Atlantic Canada Conservation Data Centre
Centre de donneés sur la conservation du Canada atlantique

DOCUMENTING RARE SPECIES HOT SPOTS IN CALCAREOUS HABITATS OF SOUTHEASTERN NEW BRUNSWICK

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EXECUTIVE SUMMARY

In New Brunswick, high-pH habitats (including alkaline bedrock outcrops, cliffs, fens and swamps) represent a very small portion of the provincial land area, often occurring as small islands within a predominantly acidic landscape. These habitats, which constitute biodiversity hotspots, support many of the province's rarest plant species and represent areas of high conservation significance. Due to lack of connectivity and relative isolation, species of conservation concern found in these habitats are at greater risk of local extirpation due to human disturbance or stochastic events, as recruitment and recolonization from other populations is unlikely. Furthermore, alkaline upland and wetland habitats are underrepresented in the province's network of protected areas and some of the communities they support may therefore be under greater threat.

High-pH habitats are known to be quite scarce in southeastern New Brunswick, but their prevalence and distribution are not presently well understood. The geology of the region is varied, including non-marine sedimentary, marine sedimentary and volcanic bedrock, as well as various glacial tills; many geological formations are composed of both alkaline and non-alkaline materials, making it difficult to predict where high-pH habitats can be found. Industrial forestry, agriculture, urban sprawl, residential development and mining have all contributed to making this region one of the most fragmented landscapes in the province. Proximity to urban centers and larger towns increases the likelihood that remnant undisturbed habitats will be affected by future development and industrial activity, thereby also increasing the need for land conservation efforts in the region.

The project outlined in the present report was supported primarily by NB WTF funding, supplemented by funding from Environment and Climate Change Canada's Atlantic Ecosystem Initiatives program. This project represents the first sizeable effort of its kind specifically focused on high-pH habitats of southeastern New Brunswick, but it builds on numerous previous Atlantic Canada Conservation Data Centre (AC CDC) efforts focused on alkaline habitats in the Maritimes including many previous NB WTF-supported projects. During this project, AC CDC botanists carried out botanically-focused biological surveys in potentially alkaline areas of southeastern New Brunswick. Roughly 18 person days were devoted to fieldwork at seven sites in Kings, Westmorland and Albert counties.

Survey efforts documented over 4000 vascular plant location records for 693 different vascular plant taxa, 78% of which are native to the province of New Brunswick, and 22% of which are introduced. Our fieldwork resulted in the discovery of 247 location records for 51 different species of conservation concern (38 vascular plants, 6 macrolichens, 8 birds and 1 butterfly), including 55 location records for species presently considered to be Critically Imperiled or Imperiled.

Through precise documentation of provincially rare species and communities, the project has allowed for the fine-scale identification of several areas of conservation significance which represent potential future targets for protected area designation. The occurrence information collected has also made a significant contribution to our understanding of the status and distribution of many species and to our general knowledge of the flora of southeastern New Brunswick.

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BACKGROUND

The distribution of species on the landscape is a function of numerous biotic and abiotic factors and processes. Along with hydrology, soil pH is one of the most important factors governing the occurrence of plant species and communities. Soils with higher pH values (i.e. alkaline, basic or calcareous soils) are generally much more fertile than acidic ones, and often support species-rich communities, constituting biodiversity hotspots. Conditions suitable to support calciphilic plant communities generally occur in two types of situations: (1) where high-pH bedrock is exposed (cliffs, outcrops, deeply incised ravines, etc.) or where shallow soils are underlain by high-pH bedrock (ex: rich upland hardwoods underlain by limestone) and (2) where significant groundwater seepage through high-pH bedrock brings nutrient-rich alkaline water to the surface, forming calcareous swamps and fens.

Over 400 of New Brunswick's native vascular plant species, representing ~35% of the province's total flora, show at least some affinity for high-pH conditions (Blaney 2015, unpublished analysis; AC CDC 2018). These include roughly 270 species of conservation concern, nearly 200 of which are considered Critically Imperiled (S1) or Imperiled (S2) (see appendices 1 and 2 for status rank definitions) in the province. Many of New Brunswick's rarest species occur exclusively in high-pH habitats, meaning that these areas are particularly significant for conservation.

In New Brunswick, high-pH habitats represent a small portion of the total provincial land area, and frequently occur as small islands within a predominantly acidic landscape. Due to lack of connectivity and relative isolation, species of conservation concern found in these habitats are at greater risk of local extirpation due to human disturbance or stochastic events, as recruitment and recolonization from other populations is less likely. Furthermore, alkaline upland and wetland habitats are underrepresented in the province's network of protected areas and some of the communities they support may therefore be under greater threat.

High-pH habitats are known to be generally scarce in southeastern New Brunswick, but their prevalence and distribution are not presently well understood. The region, which includes Albert and Westmorland counties as well as portions of Kent, Kings, Saint John and Queens counties, has a varied geology (Fyffe and Richard 2007, GSC 2018, NB DERD 2018). Early and late-Carboniferous sedimentary rocks containing both calcareous and non-calcareous deposits are most prevalent. Moderately to (locally) highly alkaline mafic and felsic volcanic rocks and conglomerates of various composition occupy a considerable portion of the Fundy Coast and Fundy Uplands ecoregions. Highly calcareous deposits of evaporites and carbonates of the Windsor group (including gypsum and anhydrite) and Green Head group (including calcite marble, dolomite marble, quartzite and limestone) are also present but rare and highly localized. This varied geology, combined with the fact that many formations are composed of both alkaline and non-alkaline minerals, make it difficult to predict where high-pH habitats can be found.

The region includes both Moncton and Saint John, the largest two urban centers in the province, as well as several larger towns including Sussex, Sackville and Shediac. Urban sprawl, residential development, industrial forestry, agriculture and mining have all contributed to making this

region one of the most fragmented landscapes in the province. Proximity to urban centers and larger towns increases the likelihood that remnant undisturbed habitats will be affected by future development and industrial activity, thereby also increasing the need for land conservation efforts in the region.

The project outlined in the present report was supported primarily by NB WTF funding, supplemented by Environment and Climate Change Canada's Atlantic Ecosystem Initiatives program. It represents the first sizeable effort of its kind specifically focused on high-pH habitats of southeastern New Brunswick, but it builds on numerous previous AC CDC efforts focused on alkaline habitats in the Maritimes including many previous NB WTF-supported projects. The objective of this project was to discover and precisely document rare vascular plant populations and rare plant communities in order to (1) identify areas of high conservation value, and (2) improve our understanding of the provincial status of rare species and communities through the enhancement of the AC CDC's species occurrence dataset.

METHODS

Prior to fieldwork, relatively intact sites potentially supporting rare upland, wetland and shoreline plant communities were identified in southeastern New Brunswick using aerial photography. AC CDC species occurrence data was consulted around selected sites to ensure they had not previously been extensively covered. Documented calciphilic plant occurrences were also used as indicators of high-pH habitats to identify higher-priority areas for survey.

Between July 19th and September 21st, AC CDC Senior Scientist Sean Blaney and botanists David Mazerolle and Alain Belliveau devoted the equivalent of roughly 18 person days (conservative estimate including travel and overtime) to fieldwork focused on documenting plant biodiversity as well as species and ecological communities of conservation concern. Surveys were carried out at the following seven sites: (1) Hammond River, (2) Hampton, (3) Parlee Brook, (4) Anagance, (5) North River, (6) Petitcodiac River, and (7) Sweet Mountain. Figure 1 shows the location of surveyed sites. Total Because the level of fieldwork effort expended exceeded that allowed by WTF assistance, a small portion of these surveys was also funded through Environment Canada's Atlantic Ecosystems Initiatives program.

Botanists focused on areas with higher potential to support provincially rare species or ecological communities (with particular attention to potential occurrences of rich floodplains, alkaline wetlands and high-pH bedrock exposures), but generally sampled all habitat types within survey areas. Site coverage was precisely documented by GPS unit track logs. Fieldwork was conducted on foot, with the exception of sites along the Kennebecasis and Hammond rivers, which were covered using a combination of on-foot and canoe-based surveying. Approximately 140 km were travelled during the project, with roughly 87% of this distance covered on foot (~120 km). Survey coverage is precisely illustrated in figures 2, 4, 7, 10, 12, 15, and 18.

We compiled full vascular plant species lists for each site, assigning general descriptions of species' abundance within a surveyed area as follows: *rare* – present in small numbers at very few locations; *uncommon* – present at roughly four or five locations in small numbers or one or two locations in large numbers; *locally common* – present at several locations in larger numbers but not widespread; *fairly common* – widespread at the site but generally not in very large numbers; *common* – widespread at the site and present in large numbers. For any provincially rare species encountered during surveys (those species with provincial status ranks [S-ranks], of S1 to S3S4 and/or provincial General Status Ranks of At Risk, May Be At Risk or Sensitive; see appendices 1 and 2 for rank definitions), we recorded precise locations by GPS (accurate to 10 m or less), along with information on population size and extent, habitat and associated species. Any individuals or patches separated from others by a distance of 10 m or more were considered distinct locations and recorded separately. A majority of rare species populations were also documented by voucher specimens that will be deposited at the New Brunswick Museum in Saint John, with duplicates provided to the Connell Memorial Herbarium at the University of New Brunswick in Fredericton and the Agriculture and Agri-Food Canada Collection of Vascular Plants in Ottawa.

In addition to vascular plant occurrence data, general notes were taken on ecological communities represented within survey sites, with more detailed documentation of provincially rare communities and old growth forest. Macrolichens were recorded incidentally by Alain Belliveau and numerous specimens were collected for future identification. Bird species, particularly those considered to be of conservation concern, were also incidentally documented with breeding evidence recorded using the methods of the Maritimes Breeding Bird Atlas (http://www.mba-aom.ca).

All data collected and compiled through this project were digitized and standardized for incorporation into the AC CDC's geo-referenced species occurrence database, where it will be permanently maintained and will inform conservation and land use decisions.

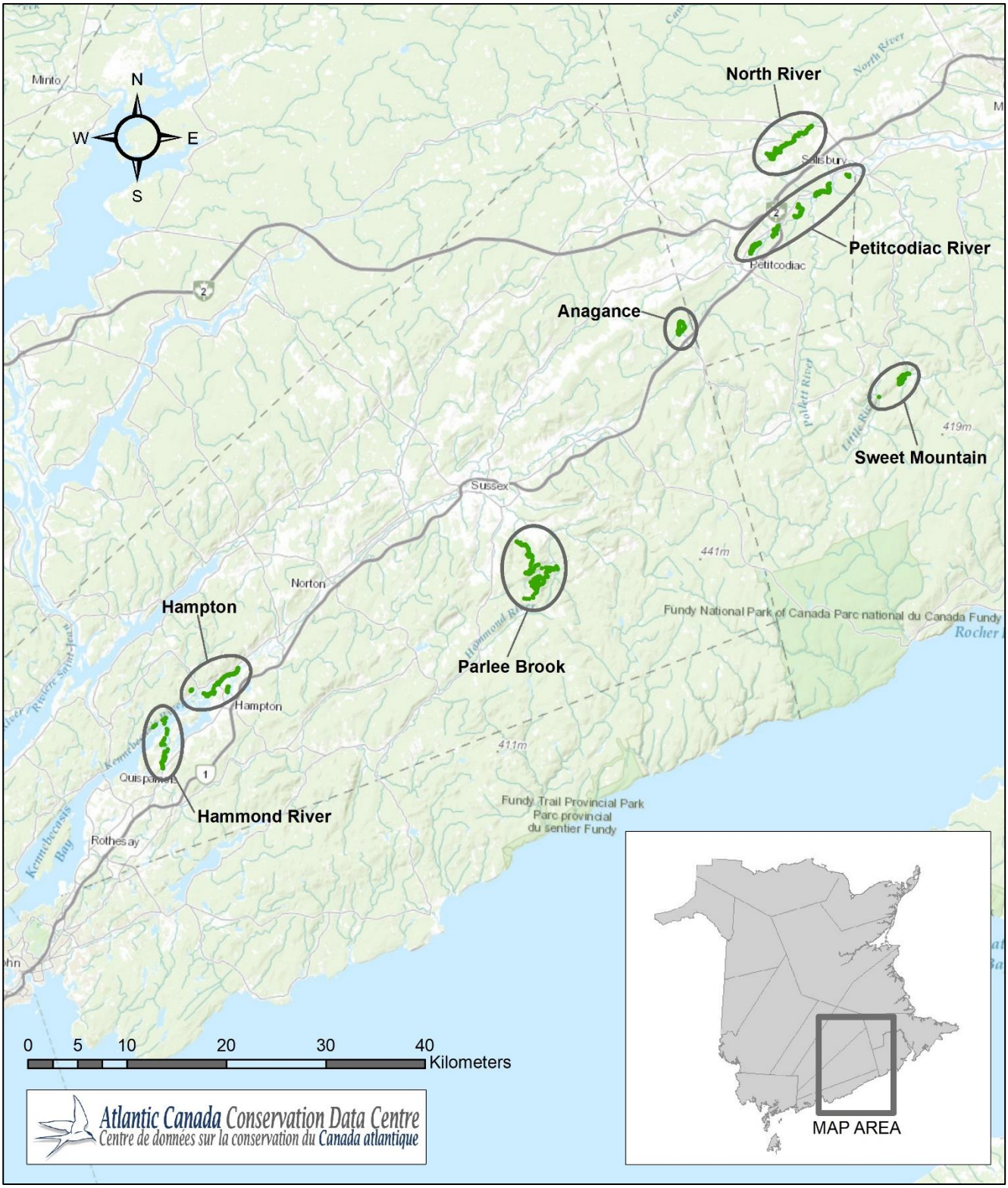

Figure 1. Location of project survey sites, in Kings, Albert and Westmorland counties, New Brunswick. Dark green dots (mostly forming polygons and lines at this map scale) represent documented species occurrence records. Topographical mapping from Esri's World Topographic Map.

RESULTS

All data collected through this project are compiled in the excel workbook file "ACCDC_WTF_DATA_2017.xlsx", provided along with the present report.

RARE VASCULAR PLANTS

Through this project, we discovered populations of 38 different provincially rare vascular plant species, including two Critically Imperiled (S1) species, eleven Imperiled (S2 and S2S3) species, and 25 Vulnerable (S3 and S3S4) species. All but eight of the rare plants documented during surveys can be considered moderately to highly calciphilic, and eight of the Imperiled species discovered are exclusively found on high-pH substrates in the province. Across all surveyed sites, we documented 221 locations for species of conservation concern, including 55 locations for Imperiled species. The rare species documented through this project, along with provincial status ranks and on-site abundance, are compiled below in Table 1 as well as in the *Site Summaries* section below.

Rare species richness ranged from 2 to 15 and averaged approximately 8 across all sites. The highest number of provincially rare species was recorded along the Petitcodiac River in Westmorland County, which was the subject of a significantly more intensive search effort, with three botanists covering 29 km on foot over four person days. Most of the 15 rare species found along this river were observed within remnant bands of Silver Maple (*Acer saccharinum*) floodplain and are typical of alluvial bottomlands along New Brunswick's richest river valleys. The most provincially significant concentration of rare species was discovered in ravines and rocky slopes near Parlee Brook in Kings County. Occurrences of exposed calcareous conglomerate bedrock at this site support numerous calciphilic plants, including both of the Critically Imperiled species found through this project.

The following species of conservation concern represent our most provincially significant finds:

Scirpuslike Sedge (*Carex scirpoidea*; S1 – Critically Imperiled) (see figures 9D, 9E and 9F): Scirpuslike Sedge is a widespread northern species ranging throughout most of North America's arctic, subarctic, and boreal zones, as well as some western and northeastern regions of the north temperate zone. The species is considered rare to extremely rare in New England and the Maritimes, where it is mainly restricted to boreal and alpine ridges and cliffs of high-pH bedrock. It differs from most other true sedges in being dioecious, with each individual bearing only either male or female flowers in a single elongate spike. Scirpuslike Sedge was discovered at several locations within a 70 m x 50 m area near Parlee Brook, growing along with several other rare calciphiles on calcareous conglomerate bedrock cliffs in a very steep ravine. Prior to our discovery of this population, the species was considered to be possibly extirpated in the province; it had only been observed and collected once, on June 15th 1940, in the Aroostook River gorge at the site of the Tinker hydroelectric dam, and several subsequent efforts to rediscover the population had been unsuccessful. Our documentation of this species near Parlee Brook therefore represents a significant find, proving that the species is still extant in New Brunswick, though extremely rare and Critically Imperiled.

White Mountain Saxifrage (*Saxifraga paniculata* ssp. *neogena*; S1 – Critically Imperiled) (see figures 9C and 9F): This arctic, subarctic and boreal species of exposed calcareous rock exposures

ranges from Atlantic Canada as far west as the Northwest Territories and Manitoba, and south to the Great Lakes and New England. A small but distinctive forb, White Mountain Saxifrage is easily recognizable in our region by its dense rosettes of finely serrated basal leaves which secrete a silvery-white lime crust. The species is Imperiled (S1 to S2) in all New England states and Maritime provinces where it occurs. In New Brunswick, White Mountain Saxifrage is extremely rare and restricted to four sites in the south (Albert, Kings and St. John counties) and two recently discovered sites in Restigouche County. We found the species growing on several calcareous conglomerate bedrock cliffs near Parlee Brook, usually co-occurring with several other calciphilic species of conservation concern.

Drummond's Rockcress (*Arabis drummondii* [syn: *Boechera stricta*]; S2 – Imperiled): A mustard species of cliffs, talus slopes and open rocky forest, Drummond's Rockcress has a wide distribution ranging throughout boreal, north temperate and western North America. The species is considered rare to uncommon in all jurisdictions where it occurs east of Ontario. In Atlantic Canada, Drummond's Rockcress is restricted to exposed calcareous bedrock cliffs and is considered Imperiled in all provinces except for Prince Edward Island, where it does not occur. We found two small occurrences of this species (one containing 37 individuals and the other containing 2) growing along with other rare calciphiles on calcareous conglomerate bedrock cliffs near Parlee Brook.

Pale Jewelweed (*Impatiens pallida*; S2 – Imperiled): This eastern North American species has a distribution that extends from the Atlantic Coast to Ontario and the Midwestern United States and as far south as Oklahoma and Georgia. Pale Jewelweed is rare in all Canadian provinces where it occurs, with the exception of Ontario, where it is apparently secure. In Atlantic Canada, the species can be considered a rare element of the northern Appalachian flora, and is typically found in rich forest and meadows underlain by high-pH bedrock. A single small occurrence tentatively identified as Pale Jewelweed was discovered on a rich mossy ledge next to a cascading brook, in a narrow ravine carved out of calcareous bedrock. Confirming identification versus the common Spotted Jewelweed (*Impatiens capensis*) will require further investigation, as both species are very difficult to differentiate from each other when flowers are not present.

Wild Leek (*Allium tricoccum*; S2 – Imperiled): Mainly a species of the Appalachian and Great Lakes regions, Wild Leek is most often found in the understories of rich hardwoods and alluvial bottomlands, where it is occasionally harvested for culinary purposes. Its distribution in Canada is limited to portions of southern Manitoba (S1S2), southern Ontario (S4), Southern Quebec (S3), southern Nova Scotia (S1) and New Brunswick (S2). In New Brunswick, the species is largely restricted to the south of the province, with a single large population documented in the north along the lower Restigouche River. A single patch of this species, containing an estimated 40 individuals, was discovered during our surveys along the Petitcodiac River, growing on a forested bank above a rich floodplain backwater channel.

Water Smartweed (*Polygonum amphibium* var. *emersum*; S2 – Imperiled): This plant of open marshes, shorelines and meadows is widespread throughout North America, but generally rare in Atlantic Canada. In New Brunswick, this subspecies of Water Smartweed is known from roughly 20 sites, mostly found in southern and western counties. Due to its strong similarities to other varieties of Water Smartweed, however, it is likely somewhat overlooked and may be more common than data

currently indicates. During our surveys, the *emersum* variety of Water Smartweed was found to be quite common in the extensive marshy floodplains of the Kennebecasis River near Hampton and was also found at one location in similar habitat along the lower Hammond River.

Maidenhair Spleenwort (*Asplenium trichomanes*; S2 – Imperiled): This diminutive fern has a widespread North American distribution, sparsely occurring in more or less disjunct western, south-central and eastern regions. It is considered to be of conservation concern in most states and provinces where it occurs. In Canada, the species is found in British Columbia and from Ontario to Newfoundland, with the exception of Prince Edward Island and Labrador. The New Brunswick distribution of Maidenhair Spleenwort is limited to fewer than ten cliffs and ledges in Restigouche County, along the lower St. John River, along the inner Bay of Fundy coast and in Albert County. A single clump of the species was observed on the partially shaded face of an extensive west-facing high-pH bedrock cliff above Rat Tail Brook. Twelve small clumps of this species were found at a single location near Parlee Brook, growing on a very steep mossy partially forested slope with exposures of calcareous conglomerate bedrock.

Orange-fruited Tinker's Weed (*Triosteum aurantiacum*; S2 – Imperiled) (see Figure 16D): Orange-fruited Tinker's Weed is a medium-sized eastern North American herbaceous plant of rich woods and thickets. Its distribution extends from the Maritimes west to the Great Lakes and as far south as Arkansas and Georgia. In Canada the species is mostly restricted to southern portions of eastern provinces; it is considered secure in Ontario but is Vulnerable Quebec and Imperiled in both New Brunswick and Nova Scotia, where the species reaches it northeastern range limit. New Brunswick occurrences are largely limited to central-western counties (Carleton, Victoria, York), where the plant occurs in riparian forest edges and rich open upland hardwoods, typically in areas underlain by calcareous bedrock. We documented the species in seven locations along the Petitcodiac River, where it was found growing in the understory of rich hardwood floodplain forest. This represents the first documented population for Westmorland County and eastern New Brunswick.

Pubescent Sedge (*Carex hirtifolia*; S2 – Imperiled) (see Figure 16C): This inconspicuous forest sedge occurs throughout much of temperate eastern North America, from Ontario to the Maritimes in the north and to Arkansas, Tennessee and Virginia in the south. Its Canadian range extends to southern Ontario, southern Quebec, New Brunswick and Nova Scotia. In the Maritimes, Pubescent Sedge is typically restricted to very rich hardwood forest on floodplain terraces and in upland areas receiving rich seepage influenced by calcareous bedrock. We found a single patch of this species in a shrubby Black Cherry (*Prunus serotina*) and Red Maple (*Acer rubrum*) floodplain along the Petitcodiac River.

Small White Aster (*Symphyotrichum racemosum*; S2 – Imperiled): Small White Aster occurs throughout the eastern United States as far west as Texas and Wisconsin. In Canada, the species is only known to be present in New Brunswick, although there are unsubstantiated reports in Ontario and Quebec. Due to its strong resemblance to the common and highly variable Calico Aster (*Symphyotrichum lateriflorum*), the species may easily be overlooked and may therefore be more widespread than available data indicates. The true status of Small White Aster in New Brunswick is uncertain at present; while several sources consider this taxon to be introduced in Canada, the AC CDC is tentatively treating it as native based on the fact that most documented occurrences are in

natural habitats. A few plants tentatively identified as Small White Aster were found at Hampton, in moderately shaded moist mucky soil between an intermittent brook and open marsh.

VASCULAR PLANT SPECIES DIVERSITY

Across the seven areas surveyed, we generated over 4000 vascular plant location records for 693 taxa, 78% of which are native to the province of New Brunswick, and 22% of which are introduced. A full list of all vascular plants documented through this project, with site-specific abundance, is given in Appendix 2. Site-specific summaries of vascular plant diversity are provided in the *Site Summaries* section below.

Total and native species richness were highest at Petitcodiac River (361 native taxa) and North River (332 native taxa), the two sites that received the most intensive search efforts (see *Site Summaries*). Native species richness for the remaining five sites ranged from 157 taxa in the Anagance area to 261 along Parlee Brook. The proportion of exotic species for specific sites varied from 11% at Anagance to 24% along the Petitcodiac River, averaging 18% across all seven sites.

Native species counts provide general indications of habitat diversity and richness, but on their own are not necessarily strong indicators of site condition or relative conservation value. Likewise, exotic species counts do not always provide an accurate inverse measure of a site's ecological integrity. Both metrics are greatly influenced by factors such as search effort, habitat coverage, and the extent to which anthropogenic habitats were traversed. In fact,

NON-VASCULAR PLANTS

We documented 83 location records for 43 macrolichen species, including eight locations for six species of provincial conservation concern (see Table 1). Four provincially rare lichens were recorded at Hampton, the highest number across all sites. Olive Cladonia Lichen (*Cladonia strepsilis*; S3) found on a bedrock outcrop near Hampton represents the most important lichen find. Most lichen observations were made by Alain Belliveau, who carried out basic microlichen surveys at Hampton, North River, Parlee Brook, and Petitcodiac River. The level of attention to lichen diversity at these sites was sufficient to provide a description of abundance for most species. David Mazerolle documented incidental lichen records for North River and Parlee Brook. All data collected for lichens is provided in Appendix 3.

ANIMALS

Birds were not a focus of our surveys and no early morning bird surveys were conducted. We documented 117 incidental observations of 57 bird species, with highest numbers of species recorded along the North River (39 spp.) and at Sweet Mountain (29 spp.), the only sites covered during mid-summer bird breeding season. We documented two presumed breeding sites for Barn Swallow (*Hirundo rustica*; S3B,S3M; SARA Threatened) near Sweet Mountain. Four other provincially rare breeding birds were also observed: Cliff Swallow (S2S3B,S2S3M; probable breeding at Sweet Mountain), Red Crossbill (S3; observed long the North River; no evidence of breeding), Turkey

Vulture (S3B, S3M; observed at Parlee Brook and Anagance; no evidence of breeding), and Wilson's Snipe (S3S4B,S5M; observed along the North River; no evidence of breeding). Bird observations are compiled in Appendix 4.

A few occurrences of mammals, amphibians, and invertebrates were also documented during surveys, including five location records for the federally listed Monarch butterfly (S3B,S3M; SARA Special Concern) on the Hammond River, at Hampton and on the North River.

TABLE 1. Species of conservation concern detected during surveys, with numbers of occurrence locations found in each survey site and provincial status ranks (S-rank, see Appendix 1 for definitions).

	NNAME	COMMON NAME	FAMILY	NB S-RANK	SURVEY SITE						
					Hammond R.	Hampton	Parlee Bk.	Anagance	North R.	Petitcodiac R.	Sweet Mtn.
VASCULAR PLANT	*Carex scirpoidea*	Scirpuslike Sedge	Cyperaceae	S1			6				
	Saxifraga paniculata ssp. neogaea	White Mountain Saxifrage	Saxifragaceae	S1			11				
	Allium tricoccum	Wild Leek	Liliaceae	S2						1	
	Arabis drummondii	Drummond's Rockcress	Brassicaceae	S2			5				
	Asplenium trichomanes	Maidenhair Spleenwort	Aspleniaceae	S2			1				
	Carex hirtifolia	Pubescent Sedge	Cyperaceae	S2						1	
	*Impatiens pallida**	Pale Jewelweed	Balsaminaceae	S2			1				
	Polygonum amphibium var. emersum	Water Smartweed	Polygonaceae	S2	1	14					
	*Symphyotrichum racemosum**	Small White Aster	Asteraceae	S2		1					
	Triosteum aurantiacum	Orange-fruited Tinker's Weed	Caprifoliaceae	S2						7	
	Ceratophyllum echinatum	Prickly Hornwort	Ceratophyllaceae	S2S3					1	1	
	Geranium robertianum	Herb Robert	Geraniaceae	S2S3	2						
	Rubus pensilvanicus	Pennsylvania Blackberry	Rosaceae	S2S3						2	
	Arabis hirsuta var. pycnocarpa	Western Hairy Rockcress	Brassicaceae	S3			2				
	Bromus latiglumis	Broad-Glumed Brome	Poaceae	S3						20	
	Carex haydenii	Hayden's Sedge	Cyperaceae	S3		5					
	Carex lupulina	Hop Sedge	Cyperaceae	S3		1				2	
	Carex tuckermanii	Tuckerman's Sedge	Cyperaceae	S3		2				4	
	Carex wiegandii	Wiegand's Sedge	Cyperaceae	S3					1		
	Cyperus esculentus	Perennial Yellow Nutsedge	Cyperaceae	S3		3					
	Epilobium strictum	Downy Willow-Herb	Onagraceae	S3					2	2	
	Geranium bicknellii	Bicknell's Crane's-bill	Geraniaceae	S3						3	
	Heteranthera dubia	Water Stargrass	Pontederiaceae	S3	1	1					
	Lemna trisulca	Star Duckweed	Lemnaceae	S3		5			3	1	
	Myriophyllum heterophyllum	Variable-leaved Water Milfoil	Haloragaceae	S3	2						
	Penthorum sedoides	Ditch Stonecrop	Saxifragaceae	S3		6				25	
	Pilea pumila	Dwarf Clearweed	Urticaceae	S3		3	2			11	1
	Polygonum arifolium	Halberd-leaved Tearthumb	Polygonaceae	S3				4			
	Polygonum punctatum var. confertiflorum	Dotted Smartweed	Polygonaceae	S3				3			
	Polygonum scandens	Climbing False Buckwheat	Polygonaceae	S3	1					11	
	Polypodium appalachianum	Appalachian Polypody	Polypodiaceae	S3			3				
	Potamogeton obtusifolius	Blunt-leaved Pondweed	Potamogetonaceae	S3				1	1		
	Ranunculus gmelinii	Gmelin's Water Buttercup	Ranunculaceae	S3				2	7	4	
	Rhodiola rosea	Roseroot	Crassulaceae	S3			5				
	Schoenoplectus fluviatilis	River Bulrush	Cyperaceae	S3	6	6					
	Corallorhiza maculata	Spotted Coral-Root	Orchidaceae	S3S4							1
	Myriophyllum sibiricum	Siberian Water Milfoil	Haloragaceae	S3S4	1						
	Spirodela polyrrhiza	Great Duckweed	Lemnaceae	S3S4		2					

	NNAME	COMMON NAME	FAMILY	NB S-RANK	SURVEY SITE						
					Hammond R.	Hampton	Parlee Bk.	Anagance	North R.	Petitcodiac R.	Sweet Mtn.
LICHEN	*Cladonia strepsilis*	Olive Cladonia Lichen	Cladoniaceae	S3		1					
	Cladonia floerkeana	Gritty British Soldiers Lichen	Cladoniaceae	S3S4		1					
	Dermatocarpon luridum	Brookside Stippleback Lichen	Verrucariaceae	S3S4		2					
	Nephroma parile	Powdery Kidney Lichen	Nephromataceae	S3S4		1			1		
	Protopannaria pezizoides	Brown-gray Moss-shingle Lichen	Pannariaceae	S3S4			1				
	Pseudocyphellaria perpetua	Gilded Specklebelly Lichen	Lobariaceae	S3S4					1		
BIRD	*Petrochelidon pyrrhonota*	Cliff Swallow	Hirundinidae	S2S3B,S2S3M							1
	Loxia curvirostra	Red Crossbill	Fringillidae	S3					1		
	Cathartes aura	Turkey Vulture	Cathartidae	S3B,S3M			1	1			
	Hirundo rustica	Barn Swallow	Hirundinidae	S3B,S3M						1	1
	Gallinago delicata	Wilson's Snipe	Scolopacidae	S3S4B,S5M					1		
INVERTEBRATE	*Danaus plexippus*	Monarch	Nymphalidae	S3B,S3M	1	4			1		

*Identification for these occurrences is tentative and will require expert verification.

SITE SUMMARIES

Georeferenced notes on survey site features, including ecological communities, habitats and anthropogenic disturbance, are included in the data spreadsheet provided with this report.

Geological details provided in this section were obtained from Fyffe and Richard (2007), GSC (2018) and NB DERD (2018).

HAMMOND RIVER

Survey date: August 23rd 2017
Observer(s): D.M. Mazerolle
Survey track length: 14.2 km (mainly canoe-based, but including 3.5 km on foot)

Vascular Plant Diversity:

Total Spp. Richness	Native Spp. Richness	Exotic Spp. Richness	% Native	% Exotic	# of Rare Spp.
204	164	40	80	20	8

Rare Species Documented:

	SCIENTIFIC NAME	COMMON NAME	NB S-RANK	# OF LOCATIONS
VASCULAR PLANT	*Polygonum amphibium var. emersum*	Water Smartweed	S2	1
	Geranium robertianum	Herb Robert	S2S3	2
	Heteranthera dubia	Water Stargrass	S3	1
	Myriophyllum heterophyllum	Variable-leaved Water Milfoil	S3	2
	Polygonum scandens	Climbing False Buckwheat	S3	1
	Schoenoplectus fluviatilis	River Bulrush	S3	6*
	Myriophyllum sibiricum	Siberian Water Milfoil	S3S4	1
INVERT-EBRATE	*Danaus plexippus*	Monarch	S3B,S3M	1

*****Some recorded occurrences extend over hundreds of meters.

Notable Features:

- Fieldwork at this site was focused on the lowermost ~8 km of the Hammond River, as well as its confluence with the Kennebecasis River. Survey coverage was mainly canoe-based, with several on-foot spot checks carried out wherever habitats appeared to have a higher likelihood of containing rare species.
- The area is adjacent to highly calcareous carbonate bedrock deposits of the Green Head Group, but is for the most part underlain by Horton Group non-marine sedimentary rocks which may contain both calcareous and non-calcareous components.
- The lower Hammond River valley widens considerably at Nauwigewauk, where the river becomes freshwater tidal and flows through a floodplain reaching widths of over 1 km. This area is characterized by extensive emergent graminoid marsh, numerous secondary river channels and forested floodplain islands. Although some floodplain has been deforested and significantly altered by agriculture, most islands remain relatively intact. Mature floodplain forest stands are strongly dominated by Silver Maple (*Acer saccharinum*) and occasionally contain a minor component of Red Ash (*Fraxinus pennsylvanica*). These represent provincially rare forest communities (S3) almost entirely restricted to the St. John River drainage.
- Extensive emergent freshwater tidal marsh communities at this site are composed of Bluejoint Reed Grass (*Calamagrostis canadensis*), Freshwater Cordgrass (*Spartina pectinata*), Softstem Bulrush (*Schoenoplectus tabernaemontani*), Northern Wild Rice (*Zizania palustris* var. *palustris*) and Broad-fruited Bur-reed (*Sparganium eurycarpium*). The provincially Vulnerable River Bulrush (*Schoenoplectus fluviatilis*) gradually becomes a major component of these communities as the river nears the confluence with the Kennebecasis River.

- Two south-facing exposed bedrock cliff faces were observed on a ridge along the north side of the Kennebecasis River. Apparently consisting of granite and generally quite weedy, these outcrops supported small occurrences of the provincially Imperiled Herb Robert (*Geranium robertianum*).

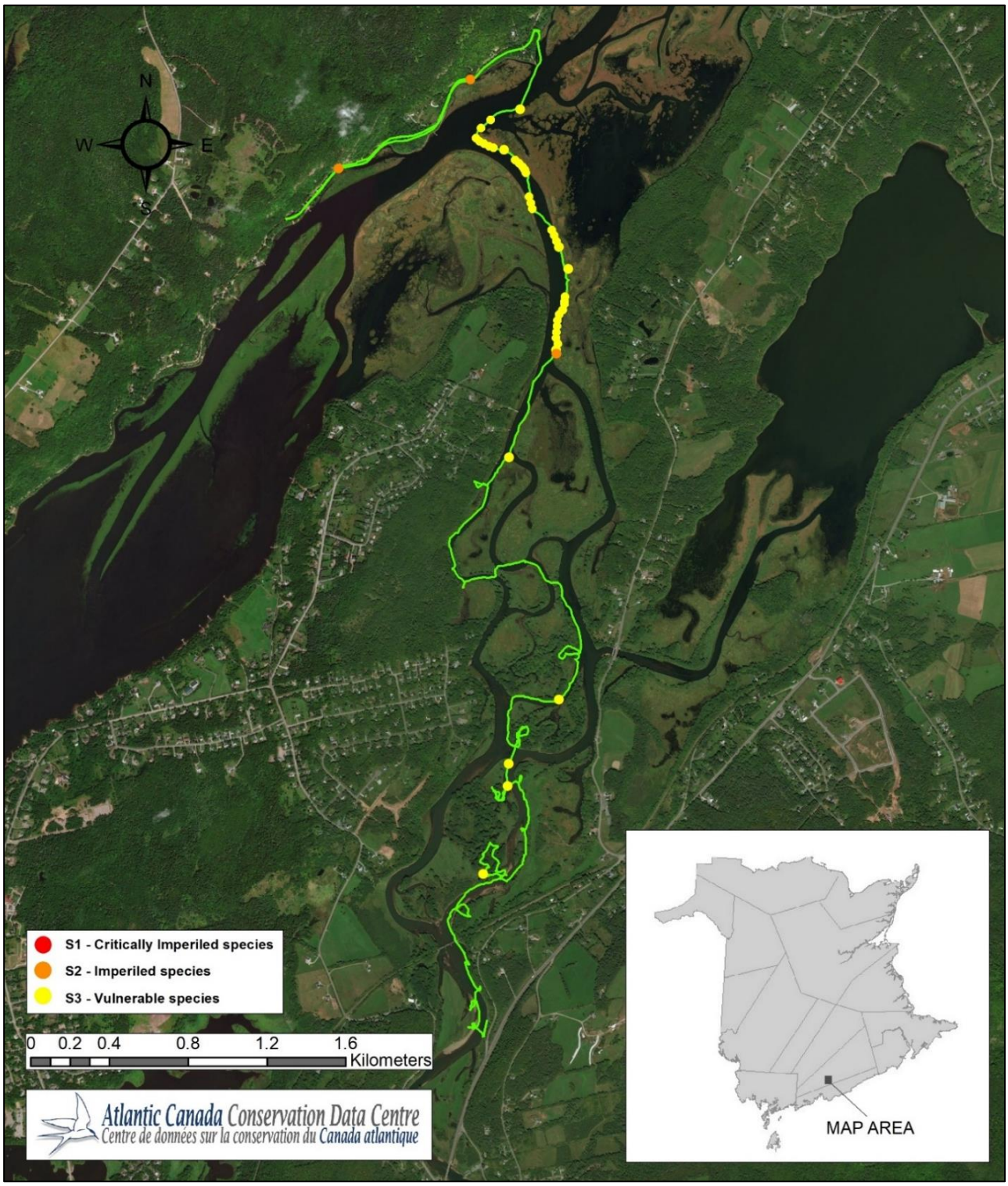

Figure 2. Survey coverage and rare species occurrences documented along the Hammond River, Kings County, NB. Green line corresponds to the GPS track file recorded by D.M. Mazerolle during the survey on August 23rd 2017. Survey effort at this site was mainly canoe-based. Imagery from Bing Aerial Maps.

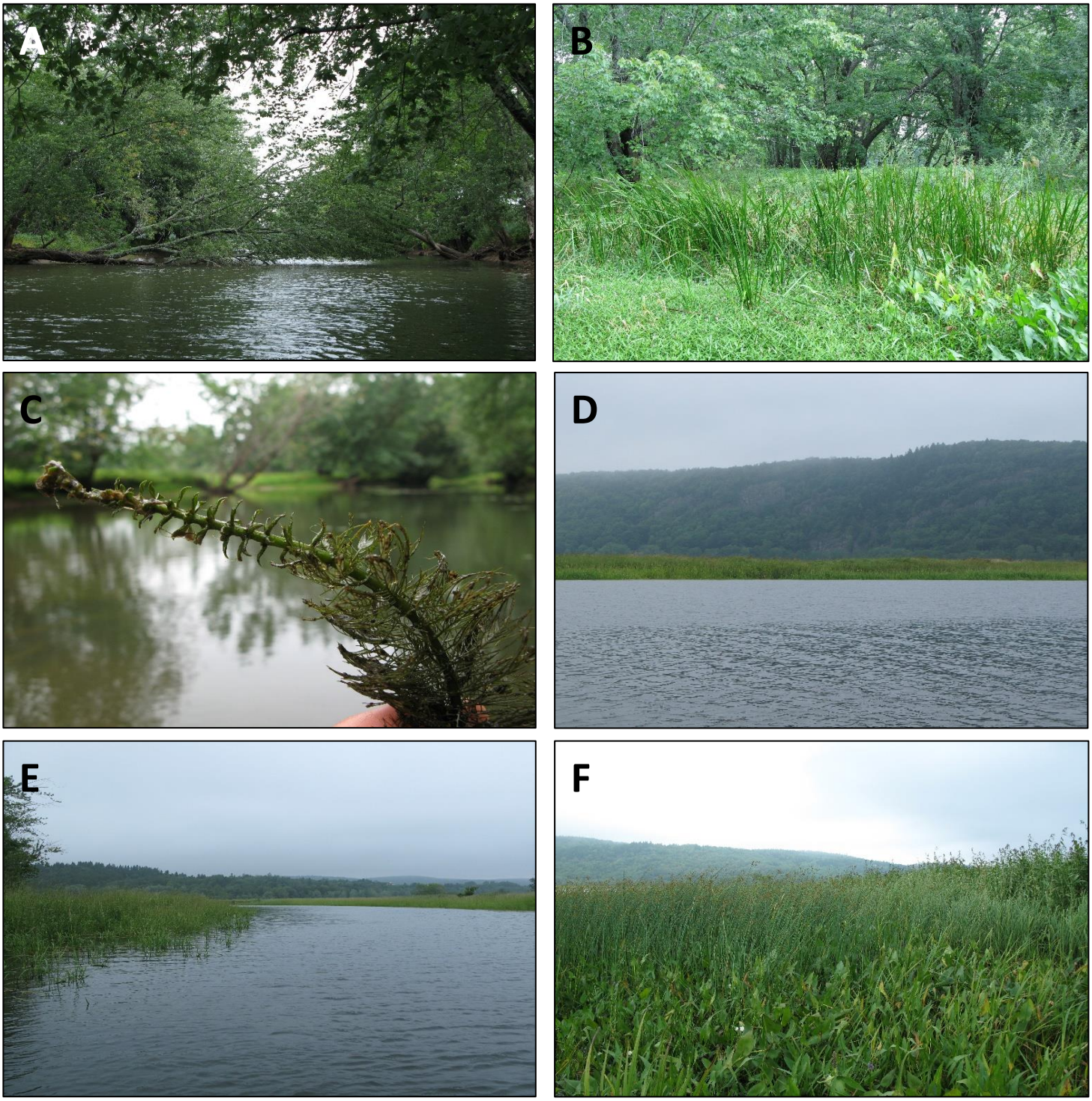

Figure 3. **Hammond River. (A)** Mature Silver Maple (*Acer saccharinum*) floodplain forest along secondary channel of river. **(B)** Wet Silver Maple swamp on floodplain island, with understory community dominated by False Waterpepper (*Polygonum hydropiperoides*), Broad-leaved Arrowhead (*Sagittaria latifolia*), Broad-fruited Burreed (*Sparganium eurycarpum*) and Satiny Willow (*Salix pellita*). **(C)** Variable-leaved Water Milfoil (*Myriophyllum heterophyllum*; S3) collected in shallow muddy backwater among floodplain islands. **(D)** Freshwater tidal graminoid marsh at confluence of Hammond and Kennebecasis rivers, with steep slope and bedrock cliffs of south facing ridge visible in background. **(E)** Freshwater tidal marsh including wide communities of emergent graminoids along the lower Hammond River. **(F)** Freshwater tidal marsh community composed of Softstem Bulrush (*Schoenoplectus tabernaemontani*), Broad-leaved Arrowhead, Common Reed (*Phragmites australis* ssp. *americanus*), Pickerelweed (*Pontederia cordata*), Freshwater Cordgrass (*Spartina pectinata*) and the provincially rare River Bulrush (*Schoenoplectus fluviatilis*; S3).

HAMPTON

Survey date: August 22nd & 23rd 2017
Observer(s): D.M. Mazerolle and A.G. Belliveau
Survey track length: 17.2 km (mainly canoe-based but including 5.5 km on foot)

Vascular Plant Diversity:

Total Spp. Richness	Native Spp. Richness	Exotic Spp. Richness	% Native	% Exotic	# of Rare Spp.
273	226	47	83	17	17

Rare Species Documented:

	SCIENTIFIC NAME	COMMON NAME	NB S-RANK	# OF LOCATIONS
VASCULAR PLANT	*Polygonum amphibium var. emersum*	Water Smartweed	S2	14
	Symphyotrichum racemosum	Small White Aster	S2	1
	Carex haydenii	Hayden's Sedge	S3	5
	Carex lupulina	Hop Sedge	S3	1
	Carex tuckermanii	Tuckerman's Sedge	S3	2
	Cyperus esculentus	Perennial Yellow Nutsedge	S3	3
	Heteranthera dubia	Water Stargrass	S3	1
	Lemna trisulca	Star Duckweed	S3	5
	Penthorum sedoides	Ditch Stonecrop	S3	6
	Pilea pumila	Dwarf Clearweed	S3	3
	Schoenoplectus fluviatilis	River Bulrush	S3	6
	Spirodela polyrrhiza	Great Duckweed	S3S4	2
LICHEN	*Cladonia strepsilis*	Olive Cladonia Lichen	S3	1
	Cladonia floerkeana	Gritty British Soldiers Lichen	S3S4	1
	Dermatocarpon luridum	Brookside Stippleback Lichen	S3S4	2
	Nephroma parile	Powdery Kidney Lichen	S3S4	1
INVERT-EBRATE	*Danaus plexippus*	Monarch	S3B,S3M	4

Notable Features:

- Carried out over three person days, survey effort near Hampton was focused on a 5 km section of the Kennebecasis River, as well as nearby upland sites at Frost Mountain and along Ossekeag Creek. Coverage along the Kennebecasis River was mainly canoe-based, with on-foot surveys conducted at regular intervals and when habitats appeared to have a higher likelihood of supporting rare species.
- Agriculture, residential development and wood harvesting have contributed to considerable deforestation along this section of the Kennebecasis River. Mature late-successional forest is scarce in the surveyed area but is still commonly found in the form of small isolated upland stands, and narrow interrupted riparian bands.
- Freshwater tidal marshes, floodplain meadows and stands of remnant floodplain forest are prominent features throughout this section of the lower Kennebecasis River valley. These habitats become much more extensive as the floodplain widens below Hampton.

- Floodplain marsh communities above Hampton are generally more degraded by adjacent agriculture, and exotic species represent a much greater portion of their composition. Freshwater Cordgrass (*Spartina pectinata*) and invasive Reed Canary Grass (*Phalaris arundinacea*) are dominant in this area. Below Hampton, these habitats support communities which are much more diverse and have much smaller exotic components.
- Stands of mature Silver Maple (*Acer saccharinum*) and Silver Maple / Red Ash (*Fraxinus pennsylvanica*) floodplain forest form narrow interrupted bands along much of the surveyed river section. These forest communities are provincially rare (S3) and largely restricted to the St. John River watershed. Below Hampton, a floodplain island holds a richer, more extensive, and relatively undisturbed stand, which supports several provincially rare understory species including Hope Sedge (*Carex lupulina*; S3), Tuckerman's Sedge (*Carex tuckermanii*; S3) and Ditch Stonecrop (*Penthorum sedoides*; S3). Ecotones between mature riparian forest and open marsh just northeast of the Dr. A.T. Leatherbarrow Primary School also support several rare species, including Small White Aster (*Symphyotrichum racemosum*; S2), Hayden's Sedge (*Carex haydenii*; S3), Dwarf Clearweed (*Pilea pumila*; S3) and Tuckerman's Sedge.
- Several species documented along the Kennebecasis River have provincial distributions which are largely or entirely restricted to the lower St. John River drainage, including species of conservation concern such as Small White Aster (*Symphyotrichum racemosum*; S2), Water Stargrass (*Heteranthera dubia*; S3), Perennial Yellow Nutsedge (*Cyperus esculentus*; S3) and River Bulrush (*Schoenoplectus fluviatilis*; S3).
- Exposed bedrock outcrops were surveyed at the summit of Frost Mountain northwest of Hampton. These outcrops of felsic volcanic origin support two rare macrolichens (Olive Cladonia Lichen [*Cladonia strepsilis*; S3] and Gritty British Soldiers Lichen [*Cladonia floerkeana*; S3S4]) but are quite weedy and do not support calciphilic communities.

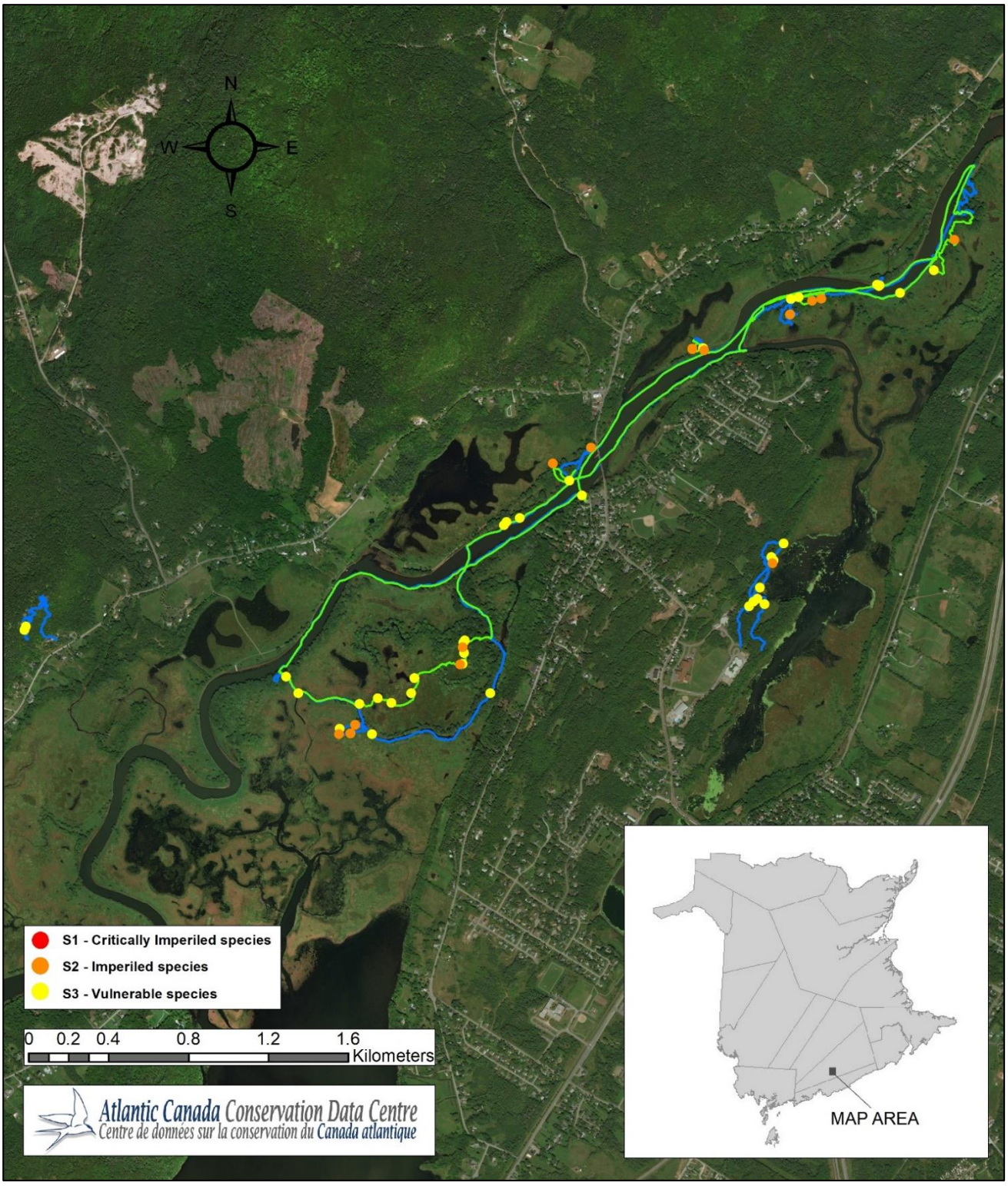

Figure 4. Survey coverage and rare species occurrences documented at Hampton, Kings County, NB. Colored lines correspond to the GPS track files recorded during surveys by D.M. Mazerolle (green) and A.G. Belliveau (blue) on August 22nd and 23rd 2017. Survey effort along the Kennebecasis River was mainly canoe-based. Imagery from Bing Aerial Maps.

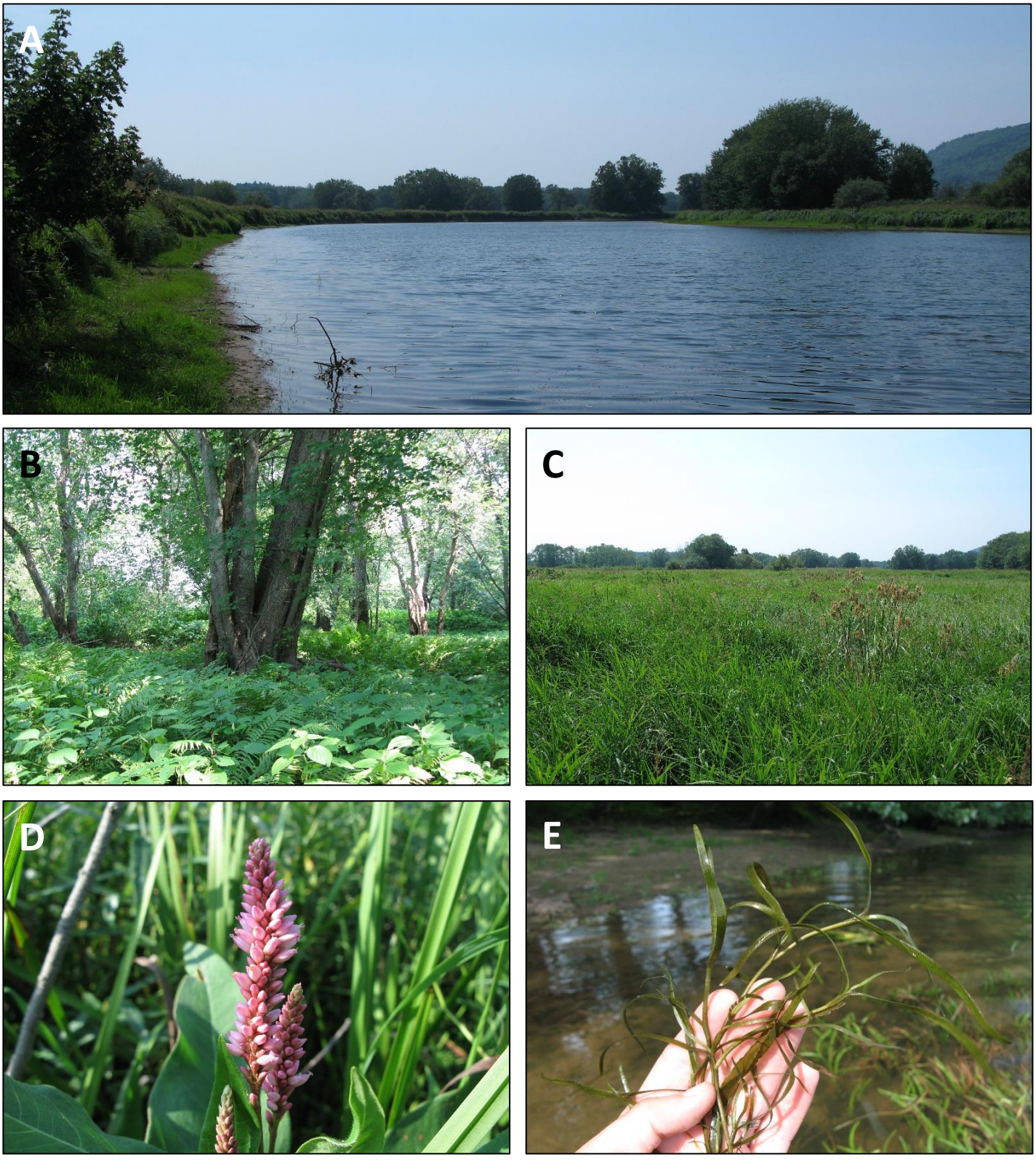

Figure 5. **Hampton. (A)** Freshwater tidal shore, floodplain meadows and Silver Maple (*Acer saccharinum*) forest stands along the Kennebecasis River. **(B)** Mature Silver Maple and United Maple (*Acer x freemanii*) floodplain forest with understory of Wood Nettle (*Laportea canadensis*) and Ostrich Fern (*Matteuccia struthiopteris*). **(C)** Extensive graminoid floodplain meadow community mainly composed of Bluejoint Reed Grass (*Calamagrostis canadensis*), Reed Canary Grass (*Phalaris arundinacea*) and Stalked Bulrush (*Scirpus pedicellatus*). **(D)** Water Smartweed (*Polygonum amphibium* var. *emersum*; S2) growing in graminoid-dominated floodplain marsh. **(E)** Water Stargrass (*Heteranthera dubia*; S3) collected in freshwater tidal section of the Kennebecasis River.

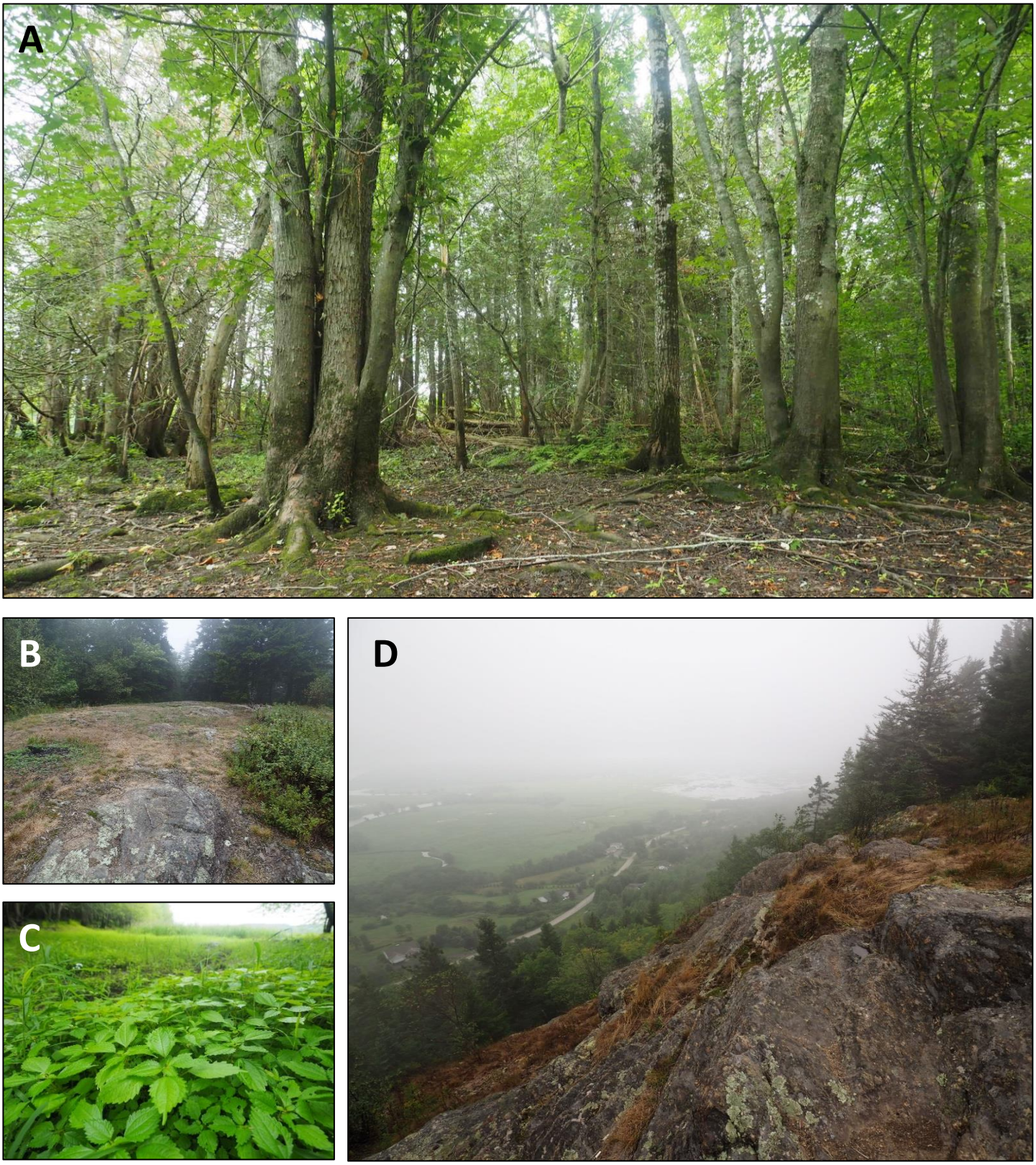

Figure 6. Hampton. (A) Mature Silver Maple (*Acer saccharinum*) floodplain swamp near high water mark, with scattered Fringed Sedge (*Carex crinita*), Sensitive Fern (*Onoclea sensibilis*) and Glossy Buckthorn (*Frangula alnus*). **(B)** Thin soil community with exposed bedrock and scattered Red Fescue (*Festuca rubra*), Sheep Sorrel (*Rumex acetosella*), Downy Goldenrod (*Solidago puberula*), and Glossy Buckthorn. **(C)** Several hundred stems of Canada Clearweed (*Pilea pumila*; S3) in moist mucky soil between an intermittent brook and open marsh. **(D)** Felsic volcanic bedrock exposure at the summit of Frost Mountain, northwest of Hampton.

PARLEE BROOK

Survey date: August 17th & September 7th 2017
Observer(s): D.M. Mazerolle and A.G. Belliveau
Survey track length: 34.1 km

Vascular Plant Diversity:

Total Spp. Richness	Native Spp. Richness	Exotic Spp. Richness	% Native	% Exotic	# of Rare Spp.
306	261	45	85	15	10

Rare Species Documented:

	SCIENTIFIC NAME	COMMON NAME	NB S-RANK	# OF LOCATIONS
VASCULAR PLANT	*Carex scirpoidea*	Scirpuslike Sedge	S1	6
	Saxifraga paniculata ssp. neogaea	White Mountain Saxifrage	S1	11
	Arabis drummondii	Drummond's Rockcress	S2	5
	Asplenium trichomanes	Maidenhair Spleenwort	S2	1
	Impatiens pallida	Pale Jewelweed	S2	1
	Arabis hirsuta var. pycnocarpa	Western Hairy Rockcress	S3	2
	Pilea pumila	Dwarf Clearweed	S3	2
	Polypodium appalachianum	Appalachian Polypody	S3	3
	Rhodiola rosea	Roseroot	S3	5
LICHEN	*Protopannaria pezizoides*	Brown-gray Moss-shingle Lichen	S3S4	1
BIRD	*Cathartes aura*	Turkey Vulture	S3B,S3M	1

Notable Features:

- The Parlee Brook area contains this project's most important finds in terms of species of conservation concern and calciphilic communities. It could therefore be considered to have the highest provincial significance and conservation value among our survey sites.
- Several exposed bedrock cliff faces surveyed in steep ravine and valley slopes in the southern portion of the surveyed area are evidently highly calcareous and support relatively high concentrations of calciphiles, including numerous provincially Imperiled species. Of particular significance is a deeply incised ravine of conglomerate bedrock cliffs found roughly halfway between Markhamville and Parlee Brook. Cliffs in this abrupt narrow gorge most notably support a healthy population of Scirpuslike Sedge (*Carex scirpoidea*; S1), which was until that point considered possibly extirpated in the province, as well as a large population of White Mountain Saxifrage (*Saxifraga paniculata* ssp. *neogaea*; S1).
- Geologically, this high-pH habitat hotspot sits near a contact line between Mabou Group non-marine sedimentary rock composed of sandstone and shale, and Windsor Group sedimentary bedrock of the Clover Hill formation. The latter group is well known for containing calcareous carbonates (e.g. limestone) and evaporites (e.g. gypsum, anhydrite, salt), as well as calcareous sandstones.
- Recent wood harvesting has been significant in the Parlee Brook watershed, impacting large tracts of forest in the central and southern portions of the surveyed area, as well as large areas

to the east. Mature forest remains quite extensive, however, particularly in areas of steeper topography. Dominant mature late-successional communities are varied and include the following: Sugar Maple (*Acer saccharum*) / Yellow Birch (*Betula alleghaniensis*) forest, Sugar Maple / Ironwood (*Ostrya virginiana*) / Yellow Birch forest, Yellow Birch / Sugar Maple / American Beech (*Fagus grandifolia*) / White Ash (*Fraxinus americana*) / Ironwood forest, Sugar Maple / Yellow Birch / Red Spruce (*Picea rubens*) / Eastern Hemlock (*Tsuga canadensis*) forest, Red Spruce / Eastern White Pine (*Pinus strobus*) forest, and Eastern Hemlock / Red Spruce / Eastern White Pine forest. Natural early- and mid-seral communities are in large part characterized by Balsam Fir (*Abies balsamea*), White Birch (*Betula papyrifera* var. *cordifolia*), Red Maple (*Acer rubrum*) and White Spruce (*Picea glauca*).

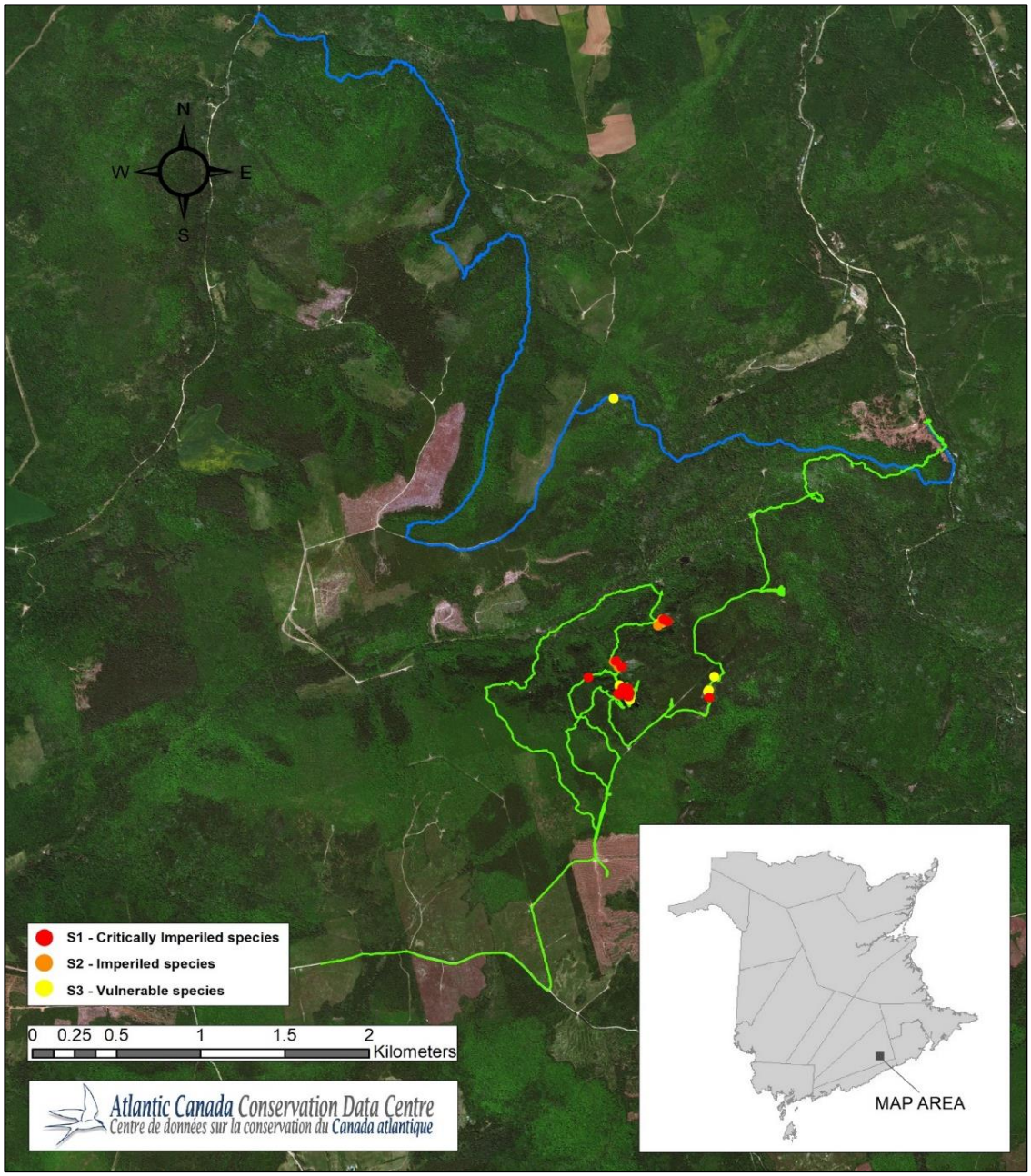

Figure 7. Survey coverage and rare species occurrences documented near Parlee Brook, Kings County, NB. Colored lines correspond to the GPS track files recorded during surveys by D.M. Mazerolle (green) and A.G. Belliveau (blue) on August 17th and September 7th 2017. Imagery from Bing Aerial Maps.

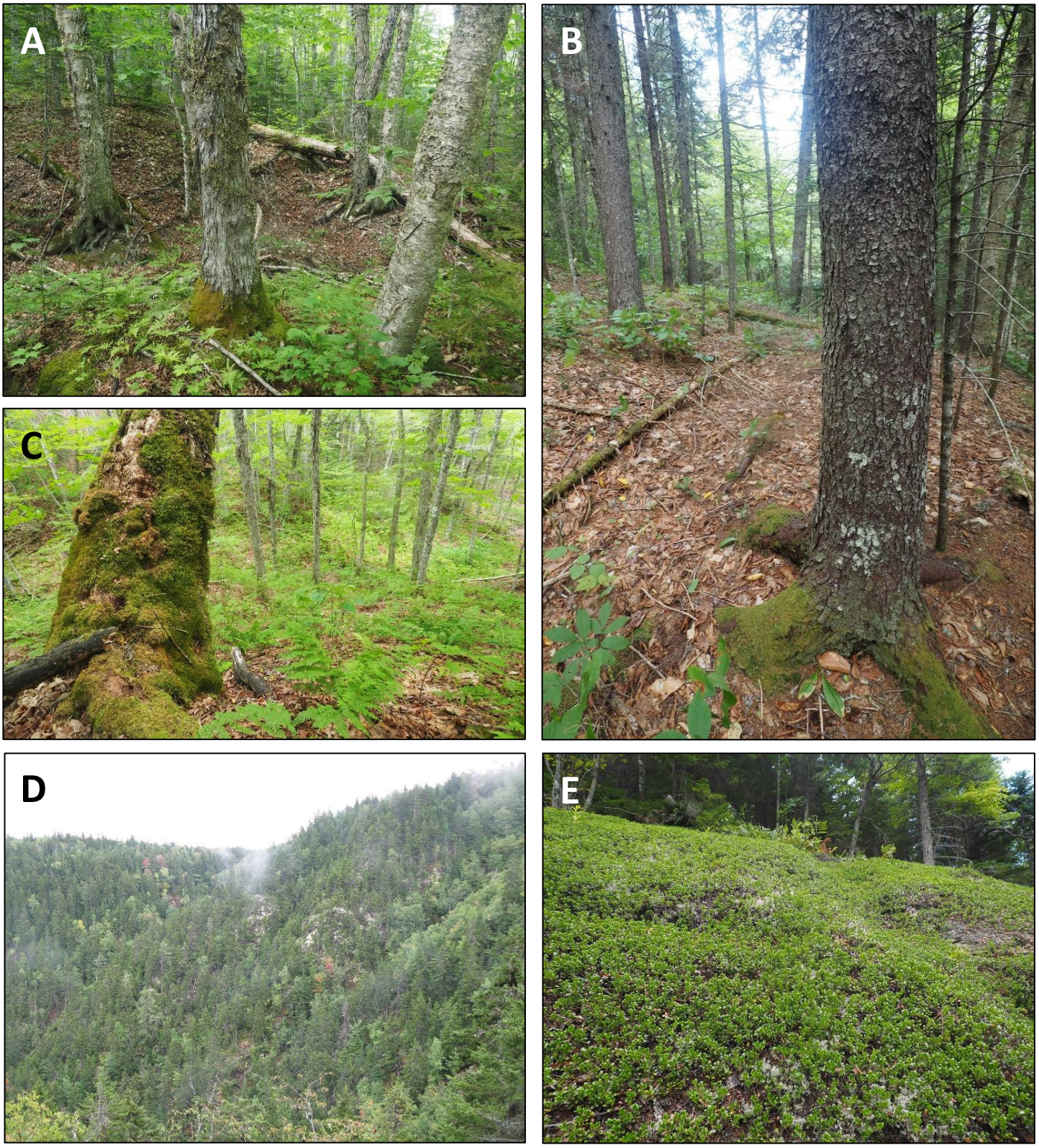

Figure 8. **Parlee Brook. (A)** Mature Sugar Maple (*Acer saccharum*) and Yellow Birch (*Betula alleghaniensis*) forest at top of steep valley slope. **(B)** Mature Red Spruce (*Picea rubens*) dominated forest at top of steep valley slope. **(C)** Mature to old Sugar Maple, Yellow Birch and Ironwood (*Ostrya virginiana*) forest with large old trees and snags. **(D)** Steep slope dominated by Red Spruce, White Spruce (*Picea glauca*) and Balsam Fir (*Abies balsamea*), with dry neutral to acidic bedrock outcrops. **(E)** Acidic Bearberry (*Arctostaphyllos uva-ursi*) and reindeer lichen (*Cladonia* spp.) community on thin soil over bedrock outcrop.

Figure 9. **Parlee Brook. (A)** Extensive calcareous conglomerate bedrock cliff faces, seen from a distance. **(B)** Dripping calcareous conglomerate bedrock cliff supporting calciphilic plant community. **(C)** White Mountain Saxifrage (*Saxifraga paniculata* ssp. *neogaea*; S1) growing on high-pH conglomerate bedrock exposure. **(D)** Senescing seed head of Scirpuslike Sedge (*Carex scirpoidea*; S1) growing on calcareous conglomerate bedrock face. Prior to this project, the species was thought to be possibly extirpated in NB. **(E)** Scirpuslike Sedge in fruit (picture taken along the Blair River in Nova Scotia). **(F)** Deeply incised calcareous conglomerate bedrock gorge supporting numerous calciphilic species of conservation concern, including Scirpuslike Sedge, White Mountain Saxifrage, Drummond's Rockcress (*Arabis drummondii*; S2) and Western Hairy Rockcress (*Arabis hirsuta* var. *pycnocarpa*; S3).

ANAGANCE

Survey date: September 5th 2017
Observer(s): D.M. Mazerolle
Survey track length: 5.6 km

Vascular Plant Diversity:

Total Spp. Richness	Native Spp. Richness	Exotic Spp. Richness	% Native	% Exotic	# of Rare Spp.
176	157	19	89	11	5

Rare Species Documented:

	SCIENTIFIC NAME	COMMON NAME	NB S-RANK	# OF LOCATIONS
VASCULAR PLANT	*Polygonum arifolium*	Halberd-leaved Tearthumb	S3	4
	Polygonum punctatum var. confertiflorum	Dotted Smartweed	S3	3
	Potamogeton obtusifolius	Blunt-leaved Pondweed	S3	1
	Ranunculus gmelinii	Gmelin's Water Buttercup	S3	2
BIRD	*Cathartes aura*	Turkey Vulture	S3B,S3M	1

Notable Features:

- Survey coverage at this site was focused on an area where the Anagance River, a small tributary of the Petitcodiac River in Kings County, flows through a wide area of flat low-lying topography which holds fairly extensive riparian and seepage wetlands. Efforts were focused on open wetlands and swamps, in the hopes that some would support rare calcareous plant communities.
- The area is underlain by late carboniferous sedimentary rocks of the Pictou Group, mainly composed of sandstones and siltstones. Based on vegetation indicators, most habitats observed here range from circumneutral to slightly alkaline. No strongly calcareous areas were observed, although species typical of calcareous wetlands were scattered throughout in seepage areas and marshy backwaters. The waters of the Anagance River may have a buffering effect in this area, neutralizing the alkalinity of groundwater seepage.
- Open marshy riparian meadows along this section of the Anagance River are moderately diverse and include various graminoid / forb / low shrub communities as well as graminoid-dominated communities characterized by Bluejoint Reed Grass (*Calamagrostis Canadensis*), Slender Sedge (*Carex lasiocarpa* var. *americana*), Tussock Sedge (*Carex stricta*), Inflated Sedge (*Carex vesicaria*) and Northern Beaked Sedge (*Carex utriculata*).
- The Anagance River floodplain includes extensive Speckled Alder (*Alnus incana* ssp. *rugosa*) and Speckled Alder / Winterberry (*Ilex verticillata*) tall shrub swamp, as well as a few areas of mature Red Maple / Speckled Alder / Balsam Fir / Gray Birch (*Betula populifolia*) swamp.
- All provincially rare plants at this site consist of wetland and aquatic plants, observed in shrubby seepage swamps and shallow backwater channels.
- Mesic and upland forests observed in the surveyed area include young regenerating forest, mature early-successional stands and fairly mature mid- to late-successional stands largely composed of Red Maple (*Acer rubrum*), Balsam Fir (*Abies balsamea*), White Spruce (*Picea glauca*) and Black Spruce (*Picea mariana*).

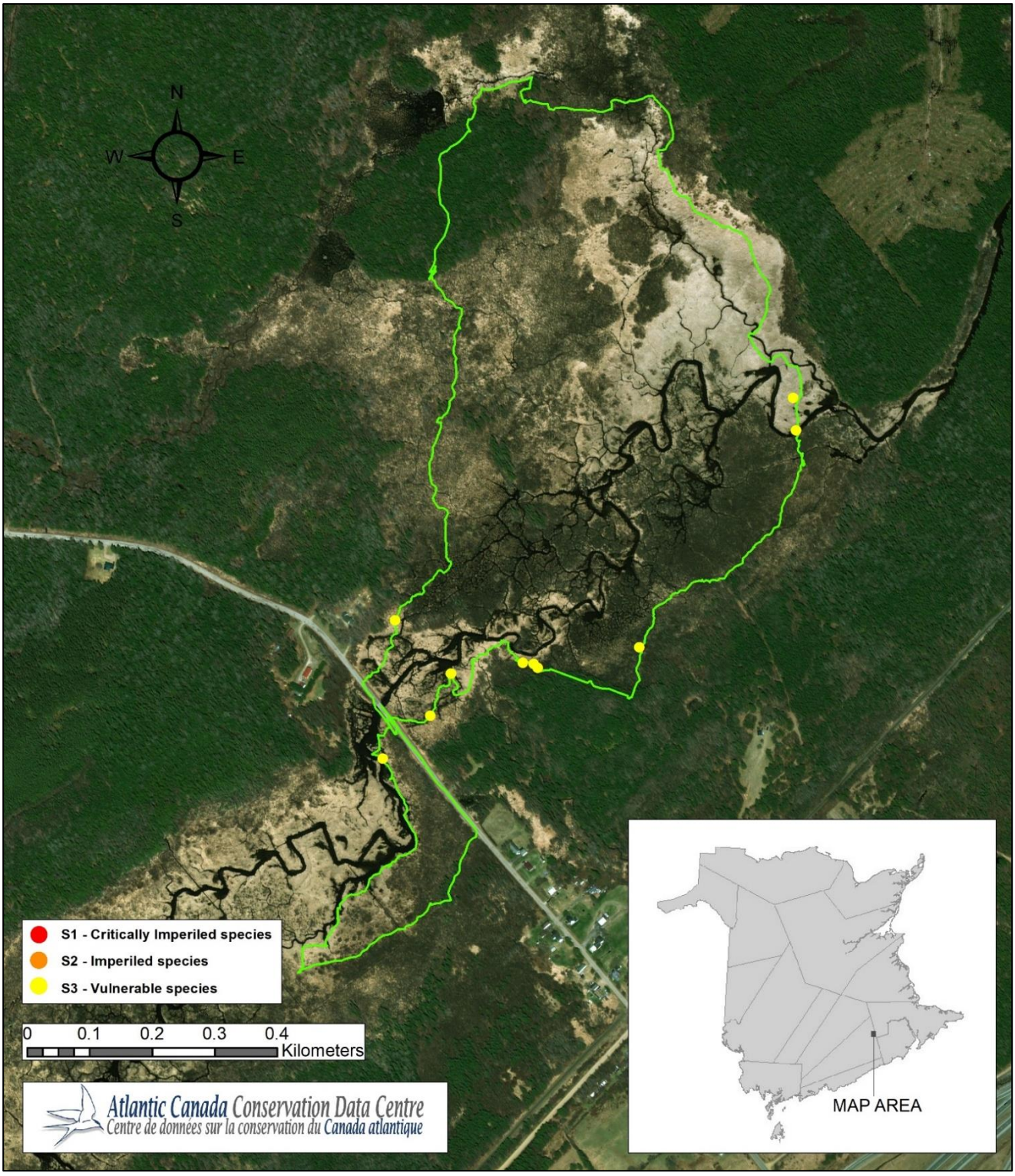

Figure 10. Survey coverage and rare species occurrences documented at Anagance, Kings County, NB. Green line corresponds to the GPS track file recorded during the survey by D.M. Mazerolle on September 5th 2017. Imagery from Bing Aerial Maps.

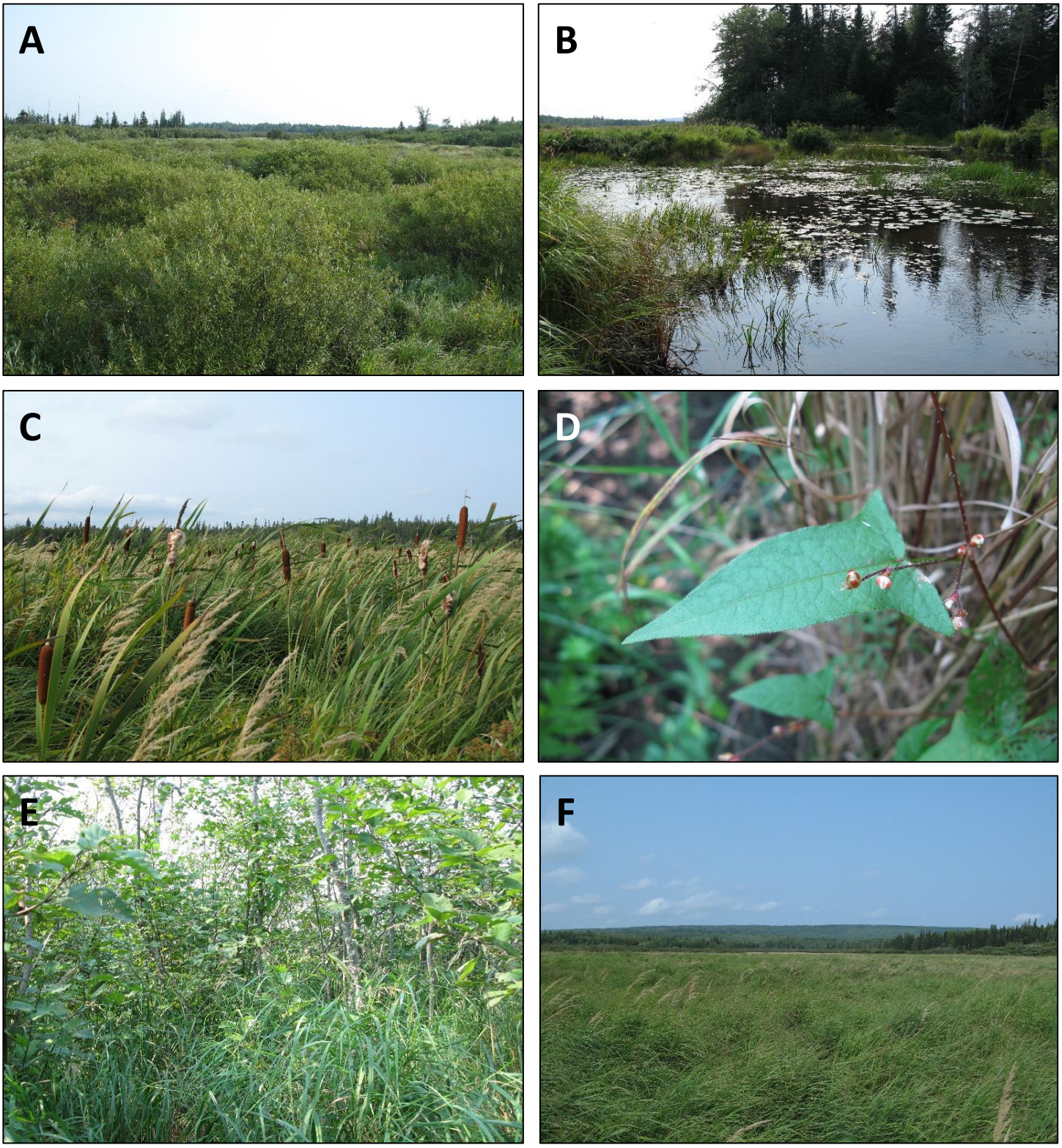

Figure 11. **Anagance. (A)** Meadow Willow (*Salix petiolaris*), Bluejoint Reed Grass (*Calamagrostis canadensis*), sedge (*Carex* sp.) and bulrush (*Scirpus* sp.) riparian marsh community. **(B)** Slow-flowing section of the Anagance River, with emergent marsh community, riparian marsh community and mixedwood swamp. **(C)** Broad-leaf Cattail (*Typha latifolia*) and Bluejoint Reed Grass riparian marsh. **(D)** Halberd-leaved Tearthumb (*Polygonum arifolium*; S3) in Speckled Alder (*Alnus incana* ssp. *rugosa*)-dominated tall shrub seepage swamp. **(E)** Red Maple (Acer rubrum), Speckled Alder and Bluejoint Reed Grass seepage swamp. **(F)** Extensive pure Bluejoint Reed Grass floodplain meadow, with Speckled Alder swamp and mesic mixedwood forest of Red Maple (*Acer rubrum*), Balsam Fir (*Abies balsamea*), White Spruce (*Picea glauca*) and Black Spruce (*Picea mariana*) visible in background.

NORTH RIVER

Survey date: July 19th and August 18th 2017
Observer(s): C.S. Blaney, D.M. Mazerolle and A.G. Belliveau
Survey track length: 28 km

Vascular Plant Diversity:

Total Spp. Richness	Native Spp. Richness	Exotic Spp. Richness	% Native	% Exotic	# of Rare Spp.
404	332	72	82	18	12

Rare Species Documented:

	SCIENTIFIC NAME	COMMON NAME	NB S-RANK	# OF LOCATIONS
VASCULAR PLANT	*Ceratophyllum echinatum*	Prickly Hornwort	S2S3	1
	Carex wiegandii	Wiegand's Sedge	S3	1
	Epilobium strictum	Downy Willow-Herb	S3	2
	Lemna trisulca	Star Duckweed	S3	3
	Potamogeton obtusifolius	Blunt-leaved Pondweed	S3	1
	Ranunculus gmelinii	Gmelin's Water Buttercup	S3	7
LICHEN	*Nephroma parile*	Powdery Kidney Lichen	S3S4	1
	Pseudocyphellaria perpetua	Gilded Specklebelly Lichen	S3S4	1
BIRD	*Loxia curvirostra*	Red Crossbill	S3	1
	Gallinago delicate	Wilson's Snipe	S3S4B,S5M	1
INVERT-EBRATE	*Danaus plexippus*	Monarch	S3B,S3M	1

Notable Features:

- Despite extensive conversion of forest land to agricultural uses and cumulative impacts of private woodlot wood harvesting, a sizeable portion of the riparian corridor along this 5 km-long section of the North River remains forested, although much of that forest is early-seral and recovering from partial wood harvest or clearcut.
- Forest along the river largely consists of coniferous or mixedwood seepage swamps and mixedwood floodplain swamps, most of which vary from circumneutral to slightly or moderately calcareous. These communities include Eastern White Cedar (*Thuja occidentalis*) swamp, Eastern White Cedar / Black Ash (*Fraxinus nigra*) / Balsam Fir (*Abies balsamea*) swamp, Red Maple (*Acer rubrum*) / Black Ash / American Elm (*Ulmus americana*) swamp, Balsam Poplar (*Populus balsamifera*) swamp, American Elm / Balsam Fir / White Spruce (*Picea glauca*) floodplain swamp, pure White Spruce floodplain swamp, and Red Maple / Black Ash / Black Cherry (*Prunus serotina*) floodplain swamp. The prevalence of Black Ash at this site is of particular significance, as the species is generally very scarce in southeastern New Brunswick. Black Ash stands observed along the North River collectively represent one of the largest southeastern occurrences of this species, which is currently being assessed by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) because of drastic declines due to the introduced beetle Emerald Ash Borer.

- In the western portion of the surveyed area, the wider river floodplain also includes open graminoid-dominated marshy meadows, tall shrub-dominated swamp, shallow backwater channels and vernal pools.
- The area is underlain by early Carboniferous non-marine sedimentary rocks of the Sussex group, which include salt deposits, as evidenced by localized salt springs observed in one area along the river. Though they don't contain species of conservation concern, halophyte plant communities found inland around saline upwellings could be considered provincially rare.
- Acidic wetland communities including Black Spruce (*Picea mariana*) swamp and partially treed Black Spruce / ericaceous shrub bog were also observed at the western end of the surveyed area.

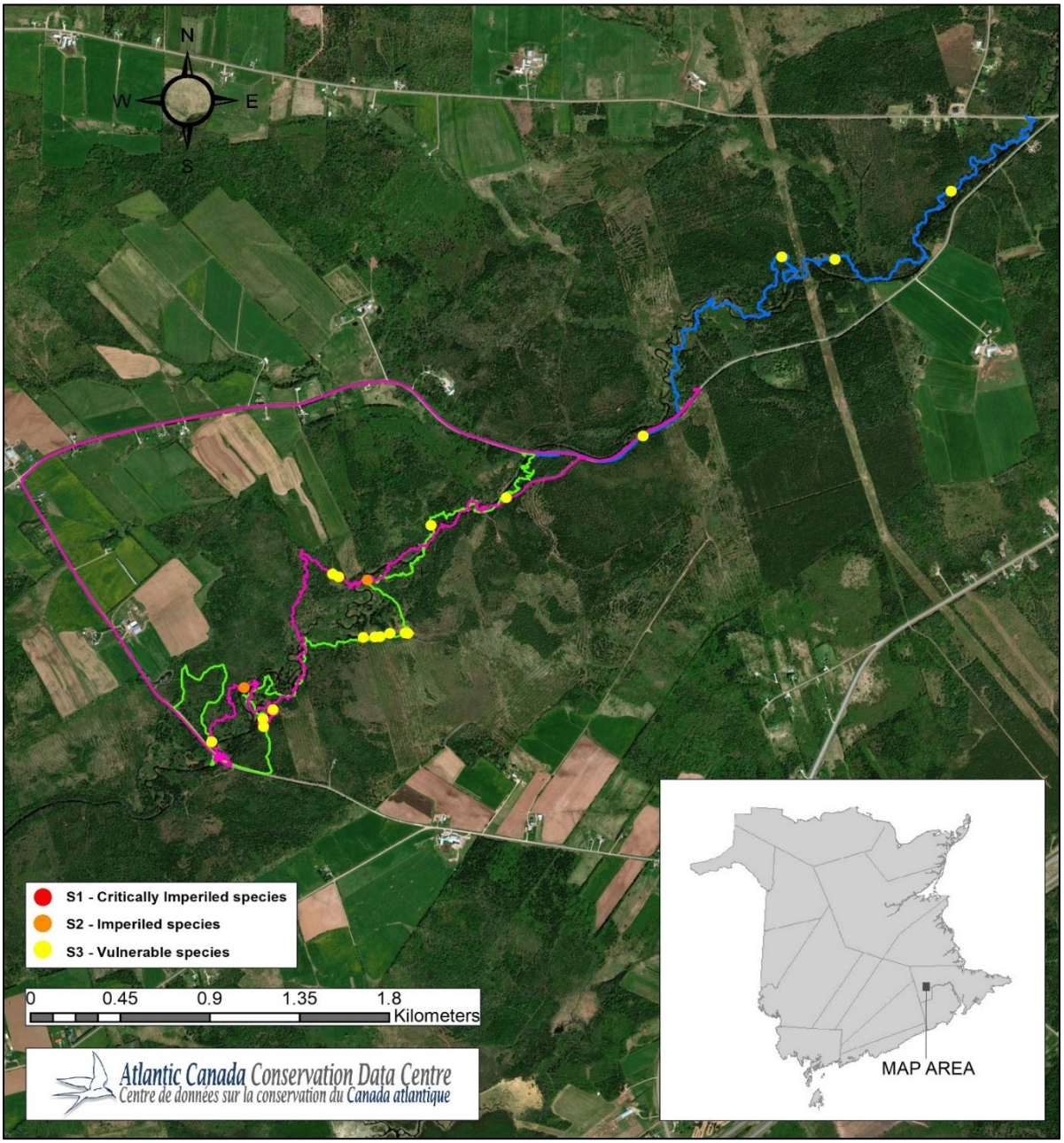

Figure 12. Survey coverage and rare species occurrences documented along the North River, Westmorland County, NB. Colored lines correspond to the GPS track files recorded during surveys by C.S. Blaney (pink), D.M. Mazerolle (green) and A.G. Belliveau (blue) on July 19th and August 18th 2017. Imagery from Bing Aerial Maps.

Figure 13. North River. (A) Moderately rich mature Eastern White Cedar (*Thuja occidentalis*) swamp with understory dominated by Woodland Horsetail (*Equisetum sylvaticum*). **(B)** Mature Black Ash (*Fraxinus nigra*), Balsam Fir (*Abies balsamea*) and Speckled Alder (*Alnus incana* ssp. *rugosa*) seepage swamp in river floodplain. **(C)** Coniferous and mixedwood floodplain forest, graminoid shoreline meadow, and shrubby floodplain thickets. **(D)** Rich Black Ash and Eastern White Cedar seepage swamp. **(E)** Rich Balsam Poplar (*Populus balsamifera*) floodplain swamp with understory of Ostrich Fern (*Matteuccia struthiopteris*), Wood Nettle (*Laportea canadensis*) and Sensitive Fern (*Onoclea sensibilis*). **(F)** Canada Lily (*Lilium canadense*) in full bloom growing in river floodplain.

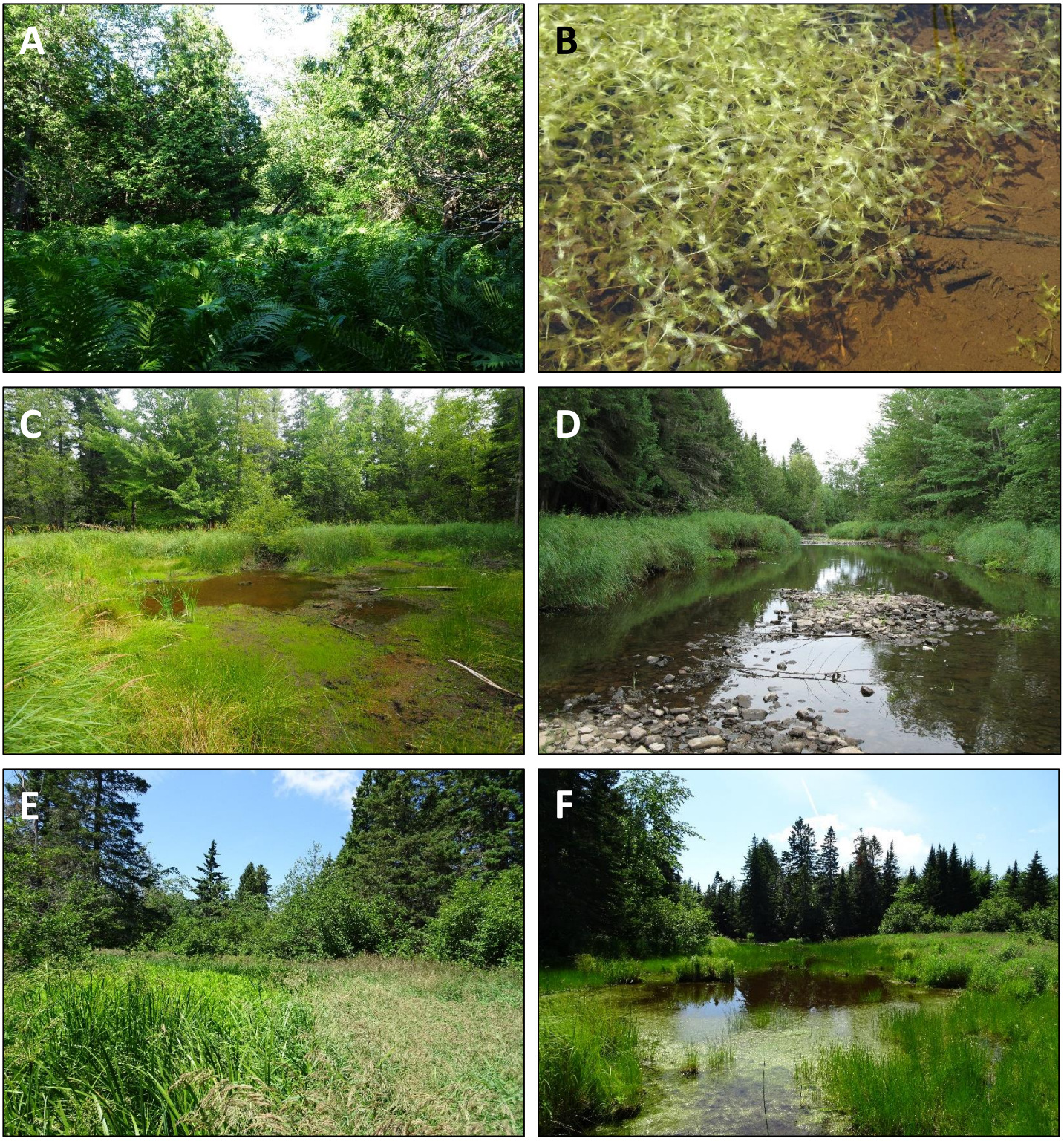

Figure 14. North River. (A) Eastern White Cedar (*Thuja occidentalis*) and Ostrich Fern (*Matteuccia struthiopteris*) floodplain swamp. **(B)** Star Duckweed (*Lemna trisulca*; S3) floating in muddy backwater. **(C)** Marshy graminoid meadow around vernal pool in river floodplain. **(D)** Cobble bars, Bluejoint Reed Grass (*Calamagrostis canadensis*)-dominated river banks, and mixedwood riparian forest. **(E)** Bluejoint Reed Grass, Common Wooly Bulrush (*Scirpus cyperinus*), American Sweetflag (*Acorus americanus*) oxbow marsh. **(F)** Oxbow pond and peripheral marsh in river floodplain.

PETITCODIAC RIVER

Survey date: September 8th and 21st 2017
Observer(s): D.M. Mazerolle, A.G. Belliveau and C.S. Blaney
Survey track length: 28.8 km

Vascular Plant Diversity:

Total Spp. Richness	Native Spp. Richness	Exotic Spp. Richness	% Native	% Exotic	# of Rare Spp.
474	361	113	76	24	18

Rare Species Documented:

	SCIENTIFIC NAME	COMMON NAME	NB S-RANK	# OF LOCATIONS
VASCULAR PLANT	*Allium tricoccum*	Wild Leek	S2	1
	Carex hirtifolia	Pubescent Sedge	S2	1
	Triosteum aurantiacum	Orange-fruited Tinker's Weed	S2	7
	Ceratophyllum echinatum	Prickly Hornwort	S2S3	1
	Rubus pensilvanicus	Pennsylvania Blackberry	S2S3	2
	Bromus latiglumis	Broad-Glumed Brome	S3	20
	Carex lupulina	Hop Sedge	S3	2
	Carex tuckermanii	Tuckerman's Sedge	S3	4
	Epilobium strictum	Downy Willow-Herb	S3	2
	Geranium bicknellii	Bicknell's Crane's-bill	S3	3
	Lemna trisulca	Star Duckweed	S3	1
	Penthorum sedoides	Ditch Stonecrop	S3	25
	Pilea pumila	Dwarf Clearweed	S3	11
	Polygonum scandens	Climbing False Buckwheat	S3	11
	Ranunculus gmelinii	Gmelin's Water Buttercup	S3	4
BIRD	*Hirundo rustica*	Barn Swallow	S3B,S3M	1

Notable Features:

- Four person days were devoted to the survey of four river sections ranging from 1.5 to 2.5 km in length as well as additional spot checks focused on riparian habitats and adjacent forest from Petitcodiac East to Salisbury in Westmorland County.
- This area is underlain by Pictou group non-marine sedimentary rock of the Salisbury formation, composed of mudstone, sandstone and conglomerates. Plant communities observed on exposed shoreline outcrops suggest that sandstones and mudstones along this section of river are calcareous.
- Despite significant loss of forest to agricultural uses and residential development, roughly half of the waterfront land in surveyed areas remains forested. Recent wood harvesting has been extensive, however, and a considerable portion of the standing forest is mid-seral and recovering from past disturbance. Most of the richer floodplain terraces, which would once have been dominated by hardwood forest, have been lost to agriculture.
- The most noteworthy communities in this area consist of remnant stands of rich hardwood floodplain forest, which vary from narrow bands relegated to the edge of agricultural fields to larger and less disturbed stands most often found on floodplain islands and where backwater

channels are found. Mature floodplain communities include Silver Maple (*Acer saccharinum*) forest, Silver Maple / White Spruce (*Picea glauca*), Sugar Maple (*Acer saccharum*) / Yellow Birch (*Betula alleghaniensis*) / Red Oak (*Quercus rubra*) forest, Black Cherry (*Prunus serotina*) forest, Black Cherry / Red Maple (*Acer rubrum*) forest, American Elm (*Ulmus americana*) / Black Cherry forest and Red Maple / Trembling Aspen (*Populus tremuloides*) / Balsam Fir (*Abies balsamea*), as well as coniferous forest of White Spruce and Balsam Fir. Most provincially rare plant species documented along the Petitcodiac River, including all Imperiled species, were found in these rich floodplain habitats.

- Fairly rich shrubby floodplain communities dominated by Speckled Alder (*Alnus incana* ssp. *rugosa*), Chokecherry (*Prunus virginiana*) and Hawthorn (*Crataegus* sp.) are also common throughout, as are graminoid and forb floodplain meadows.
- Floodplain terraces and backwaters along the river include numerous vernal pools, which represent valuable habitat for amphibians.
- The Petitcodiac River valley is of regional significance in terms of biodiversity. Many species documented at this site had never before been reported in Westmorland County, including the provincially rare Orange-fruited Tinker's Weed (*Triosteum aurantiacum*; S2), Hop Sedge (*Carex lupulina*; S3), Dwarf Clearweed (*Pilea pumila*; S3), Climbing False Buckwheat (*Polygonum scandens*; S3) and Ditch Stonecrop (*Penthorum sedoides*; S3), as well as several non-rare species. Many of these species are also not known to be present in adjacent counties to the south (Albert County) and north (Kent County).
- Due to their close proximity (20-30 km) to the Greater Moncton area, habitats found along this section of the Petitcodiac River are under much greater threat than those in other sites surveyed through this project, as encroachment from residential development will certainly increase significantly over coming decades.

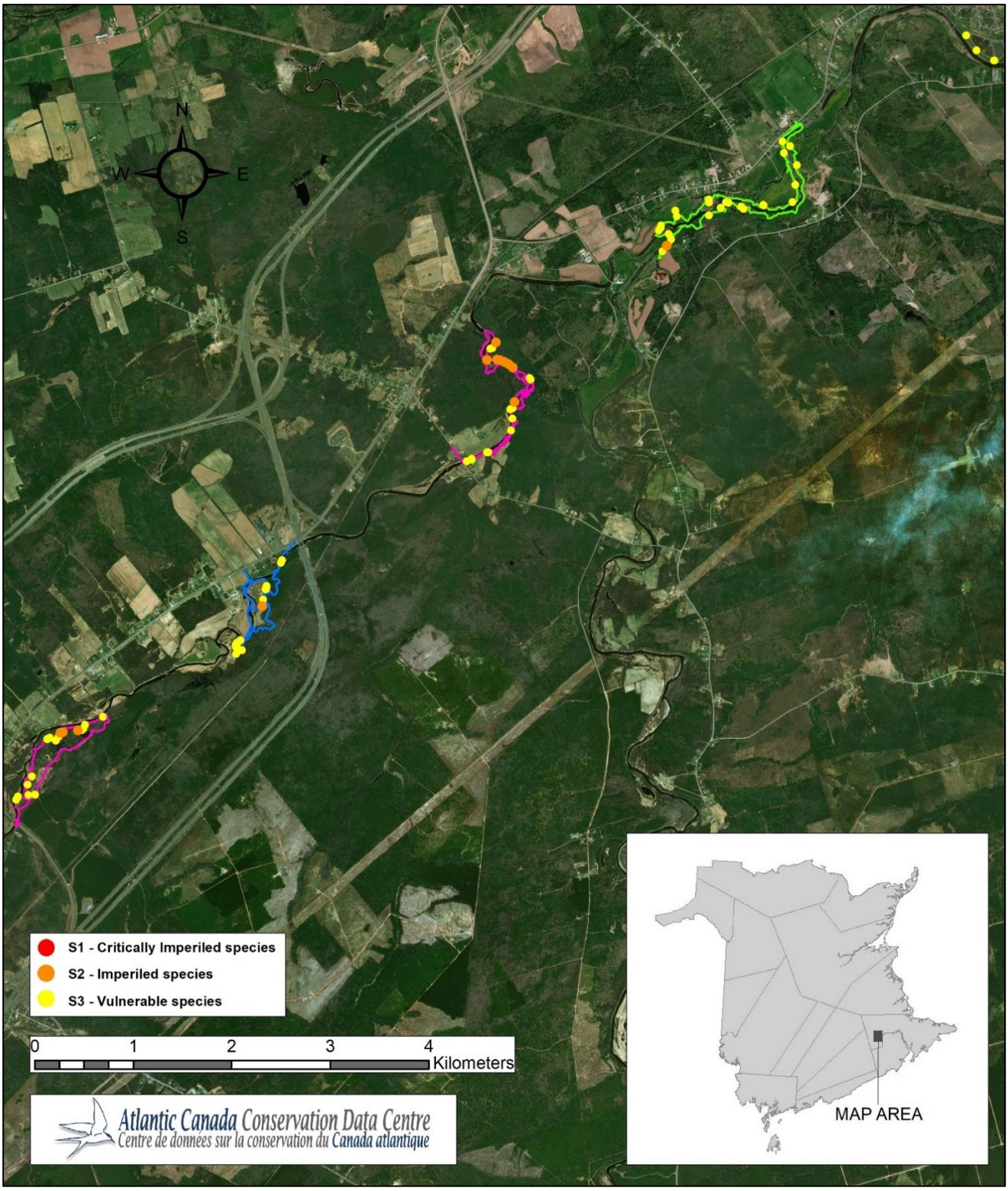

Figure 15. Survey coverage and rare species occurrences documented along the Petitcodiac River, Westmorland County, NB. Colored lines correspond to the GPS track files recorded during surveys by C.S. Blaney (pink), D.M. Mazerolle (green) and A.G. Belliveau (blue) on July 19th and September 8th and 21st 2017. Imagery from Bing Aerial Maps.

Figure 16. Petitcodiac River. (A) Mature stand of Silver Maple (*Acer saccharinum*) floodplain forest. **(B)** Shoreline bedrock outcrops, graminoid-dominated shoreline meadows and stands of hardwood floodplain forest. **(C)** Pubescent Sedge (*Carex hirtifolia*; S2) growing in understory of rich floodplain terrace dominated by Black Cherry (*Prunus serotina*) and Red Maple (*Acer rubrum*). **(D)** Mature fruit of Orange-fruited Tinker's Weed (*Triosteum aurantiacum*; S2) in rich floodplain forest. **(E)** Broad-glumed Brome (*Bromus latiglumis*; S3) on river bank.

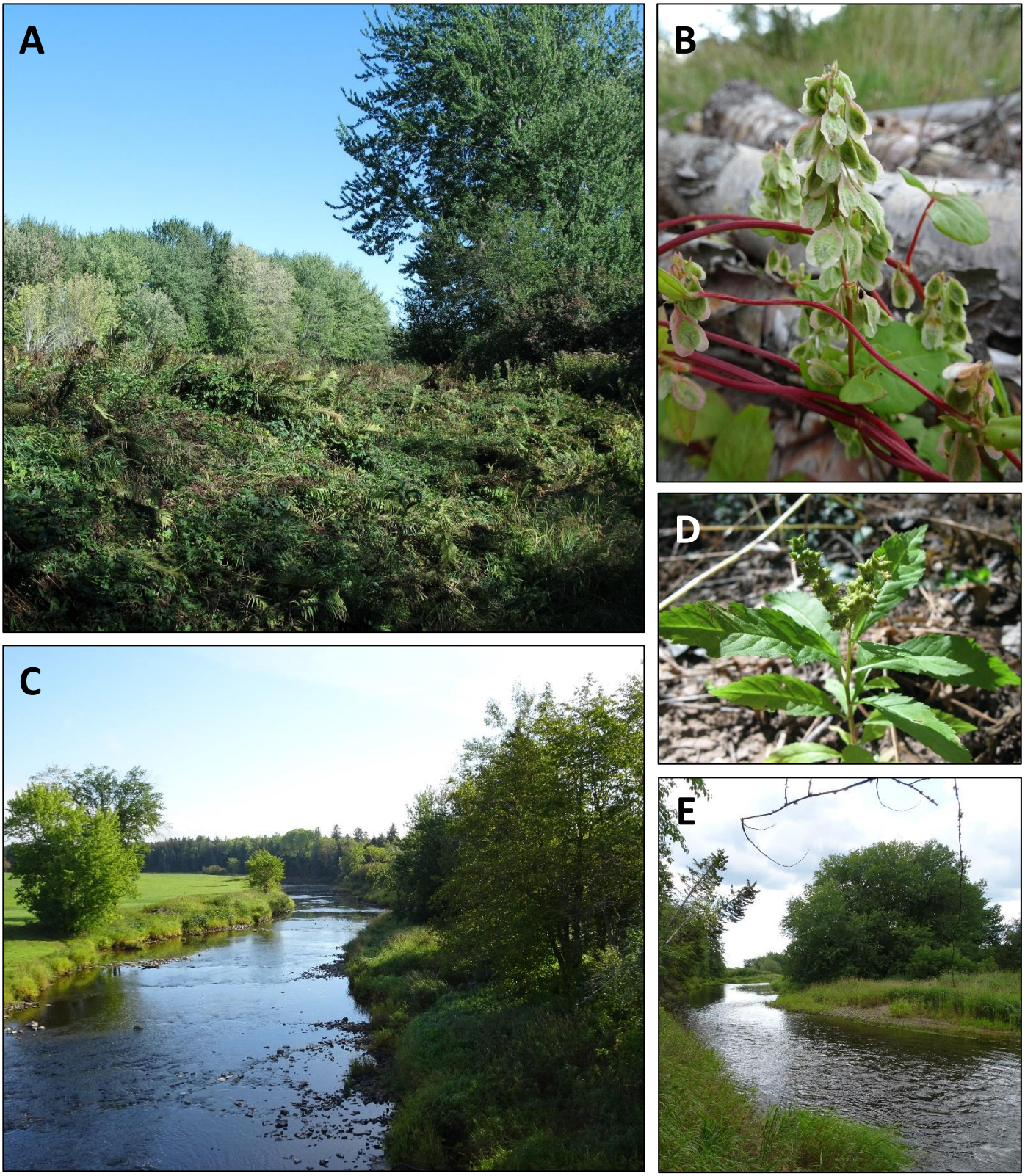

Figure 17. Petitcodiac River. (A) Rich slope at the margin of a floodplain backwater and vernal pool, in an opening among stands of mature hardwood forest dominated by Silver Maple (*Acer saccharinum*). **(B)** Climbing False Buckwheat (*Polygonum scandens*; S3) growing on a woodpile in the river floodplain. The species was also observed in several undisturbed riparian habitats. **(C)** Extensive agricultural field in river floodplain, graminoid shoreline meadows (locally weedy) and riparian mixedwood forest. **(D)** Ditch Stonecrop (*Penthorum sedoides*; S3) in fruit, growing at the margin of a dried-up vernal pool in Silver Maple floodplain forest. **(E)** Cobble shore, graminoid floodplain meadows and mature Silver Maple stand. Tall shrub-dominated floodplain is also visible in the distance.

SWEET MOUNTAIN

Survey date: July 21st 2017
Observer(s): C.S. Blaney and J.R. Breau
Survey track length: 11.3 km

Vascular Plant Diversity:

Total Spp. Richness	Native Spp. Richness	Exotic Spp. Richness	% Native	% Exotic	# of Rare Spp.
237	187	50	79	21	4

Rare Species Documented:

	SCIENTIFIC NAME	COMMON NAME	NB S-RANK	# OF LOCATIONS
VASCULAR PLANT	*Pilea pumila*	Dwarf Clearweed	S3	1
	Corallorhiza maculata	Spotted Coral-Root	S3S4	1
BIRD	*Petrochelidon pyrrhonota*	Cliff Swallow	S2S3B,S2S3M	1
	Hirundo rustica	Barn Swallow	S3B,S3M	1

Notable Features:

- The site is an exceptionally intact area of forest on a steep-sided, flat-topped hill (Sweet Mountain) that rises 215 m above the Prosser Brook valley. This small area straddles several types of bedrock, including Point Wolfe River Pluton felsic volcanic rock, Horton group non-marine sedimentary rock and Windsor group sedimentary rock, all of which may include alkaline components. Our fieldwork covered the southeast corner of the hill and crossed over four deeply incised stream ravines.
- Rare species diversity was low, but forest quality was high, with no evidence of recent forestry in the portion covered. Forests were in intermediate to mature age classes on the flat hill plateau and included some mature to very old stands on the steeper slopes and ravines.
- Bedrock is extensively exposed on the south-facing side. In areas near the slope crest, open, dry forest dominated by White Pine (*Pinus strobus*) – Jack Pine (*Pinus banksiana*) – Red Pine (*Pinus resinosa*) communities grades into open Bearberry (*Arctostaphylos uva-ursi*) – Lowbush Blueberry (*Vaccinium angustifolium*) – Cladonia lichen (*Cladonia* spp.) communities on bedrock. These are uncommon communities in southeast New Brunswick, and the province as a whole, but no provincially rare plant species were found within them.
- The stream ravines have extensive groundwater seepage and the richest soils on site. These areas support high quality, mature to old growth Sugar Maple – White Ash – Yellow Birch – Beech – Ironwood (+ sometimes including Hemlock) forest communities with diverse ground flora. Silvery Spleenwort (*Deparia acrostichoides*), a fern strongly indicative of rich, calcareous soils, is often dominant. Dwarf Clearweed (*Pilea pumila*, S3), not known in Albert County before this project occurred on one seepy stream ravine slope and cliff.
- A new fern hybrid for New Brunswick (*Dryopteris intermedia* x *marginalis*) was also present in one rich hardwood ravine slope.

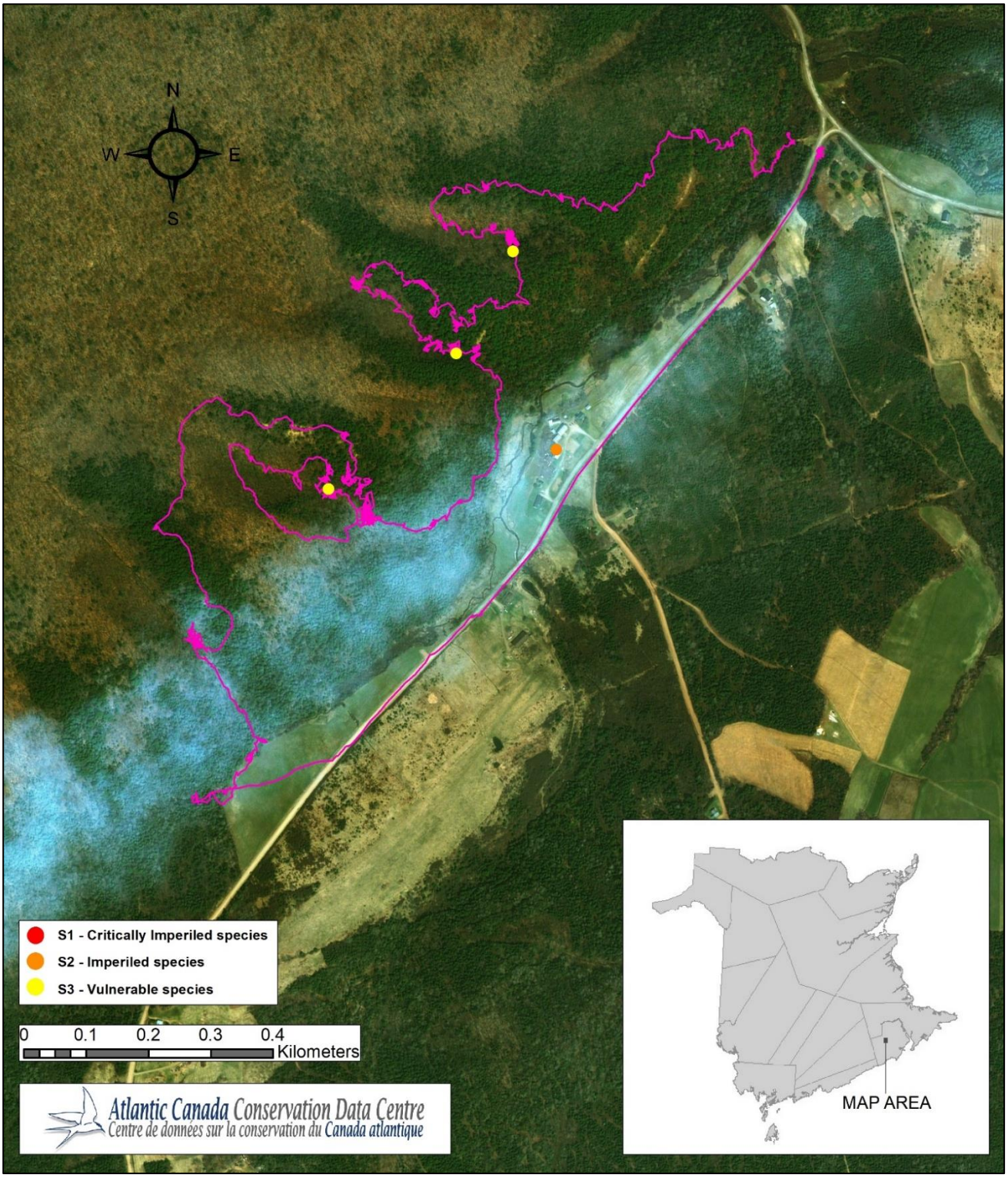

Figure 18. Survey coverage and rare species occurrences documented at Sweet Mountain, Westmorland County, NB. Pink line corresponds to the GPS track file recorded during the survey by C.S. Blaney on July 21st 2017. Imagery from Bing Aerial Maps.

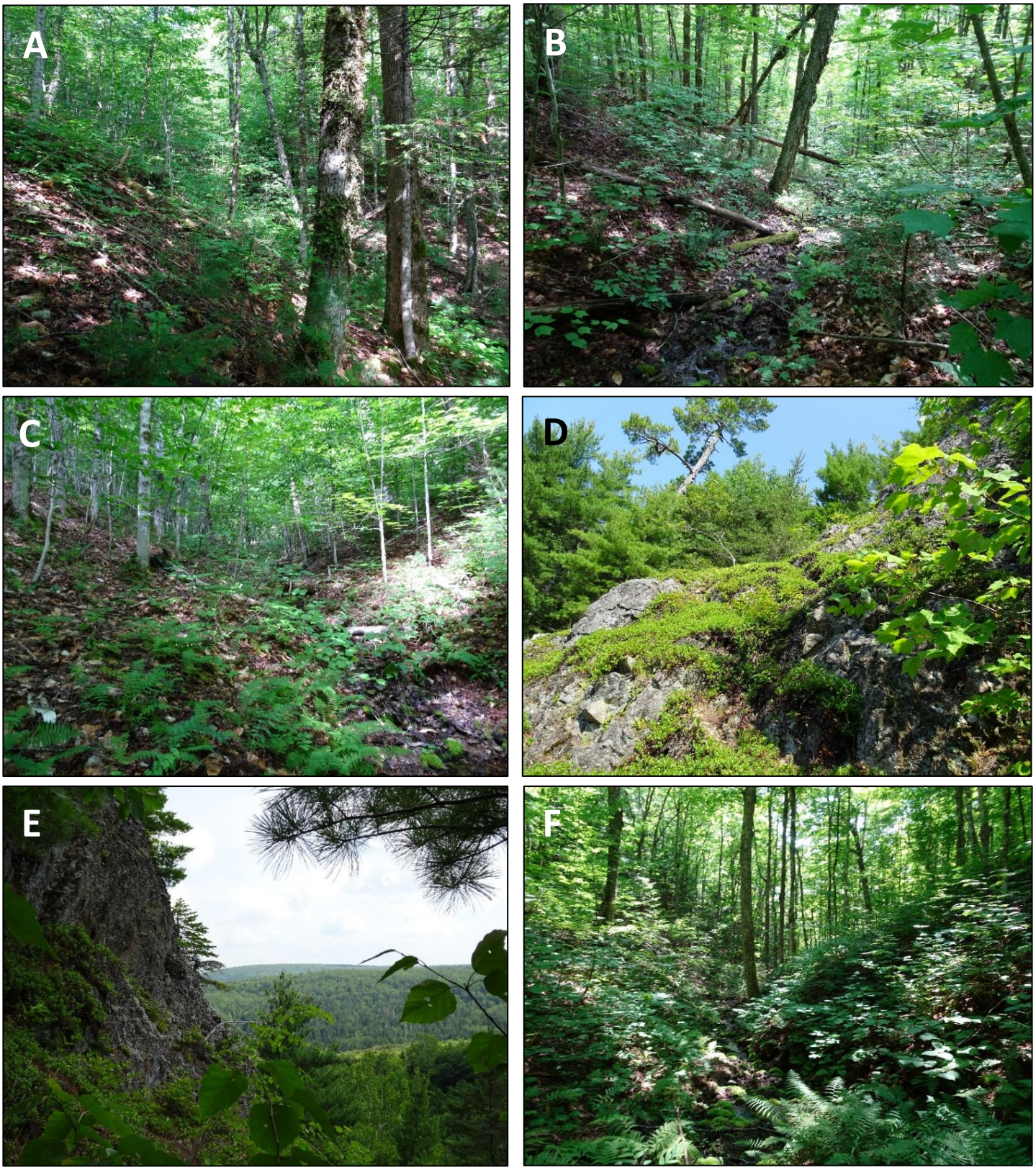

Figure 19. Sweet Mountain. (A) Rich ravine with mature Sugar Maple (*Acer saccharum*), Yellow Birch (*Betula alleghaniensis*), and White Ash *(Fraxinus americana*) forest. **(B)** Rich ravine with seepage area in Sugar Maple (*Acer saccharum*) and Yellow Birch (*Betula alleghaniensis*) forest. **(C)** Rich Sugar Maple (*Acer saccharum*) ravine with seepage gulley. **(D)** Open rock outcrop on steep slope dominated by Common Bearberry (*Arctotaphylos uva-ursi*). **(E)** Open cliff face, with outcrop community dominated by Common Bearberry (*Arctostaphylos uva-ursi*). **(F)** Mature Sugar Maple (*Acer saccharum*) and Yellow Birch (*Betula alleghaniensis*) forest at bottom of ravine.

CONTRIBUTIONS OF THE PROJECT

This project was highly successful in documenting a large number of rare species locations, and in documenting the diversity of vascular plants at seven sites in Kings, Westmorland and Albert counties. Our fieldwork resulted in the discovery of 250 location records for 53 different species of conservation concern (38 vascular plants, 6 macrolichens, 8 birds and 1 butterfly), including 55 location records for species presently considered to be Critically Imperiled or Imperiled.

Through precise documentation of provincially rare species and communities, the project has allowed for the fine-scale identification of several areas of conservation significance which represent potential future targets for protected area designation. The occurrence information collected has also made a significant contribution to our understanding of the status and distribution of many species and to our general knowledge of the flora of southeastern New Brunswick. Most notably, occurrence data gathered at our survey sites has produced numerous first county records representing provincially significant extensions of plant species' known ranges.

The occurrence data collected through this project has improved understanding of the true status of rare species and communities in the province as a whole, which will contribute toward focusing conservation action on species and areas most in need of protection.

All data collected has been permanently documented via incorporation into the AC CDC's GIS-linked database, where it will be made available for provincial agencies and land conservation organizations, and will be provided in response to any area- or species-specific data request.

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New Brunswick Department of Energy and Resource Development (NB DERD). 2018. New Brunswick Bedrock Lexicon. [http://dnr-mrn.gnb.ca/Lexicon/Lexicon/Lexicon_Search.aspx]

ACKNOWLEDGEMENTS

This project was fully funded by the New Brunswick Wildlife Trust Fund and Environment Canada's Atlantic Ecosystems Initiative fund. The AC CDC appreciates the opportunity to have conducted fieldwork along these biologically interesting northwestern New Brunswick river systems.

APPENDIX 1. NatureServe status rank definitions

(Source: http://www.natureserve.org/conservation-tools/conservation-status-assessment)

Global Rank	National Rank	Provincial Rank	DEFINITION
GX	NX	SX	**Presumed Extinct** (G-rank) / **Extirpated** (N- and S-ranks) — Species or ecosystem not located despite intensive searches and virtually no likelihood of rediscovery.
GH	NH	SH	**Possibly Extinct** (G-rank) / **Extirpated** (N- and S-ranks) — Known from only historical occurrences but still some hope of rediscovery. There is evidence that the species may be extinct or the ecosystem may be eliminated throughout its range, but not enough to state this with certainty.
G1	N1	S1	**Critically Imperiled** — At very high risk of extinction (G-rank) / extirpation (N- and S-ranks) due to extreme rarity (often 5 or fewer populations), very steep declines, or other factors.
G2	N2	S2	**Imperiled** — At high risk of extinction (G-rank) / extirpation (N- and S-ranks) due to very restricted range, very few populations, steep declines, or other factors.
G3	N3	S3	**Vulnerable** — At moderate risk of extinction (G-rank) / extirpation (N- and S-ranks) due to a restricted range, relatively few populations, recent and widespread declines, or other factors.
G4	N4	S4	**Apparently Secure** — Uncommon but not rare; some cause for long-term concern due to declines or other factors.
G5	N5	S5	**Secure** — Common; widespread and abundant.

APPENDIX 2. Full list of vascular plants documented during surveys, with provincial status ranks (S-rank, see Appendix 1 for definitions) and abundance at each survey site (c = common, fc = fairly common to common, f = fairly common, l = locally common, u = uncommon, rl = rare overall but locally common, ru = rare to uncommon, r = rare; a dot indicates that the species was recorded but abundance was not noted).

SCIENTIFIC NAME	COMMON NAME	FAMILY	NB S-RANK	SURVEY SITE						
				Hammond R.	Hampton	Parlee Bk.	Anagance	North R.	Petitcodiac R.	Sweet Mtn.
Huperzia lucidula	Shining Firmoss	Lycopodiaceae	S5			u				
Lycopodium annotinum	Bristly Club-Moss	Lycopodiaceae	S5			r		r		f
Lycopodium clavatum	Running Clubmoss	Lycopodiaceae	S5			r				
Lycopodium complanatum	Northern Clubmoss	Lycopodiaceae	S4S5							r
Lycopodium dendroideum	Round-branched Tree-clubmoss	Lycopodiaceae	S5			f	r	r		f
Lycopodium digitatum	Southern Clubmoss	Lycopodiaceae	S5			r		r		
Lycopodium hickeyi	Hickey's Tree-clubmoss	Lycopodiaceae	S4			r			r	
Lycopodium obscurum	Flat-branched Tree-clubmoss	Lycopodiaceae	S5							r
Isoetes echinospora	Spiny-Spored Quillwort	Isoetaceae	S5	ru						
Equisetum arvense	Field Horsetail	Equisetaceae	S5	c	f	f		c	c	
Equisetum fluviatile	Water Horsetail	Equisetaceae	S5	c	c		f	c	c	
Equisetum hyemale var. affine	Common Scouring-rush	Equisetaceae	S4			r				
Equisetum pratense	Meadow Horsetail	Equisetaceae	S4	r						
Equisetum sylvaticum	Woodland Horsetail	Equisetaceae	S5			u	f	c	f	u
Osmunda cinnamomea	Cinnamon Fern	Osmundaceae	S5		r		u	c	c	
Osmunda claytoniana	Interrupted Fern	Osmundaceae	S5		f	c	l	c	c	
Osmunda regalis var. spectabilis	Royal Fern	Osmundaceae	S5		f			u	r	
Polypodium appalachianum	Appalachian Polypody	Polypodiaceae	S3			r				
Polypodium virginianum	Rock Polypody	Polypodiaceae	S5		u	l				r
Polypodium x *incognitum*	hybrid polypody fern	Polypodiaceae	SNA			r				
Dennstaedtia punctilobula	Eastern Hay-Scented Fern	Dennstaedtiaceae	S5		c	l		r		
Pteridium aquilinum var. latiusculum	Bracken Fern	Dennstaedtiaceae	S5		f	c	c	c	f	c
Asplenium trichomanes	Maidenhair Spleenwort	Aspleniaceae	S2			r				
Phegopteris connectilis	Northern Beech Fern	Thelypteridaceae	S5		u	c		u	r	f
Thelypteris noveboracensis	New York Fern	Thelypteridaceae	S5	r		f		l	r	
Thelypteris palustris var. pubescens	Eastern Marsh Fern	Thelypteridaceae	S5		uf		u	c	r	
Athyrium filix-femina ssp. angustum	Common Lady Fern	Dryopteridaceae	S5	c	u	c	r	c	c	c
Cystopteris bulbifera	Bulblet Bladder Fern	Dryopteridaceae	S4			r				
Cystopteris fragilis	Fragile Fern	Dryopteridaceae	S4			r				
Cystopteris tenuis	A Bladderfern	Dryopteridaceae	S4			u				f
Deparia acrostichoides	Silvery Glade Fern	Dryopteridaceae	S4			l				c
Dryopteris campyloptera	Mountain Wood Fern	Dryopteridaceae	S5			c				
Dryopteris carthusiana	Spinulose Wood Fern	Dryopteridaceae	S5		c		u	c	c	
Dryopteris cristata	Crested Wood Fern	Dryopteridaceae	S5			u	f	f	f	
Dryopteris intermedia	Evergreen Wood Fern	Dryopteridaceae	S5	rl	uf	c	r	c	c	c

SCIENTIFIC NAME	COMMON NAME	FAMILY	NB S-RANK	SURVEY SITE						
				Hammond R.	Hampton	Parlee Bk.	Anagance	North R.	Petitcodiac R.	Sweet Mtn.
Dryopteris intermedia x *marginalis*	A Hybrid Woodfern	Dryopteridaceae	SNA							r
Dryopteris marginalis	Marginal Wood Fern	Dryopteridaceae	S5		r	c			r	c
Dryopteris x *boottii*	A Hybrid Wood-fern	Dryopteridaceae	SNA				r			
Gymnocarpium dryopteris	Common Oak Fern	Dryopteridaceae	S5		u	c		c	f	u
Matteuccia struthiopteris	Ostrich Fern	Dryopteridaceae	S5	c	l	l	r	c	c	c
Onoclea sensibilis	Sensitive Fern	Dryopteridaceae	S5	c	c	c	c	c	c	
Polystichum acrostichoides	Christmas Fern	Dryopteridaceae	S5			c				c
Polystichum braunii	Braun's Holly Fern	Dryopteridaceae	S4			ru				
Woodsia ilvensis	Rusty Cliff Fern	Dryopteridaceae	S4		u	l				c
Taxus canadensis	Canada Yew	Taxaceae	S5			r			u	
Abies balsamea	Balsam Fir	Pinaceae	S5		c	c	c	c	c	
Larix laricina	Tamarack	Pinaceae	S5				l	r	u	
Picea glauca	White Spruce	Pinaceae	S5		f	fc	c	c	c	rl
Picea mariana	Black Spruce	Pinaceae	S5			l	l	c	f	
Picea rubens	Red Spruce	Pinaceae	S5		c	c				c
Pinus banksiana	Jack Pine	Pinaceae	S5					l	u	c
Pinus resinosa	Red Pine	Pinaceae	S4		r	r				
Pinus strobus	Eastern White Pine	Pinaceae	S5	r		c		r	u	c
Tsuga canadensis	Eastern Hemlock	Pinaceae	S5			c			r	c
Juniperus communis	Common Juniper	Cupressaceae	S5			r			r	
Thuja occidentalis	Eastern White Cedar	Cupressaceae	S5	l	c	r		c		
Nuphar lutea ssp. variegata	Variegated Pond-lily	Nymphaeaceae	S5	f	uf		c	u	c	
Nymphaea odorata	Fragrant Water-lily	Nymphaeaceae	S5	r	r					
Ceratophyllum demersum	Common Hornwort	Ceratophyllaceae	S4		r					
Ceratophyllum echinatum	Prickly Hornwort	Ceratophyllaceae	S2S3					r	r	
Actaea pachypoda	White Baneberry	Ranunculaceae	S4			r				c
Actaea rubra	Red Baneberry	Ranunculaceae	S5			u		c	r	r
Anemone quinquefolia	Wood Anemone	Ranunculaceae	S4						r	
Aquilegia vulgaris	European Columbine	Ranunculaceae	SNA			r				
Clematis virginiana	Virginia Clematis	Ranunculaceae	S5		f			c	c	
Coptis trifolia	Goldthread	Ranunculaceae	S5				l	u	u	
Ranunculus abortivus	Kidney-Leaved Buttercup	Ranunculaceae	S5		r	r		f		f
Ranunculus acris	Common Buttercup	Ranunculaceae	SNA		l	u	fc	f		r
Ranunculus aquatilis	White Water Buttercup	Ranunculaceae	SNA					l	c	
Ranunculus cymbalaria	Seaside Buttercup	Ranunculaceae	S4					l		
Ranunculus flammula var. filiformis	Lesser Spearwort	Ranunculaceae	S5	r				r	f	

SCIENTIFIC NAME	COMMON NAME	FAMILY	NB S-RANK	SURVEY SITE						
				Hammond R.	Hampton	Parlee Bk.	Anagance	North R.	Petitcodiac R.	Sweet Mtn.
Ranunculus gmelinii	Gmelin's Water Buttercup	Ranunculaceae	S3				r	r	l	
Ranunculus hispidus var. caricetorum	Hispid Buttercup	Ranunculaceae	S4S5					u	r	
Ranunculus recurvatus	Hooked Buttercup	Ranunculaceae	S4			r				r
Ranunculus repens	Creeping Buttercup	Ranunculaceae	SNA	u	f	c		c	c	c
Ranunculus trichophyllus	Northeastern White Water-Crowfoot	Ranunculaceae	S4S5					c	f	
Thalictrum pubescens	Tall Meadow-Rue	Ranunculaceae	S5	u	c	f	c	c	c	u
Corydalis sempervirens	Pale Corydalis	Fumariaceae	S4S5							r
Ulmus americana	White Elm	Ulmaceae	S4	c	c	u		c	c	f
Cannabis sativa	Hemp	Cannabaceae	SNA					r	r	
Laportea canadensis	Canada Wood Nettle	Urticaceae	S5	c	c	r		c	c	
Pilea pumila	Dwarf Clearweed	Urticaceae	S3		r	r			f	r
Urtica dioica ssp. gracilis	American Stinging Nettle	Urticaceae	S4		f			f	c	
Comptonia peregrina	Sweet-fern	Myricaceae	S5					f	r	r
Myrica gale	Sweet Gale	Myricaceae	S5	u	u		c	f	c	
Fagus grandifolia	American Beech	Fagaceae	S4	l		c				c
Quercus rubra	Northern Red Oak	Fagaceae	S5	r	f	uf	r		c	u
Alnus incana ssp. rugosa	Speckled Alder	Betulaceae	S5	c	c	c	c	c	c	f
Alnus viridis ssp. crispa	Green Alder	Betulaceae	S5			f				r
Betula alleghaniensis	Yellow Birch	Betulaceae	S5		c	c			l	c
Betula papyrifera var. cordifolia	Heart-leaved Birch	Betulaceae	S5			c				
Betula papyrifera var. papyrifera	Heart-leaved Birch	Betulaceae	S5	r	f	c	c	c	c	
Betula populifolia	Gray Birch	Betulaceae	S5		u	rl	c	c	c	r
Corylus cornuta	Beaked Hazel	Betulaceae	S5			c		f	c	c
Ostrya virginiana	Ironwood	Betulaceae	S4S5			c			f	c
Atriplex patula	Spreading Orache	Chenopodiaceae	SNA						r	
Atriplex prostrata	Thin-leaved Orache	Chenopodiaceae	S5					r	r	
Atriplex sp.	A Saltbush	Chenopodiaceae	-					r	c	
Chenopodium album	Common Lamb's Quarters	Chenopodiaceae	SNA					r	l	
Chenopodium glaucum	Oak-Leaved Goosefoot	Chenopodiaceae	SNA					r	f	
Chenopodium polyspermum	Many-seeded Goosefoot	Chenopodiaceae	SNA		r					
Amaranthus retroflexus	Green Amaranth	Amaranthaceae	SNA						r	
Cerastium arvense ssp. strictum	Mouse-ear Chickweed	Caryophyllaceae	S4			r				
Cerastium fontanum ssp. vulgare	Common Chickweed	Caryophyllaceae	SNA			l			r	r
Moehringia lateriflora	Grove Sandwort	Caryophyllaceae	S5					r	r	
Sagina procumbens	Procumbent Pearlwort	Caryophyllaceae	S5						u	
Saponaria officinalis	Bouncing-Bet	Caryophyllaceae	SNA		r				c	

SCIENTIFIC NAME	COMMON NAME	FAMILY	NB S-RANK	SURVEY SITE						
				Hammond R.	Hampton	Parlee Bk.	Anagance	North R.	Petitcodiac R.	Sweet Mtn.
Silene vulgaris	Bladder Campion	Caryophyllaceae	SNA						c	
Spergula arvensis	Common Corn Spurrey	Caryophyllaceae	SNA						r	
Spergularia rubra	Ruby Sandspurrey	Caryophyllaceae	SNA			l				
Stellaria alsine	Trailing Stitchwort	Caryophyllaceae	S4		r					
Stellaria borealis	Boreal Stitchwort	Caryophyllaceae	S4S5						r	
Stellaria graminea	Little Starwort	Caryophyllaceae	SNA							u
Polygonum amphibium var. emersum	Water Smartweed	Polygonaceae	S2	r	c					
Polygonum amphibium var. stipulaceum	Water Smartweed	Polygonaceae	S5	c	c		f	f	r	
Polygonum arifolium	Halberd-leaved Tearthumb	Polygonaceae	S3				r			
Polygonum aviculare	Prostrate Knotweed	Polygonaceae	SNA	r	r			r	r	
Polygonum cilinode	Fringed Black Bindweed	Polygonaceae	S5		r	r		c	f	r
Polygonum convolvulus	Eurasian Black Bindweed	Polygonaceae	SNA						r	
Polygonum cuspidatum	Japanese Knotweed	Polygonaceae	SNA		r				r	
polygonum hydropiper	Marshpepper Smartweed	Polygonaceae	SNA	u	u		f	c	c	
polygonum hydropiperoides	False Waterpepper	Polygonaceae	S4	rl	rl					
Polygonum lapathifolium	Pale Smartweed	Polygonaceae	S5					r	f	
Polygonum pensylvanicum	Pennsylvania Smartweed	Polygonaceae	S4	r				r	c	
Polygonum persicaria	Spotted Lady's-thumb	Polygonaceae	SNA	f	c	r		u	c	
Polygonum punctatum var. confertiflorum	Dotted Smartweed	Polygonaceae	S3				ru			
Polygonum sagittatum	Arrow-leaved Smartweed	Polygonaceae	S5	r	u	u	f	u	c	r
Polygonum scandens	Climbing False Buckwheat	Polygonaceae	S3	r					u	
Rumex acetosella	Sheep Sorrel	Polygonaceae	SNA		l	l			l	r
Rumex crispus	Curled Dock	Polygonaceae	SNA	r	r				ru	
Rumex obtusifolius	Bitter Dock	Polygonaceae	SNA	u	u	r		u	c	r
Rumex orbiculatus	Greater Water Dock	Polygonaceae	S5		ru		f	r	r	
Rumex salicifolius var. mexicanus	Triangular-valve Dock	Polygonaceae	S4S5						r	
Hypericum boreale	Northern St John's-Wort	Clusiaceae	S5	c					r	r
Hypericum canadense	Canada St John's-wort	Clusiaceae	S5			l			r	
Hypericum ellipticum	Pale St John's-Wort	Clusiaceae	S5		l		u	f	c	
Hypericum majus	Large St John's-wort	Clusiaceae	S4					u		
Hypericum mutilum	Dwarf St John's-Wort	Clusiaceae	S5					u	r	
Hypericum perforatum	Common St. John's-wort	Clusiaceae	SNA	u	r	c		r	c	rl
Triadenum fraseri	Fraser's Marsh St John's-wort	Clusiaceae	S5	l	f		c	f	u	
Tilia americana	White Basswood	Tiliaceae	S4		r	r				
Tilia cordata	Little-leaved Linden	Tiliaceae	SNA						c	
Viola blanda var. palustriformis	Large-Leaf White Violet	Violaceae	S5					u	f	

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				Hammond R.	Hampton	Parlee Bk.	Anagance	North R.	Petitcodiac R.	Sweet Mtn.
Viola cucullata	Marsh Blue Violet	Violaceae	S5	r		f	c	u	u	
Viola labradorica	Labrador Violet	Violaceae	S4S5					c	u	
Viola macloskeyi ssp. pallens	Small White Violet	Violaceae	S5		u		ru	f	r	
Viola pubescens	Smooth Yellow Violet	Violaceae	S4S5					f	r	r
Viola renifolia	Kidney-leaved White Violet	Violaceae	S4S5			f		u	r	r
Viola sororia	Woolly Blue Violet	Violaceae	S5		u	r		fc	c	
Viola sp.	A Violet	Violaceae	-			r				
Viola poss. nephrophylla	A Violet	Violaceae	-						r	
Echinocystis lobata	Wild Cucumber	Cucurbitaceae	S5	u	c		r	f	c	
Populus balsamifera	Balsam Poplar	Salicaceae	S5					f	r	r
Populus grandidentata	Large-toothed Aspen	Salicaceae	S5			f				
Populus tremuloides	Trembling Aspen	Salicaceae	S5	r	u	f		c	c	c
Salix bebbiana	Bebb's Willow	Salicaceae	S5			u		u	f	r
Salix discolor	Pussy Willow	Salicaceae	S5			uf	r	r	r	r
Salix eriocephala	Cottony Willow	Salicaceae	S5	u	f	r		r	c	u
Salix humilis	Prairie Willow	Salicaceae	S5			r		r	u	u
Salix lucida	Shining Willow	Salicaceae	S5		r			r	u	
Salix pellita	Satiny Willow	Salicaceae	S4S5	c	rl					
Salix petiolaris	Meadow Willow	Salicaceae	S5				c	r	r	
Salix pyrifolia	Balsam Willow	Salicaceae	S5			r	r	u	r	
Salix sericea	Silky Willow	Salicaceae	S5		r				r	
Salix x rubens	a Willow	Salicaceae	SNA						r	
Arabis drummondii	Drummond's Rockcress	Brassicaceae	S2			r				
Arabis hirsuta var. pycnocarpa	Western Hairy Rockcress	Brassicaceae	S3			r				
*Barbarea stricta**	Small-flowered Wintercress	Brassicaceae	SNA	r				u	f	
Barbarea vulgaris	Yellow Rocket	Brassicaceae	SNA		f			f	f	
Capsella bursa-pastoris	Shepherd's Purse	Brassicaceae	SNA					r	r	
Cardamine pensylvanica	Pennsylvania Bittercress	Brassicaceae	S5	r	u			c	c	r
Erucastrum gallicum	Common Dog Mustard	Brassicaceae	SNA					r		
Erysimum cheiranthoides	Wormseed Mustard	Brassicaceae	S5					r	c	
Hesperis matronalis	Dame's Rocket	Brassicaceae	SNA						c	
Raphanus raphanistrum	Wild Radish	Brassicaceae	SNA	r					r	
Rorippa palustris	Bog Yellowcress	Brassicaceae	S5	f	r		r	u	c	
Rorippa sylvestris	Creeping Yellowcress	Brassicaceae	SNA	r	u				c	
Arctostaphylos uva-ursi	Common Bearberry	Ericaceae	S4			r				c
Chamaedaphne calyculata	Leatherleaf	Ericaceae	S5				l	l	r	

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Epigaea repens	Trailing Arbutus	Ericaceae	S5					f		
Gaultheria hispidula	Creeping Snowberry	Ericaceae	S5			l	rl	u		
Gaultheria procumbens	Eastern Teaberry	Ericaceae	S5			l		c	u	c
Gaylussacia baccata	Black Huckleberry	Ericaceae	S5						r	
Kalmia angustifolia	Sheep Laurel	Ericaceae	S5		u		l	c	u	
Rhododendron canadense	Rhodora	Ericaceae	S5					rl	r	
Vaccinium angustifolium	Late Lowbush Blueberry	Ericaceae	S5		f	c	c	c	c	c
Vaccinium myrtilloides	Velvet-leaved Blueberry	Ericaceae	S5		u	u		c	f	c
Vaccinium vitis-idaea ssp. minus	Mountain Cranberry	Ericaceae	S4S5							r
Chimaphila umbellata ssp. cisatlantica	Common Pipsissewa	Pyrolaceae	S5			f				c
Orthilia secunda	One-sided Wintergreen	Pyrolaceae	S5					u		r
Pyrola americana	Round-Leaved Pyrola	Pyrolaceae	S4S5					u	r	c
Pyrola asarifolia	Pink Pyrola	Pyrolaceae	S5			r			r	
Pyrola chlorantha	Green-Flowered Wintergreen	Pyrolaceae	S4							r
Pyrola elliptica	Shinleaf	Pyrolaceae	S5			u		f	u	f
Monotropa hypopithys	Pinesap	Monotropaceae	S4							r
Monotropa uniflora	Indian-Pipe	Monotropaceae	S5			f		r		r
Lysimachia ciliata	Fringed Yellow Loosestrife	Primulaceae	S5	f	c			c	c	
Lysimachia nummularia	Creeping Yellow Loosestrife	Primulaceae	SNA		r				c	
Lysimachia terrestris	Swamp Yellow Loosestrife	Primulaceae	S5	c	c		c	c	f	
Lysimachia thyrsiflora	Tufted Yellow Loosestrife	Primulaceae	S4		f		fc	u	r	
Trientalis borealis	Northern Starflower	Primulaceae	S5		f	c	rl	c	c	c
Ribes americanum	Wild Black Currant	Grossulariaceae	S4					r	r	
Ribes glandulosum	Skunk Currant	Grossulariaceae	S5				r	u	r	r
Ribes hirtellum	Smooth Gooseberry	Grossulariaceae	S5				r	f	r	
Ribes lacustre	Bristly Black Currant	Grossulariaceae	S5			f		f		r
Ribes rubrum	European Red Currant	Grossulariaceae	SNA						l	
Ribes triste	Swamp Red Currant	Grossulariaceae	S5					f		
Hylotelephium telephium	Garden Stonecrop	Crassulaceae	SNA	r	u			r	f	
Rhodiola rosea	Roseroot	Crassulaceae	S3			l				
Chrysosplenium americanum	Water-Mat	Saxifragaceae	S5					f	r	
Mitella nuda	Naked Mitrewort	Saxifragaceae	S5			c		f		u
Penthorum sedoides	Ditch Stonecrop	Saxifragaceae	S3		u				f	
Saxifraga paniculata ssp. neogaea	White Mountain Saxifrage	Saxifragaceae	S1			r				
Tiarella cordifolia	Heart-leaved Foamflower	Saxifragaceae	S4			u				
Agrimonia gryposepala	Hooked Agrimony	Rosaceae	S4					r	r	u

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				Hammond R.	Hampton	Parlee Bk.	Anagance	North R.	Petitcodiac R.	Sweet Mtn.
Agrimonia striata	Woodland Agrimony	Rosaceae	S5		r	u		r	c	f
Amelanchier arborea	Downy Serviceberry	Rosaceae	S4						f	
Amelanchier laevis	Smooth Serviceberry	Rosaceae	S5		u					
Amelanchier sp.	A Serviceberry	Rosaceae	-			u	r	u	u	c
Comarum palustre	Marsh Cinquefoil	Rosaceae	S5		u					
Crataegus sp.	A Hawthorn	Rosaceae	-	r		r		c	c	
Dalibarda repens	Dewdrop	Rosaceae	S5				r	f		
Dasiphora fruticosa ssp. floribunda	Shrubby Cinquefoil	Rosaceae	S4			rl				
Filipendula ulmaria	Queen-of-the-Meadow	Rosaceae	SNA		r					
Fragaria vesca ssp. americana	Woodland Strawberry	Rosaceae	S4							f
Fragaria virginiana	Wild Strawberry	Rosaceae	S5		l	c		c	c	c
Geum aleppicum	Yellow Avens	Rosaceae	S5			r		r		
Geum canadense	White Avens	Rosaceae	S5					f	c	
Geum laciniatum	Rough Avens	Rosaceae	S5	r		u		c	c	
Geum macrophyllum	Large-Leaved Avens	Rosaceae	S5	r		u		uf	u	
Geum rivale	Water Avens	Rosaceae	S5			u		u		u
Malus pumila	Common Apple	Rosaceae	SNA		r	l		u	c	r
Photinia floribunda	Purple Chokeberry	Rosaceae	S5					r		
Potentilla argentea	Silvery Cinquefoil	Rosaceae	SNA						r	
Potentilla intermedia	Downy Cinquefoil	Rosaceae	SNA						r	
Potentilla norvegica ssp. monspeliensis	Rough Cinquefoil	Rosaceae	S5			l	u	f	f	r
Potentilla recta	Sulphur Cinquefoil	Rosaceae	SNA							r
Potentilla simplex	Old Field Cinquefoil	Rosaceae	S5		l	uf	r	f	r	
Prunus pensylvanica	Pin Cherry	Rosaceae	S5		u	u		f		u
Prunus serotina	Black Cherry	Rosaceae	S5					c	c	r
Prunus virginiana	Chokecherry	Rosaceae	S5	f	u	f	c	c	c	u
Rosa carolina	Carolina Rose	Rosaceae	S4S5						f	
Rosa cinnamomea	Cinnamon Rose	Rosaceae	SNA					r		
Rosa multiflora	Multiflora Rose	Rosaceae	SNA		r					
Rosa nitida	Shining Rose	Rosaceae	S5				r	f		
Rosa rugosa	Rugosa Rose	Rosaceae	SNA						r	
Rosa virginiana	Virginia Rose	Rosaceae	S5	fc		rl	u	c	c	
Rubus allegheniensis	Alleghaney Blackberry	Rosaceae	S5	r	u	r			u	f
Rubus canadensis	Smooth Blackberry	Rosaceae	S5			c	u	c	c	r
Rubus hispidus	Bristly Dewberry	Rosaceae	S5					r	r	
Rubus idaeus ssp. strigosus	Red Raspberry	Rosaceae	S5	l	u	c	f	c	c	f

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Rubus pensilvanicus	Pennsylvania Blackberry	Rosaceae	S2S3						ru	
Rubus pubescens	Dwarf Red Raspberry	Rosaceae	S5		c	c	c	c	c	c
Rubus setosus	Bristly Blackberry	Rosaceae	S4S5			r		r		
Sibbaldiopsis tridentata	Three-Toothed Cinquefoil	Rosaceae	S5			r				
Sorbus americana	American Mountain Ash	Rosaceae	S5		u	f	u	f	f	r
Sorbus aucuparia	European Mountain Ash	Rosaceae	SNA			r				
Sorbus decora	Showy Mountain Ash	Rosaceae	S4S5			r				
Spiraea alba var. latifolia	White Meadowsweet	Rosaceae	S5	c	c	c	c	c	c	
Spiraea tomentosa	Steeplebush	Rosaceae	S5	f	l	rl	r	r		
Amphicarpaea bracteata	American Hog Peanut	Fabaceae	S4S5	c	fc				c	
Apios americana	American Groundnut	Fabaceae	S4S5	c	c				c	
Desmodium canadense	Canada Tick-trefoil	Fabaceae	S4S5						rl	
Lathyrus pratensis	Meadow Vetchling	Fabaceae	SNA	r						
Lotus corniculatus	Garden Bird's-foot Trefoil	Fabaceae	SNA	r			rl	l	c	r
Lupinus polyphyllus	Large-Leaved Lupine	Fabaceae	SNA					l	c	
Medicago lupulina	Black Medick	Fabaceae	SNA		r		r	l	r	r
Melilotus albus	White Sweet-clover	Fabaceae	SNA				rl	l	f	r
Trifolium arvense	Rabbit-Foot Clover	Fabaceae	SNA			l		rl	r	rl
Trifolium aureum	Yellow Clover	Fabaceae	SNA		l				r	r
Trifolium campestre	Low Hop Clover	Fabaceae	SNA		c			r	r	rl
Trifolium hybridum	Alsike Clover	Fabaceae	SNA					r	u	r
Trifolium pratense	Red Clover	Fabaceae	SNA	r	r	l		l	c	rl
Trifolium repens	White Clover	Fabaceae	SNA	r	u	l	rl		u	r
Vicia cracca	Tufted Vetch	Fabaceae	SNA	c	f	l	u	c	c	rl
Vicia sativa	Common Vetch	Fabaceae	SNA	r						
Myriophyllum heterophyllum	Variable-leaved Water Milfoil	Haloragaceae	S3	r						
Myriophyllum sibiricum	Siberian Water Milfoil	Haloragaceae	S3S4	r						
Myriophyllum sp.	A Water-Milfoil	Haloragaceae	-						r	
Lythrum salicaria	Purple Loosestrife	Lythraceae	SNA	c	c				f	
Daphne mezereum	Mezer's Daphne	Thymelaeaceae	SNA						r	
Chamerion angustifolium	Fireweed	Onagraceae	S5			c	f	f	c	r
Circaea alpina	Small Enchanter's Nightshade	Onagraceae	S5	f		f		f	u	f
Circaea lutetiana ssp. canadensis	Broad-leaved Enchanter's Nightshade	Onagraceae	S4						c	
Epilobium ciliatum	Northern Willowherb	Onagraceae	S5	u		uf		c	c	
Epilobium ciliatum ssp. ciliatum	Glandular Willow-Herb	Onagraceae	S5					c		f
Epilobium ciliatum ssp. glandulosum	Fringed Willowherb	Onagraceae	S5					u		r

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Epilobium leptophyllum	Bog Willowherb	Onagraceae	S5				c	f		
Epilobium palustre	Marsh Willowherb	Onagraceae	S5				ru			
Epilobium strictum	Downy Willow-Herb	Onagraceae	S3					r	r	
Ludwigia palustris	Marsh Seedbox	Onagraceae	S4	c	f		c	f	c	
Oenothera biennis	Evening-Primrose	Onagraceae	S5			c		r	c	r
Oenothera parviflora	Small-flowered Evening Primrose	Onagraceae	S5						r	r
Oenothera perennis	Perennial Evening Primrose	Onagraceae	S5		r			r	r	r
Cornus alternifolia	Alternate-leaved Dogwood	Cornaceae	S5	r		f			r	u
Cornus canadensis	Bunchberry	Cornaceae	S5		c	c	l	c	c	c
Cornus rugosa	Round-leaved Dogwood	Cornaceae	S4			r			u	f
Cornus sericea	Red Osier Dogwood	Cornaceae	S5	c	c	u	c	c	c	r
Ilex verticillata	Common Winterberry	Aquifoliaceae	S5	l	u		c	c	f	
Nemopanthus mucronatus	Mountain Holly	Aquifoliaceae	S5			l	l	f		
Acalypha rhomboidea	Common Three-seed Mercury	Euphorbiaceae	S4	r	r					
Chamaesyce vermiculata	Worm-seeded Spurge	Euphorbiaceae	S4	r				r	r	
Frangula alnus	Glossy Buckthorn	Rhamnaceae	SNA	r	c		c	f	r	r
Rhamnus alnifolia	Alder-leaved Buckthorn	Rhamnaceae	S4S5					f		
Parthenocissus quinquefolia	Virginia Creeper	Vitaceae	SNA		l				rl	
Parthenocissus vitacea	Thicket Creeper	Vitaceae	SU		r		r			
Parthenocissus sp.	A Creeper	Vitaceae	SNA						r	
Acer negundo	Box-Elder	Aceraceae	SNA					f	f	
Acer pensylvanicum	Striped Maple	Aceraceae	S5			c				c
Acer rubrum	Red Maple	Aceraceae	S5		u	c	c	c	c	c
Acer saccharinum	Silver Maple	Aceraceae	S4	c	c				c	
Acer saccharum	Sugar Maple	Aceraceae	S5		u	c			f	c
Acer spicatum	Mountain Maple	Aceraceae	S5	r	f	c		r	rl	f
Acer x freemanii	United Maple	Aceraceae	SNA						uf	
Rhus typhina	Staghorn Sumac	Anacardiaceae	S5	r		l			u	
Toxicodendron rydbergii	Northern Poison Oak	Anacardiaceae	S5	r		r		c	u	r
Oxalis montana	Common Wood Sorrel	Oxalidaceae	S5		u	c		r	r	f
Oxalis stricta	European Wood Sorrel	Oxalidaceae	S5	r	c	f		c	c	r
Geranium bicknellii	Bicknell's Crane's-bill	Geraniaceae	S3						r	
Geranium robertianum	Herb Robert	Geraniaceae	S2S3	r						
Impatiens capensis	Spotted Jewelweed	Balsaminaceae	S5	c	c	c	c	c	c	f
*Impatiens pallida**	Pale Jewelweed	Balsaminaceae	S2			r				
Aralia hispida	Bristly Sarsaparilla	Araliaceae	S5		r	rl				

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Aralia nudicaulis	Wild Sarsaparilla	Araliaceae	S5		f	c	l	c	c	
Aralia racemosa	American Spikenard	Araliaceae	S4S5							r
Angelica atropurpurea	Purple Alexanders	Apiaceae	S4S5					r		
Angelica sylvestris	Woodland Angelica	Apiaceae	SNA	ru	l				c	
Anthriscus sylvestris	Wild Chervil	Apiaceae	SNA					r		
Carum carvi	Caraway	Apiaceae	SNA					r		
Cicuta bulbifera	Bulbous Water-hemlock	Apiaceae	S5	r	fc		c	u	c	
Cicuta maculata	Spotted Water-Hemlock	Apiaceae	S5	r			ru	r	f	
Heracleum maximum	Common Cow Parsnip	Apiaceae	S5	r					f	
Hydrocotyle americana	American Marsh Pennywort	Apiaceae	S5				r	f	u	
Osmorhiza claytonii	Hairy Sweet Cicely	Apiaceae	S4S5							u
Pastinaca sativa	Wild Parsnip	Apiaceae	SNA						u	
Sanicula marilandica	Black Snakeroot	Apiaceae	S4S5					r		
Sium suave	Common Water Parsnip	Apiaceae	S5	c	c		f	c	c	
Apocynum androsaemifolium	Spreading Dogbane	Apocynaceae	S5	f		r		l	c	r
Apocynum cannabinum	Indian Hemp	Apocynaceae	S4	c					c	
Asclepias incarnata	Swamp Milkweed	Asclepiadaceae	S4		c		r		r	
Solanum dulcamara	Bittersweet Nightshade	Solanaceae	SNA	f	c	u	f	f	c	
Calystegia sepium	Hedge False Bindweed	Convolvulaceae	S5	c	c				c	
Cuscuta gronovii	Swamp Dodder	Cuscutaceae	S4S5		u				c	
Nymphoides cordata	Little Floatingheart	Menyanthaceae	S4	r						
Myosotis laxa	Small Forget-Me-Not	Boraginaceae	S5	c	r	u		c	c	r
Myosotis scorpioides	True Forget-Me-Not	Boraginaceae	SNA	c	c					
Verbena hastata	Blue Vervain	Verbenaceae	S4		r		r		c	
Clinopodium vulgare	Wild Basil	Lamiaceae	S4S5			r			u	
Galeopsis tetrahit	Common Hemp-Nettle	Lamiaceae	SNA			f		u	c	r
Glechoma hederacea	Ground Ivy	Lamiaceae	SNA		l				c	
Lycopus americanus	American Water Horehound	Lamiaceae	S5		f		r	r	c	
Lycopus uniflorus	Northern Water Horehound	Lamiaceae	S5	c	c	u	c	c	c	
Mentha arvensis	Wild Mint	Lamiaceae	S5	c	c	u		f	c	r
Prunella vulgaris ssp. lanceolatum	Common Self-heal	Lamiaceae	S5		uf	c		c	f	
Prunella vulgaris ssp. vulgaris	Self-Heal	Lamiaceae	SNA							f
Scutellaria galericulata	Marsh Skullcap	Lamiaceae	S5	r			f	c	u	
Scutellaria lateriflora	Mad-dog Skullcap	Lamiaceae	S5	c	c	r	c	u	c	r
Scutellaria x churchilliana	Mad Dog Skullcap	Lamiaceae	SNA						r	
Stachys palustris	Marsh Hedge-Nettle	Lamiaceae	SNA	c	l				c	

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Callitriche heterophylla	Large Water-Starwort	Callitrichaceae	S4S5						c	
Callitriche palustris	Marsh Water-starwort	Callitrichaceae	S5	c	c		c	u	f	
Callitriche heterophylla / palustris	A Water-starwort	Callitrichaceae	-					c	r	
Callitriche cf. palustris	Spring Water-starwort	Callitrichaceae	-		c			u		
Plantago lanceolata	English Plantain	Plantaginaceae	SNA							r
Plantago major	Common Plantain	Plantaginaceae	SNA	r	l	l	l	f	c	rl
Plantago rugelii	Rugel's Plantain	Plantaginaceae	S4		r					
Fraxinus americana	White Ash	Oleaceae	S4S5		c	c			r	c
Fraxinus nigra	Black Ash	Oleaceae	S4S5	r		r		c	c	
Fraxinus pennsylvanica	Red Ash	Oleaceae	S4	c	c					
Chaenorhinum minus	Dwarf Snapdragon	Scrophulariaceae	SNA						r	
Chelone glabra	White Turtlehead	Scrophulariaceae	S5			ru	r	c	f	r
Euphrasia nemorosa	Common Eyebright	Scrophulariaceae	SNA			l				
Euphrasia stricta	Stiff Eyebright	Scrophulariaceae	SNA			c				
Euphrasia nemorosa / stricta	An Eyebright	Scrophulariaceae	-			c			u	
Gratiola neglecta	Clammy Hedge-Hyssop	Scrophulariaceae	S4	c	l			r		
Linaria vulgaris	Butter-and-Eggs	Scrophulariaceae	SNA	c	r	l	r		c	
Lindernia dubia	Yellow-seeded False Pimperel	Scrophulariaceae	S4		u			r	u	
Melampyrum lineare	Cow-Wheat	Scrophulariaceae	S5			f		r		c
Mimulus moschatus	Musk Monkeyflower	Scrophulariaceae	SNA							r
Mimulus ringens	Square-stemmed Monkeyflower	Scrophulariaceae	S5	c	f			r	f	
Odontites vernus ssp. serotinus	Red Bartsia	Scrophulariaceae	SNA						r	
Rhinanthus minor	Common Yellow Rattle	Scrophulariaceae	SNA					r		r
Scrophularia nodosa	Knotty Figwort	Scrophulariaceae	SNA	r		c				
Verbascum thapsus	Common Mullein	Scrophulariaceae	SNA	r					r	r
Veronica americana	American Speedwell	Scrophulariaceae	S5		r	r				
Veronica officinalis	Common Speedwell	Scrophulariaceae	S5		c	c		f	u	f
Veronica scutellata	Marsh Speedwell	Scrophulariaceae	S5		ru		r	f	f	
Veronica serpyllifolia	Thyme-Leaved Speedwell	Scrophulariaceae	SNA			r				
Veronica serpyllifolia ssp. serpyllifolia	Thyme-Leaved Speedwell	Scrophulariaceae	SNA		r	u		u	r	
Epifagus virginiana	Beechdrops	Orobanchaceae	S4			u				
Utricularia macrorhiza	Greater Bladderwort	Lentibulariaceae	S5				u	r	u	
Utricularia minor	Lesser Bladderwort	Lentibulariaceae	S4S5						r	
Campanula aparinoides	Marsh Bellflower	Campanulaceae	S4	r	rl		fc		f	
Campanula rapunculoides	Creeping Bellflower	Campanulaceae	SNA					r		r
Campanula rotundifolia	Common Harebell	Campanulaceae	S5			f				

SCIENTIFIC NAME	COMMON NAME	FAMILY	NB S-RANK	SURVEY SITE						
				Hammond R.	Hampton	Parlee Bk.	Anagance	North R.	Petitcodiac R.	Sweet Mtn.
Lobelia inflata	Indian Tobacco	Campanulaceae	S5			l			r	
Galium asprellum	Rough Bedstraw	Rubiaceae	S5	r	u	u	c	c	c	
Galium mollugo	Smooth Bedstraw	Rubiaceae	SNA				rl	l	c	u
Galium palustre	Common Marsh Bedstraw	Rubiaceae	S5		c	f		c	c	r
Galium tinctorium	Dyer's Bedstraw	Rubiaceae	S5		r			ru	ru	
Galium trifidum ssp. trifidum	Three-petaled Bedstraw	Rubiaceae	S5		l	u	c	r	u	
Galium triflorum	Three-flowered Bedstraw	Rubiaceae	S5			c		f	u	f
Galium trifidum / tinctorium	A Bedstraw	Rubiaceae	-	f		r				
Houstonia caerulea	Azure Bluet	Rubiaceae	S5			l				
Mitchella repens	Partridge-Berry	Rubiaceae	S5			f		u	r	f
Diervilla lonicera	Northern Bush Honeysuckle	Caprifoliaceae	S5		f	c		c	r	c
Linnaea borealis ssp. americana	Twinflower	Caprifoliaceae	S5			f		c	u	c
Lonicera canadensis	Canada Fly Honeysuckle	Caprifoliaceae	S5			c		c	u	c
Lonicera morrowii	Morrow's Honeysuckle	Caprifoliaceae	SNA					u	r	
Lonicera tatarica	Tartarian Honeysuckle	Caprifoliaceae	SNA						r	
Lonicera villosa	Mountain Fly Honeysuckle	Caprifoliaceae	S5					u	l	
Lonicera x bella	a Hybrid Honeysuckle	Caprifoliaceae	SNA						r	
Lonicera xylosteum	Dwarf Honeysuckle	Caprifoliaceae	SNA						r	
Lonicera morrowii / x bella	A Honeysuckle	Caprifoliaceae	SNA						r	
Sambucus nigra ssp. canadensis	Black Elderberry	Caprifoliaceae	S5				r	c	u	r
Sambucus racemosa ssp. pubens	Red Elderberry	Caprifoliaceae	S5			c			r	r
Symphoricarpos albus var. laevigatus	Thin-leaved Snowberry	Caprifoliaceae	SNA			r				
Triosteum aurantiacum	Orange-fruited Tinker's Weed	Caprifoliaceae	S2						r	
Viburnum lantana	Wayfaring Viburnum	Caprifoliaceae	SNA			c				
Viburnum lantanoides	Hobblebush	Caprifoliaceae	S5			c				f
Viburnum nudum var. cassinoides	Northern Wild Raisin	Caprifoliaceae	S5				c	c	f	
Viburnum opulus var. americanum	Highbush Cranberry	Caprifoliaceae	S4	r				u	f	
Valeriana officinalis	Common Valerian	Valerianaceae	SNA			r		r	u	
Achillea millefolium	Common Yarrow	Asteraceae	S5		l	c		u	r	r
Achillea ptarmica	Sneezeweed	Asteraceae	SNA	r		r			c	
Ageratina altissima	White Snakeroot	Asteraceae	S4S5			l				
Ambrosia artemisiifolia	Common Ragweed	Asteraceae	S5			r		l	u	
Anaphalis margaritacea	Pearly Everlasting	Asteraceae	S5			fc			r	r
Antennaria howellii	Howell's Pussytoes	Asteraceae	S5			r				
Antennaria sp.	A Pussytoes	Asteraceae	-							f
Anthemis cotula	Stinking Chamomile	Asteraceae	SNA				r	r	r	

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				Hammond R.	Hampton	Parlee Bk.	Anagance	North R.	Petitcodiac R.	Sweet Mtn.
Arctium minus	Common Burdock	Asteraceae	SNA	r		l			u	r
Arctium sp.	A Burdock	Asteraceae	-					r		
Artemisia biennis	Biennal Wormwood	Asteraceae	SNA						r	
Artemisia vulgaris	Common Wormwood	Asteraceae	SNA		r				f	
Bidens cernua	Nodding Beggarticks	Asteraceae	S5	c	c		c	c	c	
Bidens connata	Purple-stemmed Beggarticks	Asteraceae	S4		u					
Bidens frondosa	Devil's Beggarticks	Asteraceae	S5	c	c	l		c	c	
Bidens vulgata	Tall Beggarticks	Asteraceae	S4		fc				r	
Centaurea jacea	Brown Knapweed	Asteraceae	SNA						r	
Centaurea nigra	Black Knapweed	Asteraceae	SNA	r					c	
Cirsium arvense	Canada Thistle	Asteraceae	SNA	u			r	f	c	r
Cirsium muticum	Swamp Thistle	Asteraceae	S5					r		
Cirsium vulgare	Bull Thistle	Asteraceae	SNA					r	r	
Conyza canadensis	Horseweed	Asteraceae	S5					u	f	
Doellingeria umbellata	Hairy Flat-top White Aster	Asteraceae	S5	l	u	c	c	c	c	u
Erechtites hieraciifolia	Eastern Burnweed	Asteraceae	S5	c	u	r	r	r	c	r
Erigeron annuus	Annual Fleabane	Asteraceae	S4S5						r	
Erigeron strigosus	Rough Fleabane	Asteraceae	S5					r	r	f
Eupatorium maculatum	Spotted Joe-pye-weed	Asteraceae	S5	c	c	f	fc	c	c	
Eupatorium perfoliatum	Common Boneset	Asteraceae	S5						u	
Eurybia macrophylla	Large-leaved Aster	Asteraceae	S5			u	r	c	c	
Eurybia radula	Low Rough Aster	Asteraceae	S5					u	r	
Euthamia graminifolia	Grass-leaved Goldenrod	Asteraceae	S5	c	l	c	l	c	c	r
Gnaphalium uliginosum	Marsh Cudweed	Asteraceae	SNA	c	c	l		f	c	
Helianthus tuberosus	Jerusalem Artichoke	Asteraceae	SNA						r	
Hieracium caespitosum	Yellow-King-Devil	Asteraceae	SNA			r		u		
Hieracium canadense	Canada Hawkweed	Asteraceae	S5			l		u		
Hieracium lachenalii	Common Hawkweed	Asteraceae	SNA			f		u	f	f
Hieracium murorum	Golden Lungwort	Asteraceae	SNA							c
Hieracium pilosella	Mouse-ear Hawkweed	Asteraceae	SNA		r	c			r	
Hieracium piloselloides	Glaucous King-Devil	Asteraceae	SNA					r	●	r
Hieracium scabrum	Rough Hawkweed	Asteraceae	S5		r	r				r
Hieracium tridentatum	Three-Tooth Hawkweed	Asteraceae	SNA					u	r	
Hieracium x *floribundum*	Smoothish Hawkweed	Asteraceae	SNA			f		u		
Hieracium caespitosum / *aurantiacum*	A Hawkweed	Asteraceae	SNA						●	
Hieracium pilosella / x *flagellare*	A Hawkweed	Asteraceae	SNA							r

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				Hammond R.	Hampton	Parlee Bk.	Anagance	North R.	Petitcodiac R.	Sweet Mtn.
Hieracium x *floribundum* / *piloselloides*	A Hawkweed	Asteraceae	SNA					rl		
Inula helenium	Elecampane	Asteraceae	SNA					r		
Lactuca biennis	Tall Blue Lettuce	Asteraceae	S5			l		u	u	
Lactuca canadensis	Devil's-Weed	Asteraceae	S5							r
Lactuca serriola	Prickly Lettuce	Asteraceae	SNA						r	
Leontodon autumnalis	Fall Dandelion	Asteraceae	SNA	r	l	rl	rl	c	f	r
Leucanthemum vulgare	Oxeye Daisy	Asteraceae	SNA			l		l	c	rl
Matricaria discoidea	Pineapple Weed	Asteraceae	SNA	r	l	l		l	r	rl
Megalodonta beckii	Water Beggarticks	Asteraceae	S4	f	u					
Oclemena acuminata	Whorled Wood Aster	Asteraceae	S5		u	c	rl	c	u	f
Omalotheca sylvatica	Woodland Cudweed	Asteraceae	S4S5			r				
Packera aurea	Golden Groundsel	Asteraceae	S4S5					f		
Packera schweinitziana	Schweinitz's Groundsel	Asteraceae	S4				rl	rl	r	
Prenanthes altissima	White Lettuce	Asteraceae	S5			u		r		u
Prenanthes trifoliolata	Three-leaved Rattlesnakeroot	Asteraceae	S5		u	c	l	l	r	
Rudbeckia hirta var. pulcherrima	Black-Eyed Susan	Asteraceae	SNA							r
Senecio jacobaea	Tansy Ragwort	Asteraceae	SNA		u			r	r	
Senecio viscosus	Sticky Ragwort	Asteraceae	SNA	r					u	
Solidago bicolor	White Goldenrod	Asteraceae	S5	r		c	r	f	c	u
Solidago canadensis	Canada Goldenrod	Asteraceae	S5	c	l	l		c	c	rl
Solidago flexicaulis	Zigzag Goldenrod	Asteraceae	S5			c			u	c
Solidago gigantea	Giant Goldenrod	Asteraceae	S5	ru	f	r	r	c	c	
Solidago juncea	Early Goldenrod	Asteraceae	S5			r			u	rl
Solidago nemoralis	Gray-stemmed Goldenrod	Asteraceae	S4S5		u	r			r	
Solidago puberula	Downy Goldenrod	Asteraceae	S5		l	f		f	f	c
Solidago rugosa	Rough-stemmed Goldenrod	Asteraceae	S5		u	c	c	c	c	r
Solidago uliginosa	Bog Goldenrod	Asteraceae	S5			rl		f	r	
Sonchus arvensis	Field Sow Thistle	Asteraceae	SNA	r				l	c	
Sonchus asper	Spiny-Leaf Sow-Thistle	Asteraceae	SNA					r	f	r
Symphyotrichum ciliolatum	Northern Heart-Leaved Aster	Asteraceae	S5					u	f	c
Symphyotrichum cordifolium	Heart-leaved Aster	Asteraceae	S5			f		c	c	c
Symphyotrichum lanceolatum	Lance-leaved Aster	Asteraceae	S5	u	ru	r	r	c	c	r
Symphyotrichum lateriflorum	Calico Aster	Asteraceae	S5	f	c	c	f	c	c	f
Symphyotrichum novi-belgii var. novi-belgii	New Belgium American-Aster	Asteraceae	S5	u	c	l	r	l	c	
Symphyotrichum puniceum	Purple-stemmed Aster	Asteraceae	S5			c	u	c	u	f
*Symphyotrichum racemosum**	Small White Aster	Asteraceae	S2		r					

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				Hammond R.	Hampton	Parlee Bk.	Anagance	North R.	Petitcodiac R.	Sweet Mtn.
Symphyotrichum tradescantii	Tradescant's Aster	Asteraceae	S4	r						
Tanacetum vulgare	Common Tansy	Asteraceae	SNA					r	c	
Taraxacum officinale	Common Dandelion	Asteraceae	SNA	ru	f	f	rl	f	c	f
Tragopogon pratensis	Goat's-Beard	Asteraceae	SNA					r		rl
Tripleurospermum maritima	Seashore Chamomile	Asteraceae	SNA					●		
Tussilago farfara	Coltsfoot	Asteraceae	SNA		l	l		f	c	
Xanthium strumarium var. canadense	Rough Cocklebur	Asteraceae	S4		f					
Alisma triviale	Northern Water Plantain	Alismataceae	S5	c	c			f	c	
Sagittaria cuneata	Northern Arrowhead	Alismataceae	S5	c	c		fc	c	f	
Sagittaria graminea	Grass-leaved Arrowhead	Alismataceae	S4	r						
Sagittaria latifolia	Broad-leaved Arrowhead	Alismataceae	S5	c	c		c	f	f	
Sagittaria sp.	An Arrowhead	Alismataceae	-					f		
Elodea canadensis	Canada Waterweed	Hydrocharitaceae	S4S5	l	c					
Vallisneria americana	Wild Celery	Hydrocharitaceae	S4	c	c					
Potamogeton alpinus	Alpine Pondweed	Potamogetonaceae	S5						r	
Potamogeton epihydrus	Ribbon-leaved Pondweed	Potamogetonaceae	S5		r		c		f	
Potamogeton foliosus	Leafy Pondweed	Potamogetonaceae	S4					r	r	
Potamogeton gramineus	Variable-leaved Pondweed	Potamogetonaceae	S5	l				c	r	
Potamogeton natans	Floating-leaved Pondweed	Potamogetonaceae	S5		u			c	f	
Potamogeton obtusifolius	Blunt-leaved Pondweed	Potamogetonaceae	S3				r	r		
Potamogeton perfoliatus	Clasping-leaved Pondweed	Potamogetonaceae	S4S5	c	c			c	l	
Potamogeton pusillus	Small Pondweed	Potamogetonaceae	S5	u	ru					
Potamogeton spirillus	Spiral Pondweed	Potamogetonaceae	S4S5	f	u					
Potamogeton zosteriformis	Flat-stemmed Pondweed	Potamogetonaceae	S4		r			u		
Potamogeton sp.	A Pondweed	Potamogetonaceae	-					●		
Potamogeton gramineus / alpinus	A Pondweed	Potamogetonaceae	-						f	
Potamogeton gramineus or x *saxonicus*	A Pondweed	Potamogetonaceae	-					u		
Potamogeton pusillus / foliosus	A Pondweed	Potamogetonaceae	-						r	
Stuckenia pectinata	Sago-Pondweed	Potamogetonaceae	S4					c	f	
Najas flexilis	Slender Naiad	Najadaceae	S5						u	
Acorus americanus	American Sweetflag	Acoraceae	S4		l			f	f	
Arisaema triphyllum	Jack-in-the-pulpit	Araceae	S5	c	c	f	u	f	f	u
Lemna trisulca	Star Duckweed	Lemnaceae	S3		l			u	l	
Lemna turionifera	Turion Duckweed	Lemnaceae	S5	r	c			f	u	
Spirodela polyrrhiza	Great Duckweed	Lemnaceae	S3S4		r					
Eriocaulon aquaticum	White Buttons	Eriocaulaceae	S5	r						

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				Hammond R.	Hampton	Parlee Bk.	Anagance	North R.	Petitcodiac R.	Sweet Mtn.
Juncus articulatus	Jointed Rush	Juncaceae	S5	r	u			u	c	
Juncus brevicaudatus	Narrow-Panicled Rush	Juncaceae	S5	r	u			r	u	
Juncus bufonius	Toad Rush	Juncaceae	S5	r	u				f	●
Juncus canadensis	Canada Rush	Juncaceae	S5	r			f	r	u	
Juncus dudleyi	Dudley's Rush	Juncaceae	S4						f	
Juncus effusus	Soft Rush	Juncaceae	S5			u	u	f	f	u
Juncus filiformis	Thread Rush	Juncaceae	S5				r	r	r	
Juncus gerardii	Black Grass	Juncaceae	S5					r		
Juncus nodosus	Knotted Rush	Juncaceae	S4S5	r					c	
Juncus pelocarpus	Brown-Fruited Rush	Juncaceae	S5			r			u	
Juncus tenuis	Slender Rush	Juncaceae	S5	u	u	l		u	f	
Luzula acuminata	Pointed Woodrush	Juncaceae	S5					u	r	
Luzula multiflora	Common Woodrush	Juncaceae	S5					u		r
Carex aquatilis	Leafy Tussock Sedge	Cyperaceae	S4S5					f		
Carex arctata	Black Sedge	Cyperaceae	S5			c		c	r	c
Carex bebbii	Bebb's Sedge	Cyperaceae	S4						u	
Carex bromoides	Bromelike Sedge	Cyperaceae	S4		r			c	c	
Carex brunnescens ssp. sphaerostachya	Brownish Sedge	Cyperaceae	S5			f		f	u	
Carex canescens	Silvery Sedge	Cyperaceae	S5				u	r		
Carex cf. peckii	Peck's Sedge	Cyperaceae	-			rl				
Carex communis	Fibrous-Root Sedge	Cyperaceae	S5			f		u	u	
Carex crawfordii	Crawford's Sedge	Cyperaceae	S5			r				
Carex crinita	Fringed Sedge	Cyperaceae	S5	c	c			c	c	
Carex debilis var. rudgei	White-edged Sedge	Cyperaceae	S5				r	f	r	u
Carex deflexa	Northern Sedge	Cyperaceae	S5			u				
Carex deweyana	Dewey's Sedge	Cyperaceae	S5			f				
Carex disperma	Two-Seeded Sedge	Cyperaceae	S5					f		
Carex echinata	Star Sedge	Cyperaceae	S5				u	r		
Carex flava	Yellow Sedge	Cyperaceae	S5			r				
Carex gracillima	Graceful Sedge	Cyperaceae	S5				r	c	r	r
Carex gynandra	Nodding Sedge	Cyperaceae	S5		c	c		c	●	●
Carex haydenii	Hayden's Sedge	Cyperaceae	S3		ru					
Carex hirtifolia	Pubescent Sedge	Cyperaceae	S2						r	
Carex hystericina	Porcupine Sedge	Cyperaceae	S4					r	r	
Carex interior	Inland Sedge	Cyperaceae	S5					u		
Carex intumescens	Bladder Sedge	Cyperaceae	S5	r	f		uf	c	f	

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Carex lacustris	Lake Sedge	Cyperaceae	S4S5		u		c	c	f	
Carex lasiocarpa var. americana	Slender Sedge	Cyperaceae	S5				l			
Carex leptalea	Bristly-stalked Sedge	Cyperaceae	S5			r	u	u		
Carex leptonervia	Ribless Woodland Sedge	Cyperaceae	S5			u		u		r
Carex lupulina	Hop Sedge	Cyperaceae	S3		r				r	
Carex lurida	Sallow Sedge	Cyperaceae	S5	r	ru			r	r	
Carex novae-angliae	New England Sedge	Cyperaceae	S5			f		r	f	
Carex pallescens	Pale Sedge	Cyperaceae	S5					r		
Carex peckii	Peck's Sedge	Cyperaceae	S4							r
Carex pedunculata	Long-Stalked Sedge	Cyperaceae	S5			l		c	c	
Carex projecta	Necklace Sedge	Cyperaceae	S5	r	c	u	r	c	f	f
Carex pseudocyperus	Cyperuslike Sedge	Cyperaceae	S5				uf	r	u	
Carex radiata	Eastern Star Sedge	Cyperaceae	S4			r			r	r
Carex retrorsa	Retrorse Sedge	Cyperaceae	S4					u	r	
Carex scabrata	Rough Sedge	Cyperaceae	S5			f				u
Carex scirpoidea	Scirpuslike Sedge	Cyperaceae	S1			rl				
Carex scoparia	Broom Sedge	Cyperaceae	S5		f	u		u	r	r
Carex stipata	Awl-fruited Sedge	Cyperaceae	S5				r	c	r	
Carex stricta	Tussock Sedge	Cyperaceae	S5	r			c	c	u	
Carex tonsa	Deep Green Sedge	Cyperaceae	S5			l				c
Carex tonsa var. rugosperma	Deep Green Sedge	Cyperaceae	SNR			rl				
Carex torta	Twisted Sedge	Cyperaceae	S5			l			rl	
Carex tribuloides	Blunt Broom Sedge	Cyperaceae	S4S5		u				●	
Carex trisperma var. trisperma	Three-seeded Sedge	Cyperaceae	S5				u	l	l	
Carex tuckermanii	Tuckerman's Sedge	Cyperaceae	S3		r				u	
Carex umbellata	Umbellate Sedge	Cyperaceae	S4S5			rl				
Carex utriculata	Northern Beaked Sedge	Cyperaceae	S5				l			
Carex vesicaria	Inflated Sedge	Cyperaceae	S5	r	c		c	uf	r	
Carex vulpinoidea	Fox Sedge	Cyperaceae	S4S5					r	u	
Carex wiegandii	Wiegand's Sedge	Cyperaceae	S3					r		
Cyperus esculentus	Perennial Yellow Nutsedge	Cyperaceae	S3		f					
Dulichium arundinaceum	Three-Way Sedge	Cyperaceae	S5	c	f		l		u	
Eleocharis acicularis	Needle Spikerush	Cyperaceae	S5	uf	c			f	c	
Eleocharis erythropoda	Red-stemmed Spikerush	Cyperaceae	S4	r						
Eleocharis obtusa	Blunt Spikerush	Cyperaceae	S5		r		fc	r	u	
Eleocharis ovata	Ovate Spikerush	Cyperaceae	S5						r	

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				Hammond R.	Hampton	Parlee Bk.	Anagance	North R.	Petitcodiac R.	Sweet Mtn.
Eleocharis palustris	Common Spikerush	Cyperaceae	S5	r	f		c	c	f	
Eleocharis tenuis	Slender Spikerush	Cyperaceae	S4S5	r	r				r	
Eleocharis sp.	A Spikerush	Cyperaceae	-						●	
Schoenoplectus fluviatilis	River Bulrush	Cyperaceae	S3	l	l					
Schoenoplectus pungens	Three-square Bulrush	Cyperaceae	S4S5	r						
Schoenoplectus tabernaemontani	Softstem Bulrush	Cyperaceae	S5	c	fc			c	u	
Scirpus atrocinctus	Black-girdled Bulrush	Cyperaceae	S5			f	f	r	ru	
Scirpus cyperinus	Common Woolly Bulrush	Cyperaceae	S5	c	fc	u	c	c	c	
Scirpus hattorianus	Mosquito Bulrush	Cyperaceae	S5		r	l		u	u	u
Scirpus microcarpus	Small-fruited Bulrush	Cyperaceae	S5				r	u	u	
Scirpus pedicellatus	Stalked Bulrush	Cyperaceae	S4	c	c					
Agrostis capillaris	Colonial Bent Grass	Poaceae	SNA			l	l	r	u	
Agrostis gigantea	Redtop	Poaceae	SNA					u	u	r
Agrostis perennans	Upland Bent Grass	Poaceae	S5	r	r	r	r	r	f	
Agrostis scabra	Rough Bent Grass	Poaceae	S5	ru	f	c		r	f	
Agrostis stolonifera	Creeping Bent Grass	Poaceae	S5	f				c	c	r
Alopecurus aequalis	Short-awned Foxtail	Poaceae	S4S5		r			f	r	
Brachyelytrum septentrionale	Northern Shorthusk	Poaceae	S5			l	r	c	r	r
Bromus ciliatus	Fringed Brome	Poaceae	S5			l	r	f	f	r
Bromus inermis	Smooth Brome	Poaceae	SNA					r	c	
Bromus latiglumis	Broad-Glumed Brome	Poaceae	S3						c	
Calamagrostis canadensis	Bluejoint Reed Grass	Poaceae	S5	c	c	l	c	c	c	
Cinna latifolia	Drooping Wood Reed Grass	Poaceae	S5		c	c		c	u	f
Dactylis glomerata	Orchard Grass	Poaceae	SNA						f	
Danthonia spicata	Poverty Oat Grass	Poaceae	S5		c	c		f	c	c
Deschampsia caespitosa	Tufted Hair Grass	Poaceae	S5			r				
Deschampsia flexuosa	Wavy Hair Grass	Poaceae	S5	r		f				
Dichanthelium acuminatum	Woolly Panic Grass	Poaceae	S5		f	l		r	●	u
Dichanthelium boreale	Northern Panic Grass	Poaceae	S5	r		r		u	r	r
Digitaria ischaemum	Smooth Crab Grass	Poaceae	SNA	r				r	r	
Echinochloa crus-galli	Large Barnyard Grass	Poaceae	SNA	r	l			f	f	
Elymus repens	Quack Grass	Poaceae	SNA			r	l	f	u	rl
Elymus virginicus	Virginia Wild Rye	Poaceae	S5	l	fc			c	c	
Elymus wiegandii	Wiegand's Wild Rye	Poaceae	S4						c	●
Festuca filiformis	Hair Fescue	Poaceae	SNA					r	r	r
Festuca rubra	Red Fescue	Poaceae	S5		l	c		r	r	

SCIENTIFIC NAME	COMMON NAME	FAMILY	NB S-RANK	SURVEY SITE						
				Hammond R.	Hampton	Parlee Bk.	Anagance	North R.	Petitcodiac R.	Sweet Mtn.
Festuca trachyphylla	Hard Fescue	Poaceae	SNA						r	r
Glyceria borealis	Northern Manna Grass	Poaceae	S5		u			u		
Glyceria canadensis	Canada Manna Grass	Poaceae	S5				c	l	r	
Glyceria grandis	Common Tall Manna Grass	Poaceae	S5		f	r		c	u	r
Glyceria laxa	Northern Mannagrass	Poaceae	S4?				r			
Glyceria melicaria	Slender Manna Grass	Poaceae	S5			r	u		u	r
Glyceria striata	Fowl Manna Grass	Poaceae	S5	r		c	c	c	c	c
Leersia oryzoides	Rice Cut Grass	Poaceae	S5	c	c		r	c	c	
Lolium arundinaceum	Tall Fescue	Poaceae	SNA					l		
Lolium pratense	Meadow Fescue	Poaceae	SNA	r						
Milium effusum var. cisatlanticum	Tall Millet Grass	Poaceae	S4			u				f
Muhlenbergia glomerata	Spiked Muhly	Poaceae	S4			rl				
Muhlenbergia mexicana	Mexican Muhly	Poaceae	S5			r		r	u	
Muhlenbergia uniflora	Bog Muhly	Poaceae	S5						r	
Oryzopsis asperifolia	White-grained Mountain Rice	Poaceae	S5			r	r	r	u	c
Panicum capillare	Common Witch Grass	Poaceae	S5	r	r	l		r	c	
Panicum dichotomiflorum var. dichotomiflorum	Fall Panic Grass	Poaceae	SNA						c	
Phalaris arundinacea	Reed Canary Grass	Poaceae	S5	c	c	r	c	c	c	r
Phleum pratense	Common Timothy	Poaceae	SNA		u	l	l	l	u	r
Phragmites australis ssp. americanus	Common Reed	Poaceae	S4	r						
Poa alsodes	Grove Meadow Grass	Poaceae	S4					f		
Poa annua	Annual Blue Grass	Poaceae	SNA	r	l			r	r	
Poa compressa	Canada Blue Grass	Poaceae	SNA			f		l	r	u
Poa nemoralis	Wood Blue Grass	Poaceae	SNA		l	ru			l	
Poa palustris	Fowl Blue Grass	Poaceae	S5	c	c	u		c	c	
Poa pratensis	Kentucky Blue Grass	Poaceae	S5				l	l	f	rl
Poa saltuensis	Weak Blue Grass	Poaceae	S4S5						r	
Schizachne purpurascens	Purple Oat Grass	Poaceae	S4S5							r
Setaria glauca	Yellow Foxtail	Poaceae	SNA					r	r	
Setaria viridis	Green Foxtail	Poaceae	SNA						r	
Spartina pectinata	Prairie Cord Grass	Poaceae	S5	c	c			c	c	
Sphenopholis intermedia	Slender Wedge Grass	Poaceae	S4						f	
Sporobolus vaginiflorus	Poverty Grass	Poaceae	SNA					r	r	rl
Torreyochloa pallida var. fernaldii	Pale False Manna Grass	Poaceae	S5	l	c		c	u	f	
Zizania palustris var. palustris	Northern Wild Rice	Poaceae	S4	c	c					
Sparganium americanum	American Burreed	Sparganiaceae	S5	r	u		c	c		

SCIENTIFIC NAME	COMMON NAME	FAMILY	NB S-RANK	SURVEY SITE						
				Hammond R.	Hampton	Parlee Bk.	Anagance	North R.	Petitcodiac R.	Sweet Mtn.
Sparganium angustifolium	Narrow-leaved Burreed	Sparganiaceae	S5	u	u					
Sparganium emersum	Green-fruited Burreed	Sparganiaceae	S5		c			c	c	
Sparganium eurycarpum	Broad-fruited Burreed	Sparganiaceae	S4S5	c	c					
Sparganium fluctuans	Floating Burreed	Sparganiaceae	S4	r						
Sparganium americanum / emersum	A Bur-reed	Sparganiaceae	-						l	
Typha latifolia	Broad-leaved Cattail	Typhaceae	S5	l	c		c	c	c	
Heteranthera dubia	Water Stargrass	Pontederiaceae	S3		r					
Pontederia cordata	Pickerelweed	Pontederiaceae	S5	c	c					
Allium tricoccum	Wild Leek	Liliaceae	S2						r	
Asparagus officinalis	Garden Asparagus	Liliaceae	SNA						r	
Clintonia borealis	Yellow Bluebead Lily	Liliaceae	S5			c		c	u	f
Hemerocallis fulva	Orange Day Lily	Liliaceae	SNA							r
Lilium canadense	Canada Lily	Liliaceae	S4					f	r	
Maianthemum canadense	Wild Lily-of-The-Valley	Liliaceae	S5		c	c	l	c	c	
Maianthemum racemosum	Large False Solomon's Seal	Liliaceae	S5			u			r	u
Maianthemum stellatum	Starry False Solomon's Seal	Liliaceae	S4S5					ru	r	
Maianthemum trifolium	Three-leaved False Solomon's Seal	Liliaceae	S5				l	l	l	
Medeola virginiana	Indian Cucumber Root	Liliaceae	S5			r				r
Polygonatum pubescens	Hairy Soloman's Seal	Liliaceae	S5			r				f
Streptopus amplexifolius	Clasping-leaved Twisted-stalk	Liliaceae	S5			u				r
Streptopus lanceolatus	Rose Twisted-stalk	Liliaceae	S5			u				f
Trillium cernuum	Nodding Trillium	Liliaceae	S5			f		c	r	
Trillium erectum	Red Trillium	Liliaceae	S5			r				f
Trillium undulatum	Painted Trillium	Liliaceae	S5			c		r		r
Uvularia sessilifolia	Sessile-leaved Bellwort	Liliaceae	S5		r	u		c	l	
Veratrum viride	Green False Hellebore	Liliaceae	S4		r					
Smilax herbacea	Herbaceous Carrion Flower	Smilacaceae	S4	r	f					
Iris versicolor	Harlequin Blue Flag	Iridaceae	S5	ru	f		u	c	u	r
Sisyrinchium montanum	Mountain Blue-eyed-grass	Iridaceae	S5		r	r				
Corallorhiza maculata	Spotted Coral-Root	Orchidaceae	S3S4							r
Cypripedium acaule	Pink Lady's-Slipper	Orchidaceae	S5			f				f
Cypripedium parviflorum var. pubescens	Large Yellow Lady's-Slipper	Orchidaceae	S4					r		
Epipactis helleborine	Helleborine	Orchidaceae	SNA			f		r	r	c
Platanthera dilatata	White Bog Orchid	Orchidaceae	S4					r		
Platanthera psycodes	Small Purple Fringed Orchid	Orchidaceae	S4					f		

*Identification for these occurrences is tentative and will require expert verification

APPENDIX 3. List of macrolichens documented during surveys, with provincial status ranks (S-rank, see Appendix 1 for definitions) and abundance at each survey site (c = common, f = fairly common, l = locally common, u = uncommon, rl = rare overall but locally common, r = rare; a dot indicates that the species was recorded but abundance was not noted).

SCIENTIFIC NAME	COMMON NAME	FAMILY	NB S-RANK	SURVEY SITE			
				Hampton	Parlee Bk.	North R.	Petitcodiac R.
Pyxine sorediata	Mustard Lichen	Caliciaceae	S4		c		
Cladina rangiferina	Gray Reindeer Lichen	Cladoniaceae	S5	l	l		
Cladina stellaris	Star-tipped Reindeer Lichen	Cladoniaceae	S5		l		
Cladonia cenotea	Powdered Funnel Lichen	Cladoniaceae	S5		u		
Cladonia crispata	Organpipe Lichen	Cladoniaceae	S5	u			
Cladonia cristatella	British Soldiers Lichen	Cladoniaceae	S5	u			
Cladonia floerkeana	Gritty British Soldiers Lichen	Cladoniaceae	S3S4	r			
Cladonia furcata	Forking Lichen	Cladoniaceae	S4S5	f			
Cladonia multiformis	Sieve Lichen	Cladoniaceae	S4S5		r		
Cladonia ochrochlora	Smooth-footed Powderhorn Lichen	Cladoniaceae	S5				●
Cladonia pyxidata	Pebbled Pixie-cup Lichen	Cladoniaceae	S5	u			
Cladonia squamosa	Dragon Lichen	Cladoniaceae	S5	c			
Cladonia strepsilis	Olive Cladonia Lichen	Cladoniaceae	S3	l			
Pycnothelia papillaria	Nipple Lichen	Cladoniaceae	S4	r			
Collema subflaccidum	Tree Tarpaper Lichen	Collemataceae	S5	c	f	u	
Leptogium cyanescens	Blue Jellyskin Lichen	Collemataceae	S5	r	c	f	u
Leptogium saturninum	Bearded Jellyskin Lichen	Collemataceae	S4			r	
Lobaria pulmonaria	Lungwort Lichen	Lobariaceae	S5	r	c	c	
Lobaria quercizans	Smooth Lung Lichen	Lobariaceae	S5		c	f	
Lobaria scrobiculata	Textured Lungwort Lichen	Lobariaceae	S4S5		u		
Pseudocyphellaria perpetua	Gilded Specklebelly Lichen	Lobariaceae	S3S4			r	
Nephroma parile	Powdery Kidney Lichen	Nephromataceae	S3S4	r		r	
Parmeliella triptophylla	Black-bordered Shingles Lichen	Pannariaceae	S4S5	r		r	
Protopannaria pezizoides	Brown-gray Moss-shingle Lichen	Pannariaceae	S3S4		r		
Evernia mesomorpha	Boreal Oakmoss Lichen	Parmeliaceae	S5	f	f		
Flavoparmelia caperata	Granulated Greenshield Lichen	Parmeliaceae	S5	c			f
Hypogymnia physodes	Monk's Hood Lichen	Parmeliaceae	S5	c	c	u	
Melanelixia subaurifera	Abrading Camouflage Lichen	Parmeliaceae	S5	●	c	u	f

SCIENTIFIC NAME	COMMON NAME	FAMILY	NB S-RANK	SURVEY SITE			
				Hampton	Parlee Bk.	North R.	Petitcodiac R.
Parmelia squarrosa	Bottlebrush Shield Lichen	Parmeliaceae	S5	c	c	c	
Parmelia sulcata	Hammered Shield Lichen	Parmeliaceae	S5				f
Platismatia glauca	Varied Rag Lichen	Parmeliaceae	S5	c		c	
Punctelia rudecta	Rough Speckleback Lichen	Parmeliaceae	S5	f	c	c	c
Xanthoparmelia cumberlandia	Cumberland Rock-shield Lichen	Parmeliaceae	S4	l			
Peltigera elisabethae	Concentric Pelt Lichen	Peltigeraceae	S4	r			
Peltigera evansiana	Peppered Pelt Lichen	Peltigeraceae	S4	r			r
Peltigera horizontalis	Flat-fruited Pelt Lichen	Peltigeraceae	S4	r	u		
Phaeophyscia rubropulchra	Orange-cored Shadow Lichen	Physciaceae	S5	c	c		c
Physcia adscendens	Hooded Rosette Lichen	Physciaceae	S4S5				r
Physcia millegrana	Mealy Rosette Lichen	Physciaceae	S4S5	●			u
Ramalina americana	Sinewed Ramalina Lichen	Ramalinaceae	S4S5	●	f	f	c
Rhizocarpon geographicum	Yellow Map Lichen	Rhizocarpaceae	SNR	l			
Umbilicaria deusta	Peppered Rocktripe Lichen	Umbilicariaceae	S4S5	u			
Dermatocarpon luridum	Brookside Stippleback Lichen	Verrucariaceae	S3S4	r			

APPENDIX 4. Bird species detected aurally or visually during surveys, with breeding evidence and provincial status ranks (S-rank, see Appendix 1 for definitions). Breeding evidence was recorded during surveys following the standards of the Maritimes Breeding Bird Atlas (see Appendix 5 for code definitions). However, because our surveys took place in late summer outside of the typical breeding season for most species, the majority of our observations do not provide evidence of breeding at these sites.

SCIENTIFIC NAME	COMMON NAME	FAMILY	NB S-RANK	SURVEY SITE						
				Hammond R.	Hampton	Parlee Bk.	Anagance	North R.	Petitcodiac R.	Sweet Mtn.
Accipiter striatus	Sharp-shinned Hawk	Accipitridae	S4B,S5M					X		
Buteo platypterus	Broad-winged Hawk	Accipitridae	S5B,S5M					X		
Haliaeetus leucocephalus	Bald Eagle	Accipitridae	S4	H	H		X		X	H
Pandion haliaetus	Osprey	Accipitridae	S4S5B,S5M	H	CF					H
Megaceryle alcyon	Belted Kingfisher	Alcedinidae	S5B,S5M					X	NU	
Mergus merganser	Common Merganser	Anatidae	S5B,S4N,S5M						X	
Ardea herodias	Great Blue Heron	Ardeidae	S4B,S4M		H			X		
Bombycilla cedrorum	Cedar Waxwing	Bombycillidae	S5B,S5M					P		H
Cathartes aura	Turkey Vulture	Cathartidae	S3B,S3M			H	X			
Catostomus commersonii	White Sucker	Catostomidae	S5							
Columba livia	Rock Pigeon	Columbidae	SNA					X		
Zenaida macroura	Mourning Dove	Columbidae	S5B,S5M,S4N							S
Corvus brachyrhynchos	American Crow	Corvidae	S5		X			H	X	
Corvus corax	Common Raven	Corvidae	S5					P		
Cyanocitta cristata	Blue Jay	Corvidae	S5		X			X	X	H
Melospiza georgiana	Swamp Sparrow	Emberizidae	S5B,S5M					S		
Melospiza melodia	Song Sparrow	Emberizidae	S5B,S5M					P		S
Zonotrichia albicollis	White-throated Sparrow	Emberizidae	S5B,S5M					CF		S
Carduelis tristis	American Goldfinch	Fringillidae	S5					H	X	H
Carpodacus purpureus	Purple Finch	Fringillidae	S4S5B,SUN,S5M					P		S
Loxia curvirostra	Red Crossbill	Fringillidae	S3					X		
Loxia leucoptera	White-winged Crossbill	Fringillidae	S5					H		
Hirundo rustica	Barn Swallow	Hirundinidae	S3B,S3M						FY	X
Petrochelidon pyrrhonota	Cliff Swallow	Hirundinidae	S2S3B,S2S3M							P
Tachycineta bicolor	Tree Swallow	Hirundinidae	S4B,S4M							X
Agelaius phoeniceus	Red-winged Blackbird	Icteridae	S4B,S4M		X					
Quiscalus quiscula	Common Grackle	Icteridae	S5B,S5M					H		
Dumetella carolinensis	Gray Catbird	Mimidae	S4B,S4M						X	
Poecile atricapilla	Black-capped Chickadee	Paridae	S5					S	X	H

SCIENTIFIC NAME	COMMON NAME	FAMILY	NB S-RANK	SURVEY SITE						
				Hammond R.	Hampton	Parlee Bk.	Anagance	North R.	Petitcodiac R.	Sweet Mtn.
Dendroica caerulescens	Black-throated Blue Warbler	Parulidae	S5B,S5M							S
Dendroica coronata	Yellow-rumped Warbler	Parulidae	S5B,S5M					H		
Dendroica fusca	Blackburnian Warbler	Parulidae	S5B,S5M					S		H
Dendroica pensylvanica	Chestnut-sided Warbler	Parulidae	S5B,S5M					S		
Dendroica virens	Black-throated Green Warbler	Parulidae	S5B,S5M					S		S
Geothlypis trichas	Common Yellowthroat	Parulidae	S5B,S5M		X			H		S
Mniotilta varia	Black-and-White Warbler	Parulidae	S5B,S5M					S		
Parula americana	Northern Parula	Parulidae	S5B,S5M					S		S
Seiurus aurocapilla	Ovenbird	Parulidae	S5B,S5M							S
Setophaga ruticilla	American Redstart	Parulidae	S5B,S5M					S		
Vermivora ruficapilla	Nashville Warbler	Parulidae	S5B,S5M					S		
Bonasa umbellus	Ruffed Grouse	Phasianidae	S5					H		
Colaptes auratus	Northern Flicker	Picidae	S5B,S5M		X					S
Picoides villosus	Hairy Woodpecker	Picidae	S5					X		
Regulus satrapa	Golden-crowned Kinglet	Regulidae	S5			X		S		H
Marmota monax	Woodchuck	Sciuridae	S5							
Gallinago delicata	Wilson's Snipe	Scolopacidae	S3S4B,S5M					X		
Tringa melanoleuca	Greater Yellowlegs	Scolopacidae	S1?B,S5M						X	
Tringa solitaria	Solitary Sandpiper	Scolopacidae	S2B,S5M					X	X	
Sitta canadensis	Red-breasted Nuthatch	Sittidae	S5					P	X	S
Archilochus colubris	Ruby-throated Hummingbird	Trochilidae	S5B,S5M					X		
Catharus fuscescens	Veery	Turdidae	S4B,S4M					H		S
Catharus guttatus	Hermit Thrush	Turdidae	S5B,S5M					H		S
Catharus ustulatus	Swainson's Thrush	Turdidae	S5B,S5M							H
Turdus migratorius	American Robin	Turdidae	S5B,S5M					S		AE
Empidonax alnorum	Alder Flycatcher	Tyrannidae	S5B,S5M					S		
Empidonax flaviventris	Yellow-bellied Flycatcher	Tyrannidae	S4S5B,S5M			X				
Empidonax minimus	Least Flycatcher	Tyrannidae	S5B,S5M							H
Vireo olivaceus	Red-eyed Vireo	Vireonidae	S5B,S5M					S		H
Vireo solitarius	Blue-headed Vireo	Vireonidae	S5B,S5M							S

APPENDIX 5. Bird breeding evidence codes (source: www.mba-aom.ca)

OBSERVED

X Species observed in its breeding season (no breeding evidence)

POSSIBLE

H Species observed in its breeding season in suitable nesting habitat

S Singing male(s) present, or breeding calls heard, in suitable nesting habitat in breeding season

PROBABLE

P Pair observed in suitable nesting habitat in nesting season

T Permanent territory presumed through registration of territorial song, or the occurrence of an adult bird, at the same place, in breeding habitat, on at least two days a week or more apart, during its breeding season. Use discretion when using this code. "T" is not to be used for colonial birds, or species that might forage or loaf a long distance from their nesting site e.g. Kingfisher, Turkey Vulture, and male waterfowl

D Courtship or display, including interaction between a male and a female or two males, including courtship feeding or copulation

V Visiting probable nest site

A Agitated behaviour or anxiety calls of an adult

B Brood Patch on adult female or cloacal protuberance on adult male

N Nest-building or excavation of nest hole by wrens and woodpeckers

CONFIRMED

NB Nest building or carrying nest materials, for all species except wrens and woodpeckers

DD Distraction display or injury feigning

NU Used nest or egg shells found (occupied or laid within the period of the survey)

FY Recently fledged young (nidicolous species) or downy young (nidifugous species), including incapable of sustained flight

AE Adult leaving or entering nest sites in circumstances indicating occupied nest

FS Adult carying fecal sac

CF Adult carying food for young

NE Nest containing eggs

NY Nest with young seen or heard