## 3.0 OPEN SPACE ASSESSMENT, GREEN INFRASTRUCTURE & NATURAL AREAS

## 3.1 Open Space Inventory and Prioritization

A major component of watershed planning includes an examination of open space to determine how it best fits into a "Green Infrastructure Network" which is best defined as an interconnected network of natural areas and other open space that conserves natural ecosystem values and functions, sustains clean air and water, and provides a wide array of benefits to people and wildlife (Benedict, 2006). Natural features such as stream corridors, wetlands, floodplain, woodlands, and grassland are the primary components of green infrastructure. Working lands such as farms and developed areas such as ball fields, golf courses, schools, naturalized detention basins, and some large residential or smaller lots that back up to natural areas can also be considered components of a Green Infrastructure Network if they help link and/or extend other green infrastructure.

A three step process was used to create a Green Infrastructure Network for Pike River watershed:

- Step 1: All parcels of land in the watershed were categorized as open space, partially open space, or developed.
  - Step 2: All open and partially open parcels were prioritized based on a set of criteria important to green infrastructure.
  - Step 3: Prioritized open and partially open parcels and some developed but linking parcels, were combined to form a network.

For this watershed plan, an "open space" parcel is generally defined as any parcel that is not developed. "Partially open" parcels have been developed to some extent, but the parcels still offer potential green infrastructure opportunities. Parcels that are mostly built out are considered "developed". Public versus private and protected versus unprotected status of open and partially open space parcels are other important green infrastructure attributes and are discussed below.

# Open, Partially Open, & Developed Parcels

Step 1 in creating a Green Infrastructure Network was completed by categorizing all parcels in the watershed as open, partially open, or developed. Open space parcels comprise approximately 17,394 acres or 47.2% of the watershed. Parcels range from 0.01 to 351 acres with a 13.8 acre average. Partially open parcels make up another 4,752 acres or 12.9% of the watershed. Parcels range from 0.01 to 737 acres with a 9.0 acre average. Developed parcels account for another

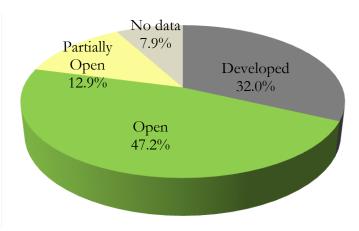
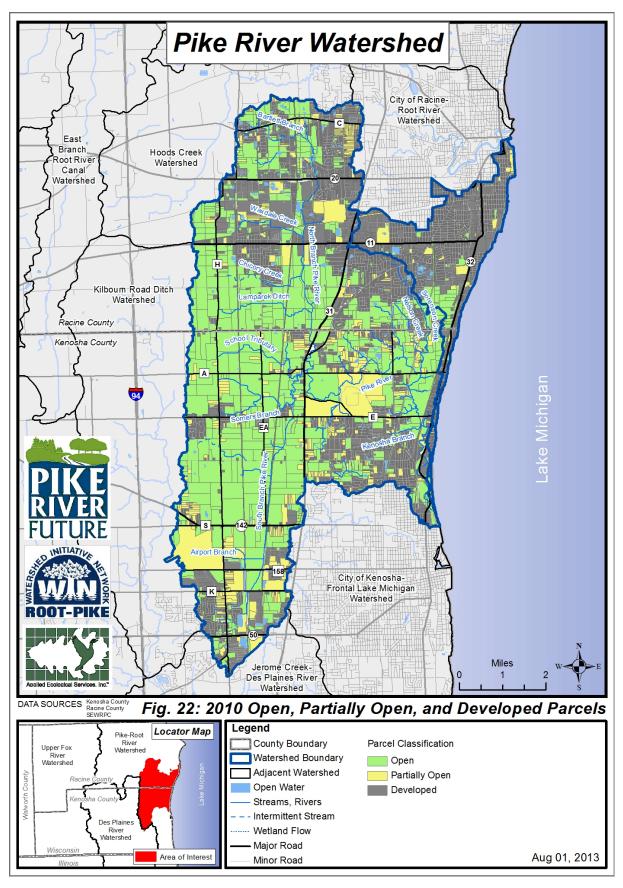


Figure 21. Distribution of open, partially open, developed, and unknown parcels.

11,777 acres or 32.0% of the watershed, while unclassified roads and parcels for which there was no data account for another 2,942 acres or 7.9% of the watershed. Figures 21 and 22 summarize and depict Step 1 results used to develop the Green Infrastructure Network. Most open and partially open parcels are located along the western and central portions of the watershed over agricultural lands and along the north branch and South Branch portions of the watershed.



## Public/Private Ownership of Open and Partially Open Parcels

The public or private ownership of each open and partially open parcel was determined from available parcel data. Developed parcels are not included in this summary. Publicly owned parcels include those owned by federal, state, county, or municipal government, park districts, and school districts. Public open and partially open parcels account for 8.7% and 5.0% of the open and partially open acreage respectively (Figures 23 & 25). Private ownership types include homeowners/business associations, land conservancy, commercial, residential, agricultural, golf clubs, etc. Private open parcels comprise 69.9% of

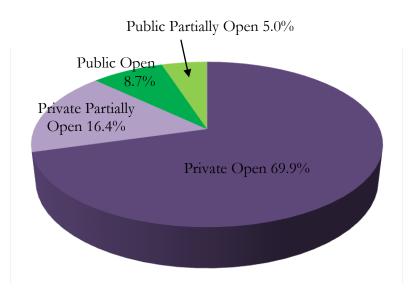
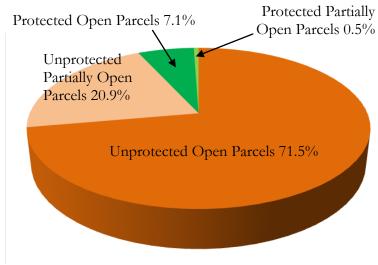


Figure 23. Distribution of private and public open and partially open parcels.

the open and partially open acreage whereas private partially open parcels comprise 16.4% (Figures 23 & 25). Most public open and partially open parcels are owned by a county or municipality and are scattered throughout the watershed.

# Protected Status of Open and Partially Open Parcels

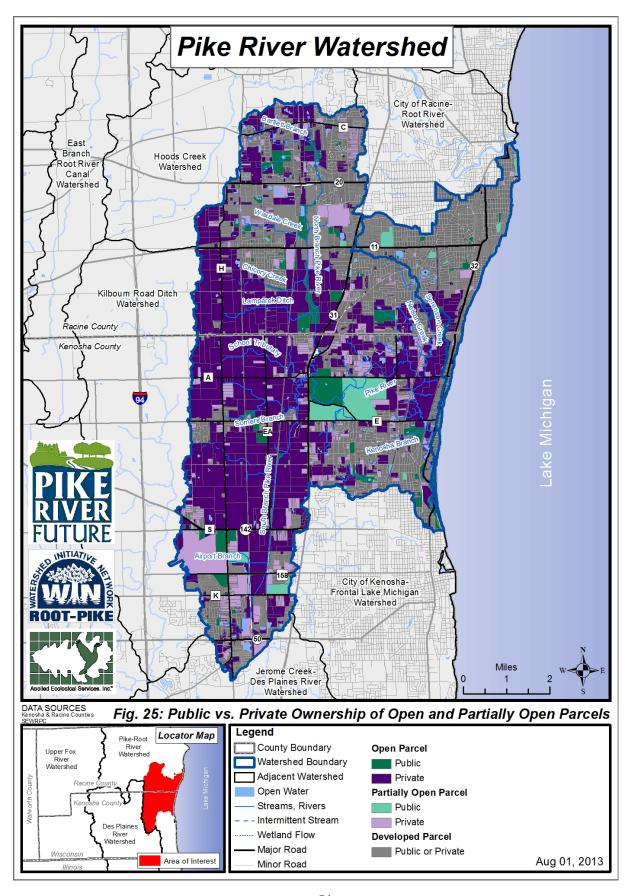
Preservation of open space is critical to maintaining and expanding green infrastructure and is an important component of sustaining water quality, hydrological processes, ecological function, and the general quality of life for both wildlife and people. Without preservation, open space can be converted to other less desirable land uses in the future. Protected open and partially open parcels account for about 8% of the open and partially open parcel acreage in the watershed while

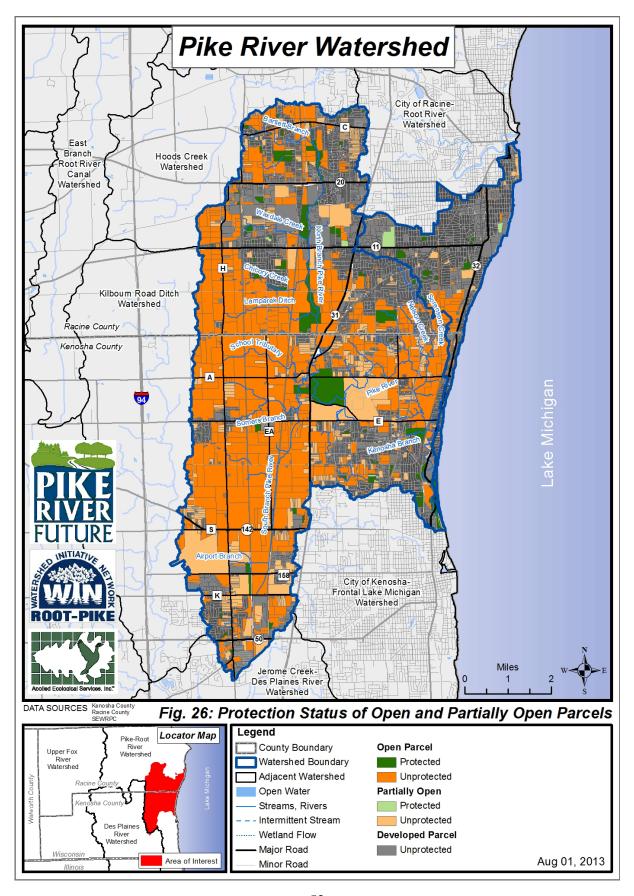


**Figure 24.** Distribution of protected and unprotected open and partially open parcels.

unprotected open and partially open parcels account for the remaining 92% (Figures 24 & 26). Parcels that were considered protected include public parks, stormwater detention basins that were defined by a separate parcel and Hawthorn Hollow. Most protected open or partially open parcels are owned by counties or municipalities and are scattered along the Pike River and its tributaries.

The most critical unprotected open and partially open parcels include some vacant parcels within the highly urbanized direct drainage area and agricultural lands along the western half of the watershed. All of these areas are currently open space, but unconnected to the current SEWRPC environmental corridors. The agricultural areas will likely be developed to commercial/retail, residential, and light industrial unless agricultural preservation tools are leveraged. Utilizing the Wisconsin Working Lands Initiative and future development that incorporates conservation design and/or Stormwater Treatment Train systems will be extremely important in many of these areas to improve water quality and reduce stormwater runoff volume to the Pike River while also expanding the protected green infrastructure along the western half of the watershed.





## Open Space Parcel Prioritization

Step 2 in creating a Green Infrastructure Network for Pike River watershed was completed by prioritizing open and partially open parcels. For this step, 10 prioritization criteria important to green infrastructure were examined via a GIS analysis (Table 9). If an open or partially open parcel met a criterion it received one point. If the parcel did not meet that criterion, it did not receive a point. This process was repeated for each open and partially parcel and for all criteria. The total points received for each parcel were summed to determine parcel importance within the Green Infrastructure Network. Parcels with the highest number of points are more important to green infrastructure than parcels that met fewer criteria. Note: the prioritization process was not completed for developed parcels.

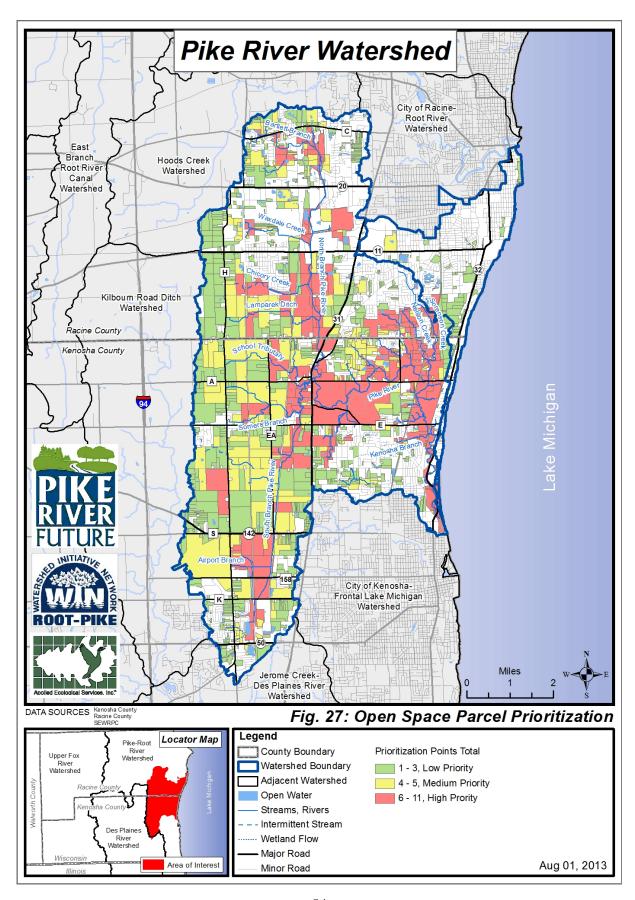
The combined possible total of points any one parcel can accumulate is 10 (10 of 10 total criteria met). The highest total value received by a parcel in the weighting process was 9 (having met 9 of the 10 criteria). After completion of the prioritization, parcels were categorized as "High Priority", "Medium Priority", or "Low Priority" for inclusion into the Green Infrastructure Network based on point totals. Parcels meeting 6-9 of the criteria are designated High Priority for inclusion into the Green Infrastructure Network while parcels meeting 4-5 criteria are designated Medium Priority. Parcels with a combined value of 1-3 are categorized as Low Priority but are not necessarily excluded from the Green Infrastructure Network based on their location or position as linking or expansion parcels.

Figure 27 depicts the results of the parcel prioritization. An obvious correlation can be seen between High Priority and many Medium Priority green infrastructure parcels and their relation to Pike River and its tributaries. Many of the Medium Priority parcels in the western half of the watershed include farmland or a segment of a secondary tributary stream. Most of the Low Priority parcels are smaller partially open parcels or agricultural fields in the western half of the watershed. Parcel size did not play a role in the parcel prioritization process for this watershed plan.

**Table 9.** Criteria used to prioritize parcels for a Green Infrastructure Network.

1	1
	Green Infrastructure Criteria

- 1. Open or partially open parcels that intersect FEMA 100-year floodplain
- 2. Open or partially open parcels within 0.5-miles of any headwater stream
- 3. Open or partially open parcels that intersect a wetland
- 4. Open or partially open parcels that intersect an Advanced Identification of Wetland Disposal Area (ADID) wetland
- 5. Open or partially open parcels that are within 100 feet of a watercourse or lake
- 6. Open or partially open parcels in a Highly or Moderately Vulnerable" Land Use/Land Cover Subwatershed Management Unit (SMU)
- 7. Open or partially open parcels adjacent to or including private or public protected open space
- 8. Open or partially open parcels that intersect areas of "very high" potential groundwater recharge
- 9. Open or partially open parcels that intersect areas of "high" groundwater contamination potential
- 10. Open or partially open parcels that intersect existing or planned trails
- 11. Open or partially open parcel that intersect existing or planned SEWRPC environmental corridors (primary, secondary, and isolated)



#### 3.2 Green Infrastructure Network

The final step (Step 3) in creating a Green Infrastructure Network for Pike River watershed involves laying out the network by using prioritized open space results from Step 2 as the base layer by including nearly all High Priority and most Medium Priority parcels. In addition, several Low Priority and many developed parcels were also included if they provided links, expanded existing green infrastructure, or were simply large isolated sites with possible environmental importance. It is also important to note that the Green Infrastructure Network includes nearly all SEWRPC identified primary and secondary environmental corridors. County and region wide green infrastructure plans generally focus on natural features such as stream corridors, wetlands, floodplain, buffers, and other natural components. The Green Infrastructure Network created for Pike River watershed captures all the natural components and other green infrastructure such as recreational parks, large residential lots, schools, and golf courses at the parcel level. Parcel level green infrastructure planning is important because land purchases, acquisitions, and land use changes almost always occur at the parcel level.

Perhaps the most important aspect of green infrastructure planning is that it helps communities identify and prioritize conservation opportunities and plan development in ways that optimize the use of land to meet the needs of people and nature (Benedict, 2006). Green infrastructure planning provides a framework for future growth that identifies areas not suitable for development, areas suitable for development but that should incorporate conservation design standards, and areas that do not affect green infrastructure.

Green Infrastructure Network implementation has several actions:

- Protect specific unprotected green infrastructure parcels through acquisition, regulation, and/or incentives.
- Incorporate conservation design standards on green infrastructure parcels where development is planned.
- Limit future subdivision or building of smaller green infrastructure parcels.
- Implement long term management of green infrastructure.

A Green Infrastructure Network for Pike River watershed is shown on Figure 28. The network is a system of *Hubs*, *Links*, and *Sites*. Hubs generally consist of the largest and least fragmented areas. Areas of the watershed such as The University of Wisconsin-Parkside and Petrifying Springs Park that are currently owned by state or local governments/park district and other school campuses are considered hubs. Links are generally formed by smaller private/unprotected parcels around Pike River and its tributaries. These links are extremely important because they provide biological conduits between hubs. However, most of the linking parcels are not ideal green infrastructure until residents embrace the idea of naturalizing streambank, wetlands, floodplains and shoreline property. Some sites may not be connected to the larger green infrastructure network but can still provide important water quality, ecological and social values. Some of the recreational parks in the watershed serve this purpose while many others do not and therefore are not included in the network. Any open space within more urban portion of the Direct Drainage area was mapped as green infrastructure due to the limited open space available.

"Other Green Infrastructure" was mapped that provided connections or links in the watershed, or are larger outlining parcels that don't provide a connection to the network. One of the most

important aspects of this other green infrastructure network that does not necessary fall into the outlined planning process is the shoreline of Lake Michigan, especially the large frontage located in the Direct Drainage area. There are few parks along the lakefront outside of the City of Racine. The immediate shoreline is almost solely privately owned, as much public access to Lake Michigan should be a high priority to enhance the biological connection with the upland portions of the watershed, provide spaces for water quality improvements prior to water outletting to the lake and public access. Additional connections to Lake Michigan within the Direct Drainage were considered. For example, vacant parcels adjacent to S.C. Johnson & Son headquarters could be regraded to become bioswales and offer stormwater and recreational connections along 14<sup>th</sup> and 16<sup>th</sup> streets with water eventually flowing to Carre-Hogle Park and other waterfront parks.

Most of the green infrastructure parcels that may become available for purchase in the future are located in the central and western portion of the watershed and will likely be developed. Parcels or hydrologically or environmentally sensitive portions of the parcels within these green infrastructure network or adjacent to existing protected corridors may be better utilized as protected natural open space via several potential tools; 1) acquisition, 2) regulation, 3) incentives, and/or conservation development. The simplest form of acquisition is through outright purchase or donation of land but can also occur through conservation easements and land trusts. Protection of land through state and federal regulation covers natural features such as wetlands or threatened and endangered species/important habitat. Local regulation protection occurs by enforcing stormwater, zoning, comprehensive plans, and subdivision ordinances. Regulatory action can also come in the form of Special Service Area assessments and Development Impact Fees. Land protection through incentives usually occurs on smaller private lands. Some incentives include landowner recognition, tax incentives, or benefits for farms through a Conservation Reserve Program. A more detailed list of the tools and methods for protecting green infrastructure are included in Table 10.

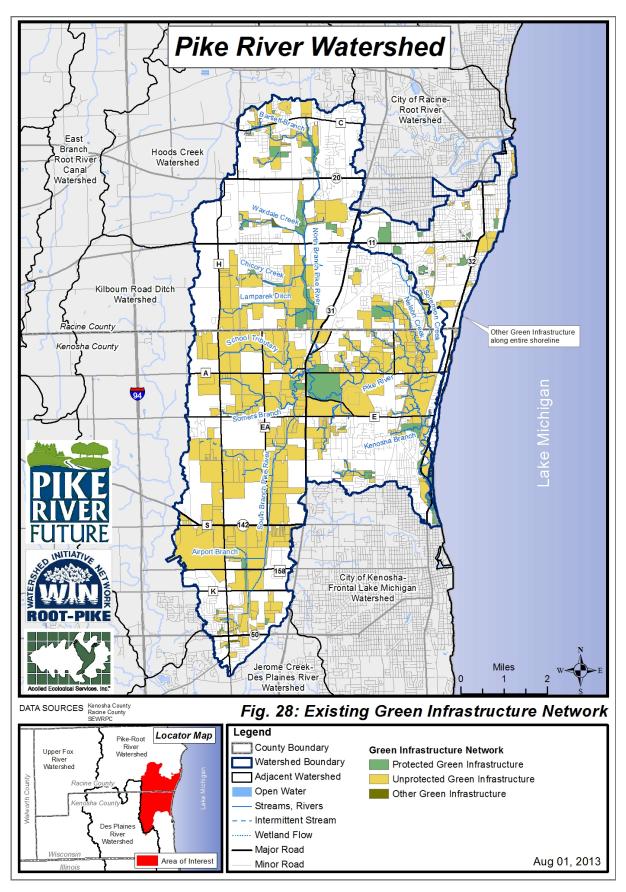
**Table 10.** Tools for protection of green infrastructure.

Tool	Method of Implementation	
	Outright purchase	
	Conservation easements	
	Land donations	
Land Acquisition	Land trusts	
	Buffer or landscape ordinance	
	Comprehensive plans	
	Development Impact Fee	
	Mitigation and mitigation banking	
	Special Service Area taxes	
	Stormwater regulations	
	Subdivision ordinances	
	Zoning	
	Wetland permitting	
Regulation	T&E species and habitats	
	Management agreements	
	Landowner recognition and rewards	
	Tax incentives	
	Technical assistance from local agencies	
Incentives	Conservation Reserve Program incentives	

Source: Benedict, 2006.

A Green Infrastructure Network can only be realized by coordinated planning efforts of local municipalities, park districts, developers, and private land owners. Elmwood Park, Kenosha, Mount Pleasant, Pleasant Prairie, Racine, Somers, and Sturtevant should follow the recommended process below to initiate and implement the Green Infrastructure Network for Pike River watershed.

- 1) Identify and designate a lead Pike River watershed stakeholder to serve as a "coordinator" and meet with other stakeholders to plan for future green infrastructure.
- 2) Include all green infrastructure parcels in updated community comprehensive plans and development review maps.
- 3) Create zoning overlay and update development ordinances to require conservation development design on all green infrastructure parcels.
- 4) Require Development Impact Fees and/or Special Service Area taxes for all new development and redevelopment to help fund future management of green infrastructure.
- 5) Identify important unprotected green infrastructure parcels not suited for development then protect and implement long term management.
- 6) Work with private land owners along Pike River stream/tributary corridors to manage their land for green infrastructure benefits.
- 7) Identify new trails and trail connections within the Green Infrastructure Network.



#### 3.3 Ecologically Significant Areas

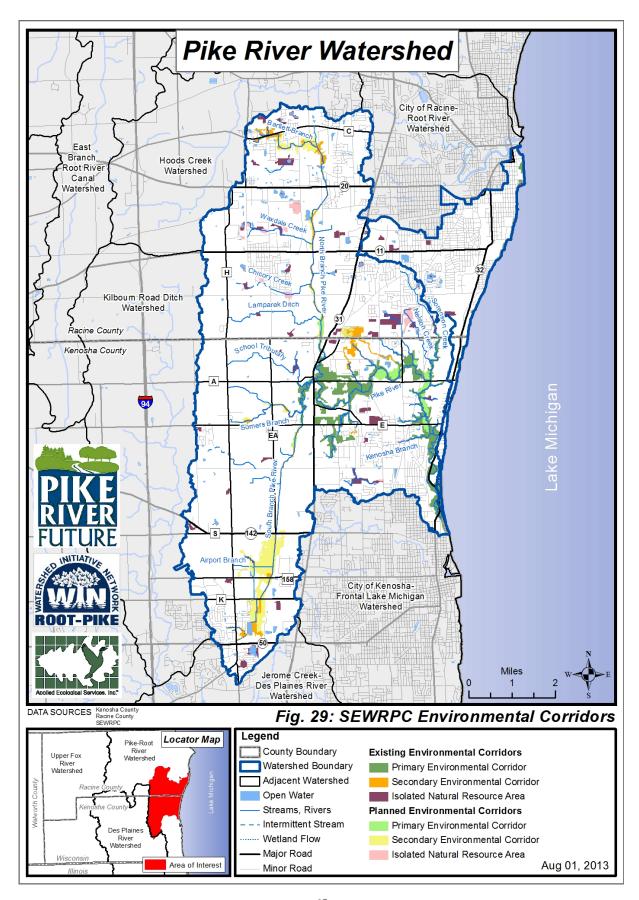
Wetlands, prairie, and woodlands that fall within concentrated corridors of the natural resource base are all considered "Ecologically Significant Areas" within Pike River watershed (Figure 31). Many of these areas are public and owned/managed by local county or municipal entities. The watershed includes one state natural area as well as several other natural areas of regional or local significance. Ecological Significant Areas provide habitat for plant and animal species. These areas also form portions of the Green Infrastructure Network that interconnects land and waterways, supports native species, maintains natural ecological processes, sustains air and water resources, and contributes to the health and quality of life for communities and people.

#### SEWRPC Environmental Corridors

As part of their regional planning efforts, SEWRPC has identified primary and secondary environmental corridors within southeastern Wisconsin. These environmental corridors were designated in order to identify and protect important natural resources in the area. The Environmental Corridors for Pike River serve as an important catalogue of ecologically significant areas within the watershed and form the backbone of the Green Infrastructure Network.

SEWRPC's Environmental corridors were determined based on the presence of water bodies, watercourses, wetlands, prairies, wildlife habitat areas, areas containing hydric or partially hydric soils, and areas of rugged terrain or high-relief topography. Additionally, the corridors took into account the relation of open space, historic sites, scenic areas, natural areas, and critical species habitat sites within the area. Primary and secondary environmental corridors, as well as isolated natural resource areas were delineated for the planning area. Primary environmental corridors are defined as being at least 400 acres in size, two miles long, and 200 feet in length. Secondary corridors are at least 100 acres in size and one mile long, unless they connect primary environmental corridors. Isolated natural resource areas include those from 200 feet wide down to a 5 acre minimum (SEWRPC, 2000).

Approximately 2.3 square miles of the Pike River watershed lie within the Primary Environmental Corridor, according to SEWRPC's 2005 delineation. An additional .9 acres and 1.1 acres, respectively, fall within the Secondary Environmental Corridors and Isolated Natural Resource Areas. The majority of the Environmental Corridor extends along and includes the Pike River from the mouth at Lake Michigan to the center of the watershed where the main branch splits into the North Branch and South Branch. An additional stretch extends along the Lake Michigan coastline in the Direct Drainage Area. The SEWRPC 2005 Environmental Corridors within the Pike River watershed are mapped on Figure 29.



#### ADID Wetlands

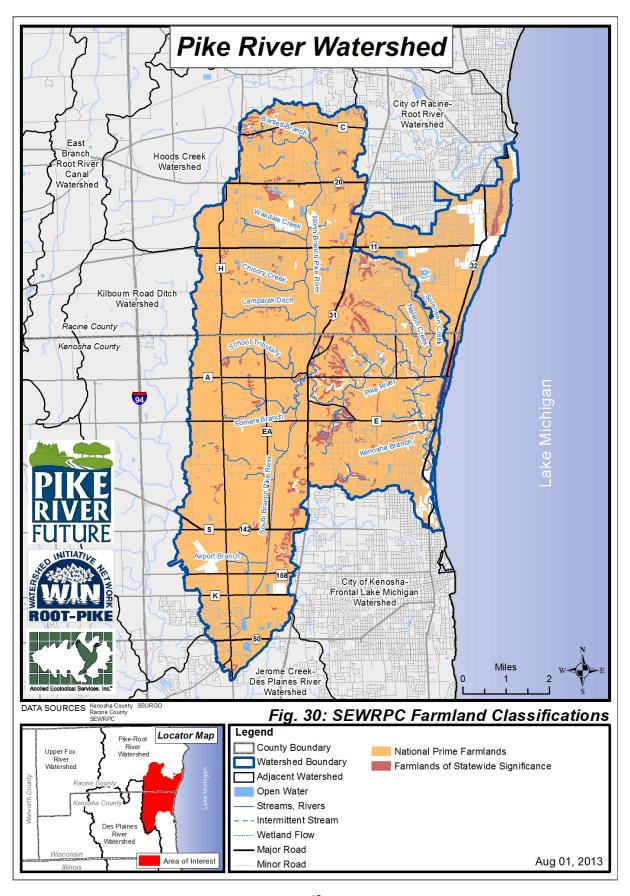
The USEPA has a planning process known as advanced identification of disposal areas (ADID) in place that is used to identify wetlands and other waters that are unsuitable for the discharge of dredged and fill materials (USEPA, 2009). For the Pike River watershed, these identifications were made by the USEPA in conjunction with the USACE and WDNR. The ADID wetland inventory was completed for Racine and Kenosha Counties in 2005. SEWRPC provided technical assistance in producing these maps by combining this data with their Primary Environmental Corridors. These inventories identify wetlands where special protection should be implemented and enforced. The ADID wetlands located in the watershed are mapped on Figure 31. A separate wetlands map and detailed ADID wetland information is found in Section 5.4.

## Highly Productive Agricultural Land

Agricultural preservation in the Pike River watershed can play a crucial role in retaining valuable open and partially open space. These areas allow for increased groundwater infiltration as opposed to the conversion of these lands to more intense, urban uses. SEWRPC's 2006 Regional Land Use Plan for Southeastern Wisconsin: 2035, calls for the preservation of as much of the most productive farmland as practicable.

SEWRPC defines the most productive farmland according to the agricultural capability of the soils on that land – specifically those classified by the U.S. Natural Resources Conservation Service as Class I and Class II soils. In the Pike River watershed, SEWRPC has identified 32,577 acres of "National Prime Farmlands" worthy of preservation. Figure 30 depicts the location of the National Prime Farmlands, as well as Farmlands of Statewide Significance. The SEWRPC's 2035 Land Use Plan, written in 2006 and while development pressure was still at its height, called for much of these Prime National Farmlands surrounding the cities of Kenosha and Racine to eventually be reserved for medium to low density residential growth.

Since that plan was written, housing pressure has since tapered back due to unforeseen changes in the housing market and economy and the 2009 Wisconsin Working Lands Initiative was introduced which includes the Farmland Preservation Program, Agricultural Enterprise Area Program, and the Purchase of Agricultural Conservation Easement Program. An opportunity may exist to expand agricultural preservation within the Pike River watershed, specifically where the National Prime Farmlands and urban development areas meet. Indeed, much of the open and unprotected land within the watershed consists of agricultural lands that could at some point leverage the opportunities provided by these initiatives in order to afford additional protected lands.



#### Natural Areas

The Wisconsin Department of Natural Resources manages the State Natural Areas Program which works to identify ecological communities that remain predominantly untouched from pre-European settlement times. These areas have been assessed according to field inventories conducted by WDNR staff and account for the quality, diversity, extent of past disturbance, context within the greater landscape, and rarity of features. Areas that meet these qualifications and have also been identified as areas of statewide significance are designated as State Scientific Areas. Within the Pike River watershed, one site meets these qualifications – Sander's Park Hardwoods in Sanders County Park and owned by Racine County.



Sander's Park Hardwoods State Scientific Area was designated as a State Natural Area in 1967 for both the quality of its southern dry-mesic forest and the extent of wildflowers and ferns located within its 20 acres. The park is located in Mount Pleasant, northeast of Petrifying Springs Park and has been owned by Racine County since 1930. It was later named in honor of a local biology

teacher, Edwin Sanders. The site lies on an ancient terrace of Lake Michigan and contains basswood, white oak, black walnut, red oak, sugar maple, shagbark hickory and white ash trees; statedesignated species of special concern goldenseal; uncommon ferns such as ostrich, rattlesnake, rusty woodsia, and ebony spleenwort; as well as showy orchis, yellow lady's-slipper, false mermaid, false Solomon's seal, Trillium, sharplobed hepatica, spring-



Showy orchis. Source: Owen Carson.

beauty, wild geranium, and blue cohosh (WDNR, 2012; SEWRPC, 1997).

Within the watershed there are also several additional sites that, while not designated as State Scientific Areas, are noted as Natural Areas of Statewide or Greater Significance, Natural Areas of Countywide or Regional Significance or Natural Areas of Local Significance. These include Petrifying Springs Hardwoods in Petrifying Springs Park within Kenosha County; Hawthorn Hollow, also in Kenosha County; and Campbell's or Fink's Hardwoods in Racine County.

The Pike River runs through portions of Petrifying Springs Park, a 358 acre public park owned by Kenosha County. The park was first opened in April of 1928 and boasts a golf course, hiking trails, dog park, and many other recreational amenities. It lies along the ridge of an ancient glacial moraine and also boasts contact springs and an artesian well. Within this park lies a 65 acre woodland referred to as Petrifying Springs Hardwoods. The woodland contains a mixture of red and white oaks as well as sugar maples, ash, and basswood over an undulating topography. It is



Petrifying Springs Park in fall. Source: Photobucket user patkru.

considered one of the better quality woodland areas remaining in the southeastern Wisconsin region (WDOA, 1980; SEWRPC 1983).



Hawthorn Hollow

Hawthorn Hollow is a 40 acre site located in Somers immediately southwest of Petrifying Springs Park. It was deeded to the Hyslop Foundation in 1967 by Ruth Teuscher and is now a nature sanctuary and arboretum. Three historical buildings of local significance have been moved to the site: the Somers Town Hall (dedicated in 1859), the Original Pike River School (d. 1847), and the Second Pike River School (d. 1906). In addition to being an excellent recreational attraction, Hawthorn Hollow includes a good quality mesic forest bordering the Pike, a 12 acre arboretum originally designed by Clarence Godshalk, and an ecologically valuable 10 acre remnant prairie.

Campbell's Hardwoods is a privately owned 38 acre parcel located in Mount Pleasant just north of Petrifying Springs Park. The site contains an upland hardwood forest of predominantly red oak and shagbark hickory trees and harbors hop-like sedge, a state-designated endangered species (SEWRPC, 1983 and 1997).

## Other Ecologically Significant Areas

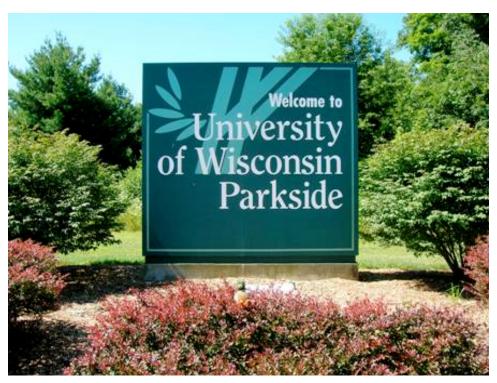
Other ecologically significant areas include the Pike River Pathway, the natural areas surrounding the University of Wisconsin – Parkside campus, and Sam Poerio Park.

The Pike River Pathway within the Village of Mount Pleasant, which involves portions of the headwaters of North Branch Pike River, has recently undergone restoration. Restored areas include wetland and prairie buffers along the river, streambank stabilization, and native plant installations, all aimed at reducing erosion and laying the foundation for a healthy ecological community. The restoration has transformed a portion



The Pike River Pathway in Mount Pleasant

of the river that was once heavily channelized and disturbed into an attractive natural and recreational asset for the community. In addition to the rehabilitation of North Branch Pike River,



University of Wisconsin's Parkside Campus in Racine. Source Kwashnak & Minton

stretches of the Pike River Pathway have been upgraded and paved in recent months.

The natural areas to the north and southwest of the University of Wisconsin – Parkside campus boast a mix of upland and lowland forest. Trails are present throughout both areas and a portion of the Pike River meanders through both these woods as well. Within the southwest

woodland area, the Pike River includes pockets where the stream is not confined to the channel, reducing the amount of sediment entering the river by filtering it through forested floodplain. Large areas of the campus also include restored prairie and a Frisbee Golf course.

Finally, Sam Poerio Park in the City of Kenosha includes some upland forest areas surrounding an old pond that has been recently filled and currently consists of bare dirt. The pond was filled in an attempt to eradicate an invasive species – red swamp crayfish, after DNR's previous attempts, including chemical treatments, pesticides, and draining the pond, were unsuccessful. Immediately to the south of this area is a tributary of the Pike River with a



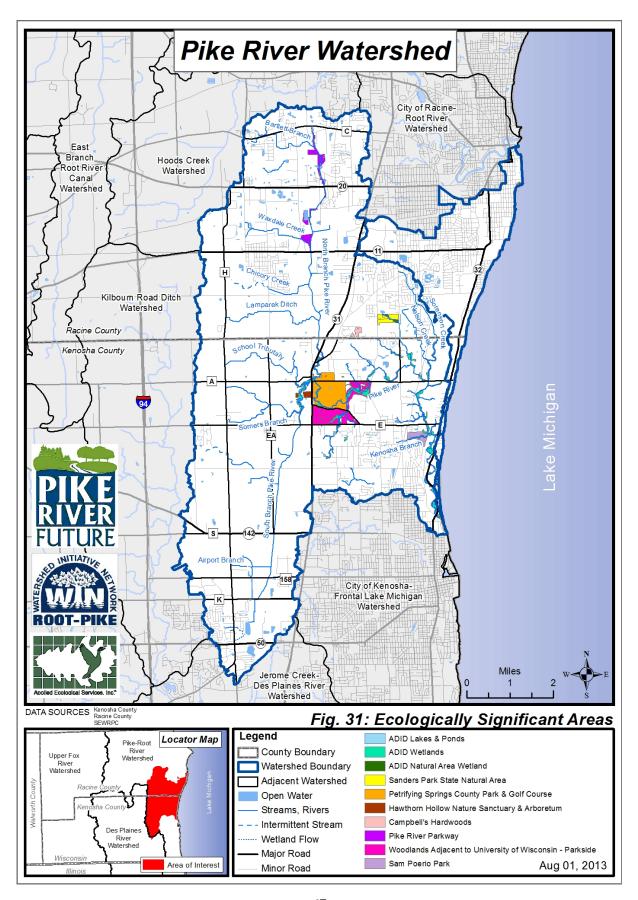
Invasive species red swamp crayfish. Source: Red Orbit.

fairly large floodplain forest riparian area. This connection to the forested floodplain area combined with the fact that the site is on publically owned land make it a great candidate for a potential restoration.

Additional Wisconsin designated threatened or special concern species found within the Pike River watershed include wild quinine (Parthenium integrifolium), Sullivant's milkweed (Asclepias sullivantii), waxy meadow rue (Thalictrum revolutum), prairie trillium (Trillium recurvatum), and marsh blazing star (Liatris spicata) (SEWRPC, 1997 and 2010).



Paddling the Pike. Source: Dave Giordano.



Pike River Watershed-Based Plan Final Report (August 2013)

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