

The Status of
Shaved Sedge
(*Carex tonsa* var. *tonsa*)

in Newfoundland and Labrador



Photo: John E. Maunder

**THE SPECIES STATUS ADVISORY COMMITTEE
REPORT NO. 11**

February 20, 2008

ASSESSMENT

Assessment: Threatened	Current designation: None
Criteria met: D2. Area of occupancy < 20 km ² and number of locations <5	
Reasons for designation: Qualifies as " <i>threatened</i> " under the SSAC/COSEWIC criteria D2 <ul style="list-style-type: none">• Restricted distribution, area of occupancy < 0.2 km²• Known only from 2 localities in Newfoundland and one historical location in Labrador• Population estimated at 9,000 to 18,000 ramets (aerial shoots) in Newfoundland, Labrador population unknown; total number of mature individuals unknown• A large portion of the overall population occurs within highly disturbed sites• Rescue effect unlikely	

The original version of this report was prepared by John E. Maunder on behalf of the Species Status Advisory Committee.

STATUS REPORT

Carex tonsa (Fernald) E. P. Bicknell var. *tonsa*
Shaved Sedge; Fr: carex à fruit glabre

Synonyms:

Carex umbellata Schkuhr ex Willdenow var. *tonsa* Fernald
Carex rugosperma Mackenzie var. *tonsa* (Fernald) E. G. Voss

Family: Cyperaceae (Sedges)

Life Form: Perennial, sedge.

Distribution

Global:

North America: Canada [see more detail below]. United States: many northeastern states, *including* Maine, New Hampshire, Massachusetts, New York, Pennsylvania, New Jersey, District of Columbia, North Carolina, Michigan, Indiana, Wisconsin, Illinois, Ohio (Crins and Rettig, 2002).

National:

Newfoundland and Labrador, Nova Scotia, Prince Edward Island, New Brunswick, Québec, Ontario, Saskatchewan, Alberta, British Columbia (Crins and Rettig, 2002).

Provincial:

Within the Island of Newfoundland, known only from 2 small localities on the northeast coast. Within Labrador, known only from the Goose Bay area (Fig 1).

Annotated Range Maps

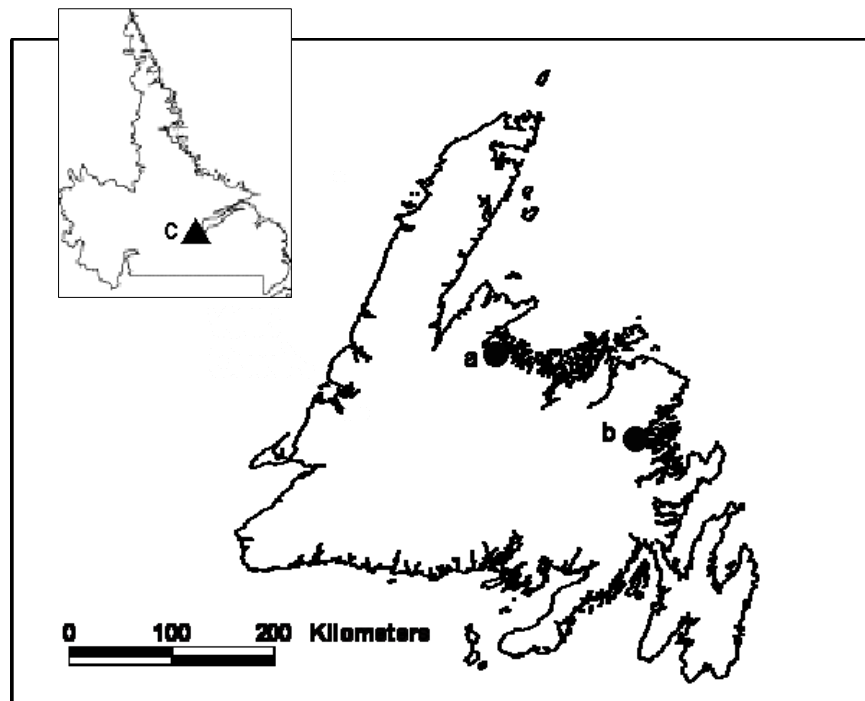


Figure 1. Known localities for *Carex tonsa* var. *tonsa* in Newfoundland and Labrador: [a] Davis Brook, Springdale, [b] Grant's Siding (red pine stand, east of Gambo), [c] Goose Bay area (historical).

Description

A densely tufted, often cushion-forming sedge. Flowering spikes few, small, inconspicuous, and typically nestled within the base of the leaf cluster. Leaves very stiff.

Habitat

A plant of open, dry, sandy fields, pine and oak barrens, savannas, dunes, roadsides, and ridges; at elevations between 50 and 1000 m (Crins and Rettig 2002).

In Newfoundland and Labrador, *Carex tonsa* is clearly associated with open, dryish, sandy-silty-pebbly, poorly-vegetated, glaciomarine soils. Gross habitat varies markedly:

Grant's Siding (red pine stand, just east of Gambo):

Disturbed areas of coarse brownish glaciomarine sand with pebbles, mostly in close association with an active four-wheel-drive/ATV track, within an open red pine (*Pinus resinosa*) woodland.

Springdale area:

"Natural populations" are located mostly within thin, open lichen woods, throughout the broad, flat, early Holocene-age "glaciomarine embayment terrace" (Scott *et al.* 1991) that ranges inland in the vicinity of Davis Brook.

"Disturbed populations" are scattered throughout a variety of largely unvegetated disturbed habitats, in different stages of succession, both within the greater Davis Brook industrial park area and, here and there, within the western extremities of the town of Springdale itself.

Goose Bay area:

"Open sandy places along airfield. Isolated clumps, with lichen and *Vaccinium*", and "Common in open sandy places on the terrace" (Gillett, 1963).

Overview of Biology

Although *C. tonsa* is apparently highly clonal, it does produce a small number of short, few-flowered spikes. In Newfoundland, John Maunder has observed that spikes appear to be particularly uncommon, and tend to be both particularly short, and particularly few-flowered. Apparently mature, male and female spikes were observed at Grant's Siding on July 22 and October 10, 2006. Seed production is apparently very low. Seed viability is unknown.

Population Size and Area of Occupancy

Grant's Siding:

A total of close to 900 ramets (ie. "individual plants" within a clone) was estimated from on-the-ground observations by John Maunder in October 2006. Clumps were estimated to contain anywhere from 1 to about 45 ramets. The total area of occupancy was estimated to be about 5000m². Within this area, individual clumps were very sparsely distributed.

Clumps containing about 30 ramets measured about 0.1m² in area. Thus, density within clumps is 300 ramets/m². Extrapolating backwards from the observed total of about 900 ramets, it can be calculated that, within the 5000m² area of occupancy described for Grant's Siding, only about 3m², or 0.06%, of ground was actually covered by *C. tonsa* plants.

Springdale:

There is no accurate count of ramets or measurement of area of occupancy for this locality. Nonetheless, a very rough extrapolation will be attempted, below.

Within the greater Davis Brook "glaciomarine embayment terrace", the total area of apparently suitable *C. tonsa* habitat (whether "natural" or "disturbed"), probably exceeds one km². However, this habitat is by no means continuous. Moreover, as is the case at Grant's Siding, individual clumps are very sparsely distributed.

A very subjective estimate might be that the actual area of occupancy for the Springdale area is about 10-20 times the area of occupancy for the Grant's Siding locality. Extrapolating very roughly, the total general area of occupancy for the Springdale area might be estimated to be about 50,000-100,000 (ie. 5000 x 10-20) m² (= 0.05-0.1 km²).

Extrapolating similarly for population size, the best that can be concluded at present is that there may be as many as 9000-18000 (ie. 900 x 10-20) ramets in the Springdale population. Finally, assuming a ramet population of 9000 to 18000, and a clump density that is relatively similar to that from Grant's Siding (ie. 300 ramets/m²), it can be additionally suggested that, within the supposed 50,000-100,000 m² area of occupancy estimated for *C. tonsa* in the Springdale area, only about 30-60 m², or 0.06%, of ground area is actually covered by *C. tonsa* plants.

Goose Bay:

The population size and the area of occupancy of the species in the Goose Bay, Labrador area is completely unknown.

Traditional and Local Ecological Knowledge

No published or other evidence has been found regarding the aboriginal use of *Carex tonsa* in Newfoundland. In particular, specific inquiries to the Federation of Newfoundland Indians, the Labrador Innu Nation, and the Nunatsiavut

Government, in 2007, have yielded no definitive information. Arnason *et al.* (1981) failed to mention *any* species of *Carex* in their comprehensive study of eastern Canada ethnobotany.

Trends

At Grant's Siding, frequent ATV traffic appears to be the main cause of physical disturbance to *C. tonsa*. Nonetheless, that same ATV traffic has apparently contributed to the creation and maintenance of an extensive low vegetation trackway, and possibly, also, to a complex sand blow-out area, both of which now provide the bulk of the *Carex tonsa* habitat at this locality. That said, the plants growing on the ATV trackway are very stunted, and do not appear to flower.

At Springdale, the situation is somewhat more complicated. Despite being endlessly criss-crossed by ATV tracks, the "natural" habitat on the "glaciomarine embayment terrace", upstream from the industrial area in the vicinity of Davis Brook, still appears to be in fairly good shape. The clearing of large plots of land for the construction of the townsite and the greater industrial park area has made a much greater impact, in recent years; having almost certainly destroyed a major portion of the original "natural" habitat of *C. tonsa*. On the other hand, as already noted, the species seems to thrive, at least initially, in "disturbed" habitats. In Springdale, many pockets of *C. tonsa* can be found scattered throughout the industrial area, and even at a few places within the built-up town.

There is no information at all for the Goose Bay population.

Threats and Limiting Factors

At Grant's Siding, frequent ATV traffic appears to be the main physical threat to *C. tonsa* and its habitat.

At Springdale, the main threats appears to be regular, habitat disturbance occurring within the already-disturbed industrial park and town areas, as well as more intermittent, new habitat destruction associated with commercial, municipal, and private, development projects. While certainly a significant disturbance element, ATV traffic is apparently not the major threat. A complication in the Springdale area is that much of the *C. tonsa* population appears to be located on actively-used private land.

There is no information at all for the Goose Bay population; although it should be noted that at least one of the known occurrences appears to be associated with the airport.

Rank or Status

Global	
G-rank	G5T4T5
IUCN	not assessed
National	
N-rank	NNR (not ranked)
National General Status	4
COSEWIC	not assessed
Provincial	
Provincial General Status	2
Newfoundland S-rank	S1
Newfoundland General Status	2
Labrador S-rank	not ranked
Labrador General Status	not assessed
Adjacent Jurisdictions	
Nova Scotia S-Rank	S5,
Nova Scotia General Status	not assessed (at the variety level)
Prince Edward Island S-Rank	S1?
Prince Edward Island General Status	not assessed (at the variety level)
New Brunswick S-Rank	S5
New Brunswick General Status	not assessed (at the variety level)
Québec S-Rank	S3S4
Québec General Status	not assessed (at the variety level)

[Note: Where available, ranking data from the biodiversity databases of the individual Provinces has been used. Otherwise, General Status assessments are based upon the “General Status of Species in Canada (2005)”, and S-Ranks are based upon “NatureServe Explorer”. Where there is apparent discrepancy, NatureServe Explorer ranks are considered to be the least current.]

[The species is often confused with similar taxa in herbarium collections, thus rankings should be viewed with some caution.]

Existing Protection

A 3 km² area of the Grant's Siding red pine stand is protected, through the Parks and Natural Areas Division of the Department of Environment and Conservation, as a "development control area" under the name "Pine Acres Development Control Area".

Special Significance

None.

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Collections Examined

Provincial Museum of Newfoundland and Labrador:
Two as yet unaccessioned herbarium collections.

TECHNICAL SUMMARY

Distribution and Population Information	Criteria Assessment
<i>Extent of occurrence (EO)(km²)</i>	approximately 18 000 km ² (approximately 80 km ² for Newfoundland only)
<i>Area of occupancy (AO) (km²) [Newfoundland only; Labrador figures unknown]</i>	roughly 0.055-0.11 km ² of general habitat; however, given an approximate 0.06% ground cover density, the actual area of ground covered by the species is only about 33-66m ² , in total
<i>Number of extant locations [Newfoundland]</i>	2
<i>Number of extant locations [Labrador]</i>	1, at least
<i>Specify trend in # locations, EO, AO (decline, stable, increasing, unknown)</i>	unknown
<i>Habitat trend: specify declining, stable, increasing or unknown trend in area, extent or quality of habitat</i>	unknown
<i>Generation time (average age of parents in the population) (indicate years, months, days, etc.)</i>	unknown; perennial
<i>Number of mature individuals (capable of reproduction) in the Provincial population (or, specify a range of plausible values)</i>	Newfoundland: possibly about 9,000-18,000 ramets; though the number of "mature" ramets may be considerably lower; however, most reproduction appears to be vegetative. Labrador: unknown.
<i>Total population trend: specify declining, stable, increasing or unknown trend in number of mature individuals or number of populations</i>	unknown
<i>Are there extreme fluctuations (>1 order of magnitude) in number of mature individuals, number of locations, AO and/or EO?</i>	unknown; probably not
<i>Is the total population severely fragmented (most individuals found within small and isolated populations)</i>	yes
Rescue Effect (immigration from an outside source)	
<i>Does species exist elsewhere?</i>	yes
<i>Status of the outside population(s)? [adjacent Provinces only]. (Assessed only at the level of species)</i>	Nova Scotia, secure; Prince Edward Island, sensitive; New Brunswick, secure; Québec, sensitive
<i>Is immigration known or possible?</i>	unlikely
<i>Would immigrants be adapted to survive here?</i>	unknown
<i>Is there sufficient habitat for immigrants here?</i>	unknown

Appendix A. Population Information

Recently verified occurrences/range use (recorded within the last 25 years)

Verified occurrences consist of observations supported by the collection of a voucher specimen (i.e. a sample to be identified/confirmed by experts and deposited in a herbarium).

Grant's Siding [red pine stand east of Gambo] (Figure A-1):

July 19, 1988. Pine Acres, Grant's Siding [just east of Gambo]. Stand of red pine; sandy roadside. [Observers: A. S. Bouchard, S. Hay, L. Brouillet. Collection: MT 88091 (Université de Montréal)]

July 22, 2006. Grant's Siding. [Observer: J. E. Maunder. Collection: no specimen collected, but, diagnostic photos taken (Maunder (ongoing) and this report).]

October 10, 2006. Grant's Siding. [Observer: J. E. Maunder. Collection: no specimen collected, but, diagnostic photos taken (Maunder (ongoing) and this report).]

Springdale (Figures B-3, B-5):

July 25, 1988. Davis Brook, Springdale. Along brook, disturbed sandy area. [Observers: A. S. Bouchard, S. Hay, L. Brouillet. Collection: MT 88219. (Université de Montréal)]

August 10, 2001. Springdale, about 3 km W of town centre, at edge of Industrial Park, W of Davis Brook, S of road 390. Cleared gravelly flat, vegetation dominated by *Hieracium* sp. and some lichen (same as CH 010810-9); ringed by *Alnus viridis* ssp. *crispa*; edge of clearing where it is less disturbed; substrate dry fine sand and silt; open. [Observers: C. Hanel, N. Djan-Chékar, L. Lavers, and D. Lavers. Collection: CH 010810-13 (Provincial Museum of Newfoundland and Labrador [NFM], collection not yet accessioned)]

August 10, 2001. Springdale, about 3 km W of town centre, Davis Brook, W-shore of brook, N of road 390, behind industrial buildings. Disturbed sandy clearing above brook, vegetation sparse, dominated by *Carex tonsa* and *Danthonia spicata*; with shrubs starting to encroach; vehicle tracks visible; patches of nearly continuous lichen (same as CH 010810-9) in less disturbed areas; substrate dry fine sand and gravel with a small amount of silt; open. [Observers: C. Hanel, N. Djan-Chékar, L. Lavers, and D. Lavers. Collection: CH 010810-4 (Provincial Museum of Newfoundland and Labrador [NFM], collection not yet accessioned).]

August 8, 2006. Springdale. [Observer: J. E. Maunder. Collection: no specimen collected, but, diagnostic photos taken in the vicinity of the Industrial Park Road junction (Maunder (ongoing) and this report).]

October 11, 2006. Springdale. [Observer: J. E. Maunder. Collection: no specimen collected, but, diagnostic photos taken (Maunder (ongoing) and this report).]

Recent Search Effort (areas searched within the last 25 years with estimate of effort)

General rare plant surveys of the west and northeast coasts of the Island were conducted by members of the Newfoundland Rare Plant Project (*q.v.*), specifically during 1999 to 2001, when 1645 individual sites were surveyed and 7622 plant collections were made. During the 2001 field season, sandy habitats of north-central Newfoundland were specifically targeted. Additional general rare plant surveys have been conducted within the Province by various National Parks personnel, and by J. E. Maunder of the Provincial Museum and H. Mann of Sir Wilfred Grenfell College (early 1970's to present), as well as by N. Djan-Chékar of the Provincial Museum (2002 to present). Significant additional general collecting has been conducted, on the south coast of the Island, by R. Etcheberry, of St.-Pierre et Miquelon (1986, 1987, 1989, 1990, 1992, and 1993).

Targeted rare plant surveys were conducted by personnel from the Université de Montréal, during the course of the preparation of the publication "The Rare Vascular Plants of the Island of Newfoundland" (Bouchard *et al.* 1991), in: 1984 and 1985 (Gros Morne National Park), 1986 (southwest coast, and the general Port au Port area), 1987 (Great Northern Peninsula), 1988 (Baie Verte Peninsula, Notre Dame Bay, and central and eastern Newfoundland), 1989 (Gros Morne National Park, and the south coast), and 1990 (west coast, and Great Northern Peninsula).

Geographically focused rare plant surveys were conducted by personnel from the Université de Montréal, during the course of the preparation of contracted rare plant reports for Port au Choix National Historic Park (Bouchard *et al.* 1993), L'Anse aux Meadows National Historic Park (Bouchard *et al.* 1993), Gros Morne National Park (Anions, 1994; Bouchard *et al.*, 1985, 1986, 1991, 1994, 1996; and Brouillet *et al.*, 1998), and Terra Nova National Park (Brouillet *et al.* 1997). Additional geographically focused rare plant surveys were conducted in the Squid Cove and Doctors Brook areas, and the Labrador Straits region by C. Hanel (2004, 2005a, 2005b).

Historical Verified Occurrences/Range Use (recorded prior to the last 25 years)

In Labrador, *C. tonsa* has been variously recorded, from the Goose Bay area, by Gillett (1963), Hustich (1965), Rousseau (1974), Scoggan (1978), Bouchard *et al.* (1991), Meades *et al.* (2000), and Crins and Rettig (2002: 538); all on the basis of specimens collected by J. M. Gillett and W. I. Findlay in 1950, by I. Hustich in 1952 and 1967, and by I. Hustich and P. Kallio in 1963:

June 16, 1950. Goose Bay. Open sandy places along airfield. In isolated clumps, with lichen and *Vaccinium*. [Collectors: J. M. Gillett and W. I. Findlay. Collection: Gillett 5021 = DAO 297978 (Agriculture and Agri-Food Canada).

August 16, 1950. Goose Bay. DAO. "Common in open sandy places on the terrace" Gillett (1963). [Collectors: J. M. Gillett and W. I. Findlay. Collection: Gillett 5780 = DAO 297977 (Agriculture and Agri-Food Canada).

July 11, 1952. Goose Bay. [Collector: I. Hustich. Collection: Hustich 1001. CAN (Canadian Museum of Nature)]

July 23, 1963. Goose Bay. [Collectors: I. Hustich and P. Kallio. Collection: Hustich and Kallio 565. CAN (Canadian Museum of Nature)]

July 10, 1967. Vicinity of Goose Bay. [Collector: I. Hustich. Collection: Hustich 190. CAN (Canadian Museum of Nature)]

Gillett (1963) referred to his Goose Bay specimens as "*Carex abdita*" [generally considered a synonym of *C. umbellata sensu stricto*]. However, Paul Catling (DAO, Agriculture and Agri-Food Canada, personal communication, January 8, 2007) has recently examined Gillett's specimens and felt confident in calling them *C. tonsa* var. *tonsa*, on the basis of their "glabrous perigynia exceeding 3 mm and relatively wide leaves 2-4 mm" plus the fact that they were growing on sand. Additionally, Jacques Cayouette, of the same agency, stated (personal communication, January 9, 2007): "They are definitely *Carex tonsa* ... var. *tonsa*".

Despite the fact that H. J. Scoggan also determined Hustich's 1952 specimens to be *Carex abdita* Bickn., all of Hustich's various collections would also appear to be *C. tonsa* var. *tonsa* (Julian Starr, Canadian Museum of Nature, personal communication, January 12, 2007).

Other Observations (unverified occurrences)

None.

Potential Sites Unexplored

In addition to the possibility of locating additional *C. tonsa* sites in the vicinity of Grant's Siding, as suggested in the caption of Figure A-1, the entire Davis Brook area, near Springdale, needs a much more thorough ground survey. In a broader sense, the numerous sandy, glaciomarine areas that are widespread in both Newfoundland and Labrador need to be better searched.

Interestingly, recent, very brief surveys of the red pine areas in the vicinity of Birchy Narrows, by John Maunder, in 2006, turned up nothing, possibly because the quality of the sand at these localities seems to be very subtly different from that found at either Springdale, or east of Gambo.



Photos: Google Earth

Figure A-1: Satellite imagery of Grant's Siding (red pine stand just east of Gambo): [a] the main area of *C. tonsa* (the sandy blowout at upper right) has a characteristic signature that seems unique to the area, EXCEPT, possibly, for [b] one additional, small, apparently natural sandy blowout area a short way to the east, on the eastern side of a dirt track accessible through the old "Pine Acres Farm"; this latter site has not yet been visited by John Maunder.

Appendix B. Supplementary Details

Taxonomic Clarifications

Carex tonsa has often been synonymized with the very similar *Carex umbellata*, or considered to be a variety of it. However, recent authors (ie. Crins and Rettig 2002) regard *C. tonsa* as a distinct species.

Two varieties of *Carex tonsa* occur at least as far east as Nova Scotia: var. *tonsa*, and var. *rugosperma*. Our variety is var. *tonsa*. The following distinctions are made by Crins and Rettig (2002):

1. Perigynia with few hairs near base of beak, otherwise glabrous; leaves pale green, often relatively short, coriaceous, usually smooth adaxially ... var. *tonsa*.
2. Perigynia pubescent on beak and body; leaves bright green, much longer than culms, herbaceous, scabrous to papillose adaxially ... var. *rugosperma*.

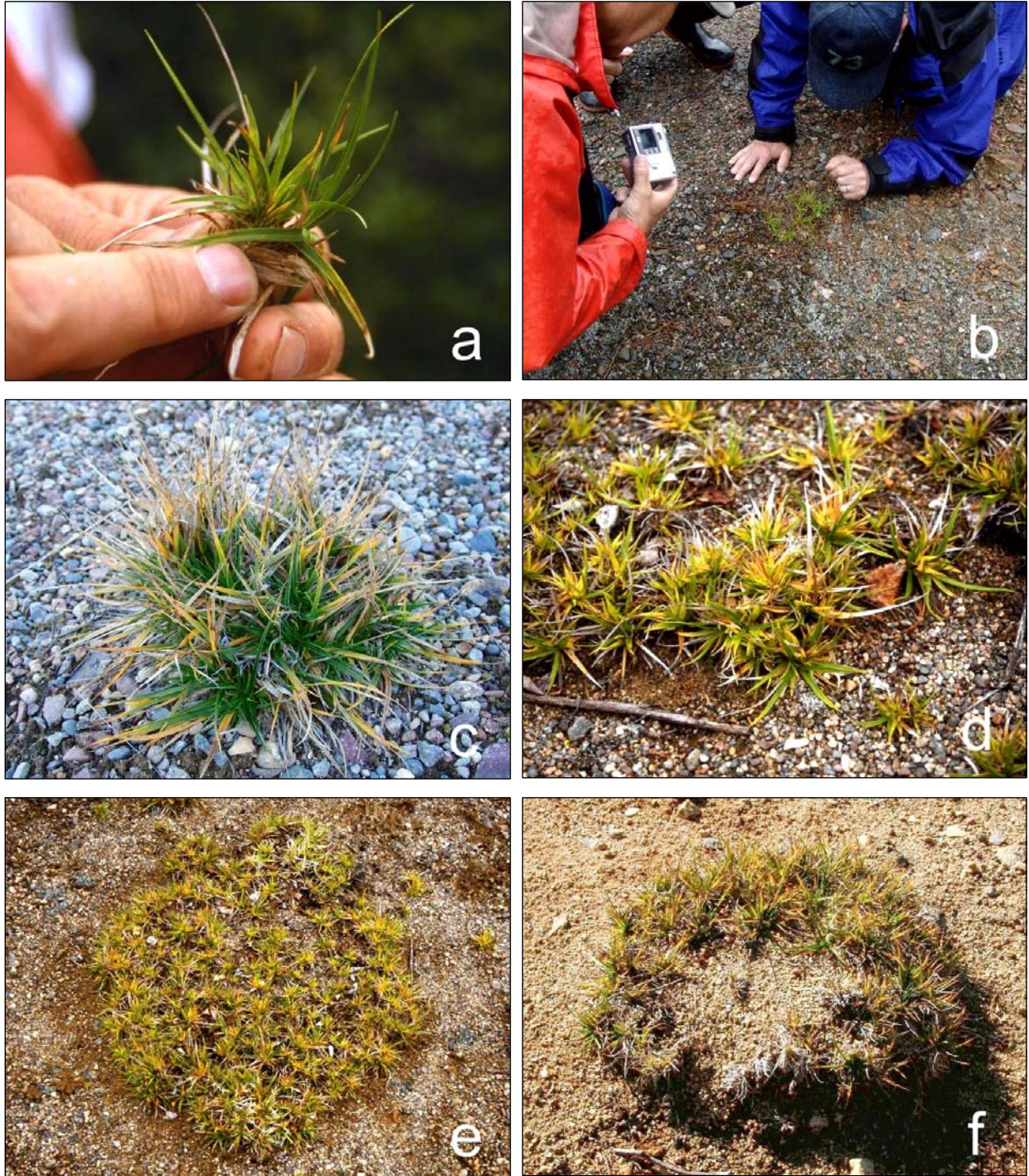
Description (Figs. B-1 and B-2)

Plants densely to loosely cespitose. **Rhizomes** ascending to erect, brown to reddish brown, 0–10 mm, stout. **Culms** 4–16 cm, scabrous distally; bases (remnants of old leaves) fibrous. **Leaf** blades pale green, often relatively short, equaling or exceeding stems, 0.5–4.3 mm wide, coriaceous, glabrous abaxially, smooth or slightly scabrous adaxially. **Inflorescences** with both staminate and pistillate scales; peduncles of basal pistillate spikes erect, short to elongate, stout to slender; peduncles of staminate spikes 0.8–15 mm; proximal nonbasal bracts scalelike, shorter than inflorescences. **Spikes**: proximal pistillate spikes 2–3



Photos: John E. Maunder

Figure B-1. Description: [a] male spike, [b] female spike showing several perigynia, [c] closeup of flowering stem, [d] whole plants showing remains of previous years' growth.



Photos: Nathalie Djan-Chékar [a, d, e], John E. Maunder [b, c, f]

Figure B-2. Description: [a] whole ramet, [b] small clumps of ramets in habitat, [c] small clump, [d] group of ramets along edge of larger clump, [e] larger clump, [f] clump associated with ants, showing coarse sand granules transported up onto the surface.

(basal spikes 1–2); cauline spikes usually overlapping with staminate spikes, with 3–10(–15) perigynia; staminate spikes 4.5–11.3 × 1.1–3 mm. **Scales:** pistillate scales pale brown to reddish brown, with narrow white margins, ovate, 2.9–4.1 × 1.5–1.9 mm, equaling or exceeding perigynia, apex acute to long-acuminate; staminate scales ovate, 4.2–5.4 × 1.2–2.1 mm, apex obtuse or acute to acuminate. **Anthers** 1.6–2.9 mm. **Perigynia** green to pale brown, veinless, ellipsoid, obtusely trigonous in cross section, 3.1–4.7 × 1.1–1.6 mm; beak straight, pale green, occasionally with reddish brown tinge near apex, strongly 2-edged, 0.9–2 mm, smooth or ciliate-serrulate, apical teeth 0.2–0.5 mm. **Stigmas** 3. **Achenes** [ie. “seeds”] brown, ellipsoid to obovoid, obtusely trigonous in cross section, 1.6–2 × 1.2–1.6 mm. $2n = 32$. (Adapted from Crins and Rettig 2002, with additions.)

Habitat

Grant’s Siding (red pine stand just east of Gambo) (see Figure B-4):

Open areas of coarse brownish glaciomarine sand with pebbles, within a restricted area of red pine (*Pinus resinosa*) woods; mostly associated with an active four-wheel-drive/ATV track veering off to the east. Associated with *Pinus resinosa*, *Picea mariana*, *Alnus viridis* subsp. *crispa*, *Kalmia angustifolia*, *Vaccinium angustifolia*, *Vaccinium boreale*; and less often with *Larix laricina* and *Betula cordifolia*; also, with *Polytrichum* sp. (moss) and various reindeer lichen species. The main locality is a sandy blowout area (Figure A-1a) that *may* or may not be natural; regardless, it is now criss-crossed with ATV tracks.

Springdale area (see Figure B-3):

“Natural populations” are located mostly within thin, open lichen woods, throughout the broad, flat, early Holocene-age “glaciomarine embayment terrace” (Scott *et al.* 1991) that ranges inland in the vicinity of Davis Brook. Generally associated with *Betula cordifolia*, *Picea mariana*, *Vaccinium angustifolia*, *Arctostaphylos uva-ursi*, various mosses, and reindeer lichens. Substrate of reddish sandy-silty-pebbly-clay. Particularly prevalent along the edges of the many ATV tracks that course through the open woods ... but, clearly a “chicken-and-egg” conundrum: are the plants attracted to the disturbed ground created by the ATV tracks, or do ATV users simply prefer to drive their ATVs through the same wide open spaces, between the trees, that are preferred by *Carex tonsa*? The latter would *seem* to be the case!

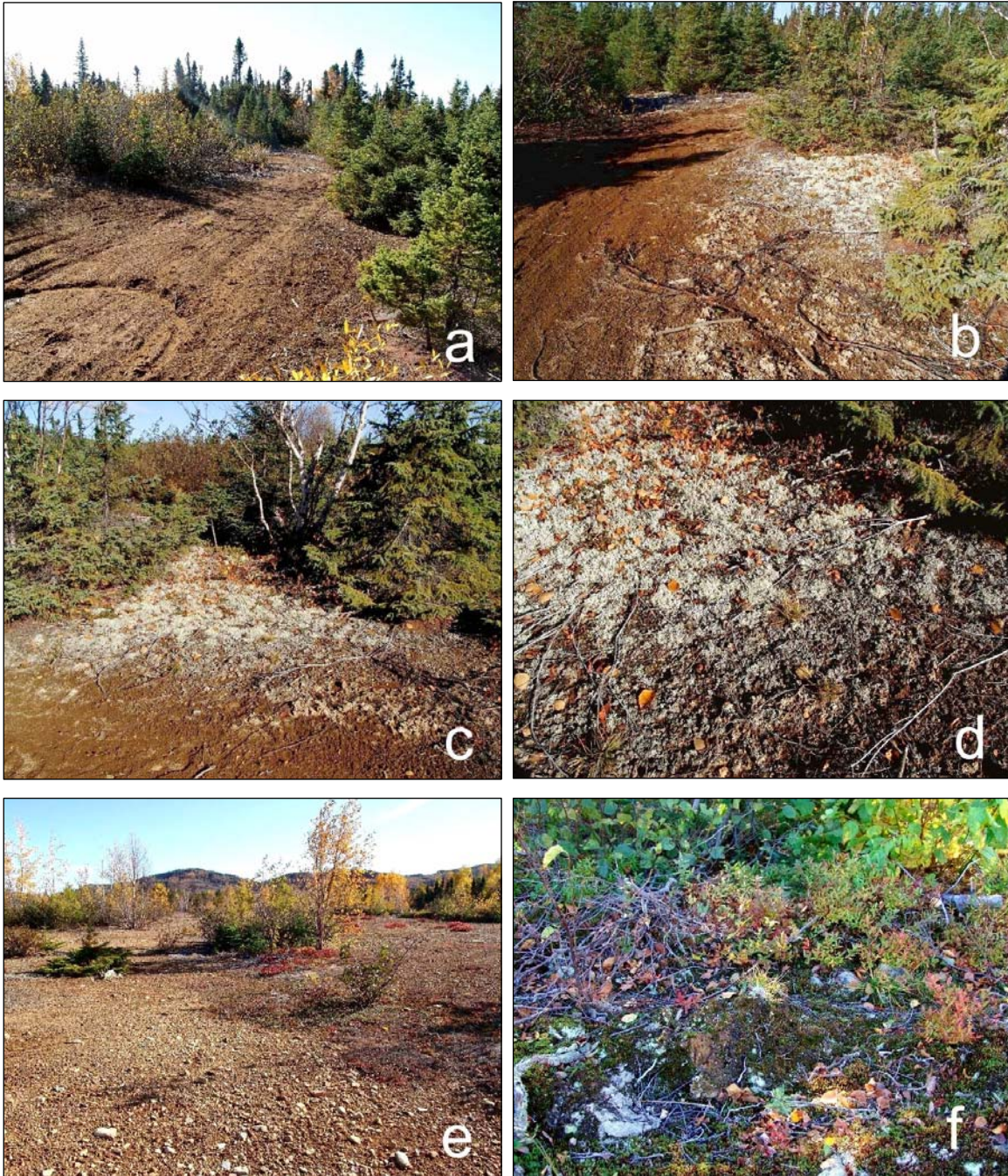
“Disturbed populations” are scattered throughout a variety of largely unvegetated habitats, mostly within the greater Davis Brook industrial park area; though they are also found, here and there, within the western extremities of the town of Springdale itself. Generally associated with sparsely-growing *Betula cordifolia*,

Alnus viridis subsp. *crispa*, *Picea mariana*, *Vaccinium angustifolia*, *Arctostaphylos uva-ursi*, various grasses and mosses, and reindeer lichens. Substrate of coarse, brown, sometimes almost pea-gravel-sized sand.

In addition to the “natural” and “disturbed” populations already described, there occur what might be termed “formerly disturbed” populations (Figure B-3e). In the Springdale area, particularly peripheral to the industrial park area, there are several tracts of land that have been completely cleared and scraped flat at some past date, perhaps in anticipation of some future industrial park use, but apparently never used for anything in particular. Some of these formerly cleared areas are slowly returning to something resembling a “natural” state. Most such areas harbour at least small populations of *C. tonsa*.

Goose Bay:

“Open sandy places along airfield. Isolated clumps, with lichen and *Vaccinium*”, and “Common in open sandy places on the terrace” (Gillett, 1963).



Photos: John E. Maunder

Figure B-3. Habitat (Springdale - "natural" or near-" natural"): [a] open, mixed, lichen woodland; *C. tonsa* growing in lichen patches on largely-undisturbed ground near trees, [b] lichen patches on largely-undisturbed ground, [c] same, [d] same, *C. tonsa* growing below and right of centre, [e] once-cleared land slowly returning to some semblance of its "natural" state; *C. tonsa* growing in low *Arctostaphylos* shrubbery on right, [f] a *C. tonsa* clump at centre of picture, growing in only semi-disturbed ground on the far right margin of the area shown in the previous image.



Photos: John E. Maunder

Figure B-4. Habitat (Grant's Siding - "natural" or near-" natural"): [a] a semi-undisturbed patch with *C. tonsa* is located *just* to the right of the centre of the image (see Figure A-1a - first small clearing along ATV track), [b] same, [c] same, [d] semi-disturbed sand blowout off to the side of the main ATV track (see Figure A-1a - upper right quadrant) [e] view looking back from same sand blow-out; *C. tonsa* growing all over area [note ATV "wheel" marks], [f] ATV track approaching a large bog just beyond the red pine stand; *C. tonsa* growing on and at side of track.

Biology

John Maunder's observations in 2006 suggest that *C. tonsa* is closely associated with ant nests in Newfoundland, especially at the Grant's Siding locality. The nature of this association is unclear; though it would *seem* to be mutually beneficial. The ants appear to centre their excavation activities directly underneath an individual clump, bringing considerable quantities of coarse sand granules to the surface, and, ultimately, carrying some of this material right up onto the top of the clump (Figure B-2f). This conspicuous "inundating activity" seems likely to be of some survival value to *C. tonsa*, although the specifics of this point can only be speculated upon at present.

Though apparently highly clonal, *C. tonsa* does produce a small number of short, few-flowered spikes, and presumably, also, viable seeds. In Newfoundland, John Maunder has observed that the spikes tends to be particularly short. In those cases where ants seriously inundate clumps, the spikes usually become completely buried, particularly as the season progresses.

Thus, while likely affording some measure of water conservation to the clump, and some physical protection for the fruiting spikes in particular, clump inundation would seem to require that any viable seeds produced must become trapped within the structure of the clump, to be, subsequently, co-opted into increasing the density of that clump. Whether flowers are initially capable of producing fruit while they themselves are inundated is unknown.

Threats and Limiting Factors (Fig. B-5)



Photos: John E. Maunder

Figure B-5. Threats and Limiting Factors (Springdale, Davis Brook area – “disturbed” habitat): [a] opposite the junction to Industrial Park Road - *C. tonsa* is located between the blue buildings illustrated, and the road, [b] looking in the opposite direction, towards the junction to Industrial Park Road - *C. tonsa* is located between the gravel foreground and the alders, [c] waste ground behind the blue buildings referred to above - *C. tonsa* fairly common, [d] the same general area as the previous image - *C. tonsa* is located below and to left of the pole, [e] again, the same general area - numerous *C. tonsa* in foreground, [f] again, the same general area - numerous *C. tonsa*.

Collections Examined

Provincial Museum of Newfoundland and Labrador:

CH 010810-13, CH 010810-4 (both collections as yet unaccessioned).
[see Appendix A for details]