

Supplement A to
ENVIRONMENTAL BASELINE REPORT 304 K

FISH AND WILDLIFE RESOURCES MONITORING
OTTER CREEK MINE
POWDER RIVER COUNTY, MONTANA

Prepared for:

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1.0 INTRODUCTION

1.1 PURPOSE AND TIME FRAME

Otter Creek Coal, LLC (OCC) plans to develop the Otter Creek Mine, a surface coal mine located approximately six miles southeast of Ashland in Powder River County, Montana. The potential mine comprises three tracts (Figure 1); Tract 2 would be developed first.

In 2010 OCC initiated baseline inventories of natural resources in the mine area. Field data collection for the fish and wildlife resources baseline study began with a site reconnaissance in August 2010 and ended in late July 2011. For the purposes of this study, seasons were defined as autumn (September 16 – December 15), winter (December 16 – March 15), spring (March 16 – June 15) and summer (June 16 – September 15). In autumn 2012 OCC submitted the results of the fish and wildlife baseline inventory (Farmer 2012) as part of its mine operating permit application to the Montana Department of Environmental Quality (MDEQ), in accordance with 82-4-222(2)(n) MCA and ARM 17.24.304(1)(j).

As reported by Farmer (2012), the winter and spring of 2010-2011 were atypical, characterized by prolonged, deep snow cover in winter and unusually high precipitation in spring and early summer. There were only three points of access to Tract 2, and two of these points were fords across Otter Creek that were impassable for most of the winter and spring. The landowner of the third access point requested that no field work be conducted on his property until mid-May to avoid conflicts with cattle calving. Consequently field work in the baseline year was skewed towards late spring-summer (Farmer 2012). Therefore OCC continued to monitor fish and wildlife resources in the mine area in 2011-2012, with emphasis on spring 2012 to address the field work limitations of spring 2011.

Dates of field work are shown in Table 1. Observations of aquatics, and fish and wildlife resources were recorded on 41 calendar days by various personnel, representing approximately 82 person-days of field effort. Of the 33 calendar days by WESTECH personnel, 11 (about 33 percent) were allocated in spring (primarily for grouse lek and raptor nest searches, and landbird surveys), 7 (about 21 percent) and 9 (about 27 percent) in autumn and winter (primarily for big game distribution and population characteristics), and 6 (about 18 percent) in summer. Therefore, as intended, about 60 percent of field work in 2011-2012 was expended in winter and spring, and approximately 40 percent was expended in summer and autumn.

1.2 OBJECTIVES

The primary objective of the Otter Creek Mine fish and wildlife resources baseline inventory was “...to provide an understanding of the species existing on and adjacent to the proposed permit area” (MDEQ 2001; Farmer 2012). Specific survey objectives (MDEQ 2001; Farmer 2012) were:

- Determine fish and wildlife species present on and adjacent to the proposed permit area;

- Map and describe existing habitats potentially affected by mining and reclamation;
- Describe fish and wildlife-habitat relationships;
- Provide a data base from which, to the extent possible, determinations of impacts due to proposed mining and reclamation activity can be made;
- Provide data enabling determination of the relationship between projected impacts related to the proposed mine and anticipated cumulative impacts;
- Provide a basis for developing an effective reclamation plan; and
- Provide a data base to be used to develop and implement mitigation practices.

The 2011-2012 monitoring effort was intended to supplement these objectives, while emphasizing field effort in winter to monitor big game distribution and habitat use, and in spring to survey for grouse leks (display sites) and raptor nests in the Tract 2 vicinity.

1.3 ACKNOWLEDGEMENTS

Many people contributed to the Otter Creek Mine fish and wildlife resources baseline inventory, including but not limited to:

Landowners and lessees of the Primary Study Area shared their knowledge of fish and wildlife resources of the area. Their input is greatly appreciated.

Several agency personnel contributed their knowledge and/or guidance to the study. For MDEQ: Chris Yde, Section Supervisor for the Coal and Uranium Section; for Montana Fish, Wildlife and Parks (FWP): Dean Waltee, area wildlife biologist in Broadus, and Adam Messer, GIS/data resource analyst in Helena; for the U.S. Forest Service (USFS): Don Sasse, wildlife biologist with the Ashland Ranger District.

In alphabetical order:

Pauline Atkinson of Schwend Aviation, Forsyth, Montana piloted all aerial surveys. Her prior knowledge of the aerial survey area, and skillful flying through sometimes tricky wind conditions in the King Mountain area, resulted in safe, thorough aerial surveys.

Tom Butts (M.S., Wildlife Biology and Management) of Continental Divide Ecological Consulting, substituted for Patrick Farmer in April, May and June 2012; conducted ring-necked pheasant crow counts, grouse lek surveys and raptor nest searches; and conducted landbird counts.

Heidi Kaiser managed Hydrometrics, Inc.'s participation in the project, including WESTECH's subcontract, contacted landowners and coordinated technical support for the study.

Dave Simpson of Simpson and Associates, LLC coordinated preparation of the permit application with Ms. Kaiser, and shared his insights regarding wildlife in the Otter Creek area.

Dave Stagliano (M.S., Aquatic Ecology) of the Montana Natural Heritage Program (MTNHP) designed the aquatics assessment, conducted field work and prepared the report.

Several WESTECH employees noted wildlife sightings while conducting vegetation field work. In particular, Ken Scow (B.S, Zoology; M.S., Zoology) mapped and summarized these observations, and conducted landbird counts in June 2012. Dan Culwell prepared all figures used in this report. Nancy Horn assisted with word processing. Patrick Farmer (B.S., Fish and Wildlife Management (wildlife option); M.S., Zoology (fisheries option)) conducted field work in autumn 2011 and winter 2011-2012, analyzed data, and wrote the report.

2.0 DESCRIPTION OF THE STUDY AREA

OCC has identified three tracts that could eventually be developed for the Otter Creek Mine (i.e., the potential life-of-mine area), but only Tract 2 is under consideration at present. Therefore, for purposes of the baseline study (Farmer 2012) and the first year of monitoring, the Primary Study Area was Tract 2 (approximately 12 mi²) plus a one-mile buffer (Figure 1), which encompassed the proposed mine facilities area. Where access was available, the Primary Study Area was surveyed by vehicle routes, pedestrian routes and landbird plots. The Secondary Study Area (Figure 1) comprised Tracts 1 (approximately 8 mi²) and 3 (about 9 mi²). No access was available to these tracts during the baseline study (Farmer 2012) but access to parts of both tracts was obtained late in the 2011-2012 monitoring year. The Aerial Survey Area was defined by a two-mile buffer around all three tracts, as shown in Figure 1; the area covered by aerial surveys was approximately 106 mi².

Geology, topography (including availability of slope and aspect), vegetation and land use were discussed in Farmer (2012). In summer 2012 (i.e., late in the 2011-2012 monitoring year) a wildfire burned a portion of the aerial survey area north of Tract 1. Wildlife habitats in this burned area will be remapped after appropriate satellite photography is available.

Both climate (long-term weather patterns) and short-term weather can dramatically affect wildlife (e.g., Frisina and Frisina 2008). The study area climate is continental, having cold winters and warm summers (USFS 1971; cited in Scow 2012); precipitation averages 14.9 inches per year (Scow 2012).

Temperature data collected at the Sonnette 2WNW station (about 15 miles east of Tract 2; NOAA 2013) from the 2011-2012 monitoring year is compared to the baseline study (2010-2011; Farmer 2012) in Figure 2. In general, average and maximum high temperatures were higher in 2011-2012 than in 2010-2011. In contrast, average and minimum low temperatures were lower in 2010-2011 than in 2011-2012, particularly in winter-early spring (January-April).

Precipitation data (NOAA 2013) from the 2011-2012 monitoring year are compared to the 2010-2011 baseline year in Figure 3. Farmer (2012) reported that winter 2010-2011 and spring 2011 were atypical due to snow accumulations and considerable spring rainfall. Snow fell in late November 2010 and was always present, often in deep drifts that impeded deer and pronghorn movements, through much of the study area until mid-March 2011. In contrast, precipitation from winter 2011-2012 and spring 2012 was generally at or below the long-term average, with comparatively little snow accumulation.

In summary, the 2010-2011 baseline year was cold and very wet, while the 2011-2012 monitoring year was warm and very dry. The colder temperatures and unusual amount of precipitation in spring 2011 was reflected as a delayed spring in terms of herbaceous vegetation growth (Farmer 2012), while spring 2012 was normal to early, in terms of herbaceous vegetation growth.

3.0 METHODS

3.1 SPECIES LISTS

The list of fish and wildlife species potentially occurring in the Otter Creek Mine study area (Farmer 2012) was retained for the 2011-2012 monitoring year. During field work all species documented by sightings or evidence were recorded by the habitat in which they were observed. These records were used to describe habitat use by species, and species richness by habitat.

3.2 AQUATIC ASSESSMENTS

As in the baseline year, MTNHP was contracted to conduct aquatic assessments in the Otter Creek Mine study area in 2012. Stagliano (2013) retained the sampling stations established for baseline sampling: four sampling stations on Otter Creek (one “control” station upstream of Tract 2, two “impact” stations adjacent to Tract 2, and one “downstream” station below the Otter Creek Mine area), and one station each on Home Creek, Threemile Creek and Tenmile Creek (Figure 4). Habitat at each station was evaluated to characterize stream reach geomorphology, riparian and in-stream habitat, and characteristics that influence aquatic community integrity. Sites with higher ranks under these protocols were considered to have higher quality local-scale habitat.

Macroinvertebrate communities were sampled qualitatively using the EMAP Reach-Wide protocol (Lazorchak et al. 1998, cited in Stagliano 2013). Samples were sorted and identified in the office, and biological metrics were calculated from the resulting data for each sample using MDEQ’s multimetric macroinvertebrate (MMI) protocols. These metrics measure attributes of benthic macroinvertebrate communities that are sensitive to condition changes in the stream. The results were then scored; the score represented the condition of the macroinvertebrate community at the time the sample was collected, and each sample was categorized as either nonimpaired or impaired, based on its score (Stagliano 2013).

Fish were sampled by seining and/or baited minnow traps at each station (Stagliano 2013). Captured fish were identified, counted, and total length was measured before release. Fish communities were analyzed using Integrated Biotic Indices (IBI) for wadeable prairie streams (Bramblett et al. 2005, cited in Stagliano 2013) and Observed/Expected Fish Models (Stagliano 2011, cited in Stagliano 2013) to detect biological integrity impairment at each site. The resulting scores were used to rank the biological integrity at each site as poor (severely degraded), poor to fair, fair to good, and good to excellent (Stagliano 2013).

In addition to habitat, macroinvertebrates and fisheries, Stagliano (2013) identified and counted adult herpetofauna (amphibians and reptiles) observed at each site. Results were presented in a report which is included as Appendix C.

3.3 TERRESTRIAL INVERTEBRATES

For the purposes of this study, the only terrestrial invertebrates inventoried in the field were those considered to be Species of Concern by MTNHP and FWP (2013). The only completely terrestrial invertebrate Species of Concern potentially found in the Otter Creek Mine study area is the gray comma, a butterfly. Farmer (2012) determined that habitat quality for the gray comma in Tract 2 was limited, and did not observe this species. Therefore no further searches for the gray comma were conducted in 2011-2012.

3.4 BIG GAME

For the purposes of this study, big game animals were considered to be those species defined as “game animals” by FWP (87-2-101(6) MCA): pronghorn, mule deer, white-tailed deer, elk, mountain lion and black bear.

Observations of big game were recorded during aerial surveys (Figure 1). These flights provided information on distribution, habitat use and minimum numbers of animals. All surveys were flown in a Piper SuperCub. Altitude was usually 150-300 feet above the ground, but varied depending on topography, presence of livestock or buildings, etc. Aircraft speed was as slow as safely practicable. As in the baseline study (Farmer 2012), most aerial surveys were flown on a grid of north-south flight lines, beginning in the northeast corner of the aerial survey area. Flight lines over gentle to rolling open habitats, where animals could be observed at greater distances, were spaced about 0.5 mile apart, while flight lines over forested or rugged habitats were about 0.25 mile apart. All major species (big game, raptors, grouse, coyotes, etc.) observed during the flight were mapped on 1" = 2000' aerial photographs, and were recorded by species, time, habitat, activity, group size, age and sex composition, if applicable.

There were two flights in autumn 2011. The first, on October 8, was before the opening of general big game hunting seasons. The second, on December 20, was after the close of all big game hunting seasons. Both surveys were used to identify big game occurrence, distribution, habitat use and minimum numbers, and age and gender were classified during the October flight. Both flights began at dawn and took approximately 2.5 hours. Flights began along the east border of the aerial survey area. Strict flight lines (transects) were not used during these surveys; rather, the flight path followed ridges and drainages, circled hills, etc., in an effort to observe as many animals as possible. There was no snow cover during the October 8 flight and only patchy snow cover during the December 20 survey.

There were four flights in winter. One survey was flown at dawn on both January 27 and March 9, 2012; afternoon flights each day were aborted due to high winds and excessive turbulence. Two surveys were flown on February 20. One flight began at dawn and the other began in mid-afternoon in order to be completed by sunset. Two surveys were flown in a single day because: 1) depending on air temperature, wind, etc., big game might be more active later in the day (Biggins 1982); and 2) for the purposes of estimating the minimum known number of animals in the area, it was assumed that mule deer, white-tailed deer and elk would not move more than one mile between the two flights. Therefore

any sightings from the afternoon flight that were within one mile of a sighting mapped during the morning flight were recorded and mapped for purposes of distribution and habitat use, but were discarded for use in estimating minimum numbers of animals in the area. For pronghorn, this distance was increased to three miles. Although these distances were considered sufficient for most animals during winter, they were not absolute limits; therefore, any animals/groups that appeared to be the same (e.g., recognizable individuals, groups of identical size and composition) from one flight to the next were discarded even if they were beyond the separation distance.

On January 27, there was 50 percent snow cover in forested areas in the east side of the aerial survey area, none on the west (King Mountain) side, and patchy snow on north slopes and drainages in between. There was almost no snow cover on February 20, and only about 10 percent patchy snow cover on March 9. These conditions were in sharp contrast to those of the baseline winter (2010-2011), when there was usually 100 percent snow cover on winter flights (Farmer 2012).

In addition to aerial surveys, observations of big game or their evidence were recorded during vehicle and pedestrian routes, and through opportunistic observations during other aspects of the study. Vehicle routes included driving public, all-season roads (Highway 212, Otter Creek and Tenmile Creek roads) throughout the year, and two-track trails in Tract 2 during all seasons. Pedestrian surveys were confined to private lands in Tract 2 and lands managed by the USFS, Bureau of Land Management (BLM) or State of Montana in or adjacent to Tract 2. Observations were recorded by species, date, time of day, habitat, number of animals, age and gender (if possible), and activity, and were mapped on 1" = 2000' base maps.

3.5 UPLAND GAME

For the purposes of this study, upland game animals were considered to be those species defined as "upland game birds" by FWP (87-2-101(13) MCA): ring-necked pheasant, gray partridge, wild turkey, greater sage-grouse and sharp-tailed grouse. Throughout the year, observations of upland game birds were recorded by species, date, time of day, habitat, number of animals, age and gender (if possible), and activity, and were mapped on 1" = 2000' base maps.

A 16-station ring-necked pheasant crow count route was established along the Otter Creek and Tenmile Creek roads (Figure 5). Stations were located approximately one mile apart at locations within 0.5 mile of riparian habitat along East Fork Otter Creek, Otter Creek and Tenmile Creek. These routes/stations were also used to locate calling male turkeys and grouse leks in spring, and for owl surveys in winter and spring. For upland game, surveys began 0.5 hour before sunrise and ended 2.0 hours after sunrise on days with no precipitation and little wind from April 15 through June 15. At each station, the surveyor stopped the vehicle, turned the engine off, stepped out of the vehicle and listened for calling/displaying birds for five minutes. Ring-necked pheasant calls were recorded for the first two minutes, while turkeys and grouse were noted throughout the five minute stop. No specific survey methods were employed for gray partridge; rather, they were recorded whenever observed.

Grouse lek searches were also conducted in upland habitats in Tract 2 by stopping the vehicle approximately every 0.5 mile along two-track trails and listening for displaying birds for 3-5 minutes.

3.6 RAPTORS

For the purposes of this study, raptors were considered to be members of the Accipitriformes (vultures, eagles and hawks), Falconiformes (falcons) and Strigiformes (owls). Throughout the year, raptor sightings were recorded by species, date, time of day, habitat, number of animals, age and gender (if possible), and activity, and were mapped on 1" = 2000' base maps.

Surveys for breeding owls were conducted along the ring-necked pheasant crow count route and portions of Tract 2 on January 26 and 27, February 17 and 18, March 9 and April 22. After several minutes of listening, recorded calls of species most likely to occur in the area in winter/early spring (eastern screech-owl, northern saw-whet owl, long-eared owl and great horned owl) were played in ascending order of bird size, to solicit responses. Locations of calling birds were triangulated, mapped and recorded in field notes.

Searches for nests of owls and diurnal raptors in accessible portions of the Primary and Secondary Study Areas were conducted in April-June by: 1) driving accessible roads and trails in the area, stopping at vantage points to look for nests and listen for calling adults; and 2) walking through appropriate habitats and looking for nests (stick nests, ground nests, tree cavities and rock ledges/cavities) or breeding/territorial behavior of adult birds. Nests were photographed, mapped and recorded in field notes.

3.7 WATERFOWL AND SHOREBIRDS

For the purposes of this study, waterfowl were defined as members of the order Anseriformes (geese, ducks and swans) while shorebirds were members of the orders Gaviiformes (loons), Podicipediformes (grebes), Pelecaniformes (pelicans and cormorants), Ciconiiformes (herons, bitterns, ibises, etc.), Gruiformes (cranes, rails, coots, etc.), Charadriiformes (plovers, snipe, sandpipers, avocets, phalaropes, gulls, terns, etc.) and Coraciiformes (kingfishers).

Aquatic habitats are limited throughout the Otter Creek Mine wildlife study area, and particularly in the Primary Study Area. The portion of Otter Creek in the Primary Study Area, as well as several ponds, was examined in April-July for use by waterfowl and shorebirds. Shorebirds that might occur in upland habitats (e.g., killdeer, upland sandpiper and long-billed curlew) were inventoried with landbird plots and opportunistic observations.

3.8 LANDBIRDS

For the purposes of this study, landbirds were defined as all species except upland game, raptors, waterfowl and shorebirds. Throughout the study, all landbirds were recorded by the habitat in which they were observed.

In early June 2012 breeding landbirds were inventoried in Tract 2 using six circular plots per the protocol contained in MDEQ (2001) guidelines to determine species richness and relative abundance in major habitat types (Figure 5). These six plots were primarily located in the northern portion of Tract 2, which could not be sampled in 2011-2012 due to access limitations (Farmer 2012). In total, 21 landbird plots were sampled in Tract 2 over the two years of study.

Landbird plots were placed over selected vegetation sampling plots (Scow 2012), to correlate the bird community to vegetation if needed (MDEQ 2001). One change was made to the method. Instead of dividing the plot into two areas (0-50 m and >50 m), plots were divided into three areas (0-50 m, 50-100 m and >100 m). Plot radius was measured with a tape and pin flags. Notes were taken on canopy height, canopy cover, etc.

Plots were surveyed from about 0.5-hour after sunrise until mid-morning. Counts lasted 10 minutes. Birds were recorded by distance (0-50 m, 50-100 m, >100 m) and time (0-5 minutes, 5-6 minute, 6-7 minute, 7-8 minute, 8-9 minute and 9-10 minute). Each plot was run three times (once on three different mornings), with the three samples divided throughout the sampling period, i.e., a plot was run once early in the morning, once during the middle of the sampling period, and once late in the sampling period (mid-morning).

3.9 MEDIUM-SIZED MAMMALS

For the purposes of this study, medium-sized mammals were defined to be animals from the size of a black-tailed prairie dog to the size of a coyote, and included some species that have legal status as “non-game species in need of management” (prairie dog, on public lands only; ARM 12.2.501(1)(e)), furbearers (beaver, muskrat, American mink and bobcat; 87-2-101(3) MCA) or predators (coyote, weasel and striped skunk; 87-2-101(11) MCA). All medium-sized mammals observed by direct sightings or evidence during all aspects of the baseline inventory were recorded by the habitat in which they were observed. Sightings of medium-sized mammals that have legal status were recorded by species, date, time of day, habitat, number of animals, age and gender (if possible), and activity, and were mapped on 1" = 2000' base maps.

3.10 SMALL MAMMALS (EXCLUDING BATS)

For the purposes of this study, small mammals were defined as mammals up to the size of a ground squirrel (i.e., smaller than a black-tailed prairie dog). Throughout the monitoring year, small mammals or their evidence (e.g., tracks, skulls in raptor casts, burrows) were recorded by the habitat in which they were observed.

3.11 BATS

Fifteen species of bats potentially occur in Montana; of these, 11 have been recorded in Powder River and/or Rosebud Counties (MTNHP 2013). As discussed by Farmer (2012), Continental Divide Wildlife

Consulting (2011) inventoried bats in Tract 2 in 2011, and documented eight species (big brown bat, silver-haired bat, hoary bat, western small-footed myotis, long-eared myotis, little brown myotis, fringed myotis and long-legged myotis). In addition, WESTECH's biologist observed a pallid bat. Since 9 of 11 potential species were recorded in the area in 2011, no further bat sampling was conducted in 2012.

3.12 AMPHIBIANS AND REPTILES

Throughout the 2011-2012 monitoring year all amphibians and reptiles were recorded by the habitat in which they were seen. Opportunistic searches were conducted at water sources for amphibians (listening for displaying adults, looking for adults, egg masses or larvae) and at rock outcrops for reptiles (looking for basking adults, turning over rocks). In addition, Stagliano (2013) recorded amphibians and reptiles during the 2012 aquatics assessments.

3.13 ENDANGERED OR THREATENED SPECIES

Most of the Otter Creek Mine wildlife study area is in Powder River County, although the western portion of the aerial survey area is in Rosebud County ([Figure 1](#)). The U.S. Fish and Wildlife Service (FWS; 2013) maintains county lists of species that are listed, proposed or candidates under the Endangered Species Act (ESA) of 1973, as amended. Three species are listed for Powder River County: black-footed ferret (Listed Endangered), greater sage-grouse (Candidate) and Sprague's pipit (Candidate); while five species are listed for Rosebud County: black-footed ferret, greater sage-grouse, Sprague's pipit, interior least tern (Listed Endangered) and pallid sturgeon (Listed Endangered).

As discussed by Farmer (2012), potential habitat for only two of these species (greater sage-grouse and Sprague's pipit) is available in the Otter Creek Mine fish and wildlife resources inventory area. The Otter Creek Mine study area is on the border of currently occupied greater sage-grouse range, and there are no known active leks in Tract 2. Sprague's pipit habitat is very limited in Tract 2, and it is considered unlikely that this species would occur in the study area (Farmer 2012).

3.14 SPECIES OF CONCERN

Montana has established a list of vertebrate animal Species of Concern (MTNHP and MFWP 2013); these species are listed in [Table 2](#), as are USFS and BLM sensitive species, and USFS Management Indicator Species. All such species observed during the study were recorded by the habitat in which they were observed and, if appropriate, their locations were mapped.

4.0 RESULTS AND DISCUSSION

4.1 SPECIES LISTS

ARM 17.24.304(1)(j)(i) requires that the fish and wildlife narrative include "...a listing of all fish and wildlife species." One of the objectives of this study (Section 1.2), reflecting MDEQ's (2001) guidelines, was to "...determine fish and wildlife species present on and adjacent to the proposed permit area."

Fish and wildlife species occurring in the region encompassing the Otter Creek Mine, as reported in Farmer (2012), are listed in [Appendix A](#). A total of 378 species (22 fish, 6 amphibians, 13 reptiles, 60 mammals and 274 birds) potentially occur in this area, while the Otter Creek Mine study area contains preferred and/or breeding habitat for 283 species (15 fish, 6 amphibians, 13 reptiles, 57 mammals and 192 birds), or about 76 percent of the potential list.

A total of 162 species (9 fish, 4 amphibians, 8 reptiles, 37 mammals and 104 birds) were recorded during the 2010-2011 baseline inventory, or 57 percent of the species with preferred and/or breeding habitat in the study area (Farmer 2012). As discussed by Farmer (2012), this total was considered low.

In comparison, a total of 122 species (10 fish, 4 amphibians, 8 reptiles, 14 mammals and 86 birds) were recorded during the 2011-2012 monitoring year ([Appendix B](#)). The difference in the number of mammals and birds from 2010-2011 to 2011-2012 was largely due to the change in monitoring emphasis, e.g., there was no small mammal trapping or bat sampling (which together accounted for 16 species during the baseline year), and considerably less field time in summer 2012 and more time in autumn 2012.

Despite the shift in emphasis of field work, 12 species (1 fish, 1 reptile, 10 birds) were added to the Otter Creek Mine species list in the 2011-2012 monitoring year ([Appendix B](#)). Stagliano (2013) captured the non-native golden shiner in Otter Creek in 2012, and speculated that its presence in Otter Creek was due to stock pond overflows. The golden shiner was probably introduced in Montana as a forage and/or bait fish; its known distribution in southeastern Montana appears to be in several slow-moving prairie streams (MTNHP 2013). Ten of the 16 fish species (63 percent; [Figure 6](#)) expected to occur in Otter Creek in the study area have been captured in the last two years.

No new amphibians were observed in 2011-2012; 67 percent (4 of 6 species) of amphibians expected to occur in the Otter Creek Mine study area have been recorded to date ([Figure 6](#)). One new reptile, the common gartersnake, was recorded in 2011-2012 ([Appendix B](#)), so that 69 percent (9 of 13 species; [Appendix A](#)) of reptiles expected to occur in the Otter Creek Mine study area have been recorded to date ([Figure 6](#)).

No new mammals were recorded in 2011-2012 ([Appendix A](#)). About 62 percent (37 of 60 species) of mammals expected to occur in the Otter Creek Mine study area have been recorded to date ([Figure 7](#)).

Of the 10 new birds added to the species list in 2011-2012, three are waterfowl (green-winged teal, northern pintail and northern shoveler) that were observed only in April, and apparently did not nest in the study area. Two (spotted sandpiper and belted kingfisher) are shorebirds; the spotted sandpiper was believed to be transient, while the belted kingfisher was resident. One species (wild turkey) is an upland game bird. One species (short-eared owl) is a raptor. One species (Eurasian collared-dove) is a non-native bird that has been increasing in both range and numbers in Montana, and is usually associated with human use sites (towns, farmsteads, etc.). Two species (gray catbird, canyon wren) are landbirds. The gray catbird was believed to be a resident; while appropriate habitat for canyon wrens (cliffs, tall outcrops; [Appendix A](#)) is available in the study area, there are comparatively few records of canyon wrens from Rosebud and Powder River Counties (MTNHP 2013). In total, 114 bird species have been recorded in the study area in the last two years, or about 59 percent of the birds expected to occur in the Otter Creek Mine study area ([Figure 8](#)).

4.2 FISH AND WILDLIFE HABITAT USE

Fish and wildlife/habitat relationships in the Otter Creek Mine study area, with particular emphasis on Tract 2, were discussed extensively in the baseline report (Farmer 2012). There are differences in habitat availability between Tract 2 and the aerial survey area, differences in habitat availability on either side of Otter Creek, and differences in slope and aspect on either side of the creek that may influence wildlife seasonal occurrence and habitat use.

Farmer (2012) identified six habitat types comprising 18 habitat subtypes in the study area. The number of fish and wildlife species recorded by habitat subtype during the baseline inventory (Farmer 2012) and 2011-2012 are compared in [Figure 9](#). Although there are sometimes pronounced differences in the number of species recorded in a single habitat, the trend in species richness by habitat subtype between years is similar.

It is recognized that fish and wildlife species would not be expected to be distributed and/or detected equally in all habitats (Farmer 2012). Nevertheless, a comparison of species richness (calculated by dividing the number of species recorded in a habitat by the total of 162 species recorded during 2010-2011, and 122 species in 2011-2012) and habitat availability (Farmer 2012) can be used as a general indicator of habitat "value." [Figure 10](#) shows that rock outcrops (subtype 001), ponds/impoundments/streams (subtype 002), the riparian habitat complex (subtypes 110 and 413) and the conifer complex (subtypes 123, 124 and 130) contributed considerably more species than would be expected, based solely on availability.

4.3 AQUATIC ASSESSMENTS

Results of the 2012 aquatic assessments of the Otter Creek Mine study area (Stagliano 2013) are presented in [Appendix C](#). Stagliano (2013) documented 10 species of fish, four amphibians and four reptiles ([Appendix A](#)), as well as 105 aquatic macroinvertebrate taxa. Stagliano (2013) concluded that:

“Similar patterns of aquatic community species and biotic integrity were documented between the 2012 and 2011 surveys, despite significantly different flow regimes. Biotic integrity of mainstem Otter Creek (based on fish) in the upstream control reach remains higher and decreases as you proceed downstream...macroinvertebrates show no discernible pattern of integrity spatially, but temporarily are showing higher integrity scores during the summer months. Fish communities have reassembled themselves since the 2011 high water...”

Stagliano (2013) collected one macroinvertebrate Species of Concern (a mayfly (*Caenis youngi*)) and one Potential Species of Concern, the brassy minnow. Both were also collected in 2011 (Stagliano 2012).

4.4 BIG GAME

As discussed in Section 3.4, big game species in the Otter Creek Mine fish and wildlife resources inventory area were pronghorn, mule deer, white-tailed deer, elk, black bear and mountain lion. All except elk and mountain lion were recorded in 2011-2012.

Elk are found primarily in the rugged hills and are rarely seen in the creek bottom or adjoining rolling uplands of the Otter Creek Mine study area (Farmer 2012). FWP’s Critical Areas Planning System (CAPS) mapping (FWP 2013) does not identify any of the Otter Creek Mine aerial survey area as elk winter range. Farmer (2012) observed elk twice during the 2010-2011 baseline inventory, and noted tracks in winter in two portions of the aerial survey area. There was so little snow during 2011-2012 aerial surveys that elk use of the aerial survey area could not be documented. However, Farmer (2012) speculated that elk used the aerial survey area irregularly during winter.

Mountain lions have been observed in and adjacent to the Otter Creek Mine aerial survey area in recent years (MTNHP 2013) and therefore could have been present at least occasionally during the present study, but this secretive species was not recorded by sightings or evidence.

Pronghorn and mule deer were commonly seen during the baseline study, while white-tailed deer were seldom observed. Black bear were recorded by evidence rather than direct observations.

4.4.1 Pronghorn

For the year there were 62 observations totaling 661 pronghorn in the Otter Creek Mine inventory area, compared to 64 sightings totaling 667 pronghorn in the 2010-2011 baseline year (Farmer 2012). Seasonal distribution of these sightings is shown in [Figure 11](#). Habitat use is presented in [Table 3](#).

4.4.1.1 Autumn

4.4.1.1.1 Distribution and Habitat Use

In autumn 2011 there were 12 observations totaling 157 pronghorn (Table 3), compared to 15 observations totaling 189 pronghorn in autumn 2010 (Farmer 2012). Although the total numbers of sightings and pronghorn were similar between years, location of sightings was substantially different. In autumn 2011, only three sightings (25 percent of all autumn observations) were west of Otter Creek, and 12 sightings (75 percent) were east of the creek (Figure 11). In contrast, in autumn 2010, 11 sightings (73 percent of all autumn observations) were west of Otter Creek, and four observations (27 percent) were east of the creek (Farmer 2012). Farmer (2012) reported that the distribution of autumn 2011 sightings was similar to that reported by Martin (1980) in autumn 1979. The reason for the difference between autumn 2010 and 2011 distribution is not readily apparent; it did not appear to be weather/snow related, since most sightings in all three years were recorded before snowfall.

In autumn 2011, 100 percent of all groups and all individuals were recorded in sagebrush and grassland habitats (Table 3). In comparison, Farmer (2012) reported that in autumn 2010 about 93 percent of all groups and 99 percent of all individuals were recorded in sagebrush and grassland habitats, and that Martin (1980) found that 97 percent of pronghorn seen in autumn came from sagebrush and grassland habitats. Thus, autumn habitat use was consistent despite the difference in distribution between years.

4.4.1.1.2 Population Characteristics

As discussed by Farmer (2012), population characteristics (size and density, age and sex ratios, etc.) are dynamic and may fluctuate considerably from year to year, depending on influences such as climate (precipitation, winter severity), predation (human and animal), land use and habitat changes.

In October 2011 there was a minimum of 121 pronghorn in the Otter Creek Mine aerial survey area (Table 4); 105 were counted east of Otter Creek and 16 were counted west of the creek. In contrast, Farmer (2012) counted 90 pronghorn in October 2010, but 29 were east of Otter Creek and 61 were west of the creek.

By mid-December 2011 (the end of autumn) all 31 pronghorn counted were west of Otter Creek (Table 4). In sharp contrast, in December 2010 Farmer (2012) counted 99 pronghorn in December, but 64 were east of the creek and 35 were west of Otter Creek. Therefore pronghorn numbers and distribution were opposites in autumn 2010 and autumn 2011: in autumn 2010 pronghorn numbers remained about the same throughout the season, but distribution changed from east of the creek to west of the creek; in autumn 2011 there was a marked decline in pronghorn numbers as the season progressed, and distribution shifted from west of the creek to east of the creek.

In October 2011 (8 groups totaling 121 pronghorn), group sizes ranged from 5 to 37 and averaged 15.1. In December 2011, average group size was 15.5 (Table 4).

The October 2011 sample was classified by age and gender (Table 4), and comprised 10.7 percent males, 62.8 percent females and 26.4 percent fawns. In comparison, the October 2010 sample comprised of 22.2 percent males, 51.1 percent females and 26.7 percent fawns (Farmer 2012). The October 2011 data yielded a male:female ratio of 17:100 and a fawn:female ratio of 42:100 (Table 4). FWP (2011a) reported an autumn 2011 fawn:female ratio of 47:100, well below the long-term average of 73:100 for Administrative Region 7. Thus the fawn:doe ratio derived from the comparatively small sample from the Otter Creek Mine aerial survey area was similar to the region-wide ratio calculated by FWP. FWP (2011a) reported that pronghorn numbers in Region 7 were 57 percent below the 10-year average, reflecting the harsh 2010-2011 winter.

No mortality was observed in autumn 2011.

4.4.1.2 Winter

4.4.1.2.1 Distribution and Habitat Use

In the mild winter 2011-2012 there were 21 observations totaling 418 pronghorn (Table 3), compared to 11 sightings totaling 354 pronghorn in the severe 2010-2011 winter (Farmer 2012). Farmer (2012) reported that by mid-winter 2010-2011 pronghorn were generally confined to two areas: 1) west of Otter Creek between Gene Creek and Chromo Creek, and 2) east of Otter Creek within two miles north of Tenmile Creek. Both these areas have been classified as high value pronghorn winter range by FWP's Crucial Areas Planning System (CAPS; FWP 2013), a GIS-based planning tool which depicts Montana native fish and wildlife species and habitat information. In the mild 2011-2012 winter, however, pronghorn movement and distribution were generally not restricted. While 9 (43 percent) of winter sightings were in the high value winter range between Gene Creek and Chromo Creek, the remaining 12 (57 percent) observations were widely scattered, primarily east of Otter Creek; none were in the area two miles north of Tenmile Creek (Figure 11).

Pronghorn distribution in the mild 2011-2012 winter (Figure 11) agreed with Martin's (1980) assessment that "...since the 1979-80 winter season was quite mild, antelope were free to roam about their range at will. Therefore the areas used during this study probably include more area than that used in more severe winter conditions." Martin (1980) reported that pronghorn east of Otter Creek were found about mid-way between Threemile Creek and Tenmile Creek. This same area was used in the 2011-2012 winter (Figure 11).

In winter 2011-2012, about 99 percent of all pronghorn groups and 99.9 percent of all individuals were recorded in sagebrush and grassland habitats (Table 3). In comparison, in winter 2010-2011 100 percent of all groups and individuals were recorded in grassland habitats (Farmer 2012). There were comparatively large blocks of sagebrush in the areas used by pronghorns during the severe 2010-2011 winter and evidence (tracks) suggested that pronghorn were using these sagebrush stands (Farmer 2012). Consequently there appeared to be little difference in habitat use between the two years, despite the difference in distribution.

4.4.1.2.2 Population Characteristics

The minimum known number of pronghorn in the aerial survey area was 31 in mid-December 2011, 0 in January 2012 (no pronghorn were observed in the Otter Creek Mine inventory area during the January 2012 aerial survey), 201 in February (85 east of Otter Creek, 80 west of the creek) and 186 in March (117 east of Otter Creek, 69 west of the creek) (Table 4). In comparison, the minimum known number of pronghorn in the aerial survey area was 99 in mid-December 2010 (64 east of Otter Creek, 35 west of the creek), 0 in January 2011, 118 in February (83 east of Otter Creek, 35 west of the creek) and 162 in March (90 east of Otter Creek, 72 west of the creek) (Farmer 2012).

It is interesting to note that there was a substantial decline in pronghorn observed in January in both years, despite the difference in winter severity. Martin (1980) documented the same decline in January in the mild 1979-1980 winter, and noted that "... many antelope appeared to have left the Otter Creek area during January..." and speculated that "...perhaps this area represents marginal wintering habitat for antelope..." WESTECH's January surveys were flown on January 25, 2011 and January 27, 2012. Martin (1980) did not report the date of his January 1980 flight. In contrast, FWP flew its Otter Creek long-term trend area (which approximately corresponds to the portion of the Otter Creek Mine aerial survey area west of Otter Creek and south of Home Creek) on January 7, 2012 and counted 92 pronghorn. Therefore, if pronghorn actually left the Otter Creek area in January 2012, it occurred sometime between January 7 and January 25.

The minimum known number of pronghorn in the study area was 186 on March 9, 2012, with 69 animals counted west of Otter Creek (Table 4). In comparison, FWP counted 53 pronghorn west of Otter Creek on March 20, 2012. In the preceding winter, Farmer (2012) counted 162 pronghorn on March 10-11, 2011, with 72 counted west of Otter Creek. Thus it appears that if pronghorn actually leave the study area in late January, they return by mid-March in both mild and severe winters.

Assuming that most or all of the pronghorn in the Otter Creek Mine aerial survey area actually left the area in January and then returned, Farmer (2012) reported that these counts suggested that additional pronghorn immigrated to both sides of Otter Creek as the severe 2010-2011 winter progressed. A similar increase appeared to occur in the mild 2011-2012 winter. However, Farmer (2012) noted that Martin (1980) did not record such an increase in the mild 1979-1980 winter.

Farmer (2012) examined satellite imagery (GoogleEarth and Bing Maps) of the region surrounding the Otter Creek Mine aerial survey area and suggested that the most likely source area for pronghorn immigrating into the Otter Creek Mine study area during winter is the Paget Creek/Cow Creek area several miles upstream. However, such movement could not be confirmed in either winter.

As in the 2010-2011 baseline year, pronghorn were not classified by age and gender during winter. Although sample sizes were small in all years, in March 1980 the average group size was 13.4 pronghorn (Martin 1980); on March 10, 2011 it was 25.9 (Farmer 2012); and on March 9, 2012 it was 16.9 (Table 4).

As might be expected, average group sizes were smaller in mild winters (1980 and 2012) than in the severe 2011 winter, when pronghorn were more concentrated.

No mortalities were observed during winter 2011-2012.

4.4.1.3 Spring

4.4.1.3.1 Distribution and Habitat Use

In spring 2012 there were 29 sightings totaling 80 pronghorn (Table 3). No aerial surveys were flown in spring, so pronghorn sightings were skewed towards accessible portions of the study area, and there were repeated observations of the same individuals in certain locations (Figure 11). Consequently it was not possible to accurately compare distribution on either side of Otter Creek. However, since there were no changes in land use or habitat availability in spring 2012 from previous years, pronghorn spring distribution was probably similar to previous years, as summarized by Farmer (2012).

In spring 2012 90 percent of all groups and 94 percent of all individuals were recorded in sagebrush and grassland habitats (Table 3); this calculation was also influenced by the skewed spring distribution and repeated sightings at certain locations (Figure 11). In comparison, however, Martin (1980) reported that 84 percent of all pronghorn observed in spring 1979, and 91 percent of all pronghorn recorded in spring 1980, came from sagebrush and grassland habitats; and in spring 2011 89 percent of all groups and 88 percent of all individuals were recorded in sagebrush and grassland habitats (Farmer 2012). Thus, pronghorn habitat use in spring 2012 closely resembled that of previous years, despite the differences in distribution.

4.4.1.3.2 Population Characteristics

Farmer (2012) reported that the minimum known number of pronghorn in the Otter Creek Mine survey area in spring, as measured by aerial surveys, seems to fluctuate considerably between years. Since no aerial surveys were flown in spring 2012 it was not possible to compare minimum known numbers with previous years. The minimum known number recorded by ground surveys in spring 2012 (April) was 14 pronghorn, which was undoubtedly low.

Although sample sizes were small, average and median group sizes declined from April through early June, which would be expected as pronghorns dispersed as fawning approached. While natality was not directly observed, fawns were seen in Tract 2 in early June, as were single does (suggesting that these does had fawns nearby). Farmer (2012) and Martin (1980) also recorded fawns in June, suggesting that fawning occurs in the study area.

No mortality was observed in spring 2012.

4.4.1.4 Summer

No pronghorn were observed in summer 2012. This was believed to be due to the change in emphasis in wildlife monitoring in the Otter Creek Mine fish and wildlife resources area in 2012 (Section 1.0), which resulted in less field effort in summer (Table 1), than to an absence of pronghorn in the study area.

4.4.1.5 Summary

As in the baseline (2010-2011) year, pronghorn were one of the most commonly observed big game species in the Otter Creek Mine fish and wildlife resources inventory area in 2011-2012. They were present year round on both sides of Otter Creek and were primarily found from low to mid-elevations, particularly in the dissected, gently-to-moderately rolling uplands between drainage bottoms and the rugged hills to the east and west. Habitat use in all seasons was dominated by the sagebrush and grassland habitat complexes. Seasonal distribution was very similar to that of the baseline year, except for winter. Pronghorn distribution and movement did not appear to be restricted in the mild 2011-2012 winter. In contrast, the 2010-2011 winter was considered severe, and by mid-winter pronghorn were concentrated in two areas, one on each side of the creek (Farmer 2012). In both winters, however, there appeared to be movement into and out of the study area in mid-winter.

As reported by Farmer (2012), pronghorn numbers in the Otter Creek Mine study area may fluctuate considerably between seasons and between years. However, autumn 2012 population structure and in particular, fawn:female ratios, were similar to those reported for the surrounding region by FWP.

Based on observations of fawns in early June, fawning was believed to have occurred in the Otter Creek Mine study area in spring 2012. No mortality was documented in 2011-2012.

4.4.2 Mule Deer

In 2011-2012 there were 56 observations totaling 296 mule deer in the Otter Creek Mine inventory area. Seasonal distribution of these sightings is shown in Figure 12. Habitat use is presented in Table 5. In comparison, in 2010-2011 there were 71 observations totaling 303 mule deer in the study area (Farmer 2012).

4.4.2.1 Autumn

4.4.2.1.1 Distribution and Habitat Use

In autumn 2011 there were 12 observations totaling 44 mule deer (Table 5). In comparison, there were 23 observations totaling 113 mule deer in autumn 2010 (Farmer 2012). Sightings were more widely distributed than in autumn 2010 (Farmer 2012), but all autumn 2011 observations were within one mile of locations used in either autumn or winter 2011, suggesting little change in mule deer autumn distribution between years.

Autumn 2011 sightings generally conformed to the east-west distribution pattern observed by Farmer (2012). In autumn 2011 four sightings (33 percent of all autumn observations) were west of Otter Creek, and eight observations (67 percent) were east of the creek (Figure 12). In comparison, 26 percent of all autumn 2010 observations were west of Otter Creek, and 74 percent were east of the creek (Farmer 2012).

Autumn 2012 habitat use is presented in Table 5 and compared to autumn 2011 habitat use in Figure 13, using the habitat complexes described by Farmer (2012). The trend in the use of habitat complexes was similar between the two years, although numbers of groups observed in each complex varied.

4.4.2.1.2 Population Characteristics

As discussed previously, population characteristics (size and density, age and sex ratios, fawn recruitment, etc.) are dynamic and may fluctuate considerably from year to year, depending on influences such as climate (precipitation, winter severity, etc.), predation (human and animal), land use, changes in habitat, etc.

In mid-October 2011 only 20 mule deer were counted in the Otter Creek Mine aerial survey area (Table 6); 13 were east of Otter Creek and seven were west of the creek. In comparison, in mid-October 2010 there was a minimum of 84 mule deer in the Otter Creek Mine aerial survey area (Farmer 2012); 48 were observed east of Otter Creek and 36 were west of the creek.

The October 2011 count was subjectively believed to be low because FWP counted 92 mule deer in its long-term trend area that overlays much of the Otter Creek Mine aerial survey area in April 2011 (Farmer 2012), and there were no reports of substantial mortality during summer 2011 that would suggest that the study area mule deer population had declined so dramatically between spring and autumn. However, FWP (2011b) reported that the mule deer population across Administrative Region 7 was 12 percent below the long-term average, and several Ashland/Otter Creek Mine area residents reported that mule deer numbers in autumn 2011 were well below their past peaks.

The October 2011 minimum density of mule deer in the Otter Creek Mine aerial survey area was $0.19/\text{mi}^2$ ($0.07/\text{km}^2$), compared to $0.80/\text{mi}^2$ ($0.31/\text{km}^2$) in October 2010 (Farmer 2012) and $1.12/\text{mi}^2$ ($0.43/\text{km}^2$) in October 1979 (Martin 1980). These densities were on the lower end of the range of densities for mule deer in southeastern Montana districts ($0.1\text{-}3.3/\text{km}^2$) reported by Youmans and Swenson (1982; cited in Mackie et al. 1998). However, mule deer densities in upland breaks and prairie-badlands habitats often fluctuate dramatically (Mackie et al. 1998).

In mid-December 2011 (the end of autumn) only 24 mule deer were counted in the study area, all east of the creek (Table 6). As in October, this count was subjectively believed to be low. It was impossible to follow tracks during the December aerial survey to locate deer groups due to the absence of complete snow cover, which probably reduced the number of observations.

Based on a very small sample (7 groups totaling 20 mule deer), in October 2011 group sizes ranged from 2 to 5 and averaged 2.9 (Table 6). In comparison, in October 2010 (16 groups totaling 84 mule deer), group sizes ranged from 2 to 13 and averaged 5.3 (Farmer 2012) and in October 1979 (23 groups totaling 103 mule deer), group size averaged 4.5 (Martin 1980).

All 20 mule deer observed during the October 2011 aerial survey were classified by age and gender. This total was composed of 20.0 percent males, 55.0 percent females and 25.0 percent fawns. In comparison, the October 2012 sample of 71 mule deer was composed of 7.0 percent males, 60.6 percent females and 32.4 percent fawns (Farmer 2012). Martin (1980) classified a sample of 103 mule deer in October 1979 that was composed of 8.7 percent males, 41.7 percent females and 49.5 percent fawns.

The October 2011 data yielded a male:female ratio of 31:100 and a fawn:female ratio of 38:100 (Table 6). In comparison, the October 2010 data yielded a male:female ratio of 12:100 and a fawn:female ratio of 53:100 (Farmer 2012).

FWP (2011b) reported that the ratio of fawns per 100 adults (a measure of animals that survive the first year of life) in Region 7 in 2011 averaged 41 fawns per 100 adults, down from a typical average of 60 fawns per 100 adults. The small October sample from the Otter Creek Mine aerial survey area yielded a ratio of 33 fawns per 100 adults, well below that observed by FWP (2011b).

No mortality was observed in autumn 2011. However, study area residents reported that both private and public lands in the Otter Creek Mine aerial survey area received hunting pressure.

In summary, in autumn 2011 mule deer numbers, group size, population composition, and gender and age ratios suggested that the Otter Creek Mine study area mule deer population had declined since autumn 2010. However, these results were based on a very small sample, and may not have accurately reflected the actual conditions in the study area.

4.4.2.2 Winter

4.4.2.2.1 Distribution and Habitat Use

In winter 2011-2012 there were 26 observations totaling 204 mule deer (Figure 12). In comparison, in winter 2010-2011 there were 19 observations totaling 128 mule deer (Farmer 2012).

As in autumn, more observations were recorded east of Otter Creek than west of the creek. Only three (12 percent of the total) 2011-2012 winter sightings were west of Otter Creek, while 23 sightings (88 percent) were east of the creek (Figure 12). In comparison, 47 percent of the total winter 2010-2011 winter sightings were west of Otter Creek and 53 percent were east of the creek (Farmer 2012), and in winter 1979-1980 45 percent were west of Otter Creek and 55 percent were east of the creek (Martin 1980; Farmer 2012).

In the severe 2010-2011 winter Farmer (2012) identified many comparatively small (most were less than 0.25 mi²) patchy areas characterized by moderate to very steep slopes, primarily in ponderosa pine and breaks habitats, that were used by mule deer during the most severe part of the winter. In contrast, Martin (1980) reported that:

“...the 1979-1980 winter... was very mild with little snow fall. As a result, mule deer remained quite widespread...two major wintering areas were determined: one southwest of Otter Creek north of the Custer National Forest; the other east of Otter Creek and south of Threemile Creek. The remainder of the observations were too scattered to consider. It is likely that many deer wintered in the adjacent Custer National Forest.”

As expected from his analysis, only four of Martin’s (1980) nine sightings from west of Otter Creek, and only two of Martin’s (1980) 11 sightings from east of the creek, came from the patchy areas identified by Farmer (2012). No use of Martin’s (1980) “major wintering area” south of Threemile Creek was observed during the severe portion of the 2010-2011 winter (Farmer 2012). In the 2011-2012 winter, however, Martin’s (1980) “major wintering area” south of Threemile Creek contributed several sightings, as did areas in the Custer National Forest (Figure 12). Therefore mule deer distribution in the mild 2011-2012 winter conformed to distribution described by Martin (1980).

Farmer (2012) reported that 52 percent of all the severe winter 2010-2011 sightings came from ponderosa pine/grass, ponderosa pine/shrub and juniper habitats (subtypes 123, 124 and 130), 26 percent from breaks habitat (subtype 280) and 10 percent from big sagebrush and silver sagebrush habitats (subtypes 212 and 222). In comparison, during the mild 2011-2012 winter, 19 percent of all sightings came from the conifer complex, 15 percent from breaks, and 19 percent from sagebrush habitats (Table 5). Thus the three habitat complexes that dominated (88 percent) sightings in the severe 2010-2011 winter contributed only 53 percent of observations in the mild 2011-2012 winter. Habitat use in the two winters is compared in Figure 14, which further supports Martin’s (1980) observation that during mild winters, mule deer in the Otter Creek area are “quite widespread.”

4.4.2.2 Population Characteristics

Farmer (2012) noted that as winter progressed, the number of deer counted during aerial surveys increased. This also occurred in the 2011-2012 winter (Table 6). A total of 7 mule deer were counted on January 27, 2012, all east of Otter Creek. On February 20, 100 mule deer were counted in the aerial survey area, with 78 east of the creek and 22 west of the creek; and on March 9, 2012 94 mule deer were counted, all east of the creek (Table 6).

In contrast, FWP counted 67 mule deer on January 7, 2012, all west of Otter Creek (FWP’s long-term trend area is primarily west of the creek). On March 20, 2012 FWP counted 98 mule deer, with 73 west of the creek and 25 east of the creek. It is subjectively believed that the disparity in both distribution and numbers between counts from the two sources reflected mule deer observability, rather than any substantial difference in mule deer numbers.

Farmer (2012) observed no movement across the Otter Creek valley in the severe 2010-2011 winter, and therefore speculated that the largest counts of mule deer from either side of the creek possibly represented the minimum known number in the aerial survey area, i.e., 78 (35 east of the creek and 43 west of the creek). In contrast, movement in the mild 2011-2012 was certainly not restricted by snow depth. No mule deer were seen crossing the Otter Creek valley, but study area residents reported that deer were feeding in the valley habitats. Therefore it was not possible to derive a minimum known number of mule deer based on the assumption of no movement. Instead, the minimum known number of mule deer in the Otter Creek Mine aerial survey area was assumed to be 100, based on the February 20 aerial survey (Table 6). Again, the difference in counts between WESTECH and FWP flights should be noted.

Mule deer were not classified by age or gender during winter. Average mule deer group size was 7.0 in January, 7.9 in February and 7.8 in early March 2012 (Table 6). FWP's data yielded an average group size of 7.4 in January and 8.2 in March. In comparison, Farmer (2012) calculated average mule deer group sizes of 8.5 in January, 6.4 in February and 6.3 in early March 2011.

No mortality was observed in winter 2011-2012. However, study area residents reported two instances of coyotes killing mule deer in the Otter Creek bottom during winter.

4.4.2.3 Spring

4.4.2.3.1 Distribution and Habitat Use

In spring 2012 there were 17 observations totaling 47 mule deer (Figure 12). In comparison, in spring 2011 there were nine observations totaling 33 mule deer (Farmer 2012). In spring 2012 four sightings (24 percent) were west of Otter Creek and 13 (76 percent) were east of the creek. However, there were no aerial surveys in spring 2012, and it appeared that distribution of mule deer sightings was skewed towards Tract 2 and accessible public roads (Figure 12).

Martin (1980) reported that in spring 1980 "...most observations are located in a band across the center of the study area between Threemile and East Fork Otter Creeks..." i.e., incorporating both sides of the stream. Such a distribution pattern was not evident in spring 2011 (Farmer 2012) or in spring 2012 (Figure 12).

Mule deer habitat use in spring 2012 is given in Table 5 and compared to spring 2011 in Figure 15. Spring 2011 habitat use may have been influenced by the "delayed" development of herbaceous vegetation (Farmer 2012), while spring 2012 habitat use may have been influenced by the skewed distribution of sightings (Figure 12).

4.4.2.3.2 Population Characteristics

The largest count (no duplicate counts of individual deer) from a single day in spring 2012 was 13, recorded during ground surveys in April. Due to the change in emphasis of wildlife monitoring, no aerial

surveys were flown in spring 2012. Consequently spring mule deer counts (Table 6) are not comparable with the results from spring 2011 (Farmer 2012) or with FWP's long-term monitoring. FWP's long-term average count in its trend area, which overlays much of the Otter Creek Mine aerial survey area, is about 99 mule deer but often shows considerable fluctuations between years (Farmer 2012). As discussed by Farmer (2012), FWP's count is obviously more representative of spring mule deer populations.

Spring 2012 mule deer observations were not classified by age. FWP's Otter Creek trend area's long-term average of fawns per 100 adults is about 62:100 (Farmer 2012). As discussed previously, FWP (2011b) reported that the typical average ratio of fawns per 100 adults in Region 7 is 60:100, but in 2011 was 41:100 adults, well below average.

No mortality was observed in spring 2012. As expected, average group size in spring 2012 declined in early June as females dispersed for fawning (Table 6). Natality was not observed, but observations of single does in early June were suggestive of fawning.

4.4.2.4 Summer

There was a single observation of mule deer in summer 2012 (Figure 12; Tables 5 and 6). This was believed to be due to the change in emphasis in wildlife monitoring in the Otter Creek Mine fish and wildlife resources area in 2012 (Section 1.0), which resulted in less field effort in summer (Table 1), than to an absence of mule deer in the study area.

4.4.2.5 Summary

As in the baseline year (2010-2011), mule deer were one of the most commonly recorded big game species in the Otter Creek Mine fish and wildlife resources inventory area in 2011-2012. They were present year round on both sides of Otter Creek, at all elevations. Seasonal distribution was similar to that of the baseline year, except for winter. During the most severe portion of the 2010-2011 winter, mule deer were confined to comparatively small patches of ponderosa pine and breaks habitat with moderate to steep slopes (Farmer 2012). In the mild 2011-2012 winter, however, mule deer movement was not restricted and they were much more widely distributed, similar to that observed by Martin (1980) during the mild 1979-1980 winter.

As in 2010-2011, ponderosa pine, breaks and sagebrush habitats were important in all seasons in 2011-2012. Use of grassland and agricultural habitats increased in 2011-2012 over the baseline year. Hay fields received substantially more use in 2011-2012, perhaps because upland habitats were more desiccated in 2011-2012.

Fawn production/survival was lower in 2011-2012 than the long-term regional average, possibly as a function of the severe 2010-2011 winter and cold, wet spring 2011.

Natality was not observed but was believed to have occurred in the Otter Creek Mine study area in spring 2012. Mortality was not observed, but winter coyote predation was reported by area residents.

4.4.3 White-tailed Deer

There were only three white-tailed deer sightings during 2011-2012, all recorded along Otter Creek (Figure 16). One sighting was four does and one fawn feeding in a hay field near the south end of the aerial survey area during the October 2011 aerial survey (Figure 16). In February 2012, there was a sighting at nearly the same location (Figure 16), of a buck, two does and a fawn feeding in a hay field. The third sighting, recorded in April, was four does feeding in a hay field near the mouth of Home Creek (Figure 16).

As discussed by Farmer (2012), white-tailed deer appear to be uncommon compared to mule deer in the Otter Creek Mine study area, possibly due to the absence of well-developed riparian forest along Otter Creek, coupled with the distance between the creek bottom and coniferous forest upland habitats.

4.4.4 Black Bear

Black bears have increased in southeast Montana in recent years, even though appropriate habitat is limited; study area residents interviewed during the Otter Creek Mine baseline study reported that black bears were rare, but were more common than in the past (Farmer 2012). Farmer (2012) did not observe black bears during the baseline year (2010-2011), but found evidence (tracks or scats) at two locations, both in or near coniferous forest habitat near the east boundary of Tract 2. In July 2012 WESTECH vegetation ecologists found a desiccated bear scat in riparian habitat along Otter Creek (Figure 16). There is not enough riparian forest along Otter Creek to support black bears. Therefore it seems likely that this animal was a transient.

4.5 UPLAND GAME

Five upland game birds have been recorded in the Otter Creek Mine area in the past (Farmer 2012): wild turkey, gray partridge, ring-necked pheasant, greater sage-grouse and sharp-tailed grouse.

Farmer (2012) reported that the Otter Creek Mine fish and wildlife inventory area has areas of sagebrush habitat capable of sustaining sage-grouse seasonally, but in the last 30 years the area appears to have been used by only small numbers of sage-grouse. There are no known active leks in the study area, but the occasional observation of sage-grouse in the area suggests that there may be a lek present within 10 miles. No sage-grouse or their evidence were observed in 2011-2012, and no displaying sage-grouse were heard from the pheasant crow count route (Figure 5) in spring 2012.

4.5.1 Wild Turkey

Wild turkeys were released in the Ashland area in 1956 and 1957, and localized releases of turkeys continued in the vicinity until at least the late 1970s (Farmer 2012). Although MTNHP's (2013) data base contains many records of wild turkey sightings in and near the Otter Creek Mine study area, turkey numbers in much of southeast Montana (including the Ashland area) were reported to have

substantially declined from 2008-2010. Farmer (2012) did not record wild turkeys or their evidence (feathers, dropping, tracks) during the 2010-2011 baseline study, and stated that study area residents reported that turkeys were rare in the area for several years.

No turkeys were observed in 2011-2012. However, turkey scats were found in riparian tree habitat (habitat subtype 110) on lower Threemile Creek in October 2011 (Figure 17), indicating that wild turkeys were present in the study area.

4.5.2 Gray Partridge

Farmer (2012) reported that there are comparatively few records of gray partridge in the region surrounding the Otter Creek Mine study area, and that the study area does not contain substantial amounts of preferred habitat for gray partridge (a mixture of cultivated crops, particularly grains, and uncultivated grasslands and shrublands, often near farm/ranch residences). No partridge were observed during the Otter Creek Mine baseline study, although a study area resident reported seeing one or two small coveys of partridge in his ranch yard along Tenmile Creek (Farmer 2012). There were two sightings during the 2011-2012 monitoring year, one in autumn 2011 (five birds) and one in May 2012 (six birds), both near the confluence of Tenmile Creek and Otter Creek (Figure 17).

4.5.3 Sharp-tailed Grouse

There were 18 sightings (excluding leks) totaling 135 sharp-tailed grouse during the 2011-2012 monitoring year (Figure 17), compared to 11 sightings (including leks) totaling 62 sharp-tailed grouse during the 2010-2011 baseline study (Farmer 2012). There were four sightings in autumn 2011, four sightings in winter 2011-2012 and 10 sightings in spring 2012, reflecting both the change in emphasis of field work during 2011-2012, and the better field conditions in Tract 2 compared to spring 2011.

All 2011-2012 sightings came from ponderosa pine, sagebrush, grassland and hay habitats (Table 7). In comparison, all 2010-2011 sightings came from ponderosa pine, sagebrush and grassland habitats (Farmer 2012).

The pheasant crow count route (Figure 5) was used to search for leks in spring by listening for displaying male grouse. Displaying was heard from five locations (Figure 17). Four of these approximately conformed to lek locations (PO-149, PO-058, PO-079 and PO-151) identified by FWP in its long-term monitoring area.

FWP counted 12 male sharp-tailed grouse on lek PO-149 during an aerial survey in early May 2012. WESTECH biologists did not have ground access to lek PO-149 in spring 2012.

FWP counted 15 male sharp-tailed grouse on lek PO-058 during an aerial survey in early May 2012. WESTECH biologists did not have ground access to lek PO-058 in spring 2012.

FWP's long-term data, cited by Farmer (2012), suggest that lek PO-79 has not been active in recent years. FWP counted 11 male sharp-tailed grouse on lek PO-079 during an aerial survey in early May 2012. WESTECH biologists did not have ground access to lek PO-079 in spring 2012. However, sharp-tailed grouse were seen along the Otter Creek road within 0.5 mile of this lek in April and May 2012. As discussed by Farmer (2012), most sharp-tailed grouse nests are placed within one mile of a lek (Kobriger 1980) and spring, summer and autumn distribution of male sharp-tailed grouse is generally within one mile of their lek (Nielson and Yde 1982). Therefore the observation of grouse along the Otter Creek road during the breeding season was consistent with activity at lek PO-079.

FWP counted 27 sharp-tailed grouse on lek PO-151 during an aerial survey in early May 2012, and considered them to be males. WESTECH biologists had access to lek PO-151, but counted only three males in late April and 12 males in early May 2012. FWP has mapped two other leks (PO-059 and PO-157) within about 0.25 mile of lek PO-151. It is likely that these sites are alternates to lek PO-151. FWP has not recorded displaying at lek PO-59 in recent years. FWP counted one male at lek PO-157 in early May 2012; this bird was likely displaced from lek PO-151.

FWP has consistently reported activity from a lek (PO-056) in the extreme northeast corner of Tract 2. WESTECH did not have access to this site in spring 2011 (Farmer 2012). No birds were seen or heard at this site in April, May or June 2012; however, FWP counted two males on this lek during an aerial survey in early May.

As discussed by Farmer (2012) FWP has mapped two other leks in Tract 2. Lek PO-152 is near the south border of Tract 2, north of Tenmile Creek. No grouse were seen or heard at or near this site in 2011 (Farmer 2012) or 2012; FWP has not recorded activity at this site in recent years. The second lek, PO-057, is near the center of Tract 2. Farmer (2012) reported that this lek apparently has not been active in the last six years. It was not active in 2011 (Farmer 2012) or 2012.

In addition, WESTECH biologists heard displaying from a fifth site, south of Tenmile Creek (Figure 17); access was not available to this site, so its exact location could not be verified. FWP has not observed a lek in this vicinity.

In summary, sharp-tailed grouse were considered to be common in the Otter Creek Mine study area in 2012. Study area residents reported that there were "lots" of sharp-tailed grouse in the study area. No grouse nests were found during field work, nor were any broods observed during summer, but this was believed to be a result of the shift in emphasis of field work during the 2011-2012 monitoring year.

4.5.4 Ring-necked Pheasant

There were two observations of ring-necked pheasants in autumn 2011. The first was a group of six birds in tall mesophytic shrub habitat (habitat subtype 310; Farmer 2012) along the Otter Creek road near the East Fork Otter Creek, while the second was a group of six birds in sod-forming grass habitat

(subtype 412) along Otter Creek near Willow Crossing. A pheasant hunter encountered in October reported that pheasant numbers were down from previous years, as predicted by FWP (2011c).

There were two observations in winter 2011-2012, one sighting of nine birds in riparian grass (habitat subtype 413; Farmer 2012) along Otter Creek, and the other sighting of three birds in a hay field along the Otter Creek bottom.

Ring-necked pheasants were primarily surveyed by the 16-station pheasant crow count route (Figure 5) in spring 2012. Unlike during the baseline study (2011-2012; Farmer 2012), the locations of displaying male pheasants recorded from the route in spring 2012 were not mapped. However, pheasants were recorded from all 16 stations along the route in April and May 2012.

FWP began a pheasant crow count route south on Otter Creek Road from Highway 212 in 1974 (Farmer 2012). In the late 1970s the average number of calls per two minute stop over the 20 mile route was 18.9, ranging from a low of 14.5 in 1978 to a high of 24.4 in 1977 (Martin 1980). Knapp (1977) considered an average of 10-20 calls per stop to be indicative of fair to good pheasant numbers in the Birney-Decker area in the late 1970s. In comparison, Farmer (2012) recorded an average number of calls per stop on the 16-mile Otter Creek Mine pheasant crow count route of 0.6 on April and 1.1 in June 2011. Farmer (2012) reported that these results suggested very low pheasant numbers, and speculated that 2011 breeding activity along Otter Creek was suppressed by the wet, cold spring, coupled with high water in May which flooded large portions of the creek bottom. FWP (2011c) also reported lower production in 2011.

In spring 2012 the average of three counts on consecutive days in late April was 3.4, and the average of three counts on consecutive days in May was 2.4. While these results suggested a substantial increase in spring male pheasant numbers from 2011 to 2012, they were still well below Knapp's (1977) average.

There was a single sighting in summer, of a bird flushed from riparian grass habitat along Otter Creek near the confluence of Threemile Creek. No broods were observed in summer, which was believed to be a function of the change in emphasis of wildlife monitoring in 2011-2012, rather than pheasant reproductive failure.

4.6 RAPTORS

As discussed in Section 3.6, for the purposes of this study, raptors were considered to be members of the Accipitriformes (vultures, eagles and hawks), Falconiformes (falcons) and Strigiformes (owls).

Eleven species (turkey vulture, bald eagle, golden eagle, rough-legged hawk, red-tailed hawk, northern harrier, prairie falcon, American kestrel, short-eared owl, burrowing owl and great horned owl) were recorded in 2011-2012 (Appendix A).

4.6.1 Turkey Vulture

There was one sighting of a single turkey vulture, soaring over ponderosa pine habitat near the Otter Creek road in May 2012 (Figure 18). Turkey vultures generally arrive in Montana in April and leave in September (MTNHP 2013). Farmer (2012) reported that there was no evidence of nesting in the Primary and Secondary study areas in summer 2011, and that the nearest potential nesting habitat in the aerial survey area was the King Mountain vicinity.

4.6.2 Bald Eagle

There were 11 sightings (Figure 18) totaling 12 bald eagles during 2011-2012, all from autumn (mid-October 2011) through winter (mid-March 2012). All were considered to be migrants/winter residents. Similarly, Farmer (2012) recorded six sightings totaling eight bald eagles during from late autumn through winter 2010-2011. As discussed by Farmer (2012), MTNHP's (2013) data base has >30 records of bald eagle sightings within 10 miles of Tract 2. About 60 percent of these were recorded in late autumn/winter, suggesting that the primary use of the study area is by migrants/winter residents.

Eight of the 11 sightings were birds perched in riparian tree habitat (subtype 110; Farmer 2012) along Otter Creek and Brian Creek. One was a bird perched in a snag in bunchgrass habitat (subtype 411) in a burned ponderosa pine stand south of Tenmile Creek, and one was a bird feeding on a cow carcass in a hay field (subtype 510) along Otter Creek (Figure 18). All birds appeared to be ≥ 4 years old.

Bald eagles generally nest where there is maximum food availability (fish and carrion), adequate nest substrates (tall, mature trees that are large enough to support the nest) and minimum human disturbance (Montana Bald Eagle Working Group 1994), although some bald eagle pairs tolerate more human activity than others. Bald eagles nest along the Tongue River within 10 miles of the Otter Creek Mine study area, but there are no nesting records from Otter Creek (MTNHP 2013), and there are very few potential nest trees in the Otter Creek Mine study area, suggesting that nesting probability is low.

4.6.3 Golden Eagle

There were two sightings totaling two golden eagles (Figure 18), both in winter 2011-2012. In comparison, Farmer (2012) reported two observations totaling two golden eagles during the 2010-2011 baseline year; one was in winter and the other was in summer.

There was no evidence of nesting in Tract 2 in 2012. Two inactive nests reported by Farmer (2012) were remained inactive (Figure 18). One of these nests was reported to have been active in 2004 (MTNHP 2013), but there was no evidence (feathers, prey remains, droppings) of recent activity at either nest.

4.6.4 Rough-legged Hawk

As in the baseline year (2010-2011), rough-legged hawks were a migrant/winter resident in the Otter Creek Mine study area in 2011-2012. There were 13 observations totaling 14 hawks (Figure 19), all

during winter, compared to 10 sightings totaling 10 hawks during the baseline study (Farmer 2012). As discussed by Farmer (2012), rough-legged hawks are common in winter in the region encompassing the Otter Creek Mine study area.

Rough-legged hawks were observed perched in deciduous trees in drainage bottoms (habitat subtype 110) and in ponderosa pine (subtype 123), grasslands (subtype 411) and breaks (subtype 280) habitats in the rolling uplands. All sightings were within one mile of a drainage bottom (Figure 19), but rough-legged hawks were subjectively believed to be more widespread than observed, based on sightings in upland habitats along Highway 212 between the study area and Broadus.

4.6.5 Red-tailed Hawk

As in the baseline year (2011-2012), red-tailed hawks were the most commonly recorded *buteo* (broad-winged hawk) in the Otter Creek Mine study area. There were 21 observations, including four active and two inactive nests. Sightings were generally grouped along drainages and adjacent uplands (Figure 19). Not surprisingly, 13 sightings were at or within one mile of an active nest.

There was one sighting in autumn, of a red-tailed hawk perched in deciduous riparian tree habitat (subtype 110; Farmer 2012) in mid-October. There was one observation during winter, also of a single bird perched in habitat subtype 110. Most red-tailed hawks migrate, leaving in October; however, as reported by Farmer (2012), there are records of red-tailed hawks overwintering within 10 miles of the study area.

There were 19 observations in spring, including active nests. Non-nest sightings were located in/over deciduous riparian tree (subtype 110), ponderosa pine (subtypes 123 and 124), big and silver sagebrush (subtypes 212 and 222), sod-forming grass (subtype 412), riparian grass (subtype 413), hay (subtype 510) and tame pasture (subtype 530) habitats.

Characteristics of active and inactive red-tailed hawk nests are given in Table 8. Nest identification (ID) numbers are keyed to nest locations in Figure 20. Two new active nests were found in spring 2012. Due to the change in emphasis in monitoring in 2011-2012, which decreased field work in summer, nest production was not monitored in 2012.

- Nest OC-RTH-01 (Figure 20) was active in both 2011 and 2012 (Table 8). There were no vantage points that would allow an observer to look down into this nest; it was only visible from Otter Creek Road through a spotting scope. Although the nest was partially obscured by leaves, two chicks were seen in the nest in early June 2011, and one fledged (Farmer 2012). No chicks could be seen in early June 2012.
- Nest OC-RTH-02 had been in a boxelder in 2011; it was active in early spring, but was lost in late May-early June flooding (Farmer 2012). Nest OC-RTH-02 was apparently rebuilt during summer

2012, and may have been an alternate to nest OC-RTH-05, which was only about 0.75 mile away (Figure 20). It could be observed from the bluff to the east, but was inactive in 2012 (Table 8).

- Nest OC-RTH-03 was in a cottonwood along Otter Creek, south of Tenmile Creek (Figure 20). It could be seen with a spotting scope from the Otter Creek road. It was inactive in 2011 (Farmer 2012). A bird was seen at the nest in early May 2012, and it was considered to be active. However, the nest was mostly obscured by leaves, and no chicks were seen (Table 8).
- Nest OC-RTH-04 was in a cottonwood on lower Brian Creek (Figure 20), and was visible with a spotting scope from the Otter Creek road. It was inactive in both years (Table 8).
- Nest OC-RTH-05 was found in spring 2012. It may have been an alternate to nest OC-RTH-02 (Figure 20). An adult was seen at the nest tree in early May, but there was no access to the site and it could not be monitored further.
- Nest OC-RTH-06 was in a cottonwood along lower Three mile Creek (Figure 20). There was no access to the site in spring 2011 (Farmer 2012), and it was not visible from the Otter Creek road. Two adults were at the nest in spring 2012, and it was considered active (Table 8).

4.6.6 Northern Harrier

There was only one sighting of a northern harrier in 2010-2011 (Farmer 2012). The best nesting habitat in the Otter Creek Mine study area is in creek bottoms, and Farmer (2012) speculated that nesting harriers were displaced from the study area in 2011 because much of this habitat was flooded in May.

In contrast, there were 12 sightings totaling 12 harriers in 2011-2012. While harriers were seen in the uplands, most sightings were clustered along Otter Creek (Figure 21). There were no observations in autumn 2011, but harriers were recorded in the other three seasons. Of the 12 observations, five were from habitat subtype 412 (sod-forming grass), two each from subtypes 413 (riparian grass), 510 (hay), 530 (tame pasture), and one from subtype 222 (silver sagebrush).

As discussed by Farmer (2012), northern harriers nest on the ground, generally in patches of dense, often tall vegetation, and usually near water. No nests were found in 2012, but most sightings (8 of 12) were recorded in spring, so harriers were present during breeding/nesting season.

4.6.7 Prairie Falcon

There were two observations of prairie falcons during the 2011-2012 monitoring year, including a sighting in breaks habitat (subtype 280; Farmer 2012) in Tract 3 during winter (Figure 21). There was an active nest on a sandstone cliff (Figure 21); this same eyrie was active in 2011, and has been active in the

past (Farmer 2012). There were several sightings from this general area in May and early June, but no production data were obtained.

4.6.8 American Kestrel

As in the baseline year (2011-2012; Farmer 2012), American kestrels were seen infrequently during 2011-2012. There were only five sightings (Figure 21), all from spring 2012. Two of the sightings were within 0.5 mile of a nest site identified in spring 2011 (Farmer 2012). However, kestrels nest in a variety of sites, including cavities in trees, banks, cliffs and buildings (MTNHP 2013). As noted by Farmer (2012), potential nest sites were available throughout the study area, so lack of nest sites does not explain the low numbers of American kestrels observed in the Otter Creek Mine study area in 2011 and 2012. In contrast, Martin (1980) reported that "...kestrels were the most common raptor in the study area. They nested mainly in old woodpecker holes in dead pine snags and large cottonwood trees."

4.6.9 Short-eared Owl

The short-eared owl is found year-round in Montana, although some may migrate; the short-eared owl is a "vole specialist," and preferred short-eared owl habitat is open grasslands, plains, and agricultural areas with suitable vegetation and food (MTNHP 2013). Preferred habitat is present in the Otter Creek Mine study area (Appendix A). The MTNHP (2013) data base contains several records from western Powder River and eastern Rosebud Counties, although none appear to have been recorded in the Otter Creek Mine fish and wildlife resources inventory area. Martin (1980) did not record short-eared owls in his Otter Creek study area in 1979-1980, nor was this species observed in 2010-2011 (Farmer 2012).

There was a single observation in April 2012, of a short-eared owl in sod-forming grass (subtype 412; Farmer 2012) habitat near the south end of the pheasant crow count route (Figure 22). Although this route was driven several times in April, May and June, no short-eared owls were subsequently observed. Therefore breeding in spring 2012 could not be verified.

4.6.10 Burrowing Owl

Burrowing owls were recorded several times in a black-tailed prairie dog colony east of Otter Creek from April through mid-June 2012 (Figure 23), including repeated sightings of a pair at a burrow (possibly a natal burrow) in April and May. This location was about 0.5 mile east of a burrowing owl natal burrow used in 2011 (Farmer 2012); thus it is possible that the 2012 birds were the same pair, or were related to the 2011 birds. It is not unusual for burrowing owls to remain in the same general area for many years/generations (Poulin et al. 2011). As discussed by Farmer (2012), in 1980 Martin (1980) recorded burrowing owls in a prairie dog colony along Home Creek about two miles north of the sites used in 2011 and 2012. The MTNHP (2013) data base contains a recent record of burrowing owls in a prairie dog colony in Tract 3. Burrowing owls appear to have benefited from the number and distribution of prairie dog colonies in and near the Otter Creek Mine study area.

4.6.11 Great Horned Owl

As in 2010-2011, great horned owls were the most frequently observed owl during the 2011-2012 monitoring year. As discussed by Farmer (2012), great horned owls are considered to be common in the vicinity of the Otter Creek Mine study area.

Great horned owls were recorded in winter and spring 2012, and were widely distributed (Figure 22). Great horned owls were the only owl recorded during night surveys on the pheasant/owl call route (Figure 5). There were seven observations in 2011-2012 (Figure 22). Great horned owls are adaptable “to any habitat” (MTNHP 2013), and in 2011-2012 in the Otter Creek Mine study area they were recorded in deciduous riparian tree (subtype 110), ponderosa pine (subtypes 123 and 124), sod-forming grass (subtype 412) and hay (subtype 510) habitats. No nests were found. Farmer (2012) found two active nests, including one nest in a rock outcrop in Tract 2. As noted by Farmer (2012), given the distribution and numbers of owls seen/heard in the study area, it seems likely that there were great horned owl nests in the inventory area that were not found.

4.6.12 Summary

Eleven species of raptors were recorded in 2011-2012 in the Otter Creek Mine fish and wildlife resources inventory. Of these, three (red-tailed hawk, prairie falcon and burrowing owl) were known to nest, three (northern harrier, American kestrel, great horned owl) were suspected to nest but nesting was not verified, two (turkey vulture, short-eared owl) were present in nesting season but nesting was not suggested by the sightings, one (golden eagle) was known to have nested in the past but did not nest in 2012, and two (bald eagle, rough-legged hawk) were migrants/winter residents.

All known active and inactive raptor nests observed during 2011-2012 are summarized in Figure 20. As in 2010-2011, most nest locations were clustered in or adjacent to Tract 2, where most ground study effort was expended, and along the Otter Creek road. Raptor nests were generally located in habitats with more vertical structure (riparian trees, ponderosa pine, cliffs and rock outcrops) rather than in open, rolling grasslands and shrublands; however, ground nesting species such as the burrowing owl, northern harrier and short-eared owl would be expected to nest in these latter habitats. As discussed by Farmer (2012), it is reasonable to assume that raptor nests would be found in similar distribution patterns and densities (although perhaps different species composition) in other parts of the Otter Creek Mine inventory area, if more effort was expended to search for them.

4.7 WATERFOWL AND SHOREBIRDS

As discussed in Section 3.7, aquatic habitats are limited throughout the Otter Creek Mine wildlife study area, and particularly in the Primary Study Area. Farmer (2012) recorded only seven species of waterfowl and eight species of shorebirds during the 2010-2011 baseline study, and speculated that the small number of recorded species was due to the paucity of aquatic habitat, compounded by comparatively late ground access into Tract 2.

In comparison, eight species of waterfowl and eight shorebirds were recorded in 2011-2012 (Appendix A). As discussed in section 4.1, three (green-winged teal, northern pintail and northern shoveler) had not been recorded during the baseline study. They were only recorded in April 2012, and apparently did not nest in the study area. Nevertheless, the number of waterfowl species recorded in the baseline study (2010-2011) and first year of monitoring (2011-2012) was near the total expected to occur in the study area, based on habitat availability (Figure 8). However, despite the addition of two species (spotted sandpiper and belted kingfisher) in 2011-2012, the total number of shorebirds (Appendix A) recorded in the study area remains well below the expected number (Figure 8).

Great blue herons were occasionally seen along Otter Creek (Figure 23). There was a small (6-7 nests) great blue heron rookery in two adjacent cottonwood trees along Otter Creek near the confluence of Tenmile Creek (Figure 23). This rookery was active in spring 2011 (Farmer 2012) and spring 2012.

Otter Creek Mine study area residents reported that they began seeing sandhill cranes along Otter Creek and Tenmile Creek in spring and summer, beginning about 2000; chicks have been seen “for several years” (Farmer 2012). MTNHP (2013) data base records follow a similar time line.

There was only one record of sandhill cranes during the 2011-2012 monitoring year, when a pair of adults was observed in a tame pasture (habitat subtype 530; Farmer 2012) along Otter Creek in April (Figure 23). In comparison, Farmer (2012) reported five sightings in spring 2011. The lower number of sightings in spring 2012 is attributed to the change in emphasis of wildlife monitoring in 2011-2012, rather than a decline in the number of sandhill cranes in the vicinity.

Farmer (2012) observed Canada geese at several locations along Otter Creek in 2011, including two broods in July. Canada geese were also recorded along Otter Creek in all seasons of the 2011-2012 monitoring year (Figure 23). One brood was observed in July, suggesting that Canada geese again nested in the study area.

Farmer (2012) reported that the pond/impoundment located in Section 11, T4S R45E in the northern part of Tract 2 was an important nesting/brood rearing area for several species of waterfowl and shorebirds, and contributed records of several species that were not observed elsewhere in the study area. This pond supported several species of waterfowl and shorebirds from April through early June 2012, but was dry by late June and remained dry through the rest of the summer. Consequently, no broods were seen at this site in 2012.

4.8 LANDBIRDS

As discussed in Section 3.9, for the purposes of this study, landbirds were defined as all species except upland game, raptors, waterfowl and shorebirds.

Landbirds were inventoried in Tract 2 using six circular plots. Results are given in Table 9. A total of 43 species (including flyovers and incidentals) were recorded on these six plots, ranging from 5 to 18

species (excluding flyovers and incidentals) per plot. In comparison, a total of 30 species were recorded on 15 plots in Tract 2, ranging from 2 to 12 species per plot, in spring 2011 (Farmer 2012).

As discussed by Farmer (2012), it would be expected that the bird species richness would increase in response to more complex vertical and horizontal structure in a plot. This was the case in 2011 (Farmer 2012) and 2012 (Table 9).

4.9 MEDIUM-SIZED MAMMALS

As discussed in Section 3.9, for the purposes of this study, medium-sized mammals were defined to be animals from the size of a black-tailed prairie dog to the size of a coyote (Appendix A).

Cottontails were considered to be common in the Otter Creek Mine study area during 2011-2012. No white-tailed jackrabbits were observed in 2011-2012. Farmer (2012) reported that jackrabbits are rare in the Otter Creek Mine study area vicinity, for unknown reasons.

Porcupines were commonly observed in forested habitats (Appendix B) but unlike 2011-2012 (Farmer 2012), were not recorded in tall mesic shrub habitat.

Muskrats were observed at several locations in Otter Creek. Mink tracks, which had been recorded during the 2010-2011 baseline study (Farmer 2012), were not observed in 2011-2012.

Farmer (2012) reported that in autumn 2010 there were about 1278 acres of active black-tailed prairie dog colonies in the Otter Creek Mine baseline inventory area but there were substantial reductions in the acreages of active prairie dog colonies from winter 2010-summer 2011. Many prairie dog colonies appeared to be completely extirpated, while others contained a few prairie dogs and some colonies appeared to be unaffected. Within Tract 2 there were about 375 acres of active prairie dog colonies in October 2010; by July 2011 only about 80 acres remained active.

Prairie dog colonies were monitored by aerial surveys in autumn 2011. There did not appear to be any difference in prairie dog colony size (i.e., more or fewer active burrows) than had been present in spring 2011, although actual colony size could not be measured from the aircraft. Prairie dog colonies in Tract 2 were visited in spring 2012, and Farmer's (2012) observation was still relevant, i.e., some colonies were completely extirpated, some contained a few prairie dogs and some smaller colonies appeared to be unaffected.

Coyotes were again considered to be common in the Otter Creek Mine fish and wildlife resources inventory area in 2011-2012. There were 14 sightings totaling 19 coyotes during the year. In comparison, there were 27 sightings totaling 46 coyotes during the baseline study (Farmer 2012). It is not known if the lower number of sightings in 2011-2012 was an artifact of the change in study emphasis during the monitoring year, a function of lower observability during winter aerial surveys due to lack of snow cover, or reflected a possible decline in coyote numbers. However, study area residents reported that coyotes were still common throughout the area. The largest number of coyotes seen in a

single day (no multiple sightings of the same individual) was seven, during a March 2012 aerial survey. In comparison, the largest number seen in a single day during the baseline study was 11, in March 2011 (Farmer 2012).

Coyotes were recorded year round and were widely distributed (Figure 24). In the 2010-2011 baseline year, coyotes or their evidence (tracks, droppings, bones, hair) were recorded in 16 of 18 mapped habitats in the study area (Farmer 2012). In 2011-2012 they were recorded in eight habitats (Appendix B), reflecting the change in field effort.

No red fox were seen in 2011-2012. Farmer (2012) recorded two sightings during the baseline year (2010-2011), and suggested that red fox numbers were low due to interspecific conflicts with coyotes.

No bobcats or their evidence were recorded in 2011-2012. Farmer (2012) found tracks at two locations, and considered the species to be uncommon in the Otter Creek Mine study area. Bobcats are comparatively secretive, and the lack of sightings in 2011-2012 is considered to be coincidental rather than reflective of a change in bobcat numbers.

Farmer (2012) considered striped skunks to be comparatively uncommon in the Otter Creek Mine study area. There was only one sighting in 2012, of a skunk along the Otter Creek road adjacent to a hay field. Badgers were not seen in 2011-2012 but their excavations were recorded in several habitats (Appendix B) throughout Tract 2; therefore they were considered common.

4.10 SMALL MAMMALS (EXCLUDING BATS)

As discussed in Section 3.10, for the purposes of this study, small mammals were defined as mammals smaller than a black-tailed prairie dog. Only three species (northern pocket gopher, thirteen-lined ground squirrel and least chipmunk) were recorded during the 2011-2012 monitoring year.

Northern pocket gopher evidence (mounds) was observed in several habitats (Appendix B) with dry, comparatively loose soils throughout Tract 2; based on this evidence pocket gophers were considered to be common.

Thirteen-lined ground squirrels were recorded in sod-forming grass (habitat subtype 412; Farmer 2012) and black-tailed prairie dog colony (subtype 430) habitats in Tract 2 (Appendix B).

Least chipmunks were regularly observed in forested habitats (Appendix B) and were considered common in the study area.

4.11 BATS

As discussed in Section 3.11, bats were not sampled in 2012 because sampling results in 2011 (Farmer 2012) were considered adequate to address species richness and habitat use in the study area.

4.12 AMPHIBIANS AND REPTILES

Throughout the 2011-2012 monitoring year, all amphibians and reptiles were recorded by the habitat in which they were seen. The only amphibian mapped by WESTECH field personnel in 2011-2012 was the northern leopard frog, which was recorded along Otter Creek (Figure 25). However, WESTECH biologists heard boreal chorus frogs at several pond/impoundments and along Otter Creek in spring 2012. In addition, Stagliano (2013) recorded the tiger salamander, Woodhouse's toad, boreal chorus frog and northern leopard frog at his aquatic assessment sites in 2012 (Appendix C).

Eight reptiles were recorded in the Otter Creek Mine inventory area during 2011-2012 (Appendix A). Stagliano (2013) observed the snapping turtle, painted turtle, terrestrial gartersnake and prairie rattlesnake at his aquatic assessment sites (Figure 4) along Otter Creek in 2012 (Appendix C). In addition, WESTECH biologists mapped sightings of five reptiles (Figure 26):

- The greater short-horned lizard was recorded at one location in summer 2012, in big sagebrush (subtype 212) habitat in Tract 3 (Figure 26). In comparison, Farmer (2012) recorded short-horned lizards at two locations in breaks habitat (subtype 280) in Tract 2 during the 2010-2011 baseline year. As discussed by Farmer (2012), appropriate habitat (ridge crests between coulees; sparse, short grass and sagebrush with sun-baked soil; rock outcrops in sandy soil; and flats of relatively pebbly or stony soil with sparse grass and sagebrush cover) for short-horned lizards is widely available in the Otter Creek Mine study area, but the comparatively low number of sightings in and near the study area suggests that short-horned lizards may be patchily distributed across the landscape, and therefore they were considered uncommon;
- The eastern racer was recorded once in 2011-2012, along the Otter Creek road adjacent to sod-forming grass (subtype 412) habitat (Figure 26). In comparison, Farmer (2012) recorded the eastern racer three times in 2010-2011 and reported that it was widely distributed across Tract 2 in a variety of habitats. Consequently Farmer (2012) considered the eastern racer to be common in the Otter Creek Mine inventory area;
- As in 2010-2011, the gophersnake was observed only once during the 2011-2012 monitoring year, along the Otter Creek road adjacent to sod-forming grass (subtype 412) habitat (Figure 26). However, Farmer (2012) reported that the MTNHP (2013) data base contains numerous records of gophersnakes within 10 miles of the study area, and consequently the gophersnake is considered common in the Otter Creek Mine inventory area;
- WESTECH vegetation ecologists observed a common gartersnake in riparian grass (subtype 413; Farmer 2012) habitat along Otter Creek in July 2012 (Figure 26). This specimen was identified to species based on coloration/scale characteristics (MTNHP 2013). This was the first record of this species in two years of study, although Stagliano (2012, 2013) observed the terrestrial gartersnake at several locations each year; and

- There was a single record of a prairie rattlesnake, in a hay field along Otter Creek (Figure 26) in July 2012. As discussed above, Stagliano (2013) also recorded the prairie rattlesnake at some of his aquatic assessment sites (Figure 4) along Otter Creek. The prairie rattlesnake was the most commonly recorded (11 sightings) reptile in the study area during the baseline study (Farmer 2012). The MTNHP (2013) data base contains many records in or within 10 miles of the Otter Creek Mine inventory area. Consequently the prairie rattlesnake is considered common in the Otter Creek Mine inventory area.

4.13 ENDANGERED OR THREATENED SPECIES

As discussed in section 3.13, only two species that are listed, proposed or candidates for listing under the ESA could occur in the Otter Creek Mine fish and wildlife resources inventory area: greater sage-grouse and Sprague's pipit. Neither were recorded in 2011-2012.

4.14 SPECIES OF CONCERN

Farmer (2012) estimated relative abundance for many Species of Concern in the Otter Creek Mine fish and wildlife resources inventory area based on habitat availability, literature review and results of field work. It was not possible to estimate relative abundance for some species from this information. Farmer (2012) recognized that many species may have been more (or less) common than estimated, depending on their ease of detection and/or distribution within the study area; and that relative abundance for some species, particularly birds, could change seasonally and/or from year to year.

A summer 2012 wildfire altered some of the coniferous forest habitat in the northern portion of the Otter Creek Mine aerial survey area (north of Tract 1). Over time, these changes may be beneficial to some Species of Concern and detrimental to others. However, for the entire aerial survey area there was no reason to suspect that conditions for Species of Concern changed in 2011-2012 from 2010-2011. Therefore, Farmer's (2012) estimates are repeated in Table 10.

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