



 **Tenmile River Assessment**

Shoreline Survey and Action Plan

February 2006

Tenmile River Stream Team Report

Table of Contents

I.	Summary of Findings	2
II.	Tenmile River Map	4
III.	Introduction: Stream Teams	5
IV.	The River and its Setting	7
V.	Stream Segment Descriptions and Maps	11
	Segments 1 and 2 Maps	11
	Segment 3 Map	16
	Segments 4 and 5 Maps	19
	Segments 6, 7, and 8 Maps	22
	Segments 9 and 10 Maps	29
	Segment 11 Map	34
VI.	Action Plan	37
VII.	Key to Tenmile River Segment Maps Impediments	39
IX.	Assessment Charts	40
X.	Data Collection Sample Forms	50

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Special thanks to Devin Kyle and David Reagon for copy, design and layout.

Thanks to our generous donors GE Foundation, Trout Walk Fund of Berkshire Taconic Foundation and HVA members.

Cover painting by Will S. Budworth, 1918. All photographs were taken by Stream Team members.

Summary of Findings

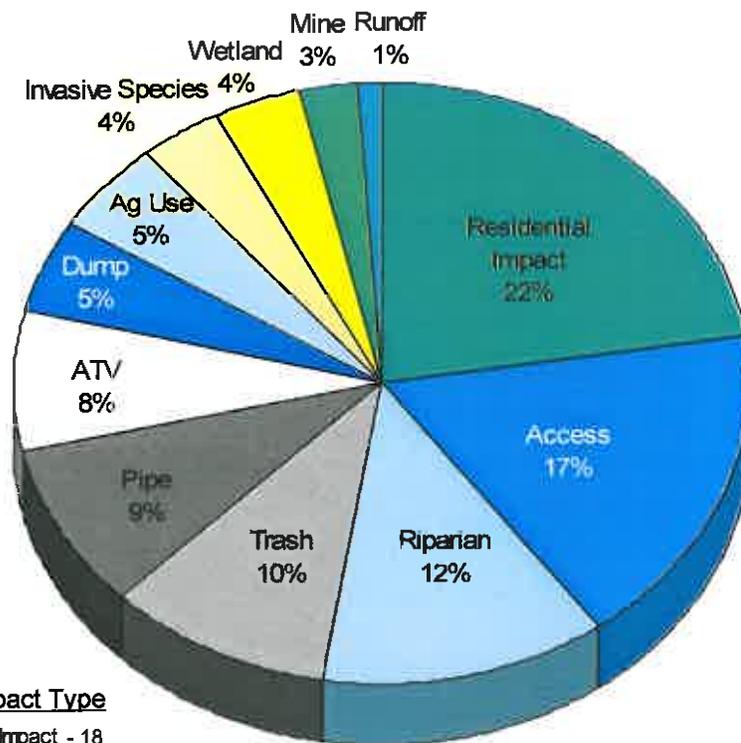
Overall, the Stream Team volunteers were impressed with the beauty and near pristine nature of the Tenmile River (Tenmile). All of the volunteer reports praised the beauty of the stream and its seeming remoteness from civilization. Very little development has taken place right along the stream so that when it is encountered, it tends to be startling.

The quiet beauty of the Tenmile may also be its undoing as development pressures are sure to increase along the river corridor. Impairments found are summarized graphically at the end of this report as well as being marked on the stream maps. The major problems are summarized below.

- **Riparian zone impacts:** In many places along the river, houses were built close to the stream bank and lawns had taken the place of the riparian zone. There was a lack of shade and also a lack of bank erosion control. These impairments are classified as human impairments.
- **Dumping:** The most severe single impairment on the river was in Dover Plains at the Tenmile River LLC site, where numerous piles of construction-and-demolition debris have been dumped in a wetland near the river. Testing performed by the town of Dover confirmed that the debris contains mesityl oxide in addition to other harmful pollutants, which may be leaching into a tributary to the river. There were other suspected dump sites near this location including one large construction-and-demolition dump in Amenia that was active in the 1980's and has since been converted into an informal motorcycle racing track near the river.
- **Agricultural Impact:** Only a few farm fields are located close to the river due to the area's diminution of dairy farming. Agricultural impacts are mostly confined to a couple of corn fields located close to the river and a few places where farm roads abut or cross sections of the river.
- **All-terrain vehicles or ATVs:** Trails used by all-terrain vehicles (ATVs) are present in many places along the river, on private as well as public land. The biggest impact is the tearing up of vegetation in the riparian zone causing stream bank erosion and habitat destruction. In addition, the noise impacts from ATVs can be very disrupting to wildlife and people located along the river.
- **Access:** For the most part, access to the river is located at bridges and roads that closely parallel the river. Pipes, culverts, pathways and an abundance of stream bank debris were observed.
- **Invasive species:** Much of the brush along the river can be classified as exotic and invasive. The major problems were honeysuckle, multi-flora rose, barberry, and Japanese knotweed. There were many places where the riparian zone was covered completely with invasive plants making it impossible to walk.
- **Sewers:** At least two important sewer outlets were observed along the river. While both are permitted uses, they represent a significant threat to the health of the river.

- **Trash:** Trash along stream banks and in the river was common but not extensive. The Tenmile often rises very quickly and probably flushes much of the less dense debris downstream.
- **Development:** Most of the river is undeveloped and often far from roads and houses. The Harlem Valley is under considerable development pressure and this will be the greatest threat to the river in the future. All of the previously cited problems are the result of human impact and will only intensify as more land near the river is developed.

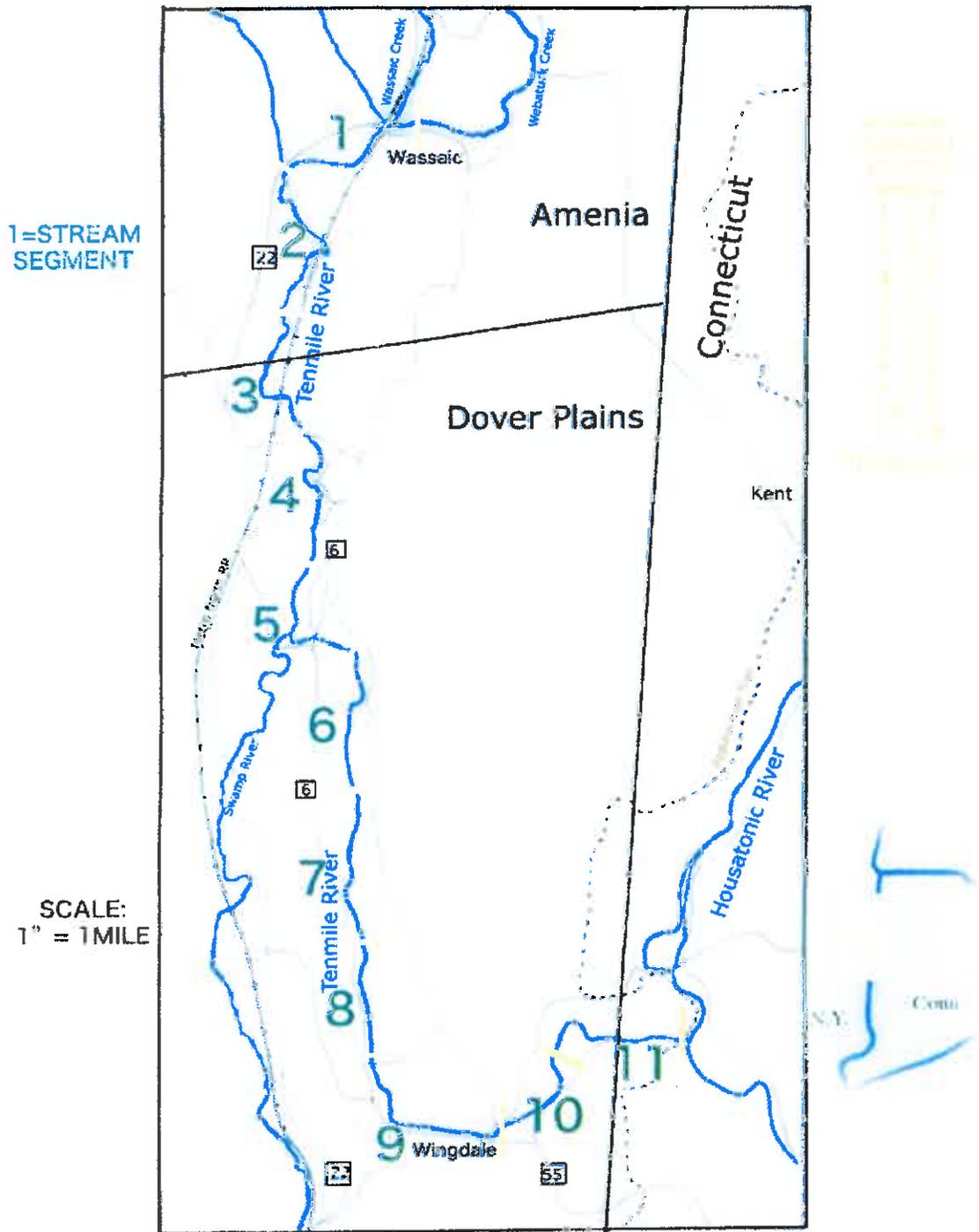
Tenmile River Impacts, By Type



Occurrences by Impact Type

Residential Impact	- 18
Access	- 14
Riparian	- 10
Trash	- 8
Pipe	- 7
ATV	- 6
Dump	- 4
Ag Use	- 4
Invasive Species	- 3
Wetland	- 3
Mine	- 2
Runoff	- 1

Tenmile River





Training local volunteers to understand the watershed environment will enable them to develop a relationship between the community and the river and foster a sense of stewardship.

Stream Teams

Between August and October of 2004, 18 volunteers from the Towns of Amenia, Dover and Pawling visually assessed the Tenmile River in eleven segments. The eleven segments extended from Wassaic, New York to the mouth of the river where it meets the confluence of the Housatonic River in Gaylordsville, Connecticut.

The group was supervised and trained by HVA's New York Watershed Coordinator Tonia Shoumatoff using the *Natural Resource Conservation Survey Form for Streams* created by the USDA. This survey method has been used to assess other streams in Dutchess County including the Fishkill Creek Stream Walk. (<http://dcemc.org/fishkill/sw/>)

The Stream Team training was held on August 4 at Listening Rock Farm in Wassaic, where members learned to identify impairments and problems along the stream. Dave Reagon and John Rocanova, two local high-school teachers, had pre-assessed the river and were able to aid the volunteers by pointing out potential problems.

After the training session, volunteers surveyed existing stream conditions by wading in and walking alongside the stream looking for features such as bank erosion, streamside vegetation, pipes coming into the river and other impairments. The information gathered by the volunteers will be used as a resource for towns, environmental groups and regional agencies enabling

planning for watershed conservation measures.

Trained local volunteers will develop a relationship between the community and the river that will help foster a sense of stewardship. This promotes education within the community bringing awareness to issues and impairments faced by the watershed. The stream teams will conduct ongoing biological monitoring of the river's water quality through macroinvertebrate sampling.

Findings

The most significant issues and impairments include bank erosion, bare riparian zones due to clear cutting of trees and mowing down to the river, impacts from ATVs and other off-road vehicles, illegal construction and household dumping.

The most severe impairment found along the river is a large illegal construction-and-demolition dump called Tenmile River LLC. The waste, tested by the Town of Dover, was found to contain mesityl oxide, a chemical toxic to aquatic organisms. This site is currently under investigation and enforcement for non-compliance by the New York State Department of Environmental Conservation and the Town of Dover. Two other areas of concern that need further assessment are a dumpsite south of the railroad bridge near the C&D waste site and a pipe located near Westchester Modular Homes that was observed to be discharging a foul odorous white liquid into the river.

Educating riverfront property owners will promote awareness and encourage improvements to stream buffers while minimizing negative impacts.

Agricultural properties should be encouraged to reduce the amount of run-off that enters the river from their fields. Townships need to play a key role in water quality protection. They can do this by passing watershed protection ordinances and administering enforcement. This provides assurance and protection for the surrounding homeowners that rely on groundwater supplies for drinking water.



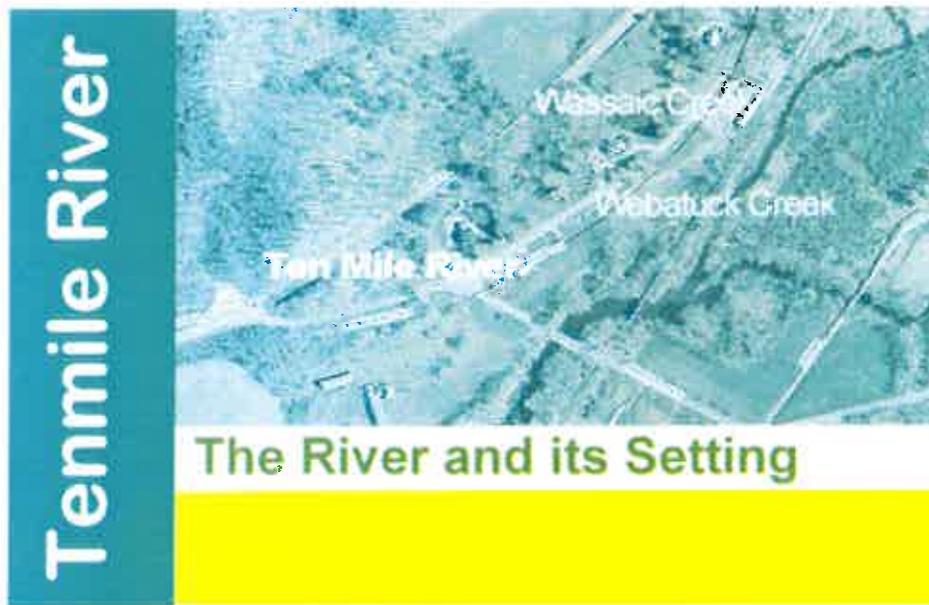
Farm along Tenmile in Dover Plains



Pipe discharging by Woodwinds



Confluence of the Tenmile and Housatonic rivers



The Tenmile is a surprisingly beautiful and near pristine river.

The Tenmile River is a surprisingly beautiful and near-pristine river system. Because of its compact and accessible watershed it can be easily studied.

The Tenmile River watershed is over 200-square miles. It includes the towns of Northeast, Amenia, Dover Plains and Pawling, all of which are part of the Harlem Valley.

The watershed contains farmland, residential areas, wetlands, and wide floodplains surrounded by high wooded and rocky ridges. The Metro North rail system parallels the river in places, as do state and local roadways.

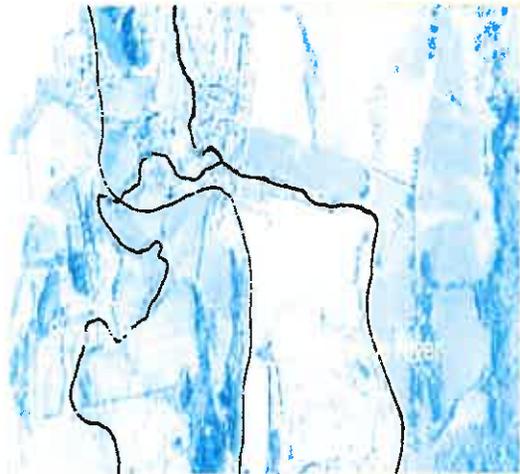
The principle tributaries of the Tenmile are the Webatuck Creek, the Wassaic Creek and the Swamp River.

Dutchess County is better known for being part of the Hudson River watershed. However, a topographic divide causing runoff to flow into the Housatonic River in Connecticut separates the eastern part of the county. Most of the precipitation in eastern Dutchess County falls into the Tenmile River watershed, which drains to Long Island Sound via the Housatonic River.

The Tributaries

Webatuck Creek originates in a large wetland near Taconic State Park in the Town of Northeast at an elevation of approximately 800 feet. Small streams flow into the wetland from high ridges to the east at elevations exceeding 1,400 feet. Curiously, the same wetland is the headwaters for the Noster Kill, which flows into the Hudson River.

Webatuck Creek, a broad gravel-filled trough, travels downstream toward the Oblong Valley in Amenia. This stream



meanders for several miles before joining Wassaic Creek and becoming the Tenmile.

The Oblong Valley geology consists of relatively soft carbonate rock. This is part of the Stockbridge Formation that is covered by thick layers of glacial till and outwash that the Webatuck has modified into a wide floodplain.

Wassaic Creek

The Wassaic Creek begins at an elevation of approximately 1,200 feet on Silver Mountain in Northeast. It flows south through the Smithfield Valley and Turkey Hollow until it reaches the hamlet of Wassaic, joining the Webatuck Creek near Tenmile River Station and forming the Tenmile River.

Both the Webatuck and the Wassaic were studied chemically and biologically by HVA volunteers in 2002 and 2003. Both creeks were found to be mostly unimpaired and in good-to-very-good condition. Both chemical and biological studies provide valuable baseline data which can be compared to future assessments.

The Swamp River begins in Pawling, flowing northward out of a very large wetland complex known as the Great Swamp. It is a very low gradient, slow moving stream until it reaches Dover Furnace where it exits the wetlands and flows into the Tenmile. Its origin and character is quite different from the Wassaic and Webatuck.

The Tenmile starts where the Wassaic Creek joins the Webatuck, a couple of miles south of the Wassaic Village. The river flows south for about 12 miles until reaching Wingdale. Here a steep ridge of hard bedrock causes the stream to divert abruptly eastward, entering into a deep valley and flowing into the Housatonic.

Similar to its tributary the Webatuck, the Tenmile is a low-gradient stream flowing through thick glacial deposits that overlie carbonate rocks of the Stockbridge Formation. Prior to reaching Wingdale, the stream's bed consists mostly of sand, gravel and cobble-sized particles that form a rich substrate for stream organisms.

Many small high-energy tributaries carry sand and silt into the river forming deposits, which the larger river moves downstream.

Floodplains

Flood plains are developed by low gradient streams that flow over wide valleys carrying and deposit easily transported material. A floodplain is the area along the sides of a stream that is subjected to flooding during periods

of high water. All three main tributaries of the Tenmile have locations with wide floodplains.

The amount of water in a stream is sometimes referred to as discharge. Discharge flow or velocity is measured by gauging stations along the river. One Tenmile River gauging station is located near Webatuck Crafts Village, about a mile before the Tenmile enters the Housatonic. Another gauging station is located near Gaylordsville, Connecticut on the Housatonic River. Both of these stations, which are maintained by the United States Geological Survey, have been keeping records for over fifty years. Access to these records is possible from the USGS Web site at <http://water.usgs.gov>.

Since 1930, the average annual flow of the Tenmile is 307 cubic-feet-per-second (cfs), which is approximately 20 percent of the average flow of the Housatonic.

The Tenmile's maximum flow recorded during the great 1938 Hurricane was recorded at 11,000 cfs, nearly 400 tons of

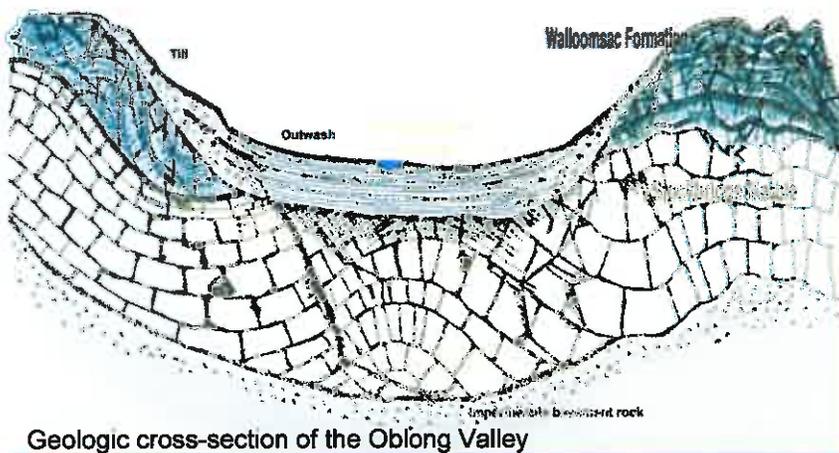
water per second. Two similar increases were recorded in 1955, also due to hurricanes. The lowest recorded flows occurred during drought years when the river flow dropped below 10 cfs.

Even in years without major hurricanes, the Tenmile can easily increase its flow by a factor of 10 in one day. Debris clinging to tree branches several feet above the river is a common reminder of how high the water level can rise. Since there are no flood control structures on the Tenmile, any major flow increase or decrease will dramatically change conditions in the receiving Housatonic River.

The Tenmile streambed is an ideal environment for micro and macroorganisms. The streambed contains glacial deposits of till and outwash that create a large rough-textured base that is ideal for the organisms to attach to.

Most studies on river bottom life report healthy and unimpaired conditions. The New York State Department of

Environmental Conservation (DEC) performed a study in 1992 that concluded, "Excellent water quality was found at all sites on the Tenmile River, based on macroinvertebrate communities. The tributary streams Webatuck Creek





View of the Oblong Valley and Webatuck Creek

and Swamp River were also assessed as non-impacted.” This study is supported by additional studies done by the HVA in 2002 and 2003. The DEC report was part of a fish study performed in 1998 and 1999 that showed summer temperatures on the Tenmile exceeding the limit that are suitable to maintain trout habitats. It was concluded that poor riparian zones may have caused this problem.

Just north of Wingdale, near the Reagan’s Mill Bridge, the river bottom changes abruptly from gravel and cobble-size particles to large boulders. This is evident in air photos taken of the river. Shortly after the bridge the river swings sharply to the east due to a high ridge of resistant rock structure. Alterations in the river’s path are due to geomorphic processes (for example, faults) creating changes in the bedrock.

As the Tenmile leaves the Webatuck Craft Village area, it changes into a river that has almost no human impact. The

beauty and unspoiled appearance of this part of the river is breathtaking.

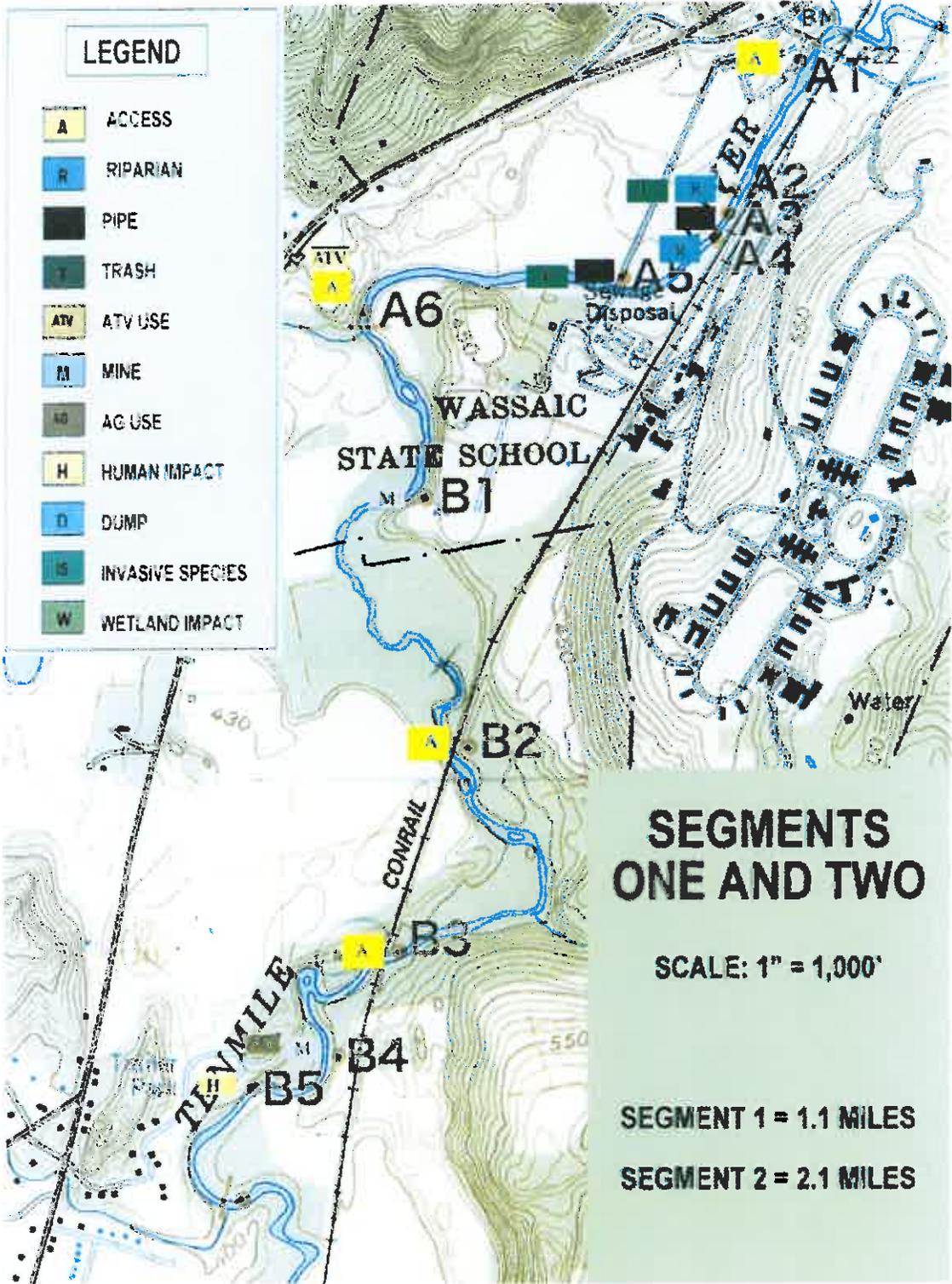
Conclusion

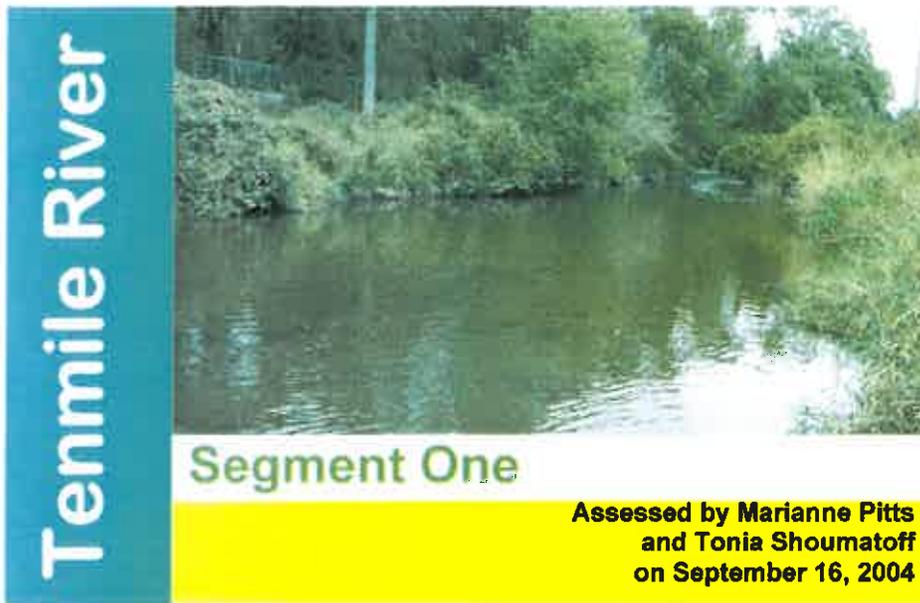
In conclusion, the Tenmile River is a surprisingly unspoiled and near-pristine river system. Due to its compact size and accessibility, it can be easily studied. It is also a gratifying river to

study because the impairments that do exist are relatively easy to identify. Also, these impairments are not so overwhelming that restoration solutions can not be achieved.

The problems that need addressing start with public awareness and education. Since large stretches of the Tenmile and its tributaries are owned by relatively few people, it is possible to work directly with property owners on projects like riparian zone restoration and public access. Many private and public resources are already in place to preserve and improve this valuable community resource including: HVA, NYDEC, town governments, Citizens Advisory Committee (CAC), Trout Unlimited and the United States Department of Agriculture (USDA).

Submitted by Tonia Shoumatoff, Tenmile River Watershed Coordinator, HVA, and David Reagon, HVA volunteer.





Segment One starts near Tenmile River Station in Amenia and extends about one mile south to the Wassaic Multiple Use Area.

The riparian zone is dense and mysterious along this section.

This segment starts on the Webatuck Creek just downstream of the bridge that leads to the Wassaic Developmental Center's water plant – a few hundred feet north of Sinpatch Road and contains a sign saying "Welcome Fisherman."

The Webatuck is shallow at this point but is shortly joined by the Wassaic Creek. It then officially becomes the Tenmile River, and flows under two more bridges turning south after a deep pool.

Along most of this segment, the river borders the Taconic Developmental Disabilities Services Office (DDSO),

formerly the Wassaic Developmental Center. Listening Rock Farm owns the property along the western bank. The Metro North Railroad can be observed at many points along the eastern side as the tracks lie close to the river.

For the first half of the segment, the river runs slowly southward through a series of deep pools and intervening riffles. A lush riparian zone of mature trees, such as willow, ash and box elder, and high banks border this section of the river. In low flow stretches of the river, the water appeared murky and greenish, possibly due to recent heavy rains. Woody debris and a dead deer were observed here as well.

A number of birds were observed in this area including: night herons, kingfishers, woodpeckers and grosbeaks. In a few places, the railroad came close to the river. A building located on the east side closely abuts the river and seemed to be associated with an eight-inch diameter pipe that entered the river.

The most important impairment on this segment is the sewage treatment plant belonging to the Taconic

DDSO. It has a large discharge pipe that enters the river near a damaged bridge. which is falling into the river. Litter was common throughout this section.

The end of the segment is near a small tributary on State property known as the Wassaic Multiple Use Area. ATV tracks were observed traversing this area and causing negative impacts on the riparian zone and the river.

Assets:

- Boating and fishing access
- Shaded banks and deep pools
- Good bird habitat. Many birds observed.

Problems:

- Littering was common.
- Unknown discharge in river.
- Narrow riparian zone near railroad
- ATV impacts.

Actions:

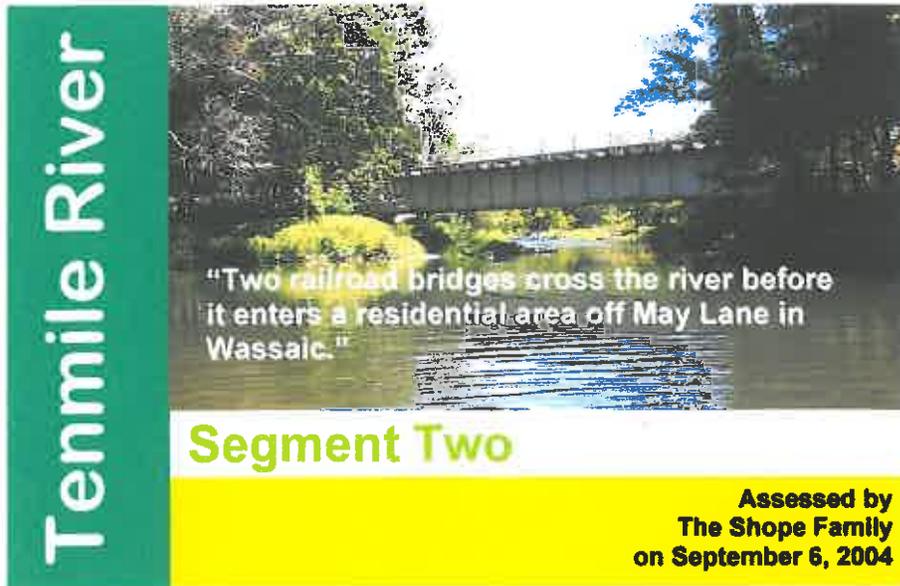
- Discourage littering.
- Monitor sewage outlet.
- Encourage railroad to repair riparian zone near tracks
- Educate, monitor and regulate ATV users.



ATV tracks leading into tributary



Discharge pipe by Taconic DDSO



Segment Two begins at the Wassaic Multiple Use Area and meanders over two miles to Oak Drive in Wassaic.

Houses near the river have had a severe impact on the riparian zone in this segment.

Segment Two begins at the Wassaic Multiple Use Area and passes through a riparian zone that is either forested or agricultural. In one area, several houses are located near the river. Many pools and riffles are present that contain downed trees. The fallen trees form barriers to boaters; however they provide good shelter for many fish habitats. There are several trails that follow the river that appear to be used by ATVs. Except at the beginning of the segment, the land on both banks is privately owned.

Two railroad bridges cross the river before it enters a residential area located off of May Lane in Wassaic. Approximately 12 homes are located close to or on the western riverbank.

Some homeowners have cleared or mowed their property down to the edge of the river. The riparian zone was seriously compromised in this area. Dumping was also observed, including large items like abandoned cars.

Stream bank stability is threatened in many places by extensive ATV use. This is especially apparent near the end of this segment where Oak Drive allows for easy river access. A motorcycle track and a closed construction-and-demolition site are located near the Oak Drive area. It is evident that motorcyclists ride from the track onto sandbars along the river's edge.

Despite the impairments noted in this segment, the river appears to be in good shape and very attractive.



ATV crossing, one of many on the river



Drive-in fishing area, circa 1956



Mowing to the river's edge

Assets:

- Many pools and riffles.
- Good riparian zones.
- Good bird habitat.

Problems:

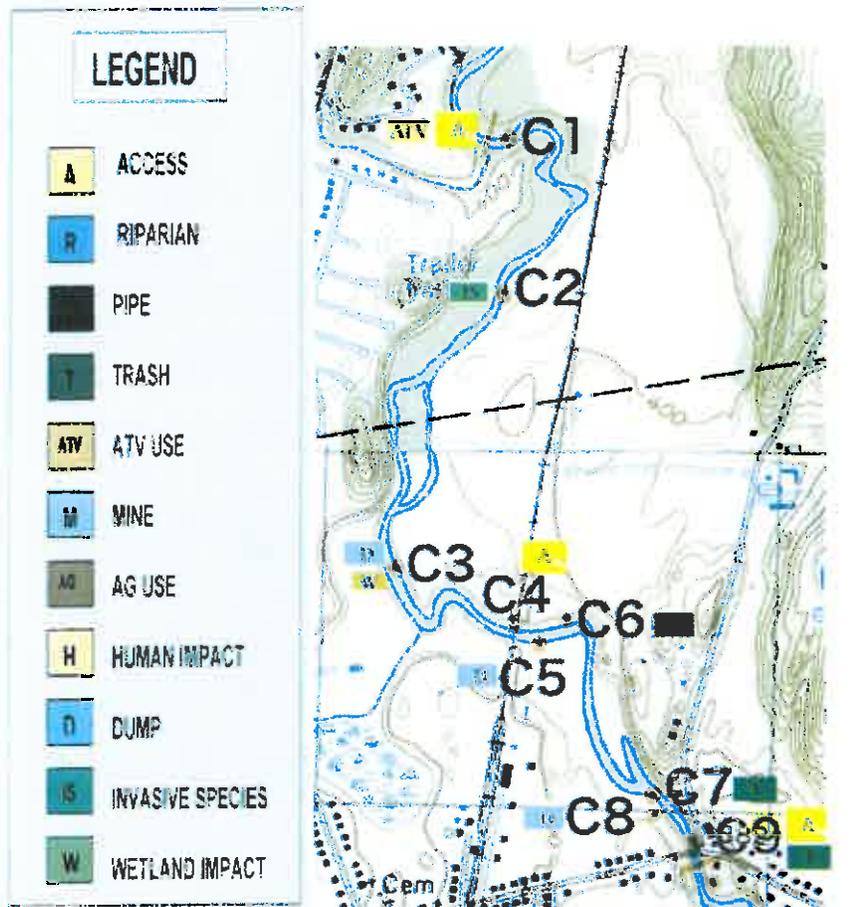
- ATV impacts.
- Houses too close to the river in many places.
- Trash.

Actions:

- Educate and regulate ATV users.
- Educate homeowners on importance of riparian zone.



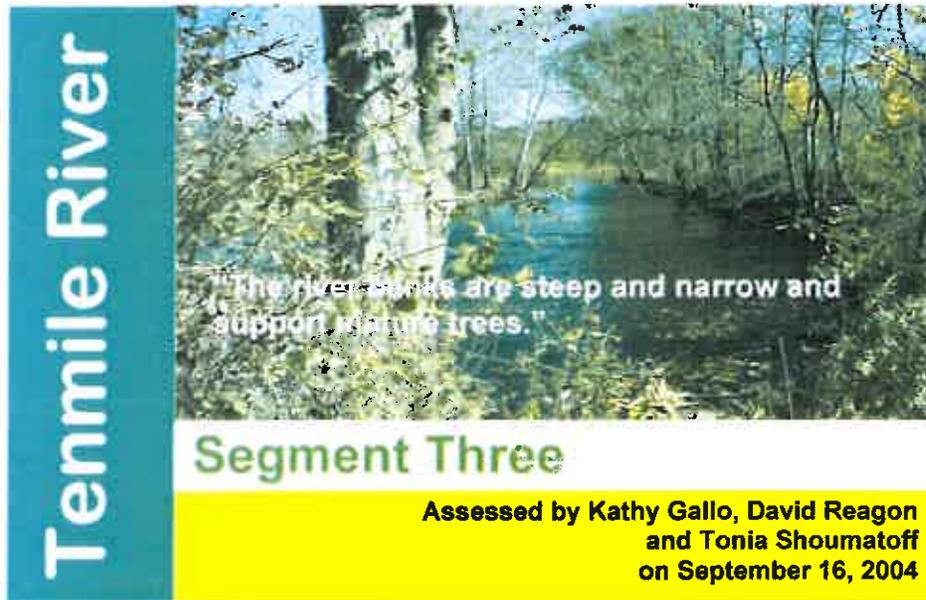
Waterfront home on the Tenmile



SEGMENT 3

SCALE 1" = 1,000'

SEGMENT 3 = 1.1 MILES



Segment Three starts at the Wassaic Multiple Use Area and ends near the Dover Memorial Town Park. It has public access at both ends.

The most seriously impaired site along the entire river is in this segment.

The stream team started at the Dover Memorial Park and walked northward. Large slabs of concrete and woody debris were observed on the eastern banks just south of the Mill Street Bridge and in the river adjacent to the Emerson property.

Large amounts of trash have been dumped under the Mill Street Bridge, and trash was encountered wherever human access to the river was easy.

Stream banks are generally 10- to 15-foot high. Exposed rocks cause the stream to abruptly change course resulting in pools, riffles, and meanders with steep banks and opposing gravel bars. Imbedded cobbles and pebbles make up most of the stream bottom in this section.

The steep narrow stream banks support mature trees typical of floodplain environments. Fallen trees block the channel in a few places. Bordering lands are mostly flat floodplains consisting of overgrown farmland. Some portions of the eastern bank are still being used for crops and grazing.

The most serious impairment on the entire river is in this segment. Tennmile River LLC, off of Midfield Lane north of Dover Plains, has covered several acres of this property with construction-and-demolition debris. This has obliterated a wetland and spilled over silt fences down into the river. The debris was tested by the Town of Dover and found to contain mesityl oxide, a compound known to be toxic to aquatic life. This material is leaching into a small stream that leads into the Tennmile. The Town of Dover is currently seeking remediation of this site in order to

restore the wetland and remove the debris.

In the same area, near the Metro North Railroad bridge, is evidence of more buried construction waste along with debris near the river bank. An old tank truck was also found in the same area. North of the Tenmile River LLC site near the Tally Ho trailer park, the river splits into channels around a large island. The east bank of the river rises to a 50-foot high bluff covered with heavy vegetation that is interlaced with ATV tracks. Invasive species are present in this area including Japanese knotweed, barberry, multi-flora rose, and Asian honeysuckle.



Piles of construction and demolition debris along the river's flood plain



Trash dumped in the river near Dover Plains

The northern edge of Segment Three is near Oak Drive in Amenia. An informal motorcycle race course atop an old construction-and-demolition debris dump is located close to the river at this point. The motorcycles ride up to the edge of the river.

An apparent flood-control structure made up of large concrete blocks occupies the eastern bank. This location is right before the segment ends at a small tributary coming in from the east. Trash was scattered around what appears to be a party spot near the bank.

Assets:

- Good riparian zones.
- Good wildlife habitat.

Problems:

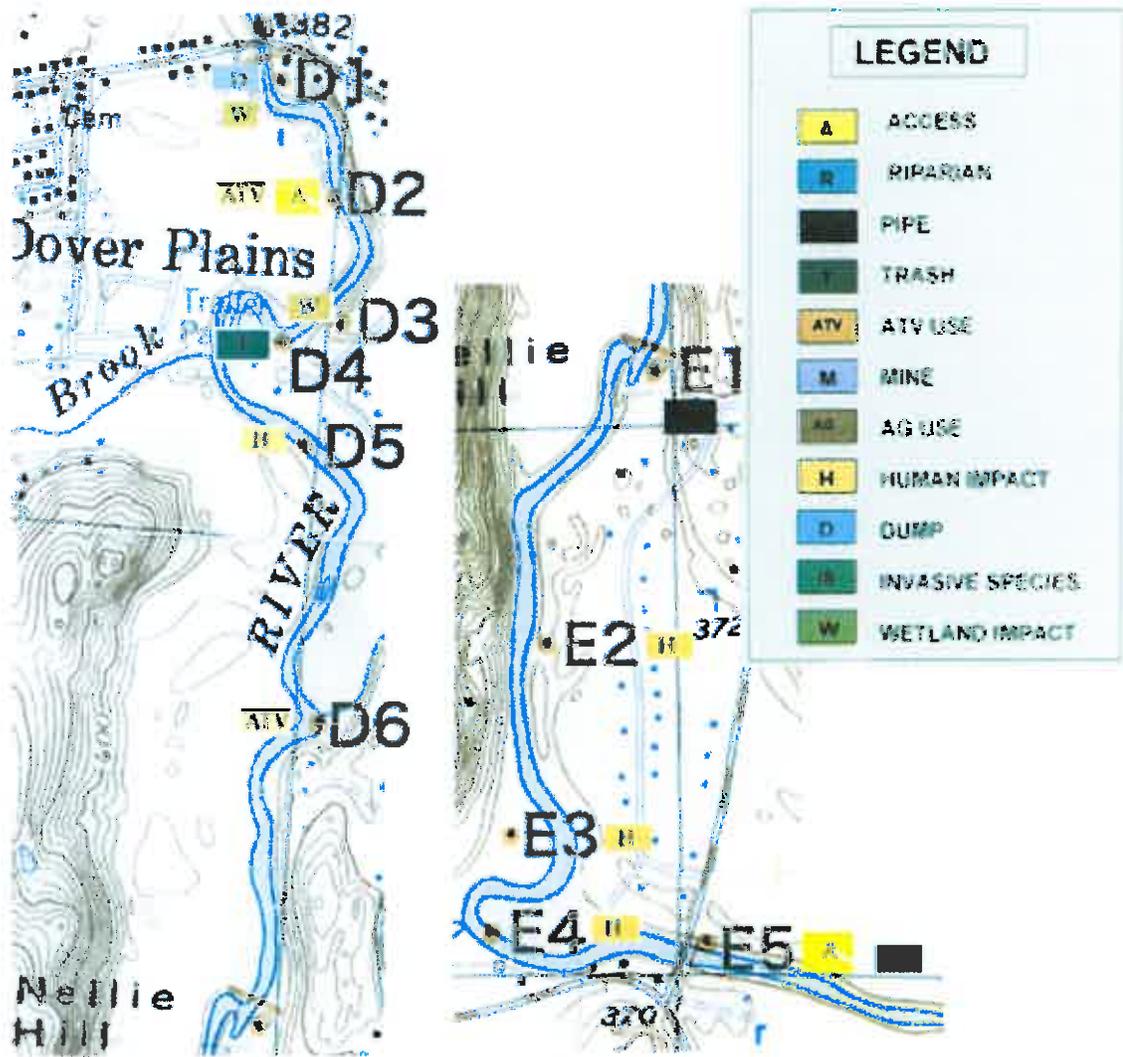
- Major dumping.
- ATV impact.
- Trash.

Actions:

- Monitor dumpsites.
- Regulate ATVs.
- Initiate clean-ups.
- Support town efforts to remediate Tenmile River LLC site.



Mesityl oxide leaching into Tenmile tributary



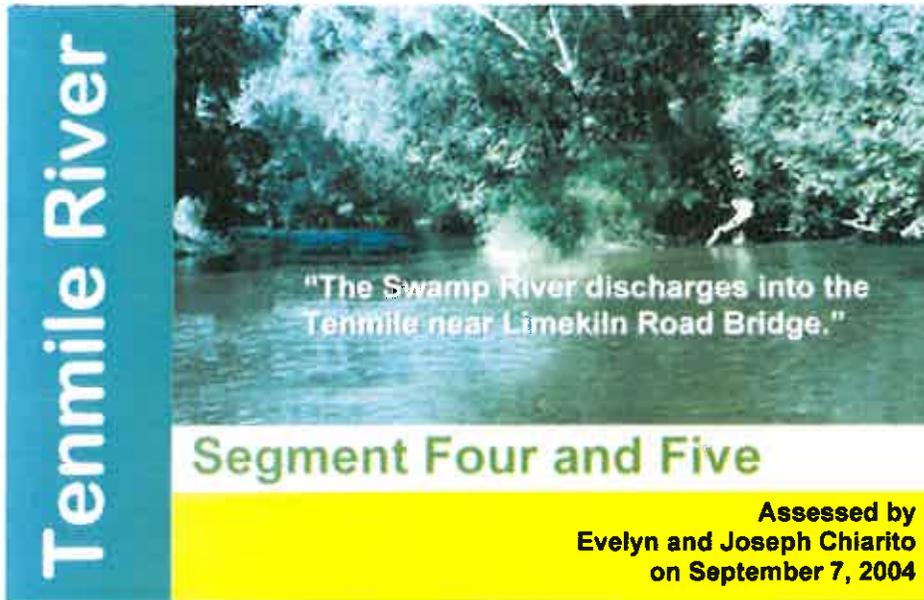
SEGMENT 4

SEGMENT 5

SCALE: 1" = 1,000'

SEGMENT 4 = 1.5 MILES

SEGMENT 5 = 2.1 MILES



Segments Four and Five start at Dover Town Park and end near the confluence of the Swamp and the Tennmile rivers.

The quality of the riparian environment in these two segments varies widely.

Segment Four

Segment Four starts at the Dover Town Park which is located on the west side of the river. This portion of the river is buffered by a forested riparian zone including a small wetland. The park provides public access to the river.

On the east side, a tree removal company has been dumping debris, including concrete slabs, onto the bank and into the river. A landowner, located adjacent to the wetland, has been pushing brush and logs into this area. ATVs are a problem here partly because of easy access from the park and partly because of lax enforcement.

Silt and debris in the river may be coming from off the Mill Street Bridge. There are dwellings close to the river which may be leaching septic waste into the river.

Going farther south, along Tennmile River Drive, there are a number of undeveloped housing lots that have river frontage. Heavy dumping of various types of debris has been noted here as well as bulldozing and clear-cutting near the park.

A large cornfield south of the park has a non-existent riparian zone with some bank erosion. Downstream, this situation improves greatly.

Near Limekiln Road there are several homes that border the river. Certain properties have intact riparian zones although some have mowed and

destroyed vegetation down to the river. A small stream enters the Tenmile behind Morgan Court and has a lot of silt at its mouth. A few years ago, the Dover Conservation Commission tested this stream and results indicated the presence of high nitrate levels.

Overall, this section of the river is in good shape except for some garbage along the banks and some houses that are too close to the stream. The stream channel has many pools and riffles and the canopy varies from full to none. Birds were abundant and the invertebrate population in the stream appeared healthy.

Segment Five

This segment begins with a small waterfall just behind the Regan home at the northern end of Craig Lane. Despite many homes on the east bank, the river is in good shape here with many pools and riffles and an extensive tree canopy over clear water. Several homes are close to the flood plain and/or have mowed down to the river. However, this is balanced by Nature Conservancy property on the west bank which has carefully preserved the riparian zone and is a good wildlife area.

Toward the end of this segment, the Swamp River flows into the Tenmile from the Great Swamp near the Lime Kiln Road Bridge. The bridge has several drains allowing runoff to flow directly into the river.

An island at the mouth of the Swamp River is being used as an apparent construction zone even though this area is subject to flooding. Large amounts of silt deposits and muck are visible and aquatic life seems to be scarce. This

activity is the major impediment on this part of the river and the cessation of activities should be required by State and Town officials.

Assets:

- Good access.
- Good riparian zone in some areas.
- Good fish habitat.

Problems:

- Trash and dumping.
- ATV impact.
- Construction.

Actions:

- Clean up trash.
- Regulate ATVs.
- Alert DEC and Town government of dumping.
- Pursue cessation of silt and construction deposits with the Town located at the mouth of Swamp River.



Drains on Limekiln Road Bridge



Construction along the Swamp River

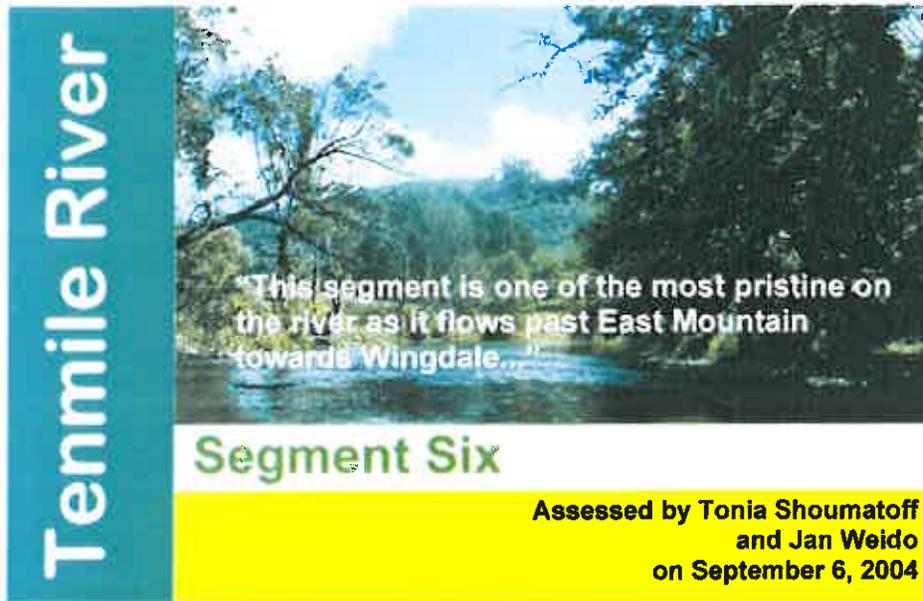


SEGMENT 8

SEGMENT 6, 7

SCALE SEGMENT 6 AND 7: 1" = 1,200'
 SCALE SEGMENT 8: 1" = 1,000'

SEGMENT 6 = 1.2 MILES
 SEGMENT 7 = 1.3 MILES
 SEGMENT 8 = 1.1 MILES



The Tenmile in Segment Six flows southward through fields and forest with East Mountain rising on one side and steep ridges on the other.

This section of the river gives the observer the impression of having gone back in time.

Segment Six starts at the Lime Kiln Road Bridge (at the intersection of Lime Kiln Road and Dutchess County Route 6) and ends 1.2 miles later near the Tenmile River Preserve. Except for one bridge crossing and at one point where Berkshire Road comes close, the river is far away from roads.

In general, this is a near pristine section of the river with good bank stability, good tree cover, many riffles and pools. Boulder-size rocks, as well as woody debris line the sandy bottom making this a good trout-spawning habitat. Signs of abundant wildlife, including beaver, skunk, and duck indicate a diverse environment.

The biggest impairments in this section are relatively minor, occurring in locations where cornfields encroach the river's edge, eliminating most of the riparian zone. There are at least two places where farm roads or ATV crossings come down to the edge of the river and even appear to enter the stream.

Lack of tree cover on the agricultural sections of the river may be contributing to warming of the stream, ultimately damaging trout spawning. A small tributary on the east bank was discovered to be warmer than the main stream. This stream flows through a large field and has no shady canopy which may result in the warmer temperatures.

Other observations in this area include a variety of ducks, fish and crayfish. Aquatic species observed included

mayflies (isonymia and stenonyma), caddisflies, and stoneflies. There were many large trees such as willow and sycamore. Undercut banks and evidence of erosion were observed underneath trees bordering the river.

One area before the Tenmile River Preserve could use more boulders and canopy.

Impacts in this area may be a concern due to The Tenmile River Preserve, a nearby hunting preserve. Lead shot may be accumulating in the stream and poisoning wildlife. Any increased amount of a substance in a living being either by ingestion or environmental exposure can then enter the food chain.

This segment is one of the most pristine locations on the river as it flows past East Mountain towards Wingdale. Every effort should be made to preserve this beautiful example of a small river flowing through an unspoiled setting.

Assets:

- Near-pristine river.
- Good fish habitat.
- Very scenic.

Problems:

- Agricultural zone close to the river.
- Farm crossings in the river.
- No canopy in places.

Actions:

- Move agricultural zones back from the river.
- Close crossings.
- Restore riparian zone.
- Explore and monitor for lead impacts along the river.



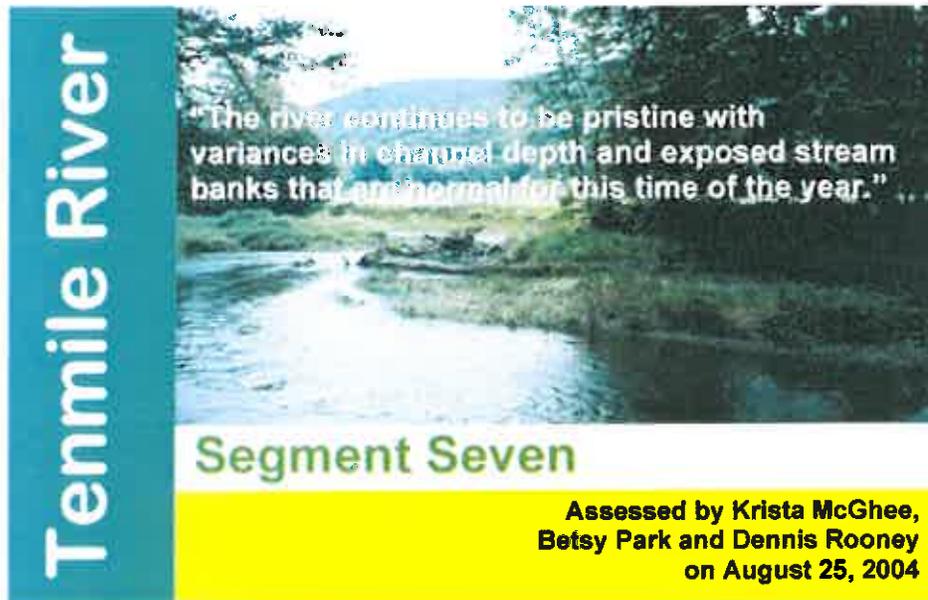
Cornfield close to the river



Near-pristine section of Segment Six



Farm road entering the river



Despite significant encroachments caused by man, including agriculture, industry, housing, and roadways, Segment Seven is mostly a nice stretch of river.

Invasive plant species were rampant on this section of the river.

The beginning of Segment Seven is just south of the Tenmile River Preserve and extends slightly over a mile to Old Quarry Road Bridge in Wingdale.

The general condition and visual assessment of this river segment is very good at the beginning. Areas of concern were extensive invasive plant species*, poor riparian zones, bank erosion and potential contamination due to lead shot ammunition.

Birds are plentiful along this stretch of the river including mergansers,

* Invasive plants observed included purple loosestrife, Russian olive, Oriental bittersweet, bush honeysuckle, Eurasian water milfoil, Japanese barberry, knapweed, multi-flora rose and garlic mustard.

mallards, egrets, kingfishers, and waxwings. Other wildlife signs included bear tracks. There was a wide diversity of macroinvertebrates on the river bottom, which is indicative of a healthy environment.

The river continues to be near-pristine with variances in channel depth and exposed stream banks that are normal for the time of the year. Debris and log-jams in the form of logs and branches occur. The riparian zone shows the evidence of long-term human impact due to agricultural use and ATVs. Some siltation of the river bottom has taken place where drainage from a farm road reaches the river. Periodic bank erosion was observed along this section.

Just north of J&J Lumber, a large lumber mill located on the western bank, the river becomes wide and over five-feet

deep. The water quality appears to be good.

Although J&J Lumber owns several acres abutting the river, it is barely visible due to the 20-foot-high stream bank. The riparian zone is diminutive, and there were few visual impacts from this large operation. During the shoreline assessment, a drainage ditch running between J&J Lumber and the adjacent property was dry.

South of J&J Lumber recent clearing and bank instability on the eastern side was observed. The river here is around 60-feet wide with a poor riparian zone. There are unfinished buildings along the riverbank and at one location, a steel cable traverses the river. Also, large numbers of concrete blocks, brush and logs have been dumped onto the banks and into the river. A nearby residential area seems to be contributing trash and garbage as well.

Dutchess County Route 6 travels closely along the western side of the stream shore. Here, a large culvert with extensive rip-rap drains into the river. Whitish-brown foam was present. Evidence of bank erosion was more common in this segment.

Assets:

- Attractive.
- Good water quality.
- Mostly well-preserved.

Problems:

- Possible lead shot contamination.
- Agricultural impacts.
- Invasive species.

Actions:

- Monitor river for contamination.
- Control invasive species.
- Explore potential of lead contamination.



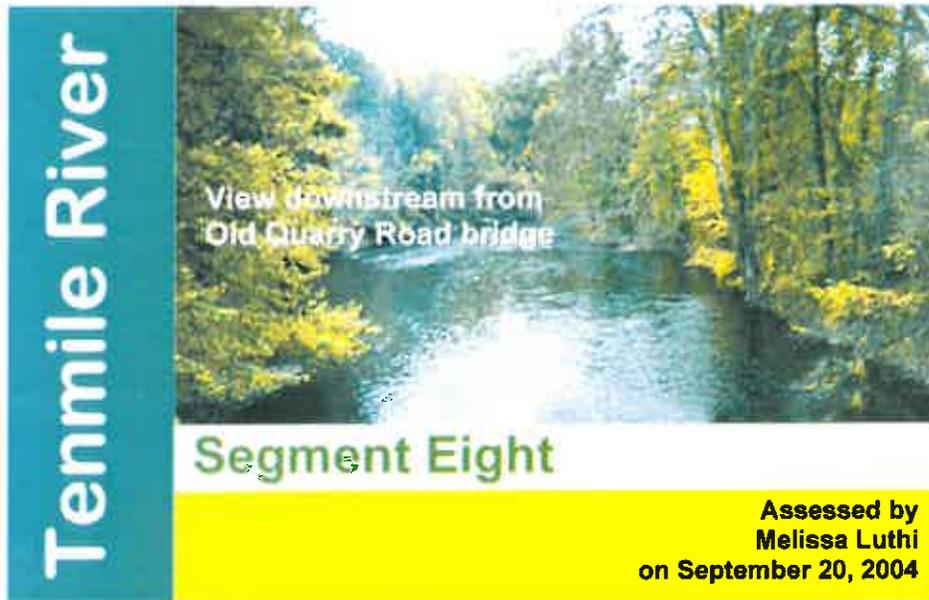
J&J Lumber Mill



Culvert off of Route 6



Invasive species in riparian zone



The river closely parallels County Route 6 for a mile in this segment.

A few houses and a busy road barely intrude on this peaceful stretch of river.

Bridges form the start and finish of this segment; Old Quarry Road Bridge at the northern end and Reagan's Mill Road Bridge at the southern end. Both bridges impact the river by narrowing the channel and permitting easy access. Some litter was present at both bridges along with the remains of an old bridge near Reagan's Mill Road.

The close presence of Route 6 along most of the river results in increased litter, road drainage into the stream and a narrowing of the riparian zone on the western stream bank.

The stream channel was wide with many pools, riffles, and large areas of plant cover making it suitable for fish. The stream banks on the eastern side

had the most forest canopy. Stream banks were stable and in good shape for most of the segment except where the stream meanders, undercutting some of the banks.

Invasive plant species were common and were typical of those noted on the rest of the river, including purple loosestrife and Japanese knotweed that are particularly troublesome.

In a few places, homeowners have cut down trees in the riparian zone and have mowed down to the edge of the river. This is a common practice along most of the river and could be remedied by an education program for riparian zone restoration. The cutting is probably to improve the residents' view of the river.



Houses close to the river



View across the river towards Route 6

Assets:

- Easy access.
- Scenic resource from road.

Problems:

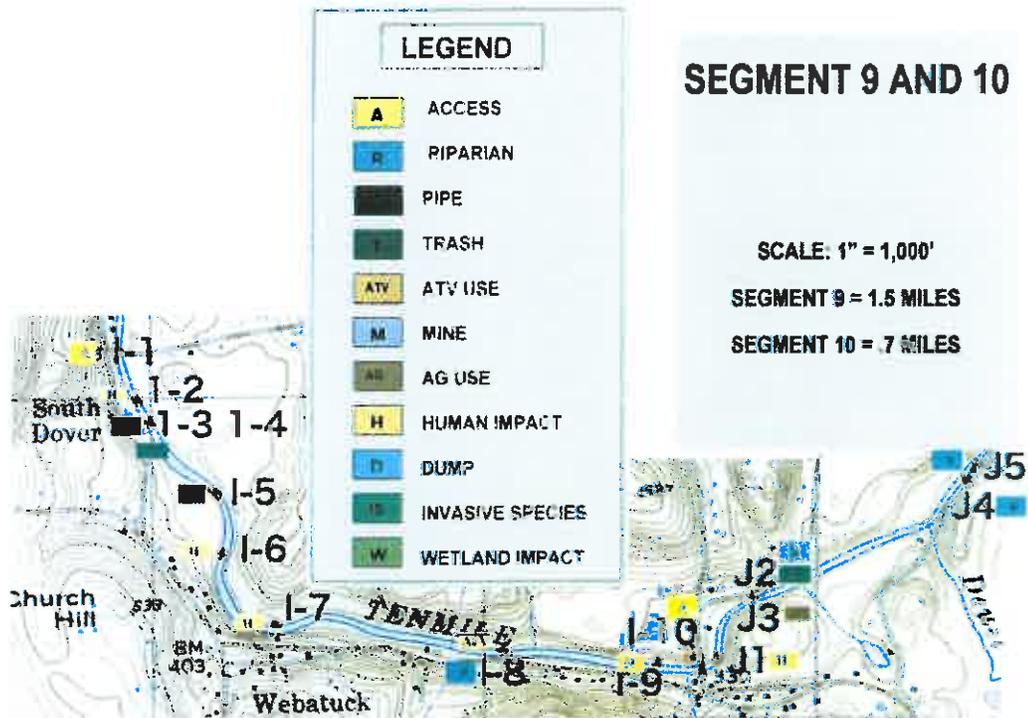
- Houses impact riparian zone.
- Road impacts.

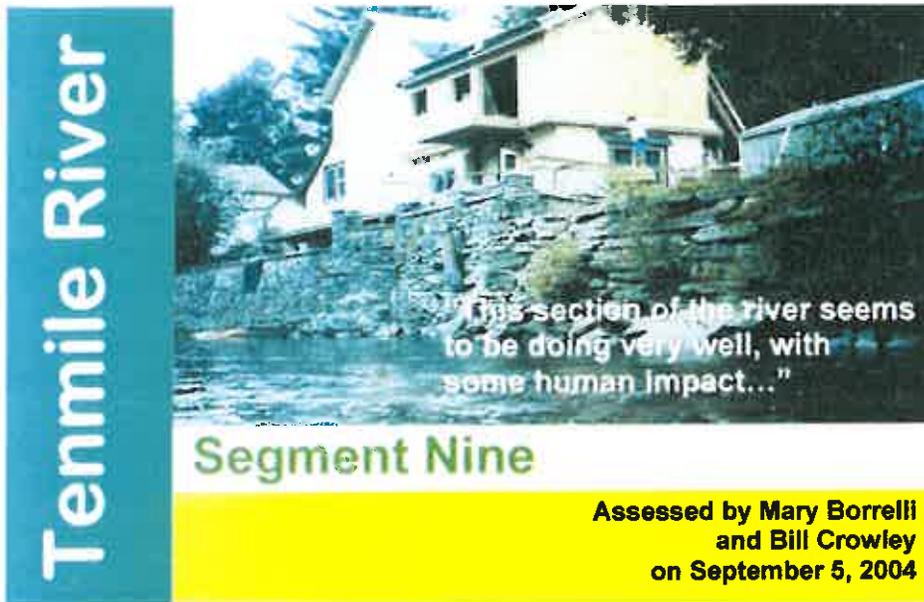
Actions:

- Restore riparian zone.
- Clean up along road.
- Educate homeowners on importance of riparian zones.



Riparian zone mostly mowed down





Segment Nine passes through the most densely populated part of the Tenmile, ending at Webatuck Craft Village.

The river here alternates between pretty sections and heavily impacted areas.

Segment Nine begins at Reagan's Mill Bridge and ends at the Webatuck Craft Village. There is parking near the bridge which allows easy access to the river. The river bottom is studded with large rocks and the water can be very rough at high levels.

The riparian zone on the western bank has been mowed to the river and a bus garage parking lot impinges on the banks. Litter and debris along with a drainage pipe were found here.

The beginning of this section also had large items of trash such as tires and car mufflers deposited in the river.

Westchester Modular Homes factory and Woodwinds, a high-density development, are both located on the

east bank. There is a large buffer zone between the river and these two areas, but a sewage disposal outflow pipe enters the stream at this point. This is a permitted use discharging a significant flow that has been observed to be murky, cloudy and odiferous. In the same area a milky liquid was observed entering the river from below the surface. Its origin was not determined.

On the west side of the river, in a cleared area opposite Cricket Hill, the Iroquois Gas Transmission System pipeline crosses the river.

At the point where the river takes a major turn to the east, the south bank becomes high and a few houses, a bar and restaurant are located close to the river.

Route 55 closely parallels the river for the remainder of this segment. There are parking areas for river access and a public fishing area along the river. The

buffer between Route 55 and the river is narrow.

This last part of Segment Nine is very popular with fishermen, canoeists and kayakers.

Although there are major human impacts, this section of the river appears to be doing very well. Some areas have good cover for birds and other wildlife, and the fishing appears to be good.

Assets:

- Good public access.
- Good fish habitat.

Problems:

- Trash.
- Sewer outlet.
- Buildings and roads close to river.

Actions:

- Clean up trash.
- Monitor sewer.
- Restore riparian zone.



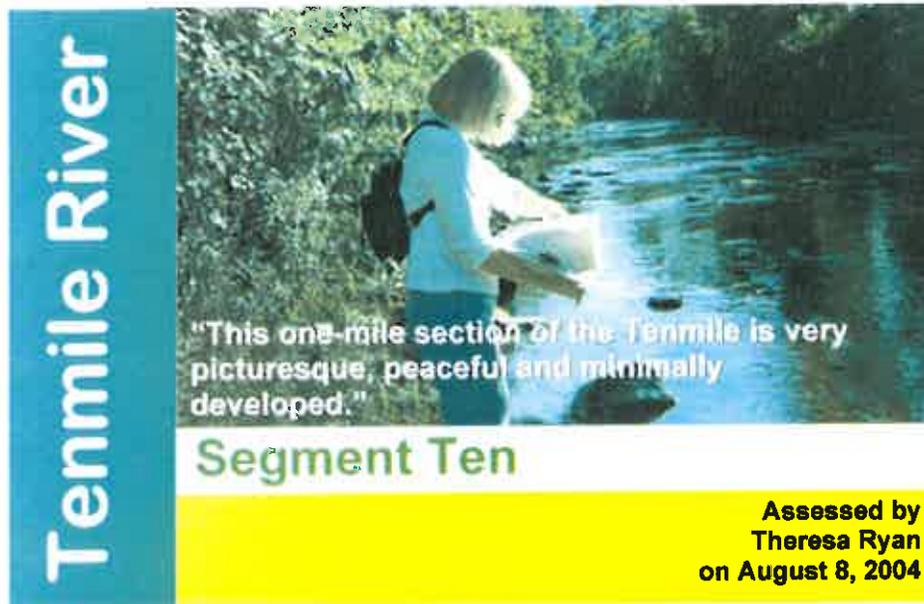
Sewer outfall



Murky discharge



Bus garage and trash



The Tenmile in Segment Ten passes from the bridge at Webatuck Craft Village to the 70-year-old USGS gauging station on Old Forge Road.

This stretch is like a picture postcard of an ideal small river.

Webatuck Craft Village forms the backdrop for the beginning of this segment. The Village occupies portions of both banks and comes right down to the edge of the river just above the Dogtail Corners Bridge.

Just below the bridge, there is a small sharp drop-off that may be the remnants of a dam. From this point on, the river has many pools, riffles, and small rapids. Fallen trees in the channel are a common site as they are on the rest of the river.

Three small tributaries enter the river from the south. One passes through a large box culvert before it enters the main stream.

Dogtail Corners Road, which follows the river on its northern bank for a short stretch, has three pull-outs for river access. Large concrete slabs have been dumped at one pull-out, but little trash was otherwise observed.

Near the gauging station at the end of the segment, the riparian zone narrows as the river gets close to Old Forge Road and a cow pasture.

The majority of this segment is undeveloped with a good riparian zone of secondary growth and shrubs. The overhanging trees and roots, woody debris, cobbles and undercut banks provide habitats suitable for fish while the rocky stream bottom appeared suitable for macroinvertebrates. Pools of varying depths were abundant.

A couple of areas need trash and debris cleanup, specifically at the first pull-out along Route 55, just west of the bridge. Overall, this section of the Tenmile is very picturesque, peaceful, and

minimally developed with habitat conditions suitable for fish, birds and other wildlife. There are opportunities for hiking, fishing, swimming and boating.

Assets:

- Near-pristine river.

Problems:

- Riparian zone issues.
- Trash areas.

Actions:

- Work with Crafts Village to restore riparian zone.
- Clean up trash.



Webatuck Crafts Village



USGS gauging station

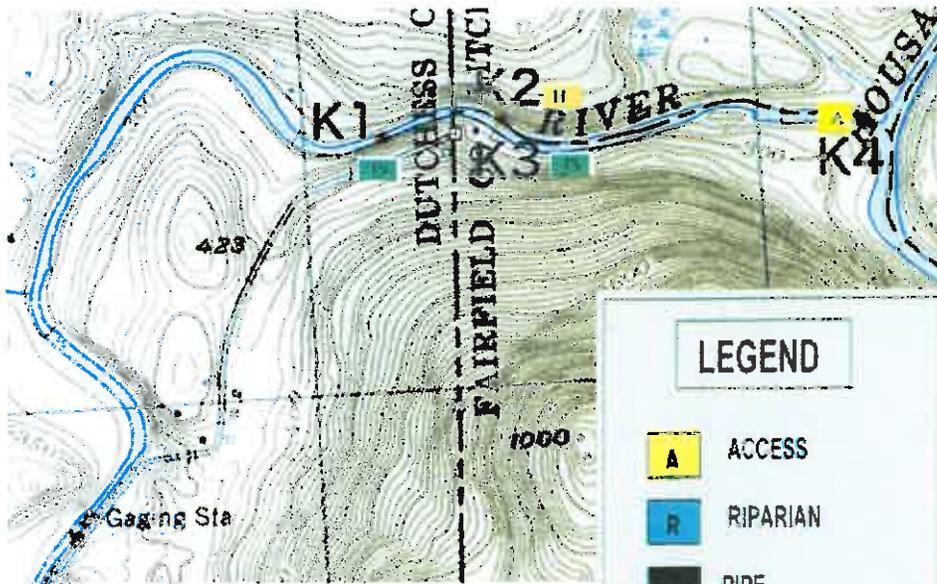


The scenic beauty of the river is evident to all



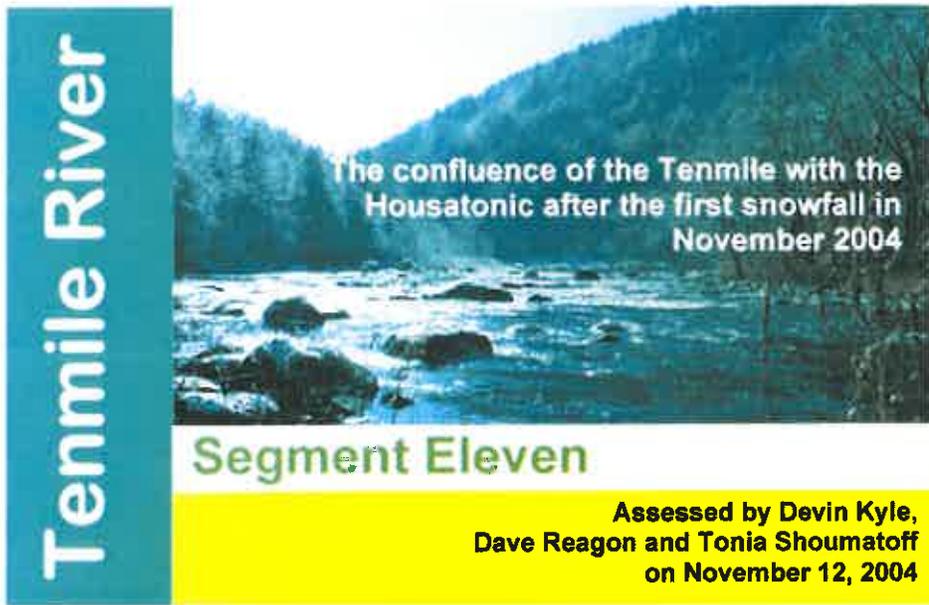
Clear water, good riparian zone

SEGMENT 11



SCALE: 1" = 1,000'
SEGMENT 11 = 1.1 MILES





The Tenmile River joins the Housatonic River near the Appalachian Trail crossing by the Ned Anderson Bridge.

The end of Segment Eleven is very scenic and wild with its thickly forested banks and rushing water.

Segment Eleven begins at the USGS gauging station off Old Forge Road in Dover Plains and ends where it joins the Housatonic near Kent, Connecticut.

At the start, the riparian zone is non-existent due to Old Forge Road being in close proximity to the river. The river then passes by farmland and is deflected to the northwest by a high hill. The bank on the east side becomes steep and forested while the western bank is broad and flat. Further downstream, the western bank begins to gain elevation and becomes more densely covered with trees. Houses are scattered along the western bank and a farm is located on the east side of the bank.

The riparian zone on the east bank is choked with brush and small trees making passage very difficult. Most of the brush is invasive barberry, making wading into the river the only way to continue on. The river is wide and slow-moving with some silt in its bed.

Eventually, the brush ends and is replaced by large trees forming a partial canopy. The banks become steep and high as the river swings due east and enters a deeply forested valley. The river here is fast moving and large rocks and fallen trees are common on the bottom. There is very little trash and few signs of human impact. Tenmile Hill rises steeply on the south bank, approximately seven hundred feet above the river. Both banks are heavily forested and steep. Old Forge Road parallels the river but is several hundred

feet away and about 50 feet above it. A few houses are located along the road, well away from the river.

Just before the New York-Connecticut border, there is a large house on the south side of the river occupying the site of an old mill. At this point the river is constricted and fast-moving with very large rocks in the channel. Invasive plants were common here. A large metal gate marks the end of Old Forge Road, which then becomes a trail through the woods.

For the next one-half mile, the river enters Appalachian Trail Lands, a wide strip of public land paralleling the Appalachian Trail. The river is fast moving with real rapids flowing over a boulder-strewn bed alternating with deep pools. The riparian zone is densely forested with large trees. It has a very wild feel to it. In too short a time, the Tenmile passes under the Ned Anderson Footbridge and joins the Housatonic. Segment Eleven is the most scenic and unspoiled section of the Tenmile.

Assets:

- Pristine river.
- Public access.

Problems:

- Invasive species.
- Riparian impacts.

Actions:

- Control invasives.
- Restore riparian zones.



Large oak tree



Just upriver from the Housatonic



Ned Anderson Bridge, Appalachian Trail

Action Plan

Based on Summer 2004 Shoreline Surveys Conducted by the Tenmile River Stream Team

A. Short Term/High Priority Projects

We recommend the following short-term projects, as we feel that they are high-priority, and/or can be completed in a few months. Because there are many suggestions, the Stream Team will select some for 2006 and others as time permits.

1. Stay in touch with the Town of Dover and the New York State Department of Conservation about the remediation of the Tenmile River LLC property. We urge all involved parties to work together to completely remove all contaminated materials from the property and restore the wetland.

2. Monitor and sample effluent from the two known sewage discharge locations on the river to make sure they are not exceeding the terms of their SPDES permits. The two locations are at the Wassaic Developmental Center in Segment One and the Westwinds development in Segment Nine.

3. Work with all appropriate agencies (public and private) to develop and implement an educational program about the importance of the riparian zone. This material should be shared with property owners along the river who have cleared or mowed down to the river's edge and steps should be taken to implement restoration plans.

4. Contact the Dutchess County Department of Transportation and work with them to correct run-off problems along County Route 6. In addition, work with local town Highway Departments to raise awareness about storm drains and request that more sand than salt be used on the bridges.

5. Contact and work with all the owners of bridges that cross the Tenmile to correct problems associated with the bridges such as drains that flow directly into the river and trash that accumulates near the bridges. Begin action to remove the decrepit bridge in Segment One.

6. Identify areas of invasive species and map these for a future program in controlling these species. The program could be presented by local Conservation Advisory Councils.

7. Urge State and local officials to enforce illegal trespassing of ATVs in the riparian zone.

8. Work with local, State, private and environmental groups and agencies to repair and restore impaired riparian zones.

9. Work with State and local officials to remediate construction impacts where the Swamp River meets the Tenmile.

10. Work with State and local officials to remediate the dumping near the Mill Street Bridge in Dover Plains.

11. Explore the potential for lead shot contamination with local and State health officials.

B. Long-Term/Ongoing Projects

These activities will encourage the Stream Team to be involved long-term with the watershed.

1. Contact local Conservation Advisory Councils in all the surrounding towns. Inform them and advocate for mandatory buffer zones and wetlands ordinances as part of their regulations.

2. Work with farmers and other stream bank owners to develop a sense of stewardship for the river. This would include such problems as fences crossing the river, cattle in the stream, runoff from fields and use of the river as a disposal area.

3. Create a "greenway" along the river, improving access for recreational and educational activities.

4. Work to improve awareness of the importance that tributaries contribute to the general health of the Tenmile.

5. Design a program to assess and monitor the Swamp River similar to the Webatuck and Wassaic Creek surveys.

6. Develop a program of macroinvertebrate collection and identification for water quality monitoring.

7. Develop a program of water quality sampling on a regular basis.

8. Work with landowners and local authorities to remove major obstructions, such as trees and logs that are major obstructions and safety hazards to river users.

9. Investigate old dumps near the river that were construction-and-demolition debris sites to see if they contain hazardous waste. There is one of these sites at the end of Oak Drive in Amenia.

Key to Tenmile River Segment Map			
CODE	FEATURES	ATTRIBUTES	NOTES
A1	ACCESS	ROAD, BRIDGES	TWO ROADS, ONE RAILROAD
A2	RIPARIAN, TRASH	SCATTERED TRASH	NARROW RIPARIAN ZONE
A3	PIPE		UNKNOWN ORIGIN
A4	RIPARIAN, RUN-OFF	CULVERT, RR, BUILDING	RR CLOSE TO RIVER
A5	PIPE, TRASH	WDC SEWER OUTLET	COLLAPSING BRIDGE
A6	ATV, ACCESS		WASSAIC MULTI-USE AREA
B1	MINE	GRAVEL MINE	STATE OPERATED
B2	ACCESS	BRIDGE	RR BRIDGE
B3	ACCESS	BRIDGE	RR BRIDGE
B4	MINE, AGRICULTURAL USE		GRAVEL MINE, GRAZING
B5	HUMAN IMPACT	HOUSES	IMPAIRED RIPARIAN ZONE
C1	ACCESS, ATV	HEAVY ATV USE	PARTY SPOT, NEARBY DUMP
C2	INVASIVE SPECIES		LOOSESTRIFE, KNOTWEED
C3	DUMP, WETLAND IMPACT	WETLAND IMPACTED	TOXIC DUMP, MAJOR IMPACT
C4	ACCESS	BRIDGE	RR BRIDGE
C5	DUMP		SUSPECTED C&D DUMP
C6	PIPE		UNKOWN ORIGIN
C7	TRASH	SCATTERED TRASH	CAR PARTS
C8	DUMP	NUMEROUS DIRT PILES	ON FLOOD PLAIN
C9	ACCESS, TRASH	BRIDGE	MILL ST. BRIDGE
D1	DUMP, WETLAND IMPACT	TREE CUTTINGS IN RIVER	MAJOR IMPACT
D2	ATV, ACCESS	ROAD	NEAR DOVER TOWN POOL
D3	WETLAND IMPACT	BRUSH, LOGS	
D4	TRASH	C&D, SCATTERED	
D5	HUMAN IMPACT	HOUSES	IMPAIRED RIPARIAN ZONE
D6	ATV		TRAILS ALONG RIVER
E1	PIPE		HOSE IN RIVER
E2	HUMAN IMPACT	HOUSES	IMPAIRED RIPARIAN ZONE
E3	HUMAN IMPACT	SCATTERED TRASH	POSSIBLE LEAD SHOT
E4	HUMAN IMPACT	CONSTRUCTION	SWAMP RIVER ENTRANCE
E5	ACCESS, PIPES	BRIDGE, DRAINS	LIME KILN ROAD BRIDGE
F1	AGRICULTURAL USE		GRAZING
F2	AGRICULTURAL USE		WARM TRIBUTARY
F3	HUMAN IMPACT		POSSIBLE LEAD SHOT
F4	ACCESS, RIPARIAN	ROAD	FARM ROAD CROSSING
G1	RIPARIAN ZONE		NARROW RIPARIAN ZONE
G2	ATV		TRAILS ALONG RIVER
G3	RIPARIAN		DAMAGE TO ZONE
G4	HUMAN IMPACT	FARM ROAD	BANK EROSION
G5	HUMAN IMPACT	FACTORY	J&J, NARROW RIPARIAN
G6	HUMAN IMPACT	CULVERT	ROAD CLOSE TO RIVER
G7	HUMAN IMPACT	HOUSING	
G8	ACCESS	BRIDGE	OLD QUARRY BRIDGE
H1	RIPARIAN, TRASH	LITTER, EROSION	S. OF BRIDGE
H2	HUMAN IMPACT	HOUSES	MOWING TO S. BANK
H3	TRASH, PIPE	LITTER, CULVERT	ROAD CLOSE TO RIVER
H4	HUMAN IMPACT	HOUSES	CLOSE TO RIVER
I1	ACCESS	BRIDGE, DRAINS	REAGAN'S MILL BRIDGE
I10	ACCESS	BRIDGE	ROAD BRIDGE, SMALL DAM
I2	HUMAN IMPACT	HOUSES	MOWING TO S. BANK
I3	PIPE	DRAINAGE PIPE	FROM ROADWAY
I4	TRASH	SCATTERED TRASH	NEAR BUS GARAGE
I5	PIPE	SEWER	WESTCHESTER MODULAR
I6	HUMAN IMPACT	BURIED PIPELINE	IROQUOIS PIPELINE
I7	HUMAN IMPACT	HOUSES	RESTAURANT
I8	RIPARIAN, ATV	NARROW RIPARIAN	ATV TRAILS N. OF RIVER
I9	HUMAN IMPACT	NARROW RIPARIAN	CRAFTS VILLAGE
J1	HUMAN IMPACT	HOUSES	HOUSE CLOSE TO RIVER
J2	TRASH, RIPARIAN	SCATTERED, N RIPARIAN	RTE. 55 PULL-OFF
J3	AGRICULTURAL USE		GRAZING
J4	RIPARIAN ZONE	NARROW RIPARIAN	NEAR OLD FORGE ROAD
J5	RIPARIAN ZONE	NARROW RIPARIAN	NEAR GAUGING STATION
K2	HUMAN IMPACT	HOUSES	OLD FORGE SITE
K3	INVASIVE SPECIES		KNOTWEED
K4	ACCESS	BRIDGE	AT BRIDGE
KI	INVASIVE SPECIES		THICK BARBERRY

Segment One		
Assessed by: Tonia Shoumatoff and Marianne Pitts Date: September 16, 2004 Time: 10 a.m. Temperature: 80° F Weather: partly sunny Existing Land Use: Recreational, forest, residential, agricultural, industrial		Average width: 42.5 feet Point 1: 1 foot deep, 35 feet wide Point 2 : .2 feet deep, 50 feet wide Point 3: 3.5 feet deep, 45 feet wide Point 4: 9 feet deep, 40 feet wide Average depth: 4 feet
Overall Assessment: 8		
Channel Condition	9.5	Natural channel with three bridges, some rip rap under bridges.
Hydrology	9	Recent evidence of water reaching high water marks. Frequent high level with flooding occurring every three to five years.
Riparian Zone	5	Natural vegetation extends half of the active channel width on each side. Two to three areas where banks were extremely steep and vegetation was sparse. The railroad came very close to the river at one point with little or no riparian zone.
Bank Stability	6.5	Banks were moderately stable with some high banks towards the end of the segment, with one notably eroded section with no vegetation where banks could collapse. Steep banks periodically especially near railroad.
Water Appearance	7	Some turbid slightly green area but mostly clear.
Nutrient Enrichment	8	Two spots of green hairy plants growing on rocks, one at the beginning of the segment and 3/4 of the way downstream, also green plants growing on rocks.
Barriers to Fish	10	No visible barriers to fish movement.
In-stream Fish Cover	8	Excellent fish breeding habitat. Logs, large woody debris, many deep pools, overhanging vegetation, riffles, cobbles, undercut banks and backwater pools evident.
Pools	10	At least four very deep pools that were over five feet deep.
Invertebrate Habitat	10	At least five types of insect habitat were evident including boulders, large cobble, submerged logs and woody debris, undercut banks and overhanging trees.
Canopy Cover		N / A
Embeddedness	9	Rocks, cobble and boulders were 20-30 percent embedded.

Segment Two		
Assessed by: Julie, Alan, Elizabeth, and Claire Shope Date: September 6, 2004 Time: 11 a.m. Temperature: 80° F Weather: partly sunny Existing Land Use: Recreational, forest, residential, agricultural		Average width: 60 feet Average depth: 1.5feet
Overall Assessment: 7.9		
Channel Condition	9	Channel condition seemed good, with minor flaws consisting of several trees that had fallen across the channel through adjacent erosion, which were catching miscellaneous debris, creating a channel obstruction. Also, minor obstruction from stones left over from a 19 th century farm crossing. There were two railroad crossings.
Hydrology	10	This section of the river floods annually and is entirely located in the Wassaic flood plain.
Riparian Zone	3	In general, the riparian zone was in good natural condition, but it was entirely missing along the western bank by May Lane, adjacent to approximately a dozen houses that were located one to 50 feet away from the river's edge. This area included two docks and was completely manipulated by human habitation. At southern eastern side of this section, there were agricultural fields being used within 20 feet of river.
Bank Stability	7	Banks generally stable, with several exceptions, including various ATV crossings, approximately 200 yards of eroding gravel bank adjacent to the Taconic DDSO and occasional riprap adjacent to railroad tracks.
Water Appearance	10	Clear!
Nutrient Enrichment	9	Segment was mostly small stones with small amounts of brown and green algae clinging to stones.
Barriers to Fish	10	No barriers to fish-movement found.
In-stream Fish Cover	10	If you were a fish this is where you would want live.
Pools	10	Terrific pool diversity.
Insect Habitat	10	Excellent, all forms of Invertebrate habitat available.
Canopy Cover	7	Mixed canopy cover.
Embeddedness	N/A	We did not have any apparent embeddedness.

Segment Three

Assessed by: Tonia Shoumatoff, Kathy Gallo, and Dave Reagon Date: Oct. 26, 2004 Time: 11 a.m. Temperature: 65° F Weather: partly sunny Existing Land Use: Recreational, forest, residential, agricultural, industrial		Average width: 60 feet Average depth: 1.5feet
Overall Assessment: 9.5		
Channel Condition	10	Some rip rap, some concrete slabs near Mill Street Bridge.
Hydrology	10	Rapids near bridge, lots of pools and riffles.
Riparian Zone	8	Well developed and preserved in most places.
Bank Stability	10	Some unstable slopes, much ATV activity.
Water Appearance	10	Great, clear always.
Nutrient Enrichment	10	None
Barriers to Fish	9	None
In-stream Fish Cover	10	Good
Pools	10	Plentiful
Insect Habitat	8	Good
Canopy Cover	10	Heavy in some places.
Embeddedness	10	Good

Segments Four and Five

<p>Assessed by: Joseph and Evelyn Chiarito Date: September 7, 2004 Time: 10 a.m. Temperature: 78° F Weather: Sunny and humid Existing Land Use: Recreational, forest, medium density residential.</p>	<p>Average width: 36 feet Point 1: 1.5 deep, 35 feet wide Point 2 : 2 feet deep, 45 feet wide Point 3: 1.5 feet deep, 30 feet wide Point 4 : >5 feet deep, 35 feet wide Average depth: 2.5 feet</p>	
Overall Assessment: 7.1		
Channel Condition	10	
Hydrology	10	Prone to flooding.
Riparian Zone	3	Variable, good to poor.
Bank Stability	3	Poor, treeless and agricultural areas.
Water Appearance	9	Sometimes turbid.
Nutrient Enrichment	8	Algae in some areas.
Barriers to Fish	10	None
In-stream Fish Cover	5	Moderate
Pools	8	Several deep pools.
Insect Habitat	7	Good
Canopy Cover	7	Variable, good to none.
Embeddedness	5	

Segment Six

Assessed by: Tonia Shoumatoff and Jan Weido Date: September 2, 2004 Time: 9:30 a.m. Temperature: 70° F Weather: Sunny Existing Land Use: Recreational, forest, and agricultural.		Average width: 65 feet Average depth: 2.5 feet Visible human activities: Farming, hunting and shooting preserve.
Overall Assessment: 9.5		
Channel Condition	10	No evidence of channel alteration except for some riprap under the Lime Kiln Bridge.
Hydrology	7	The high water mark is about 8 to 10 feet above the stream.
Riparian Zone	9	Excellent canopy cover.
Bank Stability	10	Banks are generally stable except in a couple of places.
Water Appearance	10	Very clear.
Nutrient Enrichment	10	Clear water with no algae growth.
Barriers to Fish	10	No barriers to fish movement.
In-stream Fish Cover	10	Lots of deep pools, boulders, woody debris, undercut banks, and other good fish habitat.
Pools	10	Lots of deep and shallow pools.
Invertebrate Habitat	10	At least six different insects and insect larvae observed. Good habitat for macroinvertebrates because of the riffles, logs, boulders and undercut banks.
Canopy Cover		Good canopy cover.
Embeddedness	10	

Segment Seven		
Assessed by: Krista McGhee, Dennis Rooney, and Betsey Park Date: August 25, 2004 Time: 12 noon Temperature: 70° F Weather: Overcast, calm Existing Land Use: Recreational, forest, medium density residential, agricultural		Average width: 68 feet Point 1: 6.5 feet deep, 78 feet wide Point 2 : 3.5 feet deep, 60 feet wide Point 3: 3 feet deep, 70 feet wide Average depth: 3.6 feet
Overall Assessment: 7		
Channel Condition	10	There were very high banks but very little evidence of channel alteration. There was rip-rap and the highway drainage site, and many cinder blocks in the river, especially at the end of the segment. Two houses were perched directly over the river on a high bank. Otherwise the condition was excellent.
Hydrology	5	The Tenmile River floods regularly. The banks are incised into the flood plain where terrain dictates.
Riparian Zone	4	Agricultural activity close to the bank, Old Rte. 22 is close to the bank, J & J Lumber had stacks of logs close to the banks.
Bank Stability	6.5	The water level was high with 1 to 5 percent eroded banks and 15 percent exposed roots.
Water Appearance	9	Even after some turbidity due to many days of rain the riverbed was still visible at 2.5 feet.
Nutrient Enrichment	8	There were no signs of algae or aquatic plant growth. The water was clear along the whole segment.
Barriers to Fish	10	No barriers to fish movement.
In-stream Fish Cover	9	There was good fish habitat; regular deep pools, a few areas of overhanging vegetation and fallen trees, large boulders, lots of riffles, several backwater pools and undercut banks.
Pools	?	Could not evaluate due to high water level.
Invertebrate Habitat	10	Excellent insect habitat with many fallen trees, submerged logs, undercut banks, cobble, boulders and other domains conducive to full insect colonization. Identified water pennies, stonefly nymphs, caddisfly larvae, mayfly nymphs and lots of crayfish.
Canopy Cover	N/A	
Embeddedness	10	Very little sediment, cobble and rocks, less than 20 percent embedded.

Segment Eight

Assessed by: Melissa Luthi Date: August 20, 2004 Time: 1-5PM Temperature: 80° F Weather: Sunny Existing Land Use: Recreational, forest, residential, agricultural, industrial		Average width: 50 feet Point 1: 3 feet deep Point 2 : .25 feet deep Point 3: 2.5 feet deep Point 4: 3 feet Average depth: 2 feet
Overall Assessment: 7.6		
Channel Condition	8	Bridges at both ends have affected the channel to a small degree. There were approximately three areas where run-off from hillsides is diverted under County Route 6 down to the river.
Hydrology	7	Most of the banks slope down to the water edge, minimal drop-offs.
Riparian Zone	7	The roadside (west) is generally less than a third of the width of the channel; the east bank is about one channel width. Lots of purple loosestrife and also bamboo has been planted in some areas.
Bank Stability	8	Very little erosion.
Water Appearance	9	River was quite clear in light of the fact that it was evaluated after several days of thunderstorms but before Hurricane Charley.
Nutrient Enrichment	8	There was actually very little aquatic plant life.
Barriers to Fish	10	None.
In-stream Fish Cover	7	Several logs, undercut banks, deep pools.
Pools	8	Assessed several areas along the river where it meandered. Pools were quite deep on the outside of the bends.
Invertebrate Habitat	8	Submerged logs, cobble, undercut banks and boulders.
Canopy Cover	2	One section of the river was covered 40 to 60 percent, but the majority was less than 30 percent, probably due to the flood plain.
Embeddedness	9	Cobble less than 20 percent embedded.

Segment Nine		
Assessed by: Bill Crowley and Mary Borrelli Date: September 20, 2004 Time: 10 a.m. Temperature: 70° F Weather: Sunny Existing Land Use: Recreational, forest, residential, agricultural, industrial		Average width: 60-70 feet Average depth: 2 feet
Overall Assessment: 8		
Channel Condition	9	This section of the river is essentially in its natural state except for the bridge at Reagan's Mill Road.
Hydrology	7.5	Flooding occurs approximately every three to five years. The channel is moderately incised.
Riparian Zone	9	Generally the vegetation extended at least one active channel width on both sides.
Bank Stability	10	Good stability, high banks.
Water Appearance	7	The river is turbid after storms and/or heavy rains.
Nutrient Enrichment	8	The water was generally clear with no algae observed.
Barriers to Fish	8	There were no waterfalls, boulder dams, beaver dams, and significant drops in elevation or other obstructions that would prevent fish migration.
In-stream Fish Cover	10	We found logs and woody debris, deep pools, overhanging vegetation, rocks and boulders, numerous riffles. No isolated, backwater pools.
Pools	7	There are deep and shallow pools along this section of the river.
Invertebrate Habitat	10	The invertebrate habitat rated a 10. Undercut banks, plenty of cobble, boulders and coarse gravel, submerged logs were present as well as overhanging trees and vegetation.
Canopy Cover	1	The stream is so wide that there are not many spots with a real canopy cover.
Embeddedness	10	Many boulders, not too embedded.

Segment Ten		
Assessed by: Theresa Ryan Date: August 8 and 29, 2004 Temperature: 80° F Weather: Sunny Existing Land Use: Recreational, forest, residential, agricultural, industrial		Average width: 50 feet Average depth: 2 feet
Overall Assessment: 8		
Channel Condition	10	No evidence of channel manipulation. Bridge at Webatuck Craft Village appears not to obstruct channel flow.
Hydrology	5	Flooding occurs approximately every four to seven years. The channel is moderately incised. Evidence of high tree roots – in some places as high as four- to five-feet above the current water elevation – and occasional sediment or sand deposits or stream debris were encountered.
Riparian Zone	8	Generally vegetation extended at least one active channel width on both sides. Riparian zone narrow or non-existent at the southeastern end near Old Forge Road, along northwestern portion near Dogtail Corners Road/Webatuck Craft Village and along southwestern portion along Rte 55.
Bank Stability	8	Only three or four instances of eroded banks along this river stretch. Most tree roots extended to base-flow elevations.
Water Appearance	8	Water was very clear at a depth of three to four feet. Deeper channels and pools were obscured by cloudiness. No surface oil sheen and no noticeable film on submerged rocks. After storm events the river is very turbid.
Nutrient Enrichment		Water generally very clear. Very little vegetation along the edges; none in the most active parts of the river. No algae.
Barriers to Fish	10	No waterfalls, boulder dams, beaver dams, significant drops in elevation or other obstructions that prevent fish migration.
In-stream Fish Cover	10	There were logs and large woody debris in several locations along the river, multiple deep pools, and a lot of overhanging vegetation. The majority of this river section contained mostly rocks and boulders, numerous riffles, a few undercut banks, thick root mats and several dense beds of emergent/floating leaf vegetation. There were no isolated, backwater pools.
Pools	8	There are abundant deep and shallow pools along this section of the river. The deepest pools appeared to average three-and-one-half to four feet and the bottoms of these were obscured.
Invertebrate Habitat	7	A few instances of fine woody debris and undercut banks, plenty of cobble, boulders and coarse gravel. Overhanging trees and vegetation observed as invertebrate habitats.
Canopy Cover		The active channel width estimated 50 feet or greater.
Embeddedness	8	The gravel or cobble particles are approximately 20 percent to 30 percent embedded in the riffle areas.

Segment Eleven		
Assessed by: Tonia Shoumatoff, Devin Kyle, David Reagon Date: Aug. 5 and Nov. 12, 2004 Time: 10 a.m. Temperature: 80° F; 58° Weather: Sunny Existing Land Use: Recreational, forest, residential, agricultural		Average width: 60-75 feet Point 1: 1 foot deep, 50 feet wide Point 2 : .3 feet deep, 80 feet wide Point 3: 1 feet deep, 65 feet wide Point 4: 3 feet deep, 100 feet wide Average depth: 2.5 feet
Overall Assessment: 8.9		
Channel Condition	10	Channel is intact and in good condition
Hydrology	10	Water can rise up to six feet above banks during flooding periods.
Riparian Zone	8	Most of this section is a 10; however, there were two houses along the river within 10 to 20 feet of the river.
Bank Stability	8	Very steep banks at certain points muddy to sandy fortified with rocks and tree roots.
Water Appearance	10	Clear, many good features.
Nutrient Enrichment	8	Some green algae over rocks in riffle segments.
Barriers to Fish	10	None
In-stream Fish Cover	10	Abundant in form of rocks, woody debris, streamside overhang.
Pools	8	Many pools and rapids.
Invertebrate Habitat	10	Water was clear, little silting.
Canopy Cover	7	Most places had no-stream canopy.
Embeddedness	8	Rocks and boulders were less than 20 percent embedded.

Data Collection Sample Forms

Stream Team members recorded their findings on Streamwalk Program Survey Sheets provided by Westchester County Soil and Conservation District. This format is used by the Lower Hudson Coalition of Conservation Districts.

You can view these forms at
www.hvatoday.org.



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SEGMENT SURVEY SHEET

Segment Code: _____ **Stream Name** _____

*****All observations are to be made while walking UPSTREAM.*****

Section A: General Characteristics

Name: _____ Time: _____
 Phone: _____ Temperature: (Air) _____ °C (Water) _____ °C
 Date: _____ Weather: _____
 Past 48 hour weather conditions: _____

GPS Location (using UTM NAD83 Datum): START Waypoint # 18 T 5 _____
 UTM 4 _____
 FINISH Waypoint # 18 T 5 _____
 UTM 4 _____

1. Describe location and extent of segment (i.e. from _____ to _____). Indicate any landmarks or roads that would help locate your segment:

2. Measure the depth and the width of the stream at four points along the segment. Record the values in the chart below. Then add the values and divide by 4 to find your averages.

Location	Depth (in feet)	Width (in feet)
Point 1		
Point 2		
Point 3		
Point 4		
	<i>Average</i>	<i>Average</i>

Average Stream Depth (from above) _____ ft.

Average Stream Width (from above) _____ ft.



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*******KEEP TRACK OF THE FOLLOWING DURING YOUR STREAMWALK*******

3. Estimate the number of: (talley as you do your streamwalk)

Small Ponds _____ Dams _____

Discharge Pipes (Estimate the size if possible) _____

Vehicle Crossings _____

4. Describe the existing land uses surrounding your segment (rate from 1-10 where

1=most and 10=least):

_____ High Density Residential (<50ft/du) *du = dwelling unit

_____ Medium Density Residential (50-200ft/du)

_____ Low Density Residential (>200ft/du)

_____ Recreational _____ Agriculture _____ Industrial

_____ Forest _____ Commercial _____ School

_____ Non-Residential Roads

5. Are there visible human activities taking place along the segment (as evidenced by litter, bike & hiking trails, roads, camping areas, etc.)?

If yes, describe activities: _____

If yes, is the area publicly or privately owned? _____

6. List and estimate the number of waterfowl on the segment (Wood Ducks, Mallards, Canada Geese, etc.): _____

.....
Streamwalk surveys developed by Westchester County from multiple sources including the
Natural Resources Conservation Services (NRCS)
.....



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SEGMENT SURVEY SHEET

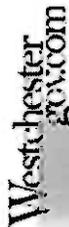
Insert your logo here

Section B: Scoring Descriptions

WALK THE ENTIRE SEGMENT AND MAKE NOTES ON EACH CHARACTERISTIC IN THE SPACES PROVIDED. RATE EACH PARAMETER AFTER COMPLETING THE ENTIRE STREAMWALK ON YOUR SEGMENT.

*****Words in bold type can be found in the glossary*****

EACH ASSESSMENT ELEMENT CAN BE RATED WITH A VALUE OF 1 TO 10. RATE ONLY THOSE ELEMENTS APPROPRIATE TO THE STREAM SEGMENT YOU ARE ASSESSING. USE THE **SEGMENT SURVEY SCORE SHEET** TO RECORD THE SCORE THAT BEST FITS THE OBSERVATIONS YOU MAKE BASED ON THE NARRATIVE DESCRIPTIONS PROVIDED. UNLESS OTHERWISE DIRECTED, ASSIGN THE LOWEST SCORE THAT APPLIES.



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SEGMENT SURVEY SHEET



1. CHANNEL CONDITION

What to do: Evaluate if the channel is in it's 'natural' state, or if there has been some alteration.
What to look for: Signs of channelization or straightening of the stream may include an unnaturally straight section of the stream, high banks, berms, or lack of flow diversity (i.e. if an area only has one type of flow, such as riffles throughout the entire segment, no pools or slow moving sections). Drop structures, irrigation diversions, culverts, bridge abutments, and riprap also indicate changes to the stream channel.

Natural channel; no structures, dikes. No evidence of downcutting or excessive lateral cutting.	Evidence of past channel alteration, but with significant recovery of channel and banks.	Altered channel: <50% of the length having riprap and/or channelization. Excess aggradation ; braided channel. Structures present restrict flow plain width.	Channel is actively downcutting or widening. >50% of the reach with riprap or channelization. Structures prevent access to the flow plain .	Can not evaluate OR Not applicable
10	7	3	1	N/A

Score _____

NOTES:



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SEGMENT SURVEY SHEET

2. HYDROLOGY

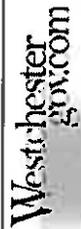
What to do: Estimate the flooding frequency for your segment. You may know your segments flood habits just from your knowledge of your local stream.

What to look for: Evidence of flooding includes high water marks (such as water lines on trees or structures located in the buffer), sediment deposits or stream debris on stream banks or within the **floodplain**.

Flooding every 1.5 to 2 years. No evidence of dams, dikes or other structures limiting the stream's access to the flood plain . Channel is not incised .	Flooding occurs only once every 3 to 5 years; limited channel incision.	Flooding occurs only once every 6 to 10 years; channel deeply incised .	No flooding; channel deeply incised or structures prevent access to flood plain or dam operations prevent flood flows.	Can not evaluate OR Not applicable
10	7	3	1	N/A

Score _____

NOTES:



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3. RIPARIAN ZONE

What to do: Examine both sides of the stream and note where vegetation does and does not exist.

What to look for: Compare the width of the riparian zone to the active channel width. A common problem is lack of shrubs and understory trees. Another common problem is lack of regeneration (presence of only mature vegetation and lack of seedlings).

Natural Vegetation extends at least two active channel widths on each side. (i.e. if stream is 2 ft. wide, the natural vegetation is 4 ft. wide on each bank.)	Natural vegetation extends one active channel width on each side. OR If less than one width, covers entire flood plain.	Natural vegetation extends half of the active channel width on each side.	Natural vegetation extends a third of the active channel width on each side.	Natural vegetation less than a third of the active channel width on each side. OR Lack of regeneration	Can not evaluate OR Not applicable
10	8	5	3	1	N/A

Score_____

NOTES:



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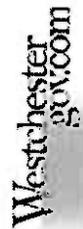
4. BANK STABILITY

What to do: Estimate the size or area of the bank affected by erosion relative to the total bank area in your segment.
What to look for: Signs of erosion include unvegetated stretches, exposed tree roots, or scalloped edges. Evidence of construction, vehicular, or animal paths near banks suggests conditions that may lead to the collapse of banks. This may be hard to evaluate during high water.

Banks are stable; banks are low (at elevation of active flood plain): outside bends that are eroding are 33% or more protected with roots that extend to the base-flow	Moderately stable; banks are low (At elevation of active flood plain): less than 33% of eroding surface area of banks in outside bends is protected by roots that extend to the base-flow elevation.	Moderately unstable; banks may be low, but typically are high (flooding occurs 1 year out of 5 or less frequently): outside bends are actively eroding (overhanging vegetation at top of bank, some mature trees falling into stream, some slope failures apparent).	Unstable; banks may be low, but typically are high; some straight reaches and inside edges of bends are actively eroding as well as outside bends (overhanging vegetation at top of bare bank, numerous mature trees falling into stream, numerous slope failures apparent).	Can not evaluate OR Not applicable
10	7	3	1	N/A

Score _____

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5. WATER APPEARANCE

What to do: Evaluate the clarity of the water.

What to look for: The deeper an object in the water can be seen, the lower the amount of **turbidity**. Use the depth that objects are visible only if the stream is deep enough to evaluate turbidity using this approach. If the water is clear, but only 1 foot deep, do not rate as if an object became obscured at a depth of 1 foot. This measure should be taken after a stream has had the chance to “settle” after a storm event.

Very clear or clear but tea-colored; objects visible at depth 3 to 6 ft. No oil sheen on surface; no noticeable film on submerged objects or rocks.	Occasionally cloudy, especially after storm event, but clears rapidly; objects visible at depth 1.5 to 3 ft.; may have slightly green color; no oil sheen on water surface.	Considerable cloudiness most of the time; objects visible to depth 0.5 to 1.5 ft.; slow sections may appear pea-green; bottom rocks or submerged objects covered with heavy green or olive-green film. OR Moderate odor of ammonia or rotten eggs	Very turbid or muddy appearance most of the time; objects visible to depth <0.5 ft; slow moving water may be bright green; other obvious water pollutants; floating algal mats, surface scum, sheen or heavy coat of foam on surface; OR Strong odor of chemicals, oil, sewage, other pollutants.	Can not evaluate OR Not applicable
10	7	3	1	N/A

NOTES:

Score _____



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6. NUTRIENT ENRICHMENT

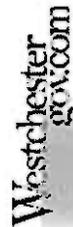
What to do: Evaluate the amount of aquatic vegetation present.

What to look for: Some aquatic vegetation is normal and indicates a healthy stream. Excess nutrients cause excess growth of algae and aquatic plants, which can create a greenish color to the water. Clear water and a diverse aquatic plant community without dense plant populations are optimal for this characteristic.

Clear water along entire segment; diverse aquatic plant community includes low quantities of many species of aquatic plants; little algal growth present.	Fairly clear or slightly greenish water along entire segment; moderate algal growth on stream substrates.	Greenish water along entire segment; overabundance of lush green aquatic plants; abundant algal growth, especially during warmer months.	Pea green, gray, or brown water along entire reach; dense stands of aquatic plants clog stream; severe algal blooms create thick algal mats in stream.	Can not evaluate OR Not applicable
10	7	3	1	N/A

Score _____

NOTES: _____



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7. BARRIERS TO FISH MOVEMENT

What to do: Look for barriers within the stream segment that potentially can block fish passage through the segment.
What to look for: Some barriers are natural, such as waterfalls and boulder dams. Note the presence of human developed barriers, their size and whether provisions have been made for fish passage. Beaver dams generally do pose a problem for fish migration. Also look for structures that may not involve a drop, but still present a hydraulic barrier. Small culverts or large ones with insufficient water depth and slopes may cause high water velocities that prevent fish passage.

No barriers	Seasonal low water levels inhibit movement within the stream segment.	Drop structures, culverts, dams, or diversions (<1 ft. drop) within the stream segment.	Drop structures, culverts, dams, or diversions (>1 ft. drop) within 3 miles of the segment.	Drop structures, culverts, dams, or diversions (>1 foot drop) anywhere within the stream.	Can not evaluate OR Not applicable
10	8	5	3	1	N/A

Score _____

NOTES: _____

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8. INSTREAM FISH COVER

What to do: Observe the number of different habitat and cover types within a representative section of your segment. Each type must be present in appreciable amounts to score.

Habitat Types to look for: Logs/large woody debris, deep pools, overhanging vegetation, boulders/cobble, riffles, undercut banks, thick root mats, dense beds of emergent/floating leaf vegetation, isolated/backwater pools, other: _____

Greater than 7 habitat types available.	6 to 7 habitat types available.	4 to 5 habitat types available.	2 to 3 habitat types available.	None to 1 habitat types available.	Can not evaluate OR Not applicable
10	8	5	3	1	N/A

Score _____

NOTES: _____

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9. POOLS

What to do: Look for deep and shallow pools existing within your stream segment.
What to look for: Pool diversity and abundance are estimated based on walking the stream or probing from the streambank with a stick. You should find deep pools on the outside of meander bends. In shallow, clear streams a visual inspection may provide an accurate estimate. In deep streams or streams with low visibility, this assessment characteristic may be difficult to determine and should not be scored.

Deep and shallow pools abundant; the pool bottom is greater than 30% of the pool bottom is obscure due to depth, or the pools are at least 5 feet deep.	Pools present, but not abundant; from 10 to 30% of the pool bottom is obscure due to depth, or the pools are at least 3 feet deep.	Pools present, but shallow; from 5 to 10% of the pool bottom is obscure due to depth, or the pools are less than 3 feet deep.	Pools absent, or the entire bottom is visible.	Can not evaluate OR Not applicable
10	7	3	1	N/A

Score _____

NOTES: _____



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10. INSECT/INVERTEBRATE HABITAT

What to do: Observe the number of different types of habitat and cover within a representative section of your segment. Each cover type must be present in appreciable amounts to score.

Habitat Types to look for: Fine woody debris, submerged logs, undercut logs, overcut banks, cobble, boulders, coarse gravel, other: _____

At least 5 types of habitat available. Habitat is at a stage to allow full insect colonization (woody debris and logs not freshly fallen).	3 to 4 types of habitat. Some potential habitat exists, such as overhanging trees, which will provide habitat, but have not yet entered the stream.	1 to 2 types of habitat. The substrate is often disturbed, covered, or removed by high stream velocities and scour or by sediment deposition.	None to 1 type of habitat.	Can not evaluate OR Not applicable
10	7	3	1	N/A

Score _____

NOTES:



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11. CANOPY COVER (if applicable)

What to do: Try to estimate how much of the river's corridor has tree canopy (cover). Do not assess this element if the active channel width is greater than 50 feet. Do not assess this element if woody vegetation is naturally absent (e.g. wet meadow).
What to look for: Estimate areas with no shade, poor shade, and shade. The relative amount of shade is estimated by assuming that the sun is directly overhead and the vegetation is in full leaf-out condition.

The stream corridor has >60% canopy cover.	Average width of canopy cover is between 40 - 60%.	Average width of canopy covers between 30 and 40% of the stream channel.	Tree canopy covers <30% of the stream corridor.	Can not evaluate OR Not applicable
10	7	3	1	N/A

Score _____

NOTES: _____



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12. EMBEDDEDNESS

What to do: Do not assess this element unless riffles are present or they are a natural feature that should be present. This characteristic should be used only in riffle areas and in streams where this is a natural feature. Estimate what percent of bottom particles are buried in sediment in the riffle areas.

What to look for: The measure is the depth to which objects are buried in the sediment. This is made by picking up particles of gravel or cobble with your fingertip at the fine sediment layer. Test for complete burial of a streambed by probing with a stick.

Gravel or cobble particles are less than 20% embedded.	Gravel or cobble particles are 20 to 30% embedded.	Gravel or cobble particles are 30 to 40% embedded.	Gravel or cobble particles are greater than 40% embedded.	Stream bottom is completely embedded.	Can not evaluate OR Not applicable
10	8	5	3	1	N/A

Score _____

NOTES:



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SEGMENT SURVEY SHEET

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Please transfer the scores recorded onto the Segment Survey Score Sheet provided in your packet.

.....

1. Did you walk this whole section of the stream? YES _____ NO _____
2. Would you be interested in doing more hands-on testing on your segment? (for example: chemical analysis or looking for macroinvertebrates (stream insects))? YES _____ NO _____
3. Other comments/concerns: _____

