

Mexican Mosquito Fern

Azolla mexicana

Prepared by Chris Gill, MSc, RPBio
Forsite
Phone: (250) 832-3366
Email: cgill@forsite.ca

Disclaimer: The following document was compiled based on a review of information currently available for this species as of November 25, 2005. This document can be used to assist with the identification of this species and to support the development of management recommendations as they relate to forestry activities. For more information on this species, please refer to the reference section or consult with a Species at Risk specialist.

Description

The Mosquito-fern is a small floating plant which measures 1 to 3 cm in diameter. It has numerous tiny fleshy leaves which measure up to 1 mm in length, and many short trailing roots. Due to its size, the Mexican Mosquito Fern more closely resembles a liverwort than a fern. Even so, this species is often hard to overlook, owing to its habit of forming dense vegetative colonies. Mosquito fern colonies may cover large expanses in the sheltered bays of ponds and lakes. By late summer, the tiny scale-like leaves have turned a deep brick red, and so render the colonies even more conspicuous. In late Fall it forms red 'carpets' on the water surface^{1,2}.

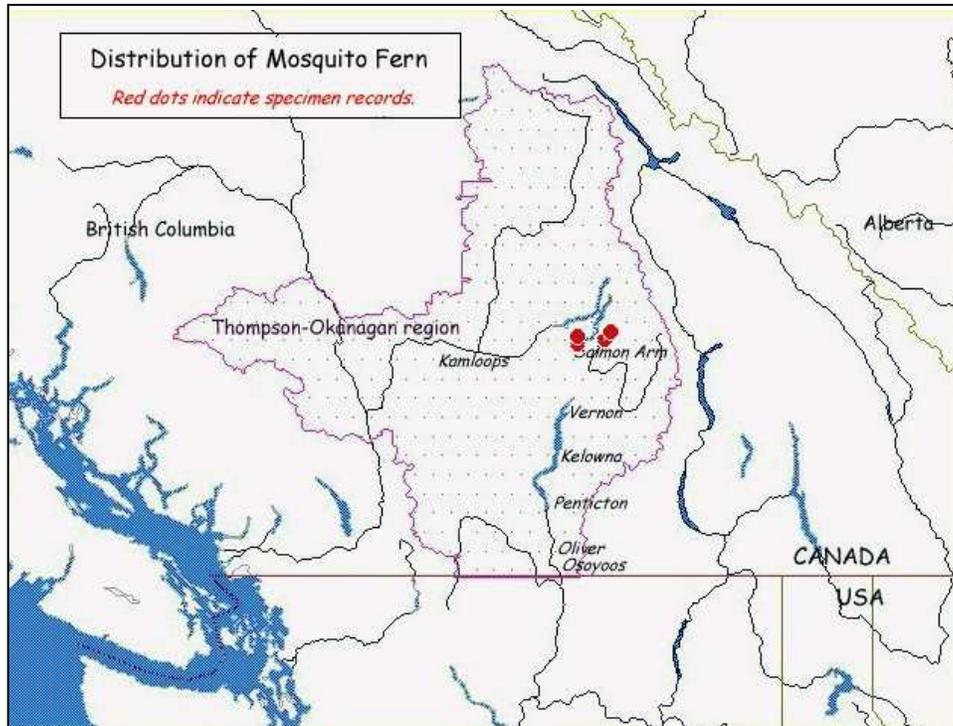


Photos courtesy of Brian Klinkenberg

Distribution

In Canada, the Mosquito-fern occurs only in British Columbia. The isolated records in British Columbia may represent relict locations in areas of what was once more widespread suitable¹ micro-climate and habitat. Until recently, this fern was known only from only four localities in British Columbia - all of them within about 35 km of one another on the south shore of Shuswap Lake, near Sicamous, Tappen, and Cambie².

Two new localities were found in south-central British Columbia on the floodplain of the North Thompson River, approximately 60 and 80 km northwest of the closest Shuswap Lake localities.



Distribution of Mexican Mosquito fern in British Columbia².

Forest Districts³

- **Headwaters Forest District (DHW)**
- **Kamloops Forest District (DKA)**
- Okanagan Shuswap Forest District (DOS)

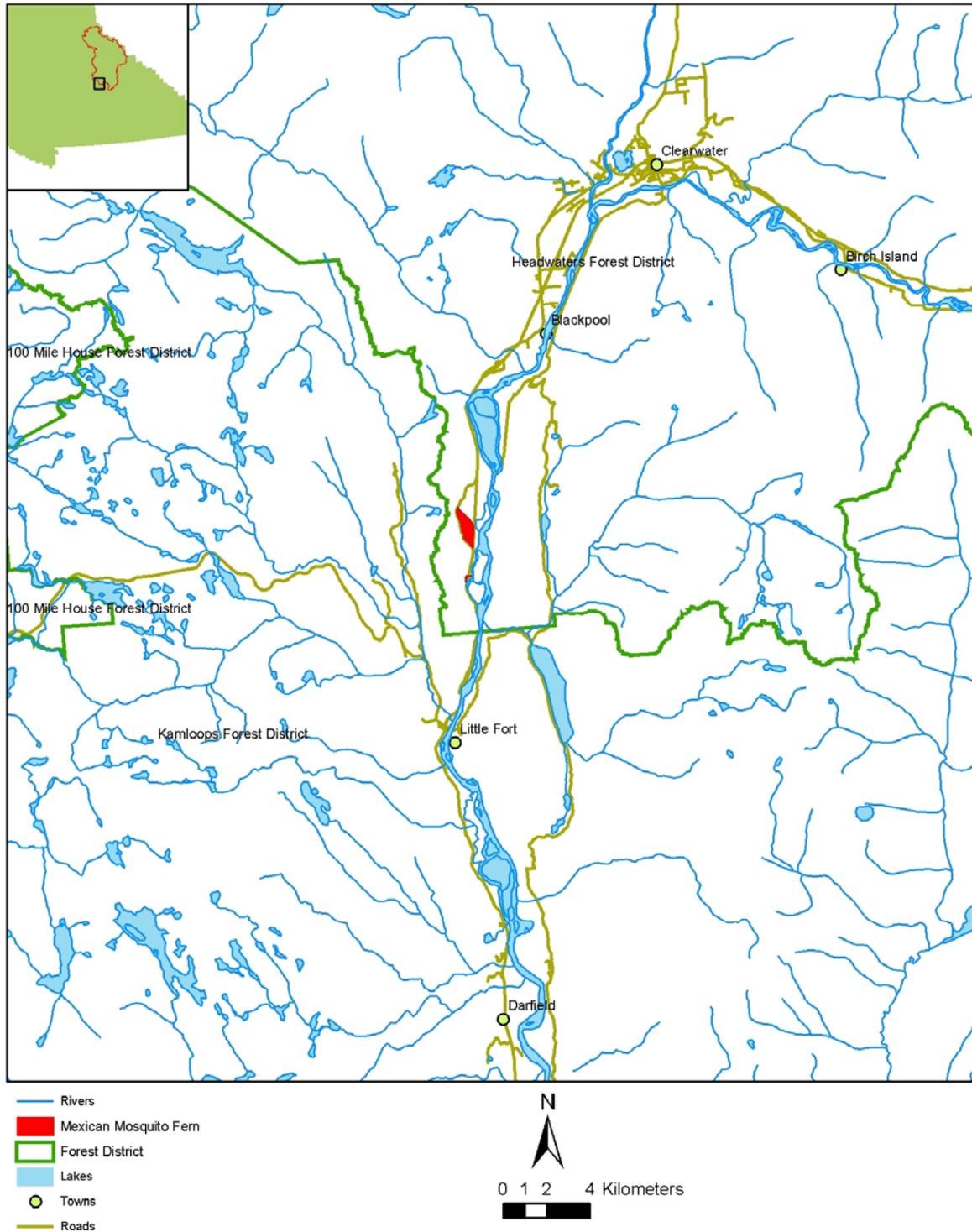
Biogeoclimatic Units³

- BGC: ICHmw - Interior Cedar -- Hemlock - Moist Warm
- IDFxh - Interior Douglas-fir - Very Dry Hot

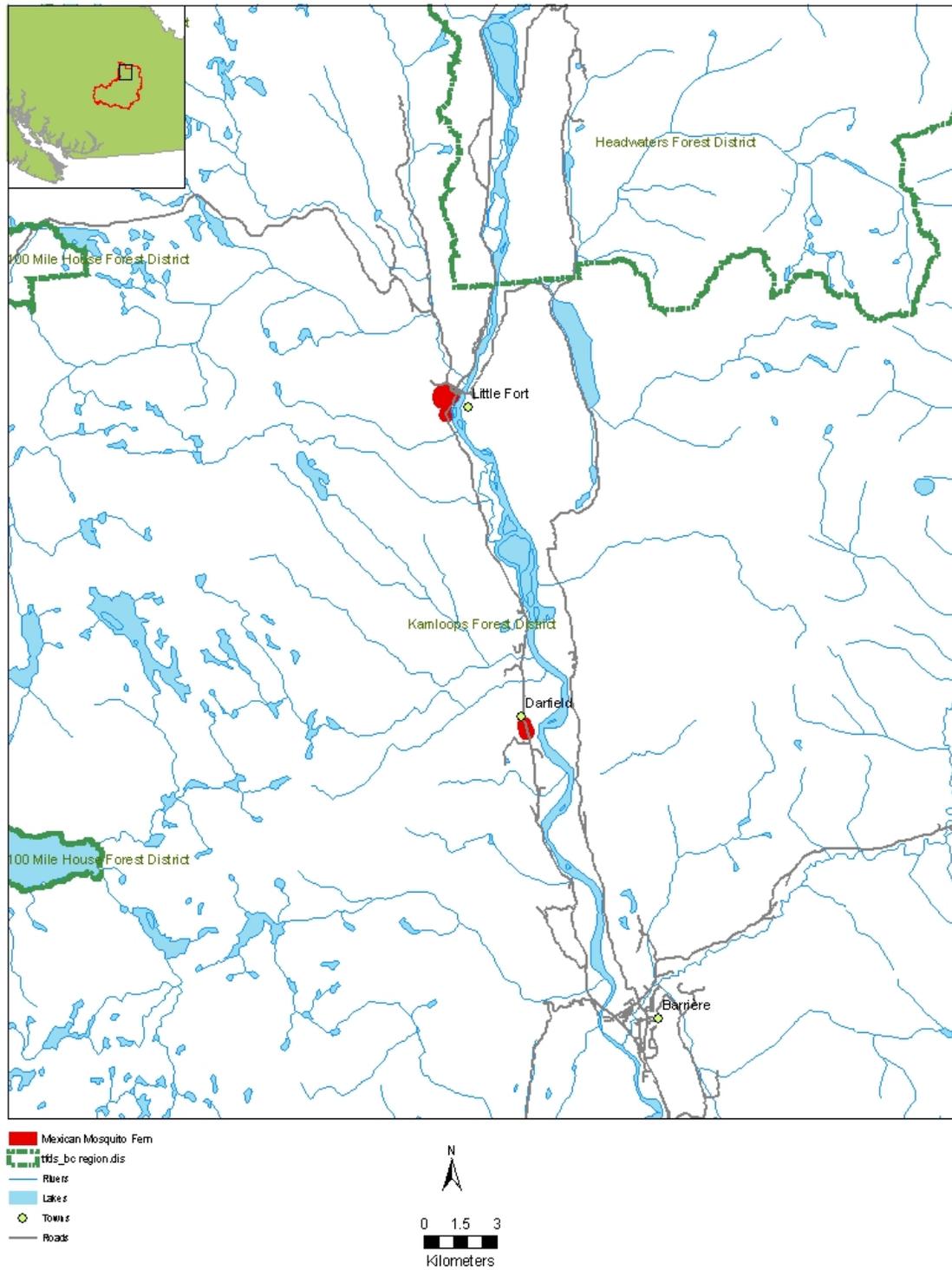
Elevation

No information available.

Map of Known Locations



Known locations for Mexican Mosquito Fern (*Azolla mexicana*) in the Headwaters Forest District as of September 2005 (data source: Conservation Data Centre).



Known locations for Mexican Mosquito Fern (*Azolla mexicana*) in the Kamloops Forest District as of September 2005 (data source: Conservation Data Centre).

Biology

Azolla is known from only a few small sites where many thousands of individual plants blanket the surface of quiet backwater pools in late summer. Vegetative reproduction is the primary vehicle for plant growth; the production of fertile material is proportionately rare. Populations completely disappear each fall/winter and do not show any evidence of survival until conditions are suitable for growth, then, the population expands quickly^{1,2}.

Different from most other pteridophytes, the Mexican Mosquito Fern produces two kinds of spores: microspores and megaspores. These function as reproductive packages for the species. Having overwintered at the bottom of the pond, they eventually float to the surface again, where they initiate sexual reproduction and so produce a new generation of mosquito ferns. Though microspores (sometimes referred to as the "male" spores) are said to occur commonly in this species, megaspores (the "female" spores) are rather rare, and have apparently not been reported from Canadian collections. In this connection, it is noteworthy that the North Thompson collections bear both types of spores^{1,2}.

A dramatically reduced water-level is apparently essential for the development of the Mosquito Fern. The water must be somewhat acidic for optimum *Azolla* growth and nitrogen-fixation. As well, the blue-green algae which the fern has a symbiotic relationship with cannot fix nitrogen without the proper levels of manganese^{1,2}.

Habitat

The Mosquito Fern prefers moderately dry climates, but where saline soils are not widespread (so that salt does not rise to intolerable levels during the water-level reduction which seems necessary for its development). Small ponds surrounded by wet meadows, still-water, fresh ox-bow lakes over sandy floodplain deposits and edges of slow streams are where the Mosquito Ferns are found. These locations are usually surrounded by young hardwood and/or mixed forests but can be in the open amongst grasses and shrubs. The plants are both free-floating and on logs and rotting vegetation^{1,2}.

Conservation and Management

Status

Prov. Rank: S2 (Rare)

BC List: Red (Threatened)

COSEWIC Status: Threatened (May 2000)

Threats

The Mexican Mosquito Fern is considered threatened on a provincial and national status. This status reflects both the few sites and their susceptibility to disturbance. The North Thompson localities are apparently no more secure than other Canadian localities^{1,2}.

Potential threats include herbicides, accumulating salt from winter road de-icing programs, and leakage of diesel oil or gasoline in the event of an accident on the adjacent highway. Though little can be done to reduce the last of these threats, the North Thompson sites should be protected against salt and herbicides².

The fern fluctuates widely in abundance from year to year; when sparsely developed it may be easily overlooked. Drought conditions cause the ponds in which the ferns live to dry up much earlier than usual.

Past threats to the habitat required by the Mosquito Fern are from in-filling of suitable backwater sites for the development of housing and road construction. Ponds where the fern had been reported to be abundant at the beginning of the century have been damaged and destroyed².

This species along with others of the grasslands communities are endangered for a number of reasons. In addition to the major impact of livestock grazing, range re-seeding and off-road recreation have modified much of the remaining "undeveloped" grassland areas. In addition, cultivation, agricultural and urban development, prescribed burning, forest encroachment, road and trail development, alien plant and animal species introductions, and hydro-electric power projects have caused outright, irreversible losses of native grassland species².

Habitat Threats

Several of the Canadian sites of the Mosquito-fern are close to major transportation corridors, hence spills of oil, gas and other toxic substances are all potential limiting factors for this plant. Accumulation of salt on the roads can also be a threat to this plant, because the salt is carried into the water when the snow melts. Road expansion or construction could destroy the habitat of the Mosquito-fern¹.

Management Recommendations

- Identify locations where Mexican Mosquito Fern occur: obtain occurrence data from the Conservation Data Centre (<http://srmwww.gov.bc.ca/cdc/>) and if necessary conduct ground surveys to confirm presence or absence of this species.

In areas where this species is identified:

- Maintain riparian habitat features including small ponds surrounded by wet meadows, still-water, fresh ox-bow lakes over sandy floodplain deposits and edges of slow streams, to minimize impacts to unnatural fluctuations in water levels.
- Do not construct roads in critical Mexican Mosquito Fern habitat. In areas where roads have previously been established, take steps to ensure that critical habitat is not contaminated by sediment runoff or diesel and oil spills.
- Do not apply herbicides in critical Mexican Mosquito Fern habitat.
- Consider using alternate methods of ice control on roads (i.e., not salting) in areas with critical Mexican Mosquito Fern habitat, such as sand and gravel mixes (T. Manning pers comm.).

References

¹ Environment Canada Species at Risk. Website:

http://www.speciesatrisk.gc.ca/search/speciesDetails_e.cfm?SpeciesID=223

² Royal BC Museum. Mexican Mosquito Fern. Website:

http://www.royalbcmuseum.bc.ca/end_species/species/mfern.html

³ BC Conservation Data Centre: Website: <http://srmapps.gov.bc.ca/apps/eswp/>