

Oikos

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Appendix 1–6

Appendix 1

A – Code, scientific name, and common name of bird taxa observed at our 96 wetland sites.

| Name | Scientific name | Common name |
|------|-------------------------------------|------------------------|
| ALFL | <i>Recurvirostra americana</i> | alder flycatcher |
| AMAV | <i>Recurvirostra americana</i> | American avocet |
| AMBI | <i>Botaurus lentiginosus</i> | American bittern |
| AMCO | <i>Fulica americana</i> | American coot |
| AMCR | <i>Corvus brachyrhynchos</i> | American crow |
| AMGO | <i>Spinus tristis</i> | American goldfinch |
| AMRE | <i>Setophaga ruticilla</i> | American redstart |
| AMRO | <i>Turdus migratorius</i> | American robin |
| AMWI | <i>Anas americana</i> | American wigeon |
| BAIS | <i>Ammodramus bairdii</i> | Baird's sparrow |
| BAOR | <i>Icterus galbula</i> | Baltimore oriole |
| BARS | <i>Hirundo rustica</i> | barn swallow |
| BBMA | <i>Pica hudsonia</i> | black-billed magpie |
| BCCH | <i>Poecile atricapillus</i> | black-capped chickadee |
| BHCO | <i>Molothrus ater</i> | brown-headed cowbird |
| BLJA | <i>Cyanocitta cristata</i> | blue jay |
| BLTE | <i>Chlidonias niger</i> | black tern |
| BNST | <i>Himantopus mexicanus</i> | black-necked stilt |
| BOGU | <i>Chroicocephalus philadelphia</i> | Bonaparte's gull |
| BRBL | <i>Euphagus cyanocephalus</i> | Brewer's blackbird |
| BRTH | <i>Toxostoma rufum</i> | brown thrasher |
| BUFF | <i>Bucephala albeola</i> | bufflehead |
| BWTE | <i>Anas discors</i> | blue-winged teal |
| CANG | <i>Branta canadensis</i> | Canada goose |
| CANV | <i>Aythya valisineria</i> | canvasback |
| CCSP | <i>Spizella pallida</i> | clay-colored sparrow |
| CEDW | <i>Bombycilla cedrorum</i> | cedar waxwing |
| CHSP | <i>Spizella passerina</i> | chipping sparrow |
| CITE | <i>Anas cyanoptera</i> | cinnamon teal |
| COGR | <i>Quiscalus quiscula</i> | common grackle |
| COLO | <i>Gavia immer</i> | common loon |
| CORA | <i>Corvus corax</i> | common raven |
| COYE | <i>Geothlypis trichas</i> | common yellowthroat |
| DOWO | <i>Picoides pubescens</i> | downy woodpecker |
| EAGR | <i>Podiceps nigricollis</i> | eared grebe |
| EAKI | <i>Tyrannus tyrannus</i> | eastern kingbird |
| EAPH | <i>Sayornis phoebe</i> | eastern phoebe |
| EUST | <i>Sturnus vulgaris</i> | European starling |
| FISP | <i>Spizella pusilla</i> | field sparrow |
| FRGU | <i>Leucophaeus pipixcan</i> | Franklin's gull |

| Name | Scientific name | Common name |
|-----------|-----------------------------------|-------------------------------|
| GADW | <i>Anas strepera</i> | gadwall |
| GBHE | <i>Ardea herodias</i> | great blue heron |
| GRCA | <i>Dumetella carolinensis</i> | gray catbird |
| GRSP | <i>Ammodramus savannarum</i> | grasshopper sparrow |
| GWTE | <i>Anas crecca</i> | green-winged teal |
| HAWO | <i>Picoides villosus</i> | hairy woodpecker |
| HOGR | <i>Podiceps auritus</i> | horned grebe |
| HOLA | <i>Eremophila alpestris</i> | horned lark |
| HOSP | <i>Passer domesticus</i> | house sparrow |
| HOWR | <i>Troglodytes aedon</i> | house wren |
| KILL | <i>Charadrius vociferus</i> | killdeer |
| LBCU | <i>Numenius americanus</i> | long-billed curlew |
| LCSP | <i>Ammodramus leconteii</i> | Le Conte's sparrow |
| LEFL | <i>Empidonax minimus</i> | least flycatcher |
| LESA | <i>Calidris minutilla</i> | least sandpiper |
| LESC | <i>Aythya affinis</i> | lesser scaup |
| LEYE | <i>Tringa flavipes</i> | lesser yellowlegs |
| LISP | <i>Melospiza lincolnii</i> | Lincoln's sparrow |
| MAGO | <i>Limosa fedoa</i> | marbled godwit |
| MALL | <i>Anas platyrhynchos</i> | mallard |
| MERL | <i>Falco columbarius</i> | merlin |
| MODO | <i>Zenaida macroura</i> | mourning dove |
| NESP | <i>Ammodramus nelsoni</i> | Nelson's sparrow |
| NOFL | <i>Colaptes auratus</i> | northern flicker |
| NOHA | <i>Circus cyaneus</i> | northern harrier |
| NOPI | <i>Anas acuta</i> | northern pintail |
| NRWS | <i>Stelgidopteryx serripennis</i> | northern rough-winged swallow |
| NSHO | <i>Anas clypeata</i> | northern shoveler |
| OVEN | <i>Seiurus aurocapilla</i> | ovenbird |
| PIWO | <i>Dryocopus pileatus</i> | pileated woodpecker |
| RBGR | <i>Pheucticus ludovicianus</i> | rose-breasted grosbeak |
| RBGU | <i>Larus delawarensis</i> | ring-billed gull |
| RBNU | <i>Sitta canadensis</i> | red-breasted nuthatch |
| RCKI | <i>Regulus calendula</i> | ruby-crowned kinglet |
| REDH | <i>Aythya americana</i> | redhead |
| REVI | <i>Vireo olivaceus</i> | red-eyed vireo |
| RENP/RHNP | <i>Phalaropus lobatus</i> | red-necked phalarope |
| RNDU | <i>Aythya collaris</i> | ring-necked duck |
| RTHA | <i>Buteo jamaicensis</i> | red-tailed hawk |
| RUBL | <i>Euphagus carolinus</i> | rusty blackbird |
| RUDU | <i>Oxyura jamaicensis</i> | ruddy duck |
| RUGR | <i>Bonasa umbellus</i> | ruffed grouse |
| RWBL | <i>Agelaius phoeniceus</i> | red-winged blackbird |
| SACR | <i>Antigone canadensis</i> | sandhill crane |

| Name | Scientific name | Common name |
|------|--|-------------------------|
| SAVS | <i>Passerculus sandwichensis</i> | savannah sparrow |
| SORA | <i>Porzana carolina</i> | sora |
| SOSP | <i>Melospiza melodia</i> | song sparrow |
| SPPI | <i>Anthus spragueii</i> | Sprague's pipit |
| SWHA | <i>Buteo swainsoni</i> | Swainson's hawk |
| SWSP | <i>Melospiza georgiana</i> | swamp sparrow |
| SWTH | <i>Catharus ustulatus</i> | Swainson's thrush |
| TEWA | <i>Oreothlypis peregrina</i> | tennessee warbler |
| TRES | <i>Tachycineta bicolor</i> | tree swallow |
| UNKN | <i>Unknown</i> | unknown |
| UPSA | <i>Bartramia longicauda</i> | upland sandpiper |
| VESP | <i>Pooecetes gramineus</i> | vesper sparrow |
| WAVI | <i>Vireo gilvus</i> | warbling vireo |
| WEME | <i>Sturnella neglecta</i> | western meadowlark |
| WILL | <i>Tringa semipalmata</i> | willet |
| WIPH | <i>Phalaropus tricolor</i> | Wilson's phalarope |
| WISN | <i>Gallinago delicata</i> | Wilson's snipe |
| WTSP | <i>Zonotrichia albicollis</i> | white-throated sparrow |
| YEWA | <i>Setophaga petechia</i> <i>Xanthocephalus</i> | yellow warbler |
| YHBL | <i>xanthocephalus</i> | yellow-headed blackbird |

Appendix 1

B – Code, scientific name, and common name of plant taxa observed at our 96 wetland sites.

| Code | Scientific name | Common name |
|----------|---|--------------------------|
| ACHALPIN | <i>Achillea alpina</i> | Siberian yarrow |
| ACHMILLE | <i>Achillea millefolium</i> | common yarrow |
| ACOCALAM | <i>Acorus calamus</i> | sweet-flag |
| AGRCRIST | <i>Agropyron cristatum</i> ssp. <i>pectinatum</i> | crested wheatgrass |
| AGRGIGAN | <i>Agrostis gigantea</i> | redtop |
| AGRSCABR | <i>Agrostis scabra</i> | ticklegrass |
| AGRSTRIA | <i>Agrimonia striata</i> | roadside agrimony |
| ALITRIVI | <i>Alisma triviale</i> | northern water plantain |
| ALOEQUA | <i>Alopecurus aequalis</i> | short-awn meadow-foxtail |
| ALOPRATE | <i>Alopecurus pratensis</i> | field meadow-foxtail |
| AMARETRO | <i>Amaranthus retroflexus</i> | redroot pigweed |
| AMEALNIF | <i>Amelanchier alnifolia</i> | Saskatoon berry |
| ANAMINIM | <i>Anagallis minima</i> | chaffweed |
| ANECANAD | <i>Anemone canadensis</i> | canada anemone |
| ANTPARVI | <i>Antennaria parvifolia</i> | small-leaf pussytoes |
| ARNCHAMI | <i>Arnica chamissonis</i> | chamisso arnica |
| ARTBIENN | <i>Artemisia biennis</i> | biennial sagewort |
| ARTCAMPE | <i>Artemisia campestris</i> ssp. <i>caudata</i> | common sagewort |
| ARTLONGI | <i>Artemisia longifolia</i> | longleaf sagebrush |
| ARTLUDOV | <i>Artemisia ludoviciana</i> | gray sagewort |
| ATRPROST | <i>Atriplex prostrata</i> | triangle orache |
| AVEFATUA | <i>Avena fatua</i> | wild oats |
| BECSYZIG | <i>Beckmannia syzigachne</i> ssp. <i>syzigachne</i> | American sloughgrass |
| BIDCERNU | <i>Bidens cernua</i> | nodding beggarticks |
| BOLMARIT | <i>Bolboschoenus maritimus</i> | cosmopolitan bulrush |
| BRANAPUS | <i>Brassica napus</i> | Argentine canola |
| BROINERM | <i>Bromus inermis</i> | smooth brome |
| CALCANAD | <i>Calamagrostis canadensis</i> var. <i>canadensis</i> | bluejoint |
| CALIPALU | <i>Callitriche palustris</i> | vernal water-starwort |
| CALLPALU | <i>Calla palustris</i> | water arum |
| CALSTRIC | <i>Calamagrostis stricta</i> ssp. <i>inexpansa</i> | slimstem reedgrass |
| CALTPALU | <i>Caltha palustris</i> | yellow marsh marigold |
| CAPBURSA | <i>Capsella bursa-pastoris</i> | shepherd's purse |
| CARAQUAT | <i>Carex aquatilis</i> | water sedge |
| CARATHER | <i>Carex atherodes</i> | awned sedge |
| CARATHRO | <i>Carex athrostachya</i> | slender-beak sedge |
| CARBEBBI | <i>Carex bebbii</i> | Bebb's sedge |
| CARBREVI | <i>Carex brevior</i> | shortbeak sedge |
| CARCARVI | <i>Carum carvi</i> | wild caraway |

| Code | Scientific name | Common name |
|----------|---|------------------------------|
| CARDIAND | <i>Carex diandra</i> | two-stamened sedge |
| CAREX_SP | <i>Carex</i> sp. | sedge |
| CARLACUS | <i>Carex lacustris</i> | lakebank sedge |
| CARPELLI | <i>Carex pellita</i> | woolly sedge |
| CARPRAEG | <i>Carex praegracilis</i> | clustered field sedge |
| CARPRATI | <i>Carex praticola</i> | meadow sedge |
| CARRETRO | <i>Carex retrorsa</i> | knotsheath sedge |
| CARSARTW | <i>Carex sartwellii</i> | Sartwell's sedge |
| CARSYCHN | <i>Carex sychnocephala</i> | many-headed sedge |
| CARUTRIC | <i>Carex utriculata</i> | northwest territory sedge |
| CERARVEN | <i>Cerastium arvense</i> | field chickweed |
| CHAANGUS | <i>Chamerion angustifolium</i> ssp. <i>angustifolium</i> | fireweed |
| CHEALBUM | <i>Chenopodium album</i> | common lambsquarters |
| CHECAPIT | <i>Chenopodium capitatum</i> | strawberry blite |
| CHERUBRU | <i>Chenopodium rubrum</i> | red goosefoot |
| CICMACUL | <i>Cicuta maculata</i> var. <i>angustifolia</i> | spotted water hemlock |
| CIRARVEN | <i>Cirsium arvense</i> | Canada thistle |
| CIRVULGA | <i>Cirsium vulgare</i> | bull thistle |
| COLLINEA | <i>Collomia linearis</i> | narrow-leaf mountain trumpet |
| COMPALUS | <i>Comarum palustre</i> | purple marshlocks |
| CORSERIC | <i>Cornus sericea</i> ssp. <i>sericea</i> | red osier dogwood |
| CRETECTO | <i>Crepis tectorum</i> | narrow-leaf hawk's beard |
| DESCESPI | <i>Deschampsia cespitosa</i> ssp. <i>cespitosa</i> | tufted hairgrass |
| DESSOPHI | <i>Descurainia sophia</i> | flaxweed tansymustard |
| ECHCRUSG | <i>Echinochloa crus-galli</i> | barnyard grass |
| ELACOMMU | <i>Elaeagnus commutata</i> | silverberry |
| ELEACICU | <i>Eleocharis acicularis</i> | needle spikerush |
| ELEPALUS | <i>Eleocharis palustris</i> | creeping spikerush |
| ELYREPEN | <i>Elymus repens</i> | quackgrass |
| ELYTRACH | <i>Elymus trachycaulus</i> | slender wheatgrass |
| EPICAMPE | <i>Epilobium campestre</i> | smooth spike-primrose |
| EPICILIA | <i>Epilobium ciliatum</i> ssp. <i>glandulosum</i> | fringed willow-herb |
| EPILEPTO | <i>Epilobium leptophyllum</i> | bog willow-herb |
| EIPALUS | <i>Epilobium palustre</i> | marsh willow-herb |
| EQUARVEN | <i>Equisetum arvense</i> | common horsetail |
| EQUFLUVI | <i>Equisetum fluviatile</i> | river horsetail |
| EQUHYMAL | <i>Equisetum hyemale</i> ssp. <i>affine</i> | scouring horsetail |
| EQUPALUS | <i>Equisetum palustre</i> | marsh horsetail |
| EQUPRATE | <i>Equisetum pratense</i> | meadow horsetail |
| ERIGRACI | <i>Eriophorum gracile</i> | slender cotton-grass |
| ERILONCH | <i>Erigeron lonchophyllus</i> | low-meadow fleabane |
| ERIPHILA | <i>Erigeron philadelphicus</i> | Philadelphia fleabane |

| Code | Scientific name | Common name |
|----------|--|----------------------------|
| ERUGALLI | <i>Erucastrum gallicum</i> | common dog-mustard |
| ERYCHEIR | <i>Erysimum cheiranthoides</i> | wallflower mustard |
| EURCONSP | <i>Eurybia conspicua</i> | western showy aster |
| FAGESCUL | <i>Fagopyrum esculentum</i> | common buckwheat |
| FALCONVO | <i>Fallopia convolvulus</i> | black bindweed |
| FALSCAND | <i>Fallopia scandens</i> | climbing false buckwheat |
| FESSAXIM | <i>Festuca saximontana</i> | Rocky Mountain fescue |
| FRAVESCA | <i>Fragaria vesca</i> | woodland strawberry |
| FRAVIRGI | <i>Fragaria virginiana</i> ssp. <i>glauca</i> | wild strawberry |
| GALTETRA | <i>Galeopsis tetrahit</i> | brittle-stem hedge-nettle |
| GALTRIFI | <i>Galium trifidum</i> | small bedstraw |
| GALTRIFL | <i>Galium triflorum</i> | sweet bedstraw |
| GEUALEPP | <i>Geum aleppicum</i> | yellow avens |
| GEUMACRO | <i>Geum macrophyllum</i> var. <i>princisum</i> | large-leaf avens |
| GEURIVAL | <i>Geum rivale</i> | purple avens |
| GLYBOREA | <i>Glyceria borealis</i> | northern manna grass |
| GLYGRAND | <i>Glyceria grandis</i> | American manna grass |
| GLYSTRIA | <i>Glyceria striata</i> | fowl manna grass |
| GRANEGLE | <i>Gratiola neglecta</i> | clammy hedge-hyssop |
| GRISQUAR | <i>Grindelia squarrosa</i> | curlytop gumweed |
| HIEUMBAL | <i>Hieracium umbellatum</i> | Canadian hawkweed |
| HIPVULGA | <i>Hippuris vulgaris</i> | common mare's tail |
| HORJUBAT | <i>Hordeum jubatum</i> | foxtail barley |
| HORVULGA | <i>Hordeum vulgare</i> | common barley |
| JUNBALTI | <i>Juncus balticus</i> ssp. <i>ater</i> | Baltic rush |
| JUNLONGI | <i>Juncus longistylus</i> | long-style rush |
| JUNNODOS | <i>Juncus nodosus</i> | jointed rush |
| JUNVASEY | <i>Juncus vaseyi</i> | vasey's rush |
| KRALANAT | <i>Krascheninnikovia lanata</i> | winterfat |
| LACSERRI | <i>Lactuca serriola</i> | prickly lettuce |
| LATOCHRO | <i>Lathyrus othroleucus</i> | cream peavine |
| LEMMINOR | <i>Lemna minor</i> | common duckweed |
| LEMTRISU | <i>Lemna trisulca</i> | ivy-leaf duckweed |
| LINUSITA | <i>Linum usitatissimum</i> | common flax |
| LYCASPER | <i>Lycopus asper</i> | rough water hore-hound |
| LYSCILIA | <i>Lysimachia ciliata</i> | fringed yellow loosestrife |
| LYSMARIT | <i>Lysimachia maritima</i> | sea milkwort |
| LYSTHYRS | <i>Lysimachia thysiflora</i> | tufted yellow loosestrife |
| MAISTELL | <i>Maianthemum stellatum</i> | false solomon's seal |
| MALNEGLE | <i>Malva neglecta</i> | roundleaf mallow |
| MEDSATIV | <i>Medicago sativa</i> | alfalfa |
| MELALBUS | <i>Melilotus albus</i> | white sweet-clover |
| MELIL_SP | <i>Melilotus</i> sp. | sweet-clover |
| MENARVEN | <i>Mentha arvensis</i> | wild mint |

| Code | Scientific name | Common name |
|----------|--|--------------------------|
| MONNUTTA | <i>Monolepis nuttalliana</i> | Nuttall's poverty-weed |
| MUHRICHA | <i>Muhlenbergia richardsonis</i> | mat muhly |
| MULOBLON | <i>Mulgedium oblongifolium</i> | blue lettuce |
| PENPROCE | <i>Penstemon procerus</i> | pincushion beardtongue |
| PERAMPHI | <i>Persicaria amphibia</i> | water knotweed |
| PERLAPAT | <i>Persicaria lapathifolia</i> | curlytop knotweed |
| PETFRIGI | <i>Petasites frigidus</i> var. <i>sagittatus</i> | arctic sweet colt's-foot |
| PHAARUND | <i>Phalaris arundinacea</i> | reed canary grass |
| PHLPRATE | <i>Phleum pratense</i> | common timothy |
| PLAHYPER | <i>Platanthera hyperborea</i> | northern bog orchid |
| PLAMAJOR | <i>Plantago major</i> | broadleaf plantain |
| PLASCOUL | <i>Plagiobothrys scouleri</i> | Scouler's popcornflower |
| POAPALUS | <i>Poa palustris</i> | fowl bluegrass |
| POAPRATE | <i>Poa pratensis</i> | Kentucky bluegrass |
| POLAVICU | <i>Polygonum aviculare</i> ssp. <i>depressum</i> | prostrate knotweed |
| POLRAMOS | <i>Polygonum ramosissimum</i> | bushy knotweed |
| POPBALSA | <i>Populus balsamifera</i> | balsam poplar |
| POPTREMU | <i>Populus tremuloides</i> | trembling aspen |
| POTANSER | <i>Potentilla anserina</i> | silverweed cinquefoil |
| POTGRAMI | <i>Potamogeton gramineus</i> | variableleaf pondweed |
| POTNORVE | <i>Potentilla norvegica</i> | Norwegian cinquefoil |
| POTRICHA | <i>Potamogeton richardsonii</i> | Richardson's pondweed |
| POTRIVAL | <i>Potentilla rivalis</i> | brook cinquefoil |
| PYRASARI | <i>Pyrola asarifolia</i> | pink wintergreen |
| RANAQUAT | <i>Ranunculus aquatilis</i> var. <i>diffusus</i> | water buttercup |
| RANCYMBA | <i>Ranunculus cymbalaria</i> | alkali buttercup |
| RANGMELI | <i>Ranunculus gmelinii</i> | Gmelin's buttercup |
| RANMACOU | <i>Ranunculus macounii</i> | Macoun's buttercup |
| RANSCELE | <i>Ranunculus sceleratus</i> var. <i>multifidus</i> | celeryleaf buttercup |
| RANUN_SP | <i>Ranunculus</i> sp. | buttercup |
| RIBLACUS | <i>Ribes lacustre</i> | prickly currant |
| RIBOXYAC | <i>Ribes oxycanthoides</i> | Canadian gooseberry |
| RORPALUS | <i>Rorippa palustris</i> | marsh yellowcress |
| ROSACICU | <i>Rosa acicularis</i> ssp. <i>sayi</i> | prickly rose |
| RUBPUBES | <i>Rubus pubescens</i> | dwarf red raspberry |
| RUBSACHA | <i>Rubus sachalinensis</i> var. <i>sachalinensis</i> | common red raspberry |
| RUMBRITA | <i>Rumex britannica</i> | greater water dock |
| RUMCRISP | <i>Rumex crispus</i> | curly dock |
| RUMEX_SP | <i>Rumex</i> sp. | dock |
| RUMFUEGI | <i>Rumex fueginus</i> | golden dock |
| RUMOCCID | <i>Rumex occidentalis</i> | western dock |
| RUMSALIC | <i>Rumex salicifolius</i> | willow dock |

| Code | Scientific name | Common name |
|----------|--|------------------------------|
| SAGCUNEA | <i>Sagittaria cuneata</i> | arum-leaf arrowhead |
| SALBEBBI | <i>Salix bebbiana</i> | Bebb's willow |
| SALDISCO | <i>Salix discolor</i> | pussy willow |
| SALEXIGU | <i>Salix exigua</i> | sandbar willow |
| SALIX_SP | <i>Salix</i> sp. | willow |
| SALLASIA | <i>Salix lasiandra</i> var. <i>lasiandra</i> | pacific willow |
| SALLUCID | <i>Salix lucida</i> | shining willow |
| SALMACCA | <i>Salix maccalliana</i> | Mccalla's willow |
| SALPETIO | <i>Salix petiolaris</i> | meadow willow |
| SALPLANI | <i>Salix planifolia</i> | plain-leaf willow |
| SALPSEUD | <i>Salix pseudomonticola</i> | false mountain willow |
| SALPYRIF | <i>Salix pyrifolia</i> | balsam willow |
| SALRUBRA | <i>Salicornia rubra</i> | red samphire |
| SALSERIS | <i>Salix serissima</i> | autumn willow |
| SCHACUTU | <i>Schoenoplectus acutus</i> var. <i>acutus</i> | hard-stem bulrush |
| SCHOE_SP | <i>Schoenoplectus</i> sp. | bulrush |
| SCHPUNGE | <i>Schoenoplectus pungens</i> var. <i>pungens</i> | common three-square bulrush |
| SCHTABER | <i>Schoenoplectus tabernaemontani</i> | soft-stem bulrush |
| SCIMICRO | <i>Scirpus microcarpus</i> | panicled bulrush |
| SCOFESTU | <i>Scolochloa festucacea</i> | common rivergrass |
| SCUGALER | <i>Scutellaria galericulata</i> | marsh skullcap |
| Sd_Forb | - | unidentifiable seedling/forb |
| SENVULGA | <i>Senecio vulgaris</i> | common groundsel |
| SISMONTA | <i>Sisyrinchium montanum</i> | mountain blue-eyed grass |
| SIUSUAVE | <i>Sium suave</i> | common water parsnip |
| SOLALTIS | <i>Solidago altissima</i> ssp. <i>gilvocanescens</i> | Canada goldenrod |
| SONARVEN | <i>Sonchus arvensis</i> | perennial sow-thistle |
| SONASPER | <i>Sonchus asper</i> | prickly sow-thistle |
| SONOLERA | <i>Sonchus oleraceus</i> | annual sow-thistle |
| SPAANGUS | <i>Sparganium angustifolium</i> | narrow-leaf bur-reed |
| SPAEURYC | <i>Sparganium eurycarpum</i> | giant bur-reed |
| SPESALIN | <i>Spergularia salina</i> | salt sandspurry |
| SPHINTER | <i>Sphenopholis intermedia</i> | slender wedgegrass |
| SPOCRYPT | <i>Sporobolus cryptandrus</i> | sand dropseed |
| STAPILOS | <i>Stachys pilosa</i> var. <i>pilosa</i> | hairy hedgenettle |
| STELONGI | <i>Stellaria longifolia</i> | long-leag starwort |
| STEMEDIA | <i>Stellaria media</i> | common chickweed |
| SUACALCE | <i>Suaeda calceoliformis</i> | paiuteweed |
| SYMBOREA | <i>Symphotrichum boreale</i> | northern bog aster |
| SYMERICO | <i>Symphotrichum ericoides</i> var. <i>pansum</i> | white heath aster |
| SYMLANCE | <i>Symphotrichum lanceolatum</i> var. <i>hesperium</i> | white panicle aster |

| Code | Scientific name | Common name |
|----------|--|--------------------------------|
| SYMOCCID | <i>Symphoricarpos occidentalis</i> | western snowberry |
| SYMPUNIC | <i>Symphyotrichum puniceum</i> var. <i>puniceum</i> | purplestem aster |
| TANVULGA | <i>Tanacetum vulgare</i> | common tansy |
| TAROFFIC | <i>Taraxacum officinale</i> | common dandelion |
| TEPPALUS | <i>Tephrosieris palustris</i> | marsh fleabane |
| THLARVEN | <i>Thlaspi arvense</i> | field pennycress |
| TRADUBIU | <i>Tragopogon dubius</i> | goat's beard |
| TRIHYBRI | <i>Trifolium hybridum</i> | alsike clover |
| TRIMARIT | <i>Triglochin maritima</i> | seaside arrow-grass |
| TYPLATIF | <i>Typha latifolia</i> | common cattail |
| UNKASTER | <i>Asteraceae</i> | unidentifiable Asteraceae |
| UNKBRASS | <i>Brassicaceae</i> | unidentifiable Brassicaceae |
| UNKCARYO | <i>Caryophyllaceae</i> | unidentifiable Caryophyllaceae |
| UNKPOACE | <i>Poaceae</i> | unidentifiable poaceae |
| URTDIOCA | <i>Urtica dioica</i> ssp. <i>gracilis</i> | stinging nettle |
| UTRVULGA | <i>Utricularia vulgaris</i> ssp. <i>macrorhiza</i> | common bladderwort |
| VERPEREG | <i>Veronica peregrina</i> | purslane speedwell |
| VERSCUTE | <i>Veronica scutellata</i> | marsh speedwell |
| VICAMERI | <i>Vicia americana</i> | American vetch |
| VIOADUNC | <i>Viola adunca</i> | early blue violet |
| VIOCANAD | <i>Viola canadensis</i> | Canada white violet |
| VIOSOROR | <i>Viola sororia</i> var. <i>affinis</i> | common blue violet |

Appendix 1

C – A list of all aquatic macroinvertebrate taxa identified with taxonomic resolution.

| Class | Order | Family | |
|---------------|------------|---------------|-----------------|
| Insecta | Coleoptera | Curculionidae | |
| | | Chrysomelidae | |
| | | Dytiscidae | |
| | | Elmidae | |
| | | Gyrinidae | |
| | | Halplidae | |
| | | Hydraenidae | |
| | | Hydrophilidae | |
| | | Phalacridae | |
| | | Ptiliidae | |
| | | Salpingidae | |
| | | Scirtidae | |
| | | Staphylinidae | |
| | | Diptera | Anthomyiidae |
| | | | Ceratopogonidae |
| | | | Chaoboridae |
| | | | Chironomidae |
| | | | Culicidae |
| | | | Dixidae |
| | | | Dolichopodidae |
| Empididae | | | |
| Ephydriidae | | | |
| Psychodidae | | | |
| Sciomyzidae | | | |
| Stratiomyidae | | | |
| Syrphidae | | | |

| Class | Order | Family |
|------------------------|---------------------------|---------------------------|
| | | Tabanidae |
| | | Tipulidae |
| | Ephemeroptera | Baetidae |
| | | Caenidae |
| | | Siphonuridae |
| | Hemiptera | Corixidae |
| | | Gerridae |
| | | Hebridae |
| | | Mesoveliidae |
| | | Notonectidae |
| | | Saldidae |
| | | Veliidae |
| | Lepidoptera | Noctuidae |
| | | Pyralidae |
| | Odonata | Aeshnidae |
| | | Coenagrionidae |
| | | Lestidae |
| | | Libellulidae |
| | Trichoptera | Brachycentridae |
| | Collembola [†] | Leptoceridae |
| | | Limnephilidae |
| Entognatha | | |
| Arachnida | Trombidiformes | Hydrachnidia [†] |
| Branchipoda | Anostraca [†] | |
| | Conchostraca [†] | |
| | Notostraca | Triopsidae |
| Malacostraca | Amphipoda | |
| Ostracoda [†] | | |

| Class | Order | Family |
|--------------------------|------------------------|-------------|
| Bivalvia | Veneroidea | Sphaeriidae |
| Gastropoda | Basommatophora | Lymnaeidae |
| | | Planorbidae |
| Clitellata | Hirudinea [†] | |
| Oligochaeta [†] | | |
| Hydrzoa [†] | | |
| Nematoda [‡] | | |
| Tardigrada | | |

[†]Not identified to Family level

[‡]Phylum level

Appendix 2

The diversity values and test results for the 1000 iterations, which include: 1) alpha, beta and gamma diversity (worksheet 1–3); 2) one-way ANOVA and Tukey’s test comparing alpha diversity among permanence classes (worksheet 4–6); 3) PerMANOVA, used to assess whether pair-wise total beta diversity differed significantly among permanence classes; 4) post hoc test (pairwise PerMANOVA), evaluating the pairwise nature of any significant differences in beta diversity (worksheet 7–9); 5) paired Student’s t-tests to compare the beta estimates between the null and observed beta diversity among permanence classes (worksheet 10–12). In the final two rows of each worksheet, we present the mean and standard error among iterations.

Appendix 3

A - Test statistics for one-way ANOVA and Tukey's test comparing alpha diversity among permanence classes on our raw data. Bold p-values indicate that group means differed.

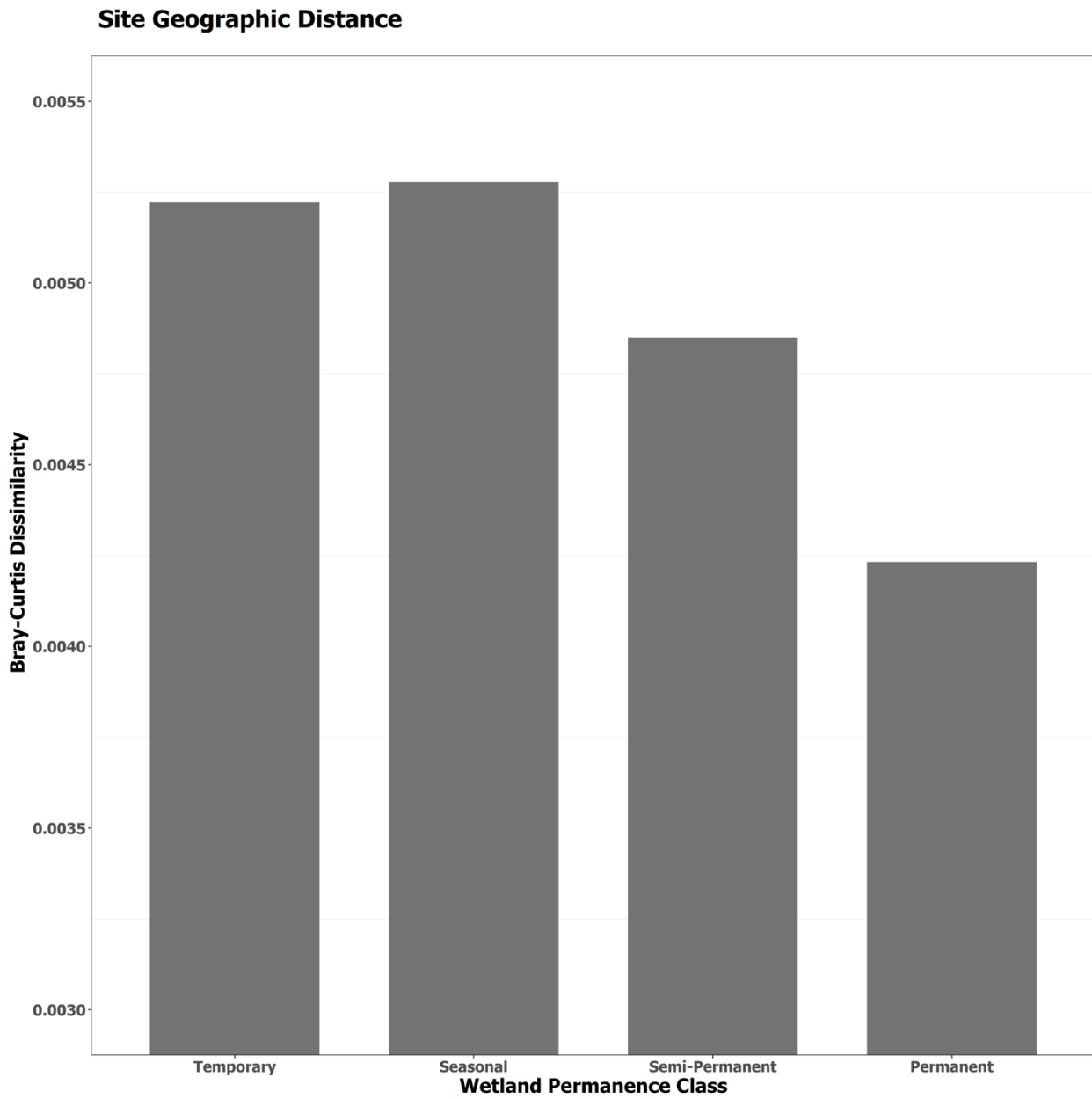
| Test | Test statistic | Birds | Plants | Macroinvertebrates |
|------------------------|----------------------------|---|--------------|---|
| One-way ANOVA | F-value | 8.314 | 3.512 | 18.968 |
| | p-value | 5.97×10^{-5} | 0.018 | 1.85×10^{-9} |
| Tukey's test (p-value) | Temporary – Seasonal | 0.082 | 0.154 | 1.23×10^{-4} |
| | Temporary – Semi-permanent | 0.184 | 0.070 | 1.06×10^{-7} |
| | Temporary – Permanent | 1.72×10^{-5} | 0.032 | 3.66×10^{-8} |
| | Seasonal – Semi-permanent | 1.000 | 0.859 | 0.044 |
| | Seasonal – Permanent | 0.008 | 0.615 | 0.012 |
| | Semi-permanent – Permanent | 0.032 | 0.975 | 0.944 |

B - Test statistics for MRPP, used to determine whether pair-wise total beta diversity differed significantly among permanence classes and post hoc test (pairwise MRPP), evaluating the pairwise nature of any significant differences. Since there was no difference in nestedness among permanence classes, we do not present results for the pairwise MRPP. Bold p-values indicate that group means differed (alpha = 0.05).

| Test | Partitioned beta | Test statistic | Birds | Plants | Macroinvertebrates |
|-------------------------|------------------|----------------------------|--------------|--------------|--------------------|
| MRPP | nestedness | A-value | -0.037 | -0.069 | 0.005 |
| | | p-value | 0.979 | 0.957 | 0.297 |
| | turnover | A-value | 0.032 | 0.016 | 0.042 |
| | | p-value | 0.001 | 0.009 | 0.003 |
| | sum | A-value | 0.024 | 0.012 | 0.027 |
| | | p-value | 0.001 | 0.006 | 0.002 |
| Pairwise MRPP (p-value) | turnover | Temporary – Seasonal | 0.252 | 0.768 | 1.000 |
| | | Temporary – Semi-permanent | 0.060 | 0.042 | 1.000 |
| | | Temporary – Permanent | 0.006 | 0.018 | 0.054 |
| | | Seasonal – Semi-permanent | 1.000 | 0.510 | 1.000 |
| | | Seasonal – Permanent | 0.006 | 0.552 | 0.012 |
| | | Semi-permanent – Permanent | 0.336 | 1.000 | 0.768 |
| | sum | Temporary – Seasonal | 0.258 | 0.906 | 0.372 |
| | | Temporary – Semi-permanent | 0.024 | 0.084 | 0.054 |
| | | Temporary – Permanent | 0.006 | 0.042 | 0.006 |
| | | Seasonal – Semi-permanent | 1.000 | 0.648 | 0.702 |
| | | Seasonal – Permanent | 0.012 | 0.348 | 0.006 |
| | | Semi-permanent – Permanent | 0.396 | 1.000 | 1.000 |

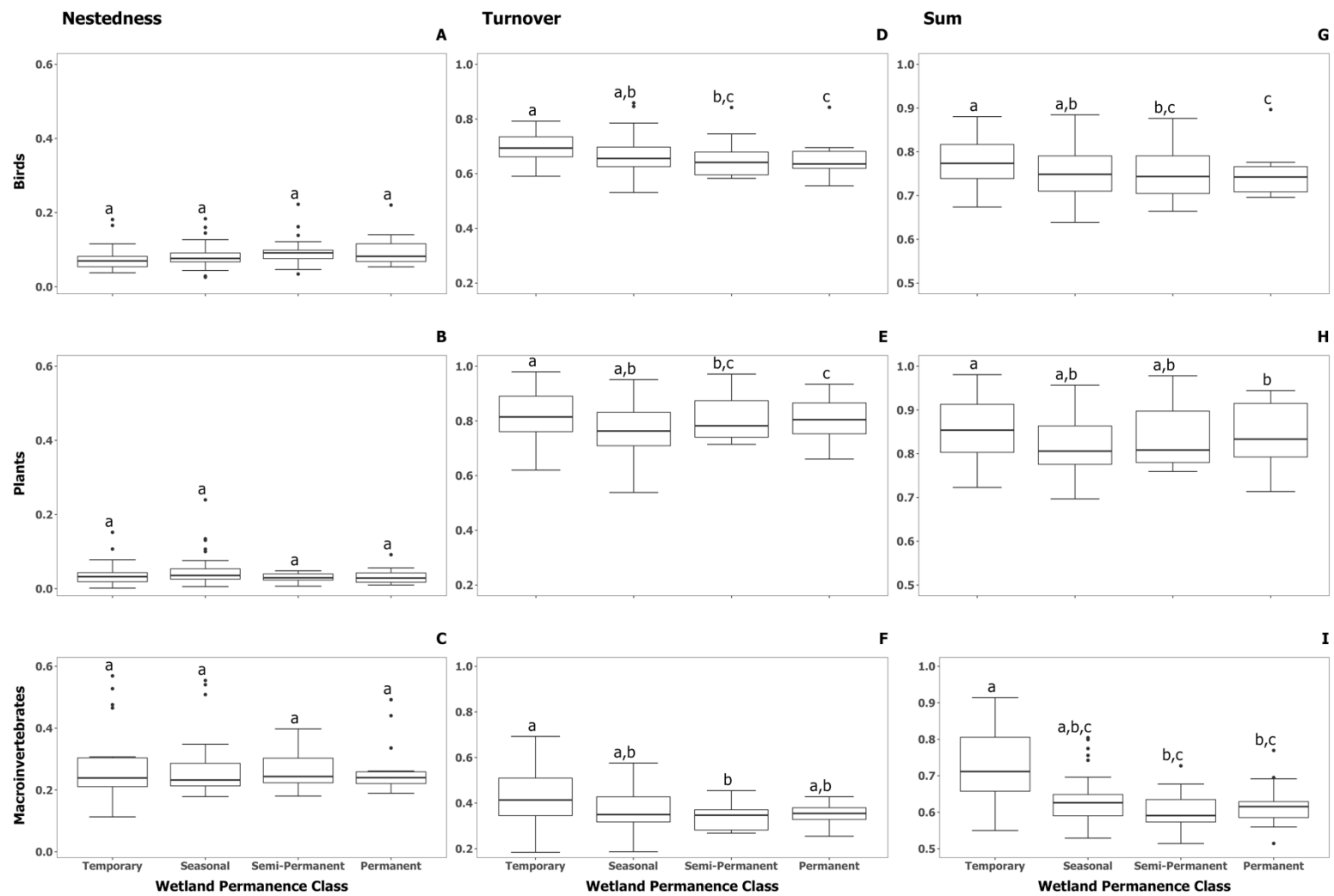
Appendix 4

Mean Bray–Curtis dissimilarity among the 56 sites that remained after ratification. We selected 14 sites per permanence class for each iteration. Here, we present the mean across 1000 iterations.



Appendix 5

Plots of variance in beta diversity among permanence classes for birds (A, D, G), plants (B, E, H) and macroinvertebrates (C, F, I) at our 96 study wetlands. In most cases, variances in beta diversity across permanence class were similar, and differences in group means matched the results of our statistical tests (MRPP and PerMANOVA). In cases where variances were larger (E: seasonal; F: temporary and seasonal; I: temporary) or smaller (G: permanent) in some permanence classes, the mean within-permanence class beta diversity might not best reflect similarities among classes (e.g. E: temporary and seasonally-ponded wetlands), which might appear to conflict with the results of our statistical tests. Letters (a, b, c) indicate whether the observed beta diversity differed among permanence classes, based on a MRPP on our raw data.



Appendix 6

Nonmetric multidimensional scaling (NMDS) for water and sediment quality data measured at our 96 study wetlands.

Detailed methods on sampling and analysis of environmental conditions at the wetlands are presented in Kraft (2016). In brief, we characterized the environmental conditions at each of our 96 wetlands by collecting water samples in May when the ponded-water area at each wetland was greatest. These were analysed for basic anions and cations (Ca^{2+} , Mg^{2+} , Na^+ , K^+ , Cl^- , SO_4^{2-}), as well as nutrients (total N, total P, dissolved organic C) by the Biogeochemistry Analytical Services Lab at the University of Alberta. At this time we also measured conductivity, temperature, and turbidity of the water in situ. We also collected sediment samples in August when vegetation was characterized. These were analysed for gravimetric water content and loss on ignition in our own lab. In addition, we submitted samples for sediment cations (Ca^{2+} , Mg^{2+} , Na^+ , K^+) and nutrients (total N, total P, total C) to the Biogeochemistry Analytical Services Lab at the University of Alberta. As sites were visited about monthly during the growing season, we also measured the maximum water depth at a staff gauge on each visit and used these to calculate the mean and maximum summer water depth as well as the amplitude and the date by which the water entirely dried up if this event occurred.

We used the “metaMDS” function under the vegan package (Oksanen et al. 2017) in R, and a Euclidian dissimilarity, to implement the NMDS (Fig. A6.1). Using three dimensions, we had low stress (8.18), and the NMDS converged after 20 tries. The NMDS is on water chemistry (W), soil chemistry (S) and wetland water depth (WD) data, which was relativized by column maximum prior to analysis. We included vectors with correlations that were greater than 0.1 for one or both axis, and the ellipses are 95% confidence intervals for sites by permanence class.

Based on this analysis, we conclude that temporarily- and seasonally-ponded wetlands did not represent a greater range in environmental conditions or habitat heterogeneity than permanently- and semi-permanently-ponded wetlands. If anything, habitat heterogeneity appears to have been greatest in the permanently ponded wetland class along axis 1, though not along axes 2 and 3. Overall, seasonal wetlands covered the smallest range in ordination space, indicating they had the most homogenous water and sediment chemistry. Consequently, we conclude that habitat heterogeneity is not responsible for the negative relationship between

hydroperiod and beta diversity that we observed in our study.

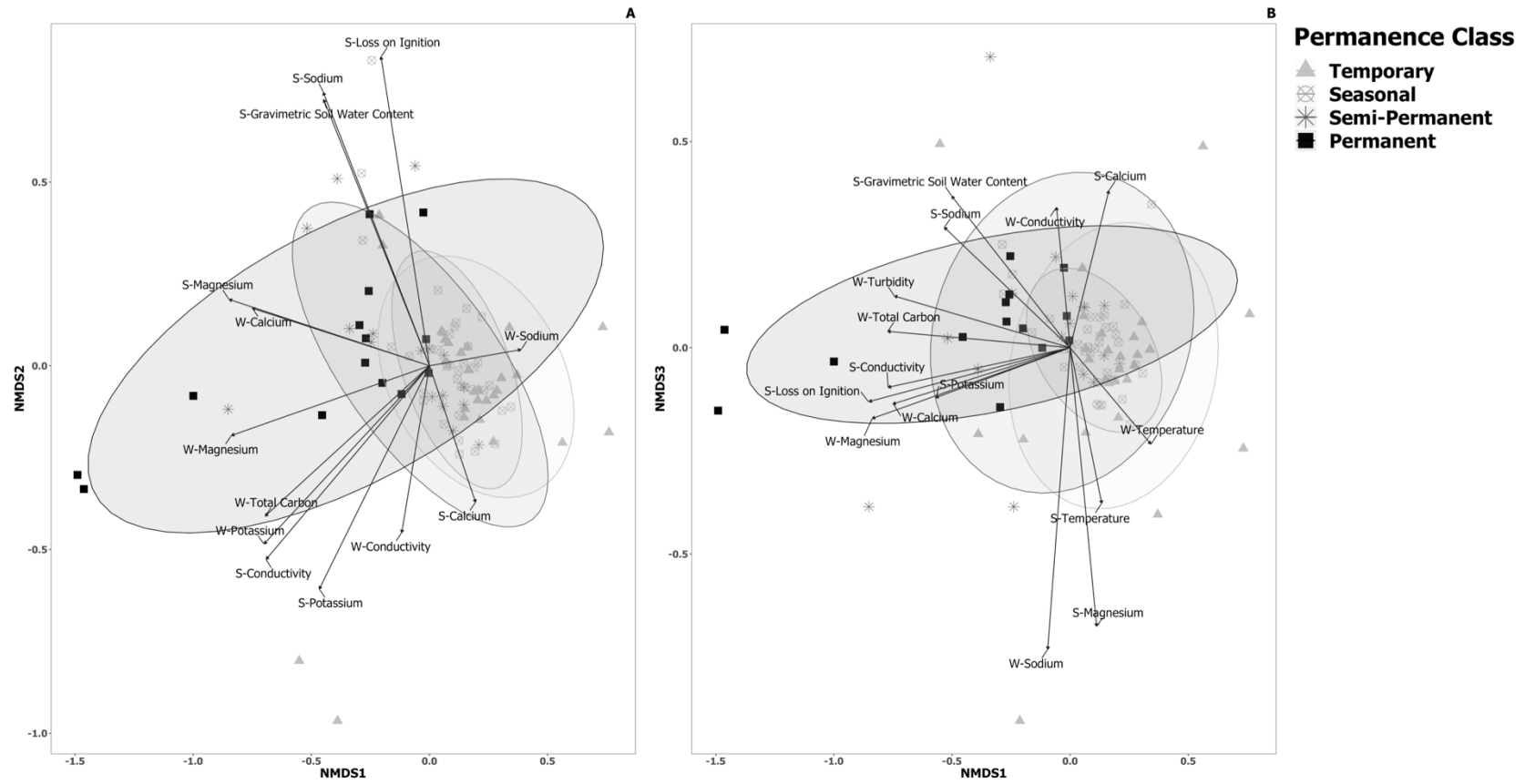


Figure A.1. Visualization of a three-dimensional NMS analysis of environmental variables including water (w) and sediment (s) quality parameters. Note that the ellipses represent 95% confidence intervals around the different wetland permanence classes.

References

Kraft, A. 2016. Physicochemical and vegetative responses of prairie wetlands to local land covers. – MSc thesis, Univ. of Waterloo,
<<http://hdl.handle.net/10012/10951>>.