

9. APPENDIX

Table A1: Summary for biodiversity by province in Canada for areas with crop production

Province	Background	Ecozone/ ecoprovince	Ecoregion	Soils	Natural vegetation include	Water bodies include	Crops include	Animals/reptiles/ amphibians include	Birds include	Fish include	References
Saskatchewan	Ecozones are Taiga Shield (Selwyn lake Upland and Tazin Lake Upland), Boreal Shield (Athabasca Plain, and Churchill River Upland), Boreal Plain Ecozone (Mid-Boreal Upland, Mid-Boreal Lowland and Boreal Transition) and Prairie (Aspen Parkland, Moist Mixed Parkland, Mixed Grassland and Cypress Upland)	Boreal Plain ecozone	Mid-Boreal Upland	Gray Luvisolic soils, Gleysols and Mesisols	Trembling aspen, balsam poplar, white and black spruce, balsam fir, feathermoss, jack pine and tamarack	Rivers, small lakes, ponds and sloughs; Wetlands (bogs and fens)	Grains	Moose, woodland caribou, mule deer, white-tailed deer, elk, black bear, timber wolf, lynx, snowshoe hare, muskrat and beaver	Common loon, red-tailed hawk, white-throated sparrow, American redstart, ovenbird, hermit thrush and bufflehead	Northern pike, walleye, whitefish, perch and lake trout	Saskatchewan Conservation Data Centre (2019); University of Saskatchewan (n.d.); Virtual Saskatchewan (2019a, b, c, d, e, f, g)
		Boreal Plain ecozone	Mid-Boreal Lowland	Eutric Brunisols, Mesisols and Grey Luvisols	Trembling aspen, balsam poplar, black and white spruce, balsam fir, tamarack, American elm, green ash and Manitoba maple	Rivers; Extensive wetlands (bogs and fens) on about 50% of the area)	Seed grains, oilseeds and forage crops	Moose, woodland caribou, black bear, wolf, lynx, snowshoe hare and muskrat	Common loon, Canada warbler, ruby-crowned kinglet, white-breasted nuthatch, ruffed grouse, duck, goose, pelican and sandhill crane.	Northern pike, walleye, lake trout, and perch	
		Boreal Plain ecozone	Boreal Transition	Gray Luvisols, Dark Gray and Black Chernozemic, Peaty Gleysolic and Mesisolic soils	Trembling aspen, balsam poplar, jack pine, white spruce, balsam fir, sedges, willow, black spruce and tamarack	Rivers, a large number of small lakes, ponds and sloughs	Mostly farmland (70% of the land); Spring wheat, other cereals, oilseeds and hay	White-tailed deer, black bear, elk, moose, beaver, coyote, snowshoe hare and cotton tail, northern flying squirrel and short tailed shrew	Gray jay, boreal chickadee, black and white warbler and great-crested flycatcher, ruffed grouse and waterfowl	Northern pike, walleye, perch, rainbow trout	
		Prairie ecozone	Aspen Parkland	Black Chernozemic and Gleysolic soils	Trembling aspen, oak groves, willow and fescue grasslands	Small lakes, ponds and sloughs	Mostly farmland; spring wheat, other cereals, oilseeds and forage crops	White-tailed deer, coyote, snowshoe hare, cottontail, red fox, northern pocket gopher, Franklin's ground squirrel and Richardson's ground squirrel	House wren, least flycatcher, western kingbird, yellow warbler, sharp-tailed grouse, black-billed magpie and waterfowl such as ducks	Northern pike, walleye and perch	
		Prairie ecozone	Moist Mixed Grassland	Dark brown Chernozemic	Wheatgrass, spear grasses deciduous shrubs (for	Lake; sloughs and ponds;	Spring wheat, other cereals,	White-tailed deer, mule deer, pronghorn	Western meadowlark, eastern kingbird, yellow-	Northern pike, walleye and perch	

				mic and Solonchic soils	example, snowberry, rose, buckbrush, chokecherry, wolf willow and saskatoon), scrubby aspen, willow, cottonwood, box-elder, meadow grasses, sedges, alkali grass, wild barley, red samphire and sea blite	Minor irrigation near Lake Diefenbaker	forage and oilseed crops	antelope, coyote, jack rabbit, red fox, badger and Richardson's ground squirrel	headed blackbird, piping plover, sharp-tailed grouse and Franklin's gull and waterfowl		
		Prairie ecozone	Mixed Grassland	Brown Chernozemic and Solonchic soils	Wheatgrasses, speargrasses, blue grama grass, June grass, dryland sedge, sagebrush, yellow cactus, scrubby aspen, willow, cottonwood, box-elder, alkali grass, wild barley, greasewood, red samphire and sea blite	Rivers	Driest ecoregion; spring wheat, durum wheat and flaxseed	Pronghorn antelope, white-tailed and mule deer, sage grouse, short-horned lizard, prairie rattlesnake, western painted turtle, black-tailed prairie dog, coyote, jack rabbit and Richardson's ground squirrel	Ferruginous hawk, long-billed curlew, yellow-breasted chat, chestnut-collared longspur, burrowing owl, sage grouse and waterfowl	Northern pike, walleye, rainbow trout and perch	
		Prairie ecozone	Cypress Upland	Chernozemic Black and Dark Brown, Luvisolic and Regosolic sils	Fescue grass, wheatgrass grasslands, forests, larkspur, lodgepole pine, death camas and wild lupine	River and creeks	Cereals (limited production)	Mule and white-tailed deer, elk, moose, pronghorn antelope, sage grouse, short-horned lizard, western rattlesnake, coyote, rabbit and ground squirrel	Trumpeter swan, golden eagle, yellow-rumped warbler, MacGillvary's warbler, Audonon's warbler, dusky flycatcher, Townsend's solitaire and Audubon's warbler	Brook, brown trout and rainbow trout	
Alberta	Ecozones are Rocky Mountain (Alpine, Subalpine, and Montane), Foothills (Upper Foothills and Lower Foothills), Grassland (Dry Mixedgrass, Northern Fescue and Foothills Fescue), Parkland	Foothills ecozone	Lower Foothills	Orthic Gray Luvisolic, Brunisolic Gray Luvisols, Dystric Brunisols, Eutric Brunisols, Regosols,	Aspen, balsam poplar, white birch, lodgepole pine, black spruce, white spruce, balsam fir, tamarack, bearberry, common juniper, hairy wild rye, green alder, low-bush cranberry, prickly rose, wild	Wetlands (20%) and lakes and streams (<1%); rivers; fens and bogs	Till cropping and forage crops;	Red squirrel, moose, flying squirrel, beaver black bear, elk, woodland caribou, wolverine, long-toed salamander, meadow vole, boreal toad and wood frog	Boreal chickadee, spruce grouse, rubycrowned kinglet, white-winged crossbill, ruffed grouse, black-capped chickadee and Tennessee warbler, warbling vireo, yellow-bellied sapsucker (northern race), rose-breasted	Rocky Mountain whitefish, bull trout, Arctic grayling, burbot and white sucker	Alberta Biodiversity Monitoring Institute (2019); Alberta Environmental Protection Natural Resources Service Recreation &

<p>(Foothills Parkland, Central Parkland and Peace River Parkland), Boreal Forest (Dry Mixedwood, Central Mixedwood, Lower Boreal Highlands, Upper Boreal Highlands, Athabasca Plain, Peace-Athabasca Delta, Northern Mixedwood and Boreal Subarctic) and Canadian Shield (Kazan Upland)</p>			Gleysolic, Mesisols, Orthic and Peaty Gleysols	sarsaparilla, dewberry, fireweed, bluejoint, feathermosses, Labrador tea, bog cranberry and common blueberry, bracted honeysuckle, ferns, bluejoint and cow parsnip, Devil's-club, horsetail and bog birch				grosbeak, purple finch, Barrow's Goldeneye, trumpeter swan, lesser yellowlegs, common snipe and Lincoln's sparrow		<p>Protected Areas Division Natural Heritage Protection and Education Branch (1997); Alberta Parks (2015); Alberta Wilderness Association (2019 a, b); Government of Alberta (2007a, b); Natural Regions Committee (2006); Stelfox and Wynes (n.d.)</p>
	Grassland ecozone	Dry Mixedgrass	Solonchic, Orthic Brown Chernozem, Rego Chernozem and Regosolic and Humic, Orthic and Luvisolic soils	Blue grama, needle-and-thread, June grass, western wheat grass, sand grass, silver sagebrush, silver berry, buckbrush, prickly rose, moss phlox, pasture sage, prairie selaginella, dotted blazingstar, willows, thorny buffaloberry, prickly-pear cactus, clammyweed, low milk vetch, annual skeletonweed and plains cottonwood	Wetlands (3%) and lakes and streams (2%); rivers; temporary waterbodies and marshes	35% under dryland farming; Irrigation (nearly 10%); mainly wheat/fallow	Richardson's ground squirrel, pronghorn, Ord's kangaroo rat, western hognose snake, deer mouse, Nuttall's cotton tail, white tailed-deer, boreal chorus frog, northern leopard frog, plains spadefoot toad and garter snake	Brown thrasher, gray catbird, common yellowthroat, yellow-breasted chat and rufous-sided towhee, mourning dove, great-horned owl, northern flicker, least flycatcher, house wren and northern oriole, horned lark, McCown's longspur, chestnut-collared longspur, Baird's sparrow, Sprague's pipit, sharp-tailed grouse, upland sandpiper, sage grouse, lark bunting, Brewer's sparrow, golden eagle, rock wren ferruginous hawk, prairie falcon and mountain bluebird	Western silvery minnow and stonecat	
	Grassland ecozone	Mixedgrass	Orthic Dark Brown Chernozems, Rego Chernozems, Regosols, Brown and Black Chernozem and Solonchic soils	Needle-and-thread, porcupine grass, northern and western wheatgrass, western porcupine grass, sand grass, June grass, buckbrush, blue grama grass, sedges, blue bunch fescue, plains rough fescue, silver sage brush,	Wetlands (5%), mostly marshes and lakes and streams (1%); few rivers	Mainly agricultural production (85% of land covered with crops); irrigation (5%); wheat, barley and canola	Similar to drymixed grass e.g., Richardson's ground squirrel	Similar to dry mixedgrass e.g., Baird's sparrow, Sprague's pipit, upland sandpiper and sharp-tailed grouse, horned lark, and chestnut-collared longspur		

					silverberry, prickly rose, willows, thorny buffaloberry, cottonwood and balsam poplar, sedges and spike-rushes						
	Grassland ecozone	Northern Fescue	Orthic Dark Brown and Black Chernozems, Solonetzics, Regosols, Rego Chernozems and Orthic, Humic and Luvic Gleysols	Plains rough fescue, aspen, balsam poplar, plains cottonwood, lue grama grass, northern wheat grass, sans grass, June grass, western porcupine grass, slender wheat grass, Hookers's oat grass, buckbrush, silverberry, prickly rose and saskatoon and herbs such as prairie crocus, prairie sagewort, wild blue flax, northern bedstraw and three-flowered avens	Wetlands (7%), mostly marshes and lakes and streams (3%); river;	Till-cropping; approximately 55% of the land is cultivated; wheat, barley and canola	Mule deer, white-tailed deer, moose and elk, thirteen-lined ground squirrel, Richardson's ground squirrel, prairie long-tailed weasel, white tailed jack rabbit, American badger, bison, pronghorn, coyote, tiger salamander, Canadian toad, boreal chorus frog, northern leopard frog, wandering garter snake, and western plains garter snake.	Baird's sparrow, Sprague's pipit, upland sandpiper, sharp-tailed grouse, horned lark, chestnut-collared longspur savannah sparrow, northern pintails, snow geese, loggerhead shrike, piping plover, ferruginous hawk, long-billed curlew, American white pelican, nesting geese. Harlequin ducks, Sabine's gull and Townsend's solitaires			
	Grassland ecozone	Foothills Fescue	Dark Brown and Orthic Black Chernozems, Solonetzics and Humic Gleysols	Mountain rough fescue, Parry oat grass, blue bunch fescue, creeping juniper, June grass, tufted hair grass, shrubby cinquefoil, sedges, western wheatgrass, buck brush, willow, sedge, silverberry, prickly rose and saskatoon. Herbs include silvery perennial lupine, sticky purple geranium, three-flowered avens, pasture sagewort and golden bean	Wetlands are uncommon (3%) and 1% lakes and streams (1%); rivers	Till cropping; 50% cultivated; barley and forage crops	Elk, pronghorn, white-tailed deer, mule deer, yellow bellied marmot and Northern leopard frog	Ferruginous hawks, golden eagles, prairie falcons, pintail duck, Baird's sparrow, Brewer's sparrow and sharp-tailed grouse	Shorthead (St. Mary) sculpin, Silvery minnow, stonecat, brassy minnow and sauger		

		Parkland ecozone	Foothills Parkland	Deep Orthic Black Chernozems, Orthic Dark Gray Chernozems and Orthic Gleysols	Aspen forests, willow, balsam poplar, white spruce, plains cottonwood, sedge, Douglas fir, mountain rough fescue, Parry's oatgrass, bluebunch fescue, needle-and-thread grass, tufted hair grass, lupines, oat grass, snowberry, silverberry, white meadowsweet, prickly rose, saskatoon, wild red raspberry, glacier lilies and wild white geranium	Wetlands (4%) and lakes and streams (<1%); river	Till cropping; hay or field crops (feed grains)	Moose and elk	Dusky flycatcher, MacGillivray's warbler, lazuli bunting, white-crowned sparrow, clay-colored sparrows, orange-crowned warblers, yellow warblers, alder flycatchers, white crowned sparrows, black-headed grosbeaks, blue grouse and trumpeter swan	Bull trout	
		Parkland ecozone	Central Parkland	Orthic Black Chernozems, Orthic Dark Gray Chernozems, Dark Grey Luvisolic, Humic and Orthic Gleysols and Solonchaks soils.	Aspen, plains rough fescue, balsam poplar, jack pine, white spruce, common cattail, willow, beaked hazelnut, bunchberry, wild lily-of-the-valley and wild sarsaparilla, western porcupine grass, June grass, needle-and-thread grass, blue grama grass, dryland sedges, pasture sagewort, northern wheat grass, Hooker's oatgrass, herbs (prairie crocus, prairie sagewort, wild blue flax, northern bedstraw and three-flowered avens among others), buckbrush, silverberry, prickly rose, chokecherry, saskatoon, hay sedge, creeping juniper, common	Wetlands (10%) and lakes and streams (2%); Rivers; mainly marshes; seasonal ponds and fens	Land is extensively cultivated; Till cropping; Crops include wheat, barley, canola, pulses and flax	Prairie vole, Franklin's ground squirrel, thirteen-lined ground squirrel, white-tailed deer, snowshoe hare, northern pocket gopher, red squirrel, least chipmunk, garter snake, American porcupine, spadefoot toad, boreal chorus frog, wood frog, Canadian toad and northern leopard frog	Upland sandpiper, Sprague's pipit, Baird's sparrow woodchuck, broad-winged hawk, rose-breasted grosbeak, red-tailed hawk, least flycatcher, Baltimore oriole, red-eyed vireo, yellow warbler, hermit thrush, sharp-tailed grouse, American redstart, Tennessee warbler, mourning dove, great-horned owl, northern flicker, house wren, northern oriole, blue jay, white-throated sparrow, yellow-bellied sapsucker and piping plover, diving ducks, grebes, American bittern, marsh wren, black tern and ducks,	Northern pike, yellow perch, white, brook stickleback and fathead minnow	

					Labrador tea, feathermosses, bulrush marshes and treed fens						
	Parkland ecozone	Peace River Parkland	Solonchic soils, Dark Gray and Black Chernozems, Dark Grey Luvisols, Orthic Gray Luvisols, Regosols, Brunisols, Rego Dark Brown Chernozems, Humic and Orthic Cumulic Regosols, Orthic and Humic Gleysols and Terric Mesisols	Aspen, jack pine, balsam poplar, white spruce, beaked willow, sedge, California oat grass, western porcupine grass, June grass, sedges, pasture sagewort, northern and slender wheat grass, brittle prickly pear, saskatoon, choke cherry, buckbrush, prickly rose, snowberry, bluejoint, red-osier dogwood, horsetail, common Labrador tea and peat moss fens	Wetlands (6%) and lakes and streams (2%); fens and ponds	Much of the land has been cultivated; Till cropping; Crops include canola, wheat and barley	Moose, elk, deer, black bear, grizzly bear, Wandering and red-sided gartersnakes	Trumpeter swan; golden eagle, bald eagle, osprey, western meadowlarks and savannah sparrows	Flathead chub, lake chub, longnose dace, longnose sucker, northern pike, trout-perch, reidside shiner, northern squawfish, largescale sucker, bull trout, goldeye, walleye, yellow perch, lake whitefish, mountain whitefish and burbot		
	Boreal Forest ecozone	Dry Mixedwood	Orthic Gray and Dark Gray Luvisols; Solonchic soils, Greysoils, Gleyed Gray Luvisols, and Organic soils (Terric Mesisols, Fibric Mesisols and Peaty	Aspen, treed and shrubby fens, jack pine, lichen, white spruce, balsam poplar, porcupine grass, June grass, sedges, pasture sagewort, northern and slender wheat grasses, saskatoon, buckbrush, bearberry, common blueberry, green alder, prickly rose, wild lily-of-the-valley, hairy wild rye, beaked hazelnut, wild sarsaparilla, cream	Wetlands (15%) and lakes and streams; rivers (3%); fens, bogs or mineral soils	Much of the land has been cultivated; Till cropping; oilseeds, wheat, barley and forages	Beaver, moose, snowshoe hare, black bear, wolf, lynx and ermine	Least flycatcher, house wren, ovenbird, red-eyed and warbling vireos, Baltimore oriole, rose-breasted grosbeak. Yellow-bellied sapsucker, Swainson's thrush, solitary vireo, magnolia warbler, white-throated sparrow, pileated woodpecker, northern goshawk, yellow rail, sedge wren, great-crested flycatcher, chestnut-sided warbler and			

				and Orthic Gleysols	colored vetchling, purple peavine, bluejoint, low bush cranberry, Canada buffaloberry, bunchberry, red-osier dogwood, feathermosses, horsetails and bogs				blackburnian warbler		
		Boreal Forest ecozone	Central Mixedwood	Gray Luvisols, Dystric, Eutric Brunisols, Solonetzic intergrades, Mesisols, Fibrisols, Cryosols and orthic and Peaty Gleysols	Aspen, white spruce, jack pine, lodgepole pine, balsam poplar, black spruce fens, bogs, conifer, balsam fir, northern rice grass, Rocky Mountain fescue, dryland sedges, plains wormwood, lichen, bearberry, common blueberry, green alder, prickly rose, wild lily-of-the-valley, hairy wild rye, low bush cranberry, Canada buffaloberry, bunchberry, wild sarsaparilla, and dewberry, feathermoss, red-osier dogwood, common Labrador tea, peat moss, feathermosses and willow, dwarf birch, sedges, bluejoint, tamarack, golden moss and rich-site forbs	Wetlands (40%) mainly peatlands; fens, bogs and marshes and lakes and streams (3%); rivers	Till cropping; hay crops, tame or native pasture	Red squirrel, beaver, moose, snowshoe hare, black bear, wolf, lynx, Southern red-backed vole, masked shrew, deer mouse, least chipmunk, moose and ermine, fisher, wolverine, river otter, and woodland caribou	Western wood pewee, gray jay, red-breasted nuthatch, golden and ruby-crowned kinglets, yellow-rumped warbler, pine siskin, red and white-winged crossbills, dark-eyed junco, boreal chickadee, bay-breasted, Cape May and black-throated green warblers, least flycatcher, house wren, ovenbird, red-eyed and warbling vireos, northern oriole and rose-breasted grosbeak, yellow-bellied sapsucker, Swainson's thrush, solitary vireo, magnolia warbler, white-throated sparrow, pileated woodpecker, northern goshawk, yellow and black-and-white warblers, American redstart, song sparrow, northern water thrush, fox sparrow, Philadelphia vireo and barred owl		
Manitoba	Ecozones are Southern Arctic (Maguse River upland), Taiga Shield (Kazan River Upland and Selwyn Lake	Boreal Shield ecozone	Lac Seul Upland	Dystric Brunisolic soils, Organic Mesisols and Fibrisols,	Jack pine, trembling aspen, black spruce, white spruce, balsam fir, balsam poplar, feather mosses, ericaceous shrubs,	Lakes and rivers; wetlands (bogs and fens	Limited agriculture; native hay and alfalfa	Moose, black bear, wolf, woodland caribou, white-tailed deer, lynx, ermine, fisher,	Bald eagle, great horned owl and red-tailed hawk, spruce grouse, herring gull, double crested cormorant	Shortjaw cisco and Carmine shiner	Government of Manitoba (2013); http://lakeofthewoods.ca/recreation/species-of-fish ; Smith

Upland), Hudson Plain (Coastal Hudson Bay Lowland and Hudson Bay lowland), Boreal Shield (Churchill River Upland, Hayes River Upland, Lac Seul Upland and Lake of Woods), Boreal Plain (Mid-Boreal Uplands, Boreal Transition, Mid-Boreal Lowland and Interlake Plain) and Prairie (Lake Manitoba Plain, Southwest Manitoba. Uplands and Aspen parkland).			Gray Luvisols and Gleysolic soils	mosses, lichens, dwarf birch, sedges and tamarack			mink, red squirrel, beaver, muskrat and snowshoe hare	and turkey vulture, ducks and geese		et al. (2001); https://www.gov.mb.ca/sd/environment_and_biodiversity/cdc/ecoregions/index.html
	Boreal Shield ecozone	Lake of the Woods	Organic Mesisols and Fibrisols, Eutric Brunisols, Dystric Brunisols, Gray Luvisols and Dark Gray Chernozemic soils and Gleysolic soils	Jack pine, trembling aspen, paper birch, white spruce, eastern white cedar, black ash, white elm, red pine, eastern white pine, bur oak, red (green) ash, black spruce and tamarack	Rivers and lakes; wetlands (peatlands)	Limited arable agriculture; feed grains, oilseeds and hay crops	Moose, black bear, wolf, lynx, snowshoe hare, white tailed deer and bobcat	Ruffed grouse, hooded merganser, pileated woodpecker, bald eagle, turkey vulture, herring gull and waterfowl	Walleye, small mouth bass, muskie, crappie and lake trout and northern pike, shortjaw cisco, banded killifish and carmine shiner	
	Boreal Plains ecozone	Mid-boreal Lowland	Eutric Brunisols, Organic Mesisols and Fibrisols and Gray Luvisolic soils	Black spruce, trembling aspen, balsam poplar, jack pine, white spruce, balsam fir, ericaceous shrubs, sedges, brown birch and tamarack	Lakes and rivers; wetlands (include peatlands)	Limited arable agriculture; feed grains, oilseeds and hay	Moose, black bear, wolf, lynx, red fox, snowshoe hare, woodland caribou and deer	Raptors, sandhill crane, ruffed grouse, ducks, geese, white pelican and cormorant	Shortjaw cisco	
	Boreal Plains ecozone	Boreal Transition	Dark Gray Chernozemic soil, Gray Luvisols, peaty Gleysols and Organic Mesisols	Trembling aspen, balsam poplar, white spruce, balsam fir, sedges, willow, black spruce, tamarack	Small lakes, ponds and sloughs; wetlands	Limited agricultural production; spring wheat, other cereals, oilseeds and hay crops	White-tailed deer, elk, black bear, moose, beaver, coyote and rabbit	Ruffed grouse and waterfowl		
	Boreal Plains ecozone	Mid-boreal Upland	Gray Luvisolic soils, Humic Gleysols, Organic Mesisols, Eutric Brunisols and Dark Gray	Trembling aspen, balsam poplar, white spruce, balsam fir, black spruce, jack pine, tamarack and feather moss	Small ponds, lakes and slough and rivers; wetlands (e.g., bog peatlands)	Land generally not used for agriculture	Elk, moose, black bear, wolf, lynx, , marten, snowshoe hare, red fox and beaver	Bald eagle, spruce grouse, duck and goose		

				Chernoze ms							
		Boreal plains ecozone	Interlake Plain	Chernoze mic Dark Gray and Blay soils, Eutric Brunisols, Gray Luvisols, Organic Mesisols and Humic Gleysols	Trembling aspen, balsam poplar, white spruce, balsam fir, jack pine, sedges, willow, black spruce and tamarack	Lakes and rivers; peatlands	Spring wheat, other cereal grains, oilseeds and hay crops	White-tailed deer, black bear, moose, beaver, coyote, snowshoe hare and eastern cottontail	Ruffed grouse, cormorant, gull, tern, heron, American white pelican and grebe	Shortjaw cisco	
		Prairie ecozone	Aspen Parkland	Chernoze mic Black soils; Regosols; Gleysols	Trembling aspen, bur oak, fescues, wheat grasses, June grass, Kentucky bluegrass, slough grasses, marsh reed grass, sedges, cattails and shrubby willows	Small lakes, ponds, sloughs and rivers; wetlands	Spring wheat and other cereals, oilseeds and potatoes	Elk, pronghorn antelope, white- tailed deer, coyote, red fox, ground squirrel, cottontail rabbit, hare, striped skunk, redback vole deer mice, black bear, red-sided and western plains garter snakes	Raptors, ferruginous hawk, sparrow hawk and red-tailed hawk, mourning dove, black-billed magpie, red-winged blackbird, killdeer, meadowlark , ruffed grouse, and ducks		
		Prairie ecozone	Lake Manitoba Plain	Black Chernoze mic soils, Humic Vertisolic and Gleysolic soils	Trembling aspen, bur oak, fescue grasses, wheat grasses, June grass and Kentucky bluegrass, slough grasses, marsh reed grass, sedges, cat- tails, sedge and shrubby willow	Lakes and rivers	Spring wheat, other cereal grains, oilseeds and hay	White-tailed deer, coyote, rabbit and ground squirrel	Waterfowl		
		Prairie ecozone	Southwest Manitoba Uplands	Dark Gray and Black Chernoze mic, Gray Luvisols, Gleysols and Organic Mesisols	White spruce, trembling aspen, balsam poplar, bur oak, sedges and willow.	Small lakes, ponds and sloughs; wetlands	Spring wheat, other cereals, oilseeds and hay crops are	White-tailed deer, black bear, beaver, coyote, rabbit and hare	Ruffed grouse, red- tailed hawk, common flicker and sparrows such as Le Conte's and the song sparrow, ducks and coots		
Ontario	Ecozones are Hudson Bay Lowlands (Hudson	Ontario Shield ecozone	Lake Temagami (4E)	Podzols, Brunisols, Greysols,	Eastern white pine, red pine, sugar maple, red maple,	Various lakes and rivers	Agriculture is important	Moose, beaver, American martens,	American black duck, broad-winged hawk, barred owl,	Lake trout, brook trout, lake	Crins, Gray, Uhlig, and Wester (2009)

<p>Bay Coast, Northern Taiga and James Bay), Ontario Shield (Big Trout Lake, Lake Abitibi, Lake St. Joseph, Lake Nipigon, Lake Temagami, Lake Wabigoon, Pigeon River, Georgian Bay and Agassiz Clay Plain) and Mixedwood Plains (Lake Simcoe-Rideau and Lake Erie-Lake Ontario)</p>			Mesisols and Dystric Brunisols	yellow birch, jack pine, black spruce, sugar maple and red maple		in the Little Clay belt	American black bear, snapping turtle, eastern garter snake, Northern ring-necked snake, eastern red-backed salamander, mink frog, northern leopard frog and spring peeper	winter wren, hermit thrush, black-throated green warbler and white-throated sparrow	whitefish, northern pike, emerald shiner, longnose sucker, creek chub, rock bass and pumpkinseed
	Ontario Shield ecozone	Lake Wabigoon (4S)	Dystric Brunisols and Mesisols	Jack pine, black spruce, balsam fir, trembling aspen, white birch, white spruce, tamarack, black ash and balsam poplar, American elm, ironwood, bur oak, large-tooth aspen, eastern white pine, and red pine, red maple, sugar maple, and American basswood, bur oak, nodding onion and big bluestem	Various lakes and rivers; wetland	Agriculture is found in the Dryden and Fort Frances areas	Gray wolf, ermine, fisher, American mink, moose, snowshoe hare, blue-spotted salamander, boreal chorus frog, green frog, western painted turtle and red-sided gartersnake.	Bald eagle, merlin, ruffed grouse, gray jay, common raven, hermit thrush and yellow-rumped warbler	Lake trout, northern pike, northern redbelly dace, goldeye, muskellunge, pumpkinseed and river darter
	Ontario Shield ecozone	Pigeon River (4W)	Dystric Brunisols, Gray Luvisols, Mesisols and Gleysols	Eastern white pine, white spruce, Jack pine, red pine, Jack pine, trembling aspen, large-tooth aspen, white birch, balsam fir, white spruce, black spruce, sugar maple, yellow birch, American basswood, ironwood, box elder, bur oak, tamarack, eastern white cedar, black ash, American elm and red maple	Various lakes and few major rivers	Agriculture is predominant	Moose, American black bear, snowshoe hare, spotted salamander, gray treefrog, western painted turtle, northern red-bellied snake and central newt	Ruffed grouse, pileated, woodpecker, hermit thrush, magnolia warbler, white-throated sparrow and hooded merganser	Lake trout, lake chub, northern pike, burbot, golden shiner, bluntnose minnow, and rock bass
	Ontario Shield ecozone	Agassiz Clay plain ecoregion (5S)	Gleysols, Gray Luvisols, hernozeimi	Black spruce, tamarack, eastern white cedar, willow, speckled alder, sugar maple,	Lakes, rivers, extensive wetlands;	Agriculture is predominant	White-tailed jack rabbit, Franklin's ground squirrel, blue-spotted salamander,	Sharp-tailed grouse, black-billed magpie, western meadowlark, golden-winged	Lake trout, lake whitefish, northern pike, muskellunge,

				c soils and Mesisols	red maple, wild black cherry, American basswood, green ash, white spruce, balsam fir, trembling aspen, and white birch, bur oak, northern pin oak and American elm	peatlands and swamps		northern red- bellied snake, American black bear, snowshoe hare boreal chorus frog and American toad	warbler, scarlet tanager, Connecticut warbler, boreal chickadee and gray jay	rock bass, pumpkinseed, black crappie, bluntnose minnow and blacknose dace
	Mixedwood Plains ecozone	Lake Simcoe- Rideau (6E)	Gray Brown Luvisols, Melanic Brunisols, Gleysols and Humoferric Podzols	Sugar maple, American beech, white ash, eastern hemlock, green ash, silver maple, red maple, eastern white cedar, yellow birch, balsam fir, black ash, fens, bogs, black spruce and tamarack and American alvar	Lakes and rivers; wetlands (peatlands)	Most of the land is cropland	White-tailed deer, Northern raccoon, striped skunk, and woodchuck, snapping turtle, eastern gartersnake common watersnake, red- spotted newt, American bullfrog, northern leopard frog and spring peeper	Field sparrow, grasshopper sparrow, eastern meadowlark, hairy woodpecker, wood thrush, scarlet tanager, rose- breasted grosbeak, Wood duck, great blue heron and Wilson's snipe	White sucker, smallmouth bass, walleye, northern pike, yellow perch, rainbow darter, emerald shiner and pearl dace	
	Mixedwood Plains ecozone	Lake Erie- Lake Ontario (7E)	Gray Brown Luvisols and Gleysols	Tulip-tree, black gum, sycamore, Kentucky coffee- tree, pawpaw, oaks, hickories, common hackberry, sugar maple, American beech, white ash, eastern hemlock, eastern white pine and tall-grass prairie	Watershed; various rivers and a few small lakes; most wetlands have been eliminated; some coastal marshes, swamps and open fens	78% of the land has been converted to agriculture	White-tailed deer, northern raccoon, striped skunk, Virginia opossum, spiny softshell turtle, eastern red- backed salamander, eastern gartersnake, Midland painted turtle, spiny softshell turtle, blue racer, small- mouthed salamander and American toad	Green heron, Virginia rail, Cooper's hawk, eastern kingbird, willow flycatcher, brown thrasher, yellow warbler, common yellowthroat, northern cardinal, savannah sparrow, wild turkey, Acadian flycatcher, king rail, prothonotary warbler and hooded warbler	Longnose gar, channel catfish, smallmouth bass, yellow perch, walleye, northern hogsucker, banded killifish and spottail shiner	
Quebec	Ecozones are Arctic Cordillera (Torngat Chain), Northern Arctic (Northern Ungava Peninsula), Southern Arctic (Central Ungava Peninsula), Taiga	Boreal Shield ecozone	Southern Laurentians	Humo- Ferric Podzols, Ferro- Humic Podzols, Dystric Brunisols	White spruce, balsam fir, paper birch, aspen, trembling aspen, black spruce, balsam fir and tamarack	Rivers and lakes; wetlands	Limited farming	Moose, black bear lynx, snowshoe hare, wolf, coyote, white-tailed deer and chipmunk	American black duck, wood duck, hooded merganser, pileated woodpecker and cardinal	http://ecozones.ca/english/zon/index.html ; http://www.corridorappalachien.ca/en/biodiversity/ ; https://mreac.o

<p>Shield (La Grande Hills, Southern Ungava Peninsula, New Quebec Central Plateau, Ungava Bay Basin, George Plateau, Kingurutik-Fraser River, Smallwood Reservoir-Michikamau and Mecatina River), Boreal shield (Abitibi Plains, Lake Temiskaming Lowland, Southern Laurentians, Riviere Rupert Plateau, Central Laurentians, Anticosti Island and Mecatina Plateau), Atlantic Maritime (Appalachians, Northern new Brunswick Highlands and Iles-de-la-Madedeleine), Mixedwood plains (St-Lawrence Lowlands) and Hudson plains (James Bay Lowlands).</p>			and Mesisols								rg/watershed/ ; DePratto and Kraus (n.d.); Wiken, Nava, and Griffith (2011)
	Boreal Shield ecozone	Central Laurentians	Dystric Brunisolic, Luvisolic and Organic soils	Black spruce, balsam fir white spruce, paper birch lichens, feathermosses, sugar maple, beech, and yellow birch, eastern hemlock, eastern white pine, white, red and jack pine and white cedar	Wetlands; rivers	Limited agriculture	Caribou, black bear, wolf, moose, lynx, snowshoe hare, white tailed deer fox and lynx	Canada goose, ruffed grouse, and American black duck, shorebirds and seabirds			
	Atlantic Maritime ecozone	Appalachians	Dystric Brunisols and Gleysols	Black spruce, balsam fir, paper sugar maple, beech, yellow birch, eastern hemlock, eastern white pine, white spruce, red maple, black ash and tamarack	Rivers; wetlands	Agriculture is one of the main land uses	Moose, black bear, white-tailed deer, beaver, porcupine, bobcat, red fox, lynx, marten and rabbit	Pileated woodpecker, American redstart, Eurasian wren, barred owl, seabirds and shorebirds			
	Atlantic Maritime ecozone	Northern New Brunswick Highlands	Loamy Humo-Ferric and Ferro-Humic Podzols and Gray Luvisols	Sugar maple, beech, yellow birch, eastern hemlock, balsam fir, eastern white pine, white, white, red and jack pine.	Rivers	Some agriculture	Moose, black bear, white-tailed deer, red fox, snowshoe hare, porcupine, fisher, coyote, beaver, bobcat, and marten	Ruffed grouse, seabirds and shorebirds	atlantic salmon, brook trout, sea lamprey, 87arbor8787 eel, alewife, blueback herring, 87arbor8787 shad, rainbow smelt, atlantic tomcod, striped bass, dace, chubs sticklebacks, flounder and capelin		
Mixedwood Plains ecozone	St-Lawrence lowlands	Gleysolic soils, Humo-Ferric Podzols and Dystric Brunisols	Sugar maple, yellow birch, eastern hemlock, eastern white pine, beech, red pine, eastern white cedar, red oak, red maple, black ash, white spruce, tamarack and eastern white cedar	Rivers	Mixed farming with corn as one of the dominant crops	Deer, black bear, moose, wolf, hare and chipmunk	Waterfowl, and other birds				

British Columbia	Ecoprovinces of British Columbia are Boreal Plains, Central Interior, Coast and Mountains, Georgian Depression, Northeast Pacific, Northern Boreal Mountains, Southern Alaska Mountains, Southern Interior Mountains, Sub-boreal Interior and Taiga Plains.	Georgian Depression ecoprovince		Fine silt, clay, coarse sand, gravel and glacial deposits	Douglas-fir, mountain hemlock, alpine, tufted hairgrass, fescues, rushes, seaside arrow-grass, silverweed, sedges, black cottonwoods, red alder, bigleaf maple, grand fir, western redcedar, flowering dogwood, salal, dull Oregon-grape, sword fern, starflower, mosses, arbutus, camas, sea bluish, shootingstar, blue-eyed Mary, oceanspray, common snowberry, eastern red cedar salal, dull Oregon-grape, red alder, salmonberry, bracken, fireweed, amabilis fir, western hemlock, yellow-cedar, white-flowered rhododendron, false azalea, blueberries, queen's cup, bunchberry, twayblades, and five-leaved bramble, mountain-heathers, crowberry, partridgefoot. Sitka valerian, Indian hellebore, white marsh-marigold, leatherleaf saxifrage, black alpine sedge, Mountain-heathers, saxifrages, and lichens	Wetlands; rivers and streams	Food crops, berries and cereals	Columbian black-tailed deer, American black bear, cougar, Roosevelt elk, coyote, mink, raccoons, Vancouver Island Marmot, Olympic Marmot, marsh shrew, Trowbridge's shrew, shrew-mole, Townsend's and coast mole, Douglas' squirrel, creeping vole, eastern cottontail, sharptail snake, Pacific treefrog, Pacific giant salamander and ensatina	Snow geese, northern harrier, red-tailed hawk, short-eared owl, dulin, Pacific loon, western grebe, Brandt's cormorant, common and Barrow's goldeneyes, surf, white-winged and black scoter, greater and lesser scaup, Thayer's and glaucous-winged gulls, common Murre, and marbled and ancient murrelets, black turnstone and surfbird, barn owl, Anna's hummingbird, double-crested cormorants, glaucous-winged Gulls, purple martin, bushitit, and Hutton's vireo, and crested myna	Rockfish, flounder, spiny dogfish, Pacific herring, ling cod, Pacific salmon, steelhead, coastal cutthroat trout, and eulachon, native peamouth chum and threespine stickleback, green sturgeon, Dolly Varden char, bull trout and Coast Range sculpin	Demarchi (2011)
		Sub-boreal interior ecoprovince		Soils are strongly acidic and often has	White spruce, subalpine fir, lodgepole pine, trembling aspen, paper birch,	Wetlands, rivers	Few cereal crops are produced	Moose, woodland caribou, mountain goats, Stone's Sheep,	Boreal owl, herring gull and black tern, rusty blackbird and magnolia warbler	Chinook and sockeye salmon, rainbow trout, lake trout,	

				turfy topsoils	prickly rose, soopolallie, willows, black twinberry, thimbleberry, devil's club, bunchberry, amicas, twinflower, fireweed, trailing raspberry, oak fern, creamy peavine, asters, sedge fens, scrub birch, willows, sedges, black spruce, Labrador tea, black cottonwood, red-osier dogwood, highbush cranberry, black gooseberry, horsetails, bluejoint, whiteflowered rhododendron, black huckleberry, mountain-ash, black gooseberry, bunchberry, arnica, twisted stalks, Sitka alder, valerian, Indian hellebore, ragwort, hellebore, Indian paintbrush, mountain heathers and lichens			mule deer and white-Tailed deer, American black bears, wolves, grizzly bears lynx, fisher, muskrat, common garter snake, western toad, wood frog, spotted frog and long-toed salamander		bull trout, lake and mountain whitefish, Arctic grayling, longnose sucker, slimy sculpin and torrent sculpin
	Southern Interior Mountains		Soils are moderately weathered, have clay layers or strongly weathered and acidic	Douglas-fir, ponderosa pine, western larch, lodgepole pine, saskatoon, antelope-brush, redstem ceanothus, rough fescue, bluebunch wheatgrass, junegrass, Kentucky Bluegrass, Canada bluegrass, needlegrasses, and cheatgrasses, rose, kinnikinnick, soopolallie, birch-leaved spirea,	Rivers;	Cereal crops produced in lowlands and flood plains	Mountain goats, mule and white-tailed deer, Rocky Mountain elk mountain caribou, bighorn sheep, grizzly and black bears, coyotes, cougars, grey wolves, Canada lynx, wolverine, martin, bobcats, fisher, American badger, long-eared myotis, pika, hoary marmot, Columbian	Forster's Tern, ospreys western grebe, long-billed curlew, black-billed cuckoo, American coots, tundra swans, Canada geese, redhead, white-breasted nuthatch and Clark's nutcracker	Chinook salmon, sturgeon, rainbow trout, bull trout, mountain whitefish, mottled sculpin and Yellowstone cutthroat trout	

				<p>pinegrass, black cottonwood, spruce, red-osier dogwood, false Solomon's-seal, horsetails, Engelmann spruce, subalpine fir, honeysuckle, saskatoon, birch-leaved spirea, false azalea, pinegrass, bunchberry, mosses white-flowered rhododendron, grouseberry, false azalea, thimbleberry, queen's cup, bunchberry, pinegrass, mosses, Sitka alder, rough fescue whitebark pine and alpine larch, western hemlock, western redcedar, grand fir, western white pine, paper birch, or trembling aspen, blueberries, false box, devil's club, Utah honeysuckle, twinflower, queen's cup, oak fern, mountain hemlock, rhododendron, black gooseberry, false azalea, twisted stalk, Sitka valerian, bunchberry</p>			<p>ground squirrel, golden mantled ground squirrel, water vole, the painted turtle, common and western terrestrial garter snakes, long-toed salamander, western toad, and spotted and northern leopard frogs</p>		
	Boreal Plains ecoprovince		Clay and silt or coarser textured soils	<p>White spruce, black spruce, trembling aspen, balsam poplar, lodgepole pine, paper birches, high bush cranberry, prickly rose, soopolallie, willows, fireweed, bunchberry, asters, creamy peavine, mosses, red-osier</p>		Some cereal production	<p>Moose, mule deer and white-tailed deer, woodland caribou, plains bison and rocky mountain elk, elk grey wolves, coyotes, lynx and American black bears, Arctic shrew, common</p>	<p>Eared grebe, Hudsonian godwit, white-rumped sandpiper, stilt sandpiper, broad-winged hawk, sharp-tailed grouse, upland sandpiper, Franklin's gull, common grackle, eastern phoebe, Philadelphia vireo,</p>	<p>Arctic grayling, northern pike, walleye, bull trout, slimy sculpin, flathead chub, lake trout, lake whitefish and pearl dace.</p>

					dogwood, horsetails, tamarack, Labrador tea, horsetails, sphagnum, saskatoon, trembling aspen, roses, wheatgrass, and needlegrass, scrub birch, Engelmann spruce and subalpine fir, white-flowered rhododendron, black huckleberry, and scrub-birch.			garter snake, salamander, the long-toed salamander and northern chorus frog	chestnut-sided warbler, black-throated green warbler, Connecticut warbler and Lapland longspur.		
Nova Scotia	Atlantic Maritime ecozone (Northern Plateau, Cape Breton Highlands, Nova Scotia Uplands, Eastern, Northumberland/Bras D'or, Valley and Central Lowlands, Western, Atlantic Coastal and Fundy Shore)	Atlantic Maritime ecozone	Cape Breton Highlands	Orthic Humo-Ferric and Ferro-Humic Podzols and Gleyed and Cemented (Ortstein) subgroups	Balsam fir, white spruce, heart-leaf birch and white birch	Wetlands, lakes and streams	Agriculture is very minimal	Moose, snowshoe hare, black bear, Canada lynx and American marten	Bicknell's thrush		Government of Nova Scotia (2015); Government of Nova Scotia (2019); Neily, Basquill, Quigley, and Keys (2017); Webb and Marshall (1999)
		Atlantic Maritime ecozone	Nova Scotia Uplands	Orthic Humo-Ferric, Ferro-Humic Podzols, Gleyed Luvisols, and Sombric and/or Dystric Brunisols	Sugar maple, beech, yellow birch, hemlock, red spruce and white spruce	Many rivers and a few lakes	Farming is carried out	White-tailed deer, moose, black bear, snowshoe hare, fisher, coyote, and porcupine			
		Atlantic Maritime ecozone	Eastern	Orthic Humo-Ferric, Ferro-Humic Podzols, Gleyed Luvisols, Gleysols, Luvic Gleysols, Folisols,	Red spruce, hemlock yellow birch, red maple, sugar maple and black spruce	Wetlands; lakes, streams and stillwaters	Some agriculture				

			Mesisols and Humisols							
	Atlantic Maritime ecozone	Northumberl and/ Bras d'Or	Gleyed Luvisols, Luvic Gleysols, Gleyed Humo-Ferric and Ferro-Humic Podzols Gleysols, Humic Gleysols and Orthic Humo-Ferric soils	Black source, jack pine, red pine, yellow birch, hemlock, red spruce, elm, sugar maple, white ash, white spruce, tamarack and aspen	Wetlands; lakes, rivers and streams	Some agriculture	Moose, black bear, skunk, eastern coyote, lynx, woodchuck, porcupine, raccoon, snowshoe hare, bobcat, American marten, white-tailed deer and bat hibernacula, wood turtle, snapping turtle and four-toed salamander	Eagle, osprey, goshawk, owls, hawk, waterfowl, shorebirds, tern, heron, gull, and seabirds	Atlantic salmon, brook trout, shad, Atlantic sturgeon, lake whitefish smelt, gaspereau, striped bass, American eel, northern cod and mussels	
	Atlantic Maritime ecozone	Valley and Central lowlands	Orthic Humo-Ferric and Ferro-Humic Podzols, Gleyed Luvisols, Luvic Gleysols and Orthic, Gleyed Humic Regosols and Cemented (Ortstein) subgroups	Red spruce, hemlock, white pine, yellow birch, red maple, black spruce, red and white pine, red oak, aspen and grey and white birch	Rivers and streams	Most of salt marsh dyked and turned to farmland. Flood plains extensively used for agriculture	White tailed deer, wood turtles	American golden plover, semipalmated plover, killdeer, greater yellowlegs, willet, spotted sandpiper, red knot, semipalmated sandpiper, least sandpiper, bald eagle and black ducks	Striped bass, sturgeon and Atlantic salmon, gaspereau, shad, and eels, tomcod and sea trout	
	Atlantic Maritime ecozone	Western	Orthic Humo-Ferric and Ferro-Humic Podzols, Gleyed subgroups, Cemented (Ortstein) subgroups	White pine, hemlock, red pine, red oak, sugar maple, beech, yellow birch, red spruce, hemlock, black spruce, white spruce balsam fir, ericaceous plants (kill, huckleberry, rhodora, blueberry, bearberry and broom crowberry)	Extensive wetlands; rivers and lakes	Field crops, orchards and forage				

				, Sombric Podzols						
		Atlantic Maritime ecozone	Atlantic Coastal	Orthic, Gleyed, Ortstein and Gleyed Ortstein Humo-Ferric and Ferro-Humic Podzols, Fibrisols, Mesisols, Humisols, Folisols and Gleysols.	White and black spruce, balsam fir, red spruce, red maple, yellow birch, raised and flat bogs, fens and salt marshes, white birch, heart-leaf birch, mountain-ash, downy alder, bayberry, foxberry, hemlock, sugar maple and beech	Wetlands; rivers and lakes	Some agriculture	White-tailed deer	Shorebirds and seabirds	
		Atlantic Maritime ecozone	Fundy shore	Orthic and Sombric Ferro-Humic and Humo-Ferric Podzols, Gleyed subgroups, Humic Gleysols, Mesisols and Humisols)	Yellow birch, red spruce, hemlock, sugar maple and beech	Wetlands; lakes, rivers and streams	Some agriculture			
New Brunswick	Atlantic Maritime ecozone (Highlands, Northern Uplands, Central Uplands, Fundy Coast, Valley Lowlands, Eastern Lowlands and Grand Lake Lowlands	Atlantic Maritime ecozone	Northern Uplands		Sugar maple, yellow birch, beech, cedar, red spruce, beech, hemlock, black ash, balsam poplar, balsam fir, black spruce, white spruce, white pine, red pine, jack pine, white pine, wood-sorrel, wood fern, and wild lily-of-the-valley	Wetlands; streams and rivers	Forage, grain and pasture	Pine marten and Canadian lynx	Osprey and great blue heron	
		Atlantic Maritime ecozone	Central uplands		Balsam fir, red, white, and black spruce, yellow birch, sugar maple,	Wetlands (peatlands, streamside alder	Forage, grain and pasture		American black duck, blue-winged teal, common merganser bald	
										Government of New Brunswick (2007); http://ecozones.ca/english/region/123.html

				beech, cedar, red oak, ironwood, basswood, butternut, white ash, green ash, hemlock, mountain maple, striped maple, and hobblebush, mountain fern moss, wood sorrel, wood fern, shining clubmoss	swamps, marshes and shallow open waters)			eagle, osprey and great blue heron	
	Atlantic Maritime ecozone	Fundy Coast	Humo-Ferric Podzols, Mesisols, Regosols and Gleysols	Red spruce, balsam fir, black spruce, white spruce, tamarack, cedar, white birch, mountain ash, red maple, yellow birch, red maple, jack pine and white pine	Wetland types are diverse; rivers and lakes	Mixed farming	Moose, black bear, white-tailed deer, red fox, snowshoe hare, porcupine, fisher, coyote, beaver, bobcat, raccoon, four-toed salamander, little brown bat, long-eared bat, and eastern pipistrelle	Ruffed grouse, ducks, seabirds, cormorants, gulls, arctic tern, Atlantic puffin, razorbill and puffin	
	Atlantic Maritime ecozone	Valley Lowlands		Red spruce, balsam fir, white spruce, basswood, butternut, ironwood, silver maple, green ash, white ash, cedar, sugar maple, yellow birch, hemlock, beech, aspen, red maple, red and white pine, red oak dogtooth violet, hay-scented fern, sensitive fern, tamarack, Christmas fern and riverbank grape	Wetland types are diverse; rivers and lakes	Mixed farming; potatoes and grain		Nesting loons, bald eagle, osprey, scarlet tanager, wood duck, pied-billed grebe, scarlet tanager, warbling vireo and wood thrush	Searun brook trout, Miramichi salmon, crayfish, American black duck, goldeneye, eiders, scoters, and bufflehead
	Atlantic Maritime ecozone	Eastern Lowlands		Trembling aspen, jack pine, red pine, white pine and black spruce	Highest percentage of wetlands in New Brunswick; rivers and lakes	Mixed farming; grains (e.g., alfalfa and oats), forage, pasture and horticultural crops		Piping plover, terns, ducks, great blue heron, belted kingfisher, ruffed grouse, willet, rail and American bittern, fork-tailed flycatcher and the scissor-tailed	

		Atlantic Maritime ecozone	Grand Lake Lowlands		Ironwood, basswood, white ash, green ash, northern red oak, and silver maple, bur oak, butternut, American elm, red maple, green and black ash, beech, sugar maple, yellow birch, red spruce, hemlock, white pine, black spruce, red pine and jack pine	Diverse wetlands; rivers and lakes	Fruits and vegetables	Salamanders, toads and frogs (e.g., eastern gray tree frog)	flycatcher, lack-crowned night heron		
Prince Edward Island		Atlantic Maritime ecozone		Podzols and Luvisols	Stunted balsam fir, red spruce, eastern hemlock, white pine, yellow birch, beech and sugar maple	Wetlands Rivers and lakes	Crops produced	White-tailed deer, moose, black bear, raccoon, striped skunk, bobcat, and eastern chipmunk, northern flying squirrel, coyote, snowshoe hare, mink, wolves and lynx;	Whip-poor-will, blue jay, eastern bluebird, rose-breasted grosbeak, loons, Canada geese and blue-winged teal, ring-neck ducks and ospreys	Atlantic salmon, striped bass, Atlantic whitefish and American eel, Brook Trout, Gaspereau, Halibut, scallop, mackerel, groundfish, and herring	https://www.thecanadianencyclopediacanada.ca/en/article/natural-regions ; http://ecozones.ca/english/zones/AtlanticMaritime/land.html
Newfoundland and Labrador	Ecozones in Newfoundland and Labrador are Arctic Cordillera, Taiga Shield and Boreal Shield	Boreal Shield ecozone			Balsam fir, white spruce, black spruce, tamarack, white birch, trembling aspen, balsam poplar white, red and jack pine, lichens and shrubs	Peatlands and lakes	Agriculture is in suitable climates and soils	Black bear, lynx, marten, woodland caribou, moose, raccoon, eastern chipmunk, white-tailed deer, fisher, striped skunk, and bobcat	Blue jay, warbler, owl and loon		https://www.heritage.nf.ca/articles/environment/boreal-shield.php
Yukon	Ecozones in Yukon are the Southern Arctic (Yukon Coastal Plain), Taiga plain (Peel River Plateau, Fort McPherson, Muskwa Plateau), Taiga Cordillera (British-Richardson Mountains, Old Crow Basin, Old Crow Flats, North	Boreal Cordillera ecozone	Klondike Plateau	Cryosols, Eutric Brunisols, Mesic Organic Cryosols, Dystric Brunisols, Regosols and Turbic Cryosols	Forests and grasslands	Wetlands; rivers	Some localized agriculture in valley bottoms	Barren-ground caribou herd, Dall's sheep, moose, snowshoe hare, lynx, marten, wolverines, wolves, coyote, mule-deer, wood chuck, grizzly and black bear, muskarats, house	Northern goshawk, red-tailed hawk, great horned owl, northern hawk owl, bald eagles, ospreys, spruce grouse, three-toed woodpecker, gray jay, common raven, black-capped chickadee, boreal chickadee, pine grosbeak, northern goshawk, common		Smith, Meikle, and Roots (2004))

	<p>Ogilvie Mountains, Eagle Plains, Mackenzie Mountains and Selwyn Mountains), Boreal Cordillera (Klondike Plateau, St. Elias Mountains, Ruby Ranges, Yukon Plateau-Central, Yukon Plateau North, Yukon Southern Lakes, Pelly Mountains, Yukon Stikine Highlands, Boreal Mountains and Plateaus, Liard Basin and Hyland Highland) and Pacific Maritime (Mount Logan). There is some forage crop based agriculture in the Yukon Southern Lakes and Boreal Mountains and Plateaus</p>							<p>mouse, beaver, fox</p>	<p>redpoll, northern flicker, western wood-pewee, ruby-crowned kinglet, varied thrush, yellowrumped warbler, dark-eyed junco, white winged crossbill, Townsend's warbler, ruffed grouse, yellow-bellied sapsucker, orange-crowned warbler, blue grouse, sharp-tailed grouse, northern shrike, Townsend's solitaire, common nighthawk, savannah sparrow, western wood-pewee, alder flycatcher, say's phoebe, mountain bluebird, hermit thrush, American robin, dark-eyed junco, American kestrels, rock ptarmigan, horned lark, American pipit, possibly long-tailed jaeger, willow ptarmigan, American tree sparrow, white-crowned sparrow and common redpoll</p>		
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Table A2: Wildlife at risk in Canada by province and status

	Species at Risk Act status (Schedule 1)			
	Endangered	Threatened	Special concern	Extirpated
Saskatchewan	<p><i>Mosses</i> Rusty cord-moss</p> <p><i>Vascular plants</i> Small-flowered sand-verbena</p> <p><i>Arthropods</i> Dakota skipper, dusky dune moth, gold-edged gem and gypsy cuckoo bumble bee</p> <p><i>Reptiles</i> Greater short-horned lizard</p> <p><i>Birds</i> Burrowing owl, eskimo curlew, greater sage-grouse urophasianus subspecies, mountain plover, piping plover circumcinctus subspecies, red knot rufa subspecies, sage thrasher and whooping crane</p> <p><i>Mammals</i> Little brown myotis, northern myotis and Ord's kangaroo rat</p>	<p><i>Mosses</i> Alkaline wing-nerved moss</p> <p><i>Vascular plants</i> Slender mouse-ear-cress, smooth goosefoot, soapweed, tiny cryptantha and western spiderwort</p> <p><i>Arthropods</i> Gibson's big sand tiger beetle and Verna's flower moth</p> <p><i>Fishes</i> Mountain sucker and plains minnow</p> <p><i>Reptiles</i> Eastern yellow-bellied racer</p> <p><i>Birds</i> Bank swallow, barn swallow, bobolink, Canada warbler, chestnut-collared longspur, chimney swift, common nighthawk, eastern whip-poor-will, ferruginous hawk, lark bunting, loggerhead shrike prairie subspecies, McCown's longspur, olive-sided flycatcher, red-headed woodpecker and Sprague's pipit</p> <p><i>Mammals</i> Black-tailed prairie dog, caribou and swift fox</p>	<p><i>Vascular plants</i> Athabasca thrift, blanket-leaved willow, buffalograss, dwarf woolly-heads, floccose tansy, hairy prairie-clover, large-headed woolly yarrow, Mackenzie hairgrass, sand-dune short capsuled willow and Turnor's willow</p> <p><i>Arthropods</i> Greenish-white grasshopper, monarch, mormon metalmark, pale yellow dune moth and yellow-banded bumble bee</p> <p><i>Fishes</i> Bigmouth buffalo</p> <p><i>Amphibians</i> Great plains toad, northern leopard frog and western tiger salamander</p> <p><i>Reptiles</i> Prairie rattlesnake and snapping turtle</p> <p><i>Birds</i> Baird's sparrow, buff-breasted sandpiper, eastern-wood pewee, evening grosbeak, horned grebe, long-billed curlew, peregrine falcon anatum/tundrius, red necked phalarope, rusty blackbird, short-eared owl, western grebe and yellow rail</p> <p><i>Mammals</i> American badger taxus subspecies, grizzly bear and wolverine</p>	<p><i>Birds</i> Greater prairie chicken</p> <p><i>Mammals</i> Black footed ferret</p>
Alberta	<p><i>Vascular plants</i> Small flower sand-verbena and whitebark pine</p> <p><i>Molluscs</i> Banff Springs snail</p> <p><i>Arthropods</i> Bert's predaceous diving beetle, dusky dune moth, five-spotted bogus yucca moth, gold-edged gem, gypsy cuckoo bumble bee, half-moon hair streak, non-pollinating yucca moth and yucca moth</p> <p><i>Fishes</i> Rainbow trout</p> <p><i>Reptiles</i> Greater short-horned lizard</p> <p><i>Birds</i> Black swift, burrowing owl, eskimo curlew, greater sage-grouse urophasianus species, mountain plover, piping plover circumcinctus</p>	<p><i>Mosses</i> Haller's apple moss and Porsild's bryum</p> <p><i>Vascular plants</i> Bolander's quillwort, hair-footed locoweed, slender-mouse-ear cress, smooth goosefoot, soapweed, tiny cryptantha and western spiderwort</p> <p><i>Arthropods</i> Gibson's bid sand tiger beetle and Verna's flower moth</p> <p><i>Fishes</i> Bull trout, mountain sucker, rocky mountain sculpin, western silvery minnow and westslope cutthroat trout</p> <p><i>Reptiles</i> Eastern yellow-bellied racer</p> <p><i>Birds</i> Bank swallow, barn swallow, bobolink, Canada warbler, chestnut-collared longspur, common nighthawk, ferruginous hawk, lark bunting,</p>	<p><i>Vascular plants</i> Dwarf woolly-heads, floccose tansy and western blue flag</p> <p><i>Arthropods</i> Greenish-white grasshopper, monarch, pale yellow dune moth, vivid dancer, Weidemeyer's admiral and yellow-banded bumble bee</p> <p><i>Fishes</i> Bull trout</p> <p><i>Amphibians</i> Great plains toad, northern leopard frog, western tiger salamander and western toad</p> <p><i>Reptiles</i> Prairie rattlesnake</p> <p><i>Birds</i> Baird's sparrow, buff-breasted sandpiper, evening grosbeak, horned grebe, long-billed curlew, peregrine falcon anatum/tundrius, red-</p>	<p><i>Birds</i> Greater prairie-chicken</p> <p><i>Mammals</i> Black-footed ferret</p>

	<p>subspecies, red knot rufa subspecies, sage thrasher and whooping crane</p> <p><i>Mammals</i></p> <p>Little brown myotis, northern myotis, Ord's kangaroo rat and western harvest mouse dychei subspecies</p>	<p>loggerhead shrike prairie species, McCown's longspur, olive-sided flycatcher and Sprague's pipit</p> <p><i>Mammals</i></p> <p>Caribou, swift fox and wood bison</p>	<p>necked phalarope, rusty blackbird, short-eared owl, western grebe and yellow rail</p> <p><i>Mammals</i></p> <p>American badger taxus subspecies, grizzly bear and wolverine</p>	
Manitoba	<p><i>Vascular plants</i></p> <p>Fascicled ironweed, Gattinger's agalinis, rough agalinis and western prairie fringed orchid</p> <p><i>Arthropods</i></p> <p>Dakota skipper, dusky dune moth, gold-edged gem, gypsy cuckoo bumble bee, ottoe skipper, poweshiek skipperling and white flower moth</p> <p><i>Amphibians</i></p> <p>Eastern tiger salamander</p> <p><i>Reptiles</i></p> <p>Prairie skink</p> <p><i>Birds</i></p> <p>Burrowing owl, eskimo curlew, loggerhead shrike migrans subspecies, piping plover circumcinctus subspecies, red knot rufa subspecies and whooping crane</p> <p><i>Mammals</i></p> <p>Little brown myotis and northern myotis</p>	<p><i>Vascular plants</i></p> <p>Small white lady's-slipper, smooth goosefoot, western silvery aster and western spiderwort</p> <p><i>Molluscs</i></p> <p>Mapleleaf</p> <p><i>Arthropods</i></p> <p>Verna's flower moth</p> <p><i>Fishes</i></p> <p>Carmine shiner</p> <p><i>Birds</i></p> <p>Bank swallow, barn swallow, bobolink, Canada warbler, chestnut-collared longspur, chimney swift, common nighthawk, eastern whip-poor-will, ferruginous hawk, golden-winged warbler, lark bunting, least bittern, loggerhead shrike prairie subspecies, olive-sided flycatcher, red-headed woodpecker, Ross's gull and Sprague's pipit</p> <p><i>Mammals</i></p> <p>Caribou and wood bison</p>	<p><i>Lichens</i></p> <p>Flooded jellyskin</p> <p><i>Vascular plants</i></p> <p>Buffalograss, hairy prairie-clover and Riddell's goldenrod</p> <p><i>Arthropods</i></p> <p>Greenish-white grasshopper, monarch, pale yellow dune moth and yellow-banded bumble bee</p> <p><i>Fishes</i></p> <p>Bigmouth buffalo and lake sturgeon</p> <p><i>Amphibians</i></p> <p>Great plains toad, northern leopard frog and western tiger salamander</p> <p><i>Reptiles</i></p> <p>Snapping turtle</p> <p><i>Birds</i></p> <p>Baird's sparrow, buff-breasted sandpiper, eastern wood-pewee, evening grosbeak, horned grebe, peregrine falcon anatum/tundrius, red-necked phalarope, rusty blackbird, short-eared owl, western grebe and yellow rail</p> <p><i>Mammals</i></p> <p>American badger taxus subspecies, grizzly bear, polar bear and wolverine</p>	<p><i>Birds</i></p> <p>Greater prairie-chicken</p>
Ontario	<p><i>Lichens</i></p> <p>Pale-bellied frost lichen</p> <p><i>Mosses</i></p> <p>Spoon-leaved moss</p> <p><i>Vascular Plants</i></p> <p>American chestnut, American columbo, American ginseng, bashful bulrush, bent spike-rush, bird's-foot violet, bluehearts, butternut, cherry birch, colicroot, cucumber tree, drooping trillium, eastern flowering dogwood, eastern prairie fringed-orchid, eastern prickly pear cactus, Engelmann's quillwort, false hop sedge, forked three-awned grass, Gattinger's agalinis, heart-leaved plantain, hoary mountain-mint, horsetail spike-rush, juniper sedge, large whorled pogonia, nodding pogonia, Ogden's pondweed, pink milkwort, red mulberry, scarlet ammannia, showy goldenrod, Skinner's agalinis, slender bush-clover, small whorled pogonia, small-flowered</p>	<p><i>Lichens</i></p> <p>Black-foam lichen</p> <p><i>Vascular plants</i></p> <p>American water-willow, blunt-lobed woodsia, branched bartonia, deerberry, dense blazing star, dwarf hackberry, false rue-anemone, goldenseal, Hill's thistle, Kentucky coffee-tree, lakeside daisy, purple twayblade, round-leaved greenbrier, showy goldenrod, small white lady's-slipper, toothcup, western silvery aster, white wood aster, wild hyacinth and willowleaf aster</p> <p><i>Molluscs</i></p> <p>Threehorn wartyback</p> <p><i>Fishes</i></p> <p>Black redhorse, eastern sand darter, pugnose minnow, pugnose shiner and silver shiner</p> <p><i>Amphibians</i></p> <p>Western chorus frog</p> <p><i>Reptiles</i></p>	<p><i>Lichens</i></p> <p>Flooded jellyskin</p> <p><i>Vascular plants</i></p> <p>American Hart's tongue fern, blue ash, climbing prairie rose, common hoptree, crooked-stem aster, dwarf lake iris, Hill's pondweed, Houghton's golden rod, Pitcher's thistle, Riddell's goldenrod, swamp rose-mallow and tuberous Indian-plantain</p> <p><i>Molluscs</i></p> <p>Eastern pondmussel, mapleleaf, rainbow and wavy-rayed lampmussel</p> <p><i>Anthropods</i></p> <p>Monarch, pygmy snaketail and yellow-banded bumble bee</p> <p><i>Fishes</i></p> <p>Blackstripe topminnow, bridle shiner, channel darter, cutlip minnow, deepwater sculpin, grass pickerel, lake sturgeon, northern brook lamprey,</p>	<p><i>Mosses</i></p> <p>Incurved grizzled moss</p> <p><i>Vascular plants</i></p> <p>Illinois tick-trefoil and spring blue-eyed Mary</p> <p><i>Arthropods</i></p> <p>American burying beetle, frosted elfin and kerner blue</p> <p><i>Fishes</i></p> <p>Gravel chub and paddlefish</p> <p><i>Amphibians</i></p> <p>Eastern tiger salamander</p> <p><i>Reptiles</i></p> <p>Eastern box turtle and timber rattlesnake</p>

	<p>lipocarpha, spotted wintergreen, Virginia goat's-rue, Virginia mallow, white prairie gentian and wood-poppy</p> <p><i>Molluscs</i> Broad-banded forestsnail, fawnsfoot, hickorynut, kidneyshell, lilliput, northern riffleshell, proud globelet, rayed bean, round hickorynut, round pigtoe, salamander mussel and snuffbox</p> <p><i>Anthropods</i> Aweme borer moth, bogbean buckmoth, eastern persius duskywing, gypsy cuckoo bumble bee, Hine's emerald, hoptree borer, Hungerford's crawling water beetle, northern barrens tiger beetle, rapids clubtail, riverine clubtail and rusty-patched bumble bee</p> <p><i>Fishes</i> Channel darter, lake chubsucker, northern madtom, redbreast dace, shortnose cisco, silver chub and spotted gar</p> <p><i>Amphibians</i> Allegheny mountain dusky salamander, Blanchard's cricket frog, Fowler's toad, Jefferson salamander, northern dusky salamander and small-mouthed salamander</p> <p><i>Reptiles</i> Blue racer, Butler's gartersnake, eastern foxsnake, five-lined skink, gray ratsnake, massasauga, queensnake, spiny softshell and spotted turtle</p> <p><i>Birds</i> Acadian flycatcher, barn owl, cerulean warbler, eskimo curlew, Henslow's sparrow, king rail, Kirtland's warbler, loggerhead shrike migrans species, northern bobwhite, piping plover, circumcinctus subspecies, prothonotary warbler, red knot rufa subspecies and yellow-breasted chat virens subspecies</p> <p><i>Mammals</i> American badger jacksoni subspecies, little brown myotis, northern myotis and tri-colored bat</p>	<p>Blanding's turtle, eastern hog-nosed snake, gray ratsnake, massasauga and wood turtle</p> <p><i>Birds</i> Bank swallow, barn swallow, bobolink, Canada warbler, chimney swift, common nighthawk, eastern meadowlark, eastern whip-poor-will, golden-winged warbler, least bittern, Louisiana waterthrush, olive-sided flycatcher, red-headed woodpecker and wood thrush</p> <p><i>Mammals</i> Caribou and gray fox</p>	<p>northern sunfish, river herring, silver lamprey, spotted sucker, Upper Great Lakes kiyi and warmouth</p> <p><i>Reptiles</i> Eastern milksnake, eastern musk turtle, eastern ribbonsnake, five-lined skink, Lake Erie watersnake, northern map turtle and snapping turtle</p> <p><i>Birds</i> Belted sandpiper, eastern wood-pewee, evening grosbeak, grasshopper sparrow pratensis subspecies, horned grebe, peregrine falcon anatum/tundrius, red-necked phalarope, rusty blackbird, short-eared owl and yellow rail</p> <p><i>Mammals</i> American badger taxus subspecies, eastern mole, eastern wolf, polar bear, wolverine and woodland vole</p>	<p><i>Birds</i> Greater Prairie-chicken</p>
Quebec	<p><i>Lichens</i> Pale-bellied frost lichen</p> <p><i>Vascular plants</i> American ginseng, butternut, false hop sedge, forked three-awned grass and spotted wintergreen</p> <p><i>Molluscs</i> Hickorynut</p> <p><i>Anthropods</i></p>	<p><i>Lichens</i> Black-foam lichen and eastern waterfan</p> <p><i>Vascular plants</i> American water willow, anticosti aster, blunt-lobed woodsia, green-scaled willow, Griscom's arnica, Gulf of St. Lawrence aster, mountain holly fern, purple twayblade, Van Brunt's Jacob's ladder, Victorin's gentian and white wood aster</p> <p><i>Fishes</i> Eastern sand darter</p>	<p><i>Lichens</i> Flooded jellyskin,</p> <p><i>Vascular plants</i> Fernald's milk-vetch and Victorin's water-hemlock</p> <p><i>Arthropods</i> Monarch and yellow-banded bumble bee</p> <p><i>Fishes</i> Bridle shiner, channel darter, cutlip minnow, deepwater sculpin, grass pickerel, lake sturgeon,</p>	<p><i>Anthropods</i> American burying beetle</p> <p><i>Mammals</i> Atlantic walrus</p>

	<p>Gypsy cuckoo bumble bee, Maritime ringlet, northern barrens tiger beetle and rusty patched bumble bee</p> <p><i>Fishes</i> Copper redhorse, spring cisco and striped bass</p> <p><i>Reptiles</i> Spiny softshell and spotted turtle</p> <p><i>Birds</i> Cerulean warbler, eskimo curlew, Henslow's sparrow, horned grebe, loggerhead shrike migrans subspecies, piping plover melodus subspecies, red knot rufa and roseate tern</p> <p><i>Mammals</i> Beluga whale, harbour seal lacs lous marins species, caribou, little brown myotis, northern myotis and tri-colored bat</p>	<p><i>Amphibians</i> Allegheny mountain dusky salamander, spring salamander and western chorus frog</p> <p><i>Reptiles</i> Blanding's turtle and wood turtle</p> <p><i>Birds</i> Bank swallow, barn swallow, Bicknell's thrush, bobolink, Canada warbler, chimney swift, common night hawk, eastern meadowlark, eastern whip-poor-will, golden winged warbler, least bittern, Louisiana waterthrush, olive-sided flycatcher, red crossbill perca subspecies, red-headed woodpecker and wood thrush</p> <p><i>Mammals</i> Caribou</p>	<p>northern brook lamprey, northern sunfish, river redhorse and silver lamprey</p> <p><i>Reptiles</i> Eastern milksnake, eastern musk turtle, eastern ribbonsnake, northern map turtle and snapping turtle</p> <p><i>Birds</i> Barrow's goldeneye, buff-breasted sandpiper, eastern wood-pewee, evening grosbeak, grasshopper sparrow pratensis subspecies, harlequin duck, peregrine falcon anutum/tundrius, red-necked phalarope, rusty blackbird, short-eared owl and yellow rail</p> <p><i>Mammals</i> Eastern wolf, polar bear, wolverine and woodland vole</p>	
British Columbia	<p><i>Lichens</i> Batwing vinyl lichen and seaside centipede lichen</p> <p><i>Mosses</i> Margined streamside moss, nugget moss, poor pocket moss, rigid apple moss, Roell's brotherella moss, rusty cord-moss and silver hair moss</p> <p><i>Vascular plants</i> Bearded owl-clover, bent spike-rush, bog bird's foot trefoil, branched phacelia, brook spike-primrose, California buttercup, coast microseris, coastal Scouler's catchfly, contorted-pod evening-primrose, deltoid balsamroot, dense spike-primrose, dense-flowered lupine, dwarf sandwort, dwarf woolly-heads, foothill sedge, fragrant popcornflower, golden paintbrush, grand coulee owl-clover, Howell's triteleia, Kellogg's rush, Lindley's false silverpuffs, Muhlenberg's centauray, phantom orchid, pink sand-verbena, prairie lupine, rayless goldfields, rosy owl-clover, scarlet ammannia, seaside birds-foot lotus, short-rayed alkali aster, slender collomia, small-flowered lipocarpha, small-flowered tonella, southern maidenhair fern, Spalding's campion, stoloniferous pussytoes, streambank lupine, tall bugbane, tall woolly-heads, toothcup, Tweedy's lewisia, Victoria's owl clover, water-plantain buttercup, white meconella, whitebark pine and yellow montane violet praemorsa subspecies</p> <p><i>Molluscs</i> Hotwater physa, northern abalone and Oregon forestsnail</p> <p><i>Arthropods</i></p>	<p><i>Lichens</i> Crumpled tarpaper lichen and seaside bone lichen</p> <p><i>Mosses</i> Alkaline wing-nerved moss, Haller's apple and Porsild's bryum</p> <p><i>Vascular plants</i> Bear's foot sanicle, cliff paintbrush, Gray's desert-parsley, Lemmon's holy fern, Macoun's meadowfoam, Mexican mosquito fern, mountain holy fern, purple sanicle, showy phlox and slender popcornflower</p> <p><i>Molluscs</i> Blue-grey taidropper and dromedary jumping-slug</p> <p><i>Arthropods</i> Audouin's night stalking tiger beetle and dun skipper vestris subspecies</p> <p><i>Fishes</i> Coastrange sculpin, salish sucker and Vancouver lamprey</p> <p><i>Amphibians</i> Coastal giant salamander, great basin spadefoot and rocky mountain tailed frog</p> <p><i>Reptiles</i> Great basin gophersnake and western rattlesnake</p> <p><i>Birds</i> Bank swallow, barn owl, barn swallow, bobolink, Canada warbler, common nighthawk, Lewis's woodpecker, marbled murrelet, northern goshawk laingi subspecies, Northern saw-whet owl brooksi subspecies, olive-sided flycatcher, red knot roselaari type, short tailed albatross, Western screech-owl kennicottii subspecies and Western screech-owl macfarlanei subspecies</p> <p><i>Mammals</i></p>	<p><i>Lichens</i> Cryptic paw lichen, mountain crab-eye, oldgrowth specklebelly lichen, peacock vinyl lichen and western waterfan</p> <p><i>Mosses</i> Banded cord-moss, Columbia carpet moss, tiny tassel and twisted oakmoss</p> <p><i>Vascular plants</i> Coastal wood fern, Lyall's mariposa lily, Vancouver Island beggarticks and white-top aster</p> <p><i>Molluscs</i> Haida gwaai slug, magnum mantleslug, olympia oyster, pygmy slug, rocky mountain ridged mussel, sheathed slug, threaded vertigo and warty jumping slug</p> <p><i>Arthropods</i> Georgia basin bog spider, monarch, sonora skipper, vivid dancer and yellow-banded bumble bee</p> <p><i>Fishes</i> Bull trout, Columbia sculpin, giant threespine stickleback, green sturgeon, mountain sucker, rocky mountain sculpin, shorthead sculpin, unarmoured threespine stickleback and westslope cutthroat trout</p> <p><i>Amphibians</i> Coastal tailed frog, Coeur d'Alene salamander, northern red-legged frog, wandering salamander and western toad</p> <p><i>Reptiles</i> Northern rubber boa, western painted turtle, western skink and western yellow-bellied racer</p> <p><i>Birds</i></p>	<p><i>Vascular plants</i> Oregon lupine</p> <p><i>Molluscs</i> Puget oregonian</p> <p><i>Arthropods</i> Island marble</p> <p><i>Reptiles</i> Pacific gophersnake, pacific pond turtle and pygmy short-horned lizard</p> <p><i>Birds</i> Greater sage-grouse phaois subspecies</p>

	<p>Behr's hairstreak, Edward's beach moth, gypsy cuckoo bumble bee, half-moon hairstreak, island blue, mormon metalmark, Okanagan efferia, olive clubtail, sand-verbena moth, Taylor's checkerspot and Wallis' dark saltflat tiger beetle</p> <p><i>Fishes</i> Basking shark, Enos Lake benthic threespine stickleback, Enos Lake limnetic threespine stickleback, Misty Lake lentic threespine stickleback, Misty Lake lotic threespine stickleback, nooksack dace, Paxton Lake benthic threespine stickleback, Paxton Lake limnetic threespine stickleback, speckled dace, Vananda Creek benthic threespine stickleback, Vananda Creek limnetic threespine stickleback, Western Brook lamprey and white sturgeon</p> <p><i>Amphibians</i> Northern leopard frog, Oregon spotted frog and western tiger salamander</p> <p><i>Reptiles</i> Desert nightsnake, sharp-tailed snake and western painted turtle</p> <p><i>Birds</i> Black swift, burrowing owl, coastal vesper sparrow, pink-footed shearwater, red knot rufa subspecies, sage thrasher, spotted owl caurina subspecies, streaked horned lark, white-headed woodpecker, Williamson's sapsucker and yellow-breasted chat auricollis subspecies</p> <p><i>Mammals</i> American badger jeffersonii subspecies and little brown myotis</p>	<p>Caribou, ermine haidarum subspecies, pallid bat, wood bison and woodland caribou</p>	<p>Ancient murrelet, band-tailed pigeon, buff-breasted sandpipe, Cassin's auklet, evening grosbeak, flammulated owl, great blue heron fannini subspecies, horned grebe, long-billed curlew, peregrine falcon anatum/tundrius, peregrine falcon pealei subspecies, red-necked phalarope, rusty blackbird, short-eared owl, western grebe and yellow rail</p> <p><i>Mammals</i> Grey whale, Harbour porpoise, sea otter and steller sea lion, collared pika, grizzly bear, mountain beaver, Nuttall's cottontail nuttallii subspecies, spotted bat, western harvest mouse megalotis subspecies, wolverine and woodland caribou</p>	
Nova Scotia	<p><i>Lichens</i> Boreal felt lichen and vole ears</p> <p><i>Vascular plants</i> Eastern mountain avens, pink coreopsis, plymouth gentian, tall beakrush and three-leaved sundew</p> <p><i>Arthropods</i> Gypsy cuckoo bumble bee and macropis cuckoo bee</p> <p><i>Fishes</i> Atlantic salmon and Atlantic whitefish</p> <p><i>Reptiles</i> Blanding's turtle</p> <p><i>Birds</i> Eskimo curlew, piping plover melodus subspecies, red knot rufa subspecies and roseate tern</p> <p><i>Mammals</i> Little brown myotis, northern myotis and tri-colored bat</p>	<p><i>Lichens</i> Black foam lichen, eastern water fan and wrinkled shingle lichen</p> <p><i>Vascular plants</i> Eastern baccharis and sweet pepperbrush</p> <p><i>Arthropods</i> Sable island sweet bee</p> <p><i>Reptiles</i> Eastern ribbonsnake and wood turtle</p> <p><i>Birds</i> Bank swallow, barn swallow, Bicknell's thrush, bobolink, Canada warbler, chimney swift, common nighthawk, eastern meadowlark, eastern whip-poor-will, least bittern, olive-sided flycatcher and wood thrush</p>	<p><i>Lichens</i> Blue felt lichen and frosted glass-whiskers</p> <p><i>Vascular plants</i> Eastern lilaeopsis, goldencrest, New Jersey rush, prototype quillwort, redroot, tubercled spike-rush and water pennywort</p> <p><i>Molluscs</i> Brook floater and yellow lampmussel</p> <p><i>Arthropods</i> Monarch and yellow-banded bumble bee</p> <p><i>Fishes</i> Shortnose sturgeon</p> <p><i>Reptiles</i> Snapping turtle</p> <p><i>Birds</i> Barrow's goldeneye, eastern wood-pewee, evening grosbeak, harlequin duck, peregrine falcon anatum/tundrius, red-necked phalarope,</p>	<p><i>Mammals</i> Atlantic walrus</p>

			rusty blackbird, savannah sparrow princeps subspecies and short-eared owl	
New Brunswick	<p><i>Lichens</i> Boreal felt lichen and vole ears lichen</p> <p><i>Vascular plants</i> Butternut and Furbish's lousewort</p> <p><i>Arthropods</i> Cobblestone tiger beetle, gypsy cuckoo bumble bee, Maritime ringlet and skillet clubtail</p> <p><i>Fishes</i> Atlantic salmon</p> <p><i>Birds</i> Eskimo curlew, piping plover melodus subspecies, red knot rufa species and roseate tern</p> <p><i>Mammals</i> Little brown myotis, northern myotis, tri-colored bat</p>	<p><i>Lichens</i> Black-foam lichen, eastern waterfan and wrinkled shingle lichen</p> <p><i>Vascular plants</i> Anticosti aster and Gulf of St. Lawrence aster</p> <p><i>Fishes</i> Rainbow smelt</p> <p><i>Reptiles</i> Wood turtle</p> <p><i>Birds</i> Bank swallow, barn swallow, Bicknell's thrush, bobolink, Canada warbler, chimney swift, common nighthawk, eastern meadowlark, eastern whip-poor-will, least bittern, olive-sided flycatcher and wood thrush</p>	<p><i>Lichens</i> Blue felt lichen</p> <p><i>Arthropods</i> Beach pinweed and prototype quillwort</p> <p><i>Molluscs</i> Brook floater and yellow lampmussel</p> <p><i>Arthropods</i> Monarch, pygmy snaketail and yellow-banded bumble bee</p> <p><i>Fishes</i> Shortnose sturgeon</p> <p><i>Reptiles</i> Snapping turtle</p> <p><i>Birds</i> Barrow's goldeneye, eastern wood-pewee, evening grosbeak, harlequin duck, peregrine falcon anatum/tundrius, red-necked phalarope, rusty blackbird, short-eared owl and yellow rail</p>	<p><i>Molluscs</i> Dwarf wedgemussel</p> <p><i>Mammals</i> Atlantic walrus</p>
Prince Edward Island	<p><i>Arthropods</i> Gypsy cuckoo bumble bee</p> <p><i>Birds</i> Eskimo curlew, piping plover melodus subspecies and red knot rufa</p> <p><i>Mammals</i> Little brown myotis and northern myotis</p>	<p><i>Lichens</i> Wrinkled shingle lichen</p> <p><i>Vascular plants</i> Gulf of St. Lawrence aster</p> <p><i>Birds</i> Bank swallow, barn swallow, bobo link, Canada warbler, common night hawk and olive sided flycatcher</p>	<p><i>Vascular plants</i> Beach pinweed</p> <p><i>Arthropods</i> Monarch and yellow-banded bumble bee</p> <p><i>Birds</i> Barrow's goldeneye, eastern wood-pewee, evening grosbeak, red-necked phalarope, rusty blackbird and short-eared owl</p>	<p><i>Mammals</i> Atlantic walrus</p>
Newfoundland and Labrador	<p><i>Lichens</i> Vole ears lichen</p> <p><i>Vascular plants</i> Barrens willow, Fernald's braya and Long's Braya</p> <p><i>Arthropods</i> Gypsy cuckoo bumble bee</p> <p><i>Birds</i> Eskimo curlew, ivory gull, piping plover melodus subspecies and red knot rufa subspecies</p> <p><i>Mammals</i> Little brown myotis and northern myotis</p>	<p><i>Lichens</i> Wrinkled shingle lichen</p> <p><i>Mosses</i> Porsild's bryum</p> <p><i>Vascular plants</i> Griscom's arnica and mountain holly fern</p> <p><i>Birds</i> Bank swallow, barn swallow, bobolink, common nighthawk, olive-sided flycatcher and red crossbill perca subspecies</p> <p><i>Mammals</i> American marten and caribou</p>	<p><i>Lichens</i> Blue felt lichen and boreal felt lichen</p> <p><i>Vascular plants</i> Fernald's milk vetch</p> <p><i>Arthropods</i> Yellow-banded bumble bee</p> <p><i>Fishes</i> Banded killifish</p> <p><i>Birds</i> Barrow's goldeneye, evening grosbeak, harlequin duck, peregrine falcon anatum/tundrius, red-necked phalarope, rusty blackbird and short-eared owl</p> <p><i>Mammals</i> Polar bear and wolverine</p>	<p><i>Mammals</i> Atlantic walrus</p>
Yukon	<p><i>Arthropods</i> Gypsy cuckoo bumble bee</p> <p><i>Birds</i> Eskimo curlew</p> <p><i>Mammals</i> Little brown myotis and northern myotis</p>	<p><i>Birds</i> Bank swallow, barn swallow, Canada warbler, common nighthawk, olive-sided flycatcher and red knot roselaari</p> <p><i>Mammals</i> Caribou and wood bison</p>	<p><i>Vascular plants</i> Baikal sedge, spiked saxifrage and Yukon podistera</p> <p><i>Arthropods</i> Dune tachinid fly and yellow-banded bumble bee</p> <p><i>Fishes</i></p>	

			<p>Bull trout and dolly varden</p> <p><i>Amphibians</i></p> <p>Western toad</p> <p><i>Birds</i></p> <p>Buff-breasted sandpiper, evening grosbeak, horned grebe, peregrine falcon anatum/tundrius, red-necked phalarope, rusty blackbird and short-eared owl</p> <p><i>Mammals</i></p> <p>Grey whale, collared pika, grizzly bear, polar bear, wolverine and woodland caribou</p>	
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Source: Government of Canada (2019)

Table A3: Ecosystems at risk in Canada

Biome	Background	Reference
Grasslands	Estimated losses in grasslands before the 1990's are 97% of tall grass/savannah in Southern Ontario, 70% of prairie grasslands and 19% of bunchgrass/sagebrush in British Columbia. Losses still occur in small amounts. The health of grasslands is influenced by natural disturbances such as fires, grazing of cattle, non-native invasive species, encroachment of forests, fragmentation, intensification of agriculture, contamination from pesticides and insecticides, irrigation and urbanization among others.	Federal, Provincial and Territorial Governments of Canada (2010); Kraus (2018); Roch and Jaeger (2014);
Wetlands	Roughly 16% of the area of land in Canada is covered by wetlands. Southern Canada experienced high losses of wetlands and It is estimated that 200,00km ² of wetlands were lost before 1990. Although efforts are being taken to reduce losses of wetlands, they still occur especially near urban areas. Wetlands are threatened by conversion to other land uses, pollution, water regulation and invasive non-native species.	Federal, Provincial and Territorial Governments of Canada (2010)
Forest	Sixty percent of the land in Canada is covered by forests and 70% of the forests are of the boreal type. Although losses of forests are little at the national level, there are some regions that have significant losses. Approximately 0.01-0.02% of forests in Canada are lost per year. Forests are converted to other land uses such as cropland, resource roads, transmission lines, oil and gas development, urban areas and flooding of new hydro reservoirs.	Federal, Provincial and Territorial Governments of Canada (2010)
Lakes and rivers	Changes in the flow of rivers and lakes affect aquatic life and the changes include seasonal changes in the magnitude of the flows of the streams, rising temperatures in rivers and lakes and reductions in the levels of the lakes, habitat loss and fragmentation.	Federal, Provincial and Territorial Governments of Canada (2010)

Note: Coastal, marine and ice across biomes are also at risk (see Federal, Provincial and Territorial Governments of Canada (2010) for more information)

Table A4: Economic valuation of ecosystems

	Canada	Place	Province	Ecozone	Ecoregion/Region	Value (\$/year unless stated otherwise)		Methods	Reference	
Biodiversity ecosystem services							<i>United States</i> <i>World</i>		Pimentel et al. (1992)	
						Nitrogen fixation	7 billion 50 billion			
						Cross-pollination	30 billion			
						Pest control		20 billion		
						Fish, other wildlife and plant materials harvested from the wild	2 billion			
Biodiversity	United states						<i>United States</i> <i>World</i>		Pimentel et al. (1997)	
						Total	319 billion 2,928 billion			
						Waste disposal	62 billion 760 billion			
						Soil formation	5 billion 25 billion			
						Nitrogen fixation	8 billion 90 billion			
						Bioremediation of chemicals	22.5 billion 121 billion			
						Crop breeding (genetics)	20 billion 115 billion			
						Livestock breeding (genetics)	20 billion 40 billion			
						Biotechnology	2.50 billion 6 billion			
						Biocontrol of pests (crops)	12 billion 100 billion			
						Biocontrol of pests (forests)	5 billion 60 billion			
						Host plant resistance (crops)	8 billion 80 billion			
						Host plant resistance (forests)	0.80 billion 11 billion			
						Perennial grains (potential)	17 billion 170 billion			
						Pollination	40 billion 200 billion			
						Fishing	29 billion 60 billion			
						Hunting	12 billion 25 billion			
						Seafood	2.50 billion 82 billion			
						Other wild foods	0.50 billion 180 billion			
Wood products	8 billion 84 billion									
Ecotourism	18 billion 500 billion									
Pharmaceuticals from plants	20 billion 84 billion									
Forests sequestering of carbon	6 billion 135 billion									
Biodiversity	Ireland (€ per year)					Nutrient assimilation and recycling	1 billion		Production function and replacement costs	Bullock, Kretsch, and Candon (2008)
						Pollination	220 million or even 500 million			
						Baseline pest control	20 million			
						Forest ecosystem services	55 million			
Ecosystem services, forests	Canada	Ontario's Greenbelt	Ontario			Total	2,651,707,951	3,487 per ha	Avoided cost, replacement cost and	Wilson (2008)
						Air quality	68,868,821			
						Carbon stored	366,451,342			
						Carbon uptake	10,982,151			

						Flood control (wetlands)	379,676,010		contingent valuation (both direct analysis and value transfer)	
						Control of runoff (forests)	278,103,520			
						Water filtration	131,107,489			
						Erosion control and sediment retention	532,417			
						Soil formation	6,005,164			
						Nutrient cycling	2,141,547			
						Waste treatment	294,360,279			
						Pollination (agriculture)	298,235,257			
						Natural regeneration	98,001,705			
						Biological control	8,175,746			
						Habitat (refugia)	548,184,172			
						Recreation and aesthetics	95,207,535			
						Cultural/spiritual (agriculture)	65,674,796			
						<i>Nonmarket ecosystem services</i>				
						Wetlands	1,331 million	14,153/ha		
						Forests	989 million	5,414/ha		
						Grasslands	0.714 million	1,618/ha		
						Rivers	2.6 million	335/ha		
						Cropland	183 million	477/ha		
						Orchards	2.6 million	494/ha		
						Hedgerows	11.8 million	1,678/ha		
						Idle land	132 million	1,667/ha		
Ecosystem services	Canada	Pimachiowin Aki World Heritage Project Area	Manitoba and Ontario			Grasslands	121-130 million		Values based on literature	Wilson (2009)
		Southern Ontario Greenbelt	Ontario				2.6 billion			
	South Africa (Rands)						9.7 billion			
Ecosystem services, forests	Canada	Long Tusket Lake	Nova Scotia		Acadian Forest	Forests		26,250/ha	Abatement costs; values based on literature	TD Economics & Nature Conservancy of Canada (2017)
		Maymont Property	Saskatchewan		Boreal Forest			5,800/ha		
		Kurian property	Manitoba		Boreal Forest			26,800/ha		
		Salmonier Conservation Project	Newfoundland & Labrador		Boreal Forest			26,300/ha		
		Backus Woods	Ontario		Carolinian Forest			19,353/ha		
		Crane River	Ontario		Great Lakes-St. Lawrence Forest			19,400/ha		
		Gullchucks Estuary	British Columbia		Coastal Forest			33,700/ha		
		Midgeley	British Columbia		Columbia Forest			46,000/ha		
		Enchantment Property	British Columbia		Subalpine Forest			24,600/ha		

		Kenauk	Quebec		Great Lakes-St. Lawrence Forest			20,000/ha		
		Lusichich	Alberta		Montane Forest			42,000/ha		
Ecosystem services	Canada	Lake Simcoe Watershed	Ontario			Total	922.7 million		Values from literature (eg., expenditure)	Green Analytics (2017)
						Recreation	487.4 million			
						Water supply	157 million			
						Pollination	45.4 million			
						Clear air	5 million			
						Food regulation	169.3 million			
						Carbon sequestration	35.9 million			
Habitat and refugia	22.7 million									
Ecosystem Services	Canada	Yamasca River Watershed	Quebec			Wetlands		5,277 or 9,080/ha	Metanalysis; second values based on a more detailed sub-watershed scale	He et al. (2015)
		Bécancour River Watershed	Quebec			Wetlands		3,979 or 4,702/ha		
Ecosystem services, Great Lakes	Canada	Credit River-16 Mile Creek	Ontario		Great Lakes	Wetlands,	10,191,324		Value transfer and metanalysis	Marbek (2010)
		Toronto Area					6,521,303			
		Prince Edward Bay					23,565,905			
		Credit River-16 Mile Creek				148,643,615				
		Toronto Area				176,534,484				
		Prince Edward Bay				51,473,336				
Ecosystem services	Canada	Mackenzie Watershed	Alberta, British Columbia, Saskatchewan, Northwest Territories and Yukon	Boreal Cordillera, Boreal Plains, Boreal Shield, Montane Cordillera, Prairies, Southern Artic, Taiga Cordillera, Taiga Plains and Taiga Shield		Total	570,648 million		Market value and values from literature	Anielski and Wilson 2009a
						Cropland	297 million			
						Deciduous Broadleaf	366 million			
						Evergreen needleleaf	54,714 million			
						Grassland	12 million			
						Mixedwood	20,710 million			
						Mosaic land (cropland and native vegetation)	604 million			
						Transition tree and shrubland	6,620 million			
						Urban and Built-up	0.7 million			
						Water bodies (rivers and lakes)	188,675 million			
						Wetland/shrubland	181,869 million			
Natural capital/ecosystem services of peatlands	Canada	Eastern and Interlake regions	Manitoba			Total	128 million			Voora, Swystun, Dohan, and Thrift (2013)
						Water supply	3 million			
						Subsistence	1 million			
						Carbon sequestration	15 million			
						Flood protection	2 million			
Water treatment	74 million									

						Erosion control	3.32 million			
						Habitat and refugia services	24 million			
						<i>Natural capital</i>				
						Peat (extracted good)	1.914 billion			
						Carbon	34 billion			
						Water	4 billion			
Prairie shelterbelts ecosystem services	Canada		Prairie provinces			Total of external benefits (public and non-public goods (1981-2001))	140 million		Benefit transfer used in some cases	Kulshreshtha and Kort (2009)
						Total benefits (public goods)	100.9 million (1981-2001)			
						Total benefits from non-public goods	39.1 million (1981-2001)			
						Reduced soil erosion	15-97 million			
						Air quality (non-odor)	3.71 million per year			
						Reduced net emissions for carbon	72.8 (for 1981-2001)			
						Water quality benefits	1.21 million			
						Protected or enhanced biodiversity	4.72 million (1981-2001)			
						Consumptive wildlife	39 million			
						Non-consumptive wildlife	3.70 million			
Aquatic ecosystem service benefits	Canada	Blue Network of Greater Montreal	Quebec	Upper St. Lawrence Plain		Biodiversity (one species improvement)	1.2 million		Contingent choice study using real projects	Poder, Duoras, Fetue Ndefo, and He (2016)
						Water Quality	13.5 million			
						Carbon sequestration	0.1 million			
Forest	Canada	Midgeley property	British Columbia		Columbia Forest Region/Columbia Mountains Highlands	Total	3,162,401	46,476/ha	Values based on literature	DePratto and Kraus (n.d.)
		Lusicich property	Alberta		Montane Forest Region/Northern Continental		4,685,827	42,136/ha		
		Kenauk property	Quebec		Great Lakes-St. Lawrence Forest Region/Southern Laurentians		78,925,706	19,405/ha		
Prairie native grasslands	Canada		Saskatchewan			Direct economic value	412 million	32.19 per acre	Values from literature	Chris Nykoluk Consulting (2013)
						Indirect value		297.79/acre		
Grasslands	Canada		Manitoba			Total	936.2 million			The National Centre for Livestock and the Environment, University of
						Forage production	524.6 million			
						Carbon storage	9.4 – 637 million			
						Nutrient cycling	127 million			
						Water regulation	12.2 million			
						Soil erosion control	31.9 million			

						Soil formation	25.5 million			Manitoba (2019)
						Waste treatment	153.9 million			
						Recreation and aesthetics	40.7 million			
						Refugium function	11.0 million			
Wetland program social benefits	Canada	Credit River Watershed	Ontario			Total	220.9-250.4 million (total willingness to pay in the next 5 years)			Lantz, Boxall, Kennedy, and Wilson (2010)
Wetlands and biodiversity	Canada	Laurentian Great Lakes Basin					70 million		Market values, and maintenance and restoration costs	Krantzberg and De Boer (2008)
Wetland ecosystem services						Wildlife habitat		3,000/ha	Values from literature	Hotte, Kennedy, and Lantz (2009)
						Recreational hunting		2,500/ha		
						Amenity		8,500/ha		
						Recreational fishing		3,500/ha		
						Raw materials		450/ha		
						Water quality		8,500/ha		
						Flood protection		5,500/ha		
						Water supply		2,000/ha		
						Fuelwood		80/ha		
						Biodiversity		11,500/ha		
Boreal ecosystem services	Canada			Taiga Plains, Taiga Shield, Boreal Shield, Boreal Plains, Taiga Cordillera, Boreal Cordillera and Hudson Plains		Total net market value	50.9 billion		Market values, costs and non-market values such as replacement costs	Anielski & Wilson (2009b)
						Total non-market value	703.2 billion	1,204/ha		
						Pest control by birds	5.4 billion			
						Nature related activities	4.5 billion			
						Carbon sequestration	582 billion			
						Subsistence for Aboriginal peoples	575 million			
						Non-timber forest products	79 million			
						Municipal water use	18.3 million			
						Passive conservation value	1.1.7 million			
						Wetlands and peatlands (non-market)	512.6 billion	4,809/ha		
						Water resources	19.5 billion			
Ecosystem services	Canada	National Commission's Green Network (Gatineau Park, Greenbelt and urban lands)	Ontario and Quebec	Canadian Shield and St. Lawrence Lowlands		Total	332,172,600		Market values, transfer values and replacement costs	Dupras et al. (2016)
						Urban forests	14,514,300	9,352/ha		
						Rural forests	159,489,400	4,183/ha		
						Wetlands	145,693,500	59,394/ha		
						Croplands	4,506,100	1,363/ha		
						Prairies, grasslands	7,744,200	3,338/ha		
						Freshwater systems	225,100	137/ha		
Ecosystem services	Canada	Peace River Watershed	British Columbia			Total value (10 years)	204.6 billion		Market values, transfer	Wilson (2014)
						Water supply	2,502,441	32.60/ha		
						Air filtration by trees	12,684,230	3.51/ha		

					Forest ecosystem carbon storage	1.56-8.5 billion	1,175.69/ha (central value)	values, avoided, replacement and travel costs, meta-analysis and willingness to pay	
					Wetland soil carbon storage	401 million-1.89 billion	715.24-2,453.85/ha		
					<i>Other soil carbon storage</i>	413.5 million-1.95 billion			
					Grassland		921.32/ha		
					Pasture		1,073.77/ha		
					Shrubland		1,552.03/ha		
					Cropland		1,181.55/ha		
					<i>Carbon sequestration</i>	285.5 million-1.15 billion			
					Forest		138.08/ha		
					Wetland		33.42/ha		
					Shrubland/grassland/perennial cover		56.20/ha		
					Wetland flood control, water supply, nutrient recycling	133,157,316	256.67/ha (wetland)		
					Water filtration	22,529,524	6.23/ha (forest, treed wetland)		
					Erosion control/sediment retention	4,467,440	6.60/ha (grassland/perennial cover)		
					Waste treatment	46,970,791	27.92/ha (perennial cover/grassland) and 54.10/ha (wetland)		
					Pollination	39,895,056	43.63/ha (shrubland/grassland/perennial cover/pasture)		
					Habitat	206,744,044	379.43/ha (wetlands) and 41/ha (perennial cover/pasture)		
					Recreation	119,738,498	21.47/ha (forest, wetland, shrubland and grassland) and 214.97/ha (water)		
					Cultural values	5,258,881	9.38/ha (farmlands) and 0.39/ha (protection of forests and wetlands)		
Ecosystem services	Canada	Northern Alberta	Alberta		Forest (regional)-total	232.4 million	Values are for 1996	Net national product and value transfer	Haener and Adamowicz (2000)
					Biodiversity maintenance	58.4 million			
					Carbon sequestration	9.5 million			
Ecosystem services, Prairie wetlands	Canada		Saskatchewan		Riparian area	26.5 million	One-time payment	Choice experiment	Dias and Belcher (2015)
					Wildlife population	23.6 million			
					Water quality	42.9 million			
Ecosystem services, wetlands	United States				Fish and shellfish support	1992 values	6,132/acre	Based on literature	Heimlich et al. (1998)
					Fur-bearing animals		137/acre		
					Ecological functions		32,149/acre		

Natural capital	Canada	Lower mainland	British Columbia	Pacific Maritime	Amenity and cultural		2,722/acre	Avoided cost, replacement cost, production function method and travel cost	Wilson (2010)
					<i>Climate regulation</i>				
					Forests (primary study area)	246 million	1,709/ha		
					Forests (secondary study area)	1,280 million	1,898/ha		
					Wetlands	44 million	1,432/ha		
					Grasslands	3.1 million	594/ha		
					Shrublands	61 million	1,000/ha		
					Croplands	41 million	698/ha		
					Clean air-forests	409 million	495/ha		
					Flood protection/water regulation-forests	1,241 million	1,502/ha		
					Waste treatment-wetlands	41 million	1,283/ha		
					<i>Water supply</i>				
					Forests	1,561 million	1,890/ha		
					Wetlands	61 million	1,890/ha		
					<i>Pollination (primary study areas)</i>				
					Forests	234 million	1,669/ha		
					Shrublands	14 million	1,669/ha		
					Grasslands	0.1 million	1,669/ha		
					Salmon habitat-Integral forests	1.6 million	3/ha		
					<i>Recreation/tourism</i>				
					Forests	105 million	127/ha		
					Wetlands	4.1 million	127/ha		
					Farm-based	13 million	422/ha		
Local food production-croplands	24 million	382/ha							
<i>Total</i>	<i>5,384 million</i>								

Table A5: Economic benefits of different species

Species	Country	Place	Province	Ecozone	Ecoregion	Total value (\$/year)		Methods	Reference
Bats (importance to agriculture)	United States					22.9 billion		Reduced costs of pesticides	Boyles et al. (2011)
Caribou	Canada (based on 2005-2006 harvest)		Nunavat			9.50 million			Intergroup Consultants Ltd. (2013)
			Saskatchewan			5.90 million			
			Manitoba			3.80 million			
			Northwest territories			0.80 million			
Economic value of wildlife (annual values)	Canada		Alberta					Contingent valuation and market values	Adamowicz et al. (1991)
<i>Total</i>						185.2 million			
<i>Preservation benefits</i>						67.7 million			
<i>Hunting</i>									
Waterfowl						10.3 million			
Other birds						11.0 million			
Small mammals						6.8 million			
Large mammals						24.9 million			
<i>Non-consumptive use</i>						64.5 million			
Canada Lynx (upper bound values)	United States	Montana Maine				557,30,084 69,611,046		Market value, willingness to pay and avoided and replacement costs	Kroeger and Casey (2006)