Bull. Iraq nat. Hist. Mus.
(2016) 14 (2): 117-133

A VEGETATIONAL STUDY OF THE LOVE CREEK NATURE CENTER BFRR1EN COUNTY, MICHIGAN HISTORICAL, PHYSICAL AND ECOLOGICAL FEATURES

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ABSTRACT

The Love Creek Nature Center, one of the three nature centers located within the boundaries of Berrien County, is owned and operated by the county for public enjoyment and instruction of nature. The 44.5 ha study area, located seven km east of Berrien Springs, and two km southwest of Berrien Center, on Huckleberry Road, in T6S, R17W, sections 16, 17 (Lat. 41° 56' N; Long. 86° 18' W) is made up of deciduous woods and abandoned fields at various stages of succession. It is bounded on the east by the Berrien County Dog Pound and Huckleberry Road, to the north by cultivated Berrien County land and the Berrien General Hospital, to the west by the recently closed Berrien - Oronoko Township Landfill Dump; and to the south by private property. Love Creek flows east to west across the length of the property and forms its curved western boundaries. It eventually empties into the nearby St. Joseph River.

The vegetation cover is represented by four distinctive communities of deciduous forests and four others: The Marsh, The Stream Sides, The Dry Meadow, The Disturbed Area and Trail Sides. Because of continued disturbance from all sides of the nature center, there is danger that considerable change in the vegetation may be forthcoming. This study is the first attempt to consolidate the known information about the Love Creek Nature Center area and to document its vegetation for future reference.

Key words: Berrien County, Forest, Love Creek, Michigan, Vegetational study.

INTRODUCTION

In 1838, Berrien County officials felt the need to purchase a "poor farm" for the needy individuals of the region. It was not, however, until 1847 that the Berrien County Board of Commissioners purchased the property where the Love Creek Nature Center and Berrien General Hospital are now located. The first frame dwelling to be erected on the "poor farm" was completed in July of 1847. In 1869 the first brick structure was built on the portion of the property where the Berrien General Hospital is located today (Ellis and Ensign, 1880). To provide water for the "poor farm" complex, two dams were constructed on Love Creek: one small dam on the south fork just east of the confluence of the northern and southern tributaries of Love Creek, and a large one a short distance west of the confluence of the two streams. The construction date of the two dams is not known for certain, but the date 1903 was inscribed in the cement of the larger dam. How long the dams were in use is not known (Charles Barnes, former Director of the center, Pers. Comm.).

In 1962, a building to house the Berrien County Dog Pound was built on Huckleberry Road. It is believed that the surrounding forest was cleared at that time (Charles Barnes, Pers. Comm.) and put into cultivation. Apple trees were planted too, as old apple trees have been found in the area. The next known alteration of area took place in April 1970 when black walnut trees *Juglans nigra* L. were logged from western portion of the property (Anonymous, 1970). The full extent of the logging is not known. The center was dedicated and fenced as a public park in 1976. It was not, however, until 1977 that the center, with proper staff, was opened to the public.

Very little scientific information has been gathered about the area; two previous limnological studies by Jackson and Johnson (1974) and Rule (1976) were concerned specifically with the microflora and fauna of Love Creek on a seasonal basis, and with various chemical and physical properties of the stream. More recently, Kron (1982) has studied the Indian Bowl wet prairie region located one km northwest of the center.

Due to the proximity of Lake Michigan on the west side of Berrien County, the climate of the county tends to be milder than would normally be expected at the same latitude. Areas at the same latitude of Michigan inland Lower Peninsula normally fluctuates in temperatures. The prevailing westerly winds produce cool spring and summer days, and mild Autumn and Winter temperatures. Colder temperatures are generally associated with easterly and northerly winds. Weather data from 1974 -85, from the nearest reporting station at Eau Clair, Ml, located approximately seven km north of the center (at 42° 10' N, 86° 25' W), showed that the mean temperature for the warmest month, July, was 22.5C while the coldest month, January, was 5.8C. The highest average precipitation occurred in June (9.7 cm), with the lowest in December (1.3 cm).

The Love Creek Nature Center is 1,552 m long and consists of three major sections: eastern, middle and western. The eastern section is the largest (26.5 ha) with a length of 576 m and a width of 430 m. The middle region is the smallest and narrowest having a length of 322 m, with a width of 137 m in the east, while being only 80 m across at the western end. The western section of the study area has a semicircular shape, with the middle portion being widest. This section is 644 m long and 279 m wide. The area of both the middle and the western sections is 18 ha.

The topography of the area consists of rolling hills separated by moist, wooded valleys (Fig. 1). Flat ridges, moderately steep slopes, and stream valleys are found throughout the entire length of Love Creek and its tributaries. The maximum elevation (230 m or 760 ft) is reached at the southeastern corner, whereas the minimum elevation is located at the extreme western end (197 m or 650 ft). Lowlands bordering Love Creek slope from east to west. The north-eastern section is relatively level, with a southward slope towards the creek. The southeast section is characterized by a lowland marsh bordered on the east by a ridge, which also represents the eastern border of the center. The middle section is relatively low compared with the eastern and western ones; the western segment includes an elevated area that slopes steeply towards Love Creek. It reaches to the lowest point of nature center at the Love Creek western exit.

Seven soil types exist within the Love Creek Nature Center, based on information from the Soil Conservation Service (Fig. 2). The physical and chemical characters associated with the soil types are given in Table 1.

The majority of the forest communities in Love Creek Nature Center are located on major well drained soil types: Riddle Oshtemo Soil Complex and/or the Oshtemo sandy loam. The imperfectly drained Monitor loam, Abscota, and the poorly drained Cohoctah soils are minor units of the succession forest soil. The marsh pond community is growing on the Aquents and Histosols soils whereas the stream community runs through a mixture of various soil types: Oshtemo sandy loam, Monitor loam, Cohoctah, Spinks loam and Udorthents and Udipsamments soils. The communities of the exposed habitats, the north division of the dry meadow, and the disturbed areas are growing on Oshtemo sandy loam and Riddle Oshtemo soil complex respectively. The former soil type is located in a limited portion of the disturbed area (3), which appears as a continuous extension of the mesic deciduous forest soil while the latter soil type is in the south division of the dry meadow.

The forested areas of the nature center are rich with a mixture of deciduous, beech-maple forest, and herbaceous elements which characterize southwestern Michigan wood. Some studies in such woods include Sandhill Woodlot (Frye, 1976 a, b) and Baker Woodlot (Beach and Stevens, 1980) in East Lensing in Ingham Co., Toumey forest (Schneider, 1966), Sandford Natural Area (Beaman, 1970), Cooper's Glen Woodlot in Kalamazoo county (Zager and Pippen, 1977), the sand dunes along Lake Michigan (Wells and Thompson, 1982), and Warren Woods (Billington, 1924; Braun, 1950; Donnelly, 1986; Donnelly and Murphy, 1987) in Berrien County, Niles Township (Kee, 1982) and Robinson Preserve (Carter, 1972; Reiss, 1986). The disturbed areas and the dry meadow of the center have a composition similar to other dry meadows of southwestern Michigan such as a tract studied by Brewer *et al*. (1969). The marsh and the streamside communities are conspicuously devoid of submerged and floating aquatic plants, except for duckweed, *Lemna minor* L. which is occasionally present in the marsh.

MATERIALS AND METHODS

The arborescent vegetation was analyzed by the point-centered quarter method (Cottom and Curtis, 1956). Because of the short distance between the trees, parallel compass lines with sampling points, every 10 m, were adequate for sampling. All transects were initiated 10 m from the edge of each stand except in The Forest Strip along the Northern Edge of the Marsh (Fig. 3). Because of its narrowness, an east -west transect through the middle part of this formation was made. The number of sampling points in each forest community was proportional to the area with 73 points in the Upland Deciduous Forest, 63 points in the Mesic Deciduous Forest, 19 points in the Forest Strip along the Northern Edge of the Marsh, and 169 points in the Succession Forest. Only individuals with a stem diameter at breast height (DBH) of at least 5 cm, and taller than 3 m, were considered as trees. Important value (IV) was calculated by summing up relative density, relative frequency, and relative dominance.

The shrub and herbaceous layers were not studied quantitatively due to lack of time. The relative abundance of individual species however was recorded using visual estimation according to the following abundance scale after Tansley and Adamson (1913) and Phillips (1959).

D = Dominant (i.e. gregarious as to occupy and control any layer of vegetation)
C = Common (never or rarely out of sight)
F = Frequent (frequently observed)
O = Occasional (occasionally observed)
R = Rare (solitary, found only after thorough exploration).
Identification and nomenclature are based on Gleason and Cronquist (1963).

RESULTS

Following preliminary observations eight habitats were chosen because their vegetation was relatively distinct. These were: Upland Deciduous Forest, Mesic Deciduous Forest, the Forest Strip along the Northern Edge of the Marsh, Succession Forest, Marsh, Stream Side, Dry Meadow and The Disturbed Areas and Trail Sides (Fig. 3).

List of distinctive species for the four forests were made as in tables 2 to 5 whereas a brief description for the ground cover of the whole communities are given as below.

1. The Upland Deciduous Forest:

The well-developed understory consisted various herbaceous plants like the Canada violet, *Viola canadensis* L.; water leaf, *Hydrophyllum canadense* L., and *H. appendiculatum* Michx, which were tolerant of the cool, shaded and low light intensity conditions in this forest. These conditions were ideal for the pteridophytes, narrow-leaved spleenwort, *Athyrium pycnocarpon* (Spreng.) Tidest and ground-cedar, *Lycopodium complanatum* L. which were found only in this habitat. Ginseng, *Panax quinquefolium* L. was also, only observed in this forest.

2. The Mesic Deciduous Forest :

Tulip tree, *Liriodendron tulipfera* L. (31.61) tended to occur with higher frequency in the waterlogged Zone near the marsh and at the base of the slope; a habitat where this species is usually observed in Michigan (Thompson, 1981). One large tree of chestnut, *Castanea dentata* (Marsh.) Borkh (DBH 30.7 cm), and several saplings in apparent good health, were observed but not encountered in sampling. During spring, the forest floor was a lush carpet of dominant Trillium, *Trillium grandiflorum* (Michx.) Salisp. It was also ideal for other species like *Viola canadensis* L.; May-apple, *Podophyllum peltatum* L.; false mermaid, *Florkea proserpinacoides* Willd.; sweet cicely, *Osmorhiza claytonia* (Michx.) Clark; jack in the pulpit, *Arisaema triphyllum* (L.) Schott. and many others. Swamp saxifrage, *Saxifraga pensylvanica* L. was only seen in this habitat.

3. The Forest Strip along the Northern Edge of the Marsh:

The herbaceous layer was comprised of skunk cabbage, *Symplocarpus foetidus* (L.) Nutt; stinging nettle, *Urtica dioica* ssp. *gracilis* (Ait) Selander; hedge-nettles, *Stachys hispida* Pursh. Sensitive fern, *Onoclea sensibilis* L. and species of sedge *Carex*. This habitat also harboured species from the adjacent marsh and dry meadow communities.

4. Succession Forest:

Herbaceous plants, in various degrees of abundance, made up the ground cover. They included *Arisaema triphyllum* (L.) Schott; *Trillium grandiflorum* (Michx.) Salisb; *Aster cordifolius* L.; frost Aster, *A. pilosus* L.; crinkleroot, *Dentaria diphylla* Michx.; lopseed, *Phryma leptostachya* L.; grape fern, *Botrychium* spp.; beech-drops, *Epifagus virginiana* (L.) Bart.; rattlesnake plantain, *Goodyera pubescens* (Willd.) R.Br. and many others.

5. The Marsh:

The vegetation of the marsh appeared to be determined by the depth of water. In muddy shallow canals isolated stands of the species, arrowhead, *Sagittaria latifolia* Willd.; monkey-flower, *Mimulus ringens* L.; blue vervain, *Verbena hastate* L.; marsh marigold, *Caltha palustris* L.; bur-reed, *Sparganium americanum* Nutt. were encountered. The largest area of the marsh is composed of raised, decaying organic mat which included cat-tails, *Typha latifolia* L. and cut grass, *Leersia oryzoides* (L.) Sw.

The most common herbaceous species in the marsh were redstem Aster, *Aster puniceus* L.; boneset, *Eupatorium perfoliatum* L.; joy-pye weed, *E. maculatum* L.; swamp-milk weed, *Asclepias incarnate* L. and willow-herb, *Epilobium palustre* L.

6. The Stream Sides:

Love Creek originates from a swampy area near the village of Berrien Center and empties into the St. Joseph River after leaving a flood plain wet prairie fen area known as "Indian Bowl" (Barnes and Kohring, 1978). The greatest portion of the Creek lies within Sections 16 and 17 of Berrien County. The average width of the stream in the nature center was approximately 50 cm wide with a depth of 15 to 40 cm. The water is cool and flows fast in a narrow and shallow channel. Small, open, shallow areas occur along the sides of the North Fork. It was here that horsetail; *Equisetum hyemale* L. was dominant. Various species of *Carex* and grasses were found in more open areas. The grasses included red top, *Agrostis gigantean* Roth.; reed meadow grass, *Glyceria melicaria* (Michx.) F.T.Hubb. and rough-stalked meadow grass, *Poa trivalis* L. The soft rush, *Juncus effuses* L. and path rush, *J. tenuis* Willd. were occasionally distributed on both sides of the stream. They were found most abundantly in lowland floodplains where the North and South Fork join each other.

7. The Dry Meadow:

This, the driest habitat of the nature center, is located in the east central portion. A ridge of planted red pin, *Pinus resinosa* Ait. divides the meadow into two unequal, north and south divisions. The smaller southern division is located along the northwest side of the marsh and is separated from the marsh by the Forest strip along the Northern Edge of the Marsh. This division of the Dry Meadow is a grassy area dominated by *Bromus inermis* Leyss. and cheat, *B. secalinus* L., while the larger, northern division, is dominated by *Aster pilosus* L.; wild carrot, *Daucus carota* L., and Canada goldenrod, *Solidago canadensis* L. The dry meadow has been greatly disturbed by man. Forty-five years ago, the area was planted for agricultural crop (Charles Barnes, Pers. Comm.). In the southwest part of the meadow, there is a small successional stand of young trees; white ash, *Fraxinus americana* L.; *Prunus serotine* Ehrh.; the American linden, *Tilia Americana* L.); *Ulmus americana* L., and the vine, riverbank grape, *Vitis riparia* Michx.

8. The Disturbed Area and Trail Sides:

Disturbed areas occupy two parts of the Love Creek Nature Center. The first site is located near the old abandoned northern entrance and parking lot of the nature center, while the second disturbed location is gently rolling from huckleberry Road, on the east, to the dry meadow on the west. Cultivated shrubs and seedlings planted near each of the entrances of the center, the parking lots and the information office include: balsamfir, *Abies balsamea* (L.) Mill.; *Acer saccharum* Marsh.; redbud, *Cercis canadensis* L.; *Cornus stolonifera* Michx.; the cork-winged euonymus, *Euonymus alata* (Thunb.) Sieb.; common privet, *Ligustrum vulgare* L.; the Colorado spruce, *Picea pungens* Engelm.; white pine, *Pinus strobus* L.; white poplar, *Populus alba* L.; Japanese yew, *Taxus cuspidate* Sieb & Zucc., and the American arbor-vitae, *Thuja occidentalis* L. The whole area was subjected to recent disturbance; hence various annual, biennial, and perennial weeds exist. The dominant herbs in the disturbed areas are ragweed, *Ambrosia artemisiifolia* L.; *Aster pilosus* L., the common orchard grass, *Dactylis glomerate* L.; daisy fleabane, *Erigeron annuus* (L.) Pers.; wild strawberry *Fragaria virginiana* Duchesne; evening primrose, *Oenothera biennis* L.; and *Solidago canadensis* L. Occasional species were corn cockle, *Agrostemma githago* L.; bouncing bet, *Saponaria officinalis* L., butterfly-weed, *Asclepias tuberosa* L., and wild-bergamot, *Monarda fistul*osa L. Patches of *Epilobium palustre* L., were found in moist marginal locations in the disturbed habitats.

A few plants from the main disturbed areas were introduced accidentally along some of the nature trails. The common plants were: sweet rocket, *Hesperis matronalis* L.; motherwort, *Leonurus cardiac* L.; common plantain, *Plantago major* L.; common dandelion, *Taraxacum* Weber); hedge-bindweed, *Convolvulus sepium* L.; and black nightshade, *Solanum nigrum* L.

CONTOUR INTERVAL 10 FEET (3 METERS)
DATUM IS MEAN SEA LEVEL

Figure (1): Topography of the Love Creek Nature Center, Berrien County, Michigan (from a topographic map of Berrien Springs, Dept. Interior Geological Survey, U.S.G.S. and U.S.C. & G.S., U.S.A. 1971)

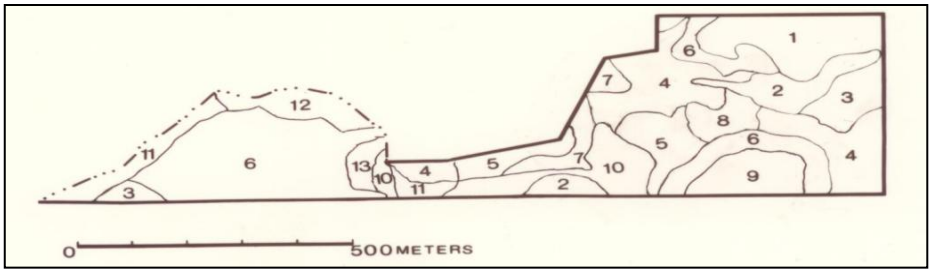

Figure (2): Soils map of the Love Creek Nature Center, Berrien County, Michigan (after Larson, 1980)

1, 3, 6 = Riddles-Oshtemo Complex
4,5,2,8 = Oshtemo sandy loam
13, 12 = Spinks loamy sand
11 = Udorthents and Udipsamments
9 = Aquents and Histosols
10 = Monitor loam
7 = Cohoctah-Ahscota sandy loam.

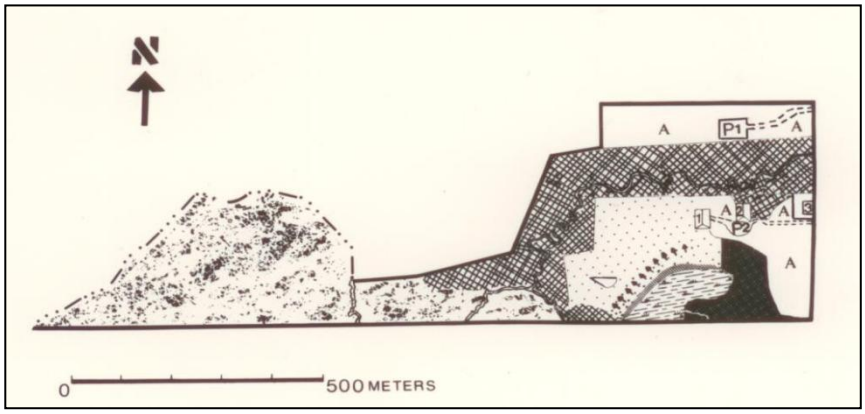

Figure (3): A map showing the vegetation sites of the Love Creek Nature Center.

	fence of the Nature Center
	fence borders different habitats
	the Love Creek forms of the curved westernmost border of the Center
	the upland forest
	the mesic deciduous forest
	the marsh, and the forest strip along the northern edge of the marsh
	the succession forest
	the large and the small portions of the dry meadow
	undisturbed site of various shrubs and trees
	the planted pine band
A	the disturbed area
P1, P2	the first and second parking lots
	gravel road
	the Information Office (1)
	garage storage (2)
	the County Dog Pound (3)

Table 1. Physical and Chemical Characters of the Love Creek Nature Center Soils (Data based on Larson 1980)

Map Symbol Soil Complex Soil Units	Slope % respective to the order of map symbol	Depth (cm)	Parent Material	Texture	Organic Matter %	Soil Reaction (pH)	Moist Bulk Density (g/cm3)	Available Water Capacity (cm/cm)
1,3,6 Riddles-Oshtemo Complex	1-6,6-12,12-18							
Riddles		0-17.8	Loam and sand clay	Loam	0.5-2	6.1-7.3	1.30-1.50	0.51-0.61
		17.8- 139.7	Loam till	Sandy clay loam,		5.1-7.3	1.40-1.60	0.41-0.46
				clay loam, loam				
Oshtemo		0-25.4	Loamy and sandy material	Sandy loam	0.5-3	5.1-6.5	1.14-1.60	0.25-0.38
		25.4-83.8		Sandy clay loam		5.1-6.5	1.20-1.59	0.30-0.48
4,5,8,2 Oshtemo sandy loam	0-12,6-12,12-18,18-35							
Oshtemo		0-25.4	Loam and sandy material	Sandy loam	0.5-3	5.1-6.5	1.14-1.60	0.25-0.38
		25.4-83.8		Sandy clay loam		5.1-6.5	1.20-1.59	0.30-0.48

Table 1 (contd.)

Map Symbol Soil Complex Soil Units	Slope % respective to the order of map symbol	Depth (cm)	Parent Material	Texture	Organic Matter %	Soil Reaction (pH)	Moist Bulk Density (g/cm3)	Available Water Capacity (cm/cm)
13,12 Spinks loamy sand	0-6,6-12							
Spinks		0-25.4	Sand material	Loamy fine sand	2-4	5.1-7.3	1.14-1.60	0.20-0.25
		25.4-152.4		Stratified sand to loamy fine sand		5.6-7.8	1.20-1.47	0.10-0.20
11 Udorthents and Udipsamments	18-90							
Udorthents		No data	No data available	No data	No data	No data	No data	No data
Udipsamments		No data	No data available	No data	No data	No data	No data	No data
9 Aquents and Histosols	0							
Aquents		No data	No data available	No data	No data	No data	No data	No data
Histosols		No data	No data available	No data	No data	No data	No data	No data

Table 1 (contd.)

Map Symbol Soil Complex Soil Units	Slope % respective to the order of map symbol	Depth (cm)	Parent Material	Texture	Organic Matter %	Soil Reaction (pH)	Moist Bulk Density (g/cm3)	Available Water Capacity (cm/cm)
10 Monitor loam	0-3							
		0-40.6	Loamy outwash Underlain by sand and gravel	Loamy silt loam	1-3	5.6-7.3	1.30-1.45	0.51-0.61
Monitor		40.6-71.1		Sandy clay loam		4.5-6.5	1.45-1.65	0.41-0.46
7 Cohoctah-Abscota sandy loam	No data available							
Cohoctah		0-38.1	Loamy and sandy Alluvial deposits	Sandy loam	1- 4	6.1-7.8	1.12-1.59	0.33-0.56
		38.1-106.7		Loam sand, fine sandy loam, silt loam		6.1-8.4	1.48-1.80	0.30-0.51
Abscota		0-15.4	Sandy and loamy alluvium	Sandy loam	0.5-3	6.1-6.5	1.14-1.60	0.30-0.38
		15.4-99.0		Sand		6.1-7.8	1.20-1.59	0.13-0.18

Table (2): Upland Deciduous Forest Composition in the Love Creek Nature Center determined by Point Centered Quarter Method. Data are based on 73 sample points.

Species	Relative Density	Relative Frequency	Relative Dominance	Importance Value (1.V.)
Acer saccharum Marsh.	26.03	23.15	23.71	72.89
Ulimns rubra Muhl.	13.01	14.29	10.44	37.74
Prunus serotine Ehrh.	11.30	12.81	12.75	36.86
Rohinia pseudoacacia L.	10.27	9.85	15.35	35.47
Liriodendron tulipifera L.	6.85	7.88	11.33	26.06
Fagus grandifolia Ehrh.	7.88	6.90	7.66	22.44
Quercus borealis Michx.	4.79	4.43	5.90	15.12
Fraxinus Americana L.	5.14	5.91	3.23	14.28
Sassafras albidum (Nutt.) *Nees*	2.40	2.96	2.98	8.34
Carpinus caroliniana Walt.	2.74	3.94	0.94	7.62
Ostrya virginiana (Mill.) K. Koch	2.40	2.46	1.12	5.98
Celtis occidentalis L.	1.71	1.48	1.18	4.37
Asimina triloba (L.) *Dunal*	1.37	1.48	0.42	3.27
Carya cordiformis (Wang.) K.Koch	0.68	0.99	0.82	2.49
Juglans nigra L.	0.68	0.49	0.94	2.11
Ulmus Americana L.	0.34	0.49	0.95	1.78
Crataegus holmesiana Ashe	0.68	0.49	0.27	1.44

Note: The mean distance between trees was 3.84 m.

Table (3): Mesic Deciduous Forest Composition in Love Creek Nature Center determined by Point Centered Quarter Method. Data are based on 63 sample points.

Species	Relative Density	Relative Frequency	Relative Dominance	Importance Value (1.V.)
Ulmus rubra Muhl.	32.15	27.88	27.30	87.33
Prunus serotine Ehrh.	20.24	21.82	27.82	69.88
Liriodendron tulipifera L.	11.11	12.12	8.38 3	31.61
Carya cordiformis (Wang.) K.Koch	7.54	6.67	5.22	19.43
Acer saccharum Marsh	5.56	7.88	4.27	17.71
Fraxinus Americana L.	5.16	6.06	3.72	14.94
Quercus borealis Michx	5.16	4.85	4.86	14.87
Fagus grandifolia Ehrh.	3.17	3.64	4.82	11.63
Juglans nigra L.	1.59	0.61	3.53	3.73
Tilia Americana L.	1.59	2.42	1.21	5.22
Asimina triloba (L.) Dunal.	1.98	1.21	1.02	4.21
Populus tremuloides Michx	1.19	1.21	0.77	3.17
Celtis occidentalis L.	0.79	1.21	0.61	2.61
Ostrya virginiana (Mill.) K.Koch	0.40	0.61	0.26	1.27
Carpinus caroliniana Walt.	0.40	0.61	0.23	1.24

Note: The mean distance between trees was 3.20 m.

Table (4): The Forest Strip along the Northern Edge of Marsh Composition in the Love Creek Nature Center determined by the Point Centered Quarter Method. Data are based on 19 sample points.

Species	Relative Density	Relative Frequency	Relative Dominance	Importance Value (1.V.)
Prunus serotine Ehrh.	27.63	25.00	25.27	77.90
Acer saccharum Marsh	18.42	15.39	27.32	61.13
Ulmus rubra Muhl.	21.05	17.31	17.16	55.52
Fraxinus Americana L.	6.58	9.62	9.00	26.20
Acer rubrum L.	5.26	5.77	2.54	15.66
Populus tremuloides Michx	5.26	5.77	2.47	13.57
Carpus caroliniana Walt.	3.95	5.77	2.47	12.19
Salix amygdaloides Anderss.	2.63	3.85	5.60	12.08
Liriodendron tulipifera L.	1.32	1.92	2.67	5.91
Querus borealis Michx.	1.32	1.92	1.74	4.98
Carya cordiformis (Wang.) K.Koch	1.32	1.92	1.59	4.83
Fagus grandifolia Ehrh	1.32	1.92	1.10	4.34
Morus rubra L.	1.32	1.92	0.84	4.08

Note: The mean distance between trees was 3.14 m.

Table (5): Succession Forest Composition in the love Creek Nature Center determined by the Point Centered Quarter Method. Data are based on 169 sample points.

Species	Relative Density	Relative Frequency	Relative Dominance	Importance Value (1.V.)
Fraxinus Americana L.	22.85	25.45	23.51	71.81
Prunus serotine Ehrh.	23.29	23.94	21.13	68.56
Ulmus rubra Muhl.	26.11	14.85	24.44	65.40
Quercus borealis Michx.	7.57	9.09	7.12	23.78
Acer saccharum Marsh.	3.56	5.45	5.56	14.57
Liriodendron tulipifera L.	2.52	3.95	3.67	10.12
Tilia Americana L.	2.08	3.94	1.74	7.76
Juglans nigra L.	0.89	1.52	4.35	6.76
Salix exigua Nutt.	1.04	1.82	1.41	4.27
Carya cordiformis (Wangenh.) K. Koch	1.19	1.82	1.21	4.22
Asimina triloba (L.) Dunal.	1.19	1.49	0.75	3.43
Sassafras albidum (Nutt.) Nees	0.74	1.52	0.52	2.78
Fagus grandifolia Ehrh.	0.59	0.91	1.19	2.69
Rhus typhina L.	1.04	0.91	0.54	2.49
Ostrya virginiana (Mill) K.Koch	0.59	0.91	0.89	2.39
Carpinus caroliniana Walt	0.74	0.91	0.62	2.27
Salix rigida Muhl.	0.59	0.30	0.61	1.50
Celtis occidentalis L.	0.30	0.60	0.26	1.16
Pyrus malus L.	0.15	0.30	0.35	0.80
Morus rubra L.	0.15	0.30	0.14	0.59

Note: The mean distance between trees was 2.86 m.

DISCUSSION

Topographic diversity, differences in soil moisture and drainage, the history of the site and the seed source, the disturbances of some areas in the center, and the introduction of some plants are all factors that have contributed to the local variation of the vegetation. The vegetation of Love Creek Nature Center is still subject to some disturbances. The task now is to consider carefully the nature and extent of the use made of the area and to apply protective measure where necessary. Uncontrolled disturbance will lead to serious loss of rare and sensitive species and the introduction of additional "weeds". The general defacement of the environment will inevitably lead to an alteration of the flora.

Following this survey a management plan for the center can be constructed ensuring the continuation of a diverse association of plants on its grounds. Management activities that would maintain both the heterogeneity within each of the four woods and the high number of plant species in each community (see checklist in Hamodie 2016 in prep.) are necessary to apply.

It would be desirable not to obstruct the present water flow in order to keep the marsh and the streamside's communities in their present state. The challenge of the Love Creek Nature Center, the local people, and the Staff of the center is to respond to the needs of present and future land use in a way that will maintain both the center's beauty and usefulness for generations to come.

Note: A set of voucher specimens has been deposited in Babylon University Herbarium, Iraq (BLN)

ACKNOWLEDGEMENT

My appreciation to Mr. Khalid J. Rasheed for his assistance in typing this manuscript.

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دراسة الغطاء الخضري في المركز الطبيعي لوف كريك (Love Creek nature center) - بيرين كاونتي مشيغان – الولايات المتحدة مظاهر تاريخية وطبيعية وبيئية

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الخلاصة

المركز الطبيعي لوف كريك هو واحد من ثلاث مراكز طبيعية يقع ضمن حدود بيرين كاونتي تعود ملكيته وادارته الى الحكومة المحلية في بيرين كاونتي والغرض من اقامته للمتعة للناس ودراسة الطبيعة. مساحة المركز ٤٤,٥ هكتار ويبعد سبعة كيلومترات الى الشرق من بيرين سبرنكز و كيلومترين الى الجنوب الغربي من مركز القرية بيرين، يقع على شارع هاكلبري في T6s, R17W ضمن القسمين ١٦ و ١٧ (خط عرض 41^{o} 56 / شمالا، خط طول 86^{o} 18 / غربا). مكون من غابات نفضية وحقول في مراحل مختلفة من التعاقب الخضري. يحده من الشرق مركز لسكن الكلاب السائبة للكاونتي وشارع هاكلبري، والى الشمال ارض مزروعة مملوكة لبيرين كاونتي ومستشفى عام بيرين والى الغرب مطمر نفايات بلديتي بيرين واوراناكو والى الجنوب ارض ذات ملكية خاصة. جدول الماء لوف كريك يجري من الشرق باتجاه الغرب قاطعا المركز الطبيعي عرضيا ليكون الجزء المنحني منه حدود المركز الطبيعي غربا وفي النهاية يصب في نهر سانت جوزيف القريب منه.

يتمثل الغطاء النباتي بوجود اربعة مجتمعات نباتية لغابات نفضيه متميزة عن بعضها إضافة الى اربعة مجتمعات نباتية أخرى هي مجتمع الهور ومجتمع نباتات تنمو على ضفتي الجدول المائي ومجتمع الحقل الجاف ومجتمع مناطق تعرضت للعبث وعلى جانبي ممرات سير الناس. بسبب العبث المستمر المتمثل بقطع الأشجار ورمي النفايات والإساءة الى البيئة فان الخطر يهدد الغطاء الخضري لمركز لوف كريك الذي قد يحصل مستقبلا.

هذه الدراسة هي المحاولة الاولى لجمع معلومات معروفة عن المركز الطبيعي لوف كريك ودراسة الغطاء الخضري للتوثيق كمرجع مستقبلي.