

**Buttertubs Marsh Conservation Area
Management Plan**

2004

**Buttertubs Marsh Conservation Area
Co-Management Steering Committee**

Buttertubs Marsh Conservation Area Management Plan

The signatories of the primary stakeholders approve the Management Plan for the Buttertubs Marsh Conservation Area and agree to work co-operatively to implement the management strategies.

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Dedication

This wetland management plan is dedicated to the memory of the late Rick Davies, Senior Wildlife Management Biologist with the B.C. Ministry of Environment, Lands and Parks and Property Manager for the Buttertubs Marsh Conservation Area for much of its existence. He is remembered and missed by those who knew him and had the pleasure of working with him. The information he compiled and documented has been invaluable in preparing this management plan.

Acknowledgements

The Buttertubs Marsh Co-Management Steering Committee prepared this management plan based on the May 2001 management plan documentation prepared by Charlene Lee and Kanya Baillie of J.C. Lee and Associates Ltd.

The Buttertubs Marsh Co-Management Steering Committee would like to thank the many people that provided valuable information regarding the history of the site, public use activities, biological resources and volunteer support to the operation of the Conservation Area.

The Nature Trust of British Columbia provided administrative support and preparation of the management plan report. Final edits were provided by Tim Clermont and Bill Merilees.

Note to Readers:

The following acronyms are used in the management plan report.

TNT	The Nature Trust of British Columbia
MWLAP	Ministry of Water, Land and Air Protection
DUC	Ducks Unlimited Canada
NFN	Nanaimo Field Naturalists
CWS	Canadian Wildlife Service
CITY	City of Nanaimo

Executive Summary – Buttertubs Marsh Conservation Area Management Plan

Buttertubs Marsh Conservation Area is located within the City of Nanaimo, British Columbia and is owned by The Nature Trust of British Columbia (TNT). This 22 ha conservation area consists of reclaimed wetlands (75%) and is bordered by a shrub-mixed forest complex which provides superb public trails and nature view points. The Buttertubs Marsh Conservation Area is a highly valued recreational area and provides exceptional educational opportunities. Striking the balance between preserving the ecological integrity of this urban wetland and accommodating public use demands presents considerable ongoing challenges for management of the area.

The Buttertubs Marsh Conservation Area is leased for 99 years to the Province of British Columbia to be managed by the Ministry of Water, Land and Air Protection (MWLAP). Assisting MWLAP in Region 1 with the management of properties like Buttertubs Marsh is the Vancouver Islands Wetlands Management Program. Projects are coordinated by the Wetlands Manager and this program is supported by: Ducks Unlimited Canada (DUC), Habitat Conservation Trust Fund, Canadian Wildlife Service (CWS), MWLAP and TNT. In 1997, a co-management agreement was developed for the Buttertubs Marsh Conservation Area involving the City of Nanaimo, the Nanaimo Field Naturalists and the MWLAP. One of the first achievements of this agreement was to develop a management steering committee which clearly defined the role of each agency or stewardship group and the following governance model details the roles and responsibilities of all active members:

MEMBER	ROLES AND RESPONSIBILITIES
Ministry of Water, Land and Air Protection (MWLAP)	<p>MWLAP is responsible for management of the property under a 99-year lease (signed in 1977) with TNT. General administrative duties for the Conservation Area involves land use planning, habitat protection and property rights issues. Additional administrative time is spent dealing with city-wide planning issues, impacts of adjacent urban development, and issues concerning the adjacent marshlands as they pertain to the Conservation Area. Under the 1997 co-management agreement between MWLAP, the City of Nanaimo and the Nanaimo Field Naturalists, MWLAP:</p> <ul style="list-style-type: none"> • Performs the lead role in administration of the lands; • Acts as the lead planning agency by co-ordinating and hosting meetings with other management partners to determine yearly and long-term property objectives; • Attempts to secure funds each year for general property upkeep; • Co-ordinates major wetland habitat projects and maintenance of the Millstone dyke and water control structures; • Acts on problem wildlife issues except geese which is a shared responsibility with the City; and • Develops signage and marks land boundaries. <p>MWLAP manages water through the provisions of the Water Act and is responsible for habitat protection under the Wildlife Act, and for resident native fish populations (Fish Protection Act and Fisheries Act).</p>
City of Nanaimo	<p>The City of Nanaimo is responsible in part for habitat maintenance and enhancement, trail and facility maintenance and interpretive program development. Under the 1997 co-management agreement between MWLAP, the City of Nanaimo and the Nanaimo Field Naturalists, the City of Nanaimo:</p> <ul style="list-style-type: none"> • Maintains trails, public facilities (benches, viewing platforms, etc.); • Assists in the enforcement of dog control bylaws and goose control; and • Continues maintenance responsibilities over the City dyke which delineates the western boundary of the Conservation Area. <p>The City of Nanaimo manages land use through its Official Community Plan and zoning processes and works with other government agencies to address storm water management within the municipality.</p>
Nanaimo Field Naturalists (NFN)	<p>NFN are responsible in part for habitat maintenance and enhancement, trail and facility maintenance and interpretive program development. Under the 1997 co-management agreement between MWLAP, the City of Nanaimo and the Nanaimo Field Naturalists, NFN:</p> <ul style="list-style-type: none"> • Initiates the development of annual work plans and provides continued input on the review and

	<p>update of the Management Plan in consultation with the other parties;</p> <ul style="list-style-type: none"> • Acts as volunteer guardians of the Conservation Area and in this capacity reports management or maintenance/public safety issues to either the Province, the City, or both; • Continues wildlife and plant inventory programs; and • Continues as the lead group implementing volunteer projects (e.g. invasive vegetation control) and interpretive/public education programs.
Ducks Unlimited Canada (DUC)	DUC is responsible for the construction, maintenance and repair of the north dyke and associated water control structures as per the 30-year agreement signed in 1985 between DUC and MWLAP. This includes clearing of mud and debris piled around the outlet level control structure each fall, as well as annual inspections of the north dyke and associated structures and repairs or maintenance, as required.
The Nature Trust of British Columbia (TNT)	TNT as the property owner is responsible for ensuring that the conditions of the 99 year lease agreement with MWLAP are being met. TNT as a landowner within the City of Nanaimo is responsible for paying property taxes, including making an annual application to the City to have the taxes reduced. TNT also responds to requests to upgrade present and future utilities which pass through the Conservation Area and provides input towards annual workplans by participating on the management committee.

This Management Plan has been prepared to guide the Buttertubs Marsh Conservation Area management over the next ten years. The Plan is divided into three sections:

- Section 1.0 - provides a summary of the natural and recreation values of the Conservation Area, land use and access, and a listing of management issues.
- Section 2.0 - details the management strategies and tasks.
- Section 3.0 - addresses implementation of the Management Plan.

Section 1: Background

The management goal for the Buttertubs Marsh Conservation Area is to maintain and, where possible, enhance the plant and animal resources and to provide for compatible recreational and educational use of the area.

The Buttertubs Marsh Conservation Area is one component of a larger wetland, river and floodplain habitat complex within the City of Nanaimo. The early seral vegetation now present is predominately non-native species growing on disturbed soils that have been extensively modified by past agricultural practices. However the Buttertubs Marsh Conservation Area has significant wetland values for a number of species including one red-listed and six blue-listed birds and one blue-listed reptile. Buttertubs Marsh includes the following habitat types:

- **Marsh and Shallow Water:** Cattail marsh and shallow water wetlands with small areas of shrub swamp occupy about 75% of the area.
- **Millstone River Riparian Area:** A narrow strip of riparian woodland bordering the Millstone River, dominated by large English Oaks with a largely native shrub understory.
- **Marsh Shoreline and Riparian Upland:** This includes the low tree, shrub and herbaceous vegetated area from the marsh margin back to property boundaries. There are three components that include the lower shoreline, the upper shoreline and vegetated upland.
- **Lower Shoreline:** The immediate fringe to the marsh that dries as the water level

recedes during the summer months, dominated emergent succulent vegetation

- **Upper Shoreline:** This area includes the shrubby and taller herbaceous riparian vegetation that derive their moisture from the marsh. The extent of this area varies depending on aspect, slope and substrate.
- **Vegetated Upland:** This area occupies the fringe of the Buttertubs Marsh Conservation Area and has generally thin soil cover. It occurs primarily along the eastern boundary where English Hawthorn is the predominant species.

Section 2: Management Strategies

Management:

The Buttertubs Marsh Conservation Area is managed jointly through a variety of administrative vehicles. The area was purchased by The Nature Trust of British Columbia in 1976. There are a number of legal agreements that provide management direction: a 99 year lease with the Provincial Ministry of Water, Lands and Air Protection (MWLAP); a provincial Conditional Water License to divert and store 150 acre-feet of water; a 30 year agreement signed in 1985 between MWLAP and Ducks Unlimited Canada for the construction, maintenance and repair of the North Dyke and associated water control structures; and a co-management agreement signed in 1997 between MWLAP, the City of Nanaimo and the Nanaimo Field Naturalists Club. This agreement established a Co-management Steering Committee, chaired by the NFNC which is responsible for the annual work plans, on-site monitoring, and periodic review and updating of the Management Plan. The Co-management Steering committee membership includes TNT, MWLAP, the City of Nanaimo and the NFNC. A working committee comprising representatives of neighboring communities, interest groups and individuals with marsh/wildlife/fishery expertise reports to the Steering Committee through the NFNC representative.

Resource Protection – to protect the managed resources of the Buttertubs Marsh Conservation Area several key activities have been identified. The existing conservation lands cover only a small portion of the original wetland area. A plan has been put forward that identifies additional properties for future acquisition. Ensuring the ecological integrity of the current property requires vigilance to identify and eliminating encroachment, unauthorized works within the area, and ensuring that neighboring developments do not impact the existing marsh ecosystem. The establishment of boundary fencing along residential property lines is proposed.

Resource Inventories – to properly identify the resources found within the Buttertubs Marsh Conservation Area a variety of inventories are required. These efforts need to be continued on a regular basis to measure the increase/decrease and diversity of native plant and animal species and the management goals set out in this plan.

Land Use Activities – acceptable activities in the Buttertubs Marsh Conservation Area are restricted to low impact recreational and educational endeavors, including, bird and wildlife viewing, photography, walking, nature appreciation, rest and relaxation. Facilities that promote or enhance these activities are encouraged.

Habitat Maintenance, Enhancement and Diversification – during the tenure of this plan the marsh is likely to require major renovation and rejuvenation which may include draining of the Buttertubs Marsh Conservation Area. Clearing ditches, repairing water control structures and modifying vegetation to improve the diversity of native species. Less extensive maintenance activities will include minor modifications such as scarifying shallow areas, brushing out nesting islands, removal of exotic species, planting native species and associated works.

Water Level Maintenance and Control – the north and western sides of the Buttertubs Marsh Conservation Area are enclosed by dykes that are essential structures for maintaining the required water level in the marsh. Dyke maintenance should include the paving of an overflow spillway on the north dyke to prevent erosion during overflow conditions due to winter rains. Normal water level is regulated by ‘beaver proof’ overflow culvert to maintain the water retention capacity required to meet management/ water storage objectives.

Wildlife Enhancement and Control – the installation and maintenance of bird nesting boxes are recognized as part of management activities. In addition the installation of a raptor artificial perch/nesting platform is proposed during the current management cycle. An egg addling program at the Buttertubs Marsh Conservation Area, targeting Canada geese, is identified to assist the regional effort to control goose numbers. Vegetation diversity plans are being developed that include native tree and shrub species as well as aquatic plants that beaver use for food and lodge construction.

Exotic/Invasive Species Control –weeding projects will be developed to monitor and remove exotic plants species such as yellow iris and purple loosestrife in the marsh and Scotch broom, Himalaya blackberry, common (English) hawthorn and tansy ragwort in upland areas. Monitoring and control activities, where possible, will be developed for exotic animal species such as cottontail rabbits, pumpkinseed sunfish and bullfrogs.

Public Health - Buttertubs is an active, healthy, vibrant wetland habitat. As long as it remains in this state, public health issues, such as the concern regarding the mosquito-borne West Nile Disease will be minimal. In addition, Buttertubs Marsh has very healthy populations of the native stickleback and the exotic pumpkinseed sunfish. These fish species along with swallows and bats provide a natural biological control of mosquito larvae and pupae.

Domestic Dog and Cat Control – education programs will be developed to inform the public about the negative impact dogs and cats have on wildlife, especially birds, in the conservation area. In keeping with the management goals, Buttertubs has been designated a “No Pet” area.

Trail and Facility Maintenance – maintenance activities will concentrate on safety issues such as annual trail maintenance, brushing and trail surfacing, designated access management, signage, maintenance of wildlife viewing structures and benches and litter control.

Interpretation/Education Program – Due to its urban location the Buttertubs Marsh Conservation

Area becomes an important community outdoor education resource. Through signage, printed materials, and where possible, on-site field trips, guided walks and nature tours may be provided to foster public knowledge and awareness of this important wetland.

Warden Program – the duties of the warden program will be integrated into the responsibilities of the Buttertubs Marsh Conservation Areas Liaison Committee. Members of the committee make regular rounds of the area, conduct work parties, and hold regular meetings. A report of their activities is presented at each meeting of the Co-management Steering Committee.

Revenue Generation – funding to achieve the goals set out in the Buttertubs Marsh Conservation Area management plan will generally be raised by the Liaison Committee through grant applications to charitable and wildlife organizations for project specific funding. Donation of materials, student community experience programs, and other sources of assistance will be solicited on an “as needed” basis.

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THE MANAGEMENT PLAN - INTRODUCTION

The Buttertubs Marsh Conservation Area is a reclaimed wetland and floodplain habitat adjacent to the Millstone River within the Nanaimo City limits (Figures 1 and 2). Although dykes isolate Buttertubs Marsh itself from the rest of the flood plain, the area is subject to flooding from the Millstone River. Enhancement works implemented since the mid 1970's include water control structures, channel dredging, nest boxes, waterfowl nesting islands, trails, an observation tower, and a wheelchair accessible viewing platform. The Conservation Area provides habitat for a number of rare-listed species, including the first recorded breeding site on Vancouver Island for the blue-listed American bittern. Buttertubs Marsh also offers wildlife viewing opportunities, education and enjoyment of nature by the public.

The 22 ha Buttertubs Marsh Conservation Area owned by The Nature Trust of British Columbia (TNT) consists of two adjacent properties (Figure 2) with street addresses of 1780 Jingle Pot Road and 200 Buttertubs Drive. Their respective legal descriptions are:

Lot 1, Section 1, Nanaimo District, Plan 28980 (PID# 000-558-711); and
Lot A, Section 1, Nanaimo District, Plan VIP63268 (PID# 023-416-017).

1.1 Management Plan Process

This Management Plan has been prepared to guide the Buttertubs Marsh Conservation Area's management over the next ten years. The process for preparing the Management Plan involved an extensive review of the history, current land use status on and around the site, natural resource values, management history of the Conservation Area since the mid 1970's, and a review of the management issues (J.C. Lee and Associates, 2001). In February of 2003, a public open house was held that provided a forum for input regarding the management plan. Building from the goals and objectives, the Management Plan sets out strategies and tasks for conservation, land use, interpretation and operation and maintenance of the Conservation Area. The intent of the management strategies is to ensure management decisions protect and enhance the natural values and that human use within and adjacent to the Conservation Area do not result in unacceptable impacts. The Management Plan not only sets long-term direction for the Conservation Area, but also gives direction and identifies specific actions to address immediate issues. Due to the number of strategies and actions, priorities have been established for the tasks.

The Management Plan report is organized with Section 1.0 that provides a summary of the natural and recreational values of the Conservation Area, land use and access, and a listing of the management issues. Section 2.0 details the management strategies and tasks and Section 3.0 addresses implementation of the Management Plan.

1.2 Governance

The Buttertubs Marsh Conservation Area was purchased by The Nature Trust of British Columbia (TNT) in 1976. TNT has a 99-year lease with the Ministry of Water, Land and Air Protection (MWLAP) to manage the site "for preservation, protection and/or development as a wildlife sanctuary". Assisting MWLAP in Region 1 with the management of properties like Buttertubs Marsh is the Vancouver Islands Wetlands Management Program. Projects are coordinated by the Wetlands



Figure 1



Project:
Buttertubs Marsh Conservation Area
 Site Context Plan, with Air Photo (April 1996)

Legend:

- Buttertubs Marsh Conservation Boundary (22.8 Hectares)
- City Parks
- Trails (Loop Trail 2.4km)

Date: Feb. 7, 2003
 Drawn: JET
 Checked: RH

Distance in metres
 0 100



Drawing 3 of 4



Notes:
 1. The information used to compile this map is based on a variety of sources, dimensions to be verified.

Figure 2



Project:
Buttertubs Marsh Conservation Area
 1984 Natural Features Inventory

Legend:

- Buttertubs Marsh Conservation Area Conservation Boundary (22.8 Hectares)
- City Parks
- Golf Course

'1984 Drawing' Representation of the vegetation after the major works were completed in the marsh.

Date: Feb. 10th, 2003
 Drawn: JET
 Checked: RH

Distance in metres
 0 100



Manager and this program is supported by: Ducks Unlimited Canada (DUC), Habitat Conservation Trust Fund, Canadian Wildlife Service (CWS), MWLAP and TNT. In addition to the lease between TNT and MWLAP, there are several other agreements which provide management direction:

- A provincial Conditional Water License issued in 1976 to divert and store 150 acre-feet of water in the Conservation Area;
- A 30-year agreement signed in 1985 between MWLAP and Ducks Unlimited Canada (DUC) for the construction, maintenance and repair of the north dyke and associated water control structures; and
- A co-management agreement signed in 1997 between MWLAP, City of Nanaimo, and the Nanaimo Field Naturalists.

The Co-Management Steering Committee is responsible for the implementation of the Buttertubs Marsh Conservation Area Management Plan, including preparation and implementation of annual work plans, monitoring, and periodic review and updates of the Management Plan.

The Co-Management Steering Committee membership includes:

- MWLAP who is responsible for management of the property under the lease with TNT.
- City of Nanaimo and the Nanaimo Field Naturalists who are responsible in part for habitat maintenance and enhancement, trail and facility maintenance and interpretive program development under the co-management agreement with MWLAP.
- TNT further to their responsibilities as the property owner. The Nature Trust representative maintains communications for DUC and ensures they fulfill their obligations to help maintain the marsh habitat.

1.3 Background Summary

1.3.1 Natural Values

Habitat Types

The Buttertubs Marsh Conservation Area is one component of a larger wetland, river and floodplain habitat complex in the City of Nanaimo. Although this wetland is located within the Moist Maritime Coastal Douglas-fir Biogeoclimatic zone (CDFmm), the standard classification site series for this zone cannot be applied to the early seral vegetation on the site as the predominantly non-native plant species

now present are growing on disturbed soils that have been extensively modified by past agricultural practices. However, this Conservation Area has significant wetland values for a number of species including one red-listed and six blue-listed birds and one blue-listed reptile. Buttertubs Marsh includes the following habitat types and is illustrated on Figure 2 (based on 1984 data). The City of Nanaimo commissioned the development of a current habitat map which was produced in April of 2004 (Appendix 1). Species lists for plants, birds, and mammals as well as a description of the flora and fauna is contained in the source documentation for the preparation of the Management Plan (J.C. Lee and Associates, 2001).

Marsh and Shallow Water

-cattail marsh and shallow water wetlands with small areas of shrub swamp that occupy about 75% of the surface area of the site.

The 2004 habitat mapping breaks this down further into Anchored Cattail (7%), Floating Cattail (13%), Cattail/Iris Mix (8%), Island (1%), Shallow Open Water (41%), Seepage Areas (1%), and Hardhack (4%) (Buttertubs Marsh Conservation Area 2004 Natural Features Inventory, City of Nanaimo, Appendix 1).

Vegetation	Wildlife Habitat Values
<ul style="list-style-type: none"> • Wetlands that consist of open water areas up to 1-2m deep interspersed with emergent cattail marsh, floating cattail islands, hummocks and four small constructed islands with herbaceous vegetation. • Shallow open water areas support emergent and floating aquatic vegetation, including common mares tail, water smartweed, bladderwort, duckweed, pondweed and yellow pond lily. • Two small shallow wetland areas, to some extent isolated from the main marsh, partially dry out during the summer drawdown and have different more diverse vegetation. The dominant vegetation is hardhack, young willows and some red-osier dogwood characteristic of a shrub swamp habitat. 	<ul style="list-style-type: none"> • Cattail marsh areas are used for roosting, feeding and nesting by red-winged blackbirds, common yellowthroats, marsh wrens, mallard ducks, pied-billed grebes and Canada geese, as well as American bittern (blue-listed), Virginia rails and sora. Mallards, wood ducks, hooded mergansers and other waterfowl use these areas for cover while flightless. These areas are also used for feeding and resting by beaver, muskrat, mink, raccoon and river otter. • Open water areas are used for feeding and resting by many waterfowl species, including dabbling ducks, diving ducks, grebes, American coots, geese and an occasional trumpeter swan (blue-listed). These habitats are heavily used during fall and spring migration and for waterfowl over wintering in the Nanaimo area.

Marsh Shoreline and Riparian Areas- shrubby and grass-dominated riparian margins. There are three components that include a lower shoreline, upper shoreline and riparian habitat types. The riparian area is varied depending on aspect, slope, substrate, elevation, previous use and historic plantings.

Vegetation	Wildlife Habitat Values
<ul style="list-style-type: none"> • <u>Lower shoreline = Cattail-yellow iris shoreline plant association</u> Dominated by cattail and yellow flag iris, growing on saturated soils. There is also a mud flat area which has a dense cover of common mares tail. • <u>Upper shoreline = Reed canary grass-hardhack shoreline plant association</u> The area above the full standing level is dominated in most areas by a dense growth of reed canary grass with scattered clumps of hardhack. Patches of common rush occur in some areas. This may be the lower extent to the riparian area but is distinguished by the absence of a tree or shrub canopy. Seedlings of Pacific, Sitka and Hooker's willow appear but are soon eliminated by beaver. • <u>Riparian area</u> In general the overall tree cover is sparse and a typical native tree-shrub community is entirely lacking. The northern riparian cover is either a dense cover of Himalayan and some evergreen blackberry with a few emerging hawthorn trees or blackberry, broom and common hawthorn, with minor inclusions of other riparian species (hardhack, red osier dogwood, snowberry, willow, Lombardy poplar saplings) as well as a ground cover of grasses and weedy herbaceous species in openings in the shrub layer. Riparian vegetation around the small shrub swamp has a tree canopy mix of Sitka and Pacific willows, young red alder and black cottonwood, several large Lombardy poplars and a few poplar and English oak saplings. The under storey contains young trees mentioned above plus red osier dogwood, hardhack, snowberry, Saskatoon and some broom, blackberry and English holly. Riparian vegetation east of the marsh is on the remnants of old farm fields and is in a very early stage of succession. The hawthorn-broom-blackberry scrub grades into the reed canary-grass-hardhack plant association. At the south end a more typical riparian plant community is developing in a narrow strip bordering Jingle Pot Road, in part due to the success of earlier habitat restoration efforts. The dominant tree species is red alder with English oak, Pacific willow and black cottonwood. The under storey is Pacific and Hooker's willows, hardhack, Nootka rose and snowberry as well as declining common hawthorn, Himalayan black berry and escaped domestic privet. 	<ul style="list-style-type: none"> • Marsh riparian areas are utilized by various bird species, depending on the vegetation type, for cover, foraging and/or nesting, (e.g. red-wing blackbird, marsh wren, Virginia rail, snipe, mallard, wood duck, Canada goose, common yellowthroat, song sparrow, willow flycatcher). These areas are also used by a number of mammal species for cover and/or foraging, including beaver, muskrat, raccoon, mink and river otter, as well as voles, shrews and numerous domestic cats. They are also important for some life stages of amphibians (e.g. frogs and salamanders with aquatic larval and terrestrial adult stages) and reptiles (e.g. painted turtles (blue-listed) and some garter snakes). In general, areas with greater vegetation species diversity and structural complexity tend to be utilized by a wider range of species in all groups.

Exotic/Invasive Weeds

- the cattail areas are heavily intermixed with yellow flag iris, an invasive non-native species originally planted in the 1970's.
- purple loosestrife is also present in several areas but not yet well established.

Millstone River and Riparian Area

- a narrow strip of riparian woodland bordering the Millstone River, dominated by alder and large English oaks with a shrub under storey. The well vegetated riparian strip is the least disturbed area and contains mainly native plant species and represents 5% of the conservation area (Appendix 1).

Vegetation	Wildlife Habitat Values
<ul style="list-style-type: none"> • English oaks planted along the river bank in the early 1900's, with some red alder and other native 	<ul style="list-style-type: none"> • Habitat provides feeding by Wood Ducks, Band-Tailed Pigeons, hunting and roosting by Barred Owls

<p>deciduous trees with a dense native shrub under storey of ninebark, red osier dogwood, snowberry and some willows. The under storey vegetation resembles a mid-late seral native plant association indicative of medium bench floodplain sites (CDFmm Site Series 08).</p>	<p>and several hawk species and feeding and nesting by woodpeckers and numerous songbirds.</p> <ul style="list-style-type: none"> • Mammals, including deer, raccoons, beaver, muskrat, mink and river otter feed and/or rest in this area. • This also provides a wildlife corridor linking the Buttertubs area with adjacent habitats.
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Exotic/Invasive Weeds

- Broom and blackberry are invasive species that remain even in areas with ongoing control efforts. However these shrubs are no longer the dominant cover in areas where there is sufficiently dense tree-shrub canopy developing to displace these shade-intolerant species.
- Reed canary grass is highly invasive at wetland margins where soils are saturated for part of the growing season.

Vegetated Upland

- approximately 20% of the Buttertubs Marsh Conservation Area is represented by upland units consisting of blackberry (1%), broom/grass (2%), hawthorn shrubland (13%), mixed forest (3%), and an red oak forest (1%), Appendix 1. Most of these uplands exist on the remnants of the abandoned farm field after dyking and flooding of the original wetland and adjacent hay fields.

Vegetation	Wildlife Habitat Values
<ul style="list-style-type: none"> • old farm pasture/hay field with a variable shrub cover dominated by common hawthorn, Scotch broom and Himalayan blackberry. • Limited numbers of other tree and shrub species are present. Some were planted by various groups over the past 20 years (primarily conifers) and others re-colonized, (e.g. red alder, arbutus, cascara, mountain ash, bitter cherry, Pacific crabapple, snowberry, Nootka rose, trailing blackberry, spreading dogbane, spurge laurel). 	<ul style="list-style-type: none"> • The upland scrub vegetation areas are utilized by numerous bird species for cover and foraging, including many residents, over wintering and migrating song birds attracted by insects and to the abundant hawthorn berry crop (e.g. chickadee, Berwick’s wren, kinglets, various warblers, American robin, cedar waxwing, house finch). In spring and summer a number of species also nest although the low habitat diversity likely limits this activity (e.g. American robin, spotted towhee, song sparrow, house finch, Bewick’s wren, bush tit, orange-crowned warbler, California quail and ring-necked pheasant). Mammals using this habitat include deer, raccoon, eastern cottontail, deer mouse, Townsend’s vole and shrews, as well as domestic dogs and cats. Garter snakes are fairly common in summer and Pacific tree frogs are present, though the lack of decaying large woody debris likely limits salamander abundance.

Recorded Rare-listed Flora and Fauna

Red-listed - one bird species:

- purple martin

Blue-listed - six birds and one reptile species:

- Trumpeter swan
- American bittern
- Great blue heron
- Green heron
- Turkey vulture
- Short-eared owl
- Painted turtle

1.3.2 Cultural/Recreational Values

Buttertubs Marsh and adjacent upland areas have a long history of intensive human use dating back to before the turn of the 20th century. In the 1890's the forest cover was cleared, initially to support activities of local mining operations and later for farming activities. The general outline of the marsh area has not changed significantly since 1950.

A row of heritage English oak (20 listed in Schedule A of the City of Nanaimo Tree Protection Bylaw No. 4695) occurs along the north and west dykes of the marsh.

Since the purchase of the Buttertubs Marsh for conservation in 1976, there has been active participation by numerous local stewardship and school groups to work on various habitat enhancement projects and several youth employment teams built trails and other public wildlife viewing facilities.

The major recreational use of the Conservation Area is walking (including walking dogs); jogging and bicycling either using the loop trail around the marsh only or as a connection to other City of Nanaimo trails (Figure 4). Other uses include nature appreciation (including nature walks and bird and wildlife viewing), photography, and painting.

The Conservation Area is also actively used for various environmental education programs through local societies, schools, Scouts Canada, and Girl Guides Canada. Interpretive facilities include trails, signs, wildlife viewing platforms, and the Miner's Cottage and interpretive display located at the south entrance to the Conservation Area.

1.3.3 Adjacent Land Use and Access

There are six access points to the Buttertubs Marsh Conservation Area as illustrated in Figure 3.

The Buttertubs Marsh Conservation Area is located in a primarily residential area of the City of Nanaimo (refer to Figure 4). The Conservation Area itself is zoned rural agricultural/residential (City of Nanaimo, 1998). Aside from the residential subdivisions bordering the site, there are four undeveloped properties bordering the Conservation Area as illustrated on Figure 5:

- A treed area across Millstone River north of the site;
- A large property (previously a golf course) to the east of the Conservation Area and Bird Sanctuary Subdivision;
- A large parcel of undeveloped City land south of the Conservation Area; and
- The balance of the marsh complex, much of which is privately owned, on the west side of the City dyke (known as the west marsh).

Two properties, one adjacent to the southwest boundary behind Valley Oak Mobile Home Park of the site consisting of marsh and riparian area and a second undeveloped property at the northeast end of Bird Sanctuary Drive are designated as City park (refer to Figure 5).



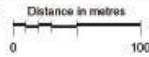
Interpretive Centre
Figure 3



Project:
**Buttertubs Marsh Conservation Area
Facilities Plan**

- Legend:**
- Buttertubs Marsh Conservation Boundary (22.9 Hectares)
 - City Parks
 - Golf Course
 - Trails (Loop Trail 2.4km)
 - Access Points
 - Culvert
 - Fence
 - Gate

Date: Feb. 10th, 2003
Drawn: JET
Checked: RH



Drawing 4 of 4



Interpretive Centre
Figure 4

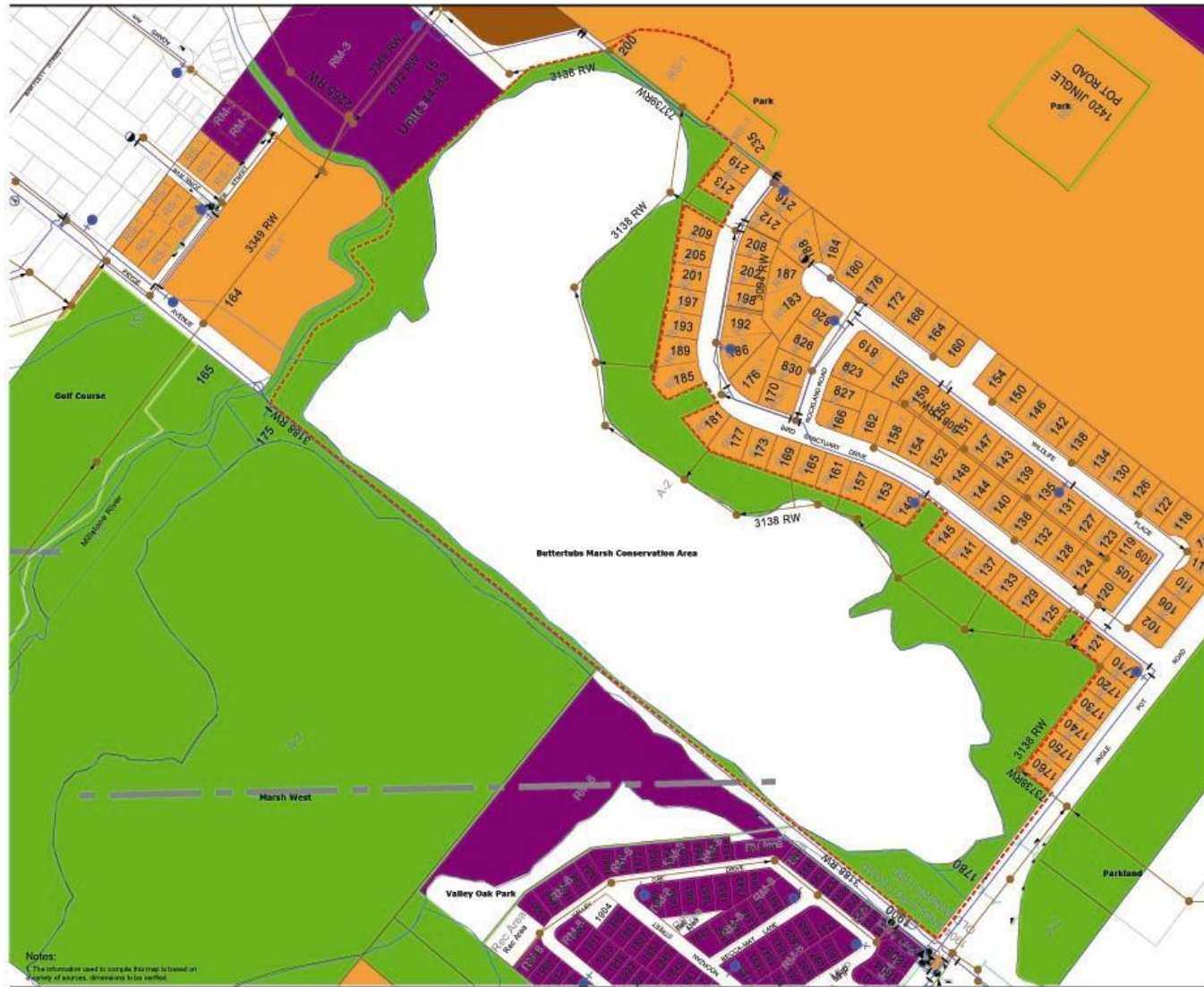


Project:
Buttertubs Marsh Conservation Area
Facilities Plan

- Legend:**
- Buttertubs Marsh Conservation Boundary (22.8 Hectares)
 - City Parks
 - Golf Course
 - Trails (Loop Trail 2.4km)
 - Access Points
 - Culvert
 - Fence
 - Gate

Date: Feb. 10th, 2003
 Drawn: JET
 Checked: RH

Distance in metres
 0 100



Notes:
 1. The information used to compile this map is based on a variety of sources. Dimensions to be verified.

Figure 5



Project:
Buttertubs Marsh Conservation Area Services

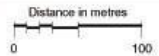
Legend:

- Buttertubs Marsh Conservation Area Conservation Boundary (22.8 Hectares)
- Services - Water
- Services - Storm
- Services - Sanitary

Zoning Legend:

- Parking - Public Institutions
- Residential Single Family
- Residential Multi-Family
- Agricultural
- Commercial
- Industrial
- Marine

Date: Feb. 10th, 2003
 Drawn: JET
 Checked: RH



1.3.4 Management Issues

The fundamental management issue for the Buttertubs Marsh Conservation Area stems from the inherent conflict of a conservation area located within an urban setting. It is recognized that wetlands are dynamic systems on the land base that respond to a variety of geomorphic and biological processes. However, in a human-managed land base, the opportunity for the natural process of wetland succession, which creates shifting vegetation patterns across the land surface, is dramatically modified. The Buttertubs Marsh has been significantly affected by past human activities that altered the vegetation in and around the site and from engineered water control facilities (e.g. dykes and water control structures). Ongoing monitoring will determine the level and type of management intervention (e.g. engineered versus implementing natural mechanisms) that will be required to meet the wildlife habitat goals for the Conservation Area. Within this context the following identifies the interrelated issues that are addressed by the management strategies in Section 2.0.

Theme	Issue
Habitat Maintenance and Enhancement	<ul style="list-style-type: none"> • Enhance and maintain habitat and wildlife resource values in the context of a managed wetland system and the surrounding land uses. • Maintain habitat enhancement facilities – e.g. nest boxes, nest islands, water control measures. • Ongoing implementation of exotic/invasive species control measures and monitoring changes. • Monitor vegetation changes and where feasible implement control programs.
Inventories and Monitoring	<ul style="list-style-type: none"> • Resource inventories and ongoing monitoring to assess the implications from past, and to inform future, enhancement activities and human use of the Conservation Area.
Access and Facility Development	<ul style="list-style-type: none"> • Intensity and type of recreational use consistent with conservation values, including: <ul style="list-style-type: none"> – City park values (e.g. Trans Canada Trail) versus wildlife conservation values. • Facility (e.g. trails, interpretive signs and programs, viewing structures) design, implementation and maintenance to support agreed upon level of use. • Curbing unapproved uses (observed and reported by seniors) include uncontrolled pets, training of bird dogs, horse back riding and trail and motor bikes. • Vandalism and maintenance of facilities including requirements to monitor and “police” activities and design and construction of facilities to be as maintenance free as possible. • Control of domestic species (e.g. dogs, cats, and non-native wildlife).
Adjacent Land Use	<ul style="list-style-type: none"> • Address the challenge of maintaining the conservation values of Buttertubs Marsh as the surrounding urban area develops by: <ul style="list-style-type: none"> – exploring with the City and neighbors appropriate buffers and management direction as development occurs on adjacent properties; and – maintaining an ongoing interest in acquiring the nearby privately owned marshland.

1.4 Goals and Objectives for the Conservation Area

The management goal for the Buttertubs Marsh Conservation Area is to maintain and, where possible, enhance the plant and animal resources of Buttertubs Marsh Conservation Area and to provide compatible public recreational and educational use of the area.

GOAL 1: Maintain and, where possible, enhance plant & animal resources of the Conservation Area

Objective 1: Provide wildlife habitat

Objective 2: Control exotic, invasive plant and animal species

Objective 3: Gradually increase wildlife habitat and species biological diversity

GOAL 2: Provide for compatible public recreational and educational use of the area

Objective 4: Provide controlled public access

Objective 5: Provide wildlife and nature viewing opportunities

Objective 6: Provide public education opportunities

2.0 MANAGEMENT STRATEGIES

The management strategies to address the goals and objectives for the Buttertubs Marsh Conservation Area are described under the specific theme areas followed by a task list that identifies the relative priority and responsibility for the task.

2.1 Property Administration and Planning

While the Buttertubs Marsh Conservation Area is privately owned by TNT, there are several agreements in place for the management and maintenance of the property, as follows:

- The Conservation Area is administered under a 99-year lease (signed in 1977) to the BC Government through the MWLAP for preservation, protection and/or development as a wildlife sanctuary. The Ministry's general administrative duties for the Conservation Area involve land use planning, habitat protection and property rights issues. Additional time is spent regarding environmental, habitat protection, and issues concerning the adjacent marshlands as they pertain to the Conservation Area.
- A provincial Conditional Water Licence was issued in 1976 to divert and store 150 acre-feet of water in the Conservation Area and to construct a diversion structure, culverts, dyke, and pond.
- In 1985, the Ministry signed a 30-year agreement with Ducks Unlimited Canada (DUC) for the construction, maintenance and repair of the north dyke and associated water control structures. This includes clearing of mud and debris piled around the outlet level control structure each fall, as well as annual inspections of the north dyke and associated structures and repairs or maintenance, as required.
- In 1997, a co-management agreement was signed between the MWLAP, the City of Nanaimo and the Nanaimo Field Naturalists to assist in the habitat maintenance and enhancement, trail and facility maintenance and interpretive program development.

TNT as a landowner within the City of Nanaimo is required to pay property taxes as levied by the City. However, there is an annual application process in place whereby a non-profit organization can apply to the City to have the taxes reduced. In 2001, the City exempted the Conservation Area of all property taxes.

The Co-Management Steering Committee which includes representatives from the signatories of the co-management agreement holds two to three meetings a year to draw up annual work plans, delegate tasks, review the success of the work at the end of the year and monitor progress toward the goals and objectives of the Management Plan. A group of volunteers “known as the working /liaison committee” conduct activities directed by this management plan. Their activities are recorded in their minutes and forwarded to the management committee.

Task	Priority	When	Implement By	Cost
Steering Committee Meetings				
Organize three meetings each year - send out notices to confirm meetings - review annual report; review agreements and rights of way; plan up-coming year's activities	1° 1°	Annually: Mar (First Week); Sept (Fourth Week); December (First Week)	MWLAP Steward Committee	
- review progress of identified activities - review progress of activities & submit written reports for annual report - prepare annual report for December meeting	1° 1° 1°	March Oct – Dec	Committee Committee MWLAP Steward	
Property taxes				
Annual application for property tax reduction	1°	Exemption Granted 2002. Review – 3 Year Term	TNT, City	
Agreements & Rights-of-way				
Review all signed agreements & rights-of-way	1°	As required	TNT, MWLAP, City	
- 30-yr agreement between Prov. Gov. & Ducks Unlimited Canada - 99-yr lease between TNT and Prov. Gov.	Med term Long term	2015 2076	MWLAP, DUC, TNT, MWLAP	

2.2 Protection

2.2.1 Adjacent Lands

Buttertubs Marsh Conservation Area is buffered somewhat from urban development by adjacent undeveloped City park lands and further donations of adjacent ecologically sensitive lands (Figure 6). An area of 3.4 ha, adjacent to the Valley Oak Estates Manufactured Home Park on Jingle Pot Road and adjacent to the southwest corner of the Conservation Area, has been dedicated to the City of Nanaimo as park. An additional < 0.5 ha area adjacent to the eastern boundary of the Conservation Area is also designated City park. In 1997, 0.5 ha (1.25 acres) adjacent to the eastern boundary was donated to TNT for wildlife habitat and environmental enhancement purposes.

Approximately half of the marsh complex within the surrounding Millstone River floodplain, identified by the 60m ASL contour is presently incorporated into Buttertubs Marsh Conservation Area owned by TNT. To ensure more complete protection of this unique marsh complex, the privately-owned marshlands (identified in Merilees 2000 report) should be purchased, added to the existing Conservation Area, and managed as a natural wetland area for wildlife conservation. Although this opportunity has been actively pursued in the past, it cannot proceed until the land is available for purchase.

It would be extremely desirable to expand both the Conservation Area and the Management Plan to include the adjacent wetland area, when/if this becomes a practical possibility.

Task	Priority	When	Implement By	Cost
Land Acquisition				
Purchase west marsh and other identified properties	1 ^o	when available	PECP, City of Nanaimo, and Nanaimo Area Land Trust	fair market value

2.2.2 Provincial and Municipal Designations

Buttertubs Marsh, adjacent wetlands and riparian area along the Millstone River have been identified on a provincial level as Environmentally Sensitive Areas (ESAs)¹. The wetland and riparian habitat types within the Conservation Area are considered at risk within the Nanaimo Lowland area of east Vancouver Island reaffirming protection of this area for conservation purposes.

These wetland and river areas are also identified in the City of Nanaimo Zoning Bylaw 4000.126 and Schedule 'G' (Watercourse Map), which indicates the watercourses protected in Nanaimo and are included in Development Permit Area (DPA) 23 in the Official Community Plan (OCP: Bylaw 1996 #6000) which also reflects the provincial ESA identification. Under these bylaws, construction and most other forms of disturbance within the leave strip areas, which is 15 m from the natural boundary for wetlands and 30 m from top of bank for the Millstone River, are restricted and regulated by permit. These City bylaws provide some means of recourse to the landowner to legally request mitigation for any unauthorized 'works' within and adjacent to the marsh. The above designations should be maintained and enforced for the continued protection of the Conservation Area and adjacent salmonid habitat.

2.2.3 Encroachments

On-going encroachment into the Conservation Area by some property owners along Bird Sanctuary Drive needs final resolution. Those landowners expanding beyond their property boundaries into the Conservation Area were informed of their encroachment in 1995 and many of the compost piles, building supplies, etc. were removed. However, by 1999, some residents were again using the Conservation Area for storing supplies, piling yard waste, etc. While the installation of a fence along the property line was recommended by both the City of Nanaimo and Nanaimo Field Naturalists, a lack of resources prevented this from occurring at the time.

To be consistent with management objectives, the management committee now recommends the installation of a fence along the eastern property line where Bird Sanctuary Drive residential properties border the Conservation Area. In advance of a permanent fence will be the installation of a series of visual boundary markers. Any encroachment issues should be dealt

¹ Eastern Vancouver Island Sensitive Ecosystem Inventory (SEI). This initiative was begun in 1993 as a joint provincial-federal project to develop a systematic inventory of threatened ecosystems and the species that inhabit them, to enable resource agencies to set priorities for their management and protection (Ward *et al*, 1998).

with soon after, through meetings with the residents that encourage self monitoring. Should non-compliance continue then fencing be installed.

In 1995, a 5-year lease agreement between TNT and the property owners at 133, 137, 141 and 145 Bird Sanctuary Drive allowed a 25 foot wide piece of Conservation Area property to be used as a firebreak. It was to be left in a natural state to provide wildlife habitat with no improvements (e.g. Fences, composers, etc.) and it was agreed that no permanent property fences would be installed. Again to be consistent with the management plan and stated objectives the committee now agrees that the expired agreement should not be renewed and a more permanent solution be found (e.g. Boundary fencing).

Task	Priority	When	Implement By	Cost
Control of Encroachments				
Establish fence or other visible boundary marker along east property line	1°	2003 (Immediate) – Mark boundaries with cedar posts and sign 2004-beyond – construct 6’ fence	City City & Committee	
Review encroachments, vegetation removal, unauthorized plantings, etc.	1°	As required	TNT, MWLAP, City	
Do not renew expired agreement between TNT and property owners at 133, 137, 141 & 145 Bird Sanctuary Drive	1°	2003	TNT	

2.3 Additional Resource Inventories

A variety of inventories and surveys have been done at Buttertubs Marsh by members of the Ministry of Water, Land and Air Protection, Ducks Unlimited Canada, Nanaimo Field Naturalists and others. The most comprehensive one to date is the Nanaimo Field Naturalists' quantitative bird survey undertaken between March 1991 and March 1992 and printed in their publication called *Thrush* (Gillespie, 1992).

Other shorter term projects and incidental observations have been carried out in the marsh area. Through the development of this management plan, copies of many of these were acquired as reference material for the management plan and background information for future studies (J.C. Lee and Associates, 2001).

A resource inventory and monitoring program should be developed, undertaken and updated every 3-5 years to monitor and document the progress of habitat enhancement efforts and other changes occurring in and around the marsh.

Task	Priority	When	Implement By	Cost
Resource Inventories				
Develop a resource inventory and monitoring program	1°	Ongoing	NFN, MWLAP, DUC	

Task	Priority	When	Implement By	Cost
Conduct inventory and monitoring program for:				
Birds - waterfowl, wetland & upland	2°	Ongoing	NFN, MWLAP	
Mammals	2°		NFN, MWLAP	
Amphibians	2°		NFN & partners	
Reptiles	2°		NFN & partners	
Fish	2°		NFN & partners	
Insects & Other Invertebrates	2°		NFN & partners	
Red & Blue-listed Fauna	1°	Annually	NFN, MWLAP	
Red & Blue-listed Flora & Plant Associations	1°	Annually	NFN, MWLAP	
Wildlife Trees	1°	Annually	NFN, MWLAP, City	

2.4 Land Use Activities

Acceptable land uses within Buttertubs Marsh Conservation Area are restricted to low impact recreational and educational endeavours. Examples of such activities are bird and wildlife viewing, photography, walking, and jogging. These activities were greatly enhanced in early 1995 with the completion of the perimeter trail, widening of the existing trail and the construction of a viewing platform on the east side of the Conservation Area. Other compatible activities (such as painting and nature appreciation) should be encouraged in the future.

2.5 Habitat Maintenance and Enhancement

2.5.1 Marsh Habitat Type Diversity

Once every 20-30 years, major modifications within the marsh may be required. These may include draining the marsh, clearing ditches, repairing control structures and clearing and modifying vegetation to maintain within-marsh diversity (Fry, 1984). In the past the work has been funded by the provincial Habitat Conservation Trust Fund (HCTF), and engineered and supervised by Ducks Unlimited Canada (DUC). The cost was estimated to be \$25,000+ (1995). The next major maintenance effort within the marsh is expected to be required between the years 2004 and 2014.

Once every 3-5 years, minor modifications such as scarifying the shallows and brushing out the nesting islands (Fry, 1984) may need to be made when these areas become choked with vegetation not suitable for their intended use.

In 1976 the north dyke was built and water control structures were installed. Dense cattail growth was excavated to provide more open water and thereby increase bird abundance and diversity, which are highest in wetlands with a 50:50 interspersion of emergent vegetation and open water (Fry, 1984). In 1984, extensive modifications were undertaken within the marsh to establish nesting islands, ditches and open water areas. The cattail and yellow iris had spread extensively and large sections were removed or mown prior to the reflooding of the marsh in October 1984.

A comparison of 1984 and 1996 aerial photographs of Buttertubs Marsh shows some movement of floating cattail islands but very little expansion of cattail and yellow iris. The ditches are still open in the cattail/yellow iris area in the northwest corner of the marsh in 1999. It may be that further spread is being limited by competition for space and/or nutrients between the cattail and yellow iris, or by the current water level regime. Periodic monitoring of further spread and reduction of interspersion, both on the ground and from aerial photographs taken at 3-5 year intervals, should be undertaken to determine when further intervention to restore waterfowl and wildlife habitat quality is required.

Task	Priority	When	Implement By	Cost
Marsh Habitat Diversity				
- monitor vegetation in shallows and on nesting islands to determine timing for minor clearing - plan minor clearing operations - carry out minor clearing operations	2°	2003, 2006, 2009, 2012... as required as required	NFN/DUC/ MWLAP Committee City	
- map reed canary grass distribution and determine potential to replace with sedge meadow	2°	2003 – 2008	NFN, DUC, MWLAP	
- determine potential to increase open shallow water habitat	2°	2003	NFN, DUC, MWLAP	
- monitor expansion & interspersion of cattail & yellow iris from ground and aerial photos to determine timing for any major modifications - plan major modifications - carry out major modifications	2°	2003, 2008, 2013 ... after study in 2013 after study in 2013	NFN/DUC/ MWLAP Committee DUC & partners	

2.5.2 Aquatic and Emergent Vegetation Diversity

The diversity of aquatic and emergent marsh vegetation in Buttertubs Marsh has increased since 1976 when dense cattail growth was excavated to increase the amount of open water. However, a detailed survey of wetland vegetation has not been undertaken since 1982.

Once every 3-5 years a wetland vegetation survey should be undertaken to record plant species, location and % cover within the marsh. These surveys would document such aspects as the spread of cattail, extent of competition between cattail and yellow iris, the abundance of waterfowl food species such as water smartweed, duckweed and potamogetans (pondweed), the spread of purple loosestrife, and the spread of coontail, a coarse aquatic plant which has no food value to fish or waterfowl, grows quickly, and chokes out other aquatic plant species (Godwin *et al*, 1982).

Task	Priority	When	Implement By	Cost
Aquatic & Emergent Vegetation Diversity				
- develop a wetland vegetation survey protocol - carry out wetland vegetation survey	2°	2003 2003, 2008, 2013 ..	NFN/DUC/ MWLAP NFN/DUC & partners	

2.5.3 Upland Habitat Type Diversity

The Buttertubs Marsh upland lacks habitat diversity as this area is primarily reclaimed farmland. Much of the existing upland consists of an old field-scrub community dominated by only a few species of introduced invasive plants, including Scotch broom, hawthorn and/or Himalayan blackberry. Also noticeably lacking is riparian community diversity; most of the shoreline is dominated by reed-canary grass, with clumps of hardhack and common rush, or in a few areas by Himalayan blackberry. Since the 1970s many volunteers have planted a variety of tree and shrub species to increase plant diversity and the Nanaimo Field Naturalists and Environmental Youth Teams have worked on Scotch broom removal and Himalayan blackberry control. The English oak and Lombardy poplar date back to the early 1900s. Some residents have established native and non-native vegetation along portions of the Conservation Area bordering their Bird Sanctuary Road properties. This has been done without approval from TNT or any other management partner.

Therefore, a long term upland habitat diversity enhancement plan needs to be developed and implemented taking into account present plant species diversity and extent, soil type, organic content and depth, moisture content, aspect, etc., and what upland habitat types are desirable and possible within the Conservation Area. The emphasis would be on promoting and, where practical, accelerating succession of appropriate native plant species. This will necessarily be a slow long-term process.

Task	Priority	When	Implement By	Cost
Upland Habitat Diversity				
- develop long term upland vegetation enhancement plan with annual objectives - implement upland vegetation enhancement plan - increase riparian shrub & tree habitat, deciduous & mixed deciduous-evergreen woodland	2°	2004 Annually from 2004	NFN/DUC/ MWLAP NFN & partners	

2.5.4 Upland Plant Species Diversity

The diversity of upland vegetation of Buttertubs Marsh Conservation Area has been severely

affected by 70 -80 years of continuous farming, the spread of introduced invasive species such as Scotch broom and hawthorn from adjacent properties, and the introduction of invasive species with gravel and fill materials.

The lack of upland vegetation diversity was noted in the late 1970s and since then many groups have planted a variety of trees and shrubs in the Conservation Area to improve upland plant diversity - red osier dogwood along the dykes and the individual or small groups of evergreen trees on the east side are evidence of this. In 1995-96, the Nanaimo Field Naturalists started removing some of the Scotch broom, selectively removing some of the blackberry and thinning the hawthorn in some places. Red alder, western red cedar, and Douglas fir were replanted in some of these areas through the efforts Environmental Youth Teams and PRIMUS crews in 1997 and 1998.

In the spring of 1995, some native wildflowers, salvaged from along the Parkway Highway right-of-way, were planted in an open grassy area in the southeast corner (Jingle Pot Road side) to see if they would naturalize there. They survived the first summer and the sea blush survived a second summer, but none were found in subsequent years. Whether they were removed, out-competed by the grasses or unable to survive and become established for some other reason is not known.

In the late 1990s, hawthorn in the southwest corner of the Conservation Area was being selectively removed by beaver. The addition of aspen to this location would provide species diversification in this low, wet area and aspen would be a beneficial food item for beaver.

Once every 3-5 years a plant survey and vegetative cover mapping should be undertaken to document changes in plant diversity and extent. As well, the Conservation Area would benefit from further upland vegetation diversity which would be an integral part of the habitat diversity plan, discussed above.

Annual monitoring of the English oak along the dykes and Lombardy poplar in the northeast corner should be undertaken, to ensure public safety in these areas, due to the risk of falling decayed branches.

Task	Priority	When	Implement By	Cost
Upland Plant Species Diversity				
- as part of plan above, develop protocol for a plant survey and vegetative cover mapping	2 ^o	2003	NFN/DUC/ MWLAP	
- carry out survey and mapping		2004, 2009, 2013	NFN & partners	

2.6 Water Level Maintenance and Control

The dyke structures form two sides of the Conservation Area and are essential for maintaining the existing water level in the marsh. The north dyke and water control structures are authorized under a provincial Water Licence (1976) allowing diversion and storage of up to 150 acre-feet of water per annum within the Millstone River floodplain, and are maintained by Ducks Unlimited

Canada (DUC). Costs for maintaining these structures are typically \$1000/yr, not including any emergency repairs. The dyke on the west side of the Conservation Area contains a City of Nanaimo water main, is built on a right-of-way on the adjacent property, and is maintained by the City.

The north dyke overflow spillway should be paved to reduce erosion of the dyke core and to stabilize the dyke surface. This should be done in conjunction with a DUC engineer, as DUC is responsible for the maintenance of the water control structures and the north dyke. When the crushed gravel is replaced in this location after a major flood event, the overflow area is often filled to the level of the adjacent trail sections thereby forcing the flood waters to flow over the dyke at a low point adjacent to the outlet level control structure, which was not designed or intended as a spillway, resulting in additional erosion.

In 1998, the screw gate water control structure used for initially flooding the marsh was removed from the west end of the north dyke by DUC. Water was continuing to leak through the dyke around the metal culvert, possibly due to muskrat burrowing. DUC personnel were concerned that this leakage would undermine the stability of the dyke, so they removed the structure completely.

There are currently two water level staff gauges in the area, one on the outlet level control structure at the northwest corner of the Conservation Area, graduated in feet and tenths of feet, which indicates the water level in Buttertubs Marsh (indicated as approx. 197.2' in recent years). The second staff gauge is located in the west marsh adjacent to the paved flood overflow spillway in the west dyke, and is graduated in metres and centimetres. Both gauges appear to be set to approximately the same local datum, which according to DUC is unfortunately 2.90 m below the local map/survey datum referenced to sea level, so relating water levels between the two marsh areas and to topographic information on local maps can be a confusing and sometimes frustrating exercise. Re-surveying both staff gauges, re-setting them to the standard map/survey datum for the area from a permanent local benchmark and using standard metric scales on both would be a significant and welcome improvement. After metric conversion and correction (-2.9 m), the actual current full standing level in the Conservation Area seems to be approx. 57.2 m above sea level.

Water input to Buttertubs Marsh occurs primarily during winter storm events when the Millstone River floods over the west dyke. Supplementary sources of water input include runoff inflow from a small catchment area to the north, northeast and east, much of which is developed residential area; runoff and ground water seepage from the south via ditches paralleling the Parkway Trail connector; and, seepage pumped throughout the year from a City of Nanaimo water main control valve vault under Jingle Pot Road. These supplementary sources are the only input to the marsh during summer months. Therefore, it is essential that this continuous low flow be maintained.

During the development of the Parkway Trail along former Addison Road a culvert, which diverted runoff and ground water seepage under the road and into the Conservation Area was removed rather than maintained or replaced as originally planned. This flow is now directed away from the Conservation Area into the marsh to the west of the City dyke. In the near future, this culvert needs to be replaced to return this important summer ground water flow to the Conservation Area.

Beavers generally attempt to build a dam in front of the marsh outlet debris grating in the spring to maintain a preferred water level as the marsh level begins seasonal decline, but are ineffective in doing so because of the design of the outlet structure and very restricted inflow volume, though the dam material may raise the water level by a few centimetres temporarily until loss from evaporation, plant transpiration and seepage exceeds input. Each year this dam material is removed by DUC in the late fall, prior to arrival of the rainy season, and this process should be continued.

Ultimately, water level manipulation or other disturbance may be considered desirable or necessary for maintenance or improvement of waterfowl habitat. For the moment at least, the present full standing water level as set by stop logs in the water level control structure should be maintained, since this level determines the starting point for seasonal summer drawdown. The marsh shoreline and shallow emergent vegetation has adapted to this level and is sensitive to even fairly small changes in seasonal water level regime, particularly during the spring and summer growing season. While water level manipulation (artificial drawdown) can be used to alter depth as well as shoreline and shallow water vegetation species composition in the marsh, this should not be attempted in this instance without careful planning, monitoring and additional information, because of the presence of both reed canary grass and purple loosestrife within the Conservation Area, the west marsh and further upstream, and the presumed presence of seed banks of both highly invasive species in the marsh sediments. The recent stable water level regime has resulted in dense stands of cattail-yellow iris around much of the shoreline of the marsh, which are preventing significant germination of seeds of these invasive species. Any disturbance or removal of this vegetation or excessive drawdown to expose bottom mud during the growing season must be carefully evaluated and planned, and could easily trigger germination of the dormant seed bank. A large scale effect could result in a major habitat shift and further loss of native plant species diversity which would be extremely difficult or impossible to control or reverse. This is a key management priority for this system.

At some point it will be necessary to determine the extent of the purple loosestrife seed bank (the reed canary grass seed bank can be assumed to be extensive from the present abundance of this species) before a major drawdown or other form of disturbance within the marsh is anticipated, so that appropriate precautions can be developed and implemented. An additional complication with this system is the very low summer inflow due to low rainfall and minimal groundwater seepage input, so that once the water level has been lowered it cannot easily be restored until heavy fall rains arrive.

Task	Priority	When	Implement By	Cost
Maintain north dyke				
Annual maintenance	1°	Annually - summer/fall	DUC	\$1000/yr
Pave overflow spillway to reduce erosion of core and stabilize surface	2°	2004	City	
Remove beaver dam material from in front of marsh outlet debris grating	1°	Annually - late summer	DUC	
Maintain west dyke				

Task	Priority	When	Implement By	Cost
Annual maintenance	1°	Annually - as required	City	
Maintain staff gauges				
Resurvey both staff gauges, re-set them to standard map/survey datum for the area and use standard metric scales for both	1°	Ongoing	DUC	
Maintain summer water input				
Review development plans for surrounding area to ensure supplementary water sources maintained - runoff from N, NE and E - runoff & ground water seepage from S via ditches paralleling Parkway trail connector - seepage pumped throughout year from City water main control valve vault adjacent to miner's cabin	1°	Annually & as required	Committee	
Maintain full standing water level				
Maintain at current level until thorough marsh resource & vegetation surveys undertaken & data analysed	1°	Annually	DUC/City	

2.7 Wildlife Enhancement and Control

2.7.1 Nest Boxes

Due to the general absence of a supply of large old trees suitable for excavation of nesting cavities, nest boxes for cavity nesting waterfowl (such as wood ducks and hooded mergansers) and songbirds are desirable to increase avian reproduction potential within the Conservation Area.

Bird nesting boxes have been set up in the Conservation Area on numerous occasions but have not been maintained on a regular basis. New wood duck nesting boxes were built and placed in the English oak along both dykes in 1998. However, due to continued vandalism and removal of the boxes, few currently remain.

According to DUC (Fry, 1984), the Buttertubs Marsh area could hold up to 30 wood duck nesting boxes and a considerable number of other nest boxes suitable for swallows, chickadees, woodpeckers, owls, etc. Purple martin boxes were set out on pipes in the marsh in the spring of 1999 after seeing one exploring the marsh area in the fall of 1997. One was used successfully by tree swallows in 1999, and several purple martins were seen at the marsh in late summer.

A nest box program should be developed and implemented in the early spring on an annual basis. The program should include an educational component on why the nest boxes are needed, followed by construction and installation. People could also be encouraged to take a box or two home to see what birds live in their neighbourhood. The Nanaimo Field Naturalists should be responsible for setting up the program each year, monitoring nest box use, and maintaining the

boxes. The colour and location of the boxes are critical issues that need to be addressed to reduce vandalism and minimize the heavy racoon predation.

Other suggestions for increasing bird diversity at the marsh include:

- installation of perching poles for raptors which the dead oak trees along the west dyke may now provide; (one installed in 2004)
- installation of an osprey nest pole; and,
- install Cliff and Barn Swallow, and Purple Martin nesting structures.

Task	Priority	When	Implement By	Cost
Increase bird biodiversity				
Nest box program - develop nest box educational program - conduct educational program - monitor & maintain nest boxes	1°	2003 Annually - early spring Annually - early spring	NFN, MWLAP NFN & MWLAP NFN & MWLAP	
Perching poles for raptors - install poles - check for vandalism - check condition	2°	2004 Annually every 5 years	MWLAP & NFN; NFN; contractor	\$ and/or materials from BC Hydro?
Osprey nest pole - installed pole in 2004 - check for vandalism - check condition	2°	2004 Annually every 5 years	MWLAP & NFN; NFN; contractor	as above

2.7.2 Duck Feeding

Mallards, Canada geese, other waterfowl and some upland birds are present at the marsh year round. People enjoy feeding the birds and are sometimes unaware of the birds' food requirements. The duck feeding information sign at the north side of the marsh encourages feeding of grains rather than bread and needs to be maintained and replaced periodically, as required.

In 1991 the possibility of providing a heavy duty vending machine for dispensing feed for waterfowl was reviewed. The idea was to charge enough money for the feed to recover the costs of the feed and keeping the feeder full and in good repair. No subsequent information on this topic was found. The use of such a vending machine is not recommended for the Conservation Area. The logistics and costs of maintaining the vending machine would be substantial considering the level of vandalism experienced at the Conservation Area from time to time.

Task	Priority	When	Implement By	Cost
Maintain Signage				
Check condition and replace as required: - duck feeding signs - nesting areas signs	1° 1°	Annually Annually	City MWLAP	

2.7.3 Juvenile Waterfowl Production and Predation

A number of Nanaimo Field Naturalist club members, local residents and others who regularly frequent the Conservation Area have suggested that production and survival of mallard ducklings and Canada goose goslings have declined considerably in recent years. While there has been no study or other documentation to confirm these observations, they may well be correct. A Canada goose egg addling program conducted in recent years will certainly have effected gosling production (see Section 2.7.4).

Many mallards nest outside the marsh where shrub cover is denser and nest predation may be lower, then bring their young to the marsh when they are ready to leave the nest. It is likely that survival of ducklings was fairly high initially, when the marsh was newly created and predator densities were low, and that higher predator densities in recent years as predator populations adapted to this additional food supply have resulted in much lower duckling survival and rearing success. A wide range of predators (including some that thrive in adjacent urban areas) prey on duckling and other young birds at the marsh (e.g. mink, raccoon, domestic cat, bald eagle, various hawks, owls, great blue herons and American bull frog) and broods can be seen to shrink on a daily basis, often to a single duckling or none.

A 5-year juvenile waterfowl survey should be developed to monitor production and document the affects of predation, where possible.

Task	Priority	When	Implement By	Cost
Juvenile Waterfowl Production				
Develop a study to evaluate annual production over a 5-year period; carry out study	1°	2003 2003 – 2008	NFN & MWLAP NFN/contract	

2.7.4 Canada Goose Control

Due to the exponential increase in the resident Canada goose population since the late 1970s in the Nanaimo area (as a result of earlier import and release of flightless young, which do not migrate), a Canada goose egg addling program was initiated in 1994 by both the Ministry and the City of Nanaimo on a city wide basis under the direction of the Canadian Wildlife Service.

Canada goose eggs were addled in the Buttertubs Marsh Conservation Area as part of the program until 1996 when the public realized that this activity was being undertaken in the 'bird

sanctuary' and articles were printed in the local newspaper. After several meetings the Ministry and City agreed to allow some Canada goose eggs to hatch within the Conservation Area on an annual basis.

As long as the above egg addling program is continued, some Canada goose eggs should be allowed to hatch within the Conservation Area on an annual basis.

2.7.5 Beaver Control

From time to time the number of beaver in the Buttertubs Marsh complex and adjacent Millstone River are controlled by trapping under permit issued by the Ministry of Water, Lands and Air Protection. In the past, trapping and removing beaver has been in response to complaints arising from private properties being flooded during winter storm events where beaver dams occur. The management of beaver and their structures is currently under review in the City of Nanaimo area and other techniques of water control may be implemented in the future. In the future, removal of beaver should be the 'last resort' control measure utilized where beaver are considered a problem.

A family of beaver, now resident in the Conservation Area, remove a wide variety of trees and shrubs for their use within the marsh. When the vegetation diversity plans are being developed, native trees and shrubs as well as aquatic plants that beaver use for food and construction need to be included. One long term possibility is to establish a stand of aspen, a fast-growing colonial species propagating from underground runners that is preferred by beavers but recovers vigorously from cutting. One suitable location would be the southwest corner of the Conservation Area where hawthorn are being removed by beaver. The young aspen stand would be securely fenced initially to exclude beaver until the trees were fully established.

Trees within the Conservation Area that are to be protected from beaver are wrapped at the base with 3-4' high collars of galvanized stucco wire. These trees are checked on an annual basis. The wire mesh is changed when the tree trunk grows to almost fill the collar or when the beaver start chewing above the top of the collar, as has happened on several occasions. Some trees should always be left for the beaver to cut.

When the major marsh modifications are being planned, a number of issues should be taken into account. The exact location of the beaver lodge and loafing areas need to be recorded so that they can be retained. As the beaver at Buttertubs Marsh use cattail roots and stems for food, the location and amount of cattail removed should be considered carefully. Timing for lowering the marsh water level should be considered carefully to minimize impacts on breeding birds and young beaver of the year as well as to minimize the duration of the low marsh water level. Reducing the water level required for these modifications may be more complicated than in 1984 now that the screw gate structure has been taken out of the north dyke and the removal of stop logs will trigger intensive beaver damming activity.

Task	Priority	When	Implement By	Cost
Wildlife Control				
Canada goose egg addling program	2°	Annually	City, MWLAP, NFN	

Task	Priority	When	Implement By	Cost
Check & replace, as required, stucco wire wrapped around trees to protect from beaver	2°	As needed	NFN	

2.8 Exotic/Invasive Species Control

Within the Conservation Area the majority of exotic, invasive species are plants, such as yellow iris and purple loosestrife in the marsh and Scotch broom, Himalayan blackberry, common or English hawthorn, tansy ragwort and weedy species brought in with fill material in the upland areas. To date the only recorded exotic, invasive animals in the Conservation Area are pumpkinseed sunfish, bullfrogs and the occasional Eastern cottontail. The painted turtle is thought to be introduced on Vancouver Island, but is Blue-listed elsewhere in BC and not considered a threat to biodiversity.

As part of an integrated marsh monitoring program and the 2003 habitat mapping project, a survey of exotic, invasive species needs to be undertaken to track their abundance and distribution over time and their effect on other species within the Conservation Area. Control measures for each exotic, invasive species should be developed, where applicable, and carried out as required.

2.8.1 Yellow Iris

Wilson (1976) indicates that the distribution of yellow iris within Buttertubs Marsh is not extensive. Godwin *et al* (1982) mention yellow iris as being present but there is no indication that it may have spread from previously identified areas. By the early 1990s yellow iris had spread throughout the cattail and parts of the reed canary grass areas (K. Baillie, pers. comm.) and may now be out-competing the cattail in some areas of the marsh. Yellow iris is also prominent on hummocks in the west marsh.

An extensive yellow iris seed bank now exists within the Conservation Area and the west marsh. During the winter when water levels are high in the Conservation Area and west marsh, windrows of yellow iris seed are often seen along both sides of the west dyke. In some years considerable amounts of iris seed accumulate in the northwest corner of the Conservation Area.

As yellow iris is well established within Buttertubs Marsh and the west marsh the only effective control method within the Conservation Area may be mechanical removal. The distribution and density of yellow iris should be monitored and recorded as part of the wetland vegetation survey.

Task	Priority	When	Implement By	Cost
Yellow iris				
Map current distribution and density	1°	2003	City/NFN/MWLAP	

Task	Priority	When	Implement By	Cost
Monitor expansion and interspersions with cattail, as described under 'Marsh Habitat Diversity'	2°	2003, 2008, 2013 ...	NFN/DUC/ MWLAP	
Mechanically remove if indicated by study	2°	after 2013 study	DUC & partners	

2.8.2 Purple Loosestrife

Purple loosestrife was first identified in the Conservation Area and immediately adjacent to the dyke spillway in the west marsh in 1994. Until the chain link fence and 'No Trespassing' signs were posted in the west marsh, members of the Nanaimo Field Naturalists annually removed the loosestrife flower stems and seed heads at both sites to prevent further seed production. Since then the above annual removal has been continued only in the Conservation Area by the Field Naturalists and other interested parties.

Although seed production within the Conservation Area and west marsh has been poor. Purple loosestrife may spread within the Conservation Area from uncontrolled seed production in the west marsh and further upstream within the Millstone River watershed. A considerable seed supply is also available from the Diver Lake area, despite ongoing control efforts by the Nanaimo Field Naturalists. New seed may be introduced to the Conservation Area with every influx of flood waters from the Millstone River and adjacent west marsh.

The best long term control method is likely initiation of a bio-control program (including both the Conservation Area and west marsh), with the introduction of one or more insect species used for this purpose, as is being conducted by the Nanaimo Field Naturalists at Diver Lake.

Task	Priority	When	Implement By	Cost
Purple loosestrife				
Map location of loosestrife plants	1°	Annually	NFN/MWLAP	
Remove & BURN flower heads only; leave stem and leaves on site	1°	Annually – Aug – Sept	NFN/MWLAP	
Monitor for signs of beetle damage on leaves of plants	1°	Annually – May, Jul, Sept	NFN/MWLAP	

2.8.3 Common/English Hawthorn

Common hawthorn, introduced along Jingle Pot Road in the early 1900s, has spread throughout much of the surrounding undeveloped area, including the upland around Buttertubs Marsh. Hawthorn was also planted as a hedge along sections of the eastern boundary of the Conservation Area in the 1970s and 1980s. Hawthorn seeds are spread widely by some birds and germinate readily in old grassy fields.

The dense stands of hawthorn within the Conservation Area should be thinned and inter-planted, in some areas, with native tree species. Increasing the diversity of trees bearing seeds and berries suitable for birds to feed on would also be beneficial.

Task	Priority	When	Implement By	Cost
Common hawthorn				
Thin and inter-plant with native seed & berry-bearing tree species	2°	Annually from 2004	NFN & partners	

2.8.4 Scotch Broom

The highly invasive Scotch broom plant has been present throughout much of the Buttertubs Marsh upland area since 1976 and should be removed and replaced with native trees and shrubs suitable to each specific site. Nanaimo Field Naturalists, Environmental Youth Teams and other interested parties have been cutting, and in some instances pulling, broom for removal from the Conservation Area since 1995. The north and west dykes and discrete areas along the east trails are the areas of highest priority at this time.

As the upland area is not environmentally sensitive (as is Garry oak/wildflower meadow), the use of other methods or a combination of methods for broom removal (such as cutting, mulching, burning, tilling, etc.) over a number of years to exhaust the accumulated seed bank may be applicable in some locations. Removal of Scotch broom from areas that are not environmentally sensitive has not been studied extensively. A single method and combinations of methods for broom removal should be studied in experimental plots along the east side of the marsh to find out which methods would be most appropriate to use in the Conservation Area.

Once broom has been removed and before native vegetation is planted, large quantities of humus material should be added as mulch to enrich the gravelly-sandy soil and to keep the soil cool to prevent broom seed germination. The types and sizes of native trees and shrubs to be planted would be identified in the long term upland habitat diversity enhancement plan discussed in Section 2.5.3. However, the most appropriate prescription to start with after broom removal may be seeding with red alder in the fall and/or planting 2'-3' young red alder in some locations during the winter, both of which are available locally.

Task	Priority	When	Implement By	Cost
Scotch broom				
Remove from north and west dykes	1°	Annually - spring/fall	NFN & partners	
Remove from along east trail as labour force permits	1°	Annually - spring/fall	NFN & partners	

In east and south areas, remove broom in sections and replace with native trees and shrubs suitable for specific sites; add large quantities of humus material before planting to enrich soil; plant red alder where suitable	2°	Annually from 2003	NFN & partners	
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2.8.5 Himalayan Blackberry

Himalayan blackberry may be a suitable barrier plant in some locations, but it should be controlled by pruning and be shaded out with native trees in other places within the Conservation Area. Blackberry forms a tightly closed canopy which allows very little light penetration, preventing competing species (including even such invasive species as broom and hawthorn) from developing in the under storey, with the result that further plant succession is almost completely prevented. Once a closed canopy is formed, the blackberry cover is replaced only very slowly by shading from tall shrubs and trees at the perimeter of the patch, particularly from the south side, since it is not shade tolerant. The establishment of shade trees (especially big leaf maple) to eliminate blackberry in specific areas would be part of the long term upland habitat diversity enhancement plan discussed in Section 2.5.3.

Task	Priority	When	Implement By	Cost
Himalayan blackberry				
Lightly prune canes where suitable barrier plant	1°	Annually - late summer	City	
Shade out with native trees such as big leaf maple or aspen	2°	Bi-annually from 2003	NFN & partners	

2.8.6 Tansy Ragwort

Tansy ragwort, a provincially designated noxious species, is poisonous to cattle and is easily spread to adjacent agricultural land. This plant is currently removed from the Conservation Area during the summer on an annual basis by the Nanaimo Field Naturalists. A bio-control agent (Cinnabar moth) has been introduced locally, but is only partially effective. Tansy ragwort plants should be pulled or dug out on an annual basis before they go to seed.

Task	Priority	When	Implement By	Cost
Tansy ragwort				
Pull or dig out before plants go to seed; leave plants on-site; REMOVE ANY SEED HEADS & BURN	1°	Annually - spring/fall	NFN & partners	

2.8.7 Reed-canary Grass

Reed-canary grass, possibly indigenous in some areas but considered a highly invasive Eurasian agricultural import locally, is used as a low-quality forage crop grown on soils too wet to support a higher quality crop during part or all of the growing season, and has been widely spread by agricultural use as a result. It may have been sown initially during the farming period or may have invaded from adjacent wet agricultural areas or wetlands, but was well established in the Conservation Area before modifications to the marsh were made in 1984.

Reed-canary grass produces abundant seed capable of germinating immediately and is extremely invasive in wetland margin habitats, quickly dominating suitable sites with a tall (1-2 m) dense grass cover that strongly inhibits establishment of other species, thus delaying or preventing succession and limiting species biodiversity. It is also extremely difficult to control without the use of herbicides (Kilbride and Paveglio, 1999), which is prohibited in and around wetlands in BC. However, this grass might be gradually displaced at least in some areas if desirable riparian trees and shrubs can be established, protected and maintained in sufficient numbers (despite beaver activity) to provide a shade cover.

Task	Priority	When	Implement By	Cost
Reed canary grass				
Plant appropriate native trees along edge of marsh to shade out reed canary grass	2°	Bi-annually from 2003	NFN & partners	

2.8.8 Other Invasive Plant Species

Other invasive plant species brought in with fill material are especially prevalent along the north dyke and most recently along the fence at the Buttertubs Drive entrance. These species should be removed on an annual basis until the existing seed bank is exhausted.

Task	Priority	When	Implement By	Cost
Other invasive plant species				
Remove weedy plants especially along north dyke and Buttertubs Drive entrance until seed bank exhausted	1°	Annually - spring/fall	NFN & partners	

2.8.9 Eastern Cottontail

Eastern cottontail were first seen in Buttertubs Marsh area in 1984 (Merilees *et al*, 1992) and are common in the agricultural and undeveloped lands around the Conservation Area. However, cottontail are only occasionally seen at Buttertubs Marsh. While they did not appear to be a management concern in the Conservation Area up to and including 1999, their population

numbers and any apparent impacts should be monitored in the resource inventory and monitoring program discussed in Section 2.3.

Task	Priority	When	Implement By	Cost
Eastern cottontail				
Protect individual plants with anchored wire collars; protect larger areas with anchored rabbit exclusion fencing	2°	Annually - as required	NFN & partners	
Monitor population numbers and impacts	2°	Bi-annually from 2002	NFN & partners	

2.8.10 Pumpkinseed Sunfish

Pumpkinseed sunfish was introduced or arrived from upstream in flood waters shortly after the creation of the Conservation Area. They are a serious predator on native fauna, especially amphibian larvae, capable of seriously depressing or eliminating native prey populations. As there fish are well established in Buttertubs Marsh and upstream wetlands and lakes, their removal is likely impractical.

2.8.11 Bullfrogs

In 1999, bullfrogs appeared to spread rapidly throughout many of the Nanaimo wetland areas and are a recent invader at Buttertubs Marsh; the first bullfrog was heard at Buttertubs Marsh in 1997 but was not found. These frogs prey on a wide variety of species from tadpoles to young birds and should be removed from the area on a continuing basis. In 1999 and again in 2002, the Ministry of Water, Land and Air Protection tested a variety of bullfrog removal strategies and the results should be reviewed for appropriate methods to use within the Conservation Area.

Task	Priority	When	Implement By	Cost
Bullfrogs				
Remove egg masses	1°	Annually - early spring	MWLAP & partners	
Remove adults	2°	On continuing basis	MWLAP & partners	
Conduct impact assessment		Annually - spring – fall		
Develop educational brochure and signage re: bullfrog invasion		2003	MWLAP & partners	

2.9 Domestic Dog and Cat Control

The control of domestic dogs and cats within the Conservation Area has been a concern since an Advisory Committee was established in 1976 and no reliable control method has been found over the years. Signage requesting people walking their dogs to have them on a leash has

typically not been adhered to or enforced. The logistics of controlling unleashed pets or those at large (unaccompanied by their owner) is likely more complicated and time consuming than volunteers and government agencies are willing to take on at this time.

The exclusion of cats from the Conservation Area would require a perimeter fence that they could not climb, jump over or dig under, that had no overhanging tree branches that the cats could jump to and from, and had gates that were closed except when used by people. Currently fencing the entire perimeter of the Conservation Area is not economically feasible but phased fencing is being considered. A public education program regarding this issue will precede a possible live trapping and removal program.

An education program should be developed to inform the general public about the negative impact dogs and cats can have on wildlife, especially birds, in the Conservation Area.

In keeping with the management goals of the Conservation Area, at the steering committee meeting of February 14th, 2002, it was decided by all to designate the Conservation Area a “Pet Free” area. This will be in place March 1, 2003.

Task	Priority	When	Implement By	Cost
Control of domestic dogs & cats				
Enforce “No Pet & Nuisance Animal Policy”	1 ^o	Annually - regular basis	City/MWLAP	
Develop education program about negative aspects that dogs and cats can have on wildlife, especially birds;	1 ^o	2002	Committee	
Implement education program	1 ^o	Annually from 2003	NFN & partners	

2.10 Trail and Facility Maintenance

2.10.1 Safety Issues

Tree hazards, emergency clean-up and preventative hazard maintenance should be reviewed on an annual basis and major work done in 3-5 year intervals. The viewing towers, benches and wooden access gates should be inspected annually and repairs should be attended to promptly. Estimated costs are \$500-1000/year and will vary widely depending on repairs required.

In 1982, High Tree Services was consulted regarding the structural soundness of the dead oaks along the west dyke (Godwin *et al*, 1982). High Tree Services reported that the dead trees were sound at the time and would likely remain standing for another 5 years, after which time they would start to fall. Godwin *et al* (1982) recommended that the dead oaks be left standing and be checked frequently for soundness. There is no indication in the information reviewed that the oaks have been checked since that time.

When the oaks do become a hazard, they should be trimmed to leave a wildlife snag (where possible) or felled towards the marsh, and or left for wildlife use and to decay naturally. Similar

recommendations are made for the Lombardy poplar along the east side of the marsh.

Since 1982, some of the dead oaks and parts of the poplar have decayed and fallen over. Whenever they fell on pathways, the woody debris was moved to the side and/or pushed into the marsh by City workers or local residents.

Task	Priority	When	Implement By	Cost
Safety Issues				
Tree hazards	1°	Every five years, starting in 2003	City or contractor	
- check for structural soundness of dead oaks on west dyke	1°	Every five years, starting in 2003	City or contractor	
- check for structural soundness of dead Lombardy poplar on east side of marsh	1°	Annually - as required	City or contractor	
- trim hazard trees to leave as wildlife snag or fell away from trails and leave to decay on site	1°	Annually - as required	City	
- leave debris from dead or dying trees on site				
Viewing towers, benches, wooden access gates	1°	Every 5 years, starting in 2003	City	
- check for structural soundness	1°	Annually - as required	City	
- repair minor damage promptly				
Emergency repair and/or clean-up	1°	As required	City, DUC	
- do promptly and notify Committee within 24 hrs by phone or e-mail				
Preventative hazard maintenance	1°	Annually - as required	Committee	
- review any potential hazard situations	1°	As required	City, DUC	
- do minor maintenance promptly	1°	As required	Committee	
- add major works to plan and undertake according to schedule			City, DUC	

2.10.2 Annual Trail Maintenance, Brushing and Minor Surfacing

Trails in the Conservation Area need to be maintained on a regular basis (seasonally and/or annually) to remove unwanted growth, especially blackberry vines, hawthorn and other vegetation that spreads in from the sides, and to repair minor surface erosion, maintain drainage culverts, and fill in puddles that occur along the trails.

This maintenance was neglected in the past by the Ministry due to a lack of funds and was done on an ad hoc basis by various volunteer groups and local residents. In 1995, the City of Nanaimo Department of Parks, Recreation and Culture formally agreed to take on this responsibility. Estimated costs are approximately \$5,000/year.

Task	Priority	When	Implement By	Cost
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Task	Priority	When	Implement By	Cost
Minor trail maintenance, brushing & surfacing				
Maintain trails - cut back tall grass & lightly prune blackberry vines - repair minor surface erosion	1°	Annually	City & partners	\$5,000/yr
- maintain drainage culverts on east & south trails (culvert under south trail regularly covered by slumping gravel from trail) - fill in puddles on north and west dykes	1°	Annually - fall	City	

2.10.3 Major Trail Surfacing, Repair and Brushing

Major trail maintenance should be done at 3-5 year intervals. The City of Nanaimo Department of Parks, Recreation and Culture has formally agreed to take on this responsibility. Estimated costs are approx. \$20,000 for a crew of 5 plus supervisor, truck, machine work, and materials. If volunteer labour (e.g. Nanaimo Corrections Centre or youth program) and donated materials are used, the costs could be reduced substantially.

Trail Surfacing

Pervious material should be used on the trail surfaces within the Conservation Area. Bark mulch has been used on the east and south trail surfaces while the north and west trails and dykes have crushed gravel surfaces. The trails need major resurfacing every 3-5 years.

Much of the bark mulch placed on trails east of the marsh in 1995 has since decomposed and should be replaced as soon as possible.

Trail Repair

Trail maintenance was done on an ad hoc basis in the past using youth crews, Nanaimo Corrections Center crews and volunteers. In 1995, an Environmental Youth Team, sponsored by the City and the Province, did major trail maintenance around the Conservation Area including brushing, widening and resurfacing the east side trails with wood chips, and ditching and installing culverts to reduce the extent of muddy trails in the winter time.

There are several sections along the east side trail that need to be re-designed for better management of runoff, ground water seepage and inundation during winter flooding events. During the winter of 1998, these sections of the trail became muddier and wider as pedestrians continued to use the loop trail during the winter months. Some aspects to review include:

- increase the height of the trail surface using gravel and/or crushed rock;
- extend ditching on upland side of trail; and
- add more culverts to drain water under the trail into the marsh.

The middle section of the south trail adjacent to Jingle Pot Road also needs to be re-designed.

With increased use of the loop trail, this section of trail needs to be widened and resurfaced. This section crosses the end of the marsh and will require a firm edge (e.g. cement/sand bags) along both sides of the trail to reduce slumping of the banks. An edged structure of this kind was used along the newest section of the east trail. The culvert in this section also needs to be cleared of gravel which has slumped from the trail.

The two duck feeding areas on the north end of the marsh need to be re-designed to minimize bank erosion and to allow both people and waterfowl easy access to the water and upland area. Wilson (1976) indicated that "the rocks dumped in front of the senior citizens housing could be used in construction of a stable bank and lower path around the open water. This would be a great asset to the area already much frequented by senior citizens with their bread crumbs." Duck and people traffic is continuing to erode the bank, causing slumping of the crushed gravel, which leaves potentially dangerous holes between the boards and the next level of bank. It would appear that the fill material that was originally dumped here in the 1970s was not regraded and the current duck feeding area developed over time by common usage and erosion, not by design.

Trail Brushing

While the vegetation along the trails has been trimmed back on an annual basis since 1995, a major trimming and edging needs to be done every 3-5 years to keep the vegetation from completely overtaking the trails. The grass along the trail edge is trimmed at ground level and in some cases removed and replaced with fine bark mulch. The brush along the trails is cut back in a series of steps to retain the greenway and give the feel of more open space.

Task	Priority	When	Implement By	Cost
Major trail surfacing, repair and brushing				
Trail surfacing - add bark mulch to east and south trails - add crushed gravel to north and west trails	1° 1°	Ongoing	City & partners City & partners	
Trail repair - upgrade east trail - widen and resurface with wood chips; clean out ditches and culverts; brush out grass and shrubbery overgrowing trail - re-design sections where runoff, groundwater seepage and/or inundation by winter flood waters are a problem	1° 1°	Every 3 years 2004	City & partners City, DUC & partners	
- middle section of south trail - re-design both sides of trail to be firm edged (e.g. cement/sand bags as on east trail) to widen trail and eliminate slumping sides - extend culvert to accommodate added trail width	1°	2004	City & partners	

Task	Priority	When	Implement By	Cost
- north end duck feeding areas - re-design area to minimize bank erosion and allow both people and ducks easy access to water and upland area	1°	2003	City & partners	
Trail brushing, esp. along east & south trails - trim grass; remove grass encroaching into trail; add bark mulch - cut brush back in series of steps to retain greenway and provide sense of open space	1°	Every 3 years	City & partners	

2.10.4 Information Signs, Boundary and Access Management

The maintenance of signs, barricades and fences has been done on an ad hoc basis in the past, shared equally by the City and the Ministry. Costs have run at \$1000+ /year for materials.

Signage

Standardized signs, indicating wildlife area, bird nesting area, trail markers and interpretive/education information, are needed around the Conservation Area. All these signs need to be maintained on an annual basis and, depending on the amount and type of vandalism, replaced on an as required basis. All signs should be covered with clear acrylic or lexan to preserve the original information, make removal by vandals difficult and make maintenance/repair as easy as possible.

The Ministry wildlife area signs should be posted at each access point to the Conservation Area and bird nesting areas signs should be placed on posts within the marsh as important reminders of why Buttertubs Marsh has been preserved.

Because trails are used more and more by joggers and walking groups, measured distances around the marsh are marked with odometric signs provided by the City. This is a widely used tool for encouraging the use of recreational areas and it provides continuity with a section of City trail between Bowen and Westwood Lake Parks. Symbols for 'no pets', 'no motorcycles', etc. have also been added to these signs. In 1999, updated odometric signs, replacing some that had been defaced or removed by vandals, were covered in clear acrylic.

A newly designed 'Buttertubs Marsh Conservation Area' sign, was installed at the Jingle Pot Road entrance to the marsh and at the north entrance adjacent to the north dyke outlet structure in 1999. Similar signage is required to the east of the Buttertubs Drive entrance and similar but smaller signage at all access points off Bird Sanctuary Drive.

A Buttertubs Marsh interpretive sign, designed by NFN members, was installed in 1997 on the information kiosk at the Buttertubs Drive entrance. This sign was covered with clear lexan to minimize vandalism to the underlying print. The kiosk was also re-roofed and painted at this time. In 2003, the City has installed several park benches along current viewpoints to the marsh.

Boundary and Access Management

Buttertubs Marsh Conservation Area is bounded by two dykes, two City roads and numerous private properties. The dykes and roads provide obvious physical boundaries, whereas the private property boundaries are less clear, especially for unfenced properties.

The west dyke which protects a City water main was built on a right-of-way across the undeveloped, privately-owned property to the west of the Conservation Area. Around 1997, the landowner had a chain link fence with gates installed across the part of the dyke on his property. In the event that the gates are ever locked and public access is denied, the loop trail around the marsh will be obstructed until a new trail can be constructed on the east side of the dyke. The west dyke is maintained by the City.

The north dyke is part of the Conservation Area and is maintained by Ducks Unlimited Canada through their water structure management agreement with the Ministry.

In 1997, a new high chain link fence, replacing a deteriorating stucco wire fence, was installed along the north end of the Conservation Area. This fence serves two purposes:

- keeps ducks and geese off the lawn and out of the gardens of the senior citizens housing complex; and
- provides a physical barrier along the vehicle parking area at the end of Buttertubs Drive.
- This fence should withstand the elements for approximately 20 years (replacement cost is estimated at \$4000+). Any minor damage should be repaired as soon as possible.

The property adjacent to the southern boundary of the marsh was formerly part of Jingle Pot Road, prior to construction of the Third Street connector and realignment of this section of roadway, and has been developed as a parking area for the miner's cottage heritage display. A small portable toilet accompanies this development. Existing trees and brush as well as wetted area of the marsh discourage public access along this boundary.

The demarcation of the eastern boundary of the Conservation Area is less clear. Although the installation of a chain link fence to eliminate encroachment from adjacent private properties was discussed in the mid 1990s, it was not adopted for several reasons. Dense hawthorn blocks access along the centre section and the remainder has varying degrees of urban encroachment and debris. Now that the management plan is developed and the committee now shares responsibilities, this portion of the Conservation Area should be fenced (refer also to Section 2.2.3.).

Pedestrian pass-thrus were built in 1989 at each access point (six) along the east and west sides of the marsh to restrict access by horses and motorcycles and to protect the trails and dykes from possible damage from these sources. These structures need to be maintained annually and repaired as required.

To allow public access from Bird Sanctuary Drive to Buttertubs Drive for non-conforming uses of the Buttertubs Marsh Conservation Area (bicycles, pets, etc.); the direct gravel path along the City service corridor be exempted from the regulations and that the two entrances to the trail circuit be appropriately gated and signed. This will allow the public to transit the area.

Task	Priority	When	Implement By	Cost
Signs, boundary & access management				
Signage - standardize signs - cover existing signs along trails in clear acrylic	1° 1°	2003 2003	Committee City & MWLAP	
- maintain wildlife area signs at each access point & replace as required - maintain bird nesting area signs within the marsh & replace as required - post new Conservation Area signs at main entrances - maintain Conservation Area signs at main entrances	2° 2° 1° 2°	Annually Annually 2003 & 2011 Annually	MWLAP or contractor MWLAP or contractor City & MWLAP City & MWLAP	
- maintain odometric signs around marsh & replace as needed - post and maintain City Bylaw signs at each access point	2° 2°	Annually Annually	City City	
- maintain interpretive kiosk signs - replace interpretive kiosk signs - sign at north end - adjacent to miner's cottage	2° 1° 1°	Annually As required As required	City, MWLAP & partners City, MWLAP & partners	\$6000 \$6000
Boundary and access management - develop access plan in event west dyke access closed by private landowner - repair minor damage to 4' chain link fence along northern boundary - review condition of 4' chain link fence along northern boundary for possible replacement	3° 2° 3°	2004 Annually - as required 2020 or as required	Committee City & partners City & partners	est. \$4000
- install chain link fence along east boundary where necessary to reduce urban encroachment - upgrade pedestrian pass-thrus	1° 2°	2004 2005	Committee City	

2.10.5 Maintenance of Viewing Towers and Benches

Two viewing platforms in the Conservation Area are used by the public to observe wildlife activities in the marsh. A tall tower was built on the west dyke in 1984 and a viewing platform was installed on the east side of the marsh in 1995. These structures need to be assessed for soundness every 3-5 years and any minor damage repaired as soon as possible. The tower on the west dyke requires periodic painting, whereas the east side platform was left as unstained wood.

The City of Nanaimo has received requests from the public, generally the elderly, for the installation of more benches along the marsh trails. There are currently two adjacent to the duck feeding area (north end), one adjacent to the kiosk, three on the west dyke and two along the east trails. Several of these are in commemoration of people who used to visit the marsh on a regular

basis and have since passed away. There is ample room for more benches to be installed around the marsh as they become available. The benches should be checked for soundness every 3-5 years and for minor repair every 2-3 months.

In 1997, the City of Nanaimo Department of Parks, Recreation, and Culture formally agreed to take on the maintenance responsibility of these structures.

2.10.6 Garbage Control

Garbage control, including dog feces, in the Conservation Area has been a concern since the Advisory Committee was formed in 1976. Two garbage containers are currently on the property, one is maintained by the City and the other by George Pearkes.

Some of the public who frequent the area on a regular basis have started to complain to the City about this problem. This problem should be discussed further with the City of Nanaimo and MWLAP and a satisfactory solution implemented as soon as possible.

Task	Priority	When	Implement By	Cost
Garbage control				
- Install/maintain garbage cans at main entrances to marsh	1 ^o	immediately	City	

2.11 Information/Interpretation Program

Visitors to the conservation area need to be made aware that the area is privately owned land being managed where wildlife and habitat protection has the highest priority. This message needs to be clearly conveyed by a variety of means. On site signage and printed information needs to be made available along with information utilizing the local media, community information and education opportunities.

2.11.1 Interpretive Centre

In the 1970s, Ministry personnel discussed the development of an interpretive centre at Buttertubs Marsh, utilizing the old barn, including displays, films, and student naturalists to provide programs to school groups (elementary to college level), local residents and visiting tourists (Hatter, 1975; Wilson, 1976). However, due to extensive damage during the installation of the sewer line, the barn was demolished and removed in 1977, except for the concrete foundation which still exists today.

The old barn foundation has been considered for the possible base of a covered shelter to be used as an outdoor classroom and a place to get out of the rain for groups and the general public. The size of the foundation and the use of metal structures instead of wood (no easy access for fire trucks) increased the estimated cost for the shelter to \$10,000.00+ and sources of funding must be actively pursued if this shelter is to be built.

The preservation of the miner's cottage adjacent to the marsh offers a good opportunity to develop an interpretive centre and accompanying displays. The NFN worked with the City on an outside interpretive display by the miner's cottage and have been invited to participate in developing the inside displays. The management and maintenance of the miner's cottage will be the responsibility of the City. The use of student naturalists to provide educational programs during the summer is under discussion.

Task	Priority	When	Implement By	Cost
Interpretive centre				
- develop old barn foundation as covered shelter for outdoor classroom & shelter from the elements	3°	2005	NFN, MWLAP, City & partners	
- develop miner's cottage as interpretive centre and meeting room	2°	2003	City & partners	

2.11.2 Interpretation Kiosk

In 1997, a new coloured interpretive sign about Buttertubs Marsh, designed by NFN and TNT, was installed at the kiosk adjacent to the Buttertubs Drive entrance. Barring any damage by vandals, the coloured print is guaranteed to last for 10 years, and should last for 15 years because it is not exposed to direct sunlight. The estimated replacement cost is \$3,000 plus volunteer time.

A second interpretive sign, divided into six panels, was developed for the kiosk by the miner's cottage at the Jingle Pot Road entrance. The information presented on this sign is a combination of history and ecology for a wider geographic area that includes Buttertubs Marsh as one component. This sign was unveiled in 2000. The replacement of this kiosk sign will be the responsibility of the City with the addition of much volunteer assistance.

2.11.3. Self Guided Tour and Brochure

As a wide cross section of people including school groups and other organizations utilize the Conservation Area, the development of a self guided tour provides another educational opportunity (Godwin *et al*, 1982) and should be a high priority task in the 2000-2001 work schedule. A self guided tour should have two components - a brochure and numbered areas around the marsh. The brochure would be designed to lead the public around the marsh and would be coded with explanations corresponding to the numbered areas. This tool of interpretation is widely used and therefore familiar to the public.

The brochure should include and follow on from the information presented in the interpretive sign. More detailed information can be presented in the brochure about specific plants and animals and the marsh ecology. A good example for layout is the '*Natural History Guide to the Morte Lake Trail, Quadra Island*'. For both continuity and durability, the areas of interest could be identified with a wooden post and plastic covered plaque similar to those used for the odometric signs. The estimated costs for producing the brochure are \$1000+ for black and white copy plus volunteer time to develop the text and line drawings. Production costs for the signs and plaques will depend on the complexity of the information to be presented and the number of

signs and plaques required.

Task	Priority	When	Implement By	Cost
Self guided tour & brochure				
- develop self guided tour brochure and numbered signs; print and install signs; print and distribute brochures	1 ^o	Ongoing	NFN, City	est. \$2000

2.11.4 Slide Show, Posters and Other Media

A slide show about Buttertubs Marsh was put together in the late 1970s or early 1980s for use by schools and other organizations. Its whereabouts is currently unknown. If it no longer exists a new slide show should be put together for use by such groups as Morrell Sanctuary, Scouts Canada and Girl Guides Canada. This slide show could also be used as a presentation at the miner's cottage as part of a naturalist program.

A poster or series of posters could be developed about Buttertubs Marsh and the important role wetlands play in a watershed. These posters would be suitable for distribution to schools, tourist centres and environmental groups.

A fact sheet about Buttertubs Marsh has been suggested for distribution to individuals and groups who frequent the Conservation Area.

Buttertubs Marsh is regularly listed as a recreation destination in various City promotional brochures and is an integral part of the City trail system as a link between Bowen Park and Westwood Lake Park. The portion of the Trans Canada Trail within the Conservation Area should be relocated.

Videos, as promotional and informational tools, became popular in the 1990s. Shaw Cable has several different venues for presenting local environmental issues to the general public and is willing to work with local groups to develop five minute videos for inclusion in their weekly programming. Malaspina University-College Arts students are often looking for projects to work on for course credit which may be in the form of videos, interpretive signs, or posters.

Task	Priority	When	Implement By	Cost
Slide show, posters and other media				
- develop slide show about the ecology and history of the marsh	3 ^o	2004-2006	NFN & MWLAP	
- develop poster series about Buttertubs and the importance of wetlands	3 ^o	2004-2006	NFN & partners	
- develop series of 'Did you know?' fact sheets about the marsh	2 ^o	2004-2006	NFN, MWLAP	
-develop video about wetlands using Buttertubs as an example	3 ^o	2004-2006	NFN & partners	

2.12 Warden Program

In 1987 the Federation of BC Naturalists (FBCN) initiated a volunteer warden program for The Nature Trust of BC properties to ensure frequent monitoring where Ministry staff were unable to visit the sites on a regular basis. The Nature Trust has recently improved warden guidelines.

Buttertubs Marsh Conservation Area was monitored on a regular basis by a volunteer warden between 1990 and 1992. Since that time monitoring has been carried out on a semi-regular basis by members of the Nanaimo Field Naturalists and residents of the adjacent senior citizen housing complex. Repair and maintenance requirements have been reported, when necessary. The duties of the Warden Program are being integrated into the responsibilities of the Buttertubs Marsh Conservation Area Liaison Committee chaired by the NFN.

Monitoring of the Conservation Area needs to be formalized with a member(s) of the NFN and undertaken every 2-3 months. A site inspection form must be filled in and submitted to the Ministry of Water, Land and Air Protection and City of Nanaimo for their review, input and action, especially where repair and maintenance are required.

Task	Priority	When	Implement By	Cost
Warden program				
Formalize warden program	1°	2004	Buttertubs Working Group	
Volunteers to monitor Conservation Area and submit completed site inspection form	1°	every 3-4 months; report safety issues a.s.a.p.	NFN, MWLAP	
Review submitted form in timely fashion & action any works required	1°	every 3-4 months	Committee	

2.13 Revenue Generation

Between 1989 and 1991 both Morrell Sanctuary and the Advisory Committee were interested in having packets of bird seed for sale at Buttertubs Marsh. The Advisory Committee looked into the possibilities of having a vending machine set up for use by visitors to the marsh. The hope was that this would encourage people to feed the birds a healthy food and reduce the use of bread. This project has not as yet been implemented. Refer also to Section 2.7.2.

There is a possible future opportunity to operate a small kiosk at or beside the miner's cottage and/or beside the duck feeding area at the north end of the marsh. This facility could be operated by volunteers and/or students with the proceeds going towards the management of Buttertubs Marsh. Such items as bird seed, bird checklists, self guided tour brochures, natural history brochures about the marsh and t-shirts could be available through this outlet. The operation of a store (gift shop) with the proceeds split between the operator and the Conservation Area for marsh management has also been suggested.

The development of a Buttertubs Marsh Conservation Area season or life time pass which is sold on a volunteer basis might be considered. A bird checklist, brochure, copy of the management plan etc. might be part of the package.

Task	Priority	When	Implement By	Cost
Revenue Generation				
Season or Life Membership/Pass	1°	Annually	TNT/NFN	
Operate small kiosk beside miner's cottage and/or north end of marsh	3°	Annually - summer	?	
Publish History Document of Management Plan & Bird List	3°	Ongoing	NFN	

3.0 MANAGEMENT PLAN IMPLEMENTATION

3.1 Plan Implementation Process and General Responsibilities

The Buttertubs Marsh Conservation Area Co-Management Steering Committee is responsible for the implementation of the Buttertubs Marsh Conservation Area Management Plan, including preparation and implementation of annual work plans, monitoring, and periodic review and updates of the Management Plan.

3.1.1 Roles and Responsibilities of the Co-Management Steering Committee

The roles and responsibilities of the members of the Co-Management Steering Committee are:

MEMBER	ROLES AND RESPONSIBILITIES
Ministry of Water, Land and Air Protection (MWLAP)	<p>MWLAP is responsible for management of the property under a 99-year lease (signed in 1977) with TNT. General administrative duties for the Conservation Area involves land use planning, habitat protection and property rights issues. Additional administrative time is spent dealing with city-wide planning issues, impacts of adjacent urban development, and issues concerning the adjacent marshlands as they pertain to the Conservation Area. Under the 1997 co-management agreement between MWLAP, the City of Nanaimo and the Nanaimo Field Naturalists, MWLAP:</p> <ul style="list-style-type: none"> • Performs the lead role in administration of the lands; • Acts as the lead planning agency by co-ordinating and hosting meetings with other management partners to determine yearly and long-term property objectives; • Attempts to secure funds each year for general property upkeep; • Co-ordinates major wetland habitat projects and maintenance of the Millstone dyke and water control structures; • Acts on problem wildlife issues except geese which is a shared responsibility with the City; and • Develops signage and marks land boundaries. <p>MWLAP manages water through the provisions of the Water Act and is responsible for habitat protection under the Wildlife Act, and for resident native fish populations (Fish Protection Act and Fisheries Act).</p>
City of Nanaimo	<p>The City of Nanaimo is responsible in part for habitat maintenance and enhancement, trail and facility maintenance and interpretive program development. Under the 1997 co-management agreement between MWLAP, the City of Nanaimo and the Nanaimo Field Naturalists, the City of Nanaimo:</p>

	<ul style="list-style-type: none"> • Maintains trails, public facilities (benches, viewing platforms, etc.); • Assists in the enforcement of dog control bylaws and goose control; and • Continues maintenance responsibilities over the City dyke which delineates the western boundary of the Conservation Area. <p>The City of Nanaimo manages land use through its Official Community Plan and zoning processes and works with other government agencies to address storm water management within the municipality.</p>
Nanaimo Field Naturalists (NFN)	<p>NFN are responsible in part for habitat maintenance and enhancement, trail and facility maintenance and interpretive program development. Under the 1997 co-management agreement between MWLAP, the City of Nanaimo and the Nanaimo Field Naturalists, NFN:</p> <ul style="list-style-type: none"> • Initiates the development of annual work plans and provides continued input on the review and update of the Management Plan in consultation with the other parties; • Acts as volunteer guardians of the Conservation Area and in this capacity reports management or maintenance/public safety issues to either the Province, the City, or both; • Continues wildlife and plant inventory programs; and • Continues as the lead group implementing volunteer projects (e.g. invasive vegetation control) and interpretive/public education programs.
Ducks Unlimited Canada (DUC)	<p>DUC is responsible for the construction, maintenance and repair of the north dyke and associated water control structures as per the 30-year agreement signed in 1985 between DUC and MWLAP. This includes clearing of mud and debris piled around the outlet level control structure each fall, as well as annual inspections of the north dyke and associated structures and repairs or maintenance, as required.</p>
The Nature Trust of British Columbia (TNT)	<p>TNT as the property owner is responsible for ensuring that the conditions of the 99 year lease agreement with MWLAP are being met. TNT as a landowner within the City of Nanaimo is responsible for paying property taxes, including making an annual application to the City to have the taxes reduced. TNT also responds to requests to upgrade present and future utilities which pass through the Conservation Area and provides input towards annual workplans by participating on the management committee.</p>

3.1.2 Co-Management Steering Committee Procedures

The Co-Management Steering Committee generally meets three times each year (December, March and September) to:

- plan activities for 2-3 years in advance to allow adequate time for securing both financial and labour resources;
- prepare and confirm annual work plans and delegate the up-coming year's activities;
- monitor progress of activities for the current year;
- resolve any problems that might arise while the work is being done

MWLAP/NFN confirms the date, time and location of meetings one month in advance. An agenda for the meeting is provided to each representative at that time.

In the event that an unforeseen, non-emergency situation arises, no action is to be taken until the matter is discussed by the Co-Management Steering Committee as a whole and approval to proceed is given by the Committee. The situation, discussion, approval and action taken are to be documented in a timely fashion in writing. Any changes to trails, public facilities and other infrastructures within the Conservation Area must be approved by the Co-Management Steering Committee as a whole prior to any changes being made.

In emergency situations (such as floods and trees down across trails), the responsible

organization must notify other parties of the Co-Management Steering Committee, within 24 hours, by phone and/or e-mail about the actions taken or to be taken. The situation and action taken are to be documented in a timely fashion in a written report to the Co-Management Steering Committee. If there is any additional action(s) to be taken after the emergency is dealt with, it is to be discussed by the Co-Management Steering Committee, as indicated above, before implementation.

3.2 Tasks, Priorities and Timelines

The management plan strategies and tasks presented in Section 2.0 were developed to fulfill the goals and objectives presented in Section 1.4 over the ten-year period 2003 to 2012. Table 3.1 provides a listing of the annual tasks grouped under the theme headings used in Section 2.0 and sorted according to priority. Table 3.2 provides the priority 1 occasional tasks, and Table 3.3 provides the priority 2 and 3 occasional tasks grouped under the theme headings used in Section 2.0 with notation of the year that the task should be undertaken.

Table 3.1 ANNUAL TASKS{ TC (11 ")

Administration (Sec 2.1 and 2.2)

Priority	Who	When	Task
1	Committee	Dec, Apr, Oct	planning and review meetings
1	Committee	Dec mtg	review annual report review agreements and rights-of-way pertinent to Buttertubs Marsh review potential to purchase west marsh
1	MWLAP Steward?	Oct-Dec	prepare annual report for December meeting
1	MWLAP Steward?	Spring	apply to City for property tax reduction
1	TNT, MWLAP, City	as required	encroachments, unauthorized vegetation removal and/or plantings
1	TNT, NFN and/or Warden/Steward	Sept	on-site review adherence to 5-yr agreement between TNT and Bird Sanctuary Drive landowners

Warden Program (Sec 2.12)

Priority	Who	When	Task
1	Committee	2003-2004	formalize Warden Program
1	NFN, MWLAP	every 3-4 months	Warden monitor Conservation Area, report safety issues a.s.a.p. & submit completed inspection form
1	Committee	every 3-3 months	review submitted form in a timely fashion & action any works required

Revenue generation (Sec 2.13)

Priority	Who	When	Task
3	?	Annually - summer	operate a small kiosk beside miner's cottage and/or at north end of marsh
3	?	Annually - summer	operate small gift shop in miner's cottage

Water Level Maintenance and Control (Sec 2.6)

Priority	Who	When	Task
1	DUC	summer/fall	maintain north dyke
1	DUC	summer/fall	remove beaver debris from outlet debris grating
1	City	as required	maintain west dyke
1	Committee	as required	review development plans for surrounding area to ensure supplementary water sources maintained

Wildlife Enhancement and Control (Sec 2.7)

Resource Inventories (Sec 2.3)

Priority{ TC \12 ''}	Who	When	Task
2	NFN, MWLAP, City	spring/fall	Conduct nest box educational program
1	NFN, MWLAP	spring/fall	monitor & maintain nest boxes
1	NFN & partners	spring – fall	Conduct amphibian survey
1	NFN, MWLAP	spring/fall	Monitor wildlife trees
1	NFN, MWLAP	spring – fall	Conduct inventory and monitoring program of Red and Blue-listed fauna, flora and plant communities
1	NFN, City	as required	Check duck feeding signs, restore or replace
1	NFN, MWLAP	as required	Check nesting areas signs, restore or replace
1	City, MWLAP	Spring	Conduct Canada goose egg addling program
1	NFN	as required	Check stucco wire around trees, replace as needed. Protect other trees with stucco wire where necessary
1	NFN	as required	If installed, check perching and nesting poles for vandalism

Exotic/Invasive Species Control (Sec 2.8)

Priority{ TC \12 ''}	Who	When	Task
1	NFN/MWLAP	July-Sept	Map location of purple loosestrife plants; remove & burn flower heads only; monitor of signs of beetle damage on plant leaves
1	NFN & partners	spring/fall	Remove scotch broom from north and west dykes; remove broom from along east trail as labor force permits
1	City	late summer	Lightly prune Himalayan blackberry canes where suitable barrier plant
1	NFN & partners	spring/fall	Remove tansy ragwort plants before they go to seed
1	NFN & partners	spring/fall	Remove other invasive weedy species along north entrance and dyke
1	MWLAP & partners	early spring	Remove bullfrog egg masses in early spring; remove adults as required
1	MWLAP, NFN, partners	spring – fall	Bullfrog impact assessment
2	MWLAP, NFN	as required	Protect individual trees against rabbit damage using anchored wire collars and for larger areas use anchored rabbit exclusion fencing

Domestic Dog and Cat Control (Sec 2.9)

Priority{ TC \12 ''}	Who	When	Task
1	City/NFN/MWLAP	regular basis	Enforce 2003 No Pet Policy.

Trail and Facility Maintenance (Sec 2.10)

Priority{ TC \12 ''}	Who	When	Task
1	City or contractor	as required	Trim hazard trees to leave as wildlife trees or fell away from trails and leave to decay on site; leave debris from dead or dying trees on site
1	City, MWLAP	as required	Do minor repairs to viewing towers, benches and wooden access gates
1	City, MWLAP	as required	Do emergency repair and/or clean up promptly and notify Committee within 24 hours by phone or e-mail
1	Committee City, DUC, MWLAP	as required	Review potential hazard situations; do minor maintenance promptly; add major works to plan and undertake according to schedule
1	City & partners	Fall	Complete minor trail maintenance, brushing and surfacing

Signs, Boundary and Access Management (Sec 2.10.4)

Priority{ TC \12 ''}	Who	When	Task
2	MWLAP or contractor	as required	Maintain wildlife area signs at each access point and replace as needed
2	MWLAP or contractor	as required	Maintain bird nesting area signs within the marsh and replace as needed
2	City, MWLAP	as required	Maintain Conservation Area signs at main entrances
2	City	as required	Maintain odometric signs around marsh and replace as needed
2	City	as required	Maintain City Bylaw signs at each access point
2	City, MWLAP & partners	as required	Maintain interpretive kiosk signs
2	City & partners	as required	Repair minor damage to 4' chain link fence along northern boundary
1	City, MWLAP	Immediately	Install plastic bag dispenser & garbage can at main entrances to marsh

Table 3.2 PRIORITY #1 OCCASIONAL TASKS

Administration (Sec 2.1, 2.2.3 and 2.10.4)

Task	Who	2003	2002	2003	2004	2005	2006	2007	2008	2009	2010
Establish fence or other visible east boundary marker	Committee		✓								
Renegotiate signed agreements: - 30-yr MELP/DUC - 99 yr lease TNT/MWLAP	TNT, Committee	✓				✓					✓ 2015 2076

Water Level Maintenance and Control (Sec 2.6)

Task	Who	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Pave overflow spillway on north dyke to reduce erosion of core & stabilize surface	City		✓ su/fall								
Resurvey staff gauges, set to a standard datum & use gauges with standard metric scale	DUC &/or City	✓									
Replace culvert under former Addison Rd to divert water back into marsh	City		✓ su/ fall								

Wildlife Enhancement and Control (Sec 2.7)

Resource Inventories (Sec 2.3)

Exotic/Invasive (Animal) Species Control (Sec 2.8)

Task	Who	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Develop resource inventory & monitoring program	NFN, MWLAP, DUC	✓	✓								
Conduct bird inventory and monitoring program	NFN, MWLAP		✓					✓			& in 2012
Develop juvenile waterfowl production study & carry out study	NFN, MWLAP NFN/contract		✓		✓	✓	✓	✓			

Domestic Dog and Cat Control (Sec 2.9)

Task	Who	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Develop education program about negative aspects dogs & cats can have on wildlife	Committee		✓								
Implement above education program	NFN, MWLAP			✓	✓	✓	✓	✓	✓	✓	✓

Trail and Facility Maintenance (Sec 2.10)

Task	Who	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Check dead oaks & Lombardy poplar for structural soundness	City or contractor		✓					✓			& in 2012
Check viewing towers, benches and wooden access gates for structural soundness	City or contractor		✓					✓			& in 2012
Complete major trail surfacing, repair and brushing: - add bark mulch to east & south trails - add crushed gravel to north and west trails	City & partners City & partners	✓ ✓			✓		✓	✓			✓ & in 2011
-upgrade east trail & re-design wet problem sections	City & partners	✓	✓		✓			✓			✓
- re-design & widen middle section of south trail	City, DUC & partners		✓								
- re-design north end duck feeding area	City, DUC & partners		✓								
- complete major trail brushing, esp. along east & south trails	City & partners	✓			✓			✓			✓

Signs, Boundary and Access Management (Sec 2.10.4)

Task	Who	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Standardize signs for Conservation Area	Committee	✓	✓								
Cover existing signs with acrylic	City + MWLAP	✓									
Post new Conservation Area signs at main entrances to marsh	City + MWLAP		✓								& in 2011
Replace interpretive kiosk signs - at north end - adjacent to miner's cottage	City, MWLAP & partners							✓?			✓?

Task	Who	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Install chain link fence along eastern boundary	Committee		✓								

Interpretive Program (Sec 2.11)

Task	Who	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Develop self guided tour brochure and numbered signs	NFN, MWLAP, City		✓								

Table 3.3 #2 & #3 OCCASIONAL TASKS
Habitat Maintenance and Enhancement (Sec 2.5)
Exotic/Invasive (Plant) Species Control (Sec 2.8)

Task	Who	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Marsh Habitat Diversity											
- monitor vegetation in shallows & on nesting islands	NFN, DUC, MWLAP		✓ sp/su			✓ sp/su			✓ sp/su		& in 2011
- plan & carry out clearing operations	Committee City; E-team		✓ fall			✓ fall			✓ fall		
- map reed canary grass distribution and determine potential to replace with sedge meadow	NFN, DUC, MWLAP		✓ fall	✓ fall	✓ fall	✓ fall	✓ fall				
- determine potential to increase open shallow water habitat	NFN, DUC, MWLAP		✓								
- map current distribution and density of yellow iris - monitor cattail & yellow iris expansion & interspersion	NFN, DUC, MWLAP		✓ sp					✓ sp			& in 2012
- plan and carry out major mechanical modifications, if indicated by study	Committee DUC & partners										after study in 2012
Aquatic & Emergent Vegetation Diversity											
- develop wetland veg survey - carry out survey	NFN/DUC/ MWLAP NFN, DUC + partners	✓	✓ sp/su					✓ sp/su			& in 2012
Upland Habitat Diversity											
- develop long term veg enhancement plan	NFN/DUC/ MWLAP		✓								
- implement vegetation enhancement plan, such as: - thin & interplant common hawthorn with native trees	NFN & partners			✓ fall	✓ fall	✓ fall	✓ fall	✓ fall	✓ fall	✓ fall	✓ fall
- remove scotch broom along east & south sides; replace with native trees & shrubs, esp. red alder where suitable; add LARGE quantities of humus material to enrich soil	NFN & partners			✓ sp/fall	✓ sp/fall	✓ sp/fall	✓ sp/fall	✓ sp/fall	✓ sp/fall	✓ sp/fall	✓ sp/fall

Task	Who	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
- plant big leaf maple to shade out Himalayan blackberry; protect maple with anchored wire cages	NFN & partners			✓ fall		✓ fall		✓ fall		✓ fall	
- plant native trees along edge of marsh to shade out reed canary grass, where appropriate	NFN & partners				✓ fall		✓ fall		✓ fall		✓ fall
- increase riparian shrub & tree habitat, deciduous and mixed deciduous-evergreen woodland	NFN & partners			✓ sp/fall	✓ sp/fall	✓ sp/fall	✓ sp/fall	✓ sp/fall	✓ sp/fall	✓ sp/fall	✓ sp/fall
Upland Plant Sp Diversity											
- develop protocol for plant survey & veg cover mapping - carry out survey & mapping	NFN/DUC/ MWLAP NFN & partners	✓			✓ sp/su			✓ sp/su			& in 2012

Wildlife Enhancement and Control (Sec 2.7)

Exotic/Invasive (Animal) Species Control (Sec 2.8)

Task	Who	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Develop nest box educational program	NFN, MWLAP		✓								
Evaluate use of duck nesting baskets	NFN, MWLAP		✓								
Monitor Eastern cottontail population numbers and impacts	MWLAP, NFN & partners		✓		✓		✓		✓		✓
Establish & maintain aspen grove	NFN, MWLAP, City		✓	✓	✓	✓	✓	✓	✓	✓	✓
Install perch and nesting poles	MWLAP & NFN			✓	✓						
If installed, check condition of perch and nest poles	Contractor								✓		& in 2013

Resource Inventories (Sec 2.3)

Task	Who	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Conduct inventory & monitoring program: - mammals - reptiles	NFN, MWLAP, & partners		✓ ✓					✓ ✓			& in 2012
- fish -insect & other invertebrates	NFN, MWLAP & partners		✓ ✓					✓ ✓			& in 2012

Signs, Boundary and Access Management (Sec 2.10.4)

Task	Who	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Develop access plan in event west dyke closed	Committee		✓		✓						
Review condition of 4' chain link fence along northern boundary for possible replacement	City & partners										in 2020
Upgrade pedestrian pass-thrus	City & MWLAP		✓								

Interpretive Program (Sec 2.11)

Task	Who	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Develop old barn foundation as covered class room & shelter	NFN, MWLAP, City, & partners					✓					
Develop miner's cottage as interpretive center & meeting room	City & partners		✓								
Develop slide show about ecology & history of marsh	NFN & MWLAP		✓	✓	✓	✓					
Develop poster series & video about Buttertubs & importance of wetlands	NFN & partners			✓	✓	✓					
Develop series of 'Did you know?' fact sheets about the marsh	NFN, MWLAP & partners		✓	✓	✓	✓					

3.3 Monitoring and Evaluating the Plan

It is recognized that the Management Plan itself must be dynamic and responsive to changes in our knowledge base and directions as a society. Monitoring and evaluating the management decisions and actions will help to ensure that the Management Planning process achieves what it is designed to do and to stay open to new ideas and changing conditions in and around the Buttertubs Marsh Conservation Area.

3.1 Steps to Monitor and Evaluate the Management Plan

- 1 Establish and/or reaffirm the baseline conditions and/or performance indicators against which each management strategy can be evaluated to determine if management decisions and actions taken are moving towards the objectives for the Conservation Area. This step may require the development of appropriate measurement methods.
- 2 On an annual basis, undertaking the following:
 - Review of the written annual report submitted for the December meeting of the Co-Management Steering Committee, which summarizes what was completed and what indicators were used to define success of the activities. The annual report compiled by WMLAP incorporates information provided by agency representatives responsible for each activity, including submissions from DUC and the City regarding maintenance activities completed during the year. The annual report also includes a completed annual site inspection and review form “Annual Management Plan Review for the Buttertubs Marsh Conservation Area” (a copy provided in Appendix 2)
 - Evaluate whether the Management Plan tasks identified are appropriate in terms of attaining or moving towards the objectives.
 - Determine whether the information base used to monitor the results of the implementation of the management strategies is appropriate.
 - Make necessary adjustments to the tasks and annual work plans based on the evaluation.
 - Review compliance of written agreements and rights-of-way pertinent to the Conservation Area and joint funding arrangements to complete the proposed annual work plan.
- 3 Every five years, revisit the goals and objectives for the Management Plan and make necessary refinements based on the ongoing monitoring and evaluation of the Management Plan strategies and tasks.

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Appendix 1

Buttertubs Marsh Conservations Area 2004 Natural Features Inventory

Produced by: Ursus Environmental and Parellel Geo-Services Inc.

(Includes Ortho Habitat Map and Legend and Plant Species List)

Buttertubs Marsh Conservation Area – Plant Species List

Revised April, 2004 (incl. Plants identified by Madrone in July, 2003)

A. Trees (14 Species)

Common Name	Scientific Name
Apple (domestic)	<i>Malus domestica</i>
Arbutus	<i>Arbutus menziesii</i>
Bitter Cherry	<i>Prunus emarginata</i>
Black Locust	<i>Robinia pseudoacacia</i>
Black Cottonwood	<i>Populus trichocarpa</i>
Big Leaf Maple	<i>Acer macrophyllum</i>
Chestnut	
Douglas Maple	<i>Acer glabrum</i>
Douglas-fir	<i>Pseudotsuga heterophylla</i>
Ponderosa Pine	<i>Pinus ponderosa</i>
Red Alder	<i>Alnus rubra</i>
Red Oak	<i>Quercus robur</i>
Western Flowering Dogwood	<i>Cornus nuttallii</i>
Western Hemlock	<i>Tsuga heterophylla</i>

B. Shrubs (32 species)

Common Name	Scientific Name
Black Twinberry	<i>Lonicera involucrate</i>
Briar Rose	<i>Rosa eglanteria</i>
Cascra	<i>Rhamnus purshiana</i>
Common Hawthorn	<i>Crataegus monogyna</i>
Daphne	<i>Daphne laureola</i>
English Holly	<i>Ilex aquifolium</i>
Hardhack	<i>Spiraea douglasii</i>
Himalayan Blackberry	<i>Rubus discolor</i>
Hooker's Willow	<i>Salix hookeriana</i>
Indian Plum	<i>Oemleria cerasiformis</i>
Mountain Ash	<i>Sorbus sitchensis</i>
Ninebark	<i>Physocarpus capitatus</i>
Nootka Rose	<i>Rosa nutkana</i>
Oceanspray	<i>Holodiscus discolor</i>
Pacific Crabapple	<i>Malus fusca</i>
Pacific Willow	<i>Salix lucida ssp. lasiandra</i>
Red Alder	<i>Alnus rubra</i>
Red Elderberry	<i>Sambucus racemosa</i>
Red-osier Dogwood	<i>Cornus stolonifera</i>
Rugosa Rose	<i>Rosa rugosa</i>
Rubus species	<i>Rubus armeniacus</i>
Salmonberry	<i>Rubus spectabilis</i>
Saskatoon	<i>Amelanchier alnifolia</i>
Scotch Broom	<i>Cytisus scoparius</i>

Scouler's Willow	<i>Salix scouleriana</i>
Sitka Willow	<i>Salix stichensis</i>
Snowberry	<i>Symphoricarpos albus</i>
Sweet Briar	<i>Rosa eglanteria</i>
Thimbleberry	<i>Rubus parviflorus</i>
Trailing Blackberry	<i>Rubus ursinus</i>
Variable Willow	<i>Salix commutata</i>
Vine Maple	<i>Acer circinatum</i>
White Willow	<i>Salix fragilis</i>

C. Herbaceous and Aquatic/Emergent Plants (68 species)

Common Name	Scientific Name
Algae	<i>Nitella spp.</i>
Alpine Speedwell	<i>Veronica wormskjoldii</i>
Bluegrass	<i>Poa sp.</i>
Bronze Sedge	<i>Carex aenea</i>
Canadian Thistle	<i>Cirsium arvense</i>
Canadian Waterweed	<i>Elodea canadensis</i>
Cattail	<i>Typha latifolia</i>
Cleavers	<i>Galium aparine</i>
Clubrush	<i>Schoenoplectus validus</i>
Coastal Strawberry	<i>Fragaria chiloensis</i>
Colonial Bentgrass	<i>Agrostis capillaries</i>
Common Dead Nettle	<i>Lamium amplexicaule</i>
Common Mare's Tail	<i>Hippuris vulgaris</i>
Common Rush	<i>Juncus effusus</i>
Common Stork's-Bill	<i>Erodium cicutarium</i>
Common Tansy	<i>Tanacetum vulgare</i>
Common Velvet Grass	<i>Holcus lanatus</i>
Creeping Buttercup	<i>Ranunculus repens</i>
Dagger-leaved Rush	<i>Juncus ensifolius</i>
Dandelion	<i>Taraxacum officinale</i>
Ditchgrass	<i>Ruppia maritime</i>
Dock species	<i>Rumex sp.</i>
Dove-foot Gernanium	<i>Gernatium molle</i>
Duckweed	<i>Lemna</i>
Early Hairgrass	<i>Aira praecox</i>
English Ivy	<i>Hedera helix</i>
English Plantain	<i>Plantago lanceolata</i>
Eurasian Milfoil	<i>Myriophyllum spicatum</i>
Field Bindweed	<i>Convolvulus arvense</i>
Field Chickweed	<i>Cerastium arvense</i>
Fireweed	<i>Epilobium angustifolium</i>
Floating-leaved Pondweed	<i>Potamogeton natans</i>
Fringecup	<i>Tellima grandiflora</i>
Great Bladderwort	<i>Utricularia macrorhiza</i>
Great Duckmeat	<i>Spirodela polyrhiza</i>
Hairy Cat's Ear	<i>Hypochaeris radicata</i>
Horsetail	<i>Equisetum arvense</i>

Lamb's Quarters	<i>Chenopodium album</i>
Large-leaved Pondweed	<i>Potamogeton amplifolius</i>
Marsh Speedwell	<i>Veronica Scutellata</i>
Marsh Violet	<i>Viola palustris</i>
Morning Glory	<i>Calystegia spium</i>
Narrow-leaved Bur-reed	<i>Sparganium angustifolium</i>
Orchard Grass	<i>Dactylis glomerata</i>
Oxeye Daisy	<i>Leucanthemum vulgare</i>
Pearly Everlasting	<i>Anaphalis margaritacea</i>
Periwinkle	<i>Vinca major?</i>
Pondweed	<i>Potamogeton pusillus</i>
Purple Willowherb	<i>Epilobium ciliatum</i>
Quackgrass	<i>Elymus repens</i>
Red Clover	<i>Trifolium pretense</i>
Reed Canary Grass	<i>Phalaris arundinacea</i>
Rough Bluegrass	<i>Poa trivialis</i>
Scouler's Popcornflower	<i>Plagiobothrys scouleri</i>
Sheep Sorrel	<i>Rumex acetosella</i>
Siberian Bitter-cress	<i>Cardamine umbellate</i>
Slender Beaked Moss	<i>Kindbergia praelonga</i>
Slough Sedge	<i>Carex obnupta</i>
Small-flowered Bulrush	<i>Scirpus microcarpus</i>
Spring Hornwort	<i>Ceratophyllum echinatum</i>
Straight-beak Buttercup	<i>Ranunculus orthorynchus</i>
Sweet Vernal-grass	<i>Anthoxanthum odoratum</i>
Sword Fern	<i>Polystichum munitum</i>
Thyme-leaved Speedwell	<i>Veronica serpyllifolia</i>
Trefoil Species	<i>Lotus species</i>
Tufted Vetch	<i>Vicia cracca</i>
Tule	<i>Scirpus lacustris</i>
Vetch	<i>Vicia species</i>
Wall Lettuce	<i>Lactuca muralis</i>
Water Hemlock	<i>Cicuta douglasii</i>
Water Purslane	<i>Ludwigia palustris</i>
Water Sedge	<i>Carex aquatilis</i>
Water Shield	<i>Brasenia schreberi</i>
Western Bittercress	<i>Cardamine occidentalis</i>
Western Fescue	<i>Festuca occidentalis</i>
Western Meadowrue	<i>Thalictrum occidentale</i>
White-stalked Pondweed	<i>Potamogeton praelongus</i>
Yellow Flag	<i>Iris pseudacorus</i>
Yellow Pond Lily	<i>Nuphar polysepala</i>
Hoary Rock-moss	<i>Racomitrium lanuginosum</i>
Juniper Haircap Moss	<i>Polytrichum juniperinum</i>
Slender Beaked Moss	<i>Kindbergia Praelonga</i>

Buttertubs Marsh Conservation Area
Baseline Vegetation Mapping – Legend

April 30/04

Black = Original “1984” vegetation units

Blue = new vegetation units added in 2004

Vegetation Map Code	Plant Community	Description
A. WETLAND / RIPARIAN UNITS		
Ca (a)	Anchored Cattail	stable aquatic emergent communities with high cover of cattail and moderate amounts of yellow flag & reed-canary grass. Isolated patches of hardhack. Generally < 5m from high wetted perimeter
Ca (f)	Floating Cattail	poorly-attached mats of emergent vegetation that move with shifting with winds. Similar composition to anchored cattail. Typically contain less yellow flag than above.
Ca / I	Cattail / Iris Mix	floating emergent plant communities where cattail and yellow flag occur as co-dominants. Often contains minor cover of sedges, rushes and grasses.
Isl	Island	stable mounds of excavated bottom material placed to function as waterfowl nesting and loafing habitat. Typically, grass-covered. Surrounded by bands of aquatic emergents.
OW	Shallow Open Water	open water areas to 2.0m depth. Shallow (< 9.6 m) and ephemerally-exposed areas support mare’s tail, watershield, and floating-leaved pondweed. Waterweed, water-lily and pondweeds common at depths > 1.0 m.
Ju	Seepage Areas	water-receiving sites supporting dense stands of common rush (<i>Juncus effusus</i>), and/or small-flowered bulrush. Much reduced since 1984 due to stormwater drainage alterations.
Hh	Hardhack	emergent shrub community dominated by hardhack with occasional willow and alder. Reed-canary grass, rushes and sedges often in understory.
Ri(d)	Deciduous Riparian	streamside forest communities dominated by alder or introduced oaks. Characterized by well-developed and diverse understories, rich soils, and high soil moisture.
B. UPLANDS UNITS		
Bb	Blackberry	dense patches of invasive Himalayan blackberry. Often interspersed with common hawthorn.
Br / Gr	Broom / Grass	disturbed areas supporting > 10% cover by Scotch broom. Typically include large component of introduced grasses and weedy forbs. May contain vernal wildflowers.
Ha	Hawthorn Shrubland	disturbed areas dominated by common hawthorn with patches of invasive broom and blackberry. Dense herb layer of grasses and weedy forbs.
Fm	Mixed Forest	semi-open stands of Douglas fir and arbutus. Dense understory may include significant cover of invasive exotics and introduced grasses.
Fo	Oak Forest	remnants of red oak trees planted along west dyke. Young alders and juvenile oaks regenerating under canopy. Moderate cover of native shrubs in understory.

VEGETATION POINTS OF INTEREST		
Vegetation Map Code	Description	Comments
P1	Briar rose	uncommon ornamental
P2	Cascara grove	10 – 11 cm diameter
P3	Ponderosa pine	30 cm diameter; not native to Vanc. Isl.
P4	Red oak	7 cm diameter; from west dyke trees
P5	Ponderosa pine	45 cm diameter
P6	Ponderosa pine	45 cm diameter
P7	Black cottonwood	50 cm diameter
P8	Mountain ash	multi-stemmed 3-7 cm diameters
P9	Douglas maple	10 cm diameter
P10	Douglas maple grove	7 trees; 7 cm – 20 cm diameters
P11	Himalayan blackberry	dense patch too small to map
P12	Popcornflower patch	near trail junction; consider fencing off
P13	Lombardi poplar grove	adjacent to shrub swamp
P14	Lombardi poplar grove	adjacent to shrub swamp
P15	Red oak	lone oak in NE corner; 35 cm diameter
P16	Blackberry patch	extensive patch at north end of BMCA
P17	Laburnum	lone specimen in BMCA
P18	Blackberry patch	extensive patch at north end of BMCA
P19	Red oak grove	numerous specimens >100 cm diameter next to trail
P20	Douglas fir	70 cm diameter

Appendix 2

Buttertubs Marsh Conservations Area Annual Management Plan Review Form

Annual Management Plan Review for the Buttertubs Marsh Conservation Area

A. OVERVIEW

1.	<p>General Property Management</p> <p><i>(i) Is the property being managed in a manner consistent with the Management Plan?</i> Yes: ____ No: ____ (specify reasons)</p> <p><i>(ii) Are the administrative tasks including operation of the Steering Committee, application for annual property tax reduction, control of encroachments, periodic reviews and renegotiations of agreements and rights-of-ways, and pursuit of adjacent land acquisitions being undertaken?</i> Yes: ____ No: ____ (specify reasons)</p> <p><i>(iii) Recommendations for further action (e.g., next 5 years).</i></p>
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B. MANAGEMENT PLAN IMPLEMENTATION

2.	<p>Water Level Maintenance and Control.</p> <p><i>(i) Identify annual maintenance activities completed or started in the period since the last assessment to maintain the north dyke, west dyke, staff gauges, summer water input and full standing water level.</i></p> <p><i>(ii) Were any follow-up actions required over and above the annual maintenance activities?</i> No: ____ Yes: ____ (specify reasons)</p> <p><i>(iii) Were the desired objectives met where work was completed?</i> Yes: ____ No: ____ (specify reasons)</p> <p><i>(iv) Has a thorough marsh resource and vegetation survey been undertaken and data analyzed to determine the optimum full standing water level to meet the objectives of the Management Plan?</i> Yes: ____ No: ____ (specify reasons)</p> <p><i>(v) Recommendations for further action (e.g., next 5 years).</i></p>
3.	<p>Exotic/Invasive Species Control</p> <p><i>(i) Have the exotic/invasive weed control measures been implemented as per the Management Plan?</i> Yes: ____ No: ____ (specify reasons)</p>

	<p><i>(ii) What is the estimate of the exotic/invasive weed status? (circle one)</i></p> <table border="0"> <tr> <td>Yellow iris Change</td> <td>Increasing</td> <td>Decreasing</td> <td>No</td> </tr> <tr> <td>Purple loosestrife Change</td> <td>Increasing</td> <td>Decreasing</td> <td>No</td> </tr> <tr> <td>Common hawthorn Change</td> <td>Increasing</td> <td>Decreasing</td> <td>No</td> </tr> <tr> <td>Scotch broom Change</td> <td>Increasing</td> <td>Decreasing</td> <td>No</td> </tr> <tr> <td>Himalayan blackberry Change</td> <td>Increasing</td> <td>Decreasing</td> <td>No</td> </tr> <tr> <td>Tansy ragwort Change</td> <td>Increasing</td> <td>Decreasing</td> <td>No</td> </tr> <tr> <td>Reed canary grass Change</td> <td>Increasing</td> <td>Decreasing</td> <td>No</td> </tr> <tr> <td>Other invasive plants Change</td> <td>Increasing</td> <td>Decreasing</td> <td>No</td> </tr> </table> <p><i>(iii) Have exotic/invasive vertebrate control measures been implemented as per the Management Plan?</i> Yes: ____ No: ____ (specify reasons)</p> <p><i>(iv) What is the estimate on population numbers and impacts of exotic/invasive vertebrate species? (circle one)</i></p> <table border="0"> <tr> <td>Eastern cottontail Change</td> <td>Increasing</td> <td>Decreasing</td> <td>No</td> </tr> <tr> <td>Bullfrogs Change</td> <td>Increasing</td> <td>Decreasing</td> <td>No</td> </tr> </table> <p><i>(v) Recommendations for further action (e.g., next 5 years).</i></p>	Yellow iris Change	Increasing	Decreasing	No	Purple loosestrife Change	Increasing	Decreasing	No	Common hawthorn Change	Increasing	Decreasing	No	Scotch broom Change	Increasing	Decreasing	No	Himalayan blackberry Change	Increasing	Decreasing	No	Tansy ragwort Change	Increasing	Decreasing	No	Reed canary grass Change	Increasing	Decreasing	No	Other invasive plants Change	Increasing	Decreasing	No	Eastern cottontail Change	Increasing	Decreasing	No	Bullfrogs Change	Increasing	Decreasing	No
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Eastern cottontail Change	Increasing	Decreasing	No																																						
Bullfrogs Change	Increasing	Decreasing	No																																						
4.	Domestic Dog and Cat Control																																								
	<p><i>(i) Have the domestic dog and cat control measures and education program been implemented</i> Yes: ____ No: ____ (specify reasons)</p> <p><i>(ii) Are the control measures effective?</i> Yes: ____ No: ____ (specify reasons)</p> <p><i>(iii) Recommendations for further action (e.g., next 5 years).</i></p>																																								
5.	Trail and Facility Maintenance																																								
	<p><i>(i) Have safety issues been addressed regarding tree hazards, and other structures, including viewing</i></p>																																								

	<p><i>towers, benches, and wooden access gates?</i> Yes: ____ No: ____ (specify reasons)</p> <p><i>(ii) Were emergency repairs and/or clean-ups required?</i> No: ____ Yes: ____ (specify reasons)</p> <p><i>(iii) Recommendations for preventative hazard maintenance measures (e.g., next 5 years).</i></p> <p><i>(iv) Identify maintenance, surfacing, brushing and repair activities completed or started in the period since the last assessment for the trails and duck feeding areas.</i></p> <p><i>(v) Identify signage, boundary and access management maintenance activities and garbage control activities completed or started in the period since the last assessment.</i></p> <p><i>(vi) Were any follow-up actions required over and above the annual maintenance activities?</i> No: ____ Yes: ____ (specify reasons)</p> <p><i>(vii) Were the desired objectives met where work was completed?</i> Yes: ____ No: ____ (specify reasons)</p>
6.	Interpretive Program
	<p><i>(i) Identify the activities completed or started in the period since the last assessment related to development of an interpretive center, a self guided tour and brochure, and a slide show, posters and other media.</i></p> <p><i>(ii) Were the desired objectives met for the work completed?</i> Yes: ____ No: ____ (specify reasons)</p> <p><i>(iii) Recommendations for further action (e.g., next 5 years).</i></p>
7.	Warden Program
	<p><i>(i) Have the requirements of the warden program been met during the period since the last assessment?</i> Yes: ____ No: ____ (specify reasons)</p> <p><i>(ii) Recommendations for further action (e.g., next 5 years).</i></p>

8.	Revenue Generation
	<p><i>(i) Identify revenue generation options and results from those implemented.</i> Yes: ____ (what was the revenue generated) No: ____ (specify reasons)</p> <p><i>(ii) Recommendations for further action (e.g., next 5 years).</i></p>

C. ECOLOGICAL CONSIDERATIONS

9.	Resource inventories
	<p><i>(i) Has a resource inventory and monitoring program consistent with the objectives identified in the Management Plan been developed?</i> Yes: ____ No: ____ (specify reasons)</p> <p><i>(i) Identify the inventory and monitoring programs conducted during the period since the last assessment, including birds, mammals, amphibians, reptiles, fish, invertebrates, rare-listed fauna, rare-listed flora and plant associations and wildlife trees.</i></p> <p><i>(ii) Recommendations for further action (e.g., next 5 years).</i></p>
10.	Habitat Maintenance and Enhancement
	<p><i>(i) Identify the marsh habitat diversity activities completed or started since the last assessment, including monitoring and mapping marsh vegetation, particularly reed canary grass, yellow iris and cattail, clearing operations, re-plantings, or other modifications to the marsh habitat including the nesting islands.</i></p> <p><i>(ii) Has a wetland vegetation survey protocol been developed to address the aquatic and emergent vegetation diversity objectives of the Management Plan?</i> Yes: ____ No: ____ (specify reasons)</p> <p><i>(iii) Identify wetland vegetation surveys conducted during the period since the last assessment.</i></p> <p><i>(iv) Has a long term upland vegetation enhancement plan that will increase riparian shrub and tree habitat, and deciduous and mixed deciduous-evergreen woodland been developed to increase upland habitat diversity?</i> Yes: ____ No: ____ (specify reasons)</p> <p><i>(v) Has a protocol for a plant survey and vegetative cover mapping been developed to support the upland vegetation enhancement plan?</i> Yes: ____ No: ____ (specify reasons)</p>

	<p><i>(vi) Identify upland vegetation surveys conducted during the period since the last assessment.</i></p> <p><i>(vii) Identify upland habitat diversity activities completed or started since the last assessment</i></p> <p><i>(viii) Recommendations for further action (e.g., next 5 years).</i></p>
11.	Wildlife Enhancement and Control
	<p><i>(i) What nest box education programs were developed and carried out during the period since the last assessment?</i></p> <p><i>(ii) Were inspections carried out of the bird nest boxes and baskets, nest poles and perching poles to assess use, vandalism, and maintenance requirements?</i> Yes: _____ No: _____ (specify reasons)</p> <p><i>(iii) Identify the maintenance and any replacement of the duck feeding and nesting area signs.</i></p> <p><i>(iv) Was a study to evaluate annual juvenile waterfowl production developed?</i> Yes: _____ No: _____ (specify reasons)</p> <p><i>(v) Identify annual juvenile waterfowl study activities undertaken since the last assessment.</i></p> <p><i>(vi) Identify the wildlife control measures taken during the period since the last assessment related to Canada geese and beavers.</i></p> <p><i>(vii) Recommendations for further action (e.g., next 5 years).</i></p>

This evaluation was prepared by: _____
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