

A Study of Prescribed Burns, Tree and Shrub Layer in Oak Savanna Plant Communities in Southern Ontario: Pinery Provincial Park, Rondeau Provincial Park and Point Pelee National Park

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Abstract

*Oak savanna is a rare plant community in Ontario, which has been intensely overgrazed by white-tailed deer in the study areas. The goals of the study were to: 1) assess vegetation recovery after deer herd reduction and prescribed burns at Pinery Provincial Park, 2) monitor savanna remnants at Rondeau Provincial Park and Point Pelee National Park. In the Pinery sites deer exclosures were built in 1994 in order to test for deer grazing. Following burning some of the sites at Pinery and at Rondeau has shown an increase in species such as Big Bluestem (*Andropogon gerardii*). In the unburned site at Rondeau native savanna species are present. In Pelee the Oak savanna remnants appear to be in an advanced stage of succession with closer canopy and forest type species. The tree and shrub density are similar, except for the tree density in the Point Pelee sand dune.*

Introduction

Oak savanna is to some degree a fire-dependent plant community (Bond and Wilgen, 1996). Rare and endangered species (e.g. Wild Lupine and Karner Blue Butterfly) are present and the community itself is considered to be extremely rare in Ontario and globally imperiled (NHIC, 1996). The overstorey layer is characterized in southwestern Ontario by black (*Quercus velutina*), white (*Q. alba*), red (*Q. rubra*), dwarf chinquapin (*Q. prinoides*), and chinquapin (*Q. muhlenbergii*) oaks (Bakowsky, 1988). The oak savanna plant community is a blend of species some of which are found in prairie and forest habitats, all part of the complex ecotone existing between the major biomes (Temple, 1998). Some of the herbs species found in oak savanna are woodland sunflower (*Helianthus divaricatus*), sedges (*Carex* spp.), mints (*Pycnanthemum* spp.), big bluestem (*Andropogon gerardii*), and bedstraw (*Galium* spp.) (Bray, 1960 and Bakowsky, 1988).

Two site-selection criteria were used for this study: 1) a canopy layer of open grown Oaks, 2) a history of fire in the past (Leach and Givnish, in press). The three oak savanna remnants in Southwestern Ontario were selected at Pinery Provincial Park, Point Pelee National Park and Rondeau Provincial Park (Figure 1). The tree sites are found in the St. Clair clay plains (Chapman and Putnam, 1996) within the Carolinian Canada eco-zone (Allen *et. al.*, 1990).

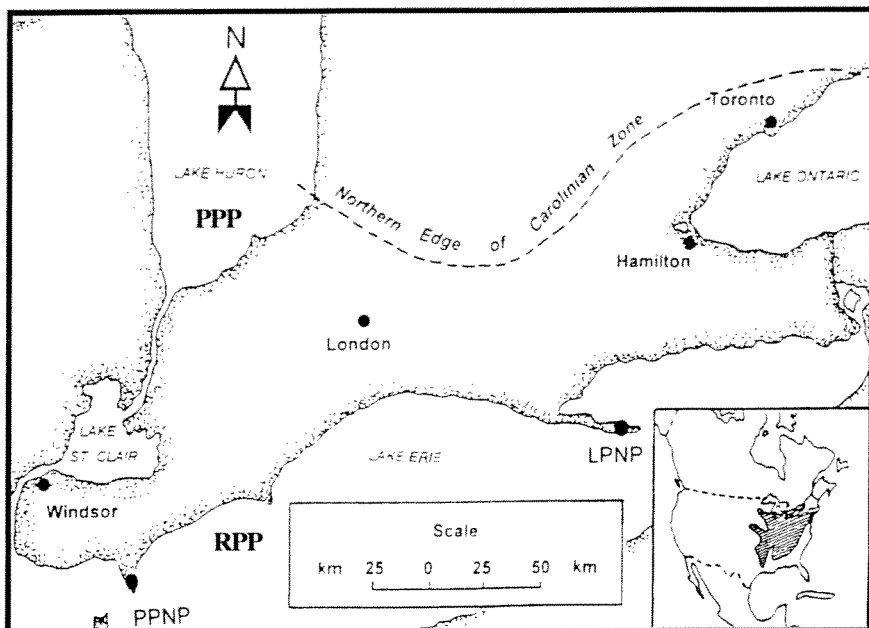


Figure 1. Oak savanna study sites in Southwestern Ontario. PPP: Pinery Provincial Park RPP: Rondeau Provincial Park, and PPNP: Point Pelee National Park

Fire, deer grazing, climatic and topographic characteristic of the region could be the factors that maintain this community in a “stable” equilibrium. In the terminology of Clements (1916) this will be identified as a ‘sub-climax’ community or as Godwin (1929a) suggest a ‘deflected’ one. The interruption or change of the proper disturbance regimes (e.g. suppression of fire and over-grazing) could affect the plant community, pushing it towards a climax community (e.g. deciduous forest).

The goals of this study were:

- 1) To assess the effects of restoration efforts (prescribed burns, deer herd reductions and deer exclusion) on plant community composition.
- 2) To monitor savanna remnants at Rondeau PP and Point Pelée NP

Materials and Methods

For Understory Survey

At Pinery Provincial Park, 20 (2x2m) permanent deer exclosures were built in 1994 in oak savanna plant communities. In 2000 we added a second control, external plot to each large exclosure. In 2000, we also built 12 new (1.2x1.2m) exclosures, in order to monitor the effect of deer grazing in 4 new sites where prescribed burns (PBs) were carried out in late April 2000 (Figure 2). Each exclosure had one or two associated controls plots. The percentage cover and frequency of stems of understory species (below 40 cm height above ground) was

recorded in 1m x 1m quadrats both inside exclosures (n=32 un-grazed) and outside the exclosures (control, n=54 grazed plots) for a total of 86 plots. Herd reductions were undertaken in 1998 and 1999, and some sites were burned between 1989 and 1993 (T. Crabe pers. comm., Bakowsky 1995).

To test the prediction that deer overgrazing has affected the plant community composition in Pinery, plant species composition inside (ungrazed plots) and outside exclosures (grazed plots) were compared. The same plots were compared to assess the effect of deer herd reduction, which we hypothesized would promote the rehabilitation of the Oak Savanna plant communities. To test the prediction that early spring burning would promote the recovery of oak savanna vegetation, community composition was compared in burned and unburned sites at Pinery Provincial Park where a prescribed burn was carried out in April 2000 four areas of Oak Savanna.

In Point Pelée National Park, a total of 10 transects were established along the west side of the park, at five sites (Figure 3). At each site one transect was placed in the sand dune area in a north-south direction (recently classified as grass dominated community (McLachlan, 1997)) and a second, parallel transect was placed to the west, in sites identified as a highly degraded Black Oak Savanna (Gary Moulard, pers. comm.), recently classified as forest habitat (McLachlan, 1997). Five permanent plots were established at intervals of 5-10 m along each transect, for a total of 50 plots in the park.

In Rondeau Provincial Park five areas were selected that had been identified as remnants of Oak Savanna by the park staff and on an old map of the park (M. Natvik pers. comm., Carman, 1928) (Figure 4). "D", the disturbed site, had not been burned since the 1920s. Ten plots were randomly selected along a north-south transect. Five plots were randomly selected in three other sites: O1: Oak Savanna 1, a site not burned according to the knowledge of park staff; O2: Oak savanna 2, a sites burned accidentally in February 2000, and O3: Oak savanna 3, a site burned accidentally in March 2000. The final site, "B", located in the west side of South Point Trail, was accidentally burned in May 2000 had two parallel north-south transects. Along each transect, four 1.2x1.2 m deer exclosures were built at randomly selected points. An additional six control plots were also established per transect. Overall, there were a total of 45 plots established in Rondeau.

In 2000, the understorey plant community composition was sampled three times in all plots, in spring (8 May-8 June), in summer (6 July-20 July), and in late summer (16 August-7 September). Percent cover and frequency were assessed in 1x1 m quadrats placed at precise locations at each plot in each of the three parks.

Tree and shrub densities

Tree and shrub density was estimated with the nearest neighbor method at 24 plots in Pinery Provincial Park, 8 in Rondeau and 10 in Point Pelée. At each plot 10 tree

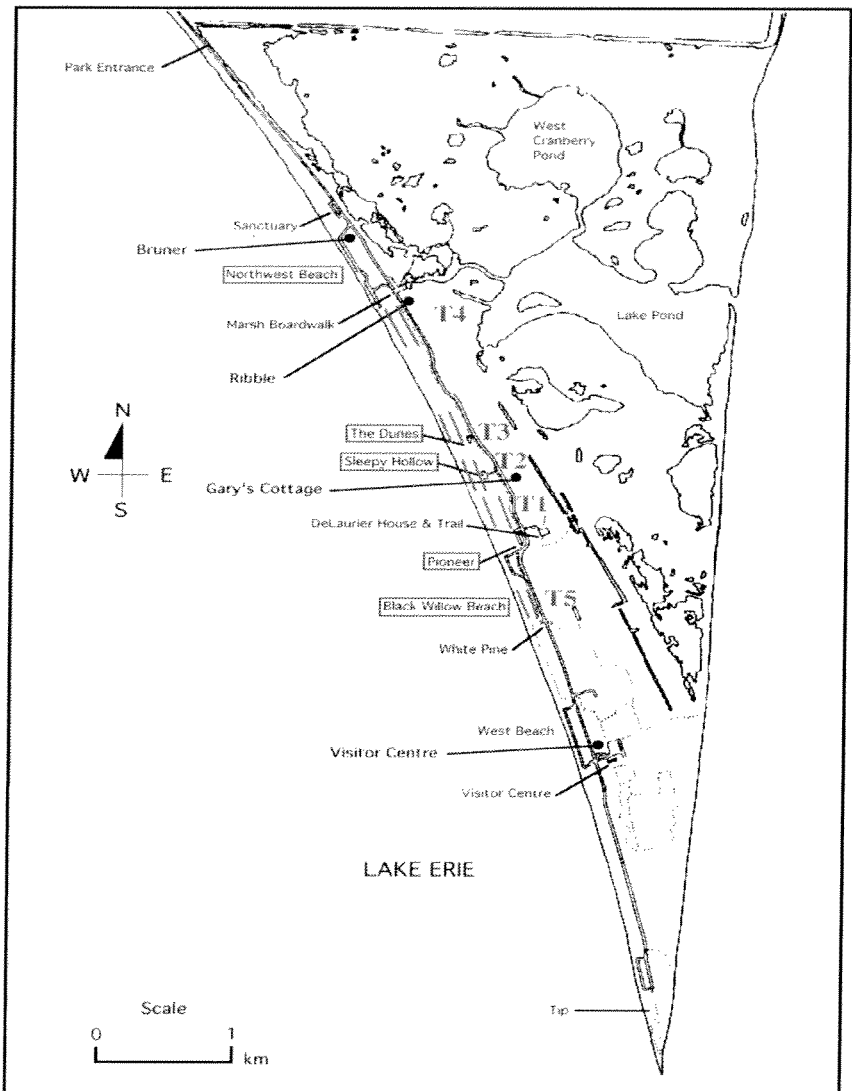


Figure 3. Locations of the five oak savanna sites (transects) in Point Pelée National Park

distances between tree and the closest trees were measured. A mean distance (d) for the plot was calculated and this entered in the formula which gives an estimate of the density (D) (Cottam *et al.* 1949,1953 & Cottam,1956): $D(\text{tree or shrub/ hectare})=10,000\text{m}^2/(1.67 \times d^2)$.

Statistical analyses

A multivariate approach was used to analyze the plant species composition of the Oak Savanna communities. Detrended Correspondence Analysis (DCA) was performed using for each species the maximum value (between the spring, sum-

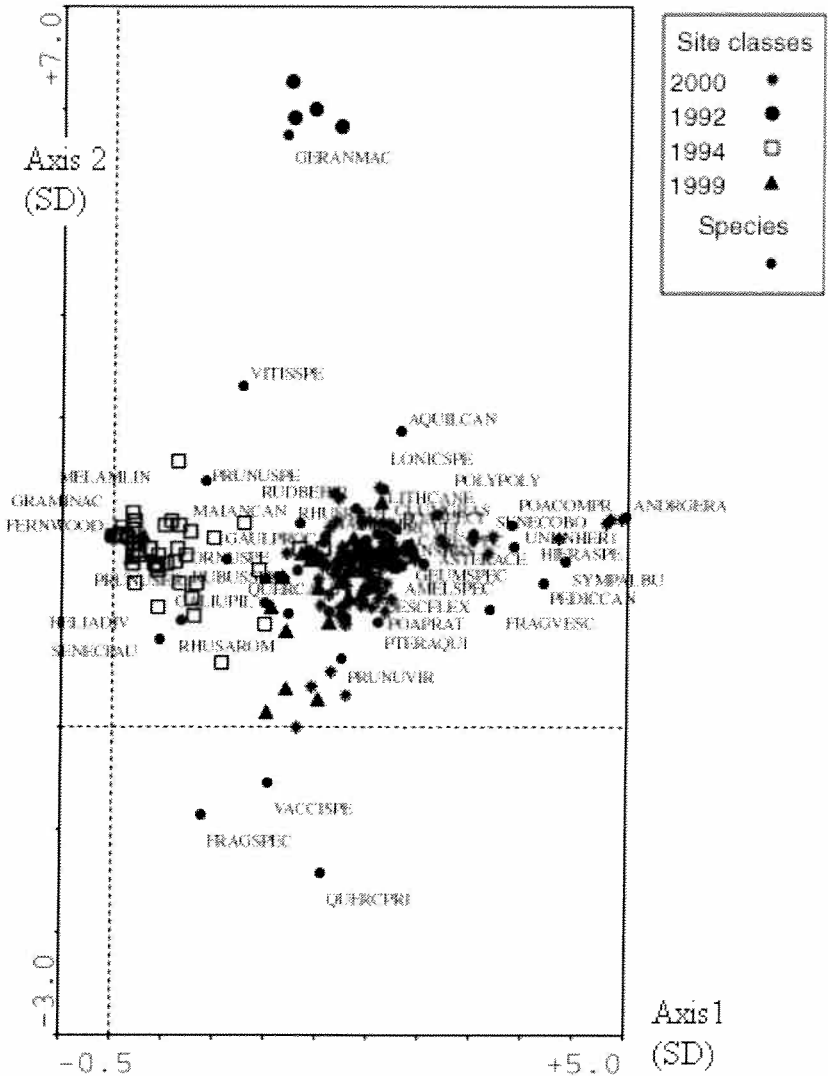


Figure 5. DCA (axes 1 and 2) showing plots (quadrats) at Pinery Provincial Park over different years of the study. Ungrazed and grazed plots are not shown separately, since they they overlapped within years.

carrying capacity for park deer herds is approximately 7 deer/km² (D. Voigt pers. com.). The deer density in the park was estimated at 73.2 deer/km² in 1993, and from 1998 (69 deer/ km²), to 2000 (19 deer/km²) culls have significantly reduced these densities. Over the last 6 years, reduced grazing pressure has had a positive influence, as shown by the fact that grazed and non-grazed plots were not separated in 1999.

In Figure 6 all plots are designated by black triangles due to the extensive overlap. We therefore concluded that the grazed plots have followed a similar recovery trajectory as the ungrazed plots. In 2000, plots in two of the four burned areas of Oak Savanna (Figure 2, prescribed burns) with lower canopy cover, showed increased cover of prairie species. Plots in the two burned sites that had greater canopy cover, did not show any particularly dramatic post-fire effect (all 2000 plots shown as star symbols), and overlapped with the 1999 plots. This may be due to lack of a seedbank due to deer overgrazing.

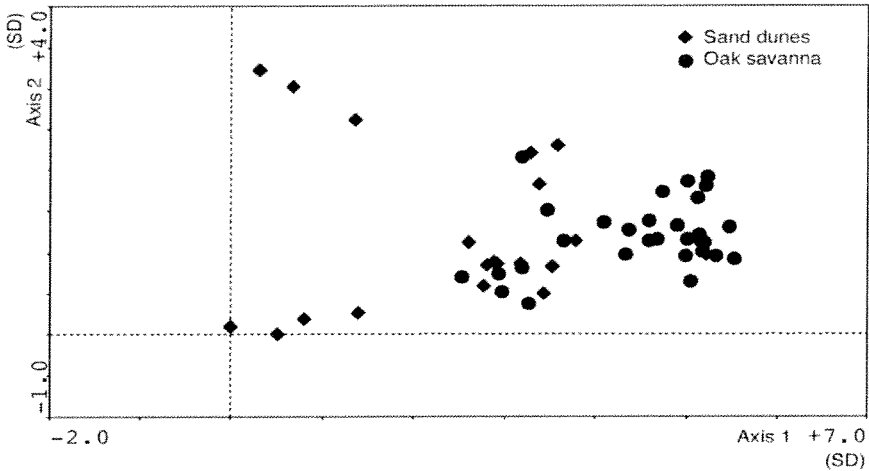


Figure 6. DCA (axes 1 and 2) showing Oak Savanna and Sand Dune plots (quadrats) at Point Pelée National Park in 2000.

Point Pelée National Park

In Point Pelée National Park the two plant communities sampled were very different in their species composition and are separate in the DCA diagram (Figure 6). The sand dune area had species characteristics of grassland and sand dune such as: rock sandwort (*Arenaria stricta*), thyme-leaf sandwort (*A. serphyllifolia*), and wormwood (*Artemisia spp.*). The oak savanna remnants were characterized by the presence of: greenbrier (*Smilax spp.*), violet (*Viola spp.*), and garlic mustard (*Alliaria petiolata*).

Rondeau Provincial Park

In Rondeau the burned sites had a great abundance of big bluestem (*Andropogon gerardii*) compared with unburned sites. The DCA (Figure 7) shows that the burned areas had greater species diversity than the fire suppressed ones, for which plots cluster together, demonstrating greater homogeneity. All species found in plots are listed in Appendix.

Comparison between the three parks

In the DCA of the combined data for 2000 (Figure 8) the three parks can be clearly

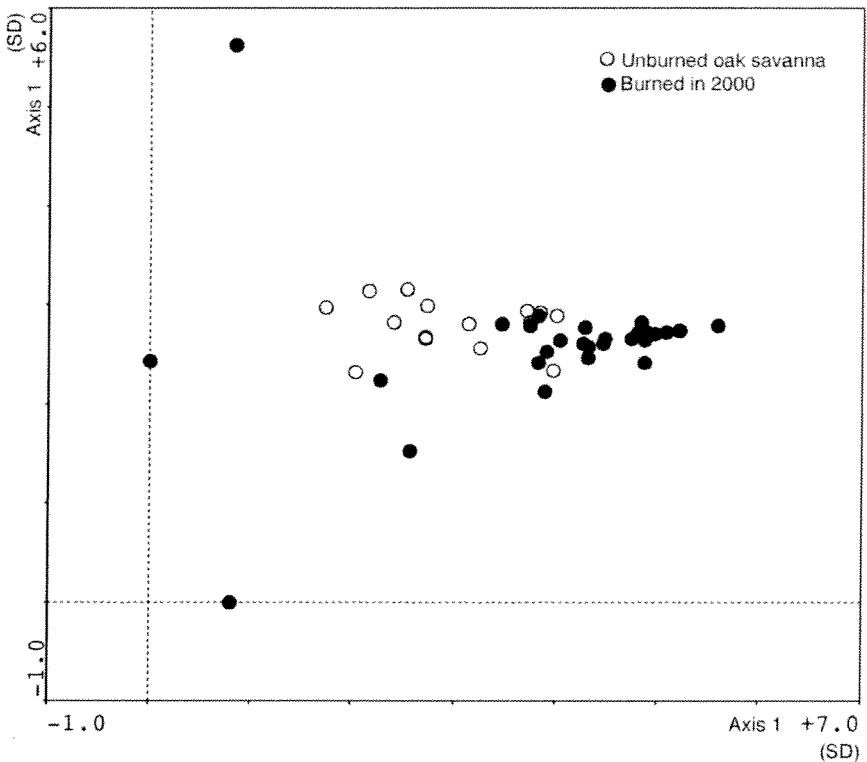


Figure 7: DCA (axes 1 and 2) showing plots (quadrats) at Rondeau Provincial Park in 2000.

distinguished, although there is clearly a great deal of overlap or commonality in some plots. One interpretation of these preliminary data is that the first DCA axis corresponds to a light gradient.

The Oak Savanna sites at Point Pelée were much separated from the rest of the plots. These Point Pelée sites contained a high number of Carolinian forest species (e.g. sweet cicely). They were previously identified from aerial photographs, as forest locations in 1994-5, because of their closed canopy (McLachlan, 1997). The burned plots at Rondeau occur close to the burned plots at Pinery on the DCA, and also overlap with some of the Point Pelée sand dune plots. Burned areas were generally characterized by the presence of species such as Big Bluestem (*Andropogon gerardii*) a warm season grass that is found in most of the prairie habitat (Anderson, 1998).

The shrub densities were in average not significantly different ($\chi^2_{0.05, k-1=3} = 7.362$) between Pinery (20,952 shrubs/ha), Rondeau (20,790 shrub/ha) Pelée oak savanna (20,173 shrubs/ha), and in Pelée sand dune (15,031 s/ha) (Figure 9). A statistically significant difference ($\chi^2_{0.05, k-1=3} = 10.793$) in tree density was found between the Point Pelée sand dune (312 tree/ha) and the Pinery (796 tree/ha) plots. Pelée oak

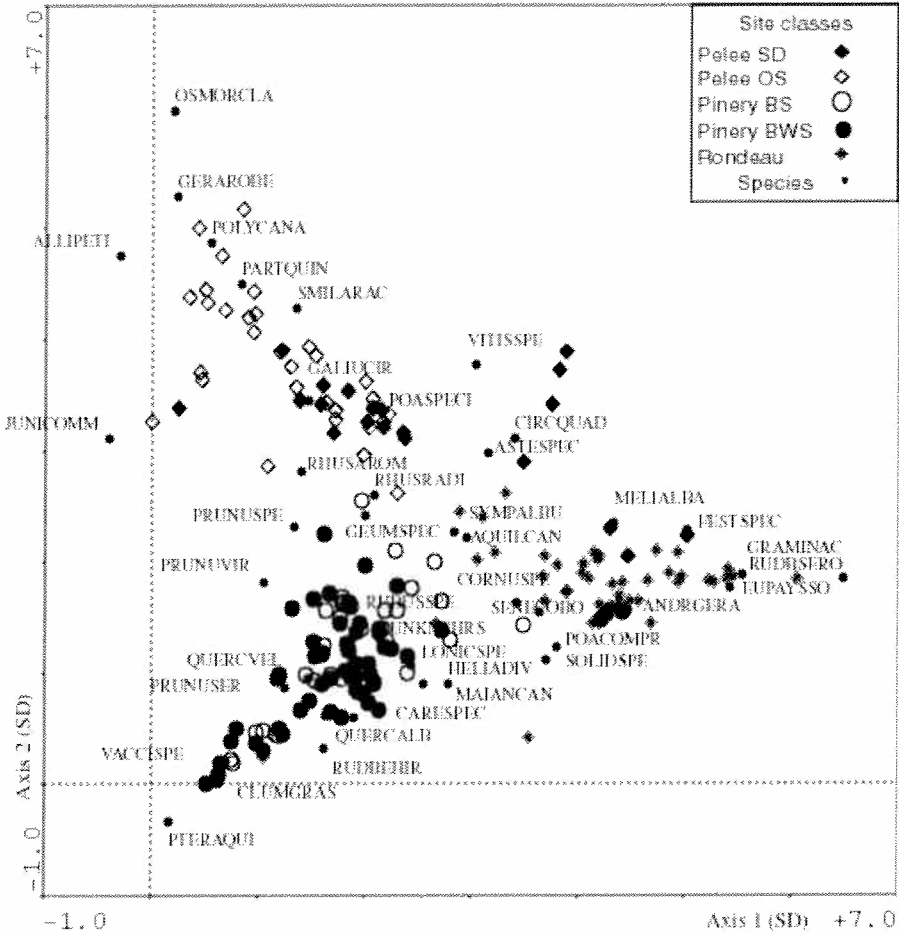


Figure 8: DCA diagram (axes 1 and 2) showing plots for all the parks in 2000 and the species that most characterize the plots.

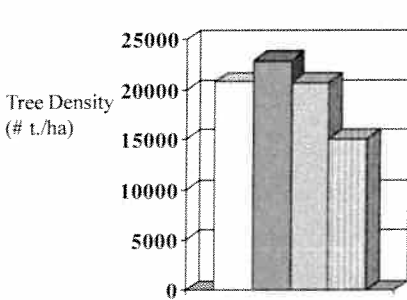


Figure 9 Mean shrub density

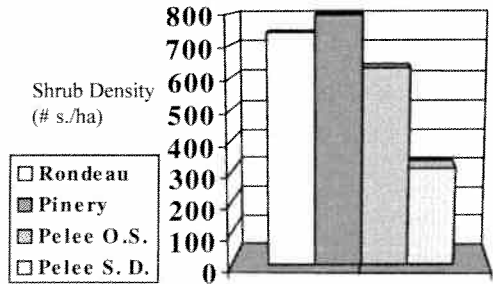


Figure 10 Mean tree density

savanna (636 tree/ha) and Rondeau (742 tree/ha) were not significantly different to each other and the other sites (Figure 10).

Discussion and Conclusions

The Oak Savanna plant communities in the three parks have similarities, but are also clear differences - especially the degraded Oak Savanna sites at Point Pelée, where succession has occurred. Distinguishing features of the park plant communities include the following: in Point Pelée there were more forest species and the unique presence of the exotic, garlic mustard (*Alliaria petiolata*). In Rondeau there were many "classic" prairie species such as big bluestem. Some Pinery plots were characterized by the presence of early low blueberry (*Vaccinium angustifolium*) and bracken fern (*Pteridium aquilinum*), which did not occur elsewhere. The tree and shrub density was similar in all tree parks although there was lower tree density in the Point Pelée sand dune plots.

Intensive deer herd reductions, removal of planted pine trees and prescribed burns at Pinery Provincial Park are allowing the Oak Savanna plant communities to move away from the species composition of the early to mid-1990s. Our results confirm previous findings that show how early spring fires may promote the germination of late summer grasses (Tester, 1989 & 1996; Garza & Blackburn, 1985). Similarly, it is likely that prescribed burns at Rondeau in all sites will benefit the savanna and prairie species. However the recovery rates of the D site at Rondeau and the Oak Savanna sites at Point Pelée, which do have some remaining characteristic oak savanna species, will in the future depend on the presence of a suitable seedbank (currently under investigation) and the dispersal rates of individual plant species from local seed sources.

Acknowledgments

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Appendix

Savanna plant species, latin and common names, occurrence in the parks [PTP=Point Pelée National Park RON=Rondeau Provincial Park PIN=Pinery Provincial Park] and labels used in the DCA analysis.

Species		Occurrence	Label used in DCA analysis
Latin name	Common name		
<i>Acer saccharum</i>	Sugar maple	PTP	ACERSACC
<i>Achillea millefolium</i>	Common yarrow	PTP, RON	ACHIMILL
<i>Alliaria petiolata</i>	Garlic mustard	PTP, RON	ALLIPETI
<i>Ambrosia artemesifolia</i>	Common ragweed	PTP, RON	AMBRARTE
<i>Amelanchier sp.</i>	Serviceberry	PIN, PTP	AMELSPEC
<i>Amphicarpa bracteata</i>	American Hog-peanut	RON	AMPHBRAC
<i>Andropogon gerardii</i>	Big bluestem	RON, PTP, PIN	ANDRGERA
<i>Anemone canadensis</i>	Canada anemone	RON, PTP	ANEMCANA
<i>Aquilegia canadensis</i>	Wild Columbine	RON, PTP, PIN	AQUILCAN
<i>Arctostaphylos uva-ursi</i>	Bearberry	PIN	ARCOUVAU
<i>Arenaria serpyllifolia</i>	Thyme-leaf Sandwort	PTP	ARENSERP
<i>Arenaria stricta</i>	Rock Sandwort	PTP	ARENSTRI
<i>Artemisia caudata</i>	Beach Wormwood	PTP	ARTECAUD
<i>Artemisia sp.</i>	Wormwood	PTP	ARTESPEC
<i>Asclepias sp.</i>	Common milkweed	RON	ASCLSPEC
<i>Asclepias tuberosa</i>	Butterfly Milkweed	RON	ASCLTUBE
<i>Aster spp</i>	Aster species	RON, PTP	ASTERSPP

<i>Berberis thunbergii</i>	Japanese Barberry	RON	BERBTHUN
<i>Blephilia hirsuta</i>	Hairy Woodmint	PIN	BLEPHIRS
<i>Campanula americana</i>	Tall bellflower	PTP	CAMPAMER
<i>Carex pensylvanica</i>	Pennsylvania Sedge	PTP	CAREPENS
<i>Carex spp</i>	Sedge species	PIN, RON, PTP	CAREXSPP
<i>Carpinus caroliniana</i>	American Hornbeam	RON	CARPCARO
<i>Carpinus sp.</i>	Hornbeam	PTP	CARPSPEC
<i>Celastrus scandens</i>	Climbing Bittersweets	PTP	CERASCAN
<i>Celtis spp</i>	Hackberry	PIN	CELTISPP
<i>Centaurea maculosa</i>	Spotted Starthistle	PTP	CENTMACU
<i>Circaea quadrisulcata</i>	Enchanter's nightshade	PTP, RON	CIRCQUAD
<i>Fescue spp.</i>	Clumped grass or hair grass	PIN, PTP	CLUMGRAS
<i>Comandra umbellata</i>	Bastard toad-flax	PIN	COMAUMBE
<i>Cornus alternifolia</i>	Alternate-leaf Dogwood	PTP	CORNALTE
<i>Cornus rugosa</i>	Roundleaf Dogwood	PTP	CORNRUGO
<i>Cornus sp.</i>	Dogwood	PIN, PTP, RON	CARESPEC
<i>Deschampsia flexuosa</i>	Crinkled Hairgrass	PIN	DESCFLEX
<i>Desmodium canadense</i>	Showy Tick-trefoil	RON	DESMCANA
<i>Desmodium paniculatum</i>	Panicled Tick-trefoil	RON	DESM PANI
<i>Desmodium sp.</i>	Tick-trefoil	RON	DESM SPEC
<i>Epipactis helleborine</i>	Eastern Helleborine	PIN	EPIPELL
<i>Equisetum sp.</i>	Horsetail	PIN, RON	EQUISPEC
<i>Eupatorium hyssopifolium</i>	Boneset	RON	EUPAHYSS
<i>Euphorbia corollata</i>	Flowering Spurge	RON	EUPHCORO
<i>Euphorbia esula</i>	Leafy Spurge	PIN	EUPHESUL

<i>Fagus grandifolia</i>	American Beech	RON	FAGUGRAN
<i>Festuca sp.</i>	Fescue spp.	RON	FESTSPEC
<i>Fragaria vesca</i>	Wood strawberry	PTP	FRAGVESC
<i>Fragaria virginiana</i>	Virginia Strawberry	PIN,	FRAGVIRG
<i>Fraxinus americana</i>	White ash	PTP, PIN	FRAXAMER
<i>Galium aparine</i>	Catchweed Bedstraw	PIN	GALIAPAR
<i>Galium asprellum</i>	Rough Bedstraw	RON	GALIASPR
<i>Galium circaezans</i>	Wild Licorice	PTP	GALIUCIR
<i>Galium pilosum</i>	Hairy Bedstraw	PIN, PTP, RON	GALIUPIL
<i>Galium triflorum</i>	Sweet-scent Bedstraw	RON, PTP, PIN	GALIUTRI
<i>Gaultheria hispidula</i>	Creeping Snowberry	PIN	GAULHISP
<i>Gaultheria procumbens</i>	Teaberry or Wintergreen	PIN	GAULPROC
<i>Geranium maculatum</i>	Wild geranium	RON, PTP, PIN	GERAMACU
<i>Geranium robertianum</i>	Herb robert	RON, PTP, PIN	GERAROBE
<i>Geum canadense</i>	White avens	PTP	GEUMCANA
<i>Geum laciniatum</i>	Rough avens	RON	GEUMLACI
<i>Geum sp.</i>	Avens	RON PIN	GEUMSPEC
<i>Graminae (family)</i>	grasses	RON PIN	GRASSSPP
<i>Hamamelis virginiana</i>	American Witch-hazel	PIN, PTP	HAMAMVIR
<i>Helianthus divaricatus</i>	Woodland Sunflower	PIN, PTP, RON	HELIADIV
<i>Hepatica sp.</i>	Hepaticas	PIN	HEPASPEC
<i>Hieracium pratense</i>	Field Hawkweed	PIN, RON	HIERPRAT
<i>Hieracium sp.</i>	Hawkweed	PIN, PTP	HIERSPEC
<i>Hieracium venosum</i>	Rattlesnake Hawkweed	PIN	HIERVENO
<i>Ipomea pandurata</i>	Wild potato vine	PTP	IPOMPAND
<i>Iris versicolor</i>	Multi-coloured Blue-flag	RON	IRISVERS

<i>Juniperus communis</i>	Ground Juniper	PIN, PTP	JUNICOMM
<i>Juniperus virginiana</i>	Eastern Red Cedar	PIN, PTP	JUNIVIRG
<i>Krigia virginica</i>	Dwarf Dandelion	PIN	KRIGVIRG
<i>Lactuca biennis</i>	Tall Blue Lettuce	PTP	LACTBIEN
<i>Lactuca canadensis</i>	Canada Lettuce	PTP	LACTCANA
<i>Lespedeza hirta</i>	Hairy Bush-clover	PIN, PTP	LESPHIRT
<i>Liatris graminifolia</i>	Grass-leaved Blazing Star	RON	LIATGRAM
<i>Lilium sp.</i>	Wood Lily	RON	LILISPEC
<i>Lindera benzoin</i>	Spicebush	RON	LINDBENZ
<i>Liriodendron tulipifera</i>	Tulip Tree	PIN, RON	LIRITULI
<i>Lithospermum canescens</i>	Hoary Puccoon	PIN, PTP	LITHCANE
<i>Lonicera dioica</i>	Mountain Honeysuckle	PIN, PTP	LONIDIOI
<i>Lonicera japonica</i>	Japanese Honeysuckle	RON	LONIJAPO
<i>Lysimachia ciliata</i>	Fringed Loosestrife	RON	LYSMCILI
<i>Lysimachia terrestris</i>	Swamp Loosestrife	PTP	LYSMTERR
<i>Maianthemum canadense</i>	Canada Mayflower	PIN, PTP, RON	MAIACANA
<i>Marrubium vulgare</i>	Common Horehound	PIN, PTP	MARRVULG
<i>Melampyrum lineare</i>	American Cow-wheat	PIN, PTP	MELAMLIN
<i>Melilotus alba</i>	White sweet clover	PTP, RON	MELIALBA
<i>Melilotus officinalis</i>	Yellow sweet clover	PTP	MELIOFFI
<i>Monarda fistulosa</i>	Wild Bergamot	RON	MONAFIST
<i>Onoclea sensibilis</i>	Sensitive Fern	RON	ONOCSENS
<i>Orchis</i> (family)	Orchids	PTP	ORCHSPEC
<i>Osmorhiza claytonii</i>	Sweet cicely	PIN, PTP	OSMOCLAY
<i>Ostrya virginiana</i>	Eastern Hop-hornbeam	RON	OSTRVIRG
<i>Oxalis sp.</i>	Wood-sorrel	PIN	OXALSTRI
<i>Panicum clandestinum</i>	Broadleaf Panic Grass	PIN	PANICLAN
<i>Parthenocissus quinquefolia</i>	Virginia creeper	PIN, PTP, RON	PARTQUIN

<i>Pedicularis canadensis</i>	Early Wood Lousewort	PIN, PTP	PEDICCAN
<i>Pedicularis lanceolata</i>	Swamp Lousewort	RON	PEDILANC
<i>Plantago sp.</i>	Plantain	PIN	PLANLANC
<i>Poa compressa</i>	Canada Bluegrass	PIN	POACOMPR
<i>Poa pratensis</i>	Spear grass	PIN	POAPRAT
<i>Polygala polygama</i>	Racemed Milkwort	PIN, PTP	POLYPOLY
<i>Polygala senega</i>	Seneca Snakeroot	RON	POLYSENE
<i>Polygonatum biflorum</i>	Smooth solomon's seal	PIN	POLYBIFL
<i>Polygonatum canaliculatum</i>	Great solomon's seal	PTP	POLYCANA
<i>Polygonatum pubescens</i>	Downy Solomon's-seal	RON	POLYPUBE
<i>Prenanthes alba</i>	White Rattlesnake-root	PIN	PRENALBA
<i>Prunella vulgaris</i>	Self-heal or Heal-all	PIN	PRUNEVUL
<i>Prunus serotina</i>	Black cherry	PIN, PTP	PRUNSERO
<i>Prunus virginiana</i>	Choke cherry	PIN	PRUNVIRG
<i>Pteridium aquilinum</i>	Bracken fern	PIN	PTERAQUI
<i>Pycnanthemum pilosum</i>	Hairy Mountain Mint	RON	PYCNPILO
<i>Quercus alba</i>	White oak	PIN, PTP	QUERCALB
<i>Quercus muhlenbergii</i>	Yellow Oak	PIN	QUERCMUE
<i>Quercus prinoides</i>	Dwarf Chinquapin Oak	PIN, PTP	QUERCPRI
<i>Quercus rubra</i>	Red oak	PIN, PTP	QUERRUBR
<i>Quercus velutina</i>	Black oak	PIN, RON, PTP	QUERVELU
<i>Ranunculus abortivus</i>	Small-flowered crowfoot	PIN	RANUABOR
<i>Rhus aromatica</i>	Fragrant sumac	PIN, PTP	RHUSAROM
<i>Rhus radicans</i>	Poison ivy	PIN, PTP	RHUSRADI

<i>Ribes cynosbati</i>	Prickly gooseberry	PIN	RIBECYNO
<i>Rosa blanda</i>	Smooth rose	PTP	ROSABLAN
<i>Rosa multiflora</i>	Multiflora rose	PTP, RON	ROSAMULT
<i>Rosa rugosa</i>	Rugosa rose	PTP	ROSARUGO
<i>Rubus idaeus</i>	Wild red raspberry	PIN	RUBUSIDA
<i>Rubus occidentalis</i>	Thimbleberry	RON	RUBUOCCI
<i>Rudbeckia hirta</i>	Black-eyed Susan	RON, PIN	RUDBEHIR
<i>Rumex (sp.)</i>	Curled dock	PIN	RUMESPE
<i>Salix bebbiana</i>	Bebb's Willow	PIN	SALIBEBB
<i>Sanicula marilandica</i>	Black snakeroot	PIN	SANIMARI
<i>Saponaria officinalis</i>	Bouncing bet	PTP	SAPOOFFI
<i>Sassafras albidum</i>	Sassafras	PIN, RON	SASSALBI
<i>Satureja vulgaris</i>	Wild basil	PIN, RON	SATUVULG
<i>Scutellaria sp.</i>	Small skullcap	PTP	SCUTPARV
<i>Senecio obovatus</i>	Roundleaf Ragwort	PIN, PTP, RON	SENECOBO
<i>Senecio pauperculus</i>	Balsam Ragweed	PIN, PTP, RON	SENECPAU
<i>Smilacina racemosa</i>	False Solomon's seal	PTP, RON, PIN	SMILARAC
<i>Smilax herbacea</i>	Smooth Herbaceous Greenbrier	PTP, RON	SMILHERB
<i>Smilax rotundifolia</i>	Round-leaved Greenbrier	RON	SMILROTU
<i>Smilax tannoides</i>	Bristly greenbrier	PTP, RON	SMILTAMN
<i>Solanum nigrum</i>	Black nightshade	PIN	SOLANIGR
<i>Solidago canadensis</i>	Canada goldenrod	PIN, RON	SOLICANA
<i>Streptopus sp.</i>	Twisted Stalk	PTP	STRESPEC
<i>Symphoricarpos albus</i>	Snowberry	PIN, PTP, RON	SYMPALBU
<i>Taraxacum officinale</i>	Common dandelion	PIN, PTP, RON	TARAOFFI
<i>Trifolium pratense</i>	White clover	RON	TRIFREPE

<i>Urtica sp.</i>	Nettle	RON	URTISPEC
<i>Uvularia perfoliata</i>	Perfoliate Bellwort	PIN, PTP, RON	UVULPERF
<i>Vaccinium sp.</i>	Blueberry	PIN, PTP, RON	VACCISPE
<i>Viburnum sp.</i>	Arrowwood	PIN, PTP, RON	VIBURSPE
<i>Vicia cracca</i>	Tufted vetch	PTP	VICICRAC
<i>Vinca minor</i>	Periwinkle	PIN, RON	VINCMINO
<i>Viola sp.</i>	Violet	PIN, PTP, RON	VIOLSPEC
<i>Vitis sp.</i>	Grape	PIN, PTP, RON	VITISPEC

In addition to this list, a number of unknown species are currently being identified