DISTRICT OF METCHOSIN
AGENDA

ENVIRONMENTAL ADVISORY SELECT COMMITTEE MEETING

March 26, 2024 at 7:00 p.m.
Council Chambers
Metchosin Municipal Hall

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2. Presentations

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b) Fossil Fuel Non-Proliferation Treaty
c) Provincial Biodiversity Letter
d) BC Hydro Re-Greening Program Grant Application
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District of Metchosin

Minutes
Environmental Advisory Select Committee Meeting
Tuesday, February 27, 2024 at 7:00 p.m.
Council Chamber
Metchosin Municipal Hall

Present: Bill Cave, Garry Fletcher (Chair), Councillor Steve Gray, Anna Hall (Zoom), Merrilee Hoen, Andy MacKinnon, Ric Perron (recorder), Erin Van de Water

The meeting was called to order at 7:05 p.m.

1. Agenda, Additions and Approval

Moved and Seconded by Steve and Merrilee that the Committee approve the agenda with these changes: add 6e) Climate Action Plan; 9c) Hydro Re-Greening Program; 9d) Lombardy poplar trees.

Carried

2. Presentations: None.

3. Public Participation

Brent Donaldson: update about recent cougar kills in the last seven days. Cougars were observed at a kill during the daytime on one farm. Nine sheep killed.

4. Adoption of Minutes

a) Environmental Advisory Select Committee, January 23, 2024

Moved and Seconded: by Steve and Andy that the Committee approve the minutes of the Environmental Advisory Select Committee meeting held on January 23, 2004.

Carried

5. Receipt of Minutes

a) Environment and Natural Areas Committee, January 15, 2024
b) Parks and Trails Advisory Select Committee, January 16, 2024

Moved and Seconded by Erin and Merrilee that the Committee receive these Committee Minutes for information.

Carried

6. Business Arising from the Minutes

a) Predator Strategies (lessons learned from other communities)

Steve reported that the Environment Committee agreed the MEASC recommendation that Council seek advice from the Agricultural Advisory Committee (AASC) and MEASC on addressing human wildlife conflict.

Action 3.3 in the Draft Agricultural Plan is for farmers to support the agricultural sector in managing wildlife conflicts on farms with support from the CRD, Ducks Unlimited and the District.

Anna agreed previously to assist AASC on behalf of MEASC.

b) Mapping of potential sensitive areas in Metchosin

Andy contacted the Conservation Data Centre (and Jacqueline Claire) on mapping. CDC stated they would not accept anything that is not digital. Our current maps are not digital. Andy will engage further with CDC.

c) Fossil Fuel Non-Proliferation Treaty

Steve said the Environment Committee agreed the MEASC recommended that Council endorse the treaty. It will go to council next.

d) Dark Sky Draft Proposal

Steve followed up with Mr. Payette with regard to the District not following our own policy. Committee discussion was that compliance might best be achieved as the opportunity arises to replace lights/fixtures.

e) Climate Action Plan

Merrilee and Erin went to the open house hosted by AASC on the Draft Agricultural Plan, three goals identified in the plan to support a resilient farming sector in Metchosin. There is a meshing of the climate action plan with the proposed agricultural plan. There will be a monitoring and reporting framework built into the agricultural plan.

f) Ending the use of Glue Traps for pest management,

Glue traps are considered by many to be inhumane as compared to alternatives. Glue traps also cause death to non-target other small animals, birds, and other creatures.

Council's Environment Committee had asked Steve to work with MEASC on a resolution for AVICC/UBCM to ban glue traps in BC. In the meantime, Saanich has moved forward and submitted a resolution to AVICC on the topic. As a result, Council members have been encouraged to vote in support of the Saanich resolution at AVICC/UBCM.

7. Reports:

a) Councillor's Memo, District of Metchosin Environmental Year-In-Review (Partial List)

Steve reported on the work done by Metchosin Advisory Select Committees, Council's Standing Committees, Council, and staff in relation to environmental initiatives this past year. Steve thanked the Committee for their efforts and congratulations were offered to Steve and Council.

b) Media interest in Tanker traffic and environmental conditions

Garry and Steve met with Sidney Coles (local journalist) to discuss District concerns re: tanker traffic when spill response cannot be launched due to adverse environmental conditions.

Sidney followed with a Feb 26, 2024 article in The Westshore entitled: *Impacts of Underwater Radiated Noise in Juan de Fuca* that including some of our concerns. There is potential for follow up articles.

8. Correspondence: None.

9. Other Business

a) Provincial Biodiversity, Draft Letter

Following up on the biodiversity resolution sponsored by Metchosin and adopted by the 2023 AVICC/UBCM conventions, a letter has been drafted (see agenda package) to Premier David Eby seeking the establishment of a fund to support local governments in acquiring and protecting land and asking the province to enact a biodiversity protection law. Andy said much land is privately owned on south Vancouver Island.

Moved and Seconded by Steve and Merrilee to recommend that Council write and encourage the province to establish a Local Areas Protection Fund and to enact legislation to protect biodiversity.

Carried

b) Anchorages - Amendment to Bill C-33 (federal)

The amendment suggests a maximum two-week stay by a freighter. MEASC states it is an improvement but requires a shorter time frame, (like zero). Freighters shouldn't be anchored: anchor dragging, environmental expense to run their engines etc.

c) BC Hydro Re-Greening Program

Merrilee's initiative at Andy's suggestion, application for grant money for Moralee's Meadow. She has completed the application and the District has filed it. On March 4, it goes to Council for endorsement.

Moved and Seconded by Andy and Merrilee to recommend that Council endorse the BC Hydro Re-Greening Program grant application prepared by Moralea's Meadow volunteer group to support further ecosystem restoration.

Carried

d) Lombardy Poplar Trees

A tree fell onto a Metchosin resident's Jeep, ruining it (windshield, hood, bumper). Bob Payette has asked for advice from MEASC with regard to tree health on Lombard Road. Lombardy poplars lifespan is 30-50 years.

Moved and Seconded by Andy and Garry, to recommend that the District hire an arborist to investigate the poplars on Lombard Rd.

Carried.

e) Provincial Housing initiatives

Steve explained that Metchosin is exempt from new provincial requirements encouraging increased density with more than two dwellings per lot. This is because Metchosin is outside the regional urban containment boundary and no lots in Metchosin are serviced with both water and sewer. New STVR rules will apply.

10. Adjournment and Next Meeting Date

Moved and Seconded by Bill and Ric that the Committee adjourn the meeting at 8:34 p.m.

Carried

The next MEASC meeting will be held on Tuesday, March 26, 2024 at 7:00 p.m.

District of Metchosin

Minutes
Environment and Natural Areas Committee Meeting
February 12, 2024 at 7:00 p.m.

Council Chambers
Metchosin Municipal Hall

PLEASE NOTE: The meeting has been recorded.

Present: Councillor Gray in the Chair, Mayor Little, Councillors Shukin, Donaldson and Epp. Also present was Bob Payette, Chief Administrative Officer, and Jennifer Miller, Legislative Services Assistant (recorder).

The meeting was called to order at 7:00 p.m.

The Chair provided a Territorial Acknowledgement.

1. Agenda, Additions and Approval

The agenda was approved with the addition of the following correspondence as supplemental information:

- Andrew Penn, re: Fossil Fuel Non-Proliferation Treaty

2. Public Participation

Nicole Shukin, resident, supports the fossil fuel non-proliferation treaty and encourages committee endorsement. In tandem with global initiatives like this one, Ms. Shukin would like to see more Metchosin-specific action that translates big endorsements into concrete steps towards non-proliferation for budget items such as road paving. Ms. Shukin also referred to Freedom of Information (FOI) requests discussed at recent budget meetings, noted that access to information is a pillar of democracy, and challenged the idea that the measure of an open and transparent Council is the number of FOI requests.

Brent Donaldson, resident, spoke to the practical aspect of the use of fossil fuels and noted that the District cannot function without them. Mr. Donaldson provided examples such as the District vehicles, diesel fuel to heat the Municipal Hall, and how travel impacts the environment.

3. Adoption of Minutes

Moved and Seconded by Councillors Shukin and Epp that the Committee adopt the minutes of the Environment and Natural Areas Committee meeting held January 15, 2024.

Carried

4. Receipt of Minutes

Moved and Seconded by Councillors Shukin and Donaldson that the Committee receive the minutes of the Environmental Advisory Select Committee meeting held January 23, 2024.

Carried

5. Business Arising

Environmental Advisory Select Committee Recommendations, November 28, 2023 Meeting

Councillor Gray provided an overview of the Metchosin Advisory Select Committee (MEASC) recommendations from the November 28, 2023 meeting.

a) Human Wildlife Conflict

Councillor Gray provided an overview of the topic of human wildlife conflict in the District.

Committee discussion:

- Suggestion to form a subcommittee
- Background on challenges in the District with wildlife
- Conservation services, trapping, relocating
- Practical solutions to manage human and wildlife conflict
- Impacts to livelihoods and the farming community
- What role the District could play
- Wild Wise Metchosin and other groups and resources
- Best practices and guidelines suggested by the province may be problematic and impractical in Metchosin

Moved and Seconded by Councillors Shukin and Donaldson to recommend that Council seek advice from the Agricultural Advisory Select Committee (AASC) and the Environmental Advisory Select Committee (MEASC) on addressing Human Wildlife Conflict.

Carried

b) Fossil Fuel Non-Proliferation Treaty

Councillor Shukin declared a perceived conflict of interest with this agenda item as the company he works for currently has several natural gas generation projects underway. Councillor Shukin left the meeting at 7:14 p.m.

Councillor Gray provided an overview of the memorandum regarding Fossil Fuel Non-Proliferation Treaty.

Committee discussion:

- Other municipalities that have endorsed the Treaty
- Clarification that support letter would go to the organizers who will gather support letters to use as a lobbying effort
- No financial implication
- In line with Paris Agreement

Moved and Seconded by Councillor Epp and Mayor Little to recommend that Council endorse the Fossil Fuel Non-Proliferation Treaty.

Carried

Councillor Shukin returned to the meeting at 7:23 p.m.

Environmental Advisory Select Committee Recommendations, January 15, 2024 Meeting

Councillor Gray provided an overview of the Metchosin Advisory Select Committee (MEASC) recommendations from the January 15, 2024 meeting.

Draft Association of Vancouver Island Coastal Communities (AVICC) Resolution – Ban Glue Traps

Councillor Gray provided an overview of the draft AVICC Resolution on the ban of glue traps for information. The following DRAFT AVICC Resolution to ban glue traps was endorsed by the District of Saanich:

WHEREAS *glue traps are an ineffective method for controlling rodents as they fail to address the root causes of an infestation, including access to food and shelter, and they cause fear, pain, and distress for captured animals, including rodents and non-target animals like birds, bats, small mammals, amphibians, reptiles, and household pets;*

AND WHEREAS *most users are not capable of humanely killing trapped animals, leaving them to suffer for hours, and even days, before dying of suffocation, dehydration, starvation, exhaustion, or exposure;*

THEREFORE BE IT RESOLVED *that the Association of Vancouver Island Coastal Communities (AVICC) and Union of British Columbia Municipalities (UBCM) ask the Province of British Columbia to implement a province-wide ban on the sale, purchase, and use of glue traps.*

6. Reports

a) Memo, District of Metchosin Environmental Year-in-Review (Partial List)

Councillor Gray provided a summary of the Year-in-Review including the following:

- Climate change and biodiversity
- Watersheds and aquifers
- Ocean and shoreline
- Mary Hill
- Subdivision and re-zoning applications review by MEASC

b) Councillor's Update

Councillor Gray provided the following updates:

- Upcoming strategic planning exercise and proposed Committee 2024 workplan to include moving forward on our Climate Plan, as follows:
    - Strengthening Riparian Area Education and Protection
    - Enactment of a Tree Preservation Bylaw
    - Support Aquifer Protection
    - Launch development of a Shoreline Protection Plan
- Successful grant application through the Capital Regional District for two Electric Vehicle chargers
- A "March for Liz" clean-up day is scheduled for 9:00 a.m. on March 2, 2024 at the Fire Hall.
- The next Special Finance Committee – Budget Meeting is scheduled for 4:00 p.m. on February 22, 2024

- An "Everything Water" workshop is scheduled for February 28, 2024 at 6:30 p.m. There will be additional workshops in March on groundwater and in April on wells.

7. Correspondence

The following correspondence was received:

- Andrew Penn, re: Fossil Fuel Non-Proliferation Treaty

8. Adjournment

Moved and Seconded by Councillors Donaldson and Mayor Little that the meeting be adjourned at 7:30 p.m.

Carried

Certified Correct:

_____ _____

Chair **Corporate Officer**

District of Metchosin

Minutes
Environment and Natural Areas Committee Meeting
March 11, 2024 at 7:00 p.m.

Council Chambers
Metchosin Municipal Hall

PLEASE NOTE: The meeting has been recorded.

Present: Councillor Gray in the Chair, Mayor Little, Councillors Shukin, Donaldson and Epp. Also present was Bob Payette, Chief Administrative Officer, and Jennifer Miller, Legislative Services Assistant (recorder).

The meeting was called to order at 7:00 p.m.

The Chair provided a Territorial Acknowledgement.

1. Agenda, Additions and Approval

Moved and Seconded by Councillor Shukin and Mayor Little to approve the agenda with the addition of the following supplemental information:

- UBCM 2022 Resolution: NR38 New Legislation to Protect and Restore Biological Islands Trust Diversity and Ecosystem Health

Carried

2. Public Participation: None.

3. Presentations

a) Cindy Moyer, President, and Gwen Snyder, Treasurer, ReImagine West Shore Community "Making Shift Happen: Reconnecting and Reimagining Us".

Cindy Moyer provided an overview of her PowerPoint presentation including the following:

- Overview of the ReImagine West Shore non-profit society
- Importance of social and behavioural change in response to climate change
- ReImagine's Community Work Plan
- Request to the District of Metchosin for support of the ReImagine West Shore program
- Ways to support the program: amplify, in-kind, and funding
- Leadership Team review
- Vision, Mission, and Values
- Organizational structure
- Memberships and annual membership cost

4. Adoption of Minutes

Moved and Seconded by Councillors Epp and Shukin that the Committee adopt the minutes of the Environment and Natural Areas Committee meeting held February 12, 2024.

Carried

5. Receipt of Minutes

Moved and Seconded by Councillors Shukin and Donaldson that the Committee receive the minutes of the Environmental Advisory Select Committee meeting held February 27, 2024.

Carried

6. Business Arising

Environmental Advisory Select Committee Recommendations, February 27, 2024 meeting

Councillor Gray provided an overview of the Metchosin Advisory Select Committee (MEASC) recommendations including the following:

- Establishment of Local Natural Areas Protection Fund and Provincial Biodiversity Law
    - Draft Letter
    - UBCM Resolution EB32 Supporting Biodiversity in Local Communities
    - UBCM 2022 Resolution NR38 New Legislation to Protect and Restore Biological Islands Trust Diversity and Ecosystem Health

Moved and Seconded by Mayor Little and Councillor Shukin to recommend that Council send a letter to the province supporting the implementation of UBCM Resolutions 2023 EB32 and 2022 NR38: Establishment of Local Natural Areas Protection Fund and Provincial Biodiversity Law; **And that** a copy of the letter be provided to the Union of British Columbia Municipalities (UBCM).

Carried

7. Reports

a) Councillor's Update

Councillor Gray noted that there is little to report due to budget focus. More updates will follow next month.

8. Correspondence

The following correspondence was received:

- ReImagine West Shore Community 2024 Program

9. Adjournment

Moved and Seconded by Councillors Donaldson and Epp that the meeting be adjourned at 7:18 p.m.

Carried

Certified Correct:

_____ _____

Chair **Corporate Officer**

District of Metchosin

Minutes

Special Community Planning Committee Meeting
Joint Meeting with the Parks & Trails Advisory Select Committee
February 20, 2024 at 7:00 p.m.

Council Chambers
Metchosin Municipal Hall

Present: Councillor Shukin in the Chair, Mayor Little, Councillors Donaldson, Gray and Epp. Parks and Trails Advisory Select Committee members: Ron Aubrey (PTASC Chair), Gordon Stodola, Jim Nan, Karen Hoffman, Ryan Carter. Also present was Bob Payette, Chief Administrative Officer, and Jennifer Miller, Legislative Services Assistant (recorder).

Regrets: Ryan Carter

The meeting was called to order at 7:00 p.m.

The Chair provided a Territorial Acknowledgement.

1. Agenda, Additions and Approval

Moved and Seconded by Councillors Gray and Donaldson that the Committee approve the agenda as amended with introductions prior to public participation and the addition of the draft Duke Road East Feasibility Assessment.

Carried

2. Introductions

Councillor Shukin provided an overview of the agenda items and thanked current and outgoing committee members for their service. Round table introductions were made by Community Planning Committee members, Parks & Trails Advisory Select Committee (PTASC) members, and the Chief Administrative Officer (CAO).

3. Public Participation

Patty Williams, resident and member of the Albert Head Neighbourhood Group, thanked the Community Planning Committee, PTASC, the CAO, staff, and everyone involved for the help since this project started. The feasibility study, trail estimates, site visits, access to survey maps, and sharing of knowledge and expertise have benefited the project. Ms. Williams noted other resources and connections that the Albert Head Neighbourhood Group is working with such as the Metchosin Foundation, CRD (Capital Regional District) Parks, CENiC (Citizens Environment Network in Colwood), Colwood Parks, Trails, and Recreation Committee, MISC (Metchosin Invasive Species Cooperative), and HAT (Habitat Acquisition Trust).

Nicole Shukin, resident, thanked the PTASC past Chair for his vision and commitment and all PTASC members for their contributions. Ms. Shukin presented an idea to explore the Buffer Land as a memorial site which has the potential to support the Parks Donation Program and conserve the Buffer Land as an ecological refugia, particularly if tree donations are included in the Parks Donation Program. Ms. Shukin noted that commemoration and reforestation could work together and suggested a cost-benefit analysis could be done to determine if costs could be covered and if there could be a potential revenue resource for managing the Buffer Land.

Erin Ronsse, resident and member of the Albert Head Neighbourhood Group, noted that another item to consider, in addition to the Duke Road Trail, is making Metchosin more travel friendly overall. Ms. Ronsee provided CRD plans that include the Albert Head/Duke Road area and connections that go through the Bilston Creek. Ms. Ronsse provided a map showing proposed trails for Metchosin as a whole as well as summary of some of the actions the Albert Head Neighbourhood Group is taking to engage the neighbourhood and create other collaborations to help with funding and other opportunities.

4. Parks and Trails Advisory Select Committee (PTASC)

Ron Aubrey overviewed the following process review/improvement items and committee discussion took place:

a) Communications between PTASC & Council

- Improvements to communications would increase productivity and benefit the community.
- PTASC understands that their recommendations may not always be accepted; however, a response is expected whether positive or negative.
- Receiving all the required information in order to make a decision and meet the required objectives is essential.
- PTASC understands and considers the PTASC Terms of Reference when making recommendations and budget requests.

b) Council Liaison Role

- Importance of providing communications and feedback between PTASC and Council
- PTASC respects past and present Council Liaisons and the time and energy that has been put into the Council Liaison role.

c) Parks and Trails Coordinator

- A Parks and Trails Coordinator was appointed in February 2023.
- Suggestion for training of the Parks and Trails coordinator to assist with the related responsibilities including budget processes
- Potential to work with former trails coordinator

d) Hands on work

- Some PTASC members are eager to work on trail maintenance and the removal of fallen trees; however, some members more advanced in years may require occasional assistance from the Public Works Crew as needed.
- Potential for younger members to participate in trail maintenance
- Suggestion to reach out to new and young members of the Metchosin Equestrians, via the Parks and Trails coordinator.

e) PTASC referrals

- Request that referrals include details of what is being requested of PTASC and that feedback is received on recommendations, particularly recommendations related to roadside trails.
- Suggestion that committee chairs meet annually to discuss common issues and that the minutes between committees continue to be received in agenda packages
- Request for sub-committee work and decisions to be clearly communicated to PTASC and other impacted advisory committees

- Request for clarification on point of contact for advisory committee chairs to communicate with staff
- It was noted that downed trees can be reported to the District via the info@metchosin.ca address for forwarding to Public Works.
- Kudos to the District engineer for hands-on approach to roadside trails.
- Caution regarding adding to the workload of Public Works

f) Road resurfacing program and roadside trails

- Seeking more lead time and to work with the CAO to develop a multi-year plan
- Suggestion that roadside trail opportunities should be taken into consideration in conjunction with ongoing road resurfacing
- Request to put a Ditching Policy (frequency, size, width, depth) back on the table to assist with future decisions.

g) Communication with Langford, Colwood, Sooke

- Recent neighbour interest has raised the potential of intermunicipal collaboration.
- Opportunities for partnerships with municipalities and contractors
- Council liaison connections and representation to discuss and understand development requirements and safety for mutual benefits
- Potential for collaboration with other agencies such as BC Transit to work together on projects

Action: Councillor Shukin to discuss the suggestion about greater intermunicipal connectivity with Mayor Little and CAO Bob Payette and reach out to Council and Committee counterparts in neighbouring municipalities.

5. Collective Look Ahead

Councillor Shukin reviewed the following items and committee discussion took place:

a) Memorial benches, picnic tables, trees

- Recommendation for a budget line item rather than using general revenue in order to track the incoming and outgoing amounts
- Costs are relatively small, and maintenance could take place over the course of years.

b) Duke Road East

- The draft Duke Road East Feasibility Assessment was included and will be brought to an upcoming Community Planning Committee meeting.
- Potential to develop community building by creating a public space that residents can travel on and contribute to
- Thanks to the PTASC Chair, the Parks and Trails Coordinator, and the previous trails coordinator for their input on the creation of the Draft Feasibility Assessment.
- Recommendation to move forward with the recommended budget amounts for the survey and Phase One as outlined in the final assessment and recommendation section of the Draft Feasibility Assessment in order to keep the momentum going
- Importance of PTASC being the conduit between the Albert Head Neighbourhood Group and Council regarding progress, actions, and grant and donation requests
- Suggestion to visit the retaining wall and guard rail at Lomax Road as a potential model to follow.

c) Buffer Land

- A Special Community Planning Committee meeting was held on November 7, 2023 to review the Buffer Land Working Group's (BLWG) Recommendations Report.
- A Council resolution was made to direct staff to provide a report on the BLWG's Recommendations Report. Staff is currently busy with housing legislation.

Action: Councillor Shukin will discuss with the Chief Administrative Officer the request for staff to take a deeper look at the recommendations and determine what can be done in the coming year.

d) Active Transportation
A BC Active Transportation Infrastructure grant application has been submitted, which would contribute funds to an Active Transportation Network Plan for the District.

6. Next Steps

- Determine how parks donations will be managed over time
- Clarify with the CAO the management of downed trees
- Provide clarity to the Parks and Trails Coordinator in terms of budget
- Implement a road resurfacing plan over time
- Determine a path forward for inter-municipal coordination
- Contact the Metchosin Equestrians via the Parks and Trails Coordinator
- Develop a Ditching Policy
- Liaise with BC Transit on behalf of residents
- Collaborate with CFB Esquimalt and RCMP to slow traffic
- Visit the Lomax Road infrastructure and research what the costs were
- Review and update the Trails Master Plan in the OCP

The PTASC Chair took the opportunity to thank and recognize past PTASC members for their long-standing service.

7. Adjournment

Moved and Seconded by Councillors Gray and Donaldson that the Committee adjourn the meeting at 8:05 p.m.

Carried

Certified Correct

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Chair **Corporate Officer**

March 15, 2024

Attention: Chris Watkins – District of Metchosin
4450 Happy Valley Road
Victoria BC V9C 3Z3
Cell – 250.883.4465
Email - cwatkins@metchosin.ca

SouthShore Forest Consultants
PO Box 2203, Sidney BC V8L-3S8
Phone: (250) 893-9056, email: butcherlodi@aol.com
GST # 777095324 RC001
Work Safe BC # 968408
Insurance/ Seafirst (CFC Underwriting – 5 million Dollar Liability- Policy PSG03515712)
Incorporation # BC1069996 Ltd.
Intermunicipal Business Licence #00016808
BC SEBASE Safe Certified #5200066

RE: Tree Risk Assessment level "2" – 47 – Lombardy Poplars

Location – Lombard Drive – Heritage Site

On Monday March 11, 2024 Ray Praud an Associate Consulting Arborist with SouthShore Forest Consultants provided a Basic Tree Risk Assessment Level "2" on forty-seven (47) Lombardy poplar (*Populus nigra*) trees positioned in the public right-of-way along Lambard Drive in the District of Metchosin.

Our assessment included visual assessment through the use of small hand tools (mallet) and a camera. In each case no form of invasive exploratory assessment was performed. It was very apparent from our observation that each of the trees were observed to be in poor condition. Strucutrally each tree was observed to have poor structure and/or infected with active decay. Lombardy poplars are short lived and notorious for attracting wood decay pathogens. A poor street selection for the urban areas, Lombardy poplar is not utilized for street tree plantings.

We recommend all 47 poplar trees identified in this report be removed to grade.

Observations

Upon assessing the site, it was evident that the subject poplar trees exhibited a variety of structural defects, wood decay and health conditions which appear to be declining in the landscape.

Our observations indicate there could be several forest pathogens active in the base of serval trees. Combined with the age of most trees and previous maintenance activities, our assessment indicates that tree removal is the most practical solution in this case.

Our observations indicated that several of the trees were sounded to be hollow. An indication of wood loss (strength) which would result in a higher tree failure potential.

Our observations indicate that several of the trees appeared to have been removed to a stump several decades ago. This has resulted in the formation of multi stemmed trees and active decay in the base of several trees.

Our observations indicate that several of the tree's upper stems and/or branching were dead and flagging. This is a direct correlation to tree heath which is affecting the uptake of water and nutrient distribution.

It is apparent that each of these trees have approached or surpassed their life expectancy in the landscape.

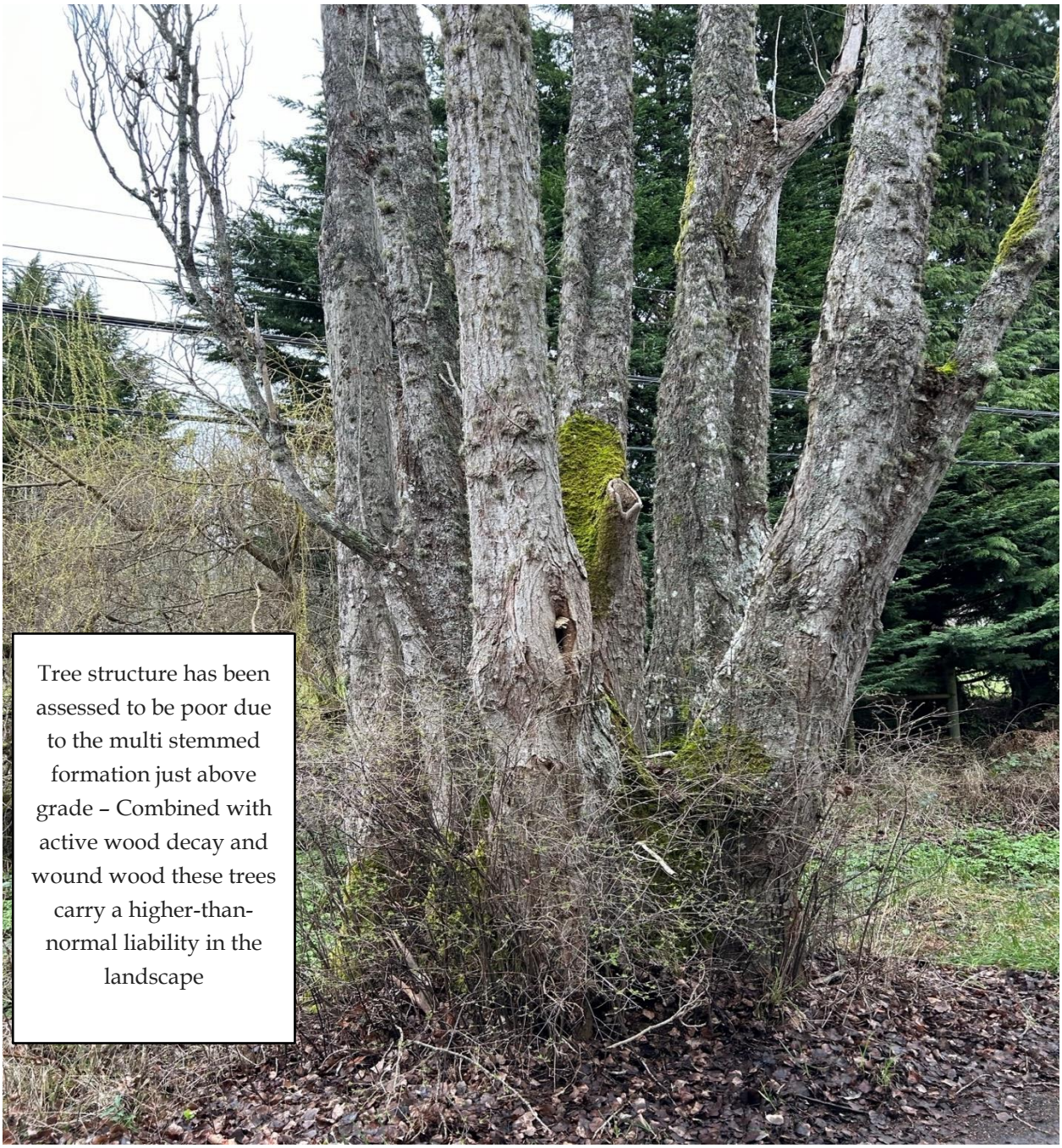
Figure #1 – Tree Inventory – Lambard Drive – District of Metchosin

SouthShore Forest Consultants (SSFC)									
Appendix A - Tree Inventory/Hazard Ratings Summary									
Location: Lombard Dr. Metchosin, BC. (Herritage Poplars)									
Date: March 11, 2024								Conditions during TTS inventory visits: 8°C. Overcast. 5km/h NE Breeze.	
Tag #	Species	DBH (cm)	PRZ (m)	Height (m)	Health/ Structure	Canopy (r) (m)	Bylaw Protected	Action	Observations
309	L Poplar	136	16	18	P/P	4	Yes	**Remove**	5x stem 1m AG 47,45,60,13,22cm. Poor live foliar area. Basal decay and multiple cavities. Root crown decay and multiple cavities. Sound tested hollow.
310	L Poplar	109	13	18	P/P	3	Yes	**Remove**	3x stem 1.3m AG. 61,40,41cm. Poor live foliar area. Basal decay and multiple cavities. Root crown decay and multiple cavities. Sound tested hollow.
311	L Poplar	97	12	18	P/P	3	Yes	**Remove**	3x stem 1m AG 66,35,18cm. Poor live foliar area. Basal decay and multiple cavities. Root crown decay and multiple cavities. Sound tested hollow.
312	L Poplar	99	12	18	P/P	2	Yes	**Remove**	3x stem 1m AG 44,54,32cm. Poor live foliar area. Basal decay and multiple cavities. Root crown decay and multiple cavities. Sound tested hollow.
313	L Poplar	141	17	18	P/P	4	Yes	**Remove**	4x stem AG 69,57,48,18cm. Poor live foliar area. Basal decay and multiple cavities. Root crown decay and multiple cavities. Sound tested hollow.
314	L Poplar	170	20	20	P/P	4	Yes	**Remove**	Bifuricate 2m AG. Poor live foliar area. Basal decay and multiple cavities. Root crown decay and multiple cavities. Sound tested hollow.
315	L Poplar	86	10	18	P/P	3	Yes	**Remove**	5x stem AG 47,13,27,10,17cm. Poor live foliar area. Basal decay and multiple cavities. Root crown decay and multiple cavities. Sound tested hollow.
316	L Poplar	272	33	18	P/P	4	Yes	**Remove**	7x stem AG 90,65,58,61,50,42,31cm. Poor live foliar area. Basal decay and multiple cavities. Root crown decay and multiple cavities. Multiple fruiting bodies 1m AG. Sound tested hollow.
317	L Poplar	175	21	18	P/P	3	Yes	**Remove**	Bifuricate 2m AG. Poor live foliar area. Basal decay and multiple cavities. Root crown decay and multiple cavities. Previous 80cm failure. Sound tested hollow.
318	L Poplar	93	11	16	P/P	3	Yes	**Remove**	2x stem 1m AG 74,34cm. Poor live foliar area. Basal decay and multiple cavities. Root crown decay and multiple cavities. Sound tested hollow.
319	L Poplar	84	10	16	P/P	3	Yes	**Remove**	3x stem 1m AG 15,54,36cm. Poor live foliar area. Basal decay and multiple cavities. Root crown decay and multiple cavities. Sound tested hollow.
320	L Poplar	28	3	12	P/P	2	Yes	**Remove**	3x stem AG 4,20,11cm. Poor live foliar area. Basal decay and multiple cavities. Root crown decay and multiple cavities. Sound tested hollow.
321	L Poplar	107	13	18	P/P	2	Yes	**Remove**	7x stem AG 40,15,13,30,30,11,15cm. Poor live foliar area. Basal decay and multiple cavities. Root crown decay and multiple cavities.
322	L Poplar	100	12	18	P/P	2	Yes	**Remove**	3x stem 1m AG 60,20,48cm. Poor live foliar area. Basal decay and multiple cavities. Root crown decay and multiple cavities. Sound tested hollow.
323	L Poplar	49	6	15	P/P	2	Yes	**Remove**	2x stem AG 34,26cm. Poor live foliar area. Basal decay and multiple cavities. Root crown decay and multiple cavities. Sound tested hollow.
324	L Poplar	102	12	18	P/P	3	Yes	**Remove**	5x stem AG 34,30,37,35,11cm. Poor live foliar area. Basal decay and multiple cavities. Root crown decay and multiple cavities.
325	L Poplar	114	14	18	P/P	3	Yes	**Remove**	6x stem 1m AG 10,10,12,41,46,42cm. Poor live foliar area. Basal decay and multiple cavities. Root crown decay and multiple cavities. Sound tested hollow.
326	L Poplar	97	12	18	P/P	2	Yes	**Remove**	5x stem 1m AG 19,14,14,45,42cm. Poor live foliar area. Basal decay and multiple cavities. Root crown decay and multiple cavities. Sound tested hollow.
327	L Poplar	122	15	18	P/P	3	Yes	**Remove**	5x stem AG 32,45,15,58,15cm. Poor live foliar area. Basal decay and multiple cavities. Root crown decay and multiple cavities. Sound tested hollow.
328	L Poplar	160	19	20	P/P	4	Yes	**Remove**	3x stem AG 30,70,100cm. Poor live foliar area. Basal decay and multiple cavities. Root crown decay and multiple cavities. Sound tested hollow.
329	L Poplar	140	17	20	P/P	4	Yes	**Remove**	3x stem 1.3m AG 100,38,31cm. Poor live foliar area. Basal decay and multiple cavities. Root crown decay and multiple cavities. Sound tested hollow.
330	L Poplar	108	13	18	P/P	3	Yes	**Remove**	3x stem 1m AG 49,60,32cm. Poor live foliar area. Basal decay and multiple cavities. Root crown decay and multiple cavities. Sound tested hollow.
331	L Poplar	41	5	18	P/P	2	Yes	**Remove**	Poor live foliar area. Basal decay and multiple cavities. Root crown decay and multiple cavities. Sound tested hollow.
332	L Poplar	67	8	16	P/P	2	Yes	**Remove**	3x stem AG 30,33,27cm. Poor live foliar area. Basal decay and multiple cavities. Root crown decay and multiple cavities. Sound tested hollow.
333	L Poplar	96	12	18	P/P	3	Yes	**Remove**	3x stem 1m AG 62,46,13cm. Poor live foliar area. Basal decay and multiple cavities. Root crown decay and multiple cavities. Sound tested hollow.
334	L Poplar	17	2	10	P/P	1	Yes	**Remove**	Dead. Sound tested hollow.
335	L Poplar	26	3	10	P/P	1	Yes	**Remove**	2x stem AG 10,20cm. Poor live foliar area. Basal decay and multiple cavities. Root crown decay and multiple cavities. Sound tested hollow.
336	L Poplar	81	10	18	P/P	1	Yes	**Remove**	5x stem AG 36,34,20,10,12cm. Poor live foliar area. Basal decay and multiple cavities. Root crown decay and multiple cavities. Sound tested hollow.
337	L Poplar	71	9	16	P/P	2	Yes	**Remove**	4x stem 1m AG 18,32,31,19cm. Poor live foliar area. Basal decay and multiple cavities. Root crown decay and multiple cavities. Sound tested hollow.
338	L Poplar	55	7	16	P/P	2	Yes	**Remove**	2x stem 1m AG 34,35cm. Poor live foliar area. Basal decay and multiple cavities. Root crown decay and multiple cavities. Sound tested hollow.
339	L Poplar	83	10	16	P/P	2	Yes	**Remove**	5x stem AG 31,14,30,15,30cm. Poor live foliar area. Basal decay and multiple cavities. Root crown decay and multiple cavities. Sound tested hollow.
340	L Poplar	85	10	16	P/P	2	Yes	**Remove**	4x stem AG 26,26,26,40cm. Poor live foliar area. Basal decay and multiple cavities. Root crown decay and multiple cavities. Sound tested hollow.
341	L Poplar	106	13	16	P/P	3	Yes	**Remove**	6x stem 1m AG 16,20,21,40,30,26cm. Poor live foliar area. Basal decay and multiple cavities. Root crown decay and multiple cavities. Sound tested hollow.
342	L Poplar	55	7	16	P/P	3	Yes	**Remove**	3x stem AG 20,20,31cm. Poor live foliar area. Basal decay and multiple cavities. Root crown decay and multiple cavities. Sound tested hollow.
343	L Poplar	69	8	18	P/P	2	Yes	**Remove**	3x stem 1m AG 31,32,32cm. Poor live foliar area. Basal decay and multiple cavities. Root crown decay and multiple cavities. Sound tested hollow.
344	L Poplar	59	7	18	P/P	2	Yes	**Remove**	2x stem 1m AG 36,38cm. Poor live foliar area. Basal decay and multiple cavities. Root crown decay and multiple cavities. Sound tested hollow.
345	L Poplar	130	16	20	P/P	2	Yes	**Remove**	6x stem AG 38,38,22,25,34,38cm. Poor live foliar area. Basal decay and multiple cavities. Root crown decay and multiple cavities. Sound tested hollow.
346	L Poplar	145	17	20	P/P	2	Yes	**Remove**	5x stem AG 10,38,49,24,24cm. Poor live foliar area. Basal decay and multiple cavities. Root crown decay and multiple cavities. Sound tested hollow.
347	L Poplar	121	15	20	P/P	3	Yes	**Remove**	4x stem AG 63,15,35,48cm. Poor live foliar area. Basal decay and multiple cavities. Root crown decay and multiple cavities. Sound tested hollow.
348	L Poplar	119	14	20	P/P	3	Yes	**Remove**	3x stem 1m AG 32,52,69cm. Poor live foliar area. Basal decay and multiple cavities. Root crown decay and multiple cavities. Sound tested hollow.
349	L Poplar	147	18	21	P/P	3	Yes	**Remove**	4x stem 1m AG 18,30,82,62cm. Poor live foliar area. Basal decay and multiple cavities. Root crown decay and multiple cavities. Sound tested hollow.
350	L Poplar	101	12	20	P/P	3	Yes	**Remove**	2x stem 1m AG 77,40cm. Poor live foliar area. Basal decay and multiple cavities. Root crown decay and multiple cavities. Sound tested hollow.
351	L Poplar	108	13	18	P/P	3	Yes	**Remove**	5x stem 1m AG 21,18,22,46,46cm. Poor live foliar area. Basal decay and multiple cavities. Root crown decay and multiple cavities. Sound tested hollow.
352	L Poplar	80	10	20	P/P	3	Yes	**Remove**	2x stem 1m AG 30,62cm. Poor live foliar area. Basal decay and multiple cavities. Root crown decay and multiple cavities. Sound tested hollow.
353	L Poplar	11	1	10	P/P	1	Yes	**Remove**	Epicormic. Poor live foliar area. Basal decay.
354	L Poplar	31	4	15	P/P	3	Yes	**Remove**	Epicormic. Poor live foliar area.
355	L Poplar	40	5	18	P/P	4	Yes	**Remove**	Epicormic. Poor live folia area.

Photo #1 – Lombard Drive – Lomardy Poplar Trees

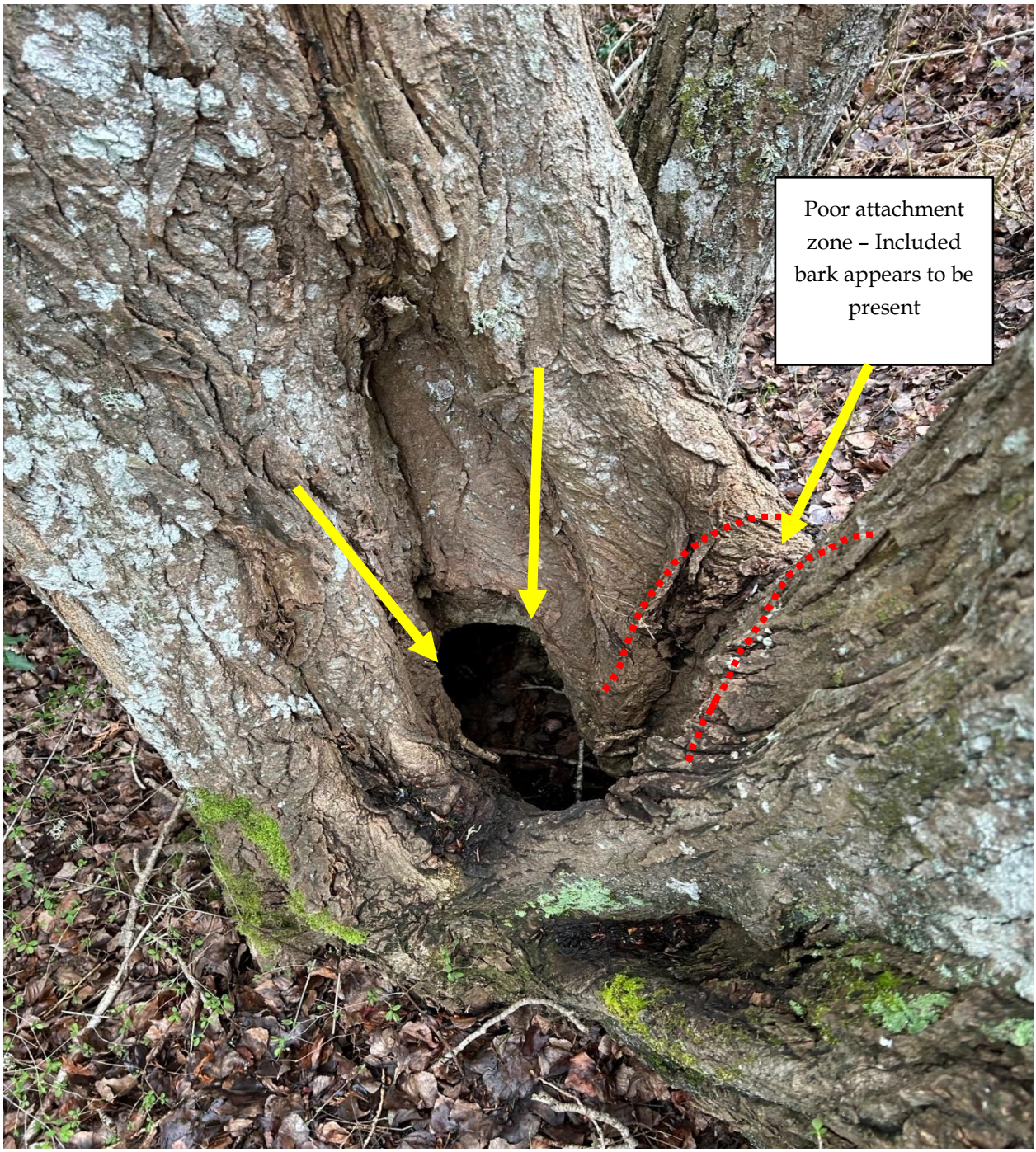


Photo #2 – Lombard Drive – Lomardry Poplar Tree



This tree has seven (7) stems – considerd to have poor structure, this tree was observed to have active wound wood and decay pockets in some stems. Estimated to be approximately 120 years in age these trees are reaching their maximum life expectancy.

Photo #3 – Lombard Drive – Lomardry Poplar Tree



Basal cavities were observed in several of the trees at grade. We sounded the base of each tree and concluded that several of them were hollow.

Photo #4 – Lombard Drive – Lomardry Poplar Tree



In this photo you can see the trees structure with several structural issues – High risk this tree is carries a high liability in the landscape. Observed to have cavities, decay wood and basal stem wound wood we believe that at one time the trees were severely impacted by previous activities (several of the trees appear to have formed off stumps resulting in *stump sprout regeneration*).

Photo #5 – Lombard Drive – Lomardry Poplar Tree



In this photo you an see more wound wood and a basal cavity in one of the poplars at grade.

Photo #6 – Lombard Drive– Lomardry Poplar Tree Stump – Failed Tree



In this photo you can see the resent failure of a similar poplar tree. In this case wood decay (loss of wood strength) resulted in the trees stem collapsing.

Photo #7 – Lombard Drive – Lomardry Poplar Tree



In this photo you can see a basal wound just above grade.

Professional Opinion

In our professional opinion we determined that:

- The subject poplar trees exhibit poor structure and health resulting in an assessment condition of "Poor".
- The subject poplar trees were observed and assessed to carry a "High" level of liability in the Landscape.
- We observed what appeared to be several trees infected with forest wood decay pathogens.
- Several of the subject poplar trees appeared the have been previous topped/reduce to grade resulting in multi-stemmed tree formations. This type of action would result in excessive wood decay and basal cavities.

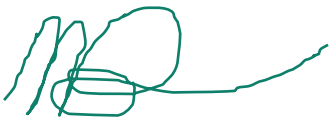
Recommendations

1. Remove subject poplar trees to grade. – Remove stumps
   Residual Risk – "None"

Tree Replacement

1. Provide tree mitigation at a ratio of 1:1 – to be planted on site.
   Provide a #15 gallon medium to large sized canopy shade trees – utilize a columnar /fastigiate form of tree.

Michael Butcher – Consulting Arborist



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Work Safe BC # 968408
Incorporation # BC1069996
BC SEBASE Safe Certified #5200066

Arborist Disclosure Statement:

Arborist are tree specialists who use their education, training and experience to examine trees, recommend measures to enhance the beauty and health of trees, and attempt to reduce the risks.
Arborist cannot detect every condition that could possibly lead to structural failure of a tree.
Trees are living organisms that fail in ways we do not fully understand. Conditions are often hidden within trees and below the ground.
Arborist cannot guarantee that the tree will be healthy and safe under all circumstances, or for a specific period of time. Trees are dynamic specimens, not static. Changes in conditions including the environment are unknown.
Remedial treatments cannot be guaranteed.
Trees can be managed, but they cannot be controlled. The only way to eliminate all risk is to eliminate all trees.

Tomahawk Tree Services Ltd. (TTS)

Appendix A - Tree Inventory/Hazard Ratings Summary

Location: Lombard Dr. Metchosin, BC. (Herritage Poplars)

Date: March 11, 2024

Conditions during TTS inventory visits: 8°C. Overcast. 5km/h NE Breeze.

Tag #	Species	DBH (cm)	PRZ (m)	Height (m)	Health/ Structure	Canopy (r) (m)	Bylaw Protected	Action	Observations
309	Lombardy Poplar	136	16	18	P/P	4	Yes	**Remove**	5x stem 1m AG 47,45,60,13,22cm. Poor live foliar area. Basal decay and multiple cavities. Root crown decay and multiple cavities. Sound tested hollow.
310	Lombardy Poplar	109	13	18	P/P	3	Yes	**Remove**	3x stem 1.3m AG. 61,40,41cm. Poor live foliar area. Basal decay and multiple cavities. Root crown decay and multiple cavities. Sound tested hollow.
311	Lombardy Poplar	97	12	18	P/P	3	Yes	**Remove**	3x stem 1m AG 66,35,18cm. Poor live foliar area. Basal decay and multiple cavities. Root crown decay and multiple cavities. Sound tested hollow.
312	Lombardy Poplar	99	12	18	P/P	2	Yes	**Remove**	3x stem 1m AG 44,54,32cm. Poor live foliar area. Basal decay and multiple cavities. Root crown decay and multiple cavities. Sound tested hollow.
313	Lombardy Poplar	141	17	18	P/P	4	Yes	**Remove**	4x stem AG 69,57,48,18cm. Poor live foliar area. Basal decay and multiple cavities. Root crown decay and multiple cavities. Sound tested hollow.
314	Lombardy Poplar	170	20	20	P/P	4	Yes	**Remove**	Bifuricate 2m AG. Poor live foliar area. Basal decay and multiple cavities. Root crown decay and multiple cavities. Sound tested hollow.
315	Lombardy Poplar	86	10	18	P/P	3	Yes	**Remove**	5x stem AG 47,13,27,10,17cm. Poor live foliar area. Basal decay and multiple cavities. Root crown decay and multiple cavities. Sound tested hollow.
316	Lombardy Poplar	272	33	18	P/P	4	Yes	**Remove**	7x stem AG 90,65,58,61,50,42,31cm. Poor live foliar area. Basal decay and multiple cavities. Root crown decay and multiple cavities. Multiple fruiting bodies 1m AG. Sound tested hollow.
317	Lombardy Poplar	175	21	18	P/P	3	Yes	**Remove**	Bifuricate 2m AG. Poor live foliar area. Basal decay and multiple cavities. Root crown decay and multiple cavities. Previous 80cm failure. Sound tested hollow.
318	Lombardy Poplar	93	11	16	P/P	3	Yes	**Remove**	2x stem 1m AG 74,34cm. Poor live foliar area. Basal decay and multiple cavities. Root crown decay and multiple cavities. Sound tested hollow.
319	Lombardy Poplar	84	10	16	P/P	3	Yes	**Remove**	3x stem 1m AG 15,54,36cm. Poor live foliar area. Basal decay and multiple cavities. Root crown decay and multiple cavities. Sound tested hollow.
320	Lombardy Poplar	28	3	12	P/P	2	Yes	**Remove**	3x stem AG 4,20,11cm. Poor live foliar area. Basal decay and multiple cavities. Root crown decay and multiple cavities. Sound tested hollow.
321	Lombardy Poplar	107	13	18	P/P	2	Yes	**Remove**	7x stem AG 40,15,13,30,30,11,15cm. Poor live foliar area. Basal decay and multiple cavities. Root crown decay and multiple cavities.
322	Lombardy Poplar	100	12	18	P/P	2	Yes	**Remove**	3x stem 1m AG 60,20,48cm. Poor live foliar area. Basal decay and multiple cavities. Root crown decay and multiple cavities. Sound tested hollow.
323	Lombardy Poplar	49	6	15	P/P	2	Yes	**Remove**	2x stem AG 34,26cm. Poor live foliar area. Basal decay and multiple cavities. Root crown decay and multiple cavities. Sound tested hollow.

324	Lombardy Poplar	102	12	18	P/P	3	Yes	**Remove**	5x stem AG 34,30,37,35,11cm. Poor live foliar area. Basal decay and multiple cavities. Root crown decay and multiple cavities.
325	Lombardy Poplar	114	14	18	P/P	3	Yes	**Remove**	6x stem 1m AG 10,10,12,41,46,42cm. Poor live foliar area. Basal decay and multiple cavities. Root crown decay and multiple cavities. Sound tested hollow.
326	Lombardy Poplar	97	12	18	P/P	2	Yes	**Remove**	5x stem 1m AG 19,14,14,45,42cm. Poor live foliar area. Basal decay and multiple cavities. Root crown decay and multiple cavities. Sound tested hollow.
327	Lombardy Poplar	122	15	18	P/P	3	Yes	**Remove**	5x stem AG 32,45,15,58,15cm. Poor live foliar area. Basal decay and multiple cavities. Root crown decay and multiple cavities. Sound tested hollow.
328	Lombardy Poplar	160	19	20	P/P	4	Yes	**Remove**	3x stem AG 30,70,100cm. Poor live foliar area. Basal decay and multiple cavities. Root crown decay and multiple cavities. Sound tested hollow.
329	Lombardy Poplar	140	17	20	P/P	4	Yes	**Remove**	3x stem 1.3m AG 100,38,31cm. Poor live foliar area. Basal decay and multiple cavities. Root crown decay and multiple cavities. Sound tested hollow.
330	Lombardy Poplar	108	13	18	P/P	3	Yes	**Remove**	3x stem 1m AG 49,60,32cm. Poor live foliar area. Basal decay and multiple cavities. Root crown decay and multiple cavities. Sound tested hollow.
331	Lombardy Poplar	41	5	18	P/P	2	Yes	**Remove**	Poor live foliar area. Basal decay and multiple cavities. Root crown decay and multiple cavities. Sound tested hollow.
332	Lombardy Poplar	67	8	16	P/P	2	Yes	**Remove**	3x stem AG 30,33,27cm. Poor live foliar area. Basal decay and multiple cavities. Root crown decay and multiple cavities. Sound tested hollow.
333	Lombardy Poplar	96	12	18	P/P	3	Yes	**Remove**	3x stem 1m AG 62,46,13cm. Poor live foliar area. Basal decay and multiple cavities. Root crown decay and multiple cavities. Sound tested hollow.
334	Lombardy Poplar	17	2	10	P/P	1	Yes	**Remove**	Dead. Sound tested hollow.
335	Lombardy Poplar	26	3	10	P/P	1	Yes	**Remove**	2x stem AG 10,20cm. Poor live foliar area. Basal decay and multiple cavities. Root crown decay and multiple cavities. Sound tested hollow.
336	Lombardy Poplar	81	10	18	P/P	1	Yes	**Remove**	5x stem AG 36,34,20,10,12cm. Poor live foliar area. Basal decay and multiple cavities. Root crown decay and multiple cavities. Sound tested hollow.
337	Lombardy Poplar	71	9	16	P/P	2	Yes	**Remove**	4x stem 1m AG 18,32,31,19cm. Poor live foliar area. Basal decay and multiple cavities. Root crown decay and multiple cavities. Sound tested hollow.
338	Lombardy Poplar	55	7	16	P/P	2	Yes	**Remove**	2x stem 1m AG 34,35cm. Poor live foliar area. Basal decay and multiple cavities. Root crown decay and multiple cavities. Sound tested hollow.
339	Lombardy Poplar	83	10	16	P/P	2	Yes	**Remove**	5x stem AG 31,14,30,15,30cm. Poor live foliar area. Basal decay and multiple cavities. Root crown decay and multiple cavities. Sound tested hollow.
340	Lombardy Poplar	85	10	16	P/P	2	Yes	**Remove**	4x stem AG 26,26,26,40cm. Poor live foliar area. Basal decay and multiple cavities. Root crown decay and multiple cavities. Sound tested hollow.
341	Lombardy Poplar	106	13	16	P/P	3	Yes	**Remove**	6x stem 1m AG 16,20,21,40,30,26cm. Poor live foliar area. Basal decay and multiple cavities. Root crown decay and multiple cavities. Sound tested hollow.
342	Lombardy Poplar	55	7	16	P/P	3	Yes	**Remove**	3x stem AG 20,20,31cm. Poor live foliar area. Basal decay and multiple cavities. Root crown decay and multiple cavities. Sound tested hollow.
343	Lombardy Poplar	69	8	18	P/P	2	Yes	**Remove**	3x stem 1m AG 31,32,32cm. Poor live foliar area. Basal decay and multiple cavities. Root crown decay and multiple cavities. Sound tested hollow.

344	Lombardy Poplar	59	7	18	P/P	2	Yes	**Remove**	2x stem 1m AG 36,38cm. Poor live foliar area. Basal decay and multiple cavities. Root crown decay and multiple cavities. Sound tested hollow.
345	Lombardy Poplar	130	16	20	P/P	2	Yes	**Remove**	6x stem AG 38,38,22,25,34,38cm. Poor live foliar area. Basal decay and multiple cavities. Root crown decay and multiple cavities. Sound tested hollow.
346	Lombardy Poplar	145	17	20	P/P	2	Yes	**Remove**	5x stem AG 10,38,49,24,24cm. Poor live foliar area. Basal decay and multiple cavities. Root crown decay and multiple cavities. Sound tested hollow.
347	Lombardy Poplar	121	15	20	P/P	3	Yes	**Remove**	4x stem AG 63,15,35,48cm. Poor live foliar area. Basal decay and multiple cavities. Root crown decay and multiple cavities. Sound tested hollow.
348	Lombardy Poplar	119	14	20	P/P	3	Yes	**Remove**	3x stem 1m AG 32,52,69cm. Poor live foliar area. Basal decay and multiple cavities. Root crown decay and multiple cavities. Sound tested hollow.
349	Lombardy Poplar	147	18	21	P/P	3	Yes	**Remove**	4x stem 1m AG 18,30,82,62cm. Poor live foliar area. Basal decay and multiple cavities. Root crown decay and multiple cavities. Sound tested hollow.
350	Lombardy Poplar	101	12	20	P/P	3	Yes	**Remove**	2x stem 1m AG 77,40cm. Poor live foliar area. Basal decay and multiple cavities. Root crown decay and multiple cavities. Sound tested hollow.
351	Lombardy Poplar	108	13	18	P/P	3	Yes	**Remove**	5x stem 1m AG 21,18,22,46,46cm. Poor live foliar area. Basal decay and multiple cavities. Root crown decay and multiple cavities. Sound tested hollow.
352	Lombardy Poplar	80	10	20	P/P	3	Yes	**Remove**	2x stem 1m AG 30,62cm. Poor live foliar area. Basal decay and multiple cavities. Root crown decay and multiple cavities. Sound tested hollow.
353	Lombardy Poplar	11	1	10	P/P	1	Yes	**Remove**	Epicormic. Poor live foliar area. Basal decay.
354	Lombardy Poplar	31	4	15	P/P	3	Yes	**Remove**	Epicormic. Poor live foliar area.
355	Lombardy Poplar	40	5	18	P/P	4	Yes	**Remove**	Epicormic. Poor live folia area.

TIMES COLONIST

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Lantzville mulls FOG (future old-growth) zones



Carla Wilson
about 6 hours ago



Trees in the Foothills parkland at Lantzville. The town is planning for two initial FOG areas covering 10 to 12 acres. VIA IAN SAVAGE

Listen to this article

00:03:38

Lantzville is preparing to establish havens for future old-growth forests, where big West Coast trees can thrive for hundreds of years.

The district plans to set up two such areas within its rugged and scenic Foothills parkland, donated by developer Lone Tree Properties, under a new “future old growth” (FOG) zone that would be permanently - protected.

Council members have voted unanimously in favour of the first two readings of the new bylaw, and a public hearing is set for April 10. Coun. Joan Jones called the plan “truly forward thinking.”

Planned new FOG zones are in environmentally sensitive habitat and were already earmarked by the district’s official community plan for preservation.

The initial two FOG areas will total 10 to 12 acres, said Coun. Ian Savage, who believes the new zone is the first of its kind in the province. He hopes other municipalities will follow suit.

Savage said he came up with the idea a few years ago while looking for solutions to combat the loss of old growth on B.C.’s coast. A visit to old-growth forests in Haida Gwaii cemented his commitment.

“It’s almost a spiritual experience when you’re walking through them,” he said, adding the beautiful old giants “almost feel prehistoric” in an environment with sparse undergrowth, mossy walkways, old fallen logs and a unique ecosystem.

It was “irresponsible” not to have preserved more of Vancouver Island’s old-growth forests, Savage said.

“The solution is to create more old growth forests and ensure they are protected.”

His vision is to see “islands” of old-growth areas thriving close to communities where generations of people can visit and appreciate them. Seeing old growth will hopefully inspire people to preserve and protect the trees, he told council. “It’s a long-term project obviously.”

The District of Lantzville is immediately north of Nanaimo with a population of 3,800, according to the most recent census.

Just over 800 homes are approved in the Foothills plan, which is being built out over many years. The first phase of the development was rolled out in 2017.

The project includes single-family houses, residential acreages, multi-family homes and neighbourhood villages.

Lone Tree donated 1,100 acres of parkland to the municipality that includes grasslands, meadows, trails and everything from saplings to “beautiful old trees,” Savage said. But some of the area was cleared years ago.

The park is already a popular hiking area and other recreational use is planned.

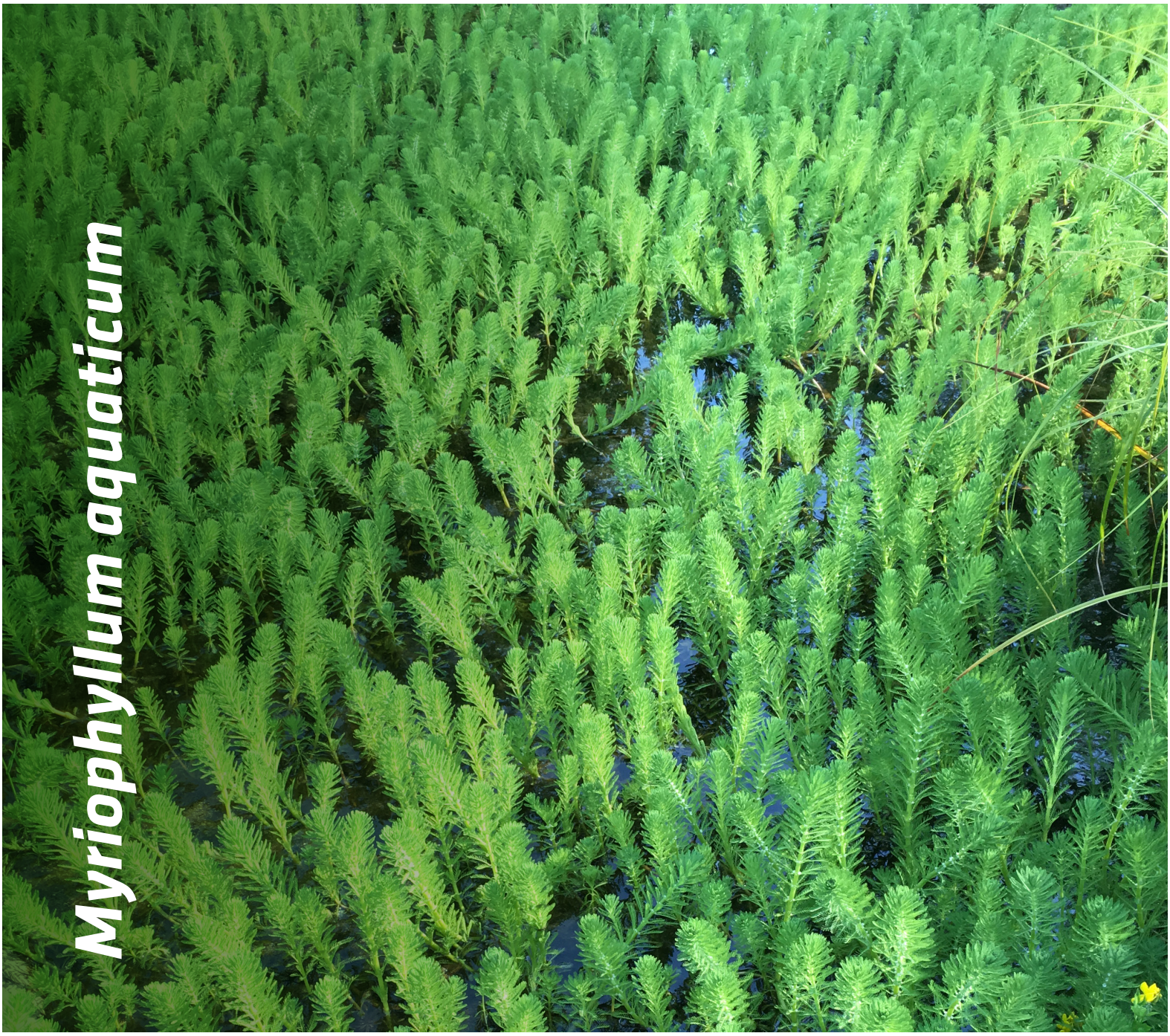
Savage cited a 2013 scientific paper focusing on the age of trees on Vancouver Island. Some old-growth areas have trees 150 to 450 years old, and even giants up to 850 years old, although trees that are more than 350 years old are less common.

Major long-lived species on the Island include yellow cedar, western red cedar, mountain hemlock, Douglas fir and western hemlock, which could be planted in FOG zones, Savage said.

Additional mapping of old trees in Foothill parkland will be carried out, said Savage.

cjwilson@timescolonist.com

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BEST MANAGEMENT PRACTICES FOR

Parrot's Feather

in the Metro Vancouver Region

metrovancouver
SERVICES AND SOLUTIONS FOR A LIVABLE REGION

ISCMV
INVASIVE SPECIES COUNCIL OF METRO VANCOUVER

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Diamond Head Consulting

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August 2021

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Introduction

The impacts of invasive species on ecological, human, and economic health are of concern in the Metro Vancouver region. Successful control of invasive species requires concerted and targeted efforts by many players. This document – "**Best Management Practices for Parrot's Feather in the Metro Vancouver Region**" – is one of a series of species-specific guides developed for use by practitioners (e.g., local government staff, crews, project managers, contractors, consultants, developers, stewardship groups, and others who have a role in invasive species management) in the region. Together, these best practices provide a compendium of guidance that has been tested locally by many researchers and operational experts.

Parrot's feather is a perennial aquatic plant native to South America. It was introduced to North America as an aquarium and aquatic garden plant (Ontario's Invasive Species Awareness Program, 2016). It grows from the bottom of fresh water bodies through the water column with plant tips emerging above the surface, quickly forming dense mats of vegetation. It is most problematic in small ponds, irrigation channel networks and streams (CABI, 2018).

Academic institutions, government, and non-government organizations continue to study this species in British Columbia. As researchers and practitioners learn more about the biology and control of parrot's feather, it is anticipated that the recommended best management practices will change overtime and this document will be updated. Please check metrovancouver.org regularly to obtain the most recent version of these best management practices.

REGULATORY STATUS

Although parrot's feather is an invasive plant of concern in the Metro Vancouver region, it is not currently regulated anywhere in British Columbia.

IMPACTS

Parrot's feather can contribute to a loss of plant and aquatic species diversity by outcompeting and replacing native plant communities (Lastrucci *et al*, 2018). This has a negative impact on overall biodiversity, and can affect habitat quality and food availability for fish, amphibians, waterfowl and other aquatic species (Ontario's Invasive Species Awareness Program, 2016). Studies in Washington State suggest that parrot's feather is highly impactful to slow-water habitats (Kuehen *et al*, 2016). Infestations dramatically reduce the levels of dissolved oxygen in the water column, change invertebrate communities and increase the number of non-native fish species (Kuehne *et al*, 2016). In addition, infestations can trap sediment, causing water levels to rise and slowing water flow. These slow flowing stagnant waters provide optimal breeding grounds for mosquitoes (Pennsylvania Sea Grant, 2013).

Recreationalists and lake shore home owners can be impacted by parrot's feather. Dense infestations in lakes can impede swimming, fishing and boating. Further, decreased recreational and aesthetic values can lead to lower property values (Pennsylvania Sea Grant, 2013).

All levels of government, non-profit organizations and private property owners spend significant resources managing invasive species in the Metro Vancouver region every year. In waterways, irrigation ditches, sloughs and drainage canals, parrot's feather has the potential to inhibit the flow of water, resulting in an increase in maintenance costs. In recent years, agencies represented on Metro Vancouver's Regional Planning Advisory Committee – Invasive Species Subcommittee together spent over $168,000 per year on parrot's feather control efforts. This figure does not include control costs for private landowners across the region, volunteer 'weed pull' hours, or costs associated with education and awareness activities.

REPRODUCTION AND SPREAD

Parrot's feather reproduces vegetatively through plant fragments. In North America, only female plants are present and sexual reproduction by seed does not occur (Raincoast Applied Ecology, 2016). Plant fragments as small as 4 millimetres are capable of establishing a new population (City of Richmond, 2016). In Pitt Meadows, this invader appears to have expanded its range throughout local sloughs and ditches at a rate of approximately 900 metres per year, resulting in a cumulative spread of 12.7 kilometres over 13 years, between 2004 and 2017 (Sloboda, 2019).

Parrot's feather can be spread unintentionally by flooding events and natural dispersal from plant fragments floating downstream (Ontario's Invasive Species Program, 2016). Fragments can travel on birds or animals. It can also be spread by contaminated boats, boat trailers or heavy-duty equipment used for parrot's feather control (Hesketh, 2017).

Most parrot's feather infestations in Metro Vancouver appear to be caused by the accidental or purposeful introduction by homeowners from garden ponds or aquariums (Raincoast Applied Ecology, 2016). Parrot's feather has been an ornamental favourite in fountains, and aquariums due to its blue-green color, feather-like leaves and cascading pattern of growth.



Parrot's feather in the Blind Channel of Katzie Slough
CREDIT: SUSANNE SLOBODA

HABITAT AND DISTRIBUTION

Parrot's feather is native to South America. It was introduced to North America in the early 1900's through the aquaria and nursery trade and is also found in Europe, New Zealand, Australia, and Africa (Wersal *et al*, 2018). It was first collected in British Columbia in 1980 in North Vancouver and was observed in a local slough by Pitt Meadows Public Works in 2004 (Sloboda, 2019) and found again in 2007 in a Garry Point Park drainage ditch in the City of Richmond (Klinkenberg, 2017). It is now widespread in a number of areas in Richmond and there are established populations in Pitt Meadows, Burnaby, Surrey and south Vancouver (Raincoast Applied Ecology, 2016). Abbotsford and Chilliwack also have infestations (Clegg, 2018). This species has also been found in the Capital Regional District on southern Vancouver Island, including the Gulf Islands.

Parrot's feather establishes roots in the bottom sediments of water bodies. It is typically found in nutrient-rich, slow-moving water, such as wetlands, streams, irrigation reservoirs or canals, edges of lakes, ponds, sloughs or backwaters. It is most common in shallow water, but can also be found as a floating plant in nutrient-enriched lakes in depths up to 4.8 metres (Wersal *et al*, 2018).

Parrot's feather prefers habitats where light can penetrate to the bottom of the water column, alkaline conditions (pH range of 6.8-8.0) and water temperatures between 16-23°C. However, it can survive even broader ranges and in saltwater as long as salt concentrations remain below 4 parts per trillion (Wersal *et al*, 2018). Parrot's feather is not usually affected by frost and can survive mild winters in its submersed form (Ontario's Invasive Species Awareness Program, 2016). It usually begins growth when water temperatures reach 7°C (Wersal *et al*, 2018).

CLIMATE ADAPTATION

Climate modellers predict that the Metro Vancouver region will experience warmer temperatures; a decrease in snowpack; longer dry spells in summer months; more precipitation in autumn, winter and spring; more intense extreme events; and an extended growing season. In the past, our region had an average of 252 days in the growing season. In lower elevations 45 days will be added to the growing season by the 2050s, and 56 days by the 2080s, resulting in nearly a year-round growing season of 357 days on average. In higher elevation ecosystems the growing season length will increase by 50% to 325 days by the 2080s (Metro Vancouver, 2016). These changes will stress many sensitive ecosystems, increasing their vulnerability to invasive species.

Parrot's feather is a hardy aquatic plant with broad environmental tolerances (Wersal et al, 2018). It may be able to adapt to our future climate in several ways:

- **Warmer temperatures & extended growing season:** Parrot's feather can tolerate mild frost but it cannot survive extended periods of cold and therefore may benefit from warmer winters (Wersal et al, 2018).
- **Increased precipitation and flooding:** This species is likely to adapt to water level fluctuations resulting from climate change (Wersal et al, 2018).

With these kinds of competitive advantages, this species is more adaptable than native species in a variety of ecosystems, suggesting that it will be able to withstand, and possibly thrive, with changing climate conditions.

Identification

Lifecycle: Perennial aquatic plant that roots in the bottom sediments of water bodies. It produces shoots in spring from overwintering rhizomes. The plant usually dies back to its rhizomes in the autumn with cool weather (Klinkenberg, 2017).

Stem: Stems grow 2–5 metres long (Ontario's Invasives Species Awareness Program, 2016). Submersed shoots creep along the water surface with extensive branching from nodes and vertical growth of emergent stems that can extend up to 30 centimetres above the water surface (Wersal *et al*, 2018). In heavily infested water bodies, the emergent portions can be so dense that the water is not visible, and it appears as if you could walk on top of the plant (Murray, 2018).

Leaves: Leaves are feather-like and resemble small fir trees. They are whorled with 20 or more segments per leaf. The leaves are heterophyllous existing both above water (emergent) and below water (submerged). Emergent leaves have whorls of 4–6 leaves per node, are 2 to 5 centimeters long and appear bright green with a waxy surface (Dickinson & Royer, 2014). Submerged leaves are 1.5–3.5 centimetres long, have whorls of 3–6 leaves per node, and are more feathery and reddish in colour (Ontario's Invasives Species Awareness Program, 2016; Penn State Sea Grant, 2013 and DiTomaso and Kyser, 2013).

Flowers: Flowers are small (1.6 millimetres long) and inconspicuous with white spikes at the tips of emergent shoots (Wersal *et al*, 2018). Flowers usually appear in spring or summer but sometimes in fall (Wersal *et al*. 2018).

Fruits: North American plants are all female and do not produce fruit (Dickinson & Royer, 2014).

The following photos show parrot's feather plant parts.



Emergent leaves

CREDIT: GRAVES LOVELL, ALABAMA DEPARTMENT OF CONSERVATION AND NATURAL RESOURCES, BUGWOOD.ORG



Portions of submerged stems

CREDIT: CITY OF RICHMOND



CREDIT: VILSESKOGEN VIA FLICKR

SIMILAR SPECIES

Several aquatic plants resemble parrot's feather in form and habitat, but they all lack upright stems above the surface water. Ten species of *Myriophyllum*, including parrot's feather, have been found in the Pacific Northwest (Williams *et al*, 2018) as outlined below.

NATIVE *MYRIOPHYLLUM*

1. Cut-leaf water-milfoil (*Myriophyllum pinnatum*) – dark green stems and foliage; whorls of 3 to 5 leaves per node; winter buds are absent.

2. Farwell's water-milfoil (*Myriophyllum farwellii*) – often over looked as it grows deep at the bottom of lakes; whorls of 3 to 6 leaves per node; winter buds are absent.

3. Western water-milfoil (*Myriophyllum hippuroides*) – appears deep green in color; whorls of 4 to 6 leaves per node, with some additional alternate leaves scattered outside the whorls.

4. Siberian water-milfoil (*Myriophyllum sibiricum*) – whitish stems; whorls of 3 or 4 leaves per node, mostly 1 centimetre or more apart; well-developed winter buds are present.

5. Ussurian water-milfoil (*Myriophyllum ussuriens*) – emergent leaves are opposite or in whorls of 3; threadlike winter buds are present on leaf axis.

6. Whorl-Leaf water-milfoil (*Myriophyllum verticillatum*) – whorls of 4 or 5 leaves per node; leaves usually have myriophylloid glands at the base of the lower segments; winter buds are present.

NON NATIVE *MYRIOPHYLLUM*

7. Eurasian water milfoil (*Myriophyllum spicatum*) – plant is reddish-brown in color; whorls of 3 to 5 leaves per node, mostly 1 centimetre apart or more on stem; 14–21 leaflet pairs per leaf, which is more than Parrot's feather and native milfoils; winter buds are absent. This species is also highly invasive in British Columbia.

8. Variable leaf water-milfoil (*Myriophyllum heterophyllum*) – whitish stems; whorls of 4–6 leaves per node.

9. Andean water-milfoil (*Myriophyllum quitense*) – lower leaves are reduced to bract-like structures; strong whitish roots; winter buds are absent.

Parrot's feather may also be confused with Brazilian elodea (*Egeria densa*), which is native to South America and also invasive in British Columbia. It has been confirmed in two water bodies in British Columbia – a City of Richmond drainage waterway and Glen Lake in Langford. Brazilian elodea is recognized by the provincial government as an Early Detection Rapid Response (EDRR) candidate species (IMISWG, n.d.). It can be distinguished from parrot's feather by its finely serrated, bright green leaves arranged in whorls of 4 leaves per node. Its leaves are spaced by short internodes giving a 'leafy' appearance. Brazilian elodea is usually submerged, but can form dense mats on the surface of water. In the spring and summer, Brazilian elodea blooms with small, white, three-petal flowers that float on top of the water or slightly above (City of Richmond, 2018; IMISWG, n.d.).



Eurasian water milfoil (*Myriophyllum spicatum*)
CREDIT: ALISON FOX, UNIVERSITY OF FLORIDA, BUGWOOD.ORG

Parrot's feather may also be confused with the many *Potamogeton* (pondweed) species that grow in British Columbia, that have entirely submersed leaves.



Brazilian elodea (*Egeria densa*)
CREDIT: ROBERT VIDÉKI, DORONICUM KFT., BUGWOOD.ORG

Tracking

The Provincial government maintains the Invasive Alien Plant Program (IAPP) application (British Columbia Ministry of Forests, Lands and Natural Resource Operations and Rural Development, 2017), which houses information pertaining to invasive plant surveys, treatments, and monitoring. Many agencies, including local governments, have their own internal invasive species inventory and mapping protocols that are used by staff, contractors and, in some cases, the public. Agencies in British Columbia that do not enter data into IAPP are encouraged to check it regularly because it contains public reports and data from other agencies and it is important to consider as much data as possible when making management decisions. The Map Display module of IAPP is publicly accessible.

When carrying out parrot's feather inventory, it is useful to record the following information as it will later inform treatment plans (adapted from Raincoast Applied Ecology, 2016):

- Geographic location,
- Size and density of infestation,
- Photo of the infestation,
- Location in relation to nearby areas and water bodies that may be at risk to new invasions, and
- Location of wetlands connected to infested sites by public access routes and boat launch sites.

Reporting

Please report parrot's feather occurrences to:

- The Provincial Report Invasives program (via smart phone app www.gov.bc.ca/invasive-species).
- The Invasive Species Council of Metro Vancouver: 1-604-880-8358 or www.iscmv.ca.
- The municipality where the parrot's feather was found.
- The landowner directly – If the landowner is unknown, the Invasive Species Council of Metro Vancouver can provide support to identify the appropriate authority.

Reports submitted through these channels are reviewed by invasive species specialists who coordinate follow-up activities when necessary with the appropriate local authorities.

Prevention and Control Strategies

Effective invasive plant management may include a variety of control techniques ranging from prevention, chemical, manual, mechanical, biological and/or cultural methods. Each method is described below in order of effectiveness.

Since parrot's feather has the ability to reproduce vegetatively through root and stem tissues, management options must be carefully evaluated on a site by site basis to avoid further spread and complications. Eradication of this plant typically requires a dedicated, multi-year, planned approach. Follow-up monitoring and treatment will be required for several years regardless of the treatment technique.

STRATEGY COLOUR LEGEND

GREEN: RECOMMENDED

ORANGE: CAUTION

RED: NOT RECOMMENDED OR NOT AVAILABLE

PREVENTION: IMPERATIVE

Prevention is the most economical and effective way to reduce the spread of parrot's feather over the long term. Below are some simple actions that can be carried out to prevent the introduction and spread of parrot's feather.

- Parrot's feather should not be purchased, traded or grown. Instead, use non-invasive plants that are naturally adapted to the local environment. Grow Me Instead and the Restoration section provide recommendations for non-invasive species to use in aquariums and water gardens.
- It is illegal to release plants and animals into the wild, or dump aquarium or water garden debris into rivers, streams, lakes or storm sewers. See the Disposal section of this document for appropriate disposal locations or inquire with staff at the location where the parrot's feather was purchased.
- Plants, plant parts and mud should be cleaned from boats and fishing gear. Any items that can hold water (e.g. buckets, wells, bilge and ballast) should be drained onto dry land. All items should be completely dried before use at another water body or site. All machinery or equipment that is used for parrot's feather management or used in areas infested with parrot's feather should also be cleaned. See Cleaning and Disinfection section below.
- Special care should be taken when controlling parrot's feather to prevent the movement of plant parts downstream.



Excavation of parrot's feather in ditches in Richmond

CREDIT: CITY OF RICHMOND

MECHANICAL/MANUAL: RECOMMENDED

Manual control should be carried out with extreme caution due to the likelihood of spread through root and stem fragments. Mechanical control is a time-consuming treatment option that will require dedication to frequent removals over numerous years. Treated sites should be surveyed in spring (March), summer (June), and early fall (October) to identify re-occurring infestations. Any necessary in-water work permits should be acquired from the appropriate authorizing organizations.

APPLYING MANUAL/MECHANICAL CONTROL METHODS IN RIPARIAN AREAS

Schedule removal works during a period of least risk to fish species, outside of the fish window. Adhere to Provincial and Federal riparian regulations. It is recommended to consult with a qualified environmental professional when working around water bodies.

Care should be taken to restrict the downstream movement of stem fragments that will result from cutting operations as regrowth is rapid from this type of propagule. Containment of plant parts during manual/mechanical treatments is critical, particularly during excavation (Ministry of Environment and Climate Change Strategy, 2018; Raincoast Applied Ecology, 2016). The following **containment procedures** are recommended. A qualified environmental professional should oversee and monitor this work if there is risk of amphibians, fish or other species getting trapped in the contained area.

- For small infestations (i.e., ditches or canals), a hardware cloth screen (1/4" mesh) should be installed at the upstream and downstream ends of the treatment area. The screen must be left in place for 1 to 5 days following completion of the work and cleaned following management activities (see Cleaning and Disinfection section below). These procedures may require use of a boat.
- For larger watercourses, a flexible floating net with lead-line should be used to contain the treatment area. In most cases, the net should be installed at the downstream end of the site. The net must be cleaned following excavation and left it in place for 1 to 5 days (if possible).
- During management activities, visual searches of the area should be conducted and any fragments hand-picked or netted. This may require use of a boat. Note that emergent fragments have higher regeneration capacity, so capture of these fragments is more important than submerged fragments (Xie *et al*, 2018).

Chances of success will improve if several of the following manual/mechanical techniques are used in combination. The City of Richmond has been carrying out parrot's feather management trials since 2011 using various methods including frost treatments, excavation, shade treatments and benthic barriers (geotextile) (Tillyer, 2018). From these trials, the treatment methods that showed the most promise for control of parrot's feather were excavation followed by overhead shading, or benthic barrier placement over the infested substrate (Hesketh, 2017).



Bucket with a thumb



Side-cast compost of parrot's feather onto the bank of No. 3 Road Slough, Chilliwack

CREDIT: DAVID BLAIR, CITY OF CHILLIWACK

EXCAVATION/DREDGING

The removal of stems, roots, and contaminated sediments from the bottom of lakes, rivers, harbours, and other water bodies is possible using an excavator. Excavation should happen in March when overwintering stems are visible as surface mats, with follow up treatment in June or July during full growth (Raincoast Applied Ecology, 2016). It is best to use a standard cleaning bucket thumb on the excavator. The excavator operator should be clearly briefed to understand the purpose of the work and to ensure that fragmentation is avoided. It is advisable to have an expert onsite supervising the work. Water levels must be < 0.5 metres deep during excavation so may require drawing down water (see Cultural Control section below). Remove at least 15–25 centimetres of the infested sediment to eliminate regrowth (DiTomaso *et al*, 2013).

This management technique may be more successful if used after another manual removal method or followed by overhead shading placed over the infested substrate (see Cultural Control section below) (Hesketh, 2017).

Excavation is expensive and is best suited for large infestations and projects. It may alter water body characteristics, by increasing turbidity or generating plant fragments that may regrow or disperse downstream. It is critical to follow the containment procedures outlined above, as a targeted activity or in conjunction with regular maintenance operations (e.g., ditch maintenance) (Raincoast Applied Ecology, 2016).

While using these methods, the excavated material should be examined for the presence of aquatic organisms (such as salamanders), which should be released back into the site.

The City of Chilliwack saw good success after excavation of parrot's feather at the No. 3 Road Slough (Blair, 2019). Excavated plant material was side-cast in a manner to prevent its re-release into the channel (see photo on previous page) and allowed to compost. Thorough collection and disposal of all floating plant fragments was undertaken downstream of the excavation. Excavated plant material was subjected to sub-zero temperatures in the evenings (Blair, 2019). After 6 weeks, the project yielded a decrease in parrot's feather and improved habitat conditions for waterfowl. The site will continue to be monitored (Blair, 2019).

HAND PULLING

Pulling by hand can be effective for small areas; however, it is labour intensive and care must be taken to remove entire plants including emergent shoots, submersed shoots, roots and rhizomes, as well as all fragments, or regrowth will occur. This method may not be possible at sites where the entire water column is not accessible.

HARVESTING

Harvesting is carried out with a floating harvester machine that contains a cutting mechanism and hydraulic lifts for raising and lowering the cutting depth. Once the weeds are cut, a steel conveyor mesh carries the weeds on board to a holding area beneath the operator's platform. A conveyor in the rear of the vessel off-loads the collected plant matter on-shore where it is left to dewater and then be loaded and trucked away (SOLitude Lake Management, 2017). Harvesting can be effective for larger sites, however, it can be expensive and care must be taken to remove the entire plant including emergent shoots, submersed shoots, roots and rhizomes, as well as all fragments or regrowth will occur. Harvesting has not been used as a treatment method in British Columbia for parrot's feather. However, it has been used in the Okanagan for "cosmetic control" of Eurasian milfoil in large lakes, although it is not the most effective method used for that species (Okanagan Basin Water Board, 2018).



Harvester used to remove aquatic plants from the surface of Burnaby Lake

CREDIT: I. LAU

CULTURAL: CAUTION

SHADING

The shading method is effective for narrow and shallow water courses that can be easily covered. Wersal (2010) found that parrot's feather biomass can be reduced in 70% shade. Growth can be suppressed by placing a permeable shade cloth or other synthetic barrier to light (e.g., plastic or Tac150) over the infestation. Covering materials can be installed as surface layers, on frames over actively growing plants or following excavation to prevent regrowth (Raincoast Applied Ecology, 2016). The shading technique was tested in the City of Richmond along drainage ditches in 2015 and has reduced the parrot's feather biomass significantly. However, construction and installation of shading structures is expensive and time consuming and is therefore unsuitable for large infestations.



Shading trial over parrot's feather infested ditches in the City of Richmond

CREDIT: CITY OF RICHMOND

BENTHIC BARRIER

A benthic barrier (also known as benthic mat/weed mat/bottom screen) is a mat that can be placed at the bottom of a body of water to prevent or inhibit the growth of plants through shading and smothering. It consists of a dark fabric/material that blocks sunlight and is held against the bottom by weights.

Benthic barrier material must be gas permeable to remain anchored (Wayne County, 2018). For example, plastic or Tac150 can be secured with 10' sections of 3/8" rebar. Other suitable bottom screen materials include densely woven synthetics, landscaping fabric, geotextiles, plastics and nylon tarp. The City of Richmond uses the product 'Nilex 4553' (Tillyer, 2018). It is important to ensure that the entire area, including channel banks, is covered by the material since parrot's feather often persists along the margin of treatment areas and colonizes open water above the fabric (Raincoast Applied Ecology, 2016). Where possible, use a single continuous piece of textile to avoid seams, as areas of overlap can be exploited by parrot's feather rhizomes (Tillyer, 2018). If multiple pieces are required, use extra-large areas of overlap and an accordion fold system to make seams as impermeable as possible (Tillyer, 2018).

Although this method is effective and relatively inexpensive, it is not suitable for large water bodies and it may impact non-target sediment-dependent species, including native aquatic plants and bottom dwelling organisms (Wayne County, 2018).

RIPARIAN REFORESTATION

Re-planting riparian areas with non-invasive species can create shade and reduce parrot's feather growth. Optimal parrot's feather growth occurs in intermediate light intensities, particularly 30% shade. This method typically takes 5 to 10 years of growth to be effective (Raincoast Applied Ecology, 2016).

The City of Pitt Meadows undertook a riparian planting project along Katzie Slough in October 2018 (including willow live-staking) where parrot's feather is prolific (Sloboda, 2019). One of the objectives of the project is to shade out parrot's feather; the site will be monitored in subsequent years to determine success of this method (Sloboda, 2019).

CASE STUDY: SERPENTINE WILDLIFE MANAGEMENT AREA

Around 2012, parrot's feather was first observed by Ducks Unlimited Canada (DUC) staff at the Serpentine Wildlife Management Area (WMA) in Surrey. By 2014, the invasive aquatic plant had begun to dominate one segment of this wetland complex. The Serpentine WMA was agricultural land that has been restored to a series of wetland compartments that can be isolated and their water levels managed through a series of drainage ditches, water control structures and a pump, which draws fresh water from the landward side of the Serpentine Sea Dam.

Beginning in 2014, DUC staff began turning off the pump that feeds water into the segment in which parrot's feather had begun to dominate. The segment dried out naturally during summer months and rainfall refilled it during fall, winter and spring. This new hydrological regime, mimicking a natural coastal ephemeral wetland, resulted in a dramatic decline in parrot's feather at the Serpentine WMA. However, in deeper ditches and shaded areas where the soil moisture remained, the plant has maintained its stronghold.

Each subsequent year of drawdown has further reduced the extent of parrot's feather, even in areas where moisture remains. Maintaining the lowest possible water levels during winter freezing (December/January) has also been attempted as a part of control efforts but it is hard to determine whether this has significantly contributed to the reduction achieved to date. The next steps will be to continue monitoring annual reductions and to introduce either mechanical removal and/or the benthic barrier approach. The drying out of the wetland seasonally has had co-benefits of managing invasive bullfrogs as well as increasing the abundance of native smartweed (Polygonum spp.), a waterfowl superfood.



Parrot's feather in the Serpentine Wildlife Management Area in October 2014

CREDIT: DUCKS UNLIMITED CANADA



October 2016 after two summers of allowing the wetland to dry out

CREDIT: DUCKS UNLIMITED CANADA

WATER DRAWDOWN

This method involves controlling the water table at the infested site, thereby exposing sediments and plant roots to prolonged drying or freezing. A qualified environmental professional should oversee and monitor this work if there are amphibians, fish or other species present at the site.

- **Water Drawdown via Drying**: Low water levels will expose the plants to desiccation and can ultimately affect plant vascular structure, rendering the plant incapable of nutrient transport and function. When the water level is again raised, these previously anchored plant structures will often float downstream, or they can be hand-removed (New Hampshire Department of Environmental Services, 2010). A drawdown lasting more than 3 months, or consecutive drawdown events, may result in complete control of parrot's feather, if the sediments remain completely dry (Wersal, 2010).

  At sites where drawdown is possible by controlling water levels, it is a relatively inexpensive control method. However, it is also unpredictable, and may cause some undesirable species to increase in abundance. Parrot's feather is well adapted to drawdown and flooding events and success of this method depends on the site, exact water depth and length of drawdown operation (Wersal & Madsen, 2011). Further, drawdown is non-selective and will result in the removal/death of aquatic invertebrates and fish, and the loss of use of the water body for the duration of the drawdown. To mitigate potential losses of submersed plants, fish, and invertebrates, a partial drawdown may be used to expose parrot's feather growing along the shoreline of a water body (Wersal, 2010).

- **Water Drawdown via Freezing**: Freezing temperatures and lake sediments can damage the structure and integrity of the vegetative material. Scouring action of ice moving over the exposed water body bed will force tubers and rooting systems from the substrate. While this method can impact parrot's feather survival, it is considered a passive method as it is unpredictable and uncontrollable.

TARGETED GRAZING

Although cattle and waterfowl may graze the shoots of parrot's feather, placing livestock in waterbodies has significant logistical challenges and negative consequences on water quality and aquatic habitat, and therefore parrot's feather is unsuitable for control by targeted grazing (Miller, Tarasoff & Salmon, 2021).

FLOODING

Although parrot's feather is adaptable to flooding events, it will not thrive in sustained deep flood conditions, as without the emergent vegetation it cannot photosynthesize well (Wersal & Madsen, 2011). It is unclear what kind of flooding event is most conducive to parrot's feather management. Understanding that parrot's feather growth is limited in deeper water may be more useful as a predictor for where this species will grow, rather than as a management technique (Wersal & Madsen, 2011).

CONVERSION TO VEGETATED MARSH

Parrot's feather prefers open, sunny habitats and does not compete well with taller vegetation such as cattails and trees. Decreasing the water depth to 30 centimetres (summer depth) will encourage growth of taller emergent species that may eventually outcompete parrot's feather (Raincoast Applied Ecology, 2016). This method may reduce open water and habitat for fish and other aquatic species, and may also reduce flow (Raincoast Applied Ecology, 2016). This conversion method has not been tested in Metro Vancouver and is probably not a suitable management strategy for many parrot's feather infestations in this region.

CHEMICAL: NOT RECOMMENDED

When alternative methods to prevent or control invasive plants are unsuccessful, professionals often turn to herbicides, however, **herbicide application for parrot's feather is not recommended due to poor absorption and the potential risks to fish, amphibians, and other aquatic species**. It may also impact local water sources intended for human consumption (Raincoast Applied Ecology, 2016). The following section provides more details about the regulations and complexity of using this control method.

With the exception of substances listed on Schedule 2 of the Integrated Pest Management Regulation, the use of herbicides is highly regulated in British Columbia. Site characteristics, goals, objectives and legal requirements must be considered when prescribing a herbicide. This summary of the *Integrated Pest Management Act* provides an overview of the provincial legislation.

In Canada, there is one registered herbicide labeled for parrot's feather control in water bodies. It is a restricted herbicide which means it can only be used under certain circumstances by specially trained individuals and it is not available to the general public (most pesticides intended for aquatic application are designated "Restricted" under the federal classification system). In British Columbia, Section 14(1)(b) of the *Integrated Pest Management Act* requires anyone using a restricted class product to hold a certificate issued. In British Columbia, it requires either approval or a permit depending on the status of the waterbody.

Herbicide could be used in combination with the drawdown method. After drawdown, the parrot's feather would likely be active for the first few days and herbicide treatment with a glyphosate product (approved for terrestrial use) would be effective (Ralph, 2019). The drawdown would need to remain in place long enough to ensure maximum translocation of the herbicide to the root tips (Ralph, 2019). This period of time would depend on a number of factors including weather (Ralph, 2019). This method also requires a special permit due to the proximity of herbicide use near water (see below).

PESTICIDE LICENCE AND CERTIFICATION

A valid pesticide license is required to:

- offer a service to apply most pesticides;
- apply most pesticides on public land including local government lands1; water bodies;

Pesticides (e.g., herbicides, insecticides, fungicides) are regulated by the federal and provincial government, and municipal governments often have pesticide bylaws.

- Health Canada evaluates and approves chemical pest control products as per the *Pest Control Products Act*.
- The *Integrated Pest Management Act* sets out the requirements for the use and sale of pesticides in British Columbia. This Act is administered by the Ministry of Environment and Climate Change Strategy'.
- Several municipalities have adopted bylaws which prohibit the use of certain pesticides.

Everyone who uses pesticides must be familiar with all relevant laws.

1 on up to 50 ha/year by a single organization. Organizations looking to treat over 50 hectares of land per year are also required to submit a Pest Management Plan and obtain a Pesticide Use Notice confirmation.

HERBICIDE APPLICATION IN AQUATIC SYSTEMS IN BRITISH COLUMBIA

In British Columbia, application of pesticides in water for invasive plants management may require an authorization under the *Integrated Pest Management Act*. Most applications to bodies of water require a pesticide use permit (PUP). Since bodies of water are owned by the province, all decisions regarding potential pesticide use must be made by a responsible member of the provincial government (or delegate). "Self-contained" filtration ponds and ditches may or may not be considered bodies of water (Mullan, 2018). The term is results-based and considers the likelihood that pesticide-treated water can reach rivers, streams or aquifers.

Proponents looking to apply herbicide in water should first contact Integrated Pest Management Program Telephone: (250) 387-9537 or Email: bc.ipm@gov.bc.ca. If the provincial government deems a permit is required, the proponent (owner/land manager) must apply for a PUP and the application fee of $1,000. Proponents must also conduct public and First Nation consultation. Once all parties have been satisfactorily consulted and all requirements of the permit have been met, the province may issue a PUP for a maximum of 3 years. Issuance is a legal decision, but can be appealed. ONLY companies or practitioners with a valid Pesticide License and staff who are certified applicators (or trained assistant applicators working under a certified applicator) may apply the herbicide.

HERBICIDE LABELS

Prior to each use, herbicide labels must be reviewed thoroughly to ensure precautions, application rates, all use directions, site characteristics are known and application directions strictly followed. Other label information includes trade or product name, formulation, class, purpose, registration number, precautionary symbols and what to do in order to protect the health and safety of both the applicator and public. (British Columbia Ministry of Environment and Climate Change Strategy, 2011).

Under the Federal *Pest Control Products Act* and the Provincial Integrated Pest Management Regulation, **persons are legally required to use pesticides (including herbicides) only for the use described on the label and in accordance with the instructions on that label**. Failure to follow label directions could cause damage to the environment, poor control results, or danger to health. Contravention of laws and regulations may lead to cancellation or suspension of a license or certification, requirement to obtain a qualified monitor to assess work, additional reporting requirements, a stop work order, or prohibition from acquiring authorization in the future. A conviction of an offence under legislation may also carry a fine or imprisonment.

Labels are also available from the Pest Management Regulatory Agency's online pesticide label search or mobile application as a separate document. These label documents may include booklets or material safety data sheets (MSDS) that provide additional information about a pesticide product. Restrictions on site conditions, soil types, and proximity to water may be listed. If the herbicide label is more restrictive than provincial legislation, the label must be followed.

HERBICIDE OPTIONS

Only diquat (e.g. Reward© Aquatic Herbicide), is registered in Canada for general aquatic use, with parrot's feather identified as a target species. It is a contact herbicide that will kill the vegetation it comes in contact with, but significant regrowth is common. **It is a restricted herbicide and in British Columbia it requires either approval or a permit depending on the status of the water body.**

In British Columbia, other aquatic herbicides are currently only permitted under "emergency registration" from Health Canada. Recent emergency registrations have been granted to glyphosate and imazapyr (R.D. Breckels, B.W. Kilgour, 2018). However, glyphosate is generally not recommended for parrot's feather control, as this herbicide only kills emergent shoots and plants often regrow in

greater densities. The use of imazapyr has been evaluated on small infestations with excellent and moderate results (Wersal, 2010). In the United States there are formulations of glyphosate and imazapyr registered for use in aquatic systems, but no formulations are currently registered for aquatic use in Canada.

BIOLOGICAL: NOT AVAILABLE

At present, there are no approved biological control measures for parrot's feather in British Columbia (Wersal, 2010); however, a number of biological agents have been evaluated outside of Canada for parrot's feather management. These include *Lysathia* species and *Listronotus marginicollis*, leaf-feeding insects that reduce emergent shoot biomass in the plant's native range and *Pithium carolinianum*, a fungal pathogen that causes root and stem rot and decrease overall plant integrity (DiTomaso *et al*, 2013; Raincoast Applied Ecology, 2016).



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CONTROL SUMMARY

The following table provides a summary and comparison of control methods for parrot's feather.

CONTROL STRATEGY	TECHNIQUES	APPLICABLE SITE TYPE	PROS	CONS
Mechanical	**Excavation/ dredging**	Large scale infestations	Moderate control, particularly after manual removal	Expensive; may alter characteristics of water body; disturbance creates fragments spreading; can be successful if used in combination with other methods
Manual	**Hand Pulling**	Small scale infestations	Inexpensive	Labor intensive; disturbance creates fragments
	Harvesting	Small infestations	Moderate control	Expensive; requires specialized equipment; may alter characteristics of water body; disturbance creates fragments
Cultural	**Shading**	Small infestations	Offers moderate control	Need 70% or more shade to reduce biomass; construction of the shading structures is expensive and time consuming
	Benthic Barrier	Small to moderate scale infestations	Effective; inexpensive	Non-selective; can affect other species, including aquatic invertebrates
	Riparian Reforestation	Large scale infestations	Inexpensive	Reduces open water and habitat for other species, may reduce flow; takes a long time for adequate growth to shade water body/infestation
	Water Drawdown	Large scale infestations	Inexpensive	Must be dry; parrot's feather may tolerate drawdowns lasting 9+ months if sediment remains moist; non-selective and can affect other species; not possible for all sites
	Flooding	Large scale infestations	Inexpensive	Non-selective and can affect other species; not possible for all sites
	Conversion to Vegetative Marsh	Large scale infestations	Inexpensive	Reduces open water and habitat for other species; may reduce flow; takes a long time for adequate growth to shade water body/infestation

CONTROL STRATEGY	TECHNIQUES	APPLICABLE SITE TYPE	PROS	CONS
Chemical	**Herbicide Application (diquat)**	New growth	Offers moderate control	Restricted herbicide, requires either approval or permit; unintended environmental/health impact, high public concern, requires trained staff and special permits; may observe re-growth; subsurface application may result in fragmentation; may not kill submerged vegetation or rhizomes
Biological	**No biological control agents are currently available in British Columbia**			

CONTROL SUMMARY COLOUR LEGEND

GREEN: RECOMMENDED

ORANGE: CAUTION

RED: NOT RECOMMENDED OR NOT AVAILABLE

Disposal

ON SITE DISPOSAL

Since parrot's feather does not spread from seeds or colonize terrestrial areas, it can be composted. Biomass can also be disposed on-site (dumped within grassy areas or other locations at least 5 metres from watercourses and outside of wet soils) (Raincoast Applied Ecology, 2016). Ensure that plant material cannot be washed back into a water body during rain.

OFF SITE DISPOSAL

When disposing off site, transport plant parts on tarps or in thick plastic bags to an appropriate disposal or compost facility. In the Metro Vancouver region, several facilities accept parrot's feather plants and/or infested sediments. Please consult this disposal facility list for current details.

PLEASE CONTACT ALL FACILITIES BEFOREHAND TO CONFIRM THEY CAN PROPERLY HANDLE THE MATERIAL.

CLEANING AND DISINFECTION[2]

Before leaving a site, all visible plant parts and soil from vehicles, equipment, and gear should be removed and rinsed if possible. When back at a works yard or wash station, vehicles should be cleaned and disinfected using the following steps:

- Wash with 180 °F water at 6 gpm, 2000 psi*, with a contact time of ≥ 10 seconds on all surfaces to remove dirt and organic matter such as vegetation parts or seeds. Pay special attention to undercarriages, chassis, wheel-wells, radiators, grills, tracks, buckets, chip-boxes, blades, and flail-mowing chains.

2 Adapted from Metro Vancouver 2017 Water Services Equipment Cleaning Procedures and Inspection Protocols.

- Use compressed air to remove vegetation from grills and radiators.
- Sweep/vacuum interior of vehicles paying special attention to floor mats, pedals, and seats.
- Steam clean poor access areas (e.g., inside trailer tubes) – 200 psi @ 300 °F.
- Fully rinse detergent residue from equipment prior to leaving facility.

* Appropriate self-serve and mobile hot power-wash companies in the Metro Vancouver area include: Omega Power Washing, Eco Klean Truck Wash, RG Truck Wash, Ravens Mobile Pressure Washing, Hydrotech Powerwashing, Platinum Pressure Washing Inc, and Alblaster Pressure Washing. Water bodies neighboring wash stations should be monitored regularly for Parrot's feather growth.

Follow-up Monitoring

Whatever control method is used, follow-up monitoring and maintenance treatments are components of an integrated management plan or approach. Parrot's feather infestations should be monitored to track treatment success. This should include location (GPS coordinates), patch size or segment length (square meters), treatment history (dates and methods), and site photos (upstream and downstream views) (Raincoast Applied Ecology, 2016).

Restoration

Restoration is recommended to create competition, control parrot's feather regrowth and replace lost habitat. River pump sand should be used to restore the ditch elevation following excavation. Use of shade or bottom fabric is not recommended after a treatment regime because it does not provide full coverage of ditch margins and culvert inlets, conflicts with future channel maintenance, and is expensive to purchase and install. This strategy requires regular monitoring and repeated excavation by hand and machine (Raincoast Applied Ecology, 2016).

Species must be prescribed based on the ecology of the site and should be determined by a qualified environmental professional who has experience working in aquatic ecosystems. Local biologists, environmental professionals, native and domestic forage specialists, and plant nurseries are all good sources for localized recommendations for regional native species and regionally adapted domestic species, based on site usage. There are several science-based resources available to guide restoration efforts, such as the South Coast Conservation Program's Diversity by Design restoration planning toolkit.

Examples of competitive aquatic species that may be planted at parrot's feather restoration sites are listed below.

AQUATIC PLANTS		
Bull rush	Cattail	Floating-leaved pondweed
Yellow pond lily	White water-buttercup	Robbin's pondweed

Parrot's feather sites are often found in areas with existing, or potential, wildlife populations (e.g. deer, beaver, muskrat, vole, etc.) that can damage restoration plantings. Therefore, any revegetation plan must consider impacts from wildlife and utilize appropriate mitigation measures to protect the restoration and existing native plantings (tree wrapping, exclusion caging/fencing, vole guards, etc.).

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Additional Resources

For more information please refer to the following resources.

- British Columbia Ministry of Forests, Lands, Natural Resources Operations and Rural Development, Invasive Alien Plant Program (IAPP). www.gov.bc.ca/invasive-species
- E-Flora BC, an Electronic Atlas of the Plants of British Columbia. www.eflora.bc.ca/
- GrowGreen Guide. www.growgreenguide.ca
- Grow Me Instead. http://bcinvasives.ca/resources/programs/plant-wise/
- Invasive Species Council of British Columbia Parrot's Feather Factsheet. https://bcinvasives.ca/wp-content/uploads/2021/01/Parrots-Feather_Factsheet_04_22_2019.pdf
- Pesticides and Pest Management. Province of British Columbia https://www2.gov.bc.ca/gov/content/environment/pesticides-pest-management

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