

## Comparing Two Different Ecosystems: Forest and Grassland

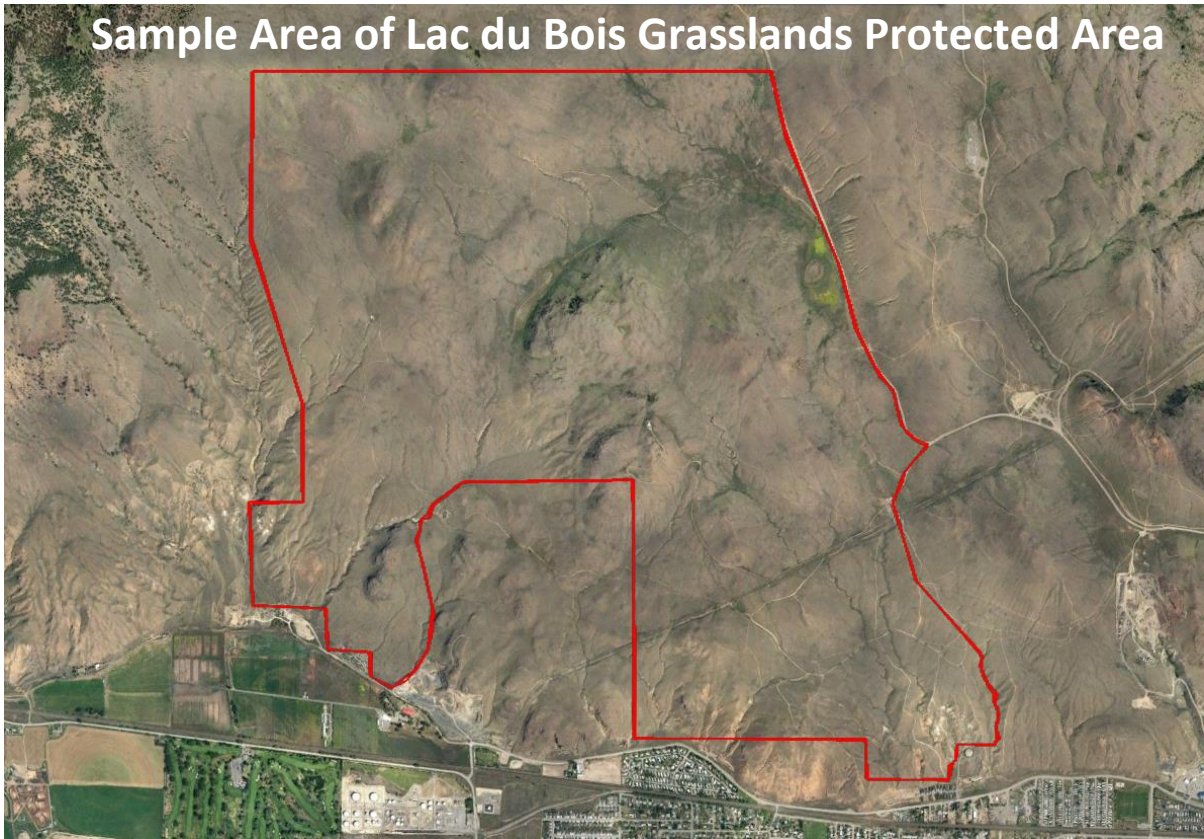
**Note:** The WildlifeDiversity program provides a list of species within an area along with other information. However, there is more that can be done other than simple lists of species. As an example, the tables below were created by taking two separate program results and combining them using a spreadsheet in order to compare two different areas. WildlifeDiversity does not itself directly combine this information. The other items below (the map and explanation of the tables) are only provided for illustration purposes. Also, this analysis does not involve inventory or validation in the field. All values are derived from general, continent-wide species and habitat associations, average population densities and knowledge of wildlife food habits.

Two parks were selected to illustrate predicted wildlife communities in two very different ecosystem types: mature forest and grassland. The parks chosen were Paul Lake Park and a portion of Lac du Bois Grasslands Protected Area in British Columbia, Canada. These were chosen because they are very close to each other – 14 kilometres – and any North American species field guide map would predict the same wildlife community. However, our process takes habitat into account, not just location, and the difference in predicted wildlife between the two is apparent in the tables below.

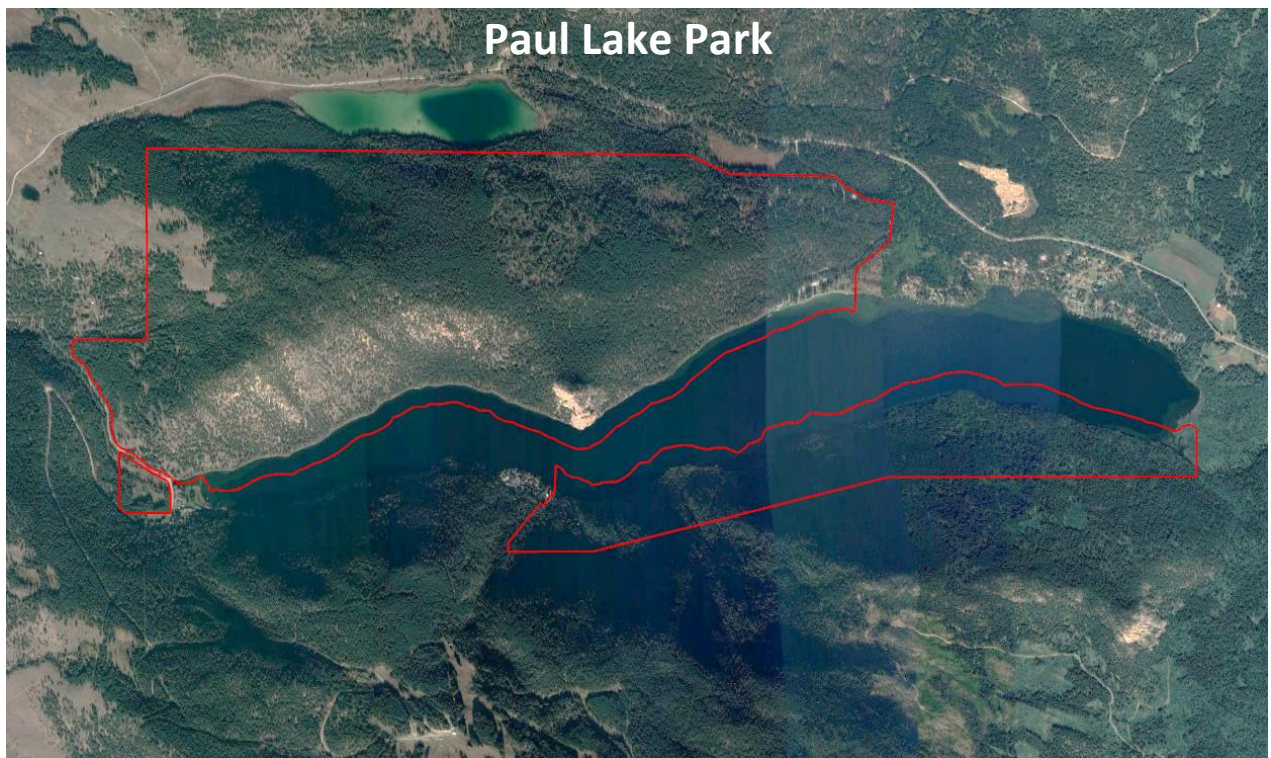
The portion of Lac du Bois Grasslands selected for analysis is low elevation, dry grassland with a few scattered trees and wetlands. Paul Lake is at a higher elevation and consists largely of mature and old growth conifer forest with a small area of grassland, an open dryer forest on a steep slope and cliff, the adjacent lake and a small wetland. The terrestrial area of both are almost identical in area, with Lac du Bois Grasslands example area being 817 hectares and the Paul Lake example being 815 hectares. Both are outlined in red below.

The Lac du Bois Grasslands area was stratified into 46 habitat types; Paul Lake had 31. Lists of predicted vertebrate species were combined in the same table for comparison purposes. Your lists for any individual site would only contain values for your site. The same was done for the food lists for each area.

**Sample Area of Lac du Bois Grasslands Protected Area**



**Paul Lake Park**



Predicted species and estimated population numbers, sorted by most abundant to least abundant for Lac du Bois Grasslands, are presented in the first table below, with the last column having corresponding numbers for Paul Lake Park. Out of a total of 262 species that have this area within their known range distribution, 76 found some habitat that met their habitat needs (number was not zero) for Lac du Bois Grasslands and 110 species for Paul Lake Park.

An old general rule of thumb is that at least 50 individuals are needed to have a viable population over the short term, and at least 500 individuals to have a successful long-term survival of a species. The actual numbers vary greatly between species and habitats. Of course, this only applies if the area is isolated from similar habitats. If there are similar adjacent habitats, then the viability for a species to survive increases by the amount of continuous or nearby suitable habitats that are available. This would mean that in these example areas, if analyzed as isolated "islands", that Lac du Bois Grasslands would have only been able to support 9 species in the short-term and 6 species in the long-term, with Paul Lake Park able to support 16 species in the short-term and 9 in the long-term.

The difference in the predicted species composition between the two areas is quite obvious even though they are very close to each other. The grassland species in Lac du Bois Grasslands gives way to the species requiring forest habitats in Paul Lake Park.

Note that there is a **Type** column so you can easily separate or sort by major invertebrate group of Bird, Mammal, Frog, Salamander, Lizard, Snake or Turtle once the information is imported into a spreadsheet.

### **Predicted Vertebrate Species and Number (Grassland and Forest Comparison)**

| Scientific Name                | Common Name                  | Type   | Number in Lac du Bois | Number in Paul Lake Park |
|--------------------------------|------------------------------|--------|-----------------------|--------------------------|
| <i>Spea intermontana</i>       | Great basin spadefoot toad   | Frog   | 4058.45               | 107.00                   |
| <i>Microtus pennsylvanicus</i> | Meadow Vole                  | Mammal | 2703.00               | 1365.00                  |
| <i>Peromyscus maniculatus</i>  | Deer Mouse                   | Mammal | 1516.20               | 21627.00                 |
| <i>Euphagus cyanocephalus</i>  | Brewer's Sparrow             | Bird   | 1425.15               | 28.80                    |
| <i>Microtus longicaudus</i>    | Long-tailed vole             | Mammal | 998.82                | 0.00                     |
| <i>Carduelis tristis</i>       | American Goldfinch           | Bird   | 554.23                | 11.20                    |
| <i>Perognathus parvus</i>      | Great Basin Pocket Mouse     | Mammal | 493.05                | 0.00                     |
| <i>Coluber constrictor</i>     | Western Yellow Bellied Racer | Snake  | 419.74                | 64.94                    |
| <i>Tyrannus verticalis</i>     | Western Kingbird             | Bird   | 170.34                | 24.34                    |

|                               |                               |        |       |         |
|-------------------------------|-------------------------------|--------|-------|---------|
| Odocoileus hemionus           | Mule Deer                     | Mammal | 83.83 | 0.57    |
| Thomomys talpoides            | Northern pocket gopher        | Mammal | 78.00 | 210.00  |
| Lithobates sylvaticus         | Wood frog                     | Frog   | 74.48 | 42.00   |
| Chordeiles minor              | Common Nighthawk              | Bird   | 64.86 | 1.28    |
| Passerina amoena              | Lazuli Bunting                | Bird   | 64.54 | 0.00    |
| Elgaria coerulea              | Northwestern Alligator Lizard | Lizard | 59.55 | 0.00    |
| Pooecetes gramineus           | Vesper Sparrow                | Bird   | 46.28 | 0.00    |
| Pituophis catenifer           | Great Basin Gopher Snake      | Snake  | 32.75 | 0.67    |
| Agelaius phoeniceus           | Red-winged Blackbird          | Bird   | 26.60 | 15.00   |
| Asio flammeus                 | Short-eared Owl               | Bird   | 23.75 | 0.48    |
| Calcarius lapponicus          | Lapland Longspur              | Bird   | 16.59 | 1.60    |
| Corvus brachyrhynchos         | American Crow                 | Bird   | 12.52 | 46.60   |
| Catherpes mexicanus           | Canyon Wren                   | Bird   | 11.62 | 68.48   |
| Ondatra zibethicus            | Common Muskrat                | Mammal | 10.64 | 6.00    |
| Crotalus oreganus             | Northern Pacific Rattlesnake  | Snake  | 9.25  | 0.00    |
| Sorex cinereus                | Cinereus Shrew                | Mammal | 9.10  | 3944.20 |
| Bombycilla cedrorum           | Cedar Waxwing                 | Bird   | 8.06  | 2.20    |
| Carpodacus cassinii           | Cassin's Finch                | Bird   | 7.60  | 1998.00 |
| Anthus rubescens              | American Pipit                | Bird   | 5.57  | 0.00    |
| Spizella arborea              | American Tree Sparrow         | Bird   | 5.45  | 29.88   |
| Porzana carolina              | Sora                          | Bird   | 4.79  | 2.70    |
| Sorex hoyi                    | American Pygmy Shrew          | Mammal | 4.52  | 528.70  |
| Corvus corax                  | Common Raven                  | Bird   | 3.98  | 3.12    |
| Phalaropus tricolor           | Wilson's Phalarope            | Bird   | 2.98  | 2.46    |
| Canis latrans                 | Coyote                        | Mammal | 2.43  | 0.35    |
| Sturnella neglecta            | Western Meadowlark            | Bird   | 2.31  | 2.24    |
| Botaurus lentiginosus         | American Bittern              | Bird   | 2.13  | 1.20    |
| Anaxyrus boreas               | Western toad                  | Frog   | 2.03  | 1250.64 |
| Plectrophenax nivalis         | Snow Bunting                  | Bird   | 1.61  | 0.02    |
| Aythya collaris               | Ring-necked Duck              | Bird   | 0.96  | 0.54    |
| Taxidea taxus                 | American Badger               | Mammal | 0.81  | 0.02    |
| Anas platyrhynchos            | Mallard                       | Bird   | 0.80  | 0.45    |
| Junco hyemalis                | Dark-eyed Junco               | Bird   | 0.64  | 110.24  |
| Geothlypis trichas            | Common Yellowthroat           | Bird   | 0.51  | 26.57   |
| Piranga ludoviciana           | Western Tanager               | Bird   | 0.46  | 69.24   |
| Xanthocephalus xanthocephalus | Yellow-headed Blackbird       | Bird   | 0.43  | 0.24    |
| Empidonax oberholseri         | Dusky Flycatcher              | Bird   | 0.41  | 0.00    |
| Myotis thysanodes             | Fringed Myotis                | Mammal | 0.35  | 2.21    |
| Mustela frenata               | Long-tailed Weasel            | Mammal | 0.35  | 0.20    |
| Lanius excubitor              | Northern Shrike               | Bird   | 0.32  | 0.05    |
| Circus cyaneus                | Northern Harrier              | Bird   | 0.31  | 0.07    |
| Eremophila alpestris          | Horned Lark                   | Bird   | 0.31  | 0.00    |
| Bos bison                     | American Bison                | Mammal | 0.27  | 0.01    |

|                                   |                          |        |      |        |
|-----------------------------------|--------------------------|--------|------|--------|
| <i>Chlidonias niger</i>           | Black Tern               | Bird   | 0.27 | 0.15   |
| <i>Mustela erminea</i>            | Ermine                   | Mammal | 0.21 | 22.58  |
| <i>Turdus migratorius</i>         | American Robin           | Bird   | 0.16 | 20.39  |
| <i>Aythya affinis</i>             | Lesser Scaup             | Bird   | 0.11 | 0.06   |
| <i>Myotis californicus</i>        | Californian Myotis       | Mammal | 0.10 | 1.70   |
| <i>Carduelis pinus</i>            | Pine Siskin              | Bird   | 0.08 | 23.30  |
| <i>Coccythraustes vespertinus</i> | Evening Grosbeak         | Bird   | 0.08 | 191.88 |
| <i>Gallinago delicata</i>         | Wilson's Snipe           | Bird   | 0.07 | 0.04   |
| <i>Puma concolor</i>              | Cougar                   | Mammal | 0.06 | 0.06   |
| <i>Branta canadensis</i>          | Canada Goose             | Bird   | 0.05 | 0.04   |
| <i>Contopus cooperi</i>           | Olive-sided Flycatcher   | Bird   | 0.05 | 15.15  |
| <i>Canis lupus</i>                | Gray Wolf                | Mammal | 0.05 | 0.11   |
| <i>Anas crecca</i>                | Green-winged Teal        | Bird   | 0.04 | 0.04   |
| <i>Myotis volans</i>              | Long-legged Myotis       | Mammal | 0.04 | 65.57  |
| <i>Sayornis saya</i>              | Say's Phoebe             | Bird   | 0.04 | 0.00   |
| <i>Molothrus ater</i>             | Brown-headed Cowbird     | Bird   | 0.03 | 1.36   |
| <i>Nucifraga columbiana</i>       | Clark's Nutcracker       | Bird   | 0.03 | 7.99   |
| <i>Loxia curvirostra</i>          | Red Crossbill            | Bird   | 0.03 | 41.26  |
| <i>Limnodromus scolopaceus</i>    | Long-billed Dowitcher    | Bird   | 0.02 | 0.01   |
| <i>Anas acuta</i>                 | Northern Pintail         | Bird   | 0.02 | 0.01   |
| <i>Podiceps grisegena</i>         | Red-necked Grebe         | Bird   | 0.02 | 0.01   |
| <i>Vireo cassinii</i>             | Cassin's Vireo           | Bird   | 0.01 | 2.98   |
| <i>Aquila chrysaetos</i>          | Golden Eagle             | Bird   | 0.01 | 0.00   |
| <i>Erethizon dorsatum</i>         | North American Porcupine | Mammal | 0.01 | 5.05   |
| <i>Lontra canadensis</i>          | Northern River otter     | Mammal | 0.00 | 0.00   |
| <i>Ovis canadensis</i>            | Bighorn Sheep            | Mammal | 0.00 | 0.00   |
| <i>Falco rusticolus</i>           | Gyr Falcon               | Bird   | 0.00 | 0.00   |
| <i>Eptesicus fuscus</i>           | Big Brown Bat            | Mammal | 0.00 | 0.35   |
| <i>Myotis evotis</i>              | Long-eared Myotis        | Mammal | 0.00 | 0.35   |
| <i>Accipiter striatus</i>         | Sharp-shinned Hawk       | Bird   | 0.00 | 0.76   |
| <i>Gulo gulo</i>                  | Wolverine                | Mammal | 0.00 | 0.07   |
| <i>Falco mexicanus</i>            | Prairie Falcon           | Bird   | 0.00 | 0.00   |
| <i>Anas americana</i>             | American Wigeon          | Bird   | 0.00 | 0.00   |
| <i>Anas clypeata</i>              | Northern Shoveler        | Bird   | 0.00 | 0.00   |
| <i>Anas cyanoptera</i>            | Cinnamon Teal            | Bird   | 0.00 | 0.00   |
| <i>Anas discors</i>               | Blue-winged Teal         | Bird   | 0.00 | 0.00   |
| <i>Anas strepera</i>              | Gadwall                  | Bird   | 0.00 | 0.00   |
| <i>Aythya americana</i>           | Redhead                  | Bird   | 0.00 | 0.00   |
| <i>Bucephala albeola</i>          | Bufflehead               | Bird   | 0.00 | 0.00   |
| <i>Bucephala clangula</i>         | Common Goldeneye         | Bird   | 0.00 | 0.00   |
| <i>Bucephala islandica</i>        | Barrow's Goldeneye       | Bird   | 0.00 | 0.00   |
| <i>Cygnus columbianus</i>         | Tundra Swan              | Bird   | 0.00 | 0.00   |
| <i>Histrionicus histrionicus</i>  | Harlequin Duck           | Bird   | 0.00 | 0.00   |

|                                  |                        |      |      |       |
|----------------------------------|------------------------|------|------|-------|
| <i>Lophodytes cucullatus</i>     | Hooded Merganser       | Bird | 0.00 | 0.00  |
| <i>Melanitta fusca</i>           | White-winged Scoter    | Bird | 0.00 | 0.00  |
| <i>Melanitta perspicillata</i>   | Surf Scoter            | Bird | 0.00 | 0.00  |
| <i>Mergus merganser</i>          | Common Merganser       | Bird | 0.00 | 0.00  |
| <i>Mergus serrator</i>           | Red-breasted Merganser | Bird | 0.00 | 0.00  |
| <i>Oxyura jamaicensis</i>        | Ruddy Duck             | Bird | 0.00 | 0.00  |
| <i>Ardea herodias</i>            | Great Blue Heron       | Bird | 0.00 | 0.00  |
| <i>Gymnogyps californianus</i>   | California Condor      |      | 0.00 | 0.00  |
| <i>Gavia immer</i>               | Common Loon            | Bird | 0.00 | 2.12  |
| <i>Callipepla californica</i>    | California Quail       | Bird | 0.00 | 0.00  |
| <i>Bonasa umbellus</i>           | Ruffed Grouse          | Bird | 0.00 | 0.00  |
| <i>Dendragapus obscurus</i>      | Dusky Grouse           | Bird | 0.00 | 0.00  |
| <i>Falciennis canadensis</i>     | Spruce Grouse          | Bird | 0.00 | 33.92 |
| <i>Lagopus leucura</i>           | White-tailed Ptarmigan | Bird | 0.00 | 0.00  |
| <i>Phasianus colchicus</i>       | Ring-necked Pheasant   | Bird | 0.00 | 0.00  |
| <i>Tympanuchus phasianellus</i>  | Sharp-tailed Grouse    | Bird | 0.00 | 0.00  |
| <i>Aechmophorus occidentalis</i> | Western Grebe          | Bird | 0.00 | 0.00  |
| <i>Podiceps auritus</i>          | Horned Grebe           | Bird | 0.00 | 0.00  |
| <i>Podiceps nigricollis</i>      | Eared Grebe            | Bird | 0.00 | 0.00  |
| <i>Podilymbus podiceps</i>       | Pied-billed Grebe      | Bird | 0.00 | 0.00  |
| <i>Accipiter cooperii</i>        | Cooper's Hawk          | Bird | 0.00 | 0.00  |
| <i>Accipiter gentilis</i>        | Northern Goshawk       | Bird | 0.00 | 0.00  |
| <i>Buteo jamaicensis</i>         | Red-tailed Hawk        | Bird | 0.00 | 0.01  |
| <i>Buteo swainsoni</i>           | Swainson's Hawk        | Bird | 0.00 | 0.00  |
| <i>Haliaeetus leucocephalus</i>  | Bald Eagle             | Bird | 0.00 | 0.00  |
| <i>Pandion haliaetus</i>         | Osprey                 | Bird | 0.00 | 0.00  |
| <i>Falco columbarius</i>         | Merlin                 | Bird | 0.00 | 0.11  |
| <i>Falco peregrinus</i>          | Peregrine Falcon       | Bird | 0.00 | 0.00  |
| <i>Falco sparverius</i>          | American Kestrel       | Bird | 0.00 | 0.00  |
| <i>Grus canadensis</i>           | Sandhill Crane         | Bird | 0.00 | 0.00  |
| <i>Fulica americana</i>          | American Coot          | Bird | 0.00 | 0.00  |
| <i>Rallus limicola</i>           | Virginia Rail          | Bird | 0.00 | 0.00  |
| <i>Charadrius semipalmatus</i>   | Semipalmated Plover    | Bird | 0.00 | 0.00  |
| <i>Charadrius vociferus</i>      | Killdeer               | Bird | 0.00 | 0.00  |
| <i>Larus argentatus</i>          | Herring Gull           | Bird | 0.00 | 0.00  |
| <i>Larus californicus</i>        | California Gull        | Bird | 0.00 | 0.01  |
| <i>Larus canus</i>               | Mew Gull               | Bird | 0.00 | 0.00  |
| <i>Larus delawarensis</i>        | Ring-billed Gull       | Bird | 0.00 | 0.00  |
| <i>Larus philadelphia</i>        | Bonaparte's Gull       | Bird | 0.00 | 0.00  |
| <i>Sterna hirundo</i>            | Common Tern            | Bird | 0.00 | 0.02  |
| <i>Actitis macularius</i>        | Spotted Sandpiper      | Bird | 0.00 | 0.00  |
| <i>Calidris alpina</i>           | Dunlin                 | Bird | 0.00 | 0.00  |
| <i>Calidris minutilla</i>        | Least Sandpiper        | Bird | 0.00 | 0.00  |



|                                 |                                |      |      |        |
|---------------------------------|--------------------------------|------|------|--------|
| <i>Tringa flavipes</i>          | Lesser Yellowlegs              | Bird | 0.00 | 0.00   |
| <i>Tringa melanoleuca</i>       | Greater Yellowlegs             | Bird | 0.00 | 0.00   |
| <i>Tringa solitaria</i>         | Solitary Sandpiper             | Bird | 0.00 | 0.00   |
| <i>Ceryle alcyon</i>            | Belted Kingfisher              | Bird | 0.00 | 1.51   |
| <i>Chaetura vauxi</i>           | Vaux's Swift                   | Bird | 0.00 | 1.26   |
| <i>Cypseloides niger</i>        | Black Swift                    | Bird | 0.00 | 0.00   |
| <i>Columba livia</i>            | Rock Pigeon                    | Bird | 0.00 | 0.00   |
| <i>Zenaida macroura</i>         | Mourning Dove                  | Bird | 0.00 | 0.00   |
| <i>Colaptes auratus</i>         | Northern Flicker               | Bird | 0.00 | 0.00   |
| <i>Dryocopus pileatus</i>       | Pileated Woodpecker            | Bird | 0.00 | 0.00   |
| <i>Melanerpes lewis</i>         | Lewis's Woodpecker             | Bird | 0.00 | 0.00   |
| <i>Picoides arcticus</i>        | Black-backed Woodpecker        | Bird | 0.00 | 0.00   |
| <i>Picoides dorsalis</i>        | American Three-toed Woodpecker | Bird | 0.00 | 27.98  |
| <i>Picoides pubescens</i>       | Downy Woodpecker               | Bird | 0.00 | 0.00   |
| <i>Picoides villosus</i>        | Hairy Woodpecker               | Bird | 0.00 | 4.80   |
| <i>Aegolius acadicus</i>        | Northern Saw-whet Owl          | Bird | 0.00 | 8.41   |
| <i>Aegolius funereus</i>        | Boreal Owl                     | Bird | 0.00 | 0.62   |
| <i>Asio otus</i>                | Long-eared Owl                 | Bird | 0.00 | 0.16   |
| <i>Bubo virginianus</i>         | Great Horned Owl               | Bird | 0.00 | 0.00   |
| <i>Glaucidium gnoma</i>         | Northern Pygmy-Owl             | Bird | 0.00 | 0.21   |
| <i>Megascops kennicottii</i>    | Western Screech-Owl            | Bird | 0.00 | 0.00   |
| <i>Strix nebulosa</i>           | Great Gray Owl                 | Bird | 0.00 | 0.00   |
| <i>Strix occidentalis</i>       | Spotted Owl                    | Bird | 0.00 | 0.00   |
| <i>Strix varia</i>              | Barred Owl                     | Bird | 0.00 | 1.04   |
| <i>Surnia ulula</i>             | Northern Hawk Owl              | Bird | 0.00 | 0.00   |
| <i>Selasphorus rufus</i>        | Rufous Hummingbird             | Bird | 0.00 | 198.08 |
| <i>Stellula calliope</i>        | Calliope Hummingbird           | Bird | 0.00 | 0.00   |
| <i>Contopus sordidulus</i>      | Western Wood-Pewee             | Bird | 0.00 | 0.00   |
| <i>Empidonax difficilis</i>     | Pacific-slope Flycatcher       | Bird | 0.00 | 377.44 |
| <i>Empidonax hammondii</i>      | Hammond's Flycatcher           | Bird | 0.00 | 21.89  |
| <i>Empidonax minimus</i>        | Least Flycatcher               | Bird | 0.00 | 107.52 |
| <i>Empidonax occidentalis</i>   | Cordilleran Flycatcher         | Bird | 0.00 | 0.00   |
| <i>Empidonax traillii</i>       | Willow Flycatcher              | Bird | 0.00 | 0.00   |
| <i>Tyrannus tyrannus</i>        | Eastern Kingbird               | Bird | 0.00 | 0.00   |
| <i>Bombycilla garrulus</i>      | Bohemian Waxwing               | Bird | 0.00 | 0.00   |
| <i>Certhia americana</i>        | Brown Creeper                  | Bird | 0.00 | 61.88  |
| <i>Cinclus mexicanus</i>        | American Dipper                | Bird | 0.00 | 0.00   |
| <i>Cyanocitta stelleri</i>      | Steller's Jay                  | Bird | 0.00 | 40.59  |
| <i>Perisoreus canadensis</i>    | Gray Jay                       | Bird | 0.00 | 10.13  |
| <i>Pica hudsonia</i>            | Black-billed Magpie            | Bird | 0.00 | 0.00   |
| <i>Hirundo rustica</i>          | Barn Swallow                   | Bird | 0.00 | 0.00   |
| <i>Petrochelidon pyrrhonota</i> | Cliff Swallow                  | Bird | 0.00 | 0.00   |
| <i>Riparia riparia</i>          | Bank Swallow                   | Bird | 0.00 | 0.00   |

|                                   |                               |      |      |         |
|-----------------------------------|-------------------------------|------|------|---------|
| <i>Stelgidopteryx serripennis</i> | Northern Rough-winged Swallow | Bird | 0.00 | 0.00    |
| <i>Tachycineta bicolor</i>        | Tree Swallow                  | Bird | 0.00 | 0.00    |
| <i>Tachycineta thalassina</i>     | Violet-green Swallow          | Bird | 0.00 | 0.00    |
| <i>Dumetella carolinensis</i>     | Gray Catbird                  | Bird | 0.00 | 0.00    |
| <i>Poecile atricapillus</i>       | Black-capped Chickadee        | Bird | 0.00 | 0.00    |
| <i>Poecile gambeli</i>            | Mountain Chickadee            | Bird | 0.00 | 25.28   |
| <i>Poecile hudsonica</i>          | Boreal Chickadee              | Bird | 0.00 | 0.00    |
| <i>Dendroica coronata</i>         | Yellow-rumped Warbler         | Bird | 0.00 | 192.59  |
| <i>Dendroica petechia</i>         | Yellow Warbler                | Bird | 0.00 | 0.00    |
| <i>Dendroica townsendi</i>        | Townsend's Warbler            | Bird | 0.00 | 0.00    |
| <i>Oporornis tolmiei</i>          | MacGillivray's Warbler        | Bird | 0.00 | 0.00    |
| <i>Seiurus noveboracensis</i>     | Northern Waterthrush          | Bird | 0.00 | 0.00    |
| <i>Setophaga ruticilla</i>        | American Redstart             | Bird | 0.00 | 0.00    |
| <i>Vermivora celata</i>           | Orange-crowned Warbler        | Bird | 0.00 | 56.70   |
| <i>Vermivora ruficapilla</i>      | Nashville Warbler             | Bird | 0.00 | 0.00    |
| <i>Wilsonia pusilla</i>           | Wilson's Warbler              | Bird | 0.00 | 0.00    |
| <i>Regulus calendula</i>          | Ruby-crowned Kinglet          | Bird | 0.00 | 150.98  |
| <i>Regulus satrapa</i>            | Golden-crowned Kinglet        | Bird | 0.00 | 2167.62 |
| <i>Sitta canadensis</i>           | Red-breasted Nuthatch         | Bird | 0.00 | 0.00    |
| <i>Sitta carolinensis</i>         | White-breasted Nuthatch       | Bird | 0.00 | 0.00    |
| <i>Sturnus vulgaris</i>           | European Starling             | Bird | 0.00 | 5.61    |
| <i>Salpinctes obsoletus</i>       | Rock Wren                     | Bird | 0.00 | 0.00    |
| <i>Troglodytes aedon</i>          | House Wren                    | Bird | 0.00 | 0.00    |
| <i>Troglodytes troglodytes</i>    | Winter Wren                   | Bird | 0.00 | 0.00    |
| <i>Catharus fuscescens</i>        | Veery                         | Bird | 0.00 | 0.00    |
| <i>Catharus guttatus</i>          | Hermit Thrush                 | Bird | 0.00 | 107.84  |
| <i>Catharus ustulatus</i>         | Swainson's Thrush             | Bird | 0.00 | 0.00    |
| <i>Ixoreus naevius</i>            | Varied Thrush                 | Bird | 0.00 | 0.84    |
| <i>Myadestes townsendi</i>        | Townsend's Solitaire          | Bird | 0.00 | 0.00    |
| <i>Sialia currucoides</i>         | Mountain Bluebird             | Bird | 0.00 | 0.00    |
| <i>Vireo gilvus</i>               | Warbling Vireo                | Bird | 0.00 | 36.86   |
| <i>Vireo olivaceus</i>            | Red-eyed Vireo                | Bird | 0.00 | 5.34    |
| <i>Pheucticus melanocephalus</i>  | Black-headed Grosbeak         | Bird | 0.00 | 0.00    |
| <i>Melospiza lincolnii</i>        | Lincoln's Sparrow             | Bird | 0.00 | 0.83    |
| <i>Melospiza melodia</i>          | Song Sparrow                  | Bird | 0.00 | 0.00    |
| <i>Passerella iliaca</i>          | Fox Sparrow                   | Bird | 0.00 | 0.00    |
| <i>Passerculus sandwichensis</i>  | Savannah Sparrow              | Bird | 0.00 | 0.00    |
| <i>Spizella passerina</i>         | Chipping Sparrow              | Bird | 0.00 | 0.00    |
| <i>Zonotrichia atricapilla</i>    | Golden-crowned Sparrow        | Bird | 0.00 | 0.00    |
| <i>Zonotrichia leucophrys</i>     | White-crowned Sparrow         | Bird | 0.00 | 0.00    |
| <i>Carduelis flammea</i>          | Common Redpoll                | Bird | 0.00 | 0.00    |
| <i>Carduelis hornemanni</i>       | Hoary Redpoll                 | Bird | 0.00 | 0.00    |



|                                  |                          |            |      |         |
|----------------------------------|--------------------------|------------|------|---------|
| <i>Leucosticte tephrocotis</i>   | Gray-crowned Rosy-Finch  | Bird       | 0.00 | 0.00    |
| <i>Loxia leucoptera</i>          | White-winged Crossbill   | Bird       | 0.00 | 5.56    |
| <i>Pinicola enucleator</i>       | Pine Grosbeak            | Bird       | 0.00 | 1.33    |
| <i>Passer domesticus</i>         | House Sparrow            | Bird       | 0.00 | 0.00    |
| <i>Synaptomys borealis</i>       | Northern Bog Lemming     | Mammal     | 0.00 | 0.13    |
| <i>Ursus arctos</i>              | Brown Bear               | Mammal     | 0.00 | 0.00    |
| <i>Vulpes vulpes</i>             | Red Fox                  | Mammal     | 0.00 | 0.00    |
| <i>Castor canadensis</i>         | American Beaver          | Mammal     | 0.00 | 0.00    |
| <i>Odocoileus virginianus</i>    | White-tailed Deer        | Mammal     | 0.00 | 0.00    |
| <i>Microtus montanus</i>         | Montane vole             | Mammal     | 0.00 | 1189.50 |
| <i>Myodes gapperi</i>            | Southern Red-backed Vole | Mammal     | 0.00 | 0.00    |
| <i>Neotoma cinerea</i>           | Bushy-tailed Woodrat     | Mammal     | 0.00 | 0.00    |
| <i>Phenacomys intermedius</i>    | Western Heather Vole     | Mammal     | 0.00 | 11.00   |
| <i>Zapus hudsonius</i>           | Meadow Jumping Mouse     | Mammal     | 0.00 | 0.00    |
| <i>Zapus princeps</i>            | Western Jumping Mouse    | Mammal     | 0.00 | 0.00    |
| <i>Lynx canadensis</i>           | Canadian Lynx            | Mammal     | 0.00 | 0.00    |
| <i>Lynx rufus</i>                | Bobcat                   | Mammal     | 0.00 | 0.03    |
| <i>Lepus americanus</i>          | Snowshoe hare            | Mammal     | 0.00 | 0.00    |
| <i>Mephitis mephitis</i>         | Striped Skunk            | Mammal     | 0.00 | 0.00    |
| <i>Martes americana</i>          | American Marten          | Mammal     | 0.00 | 0.00    |
| <i>Neovison vison</i>            | American Mink            | Mammal     | 0.00 | 0.00    |
| <i>Glaucomys sabrinus</i>        | Northern Flying Squirrel | Mammal     | 0.00 | 232.42  |
| <i>Neotamias amoenus</i>         | Yellow-pine Chipmunk     | Mammal     | 0.00 | 0.00    |
| <i>Tamiasciurus hudsonicus</i>   | Red Squirrel             | Mammal     | 0.00 | 750.33  |
| <i>Ursus americanus</i>          | American Black Bear      | Mammal     | 0.00 | 0.07    |
| <i>Corynorhinus townsendii</i>   | Townsend's Big-eared Bat | Mammal     | 0.00 | 0.00    |
| <i>Lasiurus cinereus</i>         | Hoary Bat                | Mammal     | 0.00 | 0.00    |
| <i>Lasionycteris noctivagans</i> | Silver-haired Bat        | Mammal     | 0.00 | 0.00    |
| <i>Myotis lucifugus</i>          | Little Brown Myotis      | Mammal     | 0.00 | 0.00    |
| <i>Myotis yumanensis</i>         | Yuma Myotis              | Mammal     | 0.00 | 0.00    |
| <i>Sorex monticolus</i>          | Dusky Shrew              | Mammal     | 0.00 | 0.00    |
| <i>Sorex palustris</i>           | American Water Shrew     | Mammal     | 0.00 | 0.00    |
| <i>Pseudacris regilla</i>        | Pacific tree frog        | Frog       | 0.00 | 0.00    |
| <i>Rana luteiventris</i>         | Columbia Spotted Frog    | Frog       | 0.00 | 0.00    |
| <i>Ambystoma macrodactylum</i>   | Long-toed salamander     | Salamander | 0.00 | 0.00    |
| <i>Charina bottae</i>            | Rubber Boa               | Snake      | 0.00 | 0.00    |
| <i>Thamnophis sirtalis</i>       | Valley Garter Snake      | Snake      | 0.00 | 0.00    |
|                                  | Wandering Garter Snake   |            | 0.00 | 0.00    |
| <i>Chrysemys picta</i>           | Western Painted Turtle   | Turtle     | 0.00 | 0.00    |
|                                  |                          |            |      |         |

The next two tables, one each for Lac du Bois and Paul Lake, show predicted foods consumed by the number of species in the first table. These tables need careful consideration and are not as helpful as the species table. This is because food items are based on continent-wide observations of the foods eaten by each species, so they may not match the food availabilities in your local area. Many species are opportunistic in selecting food items depending on where they live, so amalgamating food from across the continent introduces quite a bit of error and need for judgement of the results.

Some discretion will have to be applied in interpreting the food items, substituting known local foods for those that are not in your area or deleting them altogether. Some species, such as Deer Mice, are found in a variety of habitats, both forest and open, so the grass and sedge seed they eat over all habitats may not be applicable to an old growth forest such as in Paul Lake Park. Use your judgement in interpretation.

Also, because the results reflect continent-wide data, the foods are quantified as being needed year-round. It's impossible to account for all the season lengths or permanent residency of species. Of course, there are many species that either migrate or hibernate and only need the foods on a seasonal basis. Adjust accordingly.

The table shows the mass of two different life stages of the available food items. For vegetation, amounts are given for vegetative growth that is eaten, and another amount for the seeds or nuts produced at maturity. For invertebrates and vertebrates, the amounts shown are separated by the young (larval stages, eggs or young) and adult animals. A total for the combination is also given.

The most obvious error for the Lac du Bois Grasslands food list is the cedar, ceanothus, snowberry and other trees and shrubs that are not found in a dry grassland ecosystem. These should be disregarded, as should the high amounts of grasses and herbs for Paul Lake Park. Interpretation requires some knowledge of your area. Delete or substitute items that are not obviously there.

Even so, the tables do provide some insight as to the important food items found in different areas.

### **Predicted Food Consumption by Vertebrates in Lac du Bois Grasslands**

| <b>Food Item</b> | <b>Type</b> | <b>Vegetation or Young Mass(kg)</b> | <b>Seeds or Mature Mass(kg)</b> | <b>Lac du Bois Total Mass(kg)</b> |
|------------------|-------------|-------------------------------------|---------------------------------|-----------------------------------|
| Grass            | Vegetation  | 2764.6                              | 400.9                           | 3165.5                            |
| Cedar            | Vegetation  | 2211.1                              | 19.5                            | 2230.6                            |
| Ceanothus        | Vegetation  | 2211.1                              | 0                               | 2211.1                            |

|               |              |        |       |        |
|---------------|--------------|--------|-------|--------|
| Snowberry     | Vegetation   | 2211.1 | 0     | 2211.1 |
| Rose          | Vegetation   | 2211.1 | 0     | 2211.1 |
| Herb          | Vegetation   | 1515.8 | 91.2  | 1606.9 |
| Douglas-fir   | Vegetation   | 1326.7 | 91.2  | 1417.9 |
| Dogwood       | Vegetation   | 1326.7 | 11.2  | 1337.9 |
| Elderberry    | Vegetation   | 1326.7 | 3.4   | 1330.1 |
| Aspen         | Vegetation   | 1326.7 | 1.2   | 1327.9 |
| Juniper       | Vegetation   | 1326.7 | 0.6   | 1327.3 |
| Saskatoon     | Vegetation   | 1326.7 | 0.6   | 1327.3 |
| Oak           | Vegetation   | 1326.7 | 0     | 1326.7 |
| Sagebrush     | Vegetation   | 1326.7 | 0     | 1326.7 |
| Sedge         | Vegetation   | 1171.6 | 100.8 | 1272.4 |
| Grasshoppers  | Invertebrate | 0      | 749.7 | 749.7  |
| Crickets      | Invertebrate | 0      | 640.9 | 640.9  |
| Flies         | Invertebrate | 1      | 351.8 | 352.9  |
| Vole          | Vertebrate   | 0      | 334.4 | 334.4  |
| Beetles       | Invertebrate | 0      | 298.6 | 298.6  |
| Mouse         | Vertebrate   | 0      | 273.4 | 273.4  |
| Moths         | Invertebrate | 92.1   | 133.9 | 226    |
| Dragonflies   | Invertebrate | 1.6    | 146.3 | 147.9  |
| Mushroom      | Vegetation   | 98     | 45.6  | 143.6  |
| Pine          | Vegetation   | 0      | 136.8 | 136.8  |
| Birds - small | Vertebrate   | 5.5    | 112.3 | 117.8  |
| Rush          | Vegetation   | 14.7   | 100.1 | 114.7  |
| Lizard        | Vertebrate   | 0      | 112.6 | 112.6  |
| Bulrush       | Vegetation   | 14.7   | 97.9  | 112.5  |
| Frog          | Vertebrate   | 0      | 103.1 | 103.1  |
| Insects       | Invertebrate | 0      | 102.2 | 102.2  |
| Willow        | Vegetation   | 97.9   | 0     | 97.9   |
| Blackberry    | Vegetation   | 0      | 97.9  | 97.9   |
| Spiders       | Invertebrate | 0      | 67.5  | 67.5   |
| Bugs          | Invertebrate | 0      | 54.9  | 54.9   |
| Wasps         | Invertebrate | 0      | 51.6  | 51.6   |
| Gopher        | Vertebrate   | 0      | 42.6  | 42.6   |
| Grain         | Vegetation   | 0      | 38.9  | 38.9   |
| Ants          | Invertebrate | 0      | 33.5  | 33.5   |
| Rabbit        | Vertebrate   | 0.5    | 30.2  | 30.7   |
| Pigweed       | Vegetation   | 0      | 30.2  | 30.2   |
| Aster         | Vegetation   | 10.6   | 19.5  | 30.1   |
| Corn          | Vegetation   | 0      | 26.1  | 26.1   |
| Caddisflies   | Invertebrate | 0.8    | 23    | 23.7   |
| Cattail       | Vegetation   | 22.7   | 0     | 22.7   |

|                 |              |      |      |      |
|-----------------|--------------|------|------|------|
| Mustard         | Vegetation   | 0    | 22.6 | 22.6 |
| Ground squirrel | Vertebrate   | 0    | 21.7 | 21.7 |
| Goldenrod       | Vegetation   | 0    | 20.1 | 20.1 |
| Alder           | Vegetation   | 0    | 19.5 | 19.5 |
| Birch           | Vegetation   | 0    | 19.5 | 19.5 |
| Thistle         | Vegetation   | 0    | 19.5 | 19.5 |
| Springtails     | Invertebrate | 0    | 19.5 | 19.5 |
| Frogs           | Vertebrate   | 19.5 | 0    | 19.5 |
| Deer            | Vertebrate   | 0    | 16.1 | 16.1 |
| Aphids          | Invertebrate | 0    | 11.2 | 11.2 |
| Pondweed        | Vegetation   | 9.8  | 1.2  | 11   |
| Arrowhead       | Vegetation   | 9.8  | 0.9  | 10.7 |
| Dandelion       | Vegetation   | 10.6 | 0    | 10.6 |
| Alfalfa         | Vegetation   | 10.6 | 0    | 10.6 |
| Cinquefoil      | Vegetation   | 10.6 | 0    | 10.6 |
| Geranium        | Vegetation   | 10.6 | 0    | 10.6 |
| Lupine          | Vegetation   | 10.6 | 0    | 10.6 |
| Peavine         | Vegetation   | 10.6 | 0    | 10.6 |
| Rabbitbrush     | Vegetation   | 10.6 | 0    | 10.6 |
| Yarrow          | Vegetation   | 10.6 | 0    | 10.6 |
| Snake           | Vertebrate   | 0.5  | 9.6  | 10.2 |
| Horsetail       | Vegetation   | 9.8  | 0    | 9.8  |
| Smartweed       | Vegetation   | 0    | 8.2  | 8.2  |
| Ragweed         | Vegetation   | 0    | 8    | 8    |
| Knotweed        | Vegetation   | 0    | 7.9  | 7.9  |
| Mayflies        | Invertebrate | 0    | 7.7  | 7.8  |
| Lemming         | Vertebrate   | 0    | 7.6  | 7.6  |
| Snails          | Invertebrate | 0    | 6.5  | 6.5  |
| Berry           | Vegetation   | 0    | 6.3  | 6.3  |
| Butterflies     | Invertebrate | 1.2  | 4.5  | 5.7  |
| Marmot          | Vertebrate   | 0.5  | 5    | 5.6  |
| Waterfowl       | Vertebrate   | 5.3  | 0    | 5.3  |
| Carrion         | Vertebrate   | 0    | 5    | 5    |
| Mammals - small | Vertebrate   | 0    | 4.9  | 4.9  |
| Elk             | Vertebrate   | 0    | 4.6  | 4.6  |
| Sheep           | Vertebrate   | 0    | 4    | 4    |
| Grouse          | Vertebrate   | 3.8  | 0    | 3.8  |
| Quail           | Vertebrate   | 3.8  | 0    | 3.8  |
| Shrew           | Vertebrate   | 0    | 2.7  | 2.7  |
| Fish            | Vertebrate   | 0    | 2.4  | 2.4  |

|                 |              |     |     |     |
|-----------------|--------------|-----|-----|-----|
| Lizard          | Vertebrate   | 0   | 2.3 | 2.3 |
| Bees            | Invertebrate | 0   | 2.2 | 2.2 |
| Millipedes      | Invertebrate | 0   | 2.2 | 2.2 |
| Scorpions       | Invertebrate | 0   | 2.2 | 2.2 |
| Algae           | Vegetation   | 1.6 | 0   | 1.6 |
| Ivy             | Vegetation   | 0   | 1.6 | 1.6 |
| Chipmunk        | Vertebrate   | 0   | 1.4 | 1.4 |
| Slugs           | Invertebrate | 0   | 1.4 | 1.4 |
| Ponderosa pine  | Vegetation   | 0   | 1.2 | 1.2 |
| Cottonwood      | Vegetation   | 0   | 1.2 | 1.2 |
| Chickweed       | Vegetation   | 0   | 1.1 | 1.1 |
| Duckweed        | Vegetation   | 0.4 | 0.6 | 1   |
| Worms           | Invertebrate | 0   | 0.9 | 0.9 |
| Moose           | Vertebrate   | 0   | 0.8 | 0.8 |
| Water lily      | Vegetation   | 0   | 0.7 | 0.7 |
| Weed            | Vegetation   | 0   | 0.7 | 0.7 |
| Salamander      | Vertebrate   | 0   | 0.6 | 0.6 |
| Mistletoe       | Vegetation   | 0   | 0.6 | 0.6 |
| Mountain ash    | Vegetation   | 0   | 0.6 | 0.6 |
| Raspberry       | Vegetation   | 0   | 0.6 | 0.6 |
| Russian olive   | Vegetation   | 0   | 0.6 | 0.6 |
| Loon            | Vertebrate   | 0.6 | 0   | 0.6 |
| Thrush          | Vertebrate   | 0.6 | 0   | 0.6 |
| Sparrow         | Vertebrate   | 0.6 | 0   | 0.6 |
| Water scorpions | Invertebrate | 0   | 0.5 | 0.5 |
| Caribou         | Vertebrate   | 0   | 0.5 | 0.5 |
| Squirrel        | Vertebrate   | 0   | 0.5 | 0.5 |
| Shrimp          | Invertebrate | 0   | 0.4 | 0.4 |
| Beaver          | Vertebrate   | 0   | 0.4 | 0.4 |
| Trees           | Vegetation   | 0.4 | 0   | 0.4 |
| Lamb's quarters | Vegetation   | 0   | 0.3 | 0.3 |
| Wild rye        | Vegetation   | 0   | 0.3 | 0.3 |
| Skunk           | Vertebrate   | 0   | 0.3 | 0.3 |
| Amphipods       | Invertebrate | 0   | 0.2 | 0.2 |
| Mountain goat   | Vertebrate   | 0   | 0.2 | 0.2 |
| Termites        | Invertebrate | 0   | 0.2 | 0.2 |
| Lacewings       | Invertebrate | 0   | 0.2 | 0.2 |
| Leafhoppers     | Invertebrate | 0   | 0.2 | 0.2 |
| Bison           | Vertebrate   | 0   | 0.2 | 0.2 |

|                 |              |   |     |     |
|-----------------|--------------|---|-----|-----|
| Leeches         | Invertebrate | 0 | 0.1 | 0.1 |
| Damselflies     | Invertebrate | 0 | 0.1 | 0.1 |
| Diving beetles  | Invertebrate | 0 | 0.1 | 0.1 |
| Musk-ox         | Vertebrate   | 0 | 0.1 | 0.1 |
| Porcupine       | Vertebrate   | 0 | 0.1 | 0.1 |
| Sowbugs         | Invertebrate | 0 | 0.1 | 0.1 |
| Mosquitoes      | Invertebrate | 0 | 0.1 | 0.1 |
| Water boatmen   | Invertebrate | 0 | 0   | 0   |
| Birds           | Vertebrate   | 0 | 0   | 0   |
| Fox             | Vertebrate   | 0 | 0   | 0   |
| Hawk            | Vertebrate   | 0 | 0   | 0   |
| Muskrat         | Vertebrate   | 0 | 0   | 0   |
| Duck            | Vertebrate   | 0 | 0   | 0   |
| Owl             | Vertebrate   | 0 | 0   | 0   |
| Raven           | Vertebrate   | 0 | 0   | 0   |
| Crow            | Vertebrate   | 0 | 0   | 0   |
| Dove            | Vertebrate   | 0 | 0   | 0   |
| Craneflies      | Invertebrate | 0 | 0   | 0   |
| Bark beetles    | Invertebrate | 0 | 0   | 0   |
| Whitebark pine  | Vegetation   | 0 | 0   | 0   |
| Stoneflies      | Invertebrate | 0 | 0   | 0   |
| Blueberry       | Vegetation   | 0 | 0   | 0   |
| Cherry          | Vegetation   | 0 | 0   | 0   |
| Stinkbugs       | Invertebrate | 0 | 0   | 0   |
| Scale insects   | Invertebrate | 0 | 0   | 0   |
| Weevils         | Invertebrate | 0 | 0   | 0   |
| Sorrel          | Vegetation   | 0 | 0   | 0   |
| Hemlock         | Vegetation   | 0 | 0   | 0   |
| Spruce          | Vegetation   | 0 | 0   | 0   |
| Tamarack        | Vegetation   | 0 | 0   | 0   |
| Spruce budworm  | Invertebrate | 0 | 0   | 0   |
| Cicadas         | Invertebrate | 0 | 0   | 0   |
| Waterlily       | Vegetation   | 0 | 0   | 0   |
| Clover          | Vegetation   | 0 | 0   | 0   |
| Mammals - large | Vertebrate   | 0 | 0   | 0   |
| Harvestmen      | Invertebrate | 0 | 0   | 0   |

**Predicted Food Consumption by Vertebrates in Paul Lake Park**

| <b>Food Item</b> | <b>Type</b>  | <b>Vegetation<br/>or Young<br/>Mass(kg)</b> | <b>Seeds or<br/>Mature<br/>Mass(kg)</b> | <b>Total<br/>Mass(kg)</b> |
|------------------|--------------|---|---|---------------------------|
| Herb             | Vegetation   | 2058.8                                      | 1300.4                                  | 3359.2                    |
| Grass            | Vegetation   | 702.3                                       | 2613.3                                  | 3315.6                    |
| Pine             | Vegetation   | 50.6  | 2007.2                                  | 2057.8                    |
| Mushroom         | Vegetation   | 575.9                                       | 878.5                                   | 1454.4                    |
| Douglas-fir      | Vegetation   | 9.1   | 1307.4                                  | 1316.4                    |
| Moths            | Invertebrate | 1246.9                                      | 60.9                                    | 1307.7                    |
| Insects          | Invertebrate | 0   | 1207                                    | 1207                      |
| Sedge            | Vegetation   | 670.3                                       | 2                                       | 672.2                     |
| Spruce           | Vegetation   | 257.6                                       | 307.8                                   | 565.4                     |
| Plne             | Vegetation   | 0   | 527.7                                   | 527.7                     |
| Aspen            | Vegetation   | 9.1   | 347.1                                   | 356.1                     |
| Ponderosa pine   | Vegetation   | 0   | 324.7                                   | 324.7                     |
| Cottonwood       | Vegetation   | 0   | 317.2                                   | 317.2                     |
| Trees            | Vegetation   | 205.8                                       | 13.7                                    | 219.5                     |
| Flies            | Invertebrate | 0.6   | 185.7                                   | 186.3                     |
| Beetles          | Invertebrate | 1.9   | 174.9                                   | 176.8                     |
| Grasshoppers     | Invertebrate | 0   | 169.9                                   | 169.9                     |
| Willow           | Vegetation   | 107.8                                       | 1.5                                     | 109.3                     |
| Wasps            | Invertebrate | 0.2   | 99.5                                    | 99.7                      |
| Crickets         | Invertebrate | 0   | 98.7                                    | 98.7                      |
| Birds - small    | Vertebrate   | 55.1  | 37.3                                    | 92.4                      |
| Bees             | Invertebrate | 0   | 78.8                                    | 78.8                      |
| Butterflies      | Invertebrate | 72.6  | 2.9                                     | 75.5                      |
| Blueberry        | Vegetation   | 0.7   | 61.3                                    | 62                        |
| Bugs             | Invertebrate | 0   | 60.5                                    | 60.5                      |
| Vole             | Vertebrate   | 0   | 59.6                                    | 59.6                      |
| Spiders          | Invertebrate | 0   | 54.1                                    | 54.1                      |
| Dogwood          | Vegetation   | 9.1   | 42.6                                    | 51.7                      |
| Mouse            | Vertebrate   | 0   | 46                                      | 46                        |
| Grain            | Vegetation   | 0   | 45.7                                    | 45.7                      |
| Corn             | Vegetation   | 0   | 44.3                                    | 44.3                      |
| Mosquitoes       | Invertebrate | 0   | 42.9                                    | 42.9                      |
| Juniper          | Vegetation   | 9.1   | 29                                      | 38                        |
| Carrion          | Vertebrate   | 4   | 32.8                                    | 36.8                      |
| Cherry           | Vegetation   | 0   | 34                                      | 34                        |
| Ants             | Invertebrate | 0   | 31.1                                    | 31.1                      |
| Russian olive    | Vegetation   | 0   | 30.3                                    | 30.3                      |
| Fish             | Vertebrate   | 0   | 29.8                                    | 29.8                      |
| Dandelion        | Vegetation   | 28.8  | 0.6                                     | 29.4                      |



|                |              |      |      |      |
|----------------|--------------|------|------|------|
| Aster          | Vegetation   | 28.6 | 0.4  | 29   |
| Alfalfa        | Vegetation   | 28.6 | 0    | 28.6 |
| Cinquefoil     | Vegetation   | 28.6 | 0    | 28.6 |
| Geranium       | Vegetation   | 28.6 | 0    | 28.6 |
| Lupine         | Vegetation   | 28.6 | 0    | 28.6 |
| Peavine        | Vegetation   | 28.6 | 0    | 28.6 |
| Rabbitbrush    | Vegetation   | 28.6 | 0    | 28.6 |
| Yarrow         | Vegetation   | 28.6 | 0    | 28.6 |
| Snails         | Invertebrate | 0    | 28.5 | 28.5 |
| Sap            | Vegetation   | 27.2 | 0    | 27.2 |
| Slugs          | Invertebrate | 0    | 26.8 | 26.8 |
| Salamander     | Vertebrate   | 0    | 26.3 | 26.3 |
| Sowbugs        | Invertebrate | 0    | 26.1 | 26.1 |
| Cattail        | Vegetation   | 22.9 | 0    | 22.9 |
| Elderberry     | Vegetation   | 9.1  | 11.4 | 20.4 |
| Beech          | Vegetation   | 0    | 20.1 | 20.1 |
| Berry          | Vegetation   | 0    | 19.8 | 19.8 |
| Lichen         | Vegetation   | 19   | 0    | 19   |
| Whitebark pine | Vegetation   | 0    | 18.9 | 18.9 |
| Frog           | Vertebrate   | 0    | 16.6 | 16.6 |
| Lizard         | Vertebrate   | 0    | 16.1 | 16.1 |
| Cedar          | Vegetation   | 15.1 | 0.4  | 15.5 |
| Ceanothus      | Vegetation   | 15.1 | 0    | 15.1 |
| Snowberry      | Vegetation   | 15.1 | 0    | 15.1 |
| Rose           | Vegetation   | 15.1 | 0    | 15.1 |
| Aphids         | Invertebrate | 0    | 12.9 | 12.9 |
| Saskatoon      | Vegetation   | 9.1  | 3.4  | 12.5 |
| Sagebrush      | Vegetation   | 11.3 | 0    | 11.3 |
| Spruce budworm | Invertebrate | 11.2 | 0    | 11.2 |
| Bark beetles   | Invertebrate | 10.8 | 0.1  | 10.9 |
| Ticks          | Invertebrate | 0    | 10.2 | 10.2 |
| Craneflies     | Invertebrate | 0    | 9.8  | 9.8  |
| Ragweed        | Vegetation   | 0    | 9.8  | 9.8  |
| Oak            | Vegetation   | 9.1  | 0.8  | 9.8  |
| Lacewings      | Invertebrate | 0    | 9.7  | 9.7  |
| Rush           | Vegetation   | 8.3  | 1.2  | 9.5  |
| Caddisflies    | Invertebrate | 0.4  | 9    | 9.4  |
| Bulrush        | Vegetation   | 8.3  | 0    | 8.3  |
| Arrowhead      | Vegetation   | 7.8  | 0.5  | 8.3  |
| Deer           | Vertebrate   | 0.5  | 7.6  | 8.1  |
| Blackberry     | Vegetation   | 0    | 8    | 8    |
| Knotweed       | Vegetation   | 0    | 7.9  | 7.9  |

|                       |              |     |     |     |
|-----------------------|--------------|-----|-----|-----|
| Pigweed               | Vegetation   | 0   | 6.5 | 6.5 |
| Pondweed              | Vegetation   | 5.5 | 0.7 | 6.2 |
| Ivy                   | Vegetation   | 0   | 5.9 | 5.9 |
| Horsetail             | Vegetation   | 5.5 | 0   | 5.5 |
| Dragonflies           | Invertebrate | 0.9 | 4.4 | 5.3 |
| Rabbit                | Vertebrate   | 0.3 | 4.8 | 5   |
| Sorrel                | Vegetation   | 0   | 4.6 | 4.6 |
| Clover                | Vegetation   | 4.6 | 0   | 4.6 |
| Hemlock               | Vegetation   | 0   | 4.5 | 4.5 |
| Birch                 | Vegetation   | 0.7 | 3.3 | 4   |
| Mammals - small       | Vertebrate   | 0   | 3.9 | 3.9 |
| Shrew                 | Vertebrate   | 0   | 3.6 | 3.6 |
| Scale insects         | Invertebrate | 0   | 3.6 | 3.6 |
| Goldenrod             | Vegetation   | 0   | 3.6 | 3.6 |
| Termites              | Invertebrate | 0   | 3.5 | 3.5 |
| Alder                 | Vegetation   | 0   | 3   | 3   |
| Lemming               | Vertebrate   | 0   | 2.5 | 2.5 |
| Loon                  | Vertebrate   | 2.3 | 0   | 2.3 |
| Thrush                | Vertebrate   | 2.3 | 0   | 2.3 |
| Sparrow               | Vertebrate   | 2.3 | 0   | 2.3 |
| Waterlily             | Vegetation   | 2.3 | 0   | 2.3 |
| Currant               | Vegetation   | 0   | 2.2 | 2.2 |
| Fireweed              | Vegetation   | 2.2 | 0   | 2.2 |
| Lily                  | Vegetation   | 2.2 | 0   | 2.2 |
| Mint                  | Vegetation   | 0   | 2.2 | 2.2 |
| Paintbrush            | Vegetation   | 2.2 | 0   | 2.2 |
| Smartweed             | Vegetation   | 0   | 2.1 | 2.1 |
| Beetles - wood boring | Invertebrate | 0   | 2   | 2   |
| Leafhoppers           | Invertebrate | 0   | 1.9 | 1.9 |
| Elk                   | Vertebrate   | 0   | 1.9 | 1.9 |
| Moose                 | Vertebrate   | 0.4 | 1.4 | 1.8 |
| Lamb's quarters       | Vegetation   | 0   | 1.6 | 1.6 |
| Wild rye              | Vegetation   | 0   | 1.6 | 1.6 |
| Tree bark             | Vegetation   | 0.7 | 0.7 | 1.4 |
| Worms                 | Invertebrate | 0   | 1.3 | 1.3 |
| Huckleberry           | Vegetation   | 0   | 1.3 | 1.3 |
| Stinkbugs             | Invertebrate | 0   | 1.2 | 1.2 |
| Gopher                | Vertebrate   | 0   | 1   | 1.1 |
| Squirrel              | Vertebrate   | 0   | 1.1 | 1.1 |
| Weed                  | Vegetation   | 0   | 1.1 | 1.1 |
| Caribou               | Vertebrate   | 0   | 1.1 | 1.1 |

|                 |              |     |     |     |
|-----------------|--------------|-----|-----|-----|
| Tamarack        | Vegetation   | 0   | 1   | 1   |
| Beaver          | Vertebrate   | 0   | 1   | 1   |
| Algae           | Vegetation   | 0.9 | 0   | 0.9 |
| Mayflies        | Invertebrate | 0   | 0.9 | 0.9 |
| Waterfowl       | Vertebrate   | 0.8 | 0   | 0.8 |
| Millepedes      | Invertebrate | 0   | 0.8 | 0.8 |
| Cicadas         | Invertebrate | 0   | 0.8 | 0.8 |
| Raspberry       | Vegetation   | 0   | 0.8 | 0.8 |
| Weevils         | Invertebrate | 0   | 0.8 | 0.8 |
| Sheep           | Vertebrate   | 0   | 0.8 | 0.8 |
| Soapberry       | Vegetation   | 0   | 0.7 | 0.7 |
| Duckweed        | Vegetation   | 0.2 | 0.3 | 0.6 |
| Grouse          | Vertebrate   | 0.6 | 0   | 0.6 |
| Ground squirrel | Vertebrate   | 0   | 0.5 | 0.5 |
| Cranberry       | Vegetation   | 0   | 0.5 | 0.5 |
| Quail           | Vertebrate   | 0.5 | 0   | 0.5 |
| Springtails     | Invertebrate | 0   | 0.5 | 0.5 |
| Frogs           | Vertebrate   | 0.5 | 0   | 0.5 |
| Water lily      | Vegetation   | 0   | 0.4 | 0.4 |
| Snake           | Vertebrate   | 0   | 0.4 | 0.4 |
| Thistle         | Vegetation   | 0   | 0.4 | 0.4 |
| Bison           | Vertebrate   | 0   | 0.4 | 0.4 |
| Laurel          | Vegetation   | 0   | 0.4 | 0.4 |
| Water scorpions | Invertebrate | 0   | 0.3 | 0.3 |
| Shrimp          | Invertebrate | 0   | 0.3 | 0.3 |
| Gnats           | Invertebrate | 0   | 0.3 | 0.3 |
| Midges          | Invertebrate | 0.3 | 0   | 0.3 |
| Lizard          | Vertebrate   | 0   | 0.3 | 0.3 |
| Mountain goat   | Vertebrate   | 0   | 0.3 | 0.3 |
| Mammals - large | Vertebrate   | 0   | 0.3 | 0.3 |
| Damselflies     | Invertebrate | 0   | 0.2 | 0.2 |
| Mistletoe       | Vegetation   | 0   | 0.2 | 0.2 |
| Mountain ash    | Vegetation   | 0   | 0.2 | 0.2 |
| Stoneflies      | Invertebrate | 0   | 0.2 | 0.2 |
| Poison ivy      | Vegetation   | 0   | 0.2 | 0.2 |
| Musk-ox         | Vertebrate   | 0   | 0.2 | 0.2 |
| Amphipods       | Invertebrate | 0   | 0.1 | 0.1 |
| Leeches         | Invertebrate | 0   | 0.1 | 0.1 |
| Diving beetles  | Invertebrate | 0   | 0.1 | 0.1 |
| Chipmunk        | Vertebrate   | 0   | 0.1 | 0.1 |
| Spruce beetles  | Invertebrate | 0   | 0.1 | 0.1 |
| Needleminers    | Invertebrate | 0   | 0.1 | 0.1 |

|                |              |   |     |     |
|----------------|--------------|---|-----|-----|
| Rosehip        | Vegetation   | 0 | 0.1 | 0.1 |
| Rat            | Vertebrate   | 0 | 0   | 0.1 |
| Porcupine      | Vertebrate   | 0 | 0.1 | 0.1 |
| Marmot         | Vertebrate   | 0 | 0.1 | 0.1 |
| Water boatmen  | Invertebrate | 0 | 0   | 0   |
| Muskrat        | Vertebrate   | 0 | 0   | 0   |
| Duck           | Vertebrate   | 0 | 0   | 0   |
| Owl            | Vertebrate   | 0 | 0   | 0   |
| Raven          | Vertebrate   | 0 | 0   | 0   |
| Crow           | Vertebrate   | 0 | 0   | 0   |
| Dove           | Vertebrate   | 0 | 0   | 0   |
| Garbage        | Vertebrate   | 0 | 0   | 0   |
| Carpenter ants | Invertebrate | 0 | 0   | 0   |
| Cicada         | Invertebrate | 0 | 0   | 0   |
| Burdock        | Vegetation   | 0 | 0   | 0   |
| Moss           | Vegetation   | 0 | 0   | 0   |
| Skunk          | Vertebrate   | 0 | 0   | 0   |
| Harvestmen     | Invertebrate | 0 | 0   | 0   |