



**NATURAL ABUNDANCE –
AN EVALUATION OF SPECIES
RICHNESS IN THE SEAL
RIVER WATERSHED**

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INTRODUCTION

In the northernmost reaches of Manitoba there is a pristine expanse of tundra, wetlands and boreal forest that is teeming with a multitude of large mammals, birds, fish, and plants found few other places on earth. The Seal River Watershed is one of the last remaining large-scale wilderness areas of its size that remains fully ecologically intact. At 50,000 square kilometers, the watershed is nearly the size of Nova Scotia. Protecting the watershed from developments that would adversely impact habitats would provide a solid foundation for these species to thrive.

The Seal River Watershed Alliance of Dene, Cree and Inuit peoples is working to permanently protect the entire watershed for future generations as an Indigenous Protected Area. The Manitoba Chapter of the Canadian Parks and Wilderness Society has supported these efforts since 2016.

This report compiles the records of 260 species that are known to live within the Seal River Watershed — 20 of which are considered “at-risk”—using publicly available data including provincial government records, natural history records, citizen science, and Indigenous Knowledge. This paper serves as a reference tool, describing a preliminary list of species that have been formally recorded in the area and highlighting the species that are at risk. Further research will likely uncover additional species present in the watershed.

BIODIVERSITY & SPECIES RICHNESS

Our world is facing extraordinary change — widespread habitat degradation and climate shifts have forced dramatic decreases in biodiversity unprecedented in human history (Mooney *et al.* 2009; Ceballos *et al.* 2017, Callaghan *et al.* 2020). The world has lost around 60 percent of its mammals, birds, reptiles, amphibians and fish in the past 40 years,¹ according to the World Wildlife Fund. Around a million species are at risk of extinction - many within decades - according to a 2019 UN report which found that a quarter of assessed plant and animal species are threatened.²

But what is biodiversity and why is it important? Put simply, biodiversity is the variety and abundance of life— all the plants, animals, fungi and microorganisms that make up our natural world.

Biodiversity holds immeasurable intrinsic significance, but also provides great economic, ecological, recreational, cultural and scientific value (Hooper *et al.* 2005; Duffy 2008; Morton & Hill 2014). The water you drink, the food you eat, and the air you breathe all rely on the multitude of species on Earth and the interactions among them.

Understanding regional biodiversity provides a baseline measure to compare ecosystem health and human impacts over time. This understanding can be used for ongoing wildlife monitoring programs and is a critical first step in quantifying the conservation value of a given area. Species richness (the number of species present) is a standard measure used to estimate the more complex concept of biodiversity (Chapin III *et al.* 2002). Estimating species richness for a given area helps identify the presence of species at risk and can help shape conservation decisions based on their critical habitat.

¹ Source: WWF Living Planet Report <https://explore.panda.org/wildlife>

² Source: https://ipbes.net/sites/default/files/2020-02/ipbes_global_assessment_report_summary_for_policymakers_en.pdf IPBES (2019): Global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. E. S. Brondizio, J. Settele, S. Diaz, and H. T. Ngo (editors). IPBES secretariat, Bonn, Germany. 1148 pages. <https://doi.org/10.5281/zenodo.3831673>



THE SEAL RIVER WATERSHED

The Seal River Watershed is an enormous, natural ecosystem in northern Manitoba that has had minimal human intervention. There are no mines, no dams, no permanent roads. Only one community is located on the 50,000 square kilometer watershed: the Sayisi Dene First Nation, which lies on the beautiful shores of Tadoule Lake and has a population of fewer than 400 people. Today, the Seal River is one of the largest remaining free flowing (undammed) drainage basins in Canada and represents a valuable and unique habitat. The Sayisi Dene have partnered with neighboring communities, CPAWS, the Indigenous Leadership Initiative, and others to permanently conserve the watershed as an Indigenous Protected Area. (Seal River Watershed Initiative 2021).

The area is home to spectacular wildlife including beluga whales, polar bears, barren ground caribou, and a significant array of bird species.

The Seal River's estuary and surrounding marine environment has been designated as an Important Bird Area due to the many shore birds, passerines and sea birds that live there (IBA Canada 2021). While the impressive biodiversity of the Seal River and the surrounding area is widely understood, a formal list of species has not previously been compiled.

METHODOLOGY

Conservationists and ecologists are increasingly relying, at least partially, on digitized natural history collections and citizen science to quantify biodiversity (Hendrick et al. 2020; Suarez & Tsutsui 2004; Meineke et al. 2019). Using a similar approach, in order to estimate the species richness of the Seal River Watershed we reviewed publicly available records of species occurrence that have been created from multiple sources and compiled them in one list (See appendix A). Whenever the occurrence of a species was found within the boundary of the Seal River watershed for any of the following sources, they were included in the list.

- *Canadensys*: an online database that compiles the Canadian natural history collections from 11 universities, five botanical gardens, and two museums which collectively house over 13 million specimens.
- *Important Bird Areas (IBA) Canada*: an online database of avian species jointly managed by Bird Studies Canada and Nature Canada that is part of a global effort to identify, monitor and conserve the most critical sites for birds and biodiversity. The Seal River estuary has been designated an IBA.
- *The Manitoba Herp Atlas*: a citizen science database project aimed at determining where Manitoba's amphibians and reptiles live.
- *Manitoba Conservation Data Centre*: a request for data on species occurrence within the Seal River Watershed was made to and received from the Province of Manitoba in 2019.
- *The Freshwater Fishes of Manitoba*: This is the definitive and highly regarded identification guide for the 93 species of freshwater fishes found in Manitoba. Each species is described in detail with an accompanying map of their distribution.
- *Local Indigenous Knowledge*: Sayisi Dene Elders and landscape users provided expert insight into the species in the area through disclosure of personal observations.

For each species that was found within the Seal River Watershed using the above sources, if applicable, we verified their conservation status (Endangered, Threatened, Special Concern, Extirpated, or Extinct) under the following regulatory and advisory bodies:

- *The Canada Species at Risk Act (SARA)*: This act is part of Canada's strategy to protect wild plants and animal species from becoming extinct and to help in their recovery. SARA legally prohibits the harming of species designated as threatened or endangered and recognizes that protecting the habitat of species at risk is key to their conservation.
- *Committee on the Status of Endangered Wildlife in Canada (COSEWIC)*: COSEWIC acts as the advisory body for SARA. Wildlife species that have been designated at risk by COSEWIC may qualify for legal protection under SARA, however, political, social or economic factors may prevent them from adopting COSEWIC's recommendations.
- *Endangered Species and Ecosystems Act (ESEA) Manitoba*: This act is Manitoba's species and ecosystems at risk legislation. It is meant to ensure the protection of species designated as endangered, threatened or of special concern, and to enhance their survival.
- *International Union for Conservation of Nature (IUCN) Red List of Threatened Species*: The IUCN is the leading information source on the global extinction risk of animal, fungus and plant species. While not a regulatory body, the IUCN Red List is used by government agencies, wildlife departments, conservation-related non-governmental organizations, natural resource planners, educational organizations, students, and businesses to assess the risk of species worldwide.

SUMMARY OF RESULTS

In total, there are 261 documented species in the Seal River Watershed, though this is almost certainly an underrepresentation of the actual number of species. These include: 117 bird, 17 fish, 2 amphibian, 5 insect, 19 mammal, and 101 plant species (Appendix A). Of these, 20 species are designated as at risk (See Table 1).

Table 1: Species designated as “at-risk” according to the Canada Species at Risk Act (SARA), Committee on the Status of Endangered Wildlife in Canada (COSEWIC), Endangered Species and Ecosystems Act Manitoba (MB ESEA) and/or the International Union for Conservation of Nature (IUCN).

| Common Name | Scientific Name | Designation |
|-------------------------|-------------------------------|---|
| Black Scoter | <i>Melanitta americana</i> | Near Threatened (IUCN) |
| Blackpoll Warbler | <i>Dendroica striata</i> | Near Threatened (IUCN) |
| Buff-breasted Sandpiper | <i>Calidris subruficollis</i> | Near Threatened (IUCN); Special Concern (SARA); Special Concern (COSEWIC) |
| Common Eider | <i>Somateria mollissima</i> | Near Threatened (IUCN) |
| Common Nighthawk | <i>Chordeiles minor</i> | Threatened (MB ESEA) |
| Harris' Sparrow | <i>Zonotrichia querula</i> | Near Threatened (IUCN); Special Concern (COSEWIC) |
| Horned Grebe | <i>Podiceps auratus</i> | Vulnerable (IUCN); Special Concern (SARA); Special Concern (COSEWIC) |
| Long-Tailed Duck | <i>Clangula hyemalis</i> | Vulnerable (IUCN) |
| Olive-sided Flycatcher | <i>Contopus cooperi</i> | Near Threatened (IUCN); Threatened (MB ESEA); Threatened (SARA); Threatened (COSEWIC) |

| Common Name | Scientific Name | Designation |
|-------------------------------|------------------------------|--|
| Peregrine Falcon | <i>Falco peregrinus</i> | Endangered (MB ESEA) |
| Rusty Blackbird | <i>Euphagus carolinus</i> | Vulnerable (IUCN); Special Concern (SARA); Concern (COSEWIC) |
| Semipalmated Sandpiper | <i>Calidris pusilla</i> | Near Threatened (IUCN) |
| Short-eared Owl | <i>Asio flammeus</i> | Special Concern (SARA); Special Concern (COSEWIC) |
| Lake Sturgeon | <i>Acipenser fulvescens</i> | Special Concern (COSEWIC) |
| Barren-Ground Caribou | <i>Rangifer tarandus</i> | Vulnerable (IUCN); Threatened (COSEWIC) |
| Barren-Ground Grizzly | <i>Ursus arctos</i> | Special Concern (SARA); Special Concern (COSEWIC) |
| Beluga Whale | <i>Delphinapterus leucas</i> | Special Concern (COSEWIC) |
| Bowhead Whale | <i>Balaena mysticetus</i> | Special Concern (SARA); Special Concern (COSEWIC) |
| Polar Bear | <i>Ursus maritimus</i> | Vulnerable (IUCN); Threatened (MB ESEA); Special Concern (SARA); Special Concern (COSEWIC) |
| Wolverine | <i>Gulo gulo</i> | Special Concern (SARA); Special Concern (COSEWIC) |

Table 2: List of species documented to occur within the Seal River Watershed

| Species Type | Common Name | Scientific Name |
|--------------|--------------------------------|---------------------------------------|
| Bird | Alder Flycatcher | <i>Empidonax alnorum</i> |
| Bird | American Black Duck | <i>Anas rubripes</i> |
| Bird | American Golden-Plover | <i>Pluvialis dominica</i> |
| Bird | American Herring Gull | <i>Larus argentatus smithsonianus</i> |
| Bird | American Pipit | <i>Anthus rubescens</i> |
| Bird | American Robin | <i>Turdus migratorius</i> |
| Bird | American Three-toed Woodpecker | <i>Picoides dorsalis</i> |
| Bird | American Three-toed Woodpecker | <i>Picoides tridactylus bacatus</i> |
| Bird | American Tree Sparrow | <i>Spizella arborea</i> |
| Bird | American Wigeon | <i>Anas americana</i> |
| Bird | Arctic Tern | <i>Sterna paradisaea</i> |
| Bird | Baird's Sandpiper | <i>Calidris bairdii</i> |
| Bird | Bald Eagle | <i>Haliaeetus leucocephalus</i> |
| Bird | Belted Kingfisher | <i>Megaceryle alcyon</i> |
| Bird | Black Guillemot | <i>Cephus grylle</i> |
| Bird | Black Scoter | <i>Melanitta americana</i> |
| Bird | Black-bellied Plover | <i>Pluvialis squatarola</i> |
| Bird | Black-legged Kittiwake | <i>Rissa tridactyla</i> |
| Bird | Blackpoll Warbler | <i>Dendroica (Setophaga) striata</i> |
| Bird | Bohemian Waxwing | <i>Bombycilla garrulus</i> |
| Bird | Bonaparte's Gull | <i>Chroicocephalus philadelphia</i> |
| Bird | Boreal Chickadee | <i>Poecile hudsonicus</i> |
| Bird | Brant | <i>Branta bernicla</i> |
| Bird | Buff-bellied Pipit | <i>Anthus spinoletta rubescens</i> |
| Bird | Buff-breasted Sandpiper | <i>Tryngites subruficollis</i> |
| Bird | Cackling Goose | <i>Branta hutchinsii</i> |
| Bird | Canada Goose | <i>Branta canadensis</i> |
| Bird | Cliff Swallow | <i>Petrochelidon pyrrhonota</i> |
| Bird | Common Eider | <i>Somateria mollissima</i> |
| Bird | Common Goldeneye | <i>Bucephala clangula</i> |
| Bird | Common Loon | <i>Gavia immer</i> |
| Bird | Common Merganser | <i>Mergus merganser</i> |
| Bird | Common Nighthawk | <i>Chordeiles minor</i> |
| Bird | Common Raven | <i>Corvus corax</i> |
| Bird | Common Redpoll | <i>Acanthis flammea</i> |
| Bird | Dark-eyed Junco | <i>Junco hyemalis hyemalis</i> |
| Bird | Dovekie | <i>Alle alle</i> |
| Bird | Dunlin | <i>Calidris alpina</i> |
| Bird | Fox Sparrow | <i>Passerella iliaca</i> |
| Bird | Glaucous Gull | <i>Larus hyperboreus</i> |
| Bird | Golden Eagle | <i>Aquila chrysaetos</i> |
| Bird | Gray Jay | <i>Perisoreus canadensis</i> |
| Bird | Gray-cheeked Thrush | <i>Catharus minimus</i> |
| Bird | Greater Scaup | <i>Aythya marila</i> |
| Bird | Greater Yellowlegs | <i>Tringa melanoleuca</i> |
| Bird | Green-winged Teal | <i>Anas carolinensis</i> |
| Bird | Grey-cheeked Thrush | <i>Catharus minimus minimus</i> |
| Bird | Gyrfalcon | <i>Falco rusticolus</i> |
| Bird | Harris' Sparrow | <i>Zonotrichia querula</i> |
| Bird | Herring Gull | <i>Larus argentatus</i> |

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|------|------------------------|---------------------------------|
| Bird | Hoary Redpoll | <i>Acanthis hornemanni</i> |
| Bird | Hooded Merganser | <i>Lophodytes cucullatus</i> |
| Bird | Horned Grebe | <i>Podiceps auritus</i> |
| Bird | Horned Lark | <i>Eremophila alpestris</i> |
| Bird | Hudsonian Godwit | <i>Limosa haemastica</i> |
| Bird | Iceland Gull | <i>Larus glaucooides</i> |
| Bird | Killdeer | <i>Charadrius vociferus</i> |
| Bird | Lapland Longspur | <i>Calcarius lapponicus</i> |
| Bird | Least Sandpiper | <i>Calidris minutilla</i> |
| Bird | Lesser Yellowlegs | <i>Tringa flavipes</i> |
| Bird | Lincoln's Sparrow | <i>Melospiza lincolni</i> |
| Bird | Little Gull | <i>Hydrocoloeus minutus</i> |
| Bird | Long-tailed Duck | <i>Clangula hyemalis</i> |
| Bird | Long-tailed Jaeger | <i>Stercorarius longicaudus</i> |
| Bird | Mallard | <i>Anas platyrhynchos</i> |
| Bird | Merlin | <i>Falco columbarius</i> |
| Bird | Nelson's Sparrow | <i>Ammodramus nelsoni</i> |
| Bird | Northern Flicker | <i>Colaptes auratus</i> |
| Bird | Northern Harrier | <i>Circus cyaneus</i> |
| Bird | Northern Pintail | <i>Anas acuta</i> |
| Bird | Northern Shoveler | <i>Anas clypeata</i> |
| Bird | Northern Shrike | <i>Lanius excubitor</i> |
| Bird | Northern Waterthrush | <i>Parkesia noveboracensis</i> |
| Bird | Olive-sided Flycatcher | <i>Contopus cooperi</i> |
| Bird | Orange-crowned Warbler | <i>Vermivora celata</i> |
| Bird | Osprey | <i>Pandion haliaetus</i> |
| Bird | Pacific Loon | <i>Gavia pacifica</i> |
| Bird | Parasitic Jaeger | <i>Stercorarius parasiticus</i> |
| Bird | Pectoral Sandpiper | <i>Calidris melanotos</i> |
| Bird | Peregrine Falcon | <i>Falco peregrinus</i> |
| Bird | Pine Grosbeak | <i>Pinicola enucleator</i> |
| Bird | Pomarine Jaeger | <i>Stercorarius pomarinus</i> |
| Bird | Purple Finch | <i>Haemorhous purpureus</i> |
| Bird | Red-breasted Merganser | <i>Mergus serrator</i> |
| Bird | Red-necked Phalarope | <i>Phalaropus lobatus</i> |
| Bird | Red-throated Loon | <i>Gavia stellata</i> |
| Bird | Ring-billed Gull | <i>Larus delawarensis</i> |
| Bird | Ross's Goose | <i>Chen rossii</i> |
| Bird | Ruddy Turnstone | <i>Arenaria interpres</i> |
| Bird | Rusty Blackbird | <i>Euphagus carolinus</i> |
| Bird | Sanderling | <i>Calidris alba</i> |

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|------|------------------------|------------------------------------|
| Bird | Sandhill Crane | <i>Grus canadensis</i> |
| Bird | Savannah Sparrow | <i>Passerculus sandwichensis</i> |
| Bird | Semipalmated Plover | <i>Charadrius semipalmatus</i> |
| Bird | Semipalmated Sandpiper | <i>Calidris pusilla</i> |
| Bird | Short-billed Dowitcher | <i>Limnodromus griseus</i> |
| Bird | Short-eared Owl | <i>Asio flammeus</i> |
| Bird | Smith's Longspur | <i>Calcarius pictus</i> |
| Bird | Snow Goose | <i>Chen caerulescens</i> |
| Bird | Spotted Sandpiper | <i>Actitis macularia</i> |
| | | <i>Dendragapus canadensis</i> |
| Bird | Spruce Grouse | <i>canadensis</i> |
| Bird | Stilt Sandpiper | <i>Calidris himantopus</i> |
| Bird | Surf Scoter | <i>Melanitta perspicillata</i> |
| Bird | Swainson's Thrush | <i>Catharus ustulatus</i> |
| Bird | Swamp Sparrow | <i>Melospiza georgiana</i> |
| Bird | Tennessee Warbler | <i>Loiophlypis peregrina</i> |
| Bird | Tree Swallow | <i>Tachycineta bicolor</i> |
| Bird | Tundra Swan | <i>Cygnus columbianus</i> |
| Bird | Whimbrel | <i>Numenius phaeopus</i> |
| Bird | White-crowned Sparrow | <i>Zonotrichia leucophrys</i> |
| Bird | White-rumped Sandpiper | <i>Calidris fuscicollis</i> |
| Bird | White-winged Crossbill | <i>Loxia leucoptera</i> |
| Bird | White-winged Scoter | <i>Melanitta deglandi</i> |
| Bird | Willow Ptarmigan | <i>Lagopus lagopus</i> |
| Bird | Wilson's Snipe | <i>Gallinago delicata</i> |
| Bird | Yellow Warbler | <i>Dendroica petechia amnicola</i> |
| Bird | Yellow-rumped Warbler | <i>Setophaga coronata</i> |
| Fish | Arctic Char | <i>Salvelinus alpinus</i> |
| Fish | Arctic Grayling | <i>Thymallus arcticus</i> |
| Fish | Arctic Sculpin | <i>Myoxocephalus scorpioides</i> |
| Fish | Brook Trout | <i>Salvelinus fontinalis</i> |
| Fish | Burbot | <i>Lota lota</i> |
| Fish | Capelin | <i>Mallotus villosus</i> |
| Fish | Cisco | <i>Coregonus artedii</i> |
| Fish | Fourhorn Sculpin | <i>Myoxocephalus quadricornis</i> |
| Fish | Lake Chub | <i>Couesius plumbeus</i> |
| Fish | Lake Sturgeon | <i>Acipenser fulvescens</i> |
| Fish | Lake Trout | <i>Salvelinus namaycush</i> |
| Fish | Lake Whitefish | <i>Coregonus clupeaformis</i> |
| Fish | Longnose Sucker | <i>Catostomus catostomus</i> |
| Fish | Ninespine Stickleback | <i>Pungitius pungitius</i> |

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| Fish | Northern Pike | <i>Esox lucius</i> |
| Fish | Shorthorn Sculpin | <i>Myoxocephalus scorpius</i> |
| Fish | Troutperch | <i>Percopsis omiscomaycus</i> |
| Frog | Boreal Chorus Frog | <i>Pseudacris maculata</i> |
| Frog | Wood Frog | <i>Lithobates sylvaticus</i> |
| Insect | A Ground Beetle | <i>Bembidion compressum</i> |
| Insect | A Ground Beetle | <i>Bembidion hyperboraeorum</i> |
| Insect | A Ground Beetle | <i>Dicheirotrichus mannerheimii</i> |
| Insect | A Ground Beetle | <i>Dyschirius hiemalis</i> |
| Insect | A Ground Beetle | <i>Pterostichus brevicornis</i> |
| Mammal | Arctic Ground Squirrel | <i>Spermophilus parryi</i> |
| Mammal | Barren-Ground Caribou | <i>Rangifer tarandus</i> |
| Mammal | Barren-Ground Grizzly | <i>Ursus arctos</i> |
| Mammal | Beaver | <i>Castor canadensis</i> |
| Mammal | Beluga Whale | <i>Delphinapterus leucas</i> |
| Mammal | Black Bear | <i>Ursus americanus</i> |
| Mammal | Bowhead Whales | <i>Balaena mysticetus</i> |
| Mammal | Cinereous shrew | <i>Sorex cinereus cinereus</i> |
| Mammal | Fox | |
| Mammal | Gray Wolf | <i>Canis lupus</i> |
| Mammal | Harbour Seal | <i>Phoca vitulina</i> |
| Mammal | Moose | <i>Alces alces</i> |
| Mammal | Northern Short-tailed Shrew | <i>Blarina brevicauda</i> |
| Mammal | Otter | <i>Lontra canadensis</i> |
| Mammal | Polar Bear | <i>Ursus maritimus</i> |
| Mammal | Snowshoe Hare | <i>Lepus americanus</i> |
| Mammal | Southern red-backed Vole | <i>Myodes gapperi</i> |
| Mammal | Thirteen-lined Ground Squirrel | <i>Spermophilus tridecemlineatus</i> |
| Mammal | Wolverine | <i>Gulo gulo</i> |
| Plant | Alaska Bog Willow | <i>Salix fuscescens</i> |
| Plant | Alpine Azalea | <i>Loiseleuria procumbens</i> |
| Plant | Alpine Bearberry | <i>Arctostaphylos alpina</i> |
| Plant | Alpine Sweet Grass | <i>Anthoxanthum monticola</i> |
| Plant | Arctic Bellflower | <i>Campanula uniflora Linnaeus</i> |
| Plant | Arctic Bellflower | <i>Campanula uniflora Vill.</i> |
| Plant | Arctic Rush | <i>Juncus arcticus Willdenow</i> |
| Plant | Assiniboia Sedge | <i>Carex assiniboinensis</i> |
| Plant | Beautiful Cottongrass | <i>Eriophorum callitrix</i> |
| Plant | Bent Northern Sedge | <i>Carex deflexa</i> |
| Plant | Big-spore Quillwort | <i>Isoetes macrospora Durieu</i> |
| Plant | Bigelow's Sedge | <i>Carex bigelowii</i> |

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| Plant | Bigelow's Sedge | <i>Carex bigelowii</i> |
| Plant | Black Spruce | <i>Picea mariana</i> |
| Plant | Bluejoint | <i>Calamagrostis canadensis</i> |
| Plant | Boreal Bog Sedge | <i>Carex magellanica</i> |
| Plant | Boreal Starwort | <i>Stellaria borealis</i> |
| Plant | Brownish Sedge | <i>Carex brunnescens</i> |
| Plant | Capitate Sedge | <i>Carex arctogena</i> |
| Plant | Chamisso's Cottongrass | <i>Eriophorum chamissonis</i> |
| Plant | Common Cottongrass | <i>Eriophorum angustifolium</i> |
| Plant | Common False Asphodel | <i>Tofieldia pusilla</i> |
| Plant | Common Juniper | <i>Juniperus communis</i> |
| Plant | Common Moonwort | <i>Botrychium lunaria</i> |
| Plant | Common Woodrush | <i>Luzula multiflora</i> |
| Plant | Creeping Sedge | <i>Carex chordorrhiza</i> |
| Plant | Creeping Thistle | <i>Cirsium arvense</i> |
| Plant | Crowberry | <i>Empetrum nigrum</i> |
| Plant | Deergrass | <i>Trichophorum cespitosum</i> |
| Plant | Dwarf Birch | <i>Betula glandulosa</i> |
| Plant | Dwarf Scouring Rush | <i>Equisetum scirpoides Michaux</i> |
| Plant | False Toadflax | <i>Geocaulon lividum</i> |
| Plant | Fir Clubmoss | <i>Lycopodium selago Linnaeus</i> |
| Plant | Flixweed | <i>Descurainia sophioides</i> |
| Plant | Fox-tail Sedge | <i>Carex alopecoidea</i> |
| Plant | Foxtail Barley | <i>Hordeum jubatum</i> |
| Plant | Fragrant Woodfern | <i>Dryopteris fragrans</i> |
| Plant | Glacier Sedge | <i>Carex glacialis</i> |
| Plant | Glaucous Bluegrass | <i>Poa glauca</i> |
| Plant | Green Alder | <i>Alnus viridis</i> |
| Plant | Hair-like Sedge | <i>Carex capillaris</i> |
| Plant | Hairy Butterwort | <i>Pinguicula villosa Linnaeus</i> |
| Plant | Intermediate Sedge | <i>Carex media</i> |
| Plant | Jack Pine | <i>Pinus banksiana</i> |
| Plant | Lake Quillwort | <i>Isoetes lacustris</i> |
| Plant | Lapland Sedge | <i>Carex lapponica</i> |
| Plant | Lesser Saltmarsh Sedge | <i>Carex glareosa</i> |
| Plant | Long-beaked Willow | <i>Salix bebbiana</i> |
| Plant | Long-stalked Starwort | <i>Stellaria longipes</i> |
| Plant | Meadow Sedge | <i>Carex praticola Rydberg</i> |
| Plant | Mountain Firmoss | <i>Huperzia appressa</i> |
| Plant | Northern Cluster Sedge | <i>Carex arcta Boott</i> |
| Plant | Northern Firmoss | <i>Huperzia selago</i> |
| Plant | Fireweed | <i>Chamaenerion angustifolium</i> |

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| Plant | Northern Ground-cedar | <i>Diphasiastrum complanatum</i> |
| Plant | Northern interrupted-clubmoss | <i>Spinulum canadense</i> |
| Plant | Northern Seabeach Sandwort | <i>Honckenya peploides</i> |
| Plant | Northern White Rush | <i>Juncus albescens</i> |
| Plant | Northern Willow; | <i>Salix arctophila</i> |
| Plant | Northern Woodrush | <i>Luzula confusa</i> |
| Plant | Nuttall's alkaligrass | <i>Puccinellia nuttalliana</i> |
| Plant | One-cone Clubmoss | <i>Lycopodium lagopus</i> |
| Plant | Ostrich Fern | <i>Matteuccia struthiopteris</i> |
| Plant | Peck's Sedge | <i>Carex peckii</i> Howe |
| Plant | Pendant Grass | <i>Arctophila fulva</i> |
| Plant | Pincushion Plant | <i>Diapensia lapponica</i> L. |
| Plant | Polar Daisy | <i>Arctanthemum</i> |
| Plant | Purple Reed Grass | <i>Calamagrostis purpurascens</i> |
| Plant | Red Elderberry | <i>Sambucus racemosa</i> |
| Plant | Richardson's Willow | <i>Salix richardsonii</i> |
| Plant | Rock Sedge | <i>Carex saxatilis</i> |
| Plant | Rough Bentgrass | <i>Agrostis scabra</i> |
| Plant | Round-branch Ground-Pine | <i>Lycopodium dendroideum</i> |
| Plant | Round-fruited Sedge | <i>Carex rotundata</i> Wahlenberg |
| Plant | Savin-leaved Clubmoss | <i>Diphasiastrum sabinifolium</i> |
| Plant | Scant Sedge | <i>Carex rariflora</i> |
| Plant | Scant Sedge | <i>Carex rariflora</i> |
| Plant | Seabeach Sandwort | <i>Honckenya peploides</i> |
| Plant | Seaside Arrowgrass | <i>Triglochin maritima</i> |
| Plant | Silvery Sedge | <i>Carex canescens</i> |
| Plant | Sitka Clubmoss | <i>Diphasiastrum sitchense</i> |
| Plant | Small-flowered Woodrush | <i>Luzula parviflora</i> |
| Plant | Softleaf Sedge | <i>Carex disperma</i> Dewey |
| Plant | Sparse-flowered Sedge | <i>Carex tenuiflora</i> |
| Plant | Spiny-spore Quillwort | <i>Isoetes muricata</i> |
| Plant | Stiff Clubmoss | <i>Lycopodium annotinum</i> |
| Plant | Tamarack | <i>Larix laricina</i> |
| Plant | Thread rush | <i>Juncus filiformis</i> |
| Plant | Three-hulled Rush | <i>Juncus triglumis</i> |
| Plant | Three-leaved False Solomon's Seal | <i>Smilacina trifolia</i> |
| Plant | Three-toothed Saxifrage | <i>Saxifraga tricuspidata</i> |
| Plant | Tufted Pearlwort | <i>Sagina caespitosa</i> |
| Plant | Tussock Cottongrass | <i>Eriophorum spissum</i> . <i>Linnaea borealis</i> subsp. <i>longiflora</i> |
| Plant | Twinflower | |
| Plant | Wahlenberg's Woodrush | <i>Luzula wahlenbergii</i> |
| Plant | Water Sedge | <i>Carex aquatilis</i> |
| Plant | Weak Sedge | <i>Carex supina</i> ssp. <i>spaniocarpa</i> |
| Plant | White Cottongrass | <i>Eriophorum scheuchzeri</i> |
| Plant | White Spruce | <i>Picea glauca</i> |
| Plant | Williams' Sedge | <i>Carex williamsii</i> |
| Plant | Wood Horsetail | <i>Equisetum sylvaticum</i> |

CONCLUSIONS

This report verifies an impressive species richness within the Seal River Watershed with 261 documented species that were identified from multiple sources. Critically, we found that at least 20 of the species in the area are at risk.

It is important to note that the species list outlined here likely represents a gross underestimate of the actual species richness present in the area. Even though we drew upon multiple credible sources, estimates are admittedly incomplete. This is a natural consequence of remote areas being poorly sampled in biodiversity studies generally and the accessibility of this study area in particular (Callaghan et al. 2020). These data could be supplemented in the future with professional surveys, however, this would represent a substantial financial and logistical undertaking. As such, we consider this list a preliminary one that may be expanded as more publicly shared information becomes available.

Readers may note that there also appears to be a bias in the type of species listed in this report. For example, only five species of insect were identified in our sources. This is a natural consequence of the type of data that we were using, given that detection probabilities differ widely among species in natural history collections and citizen science projects tend to focus on vertebrates such as birds and large mammals, and plants of economic importance (White 2005).

Estimating biodiversity remains a fundamental measure in ecological analysis and conservation planning (Nelson & Ellis 2018), especially as we continue to lose species in the sixth global mass extinction event (Ceballos et al. 2017). Information presented in this paper will help inform the value of ecological goods and services in the area and will serve as foundational data as the initiative to protect and steward the Seal River Watershed as an Indigenous Protected Areas unfolds.

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