PROPOSED

Species at Risk Act
Management Plan Series
Adopted under Section 69 of SARA

Management Plan for the Tiny Tassel (*Crossidium seriatum*) in Canada

Tiny Tassel

2021

Government of Canada
Gouvernement du Canada

Canada

Recommended citation:

Environment and Climate Change Canada. 2021. Management Plan for the Tiny Tassel (*Crossidium seriatum*) in Canada [Proposed]. *Species at Risk Act* Management Plan Series. Environment and Climate Change Canada, Ottawa. 2 parts, 4 pp. + 17 pp.

Official version

The official version of the recovery documents is the one published in PDF. All hyperlinks were valid as of date of publication.

Non-official version

The non-official version of the recovery documents is published in HTML format and all hyperlinks were valid as of date of publication.

For copies of the management plan, or for additional information on species at risk, including the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) Status Reports, residence descriptions, action plans, and other related recovery documents, please visit the Species at Risk (SAR) Public Registry[1].

Cover illustration: © Terry McIntosh

Également disponible en français sous le titre
« Plan de gestion du petit pompon (*Crossidium seriatum*) au Canada [Proposition] »

ISBN
Catalogue no.

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[1] www.canada.ca/en/environment-climate-change/services/species-risk-public-registry.html

MANAGEMENT PLAN FOR THE TINY TASSEL (*Crossidium seriatum*) IN CANADA

2021

Under the Accord for the Protection of Species at Risk (1996), the federal, provincial, and territorial governments agreed to work together on legislation, programs, and policies to protect wildlife species at risk throughout Canada.

In the spirit of cooperation of the Accord, the Government of British Columbia has given permission to the Government of Canada to adopt the *Management Plan for Tiny Tassel (*Crossidium seriatum*) in British Columbia* (Part 2) under Section 69 of the *Species at Risk Act* (SARA). Environment and Climate Change Canada has included a federal addition (Part 1) which completes the SARA requirements for this management plan.

The federal management plan for the Tiny Tassel in Canada consists of two parts:

Part 1 – Federal Addition to the *Management Plan for Tiny Tassel (*Crossidium seriatum*) in British Columbia*, prepared by Environment and Climate Change Canada.

Part 2 – *Management Plan for Tiny Tassel (*Crossidium seriatum*) in British Columbia*, prepared by the British Columbia Ministry of Environment.

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Part 1 – Federal Addition to the *Management Plan for Tiny Tassel (*Crossidium seriatum*) in British Columbia*, prepared by Environment and Climate Change Canada

Preface

The federal, provincial, and territorial government signatories under the Accord for the Protection of Species at Risk (1996)[2] agreed to establish complementary legislation and programs that provide for effective protection of species at risk throughout Canada. Under the *Species at Risk Act* (S.C. 2002, c. 29) (SARA), the federal competent ministers are responsible for the preparation of management plans for listed species of special concern and are required to report on progress within five years after the publication of the final document on the Species at Risk Public Registry.

The Minister of Environment and Climate Change is the competent minister under SARA for the Tiny Tassel and has prepared the federal component of this management plan (Part 1), as per section 65 of SARA. To the extent possible, it has been prepared in cooperation with the British Columbia (B.C.) Ministry of Environment as per section 66(1) of SARA. SARA section 69 allows the Minister to adopt all or part of an existing plan for the species if the Minister is of the opinion that an existing plan relating to wildlife species includes adequate measures for the conservation of the species. The Province of B.C. provided the attached management plan for the Tiny Tassel (Part 2) as science advice to the jurisdictions responsible for managing the species in B.C. It was prepared in cooperation with Environment and Climate Change Canada.

Success in the conservation of this species depends on the commitment and cooperation of many different constituencies that will be involved in implementing the directions set out in this plan and will not be achieved by Environment and Climate Change Canada, or any other jurisdiction alone. All Canadians are invited to join in supporting and implementing this plan for the benefit of the Tiny Tassel and Canadian society as a whole.

Implementation of this management plan is subject to appropriations, priorities, and budgetary constraints of the participating jurisdictions and organizations.

[2] www.canada.ca/en/environment-climate-change/services/species-risk-act-accord-funding.html#2

Additions and Modifications to the Adopted Document

The following sections have been included to address specific requirements of the federal *Species at Risk Act* (SARA) that are not addressed in the *Management Plan for Tiny Tassel (*Crossidium seriatum*) in British Columbia* (Part 2 of this document, referred to henceforth as "the provincial management plan") and/or to provide updated or additional information.

Under SARA, prohibitions regarding the protection of species and their habitat do not apply to species of special concern. Conservation measures in the provincial management plan dealing with the protection of individuals and their habitat are still adopted to guide conservation efforts but would not result in federal legal protection.

1. Species Status Information

This section replaces information on the SARA legal designation for the Tiny Tassel in Canada in Section 2 of the provincial management plan.

The legal designation of the Tiny Tassel on SARA Schedule 1 is Special Concern (2019).

Table 1. Conservation Status of the Tiny Tassel (from NatureServe 2020[3], and B.C. Conservation Data Centre 2020).

Global (G) Rank*	National (N) Rank*	Sub-national (S) Rank*	COSEWIC Status	B.C. List
G2G4	Canada (N3)	British Columbia (S3)	Special Concern (2014)	Blue List**

*Rank 1– critically imperiled; 2– imperiled; 3- vulnerable to extirpation or extinction; 4- apparently secure; 5– secure.
** Blue List is defined by the B.C. Conservation Data Centre as "Any species or ecosystem that is of special concern."

2. Effects on the Environment and Other Species

A strategic environmental assessment (SEA) is conducted on all SARA recovery planning documents, in accordance with the *Cabinet Directive on the Environmental Assessment of Policy, Plan and Program Proposals*[4]. The purpose of a SEA is to incorporate environmental considerations into the development of public policies, plans, and program proposals to support environmentally sound decision-making and to

[3] NatureServe reported the Tiny Tassel to occur in Yukon Territory based on a collection by Terry McIntosh (in 2018). However, on further review and examination, the identity of that specimen is not considered to be Tiny Tassel but rather an unknown and possibly newly-discovered species in Canada (T. McIntosh, pers. comm., November 16, 2020).

[4] www.canada.ca/en/environmental-assessment-agency/programs/strategic-environmental-assessment/cabinet-directive-environmental-assessment-policy-plan-program-proposals.html

evaluate whether the outcomes of a recovery planning document could affect any component of the environment or any of the Federal Sustainable Development Strategy's[5] (FSDS) goals and targets.

Conservation planning is intended to benefit species at risk and biodiversity in general. However, it is recognized that implementation of management plans may also inadvertently lead to environmental effects beyond the intended benefits. The planning process based on national guidelines directly incorporates consideration of all environmental effects, with a particular focus on possible impacts upon non-target species or habitats. The results of the SEA are incorporated directly into the management plan itself, but are also summarized below in this statement.

The provincial management plan for the Tiny Tassel contains a section describing the effects of management activities on other species (i.e., Section 8). Environment and Climate Change Canada adopts this section of the provincial management plan as the statement on effects of management activities on the environment and other species. Management planning activities for the Tiny Tassel will be implemented with consideration for all co-occurring species at risk, such that any potential negative impacts to these species or their habitats are mitigated or avoided. Some management actions for the Tiny Tassel (e.g., inventory and habitat protection) may promote the conservation of other species at risk that overlap in distribution and rely on similar habitat attributes.

3. References

B.C. Conservation Data Centre. 2020. Species Summary: Crossidium seriatum. BC Species and Ecosystems Explorer. B.C. Ministry of Environment, Victoria B.C. Available: http://a100.gov.bc.ca/pub/eswp/ (Accessed December 15, 2020).

NatureServe. 2020. NatureServe Explorer [web application]. NatureServe, Arlington, Virginia. Available https://explorer.natureserve.org. Crossidium seriatum page: https://explorer.natureserve.org/Taxon/ELEMENT_GLOBAL.2.122670/Crossidium_seriatum (Accessed: December 15, 2020).

[5] www.fsds-sfdd.ca/en#/en/goals/

Part 2 – *Management Plan for Tiny Tassel (*Crossidium seriatum*) in British Columbia*, prepared by the British Columbia Ministry of Environment

Management Plan for tiny tassel (*Crossidium seriatum*) in British Columbia

Prepared by B.C. Ministry of Environment

BRITISH COLUMBIA

September 2016

About the British Columbia Management Plan Series

This series presents the management plans that are prepared as advice to the Province of British Columbia. The Province prepares management plans for species that may be at risk of becoming endangered or threatened due to sensitivity to human activities or natural events.

What is a management plan?

A management plan identifies a set of coordinated conservation activities and land use measures needed to ensure, at a minimum, that the target species does not become threatened or endangered. A management plan summarizes the best available science-based information on biology and threats to inform the development of a management framework. Management plans set goals and objectives, and recommend approaches appropriate for species or ecosystem conservation.

What's next?

Direction set in the management plan provides valuable information on threats and direction on conservation measures that may be used by individuals, communities, land users, conservationists, academics, and governments interested in species and ecosystem conservation.

For more information

To learn more about species at risk recovery in British Columbia, please visit the B.C. Recovery Planning webpage at:
<http://www2.gov.bc.ca/gov/content/environment/plants-animals-ecosystems/species-ecosystems-at-risk/recovery-planning>

Management Plan for tiny tassel (*Crossidium seriatum*) in British Columbia

Prepared by the B.C. Ministry of Environment

September 2016

Recommended citation

B.C. Ministry of Environment. 2016. Management Plan for tiny tassel (*Crossidium seriatum*) in British Columbia. B.C. Ministry of Environment, Victoria, BC. 17 pp.

Cover illustration/photograph

Terry McIntosh

Additional copies

Additional copies can be downloaded from the B.C. Recovery Planning webpage at:
<http://www2.gov.bc.ca/gov/content/environment/plants-animals-ecosystems/species-ecosystems-at-risk/recovery-planning>

Disclaimer

The British Columbia Ministry of Environment has prepared this management plan, as advice to the responsible jurisdictions and organizations that may be involved in managing the species.

This document identifies the management actions that are deemed necessary, based on the best available scientific and traditional information, to prevent tiny tassel populations in British Columbia from becoming endangered or threatened. Management actions to achieve the goals and objectives identified herein are subject to the priorities and budgetary constraints of participatory agencies and organizations. These goals, objectives, and management approaches may be modified in the future to accommodate new objectives and findings.

The responsible jurisdictions have had an opportunity to review this document. However, this document does not necessarily represent the official positions of the agencies or the personal views of all individuals.

Success in the conservation of this species depends on the commitment and cooperation of many different constituencies that may be involved in implementing the directions set out in this management plan. The B.C. Ministry of Environment encourages all British Columbians to participate in the conservation of tiny tassel.

ACKNOWLEDGEMENTS

This management plan was prepared by Brenda Costanzo (B.C. Ministry of Environment [MOE]). Additional assistance was provided by: Jenifer Penny and Marta Donovan (B.C. Conservation Data Centre); Jordan MacDonald, Peter Fielder, Dave Fraser, and Leah Westereng (MOE); Byron Woods (B.C. Ministry of Forests, Lands and Natural Resource Operations); and Marc Jones (PhD candidate, University of British Columbia, Okanagan Campus). Louise Blight and Orville Dyer (MOE), Kella Sadler and Matt Huntley (Environment and Climate Change Canada–Canadian Wildlife Service [ECCC–CWS), Pacific region), Marie-Andrée Carrière (ECCC–CWS, National Capital Region), Kim Borg (ECCC-CWS-National Capital Region), and Kirk Safford (BC Parks) provided additional comments.

EXECUTIVE SUMMARY

Tiny tassel (*Crossidium seriatum*) is a small (1–1.5 mm high) moss that is dark green to golden brown in colour. Individual leaves are 0.6–1.3 mm long by 0.3–0.6 mm wide with a rounded to slightly notched leaf tip. On the underside of the leaf, the midrib has filaments with rounded projections.

Tiny tassel was designated as Special Concern by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) because of its narrow range and threats of erosion related to recreational use of the habitat and maintenance of road cuts. It is not yet listed in Canada on Schedule 1 of the *Species at Risk Act* (SARA).[1] In British Columbia, tiny tassel is ranked S3 (vulnerable) by the Conservation Data Centre and is on the provincial Blue list. The B.C. Conservation Framework ranks tiny tassel as a priority #1 under goal #1 (contribute to global efforts for species and ecosystem conservation) and goal #3 (maintain the diversity of native species and ecosystems).

The management goal is to maintain all known extant populations and any future populations of tiny tassel that may be found in British Columbia.

The following are the management objectives:

1. To secure long-term protection[2] for the known populations and habitats of tiny tassel;
2. To determine the levels of real and potential threats to this species and its habitat and to mitigate their effects; and
3. To confirm the distribution of tiny tassel (including any new populations) and to reliably determine population trends through monitoring.

[1] The COSEWIC assessment will be reviewed by the Governor in Council who may, on the recommendation of the Minister, amend the List to include this species on Schedule 1 of SARA.

[2] Protection can be achieved through various mechanisms, including: voluntary stewardship agreements, conservation covenants, sale by willing vendors of private lands, land use designations, protected areas, and mitigation of threats.

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1 COSEWIC* SPECIES ASSESSMENT INFORMATION

Assessment Summary: November 2014
Common Name:[a] Tiny Tassel
Scientific Name:[a] *Crossidium seriatum*
Status: Special Concern
Reason for Designation: This very small moss has a very narrow range in Western Canada. It occurs only in the semiarid shrub steppe of four valleys in the Okanagan region of southernmost central British Columbia. Surveys have confirmed this species from only 20 sites on steep slopes associated with calcareous glacial lake deposits. Threats include erosion due to recreational use of the habitat, and maintenance of road cuts. Climate change may also be a threat, although the potential impacts are unknown. One site has been extirpated due to habitat conversion.
Occurrence: British Columbia
Status History: Designated Special Concern on November 2014.

* Committee on the Status of Endangered Wildlife in Canada.
[a] Common and scientific names reported in this management plan follow the naming conventions of the B.C. Conservation Data Centre, which may be different from names reported by COSEWIC.

2 SPECIES STATUS INFORMATION

Tiny tassel[a]		
Legal Designation:		
FRPA:[b] No OGAA:[b] No	B.C. *Wildlife Act:*[c] No	SARA:[d] No
Conservation Status[e]		
B.C. List: Blue B.C. Rank: S3 (2015) National Rank: N2N3 (2012) Global Rank: G2G4 (2009) Other Subnational Ranks:[f] State: Arizona (SNR), California (SNR), Nevada (S2), New Mexico (SNR)		
B.C. Conservation Framework (CF)[g]		
Goal 1: Contribute to global efforts for species and ecosystem conservation.		Priority:[h] #1 (2010)
Goal 2: Prevent species and ecosystems from becoming at risk.		Priority: #6 (2010)
Goal 3: Maintain the diversity of native species and ecosystems.		Priority: #1 (2010)
CF Action Groups:[g]	Inventory; Compile Status Report; List under *Wildlife Act*; Planning; Send to COSEWIC; Habitat Protection; Habitat Restoration; Private Land Stewardship	

[a] Data source: B.C. Conservation Data Centre (2016) unless otherwise noted.
[b] No = not listed in one of the categories of wildlife that requires special management attention to address the impacts of forestry and range activities on Crown land under the *Forest and Range Practices Act* (FRPA; Province of British Columbia 2002) and/or the impacts of oil and gas activities on Crown land under the *Oil and Gas Activities Act* (OGAA; Province of British Columbia 2008).
[c] No = not designated as wildlife under the B.C. *Wildlife Act* (Province of British Columbia 1982).
[d] No = not on any Schedules under the *Species at Risk Act* (SARA; Government of Canada 2002). The COSEWIC assessment will be reviewed by the Governor in Council who may, on the recommendation of the Minister, amend the List to include this species on Schedule 1 of the SARA.
[e] Red: Includes any indigenous species or subspecies that have, or are candidates for, Extirpated, Endangered, or Threatened status in British Columbia. Blue: Includes any indigenous species or subspecies considered to be of Special Concern (formerly Vulnerable) in British Columbia. S = subnational; N = national; G = global; T = refers to the subspecies level; B = breeding; X = presumed extirpated; H = possibly extirpated; 1 = critically imperiled; 2 = imperiled; 3 = special concern, vulnerable to extirpation or extinction; 4 = apparently secure; 5 = demonstrably widespread, abundant, and secure; NA = not applicable; NR = unranked; U = unrankable.
[f] Data source: NatureServe (2015).
[g] Data source: B.C. Ministry of Environment (2009).
[h] Six-level scale: Priority 1 (highest priority) through to Priority 6 (lowest priority).

3 SPECIES INFORMATION

3.1 Species Description

Tiny tassel (*Crossidium seriatum*) is a small (1–1.5 mm high) moss that is dark green to golden brown in colour. Individual leaves are 0.6–1.3 mm long by 0.3–0.6 mm wide with a rounded to slightly notched leaf tip. Leaf margins are rolled back from the tip to the leaf base. The midrib extends to a thin hair point at the leaf tip. On the underside of the leaf, the midrib has filaments with rounded projections. Capsules are 1.5–2.3 mm long and cylindrical in shape with a conical operculum (covering of the capsule). Spores are 11–13µm in diameter (COSEWIC 2014).

3.2 Populations and Distribution

3.2.1 Distribution

Tiny tassel is a shrub–steppe species from the arid regions of western North America (Figure 1), including sagebrush, grassland, and desert habitats. In Canada, it is mainly found in south-central British Columbia in the shrub–steppe habitats in the Fraser, Thompson, Nicola, and Okanagan river valleys (Figure 2), usually on steep silty bluffs. Occurrences are found within the very dry, hot Ponderosa Pine or Bunchgrass biogeoclimatic zones of British Columbia.

3.2.2 Population Size

The B.C. Conservation Data Centre has information on 21 element occurrences (EOs).[3] Of these occurrences, 19 are considered extant, and one is extirpated (EO25) owing to conversion of habitat to agriculture (COSEWIC 2014). Another occurrence (EO16) may have been disturbed by ongoing road activity, and is possibly extirpated (B.C. Conservation Data Centre 2016) as it has not been relocated since the initial observation in 2006 (Table 1). No counts exist of mature individuals as the tiny tassel is small and can occur singly among other mosses; therefore, it is difficult to determine exact population numbers.

[3] Element occurrence (EO) numbers are from the B.C. Conservation Data Centre. Refer to the B.C. Species and Ecosystem Explorer webpage at: http://a100.gov.bc.ca/pub/eswp/. Populations are defined in this report following element occurrence specification by NatureServe (2015), which defines populations as being separated by at least 1 km from one another.

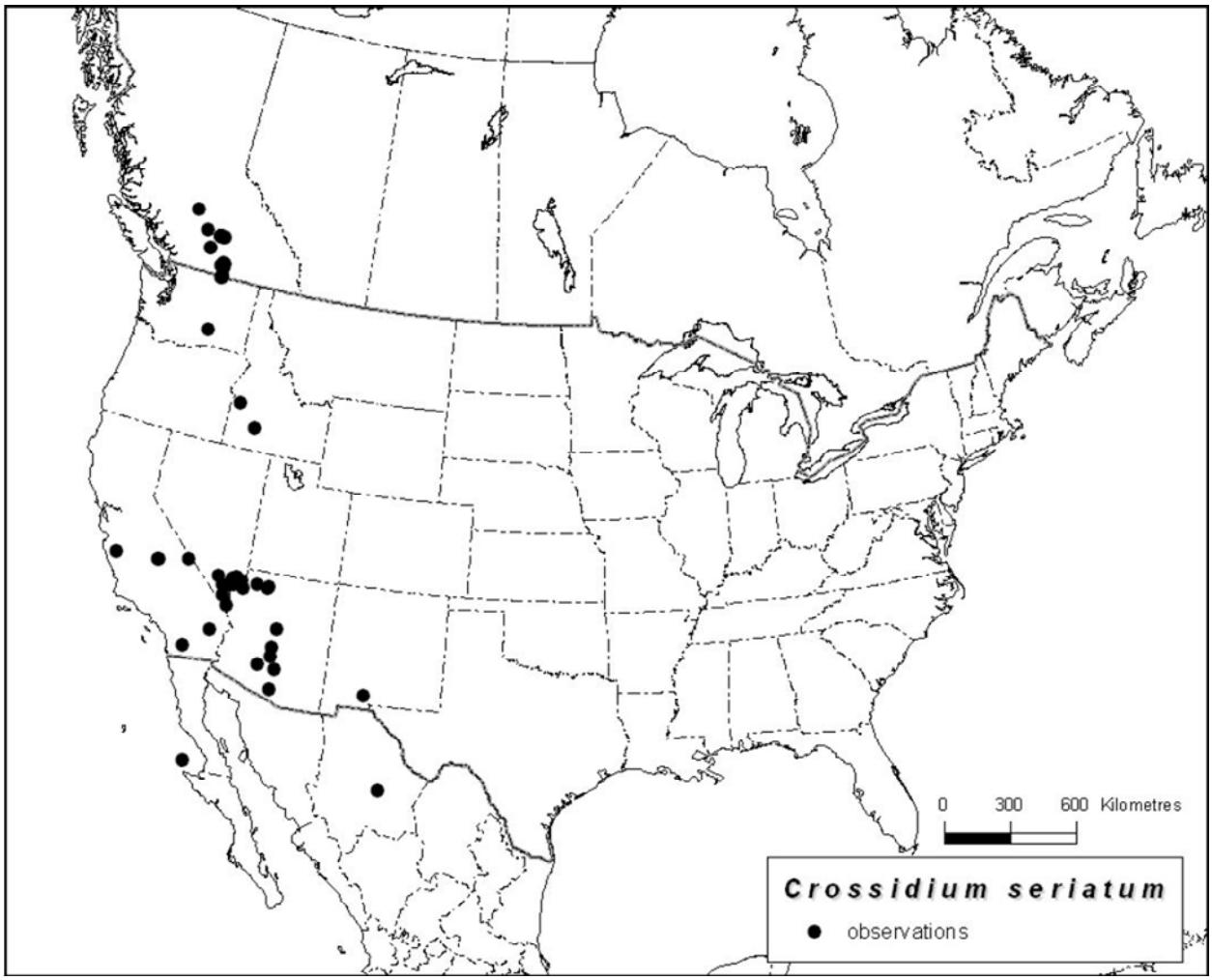

Figure 1. Tiny tassel distribution in North America (COSEWIC 2014).

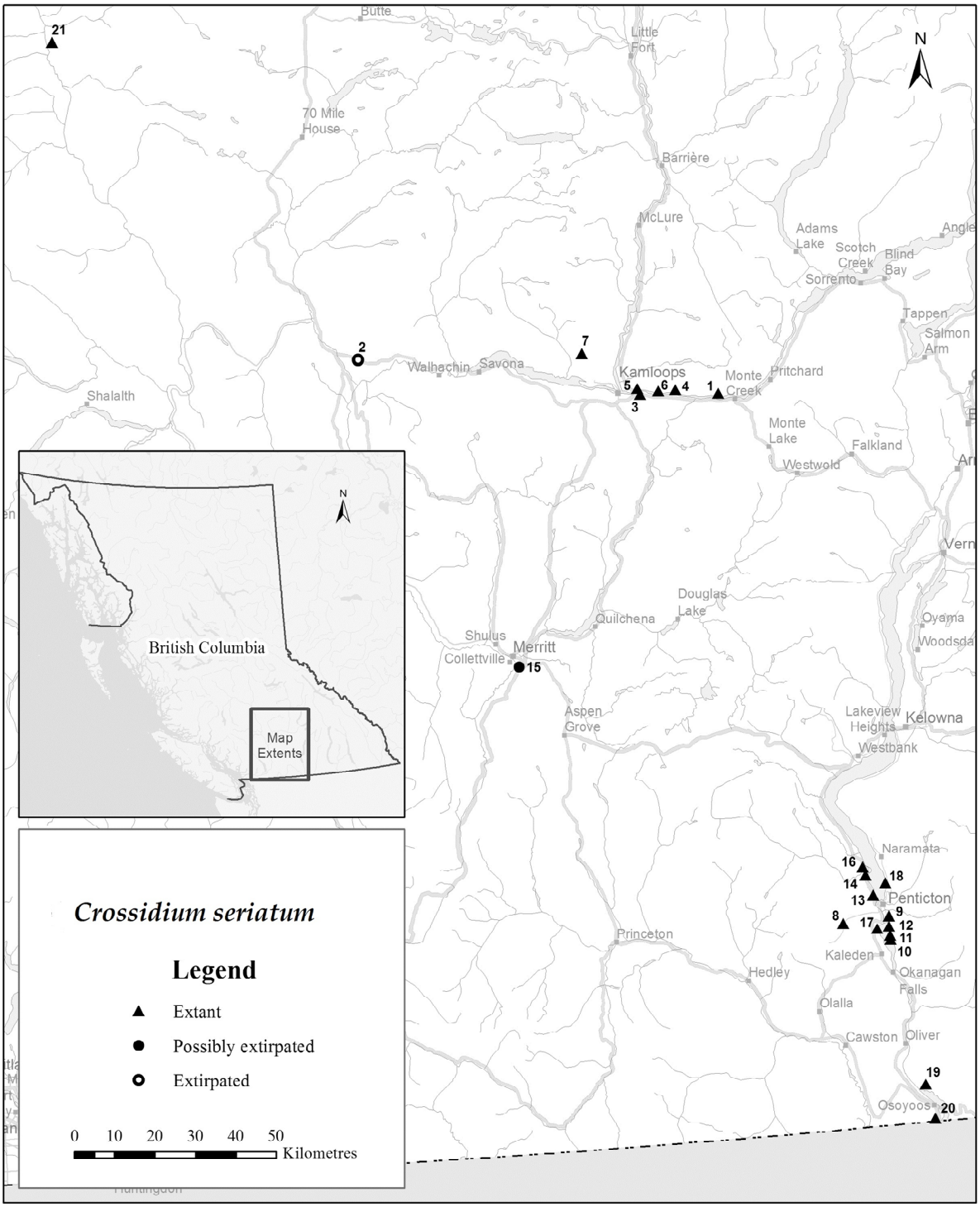

Figure 2. Tiny tassel distribution in British Columbia (B.C. Conservation Data Centre 2016). Mapped population numbers correspond with those provided in Table 1.

250 **Table 1.** Status and description of tiny tassel populations/locations in British Columbia.

Population/ location	Population no.	EO#	COSEWIC site name	COSEWIC ID	Population status[a]	Dates observed	Observer	Land tenure
South Thompson, Monte Creek, 3 km west of confluence	1	EO1	Kamloops, 23 km east	001	Extant	2011; 2013	McIntosh; Baldwin & Jones	Unknown
Semlin Valley	2	EO25	Cache Creek, Hwy. 1, 5 km east	005	**Extirpated**	2005; 2013	McIntosh ; Baldwin & Jones	Unknown
Town of Valley View, south of Kamloops	3	EO23	Kamloops, 3.5 km east	Cr8	Extant	2013	Baldwin	Unknown
South Thompson River/Gregor Creek, 4.7 km west of	4	EO24	Kamloops, 12 km east	Cr9	Extant	2013	Baldwin & Jones	Unknown
Paul Peak, 2.2 km southeast of, Kamloops IR1	5	EO5	Kamloops, 3 km east	Cr10	Extant	2013	Baldwin & Jones	First Nations
South Thompson River/Juniper Creek, Kamloops IR1	6	EO6	Kamloops, 8 km east	Cr11	Extant	1980; 2013	McIntosh; Baldwin & Jones	First Nations
Mt. Wheeler, Kamloops area, Lac du Bois	7	EO29	N/A	N/A	Extant	1982	Nicholson	Provincial protected area
Shatford Creek, Penticton IR1	8	EO7	Penticton, 10 km west	Cr12	Extant	2008; 2013	McIntosh; Baldwin & Jones	First Nations
Penticton, Green Ave. East	9	EO9	Penticton	Cr14 Cr15	Extant	2004; 2006; 2013	McIntosh; McIntosh; Baldwin & Jones	Unknown
Skaha Lake/Gillies Creek, 1.2 km south of	10	EO11	Skaha Lake, east side, 6 km south of Penticton	Cr16	Extant	2013	Baldwin & Jones	Unknown
Skaha/Gillies Creek	11	EO12	Skaha Lake, east side, 5 km south of Penticton	Cr17	Extant	2013	Baldwin & Jones	Unknown

Population/ location	Population no.	EO#	COSEWIC site name	COSEWIC ID	Population status[a]	Dates observed	Observer	Land tenure
Skaha Lake/Gillies Creek, 2.1 miles north of	12	EO13	Penticton, 3 km south	Cr18	Extant	2007; 2013	McIntosh; Baldwin & Jones	Unknown
Okanagan Lake/Okanagan River	13	EO14	Penticton, 2 km north	Cr19	Extant	1999;2013	McIntosh; Baldwin & Jones	Unknown
Okanagan Lake/Trout Creek, 1 km southwest of	14	EO15	Trout Creek, 1 km south	Cr20	Extant	2011; 2013	McIntosh; Baldwin & Jones	Unknown
Coldwater River/Spanish Creek, 0.6 km southeast of confluence, Merritt	15	EO16	Merritt, 3 km south	Cr22	**Possibly extirpated**	2006	McIntosh; Baldwin & Jones	Unknown
Town of Trout Creek, 0.7 km northwest of	16	EO17	Trout Creek, 1 km north	Cr23	Extant	2005; 2013	McIntosh; Baldwin & Jones	Unknown
Skaha Lake/Skaha Creek, 1 km south of	17	EO18	Skaha Lake, west side, 4 km south of Penticton	Cr24	Extant	2010; 2013	Baldwin; Baldwin	Unknown /First Nations
Johnson Spring Creek, Okanagan Lake	18	EO19	Okanagan Lake, east side, 5 km north of Penticton	Cr25	Extant	2013	Baldwin	Unknown
Inkaneep Creek, Osoyoos IR1	19	EO27	6 km north of Osoyoos	W7	Extant	2006	McIntosh & Peirson	First Nations
Osoyoos, 2.8 km southwest of	20	EO28	~3 km south of Osoyoos west of Osoyoos Lake	FB	Extant	2007	McIntosh	Unknown
Fraser River/Dog Creek, 4.6 km south of Canoe Creek IR3	21	EO26	Above Fraser River between Gang Ranch and Dog Creek	W3	Extant	1984	McIntosh	First Nations

[a] Extant: occurrence has been recently verified as still existing, and/or the habitat is still considered to be suitable for the species.

3.3 Habitat and Biological Needs of the Tiny tassel

3.3.1 Habitat

In British Columbia, tiny tassel occurs in the very dry, hot Ponderosa Pine and the Bunchgrass biogeoclimatic zones (Meidinger and Pojar [eds.] 1991) in the shrub–steppe areas of south-central British Columbia. It inhabits lacustrine silts, which are generally calcareous glacial lake deposits and fine in texture. These lacustrine silts are found along the Thompson and Okanagan rivers where tiny tassel occurs at elevations from 300 to 700 m. Exposure on these sites can be open and exposed as well as shaded in nature (COSEWIC 2014).

3.3.2 Biological Needs

The species requires either long-range spore dispersal by wind currents to appropriate substrate (lacustrine silts), or short-range dispersal of vegetative parts or spores to the same substrate to establish (Table 2). Although not a strong competitor, it does co-exist with other moss species in its habitat. Tiny tassel could be restricted in the amount of spatial area it inhabits because other mosses outcompete it for growing space (COSEWIC 2014).

Table 2. Summary of essential functions, features, and attributes of tiny tassel habitat in British Columbia.

Life stage	Function[a]	Feature(s)[b]	Attributes[c]
Sporophyte	Spore production/ germination	Open exposed, or shade habitat on fine soils; steep bluffs 300–700 m in elevation	• Fine-textured lacustrine soils • Calcareous soils
Gametophyte	Formation of gametes/fertilization for sporophyte production	As above; moisture required for fertilization	As above; open niches for gametophyte development

[a] Function: a life-cycle process of the species (e.g., include flowering, fruiting, seed dispersing, germinating, seedling development).
[b] Feature: the essential structural components of the habitat required by the species.
[c] Attribute: the building blocks or *measurable* characteristics of a feature.

3.4 Limiting Factors

Limiting factors are generally not human-induced and include characteristics that make the species less likely to respond to management/conservation efforts.

It is thought that tiny tassel reproduces through spores and stem or rhizoid tissue (COSEWIC 2014); however, sporophytes are only produced in seepage sites or after rain events. No sporophytes have been seen in the province, except at the now extirpated site in Cache Creek.

Lacustrine soils (calcareous glacial lake deposits) on steeply sloped silt bluffs are the preferred habitat for the species and therefore soil type may be a limiting factor (COSEWIC 2014).

4 THREATS

Threats are defined as the proximate activities or processes that have caused, are causing, or may cause in the future the destruction, degradation, and/or impairment of the entity being assessed (population, species, community, or ecosystem) in the area of interest (global, national, or subnational) (adapted from Salafsky *et al.* 2008). For purposes of threat assessment, only present and future threats are considered.[4] Threats presented here do not include limiting factors,[5] which are presented in Section 3.4.

[4] Past threats may be recorded but are not used in the calculation of threat impact. Effects of past threats (if not continuing) are taken into consideration when determining long-term and/or short-term trend factors (Master *et al.* 2012).

[5] It is important to distinguish between limiting factors and threats. Limiting factors are generally not human-induced and include characteristics that make the species or ecosystem less likely to respond to recovery/conservation efforts (e.g., inbreeding depression, small population size, and genetic isolation).

4.1 Threat Assessment

The threat classification below is based on the IUCN–CMP (World Conservation Union–Conservation Measures Partnership) unified threats classification system and is consistent with methods used by the B.C. Conservation Data Centre. For a detailed description of the threat classification system, see the Open Standards website (Open Standards 2014). Threats may be observed, inferred, or projected to occur in the near term. Threats are characterized here in terms of scope, severity, and timing. Threat "impact" is calculated from scope and severity. For information on how the values are assigned, see Master *et al.* (2012) and table footnotes for details. Threats for the tiny tassel were assessed for the entire province (Table 3).

Table 3. Threat classification table for tiny tassel in British Columbia

Note: a description of the threats included in this table are found in section 4.2.

Threat #[a]	Threat description	Impact[b]	Scope[c]	Severity[d]	Timing[e]
1	Residential & commercial development	Negligible	Negligible	Extreme	High
1.1	Housing & urban areas	Negligible	Negligible	Extreme	High
2	Agriculture & aquaculture	Negligible	Negligible	Extreme	High
2.1	Annual & perennial non-timber crops	Negligible	Negligible	Extreme	Moderate
2.3	Livestock farming & ranching	Negligible	Negligible	Serious–Moderate	High
4	Transportation & service corridors	Low	Small	Serious–Moderate	High
4.1	Roads & railroads	Low	Small	Serious–Moderate	High
6	Human intrusions & disturbance	Negligible	Negligible	Serious–Moderate	High
6.1	Recreational activities	Negligible	Negligible	Serious–Moderate	High
6.3	Work & other activities	Negligible	Negligible	Negligible	High

Threat #[a]	Threat description	Impact[b]	Scope[c]	Severity[d]	Timing[e]
11	Climate change & severe weather	Unknown	Pervasive	Unknown	High–Moderate
11.4	Storms & flooding	Unknown	Pervasive	Unknown	High–Moderate

[a] Threat numbers are provided for Level 1 threats (i.e., whole numbers) and Level 2 threats (i.e., numbers with decimals).
[b] **Impact** – The degree to which a species is observed, inferred, or suspected to be directly or indirectly threatened in the area of interest. The impact of each threat is based on severity and scope rating and considers only present and future threats. Threat impact reflects a reduction of a species population. The median rate of population reduction for each combination of scope and severity corresponds to the following classes of threat impact: Very High (75%), High (40%), Medium (15%), and Low (3%). Unknown: used when impact cannot be determined (e.g., if values for either scope or severity are unknown); Not Calculated: impact not calculated as threat is outside the assessment time (e.g., timing is insignificant/negligible [past threat] or low [possible threat in long term]); Negligible: when scope or severity is negligible; Not a Threat: when severity is scored as neutral or potential benefit.
[c] **Scope** – Proportion of the species that can reasonably be expected to be affected by the threat within 10 years. Usually measured as a proportion of the species' population in the area of interest. (Pervasive = 71–100%; Large = 31–70%; Restricted = 11–30%; Small = 1–10%; Negligible < 1%).
[d] **Severity** – Within the scope, the level of damage to the species from the threat that can reasonably be expected to be affected by the threat within a 10-year or three-generation time frame. For this species a 10-year time frame was used. Usually measured as the degree of reduction of the species' population. (Extreme = 71–100%; Serious = 31–70%; Moderate = 11–30%; Slight = 1–10%; Negligible < 1%; Neutral or Potential Benefit ≥ 0%).
[e] **Timing** – High = continuing; Moderate = only in the future (could happen in the short term [< 10 years or three generations]) or now suspended (could come back in the short term); Low = only in the future (could happen in the long term) or now suspended (could come back in the long term); Insignificant/Negligible = only in the past and unlikely to return, or no direct effect but limiting.

4.2 Description of Threats

The overall province-wide Threat Impact for this species is Low.[6] The overall Threat Impact considers the cumulative impacts of multiple threats. The greatest threat is road maintenance activities (Table 3). Details are discussed below under the Threat Level 1 and 2 headings.

Threat 1. Residential & commercial development (threat impact Negligible)

1.1 Housing & urban areas

Tiny tassel occurs mainly in the Thompson and Okanagan river valleys where a high demand for residential development occurs; however, since this species prefers silty bluffs, the steepness and geological instability of these areas reduces the scope of this threat (COSEWIC 2014).

Threat 2. Agriculture & aquaculture (threat impact Negligible)

2.1 Annual & perennial non-timber crops

Expansion of crops, pasture, or vineyards is similarly limited by the geological instability and steepness of the preferred habitat of tiny tassel (COSEWIC 2014). One location at Cache Creek (EO25) was converted from sagebrush steppe to agriculture (COSEWIC 2014).

Threat 4. Transportation & service corridors (threat impact Low)

4.1 Roads & railroads

Road expansion or maintenance that involves removal of the lacustrine silt that tiny tassel requires to grow would threaten the species' survival due to loss of habitat. Five populations are potentially affected by road activity (EO7, EO9, EO13, EO14, and EO16). Plants could be accidentally destroyed, buried or removed and its habitat disturbed or buried by road expansion. It is likely that road expansion would be the most likely event that would destroy plants on steep banks, as no one can walk there and invasive plants are mostly absent. However, any of these activities would likely only affect the lower portions of banks closest to the roadway.

Although some occurrences may have grown owing to the creation of a road cut 20–30 years ago overall this activity was considered to have a negative impact on the species. Over the next 15 years, the likelihood of re-colonization is uncertain as it is unknown how long it took for a road cut to be re-colonized by tiny tassel. New roads could create new habitat for tiny tassel, however, due to the limited sporophyte production of this species the habitat may not be colonized (COSEWIC 2014).

[6] The overall threat impact was calculated following Master *et al.* (2012) using the number of Level 1 Threats assigned to this species where timing = High or Moderate, which included one Low (Table 4). The overall threat impact considers the cumulative impacts of multiple threats.

Threat 6. Human intrusions & disturbance (threat impact Negligible)

6.1 Recreational activities

Mountain biking trails occur close to one tiny tassel site (COSEWIC 2014). Overall, this activity is popular in the Kamloops and Penticton areas and bike trails could have direct impact on populations through scraping the mosses off the substrate and/or compacting them into the ground. As well, mountain biking activities could result in increased erosion on the bluffs, affecting a larger area of the habitat occupied by tiny tassel.

6.3 Work & other activities

Collecting of the moss species for research or inventory is thought to have a negligible impact on the populations.

Threat 11. Climate change & severe weather (threat impact Unknown)

11.4 Storms & flooding

Climate change could increase the amount of suitable habitat available (through creating drier conditions in the spring/summer) and also could increase the sporophyte production (through more heavy rainfall events in the fall/winter). Nevertheless, this increased rainfall could also cause more erosion on the silty bluffs where tiny tassel occurs, thereby reducing habitat for the species.

5 MANAGEMENT GOAL AND OBJECTIVES

5.1 Management Goal

The management goal is to maintain all known extant populations and any future populations of tiny tassel that may be found in British Columbia.

5.2 Rationale for the Management Goal

The overall goal is to maintain all known extant populations of the species within British Columbia. This includes the current extant populations as well as any populations that are found in the future. No quantitative management goal is possible for tiny tassel as basic population demographics and trends are unknown for all populations. As with many rare plant species, we lack adequate information about the historical distribution of tiny tassel.

5.3 Management Objectives

The following are the management objectives for tiny tassel:

1. To secure long-term protection[7] for the known populations and habitats of tiny tassel;

[7] Protection can be achieved through various mechanisms including voluntary stewardship agreements, conservation covenants, sale of private lands by willing vendors, land use designations, protected areas and mitigation of threats.

2. To determine the levels of real and potential threats to this species and its habitat and to mitigate their effects; and
3. To confirm the distribution of tiny tassel (including any new populations) and to reliably determine population trends through monitoring.

6 APPROACHES TO MEET OBJECTIVES

6.1 Actions Already Completed or Underway

The following actions have been categorized under the action groups of the B.C. Conservation Framework (B.C. Ministry of Environment 2009). Status of the action group for this species is given in parentheses.

Compile Status Report (complete)

- COSEWIC report completed (COSEWIC 2014).

Send to COSEWIC (complete)

- Tiny tassel assessed as of Special Concern (COSEWIC 2014). (Re-assessment due 2024.)

Planning (complete)

- B.C. Management Plan completed (this document, 2016).

Inventory (complete)

- Inventory for the completion of the COSEWIC status report was undertaken in 2013.

Habitat Protection and Private Land Stewardship (in progress)

- One population at Mt. Wheeler (EO 29) is in the Lac du Bois Grasslands Protected Area and is afforded the protection under the *Protected Areas of British Columbia Act*.
- One population in Penticton (EO9) occurs within the critical habitat identified for nugget moss (Environment and Climate Change Canada 2012).

6.2 Recommended Management Actions

Table 4. Recommended management actions for tiny tassel.

Objective	Conservation Framework action group	Actions to meet objectives	Threat[a] or concern addressed	Priority[b]
1	Habitat protection	Establish appropriate protection mechanisms. Identify and contact all landowners and land managers. Pursue conservation covenants or stewardship agreements with private landowners.	ALL	Essential
1, 2	Habitat protection	Develop best management practices for mitigating threats.	4.1	Essential
2	Habitat protection	Assess and monitor the threats to determine if they are potential or real.	4.1	Necessary
3	Inventory	Survey potentially suitable locations and extant populations in the province.	Inventory	Necessary
3	Inventory/Habitat Protection	Develop and implement a monitoring protocol that provides reliable estimates of population size.	Monitoring	Necessary
1, 3	Habitat Protection	Monitor status of population and threats at extant locations every 5 years.	Monitoring	Beneficial
1, 2	Habitat Protection/ Restoration	Report monitoring results and implement threat mitigation if necessary; monitor to determine mitigation effectiveness.	4.1	Beneficial
4	Habitat Protection/ Restoration	Identify specific habitat requirements for the species (e.g., exposure, humidity, light intensity, soil chemistry and moisture content, temperature), including environmental conditions (particularly moisture) for optimal sporophyte formation.	Knowledge gap	Beneficial

[a] Threat numbers according to the IUCN–CMP classification (see Table 3 for details).
[b] Essential: urgent and important, needs to start immediately; Necessary: important but not urgent, action can start in 2–5 years; or Beneficial: action is beneficial and could start at any time that was feasible.

7 MEASURING PROGRESS

The following performance measures provide a way to define and measure progress toward achieving the management goal and objectives. Performance measures for each objective are listed below with the target of achieving each stated measurable within the next five years.

Measurable(s) for Objective 1

- Populations of tiny tassel have stewardship agreements in place or other forms of protection established.

Measurable(s) for Objective 2

- The main threat to tiny tassel populations (e.g., road maintenance) is assessed and mitigated to the extent possible; monitoring is in place to determine effectiveness of mitigation.

Measurable(s) for Objective 3

- Inventory of suitable habitats is conducted, with population trends indicating that the numbers of plants at known sites are stable or increasing over the long term.

8 EFFECTS ON OTHER SPECIES

Other moss species at risk that occur in tiny tassel habitat include nugget moss (*Microbryum vlassovii*), which is Red-listed by the B.C. Conservation Data Centre and is listed as Endangered on the SARA's Schedule 1. *Grimmia plagiopodia* (no common name) is a Red-listed moss that also inhabits lacustrine bluffs in the province.

Management activities for tiny tassel will be implemented with consideration for all co-occurring species at risk, such that there are no negative impacts to these species or their habitats.

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