

RECLAMATION OF DUCKS UNLIMITED HABITAT PROJECTS IN ALBERTA

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ABSTRACT

Ducks Unlimited Canada, a non-profit private conservation organization, has been involved in the preservation and creation of waterfowl habitat in Canada for 49 years. Project development occurs primarily through a free easement system with Ducks Unlimited assuming the costs of development, construction, operation and maintenance. A variety of earthworks are routinely undertaken to facilitate the management of waterfowl habitat. The revegetation of prescribed earthworks is an important element in the habitat development process. This paper will outline current reclamation strategies employed by Ducks Unlimited Canada in the development of wetland habitat projects in Alberta. The application of shrubs and other plant species in future reclamation planning is also discussed.

INTRODUCTION

Ducks Unlimited Canada is an international, private, non-profit conservation organization dedicated to the perpetuation and increase of North America's waterfowl resources through restoration, preservation and creation of prime breeding habitat in Canada. Since its incorporation in 1938, Ducks Unlimited Canada has spent over \$60 million dollars in Alberta developing in excess of 1500 wetlands comprising approximately 303 500 ha. In 1987, Ducks Unlimited Canada will be spending \$7.3 million dollars in Alberta to develop an additional 95 wetlands encompassing approximately 5700 ha of habitat. Project development occurs primarily through a free easement system with Ducks Unlimited assuming the costs of development, construction, operation and maintenance. Reclamation is an important element in the habitat development process. This paper provides a summary of the reclamation strategies employed by Ducks Unlimited Canada in the development of wetland habitat projects in Alberta.

PROJECT DEVELOPMENT

Project development occurs in each of the three major ecological zones, however the major focus is on prairie and parkland Alberta where habitat is so critical to North American waterfowl. Earthworks are integral to project development and are routinely undertaken to facilitate the management of waterfowl habitat. The main emphasis of Ducks Unlimited's work in Alberta has been the creation, preservation and management of wetland habitat through water control. Typically, wetland management plans strive to maximize wetland productivity through controlled water regimes.

The majority of the earthworks undertaken are directly associated with the water control component of the project and include construction of earthfill dikes and dams and excavation of channels and canals. Other earthworks are commonly undertaken in conjunction with marsh management techniques to address limitations in wetland productivity.

The loss of upland habitat across the prairie provinces, due primarily to agricultural practices, had led to the development of artificial nesting islands for waterfowl. Ducks Unlimited constructs artificial islands in prairie and aspen parkland wetlands to provide secure waterfowl nesting habitat.

Another commonly used management technique involves the excavation of sinuous level ditching with the prime objective of providing open water areas for breeding pairs of waterfowl in otherwise densely vegetated wetlands. Spoil piles resulting from excavation provide additional nesting habitat.

OBJECTIVES

The primary objectives underlying the revegetation of prescribed earthworks are twofold:

1. Minimize surface erosion; and
2. Provide productive nesting cover for waterfowl.

Reclamation strategies focus on the selection of vegetative species adapted to low moisture and poor soil conditions rather than on expensive soil improvement techniques.

VEGETATION ESTABLISHMENT

The establishment of productive nesting cover on prescribed earthworks has been the major impetus for the development of Ducks Unlimited's reclamation strategies. Productive nesting cover minimizes predation and interspecific harassment and therefore, improves nesting success (Keith 1961; Duebbert and Kantrud 1974; Giroux 1981). Upland nesting waterfowl select vegetative cover that is tall (>30 cms), dense and provides maximum screening (Giroux 1981; Duebbert 1982; Lokemoen et al. 1984). Heterogeneous cover is more productive than monotypic stands (Klett et al. 1984; Duncan 1986) and the presence of vegetation species resistant to snow-caused breakage and lodging will provide good residual cover for early nesting ducks (Duebbert et al. 1981; Higgins and Barker 1982).

The important features that affect the success of establishment of productive nesting cover appear to include site adaptability, site preparation, seedbed preparation, planting equipment and methods, rates and dates of seeding and seed sources (Sankowski 1987). Ducks Unlimited uses primarily commercially available introduced grass and legume mixtures in the reclamation of islands and other earthworks in Alberta. The seed mixture

designed for a specific site uses certified seed of proven cultivars which reflect the criteria for productive nesting cover. Species growth form is a major consideration. Some tall and some low growth form species such as tall wheatgrass (*Agropyron elongatum*) and intermediate wheatgrass (*A. intermedium*) are incorporated in mixtures to establish a diverse cover. The use of bunch grasses in conjunction with sod forming grasses further enhances habitat diversity. Good residual nesting cover is ensured by limiting the composition of introduced legumes, which are susceptible to lodging, to approximately 25% of the mixture.

The revegetation of artificial nesting islands is treated on a site specific basis. Standardized seeding specifications by biome have been compiled for other earthworks within central Alberta. Species selection was based upon availability, tolerance to limiting factors and nesting cover provided. Seeding rates are determined primarily by the seeding method and severity of the site conditions. Similarly, standardized fertilizer specifications have been compiled based on soil analyses of existing projects within each biome.

Plant species incorporated into nesting island seed mixtures reflect a broad range of tolerance. The mixtures exhibit alkali tolerance, drought tolerance and tolerance to infertile or disturbed soils.

Reclamation planning has become integral to project development. Construction methods and contracts reflect the need to utilize available topsoil and valuable organics which are routinely stripped, stockpiled and later incorporated into the seedbed.

The process of seedbed preparation and application of seed and fertilizer is accomplished using a variety of techniques as dictated by the size and accessibility of the earthworks. Commonly used techniques involve the use of ATV's, bulldozers and conventional seeding equipment. More elaborate seeding techniques are employed in remote areas and where conditions preclude alternate seeding methods. These include helicopter seeding of islands and hydroseeding of extensive dike complexes.

Proper preparation of the seedbed is often difficult with artificial nesting islands due to poor access. These conditions are partially compensated for by heavy application rates of seed and for the majority of the islands this has been quite successful. Spring and fall seeding are most commonly undertaken with summer seeding avoided, as adequate moisture is not available and plants usually do not have sufficient time to become established before winter.

Periodic rejuvenation of nesting cover is accomplished through prescribed burning undertaken ideally every five years between late March and late April. With introduced grasses, a complete renovation and reseeding of a stand is likely necessary every 9 to 10 years.

DISCUSSION

Attempts to establish productive nesting cover on islands and other earthworks in Alberta have been generally successful. Poor success can often be attributed to low available moisture and adverse soil characteristics, salinity in particular.

In southern Alberta, soil structure presents a common problem. Organic matter is low and clay content high on manmade islands. In addition, many wetlands develop in depressions having saline soils. Where feasible, organic matter is added to the soil surface to produce improvements in soil structure, moisture infiltration, and available nutrients as well as absorb some harmful salts.

Soil acidity problems encountered in the northern parkland and boreal forest biomes are addressed through incorporating species such as redtop (*Agrostis scabra*), meadow foxtail (*Alopecurus pratensis*) and alsike clover (*Trifolium hybridum*) which tolerate acidic soils and provide good quality nesting cover. In cases of extreme acidity, liming of the soil is prescribed.

Another cause cited for poor cover establishment is grazing by geese and ducks. This impact may potentially be ameliorated in the future by establishing protective cover crops.

FUTURE DIRECTIONS IN RECLAMATION

Ducks Unlimited is supporting a graduate study which is evaluating the use of perennial shrubs in nesting island reclamation in Alberta. Shrub establishment is an effective technique for enhancing waterfowl nesting habitat for several reasons: it increases nesting and success (Lokemoen et al. 1987; Duebbert et al. 1983), it discourages gull colony establishment, and shrubs are drought resistant and provide permanent cover.

Field trials of native shrub species including Wood's rose (*Rosa woodsii*), prickly rose (*R. acicularis*) and western snowberry (*Symphoricarpos occidentalis*) evaluated species suitability and techniques for establishment in prairie in parkland biomes. Preliminary results are encouraging and provide the following recommendations for the use of shrubs in island reclamation (Fehr 1986):

1. Planting should be undertaken in April or September to mid-October when plants are dormant using healthy and vigorous container stock. For nesting cover shrubs should be planted in groups of 15 to 20 in a circle or oval arrangement.
2. Watering shrubs two or three times per month is best but watering at least once per month is necessary.

3. Competition from herbaceous vegetation and rodent damage can negatively affect young plants. Therefore, shrubs should be established soon after construction before herbs establish and rodents disperse to the island.
4. Shrubs should be established away from the shoreline and before grasses that attract geese to minimize damage from loafing waterfowl.

Ducks Unlimited staff in southern Alberta are investigating the potential application of forage kochia (Kochia prostrata) in the reclamation of salt affected soils. The species has many characteristics which make it attractive for use on Ducks Unlimited projects in southern Alberta. This perennial shrub is drought resistant, salt tolerant, provides excellent cover and produces high quality forage. Many Ducks Unlimited projects in southern Alberta have been created in solonchic blowouts featuring disturbed harsh soils where the establishment of vegetation has been a problem. Kochia is a good pioneer species to use in these areas and is easily established through broadcasting seed stock.

Southern Alberta staff have also been working closely with the Agricultural Research Station in Lethbridge over the last year regarding the application of Walsh Wheatgrass, a domestic variety of the native western wheatgrass (Agropyron smithii). The species thrives on short-term flooding conditions on clay solonchic soils and is drought resistant.

Ducks Unlimited's work with Walsh Wheatgrass has developed into two separate practical applications. The first is in backflood irrigation projects where it is used to produce high quality forage and replace common disturbance species such as wild barley (Hordeum jubatum) and gumweed (Grindelia squarrosa). Under backflood conditions, yields of 7 tonnes/ha are attained. The high forage potential combined with the timing and duration of flooding makes Walsh Wheatgrass superior to other seeded grasses with respect to waterfowl production.

The second application of Walsh Wheatgrass is in the revegetation of earthworks. It will be incorporated into seed mixtures to colonize bare areas between grass species such as crested wheatgrass (Agropyron cristatum) which tend to form loose stands.

The establishment of seeded native grasses is a reclamation option which Ducks Unlimited staff in Alberta are just beginning to utilize. In eastern parts of the prairie pothole region, adapted varieties of warm and cool season native grasses have been used extensively to establish productive nesting cover. Stands of native grasses are long lived, constituting a more permanent cover type than is provided by introduced grasses; self perpetuating with minimum management requirements; and once established will survive on nutrient deficient substrates.

Use of native grasses in the reclamation of Ducks Unlimited earthworks in Alberta has been limited thus far to drought tolerant cool-season species such

as western wheatgrass and slender wheatgrass (*Agropyron trachycaulum*) which both exhibit good tolerance to saline and alkaline soil conditions. Southern staff have also used Nuttall's salt-meadow grass (*Puccinellia nuttalliana*) in reclaiming areas of extreme salinity.

Commercially available mulch blankets will be tested this year on earthworks in central and northern Alberta which have met with poor success using standard reclamation procedures. The mulch blankets will be used to establish strips of cover on the problem areas from which vegetative expansion can occur. The blankets are manufactured with or without seed stock to suit local soil and climatic conditions and are particularly effective for erosion control and slope stabilization.

CONCLUSION

The reclamation strategies adopted by Ducks Unlimited within Alberta reflect the wide range in climatic and soil conditions encountered. In northern Alberta, reclamation techniques have been relatively simple and mostly successful reflecting the generally favourable growing conditions encountered. Reclamation in other areas of the province have met with less success and required more innovative strategies.

To this end, Ducks Unlimited Canada will continue to investigate and incorporate new plant species and methodology into reclamation programs to ensure the maximum benefit to the waterfowl resource is realized from its wetland habitat projects in Alberta.

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Proceedings of a Symposium

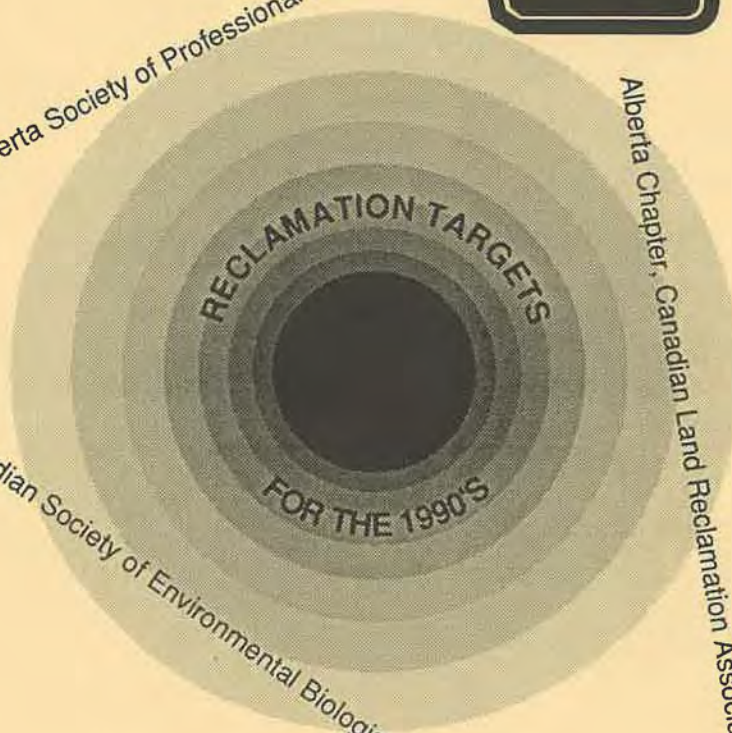


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The Organizing Committee would like to thank:

Mr. J. Green, Mr. B. Free, Ms. N. Ross and Mr. C. Powter: Session Chairmen

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And a special thank you to our two guest speakers:

Dr. David Samuel, University of West Virginia who spoke on Reclamation to Wildlife Habitat in the United States

Dr. Larry Holbrook, Biotechnica International of Canada, Calgary, Alberta who spoke on Biotechnology and Biologists

- and -

to the Hon. Ken Kowalski, Minister of Environment, for delivering the opening address.

MESSAGE FROM THE ORGANIZING COMMITTEE

Reclamation practitioners and researchers have gone a long way to solving the problems posed by such disturbances as mining, drilling and pipeline construction. The future challenge for reclamation lies in applying our expertise in other areas such as industrial site decommissioning, habitat creation and restoration, and urban design.

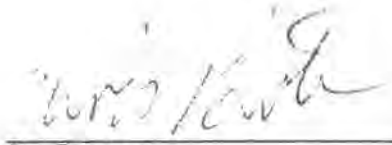
The Symposium was designed to expose participants to a wide variety of "new" areas where reclamation science could be applied. These were the "targets" referred to in the Symposium title. The speakers did an excellent job in meeting this goal. Some of the participants felt the Symposium had not provided enough information on new methods to be employed in reclaiming these new disturbance types. While this was not the goal of the Symposium it remains a valid concern that should be addressed in a future symposium.

Finally, the Hon. Ken Kowalski, Minister of Environment, encouraged all participants to get out and preach the need for, and successes of, reclamation, and indeed all environmental programs. Telling ourselves in conferences how wonderful we are is preaching to the converted. We need to let those who benefit from our labours, that amorphous group known as the public, know what we have done for them. This, too, should be the topic of a future symposium.

The papers in this proceedings have been edited and retyped into a common format. The contents of the papers are essentially unchanged from the submitted manuscripts of the authors.



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