A JOURNEY THROUGH

Lower Esopus Creek

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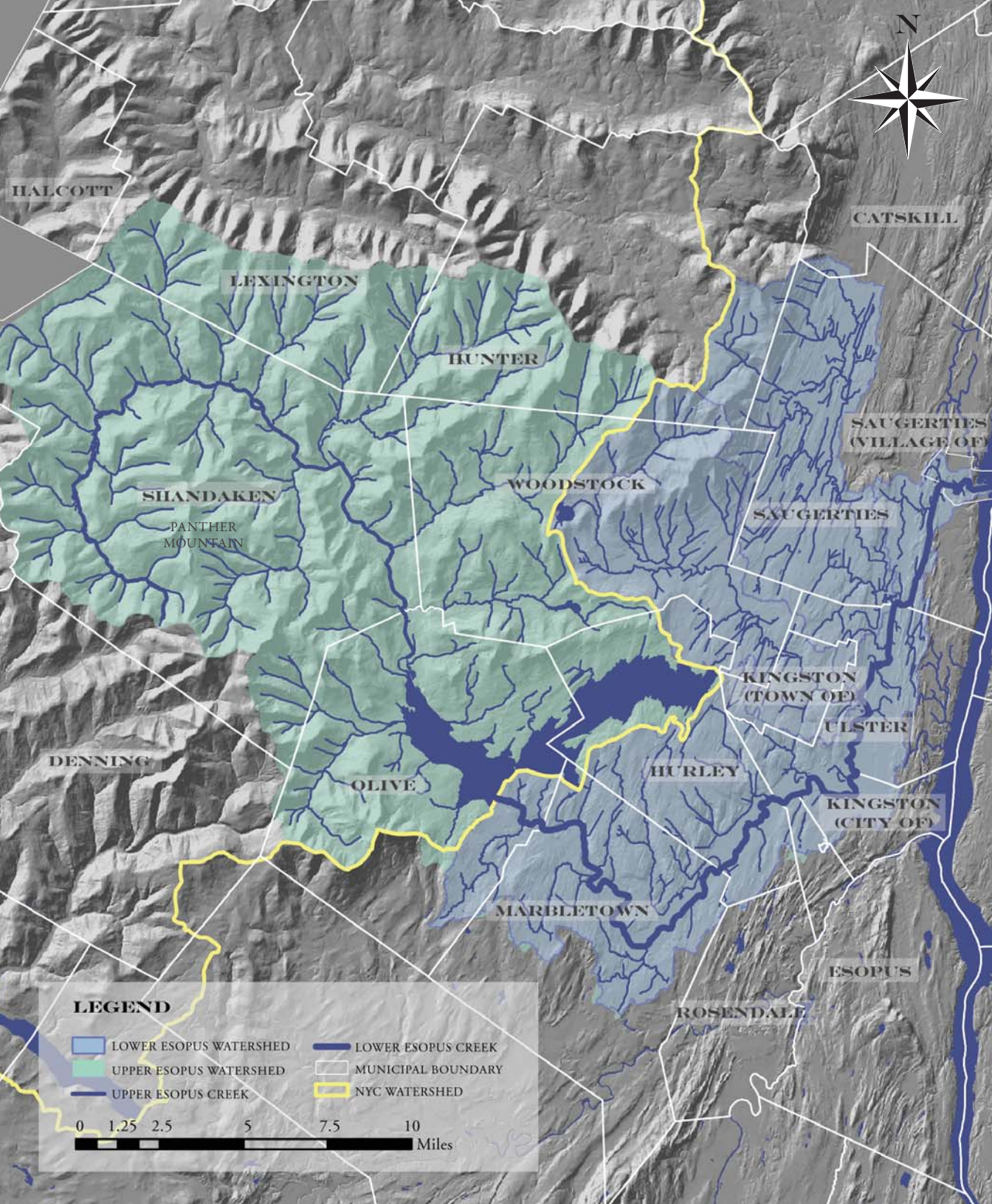
The Esopus Creek is one of the jewels of the Catskill Mountains and an important tributary to the Hudson River. Formed in the retreat of the last glacier,

the creek today feeds into the Ashokan Reservoir, which provides drinking water to New York City. However, it's the lower Esopus Creek—the portion that drains out of the reservoir at Olive, meanders through the Hurley flats, and empties out into the Hudson at Saugerties—that's been integral to the region's history, helping form the very character of the countryside and towns.

It was the extraordinarily fertile fields of the lowlands of the lower Esopus Creek that first brought European settlers to the area (and Native Americans thousands of years before that). Today, the valley is still primarily agricultural. Industry in the 19th century along other sections of the creek put towns like Saugerties on the map. While the mills are gone, the creek has become a magnet for recreation, attracting boaters, fishermen, and nature enthusiasts. Despite centuries of human impact, the lower Esopus Creek continues to support a rich biodiversity. The incredible assortment of birds, fish, plants, and animals that inhabit its watershed make up a vital ecosystem.

We invite you to join in this narrative journey, which celebrates the creek in all its magnificent beauty and abundant life. In describing the creek's hydrology, geology, history, and biodiversity, this booklet seeks to highlight the incredible importance of the lower Esopus Creek to the surrounding communities and environment.


N
HALCOTT
LEXINGTON
HUNTER
CATSKILL
SAUGERTIES (VILLAGE OF)
SHANDAKEN
PANTHER MOUNTAIN
WOODSTOCK
SAUGERTIES
KINGSTON (TOWN OF)
ULSTER
DENNING
OLIVE
HURLEY
KINGSTON (CITY OF)
MARBLETOWN
ESOPUS
ROSENDALE
LEGEND
LOWER ESOPUS WATERSHED
UPPER ESOPUS WATERSHED
UPPER ESOPUS CREEK
LOWER ESOPUS CREEK
MUNICIPAL BOUNDARY
NYC WATERSHED
0 1.25 2.5 5 7.5 10
Miles

THE TWO FACES OF ESOPUS CREEK

Esopus Creek is one of the most important Catskill rivers. Its headwaters are at Winnisook Lake, on the western slopes of Slide Mountain. The creek encircles much of that peak and the east side of Panther Mountain before turning east and descending down to the Hudson River at Saugerties. Along the way it displays two distinct "personalities," both reflective of its Ice Age history.

The upper reaches of the Esopus are typical of what might be called a mountain stream. We see a relatively narrow canyon with steep bedrock slopes rising above. This stretch passes into and out of the Ashokan Reservoir. East of the reservoir is the most revealing part of the mountain stream, the length of the Esopus that passes through Cathedral Gorge at the Ashokan Center. Here tall bedrock cliffs rise above a box canyon. We are taken back to the Esopus as it was at the end of the Ice Age. We have to imagine a time when vast, powerful whitewater torrents of meltwater poured out of the Catskills. This is when the Cathedral Gorge canyon was most likely carved. These narrow reaches of the Esopus continue about two more miles until a new personality emerges.

At Marbletown the Esopus abruptly stops being a narrow mountain stream. It opens up and widens into a broad, floodplain river. The creek makes a few sinuous meanders and then veers sharply to the northeast, as it flows on toward Saugerties. This decidedly different Esopus Creek offers another and different Ice Age history. Here the valley was once an embayment of Glacial Lake Albany, the "great lake" that filled, north to south, about 150 miles of the Hudson Valley.

Our late Ice Age Esopus flowed into an estuary of Lake Albany at Marbletown. The lake deposits created the broad level valley floor that we see here. Now we must imagine a wide, deep, and far more serene Ice Age Esopus, something akin to the Hudson at Tappan Zee. This, the final stretch of the Esopus, did not flow into the Hudson Valley so much as it peacefully merged with it.

–ROBERT TITUS

UP AND DOWN STREAM

UPPER ESOPUS

From its source at Winnisook Lake in the high valley between Slide Mountain and Panther Mountain, the Esopus swings around Panther to Oliverea and follows NYS Route 28 to Boiceville and into the Ashokan Reservoir at NYS Route 28A. During the last Ice Age, an ancestral Ashokan, Lake Shandaken, occupied the Ashokan basin, held there by an ice dam that broke in the warming climate, cutting the "Wagonwheel Gap" notch in the east flank of Ashokan High Point Mountain. The prevailing habitats are wooded. Mountain spruce-fir forest habitat grades downslope and downstream to hemlock-pine-hardwood forest. Around the Ashokan Reservoir maple-beech forest mixes with chestnut oak and oak-hickory assemblages more typical of the Hurley Hills.

OLIVE AND CATSKILL FOOTHILLS

The lower Esopus begins in the Town of Olive, between High Point Mountain (south) and Tonshi Mountain north of the reservoir. Here are transitional forests between those of the Catskill mountain slopes (beech-maple dominant) and the Hurley Hills (oak dominant). Level areas support many wetlands, some large and diverse. The mountains here are warmer and drier and support such rare habitats as

pine-oak-heath barrens on the summit of Ashokan High Point, with a stand of regionally rare THREE-TOOTHED CINQUEFOIL (*Sibbaldiopsis tridentata*).

SOUTH HURLEY HILLS (ESOPUS CUT) TO MARBLETOWN VALLEY

Plunging through the Ashokan Gorge the Esopus transits a drier forest community of oaks, hickories, and pines, warmed by thermals rising from the flat valley below the Hurley Hills in Marbletown. Dry rock ridges support acidic barrens and woodlands, with intermittent woodland pools in glacial basins. Much of the landscape bears the scars of former stone quarries. The

Esopus flows across bedrock ledges, plunges down to deep pools, and twists and turns between these obstacles and longer stretches of brisk rapids and slower passages. Southeast of the deep pool below the Ashokan spillway is an unusual floodplain sand barren habitat where nectaring insects come to abundant wildflowers such as regionally rare BUTTERFLY BUSH (*Asclepias tuberosa*) and many species of asters and goldenrods.

NORTH HURLEY HILLS AND ESOPUS VALLEY IN HURLEY

Down to the flatlands, with deep sediments filling its central valley, the Esopus slows and settles into farm country. To the west the Hurley Hills flank the green fields; to the east the broad marble upland called "Stone Ridge"

separates the Esopus from the Rondout, whose valley boasts orchards and pastures. Along the Esopus from Marbletown through Hurley and southwestern Kingston, crop fields intermingle with floodplain forests populated by silver maple and elm, with river birches leaning over the creek. Open limestone ridges east of the creek support state-rare TAWNY EMPEROR BUTTERFLY (*Asterocampa clyton*) and regionally rare EASTERN PRICKLY PEAR (*Opuntia humifusa*), our only native cactus.

CITY OF KINGSTON AND URBAN ULSTER

Through the City of Kingston and the Town of Ulster, urban development constrains the Esopus, yet much of the corridor is still wild. Here are rich herbaceous wetlands grown up from former farm fields, lacking in the farming towns upstream. The New York State Thruway (I-87) and NYS Route 209 cross the Esopus here. Commercial and residential development impacts the stream corridor, and some parts of

the shoreline lack stabilizing trees and shrubs. Floodplain wetlands next to suburban neighborhoods are rich habitats for nesting birds such as goldfinch, redwing blackbird, and possibly rare rails and sedge wren. Giant Cecropia and Polyphemus moths find refuge in these city marshes, the caterpillars

munching leaves of willow, buttonbush, and non-native purple loosestrife.

TOWN OF KINGSTON AND RURAL (WEST) ULSTER TO SAUGERTIES

Through northern Ulster to the creek's terminus at the Hudson in Saugerties, a mix of houses, farm fields, and wild land border the Esopus. Just north of Route 209 the Sawkill, a major tributary, enters the Esopus. Opposite the Sawkill confluence are alluvial flats with flood-plain pools that used to be sand or gravel pits. Now these pools are habitat for frogs, reportedly including regionally rare NORTHERN LEOPARD FROG (*Rana pipiens pipiens*), as well as damselflies and dragonflies. Fish, stranded in the pools after major

floods, provide food for vertebrate and invertebrate scavengers. This rich habitat stands at the intersection of two major highways, the Thruway and 209. The west ridge (Jockey Hill and Hallihan Hill in the Town of Kingston) is more a jumble of rounded summits than straight-lined cliff. The southwest summit is a rare pitch pine-scrub oak barren with state-rare EDWARD'S HAIRSTREAK BUTTERFLY (*Satyrium edwardsii*) feeding on scrub oak. The various angles, nooks, and crannies support a variety of snakes, including rat snakes, hognose snakes, and copperheads.

STRETCHING AND CASCADING INTO SAUGERTIES

Beyond the Sawkill confluence the west ridge flanking the Esopus flattens briefly at Ruby in a transition between the Hurley Hills and the precipitous Mt. Marion ridge starting at the Saugerties boundary. The stream itself relaxes into the long, straight stretch called Glenerie Lake bounded by houses and NYS Route 9W nestled

into shale and limestone ridges on its east and farmland and houses to its west. From the west the Plattekill, another major tributary, rushes out of the Catskills escarpment, rambles across the Catskill foothills, across the Mt. Marion ramp and into the Esopus at the Saugerties-Ulster boundary. The Mt. Marion ridge is the largest contiguous forest area in Saugerties, with diverse woodlands including open oak-hickory assemblages with carpets of sedges and spring wildflowers under stunted trees. Here uncommon butterflies such as pine elfin, brown elfin, and juniper hairstreak feast on nectar of early saxifrage, rock cresses, and bluets before summer leaves shade the ground.

SQUEEZED, BENT, DAMMED, AND DESCENDING TO THE HUDSON

Just downstream from the Plattekill confluence begins Glenerie Falls, a long, double-bended whitewater cascade through a weak bedrock fault.

Heading north along Route 9W, the Esopus relaxes into the steep-walled, 100-foot-high Esopus gorge, where the creek has cut through a weak fault between shale and limestone bedrock layers. Above the stream on parallel limestone ridges are hemlock and hardwood forests, spectacular cliff-and-talus communities, and between the ridges wetlands and vernal pools where dragonflies, frogs, and salamanders breed.

The limestone ridge east of the creek narrows through Esopus Bend Nature Preserve, giving way to eroded deep glacial sediments of alternating sand,

silt, and clay. The forest changes to a hardwood dominant mix of maple, beech, oak, hickory, and tuliptree, with giant silver maple and river birch along the high creek banks and floodplain swamp and forest east of the bend where the ridge crosses the stream. Esopus Bend, surrounded on two flanks by the long-developed Village of Saugerties, is a hotbed of biodiversity that includes over 130 species of birds and over 50 species of butterflies.

Above the Cantine Dam and the Route 9W bridge in the Village of Saugerties is a broad, deep emergent marsh with water-lilies and the invasive European water chestnut. Accumulated sediments accommodate big carp and snapping turtles that romp and splash every spring.

After tumbling over the dam and giant boulders below, the creek makes a last rocky turn east, arriving at the deep stretch to the tidal Hudson. After passing marinas and shoreline houses, the Esopus merges with the Hudson, flanked by the lighthouse peninsula north and a long jetty south. Tidal habitats here include tidal and supratidal swamp, shrub swamp, intertidal marsh, and mudflats, where snapping turtles, map turtles, and migrant and nesting birds find sustenance and solace.

–SPIDER BARBOUR

The physical shape and form of rivers, their water quality, and extreme flows, such as floods and droughts, are all determined by the watershed's hydrologic characteristics.

The Catskill region has above-average precipitation and thus above-average stream flow. The steep terrain, narrow headwater valleys, and limited wetlands all contribute to rapid runoff.

The Esopus Creek watershed is divided by the New York City Ashokan Reservoir into an upper and lower basin. The steep upper basin has 21 peaks over 3,000 feet, receiving 50–60 inches of precipitation per year, which is much wetter than surrounding regions. Most of the 256-square-mile area is forest, some of which was logged in the 1800s. Leather tanning, which required the bark of hemlock trees, was also a common forest practice. The upper watershed can be described as a source zone. This means its primary hydrologic function is the production of runoff and sediment. However, the reservoir modifies the runoff rates and is anticipated to trap most course sediment from the source.

The lower watershed extends from the Ashokan Reservoir to the Hudson River, with a length of approximately 30 miles and an incremental watershed of 163 square miles, plus the 256 square miles of watershed in the upper watershed. It can be thought of as having three separate valley segments based upon their distinctive geology, topography, and hydrologic processes.

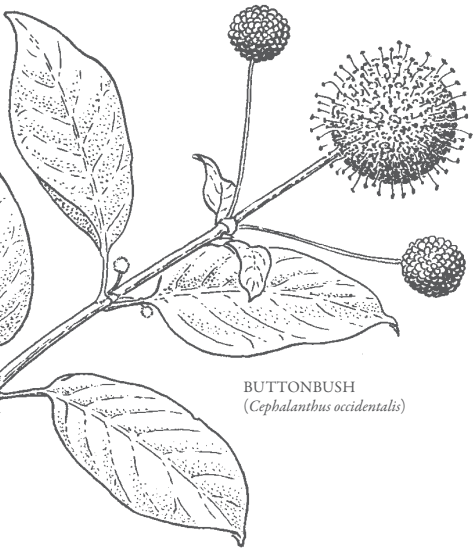
Lower Esopus Creek morphology is dominated by its bedrock setting and history. Valley Segment 1 is stratified shale of the Catskill Mountains; Segment 2 is a long, wide, flat valley floodplain in a limestone region; and Segment 3 is a narrow valley between folded shale deposits.

VALLEY SEGMENT I

The first valley segment extends from the Ashokan Reservoir dam southeast to the bridge at Hurley Mountain Road. This zone serves two functions: it transfers water from the reservoir through the zone, plus it is the source of additional runoff and sediment. It has a narrow, steep-sided, confined valley until it begins to open up two miles above the Hurley Mountain Road Bridge. Public access is very limited, with few roads or trails. The valley bottom declines from an elevation of 400 feet near the base of the dam to 200 feet near Hurley Mountain Road, over a distance of six miles. There is no floodplain as the valley narrows at the bridge. The transition from free flowing rocky channel to the broad floodplain occurs about 100 yards upstream of Marbletown Recreational Park on Tongore Road.

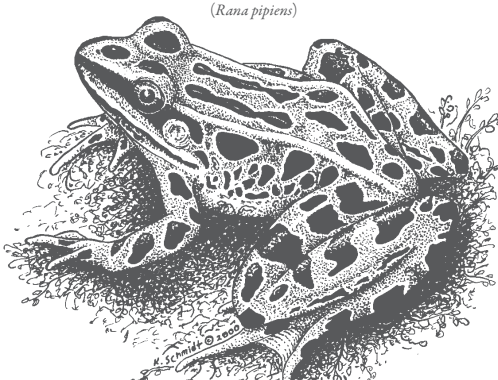
VALLEY SEGMENT II

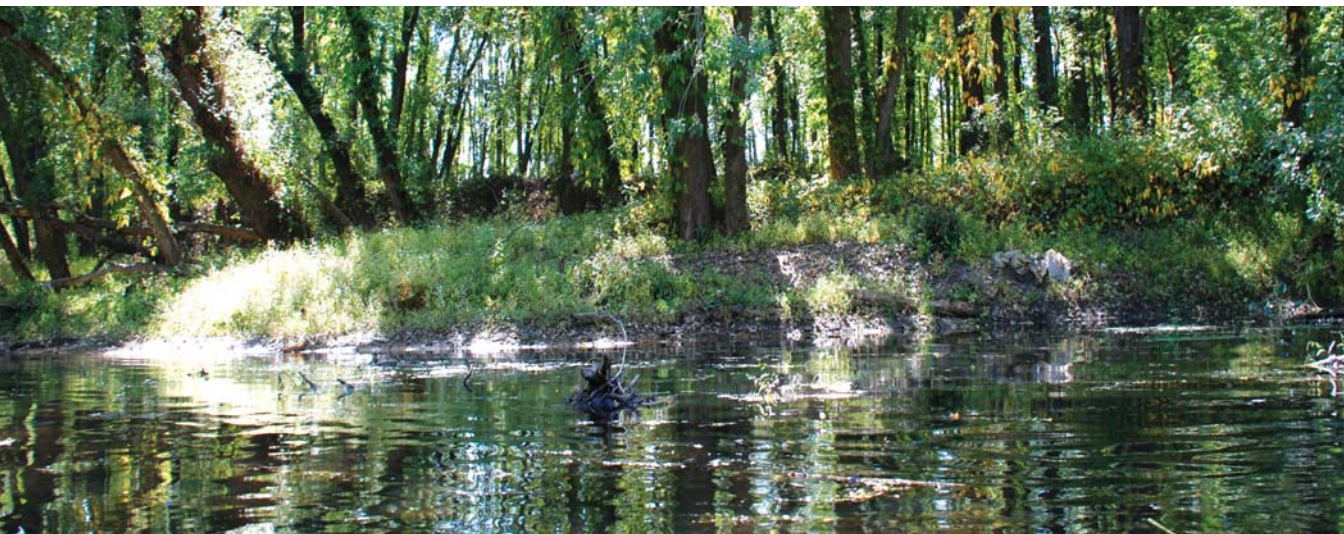
Segment two is a broad, flat, low gradient valley extending northeast from Hurley Mountain Road beyond the confluence with Sawkill Creek to Leggs Mill Road. This valley reach has several functions, including a water-source zone with several tributaries and a longitudinal transfer zone conveying that runoff downstream. A unique feature is that it generally has a broad terrace and floodplain that potentially provides sediment deposition and floodwater storage. However, the river is generally incised in a deep channel with limited floodplain connection except in large floods. The riverbanks are generally fairly steep and support shrub and hardwood vegetation. This segment is characterized primarily by low gradient, slow current, and poorer water quality. The river reach through the Town of Ulster is particularly prone to high water. Downstream of I-587, floodplain meander scrolls and oxbow ponds indicate that this has been an active floodplain and is at high risk for development. The mouth of the Sawkill Creek at its confluence with Esopus Creek is just downstream of the Ulster Town Hall. A sedimentary delta extends halfway across the Esopus Creek channel indicating high sediment loads in Sawkill Creek and low transport capacity in Esopus Creek.

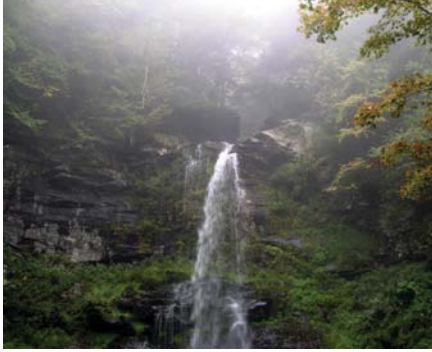


BUTTONBUSH
(*Cephalanthus occidentalis*)

NORTHERN LEOPARD FROG
(*Rana pipiens*)





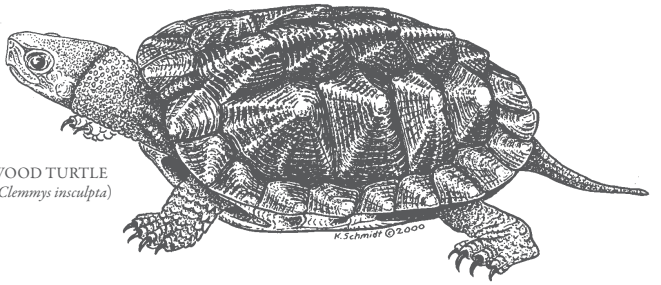


VALLEY SEGMENT III

The final segment extends from Leggs Mill Road to the Hudson River. This long, narrow valley is characterized by lateral confinement between bedrock ridges and the general lack of a floodplain. This segment functions only as a transport reach; it has little direct water or sediment inflow except at Plattekill Creek, which enters near Glenerie Falls. Glenerie Falls consists of at least five bedrock steps with individual falls or cascades, dropping about 68 feet over a length of about 2,000 feet. Both banks are steep and wooded and the bedrock creates a hydraulic control that dominates upstream water levels. The final reach of Valley Segment III consists of an estuary transition area between the Saugerties Dam and the Hudson River. It begins with an incised bedrock channel that opens up beyond the Hudson River banks. The mouth of the Esopus Creek is a beautiful harbor, connecting to the Hudson River sheltered by a sedimentary delta. This delta extends halfway across the Hudson River, verifying the Esopus Creek historic sediment load. The Hudson River at this point is both tidal and fresh water.

EXCERPTED FROM THE RIVER RECONNAISSANCE REPORT FOR SUSTAINABLE RIVER MANAGEMENT, LOWER ESOPUS CREEK, ULSTER COUNTY, NEW YORK, JULY 21, 2009, MMI #3618-01-1, MILONE AND MACBROOM, INC.

GOLDEN CLUB
(*Orontium aquaticum*)



WOOD TURTLE
(*Clemmys insculpta*)

COLLECTION OF THE NEW-YORK HISTORICAL SOCIETY, 1932.21.

BALD EAGLE
(*Haliaeetus leucocephalus*)

The lower Esopus Creek not only describes a journey through space, but also a trip through time. It courses through a landscape that encompasses many changes, yet also preserves age-old traditions.

On early Dutch maps, it was called *Clyne Esopus*, or "small water," but the original Lenape name for the Esopus Creek was more specific: *Atharhacton*, meaning "great field." The fertile bottomlands, which stretch from Tongore Road in Marbletown northeast to Saugerties, are among the richest in the state. It was these alluvial soils, cleared and planted with maize by the Lenape, that first attracted Dutch settlers to the area in the mid-17th century. The Europeans' arrival looms large in the history books, but it's a mere blip in the record of human occupation. Thirteen to ten thousand years ago, after the glacier had receded, Paleo-Indians roamed the region. They are believed to have hunted caribou, following the migrating herds along the tundra-like western shores of the Hudson River, formerly an inland lake, which had receded over recent centuries, and up the neighboring river valleys.

The earliest artifacts discovered along the lower Esopus Creek itself are approximately 6,000 years old and belong to a second stage of development. The climate had warmed, the pine-and-spruce forest had been replaced by the oak-hickory forest of today, and deer—a key resource for Native peoples—had replaced the caribou. These ancient peoples foraged for plants, fished, hunted, and harvested acorns and other nuts, moving their encampments with the changing seasons, from the Hudson River, where they fished for sturgeon in the spring and summer, to the inland forests in the fall and winter. The floodplain of the creek would likely have attracted them for its abundance of fish and game.

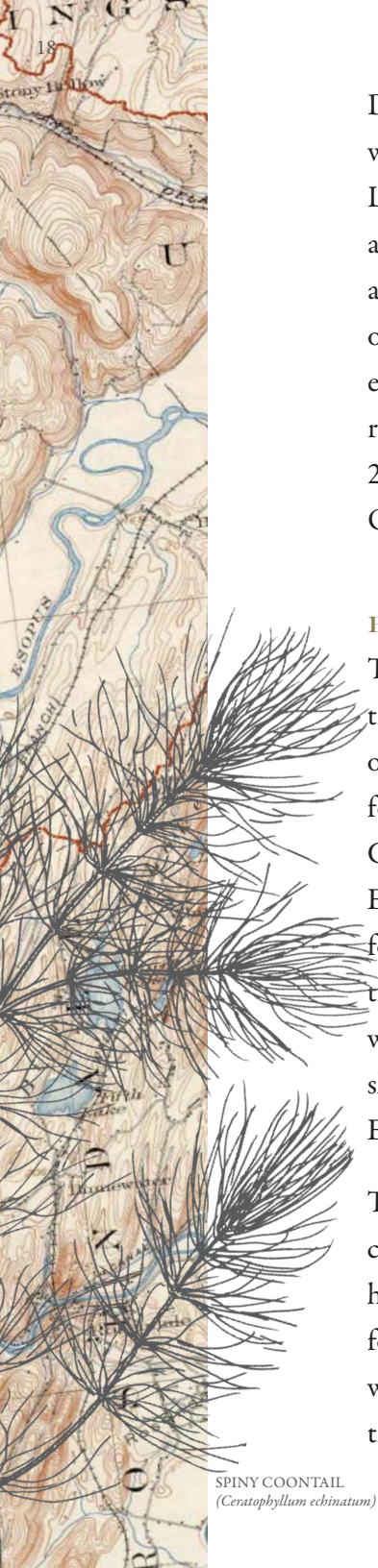
Cultivation of maize along the Esopus Creek occurred around 1,350 A.D. However, the native culture, which eventually evolved into the Algonquin-speaking Lenape, continued to rely mainly on plant foraging, nut harvesting, fishing, and hunting. Squash was introduced much earlier than maize, and beans, whose evidence in the region is very sparse, would have come later; of the three sisters, it was maize that predominated. The native practice of clearing the land for farming and management of game by burning in the region is believed by archeologists to have occurred only in the last few centuries of ancient times. Agriculture was probably adopted very gradually and played a secondary rule in the Indians' subsistence for several centuries.

THE DUTCH ARRIVE

Within a few years of Henry Hudson's voyage in 1609, the ships of private Dutch traders were plying the waters of the Hudson, trafficking in beaver skins obtained from the Lenape and other native tribes along the river. The first settlers in Ulster County sailed down the Hudson from Rensselaerswyck, landing at Rondout Creek in present-day Kingston and hiking up the bluffs along an Indian footpath to the Esopus floodplain, enticed by fields just "waiting for the plow," as one early settler described it. Among them was English-born carpenter and clapboard maker Thomas Chambers, who obtained 67 acres along the eastern side of the creek from the Lenape in 1653 in what was the first recorded land deed (it was in the vicinity of Manor Avenue, in Kingston).

As more Europeans—besides Dutch and English, they included Walloons (French-speaking Belgians) and Norwegians—settled along the creek, relations between the newcomers and the Lenape became strained. In 1658, New Netherland Governor Peter Stuyvesant traveled up from New Amsterdam to Esopus, as the fledgling settlement was called, to lay out a stockade and establish a military garrison. The scattered farm buildings were dismantled and moved to within the palisade, which was located on a bluff bounded on one side by the Esopus Creek (today the site of uptown Kingston). In 1662, the Dutch established a second settlement along the creek two and a half miles to the south, which was called *Niew Dorp*, or New Village (present-day Hurley).

Twice war broke out. The conflict culminated, in what's referred to as the Second Esopus War, in a surprise attack by the Lenape on the unarmed stockade in July 1663. The warriors killed many settlers and took others captive, and they burned Niew Dorp to the ground. The



Dutch military retaliated by torching the Indians' corn fields and wigwams, sacking all their food stores, and killing or capturing any Lenape they encountered on a series of expeditions into the surrounding area. The destruction signaled the end of the Lenape's presence in their ancestral lands along the Esopus. In 1677, after the English had taken over New Netherland, a treaty signed by Governor Andros ceded the entire valley of the Esopus kill to the English. The Lenape gradually retreated to the western mountains, where they survived into the early 20th century. Many eventually relocated to reservations in Oklahoma, Ontario, and Wisconsin, occupied to this day by their descendants.

BREAD BASKET OF THE COLONY

Thanks to the incredible productivity of the lower Esopus Creek flats, the early settlers prospered. The wheat they planted, supplemented with oats, rye, and other grains, was shipped to the West Indies in exchange for molasses and rum. More land was cultivated after 1668, when Governor Nicolls distributed farmland along the Esopus Creek to rowdy English soldiers who had replaced the Dutch garrison at Kingston, forming the township of Marbletown. The area was a bread basket for the colony. Grist mills along the Esopus and its tributaries ground the wheat into flour, which was transported to Kingston in barrels and shipped to New York City by sloop. During the American Revolution, Esopus flour fed Washington's army, stationed at New Windsor.

The farmers depended on the labor of African-American slaves to cultivate their fields as well as perform other tasks. Because their land holdings were relatively small, each farmer generally had from two to four slaves. They planted and harvested crops, spun wool, cooked, drove wagons, and operated the grist mills. They lived in close proximity with the owners, either in the cellars or attics of the farmhouses or in a small

SPINY COONTAIL
(Ceratophyllum echinatum)

building in the back. “It was an intimate life,” said Ulster County historian Anne Gordon. “Everyone worked in the fields”—owners and slaves together.

Under Dutch law, slaves could work and earn money during their free time, thereby purchasing their freedom. Hence the local colonial society included a freed contingent of black millers, saddlers, leather workers, seamstresses, and other skilled artisans who made a living off their services. However, this window of opportunity vanished under the English, whose harsher laws forbade groups of slaves to congregate and meted out terrible punishments to a slave who resisted an owner. As under the Dutch, slave children were routinely sold off. Many slaves continued to ply artisan trades, but it was the owner, not the artisan, who benefited. New York State outlawed slavery in 1827, but there was a caveat: only people over age 28 were freed. It wasn’t until the 1840s that slavery completely disappeared from the area.

It’s a sad irony that just as blacks were finally getting their freedom, a flood of skilled immigrant labor from Europe was taking away their employment opportunities: white artisans and laborers were always preferred over the blacks. African Americans left the rural premises of the lower Esopus for the cities, or wandered the roads, destitute. Many moved to points west, where the opportunities were better. Undoubtedly a few ended up in at Eagle’s Nest, the community of displaced American Indians, army deserters, and former black slaves located on a remote mountain top off Hurley Mountain Road.

The opening of the Erie Canal in 1828 devastated the Esopus farmers, who no longer could depend on free slave labor and were unable to compete with the flood of cheaper wheat pouring in from western New York and Ohio. They switched to dairy, growing hay in the flatlands,

ULSTER COUNTY'S BLACK GOLD

The rich bottomlands of the lower Esopus, extending from Tongore Road in Marbletown all the way up to Kings Highway in Saugerties, have been farmed for nearly 700 years. It was these fertile soils, cleared and planted with maize by the Lenape, which first attracted European settlers to the area in the mid-17th century and enabled them to thrive. Today, the Esopus Creek flats continue to be farmed and are an important contributor to the local economy. The creek is still vital to the agricultural community, with some farms using its waters for crop irrigation.

Most of the 2,000-plus acres of farmland bordering the creek and its tributaries are planted in sweet corn, which has replaced dairy as the main commercial commodity. Vegetables, hay, and flowers are also grown. The approximately two dozen farms along the lower Esopus Creek and its tributaries represent a variety of enterprises, ranging from the 1,200-acre Gill Corn Farms, which sells its corn wholesale nationwide and employs approximately 100 migrant laborers, to EATS Village Farm, a CSA that sells shares of produce grown by owner Lisa Alt on just three quarters of an acre.

These farms are among the most productive agricultural areas in the region. Contrary to public perception, the market value of agriculture in Ulster County is actually growing, thanks to rising food costs and consumer interest in locally grown and organic produce. According to the 2007 Agricultural Census for Ulster County, overall market value almost doubled from 2002. That increase is despite the slight decrease in the overall number of farms, from 532 in 2002 to 501 in 2007. (However, the census notes that production costs remain high, making it difficult for farmers to achieve healthy profit levels.)

Some farms supply a very specialized market. For example, Joe Hasbrouck grows oats, rye, red kidney beans, corn, and hay on the 400 acres along the creek he owns and leases, selling corn to a local food mill and red kidney beans to a food co-operative in western New York. Others sell their produce at local farm stands as well as farmers' markets and supermarkets. The availability of so much locally grown and produced food has helped transform the area into a culinary mecca.

COLLECTION OF THE NEW-YORK HISTORICAL SOCIETY, S-81.

Sue Boice, who owns a 200-acre farm in Mount Marion with her husband, Jim, planted with sweet corn, vegetables, and hay, said the growing market for fresh, local produce has been key to the success of their farm. "People are more aware of food and where it comes from," she said. "They will pay a little more for something that's fresh."

Alt, who bought her farm on Sawkill Road two years ago, also has found a market for her pesticide-free vegetables. She sells CSA shares from May to October and currently has 20 customers, who help out by volunteering their time and labor. She also maintains hives for honey bees and next year plans to open a farm stand. "The soil is really nice," said Alt. "I'm having great luck with it."

Agri-tourism is an increasingly lucrative side business. In October, Gill Corn Farms attracts visitors for its pumpkin cannon—which has an astounding range of 4,000 feet—hayrides, pumpkin picking, corn maze, and annual concert. The Paul Farm, located on Hurley Mountain Road, also draws tourists for its vast Catskill Corn Maze, drive-in movies, pumpkin picking, hayrides, and special events. Up in Saugerties, on Kings Highway, Thruview Farms, owned by the Boice family, offers haunted house tours and a corn maze, along with the novelty of viewing a herd of 15 buffalo.

The farms along the lower Esopus Creek are a great resource, helping preserve Ulster County's distinctive rural character, maintaining a centuries-old tradition, and contributing to the economy. Given the rapid loss of farmland to development, we can't afford to take these productive fields for granted. When conventional energy resources run low, the Esopus Creek flats could become ever more vital to the prosperity of the mid-Hudson Valley, noted Town of Ulster historian Robert Sweeney. "These fields sustained humankind through thousands of years," said Sweeney. "Some day we may not be such a rich country, and we won't be able to afford lettuce shipped from California. Once again, we might have to depend on this fabulous land to feed New York City. It's important to protect these rich and fertile soils."

–LYNN WOODS

pasturing their cows in the uplands, and exporting butter and cheese to New York City, first in sloops, later by railcar.

Up until the 1950s, there were dozens of dairy farms along the creek; truck gardens on the western side of the Esopus in Kingston, near where the traffic circle is today, provided fresh produce to the local population. The creek was also the place for recreation: Phil Boice, an 84-year-old farmer who owns 200 acres in the Town of Ulster, remembers fishing as a kid for pickerel, bullheads, perch, and bass. Boice said many farmers harvested ice from the creek in the winter, storing the blocks in ice houses erected on their property.

Today, the dairy farms are gone. The former "butter fields," as the area was known, have been replaced by crops of corn, vegetables, and hay. As it has for centuries, agriculture continues to be a main feature of the lower Esopus Creek flats, with sweet corn constituting the primary cash crop on the 2,000-plus acres under cultivation.

THE OLD AGRARIAN SOCIETY

With much of their acreage still under the plow, the Esopus bottomlands are little altered. Elsewhere on the creek, however, tremendous changes have occurred over the last 200 years. Both the upper section of the lower Esopus, extending below the reservoir spillway into the Town of Olive, and the lower third, stretching from Glenerie Falls to Saugerties, are transformed from even a century ago.

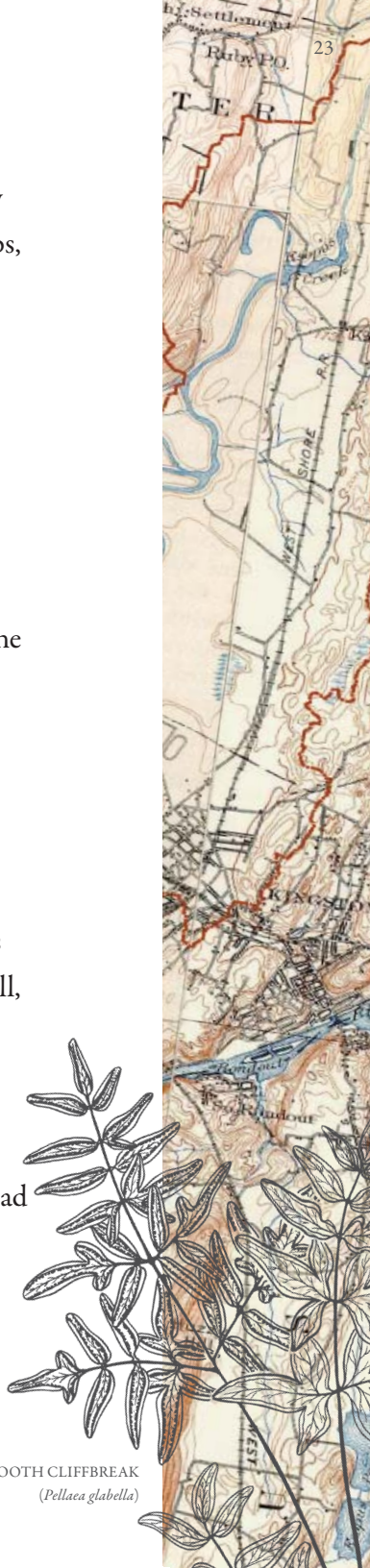
Before the building of the reservoir, the area above Tongore Road, encompassing Olive City, Shokan, West Shokan, West Hurley, and four other villages now under water, was a patchwork of subsistence farms. The poorer soils of this upland region made them less desirable than the lowlands, hence their much later development, in the late 19th

century. Every town had its grist mill, general store, and blacksmith. *Picturesque Ulster*, a photographic tour of the county by R. Lionel De Lisser published in 1896, provides a tantalizing glimpse of these sleepy back-country villages, with their one-room schoolhouses, harness shops, plain churches, and bearded patriarchs.

Mountain industries had destroyed the forests, before waning themselves. By 1900, most of the tanneries that had once extended to the banks of the upper Esopus, denuding the Catskills of their thick forests of hemlocks, were gone. Sawmills along the falls of the creek and its tributaries continued to churn out lumber for industrial and residential buildings. Other mills produced veneer and other wood products, as well as oak staves, headings, and hoops for barrels. Bluestone quarries thrived from West Hurley to Ashokan. The massive stones were transported by oxen-drawn wagon to the Ulster & Delaware rail depots and shipped by railcar to Kingston, then conveyed by barge down to New York City.

The railroad also helped spur a tourist industry. Almost every farmer took in city boarders over the summer. The rocky falls and streambeds of the Esopus and its tributaries, especially the Sawkill and the Plattekill, were prized for their scenic beauty and excellent trout fishing.

The construction of the reservoir, which started in 1908 and was completed in 1915, had a profound effect on the agricultural communities. It required the removal of entire towns and rerouted the railroad to the north, cutting off the farm communities from an essential transportation link. The general store owners could no longer easily obtain essential supplies, such as coal and kerosene. By the 1930s, many of the farms had been abandoned.



SMOOTH CLIFFBREAK
(*Pellaea glabella*)

THE BIG DIVIDE: THE ASHOKAN RESERVOIR

Once, the Esopus Creek was one long, unbroken waterway, its sinuous curves extending 68 miles. The building of the Ashokan Reservoir, which officially opened in 1916, truncated the creek into two sections, the upper and lower Esopus, forever changing the lay of the land.

The Ashokan, which supplies 40 percent of New York City's drinking water, is awe-inspiring in its dimensions. The nearly 13-mile-long reservoir, which consists of two basins divided by a weir, holds 128 billion gallons of water, has 40 miles of shoreline, and drains 250 square miles. The massive dam of cement and bluestone, located above Olive Bridge, is 1,000 feet long and 190 feet wide at its base.

It was the largest public works project of its day, taking nine years to build and employing up to 4,000 workers at a time. Eight villages in the valley—Bishop's Falls, Brown's Station, Olive City, Shokan, West Shokan, Ashton, West Hurley, and Brodhead's Bridge—were obliterated, with a few buildings moved to higher ground. The workers represented many nationalities and groups, including Italians (who constituted half the workforce), Russians, Hungarians, Irish, and African Americans. They tore down houses, barns, shops, churches, sawmills, and a historic gristmill; disinterred 2,720 corpses from dozens of cemeteries; chopped down trees; hoisted out thousands of stumps from the ground; and ripped up the rails of the Ulster & Delaware Railroad.

More than 2,000 people were displaced. Reflecting their deep connection to the land, eighty percent of that population relocated within 25 miles of their former homes. Observing the bald eagles that soar from the tall pines along the reservoir's shore today, it's easy to forget the enormous effort and sacrifice involved in the construction of this man-made lake, so essential to meeting the water needs of the vast metropolis more than 100 miles away.

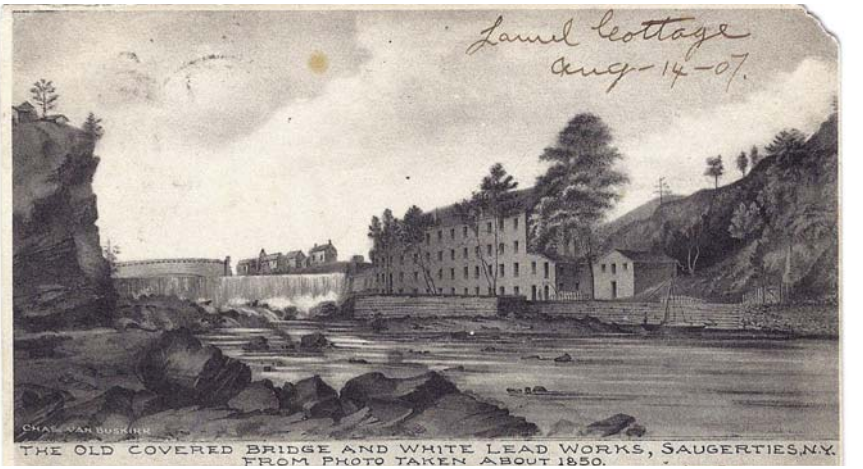
–LYNN WOODS

Today, the fields have reverted to forest. Residential and second-home owners now occupy many of the former farmhouses. Such wildly beautiful places as Cathedral Gorge, where bald eagles descend from the soaring cliffs and the creek purls over flat slabs of shale, are remote from roadways and civilization. The land is once again home to coyotes, fishers, fox, and bear.

AN INDUSTRIAL REVOLUTION AT SAUGERTIES

Downstream from the bottomlands, starting at Leggs Mills Falls north to Saugerties, a series of waterfalls provided the power for factories that played a key role in America's industrial development. In the 1820s, Henry Barclay erected a mill below the falls at Saugerties, which was the first in America to manufacture paper in rolls (the endless wire-web paper-making technology is still in use today). Barclay also constructed an iron mill, which was the first factory in America to utilize a technique of fabricating iron, called puddling, that had been developed by James Watt in England, a technology that was instrumental in launching the Industrial Revolution. This manufacturing process was dependent on anthracite coal, which was being shipped to nearby Rondout from Pennsylvania via the Delaware and Hudson Canal.

Barclay was also instrumental in developing the water power of the falls, opening the way for additional industry, including a white lead paint plant, which operated in the first half of the 19th century. The wooden dam he built was replaced by a massive structure of bluestone designed by engineer Silas Brainerd. After the Civil War, a cluster of factories sprang up, including a chair manufacturer, a book binder, the Diamond Mills Paper Plant, and Cantine's Coated Paper Manufacturing Plant. The paper mill owners joined forces in the 1870s to build a new concrete dam, creating a sluiceway that further harnessed the creek's water power. Industry consolidation and cheaper labor in the South were

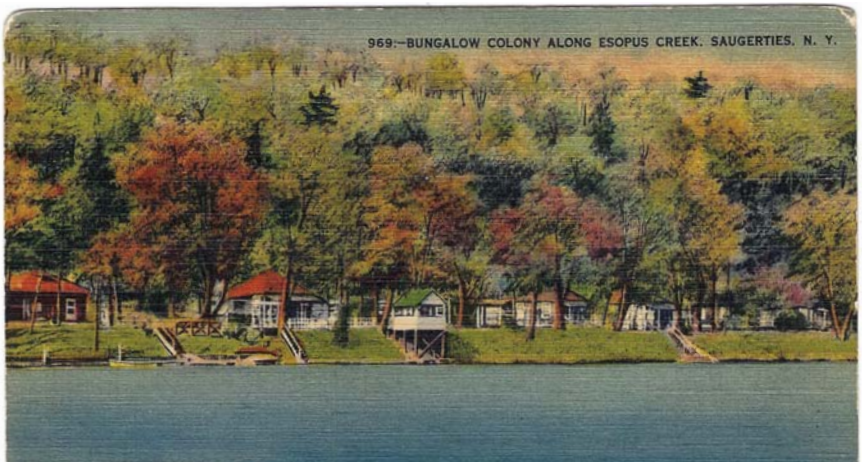


among the factors that led to these industries' demise. By World War II, most of the factories had shut down, with the exception of the Cantine plant, which lingered on into the 1960s. Today, the old brick factory buildings along the Saugerties waterfront have either been torn down or converted to housing.

Other industries were located upstream, at Glenerie Falls. As early as 1730 there was a factory that processed wool into felt, later converted into a sawmill. The owner of the sawmill was the son of a German baron who raised the funds to build Glasco Turnpike and the nearby bridge over the creek. A second white lead paint plant operated in the 19th century just below the falls; all that's left of it today is a few ruined brick walls in the forest. According to local tradition, a freed slave owned a felting mill on the Plattekill in the early 19th century. The African American factory owner reportedly had a large family and owned a flock of sheep from which he obtained the wool.

BUNGALOW HEAVEN

Starting in the late 19th century, the lower Esopus wasn't just a resource for industry and farming; it also became appreciated for its scenic beauty



and cool summer breezes. The site of the Saugerties beach was a favorite entertainment spot from the 1870s up through the 1940s. People set up stands of homemade alcohol, watched circus performers, and in the winter, built bonfires on the ice and rooted for the local hockey team, which competed in lively games underneath the bridge.

Small resorts and bungalow colonies sprang up along the lake-like expanses of water created by the dams and falls on the creek upstream from the Cantine Dam, along Esopus Creek Road, and on both shores of Glenerie Lake (the wide sweep of water located between Leggs Mills and Glenerie Falls). The creek at Lake Katrine also attracted a colony of summer cabins, built in the 1920s. A nearby train depot made the area easily accessible to city vacationers, who could walk to their cottage. Today, many of the bungalows have been converted into full-time residences, although here and there remnants of the old summer colonies survive. At one end of Glenerie Boulevard, for example, there's a scattering of green board cottages shaded by tall trees. The cabins are a throwback to a bygone era, when vacationing families enjoyed the simple pleasures of splashing around in the creek and watching the sunset over the mountains.

PHANTOM CRANEFLY
(Bittacomorpha clavipes)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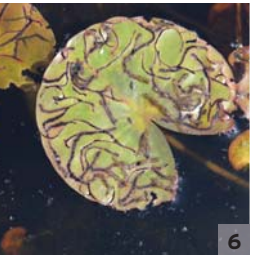
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Residents of these creekside communities still swim, boat, and fish on the lower Esopus. "There's pumpkin fish, bluegills, trout, and bass," noted Glenerie Lake resident and historian Connie Johnson. The calm waters upstream of the Cantine Dam attract bass fishermen in spring and summer; in winter, ice fishermen catch yellow perch through holes drilled in the frozen waterway, transporting their gear in a box built onto a sleigh, which also serves as a makeshift shelter from the cold. Below the dam, local fishermen net the herring that travel up the creek to spawn, selling the alewives and bluebacks to bass fishermen as bait. The campground next to Lynch's Marina attracts a large contingent of fishermen, who fish for small-mouthed bass in the Hudson River.

THE CREEK TODAY

The lower Esopus Creek not only describes a journey through space, but also a trip through time. It courses through a landscape that encompasses many changes, yet also preserves age-old traditions.

Below the spillway of the Ashokan Reservoir, where the creek descends through steep gorges, the fields have reverted to forests, and the agrarian villages have vanished. Birdsong and silence reign, where once one heard the clink of the blacksmith and the *giddy up* of the farmers. Other stretches of the creek parallel busy highways: NYS Route 209, for example, runs along the creek from Kingston to Stone Ridge, tracing an ancient Indian path that originally led all the way to the Neversink Valley and the Delaware River. All along Route 209, historic stone houses abound. Just off the highway, the village of Hurley, with its Main Street of preserved 18th-century stone houses, retains its colonial charm. Its Dutch Reformed church is a reminder of the persistence of the Dutch tradition in building styles and customs.

In Kingston, a shopping mall and housing complex back up to the creek, while TechCity, the former IBM plant that jump-started the local economy when it opened in the 1950s, overlooks the Esopus in the Town of Ulster. The industrial complex is today a center for green industries. The New York State Thruway (I-87) roars along this section of creek up to Lake Katrine, passing rows of creek-side houses on the opposite shore intermingled with scraps of farmland, the silo of a barn still punctuating a field here and there.

A railway trestle crosses the creek at Glenerie. Continuing north, limestone is mined on the western ridge. But within the ravine, all is silent. Just before entering Saugerties, the waterway winds through the riparian woods of Esopus Bend Nature Preserve. Near the Cantine dam, where factory turbines once whirred, people now relax on a sand beach and paddle canoes. Beyond the dam, the creek enters a tidal zone. Docks where once steamboats tied up now accommodate speedboats and recreational fishing boats. At the mouth of the creek, the Saugerties Lighthouse is a popular spot for swimming, picnicking, and kayaking; the historic structure is the only bed and breakfast located right smack in the Hudson River.

The creek connects the strands of the present and past. Unseen by many, even as they zoom along its banks at 65 miles per hour, it is still a connector for communities, a vital resource for the commercial farmers who are continuing a centuries-old tradition, and a recreational pleasure spot for fishermen, swimmers, and kayakers. All along the creek, there's a growing awareness by residents and visitors of the need to protect its waters, so that future generations can also come here for spiritual replenishment and enjoyment of its exquisite natural beauty.

–LYNN WOODS

RIVER OTTER
(Lutra canadensis)


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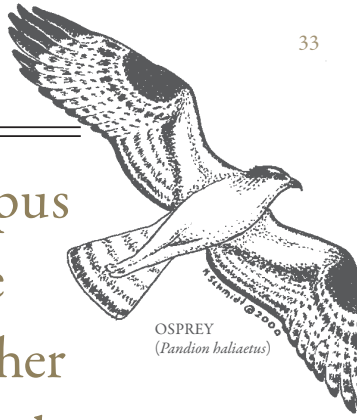


OSPREY
(*Pandion haliaetus*)

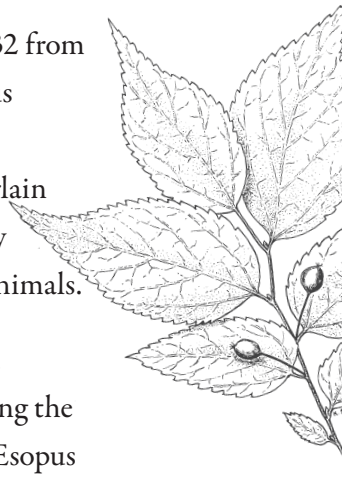
In many respects, the lower Esopus watershed is important for the biodiversity it supports and the other environmental functions it provides. Certain features of the watershed stand out against the background of the mid-Hudson Valley.

Areas on the south side of Ashokan Reservoir and the Sawkill and Plattekill sub-watersheds contain extensive forests, as does the Flatbush Ridge (or Kalkberg) area near the Hudson River.

The broad floodplain from Marbletown through Hurley and northeastward to NYS Route 28 is an important agricultural area and represents one of the few large-stream floodplains remaining minimally fragmented by land development.

Tributaries of the lower Esopus, especially those in cool and relatively clean environments, may provide refuges for fishes and other aquatic organisms during hot weather and other periods when the water quality of the mainstem declines.

The bedrock gorges and cliffs at several locations (such as near Marbletown and from about Glenerie down to Saugerties) are striking scenic features.



The ridges and wetlands on both sides of NYS Routes 9W and 32 from approximately Saugerties south to Kingston, partly in the Esopus watershed, support large areas of forest and important habitats (this is the Flatbush Ridge, or Kalkberg, area). This area is underlain by limestone and other sedimentary rocks; in the Hudson Valley limestones provide especially good habitats for rare plants and animals.

The tidal delta of the Esopus Creek and associated wetlands and shallows of the Hudson River estuary are important in supporting the estuary's biological diversity and environmental functions. The Esopus Estuary was listed as a Significant Coastal Fish and Wildlife Habitat by the New York State Department of State.

Thorough biological surveys of the lower Esopus, its tributaries, the riparian areas (cliffs, floodplain, etc.), and the Flatbush Ridge area, at a minimum, are needed to document the fauna and flora and to provide

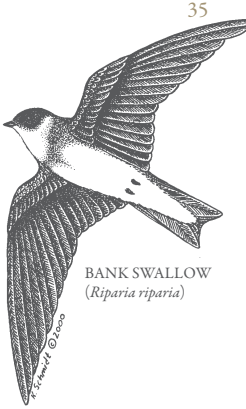
SOME COMMON BIRDS OF THE LOWER ESOPUS WATERSHED

LOUISIANA WATERTHRUSH (*Seiurus motacilla*) – A southern species at the northern limit of its range, the Louisiana waterthrush is one of the earliest migratory warblers to arrive on the watershed in spring and earliest to depart in late summer. This riparian species is largely dependent on clear, fast-flowing streams, nesting on the ground or in exposed tree roots along deeply cut stream banks and ravines and feeding extensively on aquatic insects gleaned from within the stream channel. The waterthrush's clear, loud, jumbled song is heard more often than the bird is seen and is usually the first indication of the presence of a territorial male. Listed as a species of Greatest Conservation Need in New York's Comprehensive Wildlife Action Plan, the bird has experienced a recent population decline, which may be linked to acidification of their aquatic habitat.

WOOD THRUSH (*Hylocichla mustelina*) – This familiar forest bird and accomplished singer typically breeds in deciduous and mixed woodlands with a well-developed understory, generally preferring cool, moist sites near water. The wood thrush is a species of high conservation concern, exhibiting steady, long-term population declines throughout its range, including an annual 3.1 percent statewide decline since 1980. Arriving in the watershed during the final days of April and departing for its Central America wintering grounds by early October, this species appears to benefit from large tracts of mature forest while suffering high nest predation and

HACKBERRY
(*Celtis occidentalis*)

basic information for conservation, environmental management, and land-use planning.



BANK SWALLOW
(*Riparia riparia*)

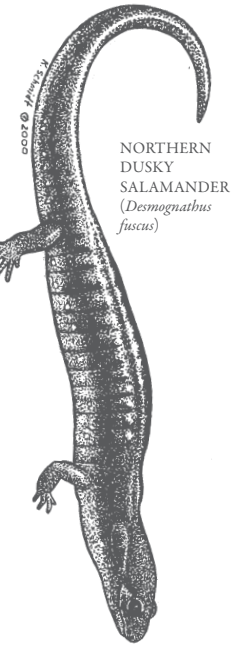
POTENTIAL ROLE OF THE WATERSHED IN BIODIVERSITY CONSERVATION

Many, if not all, of the areas of the watershed described above support important biological diversity (rare, vulnerable, and specialized species of wildlife, plants, and other organisms). Many ecologists and land managers are interested in the creation of large reserves that can support animal and plant populations requiring substantial areas of continuous or interconnected habitats. It is generally recognized that such reserves must in most cases also serve a variety of human needs, which may include water supply, agriculture, recreation, and private homes. The extensive forests, agricultural fields, riparian (streamside) vegetation, rock outcrops, and estuarine habitats in various portions of the lower Esopus watershed may be well suited to such a preserve.

competition in smaller woodlots. The largest of our spotted thrushes, its distinctive flute-like song embodies the natural essence of a summer's evening in the deciduous forest.

BARRED OWL (*Strix varia*) – One of three locally common year-round resident owls inhabiting the watershed, this nocturnal denizen of wet deciduous or mixed forests typically nests in large tree cavities not far from wooded swamps or woodland tributaries. Easily identified by its large size, lack of ear tuffs, and dark eyes, it is also the owl most likely to be encountered during daylight hours actively hunting small rodents from an exposed perch on cloudy days and during twilight. Preferring old-growth forest, this species has benefited from our maturing landscape, but it is also susceptible to loss of habitat due to forest fragmentation. Possessing an elaborate repertory of vocalizations, the barred owl's chorus of hooting and barking calls can often be heard both day and night in appropriate habitat.

–STEVE CHORVAS



NORTHERN DUSKY SALAMANDER (*Desmognathus fuscus*)

THE ESOPUS CREEK DELTA AND ADJOINING AREAS

The Saugerties tidal wetlands (Esopus delta) are one of the larger and less well-known tidal wetlands of the middle Hudson River estuary. They constitute a complex of tide-affected marshes, swamps, and vegetated shallows, the bulkheaded tidal channel of Esopus Creek, and several causeways. The diversity of plants and plant communities is fairly high. The wetlands may be the northernmost station for river birch in the Hudson Valley, and other rare plants in the vicinity include golden club.

Subtidal vegetation (also known as submerged aquatic vegetation or SAV) is extensive both north and south of the mouth of the creek. One area in particular, the Saddlebags, in the river near Glasco, attracts an abundance of canvasback ducks during the nonbreeding season. This is one of the less common migrant ducks on the Hudson River, and it depends to a greater extent on SAV, especially water celery, than other ducks.

AMERICAN BITTERN (*Botaurus lentiginosus*)

WETLANDS

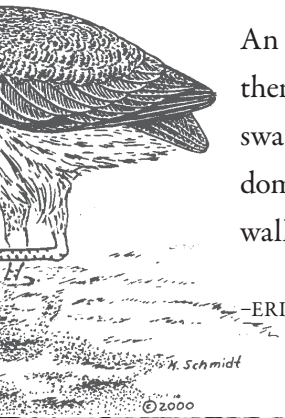
In a general sense, there are several different kinds of wetlands in the lower Esopus watershed. Wetlands that are closely associated with the mainstem of Esopus Creek are strongly influenced by flooding of the creek and the resulting erosion and deposition of sediment. Wetlands at the edge of the Hudson River estuary, in the delta of Esopus Creek, are influenced by the rising and falling tides (although freshwater) and also by wind waves and boat wakes. Wetlands that are not closely associated with the estuary or the creek are ecologically more sheltered or quiet and mostly protected from strong currents, large waves, and other influences of a large watercourse. Some of these wetlands are in small valleys and are connected by small streams, whereas others are more isolated and may even be on the tops of ridges. Many of the numerous wetlands in the Flatbush Ridge area are ultimately connected by a stream system that flows north and enters Esopus Creek at Glenerie.

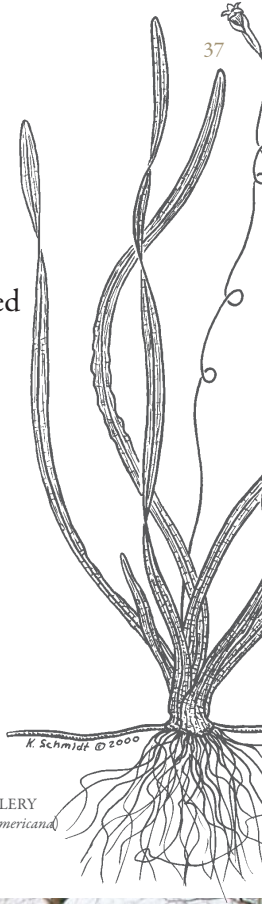
–ERIC KIVIAT

Because the Esopus Creek delta is almost opposite the Tivoli Bays, it is likely that ducks and other birds that inhabit tidal wetlands use a combination of both areas and other nearby intertidal and subtidal habitats as a habitat complex. Large complexes of tidal wetlands are all the more important now because of filling of wetlands that has occurred historically at locations such as Kingston Point. The Tivoli Bays are arguably the most important tidal wetland for biodiversity in the mid-Hudson region.

An additional point of interest about the Esopus Creek delta is that there is a public trail north of the creek channel through the tidal swamp (tree and shrub dominated) and tidal marsh (non-woody plant dominated) to the lighthouse. This offers an unusual opportunity to walk through a Hudson River tidal wetland.

–ERIC KIVIAT, HUDSONIA





WATER CELERY
(*Vallisneria americana*)

RARE ANIMAL SPECIES OF THE ESOPUS CREEK

As a rule, habitat diversity makes for species diversity, including more rare species. The lower Esopus corridor contains at least 25 rare species of animals and plants, designated as such by the federal government, the NYS Department of Conservation, and regional organization Hudsonian. (See page 49 for more information on rare species designation.) Rarity results largely from habitat degradation, a people problem. All rare species along the Esopus suffer in some way from human impacts on the stream environment, including reduced water flow, high summer temperatures, reduced oxygen, and high turbidity.

A TALE OF TWO TOADS

The common AMERICAN TOAD (*Bufo americanus*) and the rare FOWLER'S TOAD (*B. fowleri*, NYS Special Concern) share habitats of the lower Esopus corridor, except for breeding. American toad picks mud puddles, woodland pools, swamps, and swales to lay eggs in – almost any place that holds water, as long as there are no fish. Fowler's toad selects deeper waters, often with hungry fish, but with dense aquatic vegetation where the tadpoles can safely hide. In woods and fields you're as likely to find an American toad as you are a Fowler's. But you'll only find Fowler's eggs and tadpoles in the creek's deep, slow stretches and nearby oxbow pools, and only American eggs and tadpoles in big puddles, swamps, and quarry ponds above creek level.

Fowler's Toad

. . . AND A SNAKE

But toads, take heed. Stalking toads of all ages and sizes is the EASTERN HOGNOSE SNAKE (*Heterodon platyrhinos*, NYS Special Concern). Immune to toads' toxins and equipped with long rear teeth (not fangs) that puncture a self-inflated toad in seconds, these chunky serpents are misnamed "puff adders" for their flamboyant defense act – hissing, spreading the neck cobra-style, and even playing dead. Hognose snakes prefer streamside sand flats and hilltop pine woods with loose soils for burrowing after toads. Catching sight of one above ground is a rare privilege.

Eastern Box Turtle

HARD SHELLS, SOFT HEARTS

Turtles are typically pictured in a watery setting, floating, swimming, or sunning on logs and banks, ready to dive in at the slightest sound or shadow. But turtles must leave ponds and streams, sometimes on long trips or for long periods. Their eggs are laid in loose soils, sun-warmed soils of banks, fields, and gardens, often far from water. Summer drying may force turtles to find new waters. SPOTTED TURTLE (*Clemmys gutatta*), a state Special Concern (SC) species, aestivates (summer "hibernation") on land. WOOD TURTLE (*Clemmys insculpta*) (SC) actively forages for berries, worms, and other food in all land habitats. EASTERN BOX TURTLE (*Terrapene carolina*) is a land turtle, in fact a poor swimmer, rarely venturing into any but the shallowest of wetlands. The lower Esopus and Rondout watershed area is a vital stronghold for all three rare species and many common turtles.


Indiana Bat


Young Eagle


Blue Heron with Fish

FURRY FRIENDS AND NEIGHBORS

River otters eat fish, so when fish populations are at risk otters suffer. In New York, the RIVER OTTER (*Lutra canadensis*) was decimated by the pelt trade and worsening water quality. With protection and reintroduction efforts, this fun-loving, charismatic mammal has come back strong in fairly healthy stream systems like the Esopus. However, further degradation of water quality would harm otter populations in the valley. The Esopus and Rondout valleys lie in a critical habitat area for INDIANA BAT (*Myotis sodalis*), a New York State and federal endangered species. Indiana bats overwinter in caves of the limestone ridge separating the valleys and spend the summer roosting by day in neighboring forests under loose bark of dead and living trees. At dusk the bats awake to forage over open waters of the two creeks and fields nearby. In all seasons the quality of diverse habitats is essential to this imperiled consumer of pesky insects.

THREE BIRDS, THREE WAYS TO FISH

A stream full of fish lures not just pole-packing people, but scale-snacking birds. Number one is the bald eagle, bold and back in numbers from the brink of extinction. This emblematic raptor has taken the Esopus corridor by storm. From the Hudson River to the Ashokan Reservoir, two recent eagle nesting areas, these huge birds can be seen plummeting and seizing fish from open waters and feasting on fresh catches as they perch on nearby tall trees.

Along a quiet shore a slender, gray-plumed, stork-like sentinel patiently gazes into the water. Suddenly the great blue heron shifts position, raises one foot, takes a short step, and lunges. In a flash, with a splash it spears a fish, raises the prize, tosses it, catches it, and deftly downs it whole. After a quick last gulp the heron comes to attention again or starts another steady sure-footed stalk along the water's edge.

From a limb above a sunny stretch of stream comes a raucous shriek, followed by a flash of sky blue. A ragged, jagged bird resembling a chunky, rusty blue jay lands on another limb and shrieks again. The belted kingfisher bolts and blurs again, downward now, straight to the stream, and bounces back and up to the branch with fish in bill.

SWALLOWS & MOCK SWALLOWS

Bevies of small birds dip and dive over creek waters under blue summer skies. Swallows? Yes, there may be tree swallows, bank swallows, cliff swallows, barn swallows, and rough-winged swallows in the air, but not all apparent swallows are what they seem. Look closely and you'll see, more clearly when they take a landing break, familiar winter feeder visitors. Among the snack-snatchers exploiting stream hatches of aquatic insects are cedar waxwings. These inveterate nut-and-berry lovers also have an appetite for live hors d'oeuvres.

Blue Pirate and Beetle on Pickerelweed

Falcate Orangetip

Tawny Emperor Butterfly

TWO DRAGONS OF THE AIR

Dragonflies are life-long bug-munchers. As stealthy aquatic nymphs they snare other insects and even fish and frogs with hinged lower mandibles called "lip traps." Equally rapacious as winged adults they skim over waterways, dive-bombing and seizing mayflies, mosquitoes, and even other dragonflies. Among the many dragonflies of the lower Esopus corridor are two rare species whose paths rarely cross, so different are their habitats. RAPIDS CLUBTAIL (*Gomphus quadricolor*) loves long, fast flowing sections of wide streams with sandy-gravelly bottoms and large rocks to bask on. Females tap their abdomens on fast-moving water, dropping in their eggs. The ensuing larvae dig into the bottom to make meals of other burrowing bugs. ARROWHEAD SPIKETAIL (*Cordulegaster obliqua*) patrols back and forth along small, marshy brooks through marshes, swamps, or forests. But these large black dragonflies marked with yellow diamonds lay their eggs in nearby spring seeps rather than the streams where they forage. This combination of habitats may be more common in the lower Esopus valley than in other parts of the state.

A BUTTERFLY TRIO IN ENVIRONMENTAL HARMONY

Resource partitioning is what ecologists call sharing without competing. Three rare butterflies of the lower Esopus provide a good illustration. Early spring awakens FALCATE ORANGETIPS (*Anthocaris midea*) from their thorn-like chrysalids in rocky uplands all along the Esopus. The females lay eggs on rock cresses of open sandstone, shale, and limestone ridges. In June caterpillars finish feeding on the plants, which soon decay in the absence of light after leaf-out. About the same time the caterpillars of TAWNY EMPEROR BUTTERFLIES (*Asterocampa clyton*), which overwinter in silk-spun shelters of dried hackberry leaves, are eating and growing quickly on fresh hackberry greens. Summer heat spurs emperor chrysalids to hatch in July. The ensuing adults sip sap and fruit juice, gaining energy to start next year's butterfly crop. The tiny HARVESTER BUTTERFLY (*Fenesica tarquinus*) of stream banks and wetlands covers other ecological bases, adults emerging throughout the early growing season. Harvesters sip many liquids, including animal waste and carcasses. The carnivorous caterpillars live on scale insects of alders and other plants. Small as they are, harvesters are self-dwarfing, able to go straight to the pupa stage before full growth if they run out of food.

RARE FISH

Though a popular fishing venue, the lower Esopus is a poorly studied area for fish overall. Non-game fish are sketchily documented, especially the

Logperch (top), Northern Hog sucker

Redroot Flatsedge

Delmarva Beggar-ticks

smaller species, exactly those which say the most about biodiversity and water quality. Natural Heritage Program data show no records of state-rare fish species for the lower Esopus corridor. The New York State Museum Biological Survey (1927-44) reported many more species in the lower Esopus than a more recent NYS DEC survey (1977). There are no data comparing fish fauna before and after construction of the Ashokan Reservoir. LOGPERCH (*Percina caprodes*), reported from the Esopus in the Biological Survey, is rare in the Hudson Valley, and NORTHERN HOG SUCKER (*Hypentelium nigricans*), an estuarine species reported in the survey, is rarely encountered in the freshwater Hudson River (Kiviat, personal communication 2010). Whether these and other rare fishes still occur here is unknown. Thorough biological surveys are needed to document the fish, and indeed the entire biota, of the lower Esopus Creek.

RARE PLANTS GUIDE

Rare plants can be found in every municipality of the lower Esopus corridor in a variety of stream, wetland, and upland habitats, including secluded forests and swamps, lofty ledges, steep slopes, floodplains, stream banks, alluvial shores, non-tidal and tidal marshes, wet or dry fields, and running streams. The Catskill Foothills of Olive boast two state-endangered plants. SMALL WHORLED POGONIA (*Isotria medeoloides*), last found in 1920, may still grow in rich, undisturbed woods. HYSSOP-SKULLCAP (*Scutellaria integrifolia*) of semi-shaded shores was discovered in Olive in 1998. THREATENED RIVERWEED (*Podostemum ceratophyllum*) grows on bedrock exposures in the creek in Marbletown (Barbour 2004), and there is a 1945 historic record for endangered TALL IRONWEED (*Vernonia gigantea*) in Hurley. Even the City of Kingston has its rare plants, including threatened DAVIS' SEDGE (*Carex davisii*) along the lower Rondout and RIVER BIRCH (*Betula nigra*) along the Esopus. Town of Kingston has regionally rare MOSSYCUP OAK (*Quercus macrocarpa*) in an upland swamp on Jockey Hill. The adjacent Town of Ulster has a 1990 record of state-threatened GREEN ROCK-CRESS (*Boechera missouriensis*) on Gallis Hill south of NYS Route 28 and state-endangered TERRESTRIAL STARWORT (*Callitriche terrestris*) on a ridge just west on NYS Route 32. Saugerties has at least five state-rare plants, including REZNICEK'S SEDGE (*Carex rezniceckii*) on the Mt. Marion ridge, REDROOT FLATSEDGE (*Cyperus erythrorhizos*) on the Esopus Creek shore at Esopus Bend Nature Preserve, and DELMARVA BEGGAR-TICKS (*Bidens bidentoides*) on tidal flats of the Hudson estuary where the Esopus enters the river.

–SPIDER BARBOUR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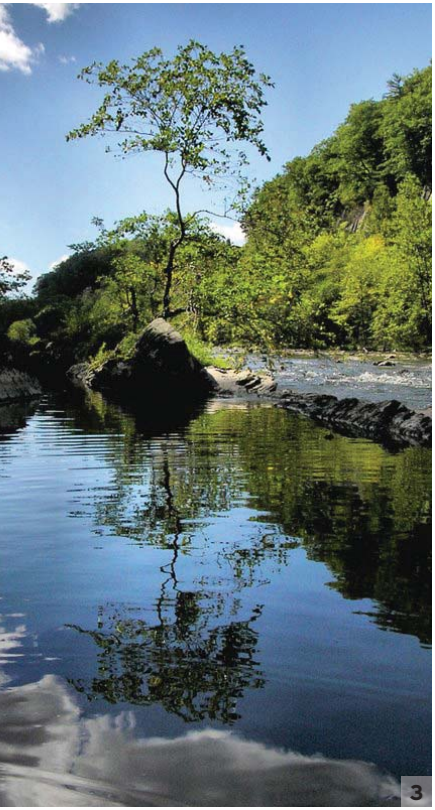
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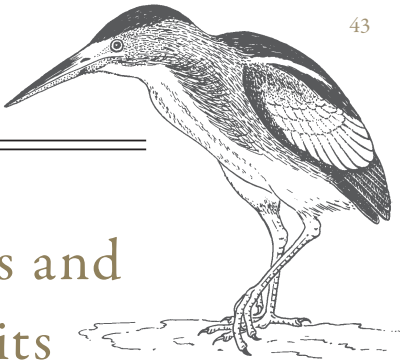

LEAST BITTERN
(*Ixobrychus exilis*)

From its mountaintop ponds and headwater streams down to its tidally influenced mouth, where it enters the Hudson River, the Esopus Creek watershed consists of a variety of aquatic habitats supporting a diversity of fish life.

Over 30 species of fish have routinely been documented within these waters, and their presence or absence within one section or another can explain a lot about the ecosystem and aquatic habitat that surrounds them. The dam and associated structures that form the Ashokan Reservoir are one of the most prominent features along the Esopus Creek, and these structures clearly define the border between the 29-mile upper Esopus Creek (including the reservoir) and the lower Esopus Creek (below the reservoir) . From the base of the Ashokan Reservoir dam, at an elevation of 420 feet, to the Hudson River, at sea level, the lower Esopus runs 32.6 miles.

RAINBOW SMELT
(*Osmerus mordax*)

BLUEBACK HERRING
(*Alosa aestivalis*)

BLUNTNOSE MINNOW
(*Pimephales notatus*)

CHAIN PICKEREL
(*Esox niger*)

SMALLMOUTH BASS
(*Micropterus dolomieu*)

LARGEMOUTH BASS
(*Micropterus salmoides*)

For anglers, the lower Esopus is primarily known as a place to fish for bass and panfish. Smallmouth bass are often caught in the faster moving sections of the creek and largemouth bass are generally caught in the slower moving sections. Largemouth fishing can be excellent in the pool above the Cantine dam in Saugerties, in areas containing abundant submerged aquatic vegetation. Largemouth bass up to six pounds are known to be caught in this section. Chain pickerel also inhabit many of the same areas where largemouth bass are found. Chain pickerel, a native member of the pike family, is an aggressive, predatory fish that can be exciting to catch. Panfish fishing for perch, sunfish (bluegill, pumpkinseed, and redbreast), crappie, and rock bass occurs in many locations below the Ashokan dam. These are the more common fish of the lower Esopus – though by no means the only ones; other fish and interesting fisheries facts are described below.

TROUT are known to reside in the portion of the creek immediately below the Ashokan dam. In this section, the only source of water in the old Esopus stream bed comes from the small amount of seepage from the dam and groundwater. This water is very cool, even in the heat of the summer, and the gorge-like shoreline shades the stream to keep it that way. Trout, primarily brown trout, can also be found in the lower

BROOK TROUT
(*Salvelinus fontinalis*)

BROWN TROUT
(*Salmo trutta*)

RAINBOW TROUT
(*Oncorhynchus mykiss*)

BLACK CRAPPIE
(*Pomoxis nigromaculatus*)

PUMPKINSEED
(*Lepomis gibbosus*)

BLUEGILL
(*Lepomis macrochirus*)

Esopus all the way to Saugerties, but summer temperatures limit the water they can inhabit. During the summer months, any trout in the lower Esopus must find cool-water refuge. These may be found in some of the tributaries streams or up as far as the section immediately below the dam.

AMERICAN EEL are common throughout the lower Esopus. The American eel spends its adult life in the inland waters along the Atlantic seaboard. The dam that forms Ashokan Reservoir is currently the upstream limit for American eel migration in the Esopus Creek. This species has an amazing life history: the adults spawn in the middle of the Atlantic Ocean (in what is believed to be the Sargasso Sea), and the very small young elvers and "glass" eels make their way up to streams along the North American coast. By way of the Hudson River, these young fish traverse the Cantine dam and disperse themselves up the lower Esopus. Some of these fish make their way to the farthest reaches of the lower Esopus tributaries. The eels live out their lives to adulthood, which can be five to 20+ years, within the freshwater watershed until they make their final, life-ending migration to the Sargasso Sea to spawn.

ROCK BASS
(*Ambloplites rupestris*)

REDBREAST SUNFISH
(*Lepomis auritus*)

AMERICAN EEL
(*Anguilla rostrata*)

STRIPED BASS
(*Morone saxatilis*)

LOGPERCH
(*Percina caprodes*)

ALEWIFE
(*Alosa pseudoharengus*)

THE TIDAL ESOPUS

The Cantine dam not only forms a barrier to most upstream fish migration, but also delineates the boundary between the tidally influenced water of the Hudson River estuary and the non-tidal upper watershed. The tide goes in and out twice a day and results in an average change in water elevation of roughly four feet between high and low tides. The fish species in this tidal section include marine anadromous and estuarine fish such as striped bass, white perch, shad, alewife, and blueback herring along with most of the resident freshwater species seen in the lower Esopus above this point. Smelt were also known to frequent these areas, but their numbers have declined precipitously over the last 30 years.

The tidal Esopus is very important as one of only five known over-wintering areas for largemouth bass in the Hudson River estuary, part of the significant largemouth fishery that extends from Albany down to Newburgh. This largemouth bass population, for reasons not fully understood, appears to make an annual movement into five relatively small locations within the estuary; large concentrations of largemouth bass inhabit this section of the lower Esopus from October to April. By some estimates, over 80 percent of the entire Hudson River estuary population of largemouth bass concentrates in these five locations. With such a concentration of fish in this small, 1.3 mile location, it is important that these fish and their habitat be protected.

FISH STOCKING

For a period of over 20 years, starting in 1980, tiger muskellunge (a hybrid cross of northern pike and muskellunge) were stocked by the NYS Department of Environmental Conservation (DEC) in the pool above the Cantine dam. The stocking was stopped after failing to produce much more than an occasional fish for anglers in this pool. Interestingly enough, more tiger muskies were reported to have been caught below the Cantine dam than in the pool above the dam, exhibiting how fish can and do make the one-way trip over the dam to live in the tidal Esopus. Walleye were also stocked in this same pool by DEC during the late 1990s and early 2000s, but they also failed to produce a fishery. Sections of the lower Esopus have also periodically been stocked with walleye by the Federated Sportsmen's Clubs of Ulster County, and these fish are reportedly being caught by anglers.

SPILL FROM ASHOKAN

During times of heavy spill from the Ashokan Reservoir, fish have been known to wash over the spillway from the east basin of the reservoir and take up residence in the lower Esopus. Sometimes these fish become stranded in the pools of the spillway channel, as the flow quickly subsides once the reservoir stops spilling. Large trout, walleye, and carp have at times created quite a spectacle when trapped in some of these small pools. The scavengers ultimately benefit from this, leaving the skeletons to whiten in the sun.

–MICHAEL FLAHERTY, NYS DEC

CISCO
(*Coregonus artedi*)

COMMON CARP
(*Cyprinus carpio*)

WALLEYE
(*Stizostedion vitreum*)

CREDITS

NATIVE AMERICAN HISTORY AND ARCHAEOLOGY:

Interviews with Christopher Lindner, Ph.D, Archaeologist in Residence, Bard College, local historian Vernon Benjamin, and Jim Davis; "The Earliest Thirteen Millennia of Cultural Adaptation Along the Hudson River Estuary," abstract by Christopher Lindner; *The First Peoples of the Northeast* by Esther K. Braun and David P. Braun (Moccasin Hill Press; 1994)

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MAPS, PAINTINGS, PHOTOGRAPHS AND ILLUSTRATIONS

Fish plates were created by Ellen Edmonson and Hugh Chrisp for the 1927-1940 New York State Biological Survey. Their use is permitted by the New York State Department of Environmental Conservation (NYS DEC).

Cover, from left to right: Largemouth Bass, fish plate courtesy of NYS DEC ; Trout Lily, Anita Barbour; Spotted Sandpiper, Anita Barbour; Tawny Emperor Butterfly, Robert Dirig; Northern Gray Tree Frog, Anita Barbour.

p. 1, Black Crappie (*Pomoxis nigromaculatus)* and Redbreast Sunfish (*Lepomis auritus)*, fish plates courtesy of NYS DEC

p. 2, Watershed Map, Ulster County Dept. of Environment

p. 3, Glenerie Falls with Swans, David Cartmell

p. 4, Esopus Headwaters, Aaron Bennett; Winterberry, Molly Mason; Cathedral Gorge, Molly Mason; Black Gold, Candace Balmer

p. 5, Kingston Traffic Circle, Candace Balmer; Paddlers, Steve Noble; Bluestone Forest Trail, Aaron Bennett

p. 6, Plattekill at Mt. Marion, Aaron Bennett; Colorful Falls, David Cartmell; Dam and Bridge after Rain, David Cartmell.

p. 7, Chain Pickerel (*Esox niger)*, fish plate courtesy of NYS DEC;

p.8, Valley Map, Ulster County Dept. of Environment and Scarlet Duba, Duba Design

p. 9, Courtesy of Ashokan Center: Autumn Esopus Creek, Ice Overhang, and Winter Esopus Creek

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p. 15, Bald Eagle (*Haliaeetus leucocephalus),* illustration by Kathy Schmidt

p. 16, Late Woodland Life, illustration by Carol Cote, from *The First Peoples of the Northeast* by Esther K. Braun and David P. Braun, with permission from the authors; Projectile Point, Lenape People, internet clip image

p. 18, Spiny Coontail (*Ceratophyllum echinatum),* illustration by Kathy Schmidt

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p. 21, *On the Esopus, Meadow Groves*, circa 1857-58, William Hart (1832-1894), oil on canvas, Accession #S-81, Collection of The New-York Historical Society

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p. 37, Water Celery (*Vallisneria americana*), illustration by Kathy Schmidt; Deep Pool near Esopus Fields in Town of Hurley, Sam Scroggins

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p. 40, Blue Pirate and Beetle on Pickerelweed, Anita Barbour; Falcate Orangetip, Steve Chorvas; Tawny Emperor Butterfly, Robert Dirig

p. 41, Logperch (*Percina caprodes*) and Northern Hogsucker (*Hypentelium nigricans*), fish plates courtesy of NYS DEC; Redroot Flatsedge, Anita Barbour; Delmarva Beggar-ticks, Anita Barbour

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pp. 44-47, Rainbow Smelt (*Osmerus mordax*); Blueback Herring (*Alosa aestivalis*); Bluntnose Minnow (P*imephales notatus*); Chain Pickerel (*Esox niger*); Smallmouth Bass (*Micropterus dolomieu);* Largemouth Bass (*Micropterus salmoides*); Black Crappie (*Pomoxis nigro-maculatus*); Pumpkinseed (*Lepomis gibbosus*); Bluegill (*Lepomis macrochirus*); Brook Trout (*Salvelinus fontinalis)*; Brown Trout (*Salmo trutta);* Rainbow Trout (*Oncorhynchus mykiss*); Rock Bass (*Ambloplites rupestris*); Redbreast Sunfish (*Lepomis auritus*); American Eel (Ang*illa rostrata);* Striped Bass (*Morone saxatilis*); Logperch (*Percina caprodes*); Alewife (*Alosa pseu-doharengus*); Cisco (*Coregonus artedii);* Common Carp (*Cyprinus carpio);* Walleye (*Stizostedion vitreum*). Fish plates created by Ellen Edmonson and Hugh Chrisp for the 1927-1940 New York State Biological Survey. Use permitted by NYS DEC.

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A NOTE ABOUT RARE SPECIES

State-rare species tracked by the New York Natural Heritage Program (NHP), a partnership of the NYS DEC and The Nature Conservancy, are given alphanumeric rarity ranks (S1 and S2, roughly equivalent to state endangered and threatened species) in NHP Rare Animal and Rare Plant Status Lists, which are updated biannually. Regionally rare and regionally scarce species are listed by Hudsonia, Ltd. in the *Manual of Biodiversity for the Hudson River Estuary Corridor* (Kiviat and Stevens 2001).

LEWP MISSION STATEMENT:

Foster appreciation and stewardship of the lower Esopus watershed through a variety of partnerships to: enhance water quality and stream function; promote floodplain management; support ecosystem health and diversity; and encourage compatible agricultural, cultural, economic, municipal, and recreational activities.

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This project has been funded primarily through a grant from the New York State Environmental Protection Fund through the Hudson River Estuary Program of the New York State Department of Environmental Conservation.

The Estuary Program protects and improves the natural and scenic Hudson River watershed for all its residents. Its core mission is to: Ensure clean recreation and river access; Adapt to climate change; Conserve the world famous scenery.

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