

1.1 Purpose: Why a *Stream Management Plan*?

Many generations of families have managed the streams of the Catskills, and the West Kill is no exception. The residents of the West Kill valley –from the DEC pullout at the top of the valley, to the junction pool at the Schoharie-- know the awesome power of the creek. Over the past several centuries of European settlement they learned how to harness that power, but also to keep out of its way when floodwaters roared, tumbling boulders down the streambed and making the foundations of their homes on the stream banks tremble. The creek has been bermed many places, revetted in many more, and intentionally redirected in some of its reaches. It has been abutted with numerous bridges, built to allow both sides of the stream to be settled. Hardened road embankments have edged in on the creek at many narrow points in the valley. Floodplains and streamside wetlands have been filled in some places, diversions created to sluice water into floodplain ponds in others, and pastures and lawns cleared along its banks and terraces. The fish community was historically augmented with sport fish by the NYSDEC. Trees in the powerline rights-of-way --which frequently run along the streambanks-- are routinely lopped or removed. Each of these activities are, in some way, stream management activities.

For all this management, the stream remains relatively wild, and generally quite healthy. It still shifts around within its floodplain during the big floods, as those who remember the floods of 1987 and 1999 (or the many others before!) will attest. The fishing is pretty good, although local anglers will tell you it was better 20 years ago. The water quality is high for the most part, although for several days after a heavy rain the stream can look like chocolate milk. Summer residents still cool off during the dog days of July and August in the pools of the West Kill, although oldtimers recall that the swimming holes were once deeper. The forests that are returning to the hillsides throughout the Catskills are also returning along many reaches of the West Kill, keeping the water cooler and the banks more stable. So why does the West Kill need a management *plan*?

In past years, efforts to manage the stream have been relatively uncoordinated. Landowners managed their own stream banks and floodplains, highway superintendents managed road embankments and bridges, power companies cleared their rights-of-way. When there were major problems, federal agencies such as NRCS or FEMA brought their resources to bear to try to address an immediate need. NYS Department of Environmental Conservation requires a permit for certain activities in or near streams. The U.S. Army Corps of Engineers also has a similar permitting program (see Section 2.??). Each of these players in stream management had their own objectives, their own knowledge or area of expertise, and their own ideas about what needed to be done to keep the stream healthy. No one, however, held responsibility for coordinating all of these isolated efforts. More importantly, no one was making sure that one person's stream management actions didn't compromise the interests and efforts of others. Streams are systems: what someone does on their own stream bank can create significant effects –good or bad– upstream or downstream. While we maintain individual rights to use our own land as we think best, and individual responsibilities to act as good stewards for the health of the stream, streams are in many ways a community resource, and cannot be effectively

managed without a coordinated effort. It is because we recognize the many benefits streams contribute to our community's quality of life, and also the many risks they pose, that we need to coordinate decision-making around the goals we identify collectively for the stream, for the common good. While that coordination requires an ongoing commitment, this Plan represents an effort to significantly improve that coordination.

Furthermore, for all of the local knowledge about the West Kill, questions remained: How can we know whether the erosion we still see along stream banks is just a natural part of the way streams evolve, or whether we are now seeing *excessive* erosion, and a stream system destabilized by the way we've managed it in the past? Where there are problems, will the stream "fix" itself, and how long will that take? What further problems will likely result in the meantime? Or do we need to change our management strategies, and undertake major projects to restore or protect stream channel stability? Where should we invest our limited resources for restoration or protection? How can we know more reliably the condition of the fish community and the quality of the stream habitat? How can we tell if the water is staying turbid longer than it used to after a storm, or if that's always been the nature of West Kill, due to its geology? What is the trend in the overall health of the West Kill?

In recent decades, advances have been made in the science of stream form and function (see Section 3.2 Introduction to Stream Processes). As part of the process of developing this plan, assessments and inventory of the condition of the stream were undertaken utilizing state of the art methods, and the results of those assessments are described in this Plan. As such, the Plan documents baseline conditions in the West Kill, and future managers can measure future conditions against these baselines to determine trends.

This stream management plan was created cooperatively through the efforts of the West Kill streamside community, local leaders and representatives of agencies involved in different aspects of stream management. It identifies the common, shared goals that many have for the West Kill stream and its adjacent floodplains, forests and wetlands. In addition to identifying our common goals, it identifies competing goals as well, and provides a "road map" for coordination among the many "stakeholders." Stakeholders are those who rely on, work with, and/or live by the waters of the West Kill, including: local landowners concerned about erosion, flooding, the fishery and the beauty of the stream, Town of Lexington and Greene County Highway Departments and the New York State Department of Transportation, responsible for managing the roads, bridges and culverts that residents and area emergency personnel use regularly; utilities that manage rights of way along the stream; anglers who enjoy the trout fishery; and even the communities of the Lower Hudson Valley and the City of New York, nine million residents who ultimately drink some of the West Kill's waters.

This Plan also includes summaries of pre-existing inventories and historical data, as well as the results of inventories, assessments and analyses completed specifically for inclusion in the Plan. Based on this information, the Plan presents recommendations for things that can be done individually and collectively to reduce the risks of living in the

West Kill valley, improve the ecology of the stream and floodplain, and protect its many resource values.

1.2 Why a Stream Management Plan for the *West Kill*?

The West Kill mainstem originates across the line in the Town of Hunter on the southwest slopes of Hunter Mountain, and flows from an elevation of over 3000 feet, west into the Town of Lexington, through the communities of Spruceton, West Kill and Lexington, to the junction pool at the Schoharie Creek just downstream of the NYS Route 42 crossing. Though the stream is modest relative to some other tributaries and streams in the Catskills, for the residents of the West Kill valley, it has an immense impact on quality of life, providing both great benefits and great challenges.

Interest in developing a coordinated management strategy for the West Kill was heightened after the January 19, 1996 catastrophic flood event. As a result of that flood, the costs of damage to private property and public infrastructure throughout the Catskills ran into the many millions of dollars. Large flood events had previously caused extensive damage in the West Kill valley every decade or two, including over two million dollars in damages after the 1987 flood. In 1996, severe bank erosion occurred in many places throughout the West Kill: four bridges across the creek were lost and several others damaged. Several sections of County Route 6 were undermined. For the streamside community, the potential for life-threatening loss of access for emergency services, on both the state and county highways, was most disturbing.

In the eastern Catskill Mountains, stream beds and banks frequently include clay-rich soils, and as a result streams generally become muddy, or “turbid,” after major rainstorms or snowmelt events that bring flood flows. Often, these same streams run clear at low flows. After the 1996 flood, after the dramatic stream and infrastructure damages that resulted, and after subsequent emergency repair work, it was apparent that something had changed in West Kill. Since 1996, small instability and erosion problems became much worse, small eroding banks grew into large failures, and the stream began to run turbid even after small storms. In addition, a number of stream reaches in the West Kill appeared to be quickly cutting down, or “incising”, into thick layers of clay underlying the cobble of the streambed.

This condition was noticed by streamside landowners, anglers, resource agencies responsible various aspects of stream management, and by the New York City Department of Environmental Protection, who has been asked by the USEPA to identify and reduce sources of “turbidity” in its water supply watershed. The NYC DEP had already identified the West Kill as a disproportionate contributor to suspended sediment and related turbidity in the Schoharie Creek drainage basin during the 1990s.

Recognizing that certain common management practices in a mountainous setting combined with catastrophic flood conditions can result in increased bed and bank erosion and turbidity, the DEP initiated a voluntary planning effort with the Greene County SWCD, the New York State Department of Environmental Conservation and the US Army Corps of Engineers. These core agencies agreed to work together to fund and coordinate the development of this management plan, and to construct stream stability restoration projects at two sites in the valley (see Section 5, Shoemaker Demonstration

Stream Stability Restoration Project) in order to demonstrate the effectiveness of various best management practices.

These agencies recognized the importance of local leadership for development of an effective management strategy for the West Kill. The GCSWCD and NYCDEP led a partnership effort with local stakeholders living and working along the stream by convening a Project Advisory Committee (PAC) to develop, guide and implement the goals and objectives of the management plan. In addition to the core agencies, the PAC included town officials, representatives of highway departments at the town, county and state levels, and local landowners who lived along the West Kill. This planning process has helped foster stronger partnerships among local, state, city and federal agencies, and landowners and various private organizations in the West Kill watershed. The plan is intended to facilitate cooperation and communication between various parties, building community relationships and support for stewardship of the stream as a vital natural resource.

1.3 Goals and Objectives for this Management Plan

There are four primary goals for the management plan:

- 1) Document risks and outline a plan to reduce damage to private property and public infrastructure - roads, bridges and utility lines – from floodwaters and stream erosion;
- 2) Summarize known information and outline a plan to protect and improve water quality;
- 3) Document current conditions and outline a plan to protect and enhance the integrity of stream and floodplain ecosystems, and of the unique communities of plants and animals that use the stream and floodplains as their home; and
- 4) Provide a strategy for coordination of management activities among the various stakeholders, to ensure no one of the above goals is achieved at the expense of another.

The following sections describe the Plan's objectives related to each of these goals.

Flooding and Erosion Threats

The risks associated with floods and their powerful erosive forces can affect an individual landowner or an entire community. To reduce these risks, this plan proposes to achieve the following objectives:

- 1) Conduct a watershed-wide survey of landowners to assess the history of flood damages, concerns and interests in the stream;
- 2) Conduct a physical survey and analysis of the stream channel and floodplain, to better understand how the stream is likely to behave in future flood events, as indicated by the physical form, or *morphology*, of the stream;
- 3) Identify, monument (for ongoing monitoring) and survey sites of bank erosion, assess their relative stability, and make prioritized recommendations for their treatment;
- 4) Identify those locations where roads, bridges or culverts may be threatened by bank erosion, or are otherwise unstable or threatened, and make prioritized recommendations for their treatment.
- 5) Identify those locations where improved or residential areas may be threatened by bank erosion, and make prioritized recommendations for their treatment;
- 6) Identify those locations where glacial lake clay and/or bank location could exacerbate bank erosion problems leading to high water quality risks, and make

prioritized recommendations for their treatment.

Water Quality

Potential impairments to water quality can come from many sources, and they can affect both surface waters and ground water supplies for wells. To protect and improve ground and surface water supplies, this plan proposes to achieve the following objectives:

- 1) Review existing water quality monitoring data and identify, to the extent possible, identify the most significant water quality impairment(s) in the West Kill;
- 2) Identify the likely sources of suspended sediment from within the stream channel, and make prioritized recommendations for their treatment;
- 3) Identify the most likely sources of suspended sediment from upland areas, if any, and make prioritized recommendations for their mitigation;
- 4) Identify potential sources of contamination from landfills or dumping areas in the stream corridor, and make prioritized recommendations for their mitigation; and
- 5) Identify potential sources of contaminants from road runoff, and make prioritized recommendations for their mitigation.
- 6) Identify potential sources of contaminants from households, and make prioritized recommendations for their mitigation.

Ecological Health and Fish Habitat

The health of our stream and floodplain ecosystems is increasingly recognized as a key element in our quality of life, a community resource as valued by some as others might value good schools or reliable emergency services. Healthy streams support a diversity of fish and insect species, and healthy floodplains support a variety of tree and shrub species, as well as wildlife that can only thrive along streams with high ecological integrity. Healthy streams provide higher recreation value, and increase property values for the individual landowner and the community as a whole. To achieve the goal of optimizing stream and floodplain ecosystem integrity, this plan proposes the following objectives:

- 1) Characterize the status of stream ecosystem health in general terms for the West Kill as a whole, using existing fish and insect population data, and outlining the general threats to ecosystem health and integrity;
- 2) Survey local residents' experience with the West Kill fishery, to determine perceived trends and document its management by local angling groups and the NYSDEC;

3) Conduct a study a) mapping the habitats and habitat characteristics throughout the West Kill under varying flows, b) characterizing fish species' presence or absence in those different habitats, c) establishing a target fish community structure based on regional and historic fish community data, and d) make recommendations for improvement of habitat for the target community;

4) Monitor the response of fish and macroinvertebrate community structure to stream stability restoration practices implemented during the course of the development and implementation of the management plan;

5) Characterize current riparian vegetation management in West Kill, and make prioritized recommendations for changes that can improve ecosystem integrity; and

6) Conduct field surveys of selected riparian vegetation; make prioritized recommendations for management and further study of the riparian zone.

Coordination

Streams are currently "managed" by many different individuals, agencies and organizations. Each of these groups has its own "take" on the stream, and each has unique goals and management practices. Sometimes the goals and practices of one group can be at cross-purposes with others, but through better communication and coordination, and by coming to agreement on a common strategy, these potential conflicts can be minimized or avoided altogether. To promote the goal of effective coordination among the many stakeholders, this plan proposed the following objectives:

1) Establish a Project Advisory Committee consisting of representatives of all significant stakeholder groups to coordinate the development and implementation of the plan;

2) Conduct a survey of West Kill residents to determine their concerns, interests and current stewardship practices;

3) Encourage and support the formation and activities of a West Kill Watershed Association to represent landowner interests, especially to the Project Advisory Committee during development of the management plan;

4) Survey highway superintendents on their concerns, interests and current management practices and priorities, and make recommendations to address these concerns;

5) Survey the needs of local stakeholders for information needed to promote land use consistent with the long-term, collective goals of the West Kill community, and make recommendations for strategies to acquire that information;

6) Determine the needs of various stakeholder groups for technical assistance, information and education, and make recommendations for the development of programs to meet those needs;

7) Document baseline conditions of the West Kill and floodplain that can be used as benchmarks to gauge progress toward the collective goals of the community and others with an interest in keeping the stream and its neighbors both healthy and happy.

1.4 Guide to the Organization of this Plan

The West Kill Stream Management Plan has been arranged in seven sections. In Section 2, regional and watershed background information is provided to set the environmental and institutional context of stream management in West Kill, and the Catskills in general. Existing institutional relationships for stream management in the West Kill are discussed, as are the interests, jurisdictions and management purview of the many project stakeholders.

Section 3 includes a summary of water quality assessments that have been undertaken over the years in the West Kill, and introduction to the science of stream processes and a description of the watershed assessment that was undertaken specifically to develop this plan.

Section 4 provides detailed descriptions and specific recommendations for approximately 9.7 miles of stream, from NYS DEC property at the top of the West Kill watershed, down to the mouth of the stream where it meets the Schoharie Creek. This section provides a useful reference for the extent of current problems at a localized stream reach scale, with specific recommendations for action and references to other sections of the plan for further information or resources. The main stem has been organized into Management Units (MUs), subdivided using physical stream characteristics, property boundaries, location of bridges and road infrastructure, and valley characteristics, all gathered through a detailed stream assessment survey conducted in 2004. These MU descriptions outline stream conditions (its bed and banks), general streamside (*riparian*) vegetation condition, and proximity and arrangement of roads, bridges and culverts. Conditions and recommendations are organized by management objective. Descriptions provide guidance and suggestions for specific projects or assessments in these categories, and any ongoing monitoring that can provide further detail to define specific problems. Summary tables provide a condensed version of each expanded description, and companion maps show the location of specific features described in the text.

Section 5 presents a report on the demonstration stream restoration project at Shoemaker Road.

In Section 6, watershed-wide, programmatic recommendations are provided.

Section 7 suggests an approach for moving toward implementation of the recommendations in this plan.