



R I V E R F R O N T
O F W I L K E S - B A R R E
P A R K S

Kirby Park Natural Area Riparian Trail Guide

Yours to Discover and Enjoy

Riverfront Parks Committee Mission

Improve the quality of life in the region through the rehabilitation, enhancement, and preservation of two historic and natural parklands along the Susquehanna River: Kirby Park Natural Area and Nesbitt Park.

Encourage environmental awareness and stewardship through the institution of environmental education programs designed for the local citizenry.

Offer the region a safe, clean, unique natural setting for year-round recreational opportunities.



A town is saved, not more by the righteous men in it than by the woods and swamps that surround it.

Henry David Thoreau

Riparian Trail Guide Acknowledgments

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Welcome to the Wilkes-Barre Riverfront Parks! You are about to explore 91 acres of open space in Wilkes-Barre, Kingston and Edwardsville. Our wise forefathers set aside this greenspace along the banks of the Susquehanna River back in 1773. The parklands straddle both sides of the river, and are owned by the City of Wilkes-Barre.

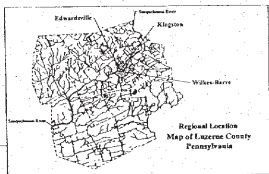
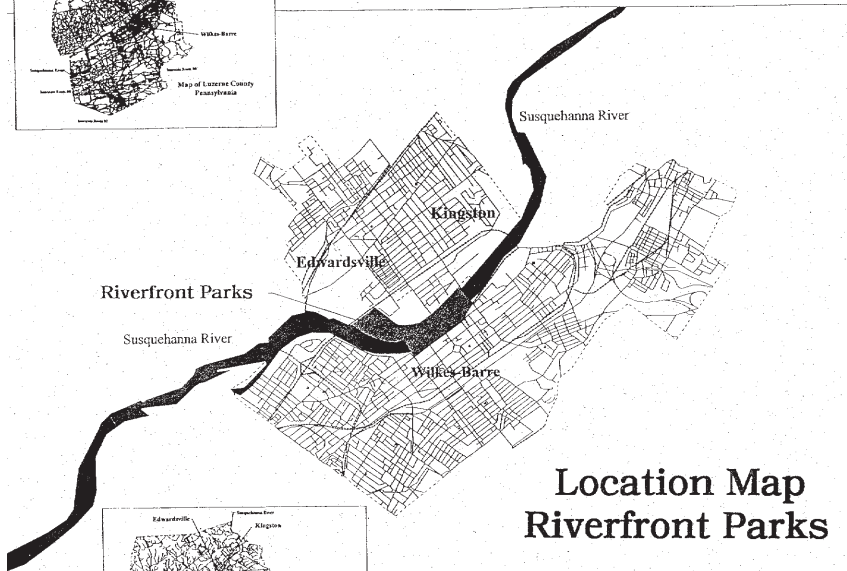
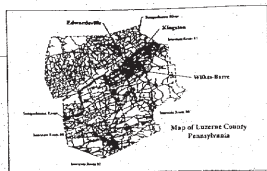
The parklands on the west side of the river are divided into three separate areas of use.

Nesbitt Park, a pastoral grassy setting north of the Market Street Bridge is used by picnickers, walkers and boaters gaining access to the Suquehanna River.

The Reflecting Pool Area is meant to showcase the Original Olmsted Design for Kirby Park.

Kirby Park Natural Area, 65 acres of *riparian* (or streamside) forest where you can experience nature firsthand.

In 1991 the City of Wilkes-Barre formed the Riverfront Parks Committee. Today this non-profit organization, along with its many partners, is responsible for much of the work and educational programs in the Parks. Members include community leaders from business, media, government, park enthusiasts, colleges, universities and civic organizations. They invite you to come enjoy and discover the natural wonders of the Riverfront Parks.



Location Map Riverfront Parks

Park Rules:

- The trail is open to human foot and bicycle traffic - No motorcycles
- Please stay on the trail
- Camping is not allowed
- Fires are not permitted
- Alcoholic beverages are prohibited
- Please do not take anything from the area or leave anything behind



Park Safety:

- After rains, the trail can be muddy and very slippery
- When following the Warrior Path, do not step close to the steep riverbank.
- The trail is open everyday until dusk.
- Wear sturdy hiking shoes or boots
- For your own safety, hike with a friend
- Do not climb or enter the remnant structures, they may not be safe.

Why Do the Riverfront Parks Exist?

The early inhabitants of the Wyoming Valley always took pride in the Susquehanna River and the land adjacent to it. Numerous Native American settlements were discovered along the river which was the Great Warriors Trail, a transportation route that stretched from New York State to North Carolina. It followed the western side of the Susquehanna in the area now known as Kirby and Nesbitt Parks.

In 1769, Wilkes-Barre's first colonial settlers from Connecticut established the River Common on the east side of the river where they tethered their livestock. During the Revolutionary War, General George Washington sent 3,500 soldiers and 2,000 horses under General John Sullivan's command to Wilkes-Barre in the summer of 1779. Sullivan's headquarters were located just south of what is now the Market Street Bridge and the soldiers camped throughout the River Common. From their base in Wilkes-Barre, the Americans successfully fought the Iroquois and Tories in New York State.

In 1804, Wilkes-Barre's park system was formally established and the River Common and center square were certified as parks. Each spring, many thousands of fish, mostly shad, weighing between two and eight pounds, swam up river to spawn. This event became an annual festival with feasts, parties, and drying fish occupying the River Common. The annual shad run in the Susquehanna was shortlived, as a dam was constructed at Nanticoke in 1830, blocking their spring run up river.

Philanthropy Saves the Riverfront

When anthracite turned Wilkes-Barre into a bustling, sprawling metropolis, people needed space to relax and play. The Wilkes-Barre Park Commission, established in 1906, encouraged citizens to donate land for parks and playgrounds. In May 1907, Abram Nesbitt, a civic minded self-made millionaire who amassed his fortune in the coal, railroad and streetcar industries, acquired 10 riverfront acres called “Rutter’s Grove” from the Erie Railroad Company, which he then donated to the City of Wilkes-Barre. Two months later, the L.D. Shoemaker Estate added 8 1/2 acres to the parcel. Together, they became Riverside Park, renamed Nesbitt Park in 1922. Today, this natural and historic greenway extends between the Veteran’s Memorial and Market Street Bridges.

In 1921, Fred Morgan Kirby, the five-and-ten-cent store magnate and the park’s namesake, donated over 70 acres of riverfront land on the west bank and hired the Olmsted Brothers firm, the preeminent landscape architects, to design a people’s park. Work on the park began in July 1921 before the plan was completed, and F.M. Kirby Park was officially dedicated on June 4, 1924. Though smaller than many parks designed by the Olmsteds, Kirby Park resembled an English landscape containing clusters of flowering shrubs and ornamental trees; winding footpaths and a driveway with parallel bridle path; tennis courts and an athletic field with race track; a reflecting pool and caretaker’s cottage;

and a bandstand and gazebo with views of the river. In 1932, the city added a zoo, featuring a monkey house, bear pits and animal cages. Several of these remnant structures can be seen in today's Kirby Natural Area.

What is an Olmsted Park?

The Olmsteds were a pioneering family of landscape architects. In the 19th century Frederick Law Olmsted, Sr. helped introduce the informal English garden style into North American public parks. His beliefs influenced his son and protégé, Frederick Law Olmsted, Jr., who designed Kirby Park for Wilkes-Barre philanthropist Fred Morgan Kirby.

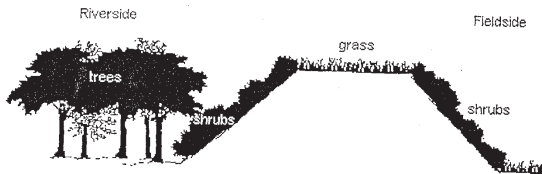
Upon the retirement of their father in 1898, Frederick Law Olmsted, Jr. and brother John C. Olmsted joined the practice in Brookline, Massachusetts, forming the firm of "Olmsted Brothers." For nearly 100 years (1857-1950) members of the Olmsted family were the nation's pre-eminent park planners, designing more than 3,000 landscapes. Their work included New York City's Central Park and Maine's Acadia National Park; the park systems of Boston, Baltimore, Seattle, Buffalo, Rochester, Louisville and Chicago's South Park; and the park of Wilkes-Barre's River Common. John C. Olmsted died shortly before the Kirby Park project was commissioned in 1921.

Birth of the Kirby Natural Area

Following the devastating flood of 1936, the US Army Corps of Engineers built a 15-mile-long levee system along the Susquehanna River. This levee system divided Kirby Park in two, allowing nature to reclaim the floodplain side. Meadows gave way to a forest of tall canopy trees through a process called *ecological succession*. Over the past 60 years, periodic flooding has shaped the soils and plant and animal communities of this area. With each flood, (sometimes an annual spring event), new soils and leaf litter are deposited, creating a rich growing medium for species adapted to this unique environment.

As you walk along the Olmsted Trail through the Kirby Natural Area you will experience a variety of habitats in this dynamic ecosystem that are constantly affected by the flowing river.

Levee Armoring Considerations



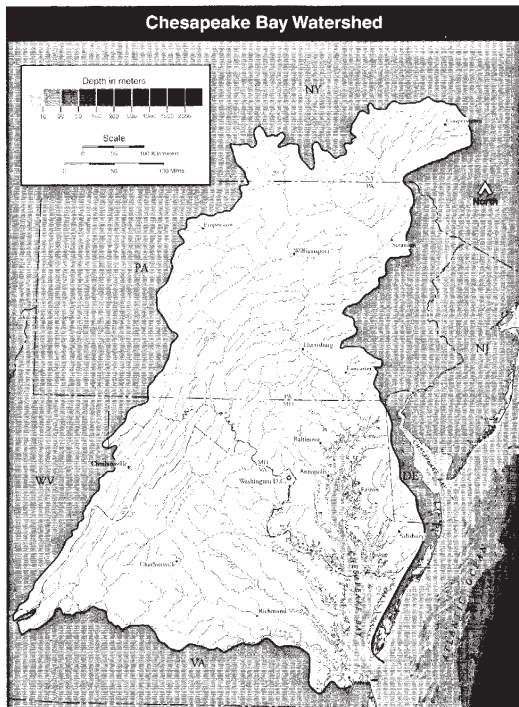
Studies and observations following the 1993 flooding along the Mississippi River illustrated that forest vegetation helped to protect existing levees by slowing water flow and reducing flood scouring effects that erode and break levees.

How Does this Forest Help the Chesapeake Bay?

You are standing in a streamside - or *riparian* - area.. The trees and forest community contributes to more than a beautiful landscape.

- They improve water quality of the Susquehanna River by filtering runoff, and trapping pollutants and nutrients that would otherwise end up in the river and flow to the Chesapeake Bay.
- They prevent soil erosion by providing bank stability from the anchoring effect of woody roots.
- Tree canopies also intercept rainfall breaking the force of rains that might cause soil erosion.
- Riparian forests provide habitat for hundreds of wildlife species, including 70% of Pennsylvania's threatened or endangered species. They are especially important to migratory birds, providing a place to rest and feed in their long journey.
- Trees provide the leafy food for aquatic creatures such as insects, amphibians and crustaceans, which are critical to the aquatic food chain.
- Forests can reduce flood damage and protect the levee system by slowing the velocity of floodwaters and capturing sediment loads.
- Forests help to clean and cool the air, by trapping air pollutants and reducing the urban heat island effect through shading and evapotranspiration.
- This riparian forest also provides recreation and environmental education opportunities and is a critical link to the Susquehanna River and the Chesapeake Bay.

Pennsylvania is graced by over 53,000 miles of streams and rivers, more stream miles than any other state except Alaska. Decades of deforestation, intense farming, mining and urban growth have degraded natural forest canopies that once covered and protected thousands of stream miles. Preserving and protecting this riparian forest is a small but crucial part of keeping the Wyoming Valley and the Chesapeake Bay Watershed healthy.



Station 1

Meadow

Directly south of the Market Street Bridge is a treeless area in the park known as the Meadow. This part of the park has been disturbed in the past, but it is being allowed to revert to a more mature condition. That reversion process is called *ecological succession*, and is an excellent example of the dynamic nature of the park's natural community.

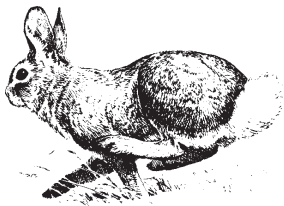
Most of the plants in the meadow are grasses or herbs. Those species were quickly able to colonize the site, germinate, and grow after disturbance. Among the grasses are species common to pasturelands throughout Pennsylvania, like timothy, fescue, orchard grass, and bluegrass. The herbs include many weedy species like chicory, Queen-Anne's lace, and dandelion. One distinctive species, teasel, produces dense oval heads that are covered in spines.

They were used for carding or teasing wool in colonial times. Closer to the river are poison hemlock plants that are recognizable because of their parted leaves, spotted stem, and broad clusters of tiny white flowers. Poison hemlock contains a substance called coniine that causes paralysis. Ancient Greeks forced condemned prisoners to drink a potion of poison hemlock.



Goldenrod

The plants of the meadow are important to animals of the park. First, they produce excellent habitat for a variety of mice, rabbits, and woodchucks. Second, the soft foliage can be eaten by those species and others that pass through the site. Finally, the large flowers produced by some species serve as a rich source of nectar for pollinators like bees, moths, and butterflies.



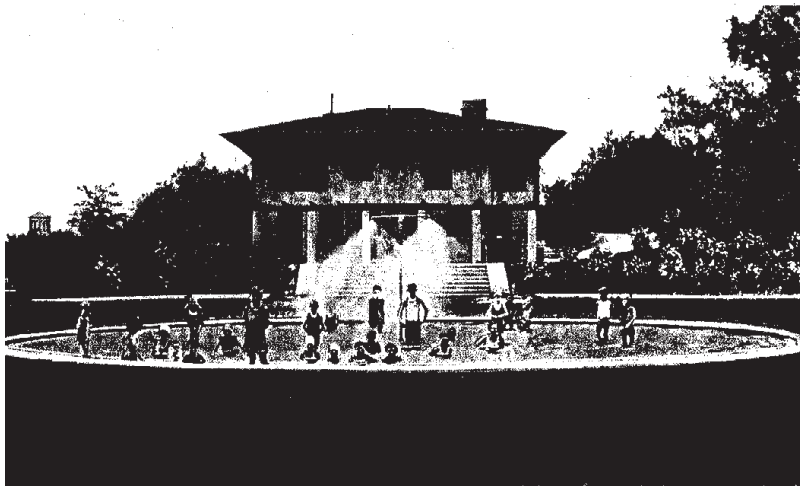
If left undisturbed, the vegetation in the meadow will change over time. Ultimately, woody species like silver maple and black locust will colonize once seeds land on the ground and sprout to form young trees. As a result, the area will become a forest, similar to the woods that occupies most of the natural area.

Station 2

The Reflecting Pool

Just past the meadow, along the Olmsted Trail, you will approach the Reflecting Pool area. This pool was part of the original Olmsted design and was used by children for wading. It is one of the most beautiful locations in the park because of the tranquil feeling it evokes. You will often times find people sitting around or near the pool.

In 1998, as part of an Eagle Scout Project, the Reflecting Pool was cleaned and refurbished. The dark colored pool inhibits the growth of algae. The native red maple (*Acer rubrum*) trees that surround the pool were planted in 1997, replacing dying Norway maples, that are not a native floodplain tree. These trees help to enhance the feeling of enclosure and to visually announce the border between the "park" and the "wilderness."



Station 3

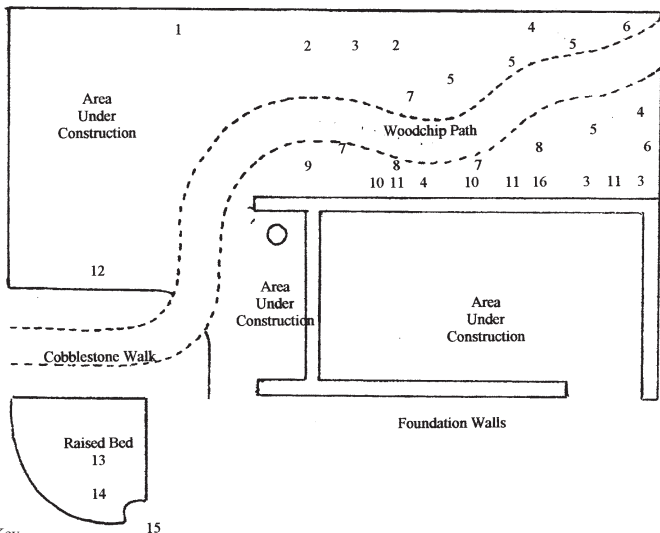
Perennial Demonstration Garden

(See Garden Layout for details)

A perennial garden awaits you at the foundation of the Caretaker's Cottage. In 1998, Penn State Master Gardeners volunteered to plant and care for a demonstration garden at this site.

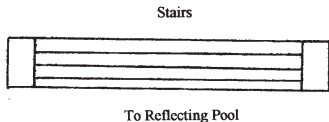
As you enter the garden from the riverside, you will be greeted by a mix of early Spring bloomers. A visit to this garden room in mid-to-late Summer will engulf you in a sea of color. These vibrant Summer colors bring bees and butterflies in to dine on the sweet nectars. During Autumn migrating goldfinches can be seen selecting seeds from the seed heads of the purple cone flowers. At the cobblestone end of the garden path you'll find that ripe gooseberries can also attract a crowd.

Sometime in 2000, the Master Gardeners will plant a more secluded garden room inside the cottage foundation. The plantings will include understory trees to provide protection for Spring bloomers and shade for Summer ferns and flowers. Berried bushes will add depth and dimension to the garden design as well as a year-round food supply to attract wildlife.



Plant Key

1. American Elm (*Ulmus americana*)
2. Swamp Milkweed (*Asclepias incarnata*)
3. Bee Balm (*Monarda didyma*)
4. Bloodroot (*Sanguinaria canadensis*)
5. Purple Coneflower (*Echinacea purpurea*)
6. Canada Lily (*Lilium canadense*)
7. Foamflower (*Tiarella codifolia*)
8. Pink Turtlehead (*Chelone glabra*)
9. Winterberry Holly (*Ilex verticillata*)
10. Jack-in-the-pulpit (*Arisaema triphyllum*)
11. Virginia Creeper (*Parthenocissus quinquefolia*)
12. Gooseberry Bush (*Ribes* spp.)
13. Daylily (*Hemerocallis fulva*)
14. Sedum (*Sedum*)
15. Tall Bearded Iris (*Iris x germanica*)
16. Baldcypress (*Taxodium distichum*)



Station 4

Birds of the Natural Area

The Kirby Park Natural Area has a great diversity of birds. About forty species nest in the forest, and at least that many others stop here to rest and refuel before continuing their north and south-bound migrations. Among the nesting birds are familiar species like robins and cardinals, and less familiar species like indigo buntings and red-eyed vireos. Listen for the wood thrush's flute-like song in spring and summer. Even Cooper's hawks and great horned owls nest in, or near, the Kirby Park Natural Area.



The Natural Area's riparian forest serves as a rest stop for many birds that migrate from as far away as South America. About twenty-five species of warblers, which are small, colorful songbirds, can be seen here from mid-April to mid-May. Other migrants include scarlet tanagers and yellow-billed and black-billed cuckoos.

Some bird species can be found year-round in the Kirby Park Natural Area. Winter is a good time to see chickadees, nuthatches, and woodpeckers, and any time is a good time to hear the Carolina wren's song of "Tea kettle, tea kettle, tea kettle, tea!" Also, be sure to check the River for mallards, common mergansers, wood ducks, and great blue herons.

List of Birds

Key to Seasons

Spring	SP - March through May
Summer	SU - June through July
Autumn	A - August through November
Winter	W - December through February

Key to Habitats

Forest	F
River	R
Wetlands	W
Shrubs	S
Overhead	O
Open Park	P

Key to Abundance

Hard to Miss	H
Should Find	S
May Find	M
Lucky to Find	L
Very Lucky to Find	V
* Nests in or near Riverfront Parks	

Seasons

SP SU A W Habitat

Grebes, Cormorants

Pied-billed Grebe	M		M		R
Horned Grebe	L				R
Double-crested Cormorant	M	M	M		R

Egrets, Herons

Great Blue Heron*	S	S	S	M	R, W
Great Egret			M		R
Green Heron*	S	S	M		R, W
Black-crowned Night Heron*	L	L			R

	Seasons				Habitat
	SP	SU	A	W	
Swans, Ducks, Geese					
Snow Goose	L		L		R, O
Canada Goose*	H	H	H	H	R, O, P
Wood Duck*	S	S	M	M	R, W
Green-winged Teal	L		L		R
American Black Duck	M	M	M	S	R
Mallard*	H	H	H	H	R, W
Blue-winged Teal	M		M	M	R, W
Gadwall	M		M		R
American Wigeon	M		M		
Ring-necked Duck	M		M	M	R,W
Hooded Merganser	M		M	M	R
Common Merganser*	S		S	S	R
Other Waterfowl					
American Coot	L		L		R
Vultures, Hawks, Falcons					
Turkey Vulture*	M	M	M	M	O
Osprey	M		M		O
Bald Eagle	V	V	V	V	O, R
Sharp-shinned Hawk	M	M	M	M	F, O
Cooper's Hawk*	M	M	M	M	F, O
Broad Winged Hawk	M	M	M		F, O
Red-tailed Hawk	M	M	M	M	F, O
American Kestrel	M	M	M	M	F, O, P
Peregrine Falcon*	L	L	L	L	O

SP	Seasons			Habitat
	SU	A	W	

Plovers, Sandpipers

Killdeer*	H	H	H		R, P
Great Yellowlegs	M	L	M		R
Lesser Yellowlegs	M	L	M		R
Solitary Sandpiper	L	L	L		R
Spotted Sandpiper	M	M	M		R

Gulls, Terns

Bonaparte's Gull	L			L	R
Ring-billed Gull	M	M	M	M	R
Herring Gull	L	L	L	L	R
Common Tern		V		V	

Doves, Cuckoos

Rock Dove*	H	H	H	H	O, P
Mourning Dove*	H	H	H	H	F, O, P
Black-billed Cuckoo	M			M	F
Yellow-billed Cuckoo	M			M	F

Owls

Eastern Screech Owl*	L	L	L	L	F
Great Horned Owl*	L	L	L	L	F

Nightjars

Common Nighthawk*	S	S	S		O
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Swifts, Hummingbirds

Chimney Swift*	H	H	H		O
Ruby-throated Hummingbird*	M	M	M		F

	Seasons				Habitat
	SP	SU	A	W	
Kingfishers, Woodpeckers					
Belted Kingfisher*	S	S	S	S	R
Red-bellied Woodpecker*	M	M	M	M	F
Yellow-bellied Sapsucker			L		F
Downy Woodpecker*	H	H	H	H	F, P
Hairy Woodpecker*	S	S	S	S	F
Northern Flicker*	H	H	S	M	F, P
Tyrant Flycatchers					
Olive-sided Flycatcher	V				F
Eastern Wood Pewee*	S	H	M		F
Willow Flycatcher	M	M	M		S, F
Least Flycatcher	M				F
Eastern Phoebe*	H	H	H		F
Great Crested Flycather*	S	S	M		F
Eastern Kingbird	M	M	M		F
Swallows					
Tree Swallow*	H	H	M		R
N.Rough-winged Swallow*	S	S	S		R, P
Cliff Swallow*	S	S	M		R
Barn Swallow*	M	M	M		R, P
Jays, Crows					
Blue Jay*	H	H	H	H	F, P
American Crow*	H	H	H	H	F, R, P, O
Fish Crow*	S	S	M		F, R, P, O

	Seasons				Habitat
	SP	SU	A	W	
Titmice, Nuthatches					
Black-capped Chickadee*	H	S	H	H	F, P
Tufted Titmouse*	H	H	H	H	F, P
White-breasted Nuthatch*	H	S	H	H	F
Creepers, Wrens					
Brown Creeper*	S	M	M	M	F
Carolina Wren*	H	H	H	H	F
House Wren*		S	H	M	F
Winter Wren	L	L	L	L	F
Kinglets, Gnatcatchers					
Golden-crowned Kinglet	S		S	M	F
Ruby-crowned Kinglet	S	M	S	M	F
Blue-gray Gnatcatcher	M	M			F
Thrushes					
Veery	M				F
Gray-cheeked Thrush	M				F
Swainson's Thrush	M				F
Hermit Thrush	M				F
Wood Thrush*	S	H	M		F
American Robin*	H	H	S	M	F, P, O
Mimics, Starlings					
Gray Catbird*	H	H	S		F, S
Northern Mockingbird	M	M	M	M	F, S
Brown Thrasher	M				F
European Starling*	H	H	H	H	O, P

	Seasons				Habitat
	SP	SU	A	W	
Waxwings					
Cedar Waxwing*	S	S	S	M	O, F, P, R
Vireos					
White-eyed Vireo	L	L			F
Blue-headed Vireo*	S	S	M		F
Yellow-throated Vireo	M	M	M		F
Warbling Vireo	S	S	M		F
Philadelphia Vireo	L	L	L		F
Red-eyed Vireo*	H	H	S		F
Warblers					
Tennessee Warbler	M	M			F
Nashville Warbler	M		M		F
Northern Parula	S		M		F
Yellow Warbler*	S	S	M		F, P
Chestnut-sided Warbler	S	M	M		F
Magnolia Warbler	S	M	M		F
Cape May Warbler	M		M		F
Black-throated Blue Warbler	S		M		F
Yellow-rumped Warbler	H		H	M	F
Black-throated Green Warbler	S		S		F
Blackburnian Warbler	M	M	M		F
Pine Warbler	M				F
Palm Warbler	M				F
Bay-breasted Warbler	M		M		F
Blackpoll Warbler	S		M		F

	Seasons			Habitat
	SP	SU	A W	
Black-and-White Warbler	S	M	M	F
American Redstart*	S	S	M	F
Worm-eating Warbler	M			F
Ovenbird	M	M	M	F
Northern Waterthrush	M			W
Louisiana Waterthrush	M			W
Kentucky Warbler	M			F
Connecticut Warbler	L		L	F
Common Yellowthroat*	H	H	S	F, S
Wilson's Warbler	M			F
Canada Warbler	M			F
Tanagers, Grosbeaks, Sparrows				
Scarlet Tanager	S	M	M	F
Northern Cardinal*	H	H	H H	F
Rose-breasted Grosbeak	S		S	F
Indigo Bunting*	S	S	S	F
Eastern Towhee	M		M	F
American Tree Sparrow			M M	F, S
Chipping Sparrow	S	M	M	F, S
Field Sparrow	M		M	F, S
Savannah Sparrow	M		M	F, S
Fox Sparrow	M		M	F
Song Sparrow*	H	H	H H	F, S
Lincoln's Sparrow	L		L	F

	Seasons				Habitat
	SP	SU	A	W	
Swamp Sparrow				L	F, W
White-throated Sparrow			S	S	F
White-crowned Sparrow	L		L		F
Dark-eyed Junco	M		M	H	F
Blackbirds, Orioles					
Red-winged Blackbird*	H	H	S		F, W, R
Rusty Blackbird	L				F
Common Grackle*	H	H	H		F, P, O
Brown-headed Cowbird*	S	S	M		F, P
Baltimore Oriole	M	M			F
Finches					
House Finch*	S	S	S	S	P, F
American Goldfinch*	H	H	H	S	F
House Sparrow*	S	S	S	S	P, F

Greater Wyoming Valley Audubon Society

Bird Data

During monthly bird walks (January 1998 - December 1998) in the Kirby Park Natural Area, 82 bird species were documented. The fewest species seen on any walk was 18; the most, 45. Six walks produced at least 30 species, which was the average for 1998.

On May 8, 1999, participants in the North American Spring Migration Count tallied 462 individuals of 69 species in approximately five hours. The 1996 North American Spring Migration Count netted 74 species.

Nationwide, bird watching attracts more recreational dollars than does baseball (Keystone Conservationist 1999). In 1996, 3.4 million Pennsylvanians age sixteen or older participated in such activities as observing, feeding, or photographing wildlife (US Department of the Interior and others 1998). These activities supported 24,530 jobs, the earning from which contributed \$15 million in Pennsylvania income taxes. In addition, the \$859 million in retail sales generated \$48 million in state sales taxes (Keystone Conservationist 1999).



The Woody Vegetation of Riverfront Parks

Thanks to the lack of recent human disturbance, Riverfront Parks is vegetated by a maturing forest composed of trees, shrubs, vines, and herbs. The most important tree species include silver maple, black locust, and mulberry. Shrubby plants include buckthorn and Japanese knotweed, while Virginia creeper and wild grape are the most common vines. The most abundant herbaceous plants include jewelweed, stinging nettle, garlic mustard, dame's rocket, and trout lily.

The plant community in the Riverfront Parks is best described as deciduous forest. Between early May and mid October the trees are cloaked with leaves, casting shade on the lower plants below. During other times of the year, the trees are leafless, allowing light to reach the surface. All of the species have traits that allow them to survive periodic floods. In fact, those floods probably prevent other species normally common in our area, like certain oaks and birches, from growing in the forest.

The forest found in the Riverfront Parks is typical of riverbanks in Pennsylvania and is interesting for several reasons. First, it includes many species that are not normally found in urban areas like Wilkes-Barre. Second, it includes species like silver maple and black willow that are not common on the mountainous areas away from the river. Third, the forest species provide excellent habitat to a number of

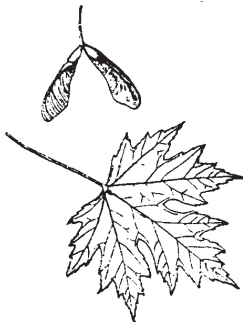
invertebrates, birds, and mammals. Fourth, some of the species are promising sources of medicines and other natural products, and their benefit to mankind is just starting to be appreciated.

Station 5

Trees of the Floodplain

The hardwood forest that occurs along the Susquehanna consists of many native trees that are able to withstand the periodic flooding. Many of the upland trees would not tolerate their root systems being inundated with water for weeks at a time. As you walk through the Riverfront Parks, here are some of the trees you will discover:

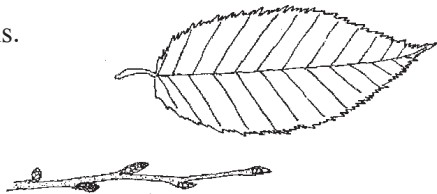
Silver Maple (*Acer saccharinum*) is a fast growing species that reaches maturity in about 125 years. With fast growth often comes weak wood. The branches are often brittle and break off during high winds or when loaded with snow or ice. The leaves are pale green above with a silvery underside. Silver maple is the most abundant tree found along the river. Unlike many tree species that would die from lack of oxygen to its roots, Silver Maple can tolerate several weeks of flooding.



American Hornbeam (*Carpinus caroliniana*) is a native tree that is usually found in the understory along rivers and streams.

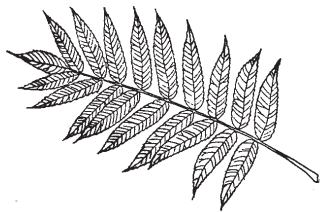
Its ability to withstand periodic flooding and its smooth bark has led to another common name of Water Beech. The name beech has been misapplied to this

member of the birch family. Its name hornbeam is from the words “horn” (for toughness) and “beam” (for tree) and refers to the very hard tough wood. Its wood was used for tool handles and wooden articles. Other common names include Ironwood and Musclewood.

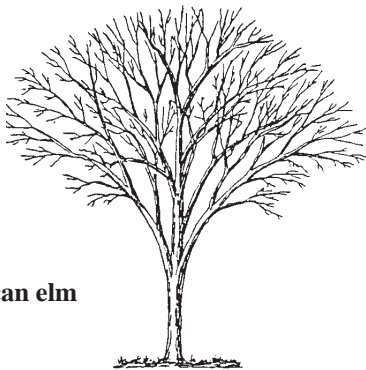


American Elms (*Ulmus americana*) were once commonly found spreading their branches across the main streets of American towns and cities. But trees can get sick, too, and many of the elms have died from Dutch Elm Disease, a fungus carried from tree to tree by beetles. This large vase-shaped tree grows well under a variety of conditions. In the wild it is commonly found along rivers and streams and wet flats where standing water may accumulate in the spring and fall. The tops of the leaves are rough and feel like sand paper. Native Americans favored using elm bark for building canoes.

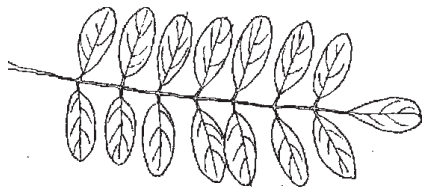
Staghorn Sumac (*Rhus typhina*) is a small tree (20-30 feet tall) that commonly forms thickets due to its ability to sprout freely from the roots. In winter, the bare, widely forking, hairy twigs may look like deer antlers “in velvet”. Native Americans made a lemonade-like drink from the upright clusters of red fruit. Tannins in Sumac bark and leaves were used to tan leather. Its compound leaves turn bright red with purple and orange in the fall.



American elm



Black Locust (*Robinia pseudoacacia*) can survive under the toughest conditions. Its root system has the ability to fix nitrogen from the air. Other trees need to get their nitrogen from the soil. It grows quickly and spreads by sprouts from the roots. Posts of this durable timber served as corner posts for the colonists first homes. Beware of the thorny branches!



Hackberry (*Celtis occidentalis*) was mistakenly named after the Scottish Hagberry, which in Britain was the Bird Cherry (*Prunus avium*), because of its abundant, small, dark purple fruit that is enjoyed by birds and other wildlife. Hackberry can thrive in a flood plain or the hot dry conditions of the Midwestern plains. The bark is grayish-brown, with characteristic corky warts or ridges, which later in life become somewhat scaly. Hackberries can grow 5 feet in diameter and 100 feet tall and live to the ripe old age of 150 to 200 years.

These are just a few of the many and diverse native trees and plants to discover at the Riverfront Parks.

Station 6 - **Spring-Flowering Herbs of Riverfront Park**

Spring is a special season at Riverfront Park. Between March and May, the site is transformed from the browns and grays of winter to a lush green. Part of the change is caused by a diverse assemblage of small plants called vernal herbs that grow and flower quickly while the woody plants remain dormant. The presence of vernal herbs within the park is especially interesting because they are generally not common throughout Luzerne County, due to our acid soils and highly disturbed, oak-dominated woods.

One of the most common vernal herbs is the trout lily. This species grows in dense colonies that can be several yards wide. Flowering individuals bear a pair of pointy leaves that have reddish-brown blotches. A slender stem emerges from between the leaves, and is topped by a nodding yellow flower. The American Indians used trout lily to treat fevers and as a contraceptive.



trout lily

A second vernal herb common throughout the park is the eastern bluebell. These plants have erect, 2'-tall stems that bear hairless leaves. The top of the stem produces clusters of blue, trumpet-shaped flowers.

Less obvious is a delicate, low-growing herb called spring beauty. This plant consists of a slender stem that bears a single pair of narrow leaves. The top of the stem bears 1"-wide flowers that have five white petals streaked by tiny red veins.

While these herbs are undoubtedly attractive, you should resist the urge to pick them, because widespread removal would hasten their demise within the park. So please leave them for others to enjoy.

Summer Herbs of Riverfront Park

Riverfront Park has a rich array of herbs that mature during the summer. Many are native species that are important components of the park's flora. Two are especially noteworthy to park visitors: jewelweed and stinging nettle.

Jewelweed is an attractive herb that grows to a height of 3-4' by mid-to-late summer. It is found as tiny seeds or seedlings in the spring. In August and September, jewelweed produces yellow flowers that dangle like pendants below the leaves. The plant is also called touch-me-not, because the pod-like fruits explode upon contact.

Jewelweed

For years, people have rubbed the juice of jewelweed on the skin to reduce itching caused by poison ivy and nettle. Scientists are just now beginning to examine those claims.

Stinging nettle is an erect herb that can grow to 3' high. Its stem produces paired, heart-shaped leaves that have a coarsely toothed edge. The entire plant is covered by stout hairs that penetrate the skin, and inject a toxin. The result is a painful, itchy rash that can last for an hour. Even so, stinging nettle is edible if cooked properly.

Though important for different reasons, those two species, like the others in Riverfront Park are important components of the park's flora and should be appreciated by all visitors.

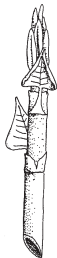


Virginia creeper

Station 7

Invasion of the Exotic Plants

The Wilkes-Barre Riverfront Park was invaded years ago by Japanese knotweed (*Polygonum cusidatum*) which spread vigorously to cover a large portion of the riparian forests understory. Also known as Japanese bamboo, Japanese knotweed, Mexican bamboo, and fleece-flower, it is a plant native to Eastern Asia, including Japan, Korea, China, and Taiwan. The plant is an aggressive spreader that forms forestlike



clumps of erect stems (up to 10 feet tall) and can spread up to 6 feet per year by its roots. Often, all it takes is a small piece of root moved in soils or flood waters and Knotweed will get established in a forest or landscape planting. As it takes control of the understory, it chokes out other plants, including young tree seedlings. If left uncontrolled, the existing forest

would disappear once the older large trees have died.

Besides the ecological consequences of the knotweed on the forest, it can also create a trail visibility and safety problem for a park setting. That issue is being addressed by the Riverfront Parks Committee and over 15 linear acres along the trails have been rid of knotweed.

Do Invasive Plants Harm the Environment?

An "invasive plant" is a plant which grows aggressively, spreads, and displaces other plants. Invasive plants tend to appear in disturbed ground, and the most aggressive can actually invade other ecosystems. A small number of invasive plants are native, meaning they occurred in Pennsylvania before European settlement, but became aggressive after the landscape was altered. Most invasive plants are exotic or introduced, having been brought from other continents.

Invasive plants degrade our native environments by crowding out existing plants. In fact, they are a major cause of the extinction and loss of native plants. Plants like Kudzu, Purple Loosestrife, Garlic Mustard and Japanese Knotweed are displacing native plants and degrading habitat for native insects, birds, and mammals.

Many of these invasive plants spread vigorously by abundant seed production or vegetatively by roots and shoots. Once established, these invasives are very hard to control or remove from natural environments like riparian forests.

Station 8

The Mammals

The Riverfront Park is home to approximately 32 species, ranging in size from a 5-g shrew to the 100-kg white-tailed deer. Included in this rich assemblage of mammals are the Virginia opossum (Marsupial), 6-7 species of moles and shrews (Insectivores), 4-5 species of bats (Chiropterans), one rabbit species (Lagomorphs), at least 14 species of squirrels, mice, voles, rats, and beaver (Rodents), seven species of foxes, raccoons, weasels, mink, and skunk (Carnivores), and the white-tailed deer (Artiodactyla). While park visitors should be familiar with some of the more common species such as the opossum, eastern gray squirrel, wood chuck or white-footed mouse, they may be surprised to know that the park is also home to less familiar species like the southern flying squirrel, fox squirrel, mink, and red fox. This rich diversity of mammalian fauna is due primarily to the range of different habitats found in this unique floodplain ecosystem. Several meadows, a high canopy forest, a rich herbaceous ground cover, fallen trees and branches, small ephemeral ponds, and the river's edge collectively provide a diversity of food and shelter for the many mammal species that call the park their home.



Station 9:

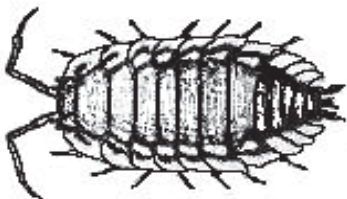
Decomposers in Soil and Leaf Litter

You can find invertebrates on any day of the year if you know where to look. One of the best places to look is beneath your feet. Soil animals, along with microbes, are very important for decomposing dead plants and animals. These organisms are a largely unseen and unappreciated community crucial to the functioning of the forest. They break down leaf litter and help form rich soil. One reason we allow dead trees to remain in the park is to allow natural processes to continue, and the roles of decomposers include recycling of nutrients and disposal of dead organisms. Examine the bark on a rotten log and you may see many different decomposers, including mushrooms and animals.

Animals you may see include sowbugs or roly-polys (see figure).

They get their second name from their habit of rolling up into a ball when disturbed. How many legs do

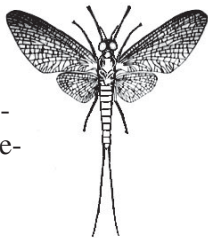
they have? Many types of beetles make their living in rotting logs and in leaf litter and soil. Poke around in the top layer of soil and try to find beetles, centipedes, millipedes, spiders, or earthworms, all very common animals in the soil.



Station 10:

Insects in the Water

Many insects are found in the river and other freshwater habitats as juveniles. Although it is difficult to get into the river, you may find insects emerging as adults from the river. These insects live their juvenile lives in the water and become terrestrial adults to mate. Mayflies (see figure), stoneflies and caddisflies are among the most common aquatic insects and are an important



source of food for fish in the river and birds in the forest. These insects are often used as indicators of clean water, and ecologists use them to monitor the health of the river. Mayflies often emerge in masses in the spring (hence their name) and you may see them swarming near lights at dusk. Their main goal as adults is to mate and they often only live for hours or days as adults. On sunny, warmer February days you may venture to the park to find two species of winter-emerging stoneflies crawling about the rocks and trees also looking for mates. These stoneflies do not fly, even though one species has wings. The other species is very tiny, and the males are wingless. Watch them as they crawl about and you may see them mate!

Biodiversity: Importance of Riparian Areas

Riparian or stream-side forests represent a critical habitat in the protection of the region's biodiversity. Such ecosystems represent a dynamic ecological interface between the terrestrial and aquatic worlds. Here the diversity of plants and animals is often much greater than surrounding areas; the floodplain forests provide a critical buffer for streams and rivers by filtering and preventing run-off; and the aquatic environment provides a constant influx of nutrients that



contributes to the productivity and diversity in the neighboring terrestrial ecosystem.

Riparian forests also serve as corridors of habitat that can connect an otherwise fragmented landscape, allowing many wildlife species to move between isolated populations. Biologists now know that maintaining such interchange between populations is one of the most important ways to prevent local

extinctions and the loss of biodiversity. The Riverfront Parks are, in fact, the centerpiece of one such corridor, comprised of several forest patches and river islands extending across a human-dominated environment that we call "The Wyoming Valley."

Station 12

Reptiles and Amphibians of the Natural Area

At least sixteen species of reptiles and amphibians are found in and near the Kirby Park Natural Area Wetlands. Some common species along the River or in the Wetlands are red-backed salamanders, snapping turtles and bull frogs. The lucky observer might see a rare map turtle basking in the sun near the river. Spring peepers can be heard calling in spring as evening approaches, and gray tree frogs may be heard calling during the day or evening in summer.

American toads are found almost anywhere along the trails in the Natural Area, and they too can be heard singing their trill-like song near wet areas in spring. Fowler's toad, a rare species in Northeastern Pennsylvania, has also been identified in the Natural Area.

Several species of snakes are found in the Kirby Park Natural Area. Common species include eastern garter snake, black racer, and northern water snake. Also, the northern brown snake, which is rare in northeastern Pennsylvania, has been found here.



Station 13:

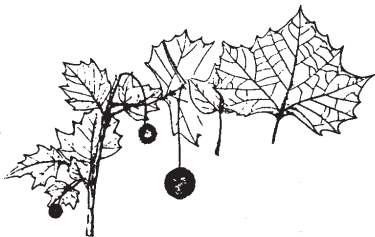
The Woodsy Owl Deck

The deck you're standing on is what's left of the gazebo from the original Olmsted Brothers' park.

From here you can view the Susquehanna River, the skyline of Wilkes-Barre, the levees, and the forest. As part of the River

Ecology Study Area, the purpose

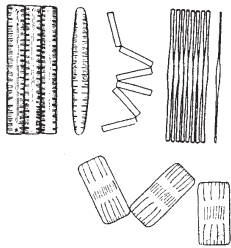
of the deck is to provide a place for viewing and investigating the Wyoming Valley, its history, and its natural history. How deep is the river? Generally, the river is at its highest in late winter, and at its lowest in late summer. Sometimes the water comes all the way up and floods the Natural Area. Do you see any evidence of flooding from where you're standing? Depending on the time of year, you may also do some bird or butterfly watching, or just take in the view. Check out some of the vegetation surrounding the deck. You may recognize some of the trees from earlier stations, and this is an excellent opportunity to practice your tree identification skills.



Station 14 - Rocky-Sandy Beach

Primary Energy Lessons

You are standing on a stretch of semi-permanent beach, 300 meters long, which was created by deposits of sand, gravel, and cobblestones on an inside bend of the Susquehanna River. During low water flows, this beach becomes an ecological powerhouse of wet pools and moist crevices fueled by sunlight. Pick up a few wet stones (making sure to replace them later where you found them) and notice the “slimy” texture caused by abundant attached diatoms, algae, and other organic matter. These slimes are created by photosynthesis and bacterial activity and are food for a huge variety of aquatic invertebrates (animals without backbones) which scrape/graze the algae from the rocks or scavenge for small organic particles in the spaces between the rocks and sand grains. The algal slimes are called in-stream primary production while the imported particles are called coarse or fine particulate organic matter. Whatever we call it, it is food for consumers great and small!



Station 15

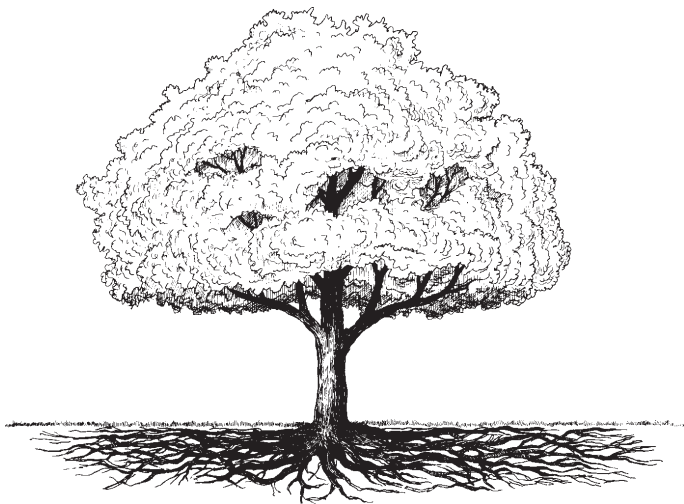
Soils at Riverfront Park

Like all ecosystems, Riverfront Park is underlain by a soil that is composed of a mixture of microscopic rock fragments, organic matter, and open pores. Soils are generally important to plant life because they serve as a spongy medium into which roots can penetrate, and because they provide water and nutrients.

The soil within the Riverfront Park has been brought to the site by two natural agents: glaciers (the most recent being 12,000 years ago) and the Susquehanna River. Therefore, it is a rather young soil and has not had the time to develop all of the layers found in more mature soils. Still, it is quite fertile, and can support healthy vegetation. In many parts of Luzerne County, areas that have similar soil are farmed for corn, potatoes and tomatoes. Other areas are productive pastureland.

The frequent flooding is also important to the soils because the waters deposit a new layer of sediment. It also dislodges and washes away resident plants and animals. Many people worry that the floods are becoming more frequent. If true, one cause might be deforestation and the destruction of wetlands upstream that act as natural sponges for water.

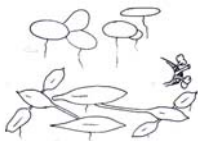
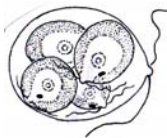
The vegetation within the park is important because it holds the soil in place, a fact that is especially evident near the bank itself. Without the binding action of the plant roots, the soils would be washed downstream with each flood. Therefore every effort should be made to preserve the existing vegetation, so that erosion can be prevented.



Station 16 - Wetlands Ponds

Pond Ecology

At first glance, this wetland pond may appear muddy and dull - or even dried out! But, as you are discovering, appearances are deceiving in field ecology. This pond, along with similar ones in the Natural Area, is the by-product of the mining of gravel deposits in the early 20th century. The ponds often have deep sediments and overlying shallow water rich in nutrients, such as nitrogen and phosphorus, which support large numbers of microscopic algae and protozoans, such as *Chlamydomonas*, and various larger water plants. You might notice the tiny floating leaf of duckweed (*Lemna*) with its thin, single root underneath. The smallest of the flowering plants, duckweed is an important food source for many waterfowl. In the late spring and throughout the summer, many larger aquatic plants exist around the edge of the ponds. They are called emergent macrophytes, and most of them, such as bullrush, have hollow stems which supply vital air to the plant roots in the low oxygen environment of the sediments. Muskrats dine on the thickened bases of the rush and birds feast on the seeds in autumn.



duckweed

Pond Hydrology and Water Quality

The ponds are remarkable from a hydrologic standpoint. Their changes in water level are synchronized with changes in the level of the river. In a modest flood, when the river level rises quickly over 48 hours but does not overtop the bank, the increasing water pressure of the river along its banks pushes water through the porous sandy soil on which you're standing. How did scientists discover this? The clue was that both the river water and the pond water had identical "chemical fingerprints" of elements such as sodium, potassium, calcium, and magnesium.

The ponds are remarkable chemically and biologically. The algae production can be so great during the daylight hours that dissolved oxygen in the water exceeds normal saturation values only to drop to near zero during the night as the plants actively respire and use up the oxygen in the water. The bottom feeding activities of turtles and carp keep the thick sediments stirred, causing the ponds to often appear muddy. If you are quiet and observant, you may be fortunate to spot a belted kingfisher skimming or hovering over the pond for food or a green heron patiently hunting in the shallows.



Ceryle alcyon, Belted Kingfisher

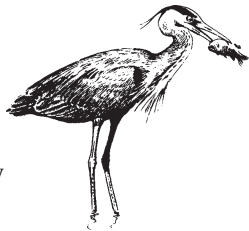
The key to understanding and studying the ecology of these ponds is that energy and chemical elements are being moved around in a very complex food web. These constructed, remnant ponds may not look or even smell appealing to you but they have become an important part of the wetland forest habitat of this natural area.

Station 17

Why Protect Wetlands

Wetlands are areas that contain standing water or waterlogged soils. Some wetlands are almost always wet, while others are wet for only a few weeks during the spring and early summer. Wetlands contain special plants that can survive the wet conditions. Three of the most common types of wetlands in Pennsylvania include marshes, swamps, and bogs. Marshes contain soft-stemmed plants like cattails, sedges, and reeds. Swamps contain trees like red maple, black willow, and black spruce. Bogs have shrubby species like leatherleaf and cranberry, and the surface is covered by peat moss.

Wetlands serve several useful purposes. First, wetlands help prevent flooding thanks to their spongy soils. Second, wetland soils are excellent filters and clean-up polluted water. Third, wetlands also provide a special habitat for many kinds of plants and animals. In fact, fish and amphibians need wetlands to reproduce.



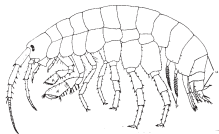
Station 14

Consumer Energy Lessons

Take the aquarium net that you brought with you and skim it along the bottom of one of the rocky pools in order to stir up the bottom.

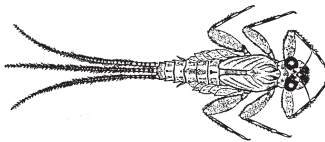
Transfer this benthic macroinvertebrate sample to a white pan with some water for observations. You are likely to spot “side swimmers or scuds,” or more properly amphipods. These small, “shrimp-like” organisms are a keystone species in this habitat because they serve as a major food source for common wading birds such as great egrets and great blue herons. In turn, amphipods graze algae off the rocks and consume other smaller animals and particles.

Amphipods



Undoubtedly you also caught some insect larvae, such as mayflies, stoneflies, caddisflies, or dragonflies. These invertebrate consumers display a wide variety of physical adaptations (hooks and grapples, flattened shape, or small size) to meet the challenges of living in a flowing water environment. How many other adaptations can you

observe and record? Do you discover any differences between the adaptations of benthic macroinvertebrates in the quiet pools versus the moving water? Are there differences in the types of organisms that you find which depend on the roughness or size of the sediments? Finally, if you have a hand lens, examine mouthparts of some of your organisms. You will be intrigued to discover a wide variety of structures for grazing, scraping, and active predation.

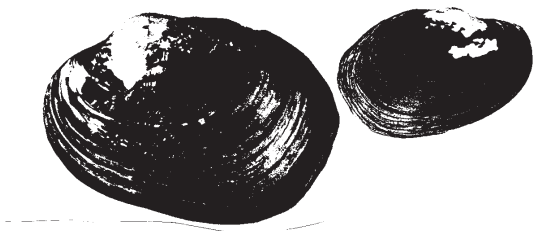


Ephemeroptera, Mayfly

One of the most interesting features of this beach is the presence of empty mussel shells made of calcium carbonate. Because the Susquehanna River waters flow from the limestone rocks of New York State, the main channel of the river contains enough dissolved calcium bicarbonate to resist acid rain and to support the growth of snails and mussels with shells. The *Lampsilis* and *Elliptio* shellfish species, common in the deeper muddy pools and offshore, form a vital part of the river foodweb. Themselves food for mink and muskrats, most people are not aware that survival of the mussels depends on native fish

species too. Fish like to nip at the mantle fringe of mussels for food. For the mussels, it is a small price to pay because they can squirt their larvae, called glochidea, at the fish while it feeds. The mussel larvae lodge in the fish gills and develop into juveniles that fall off later after maturing. Mussels filter algae and bacteria from the water. They are a vital part of aquatic ecosystems. They are also one of the most endangered groups of aquatic animals in the United States and the world because of the construction of dams which choke and alter the habitat with fine sediment.

Lampsilis, mussel species



General Ecological Lessons

The increasingly wide variety of benthic invertebrates, especially leeches, mayflies, and mussels, in this stretch of the Susquehanna River indicates a healthy aquatic ecosystem. As we continue to make progress on protecting streambanks to prevent erosion, controlling acid mine drainage and other urban pollutants, and reducing the amounts of coliform bacteria and excess nutrients in the water, we can look forward to a future with swimmable waters again. For the moment, a free-flowing Susquehanna River is excellent habitat for a wide variety of invertebrates, fish, birds, and mammals.

Both the federal government and the state of Pennsylvania have laws that protect wetlands. People who want to fill or drain a wetland must get a permit before they can do so, and usually have to build a new wetland to replace the one that's lost. Therefore, wetlands are important in many ways and should be appreciated.

If you continue on the trail past the wetland ponds, it will eventually lead back over the levy and enter Kirby Park at the tennis courts.

We hope you have enjoyed your walk. Your comments, suggestions for improving the trail, and reports of any hazardous conditions or violations of use that you encounter are important to us. Please contact the Wilkes-Barre Riverfront Parks Committee by calling (570) 825-1701 or writing to:

The Riverfront Parks Committee

P.O Box 2554

Wilkes-Barre, PA 18703

For information about park naturalist guided tours for school groups and organizations, please call the office.

The Riverfront Parks Committee works with individuals and other organizations to protect and maintain the riparian forest along the Susquehanna River in Wilkes-Barre. The trails are maintained by volunteer efforts and The Friends of the Riverfront Parks. Only through continued stewardship by those volunteers and you, the users of the trail, will it remain a unique and diverse natural setting.

Help protect it.

