Sharp-Tailed Grouse Use of Reclaimed Mine Land In Eastern Montana[1]

by
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Abstract. The paper discusses the efforts made by Western Energy Company, a surface coal mining company in southeastern Montana, to establish prime sharp-tailed grouse (Tympanuchus phasianellus) habitat following mining. Mitigation work regarding sharp-tailed grouse and how they may be affected by surface mining began in 1975. There were many unanswered questions: If traditional sharp-tailed grouse dancing grounds were disturbed, would they reestablish? Would reclaimed land provide nesting and brood habitats? Would local grouse population levels drop?

Following twenty years of mining and reclamation at Colstrip, we now have information which can help to address these concerns. With nearly 4,000 acres successfully reclaimed there is a land base on which to make some knowledgeable judgments as to how effective the reclamation program has been for reestablishing grouse habitat.

Introduction

Western Energy Company (WECO) has operated a surface coal mine in Southeastern Montana since 1968. Located in Rosebud County near the town of Colstrip, WECO's mine produces 12 million tons annually. The mine ideally disturbs and reclaims approximately 350 acres per each year. The coal seam is flat lying, uniformly 24 foot thick and located from 50 to 200 feet below the land surface.

Pre-mine topography is typified by wide open, well drained valleys bordered by steep rugged ponderosa pine covered buttes.

Federal and State surface coal mining regulations require land disturbed by coal mining activities be reclaimed to a condition that supports pre-mining land use. The dominate pre-mining land use at Colstrip was and is livestock grazing. Small grains and hay crops are supplementary. The other major land use is wildlife.

Prior to large scale mining activities, wildlife surveys conducted at Colstrip documented the area to be excellent sharp-tailed grouse habitat (ECON 1973). An important game bird in Montana, sharp-tailed grouse are a wide ranging species which occupies the state east of the Rocky Mountain front. This native grouse is also of interest because of its unique courtship displays. Sharp-tailed grouse are a species that gather at very specific sites (dancing or breeding grounds) annually to perform spring courtship rituals. One dancing ground documented by WECO has been active for 26 years at the same knoll.

According to Johnson (1964), the dancing ground behavior of the grouse was mimicked in Indian ceremonies. The Indian dances simulated the dance of the birds.

The dancing male grouse appear like wind up toys, whirling in full and half circles with wings outspread, heads lowered and tails pointed up. They stomp their feet in rapid succession and seem to dance with their rivals (Figure 1).

Dancing grounds and the habitat needs of grouse were an important permitting issue for WECO in the mid 1970's. At the time there was no definitive information to predict the

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Figure 1. Male sharp-tailed grouse in full display on reclamation dancing ground. Photo by B. Waage

impacts of large scale coal development on local grouse populations. Studies had been conducted on sage grouse (Centrocercus urophasianus) to see if dancing grounds could be moved and to determine their response (Eng 1979 and Tate 1979). These studies documented some success. In 1980 the Bureau of Land Management invoked unsuitability criteria #14 for WECO's Area C permit excluding 181 acres containing 1,964,000 million tons of Federal coal to protect one dancing ground and to maintain a portion of the available nesting cover (BLM 1980). The report stated:

"If it can be shown and the state of Montana agrees that all or stipulated methods of mining will not have significant long term impact on the area-wide sharp-tailed grouse population and their habitat and that reclamation and management of reclamation areas would provide suitable post-mining habitat. This dancing ground and nesting area could be considered for leasing."

This paper presents information which was not available at the time the BLM wrote the statement above. Obtained during nineteen years of mining and reclamation at Colstrip it includes reclamation breeding populations, dancing ground densities, nesting habitats and dancing ground establishment.

Breeding Populations Census

One universally used index to monitor sharp-tailed population trends is the censusing of display grounds. These very specific sites where male grouse congregate in the spring provide a unique opportunity to estimate grouse population trends. WECO or its consultants have conducted dancing ground counts for 19 years since 1973. A total of sixty individual grounds have been censused with an average yearly census of 20 active grounds. The number of active grounds changed annually as they became active or inactive (Figure 2) presumably in response to population level fluctuations.

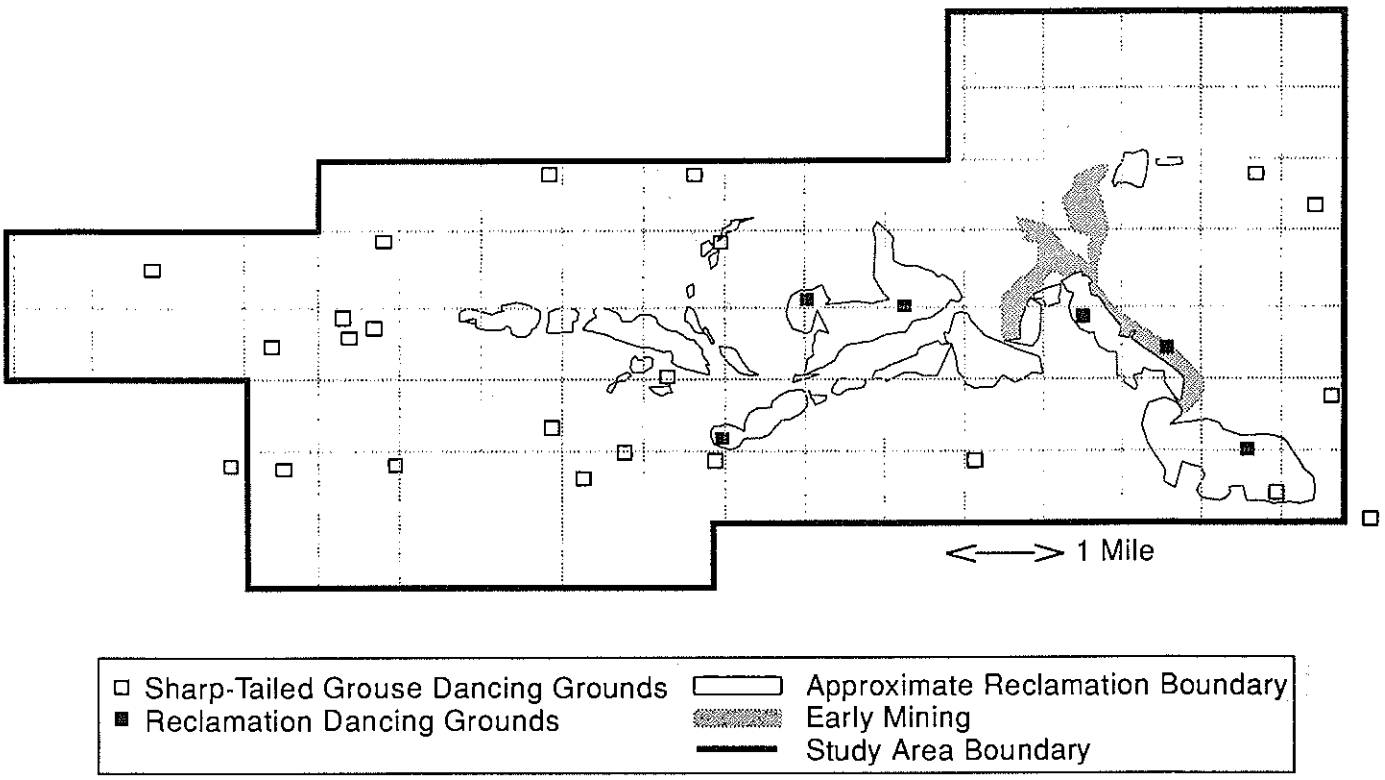

Figure 2. Sharp-Tailed Grouse Dancing Ground Distribution

Dancing grounds were found in the early morning stillness when the birds display vocalizations can be heard from 1/2 mile or greater distance. They were also located by sight from a fixed winged airplane.

Counts were repeated a minimum of two times on each dancing ground during the period of peak activity. The highest count was subsequently used for two indexes, the average number of males per dancing ground and the total number of displaying males on the study area. These values were then compared on a year-to-year basis to give an indication of the population trend.

Figure 3 shows the average number of displaying male grouse each year for all grounds counted. The nineteen year average is just above 11.5 males per dancing ground. This compares favorably with Hillman and Jackson (1973) who reported an average of 10.0 males per dancing ground for a 16 year monitoring period in South Dakota.

The first reclamation dancing ground became established in 1982 and has remained active to date or ten years. To aid in the establishment of the first dancing ground, a tape recording was used as a sharp-tailed grouse acoustical lure to stimulate display at a predetermined experimental dancing ground (Waage 1989). A total of seven dancing grounds have shown activity on reclaimed mine land with a high of five active grounds in a single year. The reclamation's 10 year average of 11.8, just above the native dancing ground average of 11.2. If we look at the highest male count on all individual dancing grounds each year Figure 4), we observe that the reclamation dancing ground established in 1982 became the largest ground in 1986 and maintained this status through 1990.

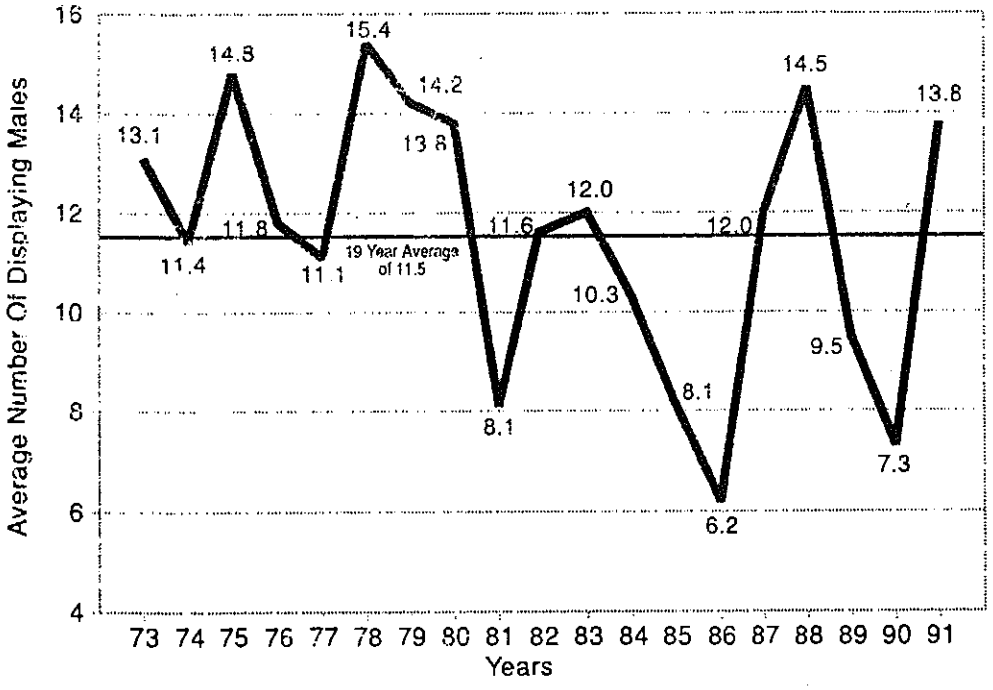

Figure 3. Average Number of Displaying Male Sharp-Tailed Grouse on Western Energy Company Study Area 1973-1991

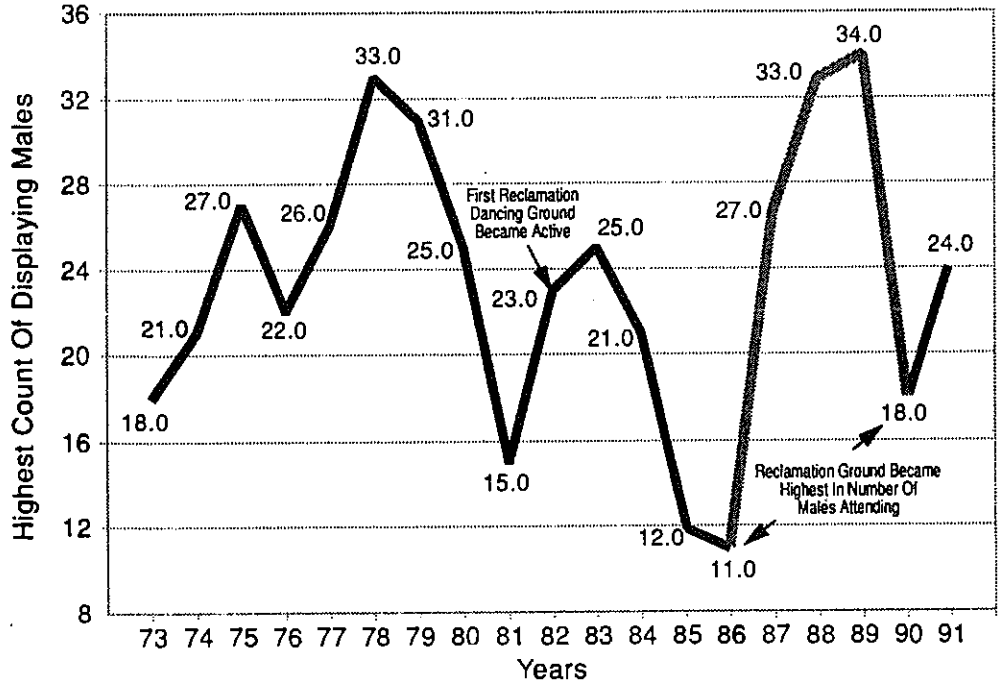

Figure 4. The Highest Count of Male Sharp-Tailed Grouse on an Individual Dancing Ground.

Possibly more can be learned about core wildlife habitat areas during the lowest population years or harshest conditions. Areas which sustain a population through these most difficult periods stand out as important habitat or core habitat areas. Conversely the marginal habitat areas may be devoid of a particular wildlife species or have greatly reduced population levels. The opportunity to identify core habitat areas occurred in 1986 when our populations of grouse plummeted to a nineteen year low or an average of 6.2 males per active dancing ground. The estimated number of birds per square mile was also correspondingly at a all time low of 1.7 birds per square mile (Figure 5).

During this period, a large number of dancing grounds became inactive. In fact, in 1984, sixteen grounds were active on the survey area, by 1986, this dropped 50% to eight core grounds. One of these core grounds was the reclamation ground, it maintained an attendance level far above the 1986 low of 6.2, maintaining eleven birds, the second highest attended ground that year. These figures indicate that the reclamation is working for grouse. It also should be pointed out that these are excellent indicators and not definitive as many factors can skew the results.

Dancing Ground Density

Sharp-tailed grouse dancing ground densities per square mile were calculated from 1973 through 1981 on the study area. This period of time was used in order to exclude reclamation dancing grounds which became an established part of the database in 1982. The highest densities for the nine year period were reported in 1980 at .15 dancing grounds per square mile. The highest densities reported in the reclamation during the period 1982 through 1991 occurred in 1991 at .86 dancing grounds per square mile. Again, this is a positive indicator.

Nesting Habitats

A special effort was begun in 1981 to describe native nesting sites and to identify which habitat cover types were important for local grouse. Table 1 contains nesting information collected over a ten year period. This information is used in reclamation planning to direct the replacement of grouse nesting habitat. The majority of nesting data was collected as a result of hens affixed with radio telemetry transmitters. Hens were trapped at dancing grounds, fitted with transmitters and later tracked to nest sites. Some nests were found by accident and some were located with the use of trained hunting dogs. The total nests found and their habitat cover type are shown in (Table 1). Of the ten habitat cover types associated with the 39 nests, seven were shrub types and three were grassland types.

Two points that can be gleaned from Table 1 are that sharp-tailed grouse appear to be versatile nesters in our location, utilizing a wide variety of shrub and grassland situations. The other point made by Table 1 is that grouse readily use the reclamation to nest. However, grouse nesting preference is not addressed by this nesting data.

WECO became interested in its reclamation dancing ground and where the hens associated with this ground would select to nest. WECO placed radio transmitters on four hens attending a reclamation dancing ground in the spring of 1985. Placing radios on hens before nesting, removes the inherent bias of nest searchers, which is that where you look the hardest is where the nests will be

found. Of the four hens radioed at the reclamation dancing ground, two were sequently located at nest sites in the reclamation and two nested in native habitat. Even though there were unlimited acres of native habitat and 2,048 acres of reclamation 50% nested in the reclamation. Though the sample size was extremely small, it is some of the first data acquired from a reclamation dancing ground.

TABLE 1

Total number of sharp-tailed grouse nests and their dominant habitat cover type found between 1975 and 1985 on the Western Energy Company survey area.

Habitat Cover Types	Number of Nests	Percent
Big Sagebrush	1	2
Silver Sagebrush	11	28
Skunkbush Sumac	9	23
Yucca	1	2
Snowberry	3	8
Ungrazed Grassland	2	5
Grazed Grassland	3	8
Reclamation	7	18
Wheat Stubble Field	1	2
Silver Sagebrush/Skunkbush	1	2
TOTAL	39	100

Density Estimate

WECO has generated estimates for it's study area during the past nineteen years. Spring population estimates were calculated from dancing ground counts using a method similar to that discussed by Rippin and Boag (1974). Their study found that for every active male on a dancing ground, there was a non-territorial male that existed in a nonbreeding portion of the sharp-tail population. Robel (1969) in Scotland found that black grouse (Lururus tretrix) segregated into displaying and non-displaying groups and that only 30%-40% of the males attended dancing grounds. Because male:female ratios were assumed to be 50:50, Rippin and Boag took the total count of males on dancing grounds and multiplied it by four to give an estimate of the total sharp-tailed population. WECO has been using a multiplication factor of three as this may be a more accurate long term number (Hamerstrom 1979). This population estimate is then divided by the land area to get the number of grouse per square mile. The nineteen year average number of grouse per square mile for the study area is 4.2 with a high of 8.8 and a low of 1.7 (Figure 5).

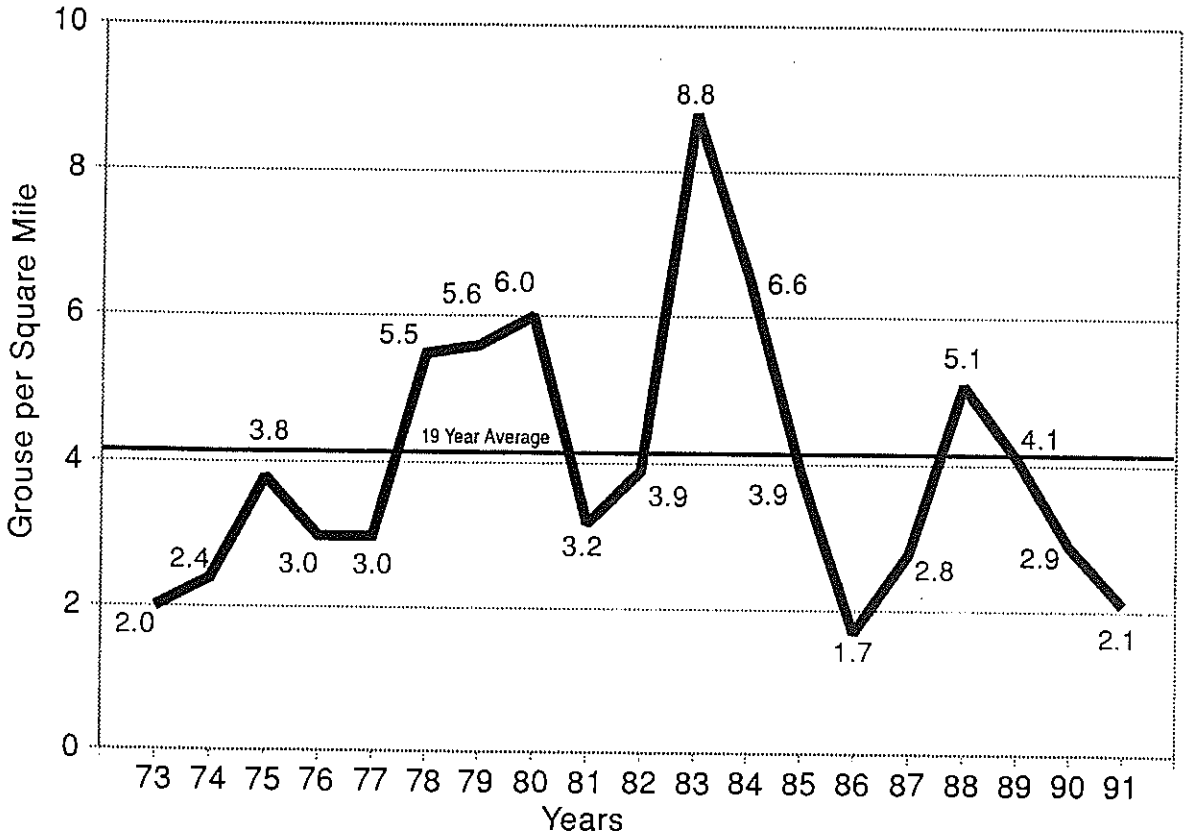

Figure 5. Sharp-Tailed Grouse Estimated Density (No. per Sq. Mi.) Western Energy Company Study Area 1973-1991.

The 1991 reclamation acreage figure of 5.8 square miles divided by the number of displaying males (36) multiplied by three results in an estimate of 18.6 birds per square mile on reclaimed land. This figure is far above the overall study area high of 8.8.

Summary and Conclusions

It is clear that grouse readily use reclamation areas at WECO's mine for dancing grounds. There may actually be a preference for reclamation areas for that purpose. This was indicated by monitoring studies which documented an apparent movement of grouse from native sites on to reclamation areas. In one case two new dancing grounds appeared at the edge of a reclamation area. Birds displaying on these two native grounds were routinely observed to fly from reclamation areas. They would return following courtship activities (Econ 1979). A third ground became established in a reclamation area between the two native grounds. The native grounds dwindled in number and eventually became inactive. It is believed that this reclamation ground drew birds away from the two native grounds. This was confirmed when a marked male, which was tagged at one of the native grounds, moved to and displayed on the reclamation ground.

Residual cover, particularly during the early spring, can have a profound effect on grouse dancing ground locations. Though grouse prefer spare vegetation on the dancing grounds, they favor sites with dense escape cover near by. This situation is indicated by Kirsch (1969). In his study on the government soil bank program in North Dakota during the 1950's and early 1960's, Kirsch noted that active dancing grounds were directly associated with individual tracts of soil bank cover. Dancing grounds moved adjacent to

the new cover and eleven of fourteen sharp-tailed grouse dancing grounds were within 180 meters of recently retired land areas.

Pepper (1972) felt from field observations that dancing grounds surrounded by a large quantity of lush vegetative cover consistently attracted more grouse than those adjacent to poorer quality growth.

Movement of grouse into reclamation areas may also be in response to intensive grazing practices on adjacent lands. Controlled grazing within reclaimed areas, where a rest-rotational grazing system has been employed since the mid 1970's, has preserved residual cover.

Dancing ground densities currently exceed pre-mine levels with a figure of .86 dancing grounds per square mile. Native dancing ground densities reported for the region have been 0.12 per square mile in Colstrip (Schwarzkoph 1980), 0.22 per square mile for the Otter Creek drainage (Martin 1980a), and 0.09 per square mile in the Sarpy Creek drainage (Martin 1980b).

Grouse use reclamation areas for nesting but to what extent has not been fully determined. Though little information has been collected on nesting success, brood survival, brood habitats and predation, it can be assumed that since population levels remain high, these factors are not having major negative effects on grouse numbers

Through our long term monitoring studies, WECO has had the opportunity to identify core habitat areas which sustain grouse through the worst years. One of the core areas identified appears to be a reclamation area. Through our ongoing monitoring studies, we will be able to look at these indicators and others to observe how reclamation grounds compare to native grounds. Preliminary findings suggest that the current rangeland reclamation program is providing for the habitat needs of an important native grouse species.

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