The Chestnut Creek Stream Management Plan

Volume I of II

Background, History and Watershed Description

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i. Foreword

It is the distinct pleasure of the Sullivan County Soil and Water Conservation District to release Parts I and II of the Chestnut Creek Stream Management Plan. After three years of teamwork by many dedicated individuals, the initial objectives of this undertaking have been reached, and the Management Plan has come together.

Part I of the Management Plan will be a "reference manual" complete with graphs, tables, pictures, and facts about the stream. It will serve as a guide for broad-based in-depth studies of Chestnut Creek and its tributaries. Part II will be a condensed "field manual" that will serve as a quick guide for general information and will be able to be utilized in the field for application of on the ground work.

It is the hope and desire of the Soil and Water Conservation District that this Management Plan will continue to grow and be updated with time. A plan such as this is never complete; it must be amended and updated continually as needs, suggestions, concerns, zoning, etc. change within the community.

We sincerely hope that this plan will serve as a valuable reference tool for many years to come!

Brian Brustman
District Manager
Sullivan County Soil & Water Conservation District
February 2004

Front cover photo of Hilltop Road Bridge, 2001.
Photo taken by Leslie Kirby, SCSWCD.

ii. Acknowledgements

The creation of the Chestnut Creek Management Plan has been enabled by the concentrated efforts of many people, working as a team, over the past three years. Firstly, we appreciate the efforts of Lori Kerrigan, Leslie Kirby, and Brian Brustman, Sullivan County Soil and Water Conservation District (SCSWCD) staff, who helped oversee much of the field effort and the project coordination, and drafted many sections of this management plan. We recognize the contribution of our current Technical Assistant and former AmeriCorps, Barbara Barone, as well as past AmeriCorps, Derrick Kelly and seasonal field crews, especially Christina Falk, for undertaking the tedious process of documentation and data collection.

We would also like to thank the NYC Department of Environmental Protection Stream Management Program (DEP SMP) staff for initiating this stewardship effort, and providing training and technical assistance and for their continued support, especially that of Sarah Miller, Beth Reichheld, Dan Davis, Phil Eskeli, and Beth Gelber. We wish to thank the Chestnut Creek Project Advisory Committee, a team of 35 who are identified in Section 2.0. We especially appreciate the participation of Russel Scheirer who has actively served as liaison to and representative of the landowners on the PAC, with co-representative Carol Smythe, Town Historian who volunteered time and information for the historical section of the plan.

We recognize local organizations such as the Beaver Dam Club, the Grahamsville Rod and Gun Club, Sullivan County Community College Geology Department, the NYS Department of Environmental Conservation (DEC) Fisheries and Habitat divisions, Cornell Cooperative Extension of Sullivan County (CCE) and DEP Division of Water Quality Control (Grahamsville), for their written contributions to the stream management plan.

We would like to acknowledge the Watershed Agricultural Council (WAC) for providing support for the Demonstration Restoration Project. We also recognize the cooperation of Town Supervisor Georgianna Lepke in helping make this effort a reality for the Chestnut Creek Watershed. We appreciate Gary VanValkenburg and the Town of Neversink Highway Department for lending equipment and operators for restoration projects along the Chestnut Creek. We want to thank Barbara Restaino, landscape architect, who also put in many volunteer hours to help design and implement the Demonstration Project. We are grateful for the advice and guidance of Natural Resources Conservation Service (NRCS) and CCE. We also thank Crystal Falls Farm for supplying so many of the materials needed for the project. We wish to acknowledge Integrated River Solutions (IRS) for the effort they have expended to better the restoration project.

A special thanks is extended to both IRS and Clear Creeks Consulting for providing recommendations and analysis for the stream management plan and management units. We recognize the contribution of the staff of the Sullivan County SWCD who showed great support for their colleagues throughout the development of the plan and the completion of the Grahamsville Town Hall demonstration project in Fall 2003 This stream management plan would not have been possible without its funders, and we thank the DEP SMP through the Water Resources Development Act of 1996 (WRDA), WAC, and the US Army Corps of Engineers under the Watershed Environmental Assistance Program.

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View of Chestnut Creek. Photo taken by Leslie Kirby, SCSWCD.

A. Introduction: What is a Stream Management Plan for Chestnut Creek?

Stream management is an emerging discipline that recognizes the importance of our local streams to our overall quality of life, and seeks to coordinate decision-making around common goals we collectively identify for the stream.

This stream management plan was created cooperatively by the Chestnut Creek watershed community, local leaders and agency representatives, and identifies common goals that many have for Chestnut Creek 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 Chestnut Creek, including: Town and County Highway Departments responsible for managing Chestnut Creek and its bridges and culverts, local landowners concerned about erosion, flooding and the beauty of the stream, anglers who seek out the rich trout fishery, and even the City of New York, which ultimately shares the creek's waters with the city's 9 million residents.

The Chestnut Creek Stream Management Plan summarizes the benefits, problems and needs of the entire creek and watershed sub-basin. The plan provides recommendations for long-term stream stewardship and protection of water quality.

B. Purpose: Why Develop a Management Plan for Chestnut Creek?

The Chestnut Creek mainstem flows approximately 5 linear miles through the town of Neversink and the hamlet of Grahamsville before it empties into the Rondout Reservoir located in the Counties of Sullivan and Ulster, New York. The Chestnut Creek Watershed including several tributaries spans 20.9 square miles. Although relatively small compared to others in the Catskills, Chestnut Creek has an immense impact on quality of life to those who live along its banks.

Although the primary land use in the watershed is wild or managed forest, there are areas of agriculture, sand and gravel mining, as well as residential and commercial development along the State Route 55 corridor in the hamlets of Neversink, Curry, Unionville, and Grahamsville. Past and current land use and land management practices in rural areas and hamlets greatly affect water quality, stream bank erosion, sedimentation, flooding, infrastructure damage, and in-stream and stream-side (riparian) habitat. If managed well, effects to and from the stream environment should be minimal, if not mutually beneficial.

Relative to other watersheds in the region, conditions in the Chestnut Creek Watershed appear relatively good, though could nonetheless be improved to benefit local communities. In 1996, the five-mile main stem was included on New York State's Priority Waterbody List (PWL) due to evidence of water quality impairment. Problems identified included potential pathogens, an impaired biological

community, and non-point source pollution. Some suspected causes include development along the lower half of the creek, road salt, and failing septic systems. Periodic flooding in the Chestnut Creek Watershed has caused identifiable stream bank erosion and infrastructure damage along the stream. There are also reaches where the channel or floodplain has been altered through the years causing disturbance to the stream's morphological characteristics, (its shape), and potential ongoing maintenance or disturbance issues.

The importance of developing a long-term stewardship plan for the Chestnut Creek Watershed, while important for the immediate community, is elevated by the Chestnut Creek's status as a primary feeder stream to the Rondout Reservoir. The Chestnut Creek is a terminal feeder in the Rondout Reservoir system (i.e., waters flow directly from Chestnut Creek into the reservoir, rather than into a larger river first). Rondout Reservoir is a Terminal Reservoir (waters flow directly from this reservoir to downstate) and one of six reservoirs in the Delaware District of the New York City drinking water supply system. Water quality in this reservoir is critical to maintaining high drinking water quality standards for upstate and downstate users.

In August 2000, New York City Department of Environmental Protection (DEP) contracted Sullivan County Soil and Water Conservation District (SCSWCD) to develop and implement a stream management plan for the Chestnut Creek Watershed. The planning process has helped foster and facilitate stronger partnerships and further cooperation and communication among local, state, city and federal agencies, landowners and various private organizations in the Chestnut Creek Watershed. The Chestnut Creek Stream Management Plan will serve as a basis for making targeted recommendations to aid development of solutions to issues identified in the watershed. Assessment is applied to the entire watershed to minimize potential for future problems that could result from site-specific analysis, and to support implementation of sound watershed and stream management practices in this watershed context.

The Chestnut Creek Stream Management Plan is an important tool that will provide a unique cooperative opportunity for citizens of the watershed to address property, infrastructure and recreational needs; for stream and resource managers to address environmental needs; for local governments to address infrastructure and planning needs; and finally for the City of New York and many downstate communities to continue to benefit from good quality drinking water.

C. Goals and Objectives for this Management Plan

1. Flooding and Erosion Threats: Document risks and outline a plan to reduce damage to private property and public infrastructure - roads, bridges, residential improvements and utility lines - from floodwaters and stream erosion;

2. Water Quality: Summarize known information and outline a plan to protect and improve water quality;

3. Ecological Health: 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. Coordination: 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.

1. 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:

a) Conduct a watershed-wide survey of landowners to assess the history of flood damages, concerns and interests in the stream;

b) 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;

c) Identify, monument (for ongoing monitoring) and survey sites of bank erosion, assess their relative stability, and make recommendations for their treatment;

d) Identify those locations where improved or residential areas may be threatened by bank erosion, and make recommendations for their treatment; and

e) Assess bridge or culvert crossings that may be at risk from erosion of stream banks or streambeds, or otherwise unstable or threatened, and make prioritized recommendations for their treatment.

2. Water Quality

Potential impairments to water quality can come from many sources, and 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:

a) Determine the most significant sources of water quality impairment in Chestnut Creek from existing water quality monitoring data as available;

b) Identify likely sources of fine or coarse sediment from within the stream channel, and make recommendations for treatment;

c) Identify the most likely sources of

suspended sediment from upland areas, if any, and make prioritized recommendations for mitigation;

d) Identify potential sources of contamination from landfills or dumping areas in the stream corridor, and make recommendations for mitigation; and

e) Identify potential sources of contaminants from road runoff, and make recommendations for mitigation.

3. Ecological Health

The health of stream and floodplain ecosystems has come to be recognized as playing a key role in quality of life in our community – benefiting both stream function impacting our management goals, as well as providing aesthetic and recreational opportunities for enriching streamside living. Healthy streams that support a diversity of fish and insect species, healthy floodplains that support a variety of tree and shrub species, as well as wildlife that can only thrive along healthy streams are invaluable to water quality, stream stability, flood protection and cultural richness. To achieve the goal of optimizing stream and floodplain ecosystem integrity, this plan proposes the following objectives:

a) Characterize the status of stream ecosystem health in Chestnut Creek as a whole, using existing fish and insect population data as indicators of ecological community condition;

b) Survey local landowners' experience with the Chestnut Creek fishery, including their ideas about stocking practices and recreational opportunities;

c) Characterize current floodplain and riparian forest management practices in Chestnut Creek, and make recommendations for changes that can improve ecosystem integrity and floodplain function; and

d) Observe the state of riparian vegetation and make recommendations for further study and management of the riparian zone.

4. Coordination

Sometimes the goals and practices of one group can be at cross-purposes with others, but through better communication and coordination these potential conflicts can be minimized or avoided altogether. In addition, implementing common initiatives can be made more powerful by teaming up with like-minded stakeholders who may be working on similar initiatives in isolation or in a different location. To promote the goal of effective coordination among the many stakeholders, this plan proposes the following objectives:

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

b) Conduct a survey of Chestnut Creek residents to determine their concerns, interests and current stewardship practices;

c) Encourage and support streamside Landowners in Chestnut Creek to represent landowner interests, especially to the Project Advisory Committee during plan development;

d) Survey highway superintendents on their concerns, interests and current management practices and priorities;

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

f) Document baseline physical conditions of Chestnut Creek and adjacent floodplains that can be used as benchmarks to gauge progress toward collective goals of the Chestnut Creek community.

D. Guide to this Stream Management Plan

Plan Organization:

Volume I—*Reference Manual* for the Chestnut Creek Stream Management Plan is arranged by broad categories including watershed description, stakeholder information, watershed and stream specific recommendations, supporting data and other resource information. Background and history of the area are also provided to set the context for stream management in Chestnut Creek.

Volume II—*Field Manual* is intended to be a hands-on field guide for the surveyed 5-mile main stem, from the top of Chestnut Creek down to the mouth of the stream where it meets Rondout Reservoir and Pepacton Hollow and Red Brook tributaries. The main stem has been organized into Management Units (MUs) – stream reaches subdivided using physical stream characteristics, property boundaries, location of bridges and road infrastructure, and valley characteristics. Large portions of these data were gathered through a detailed stream assessment survey carried out in 2001 and a historic aerial photographic overlay analyzed to determine how stream and watershed conditions have evolved in the last 4 decades. These MU descriptions outline stream conditions (bed and banks), general streamside (riparian) vegetation condition, and proximity and arrangement of roads, bridges and culverts. Conditions and recommended practices were described with the objectives of flooding and erosion hazards, water quality, and stream ecology in mind. Detailed descriptions are provided for future projects or assessments. Each MU includes a companion map and summary tables for easy access of information.

Stream stewardship recommendations contain suggestions from the MU scale out to the watershed scale. This section provides guidance on techniques, information and funding sources, and strategies for implementing recommendations and keeping plan information up to date (Volume II, Section I. Chestnut Creek Stream Management Unit Descriptions, and Section II. Stream Stewardship Recommendations).

E. Methodology Used to Accomplish Goals

As discussed in the introduction and purpose, goals defined for this management plan are to identify and provide recommendations to reduce flood and erosion hazards and water quality impairments while supporting greater ecosystem health and stakeholder coordination. Information and methods used to meet these goals were gathered from many available sources and

documented studies.

Information gathered to serve management planning goals is divided into two categories: 1) Summary and documentation of existing quantitative and narrative data, including existing mapping data, and 2) Watershed assessment field surveys to produce a new set of base maps to document current stream system condition.

1. Existing Information

Regional watershed geology, soils, topography, land use and land cover have a significant effect on the volume, timing and routing of water and sediments from adjacent uplands into a stream, and along the stream to the outlet of the watershed. These factors interact to profoundly affect the nature of stream systems and how resistant they are to disturbance. Existing information on natural watershed characteristics and historic and current land use practices was collected and compiled and additional information developed. This information was reviewed and evaluated to provide some understanding of how these characteristics may affect hydrologic and sediment regimes of the watershed, and the water quality, habitat and channel stability of Chestnut Creek and its tributaries.

Types of data collected and compiled for review and evaluation included existing GIS (Geographic Information System – spatial data) databases, topographic maps, soils maps, geology (bedrock and surficial), wetland and sensitive areas inventories, land use maps, water quality data, biological data, hydrologic and hydraulic data, historic and recent aerial photography, as well as published and unpublished technical reports and other management plans. Some of these categories are described in detail below.

Geology

To evaluate watershed-scale effects of geology on hydrologic and sediment regime and stream channel morphology of Chestnut Creek, the watershed map was overlain onto bedrock geologic maps, noting distribution of geologic formations, where changes in rock type occur, and the presence of structural boundaries.

Surficial geology maps of the Chestnut Creek watershed were obtained from the New York City Department of Environmental Protection (NYCDEP) GIS Database. Research by several regional geologists have aided in developing a picture of the geology of the Chestnut Creek watershed and influences on stream processes. (Gregg Erickson, Sullivan Co. Comm. College, http:/www.sullivan.suny.edu/academics/dept/scimath/gerickson/index.htm, and W.D. Davis, NYCDEP SMP Geologist)

Soils

Soil characteristics of the Chestnut Creek watershed were evaluated to determine potential effects on runoff and erosion hazard and potential for unstable hillslope and/or channel conditions. Soils maps of the Chestnut Creek watershed were obtained from the New York City Department of Environmental Protection GIS Database and the Soil Survey of Sullivan County, New York (1984).

Land Use and Land Cover

The Chestnut Creek stream corridor was evaluated relative to historic, current, and potential future land use and land cover. Particular attention was focused on land use, vegetation changes, and channel alterations that may have a significant influence on hydrologic and sediment regimes, hillslope processes and channel stability. Information on current land use and land cover (from aerial photographs and other remotely sensed data) was obtained from the NYCDEP GIS Database and revised based on information collected during the watershed field reconnaissance (described below).

A generalized history of land use activities, changes in vegetation patterns, as well as stream channel and floodplain alteration activities in Chestnut Creek watershed was developed from historic aerial photographs from 1963-2001, and from maps and plans obtained from records on file with the Sullivan County Soil and Water Conservation District. In addition, historical references and maps were obtained from the Neversink Historical Society and New York State Department of Transportation (DOT) in Monticello, NY. These records were supplemented with anecdotal information obtained through interviews with local officials and residents. Information on future land use potential was developed from zoning maps and master plans obtained from townships and the Sullivan County Planning Office.

100-Year Floodplains

Regulatory agencies and entities, such as town or county zoning and planning boards, State Emergency Management Office (SEMO) and Federal Emergency Management Agency (FEMA), use 100-year floodplain boundaries to assess risk in developable areas from major flooding, to regulate building in high risk areas, and to assess flood damages and funding needs for repair, rehabilitation and flood hazard mitigation following major floods. The approximate limits of the 100-year floodplain along the Chestnut Creek mainstem and its major tributaries were determined from the digital versions of the FIRMs produced by FEMA. The most recent FEMA historic flood studies conducted in the Chestnut Creek watershed were obtained for review and evaluation. These records were supplemented with anecdotal information obtained through interviews with local officials and residents to determine perceived flood risks and actual flood stages for major floods in the last several decades.

Biological Communities of the Chestnut Creek Watershed

Evaluating information and data from historic biological surveys can provide an understanding of how biological communities have changed with land use activities in a watershed. Certain biological communities, such as populations of certain fish species or benthic macroinvertebrates (aquatic insects) have been used as indicators of water quality or stream condition. As part of this assessment, available data was utilized to evaluate historic conditions and

determine trends for biological communities along Chestnut Creek and its tributaries. Data compiled from biological surveys (macroinvertebrate and fish) conducted by state agencies (e.g. NYSDEC) were reviewed and evaluated. Data compiled from other investigations were also analyzed .

Water Quality of the Chestnut Creek Watershed

Available data were utilized, to the extent practical, to evaluate historic conditions and determine trends for the water quality along Chestnut Creek and its tributaries (Volume I, Section IV.B.4, Water Quality and Ecological Health). Data compiled from water quality monitoring conducted by various agencies (e.g. NYSDEC and NYCDEP) were reviewed and evaluated.

2. Watershed Assessment

A complete watershed field reconnaissance to gather additional detailed current information on specific features of Chestnut Creek provided a set of base maps used to delineate Management Units and prioritize recommendations.

Following a watershed assessment protocol developed by the DEP Stream Management Program, including methods of stream classification developed by Rosgen (1996), current channel morphology was characterized, historic channel adjustments were researched, direction and rate of adjustment for specific reaches were estimated, and departure from a potential stable form analysis was conducted. The broad categories of data collection and analysis are described below. Please see Draft Watershed Assessment Protocol, Volume II, Section VI. Appendices for additional detail on office and field protocols.

Initial Watershed Assessment Office Procedures:

Watershed or Basin Morphometry

Watershed boundaries, drainage area, basin profile and cross-section, and drainage density have been determined from the NYC DEP GIS Database and United States Geological Survey (USGS) quadrangle topographic maps at 1:24,000 scale. This information, particularly drainage (or watershed) area, was used in more detailed watershed assessments described below.

Rosgen Level I Geomorphic Classification

Geomorphic characterization focused on classifying stream reaches of Chestnut Creek and selected tributaries into generalized stream types (i.e., A, B, C, D, etc.) described in A Classification of Natural Rivers (Rosgen, 1994). Stream reaches were classified based primarily on stream slope and valley type information gathered from USGS quadrangle maps and aerial photography. This task provided information that was useful in focusing field reconnaissance efforts, which provided verification of the initial reach classification.

Hydrology

United States Geological Survey Stream Gage Record Analysis

USGS records for the stream gage station on Chestnut Creek at Grahamsville, New York were analyzed to: 1) develop estimates for mean annual stream flow, 2) characterize seasonal variability in mean monthly streamflow, and 3) evaluate annual peak discharges for the periods of record (1939 – 1987, 1997 – 2002). In order to utilize this site for the watershed assessment, historic rating tables had to be updated. Necessary field measurements and analytical work was completed and rating tables were updated.

The most recent flood frequency analysis of maximum annual peaks was used to develop estimates for peak discharges for the 1.25-yr, 1.5-yr, 2-yr, 10-yr, 50-yr and 100-yr recurrence interval (RI) peak flows. This flood frequency curve can be used in a variety of applications for flow analysis in stream assessment, planning and management, some of which are described in sections below as appropriate.

Field Calibration of Bankfull Discharge and Channel Dimensions

Geomorphic stream assessments conducted for the Chestnut Creek watershed assessment included classification by stream morphology. An important step in this process involves correct and consistent identification of *bankfull* stage in the field. For detailed discussion of bankfull stage, see Volume I. Section III.C. Stream Morphology and Classification**.** The best way to ensure reliable bankfull identification is through the use of regional regression curves of drainage area and associated hydraulic geometry (channel width, depth, cross sectional area) to bankfull discharge developed from data gathered in the same physiographic region (or region with similar characteristics) as the project area. These curves provide critical data for checking estimates of bankfull channel dimensions in the field for use in stream classification, stability assessments or natural channel design. Information was obtained from on-going regional curve studies being conducted by NYCDEP Stream Management Program (Miller and Davis, 2003).

Elements of the Field-based Stream Assessment (from Watershed Assessment Protocol, NYCDEP Stream Management Program, 2000, see Appendix)**:**

1) Continuous delineation of channel morphology, characterized to Rosgen Level II, on the mainstem and major tributaries, with locations of classification cross-sections. A morphologic stream assessment was conducted along the mainstem of Chestnut Creek from its headwaters to the NYCDEP Water Portal from the Neversink Reservoir – just downstream from Grahamsville.

Using the regional relationships developed by DEP Stream Management Program in 2000 (briefly described in section above, with greater detail provided in Miller and Davis, 2003, and Miller and Powell, 2001 unpublished report available through DEP Stream Management Program), indicators of bankfull stage were defined and confirmed in the field at selected locations along both stream banks.

Classification to Rosgen Level II includes detailed assessment of streambed sediment

using a "pebble count" procedure to determine reach D50 particle size (see Intro to Stream Processes Section C. 8., and Rosgen, 1996). Reach classification also requires a length of stream containing at least one pool and one riffle for accurate slope calculations. Stream classification for Chestnut Creek predominantly follows the Rosgen classification system with a few exceptions (see Intro to Stream Processes Section D). A number of reaches on Chestnut Creek contain very short sections of bedrock, which are included in reach pebble counts but due to low concentrations are not reflected in final sediment size distributions. Because locations of bedrock exposure still represent an important control on stream morphology, these sections were documented in stream typing as a double stream type, such as B1/B3. This reach would be predominantly a B3 (cobble), but would have section(s) of B1 (bedrock) too small to be broken out into a separate reach or reaches. Additional reach type splits may include borderline slope classification, such as B3/B3a, where "a" signifies an A channel slope with a B cross-section morphology.

2) Locations of hydraulic controls, including rock sills and banks, rip-rap placements, weirs, and bridge abutment.

3) Locations of natural and man-made drainage confluences, including tributary outfalls, stormwater and culvert outfalls, and road ditch outfalls. The majority of the discharge outfall locations were identified and mapped during the field reconnaissance. Location of all culverts, storm drain outfalls, landfills and dumping areas along the stream corridor were identified and mapped during the field reconnaissance. Though water quality at each outfall was not assessed directly, these locations were identified as potential locations of point sources of pollutants. A more detailed evaluation would be needed to confirm any problems areas.

4) Locations of problematic riparian vegetation, such as stands of invasive exotic species like Japanese knotweed (*Polygonum cuspidatum*).

5) Locations of eroding banks, with initial characterization of bank erodibility hazard; *Level III - Assessment of Stream Condition* - Part of the Rosgen Level III assessment includes estimating potential for certain stream reaches or bank locations to either continue to experience instability problems, recover from disturbance, or stay in good condition. One set of measurements in this assessment is called the Bank Erodibility Hazard Index (BEHI), paired with the Stress in the Near Bank Region (SNR) (see Rosgen, 1996, for further description and detailed methods). These two methods provide a measure by which researchers can compare the relative severity of bank erosion and reach stability problems. Eroding banks noted during field assessments were monumented (for future monitoring), and surveyed to provide the data necessary to complete these analyses.

6) Location of potential reference reach locations for further assessment and monitoring.

7) Generalized field notes and photographic documentation provided categorical information to document existing conditions in Chestnut Creek and two major sub-watersheds, Pepacton

Hollow and Red Brook. This level of assessment provided useful tools for further detailed assessments and communication tools for summarizing classification and interpretation data with descriptive photos. Qualitative field notes kept during quantitative data collection provided invaluable information to the research team during data analysis and interpretation phases of watershed assessment. Digital photos were catalogued and stored associated with specific stream locations to enable researchers and the public to corroborate narrative descriptions with the visual evidence – in effect, demonstrating interpretation with real-life examples. The field research team obtained all notes and photographs during the project, many of which appear in Volume II. Section I. Chestnut Creek Stream Management Unit Descriptions. Selected photos and anecdotal notes were donated by the public for use in public meetings and historical interpretation.

Sub-Watershed Analysis

Physical features and current conditions of two of the major sub-watersheds of Chestnut Creek, Pepacton Hollow and Red Brook, were assessed as part of the management plan watershed assessment. Information was gathered from existing GIS databases, topographic maps, soil surveys and maps, geologic maps and reports, land use and land cover maps, as well as historic and recent aerial photography. Conducting a geomorphic characterization and field reconnaissance of the sub-watersheds yielded additional information on current conditions, though did not include the level of detail used to assess the mainstem.

II. Project Partners

A. Introduction

B. Chestnut Creek Stakeholders

C. Project Advisory Committee (PAC) Members List

Town Hall Stream Restoration Demonstration Project. Photo taken by Lori Kerrigan, SCSWCD.

II. Project Partners

A. Introduction

As described in the Introduction, the Chestnut Creek watershed became the focus of interest for a stream management planning effort in 1996, following inclusion of the five-mile main stem of Chestnut Creek on New York State's Priority Waterbody List (PWL) due to evidence of water quality impairment. In addition to impacts to the local community from development, periodic flooding and associated damages, and stream bank erosion, Chestnut Creek is a primary feeder stream to the Rondout Reservoir, a terminal reservoir in the New York City drinking water system. All of these concerns made Chestnut Creek a priority for inclusion in a wider strategy for cleaner water in the Catskills through the cooperative stream management process.

The Stream Management Program (SMP), a non-regulatory group of the NYC Department of Environmental Protection (DEP), partnered with the Sullivan County Soil and Water Conservation District (SCSWCD) to assess conditions of the main stem Chestnut Creek and several tributaries. This information was used to develop a plan for the long-term stewardship of Chestnut Creek. The SCSWCD recognized that to accomplish the broad set of goals and objectives described in the Introduction, greater communication was needed among the landowners and agencies that live near, work near, or enjoy the stream. When planning around any shared resource, there are many different points of view, regulations, concerns and management practices.

The SCSWCD established the Chestnut Creek Project Advisory Committee (PAC) in November 2000, with the first meeting in early 2001. Each member of the PAC brings a unique set of experiences, a different perspective, and history of the area. This diversity was essential to covering all management aspects of Chestnut Creek, and created a fertile ground for developing cooperation and setting common goals. The exchange of information in Chestnut Creek PAC meetings and in meetings with local residents has provided the backbone for creation of this Chestnut Creek Stream Management Plan. The PAC has met several times over the course of the project to review and discuss the information that has been collected, and to focus and redirect the work of the SCSWCD as needed to formulate this strategy.

In February 2001, the SCSWCD initiated a concentrated landowner outreach effort by mailing a Chestnut Creek landowner stream perception survey. This survey was mailed to 368 residents of the watershed. Survey results, along with concerns voiced in public meetings and other communications with local residents, are summarized in Volume I, Section IV.B.6. Landowner Concerns and Interests.

Throughout the Project, the SCSWCD has been in close cooperation with local landowners. Landowners have been actively represented on the PAC, voting on restoration project selection and participating in riparian planting efforts at the demonstration project site at the Neversink Town Hall, Grahamsville, in Fall 2003.

Detailed stream characteristics collected on an intensive stream assessment field survey, comprise the framework for organization of the stream management plan. To accomplish this effort, in 2001 the DEP SMP funded and provided training for SCSWCD staff in stream surveying and assessment, and together undertook an extensive assessment of stability and condition of the stream corridor. These findings are reported in Volume II, Section I. Chestnut Creek Stream Management Unit Descriptions.

The Federal Emergency Management Agency (FEMA) favors counties and towns that have developed hazard mitigation plans. Having such a plan in place will enhance opportunities to receive FEMA funding in the case of a federally declared disaster. This plan can lay the groundwork for future plans and hazard mitigation grant projects.

B. Chestnut Creek Stakeholders

Many more groups than those who serve on the PAC have an interest in the Chestnut Creek. The following list was developed in 2000 during a planning session with PAC members from the Chestnut Creek and other regional groups involved in development of similar plans throughout the Catskills. These local, state, regional and federal agencies and groups may be users of the stream or its watershed, decision makers who will find the management plan useful in doing their job, potential funders of future projects, or local residents.

Local:
- Town of Neversink: Planning & Zoning Boards, Highway Departments, and Code Enforcement Officer
- Neversink Historical Society
- Catskill Mountain Chapter of Trout Unlimited (TU)
- Neversink Rod and Gun Club

County:
- Sullivan County Planning Department
- Sullivan County Department of Public Works (DPW)
- Sullivan County Highway Department
- Sullivan County Soil and Water Conservation District (SCSWCD)
- New York State Department of Transportation (NYS DOT), Sullivan County Resident Engineers

State/Regional:
- New York State Department of Environmental Conservation (NYS DEC): Regional Habitat Managers and Regional Foresters and Forest Rangers
- NYS Department of Health (DOH)
- Catskill Watershed Corporation (CWC)
- New York City Department of Environmental Protection (NYC DEP)
- NYS Emergency Management Office (SEMO)
- Watershed Agricultural Council (WAC)

Federal:
- United States Environmental Protection Agency (US EPA), Region 2
- US Army Corps of Engineers (US ACOE)
- Natural Resources Conservation Service (NRCS)
- Federal Emergency Management Agency (FEMA)
- US Fish and Wildlife Service (US FWS)

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