Plant Communities of the Allen Creek Watershed (Draft 2)

Josh Sulman

Abstract

Josh Sulman, botanist, describes present day terrestrial and aquatic plant communities and their relative abundance and quality in the Allen Creek watershed. Sulman makes note of rare species in the watershed that have been found or those that may be present in association with recorded species. In addition, Sulman addresses invasive species threats and makes recommendations for land management strategies to improve plant community integrity in the watershed.

1. Introduction

The Allen Creek watershed is a drainage basin in the rolling uplands of southern Jefferson County, covering 5785 acres. Allen Creek emerges from springs and marshes near the Rock County line, and flows 7.4 miles north and west, emptying into the Rock River just below Fort Atkinson. On the map, Allen Creek appears to be an average creek draining a small basin of southern Wisconsin farmland. But the Allen Creek watershed observed in the field is a wild swath of marshes rich with rare plants, stunning remnant prairies, and ancient oak savannas. The watershed has been recognized as an exceptional resource water by the state of Wisconsin. The heritage of Wisconsin's wild past still exists here, as it does in few places in southeastern Wisconsin. This study aims to increase awareness of the natural plant communities in the watershed, and to propose measures to conserve them from current and potential threats.

2. Assessment techniques and field methods

The vegetation of the Allen Creek watershed was surveyed in May 2008. Preliminary surveys were conducted in spring 2007, and ongoing vegetation monitoring at the Karow property has been a valuable source of information. The goal for the current field study was to survey new areas that have potential of supporting intact native plant communities and rare species. Sites were selected to include a variety of habitat

types. Potential sites were selected from air photos and plat maps. All public lands in the watershed were surveyed. Private lands were visited with the permission of landowners.

In the field, a plant species list was recorded for each site. Plant communities were identified based on indicator species (Appendix 1). Descriptions of quality, size and management needs were recorded. Digital photos and plant voucher collections were taken, as allowed. Field observations often led to a better idea of where to focus future efforts.

3. Watershed vegetation cover

Information regarding vegetation types in the Allen Creek watershed was gathered from several sources, including air photos available from the Jefferson County GIS website, USGS topographic maps, and GIS vegetation cover maps (WISCLAND land cover data). According to land cover data, 61% of the watershed is agricultural land, 17% is grassland, 14% is wetland, 7% is forested, and urban/developed land, shrubland and barren land each have 1% cover. However, the area of developed land is significantly higher than indicated, because low density, suburban residential development was not picked up. The grassland figure is likely inflated, including area that is actually lawns in residential neighborhoods. In that case, developed land is probably closer to 5% of the land area. The wetland figure appears to be accurate, from observations of wetland boundaries in the field. Shrubland is greatly underestimated if wetland shrub communities are considered, since these are included as wetlands.

Most of the upland area of the watershed has been converted to agricultural and residential uses. Approximately 20% of the watershed is woodland and grassland. Woodlots of bur, white and black oaks are frequent on the uplands, often formerly pastured, but now thick with underbrush and second-growth trees. Pine plantations occur in a number of locations in the watershed. Grassland, consisting of prairie plantings, hay fields, cattle pasture, and fallow agricultural land occupies a small portion of the upland area. These grasslands are very different in composition from the original prairie grassland that occurred before settlement. They retain important functions as bird habitat and groundwater infiltration areas. Original, “virgin” or unplowed prairie with more or less intact vegetation and species diversity exists in isolated remnants, of small size, in

the Allen Creek Watershed. These small remnants are home to several threatened and endangered plants and animals (see Appendix 2 for state listed species in the watershed).

Wetlands cover approximately 14% of the watershed, and include both intact and degraded plant communities. The majority of wetland areas are continuous with, and drain into Allen Creek, with the exception of a large pothole wetland in the southwest part of the watershed.

3.1 Plant communities

A plant community is an assemblage of plant species that occur together in a particular environment. The environments on which plant communities occur in the watershed range from dry to wet, and from alkaline to acidic. They occur on terrestrial soils including sand, peat, tufa and silt, and in sediments submerged under ponds and streams. The variety of conditions affecting plant community development includes light availability, frequency of disturbance, and type of disturbance, whether it be mowing, grazing, plowing, or burning. The history of past conditions is also an important influence on the structure of plant communities today.

The boundary of plant communities from each other is often indistinct and communities may blend into each other. Some assemblages of plant species cannot be easily placed under a typical plant community definition. A site may have components of prairie and fen, and may be considered an intermediate or transition between them. In general, the community concept is useful in understanding the natural plant landscape, although communities are not rigid or discrete in nature. The plant community definitions used here are based on those developed in the DNR Natural Heritage Inventory (see http://dnr.wi.gov/org/land/er/communities/), and in *The Vegetation of Wisconsin* (Curtis, 1959), based on extensive research throughout the state.

The plant communities identified and studied in the watershed were oak savanna, prairie, fen, sedge meadow, emergent marsh, floodplain forest, and aquatic communities.

Oak Savanna

Oak savanna [DNR-NHI's Oak Opening] is a community dominated by open-grown bur oaks (*Quercus macrocarpa),* often associated with white (*Q. alba),* black (*Q. velutina),* or northern pin oaks (*Q. ellipsoidalis).* It occurs on the upland edge of many wetlands and extends into the rolling uplands, now largely converted to agriculture. Oak savannas were historically maintained by fire, and later grazing, and more recently have been invaded by thickets of European buckthorn (*Rhamnus cathartica).* Species present are a mix of woodland and prairie herbs and grasses. Some denser stands are better considered as oak woodland or oak forest. But historically these were likely derived from oak savanna communities.

Prairie

Prairie is a community dominated by grasses with a diverse component of herbaceous forbs. It was historically maintained by fire, and is today very rare. It is rapidly invaded by shrubs and forest in the absence of fire. Prairie is usually divided into several communities from dry to wet. In the prairies present in the Allen Creek watershed, the gradation is gradual and continuous. The two prairies observed range from mesic, or moderate in moisture, to wet. The prairie soil may be wet for part of the spring, but water rarely covers the surface for extended periods. Species diversity is high, with many grasses and sedges, and numerous wildflowers blooming throughout the growing season. Species typical of prairie include prairie dock (*Silphium terebinthinaceum),* shooting star (*Dodecatheon meadia),* and prairie phlox (*Phlox pilosa).*

Calcareous Fen

Calcareous fen is an open community of sedges, grasses, herbs and shrubs. It occurs where calcium-rich groundwater is at or near the surface. It is rare and localized in areas of limestone aquifers, but is particularly common in the Allen Creek watershed. Fen may occur on a tufa or peat substrate. Tufa is a white soil with a very high concentration of calcium carbonate (Carpenter, 1995). It can accumulate at the surface where calcium-rich groundwater emerges. Fens on tufa are often found on flat or sloping ground just above the level of an adjacent sedge meadow. They may dry out in late summer and fall, with the tufa forming a hard, crusty surface.

Peat is a black soil derived from partially decomposed organic material. Peat may accumulate over thousands of years to form a rounded mound where spring water

discharges to the surface. These peat mounds are typical of many of the undisturbed fens still found in southeastern Wisconsin. They stay well-watered throughout the year, and support many unusual plant species. The dominant plant species on fens may vary considerably, with typical species including sterile sedge *(Carex sterilis),* grass of parnassus *(Parnassia glauca),* and Ohio goldenrod (*Solidago ohiensis).* This community is a specialized type, closely linked with prairie and sedge meadow, and shares many species with those more widespread communities.

Sedge meadow

Sedge meadow, which is flooded with shallow water most of the spring, is dominated by sedges of the genus *Carex*. Tussock sedge (*Carex stricta)* is abundant, forming hump-like tussocks. Lake sedge (*Carex lacustris)* is dominant in the wettest areas of sedge meadow, which often retain surface water through the summer. Prairie sedge (*Carex prairea)* is locally abundant and is associated with calcareous water. Herbaceous species include the spring-blooming marsh marigold (*Caltha palustris)* and spring cress (*Cardamine bulbosa).* Most species bloom in summer and fall, including asters (*Aster* spp.), late goldenrod (*Solidago gigantea)* and spotted Joe Pye weed (*Eupatorium maculatum)*. The sedge meadow is often invaded by shrubby species, including red osier dogwood (*Cornus stolonifera),* willows (*Salix* spp.), and the invasive glossy buckthorn (*Rhamnus frangula),* in the absence of fire, mowing, or grazing. The resulting shrubby community is termed a Shrub-Carr.

Emergent Marsh

Emergent Marsh is an herbaceous plant community that is flooded most of the year, with water 6" to 2 ft. deep. It is found in sloughs, old creek channels, edges of ponds, and along creek banks. The plants typically are rooted underwater and stand erect, emerging from the water to a height of several feet. Dominant species are tall and grass-like, including wide leaved cat tail *(Typha latifolia),* bur reed (*Sparganium eurycarpum),* hard stem bulrush (*Schoenoplectus acutus),* arrowhead (*Sagittaria latifolia)* and sweet flag (*Acorus calamus).*

Floodplain Forest

This community occurs in the watershed only on the lower floodplain, above the confluence with the Rock River. It is a closed forest community with a canopy of silver

maple (*Acer saccharinum)*, green ash (*Fraxinus pensylvanica),* box elder *(Acer negundo*) and peach leaved willow (*Salix amygdaloides)* or black willow (*S. nigra)*. It is flooded in the spring and may stay under water for extended periods. Flood debris is common; sloughs, pools, openings and fallen trees create a variety of light, moisture and disturbance conditions. The understory contains sedges (*Carex emoryi)*, bottomland aster *(Aster ontarionsis),* moneywort (*Lysimachia nummularia*—an introduced species), and wood nettle *(Laportea canadensis).*

Aquatic Communities

Aquatic plant communities are submerged under 2 feet or more of water for most of the growing season. Plant species vary considerably based on water chemistry, rapidity of flow, and depth. Species with limp, floating or submerged leaves are the typical dominant vegetation. Common species include several pondweeds (*Potamogeton* spp.), coontail (*Ceratophyllum demersum),* and duckweed (*Lemna minor)*. In Allen Creek, the northern arrowhead (*Sagittaria cuneata)* is found in beds on the stream bottom, growing as a submerged plant most of the year. In years with late summer droughts, the plant may send up erect flowering stalks. The yellow pond lily (*Nuphar advena*), a Special Concern species at the northern edge of its range, is dominant on several stretches. It holds its round leaves on stalks above the water surface. In a small pond with very calcareous water, the bottom is dominated by a species of *Chara,* a plant-like algae.

3.2 Impacts of land use on plant communities

All plant communities in the watershed have been influenced by the direct or indirect impacts of human activities. The vegetation of today exists in a state altered by more than a century and a half of intensive settlement, and the legacy of thousands of years of American Indian habitation. Prior to the 1830's, fires shaped the landscape, maintaining an open, savanna-grassland, which was helpful for hunting and ease of travel. The legacy of the Indians' land management practices is seen in the many fire-adapted plant communities that occur in the watershed.

After settlers arrived, agricultural uses dominated. Grazing and mowing of meadows for hay kept many areas open and preserved a prairie-savanna vegetation

structure, but eliminated some vulnerable species. Thus, many areas of natural vegetation existed as remnants in an agricultural landscape. Modern agriculture and urban development have led to degradation of natural vegetation in recent decades. Pasturing and mowing have been reduced or eliminated, and brush has invaded meadows and savannas. Other pastures have gone into cultivation, or became building sites for homes and businesses.

Large scale draining of wetlands in the early and mid-1900's converted many wetlands into crop fields. Ditching and channeling of streams and drainage of wetlands has resulted in loss of wetland, and degradation of remaining wetland habitat. The change in the hydrology is often irrevocable. Drainage often results in dominance of invasive species on wetlands that remained too wet to plow.

Today, excessive runoff from fields, farms, urban areas, and pipeline construction areas are substantial threats to wetland vegetation in the watershed. The runoff from these sources often results in the conversion of sedge meadows into monocultures of invasive reed canary grass (*Phalaris arundinacea)*. Wetter sedge meadows and marshes are often taken over by the invasive hybrid cat tail (*Typha* x *glauca)* when soil disturbance and urban or agricultural runoff result in excessive nutrient input. Both reed canary grass and hybrid cat tail form aggressively spreading clones, and are very difficult to control once they have established.

Despite the many destructive results of modern land use on vegetation, human influence is crucial to maintaining natural plant communities. The Midwestern prairie, savanna, fen and sedge meadow have evolved for millennia in tandem with human habitation and use. Today, these communities require our active involvement and stewardship.

4. Descriptions of study sites

4.1 Pond Hill

A prairie pothole wetland located in the southwest corner of the watershed, this large pond is situated in a rolling topography, surrounded by tilled fields, a dairy operation, and a small area of sloping woods on its southwest shore. The wetland is a degraded marsh of hybrid cat-tail and open water. The shores are dominated by reed canary grass (*Phalaris arundinacea)* and sandbar willow (*Salix exigua).* Along the north shore is a strip of degraded wet prairie and sedge meadow containing several native species with heavy buckthorn (*Rhamnus cathartica, R. frangula)* invasion.

Wildlife observed included muskrat lodges, geese, sandhill crane, red wing blackbird, and American toad. The wetland at Pond Hill is the largest pothole wetland in the watershed and provides valuable wildlife habitat. It is an enclosed basin with no surface water outlet, and may serve as an important water filtration and infiltration area for nutrient-rich surface runoff.

4.3 Star School Rd. South

The area of wetland south of Star School Rd. and north of Creamery Rd. is extensive. This area features continuous wetlands, oak savanna uplands, and a long stretch of unaltered stream. Several rare plant species are present, including early fen sedge (*Carex crawei),* Ohio goldenrod (*Solidago ohiensis),* and kitten tails (*Besseya bullii).* Much of the wetland is undisturbed sedge meadow with encroaching areas of brush, predominantly the invasive glossy buckthorn (*Rhamnus frangula),* with pussy willow (*Salix discolor)* and red osier dogwood (*Cornus stolonifera)* as associates. The creek itself is about 10 ft. wide and approximately 2—4 ft. deep. Flooded marshes and sloughs border the creek with diverse marsh vegetation and only minor reed canary grass invasion. The surface of the valley seems to have significant groundwater upwelling, because even in areas distant from any perceivable water flow there is shallow standing water and sedge meadow vegetation. The sedge meadows range from tussock meadow of *Carex stricta,* to very wet meadows of lake sedge (*Carex lacustris),* which may have a foot of standing water. Areas of deeper water support marsh vegetation of wide leaved cat tail (*Typha latifolia),* sweet flag (*Acorus calamus),* and bur reed (*Sparganium eurycarpum).*

On large areas of the west portion of the wetland, a shrub-carr vegetation of buckthorns, willows and dogwood has replaced sedge meadow, on very wet ground, often with 4—6" deep water. Slow moving water tracks through the thickets in sloughs, which provide a break in the dense canopy cover. Prominent "gardens" of spring cress (*Cardamine bulbosa)* and marsh marigold (*Caltha palustris)*, tussock and prairie sedge (*Carex stricta, C. prairea)*, water dock (*Rumex orbiculatus)*, and marsh fern (*Thelypteris palutris)* occur. The edges of shrub-carr thickets are expanding outward into open sedge meadow. The cessation of mowing for marsh hay many years ago seems to have allowed the shrubs to invade.

Fens occur locally within the sedge meadow, as noted by the presence of indicator species such as valerian (*Valeriana edulis)*, grass of Parnassus (*Parnassia glauca)*, Ohio goldenrod (*Solidago ohiensis)*, sterile sedge (*Carex sterilis)*, and early fen sedge (*Carex crawei)*. An island covered with aspen, elm and buckthorn has some remnant golden alexanders (*Zizia auraea)* and tall meadow rue (*Thalictrum dasycarpum)*, and might have harbored prairie in the past. Another island supports degraded oak woodland, of open grown bur oaks, golden alexanders, and dense buckthorn.

Aquatic communities were observed by walking the creek bed upstream, following both east and west branches. The stream bottom varies from a loose, deep sediment, to a hard, sandy surface. The water is generally 2—4 ft. deep up to where the stream branches split. The most prevalent species seen were native pondweeds (narrow leaved and long leaved: (*Potamogeton strictifolius, P. nodosus*), as well as the introduced curly leaved pondweed (*P. crispus)*; water speedwell (*Veronica anagalis-aquatica)*; northern arrowhead (*Sagittaria cuneata)*, completely submerged; and yellow pond lily (*Nuphar advena)*, with emergent, heart shaped leaves often covering the surface. The banks are vegetated with sedges, willow and red osier dogwood (*Cornus stolonifera)*. The west branch of the creek is about 10 ft. wide, and progressively shallower upstream, from about 3 ft. deep where it joins the east branch, to only a foot deep near the source. The stream passes through a dense buckthorn thicket, but along its banks are 10 feet of clear ground, supporting springy fens. Species found in this stretch include early fen sedge (*Carex crawei)*, rigid sedge (*C. tetanica)*, bald spike rush (*Eleocharis erythropoda)*, and tussock sedge (*C. stricta)*.

The east branch becomes narrow and its descent from the uplands is steep. It flows around the side of an oak-covered knoll, which has some oak savanna structure and wildflowers like the balsam ragwort (*Packera paupercula).*

To the east side of the stream is extensive sedge meadow with only minimal brush invasion. Along the slopes rising to the east, where county highway K runs along the east side of the marsh, are areas of fen and wet prairie, where the wet sedge meadows grade into upland. Two sites were observed that support fen/wet prairie species. Just off county K, is an old pasture with open grown oaks, grading into sedge meadow. This site supports a large population of the Western golden ragwort (*Packera pseudaurea),* a species of the Great Plains that is rare and local in southeastern Wisconsin. Other species observed were early fen sedge (*C. crawei),* blue flag iris (*Iris virginica),* limestone meadow sedge (*C. granularis),* wooly sedge (*C. pellita),* rigid sedge (*C. tetanica),* purple false foxglove (*Agalinis* sp.), black eyed susan (*Rudbeckia hirta),* and marsh fleabane (*Erigeron philadelphicus).*

Areas supporting oak savanna are found on a slope rising to the west of the wetland. Sandy soils and open grown oaks occur with native ground layer species, including the State Threatened kitten tails (*Besseya bullii),* on a site that has been managed with prescribed burns.

The wetlands south of Star School Rd. would benefit from active management. The main threat apparent here is the invasion of brush, which has overrun large areas of sedge meadow, fen, prairie and savanna. Prescribed burning and brush clearing would be important measures to implement on this section.

A change in land uses upstream, leading to more sediment or nutrient runoff into the creek, could negatively impact water quality, and threaten the aquatic communities in the stream. Protection of uplands from development would provide protection for this stretch of creek from sedimentation and eutrophication. Ongoing pipeline construction along the south side of this section, and a planned highway 12 bypass route through the area, could have substantial impacts here.

4.4 Star School Rd. north

The wetlands north of Star School Rd. contain intact fen, prairie, and sedge meadow. Rare species observed here include the state threatened prairie Indian plantain (*Arnoglossum plantagineum)* and small white lady slipper orchid (*Cypripedium candidum)*; the state special concern Ohio goldenrod (*Solidago ohiensis)*, early fen sedge (*Carex crawei)* and flat-stemmed spike rush (*Eleocharis compressa)*. In addition, many indicator species of high quality prairie and wetland communities are present.

To the west of the creek, north of Star School Rd. is the Karow property. This site has the greatest diversity of plant communities and species found in the watershed today. The land is being actively managed with prescribed burns and brush removal. The property contains extensive, high quality remnants of mesic to wet prairie fen, sedge meadow, and oak savanna. The variety of habitat types present, the light utilization of the land in the past, and the current stewardship of the property support a landscape of exceptional plant diversity. The site contains over 200 species of native plants. Some of these, such as white lady slipper, are extremely rare in Wisconsin. The showy display of wildflowers through the season is a striking example of what southern Wisconsin's prairies must have looked like.

The adjacent property to the east includes a stretch of Allen Creek and extensive wetland habitat. High quality sedge meadow is present in large blocks interspersed with dense thickets of willow, dogwood and buckthorn. Small areas of remnant wet to wet mesic prairie and fen are scattered through the wetland. Aquatic vegetation and emergent marsh occur in and around manmade ponds.

Sedge meadow vegetation is extensive, probably covering 10-20 acres, and is of high quality, with very little invasion by reed canary grass. Most of the sedge meadow was inundated at the time of surveying, and this may help keep out the shrubs. The wettest parts are dominated by lake sedge (*Carex lacustris)*. The majority of the sedge meadow is tussock sedge (*Carex stricta)*-dominated, associated with bluejoint grass (*Calamagrostis canadensis)*, blue flag iris (*Iris virginica)*, marsh marigold (*Caltha palustris)* and spring cress (*Cardamine bulbosa)*. Drier, slightly elevated areas are the most prone to shrub invasion. The extent of fen and wet prairie is limited by the encroaching thickets of brush, a major threat to these plant communities on this site. A small area of wet prairie supports western golden ragwort (*Packera pseudaurea)*, golden

alexanders (*Zizia aurea)*, big tooth sunflower (*Helianthus grosseserratus)*, cordgrass (*Spartina pectinata)*, and prairie dock (*Silphium terebinthinaceum)*. The rigid sedge (*Carex tetanica)* is widespread through the property. Other prairie species found were Michigan lily (*Lilium michiganense)*, big bluestem (*Andropogon gerardi)*, little bluestem (*Schizachyrium scoparium)*, swamp lousewort (*Pedicularis lanceolata)*, black eyed susan (*Rudbeckia hirta)*, and swamp thistle (*Cirsium muticum)*.

Fen vegetation is present and indicative of calcium rich groundwater. A dry area of marly, white soil found along a pond shore is rich in fen and prairie species: early fen sedge is abundant on the site.

The ponds contain a diverse assemblage of marsh vegetation, including bur reed (*Sparganium eurycarpum)*, sweet flag *(Acorus calamus)*, bladderwort *(Utricularia vulgaris)*, wiregrass sedge (*Carex lasiocarpa*), swamp milkweed (*Asclepias incarnata*), pondweed, and yellow pond lily.

Allen Creek flows through the western part of the property. The stream is about 10 feet wide, bordered by willows and reed canary grass. Aquatic species include northern arrowhead (*Sagittaria cuneata)* and yellow pond lily (*Nuphar advena)*.

Brush invasion poses an ongoing threat to plant communities here. Management should include brush clearing, and prescribed fire would be beneficial to maintaining the quality of the rare plant communities present.

4. Mush-ko-se-day Park and Ft. Atkinson School District Nature Study Area

A valuable open space corridor in the urbanizing northern section of the watershed consists of the Mush-ko-se-day Park and the Fort Atkinson School District Nature Study Area. They are accessible to the public, and provide excellent recreational and educational opportunities to view and experience wetlands, restored prairies, and oak woodlands managed with prescribed burns.

These areas are located north and east of the creek. Both sites have wetlands but no surface stream channel connecting the two. The Fort Atkinson School area has sedge meadow and fen, totaling around 3 acres. A small excavated pond on the site has fen species along the margins, including Riddell's goldenrod (*Solidago riddellii)* and ladies

tresses orchid (*Spiranthes cernua),* on a calcareous, tufa-like soil. The sedge meadow is steadily being encroached on by aspen and buckthorn, and would benefit from burning and brush removal. A rare species found on the site is the yellow giant hyssop (*Agastache nepetoides),* a state threatened species, found in partial shade under black walnut trees.

Mush-ko-se-day Park has an extensive prairie restoration, ponds, and an oak woodland. The large size of the park and the active ecological management occurring here make it a valuable piece of open space and habitat for the watershed.

4.5 Highway 26 to Rock River

The vegetation below highway 26 reflects the influence of the floodplain forest of the Rock River. Valuable remnant areas of calcareous fen, prairie, and sedge meadow exist on the upper edges of the floodplain.

At the upstream end of this section the stream passes under highway 26 and through an area of degraded oak savanna. Less than a quarter mile downstream is a bridge, on a former railroad embankment, now a recreational trail. Several spring heads emerge and flow into the creek from the downstream side of the embankment, in spring runs supporting cut leaved water parsnip (*Berula erecta),* skunk cabbage (*Symplocarpus foetidus),* giant angelica (*Angelica atropurpurea),* cup plant (*Silphium perfoliatum),* and watercress *(Nasturtium officinale).*

Below the trail crossing the creek passes near a farmstead and into a mature floodplain forest on silty soils. The creek is shallow and the bottom is firm and sandy. The channel is meandering and occasionally braided, dividing into sloughs, ponds, and flooded marshes, containing many aquatic plant species, including several pondweeds (*Potamogeton* spp.), bur reed (*Sparganium eurycarpum),* river bulrush (*Bolboschoenus fluviatilus),* hard stem bulrush (*Schoenoplectus acutus),* coontail (*Ceratophyllum demersum),* and water smartweed (*Polygonum amphibium).* At the mouth of the creek, a forest of silver maple (*Acer saccharinum)* and green ash (*Fraxinus pensylvanica)* covers many acres of flooded bottomland. Slightly higher ground supports a forest of green ash and peach leaved willow (*Salix amygdaloides)* with a shrubby understory of blue fruited dogwood (*Cornus amomum).*

On the edge of the floodplain, the land rises to an elevated terrace. A largely intact prairie/fen remnant occurs here, on tufa and peat. It is directly adjacent to the oil pipeline currently under construction, and undoubtedly extended across where the pipeline has cut through it. The prairie surface is dry, but has several wetland species present, including a spike rush, *Eleocharis elliptica,* and meadow willow (*Salix petiolaris).* Crawfish burrows are visible, another indicator of the seasonally wet nature of this site. Several prairie indicators are present, such as yellow coneflower (*Ratibida pinnata),* ironweed (*Vernonia fasciculata),* and sweet grass (*Hierochloe hirta).* The extent of the remnant prairie is about 5 acres. It has resisted shrub and tree invasion to some extent, as evidenced by numerous, stunted green ash saplings. Shrub invasions, as well as soil and groundwater disturbance from the pipeline operation, constitute threats to this rare plant community. This area would benefit from prescribed burning and continued monitoring.

5. Management and conservation of the plant communities of the watershed

The unique natural features of the Allen Creek watershed are evident in the rare plant communities and rich plant diversity of its remnant habitats. In order to conserve and protect these rare resources, they must be adequately assessed. Then management recommendations can be made, and a course of action can be planned. Restoration of native plant communities is an increasingly feasible choice, with many options available to get funding, as well as expertise, to assist with restoration.

Assessing the plant communities is the first step. This preliminary survey of watershed plant communities has located remnants of rare plant communities. More surveying needs to be done to assess the extent and diversity of vegetation in these and other areas. Only with ongoing monitoring can the actual plant diversity be assessed.

Assessing threats is the next task. A major threat to the majority of plant communities in the watershed today is brush invasion. Additional threats are imminent from Enbridge pipeline expansion, the proposed highway 12 bypass, the highway 26 expansion, and residential development.

Management recommendations can then be made to address threats to the plant communities. Prairie, fen, sedge meadow, and oak savanna remnants would benefit

greatly from brush clearing and prescribed burning to offset continued losses. Marsh and aquatic communities would benefit from protecting and mitigating upstream sources of water and runoff.

With implementation of management actions such as brush clearing, prescribed fire, and watershed protection, substantial restoration of the watershed's plant communities is possible. On land where these actions have been taken, a resurgence of native plant community structure has occurred.

Grants and expertise are available to assist landowners in assessing and restoring native plant communities. The DNR offers assistance with habitat restoration through the Wildlife Habitat Incentives Program (WHIP). This may include funding to cover management activities such as brush removal, by a contractor.

If rare plants or animals are present, funding may be available to preserve their habitat. The DNR Bureau of Endangered Resources may be able to provide assistance in managing exceptional areas.

Other resources are available from the US Fish and Wildlife Service Wisconsin Private Lands Office in Madison. They have extensive experience in restoring wetlands and often are able to provide funding.

Volunteer organizations provide another opportunity to learn about native plant communities, and how to preserve and manage them. The Prairie Enthusiasts are active in managing prairies and savannas in southern Wisconsin. They organize many field trips to unique natural communities throughout the area.

The best way to learn about native plant communities may be to visit a state natural area. You can see fine examples of prairie, fen, and oak savanna in southern Wisconsin on many of these publicly accessible sites.

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Appendix 1: plant community indicator species of the Allen Creek watershed.

oak savanna: bur oak (*Quercus macrocarpa)* and/or white oak (*Q. alba)* dominant and open grown, degraded understory usually present. Native species in understory may include golden alexanders (*Zizia aurea)*, woodland sunflower (*Helianthus strumosus),* balsam ragwort (*Packera paupercula),* culver's root (*Veronicastrum virginicum).*

prairie: grasses/sedges: big bluestem (*Andropogon gerardi)*, little bluestem (*Schizachyrium scoparium),* prairie cordgrass *(Spartina pectinata)*, wooly sedge (*Carex pellita),* rigid sedge (*C. tetanica)*; forbs: prairie dock (*Silphium terebinthinaceum),* rosinweed (*S. integrifolium),* yellow coneflower (*Ratibida pinnata),* ironweed (*Vernonia fasciculate),* big tooth sunflower (*Helianthus grosseserratus),* prairie smoke (*Geum triflorum),* prairie phlox (*Phlox pilosa),* yellow star grass (*Hypoxis hirsuta).*

fen: sterile sedge (*Carex sterilis),* Buxbaum's sedge (*C. buxbaumii),* early fen sedge (*C. crawei),* cotton grass (*Eriophorum angustifolium),* Ohio goldenrod (*Solidago ohiensis),* Riddell's goldenrod (*S. riddellii),* white lady slipper (*Cypripedium candidum),* valerian (*Valeriana edulis),* grass of Parnassus (*Parnassia glauca).*

sedge meadow: one or more of following dominant: tussock sedge (*Carex stricta),* lake sedge (*C. lacustris),* prairie sedge (*C. prairea).* Forbs often present: swamp milkweed (*Asclepias incarnata),* great water dock (*Rumex orbiculatus),* blue flag iris (*Iris virginica),* spotted joe pye weed (*Eupatorium maculatum),* marsh marigold (*Caltha palustris),* purplestem aster (*Aster puniceus),* common water horehound (*Lycopus americanus).*

emergent marsh: bur reed (*Sparganium eurycarpum),* sweet flag (*Acorus calamus),* hard stem bulrush (*Schoenoplectus acutus),* river bulrush (*Bolboschoenus fluviatilus),* wide leaved cat tail (*Typha latifolia),*water smartweed *(Polygonum amphibium),* common arrowhead *(Sagittaria latifolia).*

floodplain forest: dominant canopy trees any of following: silver maple (*Acer saccharinum),* green ash (*Fraxinus pensylvanica),* black willow (*Salix nigra),* peach leaved willow (*S. amygdaloides)*; any of following present in understory: bottomland aster (*Aster ontarionsis),* moneywort (*Lysimachia nummularia),* false nettle (*Boehmeria cylindrica),* wood nettle (*Laportea canadensis),* blue fruited dogwood (*Cornus amomum).*

aquatic communities: any of following present: pondweeds (*Potamogeton* spp.), northern arrowhead (*Sagittaria cuneata),* an algae: muskgrass (*Chara* sp.), coontail (*Ceratophyllum demersum),* yellow pond lily (*Nuphar advena),* common waterweed (*Elodea canadensis).*

Appendix 2: State listed species of rare plants found in the Allen Creek Watershed.

Agastache nepetoides Yellow giant hyssop. WI Threatened
Arnoglossum plantagineum Prairie Indian plantain. WI Threatened
Besseya bullii Kitten Tails. WI Threatened
Carex crawei Early fen sedge. WI Special Concern
Cypripedium candidum. White lady slipper. WI Threatened.
Eleocharis compressa. Flat stem spike rush WI Special Concern
Epilobium palustre Marsh willow herb WI Special Concern
Epilobium strictum Downy willow herb WI Special Concern
Gentianopsis procera Lesser fringed gentian. WI Special Concern
Nuphar advena Yellow pond lily. WI Special Concern
Solidago ohiensis Ohio Goldenrod. WI Special Concern