AVIAN COLONIZATION OF RECLAIMED AREAS ON THE SUNCOR LEASE (With notes on mammal sightings)

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ABSTRACT

Reclamation activities on the Suncor lease have resulted in the development of a variety of habitat types over the past nineteen years. Many reclamation areas assume a patchy habitat type which results in the presence of a number of micro-habitats within relatively small areas. The habitats developed on reclamation areas have been colonized by avian and mammalian species. Avian species diversity is very high with 221 species recorded on the 3035 hectare lease. Avifauna enhancement devices have been used to increase the abundance of particular species while vegetation matures on the reclamation area. The abundance and diversity of avian and mammalian species recorded on the Suncor reclamation sites indicate the success of the program in terms of creation of viable wildlife habitat.

INTRODUCTION

A variety of habitat types different than those which existed prior to oil sand development have resulted from mining and reclamation activities on the Suncor lease. These types of activities, at both Suncor and Syncrude, have resulted in the creation of islands of atypical habitat within the sea of Boreal Forest habitat of northeastern Alberta.

Development has had a significant impact on local populations of many mammalian and avian species. Baseline conditions for the Suncor lease are estimated from reports for nearby areas or from land inventories conducted by the Alberta government.

The Suncor lease area was assessed by Alberta Land Inventory as having severe limitations to the production of ungulates and waterfowl (Suncor 1989). No assessments for other mammalian and avian species were conducted.

Studies on boreal forest avifauna by Erskine (1977) showed that avian species readily exploit all types of habitat available within the region. Species composition and densities were found to be site specific and variable depending on habitat characteristics. Erskine found that approximately 210 species of "boreal birds" may be found with another 40 "migrant" species possible.

Various studies have assessed trends for birds and mammals during the development of the Suncor lease (Suncor 1988). In particular, avifauna research programs have been conducted yearly since 1976 (Gulley 1990).

Reclamation activities on the Suncor lease are designed to accomplish a number of goals. While the initial goal may be to effect erosion control, long-term goals are to reclaim lands to gentle slopes covered primarily with a forest use compatible with the predisturbed terrain. Suncor has included within this goal the provision of habitat for wildlife together with the possible usage of the reclaimed area for recreational purposes (Suncor 1989).

The relevance of wildlife end use of reclaimed areas in Boreal Forest regions is examined by Green et al. in a report on reclamation of wildlife habitat (1987). The report discusses the move towards a wildlife end use for these reclaimed areas as justifiable based on the limited forestry and agricultural potentials for many Boreal Forest regions. The fact that wildlife habitat may be enhanced through minor changes to forestry end use reclamation schemes supports the viability of this reclamation option for the Suncor lease.

Colonization of reclamation areas by birds and mammals provides an indicator of the effectiveness of the reclamation activities, regardless of the planned end use goals for a particular reclamation area. Changes in bird and mammal usage mirror the vegetative progression on a particular area. The development of relatively large areas of atypical habitat types during the reclamation program means that species diversity and densities fluctuate markedly from that found on areas adjacent to the development and reclamation sites.

This report will examine the reclamation area habitat types and the avifauna records collected between 1976 and 1990 on the Suncor lease. Enhancement programs and avifauna trends on the lease will be discussed together with some notes on mammalian sightings.

COLONIZABLE HABITAT DEVELOPED ON THE SUNCOR LEASE

The development of oil sand areas and subsequent reclamation of areas through employment of a variety of experimental vegetative systems and implementation techniques has resulted in the creation of a variety of habitat types. The habitat types include those which are land or water based as well as those directly associated with the oil sands development process.

The land-based habitat types, which are discussed in detail in Suncor's 1990-2003 Development and Reclamation Plan (Suncor 1989), include four basic starter vegetation types:

- Jack pine forest
- Poplar-white spruce/shrub
- White spruce-poplar/shrub community
- Wetland complex

In addition to the land-based habitat types, a number of waterbody-based habitats have been created. These include:

- diversion and drainage ditches and ponds
- impoundment area ponds
- borrow pit ponds
- sewage lagoons

The oil sand mining and processing activities also contribute various habitat opportunities for avian and mammalian species. These include buildings, large equipment and sand or overburden banks.

Reclamation activities in a particular area of the lease may occur over a number of years as different sections become available. This may result in a patchwork of vegetative systems within a single reclamation area. An example of this is found on Tar Island Dyke where reclamation activities occurred during 1971, 1972, 1974, 1975, 1976, 1978, 1979, 1980, 1981, 1982, 1988, 1989 and 1990.

Another factor important in the development of habitat types is the variation in reclamation techniques employed over the years (Suncor 1989). Reclamation activities in the 70's involved the use of particular techniques incorporating specific species of plants. Recent reclamation activities may have involved different techniques and included the use of different plant species. Therefore, because areas become available for reclamation at variable times dependent upon mining activities, immediately adjacent areas may have been reclaimed under different methodologies.

The net result of the step-wise reclamation approach incorporating variations in techniques is that many reclaimed areas assume a mixed, patchy type of habitat which includes a variety of different specific micro-habitats. The result of this type of development is important because of the specificity of mammalian and avian habitat colonization. The development of a variety of micro-habitats within the relatively small 3035 hectare area of the Suncor lease has resulted in a high level of avian species diversification.

To increase avifauna usage of some of the habitat types developed during the mining, processing and reclamation activities on the Suncor lease, a variety of enhancement programs have been attempted. These include systems designed to specifically attract raptors, passerines and waterfowl.

Currently, enhancement devices have been erected on five reclamation areas. A total of 26 kestrel nest boxes, 3 raptor nest platforms, 53 perches and 42 swallow nest boxes have been erected. Additionally, in 1990 a floating goose-nesting platform was placed on a borrow-pit pond.

DATA COLLECTION METHODOLOGY

Avifauna data have been collected on the Suncor lease since 1976. Surveys designed to accumulate data on the diversity and abundance of lease avian species were conducted at up to 19 different sites on the lease. The number of days per year during which surveys were conducted ranged from 36 to 161. A total of 20335 site surveys were conducted between 1976 and 1989 (Gulley 1990).

Surveys typically began 45 minutes prior to sunrise. The duration of daily survey was between 120 and 300 minutes depending on the numbers of sites surveyed and the avifauna activity levels at individual sites. Individual site survey times ranged from 3 to 80 minutes depending on site size and avian activity levels.

Surveys were normally conducted by driving or walking through the site. Records were kept on all species identified visually or by ear. Prolonged stops to count birds, such as at large nesting colonies or on waterbodies, were made when required.

Survey routes and observation methodologies have been consistent throughout the years unless site modification forced revisions. The observer conducting surveys has been the author for over 99% of the surveys.

AVIAN SIGHTINGS

The total number of avian species recorded on the Suncor lease during 1976 - 1990 is 221 (Gulley 1990). Of this number, 29 (13%) are considered as accidental to the lease. While the total number recorded is in line with the numbers expected for the Boreal Forest ecosystem (Erskine 1977), it is unusual that this diversity of species has been recorded within such a small area in the Boreal Forest. This collection of a diverse variety of species has provided an excellent situation for the study of colonization activities on reclaimed areas of the Boreal Forest.

Many avian species have established successful populations on particular areas of the Suncor lease. All reclamation area ecosystems have some avifauna component. The avifauna diversity and density of a specific reclamation area depends on a number of factors including:

- size and physical features of the area
- age of the area
- within area variations in habitat type and age
- habitat types adjacent to the area

The initial result of reclamation of an area is that a grassland-type habitat develops. Colonization of the area occurs quickly with invasion and area usage by Northern Harrier, Killdeer and Savannah Sparrow. As shrubs and trees grow on the area, colonization by species requiring these components as part of their habitat occurs. Within a few years a much greater variety of avian species will be common in the area with the original colonizers joined by Sharp-shinned Hawk, American Kestrel, Sharp-tailed Grouse, Northern Flicker, Alder Flycatcher, Tree Swallow, Black-billed Magpie, American Crow, American Robin, European Starling, Red-eyed Vireo, Yellow Warbler, Chipping Sparrow, Clay-colored Sparrow, Song Sparrow, White-throated Sparrow, Brewer's Blackbird, Brown-headed Cowbird and others.

Development of these different habitats, which are within the Boreal Forest but located at least 200 kilometers north of areas having similar habitats (e.g. Wandering River), has allowed for the movement of avian species north of their typical range. Examples of these invading species are: Eared Grebe, Cooper's Hawk, Mourning Dove, House Wren, Northern Mockingbird, Brown Thrasher, Indigo Bunting, Bobolink, Western Meadowlark and American Goldfinch.

Reclamation areas on Tar Island Dyke, which provide grassland, shrub, young forest and wetland complex habitats, house the

greatest avian species diversity on the Suncor lease. One hundred and ninety two species have been recorded at this site. Avifauna diversity for this area is impacted by three important factors. The primary factor is the variety of habitat types. Secondary factors include the fact that the Athabasca River, which runs along the eastern edge of the area, brings a number of species to the dyke area. Additionally, there is an invasion of forest avian species from mature forests located both to the south and across the river from the dyke area.

Tar Island Dyke has provided a valuable colonization study site because of the nature of its patchy habitat as well as the fact that some areas have been established for as many as 19 years. Movement of particular avian species up the face of the dyke has been observed as the area vegetation matures and changes. For example, the steady progression of shrubs and trees up the face of the dyke has reduced the available optimal habitat area for Savannah Sparrows, while increasing the habitat for Song Sparrow, Clay-colored Sparrow, Red-eyed Vireo and Yellow Warbler.

The abundance of some avian species on Tar Island Dyke have been increased through provision of enhancement devices such as nesting boxes, perches and nesting platforms. These devices add a habitat component required by particular species. This component would not normally be found in the habitat until such time as the trees within the habitat had matured. Species observed using the enhancement devices on a regular basis include American Kestrels, Tree Swallows and European Starlings.

Usage of enhancement devices has been encouraging with about 50% of Kestrel nest boxes and 90+% of swallow nest boxes used yearly. Regular seasonal use is made of the perches by a variety of species, particularly American Kestrels.

The various wetland complex habitats in reclamation areas around the lease have been exploited by a wide variety of birds including loons, grebes, herons, waterfowl, cranes, coots and rails, shorebirds, gulls and terns, and passerines. Production of young of the various species is common throughout wetland complex habitats on the lease. However, the relatively small total area of these types of habitats on the lease means that total production of young is limited.

Avian species successfully exploiting available wetland complex habitats include: Common Loon, Pied-billed Grebe, Horned Grebe, Eared Grebe, Red-necked Grebe, Green-winged Teal, Mallard, Northern Pintail, Blue-winged Teal, Northern Shoveler, Gadwall, American Wigeon, Redhead, Ring-necked Duck, Lesser Scaup, Common

Goldeneye, Bufflehead, Ruddy Duck, Sora, American Coot, Sandhill Crane, Killdeer, Lesser Yellowlegs, Greater Yellowlegs, Spotted Sandpiper, Common Snipe, Wilson's Phalarope, Bonaparte's Gull, Black Tern, Belted Kingfisher, Eastern Kingbird, Alder Flycatcher, Common Yellowthroat, Lincoln's Sparrow, Swamp Sparrow, Red-winged Blackbird and Yellow-headed Blackbird.

A component of the avifauna recorded on the Suncor lease makes use of the various habitats on a transitory basis. Included in this group are migrants such as geese, many shorebird species and some passerine species as well as a variety of species which nest in nearby areas. The later group of species use the various reclamation habitats as part of their foraging territories.

Some other avian species have exploited areas of the Suncor lease directly related to oil sand production facilities or activities. Examples of these species include Ring-billed Gull, California Gull, Herring Gull, Bank Swallow, Cliff Swallow, Barn Swallow, Common Raven and House Sparrow.

A final note on the presence of avian species on reclamation sites is that it is not always a positive occurrence. An example of this was noted during the spring of 1990 when Common Ravens, in play, were viewed pulling planted trees and shrubs from the ground.

MAMMALIAN SIGHTINGS

Several mammalian species are routinely sighted on reclamation areas on the Suncor lease. Some of these species have colonized reclamation areas while others simply use the area as part of their habitat. Species sighted include: mule deer, white-tail deer, black bear, red fox, wolf, coyote, varying hare, woodchuck, red squirrel, least weasel, least chipmunk, muskrat and beaver. Smaller mammalian species, such as mice, voles and shrews, are common on reclamation areas (Suncor 1988) but only sighted occassionally. Sporadic sightings of moose and bats have also been made on the lease.

The presence of mammals on a reclamation site is often not a positive event. This is particularly true for lagomorphs and rodents which may cause extensive damage to trees and shrubs planted on reclamation areas. It was in response to the problems created by these mammalian species that the raptor enhancement program was established.

The presence of larger mammals on a reclamation area is however another reflection of the health of the ecosystem. Mammalian presence on reclamation areas increases as the area matures.

Sightings made on Suncor's reclamation areas indicate that mammalian exploitation of the areas is both active and increasing.

CONCLUSION

The habitats developed through reclamation activities on the Suncor lease have created areas which have readily been colonized by both avian and mammalian species. The reclamation program has resulted in a high variability of habitats being developed in a relatively small area within the surrounding Boreal Forest ecosystem. This has allowed the concentration of a diverse number of avian species within a very small area.

The avifauna component for individual reclamation areas has occassionally been enhanced through erection of nesting boxes or platforms and perches. These devices provide necessary components of a habitat until those components develop naturally as the area vegetation matures.

The presence of the diverse family of birds and mammals on Suncor's reclamation areas provides an indication of the success of the program in terms of developing a viable ecosystem. Whether the system will mature to a point where it fits a forest-use profile is yet to be seen. It has undoubtably fulfilled the goal of providing viable wildlife habitat.

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SCIENTIFIC NAMES OF SPECIES MENTIONED IN THE TEXT

Common Loon	*Gavia immer*
Pied-billed Grebe	*Podilymbus podiceps*
Horned Grebe	*Podiceps auritus*
Red-necked Grebe	*Podiceps grisegena*
Eared Grebe	*Podiceps nigricollos*
Green-winged Teal	*Anas crecca*
Mallard	*Anas platyrhynchos*
Northern Pintail	*Anas acuta*
Blue-winged Teal	*Anas discors*
Northern Shoveler	*Anas clypeata*
Gadwall	*Anas strepera*
American Wigeon	*Anas americana*
Redhead	*Aythya americana*
Ring-necked Duck	*Aythya collaris*
Lesser Scaup	*Aythya affinis*
Common Goldeneye	*Bucephala clangula*
Bufflehead	*Bucephala albeola*
Ruddy Duck	*Oxyura jamaicensis*
Northern Harrier	*Circus cyaneus*
Sharp-shinned Hawk	*Accipiter striatus*
Cooper's Hawk	*Accipiter cooperi*
American Kestrel	*Falco sparverius*
Sharp-tailed Grouse	*Tympanuchus phasianellus*
Sora	*Porzana carolina*
American Coot	*Fulica americana*
Sandhill Crane	*Grus american*
Killdeer	*Charadrius semipalmatus*
Greater Yellowlegs	*Tringa melanoleuca*
Lesser Yellowlegs	*Tringa flavipes*
Spotted Sandpiper	*Actitis macularia*
Common Snipe	*Gallimago gallinago*
Wilson's Phalarope	*Phalaropus tricolor*
Bonaparte's Gull	*Larus philadelphia*
Ring-billed Gull	*Larus delawarensis*
California Gull	*Larus californicus*
Herring Gull	*Larus argentatus*
Black Tern	*Chilonias niger*
Mourning Dove	*Zenaida macroura*
Belted Kingfisher	*Ceryle alcyon*
Northern Flicker	*Colaptes auratus*
Alder Flycatcher	*Empidonax alnorum*
Eastern Kingbird	*Tyrannus tyrannus*
Tree Swallow	*Tachycineta bicolor*

SCIENTIFIC NAMES OF SPECIES MENTIONED IN THE TEXT Continued

Bank Swallow	*Riparia ripiria*
Cliff Swallow	*Hirundo pyrrhonota*
Barn Swallow	*Hirundo rustica*
Black-billed Magpie	*Pica pica*
American Crow	*Corvus brachyrhynchos*
Common Raven	*Corvus corax*
House Wren	*Troglodytes aedon*
American Robin	*Turdus migratorius*
Northern Mockingbird	*Mimus polyglottis*
Brown Thrasher	*Toxostoma rufum*
European Starling	*Sturnus vulgaris*
Red-eyed Vireo	*Vireo olivaceus*
Yellow Warbler	*Dendroica petechia*
Common Yellowthroat	*Geothlypis trichas*
Indigo Bunting	*Passerina cyanea*
Chipping Sparrow	*Spizella passerina*
Clay-colored Sparrow	*Spizella pallida*
Savannah Sparrow	*Passerculus sandwichensis*
Song Sparrow	*Melospiza melodia*
Lincoln's Sparrow	*Melospiza lincolnii*
Swamp Sparrow	*Melospiza georgiana*
White-throated Sparrow	*Zonotrichia albicollis*
Bobolink	*Dolichonyx oryzivorus*
Red-winged Blackbird	*Agelaius phoeniceus*
Western Meadowlark	*Sturnella neglecta*
Yellow-headed Blackbird	*Xanthocephalus xanthocephalus*
Brewer's Blackbird	*Euphagus cyanocephalus*
Brown-headed Cowbird	*Molothrus ater*
American Goldfinch	*Carduelis tristis*
House Sparrow	*Passer domesticus*
Varying Hare	*Lepus americanus*
Woodchuck	*Marmota monax*
Least Chipmunk	*Eutamias minimus*
Red Squirrel	*Tamiasciurus hudsonicus*
Canada Beaver	*Castor canadensis*
Muskrat	*Ondatra zibethicus*
Coyote	*Canis latrans*
Timber Wolf	*Canis lupus*
Red Fox	*Vulpes vulpes*
Black Bear	*Ursus americanus*
Least Weasel	*Mustela rixosa*
Mule Deer	*Odocoileus hemionus*
White-tailed Deer	*Odocoileus virginianus*
Moose	*Alces alces*

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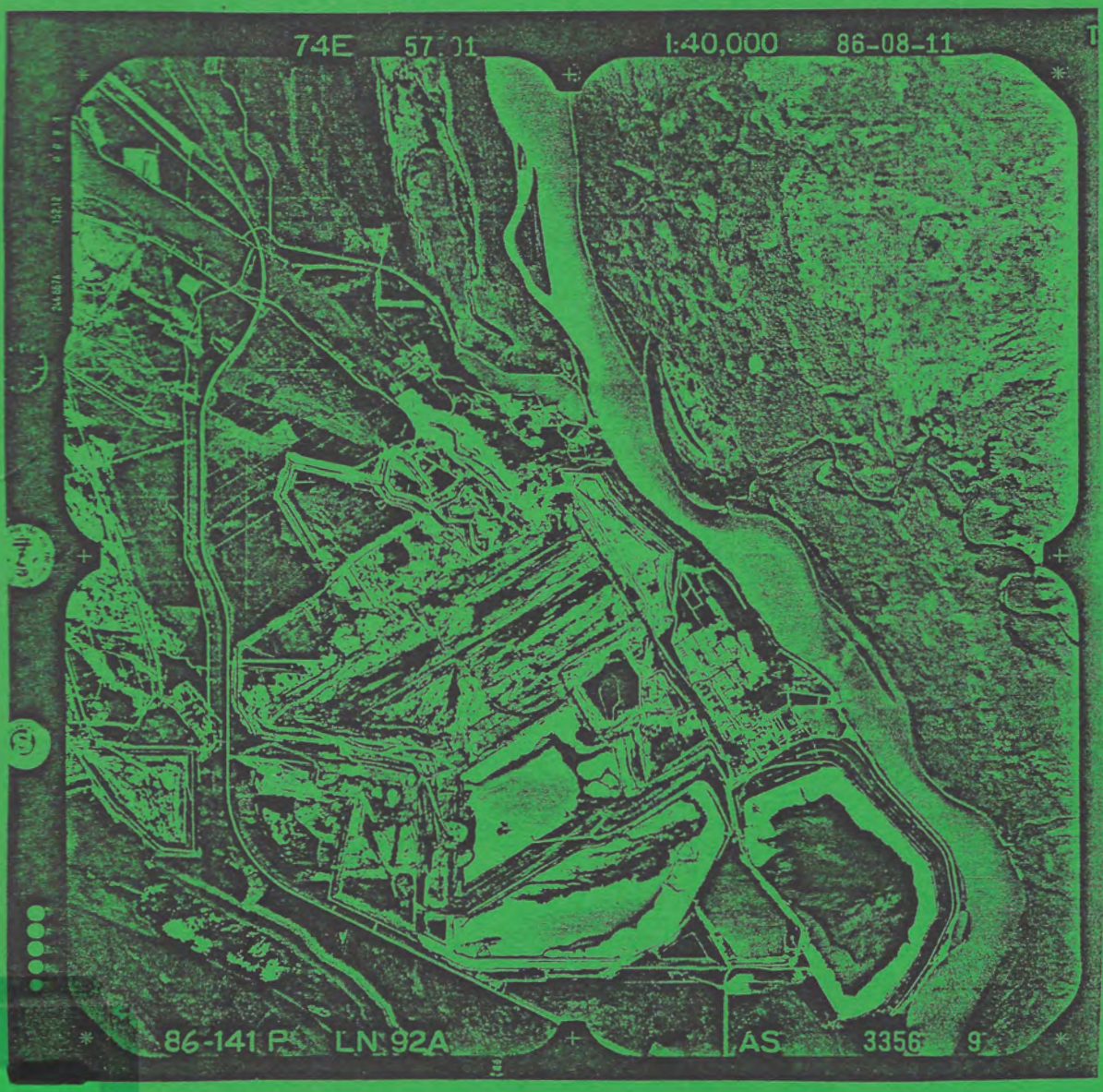

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Front Cover: 1986 airphoto of the Suncor facility, north of Fort McMurray, Alberta.

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DEDICATION

These proceedings are dedicated to the memory of Bruce Runge and Michael Mensforth. These two reclamationists passed away in the fall of 1990 while on the job.

Bruce Runge worked for Western Oilfield Environmental Services Ltd. as Operations Manager and was on his way to conduct a pipeline inspection in the Primrose Lake area when the helicopter he was in crashed on the outskirts of Edmonton. Bruce was 45 years old.

Michael Mensforth worked as a reclamation technologist for Alberta Environment, Land Reclamation Division and was on his way to a site in northern Alberta when he was killed in a freak vehicle accident. Micheal was 35 years old.

The loss of these two specialists is a blow to the small reclamation community of our province. It also points out to the rest of us that ours can be a dangerous profession and that safety is critical in our business.

SPONSORS

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