Supplemental Information for Wild Turkey Introduction
Prepared for NSDNR
16 July 2003

Introduction

This document is intended to provide additional information to the Nova Scotia DNR to assist the Minister of Natural Resources with his decision regarding the introduction of wild turkeys into the province. Per conversations with Mike O’Brien, the minister desired to have more information provided on the following topics: (1) snowfall comparison between Nova Scotia and current wild turkey range, (2) spring food availability, (3) potential habitat availability and comparison with current turkey range, and (4) disease issues. This document will address topics 1-3. The disease issue topic will be addressed separately with the assistance of IAFWA, which will work directly with NSDNR to convene a panel of experts to further investigate the potential for disease transmission.

Snowfall Comparison

While annual snowfall in the Annapolis valley region of Nova Scotia is greater than most areas within the turkey habitat of New England, there are areas with established turkey populations that receive similar amounts of average annual snowfall, and greater amounts in some years (Table 1). Because of the maritime climate in Nova Scotia, it is rare that deep powdery snow is present for long periods of time; these conditions are the hardest on wild turkeys. Despite the amount of snowfall in the Annapolis valley region, mean snow depth [6 – 25 cm (Environment Canada 2003)] in winter months is still within the generally accepted range in which turkeys will have little difficulty in surviving. The fact that this snow is generally packed and/or crusted gives wild turkeys the mobility needed to move among feeding areas and actually increases their chance of finding food and thriving.

Table 1. Comparison of average annual snowfall at selected locations.

<table>
<thead>
<tr>
<th>Location</th>
<th>Average Annual Snowfall (cm)</th>
<th>Range (cm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kentville, Nova Scotia</td>
<td>265.9</td>
<td>N/A</td>
</tr>
<tr>
<td>Greenwood, Nova Scotia</td>
<td>276.3</td>
<td>N/A</td>
</tr>
<tr>
<td>Lucknow, Ontario</td>
<td>338.9</td>
<td>N/A</td>
</tr>
<tr>
<td>Barrie, Ontario</td>
<td>238.4</td>
<td>N/A</td>
</tr>
<tr>
<td>Portland, Maine</td>
<td>181.4</td>
<td>66.5 – 381.3</td>
</tr>
<tr>
<td>Lewiston, Maine</td>
<td>198.9</td>
<td>78.0 – 323.3</td>
</tr>
<tr>
<td>Berlin, New Hampshire</td>
<td>230.6</td>
<td>137.2 – 332.5</td>
</tr>
<tr>
<td>Montpelier, Vermont</td>
<td>252.5</td>
<td>120.9 – 382.3</td>
</tr>
<tr>
<td>Watertown, New York</td>
<td>224.5</td>
<td>84.1 – 504.7</td>
</tr>
</tbody>
</table>

aData from Environment Canada (2003)
bData from National Climatic Data Center (2003)

Barrie, Ontario is in the snow belt region of Ontario, and routinely has weeks with more than 100 cm of snow on the ground. This area also consistently has a high population of turkeys and a high spring turkey harvest (Mike Malhiot, pers. comm.). The winter of 2001 was very severe in many parts of Ontario and received the most snow recorded in the past 40 years. Snow arrived in mid-December and stayed until the first week of April, thus creating extremely severe conditions. While some reports of winter mortality were received, spring 2002 wild turkey harvest in areas hardest hit were stable or actually increased (Table 2) (Bellamy and Malhiot 2003).

Table 2. Wild turkey harvest by Wildlife Management Unit (WMU) for portions of Ontario identified in Table 1. (from Bellamy and Malhiot 2003).

<table>
<thead>
<tr>
<th>WMU (location)</th>
<th>1999</th>
<th>Wild Turkey Harvest</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1999</td>
<td>2000 2001 2002</td>
</tr>
<tr>
<td>76 (Barrie)</td>
<td>246</td>
<td>371 423 528</td>
</tr>
<tr>
<td>84 (Lucknow)</td>
<td>71</td>
<td>71 154</td>
</tr>
<tr>
<td>85 (Lucknow)</td>
<td>22</td>
<td>38 43 72</td>
</tr>
</tbody>
</table>
Spring Food Availability

Spring food availability has not been considered a limiting factor for turkey survival in any area of restoration or introduction. Models to determine if and where wild turkeys should be released have primarily focused on landscape scale habitat parameters such as percentage of forested habitat, percentage of early successional habitat, and depth and duration of snow cover (Fleming and Porter 2000, Kurzejeski and Lewis 1985, Backs and Eisfelder 1990, Bellamy and Malhiot 2001). Spring food availability is not considered an important limiting factor and thus has not been used for habitat modeling to predict the success of wild turkey survival.

In the most comprehensive food habits study in the northeast U.S., Eaton et al. (1970) looked at the food habits of a northern population of wild turkeys in southwestern New York and north central Pennsylvania. The study area averaged 2,200 feet in elevation and was 75% forested with the primary tree species being beech, yellow birch, sugar maple, hemlock, white ash, wild black cherry, and red oak. In this study, for the period March through May, the primary food items noted (not in preferred order) were: sensitive fern and other fern species, sedges, burdock, clubmosses, black cherry fruit, beech-nut husks and fragments, beech twigs and buds, and maple twigs and buds. These foods are all found in Nova Scotia.

To further illustrate the availability of foods in Nova Scotia, we compared a comprehensive list of food items, compiled from a complete review of existing literature on wild turkey food habits (Vance 2001), with a plant list for Nova Scotia obtained from the Nova Scotia DNR website (Appendix A). While this list is not seasonally separated, it shows that many recognized food sources are available for wild turkeys in Nova Scotia.

Wunz and Pack (1992) provide an excellent review of the eastern wild turkey in northern hardwood forests. Spring food availability is not mentioned in this reference as a limiting factor for the wild turkey. In the spring, the wild turkey diet is primarily composed of various green vegetation and insects, both of which are abundant in Nova Scotia. Based on the information presented here and our collective professional experience, the NWTF is confident that the wild turkey will survive all seasons in the Annapolis valley of Nova Scotia.

Potential Habitat Availability

The current range of the wild turkey extends far beyond the “historic range” as outlined by Mosby and Handley (1943) (Figure 1). This range expansion is primarily due to man’s impact on the habitat and the transportation of wild turkeys by man over physical barriers (deserts, mountain ranges, and grasslands). By the time the wild turkey population was rebounding from its low in the 1930’s, man had cleared portions of the forest creating more agricultural lands and brood rearing habitat in the form of fields and pastures. Access to early successional habitat in the more northern regions of North America allowed for wild turkey expansion into this area. Wild turkeys have also benefited from increased agriculture through the utilization of waste grains that remain in the field after harvest. Additionally, wild turkeys utilize waste grain found cattle manure, particularly in the northeast where dairy farming is common. Ontario Ministry of Natural Resources biologists noted man’s changes to the habitat in the 1980’s when they were planning for their restoration efforts. They quickly recognized that much of southern Ontario north of the “historic” line was suitable habitat for wild turkeys. Dave Reid (pers. comm.) related the following account of how the restoration area was defined in Ontario.

A concern has been expressed regarding freezing rain in Nova Scotia. The concern is that wild turkeys will not be able to feed when the snow is crusted over by freezing rain. This is not a phenomenon unique to Nova Scotia; freezing rain is common throughout the range of the wild turkey and has never been shown to negatively impact wild turkey populations. In fact, freezing rain can be beneficial to turkeys because it will form a crust on top of the snow, which allows wild turkeys to walk to food sources otherwise inaccessible if fluffy snow is present. Annual snowfall, snow depth, and freezing rain conditions found in Nova Scotia have not been shown to limit wild turkey survival throughout the northern range of the wild turkey. Consequently, winter conditions experienced in Nova Scotia are not expected to limit wild turkey survival.
to classify a given wildlife management unit [WMU] as class 1 (the best), class 2 (second best) and class 3 (marginal or unsuitable) ... more points were scored for forest cover in the 26 - 40% range and this had the affect of scoring WMUs higher today than when they were 100% forested before European settlement and beyond the turkeys range at that time. Similarly, the ecozone approach gave the more southerly WMUs a higher score but WMUs found further north (beyond the “historic” range) still got some points and I believe this also takes account of man’s role on changing the landscape to suit turkeys.

Table 3. Criteria for assessment of wild turkey release areas in Ontario (from Bellamy and Malhiot 2001).

<table>
<thead>
<tr>
<th>Factor</th>
<th>Category</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>% of total area in forest cover</td>
<td>&gt;75%</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>41 to 75%</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>26 to 40%</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>16 to 25%</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>10 to 15%</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>&lt;10%</td>
<td>0</td>
</tr>
<tr>
<td>Mean # of days with &gt;5 cm of snow on the ground</td>
<td>60</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>0 to 90</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>90 to 120</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>120</td>
<td>0</td>
</tr>
<tr>
<td>Ecoregion</td>
<td>southern agricultural</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>central agricultural</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>eastern midlands</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>other</td>
<td>0</td>
</tr>
</tbody>
</table>

Table 4. Classification of Wildlife Management Units for wild turkey restoration priority (from Bellamy and Malhiot 2001).

<table>
<thead>
<tr>
<th>Class</th>
<th>Total Score and Additional Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>51 to 75</td>
</tr>
<tr>
<td>2</td>
<td>26 to 50</td>
</tr>
<tr>
<td>3</td>
<td>0 to 25 OR &lt;10% forest cover OR &gt;120 days with more than 5 cm of snow on the ground</td>
</tr>
</tbody>
</table>

The potential for further range expansion in the northern U.S. is severely limited as restoration efforts have largely been completed. Some efforts take place each year to fill isolated pockets of habitat located within the present range. Additionally, some range expansion opportunities are still available along the northern edge of the current range.

The North American Bird Conservation Initiative (NABCI) has identified Bird Conservation Regions (BCR) throughout North America. These BCRs delineate different habitat types that support different suites of bird species. The BCR, in turn, provides a framework to improve the ecological health of that habitat type in order to benefit those species.
Scotia falls within the Atlantic Northern Forest BCR along with established turkey range in Maine, Vermont, New Hampshire and northern New York (Figure 6).

Using ecoregions or ecozones is another factor that has been used to help delineate potential wild turkey habitat. For example, this was used as one of the criteria in Ontario. Ecoregions are delineated based upon the soils, vegetation types and animal species found in a given area. Nova Scotia is part of the Laurentian Mixed Forest Province ecoregion as identified by Bailey and Cushwa (1981) (Figure 7). This ecoregion includes wild turkey range in Maine, New York, Quebec, Ontario, Michigan, Wisconsin and Minnesota (Figure 7). The overlap of Nova Scotia’s ecoregion and BCR with that of current and historic wild turkey range, gives further credibility to the fact that wild turkeys would survive in Nova Scotia. In fact, an introduction of wild turkeys into Nova Scotia could be considered more of a range expansion of this species, similar to the western expansion where wild turkeys were carried over physical barriers such as mountains, deserts, and treeless grasslands. Without the Bay of Fundy acting as a physical barrier, wild turkeys would likely have already expanded their range into Nova Scotia.

Summary

Although average annual snowfall is greater in the Annapolis valley of Nova Scotia than in many portions of the current wild turkey range, wild turkeys currently are doing well in areas that have similar or greater annual snowfall in Ontario and the New England states. Even after severe winter conditions, wild turkey populations have been shown to continue to thrive. The NWTF believes that, due to the generally packed and crusted characteristics of the snow and the average snow depth, snowfall amounts are not expected to limit the survival of wild turkeys in Nova Scotia.

Spring food availability has never been considered a limiting factor for wild turkey survival. Wild turkey habitat models have not included this as a factor in determining suitability for wild turkeys. A review of the food availability in Nova Scotia shows that there is an abundance of diverse food sources available for turkeys in Nova Scotia. In the spring, wild turkeys primarily feed on green vegetation and insects; there is no shortage of either in Nova Scotia. The NWTF agrees with the literature that spring food availability is not expected to limit wild turkey survival in Nova Scotia.

A review of Nova Scotia’s ecoregion and BCR designations shows that Nova Scotia is included in zones which currently and historically include wild turkey range. This provides further support that the habitat and climate characteristics found in Nova Scotia would support wild turkeys. Nova Scotia, like most other areas in North America, has been drastically changed through human’s influence, which has made it more suitable to wild turkeys than it may have been in the past. The combination of decreased forest cover and the resulting early successional habitat, along with the interspersion of agriculture into the northern U.S. and southern Canada, has allowed the wild turkey to thrive in areas that once would have been uninhabitable. Man has also influenced the expansion of the wild turkey range by moving wild turkeys across barriers that they were unable to cross on their own. This suggests that, without the Bay of Fundy acting as a barrier, wild turkeys likely would have already expanded their range to Nova Scotia.
Literature Cited


Personal Communications

Dave Reid, Wildlife Biologist, Ontario Ministry of Natural Resources. Simcoe, Ontario.

Mike Malhiot, Wildlife Biologist, Ontario Ministry of Natural Resources. Clinton, Ontario.
Figure 1: Wild turkey range, 2000, and known historic range (from Moseby and Handley 1943).
Figure 2: Ontario landcover, wild turkey range and potential wild turkey habitat.

Figure 3: Quebec landcover, wild turkey range and potential wild turkey habitat.
Figure 4: New Brunswick land cover and potential wild turkey habitat

Figure 5: Nova Scotia landcover and potential wild turkey habitat
**Figure 6:** North American Bird Conservation Initiative (NABCI) Atlantic Northern Forest Bird Conservation Region (BCR).

**Figure 7:** Location of the Laurentian Mixed Forest Province Ecoregion in North America as identified by Baily and Cushwa (1981).
Appendix A

Following is an extensive wild turkey food items list (from Vance 2001). We compared this list of known food items across North America to a list of plant species found in Nova Scotia (from NS DNR website). We struck through the food item species that we could not confirm to be present in Nova Scotia. For the remaining plant species, our review indicated that either the species listed or a closely related species was present in Nova Scotia. Although this list is not geographically or seasonally specific, it does illustrate the diversity of potential food items available in Nova Scotia.

Hard Mast
Acorns (Quercus sp.)
Beech (Fagus grandifolia)
Blue beech (Carpinus caroliniana)
Chestnut (Castanea dentata)
Chinquapin (Castanea pumila)
Laurel oak acorn (Quercus laurifolia)
Live oak acorn (Quercus virginiana)
Pecan (Carya sp.)
Pecan Hickory (Carya illinoensis)
Pines - seeds (Pinus sp.)
Shagbark hickory (Carya ovata)

Juniper (Juniperus sp.)
Lantana (Lantana horrida, L. velutina)
Ludwigia (Ludwigia sp.)
Madroño (Arbutus menziesii)
Manzanita (Arctostaphylos pungens)
Marbleberry (Arctostaphylos alpina)
Moonseed (Menispermum canadense)
Mulberry (Morus rubra)
Muscadine grape (Vitis rotundifolia)
Myrcine —?— guiana rapanea (Rapanea guianensis)
Myrtle holly (Oreophtila myrtifolia)

Nightshade (Solanum sp.)
Oregon grape (Mahonia sp.)
Swamp cabbage berries (Sabal palmetto)
Partridgeberry (Mitchella repens)
Pawpaw (Asimina triloba)
Pear —fruit (Pyrus sp.)
Pericinmon (Diocarpus virginiana)
Raccoon grape (Amelopsis cordata)
Ratan vino (Baculum scandens)
Redbay (Persea borbonia)
Sand plum (Prunus sp.)
Snowberry (Symphoricarpus sp.)
Spicebush (Benzoin benzoin)
Strawberry —fruit (Fragaria sp.)
Sumacs (Rhus sp.)
Toyon —fruit (Phirenia argutifolia)
Wax myrtle (Myrica cerifera)

Wild cherries (Prunus sp.)
Wild geranium (Geranium maculatum)
Wild Grape (Vitis sp.)
Wild plum (Prunus americana)
Wild roses (Rosa sp.)

Seeds
American elm (Ulmus americana)
Ash (Fraxinus sp.)
Asters (Aster sp.)
Bakin grass (Bacopnum notatum)
Barley (Hordeum vulgare)
Barnyard grass — seeds (Echinochloa crus-galli)
Beautyberry (Callicarpa americana)
Beard grass (Polygynus monspeliensis)
Begger-ticks (Bidens sp.)
Beggareweed (Desmodium tortuosum)
Blackberry seeds (Rubus sp.)
Blackgold, sourgum (Nyssa sylvatica, also blackgum var. N. bizons)
Black haw (Viburnum sp.)
Black medic (Medicago lupulina)
Blue-eyed grass — seeds (Sisyrinchium sp.)

Soft Mast
American holly (Ilex opaca)
Arrowwood (Viburnum sp.)
Baneberry (Actaea rubra)
Barberry (Berbeis sp.)
Bearbush, kinnikinnick (Arctostaphylos uva-ursi)
Bitterbush (Purshia tridentata)
Blackberries (Rubus sp.)
Blackhaw (Viburnum prunifolium)
Blueberry (Vaccinium sp.)
Buffaloberry (Shepherdia sp.)
Cabbage palm (Sabal palmetto)
Caesal fruit (Opuntia sp.)
California laurel — fruit (Umbellularia californica)
Cedar (Juniperus sp.)
Chinaberry, umbrella tree (Melia azedarach)
Cleavers, goosegrass (Galium aparine)
Common pawpaw (Asimina triloba)
Cherry (Prunus sp.)
Coffeeberry (Rhamnus sp.)
Currant (Ribes sp.)
Dewberry (Rubus sp.)
Dogwoods (Cornus sp.)
Dwarf saw palmetto (Serenoa repens)
Elderberry (Sambucus simpsonii, S. caerulea)
Gooseberries (Ribes sp.)
Goosefoot (Chenopodium sp.)
Gums (Nyssa sp.)
Ground cherries (Physalis sp.)
Hackberries (Celtis sp.)
Hawthorns (Crataegus sp.)
Holllies (Ilex sp.)
Huckleberry fruit (Gaylussacia sp.)
Icajo coco plum (Chrysobalanus icaco)
Inkberry, bitter gallberry (Ilex glabra)
Ironwood, hornbeam (Carpinus caroliniana)
Jack-in-the-pupit (Arisaema sp.)

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Next
Tear thumb (Polygonum sagittatum)
Thistle (Cirsium sp.)
Thoroughwort (Eupatorium sp.)
Tick-trefoils (Desmodium sp.)
Vasey’s grass (Vaseyochloa sp.)
Vetch (Vicia sp. and V. americana)
Virginia creeper (Parthenocissus quinqufolia)
Violet (Viola sp.) seeds, pods
Water millet (Zizania palustris)
Water tupelo—seeds (Nyssa sylvatica)
Wedgedgrass (Sphenopholis sp.)
Western thistle—seeds (Cirsium occidentale)
Wheat (Triticum aestivum)
Wheat grass (Agropyron sp.)
Wild barley (Hordeum sp.)
Wild buckwheat, dog tongue (Eriogonum sp.)
Wild cherry—seed (Prunus sp.)
Wild lupine (Lupinus sp.)
Wild millet (Echinochloa sp.)
Wild mustard (Cruciferae)
Wild oatgrass (Danthonia sp., D. intermedia)
Wild oats (Avena fatua, A. barbata)
Witchhazel (Hamamelis virginiana)
Wood-betony, lousewort (Pedicularis canadensis)
Woolly yarrow (Achillea lanulosa)
Yellow-eyed grass, hard-head grass (Xyris sp.)
Yellow foxtail (Setaria glauca)
Yellow sedge (Cyperus rotundus)

(Helianthus annuus) seeds, pods
(Vitis rotundifolia) seed
(Senecio aquaticus) seeds
(Potentilla sp.)
(Onosmodium occidentale) seed
(Ulmi aquilina)
(Osmorhiza sp.)
(Eriogoneum pharnaceoides)

Herbaceous (leaves, flowers, stems)
Amaranth (Amaranthus spp.)
Barley (Hordeum vulgare)
Bearberry, kinnikinnick—flowers (Arctostaphylos uva-ursi)
Blueberry—leaves (Vaccinium sp.)
Bluegrass—leaves (Poa sp.)
Bluestem (Andropogon sp.)
Boneset (Eupatorium sp.)
Brake fern (Pteris aquilina)
Bristly ox tongue—leaves, flowers (Picris echioides)
Brome grasses (Bromus sp.)
Broom sedge (Andropogon virginicus)
Bur clover (Medicago lupini)
Buttercup—leaves (Ranunculus sp.)
Canary grass (Phalaris minor)
Carpet grass (Axonopus sp.)
Chiory (Agoseris sp.)
Christmas fern (Polystichum acrostichoides)
Clovers (Trifolium spp.)
Club moss—leaves (Lycopodium sp.)
Coneflower (Rudbeckia laciniata)
Crowbread, crown beard (Verbesina encelioides, V. microcephala)
Cypress twigs (Taxodium sp.)
Daisy (Compositae sp.)
Dandelion—leaves (Taraxacum sp.)
Dayflower (Commelina elegantissima)
Dutchman’s pipe (Aristolochia macrophylla)
Dwarf dandelion (Krigia oppositifolia)
Elegant microseris—flowers (Microseris elegans)
Elm (Ulmus americana)
False brome (Brachypodium distachyon)
False dandelion (Pyrrhopappus sp.)
Ferns and mosses—Pteridophyta
Filaree—leaves, stems (Erodium sp.)
Fleabane (Erigeron sp.)
Cranesbill (Balsamorhiza sp.)
Gaura (Gaura sp.)
Goosefoot (Chenopodium sp.)
Hackberry—flowers (Celtis occidentalis)
Hemlock—leaves, stems (Tsuga canadensis)
Honeysuckle (Lonicera japonica)
Indian mustard—flowers (Brassica juncea)
Italian rye grass (Lolium multiflorum)
Juniper—stems, leaves (Juniperus sp.)
Leopard lily (Liliaceae)
Lespedeza—flowers, leaves (Lespedeza sp.)
Lettuce (Lactuca sp.)
Mariposa lily—flowers (Calochortus sp.)
Milk thistle (Silybum marianum)
Mullein (Verbascum sp.)
Mushroom (Basidiomycetes)
Nimble-will (Muhlenbergia sp.)
Orchard grass (Dactylis glomerata)
Orchids (Orchidaceae)
Oxalis—flowers (Oxalis sp.)
Panic grass leaves (Panicum sp.)
Paper birch—leaves (Betula papyrifera)
Pasque flower—flower (Anemone patens)
Pennywort leaves (Hydrocotyle sp. and Centella repanda)
Pine—needles (Pinus sp.)
Pine grass—florets (Blepharoneuron tricholepis)
Plantain (Plantago sp.)
Poison ivy—flower (Toxicodendron rydbergii)
Poison oak—stems (Rhus diversiloba)
Pepeon flower—flowers (Plagiobothrys nothofulvus)
Prickly lettuce—stems, flowers (Lactuca scariola)
Prickly sow thistle—flowers (Sonchus asper)
Purslane (Portulaca oleracea)
Quaking grass (Briza maxima)
Ragworts (Senecio spp.)—groundsel (S. amplexicaulis)
Red stem filaree—leaves (Erodium cicutarium)
Rocky mountain iris (Iris missouriensis)
Russian olive—flowers (Elaeagnus angustifolia)
Salsify—leaves (Tragopogon spp.)
Sedge—leaves, stems (Carex sp.)
Sensitive fern (Onoclea sensibilis)
Sheep-sorrel, sourgrass (Rumex acetosella)
Silene (Silene sp.)
Skunkbrush, skunkberry, fragrant sumac—flowers (Rhus
aromatica)

Smartweed (Polygonum sp.)
Smoothe cat’s ear—leaves, flowers (Hypochoeris glabra)
Spear-leaved agoseris—flowers (Agoseris ресторса)
Spring beauty (Claytonia caroliniana, C. virginica)
Sumac—flowers (Rhus sp.)
Sweet clover (Melilotus sp.)
Tall Purpletop (Trilloba flava)
Thistle (Cirsium sp.)
Tick clover—flowers (Desmodium rotundifolium)
Vetch—leaves (Vicia sp.)
Wamppee (Pontederia cordata)
Western thistle (Cirsium occidentale)
Wild mustard (Cruciferae)
Wild roses—flowers (Rosa sp.)
Wild rye (Elymus sp.)
Windmill pink (Silene gallica)
Wood-betony, lousewort (Pedicularis canadensis)
Wood fern (Dryopteris spinulosa)
Woody yarrow (Archillea lanulosa)

Roots and Tubers
Allium sp.—bulb
Arrowhead tuber (Sagittaria sp.)
Chufa (Cyperus esculentus)
Cyperus sp.
Groundnut tubers (Apios apios)
Hog peanut (Amphicarpaea bracteata)
Hog potatoe
Red root (Cyperus tenuis)
Rocky Mountain iris (Iris missouriensis)—bulb

Invertebrates
Acrididae—adults, nymphs (grasshoppers)
Amblyomma americanum—adults
Anthrizidae—adults
Archnida
Arctiidae—larvae
Beetles (Coleoptera)
Belostomatidae—adults
Blattidae—adults
Braconidae—adults
Buprestidae—adults
Caliphoridae—adults
Carabidae—adults
Cantharidae—adults
Cerambycidae—adults
Cercopidae—adults
Chrysomelidae—adults
Cicadellidae—adults
Cicadidae—adults
Citheroniidae—adults
Coenagrionidae—adults
Coreidae—adults
Coreimelaenidae—adults
Curculionidae—adults
Cycnionidae—adults
Elateridae—adults
Formicidae—adults
Fulgoridae—adults
Gastropoda
Geometridae—larvae, pupae, adults
Hesperiidae—larvae
Hirudinea (leech)
Histeridae—adults
Hydrophilidae—adults
Ichneumonidae—adults
Labiiduridae—adults
Lepidoptera (butterfly)
Libellulidae—nymphs, adults
Lygaeidae—nymphs, adults
Mantidae—adults
Myriapoda
Myrmeloneidae—adults
Noctuidae—larvae, pupae
Nymphalidae—adults
Oligochaeta
Pentatomidae—nymphs, adults
Pieridae—larvae, pupae
Pulmonata—adults
Pyralidae—adults
Reduviidae—adults
Reptilia—bone fragments
Saltidinae—adults
Scarabaeidae—adults
Scutelleridae—adults
Stratiomyidae
Syphidae—adults
Tabanidae—adults
Tenebrionidae—adults
Tethridinidae—coconns
Tetrigidae—adults
Tettigoniidae—adults
Vespidae—adults

References: