



# *S-AMUNA'/SOMENOS MARSH CONSERVATION AREA MANAGEMENT PLAN*

A Consolidated Review (2001-2016) &  
Future Management Directions (2016-2026)





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## Introduction

The S-amuna'/Somenos Marsh Conservation Area (SMCA) is a 200ha complex<sup>1</sup> (Map 1) that contains several unique and sensitive ecosystems that provide critical fish and wildlife habitat to a myriad of plant and animal species. The area has a long history of occupation and use by the people of the Cowichan Nation<sup>2</sup> and today is recognized for having significant cultural values to both Cowichan Tribes and other residents of the Cowichan Valley.

The S-amuna'/Somenos Marsh Conservation Area includes:

- Somenos Lake and associated wetlands and marsh ecosystems
- Portions of Bings, Averill, Richards, and Somenos Creeks
- Agricultural land
- Garry Oak woodlands and meadows
- *Ye'yumnuts* cultural site
- Several recreational trails for nature interpretation and walking

The SMCA is comprised of several parcels of land and includes lands owned by the Province of British Columbia Ministry of Forests, Lands and Natural Resource Operations (FLNRO), Municipality of North Cowichan (MNC), The Nature Trust of British Columbia (TNTBC), Ducks Unlimited Canada (DUC), and the BC Forest Discovery Centre (BCFDC).

Based on Cowichan Tribes' oral history, the Cowichan Nation people have a strong connection to the area.

*"Since time immemorial, Cowichan Tribes has had a connection to the Somenos Marsh, Lake and Creek. At the time of European contact there were several thousand people living at two Cowichan villages associated with the Marsh – S-amuna' and Kwa'mutsun. The S-amuna' (Somenos) Village lined the west side of Somenos Lake (including the present location of the Forest Discovery Centre) and according to Cowichan Elders was 7,000 people strong prior to the epidemics of the mid- 1800s. The Kwa'mutsun (Quamichan) Village lined Somenos Creek extending to the confluence with the Cowichan River. Near the headwaters of Somenos Creek is an ancient burial site known as Ye'yumnuts. These villages benefited from the ready supply of coho and chum salmon that could be harvested even in the off-season during high water levels." - Oral History, Cowichan Tribes*

## Ecological and Regional Context

The entire S-amuna'/Somenos Marsh Conservation Area conserves sensitive wetland, riparian, lake and upland forest ecosystems, as well as agricultural land in the Somenos watershed.

## Biogeoclimatic Zone Representation

The SMCA lies within a unique ecological region in Canada which contains the rare moist maritime Coastal Douglas-fir (CDFmm) biogeoclimatic zone. The CDFmm has exceptionally high biodiversity

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<sup>1</sup> This includes all land in the conservation area as of June 2016.

<sup>2</sup> The Cowichan Nation describes the aboriginal peoples present in this area at time of European contact. As a result of Indian Reserve creation, the historic Cowichan Nation was divided into the bands recognized today as Cowichan Tribes, Halalt First Nation, Lyackson First Nation, Penelakut Tribe, and Stz'uminus First Nation.

values and many rare and endangered plant and animal species as well as rare plant communities, found nowhere else in Canada. Currently only 9.4% of the CDFmm is protected in either parks or conservation lands (Hectares BC, 2016).

### **Linkages to Federal and Provincial Conservation Initiatives**

Management and ongoing restoration/enhancement of the SMCA helps address 10 of the 23 major findings in *Taking Nature's Pulse: The Status of Biodiversity in British Columbia* (Austin et al. 2008):

1. At the broad scale, four biogeoclimatic zones [Coastal Douglas-fir (CDF), Interior Douglas-fir, Ponderosa Pine, and Bunchgrass], representing approximately 5% of BC's land base, are of provincial conservation concern.
2. At the fine scale, more than half of the ecological communities described in BC are of provincial conservation concern and 97% of the communities described in the CDF of are provincial conservation concern.
3. BC has a majority of the global range for six of the 16 biogeoclimatic zones that occur in the province (Coastal Douglas-fir, Interior Cedar-Hemlock, Montane Spruce, Mountain Hemlock, Sub-boreal Pine-Spruce, and Sub-boreal Spruce).
4. The Coastal Douglas-fir biogeoclimatic zone is the rarest biogeoclimatic zone in BC and is of great conservation concern.
5. Significant areas of wetlands in British Columbia have been converted or degraded, particularly in the two Major Drainage Areas of greatest conservation concern (those of the Columbia River and Fraser River).
6. Of the species assessed to date in BC, 43% are of provincial conservation concern, and these are concentrated in the four biogeoclimatic zones of conservation concern. The CDF has the highest density of species of provincial conservation concern.
7. BC is known to have a majority of the global range for 99 species. The location of this property is in an area where 26 species have the majority of their global range in BC.
8. The flow of water in lakes, streams, wetlands and groundwater systems is being seriously impacted in British Columbia by dams, water diversions, logging, stream crossings and climate change.
9. British Columbia has many significant seasonal concentrations of species (e.g. migratory birds, spawning salmon) that are vulnerable to human impacts.
10. Ecosystem conversion from urban/rural development and agriculture has seriously impacted British Columbia's biodiversity, especially in the three rarest biogeoclimatic zones (Coastal Douglas-fir, Bunchgrass and Ponderosa Pine).



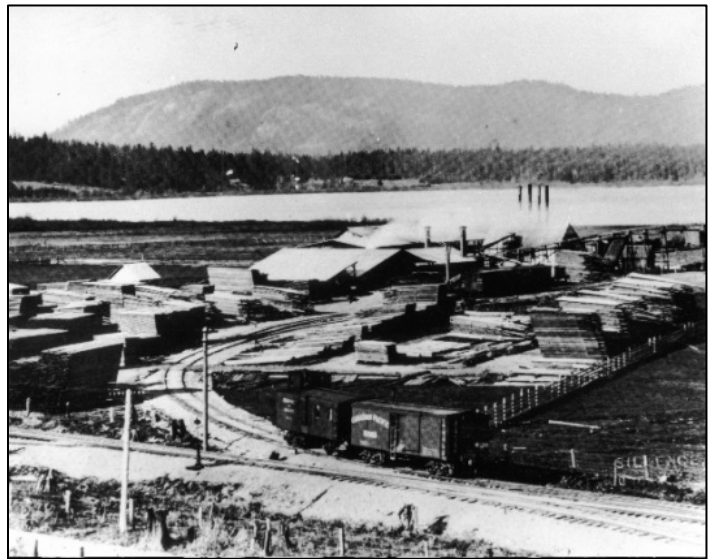
The ongoing securement and management of this conservation area helps fulfill a key goal of the *Wetland Action Plan for British Columbia* (WSP 2010): *Goal 5. Secure the protection of priority wetlands and the conservation and restoration of natural wetlands throughout the province.*

This project also supports several of the conservation objectives and four recommendations of the *Bird Conservation Strategy for Bird Conservation Region 5: Northern Pacific Rainforest* (Environment Canada, 2013) for shrub/early successional, wetland and riparian habitats and is recognized internationally as an *Important Bird Area*.

### **Linkages to Local and Regional Government**

Locally, the S-amuna'/Somenos Marsh Conservation Area fulfills commitments of the Municipality of North Cowichan's Official Community Plan (2011) – "*Guard Our Environment*", specifically in relation to the core objective to "Protect local ecosystems and, where opportunities arise, restore the natural environment to maintain biodiversity, ecological health and integrity."

The University Village Local Area Plan (UVLAP), established by North Cowichan Bylaw 3582, identifies the Somenos Marsh as an area outside the urban containment boundary (UCB) in North Cowichan's Official Community Plan. The intent of the UVLAP is to provide protection to the environmental, cultural, recreational and agricultural areas, and allow for providing opportunities for other public uses, such as visitor, recreation, agriculture, interpretation and ancillary uses associated with the Somenos Marsh. The plan supports public access through formal access pathways along the flood protection dike, York Road right of way, and formalized trails/trail adjacent to Somenos Creek.



In 2007, the Cowichan Valley Regional District (CVRD) adopted a Regional [Old Mill Site \(Open Air Classroom\)](#) Parks & Trails Master Plan which is a 10-15 year strategy identifying 11 sites of acquisition for Regional Park purposes based on a set of principles: provide outdoor recreation opportunities, protect natural areas, include representative landscapes, be regionally significant, and support regional livability. Somenos Marsh was one of the 11 sites of acquisition identified under this Regional Parks and Trails Master Plan. The Master Plan identified approximately 200 hectares of land that would be supported as a Regional Park around Somenos Marsh.

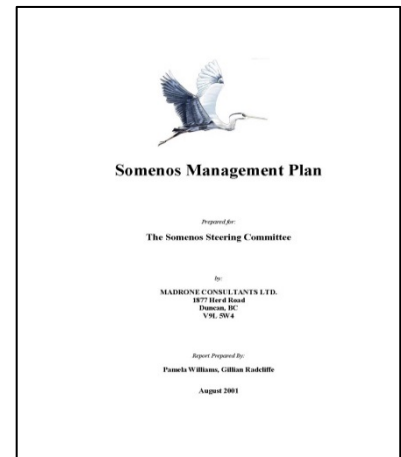
## Background to Plan Update

In 2001, the Somenos Management Committee (SMC)<sup>3</sup> adopted a Management Plan for the Somenos Marsh Conservation Area that provided recommendations for protecting, enhancing and restoring fish and wildlife habitat while continuing to allow for passive recreation.

Since 2001 the partners of the SMC have undertaken several projects and initiatives in partnership with local stewardship groups and volunteers, to achieve the goals and objectives of the Management Plan. As a result of these efforts, the conservation area has been expanded; several restoration projects have been completed; more information about the biophysical features and human use of the area has been collected; and several land management issues/concerns have been addressed.

In recognition of these successes and the changing dynamics at Somenos Marsh, the SMC committee hired Madrone Environmental Services Ltd in 2015 to undertake a strategic review of the 2001 management plan in consultation with the SMC members and provide recommendations for future management.

This review, coupled with the co-management steering committee's desire to create a plan that reflects the expanded conservation area, resulted in the development of a 10 year strategic plan as well as a land use plan to assist with addressing issues as they arise. While respecting the underlying guiding documents and legal framework of the parcels that make up the S-amuna'/Somenos Marsh Conservation Area<sup>4</sup>, this plan aims to bring the management of the entire complex under the umbrella of an area based land use management plan. This plan defines both acceptable land use activities to assist with land management decisions and establishes 5-10 year targets to meet our overall management goals in the area and to address the issues and opportunities identified by Madrone 2015. These targets are measurable and will be monitored to gauge effectiveness of our actions; this will guide our annual work plans moving forward.



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<sup>3</sup> The 2001 SMC included: Province of BC (BC Parks and Fish, Wildlife and Habitat), Cowichan Tribes, Municipality of North Cowichan, Ducks Unlimited Canada, The Nature Trust of BC, Cowichan Watershed Council, Somenos Marsh Wildlife Society, and BC Forest Discovery Centre)

<sup>4</sup> Lands within the SMCA include lands owned by the BC Forest Discovery Centre, Municipality of North Cowichan, Crown land, and land owned by The Nature Trust of BC and Ducks Unlimited Canada; some of which are leased to the province for management purposes.

## Management Plan Organization

This document is separated into two parts:

**Part 1** – A consolidated review (2012-2016) of the achievements and challenges in the implementation of the 2001 Management Plan; and,

**Part 2** – Land Use Plan and Future Directions (2016-2026) for the ongoing management of the Conservation Area.

This document is a supplementary document to the original plan (2001). Madrone's 2015 strategic review of the 2001 Management Plan is a reference document that provides additional guidance moving forward. The goal of this document in Part 1 is to update information, highlight achievements and summarize what we have learned since 2001 and, finally, in Part 2, to prioritize the next steps through the establishment of management targets.

## **Part 1 – A Consolidated Review of the 2001 Somenos Management Plan**

## Achievements in the Management of S-amuna'/Somenos Marsh Conservation Area

The 2001 Somenos Management Plan established eight goals and seven general principles:

### Goals

1. Manage all lands within the Management Area as one unit regardless of ownership;
2. Work cooperatively to expand the management area and improve the ecological integrity of the Management Area boundaries, through land acquisitions, conservation covenants, stewardship agreements or management agreements on adjacent lands wherever possible;
3. Restore damaged areas and system components, improve productivity for fish, wildlife and agriculture;
4. Support Garry oak ecosystem restoration initiatives at the Somenos Garry Oak Protected Area through collaboration with other groups ;
5. Support the Important Bird Area (IBA) designation by maintaining habitat for Trumpeter Swans, other waterfowl, and Great Blue Herons;
6. Provide educational and interpretive opportunities, including wildlife viewing, for public enjoyment and education, in so far as they do not negatively impact on the natural values;
7. Provide opportunities for scientific inventory and research to establish baselines and further our understanding of the functional ecological relationships and the critical factors determining overall productivity and diversity of this system; and
8. Support recreational and economic activities in so far as they do not negatively compromise the natural values of the Management Area.

### General Principles

- i. Promote long-term benefits to the natural ecological systems and components over potential short term gains by any particular agency, user group or individual;
- ii. Develop sustainable goals that are dynamic upon the land area, rather than strictly static management to preserve the existing status quo;
- iii. Cooperative management of the area will be undertaken in a manner that recognizes and respects Cowichan Tribes' Aboriginal rights and title interests;
- iv. Foster stewardship of the Somenos Wetlands and adjacent uplands among the local and provincial community through education and interpretation;
- v. Any dredging should be for habitat restoration purposes or to achieve fish, wildlife and agricultural objectives, or to reduce flooding damage to adjacent properties. Dredging should not be conducted to increase access or recreational opportunities;
- vi. Given the close proximity of the management area to settlement and the recreational use of the site, hunting will not be permitted within the Management Area; and Wildlife control of indigenous species (e.g. trapping of beaver) will only be considered where necessary to meet specific management objectives, and as a last resort.

In order to achieve the eight goals, a schedule of 42 actions was proposed. These actions were divided into the 5 management zones, which divided the SMCA into approximate ecosystem types: lake, marsh, agricultural fields, forests / woodlands, and riparian. An analysis of the degree to which the 42 actions were achieved provides a good barometer with which to assess the

success of the eight 2001 management plan goals.

In terms of the 2001 Management Plan actions, 33 out of 42 (78%) have been either achieved or are in some state of progress as an on-going task; just over 22% of the proposed actions were never undertaken or were unsuccessful (Madrone, 2015). Table 1 provides a “Stop Light” diagram as developed by Madrone that highlights the status of the identified actions. The following sections summarize key achievements in meeting several of the goals and general principals identified above.

### **Management & Governance (Goal 1)**

Since the inception of the 2001 Somenos Marsh Management Plan the partners of the SMC have met quarterly to discuss issues and opportunities for the management of Somenos Marsh. The continued engagement by all partners of the SMC speaks to the level of importance all of the partners place on Somenos Marsh as both critical fish and wildlife habitat but also of the value to the community. Over the years the SMC has expanded (now includes the Cowichan Valley Regional District and Cowichan Valley Naturalists) and contracted (e.g. BC Parks is no longer a member) due to changing mandates and roles/responsibilities.

### **First Nations – Cowichan Tribes**

Cowichan Tribes was a signatory to the 2001 Somenos Management Plan and have been actively involved in the stewardship and management of the Conservation Area. Cowichan Tribes Oral History re-affirms their long history at Somenos:

*“Since time immemorial, Cowichan Tribes has had a connection to the Somenos Marsh, Lake and Creek. At the time of European contact there were several thousand people living at two Cowichan villages associated with the Marsh – S’amuna’ and Kwa’mutsun. The S’amuna (Somenos) Village lined the northwest side of Somenos Lake (including the present location of the Forest Discovery Centre) and according to Cowichan Elders was 7,000 people strong prior to the epidemics of the mid- 1800s. The Kwa’mutsun (Quamichan) Village lined Somenos Creek extending to the confluence with the Cowichan River. Near the headwaters of the Somenos Creek is an ancient burial site known as Ye’ yumnuts. These villages benefited from the ready supply of coho and chum salmon that could be harvested even in the off-season during high water levels.” – Oral History, Cowichan Tribes*

To this day the people of Cowichan Tribes are dependent on salmon resources in their Territory. Somenos Marsh complex is a rich Coho rearing habitat and all drainages in it are fish bearing. Cowichan Nation people have always been connected to salmon and salmon habitat in their Territory. Over the past few decades the floodplain habitat including the Somenos wetland complex that Coho depend on has been insularized and reduced. *“We continue to see habitat for fish eroded by development in our territory, a territory to which we have never ceded our rights and title through Treaty.”*([www.cowichantribes.com](http://www.cowichantribes.com))

Since 2001 Cowichan Tribes has been an active participant on the Somenos Management Committee and have provided invaluable input and information on the ecological and cultural history of Somenos. In 2011, the Province of BC secured the *Ye'yumnuts* heritage site and in 2015 worked with Cowichan Tribes to develop a report titled "*Future Directions for Heritage Site Management at Somenos Creek DeRw-018, Ye'yumnuts*". This report represents a starting point for the management of the site for both heritage and ecological values and forms an integral part of the 2018 Collaborative Partnership Agreement for the "*S-amuna'* Wildlife Management Area" between the Province of BC (and partners of the Vancouver Island Conservation Lands Management Program) and Cowichan Tribes which was signed in early 2018.

Lake	Not Met	Underway	Achieved
Monitor water quality at spring overturn			
Monitor dissolved oxygen levels in Somenos Lake			
Increase DO by lowering water temperature by creating shade			
Increase DO summer levels through artificial means			
Undertake a nutrient input management study.			
Liaise with MNC on storm-water management and development plans			
Investigate Lake Health Management & Restoration options			
Liaise with District of North Cowichan to protect the groundwater supply			
Ensure sediment and organic inputs to the system do not exceed removal			
Provide undisturbed roosting space on the lake during the winter			
Maintain the boat launch area at the end of Drinkwater Road			
Review the fish stocking program			
<b>Marsh</b>			
Determine extent of purple loosestrife, yellow flag iris and other invasive species			
Develop purple loosestrife, yellow flag iris and other invasive control plan			
Provide winter/migratory habitat for waterfowl			
Provide breeding / molt habitat for waterfowl and migratory songbirds			
Maintain smartweed production for waterfowl			
Develop recovery plan for red-listed plant species <i>Psilocarphus elatior</i>			
<b>Agricultural Fields</b>			
Find a farmer to work the fields			
Sign a licence agreement between TNT, MWLAP and the farmer			
Work towards water levels of 4.6m or less during the growing season			
Restore agricultural land on the north side of Bings Creek			
Maintain soil fertility without increasing nitrification of Somenos Lake			
Leave strips of unmowed grass by hedgerows to enhance wildlife habitat			
Improve/replace the drainage ditches in the agricultural fields			
Plant shrubs and trees along the Trans-Canada Highway for birds			
Maintain the dyke trail at the end of York Road			
<b>Forests, Woodlands and Open Air Classroom</b>			
Explore management options for the Somenos Garry Oak Protected Area.			
Fence the Somenos Garry Oak Protected Area along York Rd.			
Conduct monitoring for invasive species in Garry Oak Protected Area			
Broom control in Garry Oak Protected Area.			
Develop and implement recovery plan for <i>Viola praemorsa</i>			
Formalize trail network in Garry Oak Protected Area			
Maintain the boardwalk and bird blind			
Continue forest restoration to provide upland habitat for wildlife			
Maintain boardwalk blackberry for birds but do not let blackberry spread			
Investigate restoring the property west of Fun Pacific to a forest			
<b>Riparian</b>			
Create cool water riparian refuges for fish along creeks and ditches			
Remove reed canary grass along Somenos Creek to facilitate water flow			
Control Reed Canary grass, protect trees/shrubs along Bings Ck			
Assess potential enhancement opportunities in Averill Ck.			

Table 1 – Diagram of recommended actions from the 2001 Somenos Management Plan

### Conservation Area Expansion (Goal 2)

Several conservation partners have actively been working to expand the Conservation Area (See Map 1: Proposed Somenos Marsh Conservation Area Boundary) since the inception of the 2001



management plan. Significant achievements include acquisitions of:

- The Silva property by Ducks Unlimited Canada and The Nature Trust of BC in 2005;
- The *Ye'yumnuts* heritage site by the Province of British Columbia in 2011;
- The Municipality of North Cowichan transferred approximately 38 acres of land on the north side of the dike along Beverly Street to Lakes Rd to TNTBC as compensation for municipal infrastructure works on just less than 1 acre of TNTBC lands; and
- Ducks Unlimited Canada secured ownership of the 90ha lake bottom from TimberWest.

Additional lands are also being proposed to be added into the Conservation Area in future (*Map 2: Proposed Additions to the Somenos Marsh Conservation Area*) and it is proposed that conservation agreements be pursued on private lands (*Map 3: Proposed SMCA Conservation Agreements on Private Lands*).

In addition the Crown Land Securement Partnership Program is actively working to designate a Provincial Wildlife Management Area over those portions of Somenos that are administered by the Province of British Columbia. This plan supports the designation (*Map 4: Proposed Somenos Wildlife Management Area*).

### **Restoration & Enhancement for Garry Oak ecosystems, fish, wildlife and agriculture (Goals 3, 4, 5)**

#### ***Garry Oak Ecosystems & Species at Risk***

In recognition of a general lack of baseline data in the SMCA, the assessment completed by Williams et al (2003) focused on the mapping and management of ecosystems in the SMCA, with a direct focus on the Garry Oak Protected Area. This study was initiated as a direct response to recommendations made in the original SMP, and represents one of the actions that were initiated as part of addressing the seventh original SMP goal of establishing opportunities for scientific research and establishing baseline data. The assessment provided plans for restoration of Garry Oak Ecosystems in the SMCA, which considered: invasive plant management; invasive wildlife management; re-establishing natural disturbance regimes; planting key native plant species; re-introducing native wildlife; minimizing recreational disturbance; protecting/restoring riparian areas; and public education.

Restoration has been on-going at the Garry Oak Protected Area, mainly through the work of the Garry Oak Ecosystem Recovery Team since the completion of the original SMP and as a

result of the recommendations provided by Williams et al (2003). Activities have included, but are not limited to: planting over 100,000 grasses and forbs; detailed monitoring for Species at



Risk/changes in vegetation; invasive plant removal; mowing (as a surrogate to natural burning); and Tall Woolly Heads (*Psilocarphus elatior*) habitat restoration (Dave Polster, pers. Comm; The Nature Trust of BC, 2013).

### **Fish & Wildlife**

A significant amount of restoration and enhancement activities have occurred in the SMCA since the original 2001 management plan. This work has included:

- Bings Creek riparian restoration project (invasive species removal, riparian plantings, maintenance); (2000)
- Invasive species removal activities have occurred annually by the Somenos Marsh Wildlife Society, volunteers and the Vancouver Island Conservation Land Management Program throughout the SMCA;
- A significant ecological restoration achievement at the former "Boatland" property at the site of the Open Air Classroom, with the restoration of an open parking area to young forest; ongoing
- Site remediation following the purchase of the Silva property including the removal of 55m<sup>3</sup> of contaminated soils;
- The addition of nest boxes since the original SMP was implemented by volunteers associated with the Somenos Marsh Wildlife Society and the Cowichan Valley Naturalists Society has been successful in restoring nesting habitat for insectivorous birds such as Tree Swallows (*Tachycineta bicolor*), Violet-green Swallows (*Tachycineta thalassina*) and provincially blue-listed Purple Martins (*Progne subis*).
- The installation of an Osprey (*Pandion haliaetus*) nesting platform has also been added to the Open Air Classroom area.
- Extensive riparian planting along Somenos Creek and in the greater Somenos Conservation Area as part of the compensation for the diking project.
- A stormwater management program (construction of wetlands) has been initiated to treat water entering the SMCA from developed land to the south. This involved a collaborative approach between suitably qualified professionals, the local government (MNC) and the SMWS.



### ***Agricultural Activities***

Over the years since the completion of the original management plan the agricultural land at Somenos has continued to provide habitat for birds, especially overwintering waterfowl. However maintaining agricultural productivity at Somenos represented a significant challenge with the inability to access the entire cultivated area early enough in the season due to seasonal flooding, invasive species and difficulty finding a suitable farm operator caused a decline in the area farmed over the years.

The Vancouver Island Conservation Land Management Program (VICLMP) however has worked to ensure an area is still suitable for cultivation. This has included the hiring of operators to remove the standing crop, removal of invasive species, and the cutting back of Willow. In 2015 a large scale field renovation project was undertaken that included the construction of new field swales and drainage ditches; while maintaining the excellent field hedgerow habitat. In 2016 as a result of this work the conditions of the fields have improved dramatically and a barley crop has been planted in a portion of one of the renovated fields. In addition the VICLMP has fostered a long term working relationship with two local agricultural producers to work in the area.



Agricultural restoration work has also occurred on lands previously owned by the Municipality of North Cowichan along Beverly Street. These lands have been managed for hay production and a small field of corn.

## Education and Interpretation (Goal 6)

A substantial amount of effort has been focused on implementing projects that provide educational and interpretive opportunities in the Somenos Marsh Conservation Area. These projects have included:

- The development and installation of interpretive signage at the Somenos Garry Oak site, the Open Air Classroom (old boatland site and Silva property), and at the end of Drinkwater Road.
- Construction of a public dock at the end of Drinkwater Road.
- Construction of the Open Air Classroom.
- Trail development as part of the diking system, including the planting of trees as a buffer in 2015 (*wildflower planting being considered as alternate to trees (as per D. Polster comment)*).
- The creation of the WildWings Nature and & Arts Festival in 2009 to celebrate the fish, wildlife and cultural values of Somenos Marsh.

The Somenos Marsh Wildlife Society has been instrumental in these efforts in promoting the values of the SMCA and have hosted several community volunteer programs, engaged with local schools for school/university visits (e.g. at the Open Air Classroom), and maintain a popular website and “Facebook” page highlighting the ecological values of the area.



## Scientific Inventory, Research and Baseline Monitoring (Goal 7)

A variety of SMC partners and agencies along with researchers have increased our understanding of the biophysical features of Somenos Marsh including the collection/development of baseline data and have provided essential monitoring information. Studies/activities that have been conducted by agency and NGO partners, local stewardship groups, consultants and university students have included:



- Hydraulic modeling of the Somenos and Richard Creek systems shows that conveyance in those systems is impacted by the Cowichan River but that vegetation in-growth further reduces conveyance of these systems by 37% and 47% respectively (NHC, 2006);
- Fish distribution data and minnow trapping results (2004/05) indicate very low densities of rearing coho fry in the Somenos watershed except in the higher reaches of the inlet tributaries. It is likely that Somenos Creek and Somenos Lake are used solely as migration corridors during periods of adequate water quality for adults to access spawning habitat in the upper reaches of tributaries and for seaward migration of pre-smolts (Guimond & Sheng, 2005);
- Increasing fish use in Somenos Creek would require maintenance of cooler water temperatures below 20 degrees and oxygen levels above 5 mg/l. This could be achieved to some degree by improvements in drainage combined with the maintenance or establishment of taller vegetation on the southern-side of the creek and reductions in nitrogen and phosphorus inputs (Guimond & Sheng, 2005);
- A Somenos Basin Coho Salmon Habitat Assessment in 2014 and 2015 concluded that Somenos Lake continues to be unviable as summer rearing habitat for juvenile salmonids. For the period between early June and early September, the surface water was sufficiently warm (>20°C) that it would likely have caused juvenile salmonids to actively avoid it. Although deeper lake water was sufficiently cool for salmonids during this period, the dissolved oxygen concentration was so low that it would have caused any salmonids present to perish. Stream habitat was sufficiently cool during the summer that it would have fostered survival and growth of juvenile salmonids. Salmonids were caught at all tributary habitats throughout the summer demonstrating their affinity for these sites (Preikshot & Bailey, 2015).



- The implementation of Beneficial Management Practices (BMPs) among the agricultural community and streamside protection initiatives targeted at urban landowners will play a significant role in improving conditions for fish production and for farmers in the long-run (Guimond & Sheng, 2005);
- The Somenos Marsh Wildlife Society continues to conduct water quality sampling since 2007;
- The establishment of baseline vegetation monitoring plots according to standardized monitoring protocols developed by the Province of British Columbia (The Nature Trust of BC, 2008);
- Extensive invasive species inventory work (terrestrial and aquatic) that has identified high priority invasive species that can substantially alter the ecosystems within the Somenos Marsh Conservation Area (EBB, 2008; TNTBC 2015);
- Somenos Marsh Conservation Area contains one of the largest known populations of Tall Woolly Heads (*Psilocarphus elatior*) which prompted an extensive restoration project to be completed to restore the population (Fleming & Polster, 2013; TNTBC 2013);
- Several rare and endangered plant, animal and invertebrate species have been identified at Somenos Marsh (Madrone, 2003; Polster & Fleming, pers comm.; TNTBC 2015) including previously unknown locations for Tall Woolly Heads and Vancouver Island BeggarTicks (Schafer, 2014).
- Updated Terrestrial Ecosystem Mapping (TEM) for Somenos Conservation Area including a historical comparison of the changes in management zones over time (Madrone, 2003)

## Challenges

### A Changing Landscape

In the 17 years since the original management plan was adopted the landscape within and surrounding the Somenos Marsh Conservation Area has undergone dramatic changes. One of the more obvious recent changes to lands surrounding the SMCA since the completion of the original SMP is the construction of the flood control dike, which currently parallels the southern boundary of the SMCA. The purpose of this structure is to protect the developed portions of the Cowichan River floodplain from a 1 in 200 year flood event. This venture was a partnership between the MNC, the City of Duncan, the Cowichan Valley Regional District and Cowichan Tribes and was completed with federal, provincial and local government funding. The dike is managed under the jurisdiction of the provincial Dike Maintenance Act. The final phase in 2016 of the dike along the east side of the Trans-Canada Highway prompted the recent 38 acre land transfer from the MNC to TNTBC, and ensure these lands will be protected for ecological value.



To the south and south-west, the SMCA is bordered by the University Village area of North Cowichan, the City of Duncan and Cowichan Tribes lands, with the developed boundaries essentially remaining unchanged since the completion of the original SMP.

The eastern edge of the SMCA continues to be bordered by rural acreages, with active farming occurring. Development has occurred up to the edge of the SMCA to the immediate east of the *Ye'yumnuts* burial site since the completion of the original SMP, as part of the Timbercrest Road subdivision that enabled the transfer of the *Ye'yumnuts* burial site to the Province of BC as a condition of subdivision.

The Trans-Canada Highway continues to border the western SMCA boundary, with the construction of the Cowichan Commons Mall representing the most significant change in land use across the highway along the western boundary since the original SMP was developed. The Cowichan Regional Visitor Information Centre also opened in November 2013 (since the completion of the original SMP) to the immediate west of the BC Forest Discovery Centre. To the north, the land use adjacent to the SMCA remains unchanged since the completion of the original SMP, and consists of rural properties engaged in the farming of seasonally-flooded areas along the channelized reaches of Richards Creek.

### Current Threats

As noted in the original SMP, land use activities in areas surrounding the SMCA have altered, and continue to alter, the historic natural hydrological processes, the distribution and spatial extent of vegetation assemblages and water quality/quantity. The SMCA is located in a low-lying

receiving area close to the downstream extent of the Cowichan River watershed and is a product of all activities that occur upstream. It is difficult, therefore, to manage specifics inside the SMCA due to the significant effects of external factors. But, the fact that the continued opportunity for meaningful active management exists for the SMCA will help to address, and hopefully mitigate, some of the broader scale impacts.

Some of the main current threats to the SMCA include:

- Non point-source pollution from surrounding lands (e.g. hydrocarbons from paved road and parking lot surfaces);
- Nutrient loading in Somenos Lake resulting from run-off from surrounding agricultural and urban lands. The accumulation of phosphorous is especially prevalent and problematic, and can lead to the occurrence of toxic algal blooms and an increase in alkalinity (and associated increase in ammonia concentrations). Peaks in water temperature can also be increased and dissolved oxygen reduced as a result of the occurrence of algal blooms;
- Encroachment of rare and/or sensitive aquatic and terrestrial habitat by invasive plant, fish and wildlife species (e.g. Yellow Flag Iris (*Iris pseudacorus*), Purple Loosestrife (*Lythrum salicaria*), Scotch Broom (*Cytisus scoparius*), Himalayan Blackberry (*Rubus discolor*), English Ivy (*Helix hedera*), Daphne (*Daphne laureola*), American Bullfrog (*Lithobates catesbeianus*), Grey Squirrel (*Sciurus carolinensis*), Pumpkinseed Fish (*Lepomis gibbosus*) and Parrot's Feather (*Myriophyllum aquaticum*) introduced from surrounding areas;
- Disturbance to wildlife during critical life stages as a result of inappropriate human/canine access to protected areas (e.g. waterfowl and nesting songbirds being disturbed by dogs) and recreational disturbance to sensitive areas (e.g. rare plant habitat in Garry Oak Ecosystems);
- Licenced and unlicenced withdrawal of water from the Somenos system, especially during periods of low flows;
- Incidences of extreme peak flow events and extreme low-flow events caused by an increase in stormwater flow and a decrease in natural infiltration (required for groundwater recharge) as a result of impervious surface coverage and land use activities throughout the Somenos watershed. This has direct effects on critical fish habitat and increases the incidence of flooding; and
- Changing global climatic conditions leading to major uncontrollable shifts in the hydrological regime of the Cowichan River watershed (e.g. reduced snow pack accumulation, increased occurrence and severity of summer droughts and an increase in the intensity of fall/winter rainfall events). These predicted changes to the Cowichan watershed were recently studied and modeled by Foster and Allen (2015).



## Opportunities

Throughout the process of reviewing the original management plan and reflecting on the plan's successes and limitations, the members of the Somenos Management Committee identified several themes and opportunities that help shape the future directions for Somenos (Part 2).

Themes include:

- A broad underlying value from all members that the Somenos Marsh Conservation Area is a locally, regionally and internationally important area for a myriad of plant and animal species.
- The citizens of the Cowichan Valley are deeply concerned about the health, well-being, and resiliency of their community and the Somenos ecosystem.
- We must protect this area from further harm and make all reasonable efforts to restore Somenos ecosystems.
- By working cooperatively the partners are better positioned to address the threats rather than as individual organizations.

Opportunities include:

- Improving local knowledge of the significance of the area through wildlife festivals, community volunteering opportunities, improved interpretive signage, boardwalks/trails, education programs with local schools, Vancouver Island University and the BC Forest Discovery Centre.
- Increasing volunteer and citizen led science programs.
- Increasing funding opportunities working on cooperative projects as a collective group.

**Part 2. Area Based Land Use Plan & Future Directions 2016-2026**

## Introduction

### Purpose Statement

The Somenos Management Plan (SMP) was implemented in 2001 to help guide the management of the Somenos Marsh Conservation Area (SMCA) through the provision of management objectives and associated strategies. The original management plan recommended that the plan should be formally reviewed and updated every five years to ensure the application of a flexible management approach that is responsive to changing economic and ecological factors.

While respecting the underlying guiding documents, legal framework and ownership of the parcels (without prejudice towards any underlying Aboriginal interests) that make up the SMCA, this plan aims to bring the management of the entire complex under the umbrella of an area based land use management plan. Guided by the principles of Ecological Integrity, Heritage and Accountability and through the development of five (5) management goals as well as the utilization of defined potential land uses and activities applied across seven (7) distinct zones of the Conservation Area, this plan provides the foundation for management activities and actions into the future for the Somenos Conservation Area.

### Partners in the Development of the Plan

#### Vancouver Island Conservation Land Management Program (VICLMP)

The majority of the land contained within the SMCA is currently managed and administered under the VICLMP, which includes both the Crown Land parcels that represent the Garry Oak Protection Area and the *Ye'yumnuts* burial site as well as the lands owned by The Nature Trust of British Columbia (TNTBC) and Ducks Unlimited Canada (DUC).

The VICLMP is an “umbrella organization”, which includes the following Steering Committee partners:

#### **Province of British Columbia – Ministry of Forests, Lands, and Natural Resource Operations (FLNRO)**

The MFLNRO, in association with The Nature Trust of BC and Ducks Unlimited Canada, has a licence agreement with the Somenos Marsh Wildlife Society for managing the boardwalk and associated infrastructure at the “Open Air Classroom”.

The MFLNRO’s goals are: to preserve and enhance waterfowl habitat; to increase public wildlife viewing opportunities; to increase the public’s knowledge of wildlife management; and to restore the land’s capability for agriculture, and fish and wildlife production. The MFLNRO also manages water through the provisions of the Water Act and is responsible for habitat protection (under the Wildlife Act) through the Habitat Branch, and for resident native fish populations through the Fisheries Branch.

#### **The Nature Trust of British Columbia**

The Nature Trust of BC (TNTBC) is a charitable corporation dedicated to conserving areas of ecological significance in BC. TNTBC acquired land around Somenos Lake to provide winter habitat for waterfowl. Their involvement is through the Vancouver Island Wetlands Management Program.

The main objectives of this program are conservation and management of important coastal wetlands. The organization has been actively managing land currently located in the SMCA since 1978. The Nature Trust of British Columbia is a leading land conservation organization based in BC with a mandate to:

1. Acquire habitats of high biodiversity values and at greatest risk of being lost; and
2. Manage conservation lands as part of landscapes to ensure ecosystem resilience and connectivity.

Since 1971, The Nature Trust of BC along with our partners has invested more than \$80 million to secure over 70,000 hectares (170,000 acres) of land. This includes over 23,000 hectares (56,000 acres) that is owned, leased or covenanted and over 47,000 hectares (116,000 acres) that is under grazing licenses for our Biodiversity Ranches in the Okanagan.

### ***Ducks Unlimited Canada***

Ducks Unlimited Canada (DUC) is a private non-profit charitable organization dedicated to the conservation of wetlands for the benefit of North America's waterfowl, wildlife and people. DUC's mission is to fulfill the annual life cycle needs of North American waterfowl by protecting, enhancing, restoring and managing important wetland and associated uplands. DUC has a management agreement with the BC Forest Discovery Centre. The purpose of DUC's project beside Somenos Lake is to provide wintering waterfowl habitat. In particular, the focus of the project is to produce smartweed.

### ***Environment and Climate Change Canada – Canadian Wildlife Service***

Environment and Climate Change Canada's mandate is to:

- preserve and enhance the quality of the natural environment, including water, air, soil, flora and fauna;
- conserve Canada's renewable resources;
- conserve and protect Canada's water resources;
- forecast daily weather conditions and warnings, and provide detailed meteorological information to all of Canada;
- enforce rules relating to boundary waters; and
- coordinate environmental policies and programs for the federal government.

As a partner in VICLMP, Environment Canada has a strong interest in species-at-risk, migratory bird management, and habitat securement at Somenos Marsh.

### ***Municipality of North Cowichan***

The Municipality of North Cowichan (MNC) sets land use policies through its' Official Community Plan and zoning processes and also helps manage recreational activities (e.g. park and trail development including maintenance) in the SMCA. The MNC works in conjunction with other government agencies and organizations to address drainage, stormwater and flooding concerns within the Municipality (e.g. dike infrastructure management and maintenance). The Administration Department volunteered to assume the role of clerical support for the Steering Committee, which involves scheduling meetings, preparing/distributing agendas, minute-taking and tracking actions for follow-up.

## **Cowichan Valley Regional District**

The Cowichan Valley Regional District (CVRD) is comprised of nine electoral areas and four municipalities in the southern part of Vancouver Island. With a population of 80,000 residents (Statistics Canada 2016), it covers a land area of 3,473.12 km<sup>2</sup>. Regional governments provide services to both electoral areas and municipalities in the region, including regional parks. The role of the CVRD in the development of the SMP is to ensure that there continues to be trail connectivity to the Cowichan Valley Trail/Friendship Trail to the west and to assist in pursuing long-term acquisition of additional uplands around Somenos Lake.

## **Somenos Marsh Wildlife Society**

Incorporated in 1989, the Somenos Marsh Wildlife Society (SMWS) is a federally registered non-profit organization. The purpose of the society is threefold: to preserve Somenos Marsh in its natural state; to protect and conserve wildlife habitat; and to promote public education and information. Volunteers with the Society have been extremely active in many projects around Somenos Lake including: collecting water quality data, conducting bird surveys, building wildlife viewing infrastructure and public education. The SMWS has a licence of occupation with the Municipality of North Cowichan and holds a licence agreement with the MFLNRO, in association with The Nature Trust of BC and Ducks Unlimited Canada for managing the boardwalk and associated infrastructure at the "Open Air Classroom".

## **Cowichan Tribes**

Because Cowichan Tribes has never signed a treaty with the Crown, they have never relinquished title to lands or waters within their Territory. Cowichan Tribes assert Aboriginal rights, including title, as recognized and affirmed in the *Constitution Act, 1982*, to lands and resources within their Territory. While limits on land use, under ordinary land ownership are generally controlled by zoning, bylaws and other provincial and municipal regulations and legislation, Canadian law recognizes that there must not be infringement on Aboriginal rights which is not justifiable under the test set out in *R. v. Sparrow*, [1990] 1 SCR 1075. Therefore, there is a need to evaluate present and future activities on lands within Cowichan Tribes Territory, such as at Somenos (known by Cowichan Tribes as *S-amuna*). Cowichan Tribes works to protect environmental attributes both on and off reserve within Cowichan Tribes' Territory, and their staff provides Indigenous knowledge and technical expertise on impacts in the Territory on such topics as fish, forestry and marine related issues.

## **Cowichan Valley Naturalists' Society**

The Cowichan Valley Naturalists' Society (CVNS) is a not-for-profit group founded approximately 30 years ago. It is a full member of BC Nature (Federation of BC Naturalists Societies). The Society holds two meetings each month (except for the summer months) and these meetings are open to the general public. These meetings cover a wide range of topics and are currently held in the Freshwater EcoCentre. The Society also organizes outings, from time to time, for members to observe plants, birds and shore-line organisms.

The Society sponsors the Christmas Bird Count for the Duncan area. For the past eight years swan, goose and raptor counts have taken place from November to March when the trumpeter swans are

in the valley. Counts of water birds in Cowichan Bay are also made each month. The Society now manages the "Bring Back the Bluebirds" project which was formerly run by the Garry Oak Recovery Team (GOERT).

### **BC Forest Discovery Centre**

The BC Forest Discovery Centre is a museum, interpretive centre and tourist attraction operated by the BC Forest Museum, a non-profit society and federally registered charity. The portion of the BC Forest Museum property that is included in the SMP is subject to a partnership agreement with DUC and includes a Wetland Conservation Area. An interpretive kiosk and trail provide some viewing and interpretive options for visitors to the Centre related to the SMCA, and represent a significant area of future development for the organization.

## **Vision Statement**

To protect the ecological values of Somenos Marsh and sensitive uplands while allowing human use that does not compromise these values.

### **Guiding Principles**

The guiding principles for the management of the Somenos Marsh Conservation Area are:

**1. Ecological Integrity**

*Protecting, restoring, and enhancing fish, wildlife and ecosystems in perpetuity. Management decisions are based on sound science, traditional ecological knowledge and best management practices.*

**2. Aboriginal**

*The Aboriginal interests and cultural heritage of the Somenos Marsh area will be recognized and protected throughout management actions outlined in this Plan, and partners will work closely with Cowichan Tribes to ensure such.*

**3. Agricultural**

*Maintain the agricultural and forestry heritage of the area for as long as feasible. The soil based agricultural heritage of the area will be maintained based on sound best management practices for agriculture and the environment.*

**4. Accountability**

*All the partners of the Somenos Management Committee respect all Federal, Provincial and Municipal statutes and regulations pertaining to environmental management; respect individual property rights and management structure of the partner agencies; respect the cultural significance of the area to Cowichan Tribes<sup>5</sup>; and commit to working together for the betterment of the Somenos Marsh Conservation Area.*

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<sup>5</sup> Cowichan Tribes may respect, but does not in all cases recognize, individual property rights, particularly if they are in direct conflict with our Aboriginal rights.

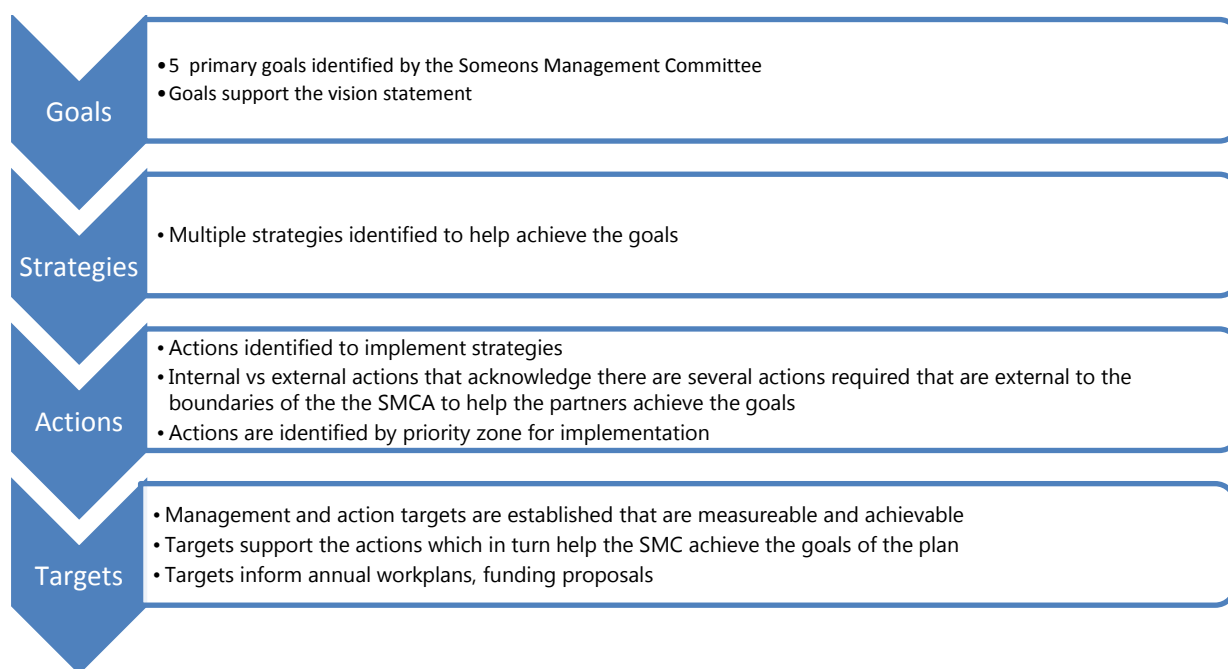
## Management Goals

As part of the completion of the SMP review and update, the Steering Committee was asked to provide comment on the configuration of updated management objectives and strategies. This helped to establish and prioritize management goals, identify timelines for implementation, determine indicators and tasks, and identify appropriate responsible organizations for each goal. Based on the feedback from the Steering Committee and the review of management goals (and shortfalls) from the original SMP, five main management goals were identified for the SMCA:

1. Expand and Increase the Protection of the Conservation Area;
2. Maintain Ecosystem Function;
3. Maintain Agricultural Productivity for Conservation Purposes;
4. Maintain Opportunities for Low Impact Recreational Use; and
5. Respect and Raise Awareness of Cultural Values.

The five main goals are considered equal in terms of overall management priority, and recommended timelines for the implementation of each management strategy vary. The timelines indicate the desired implementation period, but it is recognized that implementation is dependent upon numerous factors and practicalities such as funding, staffing availability and government liaison/approvals. If conflicts arise amongst these management goals, ecological integrity always trumps agricultural productivity. The five management goals are associated with a list of strategies and desired implementation timelines that, if enacted, would achieve the management objectives, support the intent of the original SMP and help work towards the Vision Statement. The table below outlines the linkages between goals, strategies, actions and targets.

In recognition of the significance of development pressures that exist beyond the SMCA, a distinction has been made between external and internal management strategies. This distinction helps to identify those strategies that are under the direct control of the Steering Committee and those that are either beyond the control of the Steering Committee, or would involve liaison with and/or outreach to adjacent land owners.



### Description of Management Zones in Plan Area

The Somenos Marsh Conservation Area has been divided into 7 distinct management zones or areas (Table 1). The management zones have been identified based on environmental features and physical infrastructure (see Map 5: Proposed Management Zones) and are used for identifying the locations for priority management actions based on the goals and strategies identified below in Table 1.

**Table 1. Somenos Marsh Conservation Area - Management Area and Zone Descriptions**

Management Zone	Ha*	%	Ecological Features	Anthropogenic & Cultural Features
Zone 1 - Lake	95.09	47%	Open water with fringe wetland/marsh areas	Dock and boat launch located at end of Drinkwater Road; interpretive signage; train trestle as part of Forest Museum steam train route
Zone 2 - Marsh	53.58	27%	Wetland habitats (WN); swamps (sp), fens (fn), cattail marshes, open water (sw)	Managed lands; BC Forest Discovery Centre
Zone 3 - Agriculture	30.69	15%	Seasonally flooded agricultural fields (FS); open field habitat for wildlife; hedgerows; nest boxes	Farm access roads; gates; fences; boundary signage



Management Zone	Ha*	%	Ecological Features	Anthropogenic & Cultural Features
Zone 4 - Forest/Woodland	8.80	4%	Mix of second growth forest (SG); conifer dominated (co); Garry Oak woodlands; deciduous shrub woodlands (mx); young recently replanted forested areas; known species at risk habitat	Trails; fences; interpretive signage
Zone 5 - Riparian	4.59	2%	30 metre buffer on either side of the riparian bank of existing streams	Trails
Zone 6 - Recreation	5.74	3%	Mixed shrub; replanted forest; nesting platforms	Boardwalk; parking area; interpretive signs; gates; fence, viewing platforms; trails; dock and boat launch
Zone 7 - Cultural	2.07	1%	Open grassland; young forest area; known species at risk habitat	Culturally significant site for Cowichan Tribes; trails; fence; gates
<b>Totals</b>	<b>200</b>	<b>100%</b>		

\*Areas based on GIS assessment of zone designations.

## Land Use Plan

In developing the Somenos Conservation Area Management Plan along with the zoning map, the area was also assessed for current and potential land uses. From this, a list of land use activities was developed and defined to form the basis for management direction within each of the 7 defined zones. For each zone, these land uses are designated as acceptable, conditional, not acceptable or not applicable. In addition, applicable regulations are identified that may apply to each zone. This land use plan is supplementary to this document and is meant to assist with the review of potential land use applications, development or other activities that may occur within the Somenos Conservation Area and can be found in Map 5.

## Strategies, Actions and Targets

### Goal 1 – Expand and Increase the Protection of the Conservation Area

#### Discussion

Increasing the size of the SMCA is considered to be a positive step in meeting the intent of the Vision Statement, as it will increase the extent of managed lands and help to retain the integrity of adjoining ecosystems. Several additional areas have been proposed for inclusion into the SMCA, as described in the following sub-sections and indicated on Map 5.

Goal 1 – Strategy 1: Land Acquisition, Zoning, Designation and Conservation Agreements				
<b>INTERNAL ACTIONS (Goal 1 – Strategy 1)</b>				
Actions	Priority Zone/Area	Key Partners	Timeline	Management Target
Dedication of 38 acres of Municipal Land north of the Beverly St. Dike from TCH to Lakes Rd to TNTBC	Zone 3, 4 and 5	MNC and TNTBC	Early 2017	Land transfer completed
Designate the SMCA (see Map 1) as a conservation area under Municipal Zoning	All	MNC	2018	Conservation Zoning for entire SMCA
Designation of the Wildlife Management Area (WMA) (see Map 4)	Provincially Administered conservation land and Crown land	FLNRO, DUCBC, TNTBC, VICLMP, MNC, CT	2017	Designation of a provincial WMA for provincially administered conservation lands at Somenos
Designate the existing RCMP site as part of SMCA (See Map 2)	Zone 5 Riparian	MNC, VICLMP and SMWS	On construction of a new RCMP detachment and demo of existing detachment	Designation of site as SMCA

**EXTERNAL ACTIONS (Goal 1 – Strategy 1)**

Actions	Priority Zone/Area	Key Partners	Timeline	Management Target
Work with appropriate agencies and private landowners to sign Conservation Agreements and include additional Lands in the SMCA (Map 5). Continue to work towards identifying additional areas to expand the SMCA.	Richards Creek; lower Somenos Creek	MNC, CVRD, SMWS, TNTBC, DUCBC, CVNS, MNC, CLT	Management strategy over several years	Execution of Conservation Agreements or land transfers
Work with the CVRD to implement their land acquisition goals specific to the SMCA from their Regional Parks and Trails Master Plan Conservation Strategy	Conservation Agreement Areas	VICLMP, CVRD, MNC	Management strategy over several years	Acquire upland parcels under the regional parks program

**Goal 2 – Maintain Ecosystem Function**

**Discussion**

There needs to be a discussion about the important role of the Marsh in mitigating future expected climate change induced intensification of winter flooding and summer droughts. While there is no specific ranking for each of the management goals, maintaining ecosystem function is a high priority since healthy ecosystems are the foundation to achieving most of the other management goals. Ecosystem function is based on physical, biological, and geochemical processes and components that occur within an ecosystem and across different ecosystems. Wetland systems like SMCA provide important ecological services such as water filtration, flood control, carbon sequestration, air purification, and critical habitat for fish, wildlife and species at risk.

Functional ecosystems are naturally resilient to human-induced impacts and natural disturbance (fire, storms). Human-induced impacts such as habitat loss and degradation, invasive species, pollution, and global climate change can have severe negative effects on ecosystem function. The natural resilience and ability of the SMCA to cope with extreme events (both flood and drought) has been impacted by historic development-related pressures, most notably from adjacent urban development (habitat loss), agricultural activities (nutrient loading), and ditching and increased stormwater flow originating from impervious surfaces and/or storm sewers. The apparent increase in the severity and intensity of extreme summer-time droughts (e.g. 2012, 2014 and 2015) highlights the importance of maintaining resilient, functioning ecosystems.

Management initiatives that increase the ability of the system to store and treat water from storm events are, therefore, very applicable. The recent (early spring 2015) construction of wetlands in the

southern portion of the SMCA owned by the MNC adjacent to Beverly Street represents a positive step to capturing, naturally treating and controlling stormwater originating from the adjacent developed area to the south of the SMCA.

Issues that continue to be of significant concern in the SMCA include poor water quality, especially in Somenos Lake, and invasive species. Nutrient loading to Somenos Lake, due to phosphorus inputs from agricultural activities (both ongoing and historical), urban run-off, and septic systems, can cause high levels of eutrophication. This results in a cascade of water quality issues including blooms of toxic cyanobacteria ("blue green algae"), anoxic conditions (low oxygen), and increased water temperatures in summer. These changes create lethal conditions for salmonids. In addition, some forms of cyanobacteria are highly toxic to humans, pets and potentially wildlife.

There are numerous invasive species now occurring in the SMCA. As with all invasive species, early control is extremely important to prevent populations from becoming established to a point where eradication becomes virtually impossible. Since the completion of the original Management Plan, populations of American Bullfrog appear to have increased in the SMCA. Invasive fish, such as Pumpkinseed Fish, also appear to have gained a stronghold in Somenos Lake and Somenos Creek, based on recent sampling that has been completed. Invasive plant species such as Yellow Flag Iris, Scotch Broom, Himalayan Blackberry and many others continue to spread in the SMCA. Parrot's feather is a relatively recent invader to the SMCA and has become well established in Somenos Creek. This aquatic plant thrives in freshwater environments with low water flows and high nutrients.

SMCA supports at least 2 endangered plants that require seasonally flooded habitats: Tall Woolly-heads and Vancouver Island Beggarticks. Critical Habitat for Tall Woolly-heads has been identified at 2 locations at the SMCA (Figure 1. Parks Canada, 2006; see map). Droughts and changes in water levels and drainage patterns in the SMCA can negatively affect plant species that are adapted to grow in seasonally flooded environments. Williams et al (2003) highlighted the concerns associated with the loss of rare ecosystems in the SMCA (most notably in Zone 4, the Garry Oak Protected Area – see diagram below). In addition to impacts from invasive species encroachment, changes in land-use that suppress fire have allowed both native and non-native woody shrubs to become established, which impact directly upon the integrity of Garry Oak ecosystems and associated species.

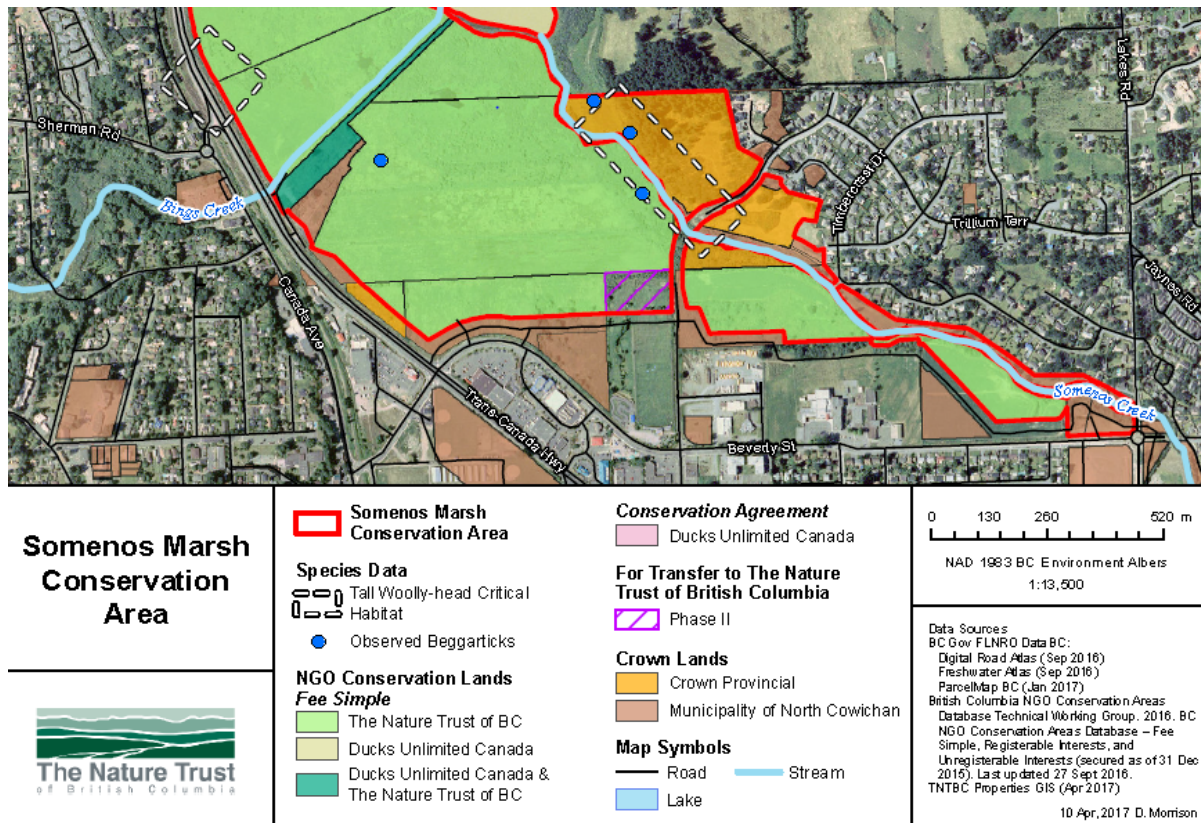


Figure 1 Map identifying Tall Woolly-head Critical Habitat areas

**Goal 2 - Strategy 1:  
Habitat Conservation & Restoration – Freshwater (lakes, creeks, wetlands, ponds)**

<b>INTERNAL ACTIONS (Goal 2 – Strategy 1)</b>				
<b>Actions</b>	<b>Priority Zone/Area</b>	<b>Key Partners</b>	<b>Timeline</b>	<b>Management Target</b>
Monitor water quality in Somenos Lake and associated tributaries inside SMCA	Somenos Lake and Tributaries	SMWS, VICLMP and MNC	Continuation of current management strategy, in addition to long-term implementation of a monitoring program over a period of several years	Annual monitoring program
Establish a baseline with a water quality monitoring program to identify phosphorous sources within the SMCA and develop plan for reduction	Somenos Lake and Tributaries	VICLMP, SMWS, MNC	2017-2018	Baseline and plan established by 2019

**INTERNAL ACTIONS (Goal 2 – Strategy 1)**

<b>Actions</b>	<b>Priority Zone/Area</b>	<b>Key Partners</b>	<b>Timeline</b>	<b>Management Target</b>
Implement strategies developed in plan for reducing elevated phosphorous, compounds (e.g. ammonia) and other elements from the system	Somenos Lake and Tributaries	VICLMP, SMWS, MNC	2019	Reduce phosphorous by 30% 2021
Expand wetland construction project to capture and treat stormwater from the urban area to the south of Beverly Street.	MNC parcel on south side of dike next to Fun Pacific (Zone 4)	SMWS, MNC	2017	Approx. 1.5 hectare area to be created 9 additional ponds totaling approximately 0.5 hectares Uncontaminated water passing through dike in 5 years
Develop and implement a treatment and control plan for invasive plants and animals	All zones	VICLMP, SMWS, MNC, CT	See Invasive Plant Action Plan (Appendix B)  Develop action plan for invasive animals by 2018	Implement Invasive Plant Action Plan (see Appendix B) 2017 & Implement Animal Action Plan by 2019

**EXTERNAL ACTIONS (Goal 2 – Strategy 1)**

<b>Actions</b>	<b>Priority Zone/Area</b>	<b>Key Partners</b>	<b>Timeline</b>	<b>Management Target</b>
Identify opportunities to “daylight” storm systems in surrounding areas using vegetated swales	Somenos Watershed	MNC	On-going strategy implemented over several years	
Establish minimum flow targets for tributaries	Tributaries flowing into SMCA	SMWS and MNC	On-going strategy over the long term	Complete review within 2 years
Determine extent of water extraction from the Somenos Lake and tributaries	Zone 1 - Lake	VICLMP and MNC	2018	Consult with provincial authority

**EXTERNAL ACTIONS (Goal 2 – Strategy 1)**

<b>Actions</b>	<b>Priority Zone/Area</b>	<b>Key Partners</b>	<b>Timeline</b>	<b>Management Target</b>
Initiate a land owner contact program to raise awareness of nutrient loading and promote best practices to improve water quality.		SMWS	Long-term strategy over several years; develop a baseline of awareness to measure effectiveness of outreach activities	

**Goal 2 - Strategy 2:  
Habitat Conservation & Restoration – Terrestrial (riparian, forest, open areas)**

**INTERNAL ACTIONS (Goal 2 – Strategy 2)**

<b>Actions</b>	<b>Priority Zone/Area</b>	<b>Key Partners</b>	<b>Timeline</b>	<b>Management Target</b>
Establish a 30m riparian setback for Somenos Lake and tributaries	Zone 1 and 5	VICLMP, SMWS, MNC, CT	2017 identify areas where 30m buffer is lacking; 2017/18 – develop prescriptive plan	2020 30m buffer established
Public access management (fencing, parking areas, trails)	All zones	VICLMP; MNC	On-going	Public use is in defined areas that limit disturbance to habitat
Continue the implementation of the Restoration plan for the Garry Oak Protected Area	Zone 4 – Garry Oak Protected Area	VICLMP; CT; NCC; CVNS	2017 status review of restoration plan and develop priority action list  2018 – ongoing implementation of restoration plan	2020 – increased population of native plant community
Develop and implement a treatment and control plan for invasive plants and animals	All zones	VICLMP, SMWS, MNC, CT	See Invasive Plant Action Plan (Appendix B)  Develop action plan for invasive animals by 2018	Implement Invasive Plant Action Plan (see Appendix B) 2017 & Implement Animal Action Plan by 2019
Coordinate compliance and enforcement initiatives	All zones	VICLMP; MNC; Province (COS/NRO) ; RCMP	2017/18 – identify and implement compliance strategy (assessment of non-compliance etc.)	50% improvement in non-compliance by 2020; 95% compliance 2022
Monitor vegetation	Zone 4, 7;	VICLMP; CT	Revisit baseline	5 year annual

**INTERNAL ACTIONS (Goal 2 – Strategy 2)**

<b>Actions</b>	<b>Priority Zone/Area</b>	<b>Key Partners</b>	<b>Timeline</b>	<b>Management Target</b>
communities (terrestrial plots)	Forest/Woodland, Cultural		vegetation plots established by TNTBC 2018;  Establish baseline plots in Garry Oak and <i>Ye'yumnuts</i> 2018	monitoring vegetation plots beginning 2018
Vegetation baseline surveys	Open areas of marsh (TNTBC property site at end of boardwalk)	SMWS	2017	Determine vegetation present at site including Vancouver Island Beggarticks
Native plantings to increase biodiversity	Open areas of marsh and open air classroom	SMWS	2017	Restoration activities implemented on 2 hectares, minimum 2000 plants seeded or planted

**EXTERNAL ACTIONS (Goal 2 – Strategy 2)**

<b>Actions</b>	<b>Priority Zone/Area</b>	<b>Key Partners</b>	<b>Timeline</b>	<b>Management Target</b>
Approach land owners to discuss riparian enhancements and the implementation of Conservation Agreements		SMWS	Long-term management strategy over several years	
Actively partner with other organizations doing ecological restoration in the Somenos Watershed	Somenos Watershed	SMWS, CVNS, CLT	Ongoing	Collaborate on work parties and other events with a direct impact on the Somenos Watershed
Enable the SMCA to become the key component of a mountain-to-ocean biodiversity corridor within the Somenos watershed	Somenos Watershed	SMWS	2018	Formalize biodiversity corridor by 2018



**Goal 2 - Strategy 3:  
Increase Abundance and Survival of Native Fish**

**INTERNAL ACTIONS (Goal 2 – Strategy 3)**

<b>Actions</b>	<b>Priority Zone/Area</b>	<b>Key Partners</b>	<b>Timeline</b>	<b>Management Target</b>
Map salmon/ trout rearing habitats in the SMCA (e.g. determine stream bed characteristics required to complete spawning activities and enhance available spawning area)	Zone 1 and 5; Lake and tributaries	SMWS, Cowichan Land Trust; VICLMP	2018	2019 updated habitat maps
Determine salmon / trout abundances in the SMCA and establish timing of migrations as juveniles and adults between SMCA habitats (e.g. movements between the creeks and Somenos Lake)	Zone 1 and 5; Lake and tributaries	SMWS; DFO; Province of BC Fisheries	Continuation of existing strategy	Determine salmon / trout abundances and seasonal migration timing in SMCA by 2022
Monitor species composition and abundance including invasive species such as the Pumpkinseed Fish and American Bullfrog, and determine potential interactions with/ impacts on native salmonids	Zone 1 and 5; Lake and tributaries	SMWS; DFO	On-going strategy over several years	Study on invasive fish and frog abundance and interactions with native salmonids complete by 2022
Develop and implement a treatment and control plan for invasive plants and animals	All zones	VICLMP, SMWS, MNC, CT	See Invasive Plant Action Plan (Appendix B)  Develop action plan for invasive animals by 2018	Implement Invasive Plant Action Plan (see Appendix B) 2017 & Implement Animal Action Plan by 2019
Follow this protocol for culvert openings for fish passage: the culverts leading to Chesterfield park and to the storm water treatment wetlands should be opened March 15 and allowed to close September 30 to allow juvenile fish passage	Lakes Rd culvert to Chesterfield park, dike section along storm water wetland restoration project property (Beverly St.)	MNC	Immediate	Protocols followed at all times

**EXTERNAL ACTIONS (Goal 2 – Strategy 3)**

<b>Actions</b>	<b>Priority Zone/Area</b>	<b>Key Partners</b>	<b>Timeline</b>	<b>Management Target</b>
Implement enhancement activities such as fish ways and migration channels	Somenos Watershed	SMWS; DFO; CLT	Immediately ensure passages (weeks to months)	Enhancement within 5 years
Develop and implement restoration plans for Richards Creek and other tributaries (Bings, Averill)	Tributaries	SMWS; DFO, CLT	On-going strategy over several years	Restoration plan created by 2020
Assess threats to fish passage and restore/enhance structures that are not currently fish passable	Somenos watershed	SMWS; DFO, CLT	Immediate (weeks to months), with an on-going management strategy to modify crossing structures	Threats assessed and report created by 2020
Manage flow of Crofton Lake to ensure optimal native fish production as per DFO letter dated June 21, 2007 ( <b>See Appendix C</b> )	Crofton Lake, Richards Creek	MNC	Immediate	Maintain flow of at least 28.3 L/S released from Crofton Lake from July to September annually

**Goal 2 - Strategy 4:  
Enhance Wildlife Use (invertebrates, birds, amphibians, reptiles, mammals)**

**INTERNAL ACTIONS (Goal 2 – Strategy 4)**

<b>Actions</b>	<b>Priority Zone/Area</b>	<b>Key Partners</b>	<b>Timeline</b>	<b>Management Target</b>
Monitor winter waterfowl use including disturbance events	Zone 1, 2, 3, 6; Lake, Marsh, Ag, Recreation	VICLMP; CVNS	Annual from November to March	Annual waterfowl reports
Monitor breeding bird use	Zone 2, 3, 4, 5, 6, 7; All zones except lake	VICLMP; CVNS, SMWS	Annual (May-July)	Annual breeding bird reports
Install and monitor nestboxes for swallows, bluebirds and other native cavity nesters	Zone 2, 3, 4, 6; Marsh, Ag, Forest/Woodland, Recreation	VICLMP; CVNS; SMWS	2017 – inventory existing boxes and replace as needed; identify additional locations  2018 – install new nest boxes	Maintain and monitor 50-75 boxes by 2019
Develop and implement inventory programs for other wildlife	All zones	VICLMP	2018 – identify priority species to inventory	2018 plan developed for additional wildlife inventory
Develop and	All zones	VICLMP, SMWS,	See Invasive Plant	Implement Invasive

**INTERNAL ACTIONS (Goal 2 – Strategy 4)**

<b>Actions</b>	<b>Priority Zone/Area</b>	<b>Key Partners</b>	<b>Timeline</b>	<b>Management Target</b>
implement a treatment and control plan for invasive plants and animals		MNC, CT	Action Plan (Appendix B) Develop action plan for invasive animals by 2018	Plant Action Plan (see Appendix B) 2017 & Implement Animal Action Plan by 2019
Wetland restoration for the benefit of native plants and wildlife	MNC parcel on south side of dike next to Fun Pacific (Zone 4)	SMWS, MNC	2018	Stormwater ponds designed to create habitat for native plants and wildlife (native plant additions, habitat features)

**EXTERNAL ACTIONS (Goal 2 – Strategy 4)**

<b>Actions</b>	<b>Priority Zone/Area</b>	<b>Key Partners</b>	<b>Timeline</b>	<b>Management Target</b>
To enable the Somenos Marsh Conservation Area to become the key component of a mountaintop-to-ocean biodiversity corridor within the Somenos Watershed by 2019	Somenos Watershed	SMWS, CVNS, MNC	2018-2020	Establish a protected greenway/biodiversity corridor from the tops of Mt Prevost and Mt Richards through the SMCA to the Cowichan Estuary

**Goal 2 - Strategy 5:  
Protect and Improve Habitat used by Species at Risk\***

**INTERNAL ACTIONS (Goal 2 – Strategy 5)**

<b>Actions</b>	<b>Priority Zone/Area</b>	<b>Key Partners</b>	<b>Timeline</b>	<b>Management Target</b>
Continue to protect and restore habitat for Tall Woolly-heads ( <i>Psilocarphus elatior</i> ), and monitor results	Zone 4, 7; Forest/Woodland, Cultural	VICLMP; SMWS; CT; CVNS	On-going	Sustaining populations of Tall Woolly Heads
Develop and implement a restoration plan for Vancouver Island Beggarticks ( <i>Bidens amplissima</i> ) and monitor results	Zone 2, 5; Marsh, Riparian	VICLMP; SMWS	On-going	Sustaining populations of Vancouver Island Beggarticks
Inventory and map all species at risk within	All zones	VICLMP; SMWS	2018-2020	2019 Map completed; 2020

**INTERNAL ACTIONS (Goal 2 – Strategy 5)**

<b>Actions</b>	<b>Priority Zone/Area</b>	<b>Key Partners</b>	<b>Timeline</b>	<b>Management Target</b>
SMCA and identify restoration opportunities				inventory restoration results
Install fencing around known critical habitat to reduce disturbance as needed	All zones	VICLMP; MNC	On-going	No disturbance in identified critical habitat
Develop and implement a treatment and control plan for invasive plants and animals	All zones	VICLMP, SMWS, MNC, CT	See Invasive Plant Action Plan (Appendix B) Develop action plan for invasive animals by 2018	Implement Invasive Plant Action Plan (see Appendix B) 2017 & Implement Animal Action Plan by 2019

**EXTERNAL ACTIONS (Goal 2 – Strategy 5)**

<b>Actions</b>	<b>Priority Zone/Area</b>	<b>Key Partners</b>	<b>Timeline</b>	<b>Management Target</b>
Update stormwater management bylaws	Somenos Watershed	MNC, Province of BC, City of Duncan, CVRD, Farm Operators	Ongoing	Reduce nutrient and sediment loading from all new and existing developments
Remove invasive species from within watershed	Somenos Watershed	MNC, Province of BC, City of Duncan, CVRD, Farm Operators	Ongoing	Control spread and prevent emergence of invasive species new to the area

\*Species at Risk refers to species listed on Schedule 1 of the federal Species at Risk Act ([https://www.registrelep-sararegistry.gc.ca/species/default\\_e.cfm](https://www.registrelep-sararegistry.gc.ca/species/default_e.cfm)), and species designated as Red and Blue by the BC Conservation Data Centre (<http://a100.gov.bc.ca/pub/eswp/>)

**Goal 3 – Maintain Agricultural Productivity for Conservation Purposes****Discussion**

Maintaining agricultural productivity for conservation purposes refers to management activities that will continue to provide and improve upon farming practices that enhance use of the SMCA by wildlife (specifically migratory waterfowl and breeding birds). The positive benefits of agriculture in the SMCA ultimately help maintain the designation of the SMCA as an Important Bird Area (IBA).

Ducks Unlimited Canada and The Nature Trust of BC are part of the International Management Board of the Pacific Birds Habitat Joint Venture. This involvement in an international initiative helps to provide a context for the importance of local waterfowl habitat improvements related to agriculture. Ultimately, local initiatives that benefit waterfowl in the SMCA will have positive implications to the “bigger picture” of international migratory bird management. The North

American Waterfowl Management Plan also represents an international partnership between Canada and the United States that helps to guide management actions that address declining waterfowl populations. Ducks Unlimited Canada is a partner in this plan, and helps implement activities that conserve and restore critical waterfowl habitat (e.g. in the SMCA).

Farming practices within the SMCA will follow the guidelines established by the Environmental Farm Plan (EFP) Program (BC Agricultural Research & Development Corporation, 2010) as well as the Salmon Safe initiative of the Pacific Salmon Foundation (Salmon Safe Inc, 2013).

<b>Goal 3 – Strategy 1: Maintain agricultural productivity for conservation purposes</b>				
<b>INTERNAL ACTIONS (Goal 3 – Strategy 1)</b>				
Actions	Priority Zone/Area	Key Partners	Timeline	Management Target
Review EFP and Salmon Safe guidelines and incorporate actions into annual farm plans and lease agreements	Agriculture	VICLMP; farm operators	2017	EFP and Salmon Safe Certification for farm operations by 2019; 10 year farm lease agreements by 2018
Prepare, plant, grow, protect, and harvest fodder crops (grains, forage, silage)	Agriculture	VICLMP; farm operators	Annually	30ha of farmland maintained in the SMCA utilizing a diversity of crops
Work with partners to monitor water conveyance from agricultural lands via field swales, ditches, culverts, creeks	Agriculture; Riparian	VICLMP; MNC	Annually	Farms operational by June 15 <sup>th</sup> annually
Remove invasive species and willow in-growth to maintain 30ha of agricultural fields	Agriculture	VICLMP	On-going	30ha of farmland maintained
Plant cover crops that provide high nutritive value to migratory birds	Agriculture	VICLMP; farm operators	Annual	All cultivated fields are planted with a suitable cover crop (e.g. Winter wheat and/or winter rye)
Monitor wildlife use of agricultural fields	Agriculture	VICLMP	Annual as part of the wildlife monitoring strategy of Goal 2 Strategy 4	Increased use of agricultural fields by migratory waterfowl

**Goal 3 – Strategy 1:  
Maintain agricultural productivity for conservation purposes**

**INTERNAL ACTIONS (Goal 3 – Strategy 1)**

Maintain/enhance field hedgerow habitat	Agriculture	VICLMP	As a component of Goal 2 Strategy 4	Hedgerows contain diversity of vegetation and help maintain the diversity of song birds in agricultural areas and are not impacted by agricultural activity
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## Goal 4 – Maintain Opportunities for Low-impact Recreational Use

### Discussion

The SMCA provides numerous opportunities for tourism, recreation and education, with the Open Air Classroom facility now providing year-round wildlife viewing on maintained boardwalks with interpretive signage. The Forest Discovery Centre provides a significant tourism draw on land immediately surrounding the SMCA and also provides interpretation/education opportunities directly associated with the SMCA (i.e. information kiosks and trails). Recreational activities encouraged in SMCA include passive activities using non-motorized means (e.g., walking, biking, wildlife viewing, canoeing, fishing, kayaking).

Education and interpretation not only provide economic benefit through tourism, but also enhance the public awareness and stewardship of the SMCA. By fostering an understanding of ecology and associated services provided, people are more inclined to value, and therefore protect through their own actions, sensitive ecological features. It is especially important to connect youth with the SMCA through programs aimed at local schools. Management strategies that seek to achieve a balance between allowing access while still protecting sensitive ecological areas are extremely important when managing education/interpretation initiatives.

Since the completion of the original SMP, the new flood protection dike provides an additional maintained trail system along and through parts of the southern portion of the SMCA. The 2016 dike expansion along the east side of the Trans-Canada Highway adds to the trail network and provides a trail access along the new dike to the Open Air Classroom. The Municipality has funded the construction (2017) of a trail from the end of the dike at the open aid classroom to the Forest Discovery Centre along the east side of the Trans Canada Hwy.

A boat launch on Drinkwater Road provides access to Somenos Lake for activities such as fishing and canoeing. A raised walkway and floating dock, which represent new infrastructure since the completion of the original SMP, also provide access for fishing and wildlife viewing. Based on the ease of access to the lake and provision of a dock, Somenos Lake is listed by the Freshwater Fisheries Society of BC as a "Family Fishing Water". Somenos Lake is stocked annually (each spring and autumn) with Rainbow Trout and Cutthroat Trout, an activity which aims to sustain a recreational fishery.

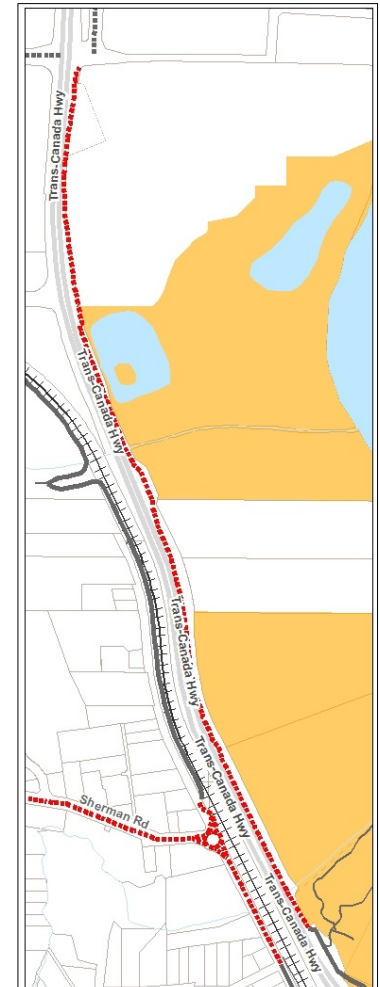


Figure 2. TCH – Proposed Dike Connector Trail Expansion

New signage has been installed at the boat launch and new interpretive signage is featured in the Open Air Classroom and along the flood protection dike network. Signs represent an important aspect of education/interpretation, but it is important that signs do not become intrusive and that they have a consistent design concept.

In support of the Vision Statement, it is important to note that recreational activities would only be permitted in Zone 1 and 6; management in all other zones would be specific to protecting ecological values and carrying out agricultural practices that enhance habitat for waterfowl. Enhancing recreation in Zone 1 and 6 should not come at the expense of ecological values, or impact negatively upon sensitive areas in adjacent management zones. For example, the current use of trails and any future trail expansions must take into account potential impacts to sensitive ecological features. The dike footprint allows for increased access opportunities along the dike trail, which runs parallel to farm fields used by overwintering waterfowl. Potential disturbance to waterfowl (both active and visual) is a concern. A key advantage of well-maintained and designated trails is that they focus public use in suitable areas and they can help define access routes, which can prevent inadvertent encroachment into sensitive areas. It is equally important to manage other human-related impacts such as garbage and vandalism at key access sites (e.g. York Road, Somenos Lake boat launch and Open Air Classroom).

Management strategies must address the protection of important habitat and identify means to separate trail-based disturbance (e.g. dogs) from wildlife. In recognition of these potential negative interactions, TNTBC and the MNC agreed and initiated in 2016 a planting plan for the lands that have recently been acquired along the north side of Beverly Street. The main goal of the planting is to create vegetation screens between the dike trail and sensitive wildlife habitat. The planting will also benefit fish habitat through the provision of key habitat elements (e.g. temperature regulation, provision of a source of Large Woody Debris and provision of leaf litter/insect drop over fish habitat). This planting will build upon planting initiatives undertaken in 2013 within the floodplain of Somenos Creek associated with construction of the flood control dike.



**Goal 4 – Strategy 1:  
Public Use and Trail Development**

**INTERNAL ACTIONS (Goal 4 – Strategy 1)**

<b>Actions</b>	<b>Priority Zone/Area</b>	<b>Key Partners</b>	<b>Timeline</b>	<b>Management Target</b>
Design, potentially construct and manage a pedestrian boardwalk and trail connection between Timbercrest and University Village/City of Duncan along the municipal statutory right of way between York Road and Somenos Creek	Pedestrian boardwalk and trail on MNC statutory right of way	MNC, Cowichan Tribes, SMWS; VICLMP, CVNS	Long-term	Design and consult Cowichan Tribes, public and interested stakeholders
Establish a trail network and access plan for <i>S-amuna'</i> WMA and surrounding areas that reflects University Village LAP	All zones	MNC, Cowichan Tribes, Somenos Marsh Committee, SMWS	Ongoing	Provide accessibility and recreation opportunities while limiting unwarranted access
Coordinate compliance and enforcement initiatives	All zones	VICLMP; MNC; Province (COS/NRO) ; RCMP, Cowichan Tribes Bylaw Officer	2017/18 – identify and implement compliance strategy (assessment of non-compliance etc.)	50% improvement in non-compliance by 2020; 95% compliance 2022
Work with Cowichan Tribes on proposed trail networks to reduce impacts to sensitive cultural areas.	<i>Ye'yumnuts</i>	Cowichan Tribes; VICLMP; MNC	Ongoing	Funding dependent; completion Fall 2019

**EXTERNAL ACTIONS (Goal 4 – Strategy 1)**

<b>Actions</b>	<b>Priority Zone/Area</b>	<b>Key Partners</b>	<b>Timeline</b>	<b>Management Target</b>
Create a trail extension from the Outdoor Classroom to BC Forest Discovery Centre (Figure 2)	Along TCH between BCFDC and Open Classroom	MNC, SMWS, BCFDC, Cowichan Tribes; NTBC	Long-term	To ensure low impact on environment including waterfowl

**Goal 4 – Strategy 2:  
Maintain and Improve Signage**

**INTERNAL ACTIONS (Goal 4 – Strategy 2)**

<b>Actions</b>	<b>Priority Zone/Area</b>	<b>Key Partners</b>	<b>Timeline</b>	<b>Management Target</b>
Develop a strategy for development and installation of signage in the SMCA to ensure a consistent standard that recognizes partnerships, ownership and responsible management organizations (Note: this does not include regulatory signage)	All zones	MNC, Cowichan Tribes, VICLMP, CVNS and SMWS	Immediate (weeks to months)	Signage to be in place by 2020
Identify appropriate areas for signage to ensure that signs do not negatively impact upon the natural aesthetics of the SMCA	All zones	MNC, Cowichan Tribes, VICLMP and SMWS	2017-2018 develop sign plan	On-going implementation of signage plan
Include the <i>Hul'q'umi'num</i> language in future interpretive signage	All zones	VICLMP; Cowichan Tribes, MNC, SMWS	On-going management strategy over several years	

## Goal 5 – Respect and Raise Awareness of Cultural Values

### Discussion

It is imperative that traditional cultural sites are not adversely affected by the implementation of any management strategies. The history and Aboriginal rights of Cowichan Tribes in the SMCA is recognized and respected in the implementation of all management objectives. It is important to encourage the reconnection of Cowichan youth to the cultural values of the SMCA through the implementation of educational and traditional activities. The connection of Cowichan Elders to youth groups is a key aspect, as it will allow for the dissemination of the *Hul'q'umi'num* language and history.

There are highly sensitive archaeological sites in the SMCA, including *Ye'yumnuts*.

The restoration of cultural sites, protection of traditional food and medicine sources, and maintenance of traditional corridors to hunting/fishing/village sites remain important management criteria.

**Goal 5 - Strategy 1:  
Protect and Raise Awareness of Traditional Cultural Sites**

**INTERNAL ACTIONS (Goal 5 – Strategy 1)**

<b>Actions</b>	<b>Priority Zone/Area</b>	<b>Key Partners</b>	<b>Timeline</b>	<b>Management Target</b>
Continue to inventory culturally significant sites in cooperation with Cowichan Tribes (e.g. the <i>Ye'yumnuts</i> site)	Zone 7	CT; VICLMP; MNC	On-going management strategy over several years	2022 map of significant sites completed
Implement recommendations of Eric McClay report (2015)	Zone 7	CT; VICLMP; Province	On-going management strategy over several years	2019 recommendations completed
Consider traditional Cowichan access corridors (e.g. creeks and waterbodies used to access fishing/hunting/gathering/village sites) when designing new access facilities	All zones	MNC, Province of BC, Cowichan Tribes	On-going management strategy over several years	Restrict unwarranted access
Ensure future trail planning related to the pedestrian walkway and trail on the York Road extension over Somenos Creek is completed in consultation with Cowichan Tribes	All zones	MNC, Cowichan Tribes	On-going management strategy over several years	Protect sensitive cultural features
Incorporate traditional ecological knowledge in interpretive signs and public education programs	All zones	MNC, Cowichan Tribes, Somenos Management Committee	Ongoing	Improve awareness

**Definition of Land Uses & Activities Identified for Area Specific Management**

In developing the Somenos Conservation Area Management Plan along with the Land Use Map, the area was assessed for current and potential land uses. From this, a list of land use activities was developed and defined to form the basis for management direction within each of the 7 defined areas and zones (Table 2). For each zone these land uses are shown in Table 2.

**Table 2. Land Use Activity Definitions for Somenos Conservation Area**

<b>Land Use/Activity</b>	<b>Definition</b>
Restoration	Actions to restore natural ecological processes; riparian planting, invasive species removal, fish habitat creation, reforestation
Enhancement	Actions to enhance or introduce desirable environmental features; wetland creation, water flows/storage, wildlife trees, spawning gravel
Scientific/Research	Inventory for SAR, baseline inventory for fish and wildlife, monitoring
Education	Naturalist groups, stewardship, guided walks, school groups
Commercial Recreation and Tourism	Commercial tour operators, organized tours, festivals, events
Public Access/Recreation	Hiking, wildlife viewing, non-motorized activities, recreational anchorage/moorage
Water Control Structures	Dams, weirs, spill ways
Fixed infrastructure – conservation	Boundary, regulatory, and interpretive signage; viewing platforms; trails
Linear infrastructure	Roads, bridges, gates, culverts, fences, drainage ditches, municipal infrastructure, docks
Fixed infrastructure - farming operations	Barns, storage facilities for fuel, equipment, crops, greenhouses
Soil based agriculture	Prepare, plant, grow, protect, and harvest fodder crops (grains, forage, silage)
Livestock grazing	Grazing of domestic livestock
Hunting	Hunting in accordance to Provincial Regulations and local municipal bylaws
Fishing	Fishing in accordance to Provincial Regulations
Trapping	Trapping In accordance to the Provincial Wildlife Act and associated regulations.

## Zone 1 – Lake

Land Use/Activity	Management Direction*	Considerations
Restoration	A	
Enhancement	A	
Scientific/Research	C	Subject to review and applicable permitting process
Education	A	
Commercial Recreation and Tourism	C	Subject to review and permitting process
Public Access/Recreation	C	Subject to regulation and posted signs
Water Control Structures	N	
Fixed infrastructure – conservation	C	No viewing platforms, floating structures, trails in riparian area of lake
Linear infrastructure	N	Water extraction applications are reviewed via Provincial Water Sustainability Act
Fixed infrastructure - farming operations	N/A	
Soil based agriculture – fodder crops	N/A	
Livestock grazing	N/A	
Hunting	C	Subject to Provincial regulations and Municipal by-laws
Fishing	C	Subject to Provincial and Federal regulations
Trapping	N/A	

\* Acceptable (A), Conditional (C), Not acceptable (N), or Not Applicable (N/A)

## Zone 2 – Marsh

Land Use/Activity	Management Direction*	Considerations
Restoration	A	
Enhancement	A	
Scientific/Research	C	Subject to review and applicable permitting process
Education	C	Subject to review and applicable permitting process
Commercial Recreation & Tourism	N	
Public Access/Recreation	N	
Water Control Structures	C	Only for conservation purposes
Fixed infrastructure – conservation	C	No viewing platforms, , trails, boardwalks
Linear infrastructure	C	Existing infrastructure exempt; gates, fencing, ditches allowed where required to protect and enhance conservation values
Fixed infrastructure - farming operations	N	
Soil based agriculture – fodder crops	N	
Livestock grazing	N	
Hunting	N	Subject to Provincial regulations and Municipal bylaws
Fishing	N	Subject to Provincial and Federal regulations
Trapping	N	

\* Acceptable (A), Conditional (C), Not acceptable (N), or Not Applicable (N/A)

### Zone 3 – Agriculture

Land Use/Activity	Management Direction*	Considerations
Restoration	A	
Enhancement	A	
Scientific/Research	C	Subject to review and applicable permitting process
Education	N	
Commercial Recreation & Tourism	N	
Public Access/Recreation	N	
Water Control Structures	C	Only for conservation purposes
Fixed infrastructure – conservation	C	No viewing platforms, floating structures, trails, boardwalks
Linear infrastructure	C	Existing infrastructure exempt; gates, fencing allowed where required to protect conservation values
Fixed infrastructure - farming operations	C	Short term storage of crops and equipment permissible
Soil based agriculture – fodder crops	A	Farm practices to follow Environmental Farm Plan guidelines
Livestock grazing	N	
Hunting	C	Subject to Provincial regulations and Municipal bylaws
Fishing	N/A	
Trapping	N	

\* Acceptable (A), Conditional (C), Not acceptable (N), or Not Applicable (N/A)

## Zone 4 – Forest Woodland

Land Use/Activity	Management Direction*	Considerations
Restoration	A	
Enhancement	A	
Scientific/Research	C	Subject to review and applicable permitting process
Education	C	Subject to review and applicable permitting process
Commercial Recreation & Tourism	C	Subject to review and applicable permitting process
Public Access/Recreation	C	Subject to regulation and posted signs
Water Control Structures	N/A	
Fixed infrastructure – conservation	C	No viewing platforms
Linear infrastructure	C	Existing infrastructure exempt; gates, fencing allowed where required to protect conservation values
Fixed infrastructure - farming operations	N/A	
Soil based agriculture – fodder crops	N/A	
Livestock grazing	N/A	
Hunting	N	
Fishing	N/A	
Trapping	N	

\* Acceptable (A), Conditional (C), Not acceptable (N), or Not Applicable (N/A)



## Zone 5 – Riparian

Land Use/Activity	Management Direction*	Considerations
Restoration	A	
Enhancement	A	
Scientific/Research	C	Subject to review and applicable permitting process
Education	C	Subject to review and applicable permitting process
Commercial Recreation & Tourism	N	
Public Access/Recreation	N	
Water Control Structures	C	Only for conservation purposes
Fixed infrastructure – conservation	C	No viewing platforms, trails, boardwalks, bridges
Linear infrastructure	C	Existing infrastructure exempt; gates, fencing allowed where required to protect conservation values
Fixed infrastructure - farming operations	N/A	
Soil based agriculture – fodder crops	N/A	
Livestock grazing	N/A	
Hunting	N	
Fishing	C	Subject to Provincial and Federal regulations
Trapping	C	Subject to Provincial regulations and for creek flow control

\* Acceptable (A), Conditional (C), Not acceptable (N), or Not Applicable (N/A)

## Zone 6 – Recreation

Land Use/Activity	Management Direction*	Considerations
Restoration	A	
Enhancement	A	
Scientific/Research	C	Subject to review and applicable permitting process
Education	C	Subject to review and applicable permitting process
Commercial Recreation & Tourism	C	Subject to review and applicable permitting process
Public Access/Recreation	C	Subject to regulations and posted signs
Water Control Structures	C	Only for conservation purposes
Fixed infrastructure – conservation	C	New infrastructure subject to review and approval
Linear infrastructure	C	Existing infrastructure exempt; gates, fencing allowed where required to protect conservation values
Fixed infrastructure - farming operations	N/A	
Soil based agriculture – fodder crops	N/A	
Livestock grazing	N/A	
Hunting	N	
Fishing	N	
Trapping	N	

\* Acceptable (A), Conditional (C), Not acceptable (N), or Not Applicable (N/A)

## Zone 7 – Cultural

Land Use/Activity	Management Direction*	Considerations
Restoration	C	Subject to review with Cowichan Tribes and Province to ensure cultural/heritage values are not impacted by activity
Enhancement	C	Subject to review with Cowichan Tribes and Province to ensure cultural/heritage values are not impacted by activity
Scientific/Research	C	Subject to review with Cowichan Tribes and Province to ensure cultural/heritage values are not impacted by activity
Education	C	Subject to review with Cowichan Tribes and Province to ensure cultural/heritage values are not impacted by activity
Commercial Recreation & Tourism	C	Subject to review with Cowichan Tribes and Province to ensure cultural/heritage values are not impacted by activity
Public Access/Recreation	N	Subject to regulations and posted signs;
Water Control Structures	N/A	
Fixed infrastructure – conservation	C	Subject to review with Cowichan Tribes and Province to ensure cultural/heritage values are not impacted by activity
Linear infrastructure	C	Subject to review with Cowichan Tribes and Province to ensure cultural/heritage values are not impacted by activity
Fixed infrastructure - farming operations	N/A	
Soil based agriculture – fodder crops	N/A	
Livestock grazing	N/A	
Hunting	N	
Fishing	N/A	
Trapping	N	

\* Acceptable (A), Conditional (C), Not acceptable (N), or Not Applicable (N/A)

## **Appendix A – Maps**

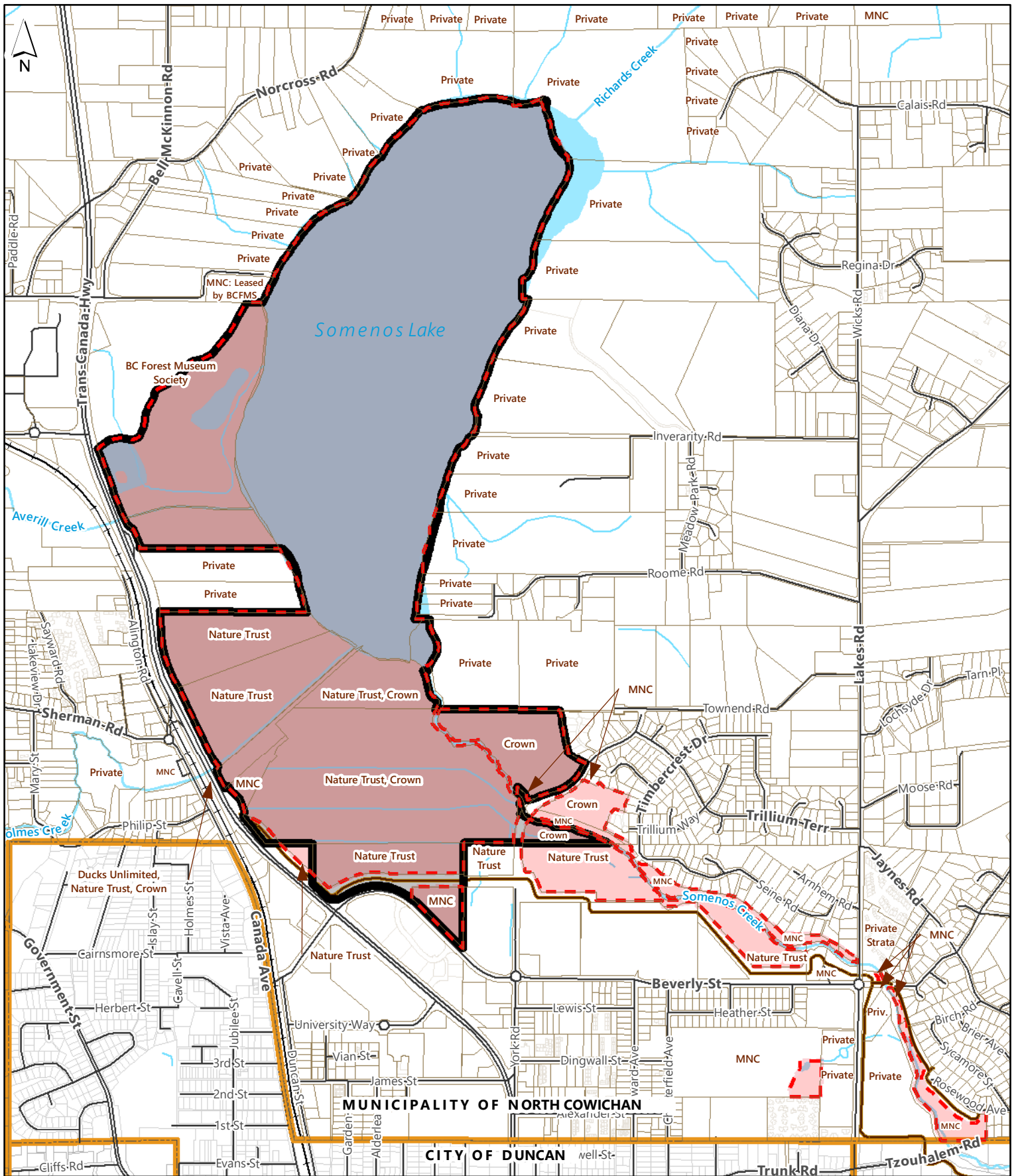
**Map 1 Proposed SMCA Boundary**

**Map 2 Proposed Additions to the SMCA**

**Map 3 Proposed SMCA Conservation Agreements on Private Land**




**Map 4 Proposed Somenos Wildlife Management Area**

**Map 5 Proposed Management Zones**

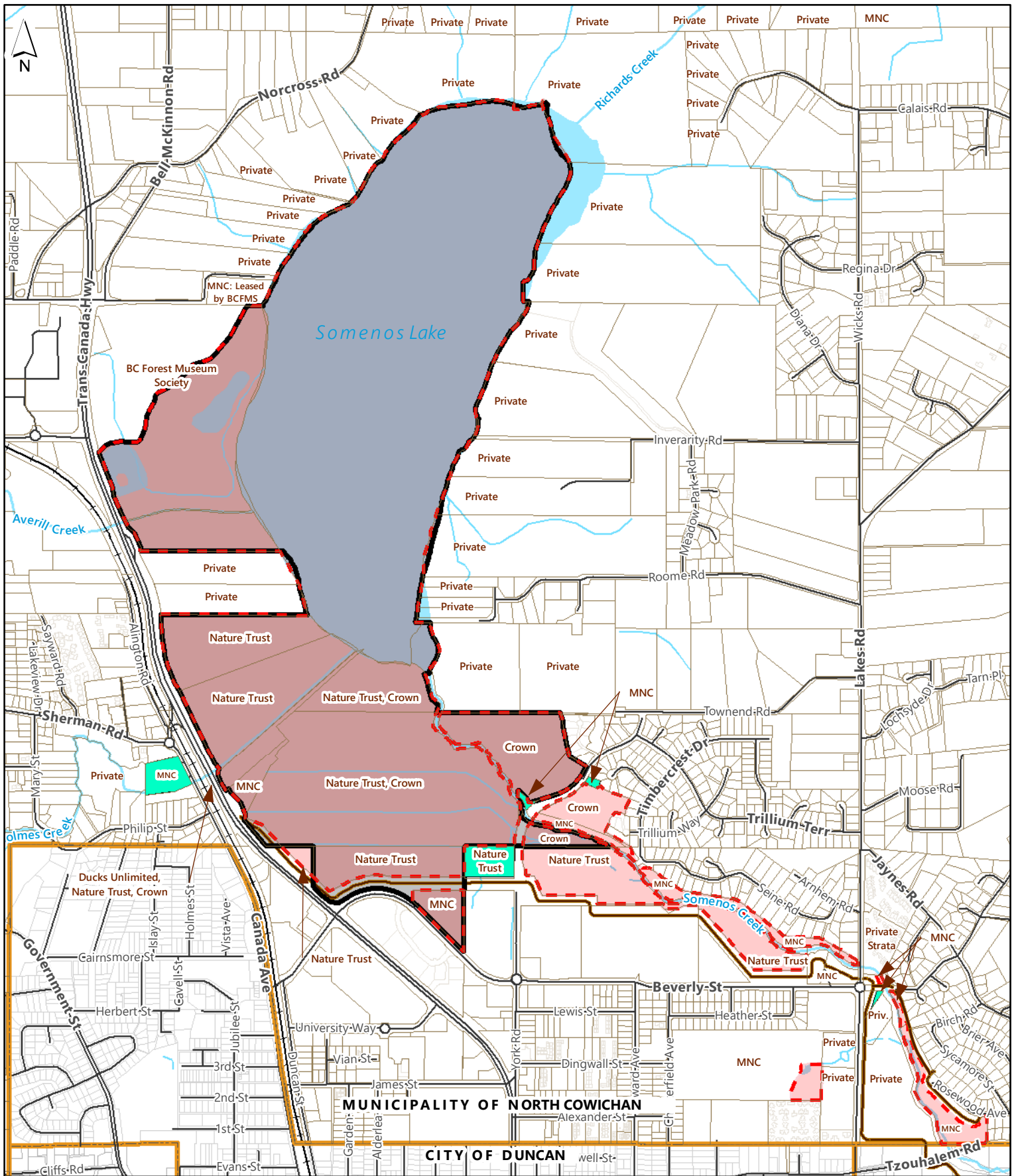


**Map 1: Proposed Somenos Marsh Conservation Area Boundary**

METRES 0 250 500  
SCALE 1:15,000

-  Existing Somenos Marsh Conservation Area
-  Dike Centerline
-  Jurisdictional Boundary



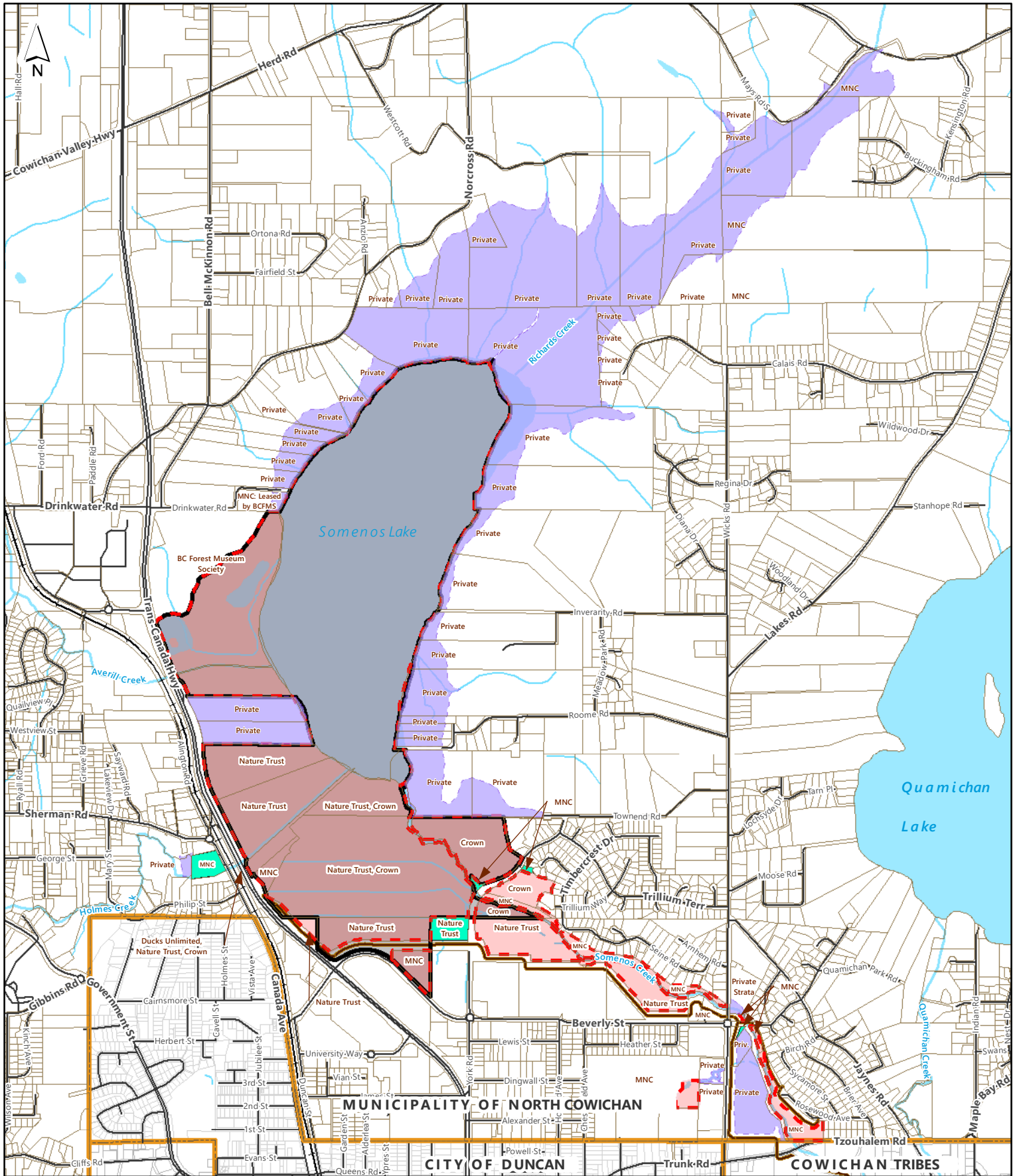


Map 2: Proposed Additions to the Somenos Marsh Conservation Area

METRES 0 250 500  
SCALE 1:15,000

- Proposed Somenos Marsh Conservation Area Additions
- Existing Somenos Marsh Conservation Area
- Dike Centerline
- Jurisdictional Boundary



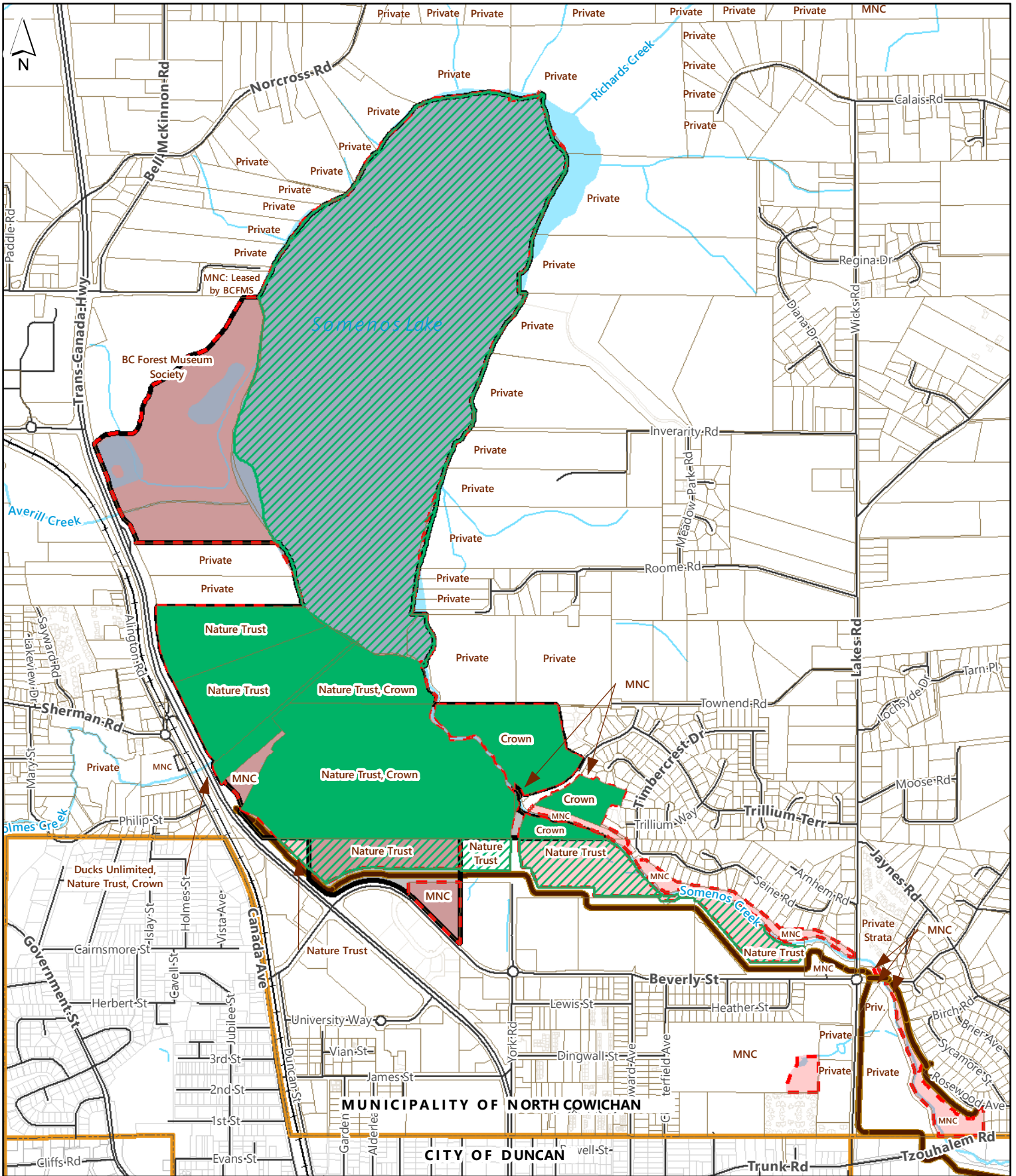


Map 3: Proposed SMCA Conservation Agreements on Private Land

METRES 0 250 500  
SCALE 1:20,000

- Proposed Conservation Agreement on Private land
- Proposed Somenos Marsh Conservation Area Additions
- Existing Somenos Marsh Conservation Area
- Dike Centerline
- Jurisdictional Boundary





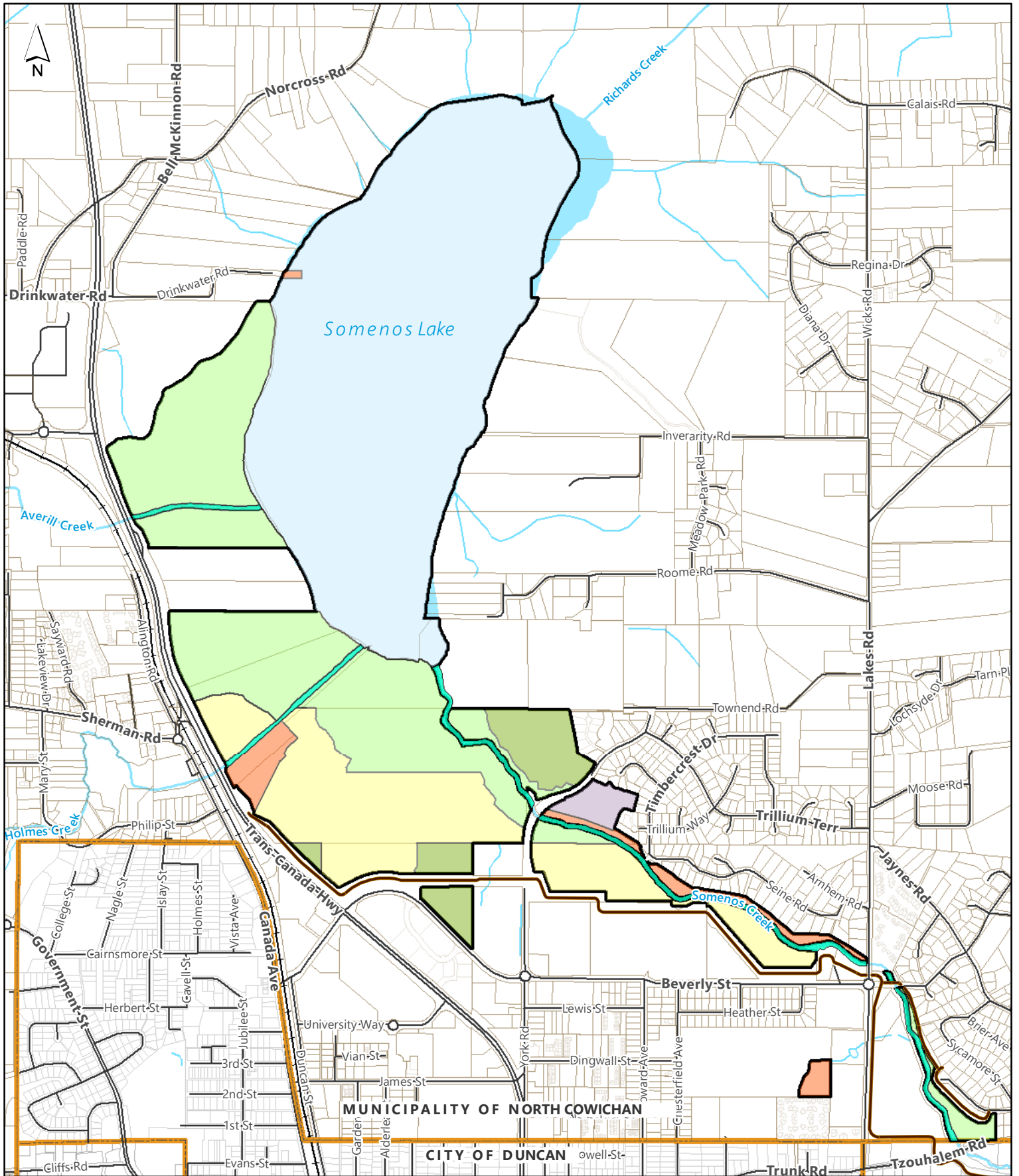
Map 4: Proposed Somenos Marsh Wildlife Management Area Boundary

METRES 0 250 500  
SCALE 1:15,000

- Existing Somenos Marsh Wildlife Management Area
- Proposed Somenos Marsh Wildlife Management Area Additions
- Existing Somenos Marsh Conservation Area
- Dike Centerline
- Jurisdictional Boundary







**Map 5: Proposed Somenos Marsh Management Zones**

Management Area:

- Zone 1 - Lake
  - Zone 2 - Marsh
  - Zone 3 - Agricultural / Potential Agricultural
- Zone 4 - Forest / Woodland
  - Zone 5 - Riparian
  - Zone 6 - Recreational
- Zone 7 - Cultural

METRES 0 250 500

SCALE 1:15,000



## **Appendix B - Action Plan for Invasive Plants**

# Somenos Marsh Conservation Area: Action Plan for Invasive Plants

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**Karen Barry (Vancouver Island Conservation Land Management Program)**

**Elizabeth Bailey (Somenos Marsh Wildlife Society)**

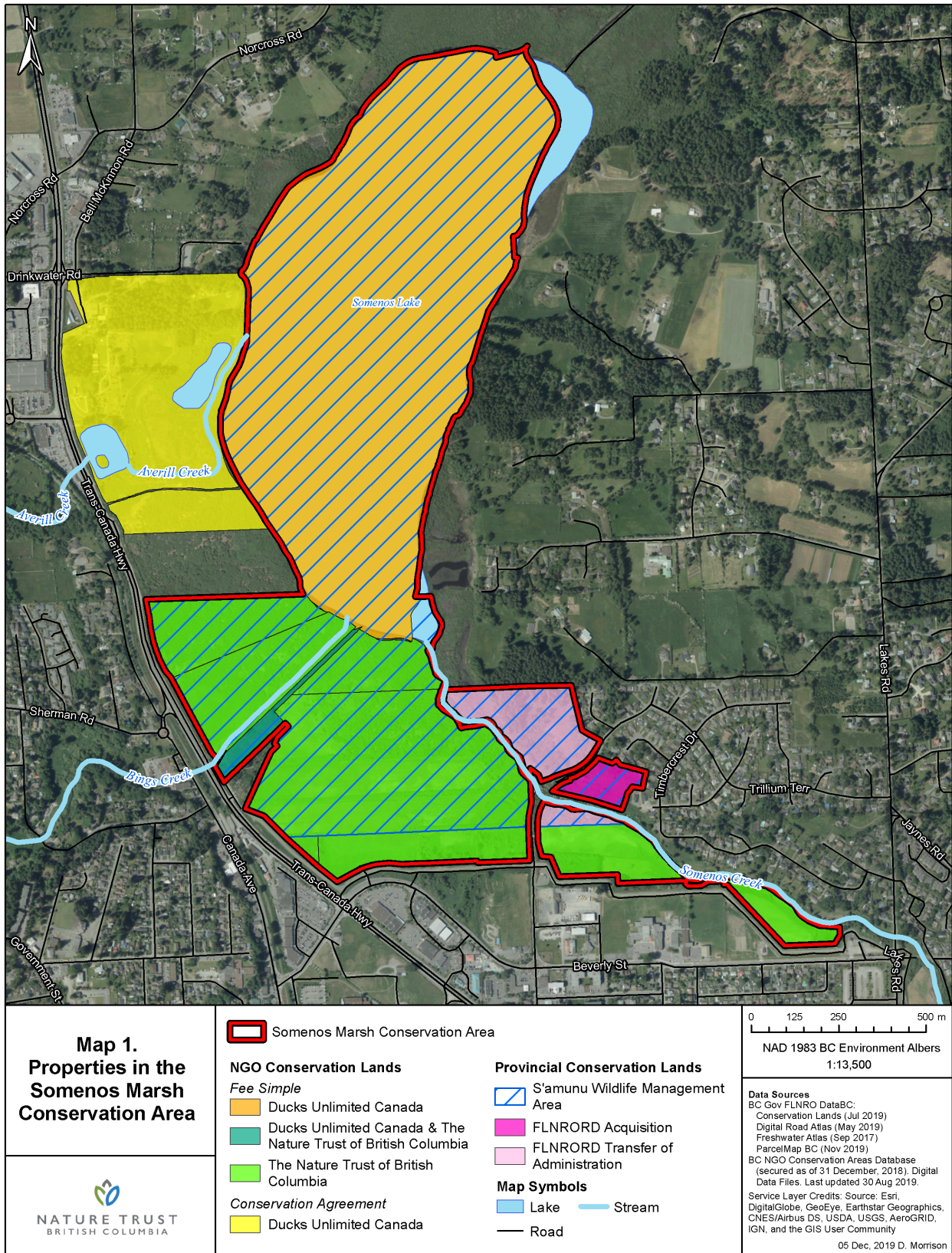
**January 2017**

## **1.0 Background & Area of Interest**

Invasive non-native plants have serious environmental, social, economic and health impacts. Most invasive species are unintentionally introduced by human activities and because they have no natural predators and are very aggressive, they often spread and survive better than native species.

Invasive plants can easily take over sensitive ecosystems and cause serious habitat impacts, as well as harm to native plant, insect, bird and animal life. The negative impacts on BC ecosystems can be extremely difficult to reverse which is why prevention, and early detection and control are key.

The Somenos Marsh Conservation Area (SMCA) is a wetland complex that provides important habitat for numerous birds, fish, and other wildlife, as well as several plant species at risk. The properties in the SMCA include lands owned or co-owned by The Nature Trust of British Columbia (TNTBC), and Ducks Unlimited Canada (DUC), including lands under management agreement with DUC, as well as Provincial and Municipal lands (Map 1). One of the major threats to the ecological function of SMCA is from non-native invasive species. Several invasive plants have been reported in the Somenos Marsh Conservation Area by organizations and agencies currently conducting conservation activities. This Action Plan outlines a collaborative approach to tackling priority invasive plants in a coordinated way given limited resource in many cases.



Map 1. Properties in the Somenos Marsh Conservation Area.

## 1.2 Overall Approach to Invasive Plant Treatment and Control in SMCA

1. The primary goal is to maintain and/or improve natural ecological function in SMCA.
2. The approach will be based on principles of Integrated Pest Management.
  - An integrated approach includes prevention, education, monitoring and evaluation.
  - Herbicides are considered only when the benefits outweigh the costs and risks.
  - Approaches must be consistent and supported by provincial invasive plant experts.
3. Priority should be placed on addressing impacts to highest valued habitats.
  - Focus on conserving and restoring the most valuable habitats when possible.
4. Partnerships and communication should be emphasized.
  - Working collaboratively is more cost-effective.
  - Control, restoration, and monitoring projects are an important component of both education and outreach.
  - Coordination with VICLMP is important.
5. Monitoring and adaptive management will be incorporated in treatment projects to learn what methods work best.
  - Success, progress, and unexpected challenges should be recorded regularly during treatment efforts.
  - Information will be shared regionally to learn from field trials.

## 2.0 Invasive Plants in Somenos Marsh Conservation Area

Table 1: Observed Invasive Plants in Somenos Marsh Conservation Area (n/a = no legal status; not regulated under the BC Weed Control Act)

Common Name (Latin name)	Origin	Habitat	Location	Abundance at Somenos & Distribution	Legal Status/ Provincial Classification	Short-term or Long-term Priority
Yellow Flag ( <i>Iris pseudacorus</i> )	Europe and Africa	Flooded terrestrial	Farm fields, adjacent to Somenos Creek	High, widespread	Provincially Noxious	Short
Japanese Knotweed ( <i>Fallopia japonica</i> )	Asia	Terrestrial, riparian	Near pond at Forest Discovery Museum	Low, localized	Provincially Noxious. Weed Control Act requires all land	Short

Other Knotweed sp					occupiers to control the spread of knotweed. Forest and Range Practices Act requires land managers to specify and implement measures that prevent the introduction or spread of knotweed	
Scotch Broom ( <i>Cytisus scoparius</i> )	Europe	Terrestrial	SGOPA, <i>Ye'yumnuts</i>	Widespread	Invasive Plants Regulation, Forest and Range Practices Act	Short & Long
Reed Canary Grass ( <i>Phalaris arundinacea</i> )	North America	Terrestrial	Throughout SMCA	Widespread	n/a	Long
Parrot Feather ( <i>Myriophyllum aquaticum</i> )	Amazon basin, South America	Aquatic submerged /emergent, rooted	Somenos Creek	Localized in Somenos Creek	n/a	Short
Purple Loosestrife ( <i>Lythrum salicaria</i> )	Eurasia	Riparian, wetland	Pond perimeter at Forest Discovery Museum, Lake perimeter	Localized in Forest Discovery Museum	Regionally Noxious, Provincially Noxious	Short
Himalayan Blackberry ( <i>Rubus armeniacus</i> )	Western Europe	Terrestrial	Pond at Forest Discovery Museum near highway, Outdoor Classroom, <i>Ye'yumnuts</i>	Widespread	n/a	Short & Long
Giant Mannagrass ( <i>Glyceria maximia</i> )	Eurasia	Terrestrial, wetland, riparian	Around new pond on Beverly St., Near Outdoor Classroom, Along lower Averill Creek	Widespread	Provincially Noxious	Long

Tansy Ragwort ( <i>Senecio jacobaea</i> )	Eurasia	Terrestrial	Along Beverly St., Near <i>Ye'yumnuts</i>	Low, Localized	Provincially Noxious	Short
Common Tansy ( <i>Tanacetum vulgare</i> )	Europe	Terrestrial	Throughout SMCA	Moderate, Widespread	Regionally Noxious	Long
Canada Thistle and other thistle sp. ( <i>Cirsium sp.</i> )	Eurasia	Terrestrial	<i>Ye'yumnuts</i>	High, Localized	Provincially Noxious; Invasive Plants Regulation, Forest and Range Practices Act	Long
Oxeye Daisy ( <i>Leucanthemum vulgare</i> )	Eurasia	Terrestrial	<i>Ye'yumnuts</i>	High, Localized	Regionally Noxious; Invasive Plants Regulation, Forest and Range Practices Act	Long
English Hawthorn ( <i>Crataegus monogyna</i> )	Europe and Britain	Terrestrial, wetland	Throughout SMCA	Widespread	n/a	Short
Lady's Thumb ( <i>Persicaria maculosa</i> )	Eurasia	Aquatic, wetland	Large patches, widely distributed. In lake and some areas of marsh	Widespread in wet meadows	n/a	Long
Field Bindweed / Morning Glory ( <i>Convolvulus arvensis L.</i> )	Eurasia	Terrestrial, wetland	One known occurrence along boardwalk	Low, Localized	n/a	Short
Poison Hemlock ( <i>Conium maculatum L.</i> )	Eurasia	Terrestrial	On dike	Low, Localized	n/a	Short
Dalmatian Toadflax ( <i>Linaria genistifolia</i> )	Europe	Terrestrial	Scattered	Low, Several Locations	Provincially Noxious	Short
St. John's-wort ( <i>Hypericum perforatum L.</i> )	Eurasia	Terrestrial	Scattered, and in <i>Ye'yumnuts</i>	Low, Widespread	n/a	Long
Giant Hogweed* ( <i>Heracleum mantegazzianum</i> )	Asia	Riparian	Upstream of SMCA on Bings Creek	One plant confirmed (removed)	Provincially Noxious	
Policeman's Helmet* ( <i>Impatiens glandulifera</i> )	Asia	Riparian	Not far upstream of SMCA on Bings Creek	Localized infestation	n/a	

\*Outside of SMCA boundaries

### 3.0 Existing Invasive Plant Data for SMCA

- FLNRO lake and creek surveys summer (2016)
- IAPP database
- VICLMP data
- SMWS data (2014 Aquatic plant survey, will be surveying areas of SMCA until July 2017)
- Inventory of Coastal Wetlands for Invasive Plants (EBB report, 2008)

### 4.0 Potential Treatment and Control Methods

There can be several options to treat invasive plants. Often a combination of methods must be used to successfully eradicate invasive plants. A systematic approach will be required to remove invasives during the appropriate times each year using specific techniques that are most effective for each particular plant. Multiple years of treatment may be required in many cases, especially for large infestations. Following removal, infested areas should be restored by planting native species that will alter the environment and make it less favourable for invasive plants to recolonize that area.



Table 2: General effectiveness of various treatment methods by species (Ranked 0-3 with 0 being not effective and 3 being most effective, n/a = not applicable, -1 = treatments can worsen infestation by increasing seed germination or dispersing root fragments, More Info= Information is lacking).

Control Method	Yellow Flag Iris	Japanese Knotweed	Scotch Broom	Reed Canary Grass	Parrot Feather	Purple Loosestrife	Him. Blackberry	Giant Mannagrass	Tansy Ragwort	Common Tansy
1) Cutting (stems, branches, leaves, not roots)										
<i>Mowing</i>	1	-1	1	2	n/a	-1	2	2	1	1
<i>Cutting at ground</i>	1	1	1	0	n/a	1	1	n/a	0	n/a
<i>Raking</i>	n/a	n/a	n/a	0	1	0	0	More info	0	0
<i>Brushcutting</i>	1	-1	1	2	n/a	More info	1	2	0	1
<i>Grazing</i>	n/a	1	More info	More info	n/a	More info	1	More info	1	More info
2) Root and/or Soil removal (usu. After cutting)										
<i>Root pulling</i>	2	0	3	3	1	2	3	2	2	2
<i>Root cutting</i>	More info	-1	1	1	-1	-1	0	2	-1	More info
<i>Tilling</i>	info	-1	-1	More info	n/a	more info	2	2	1	More info
<i>Excavating</i>	1 2	3	2	info 1	1	more info	3	2	More info	2

Table 2 (continued)

Control Method	Yellow Flag Iris	Japanese Knotweed	Scotch Broom	Reed Canary Grass	Parrot Feather	Purple Loosestrife	Him. Blackberry	Giant Mannagrass	Tansy Ragwort	Common Tansy
3) Surface covering (in combination with cutting or tilling)										
<i>Woodchips/mulch</i>	?	0	1	More info	n/a	More info	2	More info	2	More info
<i>Geotextile</i>	2	2	0	2	2	1	2	3	More info	More info
4) Biological controls										
<i>Insect pest</i>	n/a	n/a	n/a	n/a	1	2	n/a	n/a	2	n/a
<i>Fungi pest</i>	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
5) Herbicide										
<i>Spraying</i>	2	2	2	1	2	3	3	3	2	3
<i>Stem injection</i>	1	3	n/a	n/a	n/a	More info	More info	More info	n/a	More info

Table 2 (continued)

Control Method	Thistles	Oxeye Daisy	English Hawthorne	Lady's Thumb	Field Bindweed (Morning Glory)	Poison Hemlock	Dalmatian Toadflax	St John's Wort	Giant Hogweed	Police-man's Helmet
1) Cutting (stems, branches, leaves, not roots)										
<i>Mowing</i>	1	2	-1	2	0	2	-1	1	1	More info
<i>Cutting at ground</i>	n/a	n/a	0	n/a	0	2	0	n/a	1	2
<i>Raking</i>	More info	n/a	0	n/a	-1	0	0	n/a	0	n/a
<i>Brushcutting</i>	2	2	2	2	0	2	0	0	1	2
<i>Grazing</i>	More info	2	0	More info	More info	n/a	More info	0	more info	1
2) Root and/or Soil removal (usu. after cutting)										
<i>Root pulling</i>	2	2	1	2	3	3	2	2	3	2
<i>Root cutting</i>	More info	More info	0	More info	More info	0	0	More info	3	More info
<i>Tilling</i>	More info	More info	0	More info	3	more info	2	More info	More info	More info
<i>Excavating</i>	2	1	0	1	1	3	More info	More info	More info	More info
3) Surface covering (combined with cutting or tilling)										
<i>Woodchips/Mulch</i>	More info	More info	n/a	More info	1	2	More info	More info	More info	More info
<i>Geotextile</i>	More info	1	n/a	More info	More info	More info	More info	More info	2	More info
4) Biological controls										
<i>Insect pest</i>	2	n/a	n/a	n/a	n/a	n/a	2	1	n/a	n/a
<i>Fungi pest</i>	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
5) Herbicide										
<i>Spraying</i>	2	2	n/a	2	0	3	0	2	3	More info
<i>Stem injection</i>	n/a	n/a	n/a	n/a	n/a	n/a	n/a	2	3	More info

## References:

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- BC Ministry of Forests, Lands and Natural Resources: Invasive Plants with Biocontrol\_ <https://www.for.gov.bc.ca/hra/plants/biocontrol/bcmatrix.htm#SJ>
- King County Noxious\_Weeds <http://www.kingcounty.gov/services/environment/animals-and-plants/noxious-weeds/weed-control-practices.aspx>
- USDA Plants Database <https://plants.usda.gov/java/factSheet>
- Langley Environmental Partners Society: Invasive Partners of Southwest BC [http://www.shim.bc.ca/invasivespecies/\\_private/index.htm](http://www.shim.bc.ca/invasivespecies/_private/index.htm)
- City of Nanaimo Guide to Controlling Invasive Plants\_ [https://www.nanaimo.ca/assets/Departments/Parks~Rec~Culture/Parks/invasive\\_plants.pdf](https://www.nanaimo.ca/assets/Departments/Parks~Rec~Culture/Parks/invasive_plants.pdf)
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- Parrot Feather Treatment Options --- Literature Review provided by City of Richmond
- Parrots Feather Fact Sheet --- Provided by City of Richmond
- Saanich Purple Loosestrife Invasive Plant Alert\_ <http://www.saanich.ca/assets/Community/Documents/purple-alert-web.pdf>
- Albert Invasive Species Council Tansy Ragwort Factsheet
- <http://www.rockyview.ca/Portals/0/Files/Agriculture/Factsheets/Tansy-Ragwort.pdf>
- North Cowichan Poison Hemlock Factsheet\_ <http://www.northcowichan.ca/assets/Departments/Engineering/PDFs/2016AlertPoison%20Hemlock.pdf>
- Minnesota Department of Natural Resources\_ <http://www.dnr.state.mn.us/invasives/aquaticplants/purpleloosestrife/control.html>

## 5.0 Treatment Options for Priority Species

Table 3. Limitations and Considerations for Treatment Options

Species	Treatment Recommendations & Limitations	Other Considerations
Yellow Flag	<p>--- Small infestations can be controlled by hand pulling or digging out all parts of plant, especially rhizomes. If plants have flowered, remove seed heads before digging. Treatment may need to be repeated. Hand tools such as pickaxes, mattocks, pulaskis or hand saws are recommended to remove tough rhizome material.</p> <p>--- May require machine to effectively dig up all parts of plants. Plant parts should be disposed of in a lined landfill.</p> <p>Repeated mowing, cutting and/or mechanical cultivation may be used to contain infestations and deplete the plants' energy reserves over several years.</p> <p>--- Smothering with a tarp can be effective but should be monitored for plants popping up at the edges.</p> <p>-There are no known biocontrols.</p> <p>-Large infestations can be controlled through non-specific herbicide spraying. Glyphosate, Imazapyr and Mesulfuron Methyl all work. Preliminary trials with injecting herbicide into the cut flowering stems indicate success with little or no non-target damage.</p>	<p>Machinery can be costly.</p> <p>There is a possibility of using tilling as a means to control yellow flag and assist with the restoration of native marsh vegetation including rare plants such as Vancouver Island Beggarticks.</p> <p>This plant is toxic and can cause skin irritation in humans and will sicken animals if ingested. Gloves and long sleeves and pants should be worn when using manual removal techniques.</p> <p>Non-specific herbicides will injure or kill any plant they contact meaning existing native plants would be harmed if this treatment were used.</p>

<p>Japanese Knotweed + other Knotweed sp</p>	<p>-Cutting and mowing may be effective for small populations (&lt; 200 m<sup>2</sup>) if repeated several times a year with constant monitoring. Cutting and mowing can also increase spread if not done carefully. Cutting must be repeated until root reserves are depleted, usually takes several years. Cutting is most effective when followed up with a herbicide application. Mechanical treatment should not be started if ongoing maintenance is not ensured as disturbance can exacerbate an infestation. Mechanical control is not recommended for large populations (&gt; 200 m squared).</p> <p>-Cut or mowed stems should be elevated and not permitted to touch soil or water until they are fully desiccated and no longer viable. Once they are completely dry they can be composted as long as no seeds are present. If removing freshly cut plants tarp and bag them on site and label as invasive plant material. Transport to landfill for deep burial.</p> <p>-Grazing can be effective if continued over many years.</p> <p>-Research is ongoing for a biocontrol, a sap sucker psyllid, <i>Aphalara itadori</i>, but is not yet widely available.</p> <p>-Chemical treatment is effective but requires follow up treatments. Generally sites can be controlled within 3-5 years. A variety of application methods can be used depending on site and product. Stem injections have proven highly successful however this treatment is not currently available for knotweed in Canada. Effective herbicides include imazapyr, glyphosphate, tricopyr, aminopyralid.</p>	<p>Stem injections with Glyphosate require provincial permit, cannot conduct stem injections within 1 m of water.</p> <p>CISC suggested cutting stems to reduce infestation. Requires time commitment of cutting once every 2 weeks for growing season for 5 year. Could try to form partnership with BCFDC.</p> <p>Pieces of stem and root material can regenerate making knotweeds very easy to spread.</p>
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<p>Scotch Broom</p>	<p>-Cut larger plants below ground level before flowering and seed set. Minimize soil disturbance. Small plants with stems less than 1.5 cm diameter may be hand pulled, preferably in late spring when the plant is directing its energy into flower and seed production.</p> <p>-Due to enormous 'seed banking' and re-sprouting potential (stumps and roots), mechanical treatments may need to be repeated over a 3 to 5 year period.</p> <p>Mechanical control is most effective if all of the plant is removed, no seeds are dropped and soil disturbance is minimized.</p> <p>-Hand pulling may encourage broom growth due to the high level of soil disturbance. If pulling will result in soil disturbance, plants can be cut as close to the ground as possible.</p>	<p>Burning is not an effective control method as broom seeds will germinate following a burn.</p> <p>No biocontrol agents are approved for BC; however, seed-feeding beetles released in Washington State have moved north, and two other agents released in the US are suspected to have arrived in BC.</p> <p>Grazing by goats and consumption of seeds by chickens have been shown to reduce broom infestations.</p>
<p>Reed Canary Grass</p>	<p>-Successful control of reed canary grass requires shading with native competitors as this weed grows poorly in dense vegetation.</p> <p>-Hand pulling of small clumps can be done any time of year. Pulling should continue until planted trees are free growing above reed canary grass. Not practical for large infestations.</p> <p>-Cutting can be done using a weed eater, scythe, machete, brush saw, and other various hand or power tools. Necessary to cut three times per season (early June, late July, late September). Two cuts are less effective and 1 cut has virtually no desirable effect. Cutting should continue until planted trees are free growing above reed canary grass.</p> <p>-Placing shade cloth, such as landscape fabric or plastic, over plants before growing season (in April-May) can slow the growth of grass. Cloth may need to be replaced or patched throughout the growing season.</p> <p>Must continue for several growing seasons.</p> <p>Roundup can be applied during spring in areas away from standing water.</p>	<p>Smothering has been shown to be an effective method of dealing with this species.</p> <p>Covering can be expensive and labour intensive. Landscape and plastic rarely last for more than one growing season. Grass tends to grow around, through or push up on the cloth.</p>

<p>Parrot Feather</p>	<p>-Although plants can be removed either by hand (raking and seining) or by mechanical harvesters and chopping machines, it is not recommended unless all plant fragments can be removed. Any fragments can exacerbate the spread.</p> <p>-Large scale dredging using scuba divers and a suction dredge coupled with a barge or terrestrial collection station could be employed for considerable expense.</p> <p>Although it has not been tested on parrot feather it has had reasonable success on other aquatic invasive species. This process would involve large equipment and would likely have a high level of disturbance.</p> <p>-Excavation with cutting bucket can be successful of up to 2+ years if water depth is maintained high during summer and following winter.</p> <p>-A biocontrol used in South Africa, <i>Lysathia</i> sp. (Coleoptera: Chrysomelidae), has been successful of reducing parrot feather infestations over 3 years.</p> <p>-Reducing nutrient input into water body by introducing buffer strips may reduce the chances of re-infestation. Hanging booms placed across waterbodies may help limit spread of plant.</p> <p>-Shading with geotextile fabric reducing 70% of light reduces plant growth and may lead to plant mortality. However shading of just 50% of light increases plant growth.</p> <p>-Water drawdown drying water body for 9+ months will work but have significant environmental impacts.</p> <p>-Flooding of more than 30cm for at least 12 weeks apparently reduces growth, plant length and biomass.</p> <p>-Tests have been done with a variety of chemical controls elsewhere with success.</p>	<p>Hand removal can be labour intensive.</p> <p>Excavation and dredging options are expensive and large scale and may have other environmental impacts.</p> <p>Although there are several potentially successful biocontrols in existence not are presently approved for use in Canada.</p> <p>There is no chemical control that is currently available in BC.</p>
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<p>Purple Loosestrife</p>	<p>-When there are only a few plants and easy access, manual removal is recommended before plants go to seed (June or July before petals begin to fall). Pulling works for young plants but a garden fork may be used to ease out root system of larger plants. Remove as much of the root system as possible to avoid new plants sprouting back from root fragments.</p> <p>-Containment can be achieved by removing flowering spikes and cutting stems at ground level. Plants should be bagged in plastic with great care taken not to distribute any seeds that may be present in old seed heads. Bags can be disposed of in the landfill or incinerated but should not be composted.</p> <p>-Smothering with black plastic can help slow growth and seed production.</p> <p>-Glyphosate is effective at killing this plant.</p>	<p>Seeds distribute through water, humans and animals, with a single plant producing over 2.5 million seeds that drop in early fall when temperatures cool.</p> <p>New plants can grow from fragments of stalks and roots.</p> <p>In BC, 2 biocontrol agents are available for distribution:  <i>Galerucella californiensis</i> --- Beetle  <i>Galerucella pusilla</i> --- Beetle</p>
<p>Himalayan Blackberry</p>	<p>-Mowing (riding mowers and tractor-mounted mowers) can be very effective, but can also harm desirable species. If roots are not manually removed, mowing several times per year over several years is necessary to exhaust root reserves. If mowing or cutting is only done once per year, it should be done when the plants begin to flower.</p> <p>-Persistent cultivation (tillage) or cutting in combination with mowing can be very effective. Because mechanical control can stimulate strong regrowth, follow-up with either spot applications of herbicide or hand digging to remove the entire root system.</p> <p>-Cutting the stems and digging out roots is effective. Claw mattocks or Pulaski/mattocks can be effective for digging. If removing dense patches the area should be replanted with native plants and mulched.</p> <p>-Disposal: If plants are cut, all plant material must be collected and incinerated or bagged and deeply buried at a landfill.</p> <p>-There are no biocontrol agents for this species.</p> <p>-Herbicide can be used to control.</p>	<p>Grazing by goats has proven effective.</p>

<p>Giant Mannagrass</p>	<ul style="list-style-type: none"> <li>-Populations may require treatment for 2-3 years for complete control. Small infestations can be dug up; care should be taken to remove all parts of the roots and rhizomes. Subsequent removal of seedlings germinated from the seed bank or missed rhizomes pieces may be necessary.</li> <li>-Small, dense communities of reed mannagrass can also be controlled by covering with black plastic for 5 -- 6 weeks during the growing season.</li> <li>-The vegetative spread of larger populations can be controlled by repeated mowing, cutting, harvesting, roto-tilling, or rotovating. Where applicable, these treatment methods can be supplemented with artificially created flood conditions.</li> <li>-Mowing or cutting 2-3 three times per summer may deplete the energy reserves in the roots and rhizomes possibly allowing other vegetation to expand into the site</li> <li>-A foliar spray of glyphosate applied early to late summer will control populations. Rhizomes may survive after initial spraying.</li> </ul>	<p>Smothering has been shown to be an effective method of dealing with this species.</p> <p>There are no known biological control methods for this species.</p>
<p>Tansy Ragwort</p>	<ul style="list-style-type: none"> <li>-Mechanical control of established stands is only effective when the root system can be entirely removed or frequently cultivated (tilled) to prevent the growth of seedlings and root sprouts.</li> <li>-Repeated mowing before flowering can prevent seed production.</li> <li>-While light cultivation can encourage growth, repeated heavy cultivation can be used as a control technique.</li> <li>-Hand pulling is only effective in small infestations. Periodic re-treatment will be necessary. Pull plants when soils are moist to completely remove root mass.</li> <li>-Disposal: If plants are hand pulled or cut prior to flowering, the plant material can be left on the site to decompose. If plants are</li> </ul>	<p>Contains a toxic alkaloid causing liver damage in livestock.</p> <p>Vegetative reproduction is stimulated by mowing, grazing, or poor hand removal where the rootstalk was not completely removed.</p> <p>In BC, 1 biocontrol agent is available for distribution: Botanophila seneciella – Fly. A defoliating moth (Tyria jacobaeae), seedhead fly (Hylemya seneciella also known as Botanophila seneciella), root feeding beetles (Longitarsis</p>

Tansy Ragwort (cont')	<p>cut post flowering, all plant parts, including flower heads, should be bagged and incinerated or buried deeply at the landfill.</p> <ul style="list-style-type: none"> <li>-Mulching bare sites will help prevent germination.</li> <li>-Apparently sheep can graze on it with no ill effect to the animals and they have been used widely in New Zealand to control this plant. It can however cause live damage in cattle and deer.</li> <li>-Effective herbicides include dicamba, 2,4-D, picloram and picloram + 2,4-D. Site characteristics, goal and objectives and herbicide recommendations must be considered before use.</li> </ul>	<p>flavicorni, Longitarsis jacobaeae), and root crown feeding moth (Cochylis atricapitana) have been effective in controlling Tansy ragwort in the Fraser Valley.</p>
Common Tansy	<ul style="list-style-type: none"> <li>-Common tansy cannot be controlled with single mowing events (e.g. once-a-year), as the plants will respond with an increase in vegetative growth.</li> <li>-Small infestations can be dug out in spring, April-June.</li> <li>-Mowing sites very low to the ground before July can prevent seed production.</li> <li>-Combined mowing and subsequent herbicide treatment of re-growth appears to be an effective control method. Treatments must be repeated over several years.</li> </ul> <p>Hand pulling may be used in areas where mowing and herbicide application are not feasible.</p>	<p>Mechanical methods, such as mowing or hand-cutting, are most effective in combination with other management measures because this plant is rhizomatous. Plants can regrow from severed roots, and cut stems may still produce viable seed.</p> <p>Gloves and other protective clothing should be worn to prevent skin irritation during mechanical treatment.</p> <p>No biocontrol agent is currently available in BC.</p>

<p>Thistle sp (Canada Thistle)</p>	<p>-Mowing is most effective when completed at the bud stage.</p> <p>-Regular cutting or tilling can help wear down plant reserves, reduce plant growth, and reduce populations, but is not likely to kill the plant.</p> <p>-Disposal: If plants are cut prior to flowering, the plant material can be left on the site to decompose. If plants are cut post flowering, all plant parts, including flower heads, should be bagged and deeply buried at a landfill.</p>	<p>In BC, 4 biocontrol agents are available for distribution:  Larinus planus --- Beetle (weevil)  Rhinocyllus conicus --- Beetle (weevil)  Terellia ruficauda --- Fly  Urophora cardui --- Fly  The seed weevil (Larinus planus), stem gall fly (Urophora cardui), leaf-eating beetle (Altica carduorum), and stem and root mining weevil (Hadroplontus litura) have been released. L. planus is showing particular promise in suppressing Canada thistle</p>
<p>Oxeye Daisy</p>	<p>-Mowing may effectively reduce seed production, but should be repeated as it may stimulate vegetation growth.</p> <p>-Pulling or digging up plants, ensuring that all roots are removed, may reduce oxeye daisy populations. New shoots may emerge from remaining root portions.</p> <p>-Follow-up treatments will be required as seeds can remain viable in the soil for many years.</p>	<p>Grazing by sheep and goats may reduce oxeye daisy populations.</p> <p>No biocontrol agents are currently available for oxeye daisy in BC.</p>
<p>English Hawthorn</p>	<p>-Seedlings can be hand pulled when the soil is moist. Young plants can be cut using a brush saw. Older trees can be cut close to the base using chain or handsaws.</p> <p>-Cutting is most effective when about 20 percent of the flowers have gone to seed but should be avoided at this time if native plants are still flowering or setting seed. Avoid cutting when the trees are full of berries, as they will be scattered when the tree is dragged away. Roots should also be removed to prevent regeneration. Stumps can be cut with an axe to reduce re-sprouting.</p>	<p>Since Hawthorn can regenerate from cuttings, cut material should be taken off site.</p>

<p>Lady's Thumb</p>	<p>-Hand pull or dig up small infestations. Hand-hoeing or harrowing can kill young plants. Repeated cultivation will stop emerging plants from setting seed and will eventually exhaust the seed bank.</p> <p>-Frequent mowing in pastures and meadows will prevent seed-set</p> <p>-- Can be effectively controlled using available general-use herbicides, such as glyphosate.</p>	
<p>Morning Glory</p>	<p>-Can be controlled through tillage and competitive species plantings. Hand-pulling seedlings can be effective for small, new infestations before plants set seed. It must be managed for several years to bring it under control.</p> <p>-Light reduction (by smother crops or mulching) decreases Morning Glory vigor. Seeding disturbed areas with perennial grasses and forbs can provide competition against this weed.</p>	<p>Cutting and mowing have little effect on plant populations unless plants are cut below the root crown at early stages of growth.</p> <p>Established populations have a large seed bank in the soil that can remain viable for over 20 years. Hoeing or hand-pulling may encourage the germination of dormant seeds or promote vegetative growth by breaking up and spreading the plant.</p> <p>Chemical treatment often requires high rates and repeated applications which can damage non-target species.</p> <p>No biocontrol is available.</p>
<p>Poison Hemlock</p>	<p>-Small plants can be pulled while larger plants should be dug to keep roots intact.</p> <p>-Mowing or weed whacking consistently in early spring is a viable control option. After mowing the area should be covered by a thick layer of mulch.</p> <p>-Herbicides can be used.</p> <p>-For disposal plant material should be bagged and labelled "invasive species" and taken to a landfill.</p>	<p>All parts of Poison Hemlock plants are highly poisonous to humans and animals. If removing a large infestation respiratory protection should be used.</p> <p>Tools should be washed after working with this plant.</p>

<p>Dalmatian Toadflax</p>	<p>-Isolated plants can be dug up effectively, but roots tend to break off and new shoots will re-sprout from any remaining lateral roots. Follow up is required for at least a few years to watch for re-growth from the roots and emerging seedlings. If plants are in seed, carefully bag and cut off the stems before digging up the roots to minimize seed dispersal.</p> <p>-Mowing is not an effective control method for toadflax since it spreads by lateral roots as well as seeds. Toadflax is not generally a problem in cultivated areas as regular tillage will control it.</p> <p>-Chemical control of toadflax can be difficult. The waxy leaves make it necessary to add an oil-based or silicon surfactant to the herbicide mix. Spraying should be done in late spring when plants begin to flower or in the fall before the plants die back.</p>	<p>In BC, 4 biocontrol agents available for distribution:  <i>Brachypterolus pulicarius</i> --- Beetle  <i>Mecinus janthinus</i> --- Beetle (weevil)  <i>Rhinusa antirrhini</i> --- Beetle (weevil)  <i>Rhinusa neta</i> --- Beetle (weevil)</p>
<p>St Johns Wort</p>	<p>-Seed is the main means of spread. A mature plant can produce 15,000 -30,000 seeds and seeds may remain viable for at least up to 20 years.</p> <p>-Pulling should only be considered an option on new or small infestations, hand pulling should occur preferably before seeding. Repeated pulls will be necessary to ensure removal of the whole plant and any lateral roots. Remove as much of the root system as possible as St John's wort can sucker from roots left in the ground. Follow-up will be required to deal with any further germination or suckering.</p> <p>-Repeated cultivation can eliminate St John's wort. Mowing several times to reduce maturation will control it.</p> <p>-Some herbicides are effective.</p>	<p>Wear gloves and avoid touching eyes. It is toxic to livestock.</p> <p>Burning should not be used as it stimulates reshooting and suckering and can worsen an infestation.</p> <p>In BC, 3 biocontrol agents are available:</p> <p><i>Chrysolina hyperici</i> --- Beetle  <i>Chrysolina quadrigemina</i> --- Beetle  <i>Chrysolina varians</i> --- Beetle</p>

<p>Giant Hogweed</p>	<ul style="list-style-type: none"> <li>-Wear protective gear and manually remove the first 8-12cm of the central root. Minimize soil disturbance by cutting and prying versus digging.</li> <li>-For immature plants mow every two weeks to exhaust seed bank in soil, this may take 3-5 years.</li> <li>-For small infestations, the plants can be cut a ground level and the soil covered with black plastic. Monitor to ensure plants don't push through.</li> <li>-For disposal plants should be bagged, labeled as invasive and landfilled. Alternatively plants can be dried out and incinerated. Do not compost.</li> <li>-Effective herbicides include glyphosate and tricopyr. Foliar application and stem injections are both effective.</li> </ul>	<p>Leaves and stems contain a clear, water, highly toxic sap that can cause hypersensitivity to sunlight resulting in burns, blisters, and scarring when coming into contact with skin. It can also cause blindness. Anyone working with this plant must wear heavy water resistant gloves and water resistant coveralls and eye protection.</p>
<p>Policeman's Helmet</p>	<ul style="list-style-type: none"> <li>-Hand-pulling or digging up plants before they set seed can be effective. Pulling should be done annually until no new seedlings appear (2 or 3 years).</li> <li>-Cutting at ground level using a machete or scythe can control this plant and should be done every year in spring.</li> <li>-Grazing by cattle and sheep during the growing season may be effective.</li> </ul> <p>Plants will regrow if left on the ground so should be crushed dried or piled on tarps to compost.</p>	<p>Grazing in riparian zones may cause environmental damage.</p>

## 6.0 Timelines and Priorities for Action

### Short term treatment/control activities (Timeline: now–5 years):

On the ground actions are planned for these species through existing or new projects. Some of these species are high priority since the area of infestation is relatively small and immediate removal efforts will prevent plants from spreading further. Others are high priority because of the significant level of impact on ecological function.

### Longer-term treatment/control activities (Timeline: ongoing > 5 years):

Many of these plants are widespread in SMCA and will require several years of treatment and control. Other species occur only sporadically and will be removed on an ongoing basis whenever they are observed. A small number of species will require further research to identify the best course of action.

*Table 4. Short and Long term Targets for Invasive Plants in SMCA*

Species	Priority (Short-term: 1-5 yrs; Long term: ongoing > 10 yrs)	Recommended Treatment/Control Methods	Target
Yellow Flag Iris	Short and Long	Manual removal	Short: Reduce amount in field at end of Boardwalk by 50%, Ongoing cutting in farm field to keep plants contained. Long: Reduce overall infestation by 50%
Knotweed	Short	Repeated cutting during growing season for 5 years	Treat plants along shoreline of pond at Discovery Museum with the goal of population eradication.
Parrot Feather	Short	Manual removal	Reduce by 50% in Somenos creek
Purple Loosestrife	Short	Manual removal: cutting, mowing, digging	Remove plants along shoreline of pond at Discovery Museum. Monitor lake shoreline to detect any spread
Himalayan Blackberry	Short and Long	Manual removal	Short: Reduce infestation in Open Air Classroom by 50%, Long: Ongoing removals throughout SMCA to reduce infestation by 50%



Tansy Ragwort	Short	Manual removal (hand pulling opportunistically)	Short: Keep current infestation from spreading
Scotch Broom	Short and Long	Cutting at ground level	Short: Reduce infestation in Open Air Classroom by 50%, Long: Removal at <i>Ye'yumnuts</i> , restoration plan developed
English Hawthorn	Short	Emerging priority, Methods to be determined	Identify target areas for treatment; treatment plan developed
Morning Glory	Short	Manual removal	1 patch along Boardwalk eradicated
Poison Hemlock	Short	Manual removal	Plants along dike eradicated (MNC)
Dalmatian Toadflax	Short	Manual removal	Eradicate plants and prevent further infestation
Giant Hogweed	Short	Manual removal	Plant removed in 2016, ongoing monitoring
Reed Canary Grass	Long	Cutting, tilling, covering	Reduce by 25%
Giant Mannagrass	Long	Mowing, covering, shading	Long: Reduction of 25%
Oxeye Daisy	Long	Manual removal	Removal at <i>Ye'yumnuts</i> , restoration plan developed
Thistles	Long	Manual removal	Reduce by 25%
Common Tansy	Long	Manual removal	Reduce by 25%
Lady's Thumb	Long	Methods to be determined	Treatment plan developed
St John's Wort	Long	Methods to be determined	Map infestation, <i>Ye'yumnuts</i> restoration plan developed

## 7.0 Organization and agency involvement: Roles and responsibilities

Participant/Partner	Prevention	Early Detection	Strategic Management	Operational Management	Restoration & Recovery
VICLMP	✓✓	✓✓	✓✓	✓✓	✓✓
Somenos Marsh Society	✓✓	✓✓	✓✓		✓✓
Ducks Unlimited Canada	✓✓	✓✓	✓✓	✓✓	✓✓
Municipality of North Cowichan	✓✓	✓✓	✓✓	✓✓	✓✓
Cowichan Valley Regional District	✓✓	✓✓	✓✓	✓✓	✓✓
Cowichan Land Trust	✓✓	✓✓	✓✓		✓✓
Forest Discovery Museum	✓✓	✓✓	✓✓	✓✓	✓✓
FLNRO	✓✓	✓✓	✓✓		
NCC	✓✓	✓✓	✓✓		✓✓
Cowichan Tribes	✓✓	✓✓	✓✓	✓✓	✓✓
General Public	✓✓	✓✓			✓✓
Cowichan Valley Naturalists Society	✓✓	✓✓	✓✓		✓✓

### Definitions for Roles:

- Prevention:** The most effective way to reduce impacts from invasive plants is to prevent them from establishing. Since many plants that are considered invasive in the Pacific Northwest are already established in the Duncan area, it may be difficult to stop new introductions. However, prevention strategies are effective in reducing invasions to new areas. All organizations, agencies and the general public can play a role in implementing prevention strategies through public awareness and education, restrictions (e.g. nursery sales), and on-the-ground-monitoring.
- Early Detection:** Early detection and rapid response (EDRR) is the most cost effective and successful approach to manage plant invasions. Early detection is usually based on knowledge of invasive plants before they establish, often from other locations with similar environmental conditions. The EDRR stage requires mapping and data management so observations are usable to those responsible for control activities. Rapid response involves applying established control and restoration measures to eradicate small populations of new invasive plants. The success of EDRR depends on the

effectiveness of the control measures and availability of resources. All organizations, agencies and the general public can play a role in implementing EDRR through public awareness and education, developing a priority “Watch List”, making funding available for rapid response, and on-the-ground-monitoring.

- Strategic Management: Priorities for established invasive plants (not newly arrived) are identified according to the ecological value or sensitivity of the habitat, the impact (existing or potential) of the invasive plant, and the feasibility/effectiveness of controls. All organizations and agencies involved in conservation and operational activities can contribute to strategic management.
- Operational Management: This stage involves on-the-ground management of conservation lands which may involve routine mowing, pruning, and weeding. VICLMP, the Municipality of North Cowichan, and other partners responsible for land management activities will be the main organizations conducting this kind of work.
- Restoration and Recovery: The goal of this stage is to remove invasive plants and replace them with native plants. The restored plant community should match the site’s environmental conditions, and maintain or increase ecological function. This stage includes on-the-ground activities on a small or large scale. It can involve all agencies and organizations, as well as the general public who may want to volunteer. Volunteer events should be coordinated and led by a local organization with experience in restoration to ensure that appropriate methods are followed for removals and/or replanting.

## **Appendix C – DFO Letter Dated June 21, 2017**



Fisheries  
and Oceans

Pêches  
et Océans

Pacific Region  
Mel Sheng  
Ocean, Habitat Enhancement Branch  
DFO  
4166 Departure Bay Road  
Nanaimo, B.C. V9T 4B7

June 21, 2007

Mr. John P. McKay, P. Eng.  
Director of Engineering and Operations  
Municipality of North Cowichan  
7030 Trans Canada Highway, Box 278  
North Cowichan, BC V9L 3X4

Dear Mr. John P. McKay:

**Subject: Request to Increase Crofton Lake Flow Release into  
Richards/Somenos Creek**

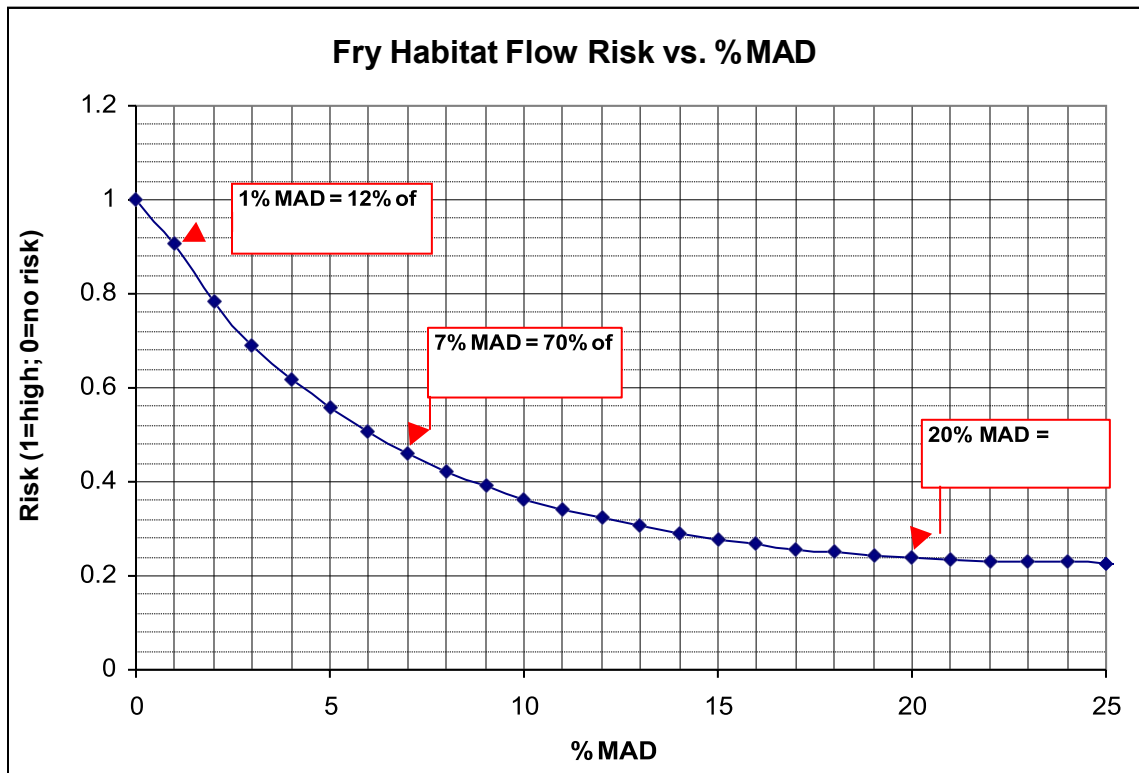
Crofton Lake dam was originally constructed in the 1940s and rebuilt in the 1950s. The reservoir was the source of domestic water supply for the town of Crofton until recently. The Municipality of North Cowichan (MNC) currently regulates a minimum flow of 3.8 L/s (50 gal/min or 0.13 cfs) from the lake into Richards Creek during the summer to satisfy downstream water licences for irrigation. Discharge in Richards Creek measured at Rice Road ranged from 5.8 L/s - 0.8 L/s (76 - 10 gal/min or 0.2 – 0.03 cfs) during June – August 2004.

A proposal to utilize water storage in Crofton Lake to potentially augment water quality downstream in Richards Creek during summer months was identified several years ago. Concerns regarding the potential impact of an increased flow on flooding of adjacent agricultural land were examined by Northwest Hydraulics (Somenos Lake Hydraulic Model Final Report, October 2005). The report recommended channel maintenance and excavation on Richards and Somenos Creek to minimize flooding. This would increase channel velocities and reduce backwatering which would improve water quality and fish-use, increase main channel conveyance resulting in faster water drainage out of the system and ensure there is adequate drainage for side ditch and field drainage. In the summer of 2004, Somenos Creek was excavated from the Lake outlet to the Tzouhalem Bridge crossing. Two beaver dams were also removed near the Somenos Creek-Cowichan River confluence on Cowichan First Nation Property to improve

drainage. In 2006, Richard Creek was excavated from Richards Trail to the Somenos Lake inlet.

The theoretical storage capacity of Crofton Lake is approximately 513 acre-feet. However, not all of this storage is available to improve fish habitat downstream since the reservoir is still used by MNC as a back-up water supply for the town of Crofton. This amount is calculated at approximately 150,000 gallons/day. Therefore, taking into account this back-up requirement, the amount of storage available to release for fisheries flows is between 22.2 and 34.3 L/s (0.8 and 1.2 cfs) with a mean of 28.3 L/s or 1 cfs, from July 1<sup>st</sup> until the end of September. Based on a catchment area of 13.3 km<sup>2</sup> and a unit runoff of 30 L/s per km<sup>2</sup> (using Bings Creek), the mean annual discharge (MAD) for Richards Creek is about 399 L/s or 14 cfs. A meta-analysis of low summer flow requirements for salmonids in North American streams (Hatfield and Bruce, 2000) clearly demonstrates optimum juvenile fish production at 10-20% of MAD. Therefore a baseflow increment from 3.8 L/s or 50 gal/min to 28.3 L/s or 450 gal/min represents an increase from 1% MAD to up to 7% MAD.

Salmon productivity is expected to increase significantly at 7% of MAD. Based on a North America meta-analysis model, fish production would increase from 12% to 70% of optimum. This is a substantial change and one that is expected to have significant ecological benefits to coho and trout, particularly in upper Richards Creek, which has a higher gradient and more riffle habitat (R. Ptolemy, pers. comm.). Based on measurements of oxygen depletion taken between Pastula and Kismet Farm, a low gradient section of Richards Creek, oxygen levels are expected to decline rapidly downstream of Kismet. However, it is still anticipated that an additional 1-2 kilometers of Richards Creek downstream of the Pastula Farm Site (Richards Trail Road crossing) will maintain acceptable oxygen levels during the summer if flows are increased to 28.3 L/s.



**Relationship between percent of mean annual discharge (% MAD) and risk for salmonid fry habitat. Text boxes indicate % optimum flow for fry rearing as discussed in the Somenos Water Quality study (T. Hatfield, pers. comm).**

The results of the Somenos Lake Hydraulic Modeling demonstrate that a flow release from Crofton Lake of 40 L/s will have an immeasurable impact on the flood capacity of the Richards Creek channel (NHC, 2005). This flow was modeled under the assumption that a full spanning water tight beaver dam is built across Richards Creek. The additional flow increased the water elevation in the channel by only 5 cm.

Taking into account these results, DFO is recommending that a test flow of 28.3 /s be release from Crofton Lake this July and monitored for 1 month to determine the benefits to fish habitat in Richards Creek. Water levels and velocities will be monitored between July and August at several locations in the low gradient as well as higher gradient reaches of the creek. This data will be used to determine benefits to fish and impacts on flooding. If there are no flooding impacts this release can be continued until late September 2007 and repeated each year.

Please advise us on your decision at your earliest convenience. Sincerely yours,

A handwritten signature in black ink that reads "Mel Sheng". The signature is written in a cursive, flowing style.

Mel Sheng  
Ocean, Habitat Enhancement Branch MS/de

cc. Craig Wightman Wayne Haddow Paul Usher Dave Tattam



## **Appendix D – Contributing Organizations**

The Somenos Marsh Conservation Area Management Plan was developed in cooperation with the following organizations:



Environment  
Canada

Environnement  
Canada

Canadian Wildlife  
Service

Service Canadien  
de la faune