U.S. Department of Interior
National Park Service

National Register of Historic Places Registration Form

DRAFT

This form is for use in nominating or requesting determinations for individual properties and districts. See instructions in *How to Complete the National Register of Historic Places Registration Form* (National Register Bulletin 16A). Complete each item by marking "x" in the appropriate box or by entering the information requested. If an item does not apply to the property being documented, enter "N/A" for "not applicable." For functions, architectural classification, materials, and areas of significance, enter only categories and subcategories from the instructions. Place additional entries and narrative items on continuation sheets (NPS Form 10-900A). Use a typewriter, word processor, or computer, to complete all items.

1. Name of Property

historic name University of Wisconsin Arboretum

other names/site number University of Wisconsin Forest Preserve, Arboretum, and Wild Life Refuge

2. Location

street & number 1207 Seminole Highway N/A **not for publication**

city or town Madison N/A **vicinity**

state Wisconsin **code** WI **county** Dane **code** 025 **zip code** 53711

3. State/Federal Agency Certification

As the designated authority under the National Historic Preservation Act, as amended, I hereby certify that this X nomination request for determination of eligibility meets the documentation standards for registering properties in the National Register of Historic Places and meets the procedural and professional requirements set forth in 36 CFR Part 60. In my opinion, the property X meets _ does not meet the National Register criteria. I recommend that this property be considered significant _x nationally _ statewide _ locally. (_ See continuation sheet for additional comments.)

Signature of certifying official/Title Date

State or Federal agency and bureau

In my opinion, the property _ meets _ does not meet the National Register criteria.
(_ See continuation sheet for additional comments.)

Signature of commenting official/Title Date

State or Federal agency and bureau

University of Wisconsin Arboretum	Dane	Wisconsin
Name of Property	County and State	

4. National Park Service Certification

I hereby certify that the property is:

__ entered in the National Register.
___ See continuation sheet.
x_ determined eligible for the National Register.
___ See continuation sheet.
__ determined not eligible for the National Register.
___ See continuation sheet.
__ removed from the National Register.
__ other, (explain:)

	Signature of the Keeper	Date of Action

5. Classification

Ownership of Property
(check as many boxes as as apply)

	private
	public-local
x	public-State
	public-Federal

Category of Property
(Check only one box)

	building(s)
	district
	structure
x	site
	object

Number of Resources within Property
(Do not include previously listed resources in the count)

contributing	noncontributing	
8	4	buildings
1	10	sites
7	5	structures
		objects
16	19	total

Name of related multiple property listing:
(Enter "N/A" if property not part of a multiple property listing.)
N/A

Number of contributing resources previously listed in the National Register
0 (2 effigy mound groups are non-contributing)

6. Function or Use

Historic Functions (Enter categories from instructions)	**Current Functions** (Enter categories from instructions)
LANDSCAPE/conservation area	LANDSCAPE/conservation area
EDUCATION/research facility	EDUCATION/research facility
	RECREATION/outdoor recreation

7. Description

Architectural Classification (Enter categories from instructions)	**Materials** (Enter categories from instructions)	
No style (site)	foundation	CONCRETE; STONE
Other: Rustic (structures and buildings)	walls	STONE; WOOD
	roof	ASPHALT
	other	

Narrative Description

(Describe the historic and current condition of the property on one or more continuation sheets.)

8. Statement of Significance

Applicable National Register Criteria
(Mark "x" in one or more boxes for the criteria qualifying the property for the National Register listing.)

x A Property is associated with events that have made a significant contribution to the broad patterns of our history.

_ B Property is associated with the lives of persons significant in our past.

x C Property embodies the distinctive characteristics of a type, period, or method of construction or represents the work of a master, or possesses high artistic values, or represents a significant and distinguishable entity whose components lack individual distinction.

_ D Property has yielded, or is likely to yield, information important in prehistory or history.

Criteria Considerations
(Mark "x" in all the boxes that apply.)

Property is:

_ A owned by a religious institution or used for religious purposes.

_ B removed from its original location.

_ C a birthplace or grave.

_ D a cemetery.

_ E a reconstructed building, object, or structure.

_ F a commemorative property.

_ G less than 50 years of age or achieved significance within the past 50 years.

Areas of Significance
(Enter categories from instructions)

CONSERVATION (national significance)
ARCHITECTURE (local significance)

Period of Significance

1934 – 1961 (Conservation)
ca. 1927 - 1940 (Architecture)

Significant Dates

ca. 1927, 1934, ca. 1935, 1936, 1937, 1943, ca. 1965, 1969, 1976, 1999, 2001, ca. 2005

Significant Person
(Complete if Criterion B is marked)

N/A

Cultural Affiliation

N/A

Architect/Builder

Longenecker, G. William
Gallistel, Albert F.

Narrative Statement of Significance
(Explain the significance of the property on one or more continuation sheets.)

9. Major Bibliographic References

(Cite the books, articles, and other sources used in preparing this form on one or more continuation sheets.)

Previous Documentation on File (National Park Service):
- _ preliminary determination of individual listing (36 CFR 67) has been requested
- _ previously listed in the National Register
- _ previously determined eligible by the National Register
- _ designated a National Historic landmark
- _ recorded by Historic American Buildings Survey #
- _ recorded by Historic American Engineering Record #

Primary location of additional data:
- X State Historic Preservation Office
- _ Other State Agency
- _ Federal Agency
- _ Local government
- _ University
- x Other

Name of repository:
University of Wisconsin-Madison Arboretum

10. Geographical Data

Acreage of Property 1,280

UTM References (Place additional UTM references on a continuation sheet.)

	Zone	Easting	Northing
1	16	302260	4769880
2	16	304060	4769860
3	16	304680	4769390
4	16	304200	4768060

☒ See Continuation Sheet

Verbal Boundary Description (Describe the boundaries of the property on a continuation sheet)

Boundary Justification (Explain why the boundaries were selected on a continuation sheet)

11. Form Prepared By

name/title	Elizabeth L. Miller, Historic Preservation Consultant				
organization				**date**	April 3, 2015
street & number	4033 Tokay Blvd			**telephone**	608-233-5942
city or town	Madison	**state**	WI	**zip code**	53711

University of Wisconsin Arboretum	Dane	Wisconsin
Name of Property	County and State	

Additional Documentation

Submit the following items with the completed form:

Continuation Sheets

Maps A USGS map (7.5 or 15 minute series) indicating the property's location.
A sketch map for historic districts and properties having large acreage or numerous resources.

Photographs Representative black and white photographs of the property.

Additional Items (Check with the SHPO or FPO for any additional items)

Property Owner

Complete this item at the request of SHPO or FPO.)

name/title	Gary Brown, UW-Madison Facilities Planning and Management (owner representative)				
organization	Board of Regents of the University of Wisconsin System			**date**	April 3, 2015
street & number	9th Floor WARF Bldg, 610 Walnut Street			**telephone**	608-263-3023
city or town	Madison	**state**	WI	**zip code**	53726

Paperwork Reduction Act Statement: This information is being collected for applications to the National Register of Historic Places to nominate properties for listing or determine eligibility for listing, to list properties, and to amend existing listings. Response to this request is required to obtain a benefit in accordance with the National Historic Preservation Act, as amended (16 U.S.C. 470 et seq.).

Estimated Burden Statement: Public reporting burden for this form is estimated to average 18.1 hours per response including time for reviewing instructions, gathering and maintaining data, and completing and reviewing the form. Direct comments regarding this burden estimate or any aspect of this form to the Chief, Administrative Services Division, National Park Service, P.O. Box 37127, Washington, DC 20013-7127; and the Office of Management and Budget, Paperwork Reductions Projects, (1024-0018), Washington, DC 20503.

Start description on line below

INTRODUCTION

The University of Wisconsin Arboretum is a 1,280-acre tract of land that wraps around the south, east and west shores of Lake Wingra and extends south past the beltline highway. The sixteen contributing resources include one site, eight buildings and seven structures. Twelve sites, four buildings, and five structures comprise the 21 non-contributing elements. There are numerous structures and objects scattered around the Arboretum that are not substantial enough to count, including low, stone retaining walls, cut-out metal signs, informational signs, memorial plaques, and benches.

DESCRIPTION

Contributing Site

The contributing site in the Arboretum is the Arboretum itself (AHI #229324). The university acquired the first 245 acres of what would become the Arboretum in 1932. These acres are located on what is now the northwest and center of the Arboretum, and includes the area where the Arboretum Visitor Center and other administration and service buildings are located. Other parcels soon followed and by 1940, the Arboretum had acquired most of its current acreage.

In 1933, Albert F. Gallistel, an architect and the university's superintendent of buildings and grounds, designed the three-mile road that winds through the Arboretum. Now called McCaffrey Drive, this road was originally graveled, but had been paved by 1942.[1] It was laid out with grades and curves in such a way as to make the drive an invisible element in the vista of the Arboretum.

The Arboretum Committee (AC, composed of University of Wisconsin faculty specializing in botany, horticulture, zoology, forestry, landscape architecture, and wildlife management) and the Arboretum Advisory Committee (AAC, made up of outside experts and interested parties) worked with Aldo Leopold, the Arboretum's first director and later, first research director, and G. William Longenecker, the Arboretum's first executive director, in guiding the development of the Arboretum.[2] Two AC members, Franz Aust (landscape architecture) and Norman C. Fassett (botany), worked especially closely with Longenecker and Leopold in planning the Arboretum. These men envisioned the Arboretum as a place that not only would provide the opportunity for the scientific study of a wide variety of trees and plants (as an arboretum traditionally did) but would also serve as a laboratory in which university scientists could develop methods for reestablishing native plant-animal communities

[1] Nancy D. Sachse, *A Thousand Ages: The University of Wisconsin Arboretum*, (1965; repr., Madison, Wisconsin: Regents of the University of Wisconsin, 1974), 26.
[2] Sachse, 16-22.

(now called "ecological restoration") on land that had been put into agricultural use. Both types of landscapes have been created and maintained in the Arboretum and form a part of the **Arboretum** as a site. Some 1,000 acres are dedicated to native plant-animal communities from forests, prairies, wetlands, and savannas, while the remainder is in horticultural plantings (traditional of arboreta), or in administrative and service use. Three areas of the Arboretum are remnants that predate Euro-American settlement: the Noe Woods, with its forest of black and white oaks; the Wingra Marsh; and the Wingra Fen.[3]

The Arboretum site, as it is presently laid out, was mostly planned between 1933 and 1943 (figure 2). With the exception of the Noe Woods, the Wingra Marsh, the Wingra Fen, and the Spring Trail Pond, dredging and planting to create the principal areas in the Arboretum was carried out principally between 1934 and 1953.[4] The Spring Trail Pond (commonly known as the "Duck Pond") was dredged for the Madison Realty Company ca. 1927 in their creation of the Spring Trail Park, which was part of the firm's Nakoma residential subdivision. It was transferred to the university in 1932.[5]

The first plantings in the Arboretum were the Leopold Pines in 1933, a 21-acre pinetum which began as a reforestation effort, and had become an ecological restoration by 1941. In 1934, work began in the 52-acre Wingra Woods (a northern Wisconsin sugar maple forest, photo 1), and the 28-acre Gallistel Woods (a southern Wisconsin mesic forest). Planting of the 60-acre Curtis Prairie (photo 2) began in 1936 (following experiments conducted in 1935). Development of the Gardner Marsh (photo 3), to provide habitat for migratory waterfowl, was planned by Leopold and initiated in 1936. In 1940, Ho-Nee-Um Pond was dredged, and restoration of Teal Pond as a sedge meadow began.[6] The Evjue Pines, located in the Grady Tract (which the Arboretum acquired in 1940) were planted in 1943.[7] The 50-acre Greene Prairie, planted (largely by hand) by Henry C. Greene from 1943 to 1951. The Southwest Grady Oak Savanna, West Grady Knoll, and Grady Oak Savanna (all in the Grady Tract) were planted in the 1950s, the last large ecological restoration projects undertaken during the historic period, 1934-1961.[8] Since 1961, the Arboretum has continued its mission to re-create plant-animal communities native to Wisconsin. Those projects that have been initiated since 1961 are compatible with the Arboretum's historic character, and include the Overlook Prairie (begun 1969), the Marion Dunn Tallgrass Prairie (1983), and the Wingra Oak Savanna (1991). The plant-animal communities in the Arboretum were not expected to mature as landscapes for 50 years or more, and have required careful maintenance and study.

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[3] Sachse, 16-22.
[4] Sachse, dates gathered from entire book.
[5] Sachse, 47.
[6] Sachse, 26, and 48-50.
[7] *Arboretum News* 1 (October 1952): 3.
[8] Sachse, 105.

There are also horticultural plantings in the Arboretum, representing the traditional concept of an arboretum, showcasing a wide variety of shrubs, vines, and trees. The largest of these is the Longenecker Horticultural Gardens, located near the center of the Arboretum. The Longenecker Gardens began with a gift of lilac bushes from the Madison Garden Club in 1935, and was shaped by Longenecker over many years (photo 4). The first crabapple was planted in 1942. Both the lilac and crabapple collections are regarded as among the finest in the country. The 50-acre gardens include more than 2,000 plants and represent over 100 varieties native to Wisconsin. The gardens were named in honor of Longenecker in 1967.[9] The Stevens Memorial Aquatic Garden, designed by Longenecker with the assistance of Fassett, was completed in 1936. The small Viburnum Garden, located just south of the intersection of Manitou Way and Nakoma Road, was planted in 1976. It contains over 80 varieties and species of viburnums, and some 110 varieties and species of arbor vitae. The four-acre Wisconsin Native Plant Garden, begun 2001, surrounds the Arboretum Visitor Center, and includes some 500 plants.[10]

Contributing Buildings

Eight contributing buildings are found in the Arboretum, clustered together around the cul-de-sac that lies just east of the Arboretum Visitor Center (figure 3). These are: the Bath House (now the Laboratory and Greenhouse), the Barracks (now the Teaching Barracks), the Carpentry Workshop and Warehouse (now the Shop and Garage), the Machine Shed, the Tool Shed, the Nursery Pumphouse, the Root Cellar, and the Main Pumphouse. The Barracks was built in 1934 (now Seed Storage), one of ten erected for the 300-some laborers employed by the Wisconsin Employment Relief Administration (WERA) at "Camp Arboretum."[11] The remainder are believed to have been constructed in 1935 for the 200 men of Civilian Conservation Corps (CCC) Company No. 2670, also called "Camp Madison," open from August 1935 until November 1941.[12] All of them display the influence of the Rustic style, combining wood frame construction with a wood shingle finish.

The **Bath House** (AHI #229325) is a one-story, frame Gable Ell building, facing west and resting on a concrete slab foundation (see photo 5). Now known as the Laboratory and Greenhouse, it originally

[9] Sachse, 49; and Edward R. Hasselkus, "The Longenecker Horticultural Gardens," in *Our First Fifty Years: The University of Wisconsin-Madison Arboretum, 1934-1984*, edited by William R. Jordan III (Madison: The University of Wisconsin, 1984), 20-21.
[10] University of Wisconsin-Madison Arboretum, "Ecological Communities and Horticultural Communities at the Arboretum," http://uwarboretum.org/about/communities_collections/ (retrieved 2 October 2014).
[11] Sachse, 30; and Franklin E. Court, *Pioneers of Ecological Restoration: The People and Legacy of the University of Wisconsin Arboretum*, (Madison: The University of Wisconsin Press, 2012), 90.
[12] Court, 90-92.

housed a laundry, showers and latrines. The Bath House is clad with wood shingles and displays regularly-distributed, wooden, six-pane hopper windows. A simple wooden door is set off-center on the west-facing façade. The original front door is still in place on the east-facing façade. Asphalt shingles cover the roof. A small, metal-and-glass greenhouse is appended to the south end of the building. A basement under the west wing houses the furnace.

The **Barracks** (AHI #229326) is a long, one-story, frame Front Gable building (photo 6). It faces southwest, is clad with wood shingles and sits on a fieldstone-pier foundation. This long, narrow building exhibits an entrance composed of a simple wooden door flanked by four-pane hopper windows. A board reading "TEACHING BARRACKS" appears over the door. Evenly-spaced hopper windows are found on the side-facing façades. The roof is surfaced with asphalt shingles.

The **Carpentry Workshop and Warehouse** (AHI #229327, now the Shop and Garage) is a long, one-story, frame Side Gable building finished with wood shingles, trimmed with corner boards and set on a concrete slab foundation (photo 7). A group of three garage doors are centered on the east-facing (front) façade. The entrance is located north of the garage doors and consists of a wood-and-glass door sheltered by a shed-roofed overdoor with knee braces. Wooden, six-pane hopper windows are irregularly-spaced on this façade. Asphalt shingles cover the roof. A broad, gabled vent stack perches on the ridge of the roof.

The one and one-half story, frame **Machine Shed** (AHI #229328) is Side Gable in form and faces east (photo 8). It is clad with wood shingles, trimmed with corner boards and rests on a concrete slab foundation. Five garage doors occupy the front façade. Wooden, six-pane hopper windows light the side and rear façades. A garage door and a paneled wooden door are also found on the rear façade. The roof is surfaced with asphalt shingles.

The small, one-story, frame **Tool Shed** (AHI #229329, now Seed Storage) is clad with wood shingles, trimmed with corner boards and set on concrete block piers (photo 9). The south-facing (front) façade is dominated by a centrally-placed, paneled wooden door. Wooden, six-pane hopper windows flank the door and light the other facades as well. The side gable roof is finished with asphalt shingles. Seeds are now stored in this building.

The **Nursery Pumphouse** (AHI #229330) is a small, one-story, frame, Side Gable building (photo 10). It exhibits a raised, poured concrete foundation, wood shingle finish, and asphalt-shingled roof. The entrance consists of a plain, wooden door, set off-center on the east-facing façade. A few tiny windows ventilate this building. Asphalt shingles cover the roof.

The **Root Cellar** (AHI #229331) is a tiny, frame, Front Gable building set into the hillside (photo 11). It is finished with wood shingles, trimmed with corner boards, sits on a concrete foundation and

displays an asphalt-shingled roof. A plain wooden door occupies the north-facing (front) façade. A board reading "ROOT CELLAR" appears above the door.

The **Main Pumphouse** (AHI #229332) faces west. It is a small, one-story, frame Front Gable building finished with wood shingles and resting on a concrete basement (photo 12). A paneled wooden door is centered on the west-facing (front) façade. A few wooden, six-pane hopper windows are found on the side facades. The roof is clad with asphalt shingles.

Contributing Structures

Seven contributing structures are located in the Arboretum: the Spring Trail Pond Entrance and Steps, the Spring Trail Pond Dam, the Stevens Pond Entrance and Walls, the Manitou Way Entrance and Walls, the Olbrich Entrance and Walls, the Gallistel Woods Shelter, and the Kenneth Jensen Wheeler Council Ring. All of these structures are Rustic in style.

The **Spring Trail Pond Entrance and Steps** (AHI #229333) and the **Spring Trail Pond Dam** (AHI #229334) were built ca. 1927 for Spring Trail Park, part of the Madison Realty Company's development of the Nakoma subdivision. Frank Lloyd Wright is reputed to have designed these structures.[13] This may be true, although the evidence to date attributing the design to Wright is circumstantial.[14] Franz Aust supervised their construction.[15] Five walls and two staircases, all interconnected, make up the entrance. The walls and steps are of rock-faced, sandstone ashlar (see photo 13). The staircases descend from street level, one on either side of the pond (photo 14). The dam is a two-part structure, also constructed of rock-faced, sandstone ashlar (photo 15).

The **Stevens Pond Entrance and Walls** (AHI #229335) consists of two low walls of rock-faced sandstone ashlar, erected in 1936 (photo 16).[16] The **Manitou Way Entrance and Walls** (AHI #229336) is also composed of two walls, which match those of the Stevens Pond Entrance in height, materials, finish and appearance (photo 17). All these resources were designed by Longenecker and built in 1936 or 1937.[17]

Gallistel designed the rock-faced, sandstone ashlar **Olbrich Memorial Entrance and Walls** (AHI #124606) at the Arboretum Seminole Highway entrance in 1937. The CCC completed its construction

[13] Sachse, 47.
[14] Mary Jane Hamilton, distinguished architectural historian and noted Wright scholar, personal communication, 17 January 2002.
[15] Court, 24.
[16] Sachse, 48.
[17] Court, 68-70.

in 1940. Longenecker designed the landscaping at the Olbrich Memorial Entrance.[18] A broad pier with a stepped silhouette anchors each wall and frames McCaffrey Drive as it runs easterly into the Arboretum (photo 18). Each wall is low and exhibits a stepped profile. A bronze plaque inset in the south wall pier (photo 19) dedicates the entrance to Olbrich and quotes him, THE UNIVERSITY ARBORETUM WILL BRING BACK INTO THE LIVES OF ALL SOMETHING OF THE GRACE, COLOR AND BEAUTY WHICH NATURE INTENDED ALL TO SHARE. The north wall zig-zags, turns the corner and runs easterly along Manitou Way for a distance of about 600 feet.

The **Gallistel Woods Shelter** (AHI #229360) was erected in 1937.[19] It was designed by Carl Riemenschneider (a stock plan for the National Park Service and the Wisconsin Department of Conservation), and built by the CCC under the supervision of Longenecker (Longenecker may have adapted the plan for the Arboretum). The shelter is constructed of rock-faced sandstone ashlar and capped with a side-gable roof (photo 20). In 1960, the northern end was shortened and the shelter was enclosed with windows and a door, creating a secure storage building.[20]

The **Kenneth Jensen Wheeler Council Ring** (AHI #82029) was constructed in 1938.[21] It was designed by Jens Jensen, the nationally-prominent landscape architect famed for his Prairie style creations. Wheeler was his grandson and had been a student of landscape architecture at the time of his death. A low wall of rock-faced limestone ashlar, unmortared, encircles a raised stone campfire platform (photo 21). Flagstones form a floor within the circle and create paths leading to the Council Ring from two directions. A naturalistic outcropping of unmortared limestone ashlar sits just outside the circle (photo 21, background). A bronze plaque attached to this outcropping reads, THIS COUNCIL RING IS DEDICATED BY HIS PARENTS TO THE EVERLASTING MEMORY OF KENNETH JENSEN WHEELER, CLASS OF 1938.

Non-Contributing Sites

The twelve non-contributing sites all predate the period of significance. Two are listed on the National Register: the Arboretum Woods Mound Group; and the Gallistel Woods Mound Group. The other ten are: five prehistoric and/or historic habitation sites; two mound group sites; one sunken barge site; one Euro-American cemetery, and one failed residential subdivision.

The **Arboretum Woods Mound Group** (ASI #47DA-152), an archaeological site constructed by effigy mound-building Native Americans sometime between 750 and 1000 C.E., is located in the area

[18] Sachse, 43.
[19] Riemenschneider, "Shelter," 16 September 1935, University of Wisconsin-Madison Arboretum Archives, Madison, Wisconsin; and Court, 68.
[20] *Arboretum News* 10 (January 1961): 2.
[21] Sachse, 48.

currently named Wingra Woods. This group is composed of 12 mounds and includes seven linear mounds, three dome shaped mounds, a bird effigy and a water spirit effigy mound. The Arboretum Woods Mound Group was listed on the National Register in 1984 (designated collectively with the Gallistel Woods Mound Group, under the name Charles E. Brown Indian Mounds).

The **Gallistel Woods Mound Group** (ASI #576) is also an archaeological site constructed by effigy mound-building Native Americans sometime between 750 and 1000 C.E. It consists of one dome shaped, two linear mounds, and one water spirit effigy mound. This group is located in the Gallistel Woods and was listed on the National Register in 1984 (designated collectively with the Arboretum Woods Mound Group, under the name Charles E. Brown Indian Mounds).

The five habitation sites will be described together, as there is very little information available about them. Three are pre-historic, and located in close proximity on the northwest edge of the Arboretum: **47DA-187**, adjacent to Monroe Street; **Old Spring Grove** (47DA-189), crossing Monroe Street near Manitou Way; and **Dudgeon** (47DA-1307), crossing Monroe Street near 47DA-187. One habitation site is both pre-historic and historic: **Big Spring** (47DA-1158), just south of Lake Wingra toward the north end of the Arboretum. The fifth is **White Clay Springs** (47DA-1423), a historic habitation site associated with the Ho-Chunk, just east of Big Spring.

Two other mound groups are found in the Arboretum. **Wingra Park Mound Group** (47DA-1192), crossing Monroe Street near 47DA-187 at the northwest edge of the Arboretum, dated from the late woodland period (750 to 1000 CE), but has no known mound features remaining. The **Vilas Mound Group** (47DA-590) retains one dome shaped and three linear mounds, dating from the woodland period.

The **Sunken Barges** site (47DA-1034) contains two barges likely dating from the early twentieth century, and is located just east of Lake Wingra in the northeastern section of the Arboretum. The **Bryant Cemetery** (47DA-1283) is a reported Euro-American cemetery with possible unmarked burials and lies near the railroad tracks north of the beltline highway on the eastern edge of the Arboretum. The **Lost City** site (47DA-1424) is the 1916 residential subdivision that failed in 1922. It is set in the eastern portion of the Arboretum, north of the beltline highway.

Non-Contributing Buildings

The four non-contributing buildings post-date the period of significance. They are the Arboretum Visitor Center, the Comfort Station, the Security Residence, and the Garage.

The **Arboretum Visitor Center** (AHI #229337) is a long, low, one-story Contemporary building set on a raised basement (photo 22). It is the westernmost among the cluster of buildings in the

Arboretum's administration and service area and commands a sweeping view of the surroundings. It is also the only building in the Arboretum that is very visible; the rest are sited unobtrusively. Originally erected in 1976-77, as the McKay Nature Awareness Center, it was enlarged and remodeled in 2001, in accordance with plans prepared by Tony Puttnam, of Taliesin Architects.[22] The influence of Frank Lloyd Wright is apparent in the building's horizontal emphasis, its siting on the hillside, its dominant and prow-like side gable roof, and its exterior finishes, which include rock-faced stone ashlar, stucco, and redwood-stained clapboards. The main entrance is offset on the south-facing façade, overlooking Curtis Prairie, and consists of a pair of metal-and-glass doors. Small awning windows light the office, meeting and storage areas. On the main floor, large picture windows provide a spectacular view. Solar shingles and asphalt shingles cover the roof. The solar shingles are composed of photovoltaic cells and produce electricity to power the building.

The **Comfort Station** (AHI #229338) is a small, frame Contemporary building erected in 1968.[23] It is finished with redwood-stained clapboards and sits on a concrete slab foundation (photo 23). The side-gabled roof is clad with asphalt shingles. A shed-roofed entrance porch with a single metal door is appended to each gable end. The Comfort Station is set down the hill and to the north of the Visitor Center at the west end of the Arboretum's cluster of buildings.

The **Security Residence** (AHI #229339) lies down the hill and just east of the Visitor Center. It is a low, one-story, shed-roofed, frame structure in the Contemporary mode (photo 24). It is clad with redwood-stained clapboards, rests on a concrete slab foundation and dates from 1968.[24] The Security Residence faces south. The south-facing façade features a door set off-center, paired and single 1/1 windows and two picture windows. A broad, shed-roofed dormer perches on the south slope of the asphalt-shingled roof.

The **Garage** (AHI #229340, now Maintenance) is a Side Gable building of concrete block on a concrete slab foundation (photo 25). It was built ca. 1965.[25] Two garage doors appear in the north-facing (front) façade. A smaller, side-gabled office section attaches to the west gable end. A door appears in the west gable end of the Garage proper and in the north-facing façade of the office section.

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[22] "New House on the Prairie," *Capital Times*, 30 August 2001, 2A.
[23] "U.W. Renews Request for Ice Arena," *Capital Times*, 7 May 1968, 32. Notes that final drawings for a security residence and restrooms in the Arboretum were approved by the Campus Planning Committee.
[24] "U.W. Renews Request for Ice Arena," *Capital Times*, 7 May 1968, 32. Notes that final drawings for a security residence and restrooms in the Arboretum were approved by the Campus Planning Committee.
[25] Gregory Armstrong, Director of the University of Wisconsin-Arboretum, personal communication, 23 January 2002.

Single-pane windows light the office. The roofs are surfaced with asphalt shingles. The Garage lies at the east end of the Arboretum's administration and service area.

Non-contributing Structures

The five non-contributing structures are the Utility Shelter, the Pergola, Margaret's Council Ring, the Visitor Center Council Ring, and the Longenecker Horticultural Gardens Entrance. All are non-contributing because they post-date the period of significance.

The **Utility Shelter** (AHI #229342) is a small, shed-roofed structure with slender metal posts, enclosed with chain-link fencing (photo 26). It appears to date from ca. 1983.

The **Pergola** (AHI #229343) is a semi-circular structure composed of pairs of round, concrete columns, supporting an open framework of wooden boards (photo 27). The ends of the boards are canted. The Pergola dates from 2001.

Margaret's Council Ring (AHI #229341) is located on the northern edge of the Curtis Prairie, south of the parking lot. It is a round, low, two-part structure of random, rock-faced sandstone ashlar, with a wide, rock-faced limestone cap (photo 28). This council ring was designed by Darrel Morrison, landscape architect and professor of landscape architecture at the University of Wisconsin-Madison until 1983. Margaret Van Alstyne, a former Arboretum guide, funded its construction in 1999.[26]

The **Visitor Center Council Ring** (AHI #229344) is a low, semi-circular wall of random, rock-faced ashlar with a broad stone cap (photo 29). Flagstones and a round hearth lie within the semi-circle. The Visitor Center Council Ring stands just northeast (to the rear) of the Arboretum Visitor Center. It dates from 2001, and was designed by landscape architect Darrel Morrison.

The **Longenecker Horticultural Gardens Entrance** (AHI #229345) is composed of a pair of walls of random rock-faced stone, set on a concrete foundation (photo 30). Each wall steps up toward the entrance, which features a gateway consisting of tall, square metal posts, surmounted by an arched metal cutout of trees. It was erected in July 2012.

ALTERATIONS

The first acreage the University of Wisconsin acquired for the Arboretum in 1932 included the former Charles Nelson farm. At that time, there were several farm buildings on the site, located in the vicinity of the Arboretum's present administration and service area. The farm buildings were removed in

[26] Court, 254.

1932-33, except for the barn. The barn served as the dining hall for a federal transient camp, in the Arboretum from October 1934 until August 1935. The barn continued as a dining hall, as well as the headquarters for National Park Service and U.S. Forest Service staff, as part of the CCC Camp until the spring of 1937, when the barn was destroyed by fire. Despite the fact that the barn was used briefly by those who were laboring to create the Arboretum, the barn's strongest association is with its earlier agricultural use. None of the farm buildings, were they extant today, would contribute to the significance of the Arboretum. Therefore, the loss of those buildings does not affect the historic character of the Arboretum or reduce its excellent integrity.

At its peak, the CCC camp had 28 buildings, all concentrated in what is now the Arboretum's administration and service area. These included a small office, a kitchen, a mess hall, officers' quarters, a canteen, two pumphouses, a root cellar, a paint shed, a bath house, ten barracks, a carpentry workshop and warehouse, a machine shop, a repair shed, a tool shed, an oil house, a blacksmith shop and two additional garages.[27] Only the bath house, the pumphouses, the root cellar, the carpentry workshop and warehouse, the machine shop, the tool shed and one barracks remain. However, CCC buildings were intended to be temporary, for the use of the men who helped build the roads, buildings and structures in the Arboretum during the Works Progress Administration (WPA) and the Public Works Administration (PWA). The loss of the majority of the CCC buildings does not diminish the excellent integrity of the Arboretum; the roads, buildings and structures that the CCC erected to serve the Arboretum were intended to be permanent and represent the CCC's contribution to its development. However, one of the resources the CCC built has been demolished: the Wingra Woods Shelter. A Rustic style structure of rock-faced sandstone ashlar construction similar to the Gallistel Woods Shelter, the Wingra Woods Shelter was severely altered in 1962, and later demolished. Fourteen buildings and structures erected by the CCC remain, outweighing the loss of the shelter, and leaving the integrity of the Arboretum undiminished.

Ten of the non-contributing resources represent alterations to the Arboretum since the end of the period of significance (1961). However, the form, natural materials and siting of three of the buildings, and three of the structures, show sensitivity to the environment and an intention on the part of the designers to make the buildings compatible with the historic character of the Arboretum. These are the Arboretum Visitor Center, the Comfort Station, the Security Residence, Margaret's Council Ring, the Arbor, the Visitor Center Council Ring, and the Longenecker Horticultural Gardens Entrance. The Garage and the Utility Shelter are not compatible with the Arboretum's historic character, but their location, down the hill from the Arboretum Visitors Center and behind the other contributing buildings, renders them unobtrusive. The twelve archaeological sites pre-date the period of significance, and are not related to the areas of significance. The non-contributing resources do not

[27] "Plat Showing Arboretum Buildings," 20 March 1944, Arboretum Archives, University of Wisconsin Arboretum, Madison, Wisconsin.

impair the excellent integrity of the Arboretum.

Contributing Resources	Date(s) of Construction
Arboretum (site)	1933-1961
Bath House	ca. 1935
Barracks	ca. 1934
Carpentry Workshop and Warehouse	ca. 1935
Machine Shed	ca. 1935
Tool Shed	ca. 1935
Nursery Pumphouse	ca. 1935
Root Cellar	ca. 1935
Main Pumphouse	ca. 1935
Spring Trail Pond Entrance and Steps	ca. 1927
Spring Trail Pond Dam	ca. 1927
Stevens Pond Entrance and Walls	1936
Manitou Way Entrance and Walls	1937
Olbrich Memorial Entrance and Walls	1937-1940
Gallistel Woods Shelter	1937
Kenneth Jensen Wheeler Council Ring	1938

Non-contributing Resources	Date(s) of Construction
Arboretum Woods Mound Group (NRHP)	750-1100
Gallistel Woods Mound Group (NRHP)	750-1100
47DA 187	pre-historic
Old Spring Grove	pre-historic
Dudgeon	pre-historic
Big Spring	pre-historic to historic
White Clay Springs	historic
Wingra Park Mound Group	750-1100
Vilas Mound Group	750-1100
Sunken Barges	early twentieth century
Bryant Cemetery	mid-nineteenth century
Lost City	1916-1922
Arboretum Visitor Center	1976/2001
Comfort Station	1968
Security Residence	1968
Garage	ca. 1965
Margaret's Council Ring	1999
Utility Shelter	ca. 1983
Pergola	2001

Visitor Center Council Ring 2001
Longenecker Horticultural Gardens Entrance 2012
End of Description of Physical Appearance

STATEMENT OF SIGNIFICANCE

The University of Wisconsin Arboretum is nationally significant under *Criterion A* in conservation. The Arboretum is the site of the first experiments in the ecological restoration of plant-animal communities in the world. The Arboretum also maintains the world's oldest collection of ecologically restored plant-animal communities. Research and experimentation carried out at the Arboretum beginning in 1934 pioneered and refined techniques and procedures for restoring and managing many different plant-animal communities from Wisconsin forests, prairies, and wetlands. These ecosystems are found not only in Wisconsin but in many areas across the country. Methods developed at the Arboretum have been disseminated through technical and popular journals, and through the academic and professional careers of the many graduates of the University of Wisconsin in conservation-related fields who have studied in the Arboretum. The plant-animal communities themselves have served as models, inspiring other ecological restoration projects (especially prairies), and have provided seeds to other arboreta and botanical gardens worldwide through the seed exchange program (from 1952 into the 1990s). Ecological restoration and ecologically restored plant-animal communities were slow to gain approval from conservationists, whose goals were erosion control and sustainable productivity of natural resources, and from preservationists, who sought to preserve pristine natural areas. However, the modern environmental movement of the late 1960s, with its dual aims of preserving natural areas and healing degraded land, brought ecological restoration into the mainstream in the 1970s such that it is now regarded as best practice in land management for both restored and natural landscapes. Governmental agencies employ ecological restoration to improve and maintain parks, recreational and natural areas. Ecological restoration is utilized for mitigation projects mandated by the National Environmental Policy Act of 1969 (NEPA) and similar federal and state legislation. Increasingly, ecological restoration is used to re-create native plant communities on small sites, from corporate properties, to school grounds, to back yards. The ecologically restored plant-animal communities at the Arboretum, and the research their development has generated, have provided a model and a proving ground for ecological restoration, making the Arboretum the catalyst for transforming ecological restoration into best practice in land management nationwide.

The resource that contributes to the national level of significance is the entire site, with the exception of the Arboretum and Gallistel woods mound groups (NRHP), the four-acre Marion Dunn and five-acre Overlook prairies (which post-date 1961), the horticultural plantings (Longenecker Gardens, Stevens Pond and Aquatic Garden, the Viburnum Garden, and the Native Plant Garden). The period of significance at the national level begins in 1934, when G. William Longenecker, executive director, and Aldo Leopold, research director, initiated ecological restoration in the Wingra and Gallistel woods, guided by the Arboretum Committee, most notably Franz Aust and Norman C. Fassett. Ecological restoration of the Curtis Prairie and the Gardner Marsh soon followed. The period of significance

extends through 1961, when John T. Curtis, research coordinator from 1941-1961, passed away. The Arboretum retains a high degree of integrity to its national period of significance.

The Arboretum is also significant at the local level under *Criterion C* in architecture for its fine collection of Rustic style structures and buildings. The Spring Trail Pond Entrance and Walls (ca. 1927), the Spring Trail Dam (ca. 1927), the Stevens Pond Entrance and Walls (1936), the Manitou Way Entrance and Walls (1937), the Olbrich Memorial Entrance and Walls (1937-40), the Gallistel Woods Shelter, and the Kenneth Jensen Wheeler Council Ring (1938) comprise a fine and intact collection of seven Rustic style structures. The Bath House (ca. 1935), Barracks (ca. 1934), Carpentry Workshop and Warehouse (ca. 1935), Machine Shed (ca. 1935), Tool Shed (ca. 1935), Nursery Pumphouse (ca. 1935), Root Cellar (ca. 1935), and Main Pumphouse (ca. 1935) form a good and intact grouping of eight Rustic style buildings. None are sufficiently distinguished to be individually eligible, but together contribute to the architectural significance of the Arboretum. The designer of the Spring Trail Pond resources has not been positively identified. Longenecker designed the Stevens Pond Entrance and Walls, and the Manitou Way Entrance and Walls, while Albert F. Gallistel designed the Olbrich Memorial Entrance and Walls. Longenecker's and Gallistel's designs were constructed by the CCC. Nationally-prominent landscape architect Jens Jensen designed the council ring that commemorates the life of his grandson, Kenneth Jensen Wheeler. Seven of the eight buildings were erected by the CCC; their designers are unknown. The integrity of these resources ranges from good to excellent. The period of significance for architecture coincides with the construction dates of the: ca. 1927 through 1940.

HISTORICAL CONTEXT

The context in which ecological restoration evolved first derives from two related movements originating in the mid-nineteenth century: early environmentalism, which called for setting aside natural areas; and the naturalistic mode of landscape design, intended to simulate the appearance of nature. The science of modern ecology, which studies the interdependence of living organisms and their environment, began to gain attention in the U.S. in the 1890s, and would influence early environmentalists and landscape architects in the twentieth century. Early environmentalists, landscape architects, ecologists and scientists in related biological fields would collaborate to establish the Arboretum as a laboratory of ecological restoration. The modern environmentalist movement, launched in the late 1960s, would bring ecological restoration into the mainstream such as best practice in land management for both natural and ecologically restored landscapes.

Early Environmentalism

In the U.S. in the mid-nineteenth century, there was growing public appreciation for the wilderness, a sense of the beauty of nature, and its beneficial effects on the mind and the spirit. This sprang from

the romantic movement in literature, as illustrated by James Fennimore Cooper (*The Last of the Mohicans*, 1826), and by writings equating nature with the divine from transcendentalist authors such as Ralph Waldo Emerson ("Nature," 1836), and Henry David Thoreau (*Walden*, 1854), and was amplified by the work of landscape architects Andrew Jackson Downing, and Frederick Law Olmsted. During the same period came a realization that human activities, especially the clearing of forests, were having a catastrophic impact on the environment. This stemmed from the work of naturalists such as John James Audubon and Charles Darwin, and most notably, George Perkins Marsh (*Man and Nature*, 1864). These currents launched the early environmental movement and initially prompted the same response: to set aside some areas of wilderness and forest as state and federal preserves. However, there was disagreement among early environmentalists about the purpose of reserving lands: preservationists, represented by John Muir, contended that the wilderness is sacred, and should remain untouched for the enjoyment of the public; and conservationists, represented by Gifford Pinchot, argued for the responsible stewardship of the wilderness, and the sustainable use of its natural resources, for the public good. The battle between preservationists and conservationists over the proposal to dam the Hetch Hetchy Valley in Yosemite National Park between 1901 and 1913 deeply divided the early environmental movement. Preservationists would continue to guide the parks, while conservationists would guide public forests, until modern environmentalism reconciled them in the late twentieth century.

Early Environmentalists Preserve the Wilderness: National and State Parks

The efforts of Euro-Americans who believed that some areas of wilderness are so beautiful and awe-inspiring that they should be not be privately owned, but rather should be preserved for the public to enjoy, gave rise to state and national parks. Romantic, fantastic accounts and images of wilderness areas in the western U.S. captured the public's imagination and built support for legislative action to create these parks. The experience of Yosemite illustrates this. In 1855, James Mason Hutchings wrote the first newspaper article about the Yosemite Valley; the first sketch of Yosemite Falls was published the same year. Charles Leander Weed became the first to photograph the Yosemite Valley in 1859. Hutchings published Weed's photographs in his *California Magazine* in 1859-60, and as a book, *Scenes of Wonder and Curiosity in California*, in 1862 (reprinted through the 1870s). These works not only inspired public interest in natural areas, but also, as Hutchings had hoped, drew visitors and commercial development. Thomas Starr King, a distinguished author of several books on landscapes, visited in 1860 and was alarmed by the impact of development on the Yosemite Valley. Publishing descriptions of his travels and his concerns in the *Boston Evening Transcript* in 1860 and 1861, King became one of the first to argue that Yosemite Valley should be made a public park. Another prominent person familiar with the grandeur of the Yosemite Valley was landscape architect Frederick Law Olmsted, co-designer of the nation's first municipal public park, New York's Central Park. Olmsted was serving as superintendent of the lands the Mariposa Mining Company held nearby. King and Olmsted, and others, pressured the U.S. Congress into ceding the Yosemite Valley and

Mariposa Grove (of Sequoia trees) to California as the nation's first state park in 1864. The eloquent and prolific articles and scientific essays of John Muir, who first came to the Yosemite Valley in 1868, describing the spiritual quality and unique beauty of this pristine natural area would lead to its designation as Yosemite, Sequoia, and General Grant national parks in 1890. In 1872, the first national park in the U.S. had been created: Yellowstone National Park. A series of Euro-American explorers and mountain men had told incredible stories about the geysers, canyons and waterfalls of the Yellowstone River valley beginning with John Colter (a member of the Lewis and Clark expedition) in 1807-10, but the tales were dismissed as fantasy. Expeditions in 1870 and 1871 along the Yellowstone River to Yellowstone Lake, and through the geyser basin, generated a report and a scientific survey that helped convince Congress to preserve the area. On March 1, 1872, Congress enacted legislation creating Yellowstone National Park, "as a public park or pleasure-ground for the benefit and enjoyment of the people," administered by the Secretary of the Interior.[28]

In the early years of state and national parks, no one knew how to protect and manage these large tracts of wilderness. At first it was thought that merely setting aside these areas would preserve their scenic qualities,[29] and that leasing land within the parks for hotels and other services for visitors would generate sufficient income to maintain and improve them. The Yosemite Valley State Park, for example, encompassed over 56 square miles. The act that ceded the property mandated that the governor of California and an eight-member unpaid board of commissioners manage the land. Governor Fredrick F. Low appointed Frederick Law Olmsted to the board, and he served as chair. The board decided to employ one of their members as the "guardian" of the park. The responsibilities of the guardian included patrolling and protecting the park; constructing trails, bridges, and roads; granting and administering leases for improvements; and using the income from the leases to carry out improvements. The guardian's lack of authority and limited resources, exacerbated by the vast size of the park, made it impossible to prevent visitors from damaging the environment.[30]

The board also asked Olmsted to make recommendations on the management of Yosemite Valley State Park. Although the California legislature did not publish Olmsted's 1865 report, two of his

[28] Norman T. Newton, *Design on the Land: The Development of Landscape Architecture*, (Cambridge, Massachusetts: The Belknap Press of Harvard University Press, 1971), 274-75, 517-523; Linda Wedel Greene, *Yosemite: the Park and its Resources; a History of the Discovery, Management, and Physical Development of Yosemite National Park, California,* (Denver, Colorado: National Park Service, 1987), 1:72-74, 87; and National Park Service, "History," http://www.nps.gov/aboutus/history.htm (retrieved 28 July 2014).

[29] Preservation of scenery, rather than the ecosystem, was the goal, and the boundaries were set without consideration for the ecology of the area.

[30] Greene, I: 87-89.

recommendations did become policy for state and national parks. Olmsted recommended that the natural scenery be preserved and maintained as exactly as was possible, with regulations to prevent visitors from damaging or destroying the scenery; and that the park be made accessible to all, with roads to the park, trails to the most scenic places within the park, and sites for camping.[31]

Yellowstone National Park did not fare any better in its early years. The government provided no funds for the park, beyond the income from leases the Secretary of the Interior could award, until 1878, and then the annual allowance was small. The superintendent had no employees, and no power to impose penalties on those who violated park regulations. Slaughter and poaching of the wildlife as well as the vandalism of natural features were constant issues, until Congress authorized the U.S. Army to control the park, which it did beginning in 1886. Military management of Yellowstone National Park was successful, and the Army would continue to administer the national parks until the National Park Service (NPS) was formed in 1916.[32]

Throughout the period prior to the formation of the NPS, the national parks were under pressure from those who wanted to use their resources for private gain, especially timber, water, and minerals. Legislators representing these interests nearly succeeded in abolishing Yellowstone as a national park in the 1890s. However, the battle that fractured early environmentalists into preservationists and conservationists would rise from conflict over the use of national park resources for the public good: the Hetch Hetchy Dam controversy. John Muir and the preservationists opposed construction of the dam, while conservationists, led by Gifford Pinchot, supported it.[33]

Early Environmentalists Conserve the Forests: Science and Responsible Stewardship
In 1864, George Perkins Marsh published *Man and Nature*, becoming the first in the U.S. to assert that humanity and the environment are interdependent, that human activity could have a destructive impact on the environment, and that humans bear the responsibility for repairing the damage they cause. Marsh believed that forests were essential to a livable, productive environment. In *Man and Nature*, he described his observations of the effects of deforestation, outlined European scientific theories on the relationship between forests and floods, water supply, and climate, and promoted European reforestation and forest management techniques. Reprinted several times through the 1860s, and

[31] *The Yosemite Guide-Book*, (1870), quoted in Linda Wedel Greene, *Yosemite: the Park and its Resources; a History of the Discovery, Management, and Physical Development of Yosemite National Park, California*, (Denver, Colorado: National Park Service, 1987), I: 88.
[32] Newton, 275, 521; Greene, I: 88 and I: 212.
[33] Newton, 591; Green, I: 233.

revised in 1874, no other work had greater influence on nineteenth century scientific thinking about forests (and waterways) in the U.S.[34]

George P. Marsh (1801-1882) was a keen observer of the natural world, first noticing in his youth that the clear cutting of the forests on the slopes of Mount Tom, the site of his family's Vermont farm, had caused erosion. This had had stripped the topsoil, leaving farm fields barren, and dumped silt in the streams, making water transport difficult and destroying fish habitat. In the 1850s, Marsh traveled extensively in the Middle East and the Mediterranean, noticing that where ancient civilizations had once flourished, deforestation had "brought the face of the earth to a desolation almost as complete as that of the moon."[35] He called this "desertification," and declared the process irreversible once the tipping point was reached. Marsh warned that the U.S. would also vanish and its lands become uninhabitable unless a certain portion of woodlands could be preserved, and damaged lands reforested. Marsh did not oppose the use of forest products, but rather, encouraged that they be used judiciously.[36]

Marsh recommended erosion control practices he had seen in Italy, such as planting vegetation on mountainsides to reduce flooding, and reforestation.[37] Reforestation and forest management ("forestry") had developed in France and Germany as well, beginning in the late eighteenth century, not only for erosion and flood control, but also to ensure sufficient lumber for commercial use.[38] Marsh's belief, and that of European scientists, on the importance of forests was soon widely accepted among American scientists, and much of the public. An editorial that appeared in *Scientific American* in 1875 attests to this:

> We are beginning to learn…that, so far from being incompatible with forests, permanent civilization is impossible without them, that the tree slayer's ambition to bring the whole land under tillage would result, if successful, in making tillage a waste of labor through climatic disturbances. Alternations of drought and deluge, blighting heats and blasting colds, have ever

[34] Marcus Hall, *Earth Repair: A Transatlantic History of Environmental Restoration*, (Charlottesville, Virginia: University of Virginia, 2005), 6-9; Herbert A. Smith, "The Early Forestry Movement in the United Stated," *Agricultural History* 12, no. 4 (October 1938): 328-29 and 340-41; Donald J. Pisani, "Forests and Reclamation, 1891-1911," *The Origins of the National Forests: A Centennial Symposium*, http://www.foresthistory.org/Publications/Books/Origins_National_Forests/sec16.htm (retrieved July 29, 2014).
[35] George P. Marsh, *Man and Nature*, (1864; repr., Seattle: University of Washington Press, 2003), 44.
[36] Marsh, 35; and Pisani.
[37] Hall, 6-8.
[38] Indra Munshi Saldanha, "Colonialism and Professionalism: A German Forester in India," *Economic and Political Weekly* 31, no. 21 (May 25, 1996): 1265-1266.

> been the penalty for general forest destruction; and many a land once fertile is now desert for this cause alone. Indeed woodlands are to climate what the balance wheel is to machinery, the great conservator and regulator, without which all other conditions are wasted.[39]

Marsh's work inspired the scientific study of trees and forests, as well as state and federal legislation to promote tree planting, forest preservation and forest management. Colleges and universities, especially land-grant institutions, began offering courses in forestry in the early 1870s, looking to Germany, in particular, where forest science was particularly advanced.[40] This coincided with the growing adoption of the German university model, especially at Midwestern state institutions, notably the universities of Michigan, Iowa, Minnesota and Wisconsin. The German model was characterized by scholarly, scientific inquiry, and its adoption prompted diversification in scientific fields in education and research. Several fields were closely related to forestry, such as geology, mineralogy, hydrology, and soil science.[41] Pioneering research and instruction in these fields would be carried out at the University of Wisconsin by men such as Thomas C. Chamberlin (glacial geology), Charles R. Van Hise (structural and metamorphic geology), Franklin H. King (soil physics, irrigation, and groundwater), and Daniel W. Mead (hydrology and hydraulic engineering). Van Hise would also write the first textbook in conservation (1910).[42]

Another manifestation of Marsh's influence on the scientific study of trees and forests in the U.S. was an added impetus to the establishment of arboreta. An arboretum is defined as a place where a variety of trees and shrubs are grown for scientific research, display and education. It is similar to a botanic garden, which is a collection of plants cultivated for the same purposes. The idea of such collections, privately owned and typically featuring exotic species, has a long history, dating back at least to Ancient Egypt. The term, "arboretum," dates only to the late eighteenth or early nineteenth century, and in the U.S. of the mid-nineteenth century, a distinguishing characteristic of both arboreta and

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[39] "Waste Land and Forest Culture," *Scientific American* 32 (13 March 1875): 161, quoted in Donald J. Pisani, "Forests and Reclamation, 1891-1911," *The Origins of the National Forests: A Centennial Symposium*, http://www.foresthistory.org/Publications/Books/Origins_National_Forests/sec16.htm (retrieved July 29, 2014). Pisani notes that similar editorials and essays appeared in other scientific and popular journals, such as *North American Review* (1879), and *Harper's New Monthly Magazine* (1882).

[40] There would be no "school of forestry" in the U.S. until 1898.

[41] Frederick Rudolph, *The American College and University: A History*, (New York: Alfred A. Knopf, 1968), 271-72.

[42] Sturgis W. Bailey, ed., *The History of Geology and Geophysics at the University of Wisconsin-Madison, 1848-1980*, (Madison: Department of Geology and Geophysics, 1980), 25-31; and *Perspectives of a University*, (Madison: University of Wisconsin-Madison, 1980).

botanic gardens was that they be open to the public. The earliest initiatives to create arboreta (and botanic gardens) in the U.S. came from landscape architects. Andrew Jackson Downing was the first to propose an arboretum (which he termed, a "public museum of living trees and shrubs") and a botanic garden for the public, in his plan for the National Mall in Washington, D.C. in 1851. Downing was influenced by the English landscape gardeners, Humphry Repton, who included an arboretum in his designs as early as 1804, and John Claudius Loudon, who had popularized the inclusion of arboreta and botanic gardens in plans for large estates and parks (all of them privately owned). Downing's proposal was only partially implemented (and did not include either an arboretum or a botanic garden), due to lack of funding, and his death in 1852.[43]

When arboreta began to be planted in the U.S., they were designed by landscape architects in collaboration with scientists, and were typically associated with a university, or represented a partnership between private and public institutions. The first was the 1879 Arnold Arboretum, laid out by Frederick Law Olmsted in cooperation with dendrologist and botanist Charles Sprague Sargent.[44] Sargent, who quoted Marsh's "admirable book" in his own 1875 report on tree planting,[45] was the first director of the Arnold Arboretum, serving for over 50 years.[46]

State legislatures also answered Marsh's plea to plant trees and protect forests. Between 1869 and 1872, many Midwestern states awarded tax exemptions to property owners who planted trees on prairie lands, among them Minnesota, Iowa, Wisconsin, Missouri, Dakota, Nebraska, and Kansas. This measure was based on the common misconception, inferred from Marsh, that foresting the plains would improve the climate, increase rainfall, and make farming the grasslands possible. The first federal legislation to address forests, the Timber Culture Act of 1873, would perpetuate this misconception, granting ownership of 160 acres on the Great Plains to any homesteader who would

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[43] Paul A. Elliott, Charles Watkins, and Stephen Daniels, *The British Arboretum: Trees, Science and Culture in the Nineteenth Century* (London: Pickering & Chatto Ltd, 2011), 3-7; and "Downing's Plan for the Mall," *Histories of the National Mall*, http://mallhistory.org/items/show/356 (retrieved 1 August 2014).

[44] Albert Fein, *Frederick Law Olmsted and the American Environmental Tradition*, (New York: George Braziller, 1972), 31 and figure 41 (no page number); and Botanic Gardens Conservation International, "The History of Botanic Gardens," http://www.bgci.org/resources/history/ (retrieved 4 August 2014).

[45] C.S. Sargent, *A Few Suggestions on Tree Planting*, Report to the Massachusetts State Board of Agriculture of Massachusetts, 1875, 7. http://bookdome.com/gardening/Suggestions-Tree-Planting/#.VEQEROfGI0w (retrieved 4 August 2014).

[46] Harvard University, "The Arnold Arboretum of Harvard University, Our History," http://arboretum.harvard.edu/about/our-history/ (retrieved July 29, 2014).

plant 40 acres of trees, no more than 12 feet apart, and maintain them in healthy condition for ten years.[47]

A number of states conducted surveys of forests, and formed forestry commissions or bureaus, generally within their state department of agriculture, in the 1860s and 1870s. Wisconsin established one of the first forestry commissions in 1867, probably due to the influence of Increase Lapham. Lapham, who is considered the founder of the conservation movement in Wisconsin, had been lobbying the legislature to fund a natural history survey of the state since 1855, and warned about the loss of forests in *Report on the Disastrous Effects of the Destruction of Forest Trees, Now Going on So Rapidly in the State of Wisconsin* (1867). Although the legislature approved a 760-square mile state forest in northern Wisconsin in 1878, the effort failed and most of the land had been sold to lumber interests by 1897. The first successful state forest preserve was established in New York in 1885, in the Adirondack and Catskill mountains, known as the Adirondack Forest Preserve.[48]

At the federal level, the U.S. Department of Agriculture (USDA), created in 1862, was the first agency to focus on forest issues. Frederick Starr Jr., in his 1865 *Report of the Commissioner of Agriculture*, enumerated the waste and consumption of forests in the U.S. He quoted Marsh at length and advocated establishing "…extensive, protracted and scientific experiments in the propagation and cultivation of forest trees…"[49] Starr further advocated establishing arboreta and botanical gardens, in connection with colleges of agriculture, and highlighted the example of the Missouri Botanical Garden in St. Louis (the oldest in the U.S., and a National Historic Landmark), founded by philanthropist Harry Shaw in 1859, yet open to the public.[50]

Although Starr had immediately embraced Marsh, Congress was not so quick to take action. Following the Timber Culture Act of 1873, it was not until 1876 that Congress authorized an appropriation to finance forestry initiatives. This funded Franklin B. Hough's exhaustive 1877 survey on the forests of the U.S., which would lead to the creation of the Division of Forestry of the USDA in 1881. Hough, the division's first chief, and Carl Schurz (born in Germany and familiar with German

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[47] Smith, 340-41; and Eliot Zimmerman, *A Historical Summary of State and Private Forestry in the U.S. Forest Service*, (Washington, D.C.: U.S. Department of Agriculture, 1976), 3. This persistence of this belief would contribute to the catastrophic environmental disaster known as "the Dust Bowl."
[48] Smith, 334-46; and Wisconsin Historical Society, "The Conservation Movement," http://www.wisconsinhistory.org/turningpoints/tp-033/?action=more_essay (retrieved 11 October 2014).
[49] Frederick Starr, Jr., *Report of the Commissioner of Agriculture*, (Washington, D.C.: Government Printing Office, 1866), 218.
[50] Starr, 220-26.

forestry practices), then U.S. Secretary of the Interior, advocated that the federal government should reserve timberlands, and regulate their use to ensure their continued productivity.[51] Bernhard E. Fernow, trained in forestry in his native Germany, served as chief of the Division of Forestry from 1886 until 1898, providing information to states and private owners on forest management practices, while continuing to press for federal ownership and management of timberlands. This idea was slow to gain traction, but was eventually codified in the Forest Reserve Act of 1891, which allowed the president to set aside publicly-owned lands as forest preserves to protect valuable timber from unlawful use, to prevent the cutting of timber in locations where its loss would increase the risk of flooding, and to preserve the wildlife and scenic beauty of natural areas. The first forest reserve created, the Yellowstone National Park Timber Land Reserve, adjacent to the national park, reflected all of these considerations. President Benjamin Harrison had designated 15 forest reserves, with 13 million acres, by the end of his term in the spring of 1893, all west of the Mississippi River. There were no provisions for protecting the reserves, which were placed under the administration of the Secretary of the Interior, until the enactment of the Forest Management Act of 1897. The Secretary of the Interior tried unsuccessfully to prevent logging and livestock grazing in the reserves; the Forest Management Act permitted these activities, as well as mining, but prescribed regulations for controlling them.[52]

During the nineteenth century, private groups and individuals took steps to protect forests and plant trees, as well. Many of these efforts were small scale, or of short duration. Several had far-reaching and long-term effects. In 1875, a group of citizens in Chicago, led by John Aston Warder, a physician and horticulturist, formed the first national conservation organization, the American Forestry Association in Chicago in 1875. Their goal was to "protect the existing forests of the country from unnecessary waste."[53] The group was a model for other citizen action organizations, such as the Sierra Club (1892), and became influential in promoting forestry legislation, counting over 20,000 members nationwide by the early twentieth century. The Minnesota State Forestry Association (1876) was the first of many similar state organizations, which labored for the passage of conservation laws to protect timberlands within their borders.[54]

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[51] Smith, 336, and 341.
[52] Hall, 7-9, and 134; and James Muhn, "Early Administration of the Forest Reserve Act: Interior Department and General Land Office Policies, 1891-1897," *The Origin of the National Forests: A Centennial Symposium*, http://www.foresthistory.org/Publications/Books/Origins_National_Forests/sec17.htm (retrieved 28 July 2014).
[53] American Forests, "History," http://www.americanforests.org/who-we-are-about-us/who-we-are-history/ (retrieved 5 August 2014).
[54] Zimmerman, 3-4.

J. Sterling Morton represents another significant private endeavor in tree planting: Arbor Day. Morton (1832-1902), born in New York and raised in Michigan, homesteaded in Nebraska territory in 1854. He served in the Nebraska territorial legislature (1855-56), and then Secretary of Nebraska Territory (1858-61). Through his political activities and as editor of the *Nebraska City News*, Morton promoted scientific techniques in farming and forestry. A firm believer in the potential of forests to transform the Great Plains of Nebraska into productive farmland, and that citizens should take responsibility for conservation, Morton organized the first Arbor Day in the U.S. in Nebraska in April 1872. Over one million trees were planted in the state that day. The success of the first Arbor Day was a factor in convincing Congress to adopt the Timber Culture Act of 1873, and the event was observed annually in Nebraska beginning in 1874. The Nebraska legislature chose April 22, Morton's birthday, as Arbor Day in 1885. Arbor Day gradually spread to every state in the nation. Morton's efforts gained the attention of President Grover Cleveland, who appointed him Secretary of Agriculture (1893-1897), in which post he advocated for the Forest Management Act of 1897. His son, Joy Morton, founder of the Morton Salt Company, would establish the Morton Arboretum in Lisle, Illinois in 1922.[55]

George W. Vanderbilt would accelerate the development of forestry in the U.S. in several ways at his Biltmore Estate in North Carolina. In 1888, the wealthy industrialist engaged Frederick Law Olmsted to plan the grounds of the new home he would build near Asheville, North Carolina. Vanderbilt wanted the grounds to be pleasant yet income producing. Olmsted recommended "forest plantations…kept and managed as a commercial forest."[56] Olmsted also advised creating an arboretum, for public education in science and landscape design. Vanderbilt accepted both suggestions, and enlarged the estate to 120,000 acres. Today, these resources are publicly owned, as a part of the Pisgah National Forest, and the North Carolina Arboretum; the first school of forestry in the U.S. would also be established on the Biltmore Estate (1898-1909).[57] Vanderbilt also took another suggestion from Olmsted, that he employ Gifford Pinchot, the son of Olmsted's friend, James Pinchot, as the Biltmore forester. Pinchot was the first American-born professional forester in the U.S., and would be a key figure in the conservation movement. Pinchot's work at the Biltmore Estate would garner him national attention.[58]

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[55] Byron Anderson, "Biographical Portrait: Julius Sterling Morton," *Forest History Today*, (Fall 2000): 31-33, http://www.foresthistory.org/publications/fht/fhtfall2000/morton.pdf (retrieved 5 August 2014).
[56] Quoted in Albert Fein, *Frederick Law Olmsted and the American Environmental Tradition*, (New York: George Braziller, 1972), 56.
[57] The Biltmore School of Forestry opened only weeks before the New York State College of Forestry at Cornell University in Ithaca, New York.
[58] M. Nelson McGeary, *Gifford Pinchot: Forester—Politician*, (Princeton, New Jersey: Princeton University Press, 1960), 19; and Gifford Pinchot, *Breaking New Ground*, (Washington, D.C.: Island

Gifford Pinchot (1865-1946) was born to a well-to-do Connecticut family. James Pinchot encouraged his son to become a forester, a profession which did not yet exist in the U.S. at that time. His parents presented Pinchot with a copy of the latest version of George P. Marsh's book, *Man and Nature*, for his twenty-first birthday.[59] Pinchot attended Yale University, and upon graduating in 1889, went to Europe, as there was as yet no forestry school in the U.S. Pinchot visited famed German forester and botanist, Dietrich Brandis (1824-1908), who had developed a system of scientific forest management for the British colonial government in India and Myanmar. Brandis urged Pinchot to attend *L'Ecole Nationale Forestiere*, at Nancy. Pinchot did study in Nancy, returning to the U.S. in 1890. He worked briefly as a forest surveyor, lecturing and writing about how European forest management could be applied in the U.S., until Vanderbilt tapped him to be the Biltmore forester in 1892.[60] About half the land Olmsted and Vanderbilt had selected for forestation was partially-cut woodland, and half was overgrazed farmland. Pinchot prepared a comprehensive plan for managing the forest, the first ever prepared in the U.S. Pinchot's plan included measures for replanting, cutting, selective thinning to improve tree growth, and fire suppression. In his three years on the Biltmore Estate, Pinchot demonstrated that it was possible "to pay the owner while improving the forest."[61]

Pinchot's work attracted national attention and became a model for managing forests as renewable resources; it was also the first large-scale, scientific reforestation project in the country. Pinchot publicized his approach in *Biltmore Forest: An Account of Its Treatment, and the Result of the First Year's Work*, (published in 1893, and exhibited at the 1893 Chicago World Columbian Exposition), and garnered forestry consultant contracts from several states and private companies in the early 1890s. It should be noted that his restoration of woodlands did not recreate the same mix or varieties of trees that had been present before Euro-American settlement, but rather was a "more [economically] valuable mixture of species and a…more uniform forest."[62] Some twenty species of trees, half of them American, were raised in the Biltmore nursery for planting. Pinchot also supervised the planting of the Biltmore Arboretum, mostly composed of exotic trees and shrubs, placed along a five-mile roadway winding through the estate.[63]

Press, 1947), 49.
[59] Pinchot, 29; Char Miller, *Gifford Pinchot and the Making of Modern Environmentalism*, (Washington, D.C.: Island Press, 2001), 55.
[60] Saldanha, 1268-1271; Pinchot, 9; George A. Cevasco, Richard P. Hammond, eds., *Modern American Environmentalists: A Biographical Encyclopedia*, (Baltimore: Johns Hopkins University Press, 2009), 390; and Miller, 102.
[61] Pinchot, 49.
[62] Pinchot, 51.
[63] Cevasco and Hammond, 390-91; John M. Meyer, "Gifford Pinchot, John Muir, and the Boundaries

In 1896, the National Academy of Sciences (Academy) convened the National Forest Commission to develop recommendations for managing federal forest reserves, and for establishing additional preserves in the western U.S. Pinchot was the only person appointed to the seven-member body who was not a member of the Academy. The commission identified 21 million acres of new forest reserves, which outgoing President Grover Cleveland designated in 1897. Pinchot wanted the commission to state that the natural resources in the new reserves were created, would not "be taken out of circulation and locked up."[64] A majority of the commission, including Arnold Arboretum Director Charles S. Sargent and ex-officio member John Muir, opposed the statement.[65]

However, Pinchot's views did find favor with the federal government and in 1898 he was appointed chief of the Division of Forestry. Pinchot systematically built the division's personnel and budget, securing bureau status for the division in 1901. He fought to have forest reserves transferred to the USDA from the Department of the Interior, so that the Bureau of Forestry could manage all the federal forests. He defined forestry as, "the practical knowledge of how to use the forest and range without destroying them."[66] Under the presidential administration of his friend and fellow Progressive, Theodore Roosevelt, Pinchot accomplished his goal in early 1905. At the same time, the Bureau of Forestry became the U.S. Forest Service (USFS); in 1907, the reserves were renamed national forests. Pinchot applied Progressive ideals to the USFS bureaucracy, establishing a corps of professionally-trained forest rangers, and a scientific management system for the national forests, setting a pattern the USFS has followed since. He outlined the practices and procedures in *The Use Book* (1906).[67] As the title reflects, the efficient use of the nation's forests for all citizens (reflecting another Progressive tenet: promoting and serving democracy) was paramount for Pinchot, as the first sentence in *The Use Book* illustrates. "Forest reserves are for the purpose of preserving a perpetual supply of timber for

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of Politics in American Thought," *Polity* 30, no. 2 (Winter, 1997): 269; Pinchot, *Breaking New Ground*, 49-55; and Gifford Pinchot, *Biltmore Forest: An Account of Its Treatment, and the Result of the First Year's Work*, (Chicago: n.p., 1893), 48-49, North Carolina State University Library, http://www.lib.ncsu.edu/specialcollections/forestry/schenck/series_v/gfi/PinBilt.html (retrieved 28 July 2014).

[64] Pinchot, *Breaking New Ground*, 105-06.

[65] Meyer, 269.

[66] Pinchot, *Breaking New Ground*, 506.

[67] Cevasco and Hammond, 391-92; Meyer, 270-72; Pinchot, *Breaking New Ground*, 322-26, and 506; and U.S. Forest Service, "The Beginning Era of Concern about Natural Resources, 1873-1905," http://www.foresthistory.org/ASPNET/Publications/first_century/sec1.htm (retrieved 30 July 2014).

home industries, preventing the destruction of the forest cover which regulates the flow of streams, and protecting local residents from unfair competition in the use of forest and range."[68]

In 1910, President William Howard Taft fired Pinchot, as the result of a dispute between Pinchot and Taft's Secretary of the Interior, Richard Ballinger.[69] Pinchot continued to write and lobby for utilitarian conservationist land use policies, and served Pennsylvania as state forest commissioner (1920-1922) and later as governor (1922-1928 and 1931-1935).[70] Under Pinchot's direction, the national forests and the USFS expanded rapidly. There were 60 forest reserves, accounting for 56 million acres, in 1905. In 1910, the number of national forests had risen to 150, encompassing 172 million acres. The idea and the goal of the "conservation" of all natural resources, not only forests, in the sense of their wise ("conservative") use, also became widely accepted during Pinchot's tenure. Pinchot claimed to have coined the term, "conservation," and wrote, "Conservation means the greatest good to the greatest number for the longest time."[71]

Although Pinchot acknowledged feeling pleasure and awe at the beauty of scenic wilderness, such as the Grand Canyon, aesthetic and intrinsic values did not enter into Pinchot's economic cost and benefit analysis for determining the "greatest good," as some historians have pointed out.[72] The pivotal environmental issue of the Progressive Era illustrates this and highlights the differences between preservation and conservation during the time: the proposal to dam the Tuolumne River in Hetch Hetchy Valley to supply water to the city of San Francisco. The positions advocated by John Muir (representing preservation) and Gifford Pinchot (representing conservation) in the course of this battle would be carried forward in the land management policy of the national parks (preservation) and the national forests (conservation), and prompt the formation of the NPS.

In 1901, and again in 1903 and 1905, the mayor of San Francisco applied for a permit to dam the Hetch Hetchy Valley in Yosemite National Park. Because of the valley was located in a national park, the secretary of the interior repeatedly denied the request. The devastating 1906 San Francisco earthquake and fire brought urgency and renewed energy to the city's campaign, and city leaders successfully petitioned for their permit application to be re-opened in 1907. Six years of contentious argument followed. John Muir and other preservationist leaders of the Sierra Club vigorously opposed the permit. Muir had co-founded the Sierra Club in 1892 primarily to fight initiatives to exploit the

[68] Gifford Pinchot, *The Use Book*, (Washington, D.C.: Government Printing Office, 1906), 13.
[69] Miller, 208-11.
[70] Cevasco and Hammond, 394.
[71] Gifford Pinchot, *The Right For Conservation*, (New York: Doubleday, Page and Co., 1910), 48.
[72] Meyer, 271-73.

Yosemite Valley, and to lobby for the preservation of unique wilderness areas.[73] San Francisco city officials enlisted the support of utilitarian conservationists, chief among them Pinchot, who believed that natural resources should serve the public. Both sides wrote to congressman and testified before Congress. Muir and Pinchot carried the debate to the pages of popular magazines, such as *Harper's Weekly* and *Atlantic Monthly*, as well.

Despite the opposition of many citizens, expressed in editorials across the country, Congress enacted the Raker Bill in December 1913, permitting the city of San Francisco to dam the Tolumne River and flood the Hetch Hetchy Valley. The loss of this battle alarmed preservationists and inspired them to fight for the creation of a federal agency that would safeguard the scenic and natural character of parks for the public good, and not be swayed by the vagaries of politics. The American Civic Association, a leader in this initiative, engaged Frederick Law Olmsted, Jr., to advise them. Olmsted pinpointed the lack of consistent and effective measures for protecting the parks as a principal issue for such an agency to address. Stephen T. Mather was another leader in the effort to form a national park agency. Mather (1867-1930), a native of San Francisco, was a wealthy industrialist. He joined the Sierra Club in 1904, becoming an admirer and friend of Muir, and an active member of the group. Mather was based in Chicago, where he participated in other civic and environmental associations, and was a founding member of the Friends of Our Native Landscape (organized by Jens Jensen in 1913). Mather was appointed Assistant Secretary of the Interior and placed in charge of the national parks in 1915. [74]

The NPS and the USFS

The enactment of the National Parks Act in 1916 authorized the formation of the NPS, in the words of Olmsted, Jr., "to conserve the scenery and the natural and historic objects and the wild life therein, and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations."[75]

Mather served as the first director of the NPS, from 1917 until 1929, and in collaboration with assistant director Horace M. Albright, professionalized the administration of the parks, forming a civil service system made up of specialists, including scientists, engineers and landscape architects. The NPS enacted a policy of passive management of wilderness areas, leaving them untouched, except for roads and rail lines to bring visitors into and through the parks, and elements such as trails, shelters, campgrounds, and lodging. Beginning in 1918, the NPS hired landscape architects to plan roads and trails, campgrounds, and other visitors' facilities, employing naturalistic design. NPS landscape

[73] Newton, 591; Greene, I:233.
[74] Newton, 528-37; and William H. Tishler and Erik M. Ghenoiu, "Conservation Pioneers: Jens Jensen and the Friends of Our Native Landscape," *Wisconsin Magazine of History* (Summer 2003): 3, 7 and 9.
[75] Quoted in Newton, 530.

architects often included native plants in their plans, and in 1930, the NPS prohibited the introduction of exotic vegetation in the parks, although this policy would only be partially implemented until the late twentieth century.[76]

In comparison, while the USFS actively managed the timberlands using scientific forestry practices, and undertook a variety of experiments in erosion control (some of which utilized native plants), recreational facilities received little oversight initially. To Pinchot, the recreational use of forest preserves was incidental, and its importance was not acknowledged until after his departure, and not formally addressed until 1917. That year, the USFS engaged Frank A. Waugh, professor of landscape architecture at Massachusetts State Agricultural College (now the University of Massachusetts) to survey the recreational use of forests and recommend guidelines for recreational facilities. Waugh found there were earlier roads, campgrounds, picnic areas, cabins and hotels in many national forests, and they generally conformed to the naturalistic style. Acting on Waugh's advice that the intensive recreational use of the forests called for more recreational facilities, planned by a professional, the USFS hired its first full-time landscape architect in 1919.[77] Waugh consulted with both the USFS (1920s) and the NPS (late 1930s), promoting naturalistic design and emphasizing the use of native plants. Although Waugh was a proponent of ecological design, from his close association with Jens Jensen and Wilhelm Miller, he advocated other modes of landscape design, as well, and did not press his clients to adhere to any single form. In the early 1930s, the USFS adopted a new policy for campground and recreational facility plans, developed by plant pathologist E.P. Meinecke, which the NPS also enacted. The "Meinecke Plan" outlined measures to protect vegetation and tree roots from trampling, and to limit pathways, parking and structures in areas of fragile vegetation, while encouraging naturalistic design elements and native plants. The work of the CCC in national and state parks and forests would follow this protective yet naturalistic approach to the design of facilities for visitors, guided by landscape architects into the 1940s.[78] Naturalistic design had been employed in the U.S. since the mid-nineteenth century.

The Evolution of Naturalistic Landscape Design

Naturalistic landscape design in the U.S. would begin with Andrew Jackson Downing in the 1840s, whose plans simulated the appearance of nature, using both exotic and native plants (although not necessarily native to the region in which the design was located). Frederick Law Olmsted, Sr., and

[76] Newton, 528-37; Linda Flint McClelland, *Presenting Nature: The Historic Landscape Design of the National Park Service, 1916 to 1942,* (Washington, D.C.: Department of the Interior, 1993), 6-7, and 155.
[77] William C. Tweed, *A History of Outdoor Recreation Development in National Forests, 1891-1942,* (Washington, D.C.: U.S. Department of Agriculture Forest Service, 1989), 1-3.
[78] McClelland, 161-166.

Calvert Vaux would create designs that more closely mimicked the appearance of nature, although they continued to utilize both exotic and native plants. After Olmsted and Vaux dissolved their partnership, Olmstead's practice expanded, and he created a body of work that included both naturalistic and formal plans. The growing popularity of native wild flowers, combined with the drive to create designs that more accurately reflected nature, inspired regional variations of naturalistic designs, using plants native to the region. O.C. Simonds was the first landscape architect to confine his designs to native plants of a region. Jens Jensen began in the naturalistic mode, using native plants of the region. His collaboration with Henry C. Cowles of the University of Chicago, pioneer ecologist who described and categorized the plant communities of a range of landscapes of the Upper Midwest, inspired Jensen to apply two major ecological principles to his designs: placing plants from the same community together to evoke the spirit of the landscape in which that plant community naturally grew; and, in accordance with the theory that plant communities in nature reach a stable, mature state, turning to the historical record to help identify the mature state of the plant communities of the natural landscape he wished to represent. Wilhelm Miller publicized Jensen's work and promoted "ecological design" through the popular, nationally-distributed magazine, *Country Life in America.* Frank A. Waugh taught landscape architecture students about ecological design through his lectures and writing, most notably in *Textbook of Landscape Gardening* (1922), a standard reference in landscape architecture education for many years. Waugh would serve as consultant in the design of visitors' facilities for the USFS and the NPS, advising naturalistic plans (although not ecological design) for both agencies. During the same period, USFS scientists began experimenting with native plants in their efforts to control erosion and ensure sustainable productivity of natural resources. To achieve their goal, USFS scientists used both ecology and the historical record to identify the plant communities of the rangelands under their purview.

Origins of Naturalistic Landscape Design in the U.S.

In the mid-to-late nineteenth century, landscape and garden design in the U.S. was dominated by the naturalistic style, which sought to imitate nature, with varying topography, serpentine drives and winding paths, planting beds with curving edges, irregular groupings of trees and shrubs, and picturesque features such as meadows, rocky outcroppings, waterfalls, brooks, and ponds. Naturalistic landscapes did not replicate nature, but rather represented a romanticized semblance of nature, what the designer thought nature could or should look like. Plants and trees were selected for their aesthetic qualities, and exotic varieties were often preferred. Andrew Jackson Downing was the first in the U.S. to promote the naturalistic style, his abstract writings linking the naturalistic landscape garden to Art (with a capital A, an idea drawn from English art critic and author, John Ruskin) and ascribing it with the divinity transcendentalists found in pristine nature. Downing's influence was generated primarily through his writings, rather than the few commissions he executed.[79]

[79]Newton, 260-66; Hall, 140; and Catherine M. Howett, "Andrew Jackson Downing," in William H.

Downing (1815-1852) was born in Newburgh, New York, located on the Hudson River. His family owned a nursery, where Downing gained extensive knowledge about cultivating plants. He became a well-respected authority on horticulture, attracting the attention of the wealthy New Yorkers building country estates in the Hudson River Valley. As editor of the magazine, *The Horticulturist*, Downing wrote about the visual qualities of plants, as well as their botanical characteristics, expanding his audience.[80] Downing's first book, *A Treatise on the Theory and Practice of Landscape Gardening Adapted to North America*, (1841, with numerous reprints), became the standard guide for landscape gardening in the U.S. in the nineteenth century, stimulating interest in landscape gardening among owners of modest properties as well as grand estates, and earning Downing the reputation as the leading landscape designer in the country. Downing drew on the English landscape gardening school of William Kent, Capability Brown, William Gilpin and the school's major figure, Humphry Repton, as interpreted by John Claudius Loudon. Loudon gathered Repton's writings and published them in 1840.[81] Downing corresponded with Loudon, and quoted him liberally in *Treatise*. Although Downing recommended both native and exotic plants and trees, and described the characteristics and merits of many varieties of natives and exotics in his book, Downing uses a quote from Loudon that suggests a preference for the use of exotic plants in the first edition of his book:

> One of the chief elements of artistical [sic] imitation in landscape-gardening [is the] difference in the materials employed in the imitation of nature from those in nature herself, nothing can be more apparent than the necessity of introducing largely exotic ornamental trees, shrubs and plants, instead of those of indigenous growth.[82]

Downing also advocated visually integrating structures and buildings into the surrounding landscape, a concept he likely adopted from Prince Puckler-Muskau (of Germany), *Andeutungen*, or *Hints on Landscape Gardening* (1834).[83] Downing presents this idea in *A Treatise on the Theory and Practice of Landscape Gardening Adapted to North America*, advising the use of natural materials for structures in the landscape, which he termed "rustic work," such as crooked, unpeeled branches woven together or moss-covered stones, artfully stacked, to form fences, bridges, and shelters.[84] Rustic structures and

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Tishler, ed., *American Landscape Architecture: Designers and Places*, (Washington, D.C.: The Preservation Press, 1989), 33.

[80] Newton, 260-61; and Howett, 31-32.

[81] Newton, 217-219.

[82] Andrew Jackson Downing, *A Treatise on the Theory and Practice of Landscape Gardening Adapted to North America*, (New York: Hopkins and Jennings, Printers, 1841), 35.

[83] Newton, 237-40.

[84] Downing, 274, 317-339, and 379-387. Downing also included a chapter on residential architecture,

buildings harmonizing with naturalistic landscapes would be employed in public parks and forests by landscape architects such as Olmsted, intended to showcase scenic beauty and enhance the visitors' experience while preserving the natural features, and would become the design ethic in public parks and forests into the 1940s.[85]

In 1850, Downing traveled to England, where he visited many of the prominent sites of the English landscape gardening school. He also saw Victoria (London) and Birkenhead (Liverpool) parks in England, the first in the world that were developed for the enjoyment and recreation of the public, with public funds (rather than by a private owner, such as the King of England, with limited public access). Downing subsequently conducted a journalistic campaign, with William Cullen Bryant, for a public park in New York City, which eventually led to the creation of the first public park in the nation: Central Park. While in England, Downing met and recruited English painter and architect, Calvert Vaux (1824-1895), to join him in opening a landscape architecture firm in Newburgh, New York.[86] The firm carried out several prominent commissions for estates on Long Island and on the Hudson River. Their 1851 plan for the National Mall grounds, although not completed, was also a naturalistic composition, and its inclusion of an arboretum and a botanic garden was the first to incorporate either use for the public in the U.S. (although neither was built).[87] Downing died in a steamboat accident in 1852, and Vaux continued Downing's business until relocating to New York City in 1857.[88]

In 1857, Vaux invited Olmsted to join him in drafting a proposal for the competition to design Central Park. At the time, Olmsted (1822-1903) was well known for his books and essays on social conditions as a traveling correspondent for a New York newspaper; he had not yet prepared any designs. Olmsted had visited both Birkenhead and Victoria parks, embraced the ideas Downing espoused, and had traveled to Newburgh to meet Downing and Vaux in 1851. In a blind competition with 34 entries, Olmsted and Vaux's plan for Central Park was selected.[89] Construction of their design began in 1858, and sparked a movement to create "country parks" in cities around the country, bringing nature to the people, as Olmsted stated,

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favoring Gothic Revival for the naturalistic setting, while noting that the Italianate style could also be appropriate. Downing published two pattern books, *Cottage Residences* (1842, a collaboration with architect Alexander Jackson Davis) and *The Architecture of Country Houses* (1850), which would popularize the Gothic Revival and Italianate architectural styles in the U.S.

[85] McClelland, 1-5.

[86] Newton, 265-66.

[87] "Downing's Plan for the Mall."

[88] Walter L. Creese, "Calvert Vaux," in *Landscape Architecture: Designers and Places*, edited by William H. Tishler, (Washington, D.C.: The Preservation Press, 1989), 34.

[89] Creese, 34-37; and Newton, 268-281.

> It is one great purpose of the [Central] Park to supply to the hundreds of thousands of tired workers, who have no opportunity to spend their summers in the country, a specimen of God's handiwork that shall be to them, inexpensively, what a month or two in the White Mountains or the Adirondacks is, at great cost, to those in easier circumstances.[90]

Central Park was a masterpiece in naturalistic design. To mimic the appearance of pristine nature required extensive earth moving to create varied topography, picturesque areas such as the Ravine and the Ramble, and artificial features such as lakes, streams, waterfalls, pools, meadows, and woods. Historians of landscape architecture regard Olmsted and Vaux's design for Brooklyn's Prospect Park (begun in 1866), another outstanding example of the naturalistic style, as their finest work. The pair designed parks for other municipalities, including Buffalo, Newark, Providence, Hartford, and Chicago. Their partnership ended in 1872, but their commissions, which built on Downing's work, set park design firmly on the naturalistic path and convinced Americans that the more a landscape resembles untouched nature, the more beautiful it is.[91]

Olmsted's practice expanded after the dissolution of his partnership with Vaux. His firm completed some 550 projects between 1872 and his retirement in 1895. Olmsted was also very active in the effort to preserve Niagara Falls and the Adirondack and Catskill mountain forests for the public. Niagara Falls State Park (called the "Niagara Reservation") and the Adirondack State Forest were both created in 1885. Olmsted and Vaux collaborated once again in 1887, on a plan for the Niagara Reservation. The plan is notable in the evolution of naturalistic landscape design because it more closely approximated the pre-Euro-American settlement appearance of a specific area. The plan called for the removal of existing buildings and structures (such as retaining walls, which allowed the Niagara River to vary its course), and limited landscaping and formal ornamentation. Olmsted and Vaux laid out footpaths and scenic overlooks, and specified plantings that included both native and exotic materials.[92]

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[90] Frederick Law Olmsted, Jr., and Theodora K. Hubbard, *Forty Years of Landscape Architecture, II: Central Park*, (New York: G.P. Putnam's Sons, 1928), quoted in Norman T. Newton, *Design on the Land: The Development of Landscape Architecture*, (Cambridge, Massachusetts: The Belknap Press of Harvard University Press, 1971), 289.
[91] Newton, 268-281, and 289.
[92] Charles E. Beveridge, "Frederick Law Olmsted," in *Landscape Architecture: Designers and Places*, edited by William H. Tishler, (Washington, D.C.: The Preservation Press, 1989), 36-43; Fein, 42-47; and Hall, 141.

Olmsted's plan for the Back Bay Fens, bordering the Charles River estuary in Boston, is also notable in the evolution of naturalistic landscape design, for its inclusion of wetland vegetation, simulating the appearance and the function (in this case, filtration) of a salt marsh. Carried out in the 1880s, part of Olmsted's design planted native and exotic salt marsh grasses around what had become a garbage-filled, disease-breeding slough, cleansing the water and creating a natural appearance. In 1910, the city dammed the Charles River, causing a continuous flow of freshwater through the fens, killing the salt-water vegetation.[93]

Inspired by the examples set by Downing and Olmsted, landscape architects and home gardeners endeavored to create naturalistic gardens that more closely resembled pristine and spontaneous natural forms. The arrangement and composition of these gardens did not replicate plant communities, but the use of native plants did increase, buoyed by the rising popularity of wildflowers. Wildflower gardens caught on in the U.S. in the 1870s, brought from Great Britain, particularly the work of William Robinson, of Ireland, who published *The Wild Garden* (1870). In the U.S., Mrs. William Starr Dana (Frances Theodora Smith Dana) published the first field guide to North American wildflowers, "How to Know the Wildflowers" in 1893. The first printing sold out in five days, testifying to the public fascination with wildflowers. Numerous editions followed, and the book remains in print. In Wisconsin, William Toole of Baraboo (Sauk County), a self-taught horticulturist and nursery owner, appears to have been the first to promote the preservation of native plants, and their use in home gardens. The Wisconsin State Horticultural Society first published a paper by Toole on native ferns in 1880. Every year thereafter until his death in 1926, Toole published at least one article in the society's journal, and contributed papers to many other agriculture and horticulture periodicals over the years. Toole domesticated 83 varieties of Wisconsin wildflowers, providing seeds for gardeners and preaching against removing native plants from the wild. Toole authored a series of papers on Wisconsin wildflowers, shrubs, trees, ferns, and vines that the Wisconsin State Horticultural Society published under the tile, *Native Plants of Wisconsin Suitable for Cultivation* (1922).[94] A tribute to Toole published in *Wisconsin Horticulture* listed among his legacies, "[h]is work with the native plants of Wisconsin and his plea not only for their preservation in their native haunts but a rational use in our gardens. No one else in Wisconsin had done this and his work was only well begun."[95]

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[93] Hall, 141; Newton, 291-294; and Dave Egan, "Perspectives: Historic Initiatives in Ecological Restoration," *Restoration & Management Notes* 8, no. 2, (Winter 1990): 84-85.
[94] Hall, 140; Mary Finger, "Who is Mrs. William Starr Dana?" *The Rhode Island Wild Plant Society Newsletter* 10, No. 1 (March 1996): 2-3; and "William Toole, 1841-1926," *Wisconsin Horticulture* XVI, no. 9 (May 1926): 126-127.
[95] Frederic Cranefield, "William Toole: A Tribute," *Wisconsin Horticulture* XVI, no. 9 (May 1926): 132-33.

Regionalism in Naturalistic Design: the Prairie School

William Toole and his work reflected the rise of regionalism, which recognized and promoted the unique features of an area. Regionalism began in the Midwest, centered in Chicago, and was especially strong there. In design, it would become known as the Prairie School, employed in both landscape architecture and architecture. It was both an appreciation of the sweeping, Midwestern prairie landscape, and a rejection of the formal, rectilinear design that characterized the Country Place and City Beautiful movement that became very popular in the U.S. in the early twentieth century, especially on the east coast. Olmsted was a leading figure in initiating both the Country Place era (in which landscape architects and architects collaborated to integrate the mansion and its setting for the super-wealthy of the Gilded Age), and the City Beautiful movement town planning.[96]

As the influence of the Ecole des Beaux-Arts and its classically-derived architecture took hold in the late nineteenth century, a more formal, architectonic style of landscape design came into being to create a proper setting for the buildings. The project that is considered the first example of Country Place was the collaboration between Richard Morris Hunt and Olmsted on the Biltmore Estate. In 1889, Hunt (the first American architect to attend the Ecole des Beaux-Arts) designed a French-inspired country mansion for Vanderbilt. Olmsted's design for the grounds immediately surrounding the mansion continued the strong geometric shape of the building itself, in a series of ordered, rectilinear spaces.[97]

The Chicago World Columbian Exposition of 1893 launched the related City Beautiful movement, and popularized the Classical Revival architectural style. Olmsted's firm planned the site, employing well-structured spatial order and simple geometry, and planting the shores of the lagoons with vegetation native to the Midwest – willows, cattails, rushes, pond lilies and irises. Daniel H. Burnham, Chicago architect and director of the project, invited five architectural firms to select the architectural theme. Four of the five were east coast firms; they selected classical as the motif. Although not all the buildings were classical, the most prominent were, and they were further unified with white plaster exterior finishes, and illuminated with electric lighting. The visual splendor of the "Great White City," as it was called, sparked widespread interest in civic planning, and promoted classical architecture for public, commercial, and residential buildings. Although Olmsted's design would have complemented other styles of architecture, most landscape gardeners, planners and architects embraced the classical ideal the buildings represented. Both City Beautiful and Country Place design are characterized by a geometric and often symmetrical structure; rectilinear spaces tied together with a long line of sight;

[96] Newton, 346-47.
[97] Newtown, 346-49.

spaces defined or implied with vertical planes using walls and steps; a layout that is formal, organized and simple; and a short list of plant materials, usually compact in nature.[98]

Formal landscape designs superseded naturalistic plans on college campus, estates, and urban parks, as well as for town plans. Naturalistic landscaping remained strong in state and national parks and forests, and in urban parks and home gardens where regionalism flourished, especially in the Midwest. As the formal, classical current of design took hold, in Chicago, artists and designers such as architects Louis Sullivan and Frank Lloyd Wright rejected the resurgence of the classical and the dominance of Easterners, and sought to establish a Midwestern cultural identity. They turned to the prairies for inspiration, developing a regional expression known as the Prairie School. In landscape architecture, its primary practitioners were O.C. Simonds and Jens Jensen, who found beauty in the natural landscapes of the Midwest, and sought to display that beauty through designed landscapes that incorporated natural topographic features and indigenous vegetation. Although Jens Jensen is the better-known landscape architect of the Prairie style, and was the first to apply ecological principles to the mode (creating "ecological design"), it was Ossian Cole Simonds who originated the Prairie School in landscape gardening. Simonds' 1878-79 plan for an addition to Graceland Cemetery in Chicago was the first in the Prairie School style: it was the first to recreate Midwestern landscape features, and the first to use native Midwestern species in a planting plan. At Graceland Cemetery in 1880, Simonds also became the first to transplant native species from the wild to a man-made landscape.[99]

Simonds (1855-1931) was born in Michigan. In 1878, he graduated from the University of Michigan in civil engineering. Simonds then went to Chicago to work for William Le Baron Jenney, with whom he had briefly studied architecture. Although Jenney is best known as an architect, he also planned landscapes, notably Chicago's West Parks (1871, later re-designed by Jensen), a system of picturesque, naturalistic parks connected with boulevards. Jenney assigned Simonds to work on the Graceland Cemetery addition. That commission led to Simonds' appointment as superintendent of the property in 1883, and afforded him the opportunity to develop his ideas about landscape gardening. After 1888, Simonds began consulting, eventually building a thriving private practice, primarily designing parks and estates in the Midwest. In the early twentieth century, Simonds consulted with the Madison Parks and Pleasure Drive Association, designing several parks in the city, and preparing a plan for the

[98] Newton, 355-67, 371-384, and 413-428; Victoria Post Ranney, "Frederick Law Olmsted, Designing for Democracy in the Midwest," in *Midwestern Landscape Architecture*, edited by William H. Tishler, (Urbana, Illinois: University of Illinois Press, 2000), 52; and Marcus Whiffen and Frederick Koeper, *American Architecture, Volume 2: 1860-1976*, (Cambridge, Massachusetts: MIT Press, 1981), 268-277.

[99] Mara Gelbloom, "Ossian Simonds: Prairie Spirit in Landscape Gardening," *The Prairie School Review* XII, no. 2 (Second Quarter 1975): 8.

campus of the University of Wisconsin College of Agriculture. He also planned the University of Michigan Nichols Arboretum (1906), and the Morton Arboretum (1923) in Lisle, Illinois. Simonds' design philosophy was firmly anchored in naturalism. He was influenced by Repton, through Downing's writings, and by Olmsted, whose work he greatly admired. Simonds' work incorporated an innovation that H.W.S. Cleveland had introduced to naturalism, that of preserving the natural features of a site. However, Cleveland, who had originally practiced landscape gardening in Boston and relocated to Chicago in 1869, regarded prairie topography as monotonous (a perspective Olmsted shared), and a fault to be corrected. Simonds, in contrast, viewed the local landscape as an asset, to be preserved and enhanced with the use of indigenous plants.[100] He concurred with Repton and Downing, however, that a landscape design should be not a "fac-simile of wild nature" but rather, should recreate the "spirit" of the natural place. Indigenous plants should be arranged for the convenience and safety of people, according to the naturalistic principles of design, rather than in the haphazard way they might appear in the wild.[101]

Simonds articulated his philosophy of design in *Landscape Gardening* (1920), advising a careful study of nature for design inspiration and plant selection, and asserting that the ultimate purpose of landscape gardening was to teach people to recognize and respect the natural beauty in the local landscape. To this end, Simonds was active in several organizations to improve and preserve landscapes, such as the Chicago Tree-Planting Society, and the Illinois Outdoor Improvement Association, as well as civic associations such as the Cliff Dwellers, and the City Club. He was also a founding member of the American Society of Landscape Architects (1899), and established one of the first four-year programs in landscape architecture in the country at the University of Michigan (1909).[102]

Jens Jensen's first design, for a garden in Chicago's West Parks District in 1887-88, was formal, rather than naturalistic. Jensen (1860-1951) was born in Denmark and immigrated to the U.S. in 1884. In 1886, he settled in Chicago, and worked his way up in the West Parks District, quickly rising from laborer to foreman, and eventually to superintendent. He was fired in 1900 for political reasons. During his years with the West Parks District, Jensen grew to appreciate the local natural landscape,

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[100] Gelbloom, 7-13; Reuben M. Rainey, "William Le Baron Jenney and Chicago's West Parks: From Prairies to Pleasure-Grounds," in *Midwestern Landscape Architecture*, edited by William H. Tishler, (Urbana, Illinois: University of Illinois Press, 2000), 59; and Julia Sniderman Bachrach, "Ossian Cole Simonds: Conservation Ethic in the Prairie Style," in *Midwestern Landscape Architecture*, edited by William H. Tishler, (Urbana: University of Illinois Press, 2000), 80-98.
[101] Downing, *Treatise*, 50-51.
[102] Gelbloom, 8, 11; and Robert E. Grese, "Ossian Cole Simonds," *American Landscape Architecture: Designers and Places*, edited by William H. Tishler, (Washington, D.C.: The Preservation Press, 1989), 74-75.

planting native wild flowers in his first garden design (the American Garden in Union Park, 1888), and developing his ideas about Prairie style plans. Jensen was active in numerous civic organizations, such as the Cliff Dwellers, the City Club, the Municipal Science Club, the Municipal Art League, and the Geographic Society. He made friends among the architects, artists, writers, scientists, and prominent citizens of Chicago society through these associations. After his dismissal from the West Parks District, these connections enabled Jensen to secure commissions from wealthy clients on Chicago's North Shore, who wanted naturalistic gardens on their estates. In 1906, Jensen was reappointed superintendent and landscape architect of the West Parks District. By 1910, he had redesigned Garfield, Douglas, and Humboldt parks (originally designed by Jenney) in the Prairie mode. Jensen's 1918 design for Columbus Park exemplified his Prairie School principles, letting the shape of the site dictate the plan, planting hawthorn to represent the prairie through its horizontal branches, and creating water features with layered rock to mimic the bluffs and ravines along the Lake Michigan shore.[103]

Roots of Ecological Design in Naturalistic Landscape Architecture

Jensen not only took inspiration from the native landscape, but over the long course of his career, increased both the use of indigenous species, and their selection and placement in groups based on plant ecology. This was "ecological design," an art form, not the replication of a plant community. The development of ecological design was predominantly the result of a network of friendship and collaboration among three men: Jensen, Henry C. Cowles, and Wilhelm Miller. Frank A. Waugh played a lesser, yet important, role.[104] This network would shape the views of one of the founders of the University of Wisconsin Arboretum, Franz Aust and, through him, Aust's student and the first executive director of the Arboretum, G. William Longenecker. Cowles (1869-1939), professor of botany at the University of Chicago, established the science of plant ecology in the U.S. Miller (1869-1938) was a nationally-prominent author who crusaded for an American style in landscape design, and championed the Prairie school (especially Jensen's work) and ecological design through his many articles and publications; Miller was also a professor of landscape horticulture at the University of Illinois. Waugh (1869-1943), professor of horticulture and landscape gardening at the Massachusetts State Agricultural College (now the University of Massachusetts), was an influential teacher and author in landscape architecture education, an advocate of preserving the native landscape, and a consultant to the USFS and the NPS over many years.[105]

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[103] Stephen Christy, "Jens Jensen," in *American Landscape Architecture: Designers and Places*, edited by William H. Tishler, (Washington, D.C.: The Preservation Press, 1989), 78-81; Gelbloom, 16-17; and Tishler and Gheniou, 3-4.

[104] Stephen F. Christy, "Jens Jensen: The Metamorphosis of an Artist," *Landscape Architecture* 66 (January 1976): 63.

[105] Frederick R. Steiner, "Frank Albert Waugh," in *American Landscape Architecture: Designers and Places*, edited by William H. Tishler, (Washington, D.C.: The Preservation Press, 1989), 100.

Cowles and Jensen may have met through their membership in the Geographic Society. In 1902, Jensen and Cowles began collaborating on a campaign to establish forest preserves in Cook County, for public and educational use. As an outgrowth of continued efforts in that campaign, Jensen and Cowles established the Prairie Club, to sponsor excursions to areas of botanical and scenic interest around Chicago for recreation and to engender an appreciation for their unique beauty. Cowles led many of the field trips. The Prairie Club attracted many intellectuals and middle-class professionals; for example, Stephen Mather, who would become the first director of the NPS, was a prominent and active member. Jensen galvanized the membership into an important lobbying group for conservation projects in the Chicago area, beginning with the Forest Preserve Districts legislation (passed in 1914), and later, the Indiana Dunes (on the south shore of Lake Michigan).[106]

Both Cowles and Miller were charter members of the second conservation group Jensen founded, the Friends of Our Native Landscape (Aust would organize the first branch of the organization in Wisconsin in 1920). Established in April 1913, the purposes of the Friends of Our Native Landscape (Friends) were to educate the public about the native landscape, and to fight to preserve it. Jensen began by inviting a small group of his most knowledgeable and influential friends, including Cowles, Miller, and Mather.[107] By the time of the first annual meeting in June, membership had grown to nearly 200. The Friends engaged in cross-disciplinary educational efforts, promoting an appreciation of the natural environment of Illinois by hosting trips to scenic areas around the state, sponsoring lectures on natural history and scientific aspects of nature, presenting a masque dramatizing humanity's responsibility as stewards of the land, and organizing exhibits of landscape paintings a the Chicago Art Institute. The Friends also identified properties of scenic and scientific value, and in 1921, would publish a report enumerating these and advocating that they be set aside as Illinois state parks; seven would be so designated by 1932. The Friends joined forces with the Prairie Club in the fight to preserve the Indiana Dunes.[108]

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[106] Eagan, 86; Robert E. Grese, "Jens Jensen: The Landscape Architect as Conservationist," in *Midwestern Landscape Architecture,* edited by William H. Tishler, (Urbana: University of Illinois Press, 2000), 120; and Robert E. Grese, *Jens Jensen: Maker of Natural Parks and Gardens*, (Baltimore: Johns Hopkins University Press, 1992), 120-122.

[107] Tishler and Gheniou, 7 and 9; and Christopher Vernon, "Wilhelm Miller: Prairie Spirit in Landscape Gardening," in *Midwestern Landscape Architecture,* edited by William H. Tishler, (Urbana: University of Illinois Press, 2000), 191.

[108] Grese, *Jens Jensen: Maker of Natural Parks and Gardens*, 122-24, 128, and 133; and Grese, "Jens Jensen: The Landscape Architect as Conservationist," 133.

While the Friends and the Prairie Club lobbied for state park status for the Indiana Dunes, Jensen tried other approaches. He tried to convince the University of Chicago to buy the land for an outdoor botanical research laboratory. Failing that, Jensen searched unsuccessfully for a wealthy sponsor to establish a school of forestry, horticulture and landscape design on the site, which he proposed to operate in cooperation with University of Chicago faculty, and Waugh (who was Jensen's close personal friend). When Mather, an active member of both the Prairie Club and the Friends, was named the first director of the NPS in 1916, Mather held hearings in endeavor to designate the Indiana Dunes a national park. Both Cowles and Miller testified before the U.S. Congress. Cowles spoke of the fragility of the plant life on the Dunes. Miller asserted their value as an inspiration to artists, in developing a uniquely American culture. Congress was not swayed, but the Friends and their allies redoubled their efforts at home, finally succeeding in having part of the dunes made an Indiana state park in 1926.[109]

Ecology: Plant Communities and Ecological Succession

Two elements of Cowles' research affected designers of naturalistic landscapes, as well as forming a foundation for scientists in plant research. The first was Cowles' application of Danish botanist Eugenius Warming's theory of "plant societies" to the natural landscapes around Chicago. Warming's theory postulates that in nature, plants form interdependent communities based on topography, soil and climatic conditions. Cowles' book, *The Plant Societies of Chicago and Vicinity* (1901), lists the geographic features of the region (i.e., ravines, swamps, prairies, and dunes) and describes the groups of plants native to each (although Cowles did not catalog all the plants in any community).[110] Botanists in academia, as well as in state and national forests, beginning in the late 1910s and early 1920s, would identify the geographic features of their areas, and describe the groups of vegetation found in each (beginning in the 1930s, they would compile more complete lists of the members of their plant communities). Jensen, an avid naturalist, conducted his own botanical studies, demonstrating Cowles' influence and a familiarity with plant associations and their relationship to landforms and soil type as early as 1904.[111]

Cowles' influence on Jensen is also illustrated by Jensen's increasing use and promotion of ecological design. By 1912, Jensen was firmly committed to ecological design, as his lecture to the Illinois Chapter of the American Institute of Architects that year testifies. Titled, "Let Nature Be Your

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[109] Grese, *Jens Jensen: Maker of Natural Parks and Gardens*, 125-26.
[110] Henry C. Cowles, *The Plant Societies of Chicago and Vicinity*, (Chicago: The University of Chicago Press, 1901), 7-8.
[111] For example, Jens Jensen, "Soil Conditions and Tree Growth around Lake Michigan," *Park and Cemetery* 14, no. 2 (April 1904): 24-25, cited in Vernon, Foreward to *The Prairie Spirit in Landscape Gardening*, by Wilhelm Miller, (1915; repr., Amherst: University of Massachusetts Press, 2002), xxvi.

Teacher," Jensen recommended design placing specific plants with specific geographic features and soil types, "certain trees are for the low lands and certain trees belong to the highlands."[112]

Miller had adopted and was promoting the principles of ecological design by 1912 as well, recommending that readers of *Country Life in America,* "Ask the nearest botanist to help you evolve a consistent plant society."[113] In 1915, Miller elaborated on plant ecology as a basis for landscape gardening, incorporating Cowles' lists of plants by landform and soil type, and recommending *The Plant Societies of Chicago and Vicinity* to his readers, as well as botanical surveys and the study of plant ecology to determine appropriate native plants for garden design. Miller also urged studying ornithology to identify the birds of the natural landscape, and the plants that would attract them, an influence of Jensen.[114]

Waugh, in his seminal treatise, *The Natural Style in Landscape Gardening* (1917), also applies Cowles' idea of plant societies to landscape gardening, enumerating four main landscape types (the sea, the mountains, the plains, and the forests), noting that there are numerous minor landscape types (such as rivers, brooks, and rolling hills), and providing examples of groupings of plants by landscape type. These groupings consist of four or five plants (not a catalog of all the plants in a community). The "pitch pine society," for example, Waugh asserts is appropriate to the sandy plains of Massachusetts, and contains four plants.[115] The idea of plant groupings associated with particular landform and soil types, when applied to landscape design, prompted landscape architects to follow botanists in their study and analysis of nature. As Waugh expressed it, "…go out into the landscape…go to the hills…visit the lakes…follow the brooks…camp on the plains."[116]

Cowles' landmark theory of ecological succession, which posits that plant communities change over time, generally developing through several stages until reaching a stable climax, was the second element in Cowles' research that impacted both naturalistic landscape design and plant scientists.[117] Ecological succession implied that any natural landscape had a stable mature form, and because Euro-American settlers had clearly changed the landscape, the stable form must predate Euro-American

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[112] Jens Jensen, "Let Nature Be Your Teacher," *Construction News* 33, no. 16 (20 April 1912): 8-9, cited in Vernon, Foreward to *The Prairie Spirit in Landscape Gardening,* xiii.
[113] Wilhelm Miller, "What is the Matter With Our Water Gardens?" *Country Life in America* 22 (June 15, 1912): 54.
[114] Miller, *The Prairie Spirit in Landscape Gardening,* 18, and 22-23.
[115] Frank A. Waugh, *The Natural Style in Landscape Gardening,"* (Boston: Richard G. Badger, 1917), 34, 37, and 51.
[116] Waugh, *The Natural Style in Landscape Gardening,* 28-29.
[117] Frederic Clements, another prominent ecologist, independently developed the same theory.

settlement. This interpretation completely discounted the land management practices of Indian nations, such as prairie burning. In response to the theory of ecological succession, landscape architects and plant scientists turned to historical descriptions of the pre-Euro-American settlement landscape. Miller expressed this in 1912 in terms that would be echoed by Leopold at the dedication of the University of Wisconsin Arboretum some 20 years later:

> …if your heart burns to restore and intensify every bit of local color, look about you and see if your land does not represent a disappearing type of landscape – some portion of meadow, hillside, mountain, seashore, valley, brook, pond, lake, rocks, or bog. Then try to find out what it was like when the first white man came. Consult the local and state historical societies about the oldest descriptions and pictures of your locality.[118]

Beginning with Lincoln Ellison at the Great Basin Experiment Station in Utah in 1938, USFS plant scientists would also study historical records to determine what plants had grown naturally in the national forests.[119]

Enriching and Articulating the Principles of Ecological Design

The collaboration between Miller and Jensen enriched and articulated the principles of ecological design, as demonstrated in Miller's writings about Jensen's work and his ideas. Evidence of the influence of Miller and Jensen and ecological design on Aust, and the founding of the Arboretum as a laboratory of ecological restoration, also appears in Miller's, and Aust's writings.

Miller first wrote about Jensen's landscapes in 1911; Jensen possibly attracted his attention through Waugh's book, *The Landscape Beautiful*, which declared Jensen's work in Chicago's West Parks as "interesting, original, novel, breaking clear away from the formulas now familiar in America…"[120] In *Country Life in America*, a nationally-distributed, popular journal that he edited, Miller had been arguing for an American style of landscape architecture, with variations unique to each region of the country. Miller believed that regional diversity was best expressed in naturalistic gardening using native plants (preferably according to ecological design principles). Miller had lauded Simonds' work at Graceland Cemetery as early as 1898, but, based in New York, had not visited any of Jensen's designs until 1911. That year, Miller met Jensen, finding in him a kindred spirit in democratic, Progressive sociopolitical ideals. In Jensen's work, Miller found not only the regional expression he had been seeking, but the mode he believed was most appropriate to American democracy.[121] Miller

[118] Wilhelm Miller, "What is the Matter With Our Water Gardens?" 54.
[119] Hall, 113-14.
[120] Waugh, *The Landscape Beautiful*, 174.
[121] Vernon, Foreward to *The Prairie Spirit in Landscape Gardening*, x; and Wilhelm Miller,

identified Midwestern landscape architects as the trendsetters in a new American landscape architecture, and highlighted Jensen's work (and that of Simonds, to a much lesser extent) in article after article in *Country Life in America*. Miller was the first to recognize, characterize and champion the ideology of the Prairie style, in a 1914 article, which he enlarged and published as a book with the same title, *The Prairie Spirit in Landscape Gardening* (1915). In that publication, Miller also advocated ecological design, presenting Cowles' plant societies, and their associated landform and soil types. Miller also wrote about the related "Illinois way" of planting, which he defined as "the use of as high a proportion of plants native to Illinois as is consistent with practical requirements and principles of design."[122] "The Illinois way" was drawn from a series of technical bulletins Miller had prepared for various Illinois state agencies. The "Illinois way"series and *The Prairie Spirit in Landscape Gardening"* both quote Jensen and present his work, and are cited by Waugh in *The Natural Style in Landscape Gardening."* These publications also illustrate Aust's connection to Miller and Jensen.

Miller was raised in Detroit, graduated from the University of Michigan (1892), and earned graduate degrees from Cornell University as a student of famed horticulturist and botanist, Liberty Hyde Bailey. Bailey recognized Miller's writing talent, and made Miller associate editor of the *Cyclopedia of American Horticulture*, which became a classic. In 1901, Bailey was appointed editor of *Country Life in America*, then a new journal. When Bailey left the magazine in 1903, Miller replaced him as editor, a post he retained into 1912.[123] Miller became an assistant professor of landscape horticulture at the University of Illinois in the fall of 1912; Aust would join him in 1913. Miller, with Aust's assistance, took charge of the Division of Landscape Extension (the first such program in the nation) in 1914, not only to further the development of a regional aesthetic, but also, reflecting his democratic, Progressive ideals, to work with farmers and "those who can never afford to employ a landscape gardener."[124] He continued to write for *Country Life in America*, as well as authoring technical bulletins for Illinois state agencies, and giving public slide lectures to stimulate interest in naturalistic landscape design, until his departure from the University of Illinois in 1916. [125]

Jensen's influence is clear in Miller's "The 'Illinois Way' of Roadside Planting," (1913). Miller quotes Jensen, and presents several of his ideas (only one of which is actually attributed to him). Interestingly, Miller recommends planting Japanese barberry, the same foreign species that Miller had scolded Jensen for using in a 1912 issue of *Country Life in America*, suggesting that Jensen had

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"Successful American Gardens VIII-The Higginson Garden at West Manchester, Mass.," *Country Life in America* (September 1, 1911): 38.

[122] Miller, *The Prairie Spirit in Landscape Gardening*, 5.

[123] Vernon, 'Wilhelm Miller: The Prairie Spirit in Landscape Gardening," 174-78.

[124] Quoted in Vernon, Foreward to *The Prairie Spirit in Landscape Gardening*, xx.

[125] Vernon, "Wilhelm Miller: The Prairie Spirit in Landscape Gardening," 184.

rebutted this criticism. In "The 'Illinois Way' of Roadside Planting," Miller wrote, "red berries and red-twigged shrubs [such as Japanese barberry] will be cheery all winter against the evergreens or the snow."[126] He concludes with this prescription:

> The one guiding principle is to restore and intensify the native beauty of each locality…The ideal is to have at least 90 percent of our planting composed of native plants, while not more than 10 percent should be composed of foreign species and horticultural varieties.[127]

Miller also advises planting trees and shrubs with edible berries to attract songbirds, asserting that they will require no maintenance because, "as Mr. Jensen, says, 'birds are the best landscape gardeners.'"[128] Providing habitats for birds was a notable aspect of Jensen's residential gardens, which Miller also promoted.[129]

The influence was not entirely unidirectional: Miller's continued campaign to encourage the planting of indigenous species in state highway rights-of-way, and the preservation of existing wildflowers and prairie grasses along the roadsides appears to have influenced Jensen in his work on the Lincoln Highway in Indiana (1917-1925), intended to serve as a model for other highways, and in the support the Friends lent to the cause. One of Jensen's final efforts for the Friends was to write the pamphlet, *Roadside Planting and Development*, which the Friends published in 1931.[130] The initiative met with some success, but was ultimately unable to overcome the mowing of rights-of-way, as native plants proved both more difficult to acquire, and to manage. Further, soon after the Friends published Jensen's pamphlet, Jensen reduced his practice and moved to Door County, Wisconsin, and concentrated on The Clearing, the outdoor school he established to foster stewardship of the environment.[131]

Miller authored two other bulletins in the "Illinois Way" series: "The Illinois Way of Foundation Planting" (1914) and *The Illinois Way of Beautifying a Farm* (1914).[132] Both quote Jensen and his

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[126] Wilhelm Miller, "The Illinois Way of Roadside Planting," in *Fourth Report of the Illinois Highway Commission,* (Springfield: State of Illinois, 1913), 341.
[127] Miller, "The Illinois Way of Roadside Planting," 343.
[128] Miller, "The 'Illinois Way' of Roadside Planting," 341.
[129] Wilhelm Miller, "Bird Gardens in City," *Country Life in America* 26 (August 1914): 46-47, and 74, which features two of Jensen's residential gardens in Chicago.
[130] Grese, "Jens Jensen: The Landscape Architect as Conservationist," 134; and Grese, *Jens Jensen: Maker of Natural Parks and Gardens,* 134.
[131] Grese, "Jens Jensen: The Landscape Architect as Conservationist," 136; and Egan, 87.
[132] The others included "The Illinois Way of Foundation Planting*"* in *Illinois Arbor and Bird Days,*

ideas (not all of them attributed to Jensen); the second is also lavishly illustrated with photographs of Jensen's work. The first was directed at schools and included a list of trees and shrubs native to Illinois, and the number of species of birds each type attracted. Miller co-authored it with Aust, who had become an instructor in the University of Illinois Department of Horticulture under Miller, in 1913. Aust is not listed as co-author on *Beautifying the Farm*, at 46 pages much longer than either of the other "Illinois way" essays. It seems likely that Miller had Aust occupied on developing what Miller called, the "Illinois motive."[133] In a June 1914 letter to Aust, Miller wrote,

> I am glad to have a postal card from you saying that you have nearly worked out the Illinois motive. The idea grows on me every day and I now have a list of about 200 motives [plants]…Jensen thinks it is a great idea, and so does Waugh.[134]

Miller and Aust co-authored a paper in July 1914, "The Illinois State Planting Motive," stating,

> The object of the present effort is to design a planting motive or combination of permanent plants that will typify the peculiar scenery of the 'Prairie State,' and will be suitable for use throughout Illinois….to be used by the artists of the prairie school.[135]

Lists of plants native to Illinois that Aust and colleague L.E. Foglesang generated appear in *The Illinois Way of Beautifying a Farm*.[136] Interestingly, Miller also suggests that landowners consider planting an arboretum of trees native to Illinois:

> An arboretum is a time-honored farmer's hobby that is worthy of a real man.... It would be folly for any farmer to try to grow all the hardy trees in the world, for even the Arnold Arboretum cannot do that on three hundred acres….The most profitable scheme for the Illinois

(Springfield: State of Illinois, 1914): 7-19; and *The Illinois Way of Beautifying a Farm* (Urbana: University of Illinois Agricultural Experiment Station Circular, no. 170, 1914).

[133] The term "motive," pronounced "motif," likely originated with Frank Waugh. Waugh explained his deliberate use of "motive" to describe a theme in the "art" of landscape design, equating it with the *leit-motiv* in musical compositions. In Frank A. Waugh, *The Natural Style in Landscape Gardening*, (Boston: Richard G. Badger, 1917), 63-67.

[134] Wilhelm Miller to Franz Aust, 19 June 1914. Franz Aust Papers, microfilm P88-1234, image 121, Wisconsin Historical Society Archives, Madison, Wisconsin.

[135] Wilhelm Miller and Franz Aust, "The Illinois State Planting Motive," 31 July 1914. Franz Aust Papers, P88-1234, reel 3, images 123-132, Wisconsin Historical Society Archives.

[136] Miller acknowledged that Aust and Foglesong prepared the lists, in Miller, *The Illinois Way of Beautifying a Farm*, 32.

> farmer is to collect only the trees of Illinois…. [it] would be irresistible to…your children, some of whom will not care to leave the farm with an Illinois arboretum on it![137]

Although Waugh may have told Miller he thought the "Illinois way" was a great idea, he was not quite as enthusiastic in *The Natural Style in Landscape Gardening*. Like Miller, Waugh was an associate of Liberty Hyde Bailey, and wrote for *Country Life in America*. In December 1915, Miller would arrange a two-week visiting professorship for Waugh at the University of Illinois. Waugh had become a close personal friend of Jensen's, although they did come into conflict, as Waugh promoted ecological design as only one of several styles for landscape gardeners.[138] In *The Natural Style in Landscape Gardening*, Waugh noted that among landscape gardeners designing in the naturalistic style, including non-indigenous species was common, and further that there was disagreement among them as to what constituted an acceptable native species:

> One gardener would accept any species native to America; another insists on plants from his own state; the gardener of real conviction accepts nothing but what grows on his own farm. My friend Dr. Wilhelm Miller in his recent crusade for the 'Illinois Way" represents a temperate recrudescence of this native plant propaganda. For it is a part of the 'Illinois Way' to use Illinois plants.[139]

Waugh adds that this may be a safe middle ground in the debate, but goes on to assert that every natural landscape form has its own spirit. Waugh follows this declaration by complimenting Miller, "Dr. Wilhelm Miller has recently published a notable treatise on 'The Prairie Spirit in Landscape Gardening,' which deals, as a matter of course, with the both the physical prairie and the spirit of the plains."[140]

In *The Prairie Spirit in Landscape Gardening*, Miller again quotes Jensen extensively, and presents his work as the embodiment of the prairie spirit; in fact, the majority of the examples are Jensen's. Miller also adopts Jensen's design vocabulary and his description of the three elements central to the Prairie style: "*conservation* of native scenery; *restoration* of local vegetation; and *repetition* of a dominant [horizontal] line [through the use of stratified rocks and plants]."[141]

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[137] Miller, *The Illinois Way of Beautifying a Farm*, 25.
[138] Vernon, Foreward to *The Prairie Spirit in Landscape Gardening*, xx, xxvi, and xxviii; and Grese, *Jens Jensen: Maker of Natural Parks and Gardens*, 60-61.
[139] Waugh, *The Natural Style of Landscape Gardening*,17.
[140] Waugh, *The Natural Style of Landscape Gardening*, 47.
[141] Miller quotes Jensen at length, and then summarizes, Miller, *The Prairie Spirit in Landscape Gardening*, 1 and 5.

Miller further defined conservation and restoration as "saving or restoring as much of the local color or native vegetation as is practical."[142] Reflecting his democratic, Progressive ideals and the desire to place Prairie style and ecological landscape design within the reach of everyman, Miller's definition was broad, "[r]estoration is fundamentally an act of the spirit; the scale of operations is incidental…the essential thing is to plant some permanent reminder of native beauty and the cost should always be well within ones means."[143]

Miller noted, "Of course, literal restoration of prairie scenery is impractical…"[144] Simonds' planting plans for the parks in Quincy, Illinois (1895-1913), which Miller identifies as "the first…that suggests…'restoration'…"[145] were not restricted to native vegetation, although the percentage of indigenous plants exceeded that of the exotics.[146]

In practice, neither the Prairie style nor ecological landscape design replicated plant communities, but rather employed native plants (some in their natural groupings, others combined with foreign species) and local natural landforms to create a naturalistic design. In the case of the Prairie style, horizontal forms dominated, evoking or symbolizing features of the prairie landscape. Lagoons represented prairie rivers, and meadows symbolized prairies. Writing of the meadow in Jensen's design for Humboldt Park, Miller noted, "[o]f course, this garden does not attempt to reproduce literally the broad, treeless prairie…It merely symbolizes."[147]

The principles of ecological design are displayed in *The Prairie Spirit in Landscape Gardening* (1915), in which Miller recommends Cowles' *The Plant Societies of Chicago and Vicinity,* and presents Cowles' topographic classifications (bluffs, ravines, ponds, prairies, and dunes) to describe the "romantic types of Illinois scenery." Miller also includes Cowles' lists of the plant societies of each, to help gardeners identify the appropriate native plants for their landscapes.[148] For landscape types Cowles did not cover, as early as 1912 Miller had recommended, "Ask the nearest botanist to help you evolve a consistent plant society."[149] Miller also includes an extensive list of plants in *The Prairie*

[142] Wilhelm Miller, "The Prairie Spirit in Landscape Gardening," *The American Magazine of Art* 7, no. 11 (Sept. 1916): 449.
[143] Miller, *The Prairie Spirit in Landscape Gardening*, 10.
[144] Miller, *The Prairie Spirit in Landscape Gardening*, 5.
[145] Miller, *The Prairie Spirit in Landscape Gardening*, 2.
[146] Gelbloom, 17.
[147] Miller, "What is the Matter With Our Water Gardens?" 54.
[148] Miller, *The Prairie Spirit in Landscape Gardening*, 22-23.
[149] Miller, "What is the Matter With Our Water Gardens?" 54.

Spirit in Landscape Gardening, all of them native to Illinois, an expansion of the one Aust and Foglesong prepared for *The Illinois Way of Beautifying a Farm* (1914).[150]

Following up on the "Illinois Way" series, as part of their work for the Division of Landscape Extension, Miller and Aust contacted farmers and encouraged them to plant indigenous vegetation, especially native wild flowers. A letter from Jensen indicates that Aust was not sure that this effort was a good idea. In March 1915, Jensen wrote,

> Brother Miller has written me regarding your pessimistic views on restoration, which means the reintroduction of native plants on small yards. I am surprised…Restoration work in a small garden applies only to the woodland borders or the edge of the prairies, but there is more beauty, more harmony in composition and more strength in character than from all the rubbish furnished in the usual nurseryman's catalogue. The prairies are awakening, get out of your winter trance and commune with them.[151]

Despite the admonitory tone of this letter, Aust admired Jensen deeply, was a member of Jensen's Prairie Club as well as the Friends, came to share his (and Miller's) commitment to ecological design, and would maintain close ties with him until the end of Jensen's life. Jensen also held Aust in high regard, recommending to his friend and president of the University of Wisconsin, Charles R. Van Hise, that Aust be appointed professor of landscape design when the university created its program in that field in the Department of Horticulture in 1915.[152]

A few months after Aust departed for Wisconsin in June 1915, Miller published the expanded version of *The Prairie Spirit in Landscape Gardening.* His zealous promotion of the Prairie School did not sit well with his colleagues at the University of Illinois, and when public funding was reduced in 1916, the university closed the Division of Landscape Extension and eliminated Miller's position. Miller opened a landscape architectural firm in Chicago, and moved it to Detroit in 1918, meeting with little success in either city, although Aust did secure Miller a commission in Madison in 1918. Miller retired in 1920, and relocated to Los Angeles, his influence at an end, although he continued to correspond with Jensen until his death in 1938.[153]

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[150] Miller, *The Prairie Spirit in Landscape Gardening*, 24-26; and Miller, *The Illinois Way of Beautifying a Farm*, 32.
[151] Jens Jensen to Franz Aust, 19 March 1915, Franz Aust Papers, P88-1232, Reel 2, Wisconsin Historical Society Archives.
[152] Tishler and Geniou, 10.
[153] Vernon, "Wilhelm Miller: Prairie Spirit in Landscape Gardening," 189; and Egan, 87.

That Miller and Jensen had a profound impact on Aust is evident in the activities Aust carried on at the University of Wisconsin. Aust (1885-1963) was born in Ohio. He studied physics in North Dakota and at the University of Minnesota before earning a master's in landscape design at the University of Michigan in 1913. He worked briefly in Minnesota, becoming an instructor in landscape design at the University of Illinois under the Miller's direction in 1913. Aust was Miller's chief designer and collaborator at the Division of Landscape Extension. Aust would follow Miller's approach in his landscape extension program at the University of Wisconsin, explaining in "The State Program – Wisconsin," (1922) that the function of landscape extension is primarily education, carried out through research in landscape problems, demonstrations, lectures, publications, and follow up. The list of sample demonstration projects reflects Miller's tutelage as well, displaying an emphasis on beautifying home and school grounds, and roadsides, and on preserving native vegetation. Aust's statement that his publications fell into two categories; practical and inspirational, likewise mirrored Miller's writings.[154]

Jensen's influence on Aust was more personal and of longer duration. Jensen's ecological design aesthetic is evident in Aust's 1920 design for the Council Rock Spring Garden in the ill-fated Lake Forest planned community on the south shore of Madison's Lake Wingra (a site that would later be purchased for the University of Wisconsin Arboretum).[155] Aust's plan, which was never executed, proposed, "restoration of the spring to its boiling, bubbling, untamed condition and restoration of the native plants and wildflowers found there before the advent of civilization."[156]

In February1920, Jensen gave a speech in the Wisconsin state assembly on the beauty of the native landscape, which Aust attended. Taking advantage of the contagious enthusiasm Jensen's speech generated, Aust gathered a group of in one of the Capitol's parlors immediately after Jensen concluded, and established the Wisconsin chapter of the Friends of Our Native Landscape (Wisconsin Friends). Michael Olbrich, then president of the Madison Parks and Pleasure Drive and later a major figure in the founding of the University of Wisconsin Arboretum, was a member of the first board of directors.[157] The stated purpose of the Wisconsin Friends echoed Miller and foreshadowed Leopold's

[154] Franz A. Aust, "The State Program – Wisconsin," *Landscape Architecture* XII, no. 2 (January 1922): 69-73.
[155] Aust also prepared landscape plans for another area adjacent to the future site of the Arboretum: the Nakoma subdivision, and Nakoma Golf Course, "General Development Plan for Nakoma, Madison, Wis.," (1920); and another portion of Lake Forest, "Landscape Plan for Floyd Place and Catlin Place, Lake Forest, Madison, Wis.," (1918).
[156] *Lake Forester* (Madison), 15 December 1920, 2.
[157] "Is Scenery Farthest Away Always Most Beautiful? Jensen Says No," *The Capital Times*, 23 February 1920, 4; and Tishler and Gheniou, 10.

1934 speech at the dedication of the Arboretum, "to secure and preserve examples of the native landscape types that existed in Wisconsin at the coming of the white man…"[158] Aust served as secretary from 1920 until his retirement from the university in 1943, and edited the group's newsletter. The Wisconsin Friends would be the longest-lasting chapter, and highly successful in conservation action and promoting landscape appreciation. Their advocacy would be key in establishing at least ten parks: Rocky Arbor, Aztalan, Nelson Dewey, Tower Hill, Devils Lake, Wyalusing, Terry Andrae, Roche a Cri, High Cliff, Rib Mountain and Peninsula State.[159] Finally, Aust and his colleague (and former student) in the Department of Horticulture, Longenecker (executive director of the Arboretum from 1933 until 1966), would frequently bring, or send, their students to study with Jensen at The Clearing.[160]

It was perhaps the combined influence of both Miller and Jensen that would shape Aust's perspective in the vision of the University of Wisconsin Arboretum as a laboratory of ecological restoration. In *The Prairie Spirit in Landscape to Gardening* (1915), Miller differentiates between a "wild prairie," a natural landscape of the pre-Euro-American settlement era, and a "cultivated prairie," a garden design using native plants to symbolize a prairie. He asks the question, "Can the prairie be restored?" Miller notes that the wild prairie has great sentimental appeal, and that people believed it gone forever, that "it never occurs to them that any restoration of wild prairie is possible." Miller disagrees, but cautions, "To re-create a big, wild prairie is a state-park proposition." Under the succeeding sub-heading, labeled, "Wanted – a Prairie Park," Miller quoted "one far-seeing citizen," likely Jensen,[161]

> Some day every middle-western state will make one prairie reservation before it is too late or re-create one wild prairie for the people to enjoy forever….This can perhaps be done on 1,000 acres, if the land rolls enough….For contrast, the big open space could be skirted by the other great element of Illinois scenery – the irregular border of woodland, which originally defined the typical Illinois prairie….The educational value of the park would be increased by combining with it an arboretum or botanical garden large enough to teach the people the names

[158] Articles of Incorporation, 13 March 1920, Friends of Our Native Landscape Papers, Wisconsin Historical Society Archives, M2013-69, Box 1, Folder 1.
[159] Tishler and Gehniou, 15.
[160] Grese, *Jens Jensen, Maker of Natural Parks and Gardens*, 135 and 148; Tishler and Gheniou, 12.
[161] Miller's biographer, Christopher Vernon, speculates that Miller left some of Jensen's quotes and ideas unattributed to minimize the impression that the book was all about one man: Jensen and his work and design philosophy. Vernon, Foreward to *The Prairie Spirit in Landscape Gardening*, xvii. If the quote was from someone else, it would likely have been attributed to that person.

> of the most interesting trees and wild flowers which they find in the adjacent woodland and prairie…[162]

Miller was referring to ecological restoration when he asked the question, "Can the prairie be restored?" At the University of Wisconsin Arboretum, Aust, Longenecker, Leopold, and others would answer Miller's question with a resounding "yes!"

THE HISTORY OF THE UNIVERSITY OF WISCONSIN ARBORETUM

John Nolen and the Madison Parks and Pleasure Drive Association: an Arboretum is Proposed

As early as 1910, distinguished city planner John Nolen had recommended that a large park be established around Lake Wingra, connected to Vilas Park. Nolen had also suggested an arboretum, patterned after the Arnold Arboretum in Boston, and located west of the University of Wisconsin campus on Lake Mendota. Nolen's reference to the Arnold Arboretum makes clear that he had a traditional collection of trees and shrubs in mind. In *Madison, A Model City*, Nolen wrote,

> The most serious lack [of the University of Wisconsin] is that of a garden and landscape features. A University, especially a State University devoted largely to horticultural and agricultural interests, should naturally recognize the scientific, practical, and aesthetic value of the beautiful outdoor laboratories that have proved so useful in other places. The University of Wisconsin should have a first class botanical garden of at least 20 acres; a water garden and aquarium; a good-sized arboretum, say 200 acres (the Arnold Arboretum in Boston has more than 200 acres); [and] a University forest of from 1,000 to 2,000 acres (the Harvard forest contains 2,000 acres)…[163]

Nolen had come to Madison at the invitation of the president of the Madison Park and Pleasure Drive Association (MPPDA), John M. Olin. From its founding in 1894 until it dissolved in 1938, the MPPDA transformed Madison from a city with one three-1/2 acre public park, to one with a wealth of parks, playgrounds, athletic fields, beaches and open space. The MPPDA was instrumental in securing almost all the parks created in Madison during that organization's 44 years. The MPPDA set high aesthetic standards, hiring the most talented landscape architects of the era to design these public improvements, most notably Simonds and Nolen. The MPPDA was formally organized in 1894, with 26 members. Olin (1851-1924) was chosen as president, and would prove to be a highly effective

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[162] Miller, *The Prairie Spirit in Landscape Gardening,"* 16-17.
[163] John Nolen, *Madison: A Model City*, (1911), 70, History Collection, http://digital.library.wisc.edu/1711.dl/History.NolenMadsn (retrieved 26 August 2014). Note that the suggestion of the Lake Mendota shore west of the existing campus was made on page 72.

leader. The MPPDA initially focused on pleasure drives, establishing over 17 miles of scenic roadways in the Madison area, much of along Lake Mendota, in its first five years. Membership grew to 400 by 1899, consisting primarily of Madison's leading business and professional men. They and their families were also the primary beneficiaries of the pleasure drives. The roadways were not accessible to the three-quarters of the population who could not afford to own or rent a horse. Although the MPPDA was highly regarded for what it had accomplished, it was criticized by some as elitist for this reason.[164]

The focus of the MPPDA abruptly changed in 1899, when several property owners offered to sell 14 acres to the city as a park. Before the city could respond, Daniel K. Tenney, a wealthy businessman and ardent supporter of the MPPDA, offered to buy the land and donate funds for its development. Tenney attached conditions to his gift that challenged both the MPPDA and the city to become involved in the support of public parks in the city. This gift and its conditions changed the character of the MPPDA from private to quasi-public, taking on the role of city parks department until a city parks department was created in 1938, and it marked an expansion in the focus of the MPPDA from pleasure drives outside the city to include in-city parks. Tenney Park (NRHP) itself set two precedents: it was the first Madison park that provided lake access for the public (a goal that other park philanthropists, notably Michael Olbrich, sought to fulfill); and it was a naturalistic design emphasizing native species. The original plan was the first in Madison by Simonds (1900); Nolen enlarged and modified it in 1911, maintaining its Prairie style. Olin also hired Simonds to design the Yahara River Parkway (1903), Vilas (1904), and Brittingham (1905) parks. Between 1906 and 1910, Simonds did not work with the MPPDA. However, in 1911, Simonds again became the MPPDA's consulting landscape architect, and continued in that role for many years.[165]

In 1908, Nolen (1869-1937) was a rising star in the new discipline of town planning, and Olin was determined to bring him to Madison. Olin secured a three-year commitment from Nolen for "preferred client" status for Madison. In April 1908, Nolen made his first presentation to the MPPDA, commending the accomplishments of the organization, and lauding Madison's beauty. Nolen spoke about the new planning movement, and recommended that Madison prepare a city plan. At the time, very few cities had begun to plan, although the idea was growing, stimulated by the City Beautiful movement and the 1893 Chicago World's Columbian Exposition. Madison civic leaders were intrigued, and over the next three years, Nolen visited several times, studying the city and presenting various recommendations for improving and beautifying Madison. Nolen unified his observations, recommendations, designs and renderings in a report presented in September 1910, and published as

[164] Mollenhoff, *Madison: A History of the Formative Years*, 2nd ed. The University of Wisconsin Press, (Dubuque: Kendall/Hunt Publishing, 1982), 221-22.
[165] Mollenhoff, 309-11, 321, and 450.

Madison: A Model City in 1911. It was in this document that Nolen recommended an arboretum, a botanical garden, an aquarium, and a forest for the university. But the city's golden era of park creation (1899-1910), funded by public donations and large monetary gifts from local philanthropists, was drawing to an end, and Nolen's plan was not well received beyond a small group of professional and business leaders. Although Madison ignored Nolen's plan, some of his recommendations were implemented over the years. Under Van Hise's tenure, 500 acres were added to the west end of the university campus; he attempted unsuccessfully in 1913 to prevail upon the legislature to acquire land for a university forest. And two men who were leaders in the MPPDA would tirelessly promote the creation of an arboretum for the university: Michael B. Olbrich, and Joseph W. Jackson.[166]

Michael Olbrich and the Madison Parks Foundation: Assembling Land for an Arboretum, Wildlife Refuge and Forest Preserve

Olbrich (1881-1929) was born in Illinois and raised in Wisconsin. A graduate of the University of Wisconsin (1902), Olbrich was a prominent attorney, and a politically-active proponent of Progressive reforms. Olbrich made the speeches nominating Robert M. La Follette at the 1912 and 1916 national Republican conventions, and acted as the state's deputy attorney general from 1919 until 1921, and as executive counsel to Governor John J. Blaine from 1921 until 1926. Olbrich was public-spirited, especially in conservation and the development of public parks. In addition to his active membership in the MPPDA, Olbrich was a member of the Getaway Club (a conservation group), and loved gardening with native plants, especially wildflowers. When Aust organized the Wisconsin chapter of Friends of Our Native Landscape in February 1920, Olbrich sat on the board of directors. Olbrich was recognized as an authority on Wisconsin wildflowers, especially lady slippers, such that the editors of the periodical of the Wisconsin Conservation Commission, *The Wisconsin Conservationist*, asked him to submit an article on the topic. Olbrich's essay, "The Culture of the Native Lady Slipper," was published in July 1921. Olbrich also corresponded with nationally-known wild flower nurseryman, Edward Gillett, of Gillett's Fern and Flower Farm in Southwich, Massachusetts, in 1921. In one of several exchanges, Olbrich confided that he was considering "instituting a movement for establishing…a wild flower park or refuge…devoted to the preservation of native flowers…"[167]

Olbrich worked independently of the MPPDA toward another of Nolen's recommendations, to "secure the most important lake frontages" on the shores of Madison's four lakes for public access.[168] In 1916,

[166] Mollenhoff, 325-334; and M.B. Olbrich, "The Wisconsin Arboretum," *The Wisconsin Alumni Magazine* 29, no. 9 (June 1928): 313.
[167] Tishler and Gheniou, 10; "M.B. Olbrich Commits Suicide," *The Capital Times*, 10 October 1929, 1 and 6; and M.B. Olbrich, letter to Edward Gillett, 11 June 1921, Michael B. Olbrich Records, Wis Mss UX, Box 1, Wisconsin Historical Society Archives.
[168] Cited in Mollenhoff, 332.

he obtained an option on 2,700 feet of Lake Monona's shoreline on either side of Starkweather Creek (part of present-day Olbrich Park), and offered it to the city of Madison. The city rejected the offer, perhaps because Olbrich insisted the park be named for La Follette, whose outspoken opposition to U.S. entry into World War I had made him unpopular. Undaunted, Olbrich joined with realtor Paul E. Stark and other citizens to acquire additional frontage, approaching the city again in 1921, with a plan drafted by Simonds. After some negotiation, the city of Madison agreed to buy the land on Lake Monona (by then 5,700 feet of shoreline adjacent to Starkweather Creek) for $50,000. Initially called Lake Monona Park, it would be named in honor of Olbrich following his death in 1929. The proceeds from its sale to the city would purchase the first parcel in what would become the University of Wisconsin Arboretum.[169]

In February 1922, Olbrich and Stark incorporated the Madison Parks Foundation (MPF), with a capital stock of $100,000. The purpose of the association was to secure property on Madison's lakeshores for public parks.[170] Olbrich was especially interested in acquiring land on the south shore of Lake Wingra, to fulfill Nolen's recommendation to establish a very large park there. Between 1922 and 1928, Olbrich made speeches to various local and state organizations promoting the idea and raising funds toward this effort. Olbrich's concept of what the park on Lake Wingra would comprise changed over time, but his commitment to making Madison the model city Nolen envisioned did not waver. In a June 1922 address, for example, Olbrich advocated purchasing 600 acres on the south shore of Lake Wingra for a "park preserve for wild life…[with] a wild flower garden…"[171] Olbrich's endorsement of the Izaak Walton League's resolution, to carry out "the restoration of the outdoor America of our ancestors" at the August 1922 meeting of that new conservation organization, formed in Chicago by sportsmen concerned about loss of fish habitat, may have affected Olbrich's concept for the park.[172] But it was likely Nolen himself who inspired Olbrich to propose an arboretum for the site.

In January 1923, Nolen wrote to Olbrich, apparently aware of the latter's role as successor to Olin in establishing public parks in Madison. Nolen wanted to know what progress had been made on his recommendations.[173] This, the first of a number of letters exchanged between the two men, appears to

[169] Court, *Pioneers of Ecological Restoration*, 7 and 14; and "Park Gift is Accepted By City Council: East Side Tract Donated by Olbrich and Other Citizens Accepted," *The Capital Times*, 27 August 1921, 1.
[170] Sachse, 15.
[171] "Remarks…June 15th, 1922," Michael B. Olbrich Records, Wis Mss UX Box 14, Wisconsin Historical Society Archives.
[172] Franklin E. Court, "Michael B. Olbrich's Role in the History of Wildlife Conservation in Wisconsin," unpublished manuscript, 2014, 6.
[173] John Nolen, letter to M.B. Olbrich, 30 January 1923, Arboretum Records 38/4/8, University of

have reinforced Olbrich's regard for Nolen's plan. Speaking to the Madison Woman's Club in March 1923, Olbrich requested members' assistance in carrying out Nolen's vision, by republishing *Madison: A Model City* and distributing it for use as a text in public schools. Olbrich then highlighted some of Nolen's recommendations, noting those that could yet be accomplished, and that the land "where he located Madison's major park is still available."[174]

In 1925, with Nolen's encouragement, Olbrich visited the Arnold Arboretum. Olbrich returned with literature on arboreta, and the determination to create an arboretum on the Lake Wingra park site. The arboretum Olbrich imagined would be like Harvard's, a collection of trees and shrubs, but large enough to incorporate native wild flowers, a wildlife sanctuary, and a forest preserve. Nolen had recommended these elements for the university, and Olbrich's appointment to the university's board of regents later that year placed him in an excellent position to advocate for the idea.[175] But first, Olbrich wanted to think through a proposal for such an arboretum, and to assemble the acreage needed.

Olbrich conferred with his friend, Edward M. Gilbert, professor of botany, about how to create an arboretum and what might be involved, and they visited natural areas around Madison. Olbrich would continue to educate himself on arboreta, wildlife and game management, and forestry, while raising funds through the MPF, and working with Stark to acquire more land. Olbrich and the MPF had begun assembling land along the south shore of Lake Wingra in 1922, with a 15-acre tract on the southwest edge of the lake (today the northwestern section of the Arboretum's Wingra Marsh, east of Manitou Way). That parcel was the first of four that the Stark's Madison Realty Company would either sell or give to create the Arboretum. All are located on the northwest corner of the Arboretum, and were a part of the Madison Realty Company's Nakoma subdivision, offered to Olbrich in the early to mid-1920s. The others were the Spring Trail Park (1-½ acres, east of Monroe Street), a 30-acre parcel just north of the Nakoma Golf Course, and a 10-acre parcel north of the 30-acre parcel. The only parcel that had been improved was Spring Trail Park, which had stone walls, steps, a dam and paths, built ca. 1927. Aust, who had served as consulting landscape architect on the plan for the Nakoma subdivision (1920), supervised the construction.[176]

Wisconsin-Madison Archives.
[174] "Olbrich Urges Woman's Club Help in Creating Sentiment for Nolen Model City Plan," *Wisconsin State Journal*, 25 March 1923, 10.
[175] Court, *Pioneers of Ecological Restoration*, 8.
[176] Aust, "General Development Plan for Nakoma, Madison, Wis."; and Court, *Pioneers of Ecological Restoration*, 24. The Spring Trail structures do no appear on the Nakoma plan. The walls were reputedly designed by Frank Lloyd Wright, but no evidence has been discovered to support that contention.

As early as 1922, Olbrich and the MPF had been trying to secure an option on the Charles Nelson farm. The Nelson farm was a 140-acre tract with Lake Wingra frontage, its northern end sandwiched between Nakoma (to the west) and another early twentieth century development, Lake Forest (to the east). It would form the heart of the Arboretum; it also contained two groups of effigy mounds (extant, NRHP). The MPF secured an option on the property, but, due to a strange series of events, would be unable to purchase it until it went into foreclosure in 1929.[177]

The sixth and final tract that Olbrich and the MPF would secure for the Arboretum was a part of the Lake Forest development. The Lake Forest Land Company, owned by developer Leonard Gay and contractor Chandler B. Chapman, had platted Lake Forest in 1916. The plat featured a circular civic center (with shops and public buildings), a broad street (Capitol Avenue) running diagonally toward the Capitol, parkland along Lake Wingra, and 1,000 residential lots. Aust prepared a landscape plan for one section of the plat (1918), as well as a scheme for Council Rock Spring Garden (1920).[178] The Lake Forest development experienced a series of setbacks, and in 1922 the mortgage company funding the venture failed, leaving behind concrete roads that gradually sank into the marsh, giving the area the name the "Lost City."[179] Olbrich arranged for the MPF to purchase a 50-acre parcel on the south shore of Lake Wingra, abutting the Nelson farm, from the Lake Forest Land Company in 1927.[180]

The six tracts that Olbrich had assembled were contiguous, and together formed a 245-acre parcel on the south shore of Lake Wingra. This was sizable, but Olbrich intended to enlarge the parcel to at least 1,000 acres. In 1927, Olbrich, still a member of the board of regents, offered to sell (or transfer options on) the 245 acres to the university. Olbrich urged the establishment of an arboretum that would not only preserve trees for the enjoyment of the public and for scientific study, but that would also be a wildlife refuge. The regents passed the following resolution on December 7, 1927,

> That the unpledged balance in the Tripp Estate, approximately $83,000, be appropriated to aid in the purchase of land adjoining Lake Wingra and the Nakoma Course for a Forest Preserve Arboretum and Wild Life Refuge...with the understanding that at least as much more will be provided.[181]

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[177] These events, which included murder, suicide, and fraudulent "high vitamin" eggs, are recounted in Franklin E. Court, *Pioneers of Ecological Restoration,* (Madison: The University of Wisconsin Press, 2012),25-29.
[178] *Lake Forester* (Madison), 15 December 1920.
[179] Mollenhoff, 345-46.
[180] Court, *Pioneers of Ecological Restoration,* 30.
[181] *Minutes of the regular meeting of the Board of Regents of the University of Wisconsin, December 7, 1927,* Board of Regents of the University of Wisconsin, 1927, 12,

Olbrich immediately set out to raise the matching $83,000, enlisting Gilbert to appeal to university staff. Olbrich also wrote to Nolen, asking for his advice (particularly with regard to the construction of a road through the proposed site), and acknowledging inspiration from *Madison: A Model City*,

> For two years I have been seeking to create a combined enterprise based on your suggestions [of a major city park surrounding Lake Wingra and a botanical garden, water garden, etc. for the university] and patterned somewhat after the Arnold Arboretum by taking over the lake shore area as a University project – a living laboratory in everything that has to do with wild life…furred, feathered or finned, together with shrubs, wild flowers, etc.[182]

Although there is no record of a response from Nolen, in January 1928, Olbrich wrote to Zona Gale, famed playwright and novelist and a fellow regent, that he had received encouraging advice from Nolen, and requesting her assistance in securing an honorarium for Nolen to lecture at the university.[183] On January 15, the *Capital Times* reported learning from Olbrich that Nolen might come to Madison to work on the design for the Arboretum.[184] Olbrich was unsuccessful in this endeavor, but he did obtain the assistance of Simonds.

In early May 1928, Olbrich visited the Morton Arboretum in Lisle, Illinois, one of the few arboreta in the Midwest, dating to 1922. Joy Morton wrote to Olbrich on May 14 to explain that Charles S. Sargent (long-time director of the Arnold Arboretum, who had died in 1926) had suggested the general plan for the Morton, and Simonds was responsible for the landscape design.[185] Olbrich knew Simonds through the MPPDA, and brought him to Madison on May 17. Olbrich reviewed his proposal with Simonds that morning, and the two addressed the Madison Rotary Club over lunch. This address was significant in two ways: it illustrates Olbrich's (and Simonds') vision for the Arboretum; and it energized at least two men who were present and would play significant roles in the history of the Arboretum, Joseph W. Jackson and Aldo Leopold. Both would sit on the first Arboretum Advisory Committee (1932) and would play significant roles in the development of the Arboretum beyond

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http://digital.library.wisc.edu/1711.dl/UWBoR.Dec71927 (retrieved August 31, 2014).

[182] M.B. Olbrich to John Nolen, 2 December 1927, Arboretum Records, 38/4/8 Box 3, University of Wisconsin Archives.

[183] M.B. Olbrich to Zona Gale, 3 January 1928, Arboretum Records, 38/4/8 Box 3, University of Wisconsin Archives.

[184] "Local Park Board is Urged by MacLean, Ex-Resident, Would Have the Power to Impose Tax, John Nolen May Come Here to Work on Arboretum Design," *The Capital Times*, 15 January 1928, 2.

[185] Joy Morton to M.B. Olbrich, 14 May 1928, Arboretum Records, 38/4/8 Box 3, University of Wisconsin Archives.

that.[186]

Simonds spoke to the Rotary Club extemporaneously, mirroring Olbrich's proposal to combine Nolen's suggestions. Olbrich's remarks to the Madison Rotary Club began by quoting Simonds,

> An Arboretum is a museum of trees and shrubs, a place where specimens of each kind of plant having a woody growth and hardy in this locality may be studied…An arboretum, however, should be more than a museum. It should be a work of art….it should be a beautiful place, affecting one like a beautiful painting, a great musical composition, a poem, a magnificent building, or the work of a great sculptor…[187]

Olbrich then reviewed the recommendations Nolen had made for the university in *Madison: A Model City*, briefly described the Arnold and Morton arboreta and Shaw Gardens (St. Louis), and stated, "[t]hose specializing in such development pronounce the Wingra project to exceed in its possibilities those of any of the institutions mentioned."

Olbrich then turned to the site's potential as a wild life refuge. Olbrich had conferred with Jack Miner, who had studied the migratory patterns of waterfowl and game birds in Ontario, and had created the "Jack Miner Bird Sanctuary" near Kingsville, Ontario, the first such refuge in North America. Miner had pronounced the Lake Wingra site ideal for projects such as his, Olbrich stated,

> [The] character [of the site] has led to the hope that the project embody the aspects of a wild life refuge and game preserve in conjunction with the botanical phases of the institution…those interested look forward to the development of a [wild life] conservation laboratory…administered under University auspices to further and encourage the [wild life] conservation program through the state.[188]

Olbrich closed his speech with an appeal that reflected his Progressive social ideals, "This arboretum or park will bring back into the lives of all confronted by a dismal industrial tangle, whose forces we so little comprehend, something of the grace and beauty which nature intended all to share…"

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[186] Court, *Pioneers of Ecological Restoration*, 14-15.
[187] "Arboretum Is Real Need To State – Olbrich, Makes Urgent Appeal For Institution Before 200 Rotarians, Guests," *The Capital Times,* 17 May 1928, 1 and 6.
[188] "Arboretum Is Real Need To State – Olbrich, Makes Urgent Appeal For Institution Before 200 Rotarians, Guests," 6; and Sachse, 17.

Olbrich then quoted Thoreau's essay "Walking."[189] Leopold was so moved by Olbrich's May 17 address as to write Olbrich, expressing regret that he could not make a financial contribution, but offering to help work on the project. Jackson, who had previously written Olbrich with an offer of assistance, was said to have been "set on fire" by Olbrich's speech, and would soon succeed Olbrich in spearheading the drive for the Arboretum.[190]

Although Olbrich did not discuss the forest preserve component of his proposal at the Rotary Club meeting, Simonds' off-the-cuff remarks at the May 17 luncheon included the statement, "We should have arboretums for the production of lumber in our state."[191] Forestry was also a focus of Olbrich's June 11 address to the Madison Kiwanis Club. Olbrich was knowledgeable about forestry issues, having been instrumental in the enactment of the "Forestry Amendment" to the Wisconsin Constitution in 1924, enabling state funding for forest preservation.[192]

Speaking before the Kiwanis, Olbrich urged the creation of an arboretum "as an experiment ground to learn how to cope with problems of reforestation, [and] replenishing of game and fish." Olbrich had consulted Raphael Zon, distinguished forest researcher who had established the Forest Service's program of forest experiment stations in 1908, and was directing the Cloquet Forest Experiment Station, associated with the University of Minnesota, in 1928. Zon would also serve on the first Arboretum Advisory Committee (1932). Olbrich quoted Zon's facts and figures on the dwindling timber supply, which Zon predicted would run out within 12 years without intensive reforestation efforts. Calling the rapid deforestation a "social and economic tuberculosis," Olbrich exhorted,

> What we ought to have without delay is 1,000 to 2,000 acres of land in Madison. This tract along Lake Wingra…will furnish a laboratory for studying seed production, tree breeding and grafting, experiment in spacing trees and determination of the relation of soil condition to tree growth.[193]

Olbrich's vision of the Arboretum had several elements. It would be a place whose physical features would be enhanced by naturalistic landscape design, creating a work of art that would lift the spirits of all people. It would be an outdoor laboratory for education and scientific study that would incorporate

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[189] "Arboretum Is Real Need To State – Olbrich, Makes Urgent Appeal For Institution Before 200 Rotarians, Guests," 6.
[190] Court, *Pioneers of Ecological Restoration*, 16.
[191] O.C. Simmonds [sic] Views Site of Madison Arboretum as Ideal, Believes City Should Lead in Arboretae," *The Capital Times*, 18 May 1928, 7.
[192] Court, "Michael B. Olbrich's Role in the History of Wildlife Conservation," 7.
[193] "State is Only 50% Efficient – Olbrich," *The Capital Times*, 12 June 1928, 5.

a collection of trees and shrubs hardy enough to thrive in Madison's climate, as well as native plants, especially wild flowers, and a wild life sanctuary, particularly for waterfowl and game birds, and a forest preserve that could be managed sustainably. It would produce research that would support wild life conservation and reforestation statewide. Although Olbrich's proposal did not include the restoration of a prairie or any other pre-Euro-American settlement environment, the elements Olbrich envisioned supported the development of that idea. Despite Olbrich's efforts, the land for the Arboretum had not yet been transferred to the regents in the fall of 1929. Olbrich, embroiled in financial difficulties on the eve of Stock Market Crash of 1929, committed suicide on October 9, 1929. Without Olbrich's leadership, his dream of an arboretum stalled. [194]

Joseph Jackson Successfully Revives the Arboretum Proposal

In November 1931, Stark convinced Jackson to lead an effort to rekindle the arboretum project. They prevailed upon the MPF to reinstate the Citizens Committee, to support the initiative. Jackson energized not only the Citizens Committee, but also the secretary of the regents, Maurice E. McCaffery, a staunch advocate of the project. Jackson and McCaffery orchestrated meetings between the Citizens Committee and the regents, and on April 26, 1932, the regents agreed to accept the deeds to the 245 acres the MPF had assembled. The official transfer took place in July. [195]

On August 27, 1932, the university announced the establishment of the University of Wisconsin Arboretum, "which will be devoted to the development of trees and plants, to the solution of reforestation problems, and the propagation of wild life..."[196] A drawing prepared by Albert F. Gallistel, and architect and the university's superintendent of buildings and grounds, showed the parcels that made up "The University of Wisconsin Arboretum and Wild Life Refuge." The announcement noted that the university hoped to substantially enlarge the Arboretum, and listed the names of the faculty that President Glenn Frank had appointed to the Arboretum Committee (AC), as well as the members of Arboretum Advisory Committee (AAC).[197]

The Arboretum Committee and the Arboretum Advisory Committee Are Convened

The AC was a cross-disciplinary team, chaired by Edward M. Gilbert (botany), who had worked with Olbrich to plan the Arboretum. The other faculty members were James G. Dickson (plant pathology), Gallistel (buildings and grounds), L.J. Cole (genetics), Chauncey Juday (zoology), Norman C. Fassett

[194] Sachse, 15-18; "M.B. Olbrich Commits Suicide," 1 and 6; and Court, *Pioneers of Ecological Restoration,*17.
[195] Sachse, 21-22; and Court, *Pioneers of Ecological Restoration*, 18-21.
[196] "Announce Establishment of Wisconsin Arboretum," *The Wisconsin State Journal*, 28 August 1932, 1.
[197] "Announce Establishment of Wisconsin Arboretum," 4.

(botany), F.B. Trenk (forestry), George Wagner (zoology), and Franz Aust (horticulture). Maurice McCaffery (representing the regents) also sat on the AC. The AAC initially consisted of E.A. Birge (limnology), H. L. Russell (dean, College of Agriculture), C.P. Winslow (director, U.S. Forest Products Laboratory), Aldo Leopold (former associate director of the U.S. Forest Products Laboratory, and then consulting forester and game management specialist), Paul D. Kelleter (Wisconsin Conservation Commission [now the Department of Natural Resources]), Raphael Zon (U.S. Forest Service), and Joseph W. Jackson (included for his long-term dedication to establishing the Arboretum).[198] The task of the AC, with the assistance of the AAC, was to oversee the development of the Arboretum. Gilbert organized the first meeting of the two committees for November 26, 1932, at the University Club. There was one agenda item, "a general presentation of the entire situation with reference to the Arboretum, and the formulation of plans relating to the project."[199]

The AC reviewed suggestions from its members, from the AAC, from the regents, and from the public. Although there was pressure to develop the Arboretum as a large, landscaped park, with recreational areas and picnic grounds, the AC was determined to establish an outdoor educational and research laboratory. In December 1932, the AC approved Gallistel's proposal for a road through the Arboretum. Gallistel's plan conformed to naturalistic design principles, consisting of a narrow, graveled roadway through the tract following the grades and curves so as to be unobtrusive, and minimal parking (foot paths would provide additional access to research areas). In the spring of 1933, work on clearing out the existing farm buildings and constructing the road began, supervised by G. William Longenecker. Longenecker also supervised the beginning of the first experiment in reforestation in the summer of 1933. This was the "pinetum," a planting of 13,000 red and white pines, and about 2,000 spruce on part of the 190-acre Bartlett-Noe parcel, added to the Arboretum in April 1933.[200] By 1941, this would transition to an ecological restoration project, with a "red and white pine association," and a "white spruce association" under development.[201] Since 1953, this 21-acre pine plantation has been called the "Leopold Pines."[202]

The AC agreed that a complete analysis of the property was needed to guide the master plan.

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[198] "Announce Establishment of Wisconsin Arboretum," 4; and Court, *Pioneers of Ecological Restoration,* 48-49.
[199] University of Wisconsin Arboretum, Minutes of Meetings of the Arboretum Committee, Meeting of 26 November 1932, Arboretum Records, 38/1/11, University of Wisconsin-Madison Archives.
[200] Sachse, 26; Court, *Pioneers of Ecological Restoration,* 31, 52-53; and "Announce Establishment of Wisconsin Arboretum," 4.
[201] G. William Longenecker, "Journal Paper #1: University of Wisconsin Arboretum," *Parks and Recreation* (repr.; September 1941), 6.
[202] Court, *Pioneers of Ecological Restoration,* 155-56.

Professors directed students in conducting many of the investigations, initiating the Arboretum's role as an educational and research laboratory. Botany professor Fassett had sent students in his classes to identify and catalog plants on the site as early as 1928, in anticipation of the regents' acceptance of the property. Beginning in 1933, students also conducted topographical, drainage and soil surveys. As part of the analysis, Charles E. Brown, curator and director of the State Historical Society of Wisconsin museum, also worked with students to map and mark the effigy mounds. Wild life and insect censuses would follow.[203]

The AC was not always unified in its approach to developing the Arboretum, but did find ways to compromise, as the appointment of the first director of the Arboretum illustrates. In August 1933, the regents approved the creation of a new chair in game management (Department of Agricultural Economics, College of Agriculture), and appointed Leopold as the first professor of game management. Operating under the impression that the AC had made the recommendation, the regents also named Leopold the director of the Arboretum. However, the AC was still debating the issue and, further, had no funds to employ a full-time director. By June 1933, Gilbert was advocating Longenecker as director; others, notably Jackson, proposed Leopold as director. Gilbert was concerned that if Leopold were named director, the focus of Arboretum research would be on wild life and game management, to the exclusion of botanical and ecological research. The Arboretum Committee reached a compromise, and in October 1933, at their request, the regents changed Leopold's title to research director, and named Longenecker executive director.[204]

Leopold, Longenecker, and the Special Committee on Arboretum Planning Set the Purpose of the Arboretum

Leopold and Longenecker, with their diverse backgrounds and successful working relationship, and the assistance of the Special Committee on Arboretum Planning (SCAP, a subcommittee of the AC), would guide the development of the Arboretum and create something new: a laboratory for restoring all the parts of a plant-animal community, now called "ecological restoration."

Leopold (1887-1948) was born in Iowa and attended Yale University, completing a master's degree in forestry in 1909. Leopold immediately joined the USFS, working in Arizona (1909-1911), and New Mexico (1911-1913) before taking charge of a new effort for the USFS in recreation, and game and

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[203] "'U' Botany Students Make Plant Survey of Proposed Arboretum Site," *The Capital Times,* 1 June 1928, 2; Sachse, 27; Court, *Pioneers of Ecological Restoration,* 50; and Aust and Longenecker, 183.
[204] Court, *Pioneers of Ecological Restoration*, 57-59, and 63-64; "New U.W. Department to Apply Farm Methods to Raising Game, Leopold Will Direct Experiments, Arboretum," *The Wisconsin State Journal,* 15 August 1933, 1; and "Longenecker is Director of U. Arboretum, Regents Select Leopold for Research Chief," *The Wisconsin State Journal*, 15 October 1933, 1.

fish management (1915-1918). Leopold was in charge of operations for twenty million acres of national forests in the southwest (1919-1924), during which time he collaborated with Arthur Carhart, the USFS's first landscape architect. He then served as associate director of the U.S. Forest Products Laboratory (1924-1928), associated with the University of Wisconsin, and lectured on game management (1928). Leopold left the USFS, conducting wild life and game surveys and writing *Game Management* (published 1933). He briefly directed erosion control projects as part of the New Deal administration (1933) before accepting the professorship in game management at the university.[205] Leopold's national prominence in game management is reflected by his appointment to the President's Committee on Wildlife Restoration in 1934. One of the policy recommendations made by that committee became a federal law in 1937, the Wildlife Restoration Act (Pittman-Robertson Act, which sought to restore wildlife by preserving habitat funded through excise tax on fire arms and ammunition).[206]

Longenecker (1899-1969) was born in Wisconsin. A student of Aust, he earned a bachelor's in horticulture (1924), and later became the first to complete a master's in landscape architecture at the university (1929). Longenecker combined extensive knowledge about plants and plant ecology with an artist's talent for landscape design, and was skilled in drawing and painting. Longenecker worked for Gallistel in the Department of Buildings and Grounds from 1926 until his appointment as executive director of the Arboretum in October 1933.[207] In May 1933, as Longenecker was supervising the removal of buildings from the Arboretum and the beginning of construction on the road, he wrote to Zon (USFS, and member of the AAC), "I should like to see the Arboretum developed as you have suggested by the planting of fairly large naturalistic groupings…Then it would be possible to develop natural ecological units of trees, shrubs and flowers compatible with each other."[208]

This is the first written reference to placing plants by ecological groupings, or plant "societies" as Cowles had named it, at the Arboretum. Leopold would elaborate on this in his speech at the dedication of the Arboretum.

On December 2, 1933, the AC appointed the SCAP, composed of Aust (chair), Fassett, Trenk, Leopold

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[205] Susan L. Flader and J. Baird Callicott, *The River of the Mother of God and Other Essays by Aldo Leopold,* (Madison: The University of Wisconsin Press, 1991), xiii-xiv; Sachse, 25; and Court, *Pioneers of Ecological Restoration,* 71.
[206] Hall, 138.
[207] Court, *Pioneers of Ecological Restoration,* 68-70; and "Bill Longenecker: Far-Sighted Planner," *The Wisconsin State Journal*, 21 May 1967, 4:3.
[208] G. William Longenecker to Raphael Zon, 9 May 1933, Arboretum Records, 38/3/1, Box 1, University of Wisconsin Archives.

and Longenecker.[209] The SCAP agreed that the restoration of examples of the flora of Wisconsin would be the primary purpose of the Arboretum.[210] The collaboration of the SCAP, especially Aust, Fassett, Leopold, and Longenecker, brought together the perspectives that created the vision of the Arboretum. Gilbert's role, as chair of the AC (1933-39) was likely also substantial, although research has not revealed the extent of his contribution. In Aust's background was Wilhelm Miller's 1915 challenge to re-create a prairie of the pre-Euro-American settlement era, as well as naturalistic landscape design employing ecological principles. Fassett was a botanist and plant ecologist, who specialized in aquatic plants, and was certainly well-versed in plant societies and ecological succession. He may also have been familiar with the work of botanist Edith A. Roberts at Vassar College to re-create the plant communities of Dutchess County, New York beginning in the 1920s.

In January 1934, Leopold proposed that Fassett supervise a project in the Arboretum in "prairie grass dissemination by planting sods in land now occupied by agricultural weeds and exotic grasses."[211] Exactly whose idea this was is unclear; nostalgia for the beauty of the prairie was expressed by at least two members of the AAC (Jackson and Brown), and grassland was the habitat for several of the game birds that Leopold wanted to attract to the Arboretum.[212] Trenk was the campus forester, and Leopold represented wild life preservation and game management (which Olbrich had first proposed). Longenecker had been recommending grouping plants by their natural associations since at least May 1933, and appears to have been more interested in trees and shrubs, especially those suitable to Wisconsin's soil and weather conditions, than in prairies.[213] Leopold would weave these perspectives together in his speech at the dedication of the Arboretum, the first to state the purpose of the Arboretum as a laboratory for restoration ecology.

Leopold, Longenecker, and Aust Articulate the Purpose of the Arboretum

On June 17, 1934, the Arboretum was dedicated with a variety of speeches, held in the former Nelson barn. The Nelson barn (not extant) was located in the present administrative/service area of the Arboretum. Nolen attended the dedication, invited in recognition of the inspiration for an arboretum *Madison: A Model City* provided. Gilbert was the master of ceremonies, introducing speakers representing the regents, the Wisconsin Conservation Commission, the university, and the Ho-Chunk

[209] University of Wisconsin Arboretum, Minutes of Meetings of the Arboretum Committee, Meeting of 2 December 1933, Arboretum Records, 38/1/11, University of Wisconsin-Madison Archives.
[210] John T. Curtis, "Information Bearing on Arboretum Policy," 1948, University of Wisconsin-Madison Arboretum Archives.
[211] Aldo Leopold to E.M. Gilbert, 10 January 1934, Arboretum Records, 38/3/1, University of Wisconsin-Madison Archives.
[212] Court, *Pioneers of Ecological Restoration,* 96-97.
[213] Court, *Pioneers of Ecological Restoration,* 68-71.

nation. Longenecker also spoke. The newspaper reported that he described the extent of the Arboretum and its development to date, noting "A prairie was left in the center as a coordinating unit."[214] Because Longenecker's speech was not preserved, it is uncertain what else he said. Leopold followed with a short address, which the newspaper account reported, "stressed the new science which realizes the interdependence between men, plants, and animals."[215]

Leopold revised the speech, and sent what he called the "popularized version" to Jackson in September 1934. This version clearly articulated what the Arboretum would become. Leopold observed,

> An arboretum is ordinarily…a collection of trees. Sometimes an arboretum also serves as an outdoor library of horticultural varieties…where one can compare all the apples, all the lilacs, all the roses. Some advanced institutions arrange their tree-collection as natural associations…Such exhibits are called 'ecological groupings' and represent 'advanced thought' in arboretum management. We want to have all these things, but they by no means represent the main idea which we are trying to express here. It is something new and different…Our idea, in a nutshell, is to reconstruct, primarily for the use of the University, a sample of original Wisconsin – a sample of what Dane County looked like when our ancestors arrived here in the 1840s.

Leopold observed that Dane County had changed markedly since the 1840s and asked, "Why try to discover the exact processes by which the Wisconsin of 1840 became the Wisconsin of 1930?" Echoing George Perkins Marsh and his USFS roots, Leopold answered,

> Because we are just beginning to realize that along with the intentional and necessary changes in the soil and its flora and fauna, we have also induced unintentional and unnecessary changes which threated to undermine the future capacity of the soil to support our civilization.

Leopold then stepped beyond the 'environment in the service of man' perspective to conclude,

> This…is the function of the Arboretum: a reconstructed sample of old Wisconsin, to serve as a bench mark, a starting point, in the long and laborious job of building a permanent and mutually beneficial relationship between civilized men and a civilized landscape.[216]

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[214] "Owls Help 8 Speakers Dedicate U. Arboretum," *The Wisconsin State Journal*, 18 June 1934, 2:I.
[215] "Owls Help 8 Speakers Dedicate U. Arboretum"; and Court, *Pioneers of Ecological Restoration,* 74-79.
[216] Leopold's 'popularized version' is attached to a note to Joseph W. Jackson, 20 September 1934, Arboretum Records, 38/3/1, University of Wisconsin Archives.

Aust's and Longenecker's vision of the Arboretum as a place that combined traditional arboretum (the Horticultural, and later, Stevens Memorial Aquatic gardens), experimental forest, and wild life refuge with the new concept of ecological restoration was at least as well-developed as Leopold's. In 1936, Aust and Longenecker wrote, "[t]he Wisconsin Arboretum is created to restore at a point near the University, *types of primitive Wisconsin landscape and its flora and fauna*."[217]

This meets the definition of ecological restoration, "the attempt to return an ecosystem (including all living organisms in an area as well as their physical environment) to its historic trajectory."[218]

Aust and Longenecker wrote that three types of landscapes had been set aside for restoration: woodlands, marshes and prairie areas. They also indicated the Arboretum included a display area with exotic plants (the horticulture garden) carefully buffered from indigenous plantings, and that students in soils, civil engineering, entomology, zoology, botany, and landscape architecture were using the Arboretum as an outdoor laboratory. Aust and Longenecker noted that Leopold had established shelter and feeding stations for game birds and aquatic fowl, and that a recently-acquired parcel (the 190-acre Gardner Marsh, 1935) would be developed with lagoons and pools to improve the area as a wild life refuge. [219] They concluded with the comment that committing to long-term planning and long-term research programs was essential, reflecting the estimation Leopold made in his address earlier in the program, "it will take 50 years to [reconstruct a sample of what Dane County looked like]."[220]

Planning and Implementing the Development of the Arboretum

Leopold drafted the first wild life management plan for the Arboretum in October 1933. He dedicated himself to wild life research, especially on migratory game birds, and the habitats that would attract them. Leopold hoped to increase their numbers in the state, and to show farmers how to create habitat for game as a conservation measure and as a "crop" that farmers could harvest. Leopold established feeding stations in the Arboretum, planned improvements to Gardner Marsh, and undertook annual

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[217] Franz A. Aust and G. William Longenecker, "The University of Wisconsin Arboretum and Wild Life Refuge," in *The American School and University*, 182, 8th ed. (New York: American School Publishing Corporation, 1936). The italics are mine.
[218] Society for Ecological Restoration International Science & Policy Working Group, *SER International Primer on Ecological Restoration*, (Version 2, October 2004), http://www.ser.org/resources/resources-detail-view/ser-international-primer-on-ecological-restoration (retrieved 24 August 2014).
[219] Aust and Longenecker, 183-84.
[220] Leopold's 'popularized version.'

censuses of wildlife populations.[221]

As executive director, Longenecker was responsible for developing and implementing the master plan, and for the daily management of the Arboretum. Using the data gathered in the studies, Longenecker and the SCAP identified the soil and landform patterns, and the plant communities that fit ecologically in each area of the Arboretum, creating the master plan. The area for the prairie was the central organizing element, and included a small remnant of original prairie. Longenecker also selected and designed the layout for the horticultural display garden (since 1967, the Longenecker Garden), where shrubs are grown for their beauty and to test their hardiness to the Wisconsin climate. Between 1933 and the 1950s, Longenecker directed the planting of nearly all the trees and shrubs in the Arboretum, often staking out their locations himself. He also designed and supervised the construction of all the stone walls, shelters, ponds and footpaths through the 1930s.[222] There was no funding for development, as the university was financially dependent on the state legislature, which had little money to allocate due to the Depression. Labor for the construction projects came from a series of work relief programs.

In 1933, the main construction project was the road through the Arboretum, which Gallistel had designed. Dane County and the city of Madison operated a work relief program, funded by the federal Civil Works Administration (CWA) and assigned laborers to public works projects, including the Arboretum road. However, the laborers were mostly transients, quick to move on in search of better opportunities, their work assignments varied daily, and they had to be trucked in. By the time the CWA program ended in the April 1934, little progress had been made on the road, although the workers had helped Longenecker plant evergreens in the pinetum. CWA laborers had also installed the first plants in the planned "tamarack association," an ecological grouping that included tamarack trees, pitcher plants, orchids, and cotton grass.[223] However, the Federal Emergency Relief Administration (FERA) was launching a work program in Wisconsin, the Wisconsin Emergency Relief Administration (WERA), and Gallistel was able to negotiate an agreement for a camp in the Arboretum. The first group of men arrived in July 1934, pitching tents and erecting wooden buildings in conformance with Gallistel's camp layout. "Camp Arboretum" was set in the administration/service area adjacent to the former Nelson barn, which served as the dining hall. By mid-October 1934, ten barracks (one is extant) had been completed, each capable of housing 32 men. However, budget limitations prevented WERA from renting trucks or heavy equipment, such that when "Camp Arboretum" closed in July

[221] Court, *Pioneers of Ecological Restoration,* 71-72.
[222] Court, 68-70; and "Bill Longenecker: Far-Sighted Planner."
[223] "University of Wisconsin Arboretum and Wild Life Refuge," undated (ca. 1934) manuscript, author unknown, Arboretum Records, 38/1/11, University of Wisconsin Archives; and Aust and Longenecker, 183.

1935, the road was still incomplete. Further, the lack of heavy equipment and trucks for transport meant that other projects that had been proposed, such as Fassett's prairie sod planting experiment, and the excavation of ponds and the creation of an island as part of Leopold's plan for Gardner Marsh and his migratory waterfowl research, had not even begun.[224]

By January 1935, disenchantment with WERA had inspired the AC (apparently at Gallistel's suggestion) to recommend to the regents that they secure a company of the Civilian Conservation Corps (CCC) for the Arboretum. The CCC is among the better known of the New Deal relief programs. Initially known as the Emergency Conservation Work program, the CCC was authorized by Congress in March 1933. It was intended to address both high unemployment and the long-term deterioration of the natural resources, by funding conservation and recreation projects in the nation's parks and forests.[225] The Army provided basic conditioning programs for enrollees, and officers to oversee the building, organization, supply, and daily operation of the CCC camps. It transported, fed, clothed, and disciplined the men. The NPS and the USFS maintained general supervision in, respectively, the state and national parks, and the state and national forests. Ninety percent of the enrollees in the CCC were between the ages of 18 and 23, unmarried, and from families on relief. By the program's end in July 1942, the CCC had enrolled a total of 75,000 men from Wisconsin, and 92,000 enrollees had served in Wisconsin.[226] From their arrival in August 1935 until their departure in November 1941, CCC Company No. 2670, "Camp Madison," provided disciplined manpower and the desperately-needed equipment to carry out a host of projects, worth more than one million dollars and for which the university paid nothing. Camp Madison was the only CCC site in the U.S. that was associated with a university.[227]

The SCAP (Aust, Longenecker, Leopold, Fassett and Trenk) planned the development of the Arboretum, including the work of the CCC enrollees. Men of the CCC were involved in projects that fell into two categories: construction and environmental improvements. In the first category, the CCC may have built other encampment buildings in 1935, of which the Bath House, the Carpentry Workshop and Warehouse, Machine Shed, Tool Shed, Nursery Pumphouse, Root Cellar, and Pumphouse remain (figure 3).[228] The CCC completed the Arboretum road (now McCaffrey Drive) in late 1936, and erected the Rustic style stone entrances and walls of the Stevens Memorial Aquatic

[224] Sachse, 29-31; and Court, *Pioneers of Ecological Restoration*, 38-43 and 83-88.
[225] John A. Salmond, *The Civilian Conservation Corps, 1933-1942: A New Deal Case Study*, (Durham, North Carolina: Duke University Press, 1967), pp. 8-11; and Conrad L. Wirth, *Parks, Politics, and the People* (Norman: University of Oklahoma Press, 1980), pp. 67-70.
[226] Salmond, pp. 32-37, and 71-74.
[227] Court, *Pioneers of Ecological Restoration*, 87; and Sachse, 32-33.
[228] "Plat Showing Arboretum Buildings."

Garden (1936), Manitou Way (1937), and Olbrich Memorial (1937-40) entrance in the Noe Woods.[229] In 1938, they quarried the stone for the Kenneth Jensen Wheeler Council Ring, a memorial designed by his grandfather, Jens Jensen.[230] The CCC also laid footpaths, and built the Rustic stone Wingra Woods Shelter (not extant) and Gallistel Woods Shelter (1937, designed by Carl Riemenschneider). The environmental improvements the CCC carried out were typically designed by Longenecker and/or planned by experts on the AC. For example, Longenecker designed the layout of the horticultural gardens, a traditional arboretum display, and planted the first of the more than 200 lilacs that have made the gardens famous himself in March 1935. The CCC would plant these and other shrubs and trees, not only in the horticultural gardens, but throughout the Arboretum. In 1937 alone, the CCC planted more than 75,000 trees and shrubs in the Arboretum.[231] The CCC also dredged the pond for the Stevens Memorial Aquatic Garden (1936), and installed water plants according to Longenecker's design (likely developed with advice from Fassett). Longenecker also designed the plantings around the Kenneth Wheeler Council Ring (1938), and the Olbrich Memorial Entrance (an oak opening design, 1937-40), which the CCC installed.[232] Longenecker and Leopold planned 14 acres of lagoons and pools adjacent to Lake Wingra and Gardner Marsh, including Ho-Nee-Um Pond (1939), which the CCC excavated, expanding the bird refuge with nesting sites and cover.[233]

Ecological Restoration Begins

The CCC provided labor for the earliest surviving ecological restoration projects, which took place in the woodlands, the marshes and most famously, the prairie. The first ecological restoration project appears to have been Leopold's attempt to establish a "tamarack association," adjacent to Teal Pond. In his speech at the Arboretum's dedication, Leopold described the research Fassett and his students had carried out in the Wingra Marsh, which showed that a tamarack forest had existed alongside the marsh (and in much of the eastern half of Dane County) prior to Euro-American settlement.[234] Workers employed by the CWA had begun planting tamaracks, cotton grass, pitcher plants, orchids and other members of the tamarack plant community in 1933.[235] Efforts to develop the tamarack bog would continue, but ultimately prove unsuccessful. As Longenecker noted, considerable research was needed to develop thriving plant communities and even so, "mistakes will undoubtedly be made," and through experimentation, successful techniques were gradually established. In addition to historical and scientific research, Wisconsin's surviving natural areas would serve as models for ecological

[229] Court, *Pioneers of Ecological Restoration,* 92-93.
[230] Court, *Pioneers of Ecological Restoration,* 92 and 124.
[231] Court, *Pioneers of Ecological Restoration,* 124.
[232] Sachse, 43 and 48.
[233] Court, *Pioneers of Ecological Restoration,* 68-69, 92, and 124; and Sachse, 45-48.
[234] Leopold's 'popularized version.'
[235] "University of Wisconsin Arboretum and Wild Life Refuge"; and Aust and Longenecker, 183.

restoration: for example, Abraham's Woods (Green County, designated Wisconsin State Natural Area in 1961) for Gallistel Woods; and the Faville Prairie (Jefferson County, designated Wisconsin State Natural Area in 1952) for the Greene Prairie.[236]

The best-known ecological restoration in the Arboretum is the Curtis Prairie, the oldest restored prairie in the world. The procedures for establishing and maintaining an ecologically restored prairie were pioneered and refined at the Arboretum. Although proposed as early as January 1934, the first experiments in prairie restoration began in November 1935, when Fassett and his graduate student, John Thomson, worked with CCC laborers to transplant prairie sod and hay from prairie remnants in south-central and southwestern Wisconsin. The test plots included 40 species of prairie plants. Although they constituted the research phase, rather than the planting of the Curtis Prairie, today several of the test plots lie within the 60-acre Curtis Prairie. In 1936, Leopold hired ecologist Theodore Sperry (1907-1995), who had recently completed his dissertation on the root system of Illinois prairies. Leopold had written to Sperry to explain that he proposed that Sperry take charge of "this prairie restoration work," elaborating, "We want to construct… a flat Wisconsin prairie, together with its 'oak openings.'"[237]

During the planting seasons (April to November) between 1936 and 1941, Sperry supervised CCC enrollees in transplanting plants and sods, and planting seeds, representing 42 prairie species, and covering the western and central sections of Curtis Prairie. During the 1940s and 1950s, more species would be added to the prairie, especially the present eastern section (Robert McCabe, 46 species between 1942 and 1946; David Archbald, 156 species 1951-54). In 1939, Sperry initiated burn experiments. Controlled burn experiments would continue through the 1940s, guided by Sperry and John T. Curtis (1940), Leopold and McCabe (1943-46), and Curtis and Max Partch (1949-50), demonstrating that fire was critical for a healthy prairie, and establishing a regimen for prescribed burns, which is today considered best practice in prairie management.[238]

In 1941, Longenecker published a paper summarizing the history and progress of the Arboretum. By this time, the Arboretum encompassed 1,137 acres (21 separate acquisitions), almost its current size.[239] In 1935-36, three adjoining tracts at the northeast corner of the property (the Hoyt Transfer, the Island, and Gardner Marsh) had been added; followed by a 28-acre parcel between Monroe Street and the west

[236] Longenecker, "Journal Paper #1: University of Wisconsin Arboretum," 6.
[237] Aldo Leopold to Ted Sperry, 18 July 1935, Theodore Sperry-Gladys Galliger Collection, Pittsburg State University Archives, Pittsburg, Kansas, quoted in Franklin E. Court, *Pioneers of Ecological Restoration,* (Madison: The University of Wisconsin Press, 2012), 101.
[238] Court, *Pioneers of Ecological Restoration,* 98-108
[239] Longenecker, "Journal Paper #1: University of Wisconsin Arboretum," 3.

shore of Lake Wingra (the Gay-Way Tract) at the northwest corner of the Arboretum; and a 55-acre plat south of Martin Street and west of Fish Hatchery Road (Lake Forest lots, the southeast section of the Arboretum) in 1937. In 1940, the Arboretum acquired the Grady Tract, the southwest corner of the property that presently extends south of Highway 18/151 (the beltline highway).[240] The SPAC had been phased out, and the AC reorganized to include six professors and Gallistel as chair in 1940. Longenecker wrote that the following plant communities native to Wisconsin were under development in 1941: juniper knoll (begun 1936), tamarack bog (abandoned), oak-hickory (begun 1940), jack pine (begun 1933), hemlock ravine, red and white pine (begun 1933), white spruce, black spruce-balsam, arbor vitae, tall grass prairie, and upland prairie (both prairie sections are a part of the Curtis Prairie, 1936).[241] Except for the tamarack bog, all of these Wisconsin plant communities survive today, many of them located in either the Wingra Woods (in transition to become a northern sugar maple forest), the Gallistel Woods (in transition to become a southern Wisconsin mesic forest), the Grady Kettle Hole Forest (dry oak woods, begun 1940), or the Leopold Pines (begun in 1933 as a reforestation, became a restoration project by 1941). Some of these plant communities began with existing natural remnants, while others were re-creations of plant-animal communities that had been destroyed. Work carried out in the Wingra Marsh (begun 1934), the Wingra Fen (begun 1934), the Gardner Marsh (begun 1936), and the Teal Pond (a sedge meadow, begun 1940) restored and preserved existing ecosystems, such that these projects also meet the definition of "ecological restoration." All the extant ecological restoration projects at the Arboretum have required active and long-term management, which is another facet of the definition of ecological restoration. The acknowledgement and commitment of the AC and staff is reflected in Theodore Sperry's answer to the question, how long will it take to restore the prairie? "Roughly…a thousand years."[242]

These ecological restoration projects often did not involve introducing wild life, but rather, Leopold hoped that, by creating the appropriate habitat, with whole plant communities, and providing feeding stations, surviving wild life would flourish, and species that had vanished would return. This guided his plan for Gardner Marsh. As he stated in 1933,

> Given, then, the knowledge and the desire, this idea of controlled wild culture or 'management' can be applied not only to quail and trout, but to any living thing from bloodroots to Bell's vireos…A rare bird or flower need remain no rarer than the people willing to venture their skill in building it a habitat.[243]

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[240] Court, *Pioneers of Ecological Restoration,* 38-43, 119-21, 137; Sachse, 37.
[241] Longenecker, "Journal Paper #1: University of Wisconsin Arboretum," 6.
[242] *The Wisconsin State Journal*, 26 November 1939, cited in Sachse, 50.
[243] "The Conservation Ethic," Speech, Southwestern Division of the American Association for the Advancement of Sciences in Las Cruces, New Mexico, 1933, quoted in Susan L. Flader and J. Baird

Leopold and his assistants trapped, banded, and recorded bird species in the Arboretum annually through 1946. In 1938, for example, they enumerated 204 different species of birds, including a wide range of songbirds, aquatic fowl, and raptors. Mink, weasels, rabbits, possums, raccoons, woodchuck, muskrat, and various species of fish were also counted. Attempts to re-establish some birds and fish were successful, while others were not. The wood duck (Robert McCabe, 1944) and the woodcock (W.S. Feeney) were re-established; quail, present in the Arboretum in 1933, died out, and their reintroduction (1950) failed. In 1934, Leopold expressed the hope that the ruffed grouse and the prairie chicken could be brought back to the Arboretum; this could not be accomplished.[244]

Even before the 1930s, carp had overrun Lake Wingra. In 1936, limnologist Arthur D. Hasler seined Lake Wingra, the first attempt in the country to eradicate carp. The seining trapped garfish, pike, bass, and trout, which were returned to the lake, and additional trout were released. Although the seining was repeated several times through the 1940s, carp remained the dominant fish in Lake Wingra, and the trout did not thrive. As research director, Leopold supervised these and other projects in botany, zoology, fish, game, and soils. Every year, he lobbied for funding for additional research personnel, with little success. In 1940, at Leopold's request, the research directorship was divided, and Leopold continued as director of animal research, while John T. Curtis was named director of plant research.[245]

Curtis Arrives; Leopold Departs: the 1940s

Curtis (1913-1961) was born in Waukesha, Wisconsin. He earned a bachelor's degree in botany at Carroll College, and completed a doctorate in the field at the university in 1937, as a student of Fassett. Curtis served as a botany instructor at the university from 1937 through 1939. As director of plant research at the Arboretum, it fell to Curtis to accomplish the AC's original goal, of establishing all the plant communities native to Wisconsin within the Arboretum. To achieve this goal, Curtis and his students spent years identifying the plants that made up each of Wisconsin's plant communities, and completing detailed studies of them, which Curtis published as *The Vegetation of Wisconsin* (1959), a classic in the field of ecology. Curtis also supervised the continuing development and management of the Arboretum's ecological restoration projects, informed by his investigations of Wisconsin plant communities, devoting considerable attention to the prairie. Curtis taught in the botany department, as well, and his influence, through his students, was widespread.[246]

Callicott, *The River of the Mother of God and Other Essays by Aldo Leopold,* (Madison: The University of Wisconsin Press, 1991), 190-191.

[244] Robert Foss, "The Arboretum," *Wisconsin Alumni Magazine* 35, no. 5 (February 1934), 123.

[245] Court, *Pioneers of Ecological Restoration,* 115-118; and Sachse, 54-57.

[246] Court, *Pioneers of Ecological Restoration,* 126-29.

Leopold continued to direct animal research projects at the Arboretum. When Sperry left with the closure of the CCC camp in November 1941, the Arboretum Committee secured a biologist to assist Leopold.[247] John Catenhusen briefly held this post; he was succeeded by McCabe in 1943.[248] McCabe would prove invaluable, not only for his own research projects, but also for his careful management of the prairie, and the other plant communities, while Curtis was overseas (1942-1946).[249] McCabe (1914-1995) was born in Milwaukee. He attended Carroll College in Waukesha, graduating in 1939. On a visit to the university, McCabe met Leopold and became determined to study with him. McCabe completed a master's in wildlife management in 1943, and in 1946 became an instructor in the wildlife management department.[250] McCabe assisted Leopold in the Arboretum throughout the 1940s, and held the post of Arboretum biologist from 1943 until 1946. McCabe's able support, and Curtis' appointment as director of plant research, reduced Leopold's responsibilities, giving him time to dedicate to writing.

In 1941, Leopold had decided to write a book for the general public, promoting conservation and his ideas on conservation ethics and the relationship between humans and the environment. A prolific writer, he had already penned many essays and delivered a number of public lectures in which he had presented his view that humans, animals, plants, and soils were mutually interdependent, and that it was the duty of the individual to prevent the deterioration of the environment. In 1933, Leopold called this the "conservation ethic," publishing an essay by the same title.[251] Leopold refined and clarified the concept through a series of writings in the 1940s, culminating in the 1948 essay, "The Land Ethic," a revision and expansion of the 1933 version. Leopold wrote,

> All ethics so far evolved rest upon a single premise that the individual is a member of a community of interdependent parts. His instincts prompt him to compete for his place in that community, but his ethics prompt him also to co-operate…The land ethic simply enlarges the boundary of the community to include soils, waters, plants, and animals, or collectively: the land…In short, a land ethic changes the role of *Homo sapiens* from conqueror of the land-community to plain member and citizen of it…A land ethic, then, reflects the existence of an ecological conscience, and this in turn reflects a conviction of individual responsibility for the health of the land.[252]

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[247] Court, *Pioneers of Ecological Restoration,* 93.
[248] Sachse, 51 and 54.
[249] Court, *Pioneers of Ecological Restoration,* 138.
[250] McCabe completed a doctorate, and served as chair of the Department of Wildlife Management from 1952 until 1979. Court, *Pioneers of Ecological Restoration,* 142-43.
[251] "The Conservation Ethic," 183 and 190.
[252] Aldo Leopold, *A Sand County Almanac with Essays on Conservation from Round River,* (1966;

"The Land Ethic," and a number of other essays were published in *A Sand County Almanac* (1949), a year after Leopold's death. *A Sand County Almanac*, presenting Leopold's holistic and ecocentric land ethic, was highly influential in environmental ethics, fundamental in the modern environmentalist movement of the late 1960s, and remains one of the most respected books ever published in the field. Leopold's writings were influenced by, and reflected, his work at the Arboretum, and at his weekend retreat in Sauk County, "the Shack" (acquired in 1935). The Shack was designated as a National Historic Landmark (2009) for its association with Leopold and his monumental contributions to conservation. Leopold pioneered the science and profession of wildlife management, held the first chair in game management in the nation at the University of Wisconsin (1933). His joint appointment as director of research at the Arboretum gave Leopold the opportunity to explore game management strategies, and prepare the first wildlife management plan.[253] As an outdoor laboratory in which the ecological communities of Wisconsin would be restored, the Arboretum embodies Leopold's Land Ethic: humanity taking the responsibility for healing the land.

During the 1940s, work had continued on the various research, ecological restoration, and wildlife management projects. The first crabapple was planted in the horticultural gardens in 1942; today over 90 varieties of crab apples bloom annually. World War II drafted male personnel and students, constraining some of the more labor-intensive efforts such as tree planting, although on Arbor Day in 1943, some 300 female students planted the first trees in what is now the Evjue Pines (in the Grady Tract), a conifer forest dominated by red and white pines. Students also planted thousands of wildflowers in the Wingra and Noe Woods in the mid-1940s. The retirement of Aust in 1943 marked the first departure of one of the visionary founders of the Arboretum. Curtis returned to the Arboretum in 1946, as plant research director. Following Leopold's death in 1948, Curtis was named research coordinator.[254]

One project begun during World War II would be planted entirely by hand, by one man: Henry C. Greene. Greene (1904-1967) was born in Indiana and educated at the University of Washington in Seattle, finishing a master's in botany in 1929, and completing a doctorate in the same field at the University of Wisconsin in 1933. Greene was hired as an instructor in the botany department in 1937. Although Greene was a mycologist (specialist in fungi), he became interested in prairie plant communities as a result of joining Curtis in searching for prairie remnants in the mid-1930s. Greene surveyed the Grady Tract in 1942, finding areas with remnant prairie plants, and began planning a

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repr., Oxford, England: Oxford University Press, 2001), 171 and 186.
[253] Curt Meine, *Aldo Leopold, His Life and Work*, (Madison: University of Wisconsin Press, 1988), 408-11 and 506-20; Court, *Pioneers of Ecological Restoration*, 130-33.
[254] Court, 62, *Pioneers of Ecological Restoration*, 138-40, and 148.

prairie. He started planting what is now the Greene Prairie in 1943, applying the knowledge of soil and moisture requirements gained through studies of the Curtis Prairie. By 1951, Green had planted more than 12,000 mature plants and seedlings (in addition to seeds), accounting for more than 133 species, completing the majority of the planting of his 50-acre prairie. Greene's methodically planted, and meticulously documented prairie is regarded as one of the finest example of a restored prairie in the world.[255]

In 1949, the AC prepared a status report, which described the Arboretum's three research functions: development research, "primarily concerned with the methods whereby natural plant and animal groupings may be established and maintained"; descriptive research, taking inventory and assembling records of "flora and fauna, soil types, water supplies, and microclimate"; and individual research in the Arboretum on land plants and animals, aquatic plants and animals, soils, and the water cycle.[256] The report noted that research carried out at the Arboretum had already made significant contributions by developing procedures for controlled burns that eliminated exotic species and allowed native prairie grasses to flourish, as well as techniques for producing bait minnows on a commercial scale in lakes and streams while preserving native minnows. Studies had established the phases of several plant communities, such as the transition from oak opening to oak forest; and catalogued fluctuations in native, fur-bearing wildlife, such as muskrat and mink. Research to treat forest tree diseases such as oak wilt was also underway, although the effort to establish an experimental forest had been abandoned, due to lack of sufficient acreage, and "Experimental Forest Preserve" would be dropped from the Arboretum's title in 1954. The 1949 report reiterated the commitment to "continuous, long-time preservation of its plant [and animal] associations and land...as they become more completely integrated and developed with each passing year." It also outlined its plans to establish those Wisconsin plant-animal communities not yet present, and further develop those that were only partially complete, to a "maximum approximation of truly natural areas…" recognizing that active management would be needed to maintain the associations. The report also indicated that no formal gardens were planned (although the horticultural gardens would be continued), that the nursery (in the administration and service area) for propagating seeds and plants for the various plant communities would continue, and that classes ranging from botany to art had brought students to observe and study in the Arboretum.[257]

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[255]Court, *Pioneers of Ecological Restoration*, 140-42; Virginia M. Kline, "How Well Can We Do? Henry Greene's Remarkable Prairie," *Restoration & Management Notes* 10 (Summer 1992): 36; and "How Greene is This Prairie?" *University of Wisconsin-Madison News*, 25 March 1998, http://www.news.wisc.edu/4233 (retrieved 21 June 2014).

[256] Arboretum Committee, "The University of Wisconsin Arboretum," January 1949, Arboretum Records, 38/1/11, 2-5, University of Wisconsin Archives.

[257] Arboretum Committee, "The University of Wisconsin Arboretum," 6-11; and Court, *Pioneers of*

Research into Plant Communities Intensifies: the 1950s

In 1951, Curtis prepared the first Arboretum Master Development Plan, focusing on the plant-animal communities (figure 4).[258] The AC (still chaired by Gallistel), and Curtis, as research coordinator, followed the plan, maintaining and expanding the plant-animal communities and the plant nursery, as well as pursuing research to support these efforts. Learning opportunities for university classes also continued. In 1955, for example, 650 students in thirteen university classes used the Arboretum. By this time, in addition to the executive director (Longenecker) and the research coordinator (Curtis), the Arboretum staff consisted of a resident superintendent, a foreman, and ten part-time laborers. Since the 1940s, there had also been three part-time graduate student research assistants, a botanist, a biologist, and a soil scientist. The superintendent would oversee all research and maintenance projects, and take over the meticulous, record keeping necessary because the plant communities and forest associations were expected to take at least 50 years to mature. More than fifty research projects were conducted every year, involving soils, fish, birds, small mammals, and insects, as well as plants. Beginning circa 1950, planting began (with acorns) in the Southwest Grady Oak Savanna, the West Grady Knoll, and the Grady Oak Savanna. The annual increase in the number of projects made the need for an on-site laboratory increasingly acute. In 1952-53, the former CCC Bath House (extant) was converted into the Arboretum Laboratory. In 1952, the Arboretum acquired the last major parcel, the 27-acre Haen property, just east of the Grady Tract. The same year, Curtis launched a new initiative, the Seed Exchange, packaging some of the seeds of native Wisconsin plants Arboretum staff had collected for exchange with other arboreta and botanical gardens. Walt Disney Productions filmed the controlled burning of the Arboretum prairies in the spring of 1953 for a documentary, *The Vanishing Prairie.* The film won the 1954 Academy Award for a documentary.[259]

The Arboretum also faced challenges in the 1950s. The loss of Leopold deprived the Arboretum of its greatest wild life advocate, and although animal research continued, the title "wild life refuge" gradually ceased to be used, and was eventually dropped from the Arboretum's letterhead. This was also due to the AC's growing conviction that the Arboretum was too small to be a wild life refuge, and the fact that wild life populations in the Arboretum were becoming isolated by the beltline highway (built as a two-lane roadway through the Grady Tract in 1949), and encroaching suburban development, which boomed after World War II. The beltline highway initially took a 15-acre strip of

Ecological Restoration, 166.

[258] J.T. Curtis, "Arboretum Master Development Plan," March 1951, Arboretum Archives, University of Wisconsin Arboretum.

[259] Sachse, 98, 101, 116; Court, *Pioneers of Ecological Restoration,* 160, 163, 165, 166, and 173. The controlled burning of the Faville Prairie, a prairie remnant owned by the U.W., was also shown in the documentary.

land in the Grady Tract, including 12,000 plantings. When it was expanded to a four-lane facility in 1956, construction took another 15 acres, and many mature white pines, spruce, and sugar maples. An underpass was installed in 1956. The beltline highway and surrounding suburban areas impacted the ecological restoration projects as well. Runoff from the beltline highway caused silting and soil erosion, a problem that endures today. Sewage from suburban development along Monroe Street draining into the Stevens Pond led to the installation of a sanitary sewer line through Arboretum land northwest of Lake Wingra in the mid-1950s. Storm sewers flushed lawn fertilizer and other nutrients into Stevens Pond and Lake Wingra, causing smelly algae blooms (still a problem). Fire was also a hazard, sometimes intentionally set, other times due to carelessness. Vandalism and trash dumping were occasional issues. Some animals were nuisances as well. The Arboretum's many rabbits had been, and continue to be, a perennial problem, eating small plants and shoots. By 1958, the deer herd in the Arboretum had become large enough to cause serious damage to trees and shrubs. Efforts to shoot rabbits and deer created public relations problems.[260]

To gain support for the Arboretum in the face of highway construction, suburbanization, and other threats, the AC changed its position from protecting the Arboretum from the public, to one of active public outreach and education. Tours were offered to school groups, Boy Scouts, Girls Scouts, and garden clubs, and the number of visits increased to such an extent that Longenecker recommended including two full-time ranger-naturalists in the budget in 1954 (a request Leopold had made not long before his death in 1948). The AC concurred, but the university would not fund a ranger-naturalist until 1965. Public relations efforts included the publication of *Arboretum News,* beginning in 1952, which Greene edited.[261] *Arboretum News* presented the history of the Arboretum, introduced key personnel, highlighted research projects and publications, informed the public about features to see in the Arboretum – from which wildflowers were in bloom, to when to expect migrating birds – and provided notification of events such as speakers, and dates of controlled burns. Detailed maps were included. *Arboretum News* announced the retirement of Gallistel in 1959; he had served 20 years on as chair of the AC, and would continue as a member. The Gallistel Woods were named in his honor that year.[262]

Public Education Becomes Part of the Arboretum's Mission: the 1960s and the 1970s
When Gallistel retired in 1959, Curtis was named chair of the AC. Curtis' untimely death in 1961 marked the beginning of a period in which no new ecological restoration projects were undertaken. Management practices such as the regular burning of the prairies continued, and much of the research

[260] Court, *Pioneers of Ecological Restoration,* 160-67, 174-78; and Sachse, 68, 95.
[261] Court, *Pioneers of Ecological Restoration,* 168-173.
[262] *Arboretum News* 1, no. 1 (1952): 1-3; Court, *Pioneers of Ecological Restoration,* 179; *Arboretum News* 8, no. 4 (October 1959): 1-2.

descriptive of the progress of the restored plant-animal communities, rather than developing additional procedures in ecological restoration. In 1969, graduate student Jerry Schwarzmeier planted experimental plots of prairie plants, which James Zimmerman would expand in the 1970s, and that would become the Overlook Prairie. This marked the beginning of renewed activity and new projects in ecological restoration at the Arboretum, which continue today.[263]

Following Curtis' death in 1961, Grant Cottam, professor of botany, became chair. Cottam (1918-2009) was born in Utah, the son of eminent University of Utah ecologist, Walter P. Cottam. Grant Cottam earned a bachelor's in botany at the University of Utah in 1939 and, following service in World War II, completed a doctorate in ecology at the University of Wisconsin in 1948. Cottam had been an instructor in the botany department since 1949, and a member of the AC since 1950.[264] In 1962, the AC consisted of six members: Cottam, botany, chair; Gallistel, emeritus; Hasler, zoology; Greene, botany; Longenecker, horticulture; and McCabe, forestry and wildlife management. The AAC, which had seldom met since 1941, was officially abolished in 1962.[265]

When Curtis gave up his position as research coordinator to become chair of the AC in 1959, the research coordinator position was left unfilled. Some of the duties were carried out by a new position, the managing director, created when the resident superintendent retired in 1962, and combining some of the functions of the two positions. David Archbald became the first managing director in 1962. Archbald (1925-2012) was born in Buffalo, New York, and had completed a bachelor's in botany at the University of Buffalo in 1948. Archbald came to the university in 1948, and studied with Curtis, working with him on the prairie 1949-1954, and also helping to plant maple understory in the Gallistel Woods. Upon completing his doctorate in 1954, he became a researcher for U.S. Rubber in Indonesia, 1955-61, which awakened in him a deep concern for environmental degradation, and made him an environmental activist.[266]

During the 1960s, the Arboretum's primary mission remained managing its Wisconsin plant-animal communities, maintaining its horticultural gardens, and continuing soil, plant and animal research as well as a plant nursery to support these efforts (figure 5). There were about 30 projects a year, including a few new research initiatives, such as experimenting with fire as a management technique for fens and marshes, beginning in 1964. In 1965, 251 species of birds, 29 kinds of fish, 35 species of mammals, 26 amphibians and reptiles, more than 500 types of plants, and over 15,000 insects were

[263] William R. Jordan III and George M. Lubick, *Making Nature Whole: A History of Ecological Restoration*, (Washington, D.C.: Island Press, 2011), 105; and Kline, 121.
[264] Court, *Pioneers of Ecological Restoration,* 183.
[265] Sachse, 116.
[266] Court, *Pioneers of Ecological Restoration,* 191-92.

recorded in the Arboretum.[267] By 1970, the Curtis and Green prairies alone contained over 300 native plant species.[268]

The last of the Lost City lots were finally added to the Arboretum in the 1960s, bringing the property almost to its current size, thanks to Jackson, who had pressed the owners for nearly 40 years.[269] The 1932 caretaker's residence was demolished in 1962, and replaced with the Security Residence (extant) in 1968. For the first time since its founding, Arboretum got its own administrative office and a part-time secretary in 1961, in room 329 Birge Hall on the UW campus, in the botany department. The office would remain there until 1977.[270]

While the Arboretum continued to provide learning opportunities for college students in the 1960s, its educational mission was expanded beyond university students in two related public outreach initiatives: the creation of the Friends of the Arboretum (FOA), an organization that would promote and protect the Arboretum; and the development of a program of public education, beginning with the first ranger-naturalist, James Zimmerman.

Cottam and the AC helped organize the FOA in 1962, publicizing its establishment in the *Arboretum News*. The FOA began with two functions: to provide public support to help protect the Arboretum from the demands made by the rapid urban development around it, including highways, utilities, and residential subdivisions; and to provide funds to improve the facilities for the public use of the Arboretum, such as preparing trail guides, and marking trails. By November 1962, the fledgling organization had 180 members from all over the state, and even a few from outside the state. This number had surpassed 400 by 1965, and would rise to nearly 700 by 1970. The FOA supported the Arboretum's educational efforts in several ways. The FOA issued trail guides, placed trail markers, and produced a new Arboretum map showing the trails on one side, and the locations of the plant-animal communities on the other side. The FOA largely funded the production of a 30-minute film about the Arboretum (1964, which premiered to a packed house at the Wisconsin Union Theater), and the publication of a history of the Arboretum, *A Thousand Ages* (Nancy Sachse, 1965), as well as two identification guides, *Wisconsin Trees, A Picture Key* (F. Glenn Goff and Paul Zedler, 1964), and *Wildflower Families and How to Know Them* (James Zimmerman and Booth Courtenay, 1965).[271]

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[267] Sachse, 102.
[268] Vivien Hone, "U.W. Prairies – Where Man-Tall Grasses and Brilliant Flowers Abound," *The Capital Times*, 19 September 1970, 27.
[269] Court, *Pioneers of Ecological Restoration*, 200.
[270] *Arboretum News* 8, no. 4 (October 1959): 2; Court, *Pioneers of Ecological Restoration*, 180, 186.
[271] *Arboretum News* 11, no. 1 (January 1962): 1; *Arboretum News* 11, no. 2-3 (April-July 1962): 1-4; *Arboretum News* 13, no. 2-3 (April-July 1964): 2; *Arboretum News* 13, no. 4 (October 1964): 2;

Zimmerman, better known as "Jim Zim," was hired as a part-time ranger-naturalist in the spring of 1965. He had completed a doctorate in plant taxonomy at the university in 1958, and had been teaching children (at the Madison School Forest) and adults (at the Madison Area Technical College-MATC) about nature. At the Arboretum, Zimmerman conducted as many as two school tours a day in the spring of 1965, and his weekend guided tours, open to the public, attracted close to 500 people during July and August 1965 alone. It became clear immediately that there were more people interested in tours than Zimmerman could accommodate alone, so Rosemary Fleming, who had studied with him at MATC, was hired as tour coordinator in 1966. The FOA initially funded her position. Fleming developed a program of tours for school children, and a guide-training program. By 1967, Dane County was paying Fleming, the first full-time county naturalist in the nation, while the FOA paid the 12 guides Fleming had trained small amounts for each tour, a practice that has continued to the present (although the number of guides has doubled). Requests for tours increased annually. In the first half of 1969, for example, the guides conducted more than 400 tours for nearly seven thousand people. In August 1969, the Arboretum offered its first summer program for children. In 1971, Fleming organized a series of courses at the Arboretum to train outdoor educators; sixty people enrolled in the first year. The popularity of tours, programs, and classes in the Arboretum was so successful that by 1970, a new problem had arisen: how to keep the Arboretum's primary purpose of research viable, and protect the sensitive plant-animal communities, in the face of ever-increasing numbers of visitors.[272] The response of the Arboretum Committee was to provide more education. As Fleming noted,

> as public interest in the Arboretum mounts, understanding of measures necessary to maintain ecologically-sound plant-animal communities grows…The best insurance for securing and maintaining Arboretum goals is an educated and concerned public.[273]

In 1966, the Arboretum lost the last of its pioneers with the retirement of Longenecker. Longenecker had served as executive director of the Arboretum, and on the AC, since 1933. He had been a member of the SCAP. Longenecker was responsible for developing and implementing the master plan, and for the daily management of the Arboretum in the 1930s and 1940s. Between 1933 and the 1950s, Longenecker directed the planting of nearly all the trees and shrubs in the Arboretum, often staking out their locations himself. He also designed and supervised the construction of all the stone walls, shelters, ponds and footpaths through the 1930s. Longenecker provided public relations for the

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Arboretum News 14, no. 2-3 (April-July 1965): 1-2; and Sachse, 104-106.
[272] Court, *Pioneers of Ecological Restoration,* 173, 186-190, 200-05.
[273] Rosemary Fleming, "Arboretum Tours on the Grow," (1968), quoted in Franklin E. Court, *Pioneers of Ecological Restoration,* (Madison: The University of Wisconsin Press, 2012), 206.

Arboretum, giving slide presentations around the state, and representing the Arboretum at meetings of national organizations such as the American Park Executives and the American Association of Botanical Gardens and Arboreta. Longenecker also bridged the early visionaries of what the Arboretum could be through his connections to Aust, Fassett, and Gilbert, all of whom were his teachers (and through them, to Michael Olbrich and John Nolen). Longenecker held true to the vision of the Arboretum as a laboratory for re-creating Wisconsin plant-communities communities even as other leaders retired or departed, from Aust (1943), Gilbert (1946), Leopold (1948), to Fassett (1950), and as other scientists important to the development of plant-animal communities came and went, including Sperry (1941), Curtis (gone 1942-46, died 1961), and Greene (whose involvement in the Arboretum began in 1942), as well as the frequently-changing lineup of graduate research assistants. Longenecker was also the creator of the Horticultural Gardens that bear his name, and was chairman of the landscape architecture department for many years. [274]

Greene also retired in 1966. He had planted the Greene Prairie beginning in 1943 and meticulously recording everything he planted. He created what is regarded as one of the finest ecologically restored prairies in the nation. Greene also designed the trail system on the prairie. He also served on the AC for 20 years (1946-1966), and edited the *Arboretum News* from 1952 until 1963.[275] The departure of Longenecker and Greene marked the end of an era. The Arboretum was about to enter a period of administrative conflict as the modern environmental movement got underway.

Archbald had been concerned about environmental degradation prior to becoming managing director of the Arboretum in 1962. Social unrest and growing public awareness of environmental issues, especially pollution, energized Archbald. He argued that the Arboretum should actively counter environmental threats, help inform the public, and engage in protest. Archbald was not shy about sharing his views with the press. In 1969, Archbald produced a series of charts with statistics correlating population and pollution, and displayed them at the Arboretum. He then authored a controversial column on global environmental issues for the *Wisconsin State Journal*. The AC looked askance on Archbald's activities, and induced him to resign in 1970. His successor, Roger Clark Anderson, was also a committed activist. He would quickly grow frustrated with the AC, not only for their silence on environmental issues, but also for their failure to include the managing director in policy-making issues. Anderson resigned in 1973.[276]

The governance structure of the Arboretum had become dysfunctional. The managing director was subservient to the AC, but in the absence of Longenecker and Greene, there were no committee

[274] Court, *Pioneers of Ecological Restoration,* 68-70; and "Bill Longenecker: Far-Sighted Planner."
[275] Court, *Pioneers of Ecological Restoration,* 140-142.
[276] Court, *Pioneers of Ecological Restoration,* 211-13, and 222.

members with the time or energy to accomplish needed tasks. For example, discussion on a classroom, laboratory research, and public education center began in 1972, but the AC's dysfunction dragged out the planning process until 1976. In 1974, Katherine T. Bradley was named director of the Arboretum. She would serve until 1983. A native of New York state, Bradley had graduated from Vassar in 1943 (where she may have been a student of eminent botanist, Edith A. Roberts), earned a master's in botany at the University of Minnesota in 1944, and a doctorate from the University of Michigan in 1953. Bradley skillfully managed the AC, gradually shifting the control of much of the operation to the director, overseeing the acquisition of the last parcels that form the present boundaries of the Arboretum (extending the southeast property line to the tracks of the Chicago & North Western Railway, 1979-80), and increasing the number of professional staff. In 1974, she was able to add a full-time ranger position, to assist with the educational program as well as security. A full-time ecologist was added in 1975, "to plan the care and feeding of the ecological communities."[277] Virginia "Gina" Kline took the post. She had been an early Arboretum guide, had studied with Jim Zim, and had just completed her doctorate with Cottam. Kline's largest and most immediate task was planning and supervising the eradication of invasive species, which had spread in the prairies, woodlands, and wetlands. Kline organized volunteers for weekly work parties. In 1977, she began compiling data and preparing a comprehensive plan for all the Arboretum plant-animal communities, *Long Range Management Plan Arboretum Ecological Communities* (1992).[278]

With the completion of the McKay Nature Awareness Center in 1977 (now the Arboretum Visitor Center), Bradley hired William R. Jordan III as a full-time public services coordinator to recruit and train volunteers, and edit the *Arboretum News*. Jordan worked with Fleming to develop exhibits and slide shows to draw visitors into the center. He also proposed a new journal, which would provide technical information and current thinking about ecosystem restoration, repair and maintenance, for naturalists, botanists, ecologists, park and forest managers, landscape architects, and other interested parties. In addition to growing public interest in protecting the environment, the National Environmental Policy Act (NEPA) of 1969 required that any federal undertaking evaluate effects on the environment, and land restoration was increasingly employed as a mitigation measure.[279] One of the earliest examples of a land reclamation project in Wisconsin was a 1976 prairie restoration at the Jackson County Iron Company near Black River Falls.[280] Jordan believed that such a journal would not only fill a need, but could also highlight the research, accomplishments, and history of the

[277] Bradley, quoted in Franklin E. Court, *Pioneers of Ecological Restoration*, (Madison: The University of Wisconsin Press, 2012), 229.
[278] Court, *Pioneers of Ecological Restoration,* 220-240.
[279] Court, *Pioneers of Ecological Restoration,* 225, and 232-36.
[280] Darrel Morrison, "Native Plants for Man-Made Moonscapes," *Arboretum News* (summer 1978).

Arboretum, in turn leading to greater public appreciation, protection and funding for the Arboretum.[281]

The Arboretum Promotes Ecological Restoration: the 1980s

With the support of Bradley and the AC, Jordan began publishing *Restoration & Management Notes* began in June 1981. It was well received regionally. By 1991, the journal was distributed nationally. In 1999, it became *Ecological Restoration*, a quarterly with peer-reviewed articles presenting information from all over the world.[282]

Gregory Armstrong succeeded Bradley as director in 1983. Armstrong had graduated from the university in horticulture in 1967. He had earned a master's in botany at Smith College in 1980, while serving as director of the Botanical Garden at Smith College (Northampton, Massachusetts). Armstrong altered Jordan's position to give him more time for public relations and editorial work to promote the Arboretum as an international center for ecological restoration. Jordan, assisted by national and international restoration ecologists and Arboretum staff, organized conferences, symposia, and workshops in the 1980s and early 1990s. In 1988 Jordan, the Arboretum, and the journal were instrumental in the formation of the Society for Ecological Restoration (SER), providing the new association with office space in the Security Residence. SER quickly developed into an international organization. In 2010, SER moved to Washington, D.C. In 2014, it counts members in 70 countries and every state in the nation. These efforts raised the Arboretum's profile, and promoted the perception that the Arboretum's commitment to restoring ecological communities was a logical extension of the land ethic that Leopold had advocated as director of research at the Arboretum. They also helped make the Arboretum a center for promoting practical techniques for restoring plant-animal communities.[283]

The Arboretum celebrated the 50-year anniversary of its dedication on June 17, 1984. Armstrong prepared a "Director's Report" for the occasion, which affirmed that while the Arboretum did have a collection of trees and shrubs as a traditional Arboretum might, what made the Arboretum unique and formed a larger part of the resource, true to the vision of its founders, was the "collection of restored ecological communities representing the major ecosystem types of pre-settlement Wisconsin."[284] Armstrong reaffirmed the vision of the founders, stating,

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[281] Court, *Pioneers of Ecological Restoration,* 237-39.
[282] Society for Ecological Restoration, "Accomplishments," http://www.ser.org/about/accomplishments (retrieved 26 September 2014).
[283] Court, *Pioneers of Ecological Restoration,* 237-39, 242-44, and 261.
[284] Gregory Armstrong, "Director's Report to the Arboretum Committee," (March 1984), 1, University of Wisconsin-Madison Arboretum Archives.

The idea here is that the value lies in the actual restoration and management of the ecological communities as opposed to an alternative notion that the end product or completely restored communities are the objective. This idea that the actual restoration *process* provides an important opportunity for basic ecological research has been a part of the Arboretum efforts for some time.[285]

The Arboretum Since the 1980s

Since the 1980s, the developing Wisconsin plant-animal communities in the Arboretum have been nurtured, their progress subjected to detailed scientific study, and to research to determine best management practices. Thirty of the 34 Wisconsin plant-animal communities (as described by Curtis) have been established in the Arboretum. Arboretum staff and trained volunteers have labored to remove invasive species, cut brush, prepare areas for burning, collect seeds, and plant vegetation. New projects in the last thirty years include the Marion Dunn Prairie (1983, ecological restoration, incorporating a retention pond); the Wingra Oak Savanna (1991, ecological restoration near Ho-Nee-Um Pond/Wheeler Council Ring); Wingra Fen (1994); Wisconsin Native Plant Garden (2000, designed by Darrel Morrison, a former professor in the Department of Landscape Architecture at the University of Wisconsin-Madison); and an addition to the Arboretum Visitor Center (2000).[286]

During Armstrong's directorship (1983-2004), endowments rose from $250,000 to $8 million, providing funding for additional personnel, and supporting new public education initiatives. New personnel included: an education coordinator (1984), in charge of classes, exhibits, tours, lectures, and grant-writing; five naturalists (1986); a native plant gardener (2004); and a horticulturist (2005). In 1997, after many years of effort, the Leopold Chair of Restoration Ecology was created, a research professorship housed at the Arboretum and primarily charged with guiding the research program at the Arboretum. Among the educational initiatives were the establishment of three libraries in the Arboretum Visitor Center (1984, one for browsing, one for reference, and one for staff); teacher-training for environmental education, which eventually became the internationally-known Earth Partnership for Schools Program (1991), encouraging students and teachers to restore native habitats on their school site and adjacent natural areas, creating an environment for nature-based, experiential learning across subjects; what eventually became the Arboretum Earth Partnership Field Program (1994), training volunteers not only for work parties, but also as ambassadors to patrol the Arboretum and educate visitors on its purpose and its rules; the publication of *Prairie Restoration for Wisconsin Schools* (Molly Fifield Murray, 1993); and the Earth Partnership for Families program (2002), bringing

[285] Armstrong, "Director's Report to the Arboretum Committee."
[286] Court, *Pioneers of Ecological Restoration,* 246-60; and Virginia M. Kline, *Long Range Management Plan Arboretum Ecological Communities,* (Madison: University of Wisconsin-Madison, 1992), 2.

families together to learn about nature. In 2009, the Earth Partnership for Schools program was launched beyond Wisconsin when the Arboretum held a leadership institute, attended by representatives of the USFS, U.S. Fish and Wildlife Service, and schools in California, Michigan, Maryland, Oklahoma, and Puerto Rico.[287]

The FOA, which has had a salaried director since 1975, and an assistant director since 1987, remains an active and thriving organization, surpassing 3,000 members in 2000. The organization publishes the monthly, *NewsLeaf,* and assists with the funding of Arboretum publications, the Arboretum Tour Guide Program, the volunteer program, and a variety of educational initiatives. Since 1990, the FOA has held an annual native plant sale, a highly successful endeavor that has helped popularize native plants for home gardens in Dane County.[288]

Challenges continue to arise, due primarily to pressures from suburbanization. The beltline highway, which was widened to six lanes with an interchange at Seminole Highway, and a frontage road on the south side of the highway, in 1969, took nearly 4 acres and some 1500 trees, and is under consideration for expansion again in 2014. Stormwater run-off from the beltline highway and adjacent commercial and residential developments continues to threaten much of the Arboretum, despite the excavation of de-silting ponds along the west edge of the Arboretum and north of the beltline highway between 1969 and 1984. Beginning in 2008, the retention ponds were rehabilitated, and a wetland basin was installed between the beltline and the retention pond just north of the highway in 2009.[289]

In 2014, the Arboretum's stated mission is "to conserve and restore Arboretum lands, advance restoration ecology, and foster the land ethic."[290] The Arboretum remains a leader in ecological restoration research, developing and managing plant-animal communities representing the forests, prairies, wetlands, and savannas of pre-Euro-American settlement Wisconsin, as well as horticultural plantings valuable for teaching, research and outreach. The Arboretum models best practices in land management, and provides an array of programs to educate the public and inspire a desire for stewardship of the Earth. Visitors to the Arboretum today find it hard to imagine that the woods, the prairies, and the marshes were mostly farm fields 100 years ago, testifying to the success of the university's continuing experiment in ecological restoration.

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[287] Court, *Pioneers of Ecological Restoration,* 253-60.
[288] Court, *Pioneers of Ecological Restoration,* 190, 246-260.
[289] Court, *Pioneers of Ecological Restoration,* 207-09, and 246-48.
[290] University of Wisconsin-Madison Arboretum, "Arboretum Mission," http://uwarboretum.org/about/mission_vision/ (retrieved 26 September 2014).

NATIONAL SIGNIFICANCE OF THE UNIVERSITY OF WISCONSIN ARBORETUM IN CONSERVATION

The University of Wisconsin Arboretum is nationally significant under *Criterion A* in conservation. The Arboretum is the site of the first experiments in the ecological restoration of plant-animal communities in the world. The Arboretum also maintains the world's oldest collection of ecologically restored plant-animal communities. Research and experimentation carried out at the Arboretum beginning in 1934 pioneered and refined techniques and procedures for restoring and managing many different plant-animal communities from forests, prairies, and wetlands. These ecosystems are found not only in Wisconsin but in many areas of the U.S. Methods developed at the Arboretum have been disseminated through technical journals, and through the academic and professional careers of the many graduates of the University of Wisconsin in conservation-related fields who have studied in the Arboretum. The plant-animal communities themselves have served as models, inspiring other ecological restoration projects (especially prairies), and have provided seeds to other arboreta and botanical gardens worldwide through the seed exchange program (since 1952). Ecological restoration and ecologically restored ecosystems were slow to gain approval from conservationists, whose goals were erosion control and sustainable productivity of natural resources, and from preservationists, who sought to preserve pristine natural areas. However, the modern environmental movement of the late 1960s, with its dual aims of preserving natural areas and healing degraded land, brought ecological restoration into the mainstream in the 1970s such that it is now regarded as best practice in land management for both restored and natural landscapes. Governmental agencies employ ecological restoration to improve and maintain parks, recreational and natural areas. Ecological restoration is utilized for mitigation projects mandated by the National Environmental Policy Act of 1969 (NEPA) and similar federal and state legislation. Increasingly, ecological restoration is used to re-create native plant communities on small sites, from corporate properties, to school grounds, to back yards. The ecologically restored plant-animal communities at the Arboretum, and the research their development has generated, have provided a model and a proving ground for ecological restoration, making the Arboretum the catalyst for transforming ecological restoration into best practice in land management nationwide.

The resource that contributes to the national level of significance is the entire site, with the exception of the Arboretum and Gallistel woods mounds groups (NRHP), the four-acre Marion Dunn and five-acre Overlook prairies (which post-date 1961), the horticultural plantings (Longenecker Gardens, Stevens Pond and Aquatic Garden, the Viburnum Garden, and the Native Plant Garden). The period of significance at the national level extends from 1934, when ecological restoration began in the Wingra and Gallistel woods, through 1961, when John T. Curtis, research coordinator, passed away. The Arboretum retains a high degree of integrity to its national period of significance.

In brief, "ecological restoration" is "the process of returning an ecosystem or piece of landscape to a previous, usually more natural condition."[291] An "ecosystem" is defined as, "a system that includes all living organisms in an area as well as its physical environment functioning together as a unit."[292] Wisconsin's major ecosystems are forests, prairies, savannas, and wetlands. Each of these ecosystems has several categories of plant-animal communities, which vary depending on climate, soil and physical features.[293]

The idea to restore plant-animal communities in the Arboretum came from the collaboration of the members of the AC, and especially, from the SCAP, appointed on December 2, 1933. Members of the AC represented a range of disciplines, including botany, plant pathology, zoology, forestry, and horticulture (which then included landscape architecture). The members of the SCAP brought the different perspectives of their disciplines and their personal experiences which, woven together, formed the elements that created the Arboretum as a laboratory for the ecological restoration of plant-animal communities, unique for its time. The SCAP was composed of Franz Aust (chair), Norman C. Fassett, Fred B. Trenk, Aldo Leopold, and G. William Longenecker. Edward M. Gilbert, chair of the AC from 1933 through 1939, also played a substantial role.

From horticulture and landscape architecture, and inspired by the collaboration of Henry C. Cowles, Jens Jensen, and Wilhelm Miller, Aust and Longenecker brought the components of arranging native plants in their ecological groupings with appropriate landforms and soils, looking to the pre-Euro-American settlement era to determine the composition of the plant communities, and Miller's challenge: to re-create a wild prairie. Aust's and Longenecker's leadership of the Wisconsin chapter of Friends of Our Native Landscape, an association Jensen founded in Chicago, and in which Cowles and Miller were active members, further demonstrates their appreciation for Wisconsin plants and

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[291] The University of Wisconsin-Madison Arboretum, "Arboretum History," http://uwarboretum.org/about/history/ (retrieved 28 September 2014). The Society for Ecological Restoration provides a more complete definition, "ecological restoration is the process of assisting the recovery of an ecosystem that has been degraded, damaged, or destroyed… Restoration attempts to return an ecosystem to its historic trajectory… Restoration represents an indefinitely long-term commitment of land and resources." Society for Ecological Restoration International Science & Policy Working Group, *SER International Primer on Ecological Restoration*, (Version 2, October 2004), http://www.ser.org/resources/resources-detail-view/ser-international-primer-on-ecological-restoration (retrieved 24 August 2014).

[292] Biology Online, "Ecosystem," http://www.biology-online.org/dictionary/Ecosystem (retrieved 24 August 2014).

[293] A "plant-animal community" may also be termed a "natural community," or an "ecological community."

landscapes. Botanist Norman C. Fassett, an expert in aquatic plants, also displayed an appreciation for Wisconsin wildflowers, publishing *Spring Flora of Wisconsin* in 1931. By January 1934, Fassett had requested permission to conduct prairie-planting experiments (and obtained Leopold's support in the endeavor). From his work with the USFS and his background as a nationally-known expert in wildlife management, Leopold represented the component that completed the Arboretum as an outdoor laboratory in the ecological restoration of plant-animal communities: wildlife. Although Leopold advocated wildlife preservation and game management on the SCAP, it was Michael Olbrich who had first suggested that the Arboretum include a wildlife preserve, based on John Nolen's recommendation.

The SCAP clearly articulated their intention to develop plant-animal communities in the Arboretum early on. Writing in 1936, Aust and Longenecker stated, "[t]he Wisconsin Arboretum is created to restore at a point near the University, *types of primitive Wisconsin landscape and its flora and fauna*.[294]

They further noted the three types of landscapes set aside for restoration: woodlands, marshes and prairies. That they were certain of the uniqueness of the idea is evidenced by Leopold's remarks at the dedication of the Arboretum on 17 June 1934,

> [The Arboretum] is something new and different…Our idea, in a nutshell, is to reconstruct, primarily for the use of the University, a sample of original Wisconsin – a sample of what Dane County looked like when our ancestors arrived here in the 1840s.[295]

Research and experimentation carried out at the Arboretum between 1934 and 1961 pioneered and refined techniques and procedures for establishing and managing many different plant-animal communities in the process of restoration. These plant-animal communities are not only found in Wisconsin, but in many areas of the U.S. and Canada. They include deciduous forests (Wingra and Gallistel woods, both begun 1934), prairies (Curtis Prairie, begun 1936 and Greene Prairie, begun 1943), wetlands (Gardner Marsh, begun 1936 and Teal Pond, begun 1940), and conifer forests (Leopold Pines, transitioned from reforestation to restoration prior to 1941, and Evjue Pines, begun 1943). Research on three remnants has generated data on the preservation and management of plant-animal communities since 1934: the Wingra Marsh, the Wingra Fen, and the Noe Woods. These data have proven incontrovertibly that active management is necessary for natural areas as well as restored ones. The results have been disseminated through numerous scientific and technical journals of national and international circulation. Between 1933 and 1971, more than 127 scientific papers and 87

[294] Aust and Longenecker, 182. The italics are mine.
[295] Leopold's 'popularized version.'

theses had been produced based on research conducted at the Arboretum, and the Arboretum had developed an international reputation as ground zero in the new field of ecological restoration.[296]

John T. Curtis guided or conducted much of the research in managing plant-animal communities, and in identifying the members (and the proportion of each) that make up each plant community, both areas in which Arboretum research has been highly influential, not only for the data he presented, but also for his investigative methods. One of the most influential series of management experiments developed the protocol for prescribed, controlled burning of prairies, today a standard practice. In 1959, Curtis published the results of many years of investigation in *The Vegetation of Wisconsin*, describing the members of various plant communities. Ecological restorationists still use Curtis' descriptions to decide which species to include in a restoration, how many of each, and their physical arrangement, based on his lists of prevalent species and the leading families for each community type for forests, prairies, and wetlands. Curtis' many students have brought his research and investigative methods, as well as his concept of vegetation as a scientific continuum, to their careers in academic institutions and public agencies across the U.S.[297]

The plant-animal communities themselves have served as models for others interested in ecological restoration. It was the prairies that first inspired others to undertake ecological restorations. As early as 1940, for example, the commissioners of the Forest District Preserve of Cook County, Illinois, decided the Forest District Preserve should have a prairie, and wrote to Leopold asking to borrow the services of Theodore Sperry for thirty days to create a prairie for them. However, the NPS, Sperry's employer, refused him permission.[298] Subsequent prairie restoration projects primarily followed in the wake of the modern environmental movement of the late 1960s. In Wisconsin, prairie plant-community restoration projects were initiated at the Boerner Botanical Gardens, Milwaukee (1965); the University of Wisconsin-Milwaukee Field Station (1966); the Keith White Prairie at University of Wisconsin-Green Bay (1973); and at University of Wisconsin Center at Fond du Lac (1995). Smaller prairie plant communities were established in Dane County parks (with seeds from the Arboretum), on corporate sites, such as CUNA Mutual Insurance in Madison, in backyards, and on school grounds. In Illinois, a prairie plant community was established at the University of Illinois near Urbana (Trelease Prairie, 1942); Knox College in Galesburg (1954); Schulenberg Prairie at the Morton Arboretum (1961); the Gensbug-Markham Prairie in Markham (expanding a remnant, 1971); Fermilab Prairie in

[296] Sachse, 98; and Court, *Pioneers of Ecological Restoration,* 215-16.
[297] Evelyn Howell and Forest Stearns, "The Preservation, Management, and Restoration of Wisconsin Plant Communities: The Influence of John Curtis and His Students," *John T. Curtis, Fifty Years of Wisconsin Plant Ecology*, James S. Fralish, Robert P. McIntosh and Orie L. Loucks, eds, (Madison: The Wisconsin Academy of Sciences, Arts, and Letters, 1996), 63.
[298] Court, *Pioneers of Ecological Restoration,* 109.

Batavia (1974); and North Branch Prairies along the Chicago River (1977). Since 1970, the ecological restoration of prairie plant and plant-animal communities has taken place throughout the North American mid-continent, where prairies once dominated.[299]

Rising interest in prairie restoration in the Midwest inspired the first Midwest Prairie Conference (which would evolve into the international biennial North American Prairie Conference), held at Knox College in Galesburg, Illinois in September 1968. David Archbald, then managing director of the Arboretum, was the keynote speaker. Ray Schulenberg, prairie ecologist from the Morton Arboretum, presented a history of the prairie restoration there, noting that "the precedent, inspiration, and basic procedural information for prairie restoration had come to us from the University of Wisconsin Arboretum at Madison."[300] By 1970, the Curtis and Greene prairies had become world famous, drawing researchers from all over the globe to view and study them. They had also appeared in the Walt Disney movie, *The Vanishing Prairie* (1953), and were the subjects of an educational film made for *Encyclopedia Britannica*.[301] In 1970, the pioneering role of the Arboretum prairies was even recognized by the *New York Times*. John Noble Wilford, a Pulitzer Prize-winning journalist, reporting on the second Midwest Prairie Conference (held in September 1970), described the emphasis ecologists were placing on increasing prairie restoration efforts, as few remnant prairies survived to be preserved. Wilford noted that there was a prototype: the Curtis Prairie.[302]

The seed exchange program, which Curtis initiated in 1952, has increased the influence of the plant communities in the Arboretum, and the prominence of the Arboretum in ecological restoration. Seeds collected from the plants every summer and fall have been made available to other arboreta and botanical gardens around the world. By 1963, the Arboretum was offering seeds from 164 native species. Some 875 packets of seeds were sent to institutions in 26 countries that year, including nations as distant as Argentina, New Zealand, Algeria, the Soviet Union, and Sweden.[303]

There are no earlier examples of ecologically restored plant-animal communities in the U.S., although there were two noteworthy efforts that initiated ecological restoration experiments before the

[299] Court, *Pioneers of Ecological Restoration,* 236; Daryl D. Smith, "Prairie Restoration: Bridging the Past and the Future," *Proceedings of the North American Prairie Conference* 23 (2014): 62.
[300] Quoted in Franklin E. Court, *Pioneers of Ecological Restoration,* (Madison: The University of Wisconsin Press, 2012), 217.
[301] Hone.
[302] John Noble Wilford, "Prairie Partisans Move to Save Grasslands," *New York Times,* 18 October 1970, 72, quoted in Franklin E. Court, *Pioneers of Ecological Restoration,* (Madison: The University of Wisconsin Press, 2012), 220.
[303] *Arboretum News* 13, no. 1 (January 1964): 3.

Arboretum did: the Dutchess County Botanical Garden at Vassar College, in Poughkeepsie, New York; and the Holden Arboretum near Cleveland, Ohio. Both re-created plant communities; the Holden Arboretum also tracked birds and small mammals in the project. However, both were abandoned (the former in the 1950s, the latter ca. 1939). Into the 1970s, the NPS employed landscape architects to design facilities for visitors in the naturalistic style, while leaving wilderness areas untouched, supporting animal species popular with visitors, and eliminating predators. The USFS undertook restoration projects as early as 1912, but the purposes were erosion control and sustainable productivity of natural resources such as timber and forage. Although the use of native plants was preferred by the 1940s, even today, land management in the national forests does not generally include the ecological restoration of plant, or plant-animal communities.

Dutchess County Botanical Garden

Edith A. Roberts established the Dutchess County Botanical Garden (now the Edith Roberts Ecological Laboratory) at Vassar College in Poughkeepsie, New York. Roberts was a student of Cowles beginning in 1905, completing her doctorate in botany at the University of Chicago in 1915. In 1919, Roberts was appointed associate professor of botany at Vassar. In 1920, the Vassar College Board of Trustees granted her request for four acres of land to be developed as an ecological laboratory, where students could learn about the taxonomy, morphology, and physiology of native plants, and the public could see the beauty of indigenous plants.[304] As Roberts explained,

> The project was to establish, on less than four acres of rough land, the plants native to Dutchess County, N.Y., in their correct associations, with appropriate environmental factors of each association in this region.[305]

Roberts began by taking students out into the field to conduct an ecological study of Dutchess County to identify the plant associations, and catalog the plants in them. The study, completed in 1922, documented thirty plant associations (such as open field, juniper hillside, gray birches, pines, oak woods, beech-maple-hemlock woods, hemlock ravine, stream-side, pond, bog). Some of the associations contained dozens of plants. Roberts planned the layout of the garden, an irrigation system was installed, and ecology students began propagating plants from seeds or cuttings, and planting them in their associations. Over the course of ten years, through a series of student research projects,

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[304] Vassar College, "The History of the Edith Roberts Ecological Laboratory," http://pages.vassar.edu/casperkill/the-history-of-the-edith-roberts-ecological-laboratory/ (retrieved 24 August 2014); and Darrel G. Foreward to *American Plants for American Gardens*, by Edith A. Roberts and Elsa Rehmann, (1929; repr., Athens: The University of Georgia Press, 1996), xiii.
[305] Edith A. Roberts, "The Development of an Out-of-Door Botanical Laboratory," *Ecology*, 14, no. 2 (April 1933): 163.

twenty-eight of the thirty plant associations had at least fifty percent of their plant members established.[306]

In 1929, Roberts collaborated with her colleague, landscape architect Elsa Rehmann, to publish *American Plants for American Gardens*, (first issued as a series of articles in *House Beautiful* between June 1927 and May 1928). The book describes thirteen plant communities, and the plants in each, along with extensive plant lists, based on research at the Dutchess County Botanical Garden.[307]

At Roberts' retirement in 1948, close to 2,000 species of ferns, flowers, vines, mosses, shrubs, and trees native to Dutchess County were growing in the botanical garden. The garden was tended for a few years after Roberts' retirement, but by the 1960s had been entirely abandoned. As of 2010, few of the original plant associations survived, but since 2011, an effort has begun to document the surviving plants, and remove invasive species.[308]

The Holden Arboretum

In 1931, the Holden Arboretum was established on 100 acres near Cleveland, Ohio, as the result of a trust created in the will of Albert Fairchild Holden following his death in 1913. The Holden Arboretum was guided by the Cleveland Museum of Natural History.[309]

Between 1931 and 1938, Arthur B. Williams, ecologist at the Museum of Natural History, and his colleagues labored to plant members of the beech-maple-hemlock, oak-hickory, river bottom forest, swamp, and several aquatic plant communities. Zoologist Benjamin Patterson Bole, Jr., inventoried the birds and small mammals that came to the sites. Williams reported in 1936,

> Eventually we hope to establish an outdoor ecological museum by reproducing as many of the plant communities of the temperate parts of the globe as we can. Each forest type will be made as complete in every detail as climate, soil and experience permit; …We will eventually be able to show a plant, a shrub or a tree in its proper relationship with other species of its native land, and not merely in a group of taxonomically related species from all parts of the world.[310]

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[306] Roberts, 163, 166, 170, and 172-222.
[307] Roberts and Rehmann.
[308] Vassar College; and Lisa W. Foderaro, "Vassar Revives Garden Nurtured By Early Promoter of Native Plants," *The New York Times*, 26 July 2013, A20.
[309] The Holden Arboretum, "The History of the Holden Arboretum," http://www.holdenarb.org/contact/documents/factsheet.pdf (retrieved 25 August 2014).
[310] Arthur B. Williams, "The Cleveland Museum of Natural History, Holden Arboretum, Report of Progress for 1935," April 1936, quoted in William R. Jordan III and George M. Lubick, *Making*

In 1938, Elmer Merrill, then director of the Arnold Arboretum visited the Holden Arboretum. After touring the site, Merrill criticized the limited presence of ornamental features, observing that it was the flowering plants that most impressed visitors, and translated into financial support for the institution. By 1940, the restoration projects had been superseded by plantings intended to appeal to the public. In the late 1970s, Holden staff would rediscover some of the early plantings, and attempt to revitalize them. This initiative has been hampered by a lack of funds; the Holden Arboretum separated from the Cleveland Museum of Natural History in 1952, and has been struggling financially, especially since the recession of 2008.[311]

The National Park Service

Until the late twentieth century, the NPS maintained a policy of passive management for wilderness areas, leaving them untouched, except for roads and rail lines to bring visitors into and through the parks, and elements such as trails, shelters, campgrounds, and lodging. Beginning in 1918, the NPS hired landscape architects to plan roads and trails, campgrounds, and other visitors' facilities, using principles of naturalistic design. NPS landscape architects often included native plants in their plans, and in 1930, the NPS prohibited the introduction of exotic vegetation in the parks, although this policy would only be partially implemented until the late twentieth century.[312]

Any departure from passive management focused on preserving popular animal species, such as buffalo, elk, or bears, and eliminating predators, to satisfy visitors. In the early 1930s, NPS biologist George Wright conducted a survey of wildlife in the national parks, which demonstrated that the number and proportion of wildlife in natural areas differed significantly from their historical condition. Wright's report, *Fauna of the National Parks: A Preliminary Survey of Faunal Relations in National Parks*, published in 1933, also recommended that the distribution of fauna in the parks should be restored to its natural balance.[313] However, NPS officials continued its policy of visitor-oriented management, without regard for science. Concerned about the state of the parks, Secretary of the Interior Stewart Udall (1961-1969) asked the National Academy of Sciences to review the management practices and policies of the NPS. Starker Leopold, son of Aldo Leopold, chaired the

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Nature Whole: A History of Ecological Restoration, (Washington, D.C.: Island Press, 2011), 69.

[311] Jordan and Lubick, 70; and Michelle Jarboe McFee, "Cleveland Botanical Garden, Holden Arboretum Could Merge to Create Regional Non-Profit," *The Plain Dealer* (Cleveland), 26 June 2014.

[312] Newton, 528-37; and McClelland, 6-7, and 155.

[313] George M. Wright, Joseph S. Dixon, and Ben H. Thompson, *Fauna of the National Parks: A Preliminary Survey of Faunal Relations in National Parks*, (Washington, D.C.: U.S. Department of the Interior, National Park Service, 1933), cited in Jordan and Lubick, *Making Nature Whole: A History of Ecological Restoration*, (Washington, D.C.: Island Press, 2011), 57.

committee, which issued the *Leopold Report* in 1963. The *Leopold Report* initially met with resistance, but resulted in a shift to active management of the plant-animal communities of natural areas employing the principals of ecological restoration in the 1970s.[314]

The U.S. Forest Service

In 1912, the USFS established the Utah Experiment Station (later the Great Basin Experiment Station) to find techniques to control erosion and develop sustainable productivity of valuable natural resources (timber, soil, water, and forage) on western rangelands, denuded by logging and livestock grazing. Plant ecologist Arthur W. Sampson was the director of the Utah Experiment Station, located in the Manti Forest Reserve (now the Manti-LaSal National Forest), from 1912 until 1922. Sampson's experiments to re-grass the Wasatch Plateau set the pattern that the USFS continued to follow in its re-vegetation projects into the late twentieth century. Sampson dug contour trenches to control erosion, and planted both exotic and native trees and grasses. The indigenous plants selected were not placed in the proportions, associations, or locations in which they occurred in pre-Euro-American-settlement, because the goals were stabilization and sustainable productivity, although by 1921, Sampson was advocating restoring previously existing species (not just any native ones). A later plant ecologist at Great Basin, Lincoln Ellison (from 1938 to 1947), would comb the archives to produce a comprehensive vegetation history of the Wasatch Plateau. Since the early 1940s, planting of native species in national forests is preferred, but only invasive exotic species are prohibited. The use of contour trenches was mostly discontinued in the 1960s, due to their lack of aesthetic appeal.[315]

LOCAL SIGNIFICANCE OF THE UNIVERSITY OF WISCONSIN ARBORETUM IN ARCHITECTURE

The Arboretum is also significant at the local level under *Criterion C* in architecture. The Spring Trail Pond Entrance and Walls (ca. 1927), the Spring Trail Dam (ca. 1927), the Stevens Pond Entrance and Walls (1936), the Manitou Way Entrance and Walls (1937), the Olbrich Memorial Entrance and Walls (1937-40), the Gallistel Woods Shelter, and the Kenneth Jensen Wheeler Council Ring (1938) comprise a fine and intact collection of seven Rustic style structures. The Bath House (ca. 1935), Barracks (ca. 1934), Carpentry Workshop and Warehouse (ca. 1935), Machine Shed (ca. 1935), Tool Shed (ca. 1935), Nursery Pumphouse (ca. 1935), Root Cellar (ca. 1935), and Main Pumphouse (ca. 1935) form a good and intact grouping of eight Rustic style buildings. None are sufficiently distinguished to be individually eligible, but together contribute to the architectural significance of the Arboretum. The designer of the Spring Trail Pond resources has not been positively identified. G. William Longenecker designed the Stevens Pond Entrance and Walls, and the Manitou Way Entrance

[314] Jordan and Lubick, 97-98.
[315] Hall, 95-123.

and Walls. Carl Riemenschneider designed the Gallistel Woods Shelter, while Albert F. Gallistel designed the Olbrich Memorial Entrance and Walls. All of these designs were constructed by the CCC. Nationally-prominent landscape architect Jens Jensen designed the council ring that commemorates the life of his grandson, Kenneth Jensen Wheeler. Seven of the eight buildings were erected by the CCC; their designers are unknown. The integrity of these resources ranges from good to excellent. The period of significance for architecture coincides with the construction dates of the contributing resources: ca. 1927 through 1940.

The Rustic style was almost exclusively employed in buildings and structures for parks, resorts, and summer residences, between the 1870s and 1940. It was especially popular for federally-funded parks projects during the 1930s, rising out of the naturalistic landscape design tradition. Structures and buildings in the style are typically of log, wood or stone construction, selected and sited either to blend into the natural setting, or to be unobtrusive so as not to detract from the setting. Typical exterior finishes include log, wooden shingles, and stone veneer. Henry Hobson Richardson's Boylston Street Bridge (1882-84) in Boston's Back Bay Fens, of random, rock-faced granite was the precedent for Rustic stonework.[316]

The Architecture/History Inventory (AHI) database maintained by the Wisconsin Division of Historic Preservation (SHPO) lists 18 Rustic style resources in Madison, not including those in the Arboretum. Seventeen are park resources, erected through the WPA between ca. 1935 and 1936, and are good examples of Rustic style. The Thornton Avenue Spillway (1936, AHI #143019) is a contributing element in the National Register-listed Tenney Park – Yahara River Parkway. It is a small, reinforced concrete-arch structure veneered with rock-faced random limestone ashlar. Rock-faced stone voussoirs accent the arch. The Thornton Avenue Spillway maintains very good integrity. Madison's other Rustic resources were all erected ca. 1935 and contribute to Hoyt Park, which is potentially eligible for the National Register. All are constructed of rock-faced, sandstone ashlar, and include the entrance (photo 32), a shelter house, a water fountain, a restroom, three fireplaces, seven fireplace and table sets, an overlook with stairs, and a flight of stairs (AHI #s222665 through 222680). The designer(s) have not been identified. The Hoyt Park resources lack individual distinction, but together represent a very good collection of Rustic structures, contributing to the architectural significance of the park. The Rustic elements of Hoyt Park retain a high degree of integrity.

In comparison, the collection of Rustic resources in the Arboretum is as good as, or better than, that of Hoyt Park. The rock-faced stone of the structures and the wood-shingle finish of the buildings, as well as their siting to fit into the natural setting or be hidden from view, are distinguishing elements of the

[316] Rachel Carley, *The Visual Dictionary of American Domestic Architecture*, (New York: Henry Holt and Company, Inc., 1994), pp. 170-174; and McClelland, 129.

Rustic style. Individually, the Arboretum's structures are larger, and more imposing than those of Hoyt Park or the Thornton Avenue Spillway. The Rustic resources of the Arboretum are among the best examples of the style in Madison, and retain excellent integrity.

End of Statement of Significance

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End of References

Insert Boundary Descriptions

UTM REFERENCES (continued)

5. 16/301070/4766190
6. 16/300450/4766340
7. 16/301240/4769200

VERBAL BOUNDARY DESCRIPTION
The University of Wisconsin Arboretum is located in portions of the city and town of Madison, and the city of Fitchburg, Dane County, Wisconsin. The nominated boundary consists of all of the Arboretum lands owned by the University of Wisconsin in 2014 as indicated on the attached USGS and site maps. These are generally bounded by a line that begins at the south intersection of the southeast right-of-way of Arbor Drive and the southwest right-of-way of Knickerbocker Street, following the southwest right-of-way of Knickerbocker Street extended southeasterly to the northwest shore of Lake Wingra (and excluding Wingra Park), then following the shoreline of Lake Wingra southwesterly, then southeasterly, then northeasterly to the south end of the Wingra Creek Dam (and excluding the dam). Then generally following the west bank of Wingra Creek to the South Mills Street Bridge (and excluding said bridge). Then southeasterly along the southwest right-of-way of Wingra Drive to Spruce Street. Then southerly along the west bank of Wingra Creek to the west right-of-way of Fish Hatchery Road. Then southwesterly along the west right-of-way of Fish Hatchery Road to Carver Street. Then generally following the north right-of-way west along Carver Street (excluding Harvey E. Schmidt Park) to Balden Street. Then northeasterly along the southeast right-of-way of Balden Street (excluding all the lots in the Forest Park Addition, on the northeast side of Balden Street) Covall Street. Then northeast along the southeast right-of-way of Covall Street to Arboretum Drive. Then westerly and then southerly along southerly right-of-way of Arboretum Drive to the southwest corner of the southwesternmost lot in the Forest Park Addition, and following the south lot line (and south lot line extended) easterly to Carver Street. Then easterly and southerly along southwesterly right-of way of Carver Street to Martin Street. Then south along west right-of-way of Martin Street, and east along south right-of-way of Martin Street to Irwin Street. Then south along the west and south lots lines of the properties on the south side of Martin Street to the northwesterly right-of-way of the former Chicago & North Western Railway. Then southwesterly along said right-of-way to the east lot lines of the development along West Badger Road. Then northerly along said east lot lines to the northeast corner of said lots. Then west along north lots lines of development along West Badger Road to the northwest corner of said lots. Then south along west lot lines of development along West Badger Road to the north right-of-way of the West Beltline Highway. Then west along said right-of-way to a point north of the west lot lines of the development on River Bend Road. Then south across the West Beltline Highway (and excluding said highway) and following the west lot lines

of the development along River Bend Road, then east along the south lot line of said development. Then continuing south along the west lot lines of the development along Kingston Drive, and then Leyton Lane, and then Westview Lane to the north right-of-way of the former Chicago & North Western Railway. Then west-northwesterly along said right-of-way to the east right-of-way of Seminole Highway. Then northerly along said right-of-way, across the West Beltline Highway (and excluding said highway) to the south lot lines of the development on Winslow Lane, then north along east lot lines of said development, and west along said lot lines to the east right-of-way of Seminole Highway. Then easterly along the south lot lines of the development on Iroquois Drive, then north along east lot lines of said development. Then west along north right-of-way of Iroquois Drive to Country Club Road. Then north along east right-of-way of Country Club Road to the south lot line of the Nakoma Golf Course. Then following the south line of the Nakoma Golf Course east, southeast, south, east, north, and then west to Manitou Way. Then north along the east right-of-way of Manitou Way to Nakoma Road. Then northeast along the easterly right-of-way of Nakoma Road to Monroe Street. The east-northeast along the easterly right-of-way of Monroe Street (excluding the development on the east side of Monroe Street at Odana Road) to Arbor Drive. Then east and northeast along the south and southeast right-of-way of Arbor Drive to Knickerbocker Street and the point of beginning. The site is composed of a conglomeration of legal parcels that encompass 1,280 acres.

BOUNDARY JUSTIFICATION

The boundary of the University of Wisconsin Arboretum encompasses all those resources that are historically associated with it and that contribute to its significance (the Arboretum site, and all the Rustic buildings and structures), while excluding resources that are not associated with it, lack integrity, or do not contribute to its significance. The boundary coincides with the legal boundary of the 1,280-acre conglomeration of parcels on which the Arboretum sits.

End of Boundary Descriptions

U.S. Department of the Interior
National Park Service

National Register of Historic Places
Continuation Sheet

Insert Photo Descriptions

Name of Property:	University of Wisconsin Arboretum
City:	Madison
County:	Dane
State:	Wisconsin
Name of Photographer:	Elizabeth L. Miller
Date of Photos:	May and October 2014
Location of Original Data Files:	Wisconsin Historical Society, 816 State Street, Madison, WI 53706

WI_DaneCounty_UniversityofWisconsinArboretum_0001
Wingra Woods (AHI #229324), camera facing east-northeast.

WI_DaneCounty_UniversityofWisconsinArboretum_0002
Curtis Prairie (AHI #229324), camera facing south-southwest.

WI_DaneCounty_UniversityofWisconsinArboretum_0003
Gardner Marsh (AHI #229324), camera facing south.

WI_DaneCounty_UniversityofWisconsinArboretum_0004
Longenecker Horticultural Gardens (AHI #229324), camera facing north-northeast.

WI_DaneCounty_UniversityofWisconsinArboretum_0005
Bath House (Laboratory and Greenhouse) (AHI #229325), west and south facades, camera facing east-northeast.

WI_DaneCounty_UniversityofWisconsinArboretum_0006
Barracks (AHI #229326), southwest façade, camera facing northeast.

WI_DaneCounty_UniversityofWisconsinArboretum_0007
Carpentry Workshop and Warehouse (AHI #229327), east façade, camera facing northwest.

WI_DaneCounty_UniversityofWisconsinArboretum_0008
Machine Shed (AHI #229328), east façade, camera facing northwest.

WI_DaneCounty_UniversityofWisconsinArboretum_0009
Tool Shed (Seed Storage) (AHI #229329), south and east facades, camera facing northwest.

WI_DaneCounty_UniversityofWisconsinArboretum_0010
Nursery Pumphouse (AHI #229330), east and north facades, camera facing west-southwest.

WI_DaneCounty_UniversityofWisconsinArboretum_0011
Root Cellar (AHI #229331), north and east facades, camera facing west-southwest.

WI_DaneCounty_UniversityofWisconsinArboretum_0012
Main Pumphouse (AHI #229332), west and south facades, camera facing northeast.

WI_DaneCounty_UniversityofWisconsinArboretum_0013
Spring Trail Pond Entrance (AHI #229333), camera facing north-northeast.

WI_DaneCounty_UniversityofWisconsinArboretum_0014
Spring Trail Pond Steps (AHI #229333), camera facing south-southwest.

WI_DaneCounty_UniversityofWisconsinArboretum_0015
Spring Trail Pond Dam (AHI #229334), camera facing south-southwest.

WI_DaneCounty_UniversityofWisconsinArboretum_0016
Stevens Pond Entrance and Walls (AHI #229335), camera facing east-southeast.

WI_DaneCounty_UniversityofWisconsinArboretum_0017
Manitou Way Entrance and Walls (AHI #229336), camera facing south-southwest, showing south wall.

WI_DaneCounty_UniversityofWisconsinArboretum_0018
Olbrich Memorial Entrance (AHI #124606), camera facing northeast.

WI_DaneCounty_UniversityofWisconsinArboretum_0019
Olbrich Memorial Entrance (AHI #124606), camera facing southeast, showing south wall.

WI_DaneCounty_UniversityofWisconsinArboretum_0020
Gallistel Woods Shelter (AHI #229360), camera facing northwest

WI_DaneCounty_UniversityofWisconsinArboretum_0021
Kenneth Jensen Wheeler Council Ring (AHI #082029), camera facing north.

WI_DaneCounty_UniversityofWisconsinArboretum_0022
Arboretum Visitor Center (AHI #229337), southwest and south facades, camera facing east.

WI_DaneCounty_UniversityofWisconsinArboretum_0023
Comfort Station (AHI #229338), west and south facades, camera facing northeast.

WI_DaneCounty_UniversityofWisconsinArboretum_0024
Security Residence (AHI #229339), north façade, camera facing southwest.

WI_DaneCounty_UniversityofWisconsinArboretum_0025
Garage (AHI #229340), northwest façade, camera facing southeast.

WI_DaneCounty_UniversityofWisconsinArboretum_0026
Utility Shelter (AHI #229342), camera facing east-southeast.

WI_DaneCounty_UniversityofWisconsinArboretum_0027
Arbor (AHI #229343), camera facing northwest.

WI_DaneCounty_UniversityofWisconsinArboretum_0028
Margaret's Council Ring (AHI #229341), camera facing south.

WI_DaneCounty_UniversityofWisconsinArboretum_0029
Visitor Center Council Ring (AHI #229344), camera facing west.

WI_DaneCounty_UniversityofWisconsinArboretum_0030
Longenecker Horticultural Gardens Entrance (AHI #229345), camera facing north.

WI_DaneCounty_UniversityofWisconsinArboretum_0031
Hoyt Park Entrance (a comparison property, AHI #222665), camera facing northwest.

End of Photo Descriptions

___Insert Figures

Figure 1 University of Wisconsin Arboretum, Madison, Wisconsin, USGS Map with UTM References

Figure 2 University of Wisconsin Arboretum Site Plan with Inset of Administrative and Service Area

Figure 3 University of Wisconsin Arboretum Site Plan with Inset of Administrative and Service Area, Showing Photo Key

Figure 3A University of Wisconsin Arboretum Site Plan, Administrative and Service Area (continued), Showing Photo Key

Figure 4 University of Wisconsin Arboretum, 1952

Figure 5 University of Wisconsin Arboretum,1963

___End Figures