

Naturalistic Landscaping at the Earth Science Centre

[from the original Department of Botany website -www.botany.utoronto.ca/plantings/index.stm]

The natural landscaping of the Earth Science Centre (ESC) at the University of Toronto is valued by the departments sharing the Centre and by the larger university community. The **boreal** forest and **deciduous** forest plantings were designed by Michael Hough and installed when the Earth Sciences Centre was built in 1989. (A third naturalistic garden – an oak savanna prairie garden - was added at the southern end of the complex in 1994 and later destroyed to make room for the expansion of the ESC). A related planting, ZooWoods, was started in 1995 along St. George Street by the Ramsay Wright Zoological Labs.

These plantings not only provide an aesthetic diversity unmatched by other landscaping on the University of Toronto St. George campus, they are probably the best example of the fundamental principles expressed in the University's **Environmental Protection Policy** (7 March 1994) as they pertain to landscaping:

- Minimization of negative impacts on the environment
- Conservation and wise use of natural resources
- Respect for biodiversity

The plantings are managed cooperatively by the departments of the Earth Science Centre and the Grounds Services of the University of Toronto.

1. Prairies and Savannas

Although the two **biomes** represented by the original courtyard plantings at the ESC, the boreal forest and the deciduous forest, covered most of the pre-settlement landscape of Ontario, a third biome, the prairie and oak savanna, plays an important role in the southern Ontario landscape. We don't think of southern Ontario as a prairie landscape, but oak savanna and associated prairie openings are Ontario's most endangered vegetation types. A large number of Ontario's **threatened** and **endangered** plant species are prairie species.

The original oak savannas and prairies of southern Ontario occurred on sand moraines and glacial outwash plains from the Peterborough area down to Windsor. Southern Ontario's prairies and savannas represent the most northeastern extension of a vegetation type that had its maximum abundance in the 'corn belt' of the Midwest (Illinois, Wisconsin, Michigan, Minnesota, Iowa). Across North America, less than 0.02% of the original 30 million acres of oak savanna remain. Less than 0.01% of the original 350 million acres of North American tallgrass prairie remain.

The best local example of the prairie/savanna vegetation type is the [degraded oak savanna at High Park](#) [[find out current state/status](#)]. Much of the **herbaceous** understory that once dominated this savanna, such as native prairie grasses and flowers, has been lost as invading trees and shrubs have filled in between the once widely spaced black oaks in the absence of periodic fire. Biologists and natural areas managers now realize that periodic low intensity fire was critical to the health of these ecosystems.

In other areas at High Park, previous management replaced the native prairie grasses with non-native grasses. The City of Toronto, with the help of an active volunteer group, is restoring portions

of High Park's original oak savanna to ensure both the regeneration of the open-grown black oaks that characterize the park and the protection of endangered species, such as the wild lupine, currently found at High Park. As part of these restoration efforts, fire was used in a small area of savanna at High Park in May 1997.

Design and Planting of the Prairie/Savanna Garden

[This garden no longer exists on campus. It was destroyed in order to make room for an expansion of the ESC; however, its design and creation provide a useful example of naturalistic landscaping and its importance to teaching and research.]

"I saw that a little height on the prairie was enough to look like much more – every detail as to height becoming intensely significant, breadth all falling short."

Frank Lloyd Wright, *An Autobiography* (1943)

Species differ in their optimal **habitats** (soil texture, moisture, light) and the prairie garden has areas differing in these characteristics. The key design feature of the ESC garden was that half was constructed on very sandy soil (characteristic of southern Ontario prairies), while half was planted on very heavy clay soil. In a sense, this was an experiment about use of these native plants on different soils. The results after three years are that the native prairie species are highly successful and competitive with weeds on the sand, while the clay soil has many more non-native old field grasses and weeds.

The west half of the garden on sand soils was a cooperative effort with the City of Toronto Department of Parks and Recreation. Almost all of the plants on this side were grown from seed collected in the savanna remnants at High Park by park horticulturalists. This living collection contains a dozen **regionally rare** species, and thus is an important tool in the preservation of these species.

Previous restoration experience has shown that **commercial varieties** of many native plants are available (e.g., Rudbeckia, Liatris, Panicum), but that these varieties have been bred for larger stature, higher nutrient requirements, and are often aggressive in such a native plant garden or restoration. Thus commercial varieties were not used in this planting.

The garden was planted in September, 1994 with over a thousand seedlings grown in the Botany greenhouse, as well as seed of native species. No live plants were taken from natural areas for the garden. All species planted were native to Ontario except a small area of particularly dry soils (the landscaped 'hill' along the wall of the Geology building), which was planted with grasses and flowers native to the northern mixed grass prairie of Manitoba, Saskatchewan and Alberta.

"There are two eyes in the human head – the eye of mystery, and the eye of harsh truth – the hidden and the open – the woods eye and the prairie eye. The prairie eye looks for distance, clarity and light; the woods eye for closeness, complexity and darkness. The prairie eye looks for usefulness and plainness in art and architecture; the woods eye for the baroque and ornamental ... A woods eye looks at twenty miles of prairie and sees nothing but grasses, but a prairie eye looks at a square foot and sees a universe; ten or twenty flowers and grasses, heights, heads, colors, shades, configurations, bearded, rough, smoother, simple, elegant. When a cloud passes over the sun, the colors shift like a child's kaleidoscope."

Bill Holm, *Horizontal Gradeur* (1990), University of Minnesota Press

Plant species in the Prairie/Savanna Garden

1. High Park Savanna Community (west half)
2. Prairie Communities of the Great plains (east half)

1. High Park Savanna Community (west half)

The west half of the garden is planted on very sandy soil. Although a few native species have found their own way into the planting, almost all of species in the west half are prairie/savanna species characteristic of the Toronto region. All of the species listed below were planted using local seed sources, most from High Park populations (labelled HP). The High Park plants were collected by seed by High Park staff and germinated in flats by Solomon Boyd at the High Park Nursery. The seedlings were grown to transplant size during the summer of 1994 in the U of Toronto Botany greenhouse by Kristina Damjanovic.

Grasses and Sedges:

Tall: (80-200 cm)

Andropogon gerardii, big bluestem, warm season (HP)
Elymus Canadensis, Canada wild rye, cool season (HP)
Sorghastrum nutans, Indiangrass, warm season (HP)
Hystrix patula, bottlebrush grass, cool season (HP)

Mid and short (15-80 cm)

Schizachyrium scoparium, little bluestem, warm season (HP)
Luzula multiflora, wood-rush, cool season (HP)
Carex pensylvanica, Pennsylvania sedge, cool season (HP)
Cyperus sp., nut sedge, warm season (Pinery Provincial Park)

Forbs:

Anemone cylindrica, thimbleweed, white fl., 40-80 cm, Jun-Aug (HP)
Aster azureus, sky-blue aster, blue fl., 75-150 cm, Aug-Sept (HP)
Aster ericoides, heath aster, white fl., 50-150 cm, Aug-Sept (HP)
Artemesia campestris, silky sage, white fl., 20-70 cm, Jun-Aug (Leslie St. Spit)
Camanula rotundifolia, harebell, blue fl., 10-40 cm, Jun-Aug (HP)
Desmodium canadense, showy tick trefoil, purple fl., 50-130 cm, Jun-Aug (HP)
Helianthus divaricatus, woodland sunflower, yellow fl., 75-200 cm, Aug-Sept (HP)
Lezpedeza capitata, round-headed bush clover, green/white fl., 80-120 cm, Aug-Sept (HP)
Liatrus cylindraceae, cylindrical blazing star, blue fl., 50-100 cm, July-Aug (HP)
Monarda fistulosa, wild bergamot, lavender fl., 60-120 cm, July-Sept (HP)
Oenothera biennis, evening primrose, yellow fl., 75-200 cm, July-Sept (HP)
Physalis virginiana, ground cherry, yellow fl., 15-50 cm, Jun-July (HP)
Rudbeckia hirta, black-eyed susan, yellow fl., 30-90 cm, Jun-Sept (HP)
Silphium perfoliatum, cup plant, yellow fl., 100-250 cm, July-Sept. (Black Creek/Toronto)
Solidago juncea, early goldenrod, yellow fl., 75-150 cm, Jun-Aug (HP)
Solidago Nemoralis, field goldenrod, yellow fl., 20-50 cm, Aug-Oct (HP)

Trees and Shrubs:

Quercus velutina, black oak (seedlings) (HP)
Ceanothus americanus, New Jersey tea, low shrub to 100 cm (HP)

2. Prairie Communities of the Great plains (east half)

The east half is planted on the heavy clay soil that underlies most of the UoFT campus. The planting mixture varies from the front (south) to the back of the planting. The front contains species characteristic of Midwestern prairies, while the back contains species characteristic of the northern Great Plains. Unlike the west (High Park) half of the planting, the origin of the seeds and plants for the east half is widespread. However, all of the species planted were native rather than cultivated or ornamental stock.

Most of the species listed from the High Park group are also planted in one or more locations on the east side and are not listed again below. Note that even if a species occurs on both sides of the plantings, a local origin for its seed is not guaranteed on the east side.

Grasses:

Agropyron smithii, western wheatgrass, cool season, mid ht.
Bouteloua curtipendula, sideoats gramma, warm season, mid ht.
Bouteloua gracilis, blue grama, warm season, short
Buchloe dactyloides, buffalo grass, warm season, short
Calamagrostis Canadensis, bluejoint grass, cool season, tall
Panicum virgatum, switch grass, warm season, tall
Koeleria cristata, June grass, cool season, short
Sporobolus cryptandrus, prairie drop seed, warm season, mid ht.

Forbs:

Achillea millefolium, yarrow, white fl., 30-150 cm, May-July
Artemisia frigida, pasture sage, white fl., 10-30 cm, Jun-Aug.
Asclepias tuberosa, butterfly weed, orange fl., 50-80 cm, Jun-Aug.
Astragalus Canadensis, Canada milk vetch, yellow fl., 30-200 cm, Jun-Aug.
Coreopsis palmata, stiff tickseed, yellow fl., 20-50 cm, Jun-July
Petalostemum purpureum, purple prairie clover, 30-80 cm., July-Sept.
Solidago rigida, stiff goldenrod, yellow fl., 30-110 cm, July-Oct
Aster novae-angliae, New England aster, purple fl., 50-100 cm, Aug-Oct.

2. Duffy's Woods – A Carolinian Forest

Planted in 1989. Designed by Michael Hough, Landscape Architect and Planner, Toronto, ON

The southern deciduous, or Carolinian, forest is a species-rich vegetation type that reaches its northern limit in southern Ontario. Many of Ontario's **rare** and **endangered** species are found in the

few remaining remnants of Carolinian forest, including trees such as sassafrass, tulip tree and Kentucky coffee tree.

This planting is named in honor of Roland Duffy (1923-1994), chief horticulturalist for the Department of Botany for four decades.

Plant Species (as noted in Native Garden Walking Tour pamphlet, June 5, 2002)

Trees

Basswood
Black cherry
Ironwood
Kentucky coffee tree
Redbud
Red maple
Red oak
Sugar maple
Sycamore
Tulip tree

Shrubs

Alternate-leaf dogwood
American hazel
American witch-hazel
Fragrant sumac
Grey dogwood
Juneberry
Pagoda dogwood
Raspberry
Red osier dogwood

Herbaceous Plants

May apple
Cattails
Wild geranium
Field horsetail
Virginia creeper

Invasive Species (noted 2009)

Dog Strangling Vine

3. The Boreal Forest

Planted in 1989. Designed by Michael Hough, Landscape Architect and Planner, Toronto, ON

The boreal forest is Canada's most widespread forest type. Stretching around the northern hemisphere, it comprises almost 10% of the vegetation on earth. Different portions of the boreal forest are represented in the planting.

The west end has a wetland and tamarack trees similar to the extensive peatlands of northern Ontario.

The north side contains a mixture of aspen, birch and jack pine, a fire-dependent conifer species. Because of natural fires every 50-200 years, much of the boreal forest is covered with mixed, early **successional** forests such as this.

Finally, the most common vegetation type in the boreal forest is the spruce – fir forest, which is often found on the hard ancient rocks of the Canadian Shield or on permafrost.

The south side of the planting has both white spruce and balsam fir.

The boreal planting has two other pine trees, a pitch pine and a white pine, planted to honor former faculty of the College of Forestry.

Plant Species (as noted in Native Garden Walking Tour pamphlet, June 5, 2002)

Trees

Balsam fir
Chokecherry
Jack-pine
Mountain ash
Mountain maple
Paper birch
Tamarack
White pine
White spruce

Ferns

Bracken fern
Ostrich fern

Shrubs

Bear-berry
Choke berry
Elderberry
Ground juniper

Highbush cranberry
Raspberry
Shrubby cinquefoil
Silverberry
Snowberry

Vines

Virburnum

Hebaceous Plants

Canada anemone
Canada goldenrod
Field horsetail

Invasive Species (noted 2009)

Burdock
Curled dock
Dame's rocket
Dog strangling vine
Garlic mustard
Manitoba maples
Purple nightshade
Thistle (Canada?)