

RAPTOR USE OF REVEGETATED COAL STRIP

MINE SPOILS IN INTERIOR ALASKA¹

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Abstract: Raptors associated with reclaimed coal strip mine spoils on the Usibelli Coal Mine in southcentral Alaska were observed in 1981 and 1982. Of the 10 raptor species identified on the mine, 6 (red-tailed hawk, golden eagle, Northern harrier, American kestrel, hawk owl, and short-eared owl) were observed hunting on the reclaimed areas.

Additional Key Words: Alaska, raptors, strip mine reclamation.

Introduction

The value of strip mined lands as wildlife habitat in the contiguous United States has been known for many years (Yeager 1942, Riley 1957, and review by Elliott 1989). If wildlife options involving surface mine reclamation are to be promoted, their value and feasibility must be established. It must be demonstrated that creation of quality wildlife habitat is an attainable product of reclamation and is a viable land use alternative (Suchecki and Evans 1978). These attributes, as they pertain to raptors, have been demonstrated for surface mined lands in the coal areas of the Eastern and Western United States [e.g., raptors have been reported to use strip mines as nesting sites and hunting areas (Birkenholz 1958, Allaire et al. 1982)]. However, information concerning the relationship between coal strip mine reclamation and raptors in Alaska is lacking.

In 1980, the University of Alaska's Agricultural and Forestry Experiment Station began a study of revegetated strip mine spoils in southcentral Alaska. One objective of the study was to evaluate postmining land use of reclaimed areas by native wildlife (Elliott and McKendrick 1988, 1990). In this study I report the observed use made of revegetated coal strip mine spoils by interior Alaskan raptors.

Methods

The study was conducted during 1981 and 1982 on the Usibelli Coal Mine (UCM). The UCM is located in interior Alaska, approximately 185 km south of the city of Fairbanks and 13 km east of the community of Healy (63° 53'N, 149° 01'W). The Healy area is situated within the northern foothills of the Alaska Mountain Range and is physiographically diverse. Elevations in the region range from 396

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to 914 m ASL. Mean annual precipitation is 43 cm, and mean annual air temperature is -3° C. Vegetation in the study area conformed to four general cover types: conifer forest, tall shrub, shrub tundra, and disturbed/reclaimed.

The conifer forest cover type was a combination of woodland and open and closed spruce forest. The woodland and open spruce forests were located on upland terraces and consisted of sparsely distributed low-growing spruce and low-to-prostrate-growing shrubs. Principal trees and shrubs included black and white spruce (*Picea mariana* and *P. glauca*), quaking aspen (*Populus tremuloides*), mountain cranberry (*Vaccinium vitis-idaea*), willow (*Salix* spp.), birch (*Betula* spp.), blueberry (*Vaccinium* spp.), and alpine bearberry (*Arctostaphylos alpina*). The closed spruce forest was characterized by dense stands of mature spruce occurring along drainages, ridges, and terraces.

The tall shrub cover type consisted of a green alder (*Alnus crispa*)-fettleaf willow (*Salix alaxensis*) association. This habitat occurred most frequently at the base of north-facing terraces, along creek drainages, and on floodplains.

The shrub tundra cover type was typified by a glandular birch (*Betula glandulosa*) and ericaceous shrub-sedge association. The disturbed/reclaimed cover type represented sites on the mine that had been disturbed by mining and reclaimed with graminoids and forbs.

Coal mining had greatly altered the soil profile on the disturbed and reclaimed areas. After the coal was extracted from an area, the combined topsoil and excavated subsoil (the overburden) were redeposited, and the area was graded back to approximate original contour, scarified, furrowed, and aerially seeded and fertilized. As a result of seed mixtures composed mainly of graminoids (Elliott et al. 1987), the resulting disturbed and revegetated areas resembled expansive meadows dominated by introduced grasses (mainly *Alopecurus pratensis*, *Festuca rubra*, and *Calamagrostis canadensis*). Although the disturbed and reclaimed areas represented sites reclaimed between 1972 and 1982, natural reinvasion of the areas was practically nonexistent (Elliott et al. 1987). At the time of this study there were approximately 1,000 ha of disturbed and reclaimed land present on the mine area.

Raptor species observed on the mine area in the course of daily year-round field work were recorded. The vegetation cover type in and/or over which each bird was observed was recorded and the activity of the raptor during the observational period was noted. If a bird was observed to capture a potential food item, the bird was followed (if possible) and a variable-power spotting scope was used to identify the prey item. Regurgitated "castings" or "pellets" (Moon 1940) collected beneath the perches of two species of raptors were analyzed following the procedure of Glading et al. (1943).

Results and Discussion

Ten raptor species were observed on the disturbed and reclaimed areas of the Usibelli Mine: red-tailed hawk (*Buteo jamaicensis*), golden eagle (*Aquila chrysaetos*), goshawk (*Accipiter gentilis*), sharp-shinned hawk (*Accipiter striatus*), Northern harrier (*Circus cyaneus*), merlin (*Falco columbarius*), American kestrel (*Falco sparverius*), hawk owl (*Surnia ulula*), boreal owl (*Aegolius funereus*), short-eared owl (*Asio flammeus*). No birds nested on

reclaimed areas, but six species were noted using revegetated regions for hunting.

A single short-eared owl spent the 1981 summer season on the Usibelli Mine. By observing the owl when it was perched, I was able to locate eight regurgitated pellets; 75% of which contained tundra voles [Microtus oeconomus; the two remaining pellets contained red-backed voles (Clethrionomys rutilus)]. The predominance of tundra voles in the diet was consistent with the dietary observations reported for the species elsewhere in Alaska (Pruitt 1959). The majority (80%, N=21) of short-eared owl sightings (and all observations of hunting, N=10) were on or over reclaimed areas. The revegetated areas and their short-statured vegetation were similar to the undisturbed habitats reported to be utilized by short-eared owls in Alaska (Gabrielson and Lincoln 1959:542-545).

Red-tailed hawks were observed over all cover types on the study area. Single birds were observed a total of 17 times during the summers of 1981 and 1982. Two birds together were sighted on three occasions (once in 1981, twice in 1982). All sightings of multiple birds occurred when an arctic ground squirrel (Spermophilus parryii) had been captured by one hawk and an in-flight prey exchange, or theft, took place between the birds. Individual red-tailed hawks were observed with prey items on four occasions: three instances when hawks had captured arctic ground squirrels and one observation of a hawk in flight with a snowshoe hare (Lepus americanus) in its talons. Based on these limited observations, red-tailed hawks in the Usibelli area seemed to prey on ground squirrels to a greater extent than hawks observed by Lowe (1978) elsewhere in interior Alaska.

Hawk owls were observed associated with the disturbed and reclaimed mine areas five times. Two sightings were of birds capturing food items (voles) on a reclaimed area; on three separate occasions birds were observed perched on top of dead snags along an infrequently used haul road.

During the summers of 1981-82, golden eagles were observed associated with the study area on 31 occasions. All sightings were of solitary birds. Eagles were located in all cover types, but observed hunting activity was concentrated at an arctic ground squirrel colony located in a revegetated area. The apparent dietary dependence of golden eagles in interior Alaska on arctic ground squirrels has been reported by Murie (1944). Eagles were observed capturing ground squirrels from the colony three times; in addition I twice saw single birds flying over the disturbed and reclaimed areas carrying other types of prey. One bird had a snowshoe hare; the other eagle was holding a gallinaceous-type bird, which I assumed to be a willow ptarmigan (Lagopus lagopus).

One pair of kestrels were observed on the reclaimed areas during each of the summers of 1981 and 1982. The birds were sighted over all cover types, but the vast majority of sightings (78%, N=87) were over open habitats (i.e., revegetated areas and shrub tundra).

Pellets collected from a male kestrel's feeding perch located adjacent to a reclaimed area revealed that kestrels in the mine area consumed mainly arthropods (frequency of occurrence = 86%), small mammals (75%), and birds (36%) (Elliott and Cowan 1983). Young and Blome (1975) reported the food habits of kestrels in northern Ontario, Canada, and noted that (based on frequency of occurrence) invertebrates comprised 76% of the diet, birds 20%, and mammals 2%.

It was postulated that the greater incidence of mammals in the diet of kestrels associated with the Usibelli Mine was due to the greater availability of small mammals on the revegetated areas. Tundra vole densities on the revegetated sites were twice the densities found on nearby undisturbed tundra (Elliott 1984).

Northern harrier preference for meadow-inhabiting birds and small mammals (Beebe 1974) and the birds' propensity to nest in grassy habitat were thought to account for the species' high use (85% of observations, N=64) of revegetated sites in 1981 and 1982. On three occasions a female was observed in a revegetated area as she dove to the ground in what I interpreted as attempts to capture prey. However, no diet information was collected for harriers.

Two species of accipiters, the goshawk and sharp-shinned hawk, were sighted on the mine area. The goshawk frequented the revegetated areas adjacent to a natural lake. A pair of sharp-shinned hawks nested in a creek drainage adjacent to a revegetated area during the summers of 1981 and 1982. Sharp-shinned hawks were mainly sighted flying along the drainage, but in 1981 individuals were observed on four occasions over revegetated areas. In every instance, the hawk was chasing or harassing a short-eared owl. Merlins and boreal owls were never observed hunting on the reclaimed areas, but were sighted both years (11 and 3 total sightings, respectively) flying over the revegetated sites.

The effect of current coal strip mine reclamation techniques on interior Alaskan raptors will depend on the size and shape of the disturbed area and the amount of undisturbed forest present. Short-eared owls and marsh hawks, because of their preference for open terrain and a microtine diet, derive the greatest benefit from current reclamation methods.

The major problem associated with mine reclamation for most interior Alaskan raptors is the loss of nesting habitat. Coal extraction methods presently employed by the Usibelli Mine result in the disturbance of small areas of land at any one time. There were always areas of forest adjacent to, or in close proximity to, a reclaimed area. These stands of variously aged trees provided the nesting habitat required by most interior Alaskan raptors. Boreal owls in Alaska nest in cavities in closed-canopy deciduous forest, while hawk owls nest in open-canopy forests or on the edge of extensive cleared areas--the nests being in the tops of tree stubs (Meehan and Ritchie 1982); sharp-shinned hawks nest in mixed stands of deciduous trees with conifers scattered throughout (Clarke 1982); red-tailed hawks tend to nest in mixed stands of deciduous trees (Lowe 1978).

Although the data presented in this article are derived from a limited time period and small sample size, it is my hope that the information (and evident lack of information) concerning reclaimed strip-mined lands and raptors in interior Alaska will serve as a stimulus for further studies. Surface mining activities that remove a majority of the forest in an area, and subsequent reclamation activities that create large expanses of treeless grasslands, could be very detrimental for most Alaskan raptors. The mining of what has been estimated to be 8.7 billion st of coal located within the interior region of Alaska (National Research Council 1980) could result in the disturbance of thousands of hectares of tundra and forest. Avoidance of the potential negative impact such large scale mining could have on raptors will require a better understanding of the role reclaimed strip mines can play in meeting the habitat needs of raptors in the northern boreal forest.

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