2021

Management Plan

Water Pygmyweed (*Tillaea aquatica)*

Department of Fisheries, Forestry and Agriculture

Wildlife Division

Newfoundland Labrador

What is the Endangered Species Act?

The **Endangered Species Act** was enacted in 2001 to ensure that species at risk of extinction in Newfoundland and Labrador, as well as their residence receive immediate protection. Furthermore, the **Endangered Species Act** ensures that efforts to recover these species are initiated and provides the ability to protect habitat that is either critical to the survival or recovery. This legislation applies to species, sub-species and populations that are native to the province, but does not include marine fish, bacteria, or viruses. It also does not apply to introduced species, except in extraordinary circumstances. The **Endangered Species Act** fulfills the province's commitments to the *Accord for the Protection of Species at Risk*. The **Species at Risk Act,** was enacted in June 2003 as the federal government's contributing piece of legislation to the Accord.

What is recovery?

For species at risk of continued population decline or extinction, such as those listed in the **Endangered Species Act** as endangered, threatened, or vulnerable, recovery is the process by which its population decline is stopped, stabilized, and reversed. This occurs when a threat to the whole population or individuals is removed or reduced. A species is not considered to be recovered, and thereby removed from the **Endangered Species Act**, until its long-term persistence in the wild is secured. It is possible that a species will always be considered rare. This typically occurs when the species is restricted to an extremely unique or uncommon habitat or habitat loss has been extensive. For each species listed as endangered or threatened a recovery team is put in place to oversee the recovery process and write a recovery plan. For each species listed as vulnerable a management plan is written to guide the recovery process.

What is a management plan?

A management plan is developed by staff of the Wildlife Division and when appropriate, in conjunction with Indigenous governments and organizations as well as other management agencies and species experts. It sets the goals and actions deemed necessary to prevent a species from further decline and identifies threats to the species' recovery. Section 24 of the **Endangered Species Act** states that a management plan will identify measures for the conservation of a species and include information that may be prescribed in regulations made by the minister under subsection 44(2). A management plan has to be developed within three years after the species is designated under the **Endangered Species Act**. These management plans are reviewed regularly and updated approximately every five years, if necessary.

What's the next step?

Implementing the plan! Many people work towards implementing the actions outlined in a management plan, including people from municipal, provincial, and federal governments, Indigenous groups, industry, universities, interest groups, and local communities. Each play a significant role in the implementation of the management plan. Success in species conservation and recovery depends on the commitment and cooperation of many different people and requires all responsible jurisdictions, as well as all Newfoundlanders and Labradoreans, to work together to support and implement management plans.

Disclaimer

A species listed as vulnerable under the Newfoundland and Labrador **Endangered Species Act** requires the development of a management plan. These management plans are prepared in cooperation with jurisdictions responsible for the species. Implementation of the goals and actions identified in this document ultimately depends on the ongoing program priorities and budgetary constraints of the participating jurisdictions and organizations. The goals and actions identified in a management plan are based on the best existing knowledge and are subject to modifications resulting from new findings and revised objectives. They do not necessarily represent the official positions of the governmental or non-governmental organizations, or individuals, involved.

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COVER PHOTOGRAPH

Water Pygmyweed, by Claudia Hanel – Dept. of Fisheries, Forestry and Agriculture.

RECOMMENDED CITATION

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PREFACE

While this management plan has been developed by the Department of Fisheries, Forestry and Agriculture, success in the conservation of this species will depend on the commitment and cooperation of agencies that will be involved in implementing the direction set out in the plan and will not be achieved by the Department of Fisheries, Forestry and Agriculture or any other party alone.

AUTHORS

The initial draft of this plan was prepared by Claudia Hanel and Shelley Garland (Wildlife Division, Government of Newfoundland and Labrador).

ACKNOWLEDGMENTS

We wish to thank John Maunder for his previous surveys and documentation of the species, as well as the preparation of the species status report.

RESPONSIBLE JURISDICTIONS

Government of Newfoundland and Labrador

EXECUTIVE SUMMARY

Water Pygmyweed is a small, annual, succulent, herbaceous plant inhabiting semi-aquatic environments close to the coast. Within the Province of Newfoundland and Labrador, it is known to occur only on the southern Avalon and Burin Peninsulas on the island of Newfoundland. Each year the seeds overwinter in the substrate, which can be sandy, gravelly, or muddy, with various amounts of organic matter. All occurrences known in Newfoundland are in intermittently wet habitats that were artificially created by human disturbance, such as quarry pits, roadside shoulders and ditches, trail ruts, and cracked pavement of a former airport runway. None of these occurrences are currently protected and all are within municipalities or close to human habitation with a resulting risk of redisturbance by vehicle traffic, infrastructure maintenance, and land development. While these activities can generate additional habitat and transfer seeds, as long as they are neither managed nor monitored it is impossible to know whether the potential benefits outweigh potential harm and it is most prudent to consider them threats.

The purpose of this management plan is to establish the goals and actions required to ensure the long-term persistence of Water Pygmyweed as a self-sustaining viable species throughout its current range in Newfoundland and Labrador. To this end, the following three goals have been identified:

Goal 1. Conduct research and monitoring to fill knowledge gaps about Water Pygmyweed and associated habitat

Goal 2. Manage the habitat of Water Pygmyweed for the conservation of the species

Goal 3. Develop stewardship, education, and outreach strategies to aid in the conservation of Water Pygmyweed

Specifically, these goals will achieve the following objectives:

- Continue surveys to determine distribution and habitat requirements.
- Undertake research and monitoring to determine population and habitat trends.
- Conserve habitat and limit disturbance
- Work with municipalities to conserve the species and habitat
- Encourage responsible vehicle use
- Encourage and support stewardship, education, and outreach

The success in the conservation of this species will depend on the commitment and cooperation of the agencies and partners involved in the implementation of the plan.

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ASSESSMENT AND LEGAL STATUS

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<tr><td colspan="2">Provincial Listing (ESA):
Vulnerable (April 2015)</td><td colspan="2">Federal listing (SARA): NA</td></tr>
<tr><td>Global ranking:
G5 Secure (NatureServe)</td><td>National ranking:
N4N4 Apparently Secure to Secure (CESCC 2016)</td><td colspan="2">Provincial ranking:
S1 Critically Imperiled (CESCC 2016)</td></tr>
<tr><td colspan="2">SSAC assessment history:
February 2008 (Vulnerable)</td><td colspan="2">COSEWIC assessment history:
NA</td></tr>
<tr><td colspan="4">Reason for designation: A very minute annual plant that relies on a seed bank for perpetuation. It has a very restricted distribution, very small area of occupancy, and a large proportion of the overall population occurs within highly disturbed sites.</td></tr>
<tr><td colspan="4">Newfoundland and Labrador occurrence: On the southern Burin and Avalon Peninsulas.</td></tr>
<tr><td colspan="4">Canadian occurrence: Prince Edward Island, Nova Scotia, New Brunswick, Québec, Ontario, Saskatchewan, British Columbia, Yukon Territory, Northwest Territories. This Canadian distribution includes Crassula saginoides, which has not been universally recognized as a separate species.</td></tr>
<tr><td colspan="4">Current legal protection: Endangered Species Act (NL)</td></tr>
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DESCRIPTION AND SPECIES BIOLOGY

Crassulaceae, *Tillaea aquatica* (syn. *Crassula aquatica*)

There is controversy about recognizing the genus *Tillaea,* which was considered separate until it was first included within the genus *Crassula* in 1930 (Flora of North America Editorial Committee 2009). There is some genetic evidence that *Tillaea* can be separated from *Crassula*, and the Species Status Advisory Committee (2008) accepted this separation. However, both VASCAN and the Flora of North America include *Tillaea* as part of the genus *Crassula* (Flora of North America Editorial Committee 2009, Brouillet et al. 2010+).

This species does not have any recognized sub-taxa; however, there is a taxonomic entity which is very similar, leading to some confusion. This is considered to be a minor variation not worthy of naming in the Flora of North America (Flora of North America Editorial Committee 2009). However, this entity it is treated as a completely separate species, *Crassula saginoides,* by Bywater and Wickens (1984) and Fujii et al. (2019) based on both morphological and genetic differences. While no genetics studies or microscopic examinations of the seed coats have been conducted for Newfoundland material, all Newfoundland populations are believed to be *Tillaea aquatica* (=*Crassula aquatica*) in the strict sense based on macroscopic characters, such as the shape of the leaf tips and the lack of noticeable flower stalks (Species Status Advisory Committee 2008, Wildlife Division, unpublished data).

The species is a tiny, tufted, succulent, semi-aquatic annual that is normally reddish, yellowish, or greenish (Species Status Advisory Committee 2008). Larger plants are branched. In Newfoundland, the size of plants growing mainly out of the water ranges from 2 mm for closely crowded individuals (Figure 1) to 3 cm for specimens unconstrained by other plants or resource limitations (cover photograph). Plants grown under partly immersed conditions can be longer, but have not been measured (Figure 2).

The leaves are opposite, parallel-sided, and have rounded to pointed tips. The tiny flowers are whitish and are located singly in the leaf axils with all flower parts in fours. The seeds are very small – approximately half a millimetre in size – and are borne in vase-like seed capsules with diverging tips (Species Status Advisory Committee 2008).

As an adaptation to both submersion and exposure, Water Pygmyweed has the ability to alternate between two types of photosynthetic metabolism. When submerged, it uses the crassulacean acid metabolism (CAM), which helps it cope with a limited supply of carbon dioxide in the water. When exposed, it uses the normal C3 carbon fixation metabolism, which enables it to better utilize the more abundant carbon dioxide in the air.

As an annual plant, Water Pygmyweed survives from year to year by seeds overwintering in the substrate. The number of seeds produced and number of offspring per parent plant are likely to fluctuate widely depending on the size of the plant, but have not yet been counted for Newfoundland individuals.

In Newfoundland, the species has been observed to be in flower during July and August, overlapping significantly with the fruiting season, which occurs from August into Fall. In mid-August 2019, many of the plants that had been mostly exposed during the growing season had mostly immature fruit, but some capsules had were already open and dispersing seeds (Wildlife Division, unpublished data).

Water Pygmyweed has no special adaptations for dispersal, but it is likely dispersed by animals, including birds, and possibly vehicles. The species grows in mats, sometimes in pure colonies, and sometimes among a sparse cover of a variety of other plant species, which are often much taller. It is a very small plant that cannot compete with a dense canopy of taller species.

No herbivory or pathology has been reported in the Newfoundland and Labrador species status report or has been observed at any of the sites on the Burin Peninsula or the southern Avalon Peninsula in 2019 (Species Status Advisory Committee 2008, Wildlife Division, unpublished data).

Figure 1. Very small Water Pygmyweed plants growing in a dense colony among other semi-aquatic vegetation in abandoned sand pits at Portugal Cove South, NL. (Photo: C. Hanel, 2019).

Figure 2. Elongated Water Pygmyweed plants growing in water at Middle Gut, St. Stephen's, NL. (Photo: C. Hanel, 2019).

DISTRIBUTION

Global

Water Pygmyweed has a circumpolar distribution. However, *Crassula saginoides* has not been recognized or separated by many sources, and therefore the distribution of Water Pygmyweed in the strict sense is not well known. In the Flora of North America, it is considered to occur in North America south to Mexico, and also in northern Eurasia (Flora of North America Editorial Committee 2009).

National

The Canadian Endangered Species Council (2016) considers the species to be occurring in Newfoundland (island portion only), Prince Edward Island, Nova Scotia, New Brunswick, Québec, Ontario, Saskatchewan, British Columbia, the Yukon Territory, and the Northwest Territories, but this distribution may also include *Crassula saginoides*, which is not universally recognized as a separate taxon. However, all populations in New Brunswick, Prince Edward Island, and Nova Scotia are believed to be Water Pygmyweed in the strict sense (S. Blaney, pers. comm.).

Provincial

In Newfoundland and Labrador, Water Pygmyweed is only known from coastal areas in the southeastern part of the island of Newfoundland. Occurrences are clustered on the southern Avalon Peninsula between St. Vincent's and Portugal Cove South, and around the southern portion (boot) of the Burin Peninsula (Figure 3). There is also an outlying occurrence at Argentia. During each of the two focused surveys for this plant, in 2006 and 2019, several new occurrences were discovered, indicating a high likelihood that additional occurrences exist in coastal areas of southern Newfoundland. In total, there are 6 occurrences on the Avalon Peninsula and 5 on the Burin Peninsula.

The population closest to Newfoundland is located on Miquelon (J.E. Maunder, pers. comm.). This location is within 30 km of the western tip of the Burin Peninsula, and therefore a rescue effect is theoretically possible, but the species appears to be limited to a single site in the archipelago of St. Pierre and Miquelon.

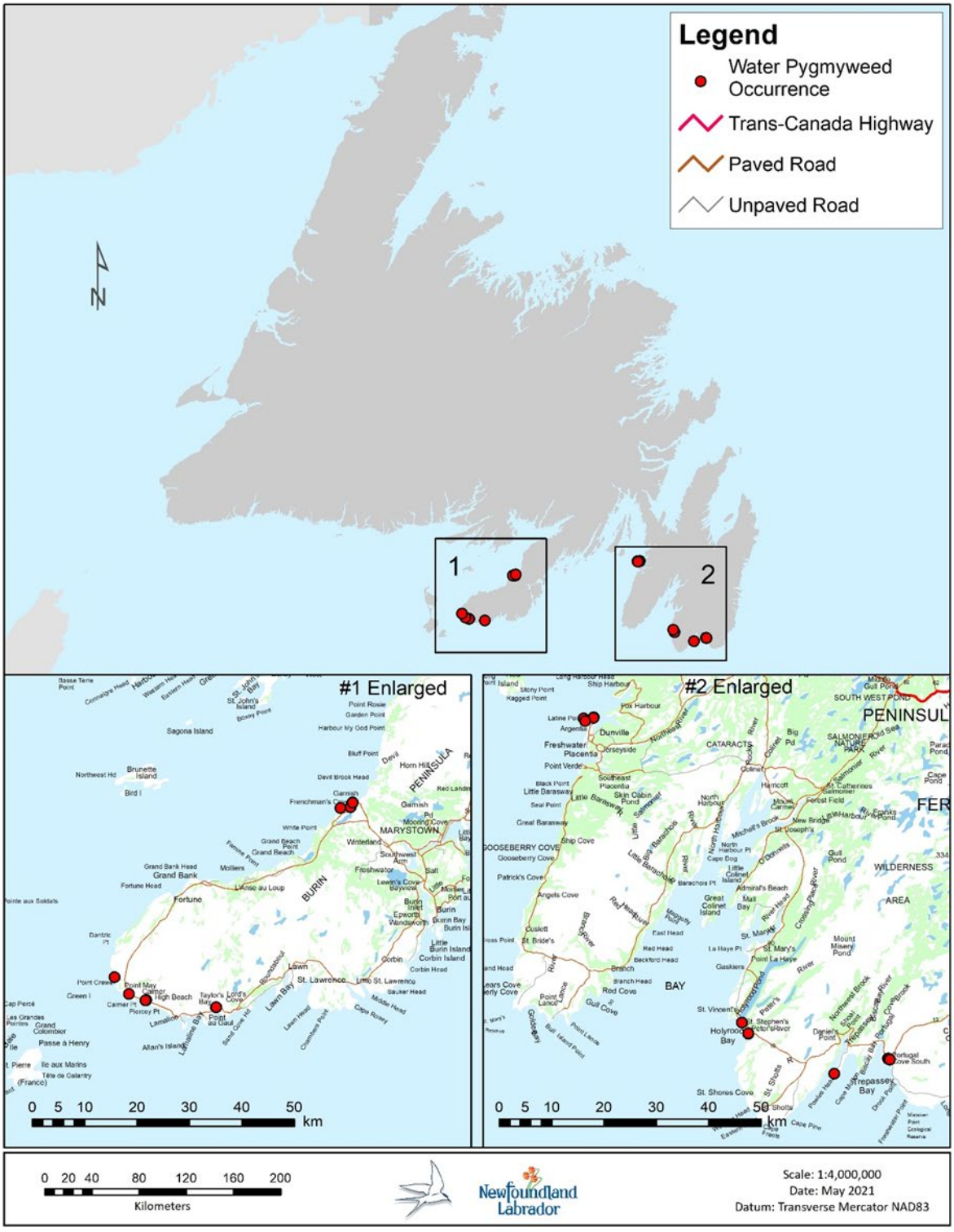

Figure 3. Water Pygmyweed known distribution in Newfoundland and Labrador. Map prepared by Adam Durocher/Atlantic Canada Conservation Data Centre.

HABITAT DESCRIPTION AND THREATS

Bywater and Wickens (1984) consider Water Pygmyweed to be a species of coastal, saline habitats, restricted to low altitudes near sea level. Typical habitats would be brackish estuarine mud flats and intertidal zones, but in New Brunswick the species has also been observed up to 70 km inland along large rivers (S. Blaney, pers. comm.). None of the documented Newfoundland occurrences are within the intertidal zone, but they are all within 250 m of the coast and below 20 m in elevation.

The species' wide Canadian and worldwide ranges suggest that it may not be extremely sensitive to climate. All of the occupied area known in Newfoundland is in the southeastern portion of the island, within the Hyperoceanic Barrens and Maritime Barrens Ecoregions. However, it is not known whether any coastal location in southern Newfoundland or throughout the island could be climatically suitable.

Water Pygmyweed is semi-aquatic and grows in intermittently wet habitats. The substrate can be sandy, gravelly, or muddy, with various amounts of organic matter, and can be compacted. Plants can be submersed but also grow in conditions that are at least sometimes dry enough to form cracks in muddy substrate. However, is not known what its optima or its tolerance windows are for submersion, drought, salinity, or habitat disturbance.

All the known areas of occupied habitat in Newfoundland have been created artificially by human activities. They include the floors of former pits and quarries, ruts in ATV trails, roadside ditches and shoulders, and cracks in the pavement of a former runway of an abandoned airport. On the nearby island of Miquelon, the species has been found in natural habitat, in this case on the sandy shore of a coastal pond. While many of the occupied areas are associated with barachois systems (lagoons separated from the ocean by barrier beaches), most of the relatively unvegetated areas on and around these beaches appear to be too coarse a substrate, too steep, too dry, and/or too disturbed to support Water Pygmyweed.

Patches of suitable habitat are scattered within the species' range, and are usually microhabitats embedded in a matrix of unsuitable habitat. The small size and variety of substrates among the habitat patches make it impossible to distinguish them on satellite imagery. Therefore, it is very difficult to estimate the amount or distribution of suitable habitat. The amount of available habitat is likely to fluctuate from year to year due to weather conditions, disturbances, and land use changes.

Long-term habitat trends are not known, but the rural areas of the southern Burin and Avalon Peninsulas are not subject to very high development pressure. However, mining exploration is occurring near at least one occurrence. Local recreational activities and limited land development are likely to continue throughout the species' distribution, with land development particularly prevalent at Argentia. Occurrences located adjacent to maintained roads are susceptible to disturbance by road maintenance, including grading, re-paving and snow plowing. Several sites face threats unique to the site, such as the parking of trailers.

All occurrences, but especially those in puddles or ruts in gravel roads, road shoulders, ATV trails, and quarry floors, face repeated vehicle traffic. Depending on the type of

vehicle, frequency of travel, time of year, and moisture level of the soil, this may crush individual plants and could also result in the destruction or creation of habitat and dispersal of seeds to new areas.

Figure 4. Water Pygmyweed habitat in moist rut in ATV trail at Calmer/High Beach, NL. (Photo: C. Hanel, 2019).

Figure 5. Water Pygmyweed habitat surrounding a puddle in the floor of a former gravel pit near the Powles Head Lighthouse near Trepassey, NL. (Photo: C. Hanel, 2019).

Figure 6. Dried muddy puddle with Water Pygmyweed near an old airport runway at Argentia, NL. (Photo: J.E. Maunder, 2020).

Figure 7. Water Pygmyweed growing in cracks in the pavement of an old airport runway at Argentia, NL. (Photo: J.E. Maunder, 2020).

ABUNDANCE AND POPULATION TRENDS

Due to the great difficulty in counting these small plants, it is unlikely that the total number of Water Pygmyweed individuals will ever be known for any site. Abundance estimates based on the occupied area are also not very reliable because occupied patches are very irregular in outline and have great variability in density. Of all known occurrences, the largest area of occupied habitat is found at Portugal Cove South, and the occupied area might be even larger than the initial estimate of 500 m^2. This is followed by the Argentia and Pieduck Point occurrences, with an occupied area approximately 1/10th of the size of the Portugal Cove South site at each. The remainder of the known occurrences contain only small pockets of habitat ranging from less than 1 m^2 to just over 25 m^2, with potentially only half of this area actually occupied (Species Status Advisory Committee 2007, Wildlife Division, unpublished data).

The density of plants within populations varies widely, from a few scattered plants among relatively dense vegetation, to continuous mats of plants that are almost touching, with up to 500 plants in a 10X10 cm area. The density likely varies between years, depending on habitat conditions, seed bank, and amount of competing vegetation. In most areas, the occupied zone within each habitat patch often follows the outline of ruts, pools and puddles, and is expected to shift, expand, or contract from year to year depending on water levels during the growing season.

No provincial population trends are known because none of the sites in Newfoundland have been regularly monitored. All Water Pygmyweed occurrences discovered before 2019, except Pieduck Point, have been revisited at least once and the species has been found to persist. The Argentia population has persisted many decades, even though the plants have shifted somewhat geographically from the location of initial discovery, which appears to have been developed (Species Status Advisory Committee 2008, John Maunder, pers. comm.). The Portugal Cove South, Garnish, and Taylor's Bay occurrences, all previously visited in 2006, were still extant in 2019. However, where the

size of the patches had been recorded repeatedly, the methodology was not consistent and the occupied area could not be directly compared.

The exact size, shape, and population density of each patch in a given year are expected to depend to a large degree on the patterns of moisture availability and disturbance, as well as on the number of seeds surviving in the seedbank from previous years. Large fluctuations between years are anticipated, with makes it more difficult to discern trends.

TRADITIONAL AND LOCAL ECOLOGICAL KNOWLEDGE

No published or other evidence has been found about Indigenous use or other traditional and local knowledge (Species Status Advisory Committee 2008). There are no First Nations communities within the range of the species in Newfoundland and it is highly unlikely that any traditional or local ecological knowledge exists.

EXISTING PROTECTION AND MANAGEMENT

None of the currently known occurrences of the species are located in any existing protected areas or Sensitive Wildlife Areas (SWAs). All but the Taylor's Bay occurrence are located within municipal boundaries.

MANAGEMENT GOALS, OBJECTIVES AND ACTIONS

The overall goal for management of species at risk is to ensure the long-term persistence of species as self-sustaining viable populations throughout their current, and when possible, historical ranges. The following details the goals, objectives, and actions needed to fulfill this purpose, all of which are summarized in Table 1. The following three goals have been identified as important to the long-term persistence of the Water Pygmyweed in Newfoundland and Labrador:

Goal 1. Conduct research and monitoring to fill knowledge gaps about Water Pygmyweed and associated habitat

Goal 2. Manage the habitat of Water Pygmyweed for the conservation of the species

Goal 3. Develop stewardship, education, and outreach strategies to aid in the conservation of Water Pygmyweed

Table 1. Management goals, objective, and actions for Water Pygmyweed in Newfoundland and Labrador

Management Goal & Objective	Management Action
Goal 1: **Conduct research and monitoring to fill knowledge gaps about Water Pygmyweed and associated habitat**	
Objective 1.1. Continue surveys to determine distribution and habitat requirements.	Action 1.1.1. Carry out surveys of potential habitat within the known range of the species in Newfoundland.
	Action 1.1.2. Broaden surveys to coastal areas outside of the known range of Newfoundland in order to search for more plan occurrences.
Objective 1.2. Undertake research and monitoring to determine population and habitat trends.	Action 1.2.1. Determine usage trends, disturbance patterns, and potential for damage from maintenance in areas frequented by vehicles.
	Action 1.2.2. Investigate the effects of variations in moisture and substrate changes.
	Action 1.2.3. Determine variation in seeds that are in the seed bank.
	Action 1.2.4. Determine the extent of population fluctuations and trends.
	Action 1.2.5. Investigate the timing and quantity of seed production.
	Action 1.2.6. Determine seed storage requirements and viability periods.
	Action 1.2.7. Determine protocols for repopulation of extirpated sites.

Goal 2: **Manage the habitat of Water Pygmyweed for the conservation of the species**	
Objective 2.1: Conserve habitat and limit disturbance	Action 2.1.1. Establish Sensitive Wildlife Areas at Portugal Cove South and Argentia to ensure review by the Wildlife Division of any development applications submitted through the Interdepartmental Land Use Committee.
	Action 2.1.2. Identify road right-of-ways and exchange information with parties involved in road maintenance to prevent damage of plants.
	Action 2.1.3. Determine land ownership and jurisdiction of Water Pygmyweed sites.
	Action 2.1.4. Ensure that quarry activities do not put the species at further risk.
Goal 3: **Develop stewardship, education, and outreach strategies to aid in the conservation of Water Pygmyweed**	
Objective 3.1: Work with municipalities to conserve the species and habitat	Action 3.1.1. Inform municipalities of Water Pygmyweed and its vulnerable status within their municipal boundaries and municipal planning areas.
	Action 3.1.2. Work with municipalities to obtain local information on municipal operations and future plans that could impact the species.
	Action 3.1.3 Investigate the possibility of a stewardship agreement with the Town of Portugal Cove South.

Objective 3.2. Encourage responsible vehicle use	Action 3.2.1. Educate vehicle users about the species and encourage limiting site disturbance, especially to shoulders and ditches, puddles, and other wet areas.
	Action 3.2.2. Erect signage in occupied areas frequented by vehicles.
Objective 3.3. Encourage and support stewardship, education, and outreach	Action 3.3.1. Determine land use patterns of local residents and businesses to determine if Water Pygmyweed is at high risk of being disturbed.
	Action 3.3.2. Encourage citizen reporting of new occurrences, as well as disturbances, extreme weather events, usage of population areas by birds and other animals, etc.
	Action 3.3.3. Alert Natural Areas Program staff, including managers and interpreters of the Mistaken Point Ecological Reserve, to the species and explore opportunities for interpretation.

GOAL 1. Conduct research and monitoring to fill knowledge gaps about Water Pygmyweed and associated habitat

Relatively little is known about the distribution, habitat, and biology of Water Pygmyweed. As an annual species that requires an intermittently wet habitat, it is expected to exhibit potentially large annual fluctuations in population and occupied area. All known occurrences of the species in Newfoundland and Labrador are in human-created habitat, much of which is subject to repeated disturbance by vehicle traffic. Understanding distribution, habitat requirements, stressors, threats, and population dynamics will allow the proper reassessment of the species and tailoring of specific management actions to the species as a whole, as well as individual occurrences.

It is possible that the assessed status of the species could be affected by additional data. Therefore, information on the distribution, threats, and abundance, as well as trends or fluctuations in population or habitat availability, is vital. Surveys and monitoring to collect this information should be prioritized before resource-intensive management actions are undertaken.

Water Pygmyweed occurrences that have not yet been discovered are nearly impossible to protect or otherwise manage. It is very likely that additional occurrences exist within the currently known range of the species in Newfoundland, especially in the Argentia area, where land development is continuing. It is also possible that the species may occur in other coastal areas of the Island. Surveys outside the currently known range would serve to refine the distribution within the province, as well as improve ranking of the relative importance of the occurrences to the conservation of the species.

Surveys can also fill other information gaps. They will improve knowledge of habitat requirements, availability of potential habitat, the distance the species can grow from the coast, population size, as well as threats and disturbances. There is a chance that if the species still exists in natural habitat in this province, it will be discovered, enabling its prioritization for conservation.

While surveys can provide one-time site data, monitoring over time is necessary to determine population changes, fluctuations, patterns, or trends. It is likely that intensive monitoring over decades will be necessary to discern population trends from annual fluctuations. Experimental research is required to determine the factors underlying any observed patterns or changes and to develop a methodology for ex-situ conservation and reintroduction. Currently there are no known protocols for collecting, preserving and germinating the seeds, or for revegetating extirpated sites.

GOAL 2. Manage the habitat of Water Pygmyweed for the conservation of the species

None of the known Water Pygmyweed occurrences are currently protected. All are in artificially created habitat and most of them face threats of repeated disturbance due to their proximity to human habitation or infrastructure. Habitat management is necessary to eliminate or mitigate threats of plant or habitat destruction by vehicles or land development.

All the known Water Pygmyweed sites are located in, or in close proximity to, roads, towns, developments and other sites impacted by ongoing use, such as vehicle traffic and aggregate extraction. Some of these sites may have some potential for future development that could conflict with the conservation of the species.

GOAL 3. Develop stewardship, education, and outreach strategies to aid in the conservation of Water Pygmyweed

All but one site with Water Pygmyweed are located within the boundaries of municipalities and some of them quite close to residences. A two-way dialogue could be used not only to convey information about the species, its habitat, ecology and conservation, but also to determine which maintenance activities, developments, or challenges within the municipalities could be impacting the populations or have the potential to do so in the future. The two sites with the largest populations, Portugal Cove South and Argentia, should be prioritized.

Most, if not all, Water Pygmyweed occurrences are in areas frequented at least occasionally by ATVs or other vehicles. Some of these are the edges of well-established roads and currently users are unaware that they are impacting a species at risk.

Currently, people residing in or near areas occupied by Water Pygmyweed are not aware of the species or its status as a species at risk. There are opportunities to disseminate information and encourage collaboration in the conservation of the species and its habitat.

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