Greater Vancouver Regional District

Boundary Bay

Regional Park Plan - 1996

Prepared for
GVRD Parks and
Environment Canada

Prepared by
Quadra Planning Consultants Ltd.
in association with Enviro-Pacific Consulting

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1.0 INTRODUCTION

The first development plan for Boundary Bay Regional Park was prepared by Charles Torrence Ltd. in September 1977 (Charles Torrence Ltd., 1977). Subsequently, a second Concept Plan was prepared and adopted by the Greater Vancouver Regional District (GVRD) Parks Committee in 1986 (J.S. Peepre & Associates 1986). Both plans called for acquisition of 89 hectares of land between the shoreline and Boundary Bay Road to be added to the Regional Park, in order to broaden recreation and conservation roles at the site. Since the preparation of this plan ten years ago, demands for outdoor recreation have increased and there has been further recognition and understanding of Boundary Bay as an internationally significant wildlife area. The function of nearby uplands in the ecology of wildlife using the Bay has also become clearer; especially agricultural lands and old-field habitats. In 1994 Boundary Bay was designated by the provincial government as a Wildlife Management Area.

As part of the 1995 Lower Mainland Nature Legacy Program and the Wildlife Habitat Compensation Program, Boundary Bay Regional Park was expanded with the addition of 89 hectares of land between Boundary Bay Road and Centennial Beach. The purchase of this property was made possible by funds available from the Vancouver International Airport compensation program (through the federal government), the Greater Vancouver Regional District (GVRD), and the Province of British Columbia. The compensation is for the loss of wildlife habitat on Sea Island as a result of construction of the new runway at the Vancouver International Airport.

Given these recent events, GVRD Parks and Environment Canada have formed a working partnership to review and update the 1986 Concept Plan. An important goal of the Plan is to integrate current and future outdoor recreation requirements with wildlife habitat management and enhancement objectives. The revised Plan will provide a basis for future park management and recreational use integrated with wildlife habitat management.

There are four major components to the updated 1996 Plan:

- Technical Basis for the Plan
- Park Management Objectives and Planning Principles
- Park Uses and Facilities
- Wildlife Habitat Management and Enhancement

1996 Park Plan Preparation

The Plan was prepared by Quadra Planning Consultants Ltd. on behalf of GVRD Parks and Environment Canada. The overall study was coordinated and prepared by Michael McPhee of Quadra Planning. He was assisted by Martin Gebauer (Enviro-Pacific Consulting) who helped prepare the section on wildlife management and enhancement. Ron Kistritz (R.U. Kistritz Consultants Ltd.) provided advice on the aquatic regime in the park and Ken Summers (K.S. Summers Biological Services) contributed information on wildlife use. Hans Utzig (Quadra Planning) prepared the graphics.

Acknowledgments

The consulting team acknowledges the important contributions made by Frieda Schade and Brian Farquhar (GVRD Parks), and Trish Hayes (Environment Canada) in preparing this Plan. They provided ideas and information, and made many useful and thoughtful comments in reviewing drafts of the Plan. Many good suggestions and comments were also provided by residents and others who attended the February and June 1996 Open Houses held in Tsawwassen. GVRD Parks operations staff also provided assistance and answers to many questions during site visits. We would also like to extend our appreciation to Allen Poynter for providing us with his bird lists and observations on wildlife use in the Regional Park.

Public Consultation

Public consultation has played an important role in preparing the 1996 Boundary Bay Regional Park Plan. On February 29, 1996 GVRD Parks and Environment Canada sponsored a public Open House at the Kiwanis Longhouse in Tsawwassen to receive public input on preliminary ideas and options for updating the Plan. Approximately 100 people attended the Open House and provided responses and comments on future park facilities, and wildlife habitat management and enhancement options. These comments were helpful in developing options and identifying priorities for the draft plan. A second public Open House was held at the Longhouse on June 4, 1996 to present the draft plan and to receive public comment. Approximately 80 people attended the second open house. Both open houses were advertised in local papers and notices were also mailed out. A summary of responses received at both open houses is included in Appendix I. A more detailed compilation of responses and comments received from the two Open Houses is available from GVRD Parks. Several letters were also received from individuals along with a petition from concerned dog owners.

The responses and comments received were carefully reviewed and resulted in some revisions to this final version of the Plan. There was strong support for the overall Park Management Objectives and Planning Principles as outlined in the Plan and a majority of respondents believe the Plan will meet its objectives if implemented.

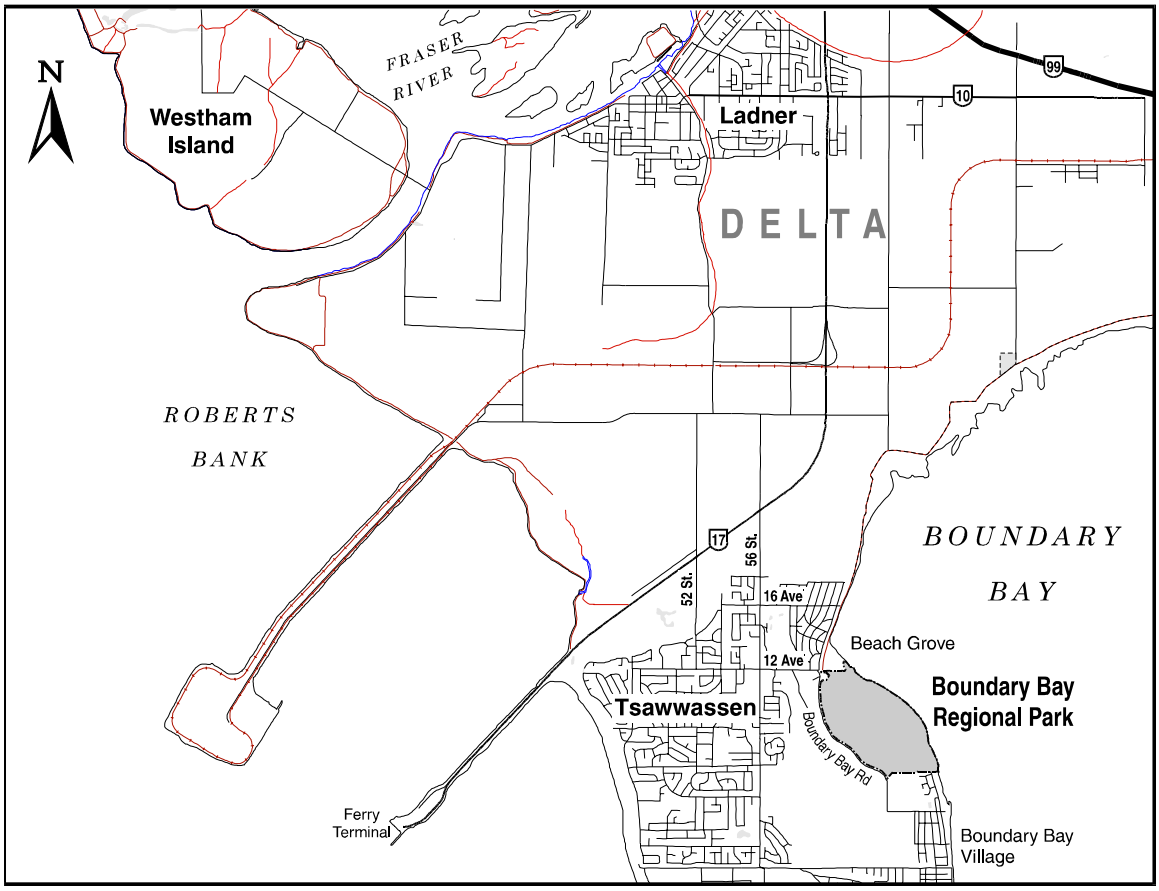
2.0 BACKGROUND

Boundary Bay Regional Park, located on the western shore of Boundary Bay in the Municipality of Delta, is a popular year round recreation destination for hundreds of thousands of visitors (Figure 1). In 1995, the Park attracted 386,832 visitors, a 55 percent increase since 1990. Visitors to the Regional Park are drawn from many areas of the Lower Mainland. Popular recreation activities include walking, dog walking, summer beach activities, wildlife viewing, beachcombing and cycling. According to GVRD's 1995 Major Parks Plan Study for the Lower Mainland, these types of outdoor recreation activities will experience a high to moderate rate of growth over the next 30 years. The sandy ocean beach areas at the Park represent a relatively scarce public recreation resource in the Lower Mainland, particularly south of the Fraser River. The Regional Park has a variety of significant natural landscape features, including marine, sand dune, savanna and wetland ecosystems. These features, combined with the Park's location on the Pacific Flyway, make for a rich diversity of wildlife which is a major attraction for birdwatching, nature interpretation and educational opportunities.

FIGURE - 1

BOUNDARY BAY REGIONAL PARK

LOCATION MAP



The addition of 89 hectares of former farmland to the Park has permitted the expanded protection of important wildlife habitat to that which already existed within the Regional Park. This area is currently zoned A-1 (Agriculture) by the Corporation of Delta. This zoning allows for compatible public use such as park use. The existing Official Community Plan designation is Agriculture, but this is in the process of being revised to Park and Recreation designation by the municipality.

Excellent opportunities exist to enhance the habitat of this area for wildlife species that have been impacted on Sea Island as a result of construction of the new runway at Vancouver International Airport. These species include raptors (hawks, owls), herons, songbirds and water birds. At the same time, the inclusion of this area into Boundary Bay Regional Park also presents a challenge in terms of protecting the integrity of this area for wildlife conservation while providing recreational opportunities to meet the growing demand as the population of the region continues to increase. This Park Plan provides the management framework for meeting this challenge.

3.0 TECHNICAL BASIS OF THE PLAN

The update of the Boundary Bay Regional Park Plan provides an opportunity to integrate recreation and wildlife values. Since the preparation of the 1986 Park Concept Plan, our understanding of the importance of the Boundary Bay ecosystem has increased, including the relationship between adjacent upland habitats, intertidal habitats and marine components of the ecosystem. Recreation needs have also continued to increase, particularly opportunities related to passive types of recreation associated with beaches and shorelines such as walking, beachcombing, nature enjoyment, birdwatching and picnicking. The 1996 Plan is based on careful consideration of the needs of both wildlife and recreation.

Wildlife

Boundary Bay is a critically important ecosystem, approximately 11,000 hectares in size. It is a vital component of the internationally significant Pacific Flyway for birds migrating between Asia, North America and South America. Over 1.5 million water birds use Boundary Bay and the Fraser River delta each year during winter migration. This area has the highest concentration in Canada of winter populations of Great Blue Heron, black-bellied plover, mew gull, rough-legged hawk, red-tailed hawk and northern harrier. Birds are attracted to Boundary Bay because of its undisturbed resting areas, mild climate and abundance of food in intertidal areas and neighbouring farmlands and grassy fields. Boundary Bay and the Fraser River estuary also support the largest wintering waterfowl concentrations in Canada. More than 100,000 waterfowl, of which mallard, northern pintail and American wigeon are the most common, utilize the Bay in winter. Many of these ducks also feed in upland fields during the day and night. Diving ducks (i.e., scaup and scoters) are found in the deeper offshore waters. Black brant are a common site near Boundary Bay Regional Park during the spring migration, with annual numbers ranging from 15,000 to 50,000.

Boundary Bay contains approximately 140 ha. of high intertidal saltmarsh and over 3200 ha. of eelgrass beds. At low tide, about 1.5 km of mudflat are exposed between the high and low water marks. Most of the world's population of western sandpipers (>500,000) rest and feed on these mudflats during their autumn migration. The extensive eelgrass beds are important spawning sites for Pacific herring and nursery areas for a variety of fish and crustaceans.

Because of its importance to wildlife, the Provincial Government designated Boundary Bay as a Wildlife Management Area in 1994. The Bay also exceeds the criteria for other international wildlife designations such as RAMSAR.

Boundary Bay Regional Park is an important component of the Boundary Bay ecosystem. At least 200 species of birds have been sighted at Boundary Bay Regional Park. Of these species, 40 are known to nest there and many others feed and rest in the different habitats of the Park (described in Section 6). The Park contains a variety of significant natural landscapes - intertidal foreshore, sand dunes, seasonal wetlands and open savannah grasslands. This Plan recognizes and outlines ways in which to maintain and enhance these habitats upon which wildlife depend while planning for and providing recreation opportunities.

Recreation

According to current trends, the Lower Mainland will see the population rise from 1.7 million to over three million in the next 25 years, an increase of 68 percent. Coincidental with this population increase is the participation in outdoor leisure activities. A household survey commissioned by GVRD Parks in 1993 found that more than 80 percent of the population in the Lower Mainland participate in walking, sightseeing, viewing nature and going to the beach. Seventy percent of the population participate in picnicking activities. Participation rates for these activities are expected to grow as the population increases over the next 25 years.

Boundary Bay Regional Park offers outdoor recreational activities that are in most demand throughout the region. In particular, it is one of only three public ocean beach areas south of the Fraser River within the Lower Mainland (the others are Crescent Beach and White Rock). Visitors to the Regional Park have grown from 250,000 in 1990 to 386,832 in 1995, an increase of nearly 55 percent. It also provides excellent walking, jogging, cycling and nature enjoyment opportunities. With the addition of 89 hectares of parkland, these opportunities are increased, particularly for growing activities such as nature enjoyment, interpretation and birdwatching. At the same time, it is necessary to plan for these activities in a sensitive way and set limits, recognizing the importance of the Park for wildlife.

Review of the 1986 Concept Plan

The need to review and update the 1986 Concept Plan for Boundary Bay Regional Park is based primarily on five main factors:

- a greater appreciation and understanding of the ecological importance of Boundary Bay and its adjoining upland and the need to protect internationally significant wildlife areas;

- the increasing demand for outdoor recreational activities in the region, in the Regional Park and the need to plan and manage for these growing uses in the future;

- the addition of 89 hectares of the former Spetifore property to the Regional Park as part of the compensation for lost wildlife habitat due to the construction of the new runway at Vancouver International Airport on Sea Island in Richmond;

- the 1986 Concept Plan is ten years old and could not be implemented due to unresolved land issues that are now resolved with acquisition of the 89 hectares; and

- a better understanding of the Park based on six years experience operating and managing the site.

The 1986 Concept Plan recommended some intensive development of park facilities. However, for the reasons outlined above, this new Park Plan proposes park facilities that are more limited and modest, compared to the 1986 Concept Plan, to be more in keeping with the site's "carrying capacity" and in preserving the Regional Park's natural setting. This new Plan is also consistent with the dual objectives of wildlife conservation and provision of recreational opportunities.

Given the above, the following park facilities and activities recommended in the 1986 Concept Plan are **not** being considered for further development.

- creation of a public beach on the Beach Grove Spit including backup parking and picnic and washroom facilities associated with such development. This area is very important for wildlife and could be negatively impacted by increased use as a public beach.

- equestrian trails. Equestrian use is not compatible with current and planned uses of the Park. Alternative trails for this recreation activity exist in other areas around Boundary Bay.

- extensive pond network. Some enhancement of ditches and limited enhancement of wetland areas is recommended in the new Plan, however, the primary management focus is on the maintenance and enhancement of old field and hedgerow habitats.

- breaching of the 12th Avenue dyke to recreate a former salt marsh. The 1986 Concept Plan recommended against this action, which was supported by the public, various government agencies and the GVRD Parks Committee and Board. The breaching, according to the 1985 Sigma Engineering report, would result in 50 percent of the newly acquired parkland being flooded on a daily basis and 70 percent of the Park subject to flooding at least once per year. This flooding was considered to be too extensive, given the importance of the grassland habitat for raptors. The current management emphasis of this area is on the maintenance and enhancement of old field habitat to help compensate for similar wildlife habitat lost on Sea Island due to expansion of the Vancouver International Airport.

- construction of a second access road to Centennial Beach from 12th Avenue. This road would not be compatible with wildlife conservation and recreational use objectives for the Regional Park.

- foreshore dyke construction. If a dyke is deemed to be necessary by municipal or provincial authorities, it should be constructed adjacent to Boundary Bay Road.

- extensive parking lots. The 1986 Concept Plan proposed extensive parking lots to accommodate future Park visitors. The new Park Plan proposes limited parking expansion at Centennial Beach and near the 12th Avenue dyke/Boundary Bay Road entrance.

- brant hunting. Access through Boundary Bay Regional Park to the crown foreshore hunting area was closed by GVRD in 1993.

4.0 PARK MANAGEMENT OBJECTIVES AND PLANNING PRINCIPLES

Overall Park Management Objective

To maintain and enhance the wildlife values while providing outdoor recreation opportunities and promoting environmental awareness and interpretation

Planning Principles

1. The Regional Park will be managed for the dual purposes of conservation of wildlife, particularly raptors, herons, songbirds and water birds, and the provision of active and passive outdoor recreation opportunities.

2. The Plan has made a major commitment to the conservation of wildlife values through the designation and management of Wildlife Reserves which are protected from disturbance.

3. Recognizing the growing beach recreation demand in the region and the scarcity of such public beach areas, the Plan identifies a limited area for expansion of beach orientated activities and support facilities in the Centennial Beach area. The foreshore area north of Centennial Beach will be left in a natural state.

4. A new access road will be constructed to divert heavy, Park destined traffic away from the residential streets in Boundary Bay Village. This road will be located as far south as feasible within the Park boundary, given the objective to conserve wildlife values and provide current and future outdoor recreation opportunities.

5. The Plan recognizes that existing ditches through the Regional Park provide important freshwater habitat for birds and other wildlife. This overall water regime will be maintained in order to provide both old field and freshwater habitats that support wildlife.

6. Any future dyking or drainage requirements of local or provincial governments must identify how these facilities will best fit the overall management objective of the Park.

7. The Plan recognizes the environmental benefits that may arise from enhancement work at the 12th Avenue lagoon or Beach Grove Spit. This work will require a lead role by BC Environment as this area lies mostly outside the Park and is within the Boundary Bay Wildlife Management Area.

8. The Plan acknowledges the need to identify areas where other organizations, government agencies and citizens might be involved in Park management activities including enhancing wildlife habitat, monitoring wildlife use and providing specialized facilities.

9. The Plan designates areas for future park needs such as parking and other uses that may arise based on ideas that cannot be anticipated and public support. These future uses must be consistent with the overall management objective. There will be no expansion of facilities into the Wildlife Reserves.

10. The Greater Vancouver Regional District and Environment Canada will continue to cooperate on major decisions involving management of the Regional Park, particularly in the management of the Wildlife Reserves. They will work closely with BC Environment, the Corporation of Delta, Department of Fisheries and Oceans and other agencies.

5.0 PROPOSED PARK USE AND FACILITIES

5.1 Park Activities

Boundary Bay Regional Park provides a variety of outdoor recreation opportunities on both a local and regional level. The demand for many of these activities is growing throughout the Lower Mainland as population increases; particularly in communities which the Regional Park serves. Beach activities are among the most popular forms of outdoor recreation in the region.

Outdoor recreation activities enjoyed at the Regional Park include the following:

- walking, jogging and wheelchair use occur on the dykes and trails. Many people stroll the dykes and trails and enjoy the tremendous views of Boundary Bay and the surrounding natural landscape features and wildlife.
- dog walking is a very popular activity both on formal and informal trails. There is great interest from dog walkers in providing opportunities within the Park for walking dogs off the leash.
- beach activities including sunbathing, swimming, and beachcombing. Centennial Beach is a valuable regional resource and these activities are expected to increase as the population in the Lower Mainland grows.
- picnicking. Despite the limited number of picnic tables in the Park and no group picnic facilities, picnicking continues to be a most popular activity with families and groups.
- casual play and sports (e.g., playground, tennis and baseball). The Centennial Beach area plays a unique and important role in that it provides active community and sports facilities that serve local residents, primarily. These activities will continue to play a small role in the Park and are discussed in further detail in Section 5.3.
- wildlife observation, interpretation and photography. Due to its location in the Boundary Bay ecosystem and Pacific Flyway, the Regional Park is a key site for birdwatching, nature enjoyment and interpretation. Over the past several years, GVRD has implemented a wildlife interpretation plan and runs interpretive programs in the Park. Facilities have included a dune trail, viewing platforms and interpretive signs jointly funded with the Friends of Boundary Bay, BC Environment and other agencies. Friends of Boundary Bay and others also use the Park extensively for interpretive programs and field trips.
- bicycling. Cycling is a very popular activity in the Park, however trails must be planned to avoid potential conflicts between cyclists and pedestrians.

The following two sections make recommendations for managing park use (designated use areas) and for meeting current and future recreation activity demands (park facilities).

5.2 Designated Use Areas

Designated use areas for Boundary Bay Regional Park include (see Figure 2):

- Centennial Beach
- 12th Avenue Entrance
- Wildlife Reserves
- Park Open Space and Trails
- Recreation Reserves

Centennial Beach

Active recreation, picnicking and park services will be concentrated around the already developed area at Centennial Beach. Facilities such as washrooms, concessions, caretaker residence, park service yard, tennis courts, basketball court, grassy fields, picnicking, playground and parking will be focused in this area. Some upgrading of existing facilities is proposed for this area as discussed in Section 5.3.

12th Avenue Entrance

The 12th Avenue Entrance, which includes the 12th Avenue dyke, is used extensively for walking, dog walking, cycling, nature enjoyment and interpretation, and birdwatching. It includes a wildlife viewing and interpretive platform, parking at the foot of 12th Avenue and a new small parking/staging area just to the south off of Boundary Bay Road. These activities would continue to be the major focus of this area.

Wildlife Reserves

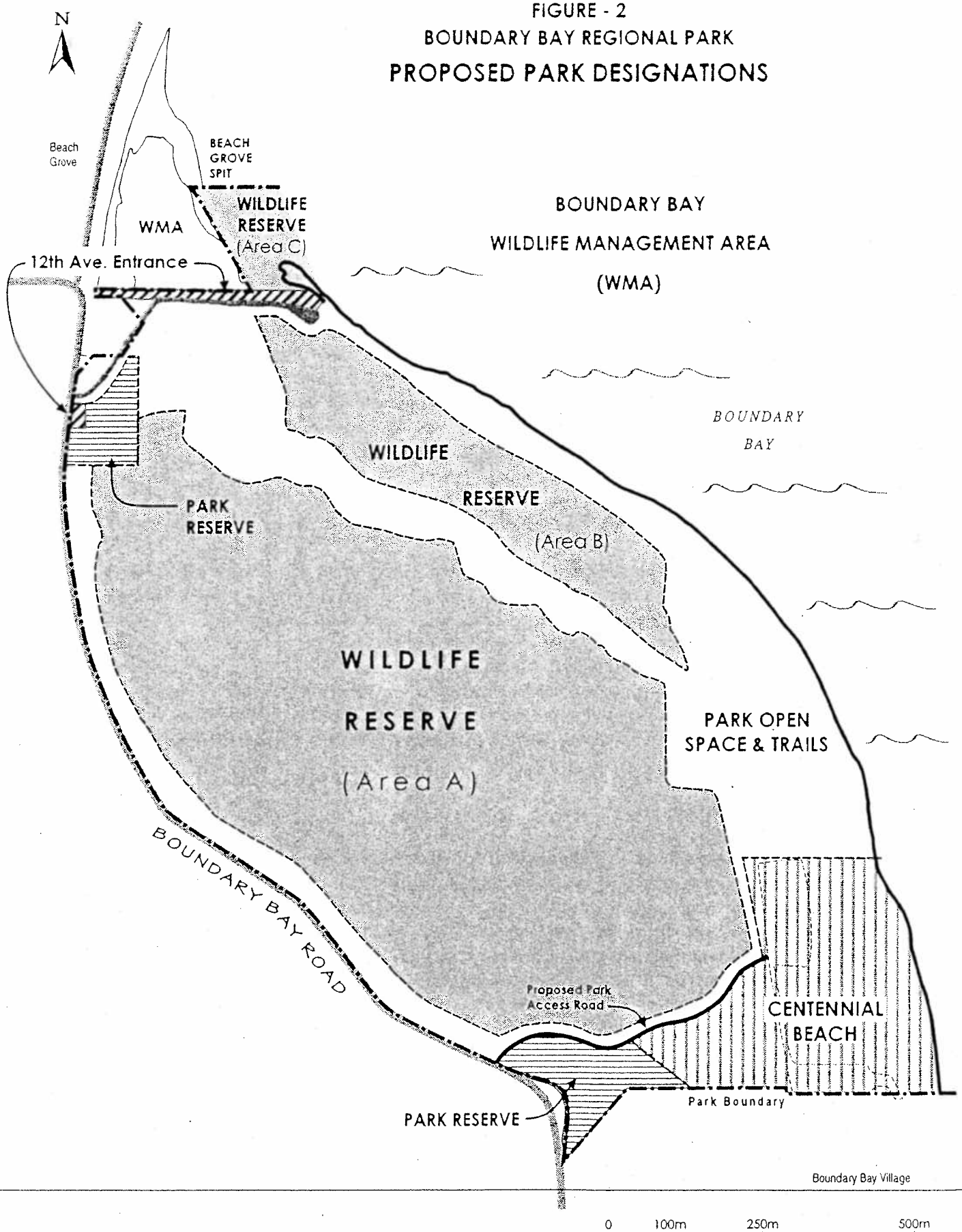
Establishment of Wildlife Reserves is critical in protecting important wildlife features in the Park such as old field, wetland and intertidal habitats.

The area between Boundary Bay Road and Centennial Beach is recognized as containing significant wildlife values (see Section 6), especially for birds such as raptors (hawk, eagles, owls), herons, songbirds and waterfowl. There are important and unique habitats such as old field, wetlands and sand dunes which require protection. The Beach Grove Spit and Lagoon is another important wildlife area. Three areas are designated as Wildlife Reserves where the primary management emphasis is the maintenance and enhancement of wildlife values (Figure 2):

1) a core area covering a significant portion of the newly acquired property (Area A);
2) an area between the foreshore dyke trail and the interior trail system extending from the 12th Avenue pumphouse to the viewing tower (Area B); and
3) the Beach Grove (Brant) Spit and Lagoon area (Area C).

Public access will be limited to the perimeter of the Wildlife Reserves where designated trails and wildlife viewing points will be established. Closure of informal trails through the Wildlife Reserves will be necessary. Public access can be controlled by establishing continuous ditches, hedgerow and/or shrubland barriers, or fences around the periphery of the Wildlife Reserves. There are many opportunities for enhancing wildlife habitat values in these areas (see Section 6).

FIGURE - 2
BOUNDARY BAY REGIONAL PARK
PROPOSED PARK DESIGNATIONS



Several studies have investigated the impacts of human activity on raptors, passerines and waterbirds. In studies on breeding songbirds, Van der Zande and Vos (1984) and Van der Zande *et al.* (1984) found that most species showed a decline in populations with an increase in recreation intensity in the same area. Studies by Holmes et al. (1993) and Klein (1993) on wintering raptors and waterbirds, respectively, also indicated negative correlations. Stalmaster and Newman (1978) determined that increased human disturbance resulted in displacement of eagles to areas of lower human activity. Generally, these studies found that increases in recreational disturbance resulted in significant negative impacts to the densities and distribution of most bird species.

Approaching waterbirds on foot was the most disruptive of the usual recreational activities (Klein 1993). Walking disturbances resulted in more flushes of raptors than vehicle disturbances. Vegetation buffers and buffer zones of at least 75 metres were recommended by researchers to protect critical wintering grounds of bald eagles and other raptors where disturbances are common (Holmes *et al.*and Stalmaster and Newman 1978). These buffers act in two ways - physically separating human activity from sensitive habitat and also providing a visual screen so that birds feel more secure. Habituation of raptors to human activity and the age of birds were also mentioned by these researchers as factors in the degree of disturbance.

While public access to the Wildlife Reserves will be prevented to limit disturbances to birds and mammals, other trails will provide further walking and cycling opportunities in the Regional Park.

The Beach Grove (Brant) Spit and Lagoon area (Area C) north of the 12th Avenue dyke is now known to be very important to wildlife, particularly for wintering and foraging brant, waterfowl and shorebirds. The 1986 Concept Plan proposed intensive beach development. This is no longer recommended. The portion of this area that is within the Regional Park boundaries is designated as a Wildlife Reserve. The area outside the Park is part of the Boundary Bay Wildlife Management Area which is under the jurisdiction of BC Environment, a provincial agency. While some lagoon enhancement to improve flushing and to prevent the spit from closing off tidal water flow may be beneficial, further work is required to coordinate provincial, municipal, regional and federal interests.

Park Open Space and Trails

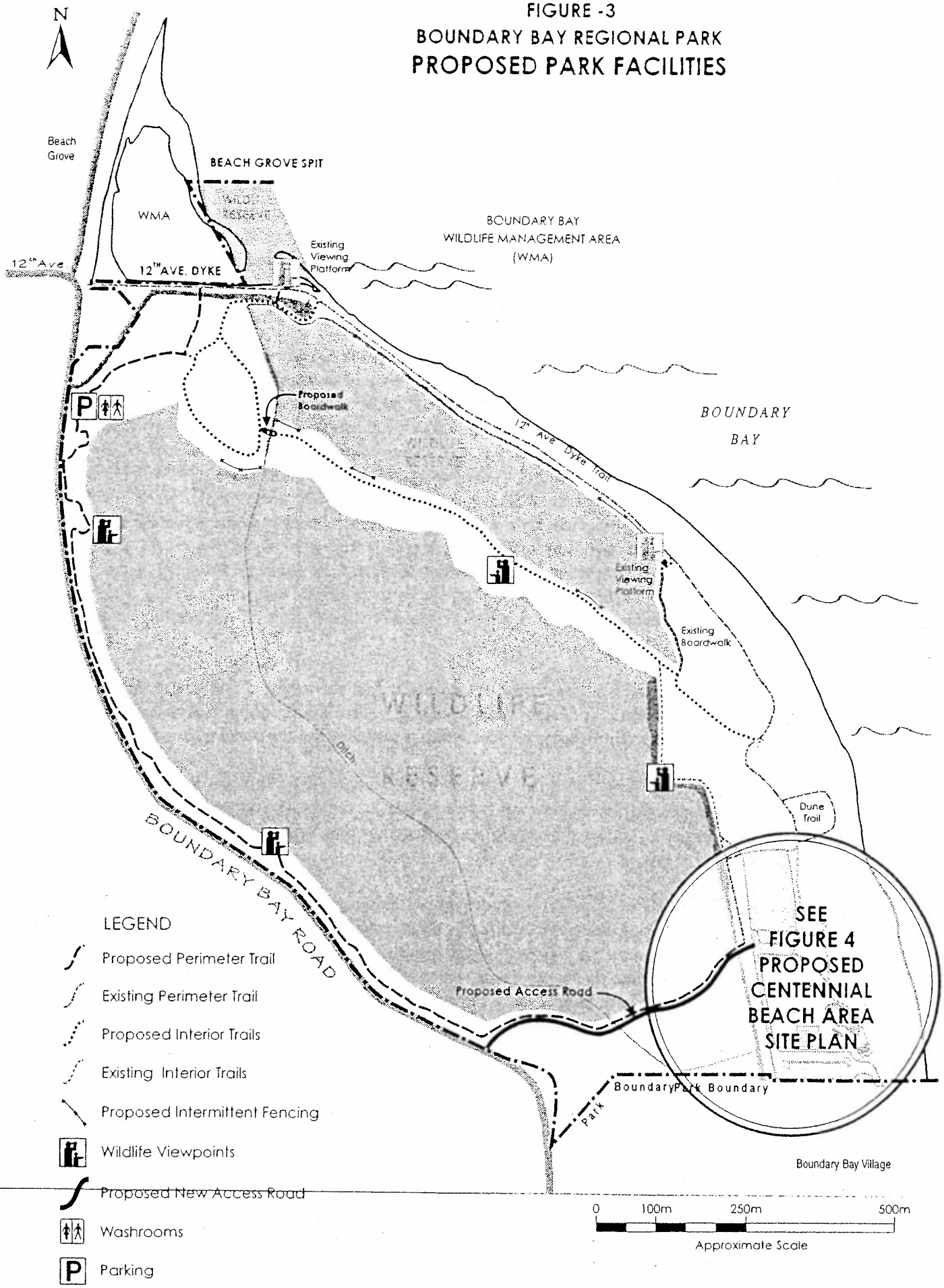
These areas will continue to be used primarily for "passive" types of recreation - walking, jogging, dog-walking, cycling (on designated trails), nature enjoyment and interpretation, and bird watching. They include: i) the existing walking/cycling path, dune interpretation trail, boardwalk and viewing tower north of Centennial Beach, ii) a perimeter trail adjacent to Boundary Bay Road and the new access road that connects to existing trails on the 12th Avenue dyke and Centennial Beach, and iii) interior trails between Wildlife Reserve Areas A and B (see Figures 2 and 3).

Park Reserves

Two Park Reserve areas are designated for future park uses: south of the proposed new access road and in the vicinity of Boundary Bay Road/12th Avenue. The latter site is primarily an area that was previously used as a dump site for construction fill. Future uses in the Recreation Reserves will be compatible with the management objective of the Park. Individual proposals for use of Park Reserves will be reviewed at the time each one is brought forward to GVRD Parks

for consideration. It is GVRD policy in developing park plans to define appropriate areas where citizen or interest group ideas for facilities or activities could be accommodated.

FIGURE -3
BOUNDARY BAY REGIONAL PARK
PROPOSED PARK FACILITIES



5.3 Park Facilities and Management

Centennial Beach Facilities

Several factors determine whether or not a recreational facility or activity is offered at a given Regional Park. Suitability of the site is key and includes other considerations, including environmental, neighbourhood and physical site elements. Recreation demand on a regional level, and Regional Park policy towards an activity in general are important, but site considerations must also be taken into account. Table 1 summarizes information from several sources about recreation demand relevant to Boundary Bay Regional Park.

The GVRD Parks system plan and policies identifies the activities that are generally provided in Regional Parks (1st column in Table 1). These are basic outdoor recreational activities, most of which presently occur at Boundary Bay. Regional surveys of potential park users help gauge demand for outdoor recreation The 2nd column in Table 1 highlights outdoor recreation activities for which there is a high regional demand. All of these activities take place at Boundary Bay Regional Park. On-site surveys of visitors to individual parks provide information about public desires and perceptions for those parks. A summary of facility requests made by more than 300 visitors to Boundary Bay Regional Park surveyed during the 1995 summer season are summarized in column 3. The results of comment forms from the February 1996 Open House are also summarized (column 4) and provide very specific comments on draft concepts presented at that time (see Appendix I). A challenge in park planning is to reconcile both regional and local recreation demands and perceptions of what a park "should be" like with its inherent features and potential.

Non-recreational facilities such as parking lots, washrooms, a service yard and caretaker are required at every Regional Park. A concession is usually provided as a service at beach parks. In addition, this type of facility returns some revenue which is used to offset the park operating costs.

In general, local residents who attended the February 1996 Boundary Bay Regional Park Concept Plan Open House supported the addition of facilities such as trails, picnic tables, washrooms, concessions and parking. A large number of local residents, however, disagreed with the provision of picnic shelters.

The recommendations outlined below for upgrading or providing new facilities at Centennial Beach are quite modest and are more limited than those proposed in the 1986 Concept Plan. These facilities are to be located in such a way as to avoid significant environmental and neighbourhood impacts (Figure 4). Approximately 44 percent of respondents at the June 1996 Open House agreed with the proposed layout of park facilities at Centennial Beach, while 26 percent were neutral and 30 percent disagreed.

TABLE 1
REGIONAL PARK DEMANDS AND RECREATIONAL PARK FACILITIES

GVRD PARKS POLICY	REGIONAL RECREATION DEMAND	SITE SPECIFIC PREFERENCES at Boundary Bay Regional Park	
Recreation Activities in Regional Parks (System Plan and Policies, 1985)	Source: Major Parks Plan Study (GVRD, 1995)	Summer Survey (1995) Visitors' suggestions for items needed in park:	Open House (February 1996) Percentage support for proposed opportunities (responses to comment form list)
• Walking • Picnicking • Nature Study • Fishing* • Beach Activities • Swimming • Horseback Riding* • Group Camping • Canoeing/Kayaking • Bicycling *Activities that cannot be provided or are not possible at the Centennial Beach area	High Demand Activities: • Walking • Bicycling on trails • Going to the beach • Nature study • Swimming outdoors • Birding • Picnicking	• Picnic tables 11% • Toilets 8% • Signs 6% • Trails 3% • Trees 2%	• Wildlife Reserves 62% • Perimeter Trail 66% • Interior Loop Trail 50% • 12th Ave. Washroom 49% • 12th Ave. Parking Lot 57% • Access Road 49% • Concession/washroom 43% • Family Picnicking 31% • Dog Off Leash Area 44 %** • Visitor Centre 31%** • Picnic Shelters 12%** • Parking expansion at Centennial Beach 13%** • Restaurant 11%** ** Activities opposed by more respondents than supported

Washrooms/Concessions

Existing washrooms at Centennial Beach are undersized for the number of visitors using the park and lineups are common even on moderately busy days. Eight percent of summer visitors surveyed in the park in 1995 wanted more toilets.

The Park Plan identifies a new Washroom/Concession building north of the playground and ball diamond adjacent to the gravel parking lot (Figure 4). This location is centered within the Centennial Beach area and would be directly served by the new access road.

The existing washroom/concession building requires upgrading, but the building structure is sound and provides a valuable service. Once the new concession is constructed, the old concession could function as a secondary food service during high visitor periods. Additional space may become available in this building when the new maintenance/service area is developed.

Visitor Centre

The Centennial Beach area of Boundary Bay Regional Park is situated on a spectacular waterfront site next to a bay that has international importance as a migratory and over-wintering area for waterfowl and shorebirds. The Park will reserve key lands for wildlife, especially raptors and

passerines. These birds provide enjoyment for visitors, and they are studied by school children in programs provided by GVRD Parks, the Friends of Boundary Bay and others. The Bay could be an attractive ecotourism destination but the mechanics of serving and promoting ecotourism have not been explored and are outside the scope of this plan. While there was strong support for an interpretive centre to serve all of Boundary Bay at the June 1996 Open House (67% support, 33% neutral, 0 against), there is no clear agreement as to whether or not such a facility should be located at Centennial Beach (43% agreed, 40% disagreed, 17% neutral).

Centennial Beach is the only area on the west side of Boundary Bay that could support a visitor centre, the nearest alternative being at Crescent Beach or Blackie's Spit. Centennial Beach is fully serviced and has adequate parking to support a visitor centre. Although there was a mixed degree of support for locating a visitor centre in Boundary Bay Regional Park at both the February and June 1996 Open Houses, GVRD Parks believes the international significance of Boundary Bay justifies allowing for one in the Park Plan. It is unlikely that GVRD Parks would build a visitor centre, however, GVRD will be receptive to proposals from others to build and operate one. Such proposals might originate from non-profit community groups, businesses, other government agencies or a coalition of all of the above. The GVRD Park Committee will be responsible for approving any arrangement with other parties for provision of a visitor centre.

The role of the Park Plan is to identify an appropriate site for a visitor centre. It should be annexed to the new washroom/concession building to minimize disruption to the Park's limited intensive land base and to economize space and site servicing. It could be as simple as a classroom or multi-purpose space with large windows looking out on the Bay. A small kitchen could be combined with this to make the space more versatile. Floodproofing of the visitor facility will likely be required.

Several financial institutions, foundations and private corporations have environmental project funds which might contribute to a visitor centre. Community groups have raised substantial sums for such projects in their local areas. For example, Rotary or the Lions Club may be potential sources of funds, or have access to other funding sources. In addition, any group proposing to build a visitor centre would have to identify sources of ongoing operating funds for the facility.

Picnic Sites

The 1986 Concept Plan proposed that 100-150 picnic tables be established in the Park over the short-term and that 300 tables would potentially be required over the longer term. Eleven percent of visitors surveyed in the 1995 summer survey requested more picnic tables. A review of the available space in the Park to accommodate different uses and the principle of avoiding environmentally sensitive areas, has determined that the 1986 estimates are probably not achievable nor desirable. It is recommended that the Centennial Beach area be the focus for picnicking activities and that the sensitive natural foreshore area to the north not be designated for picnic tables (Figure 4).

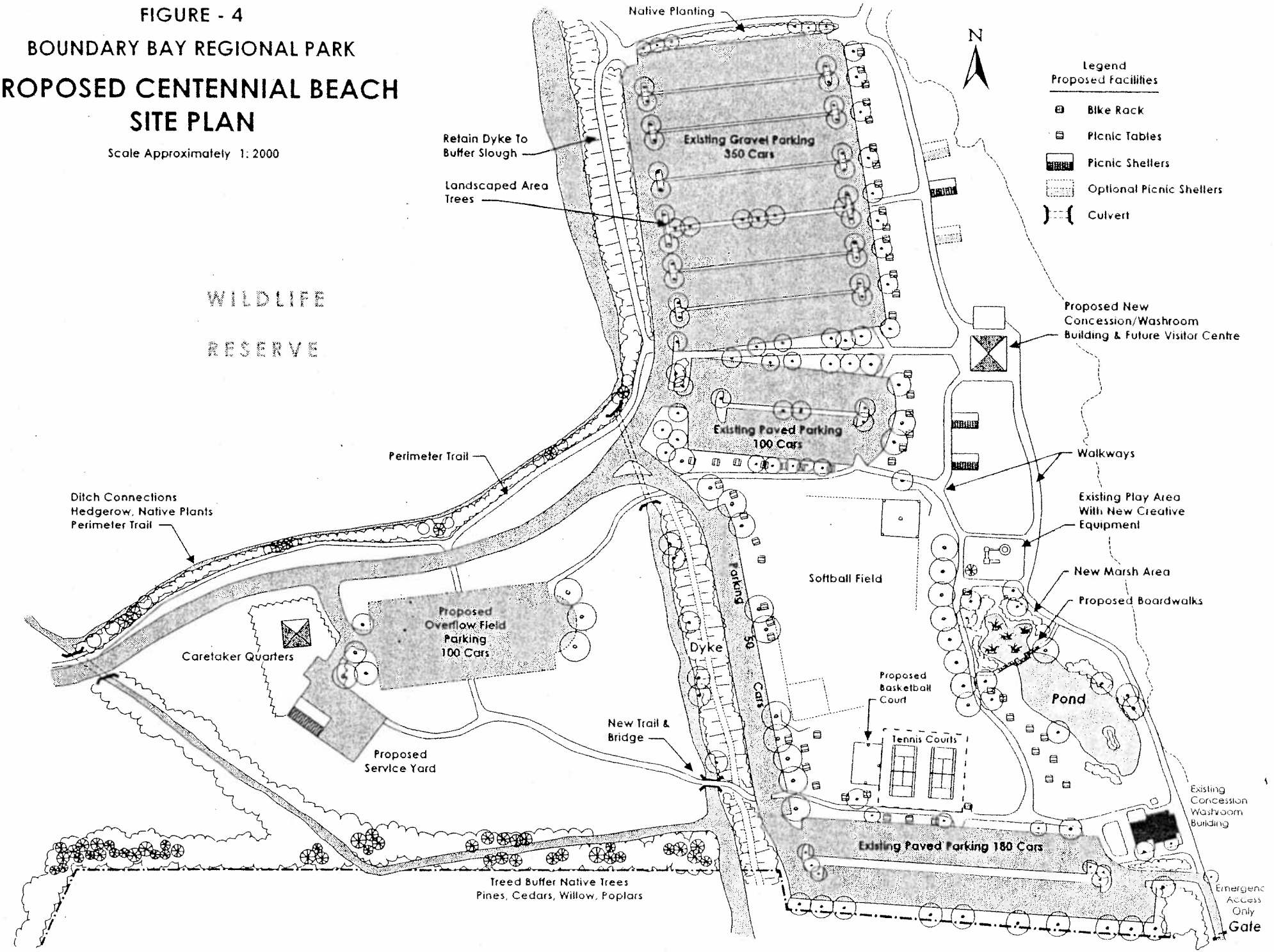
With the proposed relocation of the existing caretaker's residence, this area between the pond and tennis courts will be ideal for family picnicking. It is located near the small pond and will benefit from tree shade. Other picnic tables can be placed near the playground area, west of the tennis courts and small clusters east of the main parking lot. A total of 54 tables are proposed (Figure 4).

FIGURE - 4

BOUNDARY BAY REGIONAL PARK

PROPOSED CENTENNIAL BEACH SITE PLAN

Scale Approximately 1: 2000



Group Picnic Shelters

Group picnicking is popular in all Regional Parks wherever it is provided. Picnic shelters provide a degree of comfort in organizing a gathering in the event of poor weather. Regional Park picnic shelters can be reserved in advance. Scouts, Guides, Brownies, church groups, community groups, sports clubs, families and schools all make use of group picnic shelters. In 1995, Boundary Bay Regional Park had 18 group picnic bookings despite the fact there is no group picnic facility.

The 1986 Concept Plan proposed a group picnic area south of the new access road that would accommodate two picnic shelters of 110 people each. A review of this proposal has determined that this location is too separated from the main recreational activity areas of Centennial Beach and would possibly be too close to the property immediately to the south.

Three 20' x 20' picnic shelters (20 person capacity each) are now proposed for Centennial Beach (Figure 4). Two are located next to the ball diamond because the open field is frequently used by picnickers for races and games, including softball. The other shelter is north of the playground. This location is central to the main parking lot, open play area/ball diamond, playground and beach. It is also adjacent to the proposed new concession/washroom facility. If there is sufficient demand in the long term, two additional shelters could be added in this area.

Community Recreation and Sports

Boundary Bay Regional Park has a special role to play that is not typical of other regional parks. The Park provides for active community sports and play areas: baseball diamonds, tennis courts and playground. These were developed by the Corporation of Delta when they operated Centennial Beach as a municipal park years ago. These facilities have been maintained by GVRD under special agreement with Delta. It is not envisioned that this community recreation role will expand. One of the baseball diamonds may be removed in the future, however, for purposes of this plan, both diamonds are included.

A proposal for a basketball court has been put forward by local teenagers and a location is suggested on the site plan next to the tennis courts and ball field (Figure 4). The proposal received support from 32 percent of the respondents at the June 1996 Open House. Forty-five percent disagreed with the proposal and 23 percent were neutral. While the basketball court proposal meets GVRD's process for assessing special purpose projects on parkland (Appendix II), further discussion with the Corporation of Delta and park users is required before a final decision can be made. If approved, the proponents would raise money to build the court. The court can be fit within the site adjacent to the tennis court without loss of sensitive wildlife habitat or disruption of other park facilities. It will be available for public use, just as other Regional Park facilities are, and it is consistent with the small community recreation role that is being maintained at Centennial Beach.

The playground equipment at Centennial Beach is somewhat outdated but is still functional and well used. GVRD Parks has no plans or funding in place to upgrade the playground at this time. As equipment breaks down or is damaged beyond repair it will be removed and not replaced. If there is community interest in raising funds to update the playground, GVRD Parks will be supportive and will work with interested groups to achieve this goal. A new playground could be more concentrated in the same area which would free up space for additional picnic tables and planting of shade trees.

Restaurant

A restaurant in the Regional Park was strongly opposed by people who attended the February 1996 Open House. Seventy seven (77) percent of respondents did not want one provided at all. The restaurant is not shown on the site plan; however discussion of such a proposal may be brought forward at some future time. With the increasing amount of land GVRD manages as a result of the Provincial Nature Legacy Program and no more tax dollars available to meet these management obligations, GVRD must consider non-traditional ways of generating revenue. A restaurant can bring in money which can be used to pay for park operations and other services or facilities that people want. Such facilities are not unusual in parks and can be sensitively integrated with the natural surroundings and existing recreation uses.

If a restaurant is built at Boundary Bay Regional Park, it would have to be built as part of the new washroom/concession building, perhaps as a second storey or a special wing. A consultant study of food service potential in Regional Parks concluded that Centennial Beach had good prospects in the business sense as a restaurant location (West Bay Consultants, 1995).

New Park Access Road

The 1986 Concept Plan proposed a new park access road off Boundary Bay Road. This new proposed access received wide public support at the time, but construction was not possible without acquisition of the land to support it.

A new park access road between Boundary Bay Road and Centennial Beach is still proposed (Figures 3 and 4). The new park access is a much more direct route into the Park and will avoid the present situation of park traffic traveling through the Boundary Bay Village neighbourhood. During the summer Park destined traffic can be very heavy, averaging 500 vehicles per day.

A principle of keeping the new access road to the south as much as feasible has been adopted in order to minimize impacts to sensitive wildlife habitat. In addition, the road alignment is to avoid wetlands and seasonally flooded areas wherever possible. The road will be a maximum of two lanes and paved. The current park access through Boundary Bay Village will be closed to vehicular traffic following completion of the new road. Entry from Boundary Bay Village will be maintained for pedestrians, cyclists and emergency vehicles. At the June 1996 Open House 58 percent of respondents indicated that a new access road was appropriate given the present and expected future increase in volumes of traffic to the Park and public use of Centennial Beach (42 percent did not think it appropriate). Among those respondents who would benefit directly from the new Park access road (i.e., those who live in Boundary Bay Village), the approval rate was 89 percent.

Parking

Given the increasing visitor use of the Park, some additional parking capacity is likely to be required in the future. However, demand is not materializing to the extent predicted in the 1986 Concept Plan. Existing parking spaces at Centennial Beach are not presently used to capacity; even on peak use days the lots are not completely full. Opportunities for creating new parking lots in the Park are constrained due to a limited land base highly valued for wildlife and outdoor recreation (i.e., Centennial Beach area). Existing parking at the 12th Avenue entrance is outside the Regional Park and the odd shaped lot is often congested. There is no opportunity to improve or increase the size of this lot. Two new locations are therefore identified for future parking (Figures 3 and 4):

1) adjacent to Boundary Bay Road, south of 12th Avenue - (20 - 30 cars)
2) an overflow lot south of the new proposed access road - (100 cars)

The first location will help to relieve pressure on the existing 12th Avenue street end parking area. The size of the new lot adjacent to Boundary Bay Road has been dramatically scaled down from the 200 car lot proposed in the 1986 Concept Plan. This scaling down is primarily because the intensive beach use area on Beach Grove Spit is no longer being considered. The lot will provide a staging area for accessing the perimeter trail system and the 12th Avenue dyke. The proposed location is currently covered with old fill and debris. A gated entrance off Boundary Bay Road already exists. Simple, self-contained toilets will be provided. A sign showing the Park boundaries, trails and other facilities would also be located here. There would also be an opportunity to expand this lot somewhat in future if there were sufficient need.

The proposed overflow lot south of the new Park access road is meant to function in response to peak demand days at Centennial Beach (Figure 4). It may not need to be paved or graveled, and would be just a grassy area when not required for parking. It would be similar to the grass field at Deas Island Regional Park that is used for special event parking. In addition, 50 more spaces are possible along the west side of the baseball fields and perhaps 6-10 more spaces will be available when the existing access from Centennial Parkway is closed. Paving the main gravel parking lot would increase parking capacity by another 8 percent or about 70 spaces. Thus, the total parking capacity at Centennial Beach could be increased from 620 to 800 spaces (870 spaces if main gravel lot is paved).

Wildlife Viewing and Interpretation

GVRD and other groups offer educational and interpretive programs in Boundary Bay Regional Park. With the addition of the Wildlife Reserves and proposed perimeter and interior trails adjacent to these areas, excellent wildlife viewing and interpretation opportunities will be available. Four viewing sites are identified (Figure 3). One of these is located on the old dyke. Here, a simple wooden deck and railing extending a few feet off the existing dyke would be adequate. An interpretive sign could discuss the important wildlife values associated with the old field habitat and mention several species which are visible from the viewing site. Another theme would be to discuss how the Wildlife Reserve contributes to compensation for lost wildlife habitat at Sea Island. The other viewing locations could be raised areas, using fill, approximately one metre in height. Another possibility would be to have one of the sites, perhaps on the interior trail, as a simple blind set in among shrubs or hedgerow with a bench provided.

Trails

Perimeter Trail

A perimeter trail that will serve pedestrians and cyclists is recommended around the entire Regional Park (Figure 3). On the west it will parallel Boundary Bay Road and connect to the 12th Avenue dyke to the north and Centennial Beach to the south. It would run along the north edge of the new access road. Where the trail is adjacent to the Wildlife Reserve there will be appropriate separation between the trail and reserve via hedgerows and ditching. Opportunities for wildlife viewing will also be provided at suitable locations and breaks in the hedgerows will enable views into the interior of the Park. This trail will be approximately 3 metres wide and constructed of compacted granular material to accommodate pedestrians and cyclists.

Interior Trails

The interior trail for pedestrians only, running along the old dyke (beginning at Centennial Beach, and continuing north to the 12th Avenue dyke) will be formalized (Figure 3). This trail runs adjacent to the Wildlife Reserve areas and offers excellent wildlife viewing and interpretation opportunities. The trail will be separated from the Wildlife Reserves through a combination of hedgerows and some fencing (not chain link). The trail would be approximately 1.5 - 2 metres wide and would be composed of compacted granular material. The path will cross the ditch with a wooden boardwalk and connect with a loop trail south of the 12th Avenue dyke. Connections are proposed to the 12th Avenue dyke near the pumphouse and to the new parking lot adjacent to Boundary Bay Road, with an optimal second ditch crossing to the 12th Avenue dyke in future, near the Park entrance (Figure 3).

It is proposed that the fill placed south of the 12th Avenue dyke and in the vicinity of the loop trail be removed. Aesthetically, the fill does not fit with the surrounding landscape and is of no value to wildlife. A portion of the fill could remain as it provides for a gravel pathway running east from Boundary Bay Road and connecting to the loop trail. When removing this material, opportunities may exist to use it for a trail base or the proposed 20-30 car parking lot adjacent to Boundary Bay Road near 12th Avenue.

Linkage to East Delta Dyke Trail

In the short term, the best connection between Boundary Bay Regional Park and the East Delta Dyke Trail to the north appears to be along Beach Grove Road to the street end at 17A Avenue. This route, which is approximately 1.6 km is the most direct and offers sightlines between residences to Boundary Bay. Over the longer term, it may be preferable to establish a shoreline link if it can be demonstrated that there will be minimal disturbance to wildlife or residences fronting the shoreline. An informal one exists now for local residents along the Beach Grove Spit through the Boundary Bay Wildlife Management Area (WMA). This will have to be done in cooperation with BC Environment (the lead agency responsible for the WMA), local residents, Corporation of Delta, GVRD and other agencies.

Dog Off -Leash Area

The GVRD Parks Bylaw requires that all dogs within Regional Parks be on leash and under the control of their owners at all times. The Corporation of Delta Leash Bylaw also applies throughout Boundary Bay Regional Park. Because of the significant interest in walking dogs off-leash in the Park, options were presented for a well defined dog off-leash area within the Park at both the February and June 1996 Open Houses. However, no clear consensus has emerged from the two Open Houses on either the desire for a dog off-leash area or its possible location. Therefore, until more discussion can occur on this issue with both dog owners and other park users, the issue has been set aside. Dogs in the Park are a management issue. However, the Boundary Bay Regional Park Plan can be adopted at this time without resolution of this matter.

Based on input received from dog walkers who visit Boundary Bay Regional Park, the most preferred location for a dog-off leash area seems to be in the vicinity of the interior trail (Appendix III). A Dog-Owner's Code of Ethics (rules of conduct) for the control of dogs within the dog off-leash area was also suggested. If there is enough support in future, a task force comprised of dog owners and other park users could be formed to explore further options for a dog off-leash area and the management of dogs within the Park.

Landscape Buffers

Buffers of trees and shrubs are identified in the Park Plan for several areas. A buffer of trees and hedges along the southern property boundary should be planted to provide a visual screen to the new park access road (Figure 4). This buffer will also separate active park use/services from the lands to the south and east. A buffer of trees is also proposed along sections of Boundary Bay Road (see Section 6). This buffer should be planted in clumps to permit views from Boundary Bay Road into the Park. Hedgerow buffers are proposed in areas where trails and Wildlife Reserves abut one another in order to prevent public access to sensitive wildlife areas (Section 6; Figure 8). These tree and shrub buffers also provide important wildlife habitat. There is also an opportunity to enhance the landscaping in the Centennial Beach area, particularly around the pond.

Caretaker's Residence

A new caretaker's residence and maintenance area are proposed south of the new access road (Figure 4). The caretaker plays an important role in park safety and security. The caretaker opens/shuts gates and provides a watchman/security function, particularly to deter any after hours park use. There are at least three options for a new caretaker's residence. One would be to move the existing trailer to the new site. This would be the least expensive. A second option would be to construct a new facility. A third option has recently become available to the GVRD. The Cammidge House, a 1907 Tsawwaassen farmhouse located across Boundary Bay Road from the Park, has been offered to the GVRD for relocation to the Park as a caretaker residence. The facility may also serve as multi-use space for park visitor use and park activities. This option was presented to visitors at the June 1996 Open House. Fifty-five percent of respondents were in favour of accepting the offer, while 23 percent were against and 21 percent were neutral. As the park is in the floodplain, any structure will require floodproofing (filling to the appropriate height). All electrical connections must also be floodproofed.

Park Service Centre

The Park's maintenance staff currently work out of a workshop in the existing washroom/concession building. All park equipment, building materials, etc. are stored in a small shed/compound next to the caretaker's residence. Present storage space is so cramped that standard park maintenance equipment such as a grass mower cannot be stored on-site. The storage and workshop functions are inadequate due to limited space, conflicts with the concessionaire and safety concerns of construction/maintenance activities in and around a heavily used public area. A modest maintenance building/workshop and small enclosed yard for equipment and material storage is required. This will be located in the same vicinity as the new caretaker's residence (Figure 4). A small office/storage room could remain within the existing concession/washroom building to ensure a continual staff presence in the busy beach area.

Other

<u>Dyking</u>

In 1986 there was a perceived need for a new flood protection dyke to be located within the Park boundaries, either along a foreshore alignment or just inland. The need for this dyke does not appear to be as critical now. There is no need for a dyke within the Park to protect park property and amenities. However, should municipal or provincial authorities require a dyke in the future, the preferred alignment from a park use and wildlife management perspective is adjacent to Boundary Bay Road.

Drainage

Almost all stormwater drainage in the south Tsawwassen area is discharged into Boundary Bay at three outfall locations in and around Boundary Bay Regional Park: 1) the 12th Avenue gravity outfall, 2) the 3rd Avenue pump station, and 3) the 12th Avenue pump station.

The 12th Avenue pump station needs to be upgraded to meet the current flood standards set by the Corporation of Delta. The 3rd Avenue pump needs to be relocated to alleviate traffic conflicts and safety liability concerns on 3rd Avenue. There is also a concern over the quality of runoff waters discharging into Boundary Bay as they are known to contain high levels of fecal coliform at certain times of the year. Most of the proposed stormwater facility upgrades include alternatives for stormwater detention in Boundary Bay Regional Park.

Drainage features inside the Regional Park include a northerly aligned ditch that runs the entire length of the Park, ditches aligned along existing dykes, and natural drainage paths following low depressions. Drainage within the Park generally moves in a northerly direction toward the 12th Avenue pump station. Some of the deeper ditches and the pond in the Centennial Beach area are the only sources of permanent open freshwater. The ditch which runs alongside the old dyke at Centennial Beach is dependent upon water that flows northward from the ditch/slough on the property immediately to the south. This ditch system provides important habitat for a variety of wildlife. All other flooded areas in the Park are seasonal in nature. Flooding is extensive in fall and winter, but the ground surface is generally dry in summer.

In the 1986 Concept Plan, an elaborate retention pond and freshwater wetland system was proposed for the area between Boundary Bay Road and Centennial Beach. The system was based on stormwater input from a large scale residential development proposal immediately west of the Regional Park. However, because the current management emphasis for this area is enhancement of old field habitat, less extensive ponding and wetland creation is recommended. This is discussed more fully in the Wildlife Habitat Enhancement section (Section 6).

At the present time it is uncertain what drainage facility improvements The Corporation of Delta will be making in the surrounding area and how this could affect drainage through the Regional Park. As discussed above, the existing ditches in the Park are largely dependent upon inflows of water from the property to the south. Continuation of this flow is important to the maintenance of the Park's freshwater wetland habitat. Further discussions with The Corporation of Delta and the property owner to the south will be required to ensure any drainage improvements are beneficial to these habitats.

6.0 WILDLIFE HABITAT MANAGEMENT AND ENHANCEMENT

This section of the Park Plan:

- describes the major habitat types found within Boundary Bay Regional Park and the wildlife that utilize these habitats
- proposes habitat management objectives
- outlines habitat management and enhancement prescriptions
- describes the schedule and costs for implementing the habitat management and enhancement prescriptions

6.1 Major Habitat Types

The eight general habitat types found within Boundary Bay Regional Park include:
a) Deciduous Woodland; b) Shrubland; c) Wet Old Field; d) Dry Old Field/ Grassland;
e) Seasonal Wetland; f) Saltmarsh; g) Ditch; and h) Tidal Flats (Figure 5).

Deciduous Woodland

Deciduous woodland is most prevalent at the northern and northwestern end of the Regional Park (see Figure 5). Paper birch (*Betula papyrifera*), red alder (*Alnus rubra*), black cottonwood (*Populus balsamifera*) and Lombardi poplar (*Populus* spp.) are the dominant tree species. No coniferous tree species occur within the Park.

Shrubland

Shrubland areas are most extensive in the northern third of the Regional Park. Native stands of hardhack (*Spiraea douglasii*) are particularly prevalent, however, rose (*Rosa* spp.) is also common in some areas. Dense stands of Himalayan blackberry (*Rubus discolor*) and Scotch broom (*Cytisus scoparius*) occur in fill and disturbed areas along the northwestern end of the Regional Park.

Hedgerow vegetation is currently limited to a narrow band between the ditch and the parking lot in the southeastern area of the Park. Typical naturally occurring hedgerow plant species include Pacific crab apple (*Malus fusca*), hawthorn (*Crataegus* spp.), Himalayan blackberry, rose, common snowberry (*Symphoricarpos albus*) and red elderberry (*Sambucus racemosa*). Individual Pacific crab apple and hawthorn shrubs occur intermittently throughout open field habitats in the lower two-thirds of the Regional Park.

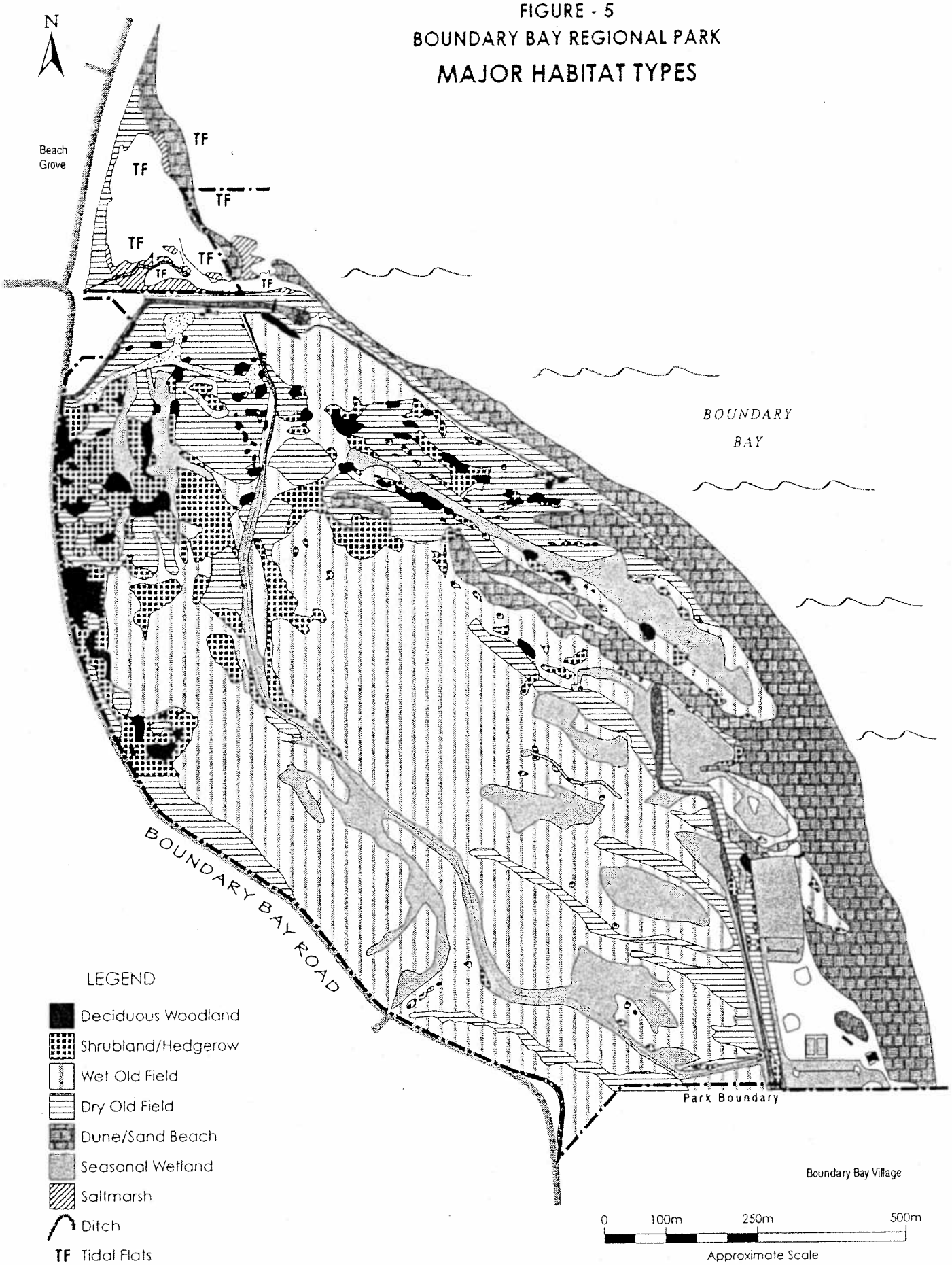
Wet Old Field

Wet old field is common throughout most low-lying areas of Boundary Bay Regional Park. Plant species composition includes a number of grasses (*Graminae*) such as the widespread dune bentgrass (*Agrostis pallens*). Canada thistle (*Cirsium canadensis*) is present in some areas.

FIGURE - 5

BOUNDARY BAY REGIONAL PARK

MAJOR HABITAT TYPES



Dry Old Field/ Grassland

Dry old field habitats are restricted to better drained sites, on old dune systems along eastern portions of the Regional Park, on fill areas in the northwest corner, and a narrow strip along Boundary Bay Road. Plant species include a variety of grasses and herbs including yarrow (*Achillea millefolium*), curled dock (*Rumex crispus*), entire-leaved gumweed (*Grindelia integrifolia*) and Canada goldenrod (*Solidago canadensis*). Large headed sedge (*Carex macrocephala*) occurs on some old dunes.

Seasonal Wetland

Seasonal wetlands are dominated by cattail (*Typha latifolia*), common rush (*Juncus effusus*), Baltic rush (*Juncus balticus),* hardhack, creeping buttercup (*Ranunculus repens*), reed canary grass (*Phalaris arundinacea*), and some bulrush or tule (*Scirpus lacustris*). Purple loosestrife (*Lythrum salicaria*) is encroaching in several areas.

Saltmarsh

Saltmarsh habitats are most prevalent north of the 12th Avenue dyke along the edges of the tidal lagoon. However, some remnant saltmarsh vegetation occurs south of the dyke. Saltmarsh species identified by Sigma (1985a and 1985b) include creeping spike-rush (*Eleocharis palustris*), seashore saltgrass (*Distichlis spicata*), Pacific silverweed (*Potentilla pacifica*), spearscale (*Atriplex patula*), Lyngby's sedge (*Carex lyngbyei*), entire-leaved gumweed, seacoast bulrush (*Scirpus maritimus*) and Baltic rush.

Ditches

The four primary ditch systems within the Regional Park are located: a) at the extreme northwest end between Boundary Bay Road and the 12th Avenue pump house; b) along the dyke at the northeast end; c) through the west portion of the Park running north/south; and d) along the old dyke next to Centennial Beach (see Figure 3). Some unidentified aquatic vegetation is found within the ditches. Ditches are bordered by emergent vegetation such as cattails and by shrub vegetation including hardhack, rose, Pacific crab apple and hawthorn.

Tidal Flats

Vascular plants are generally absent from the high tidal flats within the Boundary Bay Wildlife Management Area, adjacent to the Regional Park. Extensive eelgrass beds in the low intertidal zone are dominated by Japanese eel-grass (*Zostera japonica*), common eel-grass (*Z. marinus*) and sea lettuce (*Ulva* spp.)(Forbes 1972; Baldwin and Lovvorn 1992).

6.2 Wildlife Resources and Habitat Utilization

Birds

Approximately 40 of the more than 200 bird species recorded in Boundary Bay Regional Park are known to nest (Poynter 1990, Appendix IV; Poynter 1996, Appendix V). Summers (1996) conducted bird surveys between October 1995 and March 1996. These are presented in Table 2. References with additional information on birds of the Boundary Bay area include Butler and Campbell (1987),

Butler and Cannings (1989), Price (1990), Butler (1992), and Gebauer (1993b). Common bird species utilizing habitats within Boundary Bay Regional Park are described below.

TABLE 2
RELATIVE ABUNDANCE (I.E., TOTAL NUMBERS OF EACH SPECIES ACROSS ALL COUNTS) OF BIRDS RECORDED ON SURVEYS CONDUCTED BETWEEN OCTOBER 1995 AND MARCH 1996 AT BOUNDARY BAY REGIONAL PARK (Summers 1996)

Species	#	Species	#	Species	#
Raptors and Herons		European Starling	1,994	White-crowned Sparrow	19
Great Blue Heron	332	Northern Shoveler	891	American Pipit	17
Northern Harrier	130	Red-winged Blackbird	488	American Goldfinch	12
Red-tailed Hawk	61	Song Sparrow	387	Tree Swallow	9
Short-eared Owl	44	House Finch	333	Ring-necked Pheasant	9
Bald Eagle	29	Western Meadowlark	300	Violet-green Swallow	8
Rough-legged Hawk	21	Dunlin	216	Yellow-rumped warbler	8
Northern Shrike	19	Canada Goose	183	Cedar Waxwing	7
Unidentified hawk	4	American Robin	162	House Sparrow	4
Cooper's Hawk	3	Savannah Sparrow	114	Killdeer	5
American Kestrel	2	Northern Flicker	100	Bufflehead	5
Peregrine Falcon	1	Black-capped Chickadee	94	Gadwall	3
Merlin	1	Dark-eyed Junco	87	Golden-crowned Sparrow	3
Sharp-shinned Hawk	1	Marsh Wren	83	Lincoln's Sparrow	3
		Spotted Towhee	44	Fox Sparrow	2
Other Birds		Northwestern Crow	32	Chipping Sparrow	2
Mallard	11,907	Golden-crowned Kinglet	29	Gulls	2
American Wigeon	7,168	Bushtit	27	American Coot	1
Green-winged Teal	3,443	Pine Siskin	23	Downy Woodpecker	1
Northern Pintail	2,987	Common Snipe	23	Plover Species	1

Deciduous Woodland

Deciduous woodland habitats are utilized by numerous bird species in all seasons. During the summer, black-capped chickadee (see Appendix V for scientific names), tree swallow, American robin, black-headed grosbeak and northwestern crow nest. One pair of Cooper's hawks has nested successfully in birches at the north end of the Regional Park for the previous five years. Although red-tailed hawk utilize the Park extensively for foraging throughout the year, they currently do not nest. Pairs are known to nest at Beach Grove and the Spetifore Lands west of Boundary Bay Road (A. Poynter, pers. comm., 1996). Taller woodland trees are used as perch sites for red-tailed hawk and bald eagle.

Yellow-rumped warbler, Pacific-slope flycatcher, vireos, and thrushes are some of the many species that occur during migration. In winter, pine siskin, and occasionally purple finch are present.

Shrubland and Hedgerow

Birds breeding in hedgerow habitats throughout the Regional Park include American goldfinch, American robin, Bewick's wren, cedar waxwing, bushtit, house finch, northwestern crow, orange-crowned warbler, spotted towhee, white-crowned sparrow and song sparrow. In winter, low numbers of Cooper's hawk, sharp-shinned hawk and Merlin hunt songbirds along the hedgerows.

Non-breeding songbirds such as fox sparrow, golden-crowned sparrow, dark-eyed junco, northern shrike and American tree sparrow are attracted to hedgerow habitats in winter. Passerine species utilizing shrubland and hedgerow habitats during migration include yellow-rumped and orange-crowned warbler, Lincoln's sparrow and Pacific-slope flycatcher.

Wet and Dry Old Field/Grassland

The high abundance of Townsend's voles (*Microtis townsendii*) in old field habitats attracts a wide diversity of raptors, especially in winter. Common raptor species (i.e., approximately 2-3 individuals) are northern harrier, barn owl, short-eared owl, and red-tailed hawk. Rough-legged hawk and great horned owl occur less frequently and at lower numbers. All of these species, with the exception of rough-legged hawk, a solely wintering species, also nest in or adjacent to Boundary Bay Regional Park. In some years, American kestrel and long-eared owl utilize these habitats during the winter or migratory period. By restricting access and decreasing human disturbance, short-eared owls and northern harriers may be expected to nest in the future. Both species have nested here in the designated Wildlife Reserves in the past.

Numerous great blue herons hunt Townsend's voles in old field habitats during the winter, and forage for sticklebacks and frogs along ditches throughout the year. Herons likely originate from the large colony of approximately 400 nests in Point Roberts (Gebauer 1995).

Savannah sparrows are common breeders in the old field habitats. In winter, field habitats attract European starling, red-winged blackbird, Brewer's blackbird and western meadowlark. Horned lark and American pipit occur during spring and fall migration. Killdeer may attempt to nest in some areas.

Seasonal Wetland

Waterfowl such as northern pintail, American wigeon, green-winged teal, mallard and northern shoveler are attracted to flooded fields and wetlands in winter. Flooded fields also attract shorebirds such as dunlin, greater yellowlegs, dowitchers and common snipe (A. Poynter, pers. comm, 1996).

Marsh wren, red-winged blackbird and common yellowthroat are regular breeders in shrub vegetation in seasonal wetlands, especially in areas with extensive cattail or tule (i.e., bulrush) marshes. Northern harrier attempted to nest in one of the cattail marshes in 1994 and 1995 but apparently were disturbed during incubation by free running dogs (A Poynter, pers. comm., 1996).

Saltmarsh

Numerous migratory and wintering shorebirds, gulls and waterfowl are attracted to saltmarsh and estuarine marsh habitats in the Beach Grove Lagoon north of the 12th Avenue dyke. The lagoon is recognized by naturalists as one of the premier birdwatching areas within Boundary Bay. Most of the shorebirds and waterfowl listed in Appendix IV have been observed in this area.

Ditches

Mallard, American wigeon, green-winged teal and gadwall utilize ditch habitats throughout the Regional Park during the winter. Waterfowl species that nest along ditches are mallard, cinnamon teal and blue-winged teal. Sora is also known to nest, primarily along the cattail-lined ditch at the southeast end of the Park.

Tidal Flats

Tidal flats are of greatest importance to birds in winter. Large flocks of northern pintail, green-winged teal, American wigeon and mallard congregate in Boundary Bay along with thousands of dunlin and hundreds of black-bellied plovers. Bald eagles forage on sick or injured waterfowl, while peregrine falcon, merlin and occasionally gyrfalcon hunt shorebirds and green-winged teal. In migration, numerous shorebirds, such as western sandpipers, stop to rest and feed on the rich tidal flats (see Appendix 12 in Butler and Cannings 1989).

Mammals

Mammal species commonly encountered in Boundary Bay Regional Park include Townsend's vole, coast mole (*Scapanus orarius*), raccoon (*Procyon lotor*), eastern cottontail (*Sylvilagus floridanus*) and coyote (*Canis latrans*).

From the number of runways in old field habitats, Townsend's vole appears to be the most abundant mammal. Other mammal species expected to occur include opossum (*Didelphis virginiana*), bats, vagrant shrew (*Sorex vagrans*), muskrat (*Ondatra zibethicus*), mink (*Mustela vison*), striped skunk (*Mephitis mephitis*), ermine (*Mustela erminea*) and possibly spotted skunk (*Spilogale putorius*). Introduced rodent species such as brown rat (*Rattus rattus*), Norway rat (*Rattus norvegicus*) and house mouse (*Mus musculus*) are all likely present (Cowan and Guiguet 1965). Gray Squirrel (*Sciurus carolinensis*) has recently expanded its range into the Park. Beaver (*Castor canadensis*) and black-tailed deer (*Odocoileus hemionus*) have been recorded rarely (A. Poynter, pers. comm., 1996).

Gray whales (*Eschrichtius robustus*), harbor porpoise (*Phocoena phocoena*) and harbor seal (*Phoca vitulina*) have been seen from the Regional Park utilizing off shore areas.

Amphibians and Reptiles

Amphibian species occurring in the Park include Pacific tree frog (*Hyla regilla*), introduced green frog (*Rana clamitans*), and possibly western toad (*Bufo boreas*). These species appear to be restricted to ditch areas with permanent water. The two reptile species likely to occur include northwestern garter snake (*Thamnophis ordinoides*) and common garter snake (*T. sirtalis*).

Insects and Fish

Butterfly species with known breeding colonies on the Boundary Bay foreshore include anise swallowtail (*Papilio zelicaon*), purplish copper (*Epidemia helloides*) and mustard white (*Artogeia napi*). The anise swallowtail is attracted to angelica and cow parsnip.

No fish of commercial importance utilize ditch habitats. Fish species that may be present include threespine stickleback (*Gasterosteus aculeatus*) and sculpin (*Cottus* spp.).

6.3 Habitat Management Objectives

The primary habitat management goal for Boundary Bay Regional Park, which is based on the objectives of the Vancouver International Airport Wildlife Habitat Compensation Program, is *to enhance habitats for raptors, great blue herons, passerines, and to a lesser extent, waterfowl*. Specific wildlife habitat management objectives for Boundary Bay Regional Park include:

- maintenance and enhancement of old field habitats
- maintenance and establishment of shrubland and woodland habitats
- maintenance and establishment of hedgerow
- maintenance and creation of freshwater wetlands/ditches
- maintenance and enhancement of saltmarsh and tidal flats
- placement and maintenance of raptor perch pole and shrub placement
- establishment of nest boxes

GVRD Parks and Environment Canada have worked together to produce a broad wildlife enhancement plan for several Regional Parks and other areas in the Lower Mainland that could benefit from habitat enhancement funds available through the Vancouver International Airport Wildlife Habitat Compensation Program. Boundary Bay Regional Park is a priority site within this broader regional plan (Summers and Gebauer 1996).

Public access will not be permitted within the designated Wildlife Reserves.

Maintenance of Old Field Habitats.

An important wildlife habitat management objective is to maintain and enhance old field habitats for wintering and breeding vole-eating raptors. Increases in Townsend's vole populations and provision of good prey visibility for raptors will be the focus of old field enhancement.

Field Renovations

Field renovations such as tilling and possibly seeding will be necessary for fields that have passed the optimum stage of field succession. A desirable field structure is one of low to moderate grass height (25-50 cm) and density, and a litter mat from 10-15 cm deep (Wiebe 1988; Butler 1992). Field renovations are not expected to alter current hydrological conditions. Haying is not recommended because resultant vegetation is tall and dense making the area less attractive to hunting raptors, and because of potential impacts to nesting birds. Maintenance of old field habitats by managed grazing should be considered as a future possible option to mowing.

Removal of Woody Vegetation and Undesirable Herbaceous Plants

Woody vegetation originating from seed dispersal and/or expanding hedgerows, shrublands or woodlands adjacent to old field habitats will require periodic removal. Maintenance of an established field edge is essential to confine hedgerows, shrublands and woodlands within acceptable corridors. Retention of occasional individual hawthorn or crabapple shrubs is desirable within old field habitats as a natural alternative to temporary, artificial perch poles. As well, retention of some dense woody or herbaceous vegetation patches (e.g., hardhack or tall grass patches) will potentially provide breeding sites for raptors such as northern harrier and short-eared owl.

If undesirable herbaceous plants such as goldenrod and tansy become well established locally, removal by hand or tilling may be necessary.

Control of Noxious Weeds

Plants such as Canada thistle are considered to be noxious weeds and must be controlled under the Noxious Weed Act and a Corporation of Delta bylaw if they are a problem for agricultural reasons. Although thistles are heavily used by finches such as American goldfinch, extensive, uncontrolled patches may limit prey visibility for raptors. If control is necessary, thistles must be removed using brush saws rather than by chemical means, just prior to blooming. Annual removal of thistle (i.e., approximately 0.1 ha) may be necessary on an as-required basis.

Shrubland and Woodland Establishment and Maintenance

Another specific habitat management objective for the Regional Park is the maintenance and establishment of shrubland and woodland habitats for passerines and nesting raptors.

Maintenance of Shrubland and Woodland Boundaries

Considerable woody vegetation exists throughout the Regional Park, especially in northern and northwestern areas. Borders with old field habitats will need to be delineated and maintained. Periodic cutting and/or tilling will likely be required to contain woody vegetation within these boundaries.

Planting of Desirable Shrub and Tree Species

Woodland areas are currently dominated by tree species such as alder, birch and poplar. Planting of additional species such as cedars, which currently do not occur in the Park, would provide roosting opportunities for owls and passerines. Planting of fruit-bearing plants such as Sitka mountain-ash (*Sorbus sitchensis*), bittercherry (*Prunus emarginata*) and saskatoon (*Amelanchier alnifolia*) would provide additional foraging opportunities for birds.

Removal of Undesirable Woody Vegetation

Removal or control of undesirable woody vegetation such as blackberries will be necessary if they begin to overtake shrubland or woodland areas. Large blackberry patches at the northwest corner of the property will require immediate attention. Broom, generally of low value to wildlife, should be removed from all areas of the Regional Park. Although blackberry and broom control is initially labour intensive and requires an annual commitment to maintenance, control of these species will improve wildlife habitats. Initial control and annual maintenance should result in lower long-term maintenance costs.

Hedgerow Establishment and Maintenance

Another specific habitat management objective for Boundary Bay Regional Park is the maintenance and establishment of hedgerow habitats along fences, roads and ditches for passerines and roosting or perching raptors.

Establishment of Hedgerow Vegetation

Establishment of hedgerow vegetation along existing fences, ditches and roads will provide additional nesting opportunities for passerines as well as provide perching areas for raptors, especially in winter. Suitable hedgerow species include Pacific crabapple and hawthorn, both of which occur naturally in Boundary Bay Regional Park. Hedgerow vegetation can be established by transplanting plants removed from designated old field habitats or from nursery stock. Planting shrubs on soil mounds may be necessary in low-lying areas.

The banks of new ditches and proposed fresh water wetlands should also be planted with hedgerow vegetation. Benefits to nesting passerines, wintering raptors and waterfowl will result.

Maintenance of Hedgerow Boundaries

Borders with old field habitats need to be delineated and maintained. Periodic hand cutting or tilling of old field borders will likely be required to contain woody vegetation.

Removal of Undesirable Woody Vegetation

Removal or control of undesirable woody vegetation such as blackberries will be necessary if hedgerow species are being impacted. Regular vegetation control will improve hedgerow habitats within the Regional Park and result in lower long-term maintenance costs.

Maintenance and Creation of Freshwater Wetlands/Ditches

Currently, most of the freshwater wetlands within the Regional Park are of a seasonal nature. Creation of a new lagoon along the southeastern dyke will benefit wintering, migratory and breeding waterbirds. Creation of additional lagoons may be possible if storm water is redirected from the 3rd Avenue pump station through the Park's open ditch network to the 12th Avenue pump station. Lagoons should be constructed without islands to discourage nesting by Canada goose. Lagoon edges should be gently sloping and planted with emergent vegetation if adequate water levels can be maintained during the summer.

Construction of ditches between perimeter recreational trails and important wildlife areas (see Wildlife Reserves) will help prevent unwanted incursions into sensitive habitats by people or dogs. Hedgerow vegetation planted along ditches and lagoons will provide buffering of sensitive habitats, increase nesting opportunities for passerines, and provide perch sites for raptors.

Maintenance and Enhancement of Saltmarsh and Tidal Flats

Saltmarsh and tidal flat habitats within the Regional Park are limited to the Beach Grove Lagoon north of the 12th Avenue dyke. Enhancement of these important wildlife habitats may be possible by improving tidal flushing within the lagoon and by removing log and other debris that has accumulated on saltmarsh areas.

Raptor Perch Pole/Shrub Placement and Maintenance

Perching habitats can be improved with planting of hedgerow vegetation along existing ditches, and ditches constructed to control access into Wildlife Reserves. Additional perch sites, such as an

occasional hawthorn or crabapple shrub should be provided in old field areas. Metal or wooden poles at various heights can serve as temporary perches until shrubs have grown. Hawthorn and crabapple shrubs should be planted on slightly mounded or raised areas, especially in seasonally flooded fields. Plant material can be from nursery stock or transplants from other areas of the Regional Park to be managed as old field habitat.

Nest Box Establishment

Due to the scarcity of nesting habitats for cavity nesters, nest boxes for a variety of bird species should be installed. Maintenance of nest boxes will be required on an annual basis, but can only be implemented if a local naturalists or other group volunteers to undertake maintenance activities.

Barn Owl Nesting Habitat

Since no nesting opportunities currently exist for barn owls in Boundary Bay Regional Park, strategically placed nest boxes are expected to result in an increased resident barn owl population. Currently, the Regional Park appears to be utilized by barn owls nesting in the vicinity of Beach Grove Park to the north. Two nest boxes, placed on the edge of existing woodland areas, should initially provide adequate nesting opportunities. If occupancy is high, placement of additional nest boxes should be considered.

Nest Boxes for Other Cavity Nesters

Nest boxes for cavity nesters such as chickadees can be strategically placed throughout wooded areas of the Regional Park. As well, swallow boxes placed on fence poles or trees at the northern edge near the Beach Grove Lagoon would likely be very attractive to tree swallows. Placement of swallow boxes in the vicinity of existing seasonal wetlands or possible new lagoons is also recommended.

Wood duck box placement along the existing slough and ditch habitats at the northwestern edge of the Regional Park is desirable. If stormwater is redirected through the Regional Park, the resulting ditch and lagoon habitats with the potential for a sustained water supply year round, would be better able to support a wood duck population. Placement of additional wood duck boxes should be considered in the future if maintaining these water levels is achieved.

6.4 Habitat Management and Enhancement Prescriptions

The following management prescriptions describe the methods, materials, and scheduling required to implement wildlife habitat enhancement objectives for Boundary Bay Regional Park. Note: recommended field renovations or shrub plantings can take place in either spring (March to April) or early fall (mid August to mid October).

Wildlife Reserves

Management Objectives

Large areas of old field, woodland, seasonal wetlands and intertidal marsh are of high value to wildlife species, many of which are sensitive to human disturbance. The intertidal Beach Grove Lagoon north of the 12th Avenue dyke is a particularly important wintering and migratory stop-over area for numerous brant, waterfowl and shorebirds but the wildlife is often subject to an unacceptable level of disturbance from pedestrians and dogs that venture across the spit.

Proposed Management Activities

Initial Activities

1. establish Wildlife Reserve boundaries as described earlier (see Figure 2).

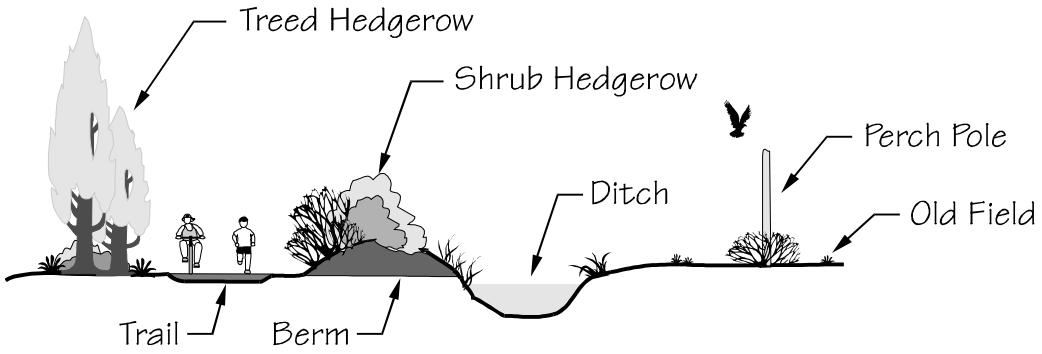
2. establish hedgerows/ditches along Wildlife Reserve borders to benefit wildlife and to provide a buffer between trails and wildlife areas as shown in the generalized schematic below and in locations specified in Figure 8.

3. install fences, where appropriate (e.g., along dog off-leash areas), to prevent uncontrolled access into Wildlife Reserves by people or dogs.

4. install signs, where appropriate, which educate the public about the important role of the wildlife reserves and why public access is limited to designated trails.

Periodic Activities

1. assess whether exclusion techniques are adequate, and if park visitor incursions are impacting wildlife. Install additional fencing and/or signage as necessary.



Typical Cross-Section: Wildlife Reserve Interface with Perimeter Trail

Old Field Habitats

Management Objectives

Old field habitats appear to support large populations of Townsend's voles (i.e., numerous tunneling) which provide foraging opportunities for wintering and breeding raptors, and great blue herons. Old field habitats need to be managed to ensure that the viability of vole populations is maintained, and voles are readily available to predators.

Proposed Management Activities

Initial Activities

1. delineate old field, and shrubland, woodland and hedgerow edges (see Figure 6).

2. renovate portions of the field dominated by common rush (Figure 6). Rototill low areas (e.g., where reed canary grass, hardhack, common rush and trailing buttercup are growing) and plant with a mixture of quack grass (*Agropyron repens*), bent grass (*Agrostis alba*), Yorkshire fog (*Holcus lanatus*) and Kentucky bluegrass (*Poa pratensis*), all grasses which are favored by voles. Improved drainage may be necessary to prevent a return to rush dominated fields.

3. improve drainage of rush dominated fields by constructing two small drainage ditches. Because of the high density of rush dominated fields, current utilization by waterbirds is low. Increased drainage is not expected to negatively impact waterfowl populations.

4. remove undesirable woody and herbaceous vegetation within areas delineated as old field habitat (see Figure 6). Note that occasional hawthorn and crabapple shrubs are to be retained as raptor perch sites and several shrubby areas are to be retained as nest sites (e.g., hardhack) for ground nesting raptors (see Figure 6). Vegetation should be removed by brush saw and not by chemical means.

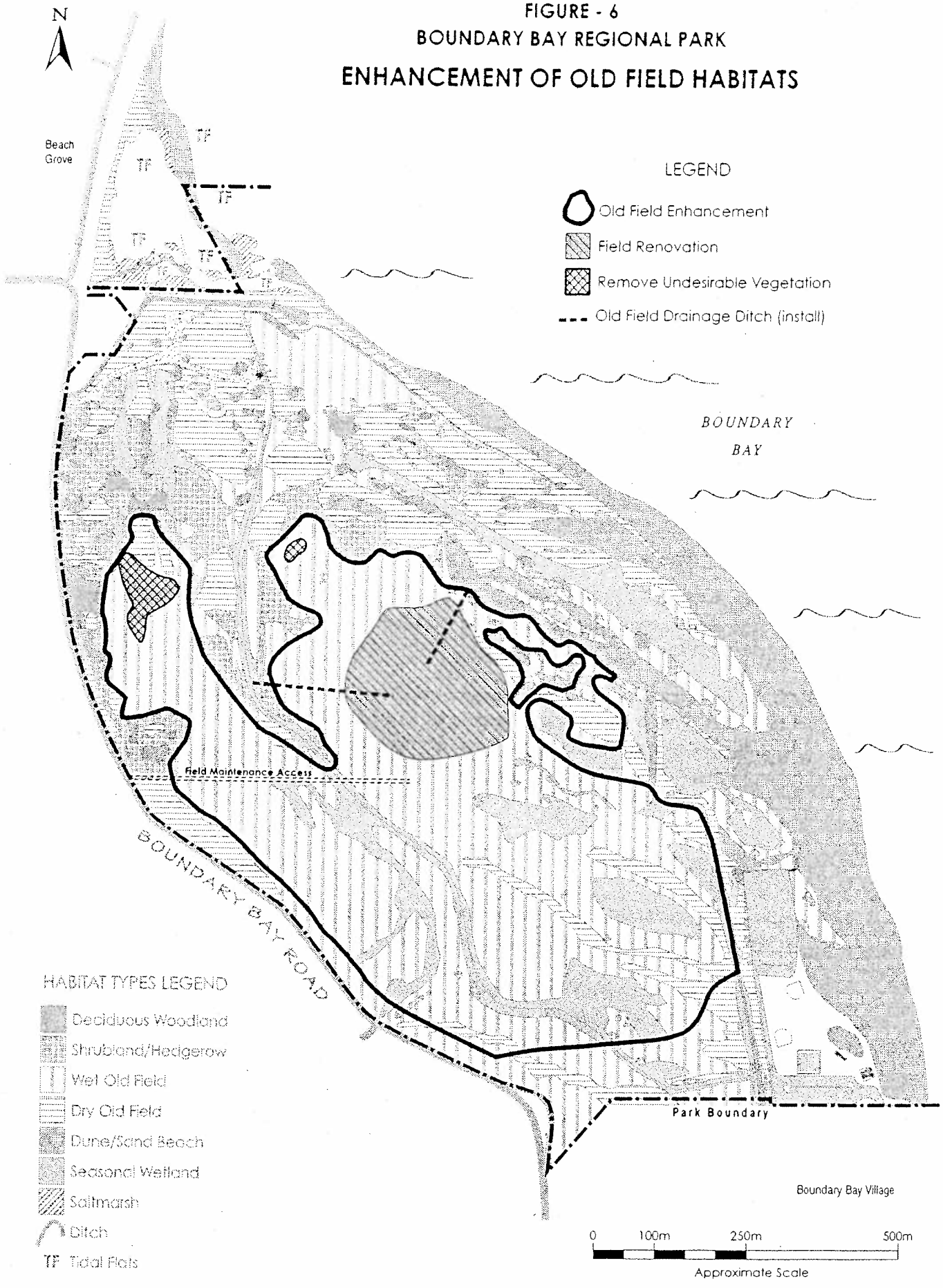
Periodic Activities

1. annually assess old field conditions in late August. Cut (i.e., mow) grass back to 20 cm if greater than 50 cm tall (mulch or remove grass).

2. remove all encroaching woody shrubs and undesirable herbaceous vegetation by tilling a five metre wide band along shrubland, woodland and hedgerow borders once every three years (if necessary). Shrubs encroaching in central areas of old field habitats should be hand removed.

3. assess fields every three years to determine whether additional renovation is warranted. Field renovation may be necessary when vole populations decline because of unfavorable vegetation growth such as common rush, or when vegetation structure obscures voles from predators. Care should be taken to ensure that declines in vole populations are due to vegetation conditions rather than to natural population cycles. If field renovation is

FIGURE - 6
BOUNDARY BAY REGIONAL PARK
ENHANCEMENT OF OLD FIELD HABITATS



necessary, rototill and plant with a mixture of grasses as indicated for 'Initial Activities' above.

4. remove thistle patches if they are a problem for agricultural reasons or are reducing suitability of old field habitats for voles. If control is necessary, thistles should be removed using brush saws rather than by chemical means, just prior to blooming.

Shrublands and Woodlands

Management Objectives

Maintenance and establishment of shrubland and woodland habitats for passerines (i.e., nesting), and raptors (i.e., nesting, perching and roosting) is a primary habitat management objective for Boundary Bay Regional Park. Undesirable woody vegetation presently grows within these habitats in several areas. Tree and shrub species diversity within shrublands and woodlands can be improved by planting species of high value to wildlife

Proposed Management Activities

Initial Activities.

1. delineate shrubland/woodland and old field edges (see Figure 7). Maintain shrublands and woodlands within delineated areas.

2. remove broom from all areas of the Regional Park. Control Himalayan blackberry growth within shrublands and woodlands where viability of native shrubs and trees are threatened or in other areas where extensive blackberry growth is limiting establishment of these species (see Figure 7).

3. increase the diversity of tree species in shrubland and woodland areas by planting western redcedar (*Thuja plicata*), Sitka spruce (*Picea sitchensis*), black cottonwood (*Populus balsamifera*), mountain-ash (*Sorbus acuparia*), bittercherry (*Prunus emarginata*), saskatoon (*Amelanchier alnifolia*) and paper birch (*Betula papyrifera*). Cedars, which currently do not grow in the Park, would provide roosting opportunities for owls and passerines. Fruit-bearing plants would provide additional foraging opportunities for birds. Plant above species in equal ratios in areas delineated on Figure 7, at an approximate density of 50 /ha. A total of 700 trees and shrubs will be required initially. Plant according to the following guidelines:
    - plant cedars in clusters of three plants;
    - do not plant cedar clusters or individual trees within 10 m of each other;
    - remove all potentially competing vegetation (e.g., blackberry) within 3 m of the plant site;
    - trees and shrubs should be of guaranteed nursery stock (see botanical names above), and ideally be at least two metres (i.e., 6 feet) in height.

Periodic Activities

1. annually assess shrubland and woodland areas for encroachment of broom and blackberry. Remove all broom, and extensive blackberry patches which threaten growth of native plant species.

2. for five years after planting, annually assess health and survival of individual trees and shrubs planted within shrublands and woodlands. Ensure other woody vegetation such as blackberry is not restricting growth. Replace dead trees as necessary.

Hedgerows

Management Objectives

Establishment of hedgerow habitats for passerines (i.e., nesting), and raptors (i.e., perching) is a key wildlife habitat management objective for Boundary Bay Regional Park. Limited perching opportunities for raptors can be remedied by creation of hedgerows along ditches and Boundary Bay Road. A treed hedgerow along Boundary Bay Road will buffer sensitive old field habitats.

Proposed Management Activities

Initial Activities

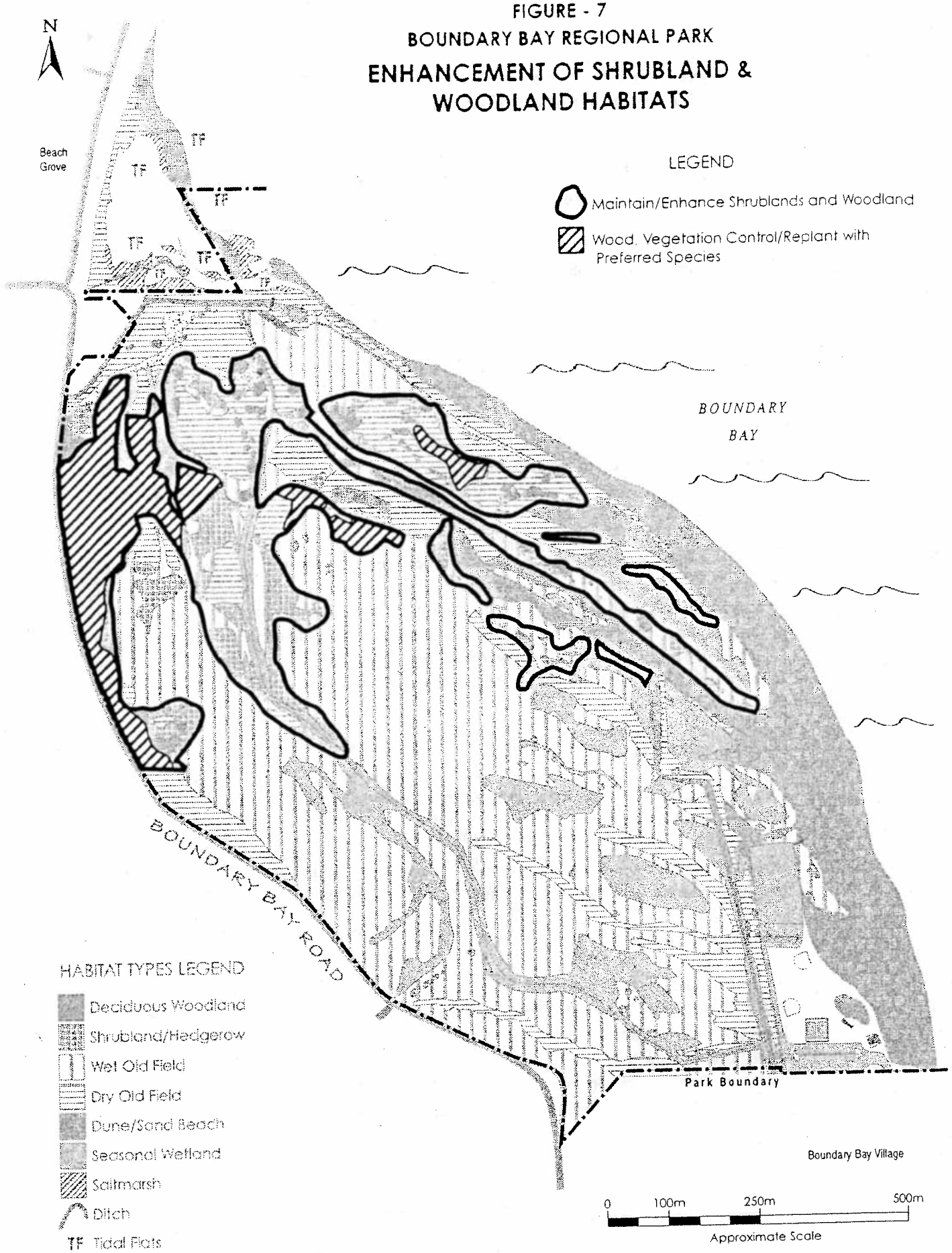
1. establish hedgerow vegetation along the north, east and central ditches of the Park, and along the Wildlife Reserve boundary (Figure 2) bordering the interior trails as indicated on Figure 8, by planting the following species, in the ratios indicated, at a spacing of one every two metres: 2 red elderberry (*Sambucus racemosa*), 2 Pacific crabapple (*Malus fusca*), 2 black hawthorn (*Crataegus douglasii*), and 1 mountain-ash (*Sorbus acuparia*). Plant western redcedar (*Thuja plicata*) clusters (i.e., ~3 plants) every 75 m on raised berms (i.e., from ditch borrow materials) along ditches. Plant according to the following regime and restrictions:
    - plant a single row of shrubs on the dyke side of existing ditches at the north and east ends of the site, and along the central ditch as indicated on Figure 8;
    - plant hedgerows along Wildlife Reserve borders in two rows
    - space plants 2 m apart in rows;
    - stagger rows so that plants or cedar clusters do not occur opposite each other;
    - shrubs should be of guaranteed nursery stock (see botanical names above) or be transplants from old field habitats, and ideally be at least 1.2 metres (i.e., 4 feet) in height.

2. establish a treed hedgerow between Boundary Bay Road and perimeter trail (see Figure 8), by planting the following species, in the ratios indicated, at an average of one every five metres: 2 black cottonwood (*Populus balsamifera*), 2 Douglas-fir (*Pseudotsuga menziesii*), 1 Sitka spruce (*Picea sitchensis*) and 1 western hemlock (*Tsuga heterophylla*). Plant according to the following regime:
    - clump trees to maintain natural feeling and setting
    - allow some openings in plantings to allow views into the Park from the road
    - stagger rows so that plants do not occur opposite each other;

FIGURE - 7

BOUNDARY BAY REGIONAL PARK

ENHANCEMENT OF SHRUBLAND & WOODLAND HABITATS



- trees should be of guaranteed nursery stock (see botanical names above) and ideally be at least two metres (i.e., 6 feet) in height.

3. establish hedgerow vegetation on a newly created berm (i.e., from borrow material) on the west side of a new ditch adjacent to Boundary Bay Road and on south side of a new ditch north of the proposed access road, by planting the following species, in the ratios indicated, at a spacing of one every two metres (see Figure 8): 2 Pacific crabapple, 2 black hawthorn, 2 red-osier dogwood (*Cornus stolonifera*), 1 elderberry, 1 snowberry (*Symphoricarpos albus*) and 1 mountain ash. Plant cedar clusters (i.e., ~3 plants) every 75 m along berm. Exact location of hedgerow, ditches and berms needs to be decided in concert with perimeter trail and potential future dyke. Plant according to the following regime:
    - space plants two metres apart in two rows;
    - allow periodic gaps (i.e., at wildlife viewing stations) to permit views to fields from perimeter trail
    - stagger rows so that plants or cedar clusters do not occur opposite each other;
    - shrubs should be of guaranteed nursery stock (see botanical names) or be transplants from old field habitats, and ideally be at least 1.2 metres (i.e., 4 feet) in height.

4. establish woody vegetation along a potential new permanent wetland on the west side of the old dyke (see Figure 8). Stock can be planted on borrow materials from creation of wetland. The following species are to be planted, in the ratios indicated, in two rows, at a spacing of one every two metres: 2 Pacific crabapple, 2 black hawthorn, 2 Pacific willow (*Salix lasiandra*), 2 red-osier dogwood, 1 red elderberry. Plant according to regime outlined for #3 above with the exception that periodic gaps in vegetation will not be necessary.

Periodic Activities

1. control Himalayan blackberry growth along hedgerows where viability of native shrubs and trees are threatened

2. maintain hedgerows within a maximum of 5 m width along fences and ditches. Maintain hedgerow and old field borders by periodic tilling along hedgerows (see 'Old Field' above).

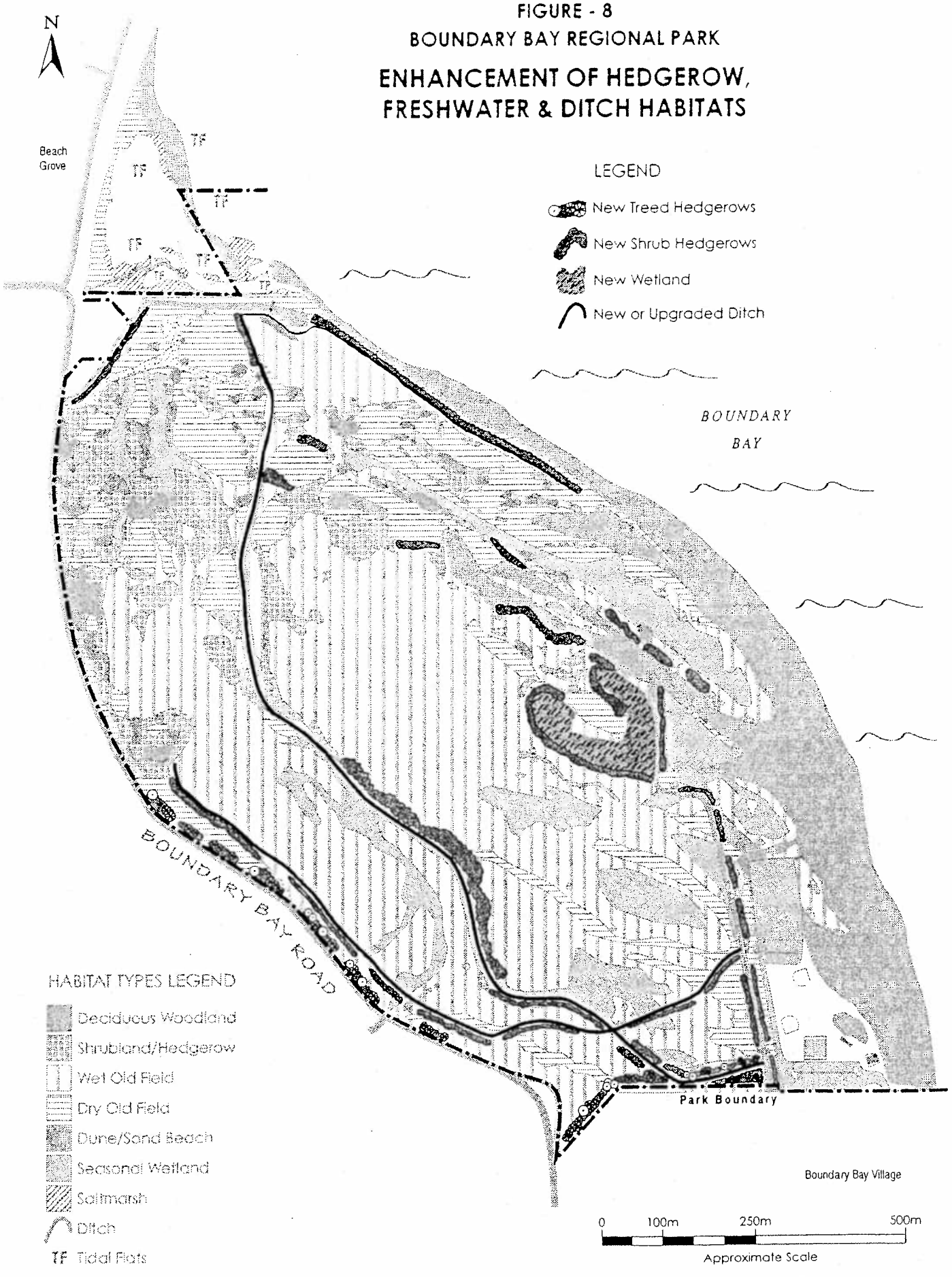
Potential Future Activities

1. if stormwater run-off is redirected from the 3rd Avenue Pump Station to the 12th Avenue Pump Station, an opportunity exists to create additional ditch and lagoon habitats. Hedgerows as outlined for 'Initial Activity' #3 above, should be planted along one side of newly created and/or expanded ditch system and along the edges of lagoons on borrow material. Planting only on one side of ditches will permit machine access for regular maintenance. The addition of willows (*Salix* spp.) to the plant species composition would be beneficial.

FIGURE - 8

BOUNDARY BAY REGIONAL PARK

ENHANCEMENT OF HEDGEROW, FRESHWATER & DITCH HABITATS



Freshwater Wetlands and Ditches

Management Objectives

Ditches and freshwater wetlands provide important nesting and foraging habitats for waterbirds. The freshwater wetlands and few ditches that do occur within the Regional Park are mostly dry in the summer months. Opportunities exist to create new ditches and lagoons, especially if storm water run-off is redirected through the Park.

Proposed Management Activities

Initial Activities

1. increase width and depth of the ditch at north end of the Regional Park next to the 12th Avenue dyke east of the pumphouse (see Figure 8) to improve wildlife habitats and create a barrier to dogs and people from entering the Wildlife Reserve to the south. The ditch should be contoured with relatively steep sides along the north and a more gradual incline on the south side. Shallow water areas along the south side will encourage colonization by emergent vegetation such as cattail. The ditch should be at least 1 m deep and 3 m wide. Hedgerow vegetation should be planted along the dyke slopes on the north side. Periodic gaps in hedgerow vegetation will allow machine access to the ditch for maintenance.

2. create a new ditch (for barrier purposes only) between old field habitats and perimeter trail at the western edge of the Regional Park, and north of the new access road to Centennial Beach. The ditch is to be contoured similar to the ditch detailed in 1. above (i.e., steep sided on the south and west sides and gradually inclined on north and east sides). Hedgerow vegetation will be established on borrow material placed between the ditch and perimeter trail. Some gaps should be left in the berm to ensure that the current hydrological regime is not altered. Because the purpose of the ditch is to act only as barrier to human encroachment, a weir may be necessary to ensure that the hydrological regime of adjacent old field habitats is not altered and water levels in the ditch can be maintained year round. Costs for a weir were not determined. Comments on this proposal by a qualified hydrologist is recommended prior to implementation.

3. excavate a portion of the seasonally flooded field area at the north end of the east ditch within Wildlife Reserve A (Figure 2) to create a permanent wetland (Figure 8). Create a gentle gradient from pond edge to centre to encourage establishment of emergent vegetation. Shrub species are to be planted along pond edges on the borrow material. Gaps in raised soil areas must be provided periodically to permit adequate drainage of surrounding fields. Prior to creation of a permanent wetland, comments on the hydrological feasibility of the proposal should be obtained from a qualified hydrologist. Excavate according to the following guidelines:
    - surface area of pond = ~ 1 ha;
    - pond depth gradient from 0 to 2.5 m below normal summer water levels. A water depth of greater than 1 m is required to maintain open water and restrict emergent vegetation;

- excavate 10 m of pond shoreline areas to -0.15 m of normal summer water levels (see Figure 9 from Sigma 1985a).

Periodic Activities

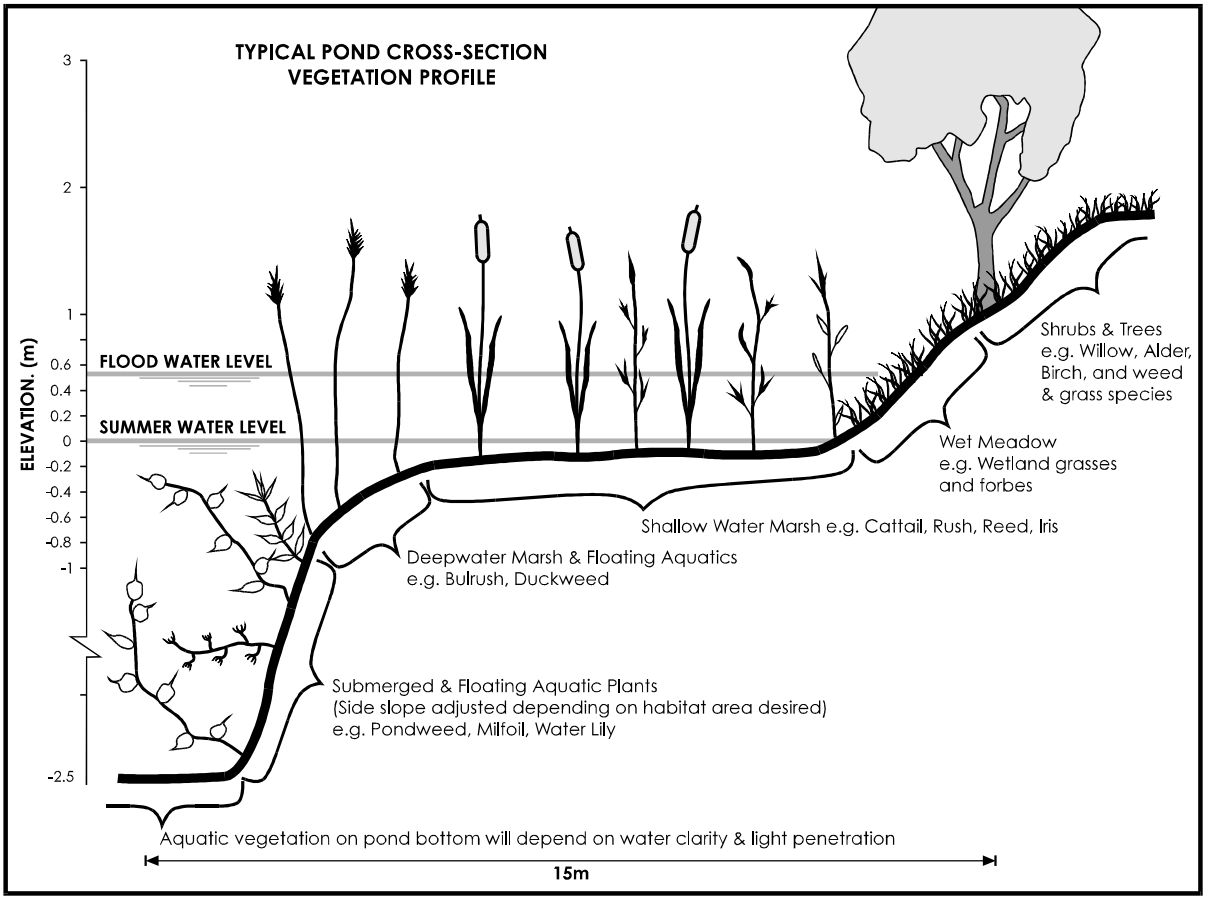
1. every three years assess whether ditches require maintenance (e.g., cleaning)

2. attempt to remove all purple loosestrife that colonizes wetland sites

Potential Future Activities

1. if a decision is made to redirect stormwater run-off from the 3rd Avenue Pump Station to the 12th Avenue Pump Station, there will be good opportunities to create additional permanent wetlands. The ditch running north/south centrally through the Regional Park could be widened and deepened, and edges contoured gradually to allow colonization of emergent vegetation. Borrow material could be spread along both sides of the ditch to provide substrate for establishment of hedgerows. Gaps should be left in borrow or berm materials to allow adequate drainage of surrounding old fields. Similar design criteria as indicated above would be required (see Figure 9).

Figure 9



Saltmarsh and Tidal Flats

Management Objectives

Saltmarsh and intertidal areas in the Beach Grove Lagoon north of the 12th Avenue dyke are utilized by numerous waterfowl, shorebirds and gulls throughout the year. Saltmarsh habitats can be enhanced by removing log and other debris. Stabilization of the existing spit and construction of a permanent inlet will likely result in a reduction of floating debris entering the lagoon, improved drainage/flushing and an increase in the productivity of saltmarsh habitat.

Proposed Management Activities

No specific management activities are proposed at this time. Future consideration should be given to enhancing these habitats as indicated above, in cooperation with BC Environment which manages the majority of the spit and lagoon area as part of the Boundary Bay Wildlife Management Area and other agencies having jurisdiction and/or interest (i.e., Department of Fisheries and Oceans, Environment Canada, The Corporation of Delta, Fraser River Estuary Management Program, etc.).

Raptor Perch Poles and Shrubs

Management Objectives

Perch opportunities for raptors are limited in open old field habitats. Temporary establishment of artificial perch structures and long-term establishment of perch shrubs such as hawthorn and crab apple in the old field will increase hunting opportunities for raptors.

Proposed Management Activities

Initial Activities

1. plant 60 individual black hawthorn or Pacific crabapple (i.e., at an approximate density of 2/ha but dependent on field configuration and presence of existing shrubs) at least 50 m from existing hedgerow, shrubland or woodland vegetation on raised soil mounds (i.e., using borrow material from ditch and wetland excavation), if necessary, to provide future perch sites for raptors. Erect wooden poles (i.e., approx. 4 m height) with cross pieces until planted shrubs have become established (Figure 10). Existing shrubs can be used as perch 'stations' or shrubs can be transplanted from old field designated areas. If excess shrubs are not available, plants should be of guaranteed nursery stock.

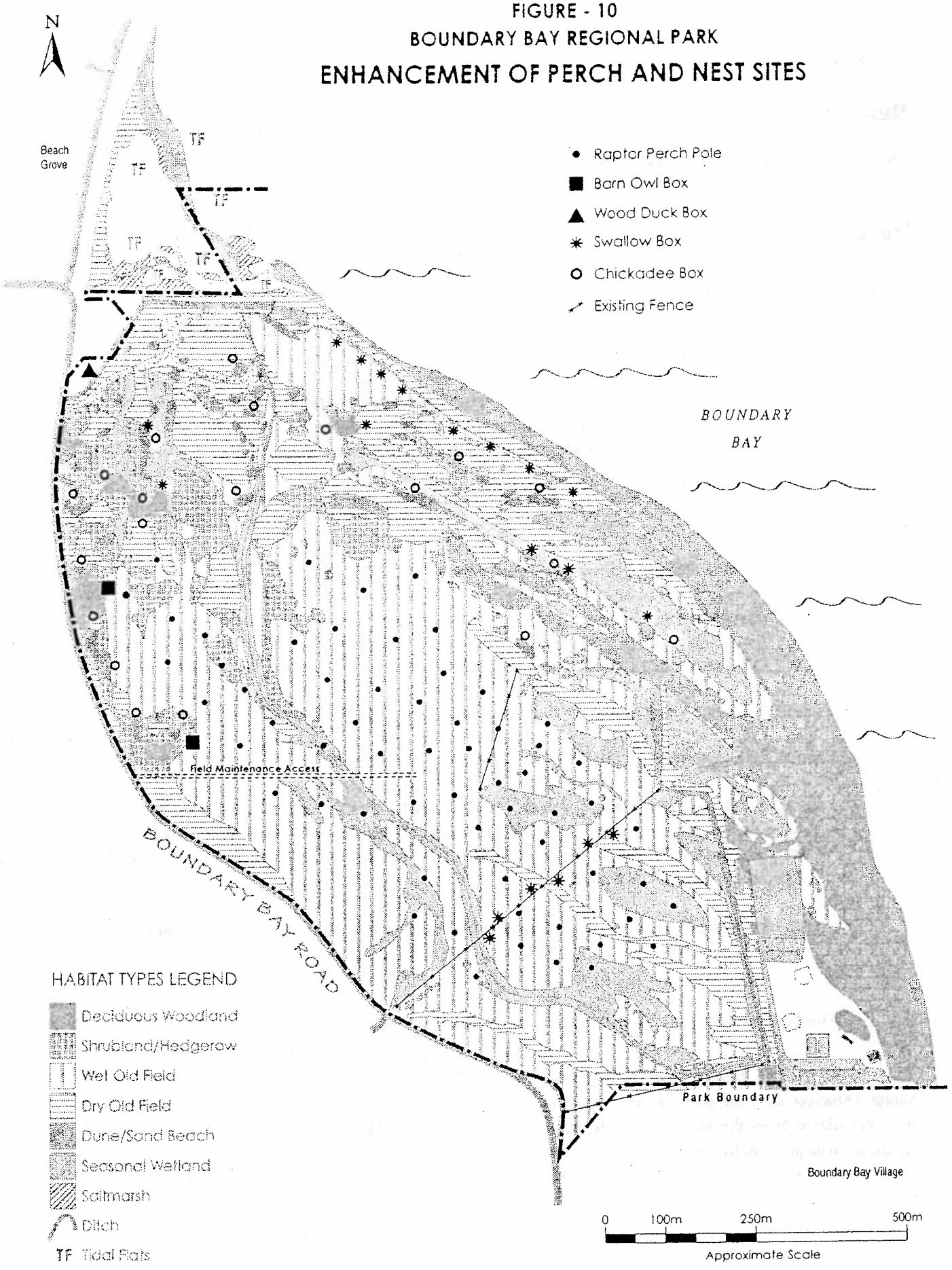
Periodic Activities

1. remove wooden perch poles once individual shrub species have become established.

FIGURE - 10

BOUNDARY BAY REGIONAL PARK

ENHANCEMENT OF PERCH AND NEST SITES



Nest Boxes

Management Objectives

Due to limited nesting opportunities for cavity nesters (e.g., chickadees, wood duck, tree swallows, barn owls), placement of nest boxes for these bird species is desirable.

Proposed Management Activities

Initial Activities

1. erect two barn owl boxes along the woodland/old field edge near the northwest end of Wildlife Reserve A (Figure 10).

2. place 20 tree swallow nest boxes placed on fence posts or on trees at the northern edge of the Regional Park near the Beach Grove Lagoon and the northern ditch, and on fence posts at the corner of the old dyke in the east central section of the Park (Figure 10).

3. strategically place 20 chickadee nest boxes throughout accessible wooded areas of the Regional Park.

4. erect one wood duck nest box along the northern ditch (Figure 10).

Periodic Activities

1. check and clean barn owl boxes twice each year.

2. check and repair, if necessary, swallow, chickadee and wood duck boxes once every year.

Potential Future Activities

1. install additional wood duck boxes once vegetation has become established along newly created ditches and permanent wetlands. Excellent habitat for wood duck will potentially exist along the central ditch if redirection of stormwater run-off from 3rd Avenue by The Corporation of Delta takes place.

2. install additional barn owl boxes if breeding success in previously installed boxes is high.

6.5 Enhancement Activity Costs and Scheduling

The size of wildlife habitat areas to be managed and quantities of materials required to complete habitat enhancements and prescriptions recommended are summarized in Table 3. All areas and lengths were calculated from the maps in this report and are thus approximate. Actual units and quantities should be measured in the field and costs recalculated before enhancement work is

initiated. Costs can be subject to considerable variation and dependent on a variety of unanticipated factors with projects of this type.

Initial Activities

Initial activities are required to bring habitats to a productive state that can be maintained by ongoing management. Initial activities include field renovation, hedgerow shrub plantings, ditch barriers, removal of undesirable woody vegetation, improved drainage, placement/ planting of raptor perch poles and shrubs, and installation of barn owl nest boxes. Some of these activities, such as removal of unwanted vegetation or hedgerow planting, could be done "in house" or with the help of summer work crews or volunteers. Care should be taken to avoid working in areas that might be active with birds during nesting season.

Wildlife Reserve

Installation of fences and signs will be required for establishing Wildlife Reserve areas. Cost for post and page wire fencing, including labour, is estimated at $10.00/m. A more expensive but more sturdy alternative is split rail fencing, estimated to cost approximately $25.00/m including labour. The total length of fence required is 1,200 m for a total estimated cost of $12,000.00 for page wire fencing or $30,000.00 for split rail fencing. Signs indicating the importance of the Wildlife Reserve Areas and therefore the closure of these areas to public access should be erected in conjunction with fencing.

Old Fields

Delineate Fields

Old field and shrubland/woodland borders will be delineated on maps of the area (see Figure 6). With ongoing maintenance of field and woody vegetation borders, these borders will become increasingly better defined as woody vegetation matures. However, it may be necessary to stake or flag field borders until edges become well defined over time. It is assumed field delineation will be done in-house at no additional cost.

Renovate Fields

Field renovations involve tilling (ploughing, discing or rototilling), and seeding. A total of 4.5 ha require initial renovation. The best cost could probably be achieved if GVRD worked out an arrangement with a local farmer. For the purpose of this report, $500.00/ha, as estimated for field renovations on Sea Island (Quadra 1994), is used. The total estimated cost of initial renovations is $2,250.00.

Improve Drainage

Drainage needs to be improved in the central fields of the Regional Park dominated by common rush. Cost for digging new, small drainage ditches is estimated to be $2.50/$m^3$. Total length of ditches (i.e., 1 m wide, 0.5 m deep) to be created is 400 m for a total volume of 200 m^3. Total cost is estimated at $500.00.

Remove Undesirable Vegetation

Removal of undesirable vegetation is necessary in several areas of old field habitats, primarily along woodland borders. A cost of $550.00/ ha, including labour, overhead costs such as vehicle and equipment operation, haulage and dump fees is estimated for shrub and vegetation clearance. Removal can be done with hand tools or gas brush cutter. Initial cost involved for clearing undesirable vegetation is estimated at $550.00 for an approximately one hectare area.

TABLE 3
ESTIMATED QUANTITIES AND COSTS OF ENHANCEMENT WORKS AT BOUNDARY BAY REGIONAL PARK

Habitat	Enhancement Activity or Item	Quantity/Size	Estimated Cost
Wildlife Reserve	**Initial**		
	• delineate Wildlife Reserve boundaries	see Fig. 2	none
	• establish hedgerows	See 'Hedgerow'	See ' Hedgerow'
	• install fences		
	- page wire ($10.00/m) or	1,200 m	$12,000.00
	- split rail ($25.00/m)	*1,200 m*	*$30,000.00*
	• erect signs	4 signs	'in house'
	Periodic		
	• implement additional exclusion techniques	variable	variable
Old Field	**Initial**		
	• delineate old field edges	see Fig. 6	none
	• field renovation and reseeding	~4.5 ha	$2,250.00
	• improve drainage	400 m (200 m^3)	$500.00
	• remove undesirable vegetation	1.0 ha	$550.00
	Periodic		
	• mow fields	~45 ha/5 years	$450.00/year
	• remove undesirable vegetation		
	• tilling (i.e., 5 m band)	~2.5 ha/5 years	$250.00/year
	• hand removal	1.0 ha/ 5 years	$110.00/year
	• field renovation and seeding	3 ha/ 5 years	$300.00/year
	• remove thistles	0.1 ha/year	$55.00/year
Shrublands and Woodlands	**Initial**		
	• delineate shrubland/woodland edge	see Fig. 7	none
	• remove undesirable woody vegetation	~ 6 ha	$3,300.00
	• plant additional trees and shrubs	~ 700 trees	$24,500.00
	• topsoil		
	• *materials*	*175 yards*	*$2,625.00*
	• *labour*	*5 days*	*$2,000.00*
	Periodic		
	• remove undesirable woody vegetation	~ 5 ha/ 5 years	$550.00/year
	• maintain planted shrubs and trees	replace 140 trees over 5 years	$980.00/year

TABLE 3: CONTINUED

Habitat	Enhancement Activity or Item	Quantity/Size	Estimated Cost
Hedgerows	**Initial**		
	• establish hedgerow along ditches, and Wildlife Reserve	see Figure 8 1,586 shrubs	 $26,962.00
	• establish treed hedgerow along Boundary Bay Road	368 trees	$12,880.00
	• establish hedgerow along new ditch adjacent to perimeter trail and new access road	1,264 shrubs	$21,488.00
	• establish woody vegetation on pond shoreline	480 shrubs	$8,160.00
	Periodic		
	• remove undesirable woody vegetation	~ 3 ha/ 5 years	$330.00/year
	• maintain hedgerows by mowing or renovation	see 'Old Field' costs above	
	Future		
	• plant hedgerow along central ditch and on edge of new lagoons	not determined	not determined
Freshwater Wetlands and Ditches	**Initial**	see Figure 8	
	• upgrade northern ditch	1,680 m^3	$6,720.00
	• create ditch adjacent to perimeter trail and new access road	3,720 m^3	$14,880.00
	• create permanent wetland	15,000 m^3	$37,500.00
	• hydrologist advice		$2,000-$3,000
	Periodic		
	• maintain ditches	~ 1000 m^3/5 years	$500.00/year
	• remove purple loosestrife	~ 0.5 ha/year	$275.00/year
	Future		
	• clean out and/or upgrade central ditch	not determined	$4.00/$m^3$
	• create additional permanent wetlands	not determined	not determined
Raptor Perch poles and shrubs	**Initial**	see Figure 10	
	• plant perch shrubs	60 shrubs	$1,020.00
	• erect perch poles	60 perch poles	$450.00
	Periodic		
	• remove perch poles	60 poles	'in-house'

TABLE 3: CONTINUED

Habitat	Enhancement Activity or Item	Quantity/Size	Estimated Cost
Nest Boxes	**Initial**	see Figure 10	
	• barn owl nest boxes	2 boxes	$100.00
	• tree swallow nest boxes	20 boxes	$300.00
	• chickadee nest boxes	20 boxes	$300.00
	• wood duck nest boxes	1 box	$25.00
	Periodic		
	• check and clean barn owl nest boxes		volunteer
	• check and repair, if necessary, other nest boxes		volunteer
	Future		
	• install additional wood duck nest boxes		$25.00/box
	• install additional barn owl boxes		$50.00/box
TOTAL	**Initial Costs**		
	Sum (does not include topsoil and split rail fencing costs)		$176,885.00
	Site Planning + 5%		$8,844.25
	Project Management + 5%		$8,844.25
	Total Initial Costs		**$194,573.50**
	Ongoing/Periodic Costs		
	Sum		$3,800.00/year
	Follow-up/Monitoring +1% of initial sum		$1,945.73/year
	Total Ongoing/Periodic Costs		**$5,745.73/year**

Shrublands and Woodlands

Delineate Shrubland/Woodland Borders

Old field and shrubland/woodland borders will be delineated on maps of the area (see Figures 6 and 7).

Remove Undesirable Vegetation

Removal of undesirable vegetation is necessary in several areas of existing shrublands and woodlands. A cost of $550.00/ ha is estimated for removal. A total of 6 ha requires shrub removal and/or control for a total estimated cost of $3,300.00.

Plant Additional Trees and Shrubs

Tree and shrub species diversity in shrublands and woodlands can be increased by planting a variety of coniferous and fruit-bearing trees. Plants do not necessarily need to be of nursery stock, however, a height of two metres or greater is preferable. An area of approximately 14 ha should be planted at a density of 50 trees/ha. With shrubs costing an estimated $25.00 each and labour costs for planting estimated at $10.00/shrub, the total cost for 700 shrubs and trees is estimated to be $24,500.00.

Topsoil, if required is expected to cost $2,625.00, assuming 0.25 yards per tree at $15.00/yard. Additional labour costs to move topsoil is estimated at five days for two workers, at $400.00/day for a total labour cost of $2,000.00. Total cost of topsoil and labour is $4,625.00.

Hedgerows

Delineate Shrubland/Woodland Borders

Old field and shrubland/woodland borders will be delineated on maps of the area (see Figures 6 and 7).

Establish Hedgerows

Hedgerows should be established along several ditches, roads and some sections of the Wildlife Reserve boundary. Hedgerow shrubs cost approximately $12.00 each and planting costs vary depending on the source of labour but are estimated at $5.00/shrub for the purposes of this report. For the treed hedgerow along Boundary Bay Road, costs are estimated at $25.00/ tree and $10.00/tree for labour costs. A breakdown of tasks and total costs is as follows:

- **Ditch Hedgerows** (2,176 m): one row at 2 m spacing = 1,088 shrubs: additional two cedars every 75 m = 58 cedars for a total number of 1,146 shrubs: Cost is **$19,482.00**.
- **Wildlife Reserve Borders** (440 m): two rows at 2 m spacing = 440 shrubs: Cost is **$7,480.00.**
- **Treed Hedgerow** (920 m): two rows at 5 m spacing = 368 trees: Cost is **$12,880.00.**
- **Perimeter Berm Hedgerow** (1,200 m): two rows at 2 m spacing = 1,200 shrubs: additional two cedars every 75 m for two rows = 64 cedars for a total number of 1,264 shrubs: Cost is **$21,488.00**.
- **Pond Edge Shrubs** (480 m): two rows at 2 m spacing = total of 480 shrubs; Cost is **$8,160.00.**

Total cost for all hedgerow and wetland shrubs is $69,490.00.

Freshwater Wetlands and Ditches

Upgrading of the northern ditch to a depth of 1 m and a width of 3 m over 560 m will require excavation of an estimated 1,680 m^3 of material. At an estimated cost of $4.00/$m^3$, total estimated cost is $6,720.00. Creation of a ditch (dimensions as above) adjacent to the perimeter trail and access road (i.e., 1,240 m) will require removal and placement of 3,720 m^3 of fill material for a cost of $14,880.00. Excavation of the new wetland will require an estimated removal of 15,000 m^3 (based on a 1 ha wetland at an average depth of 1.5 m). At an estimated cost of $2.50/$m^3$, the cost for the wetland is estimated to be $37,500.00.

It is estimated that a qualified hydrologist to provide on-site advice on the ditch/pond elevations, water flows, and placement of weirs, etc. would be approximately $2,000 - $3,000.00. Note: this is not a detailed hydrology study.

The total estimated cost for freshwater wetland and ditch enhancement, including the hydrologist advice is $62,100.00.

Raptor Perch Poles/ Plant Shrubs

Material for perch poles is expected to be minimal (~ $7.50/pole) and may be constructed from excess or waste materials. Soil may be necessary to be brought in by wheelbarrow or bobcat for some of the perch stations. Soil is assumed to be available at no cost. Shrubs cost approximately $12.00, and labour cost for planting is estimated at $5.00/shrub. A total of 60 perch stations have been recommended for Boundary Bay Regional Park. At a cost of $24.50 for materials and labour per perch station, the estimated total cost is $1,470.00.

Nest Boxes

A single barn owl box is estimated to cost approximately $50.00 for materials and labour. Some opportunities may exist to obtain excess owl boxes from Sea Island Conservation Area at no cost. Volunteers may be available to construct and install owl boxes. Total cost of two barn owl boxes is estimated at $100.00. Costs for chickadee, wood duck and swallow boxes are estimated at $15.00/box. Cost for an estimated 40 boxes will be $600.00. Cost for one wood duck box is estimated to be $25.00. Volunteers from local naturalist clubs should be involved to erect, annually clean and record utilization of boxes.

Periodic Activities

Periodic activities include removal of undesirable woody and herbaceous vegetation, field maintenance such as mowing and tilling, removal of perch poles and maintenance of barn owl nest boxes. Costs are difficult to determine because the requirement for future management is not known. Field renovations such as tilling, and shrub removal will likely cost in the order of $500.00/ha, as estimated for field renovations on Sea Island (Quadra 1994). Mowing, which will likely be required on a regular basis is estimated at $50.00/ha. Special arrangement with local farmers may result in lower costs/ha. Estimated costs of periodic maintenance requirements are presented in Table 2. Total yearly maintenance costs are estimated at $5,745.73, including follow-up and monitoring costs.

Old Fields

Mow Fields

All fields are expected to require mowing once every five years. Approximately 45 ha will cost $2,250.00 every five years at an average cost of $450.00/year.

Remove Undesirable Vegetation

Undesirable vegetation woody vegetation will have to be removed periodically to maintain old field conditions. It is expected that a 5 m band along old field borders (i.e., along shrublands, woodlands and hedgerows) will require tilling once every five years to control woody vegetation encroachment. An estimated 5 km of border tilled for a width of 5 m will result in a total tilled area of 2.5 ha. At a cost of $500.00/ha, total cost is estimated to be $1,250.00 every five years or $250.00/year.

An expected additional one ha will require hand removal of undesirable vegetation every five years at a cost of $550.00/ five years or $110.00/year.

Field Renovations

An estimated 3 ha of old field habitats requires tilling every five years. Cost is $1,500.00 every five years or $300.00/year.

Remove Thistles

Removal of an estimated 0.1 ha of thistle is expected each year at a cost of $55.00/year.

Shrublands and Woodlands

Remove Undesirable Vegetation

An estimated 5 ha of undesirable vegetation is expected to require control or removal every five years for a cost of $2,750.00 or an average cost of $550.00/year.

Maintain Planted Shrubs and Trees

A survival rate of 80% is expected, resulting in replacement of an estimated 140 trees over five years. Total cost for 140 trees is $4,900.00 or a cost of $980.00/year. Requirements for additional planting after five years is difficult to determine.

Hedgerows

Remove Undesirable Vegetation

Removal of undesirable vegetation is necessary in several areas of existing shrublands and woodlands. A total of 3 ha every five years is expected to require vegetation removal and/or control for a cost of $1,650.00 or $330.00/year.

Maintain Hedgerows

Hedgerows will be maintained within 5 m widths by tilling along old field borders (see 'Old Field' above.

Freshwater Wetlands and Ditches

Ditch Maintenance

Ditches may need to be upgraded and cleaned out periodically. Maintenance requirements are estimated at 1,000 m^3/ five years. At a cost of $2.50/$m^3$, total cost is expected to be $2,500.00 or $500.00/year.

Purple Loosestrife Removal

An estimated 0.5 ha of purple loosestrife will require removal each year for a cost of $275.00/year.

Perch Poles and Nest Boxes

Removal of perch poles and maintenance of nest boxes is expected to be at a very low cost. Park staff or volunteers would likely be available for these tasks.

7.0 PLAN IMPLEMENTATION AND COSTS

Implementation of the Boundary Bay Regional Park Plan will require funds and resources. Some elements of the Park Plan have higher priority and will be implemented over the next few years. Others will be implemented over a longer time period. Table 4 provides a summary of estimated costs and time frame for implementing the Regional Park Plan. These costs are subject to change and site-specific verification. Expenditures for each major item would have to be authorized by the GVRD Park Committee and Board as part of the annual capital program.

Higher Priority Elements

The wildlife habitat enhancements are considered an important priority of the Park Plan with funding currently available through the Vancouver International Airport Wildlife Habitat Compensation Program, and will be implemented over the next two years. As outlined in Section 6, major capital protection and enhancement items include fencing around parts of the Wildlife Reserves, enhancement of wetlands and ditches and planting of shrubs, woodlands and hedgerows. Renovation of old fields is also an important activity.

Park facilities such as the new park access road, trails, new washroom/concession, one group picnic shelter, some picnic tables, and the parking lot and toilets off Boundary Bay Road near 12th Avenue will ideally be undertaken over a 5 year period, if funds permit.

Longer Term Elements

Other facilities such as a caretaker's residence/service centre, visitor centre and additional picnic shelters are longer term projects (post 2000). Some facilities such as the basketball court, new playground equipment and a visitor centre will require funding from other sources.

Partnerships

Local groups, residents and visitors are often willing to assist with improvement, enhancement, management and volunteer activities in Regional Parks. Groups such as the Delta Naturalists, Friends of Boundary Bay, Delta Farmland and Wildlife Trust, Wild Bird Trust of BC, Stanley Park Zoological Society and Federation of BC Naturalists have ideas that could be put into action. GVRD welcomes ideas for active involvement in Regional Parks. Over 230 different groups work with GVRD throughout the 25 parks in the Regional Parks system. These partners help develop park facilities, manage, enhance and monitor natural systems; deliver programs and special events and operate special facilities such as hatcheries, rowing courses and cross-country equestrian jumps. A "Park Watch" program, Beachkeepers, environmental stewardship program, nesting boxes and many other possibilities are appropriate at Boundary Bay Regional Park. If there is enough interest, a Boundary Bay Regional Park Association could be established as a citizen led group to coordinate such activities and work with GVRD.

TABLE 4: Boundary Bay Regional Park Plan Implementation						
Priorities and Costs ($)	**1996**	**1997**	**1998**	**1999**	**2000**	**Post 2000**
Immediate Safety and Clean-up Work						
Move fill-south of 12th Ave. dyke	10,000					
Essential regulatory and other signs	5,000					
Minor trail repair, ditch crossings, etc.	10,000					
Centennial Beach Phase 1 Improvements						
Directional signs		3,000				
Renovate Centennial Beach washroom		35,000				
Basketball Court		15,000*				
Update playground				12,000**		
Group shelter #1			25,000			
Access Road						
Design and approvals	30,000					
Construction		200,000				
South boundary buffer planting		5,000				
Caretakers/Works yard site prep		15,000				
Close off existing access(Centennial Pkway)		5,000				
Cammidge House-Caretaker/Public Space						
Move house	20,000*					
Foundation and Servicing		60,000				
Interior and exterior restoration		120,000*				
Remove trailer, clean-up site			5,000			
Family picnicking, trees, old caretakers site			20,000			
Wildlife Enhancement/Protection						
Wildlife Reserve fencing		30,000*				
Ditches and Wetlands		62,100				
Hedgerows		69,490				
Old field		3,300*				
Shrublands and woodlands		32,425*				
Perch poles and nest boxes		2,195*				
Dog off-leash area, fencing, trails, signs		45,000**				
Interpretive signs				20,000**		
North Park Entrance-near 12th Avenue dyke						
Parking lot - 20 cars			20,000			
Toilets (Humus?)			20,000*			
Perimeter Trail						
Complete trail (3km)			50,000			
Viewing blinds and towers						60,000
Caretaker Residence/Works Yard - if not Cammidge House						
Caretaker's residence and services						150,000
Works shed/storage						50,000
Centennial Beach - Phase 2 Recreational Development						
New washroom/concession inc. services						260,000
Family picnicking and shade trees						25,000
Group picnic shelters #2 and #3						50,000
Visitor centre*						300,000*
Parking expansion (50 spaces next to ball fields)						30,000
Pave parking lots						110,000
Overflow parking lot						45,000
TOTALS	75,000	702,510	140,000	32,000	0	1,080,000

*to be funded by non-GVRD sources **to be shared 50-50 by GVRD

Other Sources of Funding

Other sources of funding may also exist along with voluntary initiatives of local organizations. The following are preliminary suggestions; specific requests will require further detailed discussions with each of the potential partners or funding sources. In general, the following funding sources are particularly supportive of projects where their corporate logo and name is affixed to publications, signs and other such products, and where local volunteers are involved in the project.

Possible funding sources include B.C. Environment's Public Conservation Assistance Fund (PCAF) and Habitat Conservation Fund (HCF), each administered by a board appointed by the provincial government. PCAF is for small projects which involve volunteer labour, where the volunteer time is credited at $5/hr. PCAF funds could be used to cover the cost of purchasing plants for the hedgerows for placement by local volunteers. The HCF is generally for larger habitat enhancement projects, and while preferred, does not specifically require the use of volunteers. HCF funds can be used to cover the cost of contact labour, for example, contract machine time to dig ponds and ditches, and to plough fields as a means of enhancing habitat for wildlife.

Both Ducks Unlimited Canada, Tree Plant Canada and the Pacific Estuary Conservation Program (PECP) are potential sources of funds and technical knowledge for wildlife enhancement. Ducks Unlimited Canada would be particularly helpful in the design of ditches and ponds for freshwater wetland enhancement.

Several financial institutions have environmental project funds. The Friends of the Environment Fund of Canada Trust could be used for smaller projects. Vancouver City Savings has several different funds, including a Corporate Donations Program (up to $40,000) and an EnviroFund (up to $50,000).

The Shell Environmental Fund has been utilized for many small projects in the Lower Mainland, and could be a source of funds for projects.

Many communities have local Foundations which could be approached for funds. The Vancouver Foundation has provided large sums of money for many environmental projects in the Lower Mainland.

Many local community groups raise substantial amounts of money which they spend in their local community. For example, Rotary or the Lions Club may be potential sources of funds, or have access to other funding sources.

Local donors may be a source of funds. Corporate sponsorship of an interpretive sign, a viewing platform, or a section of trail may be possible when the sponsor is given suitable recognition on site, such as the XYZ Company Viewing Platform.

The Fraser River Action Plan may also be a source of funding for wildlife enhancement, viewing and interpretation projects.

Plan Review and Monitoring

GVRD Parks and Environment Canada have agreed to work together in implementing the Boundary Bay Regional Park Plan. The Park Plan should be reviewed in 5 years in order to address any new or outstanding issues that may arise and to make adjustments where necessary. The wildlife management and enhancement components of the Park Plan call for ongoing monitoring of some of the enhancement initiatives (i.e. plant growth, weed and undesirable plant control, etc.).

8.0 REFERENCES

Baldwin, J.R. and J.R. Lovvorn. 1992. Populations, diet, food availability and food requirements of dabbling ducks in Boundary Bay. Pp. 42-69. *In*. Butler, R.W. (Ed.). Abundance, distribution and conservation of birds in the vicinity of Boundary Bay, British Columbia. Technical Report Series No. 155. Canadian Wildlife Service, Pacific and Yukon Region, British Columbia.

Boundary Bay Conservation Committee. 1992. "Ours to Preserve" Boundary Bay Biosphere Reserve, British Columbia, Canada and Washington, USA

Butler, R.W. 1992. Abundance, distribution and conservation of birds in the vicinity of Boundary Bay, British Columbia. Technical Report Series No. 155. Canadian Wildlife Service, Pacific and Yukon Region.

Butler, R.W. and R.W. Campbell. 1987. The birds of the Fraser River delta: populations, ecology and international significance. Occasional Paper No. 65, Canadian Wildlife Service.

Butler, R.W. and R.J. Cannings. 1989. Distribution of birds in the intertidal portion of the Fraser River delta, British Columbia. Technical Report Series No.93, Canadian Wildlife Service, Pacific and Yukon Region.

Charles Torrence Ltd. 1977. Boundary Bay Regional Park: A Development Plan. GVRD. September 1977

Corporation of Delta. 1992. Tsawwassen Area Plan. Planning Department.

Cowan, I.T. and C.J. Guiguet. 1965. The mammals of British Columbia. Handbook No. 11, British Columbia Provincial Museum.

Forbes, R.D. 1972. A floral description of the Fraser River estuary and Boundary and Mud Bays, British Columbia and "Additional Catalogue" Unpubl. Rep., B.C. Fish and Wildlife Branch.

Gebauer, M.B. 1993a. Birds of Boundary Bay Airport, Winter 1992/93. Unpubl. Rep.

Gebauer, M. 1993b. The wintering birds of Boundary Bay. B.C. Naturalist 31(1): 4-5.

Gebauer, M.B. 1995. Status and productivity of great blue heron (*Ardea herodias*) colonies in the lower Fraser River valley in 1992, 1993 and 1994. Prepared for Ministry of Environment, Lands and Parks, Surrey.

Greater Vancouver Regional District Parks Department. 1992. Boundary Bay Regional Park Interpretive Plan for Trails and Exhibits.

Greater Vancouver Regional District Parks Department. 1995. Major Parks Plan Study. Final Report and Conclusions.

Greater Vancouver Regional District Parks Department. 1995. Major Parks Plan Study. Summary and Recommendations.

Holmes, T.L., R.L. Knight, L. Stegall and G.R. Craig. 1993. Responses of wintering grassland raptors to human disturbance. Wildlife Society Bulletin 21: 461-468.

Klein, M.L. 1993. Waterbird behavioral responses to human disturbances. Wildlife Society Bulletin 21: 31-39.

Peepre, J.S. & Associates. 1986. Boundary Bay Regional Park Engineering & Environmental Design Study. Phase Three Report. Park Concept Plan. Prepared for GVRD Parks.

Poynter, A. 1990. Boundary Bay Regional Park: breeding bird survey 1990. Unpubl. Rep.

Poynter, A. 1996. Bird sightings - Boundary Bay Regional Park: 1988-1996. Unpubl. Rep.

Price, M. 1990. Shorebirds of Boundary Bay: An annotated checklist. Discovery 19(4): 125-135.

Quadra Planning Consultants Ltd. 1993. Proposed Boundary Bay Wildlife Management Area Plan. Prepared for B.C. Environment, Lower Mainland Region, Ministry of Environment, Lands and Parks.

Quadra Planning Consultants Ltd. and K.S. Biological Services. 1994. Sea Island Conservation Area, Draft Management Plan. 2nd draft, March 1994. Canadian Wildlife Service, Environment Canada, Pacific and Yukon Region. 70 pp plus appendices.

Sigma Resource Consultants Ltd. 1985a. Boundary Bay Regional Park engineering and environmental design study. Prepared for Greater Vancouver Regional District.

Sigma Resource Consultants Ltd. 1985b. Boundary Bay Regional Park engineering and design study: preliminary review of salt marsh feasibility, Phase One Report. Prepared for Greater Vancouver Regional District.

Stalmaster, M.V. and J.R. Newman. 1978. Behavioral responses of wintering bald eagles to human activity. Journal of Wildlife Management 42(3): 506-513.

Summers, K.R. 1996. Winter bird survey of the Spetifore Lands, Delta. Prepared for Environment Canada, Canadian Wildlife Service, Delta.

Summers, K.R. and M.B. Gebauer. 1996. Assessment of wildlife habitat potential in GVRD Parks and other sites. GVRD Parks Department, Burnaby, BC. 35 pp plus appendices.

Van der Zande, A.N. and P. Vos. 1984. Impact of a semi-experimental increase in recreation intensity on the densities of birds in groves and hedges on a lake shore in the Netherlands. Biological Conservation 30: 237-259.

Van der Zande, A.N., J.C. Berkhuizen, H.C. van Latesteijn, W.J. ter Keurs and A.J. Poppelaars. 1984. Impact of outdoor recreation on the density of a number of breeding bird species in woods adjacent to urban residential areas. Biological Conservation 30: 1-39.

West Bay Consultants. 1995. Identification of Food and Beverage Opportunities. Prepared for GVRD Parks Department. July 1995.

Wiebe, K. 1988. Behavior, habitat, population trends and management of short-eared owls in southwestern British Columbia. Unpubl. Rep., Department of Biological Sciences, Simon Fraser University.

APPENDIX I: Public Open Houses - Summary of Responses

1. Public Open House - February 29, 1996

Summary of Responses (see Tables A and B)

WILDLIFE ISSUES

62% of the respondents agreed with the proposed Wildlife Reserves. The establishment of these Wildlife reserves was given the highest priority (58%) of all the issues listed on the comment form. Habitat enhancement for Wildlife received the second highest priority at 49%.

Written comments generally were in support of the Wildlife Reserves. Many of the respondents felt that the park should be left in its present state as much as possible with little, if any, development.

48% of the respondents agreed with wildlife viewing structures, however, it was given a medium priority by 38% of respondents. Most of the written comments suggested that they were not necessary or should be very limited.

TRAILS

The perimeter cycling/pedestrian trail was agreed to by 66% of the respondents and 33% gave it a high priority.

Comments generally focused on concerns about safety when cyclists and pedestrians share the same trail. Some respondents suggested speed limits for cyclists and no asphalt.

Interior trails for pedestrian use were given almost the same priority for high (25%), medium (28%) and low (25%).

12TH AVENUE ENTRANCE ENHANCEMENTS

The location of the parking lot and washrooms near the 12th Avenue entrance were supported by 57% and 49% respectively. Both were given a low priority.

The comments by respondents indicated that the lot should be kept small and not increase beyond present capacity.

DOG OFF-LEASH AREAS

49% of the respondents disagreed with a fenced-in dog off-leash area and 44% agreed. However, when respondents were asked to rate the priority for a fenced in dog off-leash area, 47% marked it as a high priority and 38% indicated that it was not desired.

Option A, the fenced loop trail, received 50% agreement and Option B, the 12th Avenue Dyke fenced run was agreed to by 33%, while 54% disagreed.

This issue received the majority of comments.

Some felt that the whole park should be kept as an off-leash park and that the owners be held responsible for the control of their dogs. Others did not want to see any off-leash areas in the park. The fields (proposed wildlife reserve) were the area preferred to be left as off-leash areas. Coyotes were sighted as being a greater problem for wildlife than dogs.

The proposed fenced areas, Options A and B, were considered too small by most and were generally seen as an unpopular solution. The proposed use of fencing drew criticism from both dog owners and non-dog owners. Option B was considered to be too restrictive and not very desirable. It was indicated that the dyke trail should be kept as a dog on-leash area. Option A was sighted as the most workable Option, however it was considered by most to be too small. Many felt that it should include the inner trail along with the old dyke trail with no fencing. Many felt that control of the dogs should be left to their owners.

A number of comments focused on the problem of owners not cleaning up after their dogs. It was suggested that more "baggie" dispensers and disposal containers be made available.

NEW PARK ACCESS ROAD

The need for a new access road was agreed to by 49% of the respondents, and 37% gave it a high priority. Respondents pointed out that it would improve safety along Centennial Drive. Others expressed concern about the cost of the new access road.

FACILITIES AT CENTENNIAL BEACH

Generally most of the proposed improvements to the facilities at Centennial Beach received a neutral response and were considered to be of low priority. The proposal for a fine dinning restaurant was strongly disagreed to by 77% of the respondents and not desired by 77%. The expansion of the parking at Centennial Beach was only agreed to by 13% of the respondents, while 59% disagreed and 52% did not desire it. Most of the comments questioned the need for more parking and thought that the existing parking was sufficient. Mini group picnic shelters were not seen as a desired improvement with 57% of the respondents disagreeing. Other suggested improvements included: signs in other languages, improved road signs, interpretive signs, and more garbage cans.

Table A: Proposed Facilities/Enhancements

	Agree		Neutral		Disagree		Total Responses
areas dedicated for Wildlife Reserves (i.e., no public access)?	**56**	62%	**10**	11%	**26**	28%	**94**
Wildlife Viewing Structures?	**45**	48%	**26**	28%	**22**	24%	**93**
Perimeter Cycling/Pedestrian Trail?	**61**	66%	**11**	12%	**21**	23%	**93**
Parking Lot Location near 12th Avenue Entrance?	**54**	57%	**18**	19%	**23**	24%	**95**
Washroom near 12th Avenue Entrance?	**47**	49%	**18**	19%	**30**	32%	**95**
Fenced-in Dog off-leash area	**38**	44%	**6**	7%	**42**	49%	**86**
Fenced Loop Trail (Option A)	**30**	50%	**5**	11%	**25**	42%	**60**
12th Ave., Dyke Fenced Run (Option B)	**15**	33%	**6**	13%	**25**	54%	**46**
New Park Access Road?	**47**	49%	**14**	15%	**35**	36%	**96**
future expansion of parking at Centennial Beach?	**12**	13%	**26**	28%	**55**	59%	**93**
a new main Concession/Washroom facility at Centennial Beach?	**41**	43%	**25**	26%	**29**	31%	**95**
a Park Visitor Centre in conjunction with a new Concession facility?	**30**	31%	**32**	33%	**34**	35%	**96**
additional Family Picnicking at Centennial Beach?	**30**	31%	**33**	34%	**33**	28%	**96**
Mini Group Picnic Shelters? (group size 40-60 persons)?	**11**	12%	**29**	31%	**53**	57%	**93**
a Fine Dining Restaurant within the Regional Park?	**10**	11%	**12**	13%	**73**	77%	**95**
location for the Park Caretaker/Park Service Centre?	**36**	39%	**32**	35%	**24**	26%	**92**

Table B: Implementation Priorities

	High		Medium		Low		Not Desired		Total Responses
Establish Wildlife Reserves	**53**	58%	**21**	23%	**5**	5%	**12**	13%	**91**
Wildlife habitat enhancement	**45**	49%	**22**	24%	**14**	15%	**10**	11%	**91**
Wildlife Viewing Opportunities	**18**	20%	**34**	38%	**22**	24%	**16**	18%	**90**
Perimeter Cycling/Pedestrian Trails	**30**	33%	**23**	26%	**24**	27%	**13**	14%	**90**
Interior Trail Pedestrian Trails	**22**	25%	**24**	28%	**24**	25%	**19**	22%	**87**
Dog Off-leash Area	**40**	47%	**8**	9%	**5**	6%	**33**	38%	**86**
12th Avenue Entrance Parking	**15**	18%	**22**	26%	**26**	31%	**21**	25%	**84**
12th Avenue Entrance Washroom	**19**	23%	**18**	21%	**20**	24%	**27**	32%	**84**
Fenced in Dog Off-leash Area	**30**	33%	**5**	6%	**8**	9%	**45**	51%	**88**
New Park Access Road	**33**	37%	**4**	4%	**18**	20%	**34**	38%	**89**
Centennial Beach Parking Lot	**6**	7%	**10**	12%	**25**	29%	**45**	52%	**86**
Main Concession/Washroom facility	**14**	16%	**25**	29%	**25**	29%	**23**	26%	**87**
Visitor Centre	**8**	9%	**18**	21%	**32**	37%	**29**	33%	**87**
More Family Picnicking	**4**	5%	**24**	28%	**26**	5%	**31**	36%	**85**
Mini Group Picnic Shelters	**2**	2%	**12**	14%	**31**	37%	**39**	46%	**84**
Fine Dining Restaurant	**5**	6%	**5**	6%	**11**	12%	**69**	77%	**90**

2. Public Open House - June 4, 1996

Summary of Responses (See Tables 1 and 2)

50 completed comment forms were received. The responses to individual questions are tabulated in Tables 1 and 2 and detailed comments to each of the questions are attached to the end of this summary.

Park Management Objectives/Planning Principles

64% of the respondents generally agreed with the overall Park Management Objective and Planning Principles, 24% disagreed and 11% were neutral.

58% of respondents believe that the Plan, if implemented, will achieve a good balance between conservation and outdoor recreation in the Park, while 29% do not believe there will be a good balance and 13% are uncertain.

Respondents were also asked to list which Planning Principles were most important to them and which ones they disagreed with (Table 2). The three principles listed the greatest number of times as **most important** are: # 1 (23), 2 (18) and 5 (17):

1) *The Park will be managed for the dual purposes of conservation of wildlife, particularly raptors, herons, songbirds and water birds, and the provision of active and passive outdoor recreation opportunities.*
2) *The Plan has made a major commitment to the conservation of wildlife values through the designation and management of wildlife reserves which are protected from disturbance.*
5) *The Plan recognizes that existing ditches through the park provide important freshwater habitat for birds and other wildlife. This overall water regime will be maintained in order to provide both old field and freshwater habitats that support wildlife*.

The three principles which respondents listed as **disagreeing** with most often are: # 3 (16), 4 (12) and 9 (11):

3) *Recognizing the growing beach recreation demand in the region and the scarcity of such public beach areas, the Plan provides for much needed expansion of intensive beach orientated activities and facilities in the Centennial Beach area.*
4) *A new access road will be constructed to divert heavy, Park destined traffic away from the residential streets in Boundary Bay Village. This road will be located as far south as feasible, given the objective to conserve wildlife values and provide current and future outdoor recreation opportunities.*
9) *The Plan designates areas for future park needs (which cannot be precisely determined at this time) that fit within the overall management objective.*

Park Facilities

44% of respondents agreed with the proposed layout of park facilities in the Centennial Beach area of the park and 30% disagreed. 26% were neutral.

New Access Road

20% of the respondents stated that they would personally benefit from the new access road, while 80% stated they would not. 58% of respondents think that a new access road is appropriate given the present and expected future increase in traffic volumes to the Park and public use of Centennial Beach and 42% do not think it is appropriate.

Of the nine (20%) who responded Yes to "*Would you personally benefit from the new access road?*"; nine responded Yes to "*Do you think that a new access road is appropriate given the present and expected future increase in volumes of traffic to the Park and public use of Centennial Beach?*" Seven of the nine respondents agreed that the construction of the new access road should be given immediate priority and two were neutral.

Fifteen of the 35 respondents who indicated that they would **not** benefit personally from the new access road felt that a new access road would be appropriate given the present and expected future increase in volumes of traffic to the Park and public use of Centennial Beach. Ten of the fifteen respondents agreed that construction of the new access road should be given immediate priority, four remained neutral and one did not respond to the question.

Other Park Facilities

Visitor Centre

When asked if Centennial Beach, which offers one of the best locations for a visitor/interpretive centre for Boundary Bay because of existing support facilities, would be a suitable location for such a facility, 43% agreed, 40% disagreed and 17% were neutral.

67% of respondents agreed that a visitor centre for the whole of Boundary Bay is important, while 33% were neutral. No one disagreed. There were only 18 responses to this question out of a total of 50 (32 non-responses).

Basketball Court

32% of respondents agreed that local youth and families should be given the opportunity to sponsor a basketball court at Centennial Beach, 45% disagreed and 23% were neutral. Of those who agreed, 36% agreed with the proposed location next to the tennis courts, 36% disagreed with this location and 28% were neutral.

Wildlife Reserves and Habitat Management

There was strong agreement (79%) for the proposed types of habitat enhancements, with 14% disagreeing and 7% neutral.

Dog Off-Leash Trail

43% of respondents agreed with the proposed location for the dog off-leash trail, 37% disagreed with the location and 17% were neutral.

50% of the 26 respondents agreed that the GVRD should defer a decision about a dog off-leash area in the Park to allow a multi-user Park task force to be formed and to recommend a complete dog management strategy for the Park. 42% disagreed with this suggestion and 8% were neutral. It should be noted that there were 24 non-responses to this question.

Park Facility Implementation

Several facilities in the Plan are proposed for immediate construction or upgrading to meet increased demands for park use. Respondents were asked if they agreed or disagreed with this priority for: a new park access road, new 20 vehicle parking lot near 12th Avenue and trails.

41% of respondents agreed with the priority for a new park access road, 41% disagreed and 17% were neutral.

34% of respondents agreed with the priority for the new parking lot near 12th Avenue, 45% disagreed and 20% were neutral.

41% of respondents agreed with the priority for trails, 31% disagreed and 28% were neutral. There were 11 non-responses to this question.

Cammidge House

55% of respondents are in favour of GVRD accepting an offer to relocate the Cammidge House into the Park, 23% disagree and 21% are uncertain.

TABLE 1: SUMMARY OF THE CHECK BOX QUESTIONS (JUNE 1996 OPEN HOUSE)

Question **PARK MANAGEMENT OBJECTIVES/PLANNING PRINCIPLES (SEE TABLE 2 ALSO)**	Agree		Neutral		Disagree		Total Responses	Total Non Responses
Do you generally agree/disagree with the overall Park Management Objectives and Planning Principles?	**29**	64%	**5**	11%	**11**	24%	45	5
	Yes		No		Uncertain			
In your opinion will the Plan, if implemented, achieve a good balance between conservation and opportunities for compatible outdoor recreation in the Park?	**26**	58%	**13**	29%	**6**	13%	45	5
PARK FACILITIES	Agree		Neutral		Disagree			
Do you generally agree with the proposed layout of park facilities as shown on the Centennial Beach site plan?	**19**	44%	**11**	26%	**13**	30%	43	7
NEW ACCESS ROAD	Yes		No					
Would you personally benefit from the new access road?	**9**	20%	**35**	80%			44	6
Do you think that a new access road is appropriate given the present and expected future increase in volumes of traffic to the Park and public use of Centennial Beach?	**25**	58%	**18**	42%			43	7
OTHER PARK FACILITIES								
Visitor Centre	Agree		Neutral		Disagree			
Do you agree with the conclusions expressed above, from the Draft Plan?	**18**	43%	**7**	17%	**17**	40%	42	8
Do you agree/disagree that a visitor centre for the whole of Boundary Bay is important?	**12**	67%	**6**	33%	**0**		18	32
Basketball Court	Agree		Neutral		Disagree			
Do you agree that local youth and families should be given the opportunity to sponsor a basketball court at Centennial Beach?	**15**	32%	**11**	23%	**21**	45%	47	3
If so, do you agree with the proposed location for the court, next to the tennis courts as shown in the Centennial Beach Site Plan?	**14**	36%	**11**	28%	**14**	36%	39	11
WILDLIFE RESERVES AND HABITAT MANAGEMENT	Agree		Neutral		Disagree			
Do you generally agree/disagree with the proposed types of habitat enhancements as presented on the display panels and outlined in the draft Plan?	**33**	79%	**3**	7%	**6**	14%	42	8

TABLE 1: SUMMARY OF THE CHECK BOX QUESTIONS (CONTINUED)

DOG OFF-LEASH TRAIL	Agree		Neutral		Disagree		Total Responses	Total Non Responses
Do you agree/disagree with: the location now proposed for a dog-off leash trail	**20**	43%	**8**	17%	**17**	37%	46	4
and/or would you prefer the GVRD defer a decision about a dog off-leash area in the Park to allow a task force to be formed and given responsibility for recommending a complete dog management strategy and Code of Ethics to the GVRD Park Committee? Formation of a task force would include representatives for dog owners, joggers, cyclists, naturalists and walkers who use the Regional Park.	**13**	50%	**2**	8%	**11**	42%	26	24
PARK FACILITY IMPLEMENTATION	Agree		Neutral		Disagree			
Several facilities are proposed for immediate construction or upgrading to meet increased demands for park use. Do you agree/disagree with this priority for: a new park access road	**19**	41%	**8**	17%	**19**	41%	46	4
new 20 vehicle parking lot near 12th Ave.	**15**	34%	**9**	20%	**20**	45%	44	6
trails	**16**	41%	**11**	28%	**12**	31%	39	11
THE CAMMIDGE HOUSE	Yes		No		Uncertain			
Are you in favour of GVRD accepting this offer	**26**	55%	**11**	23%	**10**	21%	47	3

TABLE 2: PLANNING PRINCIPLES

Which Principles are most important to you? (List by number)

Are there any that you disagree with, and if so, which? (List by number)

	MOST IMPORTANT	DISAGREE
1) The Park will be managed for the dual purposes of conservation of wildlife, particularly raptors, herons, songbirds and water birds, and the provision of active and passive outdoor recreation opportunities.	**23**	**4**
2) The Plan has made a major commitment to the conservation of wildlife values through the designation and management of wildlife reserves which are protected from disturbance.	**18**	**3**
3) Recognizing the growing beach recreation demand in the region and the scarcity of such public beach areas, the Plan provides for much needed expansion of intensive beach orientated activities and facilities in the Centennial Beach area.	**5**	**16**
4) A new access road will be constructed to divert heavy, Park destined traffic away from the residential streets in Boundary Bay Village. This road will be located as far south as feasible, given the objective to conserve wildlife values and provide current and future outdoor recreation opportunities.	**7**	**12**
5) The Plan recognizes that existing ditches through the park provide important freshwater habitat for birds and other wildlife. This overall water regime will be maintained in order to provide both old field and freshwater habitats that support wildlife.	**17**	**4**
6) Any future dyking or drainage requirements of local or provincial governments must identify how these facilities will best fit the overall management objective of the Park.	**4**	**3**
7) The Plan recognizes the environmental benefits that may arise from enhancement work at the 12th Avenue lagoon or Beach Grove spit. This work will require a lead role by BC Environment as this area lies mostly outside the Park and is within the Boundary Bay Wildlife Management Area.	**8**	**4**
8) The Plan acknowledges the need to identify areas where other organizations, government agencies and citizens might be involved in park management activities including enhancing wildlife habitat, monitoring wildlife use and providing specialized facilities	**5**	**4**
9) The Plan designates areas for future park needs (which cannot be precisely determined at this time) that fit within the overall management objective	**0**	**11**
10) The Greater Vancouver Regional District and Environment Canada will continue to cooperate on major decisions involving management of the Park, particularly in the management of the wildlife reserves. They will work closely with BC Environment, the Corporation of Delta, Department of Fisheries and Oceans and other agencies.	**4**	**4**

APPENDIX II: Decision Tree For Special Purpose Projects on Active Parkland

(from GVRD Parks System Plan and Policies, 1985)

APPENDIX III: Proposed Dog Off-Leash Area

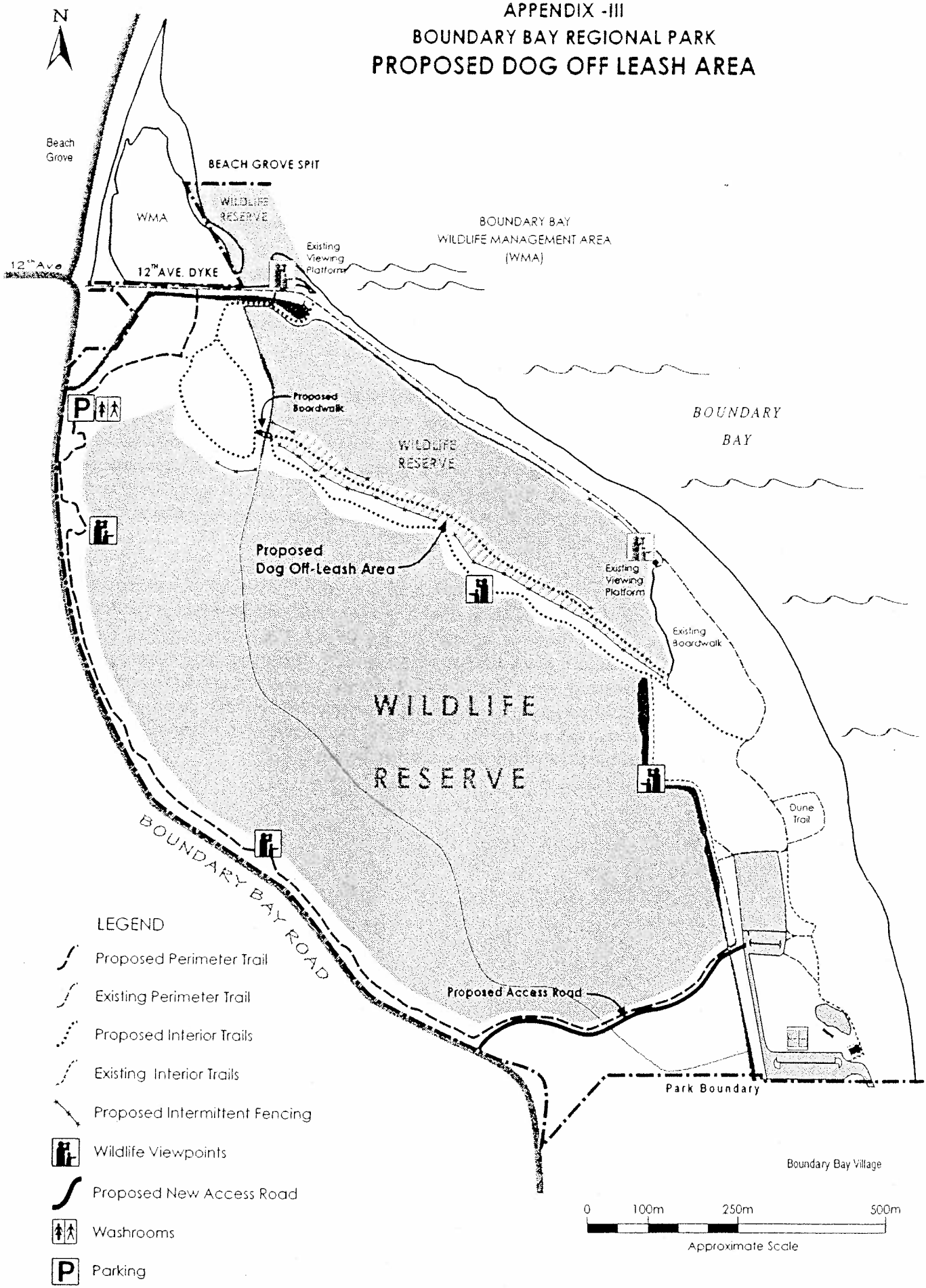
Boundary Bay Regional Park is popular with dog walkers. Many dog walkers have expressed an interest in being able to walk their dogs off leash in the Park. Two options for a dog off-leash area were proposed at the February 1996 Open House - one that utilized the loop trail area just south of the 12th Avenue dyke and a second which ran parallel to the dyke between the 12th Avenue pumphouse and the viewing platform. Both these options were not well supported by dog walkers. Based on comments and suggestions made by dog walkers, an interior trail area was considered to be one of the most suitable locations for a possible dog off-leash area. The location outlined in the following figure was proposed in the Draft Park Plan at the June 4, 1996 Open House. It received support from 43% of the respondents. 37% disagreed with this location and 17% were neutral.

There currently exists an informal trail in the proposed dog off leash area. At a point where the trail meets with the existing boardwalk trail, it is proposed that the pathway be divided into two sections for a distance of about 1 km. The south path will be a regular trail while the north path will be the designated dog off-leash area, consisting of a pedestrian path and a contained area up to 50 metres wide in some areas. The dog off-leash area would be well defined using a combination of planted shrubs (hedgerows) and low profile farm style fencing to minimize conflicts with pedestrians on the parallel interior trail and with the Wildlife Reserves to the north and south.

It is recommended that dog-walkers develop a Dog Owners' Code of Ethics (rules of conduct) for the control of dogs within the dog off-leash area. This Code of Ethics could then be submitted to GVRD Parks for review and final approval. The Code would be posted in the Regional Park at appropriate locations. The Code of Ethics would also include measures for enforcing the rules of conduct. Dog owners would be primarily responsible for implementing the Code of Ethics. Parks staff and dog owners would meet annually to review how the Code of Ethics is working and to discuss any other issues relating to the dog-off leash area. GVRD Parks would have the authority to remove the dog off-leash area within Boundary Bay Regional Park, if in their opinion, the Code of Ethics is not being followed.

AppendixIII Dog Off Leash

APPENDIX -III
BOUNDARY BAY REGIONAL PARK
PROPOSED DOG OFF LEASH AREA



APPENDIX IV: Bird species observed on a breeding bird survey, May 10-11 1990 at Boundary Bay Regional Park (Poynter 1990)

Species	Number	Number of Nests	Notes
Savannah Sparrow	51		
Marsh Wren	23		
Red-winged Blackbird	22		
Mallard	10		
Gadwall	8		
Northern Shoveler	1		
Cinnamon Teal	6	1	
Blue-winged Teal	-		(1)
Common Snipe	2	1	
Bushtit	2	1	(2)
Song Sparrow	5		
Sora	2		(3)
American Goldfinch	7		
Cooper's Hawk	-	1	
Northern Harrier	1	1	
House Finch	3		
Black-capped Chickadee	3		(4)
Tree Swallow	2		
Common Yellowthroat	7		
Orange-crowned Warbler	5		(5)
Ring-necked Pheasant	6		
Barn Swallow	1		
Brown-headed Cowbird	9		(6)
American Robin	10		
European Starling	5		(7)
American Wigeon	2		(8)
Spotted Towhee	5		(9)
Northwestern Crow	3		
White-crowned Sparrow	-		(10)
House Sparrow	-		
Red-tailed Hawk	2		(11)
Wilsons' Warbler	3		
Golden-crowned Sparrow	1		(12)
Warbling Vireo	1		
TOTAL	**208**	**5**	

NOTES:

(1) **Blue-winged Teal:** While no birds were seen or heard on the survey dates, at least nine males in breeding plumage were seen throughout the breeding season and summer in the ditches and lagoon. Three broods were eventually seen in the Park.

(2) **Common Snipe:** Seen and heard for two weeks but no nesting activity observed.

(3) **Sora:** At least one pair nested successfully. Birds were heard all summer.

(4) **Black-capped Chickadee:** No nests found but adults were seen feeding very young birds in the middle of the Park later in spring.

(5) **Orange-crowned Warbler:** No nests found but adults feeding young were seen later in two locations.

(6) **Brown-headed Cowbird:** Males and females were in area all spring and summer but no parasitism was seen.

(7) **European Starling:** Nested in southeast corner possibly in buildings and large trees - only seen carrying food to nests.

(8) **American Wigeon:** One pair performed courtship and were in southeast ditches all breeding season but no young were seen

(9) **Spotted Towhee:** Numerous feeding and singing activity throughout the breeding season, indicating at least two nests, but none were found.

(10) **White-crowned Sparrow:** There was one pair in the northwest corner throughout the breeding seen. No young were seen.

(11) **Red-tailed Hawk:** While individual birds were seen throughout spring and summer, they were obviously from outside the Park boundary, where at least one nest is active on the west side of Beach Grove Golf Course.

(12) **Golden-crowned Sparrow:** Considered to be a late migrant.

APPENDIX V: Bird Species Recorded in Boundary Bay Regional Park 1988-1996 (Allen Poynter 1996)

APPENDIX V: Bird Species Recorded in Boundary Bay Regional Park 1988-1996 (Allen Poynter 1996)

Common Name	Scientific Name	Nest	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	NOTES
Red-throated Loon	*Gavia stellata*		X	X	X					X	X	X	X	X	
Pacific Loon	*Gavia pacifica*				X							X	X	X	
Common Loon	*Gavia immer*		X	X	X	X	X	X	X	X	X	X	X	X	
Pied-billed Grebe	*Podylimbus podiceps*		X	X	X						X	X	X	X	
Horned Grebe	*Podiceps auritus*		X	X	X	X	X			X	X	X	X	X	
Eared Grebe	*Podiceps nigricollis*		X												Rare
Red-necked Grebe	*Podiceps grisegena*		X	X	X	X				X	X	X	X	X	
Western Grebe	*Aechmophorus occidentalis*		X	X	X	X	X			X	X	X	X	X	
Clark's Grebe	*Aechmophorus clarkii*												X		Casual
Double-crested Cormorant	*Phalacrocorax auratus*		X	X	X	X	X	X	X	X	X	X	X	X	
Brandt's Cormorant	*Phalcrocorax penicilattus*		X	X	X									X	
Pelagic Cormorant	*Phalacrocorax pelagicus*		X	X	X	X				X	X	X	X	X	
Great Blue Heron	*Ardea herodias*		X	X	X	X	X	X	X	X	X	X	X	X	
Green-backed Heron	*Butorides striatus*						X	X	X	X	X				
Great Egret	*Casmerodius albus*									X					
Black-crowned Night-Heron	*Nycticorax nycticorax*											X			Casual
Tundra Swan	*Cygnus columbianus*				X										
Trumpeter Swan	*Cygnus buccinator*		X	X	X							X	X	X	
Mute Swan	*Cygnus olor*											X			Rare
Greater White-fronted Goose	*Anser albifrons*		X											X	
Snow Goose	*Chen caerulescens*		X	X	X	X						X	X	X	
Ross' Goose	*Chen rossii*			X											Casual
Emperor Goose	*Chen canagica*			X										X	Casual
Brant	*Branta bernicla*		X	X	X	X	X	X	X	X			X	X	
Canada Goose	*Branta canadensis*		X	X	X	X	X	X	X	X	X	X	X	X	
Wood Duck	*Aix sponsa*				X	X									
Green-winged Teal	*Anas crecca*		X	X	X	X	X	X	X	X	X	X	X	X	
American Black Duck	*Anas rubripes*		X								X	X	X	X	Introduced
Mallard	*Anas platyrhynchos*	X	X	X	X	X	X	X	X	X	X	X	X	X	

APPENDIX V: Continued.

Common Name	Scientific Name	Nest	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	NOTES
Northern Pintail	*Anas acuta*		X	X	X	X	X	X	X	X	X	X	X	X	
Blue-winged Teal	*Anas discors*	X	X			X	X	X	X	X	X			X	
Cinnamon Teal	*Anas cyanoptera*	X	X			X	X	X	X	X	X	X		X	
Northern Shoveler	*Anas clypeata*		X	X	X	X	X	X	X	X	X	X	X	X	
Gadwall	*Anas strepera*	X	X	X	X	X	X	X	X	X	X	X	X	X	
Eurasian Wigeon	*Anas penelope*		X	X	X	X	X				X	X	X	X	
American Wigeon	*Anas americana*	?	X	X	X	X	X	X	X	X	X	X	X	X	
Canvasback	*Aythya valisineria*		X	X	X						X	X	X	X	
Redhead	*Aythya americana*													X	
Greater Scaup	*Aythya marila*		X	X	X	X	X	X	X	X	X	X	X	X	
Lesser Scaup	*Aythya affinis*		X	X	X	X					X	X	X	X	
Harlequin Duck	*Histrionicus histrionicus*				X										
Oldsquaw	*Clangula hyemalis*		X	X				X	X	X	X	X	X	X	
Black Scoter	*Melanitta nigra*		X	X	X	X	X					X	X	X	
Surf Scoter	*Melanitta perspicillata*		X	X	X	X	X	X	X	X	X	X	X	X	
White-winged Scoter	*Melanitta fusca*		X	X	X	X	X	X	X	X	X	X	X	X	
Common Goldeneye	*Bucephala clangula*		X	X	X	X		X			X	X	X	X	
Barrow's Goldeneye	*Bucephala islandica*		X	X	X	X					X	X	X	X	
Bufflehead	*Bucephala albeola*		X	X	X	X	X			X	X	X	X	X	
Common Merganser	*Mergus merganser*		X	X	X	X					X		X	X	
Hooded Merganser	*Lophodytes cucullatus*		X	X									X	X	
Red-breasted Merganser	*Mergus serrator*		X	X	X	X	X	X				X	X	X	
Ruddy Duck	*Oxyura jamaicensis*		X	X	X							X	X	X	
Turkey Vulture	*Cathartes aura*		X	X	X	X		X	X		X	X	X	X	
Osprey	*Pandion haliaetus*								X			X			
Bald Eagle	*Haliaeetus leucocephalus*		X	X	X	X	X	X	X	X	X	X	X	X	
Northern Harrier	*Circus cyaneus*	X	X	X	X	X	X	X	X	X	X	X	X	X	
Sharp-shinned Hawk	*Accipiter striatus*		X	X	X	X	X				X	X	X	X	
Cooper's Hawk	*Accipiter cooperii*	X	X	X	X	X	X	X	X	X	X	X	X	X	
Northern Goshawk	*Accipiter gentilis*		X	X							X				
Red-tailed Hawk	*Buteo jamaicensis*	X	X	X	X	X	X	X	X	X	X	X	X	X	
Rough-legged Hawk	*Buteo lagopus*		X	X	X	X						X	X	X	

APPENDIX V: Continued.

Common Name	Scientific Name	Nest	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	NOTES
Golden Eagle	*Aquila chrysaetos*						X								Rare
American Kestrel	*Falco sparverius*					X				X	X	X	X	X	
Merlin	*Falco columbarius*		X	X	X	X				X	X	X	X	X	
Peregrine Falcon	*Falco peregrinus*		X	X	X	X	X	X	X	X	X	X	X	X	
Gyrfalcon	*Falco rusticolus*		X	X	X									X	Rare
Prairie Falcon	*Falco mexicanus*		X												Casual
Ring-necked Pheasant	*Phasianus colchicus*	X	X	X	X	X	X	X	X	X	X	X	X	X	
Sora	*Porzana carolina*	X				X	X	X	X						
American Coot	*Fulica americana*		X	X	X	X								X	
Virginia Rail	*Rallus limicola*					X									Rare
Sandhill Crane	*Grus canadensis*						X								
American Avocet	*Recurvirostra americana*										X		X	X	Casual
Black-bellied Plover	*Pluvialis squatarola*		X	X	X	X	X	X	X	X	X	X	X	X	
Lesser Golden Plover	*Pluvialis dominica*										X	X			
Semipalmated Plover	*Charadrius semipalmatus*		X	X	X	X	X	X	X	X	X	X	X	X	
Killdeer	*Charadrius vociferus*	X	X	X	X	X	X	X	X	X	X	X	X	X	
Greater Yellowlegs	*Tringa melanoleuca*		X	X	X	X	X	X	X	X	X	X	X	X	
Lesser Yellowlegs	*Tringa flavipes*		X		X	X	X	X	X	X	X	X	X	X	
Solitary Sandpiper	*Tringa solitaria*								X	X					Rare
Spotted Sandpiper	*Actitis macularia*	X	X	X	X	X	X	X	X	X	X	X	X	X	
Whimbrel	*Numenius phaeopus*					X	X	X	X	X					
Long-billed Curlew	*Numenius americanus*						X		X	X					
Hudsonian Godwit	*Limosa haemastica*										X				Casual
Marbled Godwit	*Limosa fedoa*							X	X		X	X			Rare
Willet	*Catoptrophorus semipalmatus*									X					Rare
Ruddy Turnstone	*Arenaria interpres*		X				X			X			X	X	Rare
Black Turnstone	*Arenaria melanocephala*		X	X						X	X	X	X	X	
Sanderling	*Calidris alba*		X	X	X	X	X		X	X	X	X	X	X	
Rock Sandpiper	*Calidris ptilocnemis*													X	Rare
Semipalmated Sandpiper	*Calidris pusilla*					X	X		X	X	X	X			
Western Sandpiper	*Calidris mauri*		X	X	X	X	X	X	X	X	X	X	X	X	

APPENDIX V: Continued.

Common Name	Scientific Name	Nest	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	NOTES
Least Sandpiper	*Calidris minutilla*					X	X	X	X	X	X				
Baird's Sandpiper	*Calidris bairdii*					X				X	X				
Rufous-necked Stint	*Calidris ruficollis*								X	X					Casual
Temminck's Stint	*Calidris temminckii*									X					Casual
Pectoral Sandpiper	*Calidris melanotos*								X	X	X	X	X		
Dunlin	*Calidris alpina*		X	X	X	X	X		X			X	X	X	
Stilt Sandpiper	*Calidris himantopus*								X	X	X				Rare
Ruff	*Philomachus pugnax*									X	X				Rare
Short-billed Dowitcher	*Limnodromus griseus*		X	X		X	X		X	X	X	X	X	X	
Long-billed Dowitcher	*Limnodromus scolopaceus*					X			X	X	X	X	X	X	
Common Snipe	*Gallinago gallinago*		X			X	X	X	X	X	X	X	X	X	
Wilson's Phalarope	*Phalaropus tricolor*									X					Rare
Red-necked Phalarope	*Phalaropus lobatus*						X		X	X					Rare
Parasitic Jaeger	*Stercorarius parasiticus*									X					Rare
Franklin's Gull	*Larus pipixcan*								X	X	X	X	X		Rare
Bonaparte's Gull	*Larus philadelphia*		X	X		X	X	X	X	X	X	X	X	X	
Heermann's Gull	*Larus heermanni*									X					
Mew Gull	*Larus canus*		X	X	X	X	X	X	X	X	X	X	X	X	
Ring-billed Gull	*Larus delawarensis*		X	X	X	X	X	X	X	X	X	X	X	X	
California Gull	*Larus californicus*							X	X	X	X	X			
Herring Gull	*Larus argentatus*		X	X	X			X	X	X	X	X		X	
Thayer's Gull	*Larus thayeri*		X	X	X	X				X	X	X	X	X	
Western Gull	*Larus occidentalis*		X	X										X	Rare
Black-legged Kittiwake	*Rissa tridactyla*													X	Casual
Glaucous-winged Gull	*Larus glaucescens*		X	X	X	X	X	X	X	X	X	X	X	X	
Glaucous Gull	*Larus hyperboreus*		X	X										X	Rare
Caspian Tern	*Sterna caspia*					X	X	X	X	X	X	X			
Common Tern	*Sterna hirundo*						X		X	X	X				
Common Murre	*Uria aalge*		X							X			X	X	
Pigeon Guillemot	*Cepphus columba*								X	X				X	
Marbled Murrelet	*Brachyramphus marmoratus*													X	

APPENDIX V: Continued.

Common Name	Scientific Name	Nest	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	NOTES
Rock Dove	*Columba livia*		X	X	X	X	X	X	X	X	X	X	X	X	
Band-tailed Pigeon	*Columba fasciata*				X	X	X	X	X	X	X	X			
Mourning Dove	*Zenaida macroura*	?			X		X	X		X	X	X			
Barn Owl	*Tyto alba*		X	X	X	X	X	X	X	X	X	X	X	X	
Great Horned Owl	*Bubo virginianus*		X				X		X						
Snowy Owl	*Nyctea scandica*		X	X										X	Uncommon
Northern Hawk Owl	*Surnia ulula*		X										X		Old Record
Short-eared Owl	*Asio flammeus*		X	X	X	X					X	X	X	X	
Long-eared Owl	*Asio otus*		X												Rare
Common Nighthawk	*Chordeiles minor*									X					Uncommon
Black Swift	*Cypseloides niger*						X	X		X					
Vaux's Swift	*Chaetura vauxi*						X	X	X	X	X				
Anna's Hummingbird	*Calypte anna*		X						X	X					Rare
Rufous Hummingbird	*Selasphorus rufus*	X			X	X	X	X	X	X					
Belted Kingfisher	*Ceryle alcyon*		X	X	X	X	X	X	X	X	X	X	X	X	
Downy Woodpecker	*Picoides pubescens*	X	X	X	X	X	X	X	X	X	X	X	X	X	
Northern Flicker	*Colaptes auratus*	?	X	X	X	X	X			X	X	X	X	X	
Olive-sided Flycatcher	*Contopus borealis*						X			X					
Western Wood-Pewee	*Contopus sordidulus*						X								
Willow Flycatcher	*Empidonax traillii*	X					X	X	X	X					
Pacific-slope Flycatcher	*Empidonax difficilis*						X								
Eastern Kingbird	*Tyrannus tyrannus*						X	X							Rare
Western Kingbird	*Tyrannus verticalis*							X	X						Rare
Horned Lark	*Eremophila alpestris*										X	X			
Tree Swallow	*Tachycineta bicolor*		X	X	X	X	X	X	X	X	X				
Violet-green Swallow	*Tachycineta thalassina*			X	X	X	X	X	X	X					
Northern Rough-winged Swallow	*Stegidopteryx serripennis*	?				X	X	X	X	X	X				
Bank Swallow	*Riparia riparia*							X			X				Rare
Cliff Swallow	*Hirundo pyrrhonota*	?				X	X	X	X	X					
Barn Swallow	*Hirundo rustica*	X				X	X	X	X	X	X		X	X	
Steller's Jay	*Cyanocitta stelleri*									X					

APPENDIX V: Continued.

Common Name	Scientific Name	Nest	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	NOTES
Northwestern Crow	*Corvus caurinus*	X	X	X	X	X	X	X	X	X	X	X	X	X	
Common Raven	*Corvus corax*		X	X	X	X	X	X	X	X	X	X	X	X	
Black-capped Chickadee	*Parus atricapillus*	X	X	X	X	X	X	X	X	X	X	X	X	X	
Chestnut-backed Chickadee	*Parus rufescens*													X	
Bushtit	*Psaltriparus minimus*	X	X	X	X	X	X	X	X	X	X	X	X	X	
Red-breasted Nuthatch	*Sitta canadensis*													X	
Bewick's Wren	*Thryomanes bewickii*	X	X	X	X	X	X	X	X	X	X	X	X	X	
Winter Wren	*Troglodytes troglodytes*	?	X	X							X	X	X	X	
Marsh Wren	*Cistothorus palustris*	X	X	X	X	X	X	X	X	X	X	X	X	X	
American Dipper	*Cinclus mexicanus*												X		Accidental
Golden-crowned Kinglet	*Regulus satrapa*			X										X	
Ruby-crowned Kinglet	*Regulus calendula*		X	X	X	X					X	X	X	X	
Mountain Bluebird	*Sialia currucoides*					X									Rare
Townsend's Solitaire	*Myadestes townsendi*					X									Rare
Swainson's Thrush	*Catharus ustulatus*	?					X	X		X					
Hermit Thrush	*Catharus guttatus*											X		X	
American Robin	*Turdus migratorius*	X	X	X	X	X	X	X	X	X	X	X	X	X	
American Pipit	*Anthus spinoletta*			X		X				X	X	X	X	X	
Olive-backed Pipit	*Anthus hodgsoni*											X			Accidental
Cedar Waxwing	*Bombycilla cedrorum*	X						X	X	X	X	X	X		
Northern Shrike	*Lanius excubitor*		X	X	X							X	X	X	
European Starling	*Sturnus vulgaris*	X	X	X	X	X	X	X	X	X	X	X	X	X	
Solitary Vireo	*Vireo solitarius*					X									
Warbling Vireo	*Vireo gilvus*						X								
Orange-crowned Warbler	*Vermivora celata*	X			X	X	X	X	X	X	X	X			
Yellow Warbler	*Dendroica petechia*	X				X	X	X	X	X					
Yellow-rumped Warbler	*Dendroica coronata*	X	X	X	X	X	X	X	X	X	X	X	X	X	
Common Yellowthroat	*Geothlypsis trichas*	X				X	X	X	X	X	X	X			
Wilson's Warbler	*Wilsonia pusilla*				X	X	X								
Western Tanager	*Piranga ludoviciana*								X						
Black-headed Grosbeak	*Pheucticus melanocephalus*	X					X	X	X						

APPENDIX V: Continued.

Common Name	Scientific Name	Nest	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	NOTES
Lazuli Bunting	*Passerina amoena*							X							Rare
Spotted Towhee	*Pipilo macularia*	X	X	X	X	X	X	X	X	X	X	X	X	X	
American Tree Sparrow	*Spizella arborea*		X	X	X									X	
Chipping Sparrow	*Spizella passerina*									X					Rare
Savannah Sparrow	*Passerculus sandwichensis*	X	X	X	X	X	X	X	X	X	X	X	X	X	
Fox Sparrow	*Passerella iliaca*		X	X	X						X	X	X	X	
Song Sparrow	*Melospiza melodia*	X	X	X	X	X	X	X	X	X	X	X	X	X	
Lincoln's Sparrow	*Melospiza lincolnii*		X	X	X	X				X	X	X	X	X	
Swamp Sparrow	*Melospiza georgiana*		X									X	X	X	Rare
White-crowned Saprrow	*Zonotrichia leucophrys*	X	X	X	X	X	X	X	X	X	X	X	X	X	
Golden-crowned Sparrow	*Zonotrichia atricapilla*		X	X	X	X	X				X	X	X	X	
Harris' Sparrow	*Zonotrichia querula*		X										X	X	Rare
Dark-eyed Junco	*Junco hyemalis*		X	X	X	X					X	X	X	X	
Snow Bunting	*Plectrophenax nivalis*											X			
Red-winged Blackbird	*Agelaius phoeniceus*	X	X	X	X	X	X	X	X	X	X	X	X	X	
Western Meadowlark	*Sturnella neglecta*		X	X	X	X	X	X	X	X	X	X	X	X	
Yellow-headed Blackbird	*Xanthocephalus xanthocephalus*						X								Rare
Brewer's Blackbird	*Euphagus cyanocephalus*	X	X	X	X	X	X	X	X	X	X	X	X	X	
Common Grackle	*Quiscalus quiscula*			X											Accidental
Brown-headed Cowbird	*Molothrus ater*	X	X	X	X	X	X	X	X	X	X	X	X	X	Parasitic
Northern Oriole	*Icterus galbula*									X					Rare
Purple Finch	*Carpodacus purpureus*		X										X	X	
House Finch	*Carpodacus mexicanus*	X	X	X	X	X	X	X	X	X	X	X	X	X	
Red Crossbill	*Loxia curvirostra*				X	X	X	X	X	X	X	X		X	
Rosy Finch	*Leucosticte arctoa*													X	Old Record
Pine Siskin	*Carduelis pinus*		X	X	X	X	X	X	X	X	X	X	X	X	
American Goldfinch	*Carduelis tristas*	X	X	X	X	X	X	X	X	X	X	X	X	X	
Evening Grosbeak	*Coccothraustes vespertinus*										X				
House Sparrow	*Passer domesticus*	X	X	X	X	X	X	X	X	X	X	X	X	X	

TOTAL SPECIES = 214