COSEWIC
Assessment and Update Status Report

on the

New Jersey Rush
Juncus caesariensis

in Canada

SPECIAL CONCERN
2004

COSEWIC
COMMITTEE ON THE STATUS OF
ENDANGERED WILDLIFE
IN CANADA

COSEPAC
COMITÉ SUR LA SITUATION
DES ESPÈCES EN PÉRIL
AU CANADA

COSEWIC status reports are working documents used in assigning the status of wildlife species suspected of being at risk. This report may be cited as follows:

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COSEWIC
Assessment Summary

Assessment Summary – May 2004

Common name
New Jersey rush

Scientific name
Juncus caesariensis

Status
Special Concern

Reason for designation
The species is a globally rare plant found along the periphery of 25 bogs and fens in a geographically restricted area of southeastern Cape Breton Island, Nova Scotia. The Canadian population is estimated at 5,000-10,000 plants that comprise a large proportion of the global population. The Canadian plants are widely disjunct from sites along the U.S. Atlantic seaboard where the species is also quite rare. It is sensitive to activities that alter the hydrological regime of its habitat such as logging, road construction and in-filling.

Occurrence
Nova Scotia

Status history
Designated Special Concern in April 1992 and May 2004. Last assessment based on an update status report.

COSEWIC
Executive Summary

New Jersey Rush
Juncus caesariensis

Species information

New Jersey Rush is a rhizomatous, perennial herb, 40 – 70 cm tall. The elongate leaves are narrowly cylindrical and have internal cross-walls (septa). The branched inflorescence bears clusters of non-showy, green flowers that develop into dark brown capsules. The capsules are longer than the surrounding floral parts. The culms and leaves are distinctly rough to the touch.

Distribution

Juncus caesariensis occurs on the coastal plain of New Jersey, Virginia, North Carolina and Maryland in the United States. In Canada, it is restricted to southeastern Cape Breton Island, Nova Scotia.

Habitat

In Canada, New Jersey Rush occurs primarily around the edges of bogs and fens and in small bays or coves off these same wetlands. In the United States, this species occurs in a variety of habitats including open to shaded streambanks, seepy pond margins, swales, pine barren savannas, and *Chamaecyparis thyoides* (Atlantic White Cedar) swamps. Changes in the hydrological regime of its habitat and canopy closure negatively impact New Jersey Rush.

Biology

New Jersey Rush is capable of both sexual (seed production) and asexual reproduction (rhizomes). Seedlings are rarely seen in the field. Plants have reappeared in habitats that had grown in with woody species and then been cleared of the woody growth. Under these circumstances, they appear to be able to persist for an unknown length of time in vegetative form.

Population sizes and trends

There are no data on long-term trends with respect to *Juncus caesariensis* in Nova Scotia. Very little was known about this species in Canada until the late 1980s and early 1990s.

Population sizes range from <10 to 1000 mature individuals.

Surveys over the last ten to fifteen years have led to the discovery of a total of 26 sites for this species on southeastern Cape Breton Island, Nova Scotia, with a total population estimate of 5,000 to 10,000 flowering clumps. The population at one site (17) appears to be extirpated. There are still many wetlands within the known range that have not been examined and it is very likely that more populations will be discovered here in the future.

Fieldwork conducted in 2002 found no evidence of a decline in any of the populations previously reported in the status report (Newell and Newell, 1992).

There are a number of historical records for this species in the United States suggesting that it was more widely spread in the past than it is today (Schuyler, 1990).

Limiting factors and threats

New Jersey Rush is sensitive to changes in its hydrological regime such as drainage or prolonged flooding. It would therefore be affected by road construction or wetland drainage or infilling for cottage/house construction. Logging also may affect drainage patterns in the vicinity of *Juncus caesariensis* populations. All of these threats are very real possibilities on southeastern Cape Breton Island. Coastal and near coastal property in Nova Scotia is considered prime real estate. Home, cottage and road construction is therefore on the increase in these areas. Logging is a constant concern.

There has been an increase in all-terrain vehicle activity on some of the wetlands supporting New Jersey Rush in Nova Scotia, since the early 1990s. This does not appear to be negatively impacting this species at this point in time. This is an activity that needs to be monitored, however. ATV activity on some of these wetlands will ultimately reach a level that will negatively impact this species through destruction of plants and seed banks.

New Jersey Rush is threatened by natural succession as it does not compete well with woody species.

Special significance of the species

Juncus caesariensis is a member of the Atlantic Coastal Plain Flora. The Nova Scotia populations are at the northern limit of the species' range and are disjunct from the more southerly populations in the United States. As such, they may be

genetically distinct from them. This is significant in terms of survival of the species in the face of future environmental changes such as global warming. This species is globally rare and the Nova Scotia populations make up a significant proportion of total number of plants in existence.

Existing protection or other status designations

Juncus caesariensis has been designated nationally (COSEWIC, 1992) as a species of Special Concern. Provincially, it is listed as vulnerable under the Nova Scotia Endangered Species Act. Globally, it has a G2 (imperiled) ranking. State and provincial rankings are as follows: Maryland (S1; critically imperiled), New Jersey (S2, imperiled), North Carolina (S1), Virginia (S2), Nova Scotia (S1S2, imperiled to critically imperiled) (NatureServe, 2003).

Under the Nova Scotia Department of Natural Resources general status ranking system, it is tabulated as a red-listed species (a species known to be, or is thought to be at risk).

COSEWIC HISTORY

The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) was created in 1977 as a result of a recommendation at the Federal-Provincial Wildlife Conference held in 1976. It arose from the need for a single, official, scientifically sound, national listing of wildlife species at risk. In 1978, COSEWIC designated its first species and produced its first list of Canadian species at risk. On June 5, 2003, the *Species at Risk Act* (SARA) was proclaimed. SARA establishes COSEWIC as an advisory body ensuring that species will continue to be assessed under a rigorous and independent scientific process.

COSEWIC MANDATE

The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) assesses the national status of wild species, subspecies, varieties, or other designatable units that are considered to be at risk in Canada. Designations are made on native species and include the following taxonomic groups: mammals, birds, reptiles, amphibians, fishes, arthropods, molluscs, vascular plants, mosses, and lichens.

COSEWIC MEMBERSHIP

COSEWIC comprises members from each provincial and territorial government wildlife agency, four federal organizations (Canadian Wildlife Service, Parks Canada Agency, Department of Fisheries and Oceans, and the Federal Biosystematic Partnership, chaired by the Canadian Museum of Nature), three nonjurisdictional members and the co-chairs of the species specialist and the Aboriginal Traditional Knowledge subcommittees. The committee meets to consider status reports on candidate species.

DEFINITIONS
(after May 2004)

Species	Any indigenous species, subspecies, variety, or geographically or genetically distinct population of wild fauna and flora.
Extinct (X)	A species that no longer exists.
Extirpated (XT)	A species no longer existing in the wild in Canada, but occurring elsewhere.
Endangered (E)	A species facing imminent extirpation or extinction.
Threatened (T)	A species likely to become endangered if limiting factors are not reversed.
Special Concern (SC)*	A species that may become a threatened or an endangered species because of a combination of biological characteristics and identified threats.
Not at Risk (NAR)**	A species that has been evaluated and found to be not at risk.
Data Deficient (DD)***	A species for which there is insufficient scientific information to support status designation.

* Formerly described as “Vulnerable” from 1990 to 1999, or “Rare” prior to 1990.

** Formerly described as “Not In Any Category”, or “No Designation Required.”

*** Formerly described as “Indeterminate” from 1994 to 1999 or “ISIBD” (insufficient scientific information on which to base a designation) prior to 1994.

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The Canadian Wildlife Service, Environment Canada, provides full administrative and financial support to the COSEWIC Secretariat.

Update
COSEWIC Status Report

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New Jersey Rush

Juncus caesariensis

in Canada

2004

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SPECIES INFORMATION

Name and classification

Scientific name: *Juncus caesariensis* Coville
Common name(s): New Jersey Rush, Rough Rush
Family name: Juncaceae (rush family)
Major plant group: Monocot flowering plant

Description

New Jersey Rush is a tufted, perennial herb approximately 40 – 70 cm tall. The leaves are elongate and narrowly cylindrical with regularly spaced, internal crosswalls or septa. The open, branched inflorescence bears clusters of small, non-showy, green flowers or, when fruiting, sharp-pointed dark brown capsules. The capsules are longer than the surrounding floral parts. The culms and foliage are noticeably rough to the touch, not unlike sandpaper (Figure 1).

Figure 1. New Jersey Rush and enlarged ripened capsules. The enlarged portion of the stem illustrates the rough surface of the stems and leaves.

Juncus canadensis is very similar in appearance to *J. caesariensis*. Whereas the mature capsules of New Jersey Rush are distinctly longer than the surrounding floral parts, in *J. canadensis*, they are nearly equal in length to the sepals and petals. The foliage and stems of *J. canadensis* are smooth contrasting with the rough nature of the leaves and culms of New Jersey Rush. The fruit and flower clusters within the inflorescence are more congested in *J. canadensis* than in *J. caesariensis*.

Full technical descriptions are available in Gleason and Cronquist (1991) and Fernald (1950).

DISTRIBUTION

Global range

This species is currently known from New Jersey, Maryland, North Carolina and Virginia in the United States and from Nova Scotia in Canada (Figure 2).

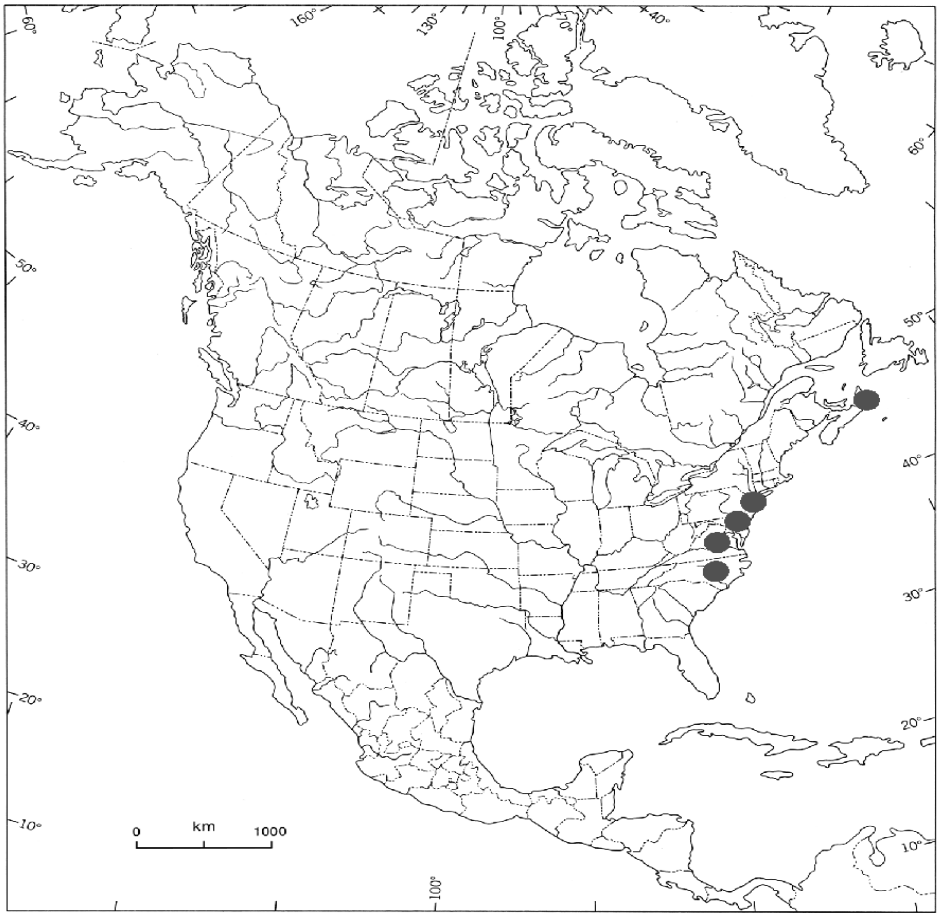

Figure 2. Global distribution of *Juncus caesariensis*.

Canadian range

In the original status report (Newell and Newell, 1992), New Jersey Rush was reported from 16 bogs and fens on the coastal plain of southeastern Cape Breton Island, Nova Scotia. These sites ranged from the Gracieville/Point Michaud area in the south, northeastwards along the coast to Fourchu Bay, a distance of approximately 50 km. Populations also occurred as much as 20 km inland (vicinity of Loch Lomond). At that time it was suggested that because of an abundance of wetland habitat present in this region, it was very probable that further fieldwork would reveal more sites for this species.

Fieldwork conducted by Parks Canada in 2001 (pers. comm., J. Bridgland, 2002), by the author in 2002 and by others (Table 1), has resulted in the discovery of an additional eleven sites for this species. All of these sites occur within the known geographic range for this species as reported by Newell and Newell (1992). Due to their proximity sites 4a and 4b have been combined as a single site, giving a total number of extant localities as 25 out of a total of 26 known sites. No plants could be confirmed in 2002 for site17.

Table 1. Population size estimates for New Jersey Rush in Nova Scotia.

Site Number (number in brackets represents site number used in COSEWIC report)	**Location**	**Population Size Estimates**			
		Status Report (1992)	**Newell (2002)**	**Fortress of Louisbourg Species at Risk Survey (2001) (pers. comm., J. Bridgland, 2002)**	**Others**
1 (1)	Gracieville (“bog 4”)	50-100	200-500	-	-
2 (2)	Gracieville (“bog 5”)	>500	>500	-	-
3 (3)	Gracieville (“bog 3”)	50-100	50-100	-	-
4a (4)*	Gracieville (“bog 2”)	100-200	100-200	-	-
4b (5)	Gracieville (“bog 1”)	10-50	10-50	-	-
5 new	Gracieville	-	200-500	-	-
6 new	Point Michaud	-	<10	-	-
7 (6)	Point Michaud (“German bog”)	100-200	assumed present (this site was not rechecked in 2002, property was heavily posted with no-trespassing and beware of dog signs)	-	-
8 (7)	Point Michaud (“elbow bog”)	10-50	50-100	-	-
9 (8)	Grand River (“bog 8”)	50-100	200-500	-	-

“continued”

Site Number (number in brackets represents site number used in COSEWIC report)	**Location**	**Population Size Estimates**			
		Status Report (1992)	**Newell (2002)**	**Fortress of Louisbourg Species at Risk Survey (2001) (pers. comm., J. ridgland, 2002)**	**Others**
10 (9)	Grand River ("bog 9b")	100-200	200-300	-	-
11 new	Grand River West	-	-	present	-
12 new	Grand River East 1	-	-	present	-
13 new	Grand River East 2	-	-	present	-
14 new	Grand River (Indian Point)	-	-	-	<10 (pers. cmm., C. Sneddon, 2003)
15 (10)	L'Archevêque / St. Esprit	10-50	10-50	19	-
16 new	St. Esprit	-	-	40+	-
17 (11)	St. Esprit / Ferguson Road	<10	0 (original population could not be relocated)	-	-
18 (12)	Lower St. Esprit	<10	<10	30+	-
19 (13)	Stirling	100-200	100-200	-	-
20 new	Framboise / Fourchu (opposite Morrison Beach road)	-	100+	-	-
21 (14)	Framboise / Fourhu	>500	>500	234	-
22 (15)	Mulcuish Lake	No data	500-1000	-	-
23 new	Mulcuish Lake (near gravel pit)	-	present	-	-
24 (16)	Loch Lomond (Graces Road)	100-200	500+	220	-
25 new	Loch Lomond (Graces Road)	-	50-100	-	-
26 new	South Arm Breeches Lake	-	-	-	present (based on herbarium specimen deposited at UCCB; Shchepanek & Dugal, 1984; CAN 521528)

*Populations 4a and 4b are separated only by a highway and for this report will be considered as a single population.
Sites 9, 10,14,15, 16, 18, 19 and 20 are on crown land.

The Canadian distribution of New Jersey Rush is illustrated in Figure 3. Additional sites surveyed, but not mapped, where plants were not found include the following (years when surveyed are indicated):

Poirierville on Isle Madame (1991)
Big Lorraine (1993)
Little Lorraine (1993)
Marion Bridge (1993)
Gabarus area (1991, 2002) – 2 sites
Fourchu (associated with MacKenzies R; a large wetland behind the community centre; 2002)
Framboise (2002) – 2 sites
Grand River area (2002) – 2 sites (one site is near Fergusons Lake)
Stirling (2002) – 2 sites (bridge over Strachans Brook, & Middle River Framboise)

In addition to the sites searched by the author, fieldwork was also conducted by Parks Canada for the presence of rare species outside of the boundaries of Louisbourg National Park and did not find any sites further north than the Mulcuish/Belfry Lakes area. Plants have never been found any further south than Little Harbour/Gracieville area and no further west than MacLeods Lakes on the road between Loch Lomond and Stirling. The region of occurrence for this species lies within a line drawn from Little Harbour to the MacLeods Lakes and then to Belfry Lake (south of Gabarus). Based on personal experience of the writer, the species appears to be limited by the general lay of the land, i.e., it is limited to the coastal plain where there is little upland but many wetlands. The terrain beyond the line indicated above rises and there are fewer wetlands. There are a large number of wetlands within the defined area that have not been checked for New Jersey Rush due to their occurrence inland and away from the roads. Most of the wetlands accessible from the highway and coastal roads have been surveyed.

The extent of occurrence is 350 km^2 (determined by the Nova Scotia Department of Natural Resources). There appears to be no decrease in the extent of occurrence over the last ten years. The area of occupancy is estimated to be 0.09 km^2.

HABITAT

Habitat requirements

In Canada, New Jersey Rush occurs sporadically along the edges of fens and bogs, in small peripheral bays or coves of these same habitats, and in small boggy openings in coniferous woods (Newell and Newell, 1992). Most of these areas display strong fen characteristics.

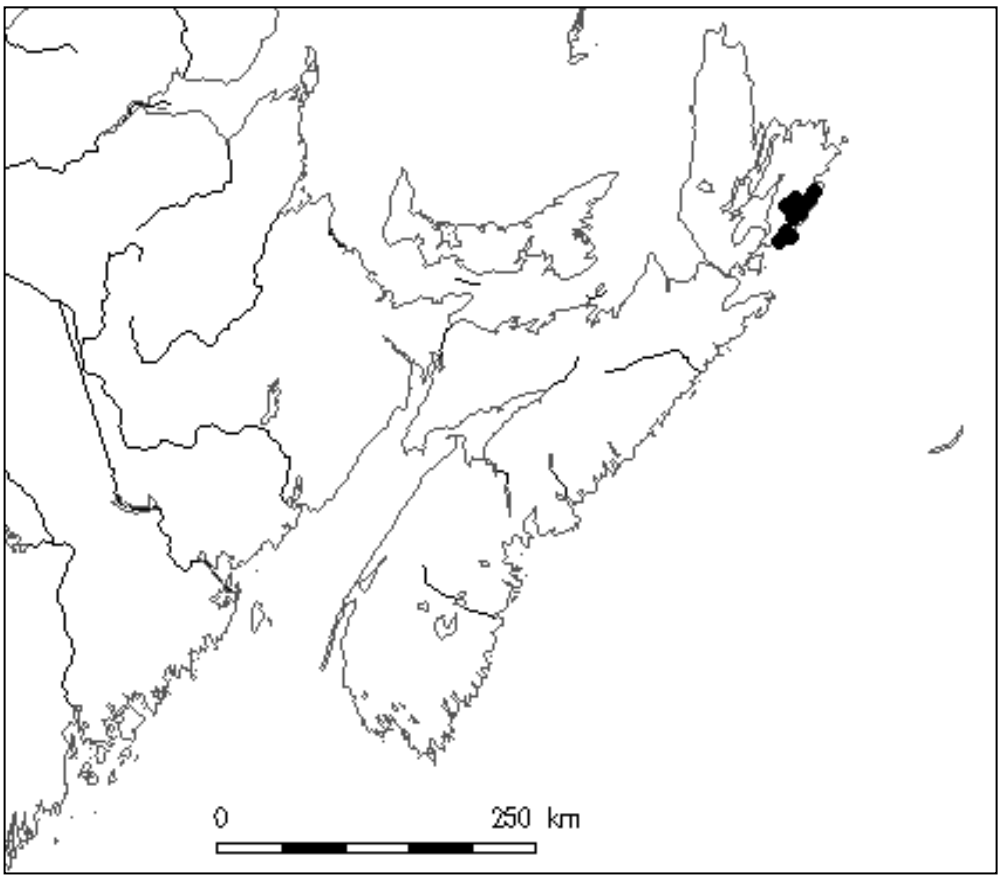

Figure 3. Canadian distribution of *Juncus caesariensis.*

In the United States, this plant is known from acidic, sphagnous, wet spring or seep areas that have a reliable source of flowing water but not standing water. Habitats include open to shaded stream banks, seepy pond margins, swales, pine barren savannas, and *Chamaecyparis thyoides* (Atlantic White Cedar) swamps. (NatureServe, 2003).

The habitat occurrences of this species throughout its range suggest that it is dependent on a certain, as yet undetermined, hydrological regime for its survival.

Strong and Sheridan (1991) reported finding healthy populations of *Juncus caesariensis* in recently cut power line corridors in Virginia. The regular mowing of this area appeared to be beneficial to New Jersey Rush by reducing woody second-growth vegetation and maintaining open habitat. Ware (pers. comm., 1991) reported a reduction in plant numbers at one location in Virginia. This was attributed to an invasion of Sweet Pepper Bush (*Clethra alnifolia*).

In Nova Scotia, the frequent association of this species with animal and lightly used all-terrain-vehicle trails on the edges of bogs and fens (Newell and Newell, 1992) suggests a possible dependence on some level of disturbance for the maintenance of

open habitat. These disturbances would reduce competition from other species. Seasonal flooding of New Jersey Rush habitats would also prevent the establishment of many species including shrubs.

A list of common associated species for Canadian populations of New Jersey Rush is presented below (Newell and Newell, 1992):

Picea mariana (Black Spruce), *Calamagrostis pickeringii* (Pickering's Reed bent-grass), *Muhlenbergia uniflora* (Fall Dropseed Muhly), *Carex exilis* (Coast Sedge), *Carex michauxiana* (Michaux Sedge), *Smilacina trifolia* (Three-leaved False Solomon's Seal), *Myrica gale* (Sweet Gale), *Alnus rugosa* (Speckled Alder), *Sarracenia purpurea* (Pitcher Plant), *Aronia* sp. (Chokeberry), *Rosa nitida* (Swamp Rose), *Ledum groenlandicum* (Labrador Tea), *Kalmia angustifolia* (Sheep Laurel), *K. polifolia* (Bog Laurel), *Chamaedaphne calyculata* (Leatherleaf), *Solidago uliginosa* (Bog Goldenrod), *Aster nemoralis* (Bog Aster).

Other rush species that may be found with *Juncus caesariensis* are *Juncus canadensis* (Canada Rush) and *Juncus brevicaudatus* (Narrow-panicled Rush). Occasionally, *Juncus stygius* ssp. *americanus* (Moor Rush) is also found in the same habitat as New Jersey Rush. This species is ranked by the Atlantic Canada Conservation Data Centre (ACCDC) as an S1 species.

Additional rare plants encountered in the vicinity of *Juncus caesariensis* populations include *Selaginella selaginoides* (Low Spike-moss), *Carex tenuiflora* (Sparse-flowered Sedge), and the moss, *Scorpidum scorpioides*. *Selaginella selaginoides* is listed by the ACCDC as an S2 species and *Carex tenuiflora* is ranked S1.

In July of 1991, pH measurements and peat depths were recorded at five sites in the Point Michaud region (Newell and Newell, 1992). The pH at these locations ranged from 4.07 to 5.52. Peat depth ranged from 40 cm to greater than 2 m.

Trends

There is no historical information prior to 1992 on which to determine long-term trends in Canada.

Fieldwork in 2002 revealed some changes to the quality of New Jersey Rush habitat in Cape Breton over the past ten years. There was an increase in all-terrain vehicle usage on some of the wetlands where New Jersey Rush occurs and in one case, a road had been constructed across a wetland (Site 3) in order to clear-cut the forest on the far side. The clear cut was taken to the very edge of the wetland.

Given the abundance of wetlands on southeastern Cape Breton Island, there is a strong possibility that still more populations (within the currently known range of this species) will be found with additional fieldwork.

Protection/ownership

Of the 25 sites known for this species, eight are located on crown land and the remaining seventeen are privately owned (Table 1). None of these sites fall within any protected areas.

New Jersey Rush is listed under the Nova Scotia Endangered Species Act as a vulnerable species. Under this act, species listed as vulnerable receive recognition as "species at risk" and require a management plan within three years of designation. However, destroying either the plants themselves or their habitat is not illegal.

Under the Nova Scotia Department of Environment and Labour's Wetlands Directive, all alterations that may impact on a wetland require a permit. Wetlands over two ha in size require an environmental assessment before a permit is issued. Species at risk and wildlife habitat are two of the top considerations in issuing or not issuing a permit. However, for a variety of reasons, permits are sometimes issued inadvertently on wetlands that harbour species at risk. In other cases, development proceeds without any application for a permit being submitted.

BIOLOGY

General

New Jersey Rush is a perennial herb that produces large numbers of seeds. In spite of this, seedlings are rarely found in the field in the United States (Schuyler, 1990) and none have been identified in the field in Nova Scotia. This species also reproduces asexually by means of rhizomes. Plants are wind-pollinated (Knuth, 1909) with flowering occurring in July and August; fruiting begins in August (Kral, 1983).

Reproduction

The relative amount of self- versus cross- pollination remains unknown (Schuyler, 1990).

Germination experiments by Ware (pers. comm., 1991) indicate that seeds germinate easily and quickly (in a few days) when placed on moist sphagnum in a Zip Loc bag and left for a short time in the greenhouse.

Survival

Changes in hydrological regime and succession by woody species affect the species' survival.

Nine new stations for *Juncus caesariensis* were reported by Strong and Sheridan (1991) in Virginia. Seven of these new sites were located in power line right-of-ways.

Schuyler (1990) reported it from logged sites in New Jersey and Virginia. These findings suggest that *Juncus caesariensis* is able to persist in vegetative form, for a certain length of time, in areas where canopy closure has rendered the habitat unsuitable for New Jersey Rush. When the canopy is opened up either through natural or unnatural means, these plants resume production of new shoots (Schuyler, 1990).

Physiology

The species is highly dependent on a certain hydrological regime and tolerates limited shade (Schuyler, 1990). This species does well under acidic conditions and is often found growing in sphagnum moss. It is always found in wet areas but does not tolerate steady standing water conditions.

In July of 1991, pH measurements and peat depths were recorded at five sites in the Point Michaud region (Newell and Newell, 1992). The pH at these locations ranged from 4.07 to 5.52.

This species is tolerant of some shade as indicated by its occurrence in Atlantic White Cedar swamps in the United States. In Nova Scotia, it is often slightly shaded by the shrubs in the riparian edges of bogs and fens. Full canopy closure, however, appears to impact New Jersey Rush negatively. Due to its re-appearance in logged sites and on power line-right-of-ways in the United States, it is believed that it can survive shaded conditions in vegetative form, resuming sexual reproduction once the canopy is opened. How long it can persist under these conditions is unknown.

Movements/dispersal

There is no data on seed dispersal although casual observation suggests that seasonal flooding and/or animal movement may assist with movement of propagules.

Nutrition and interspecific interactions

Juncus caesariensis is a member of the Atlantic Coastal Plain Flora. Most of these species are poor competitors but are tolerant of naturally occurring environmental stresses, e.g., flooding, ice scour, wave action and infertile soil (Keddy and Wisheu, 1989). These species are therefore often confined to habitats where more competitive but stress intolerant species cannot survive. New Jersey Rush, at least in Nova Scotia, is generally found in the peripheral zone of relatively infertile bogs and fens. It is in this area where seasonal flooding also occurs.

In August, 2002 a high percentage of the plants of New Jersey Rush occurring in one of the Gracieville sites (Site 4a) were observed to be heavily infected with a rust. This disease was not noticed at any of the other sites visited by the author at this time.

Behaviour/adaptability

New Jersey Rush habitat is susceptible to invasion by woody species. Any natural events or human-related activities that hold succession at an early stage appear to be beneficial to this species. Strong and Sheridan (1991) reported finding several healthy populations of *Juncus caesariensis* in recently cut power line right-of-ways in Virginia. The annual mowing of these areas was beneficial to New Jersey Rush by reducing woody second-growth vegetation and maintaining an open habitat. Ware (pers. comm., 1991) describes a reduction in plant numbers at one site in Virginia that seemed to be attributable to an invasion of *Clethra alnifolia* (Sweet Pepper Bush). On Cape Breton Island, Nova Scotia, the frequent occurrence of this species along animal, and in some cases, lightly used ATV trails, suggests a tolerance of, if not a dependence upon, some disturbance to maintain open habitat.

Seedlings grown by Ware (pers. comm., 1991) in the greenhouse were transplanted, when they were 30 cm tall, to a sphagnous pond margin where, *J. caesariensis* was once known to occur. Within two years, all had died. This was attributed to excessive flooding which kept the young plants covered by shallow water for extended periods.

Anything affecting the hydrologic regime where this species occurs may have a negative impact upon populations.

POPULATION SIZES AND TRENDS

Long-term trend information for Nova Scotia populations of *Juncus caesariensis* is not available as very little was known about Canadian populations of this species prior to the 1990s. Fieldwork was originally conducted by the writer over a 3 day period in 1993 following the designation of this species by COSEWIC and, as well, over 4 days by the writer and an assistant in late August and early September of 2002. This latest survey showed that there has been no significant decrease in population sizes at previously reported sites (Newell and Newell, 1992), over the past ten-years (Table 1). Some sites were in fact observed to have larger populations than when first surveyed. This may reflect a more efficient survey technique than an actual increase in plant numbers. Plants could not be relocated on one wetland (Site 17, St. Esprit/Ferguson Road). Original numbers for this location were very low (<10) and it would be easy to overlook the presence of this species at this particular location.

A number of new sites were discovered during the fieldwork conducted for this update status report in 2002. Additional sites were also located during a Species at Risk Survey conducted by Parks Canada in 2001 (pers. comm., J. Bridgland, 2002). A herbarium specimen of New Jersey Rush from a new site was discovered at the Herbarium at the University College of Cape Breton. This had been misidentified as *Juncus canadensis*, a similar appearing species. Another location was discovered in the fall of 2002 (pers. comm., C. Sneddon, 2003). All currently known locations for New Jersey Rush in Nova Scotia are listed in Table 1.

In total, the number of known locations for New Jersey Rush now stands at 26. At Site 17 (St. Esprit/Ferguson Road), the small number of plants reported in 1992 could not be relocated in 2002 and are assumed to be extirpated. This represents an increase of 11 populations from the original status report. Gracieville Sites 4 and 5 (Newell and Newell, 1992) are combined here as one site (Site 4a and 4b) since they represent one wetland that was divided by a highway.

There has been no significant change in the known geographic range of this species in Nova Scotia.

Population sizes range from <10 to 1000 mature individuals. From population estimates by the author and others, it is suggested in this update status report, that there are approximately 5000-10,000 mature individuals or clumps (each clump made up of 1-27 culms) of New Jersey Rush in the Canada (Table 1). There is no data available on number of vegetative individuals. There are still many wetlands within the known geographic range of this species in Nova Scotia that remain to be investigated for the presence of New Jersey Rush. Many of these are somewhat more difficult to access than the known sites.

The Canadian populations are effectively isolated from the populations in the United States by distance. The closest U. S. populations to those in Cape Breton would be in New Jersey. There would be little chance of colonization from the south if the Canadian populations should be extirpated.

Globally, this species is said to reach its greatest abundance in the Pine Barrens of New Jersey (S2). Beyond this area, it is restricted to isolated occurrences in Maryland (S1) and Virginia (S2) and has disjunct populations in Nova Scotia (S2) and North Carolina (S1) (NatureServe Explorer, 2003). In New Jersey, most sites are located in the Pine Barrens and appear secure (Schuyler, 1990). According to the New Jersey Natural Heritage Program (pers. comm., D. Snyder, 2003) a minimum of 62 out of 95 occurrences are believed to be extant with population sizes ranging from a few plants to several thousand. A few populations number 10,000 or more.

There are a number of historical records for this species in the United States suggesting that New Jersey Rush was more widely spread in the past than it is today (Schuyler, 1990).

LIMITING FACTORS AND THREATS

Juncus caesariensis is considered to be most sensitive to circumstances affecting the hydrologic regime of its habitat (Schuyler, 1990; Kral, 1983; Ware and Wieboldt, 1981) such as site drainage or prolonged flooding. Potential anthropogenic threats to Canadian populations that might affect drainage patterns or promote excessive flooding are logging, cottage, home or resort development and road building. Many of the

populations in Nova Scotia occur near the coast. Coastal real estate in Nova Scotia is currently in very high demand for home and cottage development.

Clear cutting practices that do not allow for the establishment of buffers between wetlands and logged areas may also have a negative impact on New Jersey Rush by affecting local drainage patterns.

Recent road construction across one wetland was observed in 2002 (Site 3). Continued monitoring at this site is recommended in order to determine if this will have a detrimental effect on the populations of New Jersey Rush located there. The local office of the Department of Environment and Labour should be alerted to the presence of New Jersey Rush in their jurisdiction so that the future granting of permits for wetland alteration will take this into consideration.

Natural succession could lead to the temporary and possibly the permanent disappearance of New Jersey Rush populations. There are several cases in the United States where canopy removal either through logging practices or clearing for power line right-of-ways led to the reappearance of New Jersey Rush (Schuyler, 1990; Strong and Sheridan, 1991). It is believed that the plants are able to persist in vegetative form reverting to sexual reproduction upon opening of the canopy. It is unknown how long they are able to persist after canopy closure.

Newell and Newell (1992) reported that the existing level of all-terrain vehicle activity in the Nova Scotia wetlands where New Jersey Rush occurs did not appear to be negatively impacting the populations of this species. However, it was suggested that an increase in the activity level may lead to damage to or destruction of some plants or populations. Observations in 2002 determined that there has been some increase in the level of ATV activity at a number of the New Jersey Rush sites. However, this does not appear to be negatively impacting the plants thus far. In fact, the plants in these disturbed sites are often more vigorous (i.e., more culms per plant) than plants in undisturbed sites. It may be a matter of frequency and timing where ATVs are concerned. A significant increase in activity and/or, a change in the time of the year when ATVs are used may be more likely to negatively impact the New Jersey Rush populations.

SPECIAL SIGNIFICANCE OF THE SPECIES

The Nova Scotia populations of New Jersey Rush are considerably disjunct from the other populations in the United States. They are also at the northern limit of this species' range. Although not yet demonstrated, the gene pool of the Canadian populations may be distinct from the more southern ones in the USA and therefore of significance in terms of the species' adaptability to environmental or climatic changes.

In Nova Scotia, New Jersey Rush is not subject to the same development pressures as some of the more southern populations. The Nova Scotia and New Jersey

populations may serve as global refugia if populations are lost over the rest of the species' range.

Juncus caesariensis is a member of the Atlantic Coastal Plain Flora. Species that make up this floral element are concentrated primarily on the coastal plain in the eastern United States with disjunct populations in Nova Scotia and the Great Lakes region. Many Atlantic Coastal Plain species are at risk globally due to loss and degradaton of habitat in the United States. In Nova Scotia, the majority of the globally rare species are based in the southwestern part of the province. New Jersey Rush is the exception occurring further north on the coastal plain of eastern Cape Breton Island. This unique distribution may be of bio-geographical significance

New Jersey Rush has little known economic importance. Some *Juncus* species are used as ornamentals (Lawrence, 1951; Bailey, 1924) or used in the production of woven matting, hats and chair seats (Lawrence, 1951). Pith of some species has been used in the production of candlewicks (Lawrence, 1951). Roots have been used to treat skin infections in Colombia (Mabberley, 1989).

Seeds, stems and roots of *Juncus* spp. are reported to be eaten by moose, deer, muskrats and birds (Fassett, 1957).

EXISTING PROTECTION OR OTHER STATUS DESIGNATIONS

Juncus caesariensis was designated in 1992 by COSEWIC (Newell and Newell, 1992) as a species of Special Concern. It has a Canadian national ranking of N1N2, a provincial ranking of S1S2 and is considered to be globally imperiled (G2). State rankings in the United States are as follows: Maryland (S1, critically imperiled), New Jersey (S2, imperiled), North Carolina (S1) and Virginia (S2) (NatureServe, 2003).

This species is listed under the Nova Scotia Endangered Species Act as a vulnerable species. Vulnerable species do not have the same level of protection accorded endangered and threatened species under this act. They receive recognition as species at risk and there is a requirement that within three years of the listing of a vulnerable species, a management plan be prepared for the species. However, it is not illegal to destroy plants or habitat of vulnerable species.

New Jersey Rush has been listed recently in Nova Scotia as a "Red" species, i.e., a species known to be, or that is thought to be at risk (Nova Scotia General Status Ranks: http://www.gov.ns.ca/natr/wildlife/genstatus/).

None of the Nova Scotia populations of New Jersey Rush occur in protected areas.

TECHNICAL SUMMARY

Juncus caesariensis
New Jersey Rush jonc du New Jersey
Range of Occurrence in Canada: Nova Scotia

Extent and Area Information	
• *Extent of occurrence (EO)(km²)* (Determined by Nova Scotia DNR)	350 km²
• *Specify trend in EO*	Stable
• *Are there extreme fluctuations in EO?*	No
• *Area of occupancy (AO) (km²)* (Estimate of area of habitats occupied)	<<1 km² (0.09 km²)
• *Specify trend in AO*	Stable
• *Are there extreme fluctuations in AO?*	No
• *Number of known or inferred current locations*	25 extant
• *Specify trend in #*	Stable (# of known locations should increase with more field effort)
• *Are there extreme fluctuations in number of locations?*	No
• *Specify trend in area, extent or quality of habitat*	Declining quality in habitat
Population Information	
• *Generation time (average age of parents in the population)*	Likely several years to flowering
• *Number of mature individuals*	5000-10000
• *Total population trend:*	Stable
• *% decline over the last/next 10 years or 3 generations.*	Not Applicable
• *Are there extreme fluctuations in number of mature individuals?*	No
• *Is the total population severely fragmented?*	No
• *Specify trend in number of populations*	Stable
• *Are there extreme fluctuations in number of populations?*	No

• List populations with number of mature individuals in each: Data are available for the year 2002 for the following 24 of 25 populations: Gracieville (“bog 4”): 200-500 Gracieville (“bog 5”): >500 Gracieville (“bog 3”): 50-100 Gracieville (“bogs 1 & 2”): 110-250 Gracieville: 200-500 Point Michaud: <10 Point Michaud (“German bog”): 100-200* Point Michaud (“elbow bog”): 50-100 Grand River (“bog 8”): 200-500 Grand River (“bog “9b”): 200-300 Grand River West: number of mature individuals unknown Grand River East 1: number of mature individuals unknown Grand River East 2: number of mature individuals unknown Grand River (Indian Point): <10 L’Archevêque/St.Esprit: 10-50 St. Esprit: 40+ Lower St. Esprit: 30+ Stirling: 100-200 Framboise/Fourchu: >500 Mulcuish Lake: 500-1000 Mulcuish Lake (gravel pit): number of mature individuals unknown Loch Lomond (Graces Road 1): 500+ Loch Lomond (Graces Road 2: 50-100 South Arm Breeches Lake: number of mature individuals unknown
Threats (actual or imminent threats to populations or habitats)
- wetland alteration due to road, cottage and home construction; logging in adjacent habitat; all-terrain vehicle activity
Rescue Effect (immigration from an outside source)
• *Status of outside population(s)?* **USA:** New Jersey (S2), Virginia (S2), North Carolina (S1), Maryland (S1)

• *Is immigration known or possible?*	Unlikely due to the widely disjunct range from USA pops.
• *Would immigrants be adapted to survive in Canada?*	Unknown
• *Is there sufficient habitat for immigrants in Canada?*	Yes
• *Is rescue from outside populations likely?*	Unlikely
Quantitative Analysis	Not Applicable

Other Status

COSEWIC: Special Concern (1992)
Nova Scotia Endangered Species Act: Vulnerable

Status and Reasons for Designation

Status: Special Concern	**Alpha-numeric code:** [Met criteria for Threatened, D2, but designated as Special Concern because there are about 25 extant occurrences and likely more to be found; the species is not likely to become highly endangered since there are limited risks and the species shows some adaptability to habitat disturbance.

Reasons for Designation:
The species is a globally rare plant found along the periphery of 25 bogs and fens in a geographically restricted area of southeastern Cape Breton Island, Nova Scotia. The Canadian population is estimated at 5000 -10,000 plants that comprise a large proportion of the global population. The Canadian plants are widely disjunct from sites along the U.S. Atlantic seaboard where the species is also quite rare. It is sensitive to activities that alter the hydrological regime of its habitat such as logging, road construction and in-filling.

Applicability of Criteria

Criterion A (Declining Total Population): **Not Applicable:** No declines documented
Criterion B (Small Distribution, and Decline or Fluctuation): **Not Applicable:** No continuing decline documented; populations > 10 and not fragmented
Criterion C (Small Total Population Size and Decline): **Not Applicable:** No continuing decline
Criterion D (Very Small Population or Restricted Distribution): Threatened under D2 based on the small area of occupancy
Criterion E (Quantitative Analysis): Not Applicable

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Ruth E. Newell received a B.Sc. (Hons.) from Acadia University in 1975 and a M.Sc. in Botany from the University of Guelph in 1979. She has worked as Curator of the E.C. Smith Herbarium at Acadia University for over twenty years. She also conducts vegetation and rare flora surveys as a botanical consultant. She has authored and co-authored a number of COSEWIC status and update status reports including the status report for *Juncus caesariensis*. She is currently a member of the Nova Scotia Species at Risk Working Group and the Nova Scotia Atlantic Coastal Plain Flora Recovery Team.

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COLLECTIONS EXAMINED

The collections at the E.C. Smith Herbarium (ACAD), Biology Department, Acadia University, Wolfville, Nova Scotia have been examined by the author. Herbarium specimens at the University College of Cape Breton were examined by Pixie Williams.