailing impoundment reclamation within a few years. The stockpile reclamation schedule is currently being revised in response to the dynamics of the mine plan and in conjunction with the MMD and New Mexico Environment Department. Thus, the exact schedule for wildlife monitoring of the stockpile units is difficult to predict pending resolution of the reclamation schedule. Results of the wildlife surveys will be provided to the MMD with the annual report scheduled for submission in April of each year.

The report will include an interpretative section that evaluates the trends in wildlife use with respect to regional trends, status of the reclamation, and the prevailing climatic conditions. To the extent practical, Tyrone will coordinate with local wildlife officials to ascertain the regional conditions.

## 5.0 REFERENCES

- Anderson, A.E., D.E. Medin, and D.C. Bowden, 1972. *Mule Deer Numbers and Shrub-Yield-Utilization on Winter Range*. Journal of Wildlife Management 36: 571-578.
- Dames & Moore, 1994. *Mining Operation Site Assessment for the Tyrone Mine*. Prepared for Phelps Dodge Tyrone, Inc., Tyrone, New Mexico.
- Daniel B. Stephens & Associates, Inc., 1997. *Studies in Support of Conceptual Design Development Tyrone Mine Closure/Closeout*. Prepared for Phelps Dodge Tyrone, Inc., Tyrone, New Mexico.
- Duhamel, J.E., S.S. Cook, and J. Kolessar. 1993. *Geology of the Tyrone Porphyry Copper Deposit, New Mexico*. Draft report.
- Eberhardt, L. L. and R. C. Van Etten, 1956. *Evaluation of the Pellet Group Counts as a Deer Census Method*. Journal of Wildlife Management 20(1): 70-74.
- Freddy, D.J. and D.C. Bowden, 1983a. *Efficacy of Permanent and Temporary Pellet Plots in Juniper-Pinyon Woodland*. Journal of Wildlife Management 47: 512-516.
- Freddy, D.J. and D.C. Bowden, 1983b. *Sampling Mule Deer Pellet-Group Densities in Juniper-Pinyon Woodland*. Journal of Wildlife Management 47: 476-485.
- Fuller, T. K., 1991. *Do Pellet Counts Index White-Tailed Deer Numbers and Population Change?* Journal of Wildlife Management 55: 393-396.
- Fuller, T. K., 1992. *Do Pellet Counts Index White-Tailed Deer Numbers and Population Change?: A Reply*. Journal of Wildlife Management 56(3): 613.
- Hedlund, D.C. 1978. *Geologic Map of the Wind Mountain Quadrangle, Grant County, New Mexico*. Miscellaneous Field Studies. U.S. Geological Survey Map MF-1037, Scale 1:24,000. Denver, Colorado.
- Kolessar, J. 1982. *The Tyrone Copper Deposit*. In S. R. Titley (ed.), *Advances in the Geology of the Porphyry Copper Deposits, southwestern North America*. University of Arizona Press, Tucson, Arizona.
- Metric Corporation, 1993. *A Threatened and Endangered Floral and Wildlife Survey of 280 Acres and 2.5 Miles of Proposed Haul Road, Grant County, New Mexico*. Prepared for Phelps Dodge Corporation, Tyrone, New Mexico.

- Metric Corporation, 1996. *A Threatened and Endangered Floral and Wildlife Survey of 300 Acres, Grant County, New Mexico*. Prepared for Phelps Dodge Corporation, Tyrone, New Mexico.
- Neff, D. J., 1968. *The Pellet-Group Count Technique for Big Game Trend, Census, and Distribution: A Review*. Journal of Wildlife Management 32: 597-614.
- New Mexico Department of Game and Fish. 2004. *New Mexico Game and Fish BISON-M Database*. Internet: <http://nmnhp.unm.edu/bisonm/bisonquery.php> Updated: May 13, 2004. Accessed: November 22, 2004.
- Paige, S. 1922. *Copper Deposits of the Tyrone District, New Mexico*. U.S. Geological Survey Professional Paper 122. U.S. Government Printing Office, Washington, D.C. 53p.
- Parnham, T.L., R. Paetzold, and C.E. Souders. 1983. *Soil Survey of Grant County, New Mexico, Central and Southern Parts*. USDA- Soil Conservation Service, U.S. Gov. Print. Office, Washington, DC.
- Ralph, C.J., J.R. Sauer, and S. Droege. 1995. *Monitoring Bird Populations by Point Counts*. Gen. Tech. Rep. PSW-GTR-149. Pacific Southwest Research Station, Forest Service, U.S. Department of Agriculture, Albany, California.
- White, G. C., 1992. *Do Pellet Counts Index White-Tailed Deer Numbers and Population Change?: A Comment*. Journal of Wildlife Management 56(3): 611-612.
- Verner, J., 1985. *Assessment of Counting Techniques*. Current Ornithology 2:247-302.

**TABLES**



**TABLE 1**  
**MMD APPROVED SEED MIX FOR THE TYRONE MINE AREA**

Species <sup>a</sup>	Life-Form	Duration <sup>b</sup>	Seasonality	Rate <sup>a,c</sup>
<b>Primary Seed Mix</b>				
Blue grama ( <i>Bouteloua gracilis</i> )	Grass	Per	Warm	0.25
Side-oats grama ( <i>Bouteloua curtipendula</i> )	Grass	Per	Warm	1.25
Green sprangletop ( <i>Leptochloa dubia</i> )	Grass	Per	Warm	0.15
Plains lovegrass ( <i>Eragrostis intermedia</i> )	Grass	Per	Intermediate	0.06
Bottlebrush squirreltail ( <i>Sitanion hystrix</i> )	Grass	Per	Cool	1.25
New Mexico needlegrass ( <i>Stipa neomexicana</i> )	Grass	Per	Cool	1.75
Streambank wheatgrass ( <i>Agropyron dastachyum</i> v. <i>riparium</i> )	Grass	Per	Cool	1.50
Apache plume ( <i>Fallugia paradoxa</i> )	Shrub	Per	NA	0.09
Mountain mahogany ( <i>Cerocarpus montanus</i> )	Shrub	Per	NA	1.00
Winterfat ( <i>Eurotia lanata</i> )	Shrub	Per	NA	0.60
Yellow sweet clover ( <i>Melilotus officinalis</i> )	Forb	Ann	NA	0.15
Globe mallow ( <i>Sphaeralcea</i> sp.)	Forb	Per	NA	0.10
Blue flax ( <i>Linum lewisii</i> )	Forb	Per	NA	0.15
<b>Total PLS (lbs/ac)</b>				<b>8.4</b>
<b>Alternate</b>				
Needle-and-thread ( <i>Stipa comata</i> )	Grass	Per	Cool	ND
Thickspike wheatgrass ( <i>Agropyron dastachyum</i> )	Grass	Per	Cool	ND
Smooth brome ( <i>Bromus inermis</i> )	Grass	Per	Cool	ND
Sand dropseed ( <i>Sporobolus cryptandrus</i> )	Grass	Per	Intermediate	ND
Tobosa ( <i>Hilaria mutica</i> )	Grass	Per	Warm	ND
Bush muhly ( <i>Muhlenbergia porteri</i> )	Grass	Per	Warm	ND
Squawberry ( <i>Rhus trilobata</i> )	Shrub	Per	NA	ND
Rubber rabbitbrush ( <i>Chrysothamnus nauseosus</i> )	Shrub	Per	NA	ND
Prairie coneflower ( <i>Ratibida columnaris</i> )	Forb	Per	NA	ND
White sweet clover ( <i>Melilotus alba</i> )	Forb	Ann	NA	ND

Notes:

<sup>a</sup>Seed mix and rates are subject to change based on future investigations and availability

<sup>b</sup>Per = Perennial; Ann = Annual

<sup>c</sup>Rate is in pounds of pure live seeds per acre (lbs/ac); substitutions may change seeding rates

NA = not applicable

ND = not determined

PLS = Pure Live Seed

lbs/ac = pounds per acre

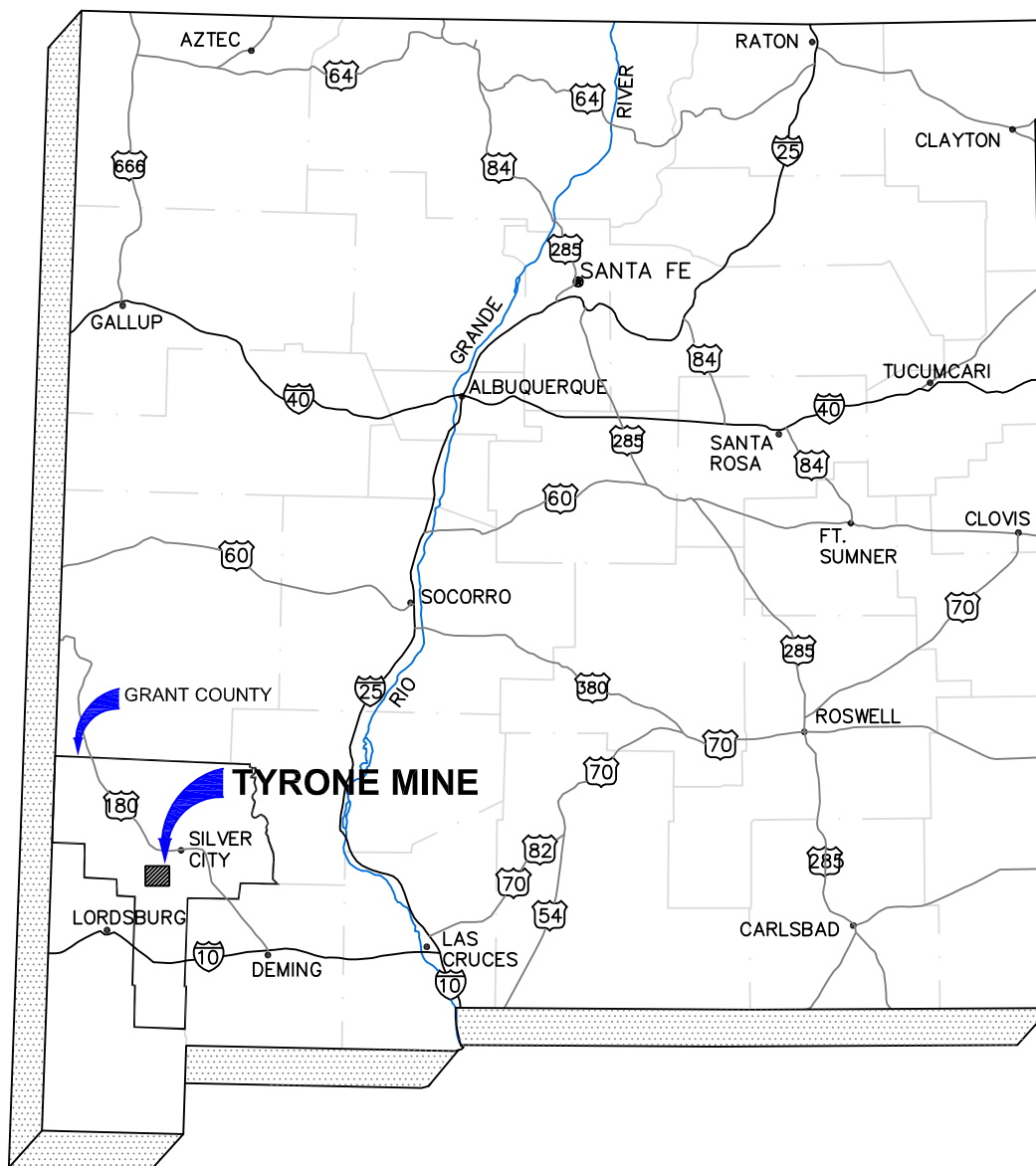
**TABLE 2**  
**PROPOSED NUMBER OF TRANSECTS FOR EACH RECLAMATION UNIT**

<b>Reclamation Unit</b>	<b>Approximate Acres</b>	<b>Number of Transect</b>
No. 1 Tailing	459	3
No. 1A Tailing	449	3
No. 1X Tailing	517	3
No. 2 Tailing	556	3
No. 3 Tailing	524	3
No. 3X Tailing	371	3
Burro Mountain Tailing	50	1
No. 1 Stockpile	163	1
South Rim Area	207	2
No. 1 Series Stockpiles	907	4
No. 2 Series Stockpiles	1006	4
No. 3 Series Stockpiles	569	3
No. 5A Stockpile	370	2

## FIGURES

# STATE OF NEW MEXICO

NOT TO SCALE



PROJECT



PHELPS DODGE TYRONE INC.  
GRANT COUNTY, NEW MEXICO

TITLE

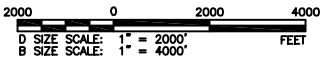
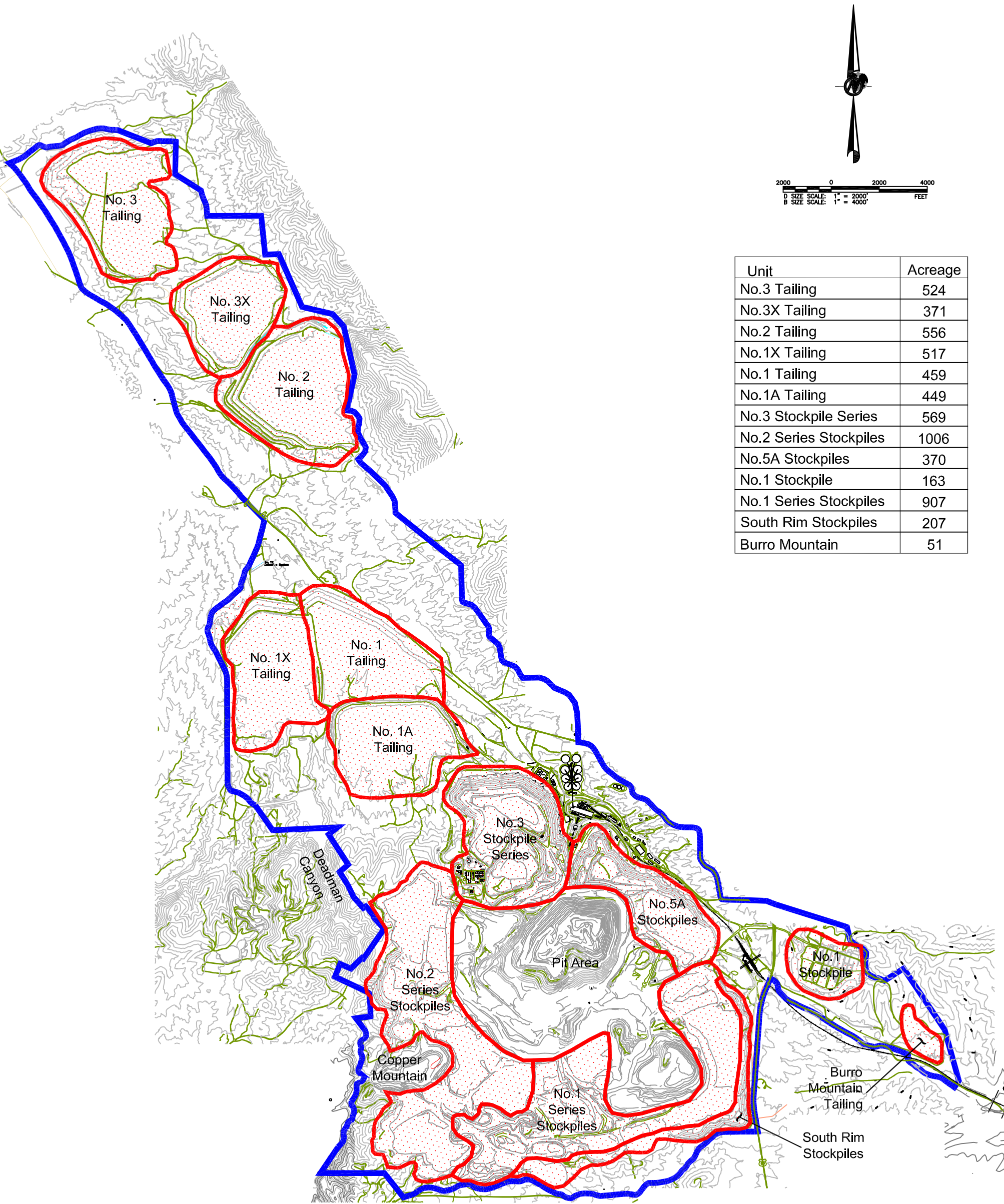
## GENERAL LOCATION OF TYRONE MINE IN NEW MEXICO



ALBUQUERQUE/NEW MEXICO

PROJECT No. 053-2016			FILE No. FIGURE01		
DESIGN	LM	10/25/05	SCALE	SCALE	REV. REV
CADD	CM	10/25/05			
CHECK	LM	10/25/05			
REVIEW	REVIEW	RVW_DATE			

1




Unit	Acreage
No.3 Tailing	524
No.3X Tailing	371
No.2 Tailing	556
No.1X Tailing	517
No.1 Tailing	459
No.1A Tailing	449
No.3 Stockpile Series	569
No.2 Series Stockpiles	1006
No.5A Stockpiles	370
No.1 Stockpile	163
No.1 Series Stockpiles	907
South Rim Stockpiles	207
Burro Mountain	51

LEGEND


- TYRONE MINE BOUNDARY
- WILDLIFE MONITORING UNITS
- ROADS OR HIGHWAYS

PROJECT

PHELPS DODGE TYRONE INC.  
GRANT COUNTY, NEW MEXICO

TITLE

PROPOSED WILDLIFE MONITORING UNITS  
TYRONE MINE

Golder Associates  
Albuquerque, New Mexico

PROJECT No.	013-1595	FILE No.	Tyrone Overview	
DESIGN	LM	12/12/05	SCALE	AS SHOWN
CADD	CM	12/13/05	REV.	A
CHECK	DR	12/29/08	FIGURE 2	
REVIEW	--	DATE		

## **APPENDIX A**

### **SPECIES LISTS**

**TABLE A-1**  
**POTENTIAL TERRESTRIAL SPECIES IN THE TYRONE MINE AREA**

<b>Birds<sup>a</sup></b>	
Thrasher, Brown	<i>Toxostoma rufum longicauda</i>
Thrasher, Bendire's	<i>Toxostoma bendirei</i>
Thrasher, Curve-billed	<i>Toxostoma curvirostre celsum</i>
Thrasher, Crissal	<i>Toxostoma crissale crissale</i>
Waxwing, Cedar	<i>Bombycilla cedrorum</i>
Phainopepla	<i>Phainopepla nitens lepida</i>
Warbler, Olive	<i>Peucedramus taeniatus arizonae</i>
Warbler, Tennessee	<i>Vermivora peregrine</i>
Warbler, Orange-crowned	<i>Vermivora celata</i>
Warbler, Nashville	<i>Vermivora ruficapilla ridgwayi</i>
Warbler, Virginia's	<i>Vermivora virginiae</i>
Warbler, Lucy's	<i>Vermivora luciae</i>
Parula, Northern	<i>Parula Americana</i>
Warbler, Yellow	<i>Dendroica petechia</i>
Warbler, Chestnut-sided	<i>Dendroica pensylvanica</i>
Warbler, Blue, Black-throated	<i>Dendroica caerulescens caerulescens</i>
Warbler, Yellow-rumped	<i>Dendroica coronata</i>
Warbler, Gray, Black-throated	<i>Dendroica nigrescens</i>
Warbler, Townsend's	<i>Dendroica townsendi</i>
Warbler, Hermit	<i>Dendroica occidentalis</i>
Warbler, Green, Black-throated	<i>Dendroica virens virens</i>
Warbler, Grace's	<i>Dendroica graciae graciae</i>
Warbler, Palm	<i>Dendroica palmarum</i>
Warbler, Bay-breasted	<i>Dendroica castanea</i>
Warbler, Blackpoll	<i>Dendroica striata</i>
Warbler, Black-and-white	<i>Mniotilta varia</i>
Warbler, Prothonotary	<i>Protonotaria citrea</i>
Ovenbird	<i>Seiurus aurocapillus cinereus</i>
Warbler, Macgillivray's	<i>Oporornis tolmiei</i>
Yellowthroat, Common	<i>Geothlypis trichas</i>
Warbler, Hooded	<i>Wilsonia citrine</i>
Warbler, Wilson's	<i>Wilsonia pusilla</i>
Warbler, Red-faced	<i>Cardellina rubrifrons</i>
Redstart, Painted	<i>Myioborus pictus pictus</i>

<b>Birds<sup>a</sup></b>	
Chat, Yellow-breasted	<i>Icteria virens auricollis</i>
Tanager, Hepatic	<i>Piranga flava</i>
Tanager, Summer	<i>Piranga rubra</i>
Tanager, Western	<i>Piranga ludoviciana</i>
Towhee, Green-tailed	<i>Pipilo chlorurus</i>
Towhee, Spotted	<i>Pipilo maculates</i>
Towhee, Canyon	<i>Pipilo fuscus</i>
Towhee, Abert's	<i>Pipilo aberti aberti</i>
Sparrow, Cassin's	<i>Aimophila cassinii</i>
Sparrow, Chipping	<i>Spizella passerina arizonae</i>
Sparrow, Clay-colored	<i>Spizella pallida</i>
Sparrow, Brewer's	<i>Spizella breweri</i>
Sparrow, Worthen's	<i>Spizella wortheni wortheni</i>
Sparrow, Black-chinned	<i>Spizella atrogularis evura</i>
Sparrow, Vesper	<i>Pooecetes gramineus</i>
Sparrow, Black-throated	<i>Amphispiza bilineata</i>
Sparrow, Sage	<i>Amphispiza belli nevadensis</i>
Bunting, Lark	<i>Calamospiza melanocorys</i>
Sparrow, Savannah	<i>Passerculus sandwichensis</i>
Sparrow, Baird's	<i>Ammodramus bairdii</i>
Sparrow, Grasshopper	<i>Ammodramus savannarum perpallidus</i>
Sparrow, Fox	<i>Passerella iliaca</i>
Sparrow, Song	<i>Melospiza melodia</i>
Sparrow, Lincoln's	<i>Melospiza lincolnii</i>
Sparrow, Swamp	<i>Melospiza georgiana ericrypta</i>
Sparrow, White-throated	<i>Zonotrichia albicollis</i>
Sparrow, Harris's	<i>Zonotrichia querula</i>
Sparrow, White-crowned	<i>Zonotrichia leucophrys</i>
Sparrow, Golden-crowned	<i>Zonotrichia atricapilla</i>
Junco, Dark-eyed	<i>Junco hyemalis</i>
Junco, Yellow-eyed	<i>Junco phaeonotus palliates)</i>
Cardinal, Northern	<i>Cardinalis cardinalis</i>
Grosbeak, Rose-breasted	<i>Pheucticus ludovicianus</i>
Grosbeak, Black-headed	<i>Pheucticus melanocephalus</i>
Grosbeak, Blue	<i>P. caerulea interfuse</i>



<b>Birds<sup>a</sup></b>	
Bunting, Lazuli	<i>Passerina amoena</i>
Bunting, Indigo	<i>Passerina cyanea</i>
Bunting, Varied	<i>Passerina versicolor</i>
Bunting, Painted	<i>Passerina ciris pallidior</i>
Dickcissel	<i>Spiza Americana</i>
Bobolink	<i>Dolichonyx oryzivorus</i>
Blackbird, Red-winged	<i>Agelaius phoeniceus</i>
Meadowlark, Western	<i>Sturnella neglecta</i>
Blackbird, Yellow-headed	<i>Xanthocephalus xanthocephalus</i>
Blackbird, Brewer's	<i>Euphagus cyanocephalus</i>
Grackle, Common	<i>Quiscalus quiscula versicolor</i>
Grackle, Great-tailed	<i>Quiscalus mexicanus</i>
Cowbird, Bronzed	<i>Molothrus aeneus loyei</i>
Cowbird, Brown-headed	<i>Molothrus ater</i>
Oriole, Orchard	<i>Icterus spurius</i>
Oriole, Hooded	<i>Icterus cucullatus</i>
Oriole, Baltimore	<i>Icterus galbula</i>
Oriole, Bullock's	<i>Icterus bullockii</i>
Oriole, Scott's	<i>Icterus parisorum</i>
Finch, Cassin's	<i>Carpodacus cassinii</i>
Finch, House	<i>Carpodacus mexicanus frontalis</i>
Crossbill, Red	<i>Loxia curvirostra</i>
Siskin, Pine	<i>Carduelis pinus pinus</i>
Goldfinch, Lesser	<i>Carduelis psaltria</i>
Goldfinch, American	<i>Carduelis tristis pallidus</i>
Grosbeak, Evening	<i>Coccothraustes vespertinus</i>
Sparrow, House	<i>Passer domesticus</i>
Vulture, Turkey	<i>Cathartes aura</i>
Kite, Mississippi	<i>Ictinia mississippiensis</i>
Eagle, Bald	<i>Haliaeetus leucocephalus</i>
Hawk, Sharp-shinned	<i>Accipiter striatus velox</i>
Hawk, Cooper's	<i>Accipiter cooperii</i>
Goshawk, Northern	<i>Accipiter gentilis</i>
Hawk, Gray, N.	<i>Asturina nitida maximus</i>
Black-Hawk, Common	<i>Buteogallus anthracinus anthracinus</i>

<b>Birds<sup>a</sup></b>	
Hawk, Broad-winged	<i>Buteo platypterus platypterus</i>
Hawk, Swainson's	<i>Buteo swainsoni</i>
Hawk, Zone-tailed	<i>Buteo albonotatus</i>
Hawk, Red-tailed	<i>Buteo jamaicensis</i>
Hawk, Ferruginous	<i>Buteo regalis</i>
Eagle, Golden	<i>Aquila chrysaetos canadensis</i>
Kestrel, American	<i>Falco sparverius sparverius</i>
Falcon, Aplomado	<i>Falco femoralis septentrionalis</i>
Falcon, Prairie	<i>Falco mexicanus</i>
Falcon, Peregrine, American	<i>Falco peregrinus anatum</i>
Pheasant, Ring-necked	<i>Phasianus colchicus</i>
Pigeon, Band-tailed	<i>Columba fasciata fasciata</i>
Dove, White-winged	<i>Zenaida asiatica</i>
Dove, Mourning	<i>Zenaida macroura</i>
Dove, Inca	<i>Columbina inca</i>
Ground-dove, Common	<i>Columbina passerina pallescens</i>
Cuckoo, Yellow-billed	<i>Coccyzus americanus occidentalis</i>
Roadrunner, Greater	<i>Geococcyx californianus</i>
Owl, Barn	<i>Tyto alba pratincola</i>
Owl, Flammulated	<i>Otus flammeolus</i>
Owl, Great-horned	<i>Bubo virginianus</i>
Owl, Pygmy, Northern	<i>Glaucidium gnoma californicum</i>
Owl, Elf	<i>Micrathene whitneyi whitneyi</i>
Owl, Burrowing	<i>Athene cunicularia hypugaea</i>
Owl, Spotted, Mexican	<i>Strix occidentalis lucida</i>
Owl, Long-eared	<i>Asio otus</i>
Owl, Short-eared	<i>Asio flammeus flammeus</i>
Owl, Saw-whet, Northern	<i>Aegolius acadicus acadicus</i>
Nighthawk, Lesser	<i>Chordeiles acutipennis texensis</i>
Whip-poor-will	<i>Caprimulgus vociferus arizonae</i>
Swift, Black	<i>Cypseloides niger borealis</i>
Swift, Chimney	<i>Chaetura pelagica</i>
Swift, White-throated	<i>Aeronautes saxatalis saxatalis</i>
Hummingbird, Broad-billed	<i>Cynanthus latirostris magicus</i>
Hummingbird, White-eared	<i>Hylocharis leucotis borealis</i>

<b>Birds<sup>a</sup></b>	
Hummingbird, Blue-throated	<i>Lampornis clemenciae bessophilus</i>
Hummingbird, Magnificent	<i>Eugenes fulgens aureoviridis</i>
Hummingbird, Lucifer	<i>Calothorax lucifer</i>
Hummingbird, Black-chinned	<i>Archilochus alexandri</i>
Hummingbird, Anna's	<i>Calypte anna</i>
Hummingbird, Costa's	<i>Calypte costae</i>
Hummingbird, Rufous	<i>Selasphorus rufus</i>
Trogon, Elegant	<i>Trogon elegans canescens</i>
Woodpecker, Acorn	<i>Melanerpes formicivorus formicivorus</i>
Woodpecker, Gila	<i>Melanerpes uropygialis uropygialis</i>
Sapsucker, Yellow-bellied	<i>Sphyrapicus varius varius</i>
Sapsucker, Williamson's	<i>Sphyrapicus thyroideus nataliae</i>
Woodpecker, Ladder-backed	<i>Picoides scalaris</i>
Woodpecker, Downy	<i>Picoides pubescens leucurus</i>
Woodpecker, Hairy	<i>Picoides villosus</i>
Woodpecker, Three-toed	<i>Picoides tridactylus dorsalis</i>
Flicker, Northern	<i>Colaptes auratus</i>
Pewee, Greater	<i>Contopus pertinax pallidiventris</i>
Flycatcher, Willow	<i>Empidonax traillii</i>
Flycatcher, Willow, SW.	<i>Empidonax traillii extimus</i>
Flycatcher, Dusky	<i>Empidonax oberholseri</i>
Flycatcher, Gray	<i>Empidonax wrightii</i>
Flycatcher, Cordilleran	<i>Empidonax occidentalis</i>
Phoebe, Eastern	<i>Sayornis phoebe</i>
Flycatcher, Vermilion	<i>Pyrocephalus rubinus</i>
Flycatcher, Ash-throated	<i>Myiarchus cinerascens cinerascens</i>
Kingbird, Western	<i>Tyrannus verticalis</i>
Flycatcher, Scissor-tailed	<i>Tyrannus forficatus</i>
Shrike, Loggerhead	<i>Lanius ludovicianus</i>
Vireo, Bell's	<i>Vireo bellii</i>
Vireo, Gray	<i>Vireo vicinior</i>
Vireo, Solitary	<i>Vireo solitarius</i>
Vireo, Cassin's	<i>Vireo cassinii</i>
Vireo, Plumbeous	<i>Vireo plumbeus</i>
Vireo, Hutton's	<i>Vireo huttoni stephenii</i>

<b>Birds<sup>a</sup></b>	
Vireo, Warbling	<i>Vireo gilvus swainsonii</i>
Vireo, Red-eyed	<i>Vireo olivaceus olivaceus</i>
Jay, Steller's	<i>Cyanocitta stelleri macrolopha</i>
Jay, Blue	<i>Cyanocitta cristata</i>
Jay, Scrub, Western	<i>Aphelocoma californica</i>
Jay, Mexican	<i>Aphelocoma ultramarina arizonae</i>
Jay, Pinyon	<i>Gymnorhinus cyanocephalus</i>
Crow, American	<i>Corvus brachyrhynchos</i>
Raven, Common	<i>Corvus corax sinuatus</i>
Martin, Purple	<i>Progne subis</i>
Swallow, Tree	<i>Tachycineta bicolor</i>
Swallow, Violet-green	<i>Tachycineta thalassina lepida</i>
Swallow, Rough-winged, N.	<i>Stelgidopteryx serripennis</i>
Swallow, Bank	<i>Riparia riparia riparia</i>
Swallow, Barn	<i>Hirundo rustica erythrogaster</i>
Chickadee, Mountain	<i>Poecile gambeli gambeli</i>
Titmouse, Bridled	<i>Baeolophus wollweberi phillipsi</i>
Titmouse, Juniper	<i>Baeolophus ridgwayi</i>
Verdin	<i>Auriparus flaviceps ornatus</i>
Bushtit	<i>Psaltiriparus minimus</i>
Nuthatch, Red-breasted	<i>Sitta canadensis</i>
Nuthatch, White-breasted	<i>Sitta carolinensis nelsoni</i>
Nuthatch, Pygmy	<i>Sitta pygmaea melanotis</i>
Creeper, Brown	<i>Certhia americana</i>
Wren, Cactus	<i>Campylorhynchus brunneicapillus couesi</i>
Wren, Rock	<i>Salpinctes obsoletus obsoletus</i>
Wren, Bewick's	<i>Thryomanes bewickii</i>
Wren, House	<i>Troglodytes aedon parkmannii</i>
Wren, Marsh	<i>Cistothorus palustris</i>
Kinglet, Ruby-crowned	<i>Regulus calendula calendula</i>
Gnatcatcher, Black-tailed	<i>Poliophtila melanura melanura</i>
Bluebird, Eastern	<i>Sialia sialis</i>
Bluebird, Western	<i>Sialia mexicana bairdi</i>
Solitaire, Townsend's	<i>Myadestes townsendi townsendi</i>
Thrush, Hermit	<i>Catharus guttatus</i>

<b>Birds<sup>a</sup></b>	
Robin, American	<i>Turdus migratorius</i>
Catbird, Gray	<i>Dumetella carolinensis ruficrissa</i>
Mockingbird, Northern	<i>Mimus polyglottos leucopterus</i>
Thrasher, Sage	<i>Oreoscoptes montanus</i>

<b>Mammals<sup>a</sup></b>	
Rabbit, Cottontail, Eastern	<i>Sylvilagus floridanus holzneri</i>
Rabbit, Cottontail, Desert	<i>Sylvilagus audubonii</i>
Rabbit, Jack, Black-tailed	<i>Lepus californicus</i>
Chipmunk, Cliff	<i>Neotamias dorsalis dorsalis</i>
Chipmunk, Gray-collared	<i>Neotamias cinereicollis cinereicollis</i>
Squirrel, Antelope, Harris'	<i>Ammospermophilus harrisii</i>
Squirrel, Ground, Spotted	<i>Spermophilus spilosoma</i>
Squirrel, Rock	<i>Spermophilus variegates grammurus</i>
Squirrel, Ground, Golden-mantled	<i>Spermophilus lateralis</i>
Squirrel, Gray, Arizona	<i>Sciurus arizonensis arizonensis</i>
Squirrel, Abert's	<i>Sciurus aberti</i>
Squirrel, Red	<i>Tamiasciurus hudsonicus</i>
Gopher, Pocket, Botta's	<i>Thomomys bottae</i>
Gopher, Pocket, Desert	<i>Geomys arenarius arenarius</i>
Mouse, Pocket, Silky	<i>Perognathus flavus</i>
Mouse, Pocket, Bailey's	<i>Chaetodipus baileyi baileyi</i>
Mouse, Pocket, Hispid	<i>Chaetodipus hispidus</i>
Mouse, Pocket, Desert	<i>Chaetodipus penicillatus</i>
Mouse, Pocket, Rock	<i>Chaetodipus intermedius</i>
Rat, Kangaroo, Ord's	<i>Dipodomys ordii</i>
Rat, Kangaroo, Banner-tailed	<i>Dipodomys spectabilis</i>
Rat, Kangaroo, Merriam's	<i>Dipodomys merriami</i>
Beaver, American	<i>Castor Canadensis</i>
Mouse, Harvest, Western	<i>Reithrodontomys megalotis</i>
Mouse, Cactus	<i>Peromyscus eremicus</i>
Mouse, Deer	<i>Peromyscus maniculatus</i>
Mouse, White-footed	<i>Peromyscus leucopus</i>
Mouse, Brush	<i>Peromyscus boylii rowleyi</i>
Mouse, Pinyon	<i>Peromyscus truei truei</i>

<b>Mammals<sup>a</sup></b>	
Mouse, Osgood's	<i>Peromyscus gratus gentilis</i>
Mouse, Rock, Northern	<i>Peromyscus nasutus</i>
Mouse, Grasshopper, N.	<i>Onychomys leucogaster</i>
Mouse, Grasshopper, Southern	<i>Onychomys torridus torridus</i>
Mouse, Grasshopper, Mearn's	<i>Onychomys arenicola</i>
Rat, Cotton, Hispid	<i>Sigmodon hispidus</i>
Rat, Cotton, Tawny-bellied	<i>Sigmodon fulviventer minimus</i>
Rat, Wood, S. Plains	<i>Neotoma micropus canescens</i>
Rat, Wood, White-throated	<i>Neotoma albigula</i>
Rat, Wood, Stephen's	<i>Neotoma stephensi</i>
Rat, Wood, Mexican	<i>Neotoma Mexicana</i>
Vole, Long-tailed	<i>Microtus longicaudus</i>
Vole, Mogollon	<i>Microtus mogollonensis</i>
Mouse, House	<i>Mus musculus</i>
Bat, Myotis, California	<i>Myotis californicus</i>
Bat, Myotis, Small-footed, W.	<i>Myotis ciliolabrum melanorhinus</i>
Bat, Myotis, Yuma	<i>Myotis yumanensis yumanensis</i>
Bat, Myotis, Brn., Little, Occult	<i>Myotis lucifugus occultus</i>
Bat, Myotis, Cave	<i>Myotis velifer</i>
Bat, Myotis, Long-legged	<i>Myotis volans interior</i>
Bat, Myotis, Fringed	<i>Myotis thysanodes thysanodes</i>
Bat, Myotis, Southwestern	<i>Myotis auriculus apache</i>
Bat, Myotis, Long-eared	<i>Myotis evotis evotis</i>
Bat, Silver-haired	<i>Lasionycteris noctivagans</i>
Bat, Pipistrelle, Western	<i>Pipistrellus hesperus</i>
Bat, Brown, Big	<i>Eptesicus fuscus pallidus</i>
Bat, Hoary	<i>Lasiurus cinereus cinereus</i>
Bat, Spotted	<i>Euderma maculatum</i>
Bat, Big-eared, Townsend's, Pale	<i>Plecotus townsendii pallescens</i>
Bat, Pallid	<i>Antrozous pallidus pallidus</i>
Bat, Free-tailed, Brazilian	<i>Tadarida brasiliensis mexicana</i>
Porcupine, Common	<i>Erethizon dorsatum</i>
Coyote	<i>Canis latrans</i>
Fox, Red	<i>Vulpes vulpes</i>
Fox, Kit	<i>Vulpes macrotis</i>

<b>Mammals<sup>a</sup></b>	
Fox, Gray, Common	<i>Urocyon cinereoargenteus scottii</i>
Bear, Black	<i>Ursus americanus amblyceps</i>
Ringtail	<i>Bassariscus astutus</i>
Raccoon, Common	<i>Procyon lotor</i>
Coati, White-nosed	<i>Nasua narica</i>
Weasel, Long-tailed	<i>Mustela frenata</i>
Ferret, Black-footed	<i>Mustela nigripes</i>
Badger, American	<i>Taxidea taxus berlandieri</i>
Skunk, Spotted, Western	<i>Spilogale gracilis</i>
Skunk, Striped	<i>Mephitis mephitis</i>
Skunk, Hooded	<i>Mephitis macroura milleri</i>
Skunk, Hog-nosed, Common	<i>Conepatus leuconotus</i>
Lion, Mountain	<i>Puma concolor</i>
Bobcat	<i>Lynx rufus baileyi (NM,AZ)</i>
Peccary, Collared	<i>Peccari tajacu</i>
Elk	<i>Cervus elaphus nelsoni</i>
Deer, Mule	<i>Odocoileus hemionus</i>
Deer, White-tailed, Coues'	<i>Odocoileus virginianus couesi</i>
Pronghorn, Chihuahuan	<i>Antilocapra americana mexicana</i>
Sheep, Bighorn, Rocky Mtn.	<i>Ovis canadensis canadensis</i>

<b>Reptiles<sup>a</sup></b>	
Lizard, Collared	<i>Crotaphytus collaris</i>
Lizard, Leopard, Longnose	<i>Gambelia wislizenii</i>
Lizard, Earless, Greater	<i>Cophosaurus texanus</i>
Lizard, Earless, Lesser	<i>Holbrookia maculate</i>
Lizard, Horned, Texas	<i>Phrynosoma cornutum</i>
Lizard, Short-horned, Mt.	<i>Phrynosoma hernandesi hernandesi</i>
Lizard, Horned, Roundtail	<i>Phrynosoma modestum</i>
Lizard, Spiny, Clark's	<i>Sceloporus clarkii clarkii</i>
Lizard, Spiny, Desert	<i>Sceloporus magister</i>
Lizard, Spiny, Crevice	<i>Sceloporus poinsettii poinsettia</i>
Lizard, Fence, Eastern	<i>Sceloporus undulates</i>
Lizard, Tree, Northern	<i>Urosaurus ornatus</i>
Lizard, Side-blotched	<i>Uta stansburiana</i>
Gecko, Banded, Western	<i>Coleonyx variegatus bogerti</i>
Whiptail, Spotted, Chihuahuan	<i>Aspidoscelis exsanguis</i>
Whiptail, Spotted, Gila	<i>Aspidoscelis flagellicauda</i>
Whiptail, Striped, Plains	<i>Aspidoscelis inornatus llanuras</i>
Whiptail, New Mexico	<i>Aspidoscelis neomexicana</i>
Whiptail, Spotted, Sonoran	<i>Aspidoscelis sonora</i>
Whiptail, Western	<i>Aspidoscelis tigris</i>
Whiptail, Grassland, Desert	<i>Aspidoscelis uniparens</i>
Whiptail, Striped, Plateau	<i>Aspidoscelis velox</i>
Skink, Many-lined	<i>Eumeces multivirgatus epipleurotus</i>
Skink, Great Plains	<i>Eumeces obsoletus</i>
Lizard, Alligator, Madrean	<i>Elgaria kingii nobilis</i>
Monster, Gila, Reticulate	<i>Heloderma suspectum suspectum</i>
Snake, Blind, Texas	<i>Leptotyphlops dissectus</i>
Snake, Blind, Western	<i>Leptotyphlops humilis segregus</i>
Snake, Glossy	<i>Arizona elegans</i>
Snake, Ringneck	<i>Diadophis punctatus</i>
Snake, Hooknose, Western	<i>Gyalopion canum</i>
Snake, Hognose, W.	<i>Heterodon nasicus</i>
Snake, Night	<i>Hypsiglena torquata</i>
Kingsnake, Desert	<i>Lampropeltis getula splendida</i>



<b>Reptiles<sup>a</sup></b>	
Kingsnake, Mountain, Sonoran	<i>Lampropeltis pyromelana</i>
Snake, Milk	<i>Lampropeltis triangulum</i>
Snake, Green, Smooth	<i>Opheodrys vernalis blanchardi</i>
Coachwhip	<i>Masticophis flagellum</i>
Whipsnake, Striped, Desert	<i>Masticophis taeniatus taeniatus</i>
Snake, Gopher	<i>Pituophis cantifer</i>
Snake, Longnose, Texas	<i>Rhinocheilus lecontei</i>
Snake, Patchnose, Big Bend	<i>Salvadora hexalepis deserticola</i>
Snake, Patchnose, Mountain	<i>Salvadora grahamiae grahamiae</i>
Snake, Ground	<i>Sonora semiannulata</i>
Snake, Blackhead, SW.	<i>Tantilla hobartsmithi</i>
Snake, Blackhead, Plains	<i>Tantilla nigriceps</i>
Snake, Garter, Blackneck, W.	<i>Thamnophis cyrtopsis cyrtopsis</i>
Snake, Garter, Wandering	<i>Thamnophis elegans</i>
Snake, Garter, Mexican	<i>Thamnophis eques megalops</i>
Snake, Garter, Checkered	<i>Thamnophis marcianus marcianus</i>
Snake, Garter, Narrowhead	<i>Thamnophis rufipunctatus rufipunctatus</i>
Snake, Lyre	<i>Trimorphodon biscutatus</i>
Snake, Coral, Western	<i>Micruroides euryxanthus euryxanthus</i>
Rattlesnake, Diamondback, W.	<i>Crotalus atrox</i>
Rattlesnake, Rock, Banded	<i>Crotalus lepidus klauberi</i>
Rattlesnake, Blacktail	<i>Crotalus molossus molossus</i>
Rattlesnake, Western	<i>Crotalus viridis</i>

<sup>a</sup> Species list from BISON-M database (NMDG&F, 2004) for Grant County, New Mexico.