Land Trust for the Little Tennessee

GRADE YOUR STREAM
PROGRAM PLANNING GUIDE

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Land Trust for the Little Tennessee

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EXECUTIVE SUMMARY

The Grade Your Stream Program Planning Guide (2014) was developed by the 2013 cohort of graduate students in the Integrative Conservation PhD Program at the University of Georgia, in collaboration with the Land Trust for the Little Tennessee (LTLT) in Franklin, North Carolina. This document is intended to guide and support the LTLT in their development and maintenance of a long-term, community-based volunteer stream monitoring program, known as Grade Your Stream.

In the following pages, we present an overview of vital information related to the creation of a sustainable and successful program for engaging community members in environmental education and volunteer monitoring activities, which is focused towards enhancing regional partnerships among conservation organizations, scientists and citizens. Our insights are derived from the peer-reviewed scientific literature and our professional understanding of biological and social sciences, water quality monitoring programs, and the emerging field of citizen science. Though we focus primarily on the LTLT’s Grade Your Stream program, this document provides recommendations that are expressly tailored to the LTLT and suited to a variety of projects.

In Section 1, Citizen Science, we begin our collective input by summarizing key findings of citizen science scholarship, an active area of research and experiential learning that is highly relevant to the work initiated by the LTLT with the local community. There are many models for both long-term and short-term citizen science programs and their success is contingent upon proper alignment of local interests, the goals of program/project administrators, and the nature of interactions between public participants and scientists. We distinguish citizen science within the broader context of Public Participation in Scientific Research (PPSR) frameworks and we draw suggestions for making collaborative projects both more useful to scientists and more engaging to citizens, in an effort to increase the long-term utility and success of the Grade Your Stream program.

Next, in Section 2, History of Stream Visual Assessment Protocols, we recount the history of the Grade Your Stream monitoring protocol. We track the evolution of the Stream Visual Assessment Protocol that forms the basis of Grade Your Stream, from its predecessors to the original version developed by the US Natural Resource Conservation Service and others in the late 1990s. An overview of field-testing efforts and adaptations of the protocol from around the world are presented along with lessons learned, and we discuss the local history of volunteer monitoring efforts and the LTLT’s activities in the Southern Appalachian region, which inspired the Grade Your Stream program.
In Section 3, Suggested Changes to the Grade Your Stream Protocol, we recommend revisions to the current format and content of the Grade Your Stream protocol. These are intended to improve its clarity and its use as an educational tool. Suggestions include broad changes to the protocol’s language, format, and general approach. Additionally, we describe specific alterations to each of the protocol’s twelve elements, which we believe will enhance data quality and participants’ experiences.

Section 4, Implementation Plan, outlines important steps associated with program planning and initiation activities, and ongoing program implementation and management. Many aspects of the LTLT’s implementation of Grade Your Stream will be contingent upon dynamic interactions between internal and external factors, such as the implementation of other LTLT programs and funding, respectively. Therefore, we present best practices and suggestions for implementation that are drawn from volunteer monitoring programs in other places and tailored to the Grade Your Stream program; however, many of our suggestions remain broad and adaptable to a variety of situations.

Guidelines for the monitoring and evaluation of LTLT programs are provided in Section 5, Monitoring and Evaluation, to help the LTLT determine the effectiveness of its activities. We distinguish between monitoring and evaluation efforts and provide suggestions for ensuring that the Grade Your Stream program monitoring data that is collected is comparable for drawing conclusions regarding program progress. The monitoring and evaluation guidelines we provide are uniquely geared towards facilitating the implementation of specific data collection strategies in support of LTLT’s overall stated objectives. Key components of a successful monitoring plan are outlined, and four preliminary logistical frameworks are detailed to organize and demonstrate the goals, purpose, logistical outputs, and activities associated with the LTLT’s objectives for Grade Your Stream.

In Section 6, Publicity, we describe a variety of outreach activities and community events that will help promote the Grade Your Stream program and the LTLT. We emphasize strategies with the potential to keep volunteers engaged over the long-term and include our expectations for required time investment and cost for each strategy. These strategies are focused on the volunteers’ sense of personal efficacy, and will help the LTLT grow its network of volunteers, keep them actively engaged, and ensure they are involved over the long term.

Section 7, References, and Section 8, Appendices, provide additional resources for the LTLT’s perusal, including those used to develop this document and others that the LTLT may find helpful.
Pictured (L-R): **Top**: Amy Nichols (ICON student), Jessica Chappell (ICON student), Jason Meador (LTLT Citizen Science Program Manager), Dr. Nik Heynen (ICON Program Director), Ted Gordon (ICON friend), Katherine Brownson (ICON student), Tara Gancos Crawford (ICON student), Elizabeth Guinessey (ICON student), Jillian Howard (ICON student); **Bottom**: Caitlin Mertzlufft (ICON student), Linda Kosen (ICON student), Hannah Burnett (ICON student), Dr. Catherine Pringle (ICON faculty), Sebastian Ortiz (ICON student); Author not pictured: Jennifer Bloodgood.
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INTRODUCTION

“Never doubt that a small group of thoughtful committed citizens can change the world; indeed, it is the only thing that ever has.”

— Margaret Mead

The Land Trust for the Little Tennessee (LTLT) is a nationally accredited non-profit organization that “is dedicated to conserving the waters, forests, farms, and heritage of the Upper Little Tennessee and Hiwassee River Valleys” (www.ltlt.org). Since its inception in 1997, the LTLT has worked collaboratively with public and private entities to protect land, restore habitats, and conserve the cultural landscape, including farmland and historic properties, in the Little Tennessee watershed. To strengthen local capacity for land and water conservation in the region, the LTLT merged with the Little Tennessee Watershed Association (LTWA) in 2011. Since 1993 the LTWA has been working to enhance local stewardship of the region’s aquatic resources through citizen science initiatives, water quality monitoring efforts, advocacy, and stream restoration.

The two long-standing organizations, now united under the LTLT, have a long history of engagement in Macon County, North Carolina, and a close rapport with local residents, businesses, public agencies and other organizations, particularly those within the Upper Little Tennessee and Hiwassee River Valleys. They work with these community partners to preserve the water quality, recreational opportunities, natural beauty, ecological integrity, economic well-being, and rural character of the Southern Appalachian Mountains for current and future generations of residents and visitors.

LTLT is embarking upon a new initiative to connect the people of the Southern Blue Ridge Ecoregion to the natural land and water resources of the Southern Appalachian Mountains that they enjoy, rely, and depend on. This initiative, termed Grade Your Stream, is a community-based stream monitoring program that is intended to enhance community awareness of streams as important habitats for the preservation and conservation of local biodiversity. In addition, this program will allow the LTLT to monitor stream health¹ in order to prioritize streams for restoration, as well as provide an additional means for the local community to interact with the LTLT on a regular basis.

¹ Health in the context of this document is a catchall term that encompasses the aspects of stream and riparian habitat quality that the LTLT identifies as beneficial for the ecosystem and its constituent parts, including species of plants and wildlife, ecological processes, and the local human community.
The Grade Your Stream program will be initiated in the Little Tennessee Watershed with future implementation aimed throughout the region, including within the Tuckasegee Watershed. It will build upon the LTLT’s past and ongoing efforts to protect, enhance, and nurture the relationships between society and its encompassing ecosystem. This effort is part of a larger movement to expand the LTLT’s popular Shade Your Stream program, which works with landowners to protect streams and their riparian buffer zones, into more than 20 counties in the western North Carolina, northern Georgia, and eastern Tennessee.

The primary objectives for the Grade Your Stream program are:

- To monitor stream health and prioritize streams for restoration;
- To increase the LTLT’s visibility within the local community;
- To increase the LTLT’s partnerships within the local community; and
- To provide educational outreach to the community.

To support the LTLT in their initiation of this program, we provide the following program planning guide. This guide emerged from a collaboration between the LTLT and the Integrative Conservation (ICON) PhD Program at the University of Georgia. The LTLT-ICON collaboration was intended to fortify the partnership between the university and its regional conservation-focused colleagues. This specific project was designed to provide students in the ICON program with an opportunity to learn about conservation, cross-discipline collaboration, strategic communication and multi-organizational partnerships through practice. The result of this endeavor is before you. Enjoy!

Pictured (L-R): Crawford Branch, Coweeta Creek, and Rabbit Creek, North Carolina.
SECTION 1: CITIZEN SCIENCE

1.1 MAKING CITIZEN SCIENCE MORE RELEVANT FOR PARTICIPANTS

Citizen science project outcomes are strongly influenced by the nature of citizen involvement. Important considerations in citizen science program implementation include how to recruit, retain, and maximize the benefits of and to citizen participants. Because citizen science programs are developed for a variety of purposes, there is no single successful model for engaging participants (Fig.1), but the success of any program can be increased by combining local needs, practitioner\(^\text{2}\) goals, and elements of different project frameworks.

1.1. A CLARIFYING THE CITIZEN SCIENCE MODEL

Under the umbrella of Public Participation in Scientific Research (PPSR) (Bonney et al. 2009), citizen science is situated among a variety of public participation frameworks. The traditional model of citizen science limits the scope of community participation to data collection, leaving question formation, methodology, and management action to the practitioners (Cooper et al. 2007). In contrast, participatory action research derives from an iterative co-management framework and incorporates citizen participation throughout multiple levels of a project (Cooper et al. 2007). While many project organizers think that citizen science is best geared toward providing long-term datasets for use in monitoring (Dickinson 2010), participants may have other goals and these are important to consider. It is essential that all participants in these programs understand exactly the terms and expected outcomes of such collaboration. This does not require complicated or overly-theoretical language; rather, distilling the message of “what, why, and how” is sufficient. By doing so, different scopes or scales of a project (e.g., the regional scale of Stream Visual Assessment Protocol (SVAP) monitoring efforts and the community scale of the Southern Appalachian SVAP (saSVAP)) can be augmented and articulated in variable ways to suit particular stakeholder groups.

1.1. B INTEGRATING ECOLOGICAL AND SOCIAL ADAPTIVE MANAGEMENT MODELS INTO CITIZEN SCIENCE PROJECTS

One way to complement the datasets collected through citizen science projects is to integrate such projects into what Cooper et al. (2007) term an Ecological and Social Adaptive Management model. Under such a model, the data collected by citizen

\(^{2}\) Practitioner in this context refers to the program organizer, which may be a government agency, non-government organization, or scientific entity.
scientists do not necessarily have to be connected to specific scientific hypotheses or outcomes; instead, citizens are encouraged to combine certain behavioral changes with data collection to directly experience the connection between human and ecological systems and gain new insights and understanding. For example, citizens participating in a stream survey may be encouraged to experiment in their own streams with a number of activities that are known to affect stream health, such as cessation of stream raking, planting stream banks with more trees and grasses, or clearing invasive plants. These activities, when combined with the original research instrument, allow participants to experientially link causes and effects in powerful, measurable ways, increasing their ecological understanding. Blending participants’ experiences and behavioral analyses thus increases understanding of local concerns while developing effective community-level solutions.

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Figure 1 (Top) Schematic of common, standardized frameworks for incorporating public participation into scientific research, including citizen science; (Bottom) Table 1: Models for Public Participation in Scientific Research (PPSR), borrowed from Booney et al. (2009), highlights the characteristics that define a PPSR program, broken down by level of citizen involvement and steps in the scientific process that are emphasized. [Note: PPSR schematic and red text in Table 1 are authors’ modifications].
1.1. C LINKING ADAPTIVE CITIZEN SCIENCE TO MULTIPLE PROJECT SCALES

Because some PPSR models work better at particular scales than others, coordinating local and regional monitoring goals into one framework can be challenging. The traditional monitoring paradigm (Fig. 2), termed *surveillance monitoring*, is geared toward the collection of regional data without the guidance of research questions at the community or practitioner levels. In contrast, *targeted monitoring* projects stem from hypothesis-driven research questions and are associated with clear conservation goals (Dickinson 2010). The aforementioned adaptive management model, if integrated into a surveillance monitoring project, can address local stakeholder interests while remaining committed to practitioners’ regional data collection goals. In the long term, a hybrid adaptive management-surveillance monitoring model can be leveraged for community-level conservation initiatives, ranging from those that are purely educational (i.e. addressing specific gaps in community knowledge) to those that are conservation practice-based (i.e. using what is known about participant motivation to target the activities that have the highest likelihood of being transformed within the local community). The adaptive model benefits participants by reflecting the perspectives of the community and recognizing conservation outcomes stemming from their participation. In order for the adaptive citizen science model to work, practitioners have to (a) provide a set of research instruments that link participants to data collection activities in a personalized way and (b) keep track of the results of such activities, including educational, behavioral, and conservation outcomes (see Section 5: Monitoring and Evaluation, below).

In summary, improving citizen experiences is most effectively achieved by ensuring the role of citizen participants is clear to all stakeholders. This information should be easily accessible (e.g., posted online) and reiterated in project materials and during interactions between practitioners and other participants. The suggestion to incorporate elements of adaptive and multi-scale monitoring paradigms into a citizen science project provides one possible avenue for allowing participants to have a greater personal investment in the projects they help to develop.

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The saSVAP is an example of surveillance monitoring.
1.2 MAKING CITIZEN SCIENCE MORE RELEVANT FOR SCIENTISTS

The growing prevalence of citizen science projects reflects the recognition among scientists of the value of citizen science as a means to collect the vast amounts of data required to study large-scale ecological processes (Dickinson et al. 2012; Bonney et al. 2009). However, many scientists have questioned the rigor of citizen science data, claiming that volunteer-generated information has a higher margin of error (Mueller et al. 2012). Questionable reliability has prevented some citizen science projects from publishing the results of their studies (Freitag and Pfeffer 2013).

Dependability of citizen science data is affected by the consistency of data collection methods, as well as the knowledge and training of citizen science volunteers. For example, a recent study involving spotlight counts of nocturnal animals found that participants’ backgrounds and levels of experience significantly affected the quality of data collected by these individuals (Sunde and Jessen 2013). In another citizen science study involving the identification of invasive species, professional participants collected more accurate data than participants without formal experience or training (Crall et al. 2011). The variation that arises from observational error within a dataset can reduce certainty about its overall accuracy.

Though the scientific literature identifies potential issues regarding the credibility of citizen science data, it also provides insights to improve its validity. Crall et al. (2011) suggest that volunteer certification programs may improve the accuracy of citizen-generated data, while also increasing overall volunteer satisfaction and retention in citizen science programs. Establishing protocols to be used consistently across projects also improves the reliability and comparability of data collected in different places (Bonney et al. 2009; Crall et al. 2011). Without scientifically-designed protocols that incorporate error-proofing methods, the legitimacy of this data is likely to be questioned (Mueller et al. 2012).

Fortunately, several error-proofing methods exist, including technology-based methods that enable quality control checks (Dickinson et al. 2012). For example, with the increasing use of smart phones in the United States, it may be possible for citizen scientists to photograph their evidence for scientific verification. In addition, online data entry forms have been developed (e.g., via CitSci.org⁴) to provide an easy way for volunteers to enter their data. Certain online data forms are even capable of checking for errors automatically, which can help reduce uncertainty regarding the validity of the dataset (Bonney et al. 2009). There are also web-based tools, such as

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⁴ http://citsci.org/cwis438/websites/citsci/home.php?WebSiteID=7
CitizenScience.org, that offer toolkits and guidance on many aspects of citizen science project development, including how to refine protocols, train participants, analyze data and disseminate results.

In summary, there are many ways to reduce uncertainty and improve the reliability of citizen science data through training, protocol development, and use of error-proofing methodologies. However, keep in mind that citizen science datasets are generally very large, so broad-scale ecological patterns may still be detected despite some level of uncertainty about individual data points. Large-scale environmental trends detected through the analysis of citizen-science data have significant potential to inform a broad range of conservation and environmental management decisions.

1.3 IMPROVING THE SUSTAINABILITY AND LONGEVITY OF CITIZEN SCIENCE PROGRAMS

Published scientific literature shows that the sustainability and longevity of citizen science programs can be increased through mechanisms that maintain volunteer commitment to the program over the long-term. For example, volunteers may be encouraged to continue participating in the program if their experiences involve active learning and if their input yields clear, measurable contributions (Shirk et al. 2012). Active learning is facilitated through hands-on activities and direct collaboration with other volunteers and scientists (Crall et al. 2011). Further, partnerships between volunteers, scientists, and conservation organizations can facilitate direct involvement of citizens in the prioritization of restoration and conservation efforts (Cooper et al. 2008; Cosquer et al. 2012).

Scientists involved in citizen science projects should strive to not only distill information about biological dynamics found in the local ecosystem, but also to build positive relationships with community members during collaborative efforts. Enhancing the volunteers’ experience improves the relationships between volunteers and among volunteers and scientists, while also facilitating the data-gathering process. It also makes the volunteer experience more enjoyable and fulfilling, which creates a more positive atmosphere for all participants and fosters relationships that extend beyond the time and space of volunteering activities (Bonney et al. 2009). One suggestion to enhance the participant’s experience is to assess volunteers’ and scientists’ personal motivations for engaging in the collaborative effort, and to inquire about personal recreation activities or hobbies. With this information, public

5 http://www.birds.cornell.edu/citscitoollkit/
participation organizations can identify similarities and incorporate some of those common interests into the time spent volunteering (Tullock et al. 2012).

In addition, for the success of future citizen science projects, it is critical to record and learn from the social insights of volunteers regarding the collaboration process itself. These insights can guide procedural revisions for the betterment of the program, and they enable practitioners to be attentive to the volunteers’ voiced preferences and concerns (Brossard et al. 2005). Moreover, individuals with good outreach education skills should serve as mediators or liaisons between volunteers and scientists to both communicate the importance and purpose of the project, and to lead participants through pilot trials. This will create and maintain channels of communication between these two groups and help generate positive attitudes towards conservation (Toomey and Domroese 2013). Utilizing these mechanisms to maintain volunteer engagement in citizen science programs will help ensure that citizens remain actively engaged in these programs over time, contributing to the overall sustainability of citizen science initiatives.

Jason Meador (LTLT Citizen Science Program Manager; camouflage hat on right) explains the Grade Your Stream protocol to graduate students and faculty from the University of Georgia’s Integrative Conservation PhD Program.
In 1986, the US Environmental Protection Agency (EPA) conducted an in-depth analysis of its surface water monitoring efforts and concluded that existing monitoring programs were insufficient in terms of their capacity to generate the aquatic biological data required to inform national water management decisions (Barbour et al. 1999). The agency recommended that new, cost effective biological monitoring techniques be developed to rapidly collect, compile, analyze, and interpret basic data on aquatic life to facilitate water quality management decisions. Methods were needed to generate scientifically valid information quickly in order to identify water quality problems, rank streams for restoration or other forms of management intervention, and monitor trends in physical and biological conditions of aquatic systems. The result was the development of rapid bioassessment protocols (RBPs) that established a framework for collecting biological data from streams and rivers on a national scale to address the goals of the Clean Water Act (1972). The first RBP was published in 1989 and was based on a synthesis of various pre-existing protocols, which had been used by state agencies around the United States (Barbour et al. 1999). The initial RBP provided a framework to agencies that could be altered to suit the particular ecologies of different regions and it included methods for evaluating stream habitat and assemblages of periphyton6, benthic macroinvertebrates, and fish. Although the developers acknowledged that the RBP was not as rigorous as other biological testing protocols that involved more technical scientific techniques, the purpose of the RBP was to provide a fast, easy tool to assess stream condition. Other potential uses of RBPs were later suggested, such as evaluating the effectiveness of restoration efforts and identifying causes of waterway impairment. Educational outcomes were not identified as an attribute of early RBPs.

2.2 THE ORIGINAL STREAM VISUAL ASSESSMENT PROTOCOL

In 1998, the US Natural Resource Conservation Service (NRCS) developed the Stream Visual Assessment Protocol (SVAP). The development began in 1997 as a joint effort of the NRCS National Water and Climate Center, seven state NRCS offices, three NRCS institutes, the EPA, and the University of Georgia. SVAP was designed as an introductory level assessment to be used by people unfamiliar with stream ecology (Bjorkland et al. 2001). Like the RBP, the idea was not to replace more in-depth

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6 *Periphyton* refers to the community of tiny aquatic organisms (e.g., algae, protozoans, insect larvae and snails) that live attached to rocks and rooted to aquatic plants.
stream assessment protocols, but to provide a simple method for rapidly assessing stream health. Originally, the protocol was intended to aid the work of NRCS field staff that worked with agricultural landowners. SVAP was primarily used by NRCS field staff for: (a) inventory and analysis steps to aid in the development of conservation plans; (b) priority setting; and (c) pre- and post-assessments to evaluate the effectiveness of cost-share contracts and conservation plans. Landowner participation was encouraged, and unlike the RBP, SVAP could thus serve as an educational tool that helped landowners learn about conservation of aquatic resources.

SVAP was constructed with the foresight that modifying the protocol to reflect relevant regional criteria would result in better precision and accuracy. The protocol was always intended as a template to be modified to reflect specific local conditions where it was implemented. SVAP2 was created as a follow-up to the original SVAP, reflecting changes motivated by issues identified by NRCS state biologists. This version further stressed the fact that SVAP is intended as a template and should be tailored to conform to the areas where it is implemented (USDA 2009).

2.3 FIELD TESTING SVAP AROUND THE WORLD

Once the method for evaluating stream health utilizing a rapid assessment had been established, several agencies began to use SVAP to meet their own monitoring needs, both in the US and abroad. Hawaii was one of the first states to modify SVAP. Stream specialists in Hawaii made changes to best reflect stream conditions in their region; the Hawaii SVAP (HSVAP) underwent several drafts, all of which were field tested to evaluate their accuracy, precision, and usability (USDA 2001).

In 2008, SVAP was employed in Brazil to evaluate whether local ecological knowledge of farmers corresponded to measured environmental parameters (Silvano et al. 2008). Researchers interviewed local farmers and surveyed the streams on their land using SVAP and found that many times farmers seemed to overstate the health and quality of their stream. This is most likely due to the fact that farmers and elements of SVAP value various characteristics of streams differently. Nonetheless, this study demonstrates the utility of standardized methods such as SVAP, which enable local farmers to evaluate the condition of their streams in an unbiased and uniform manner. This study also found that local farmers had additional knowledge about their streams that SVAP did not take into account, which could be also useful to land managers.

In Greece, scientists wanted a rapid and robust means to evaluate how much anthropogenic damage had been incurred by riparian zones throughout the mountainous region (Zogaris et al. 2009). A combination of protocols was used to evaluate riparian zones over this large area, one of which was an adapted version of
the SVAP. To avoid bias, the same two people implemented the protocols within several streams. As SVAP was paired with another rapid assessment protocol and the results were congruent, the study supports the notion that data SVAP generates is scientifically sound. The scientists also hoped that by rapidly assessing all riparian zones, highly impacted areas could be targeted for rehabilitation before further degradation occurred.

In Puerto Rico, de Jesús-Crespo and Ramirez (2011) utilized the HSVAP rather than the original SVAP because tropical Hawaiian streams were assumed to be more comparable to Puerto Rican streams relative to the temperate region streams for which the original protocol was designed. The authors evaluated the efficiency of the HSVAP within the highly urbanized Rio Piedras watershed. They concluded that HSVAP is a good tool for a general assessment of the physical characteristics of streams in Puerto Rico, but it needs modifications to accurately assess ecological quality of those streams; therefore, the protocol should not be used to predict water quality (de Jesús-Crespo and Ramirez 2011).

The original SVAP was modified for New Jersey streams by the Omni Environmental Corporation (Princeton, NJ) and the Rutgers Cooperative Extension Water Resources Program at Rutgers University in New Jersey, USA. This local adaptation of SVAP was developed to help multiple grassroots organizations evaluate stream health and potentially raise funds to restore priority areas (Obropta and Yergeau 2011). Once the protocol was completed, Rutgers biologists provided several successful training sessions for members of the organization who were interested in surveying streams. Feedback provided by the participants indicated that they appreciated the mixture of hands-on evaluation activities and time spent in the classroom.

In 2012, Frothingham and Bartlett tested the reliability of SVAP as a monitoring tool for detecting changes through time. The authors compared overall and individual SVAP scores at multiple sites within one watershed in Niagara Falls, New York, over the course of four years. Major watershed changes did not occur during this time, so the overall and individual element SVAP scores were not expected to change unless there were flaws in the methodology. Overall stream scores did not change; however, scores for individual elements were more variable. The authors concluded that linking individual element scores to specific watershed management plan goals may not be advisable (Frothingham and Bartlett 2012). Furthermore, they stated that to fix this issue the protocol could be modified to better suit the geographic location where it is implemented, as stated by the original SVAP authors (Bjorkland et al. 2001).

7 http://water.rutgers.edu/SVAP/SVAP.htm
2.4 ADAPTING SVAP FOR OTHER PURPOSES

Australia developed a protocol to allow individuals with minimal training to rapidly evaluate northern riparian zones to determine if they perform specific functions, such as promoting biodiversity (Dixon et al. 2005). Although the Australian agencies consulted the SVAP developed within the US, ultimately they designed a protocol that focused exclusively on riparian assessment. Though the priority was to evaluate riparian zones, the Australian agencies’ goals also included documenting improvements following restoration efforts, educating non-specialists on the functions of riparian habitats, and identification of areas that could be targeted for future conservation efforts.

The Watershed Working Group within the Atlantic Slope Consortium (ASC) also designed a protocol to evaluate streams that do not have a constant flow, as SVAP was not developed to evaluate such stream types. Specifically, this protocol was intended for use in the North Carolina coastal plains and it includes modifications that accommodate the unique stream characteristics in this region, such as less rocky substrate (Rheinhardt et al. 2007). Additionally, the ranks available for each category were calibrated using reference streams, which were selected based on previous measurements. This allowed the ranking to more accurately reflect what was occurring in each watershed, since the ranking of each category is adjusted based on changes observed in reference streams. The protocol involves having the surveyors grade each stream trait on a scale of 0 - 100 and suggests that multiple experts complete the evaluation to enable an accurate consensus to be reached. It appears that this protocol was not intended to be an educational tool.

The original SVAP has also been used to survey characteristics besides stream health. In eastern Oregon, the riparian section of SVAP was used to determine whether evaluated streams would support bird populations (Cooke and Zack 2009). Based on their results, the authors concluded that SVAP could assist in predicting whether bird populations are present in riparian zones; however, modifications are required to allow the protocol to be more useful for this type of assessment.

Based on this initial evaluation, it seems SVAP is generally used as a tool to rapidly evaluate streams and monitor change. Utilizing SVAP for educational purposes is typically a minor goal, which suggests a more user-friendly version should be created from the original SVAP to encourage non-expert participation.
2.5 LOCAL HISTORY OF THE GRADE YOUR STREAM PROTOCOL

In 2010 the SVAP was formally adapted for use within the Little Tennessee River basin by the Little Tennessee Watershed Association (LTWA) of Franklin, North Carolina. The LTWA is a non-profit organization (and precursor to the LTLT with which it merged in 2011) that engages in various education, advocacy, restoration, and biomonitoring activities. It was founded in 1993 by a group of community members, environmental non-profit organizations, local scientists and government representatives who were concerned about the effects of rapid population growth and development on aquatic biodiversity and water quality in the region.

In 1988, prior to the formation of the LTWA, Dr. William O. McLarney, the LTWA’s eventual Biomonitoring Program Director (and the LTLT’s current Senior Scientist & Aquatic Program Specialist), initiated the LTWA’s Little Tennessee River Biomonitoring Program. For more than 25 years, Dr. McLarney has been using the Index of Biotic Integrity (IBI) to develop a species inventory and calculate scores for river health based on samples of fish and macroinvertebrates. Roughly 30 sites in the Little Tennessee watershed are sampled annually in the context of this program, with 192 different sites having been sampled since its initiation. Since the program began, thousands of volunteers have participated and helped to generate the largest fish-based biomonitoring database for any comparably sized watershed in the world.

The Biomonitoring Program data depicts the condition of aquatic resources in the region and notes trends in those conditions as they occur—information that helps advocate for changes in local environmental policies and practices to restore and conserve biodiversity and water quality in the watershed. The program has provided a successful template for concurrently working towards multiple conservation objectives; while generating ecological data to inform local governmental policies, the Biomonitoring Program educates community members about stream health through volunteer opportunities.

Concurrent with his work in the Little Tennessee watershed, Dr. McLarney has been engaged in Asociación ANAI (ANAICR)\(^8\), a non-profit organization he helped establish in the Talamanca region of Costa Rica in 1978. ANAICR works towards sustainable economic development and community conservation, and Dr. McLarney has directed a long-term biomonitoring program in Talamancan streams that is similar in nature to the LTWA’s program.

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\(^8\) [http://www.anaicr.org/](http://www.anaicr.org/)
In the early 2000s, while searching for habitat assessment tools to complement the fish and macroinvertebrate biomonitoring surveys he was conducting in Costa Rica, Dr. McLarney was introduced to SVAP by a colleague that was using a modified version of the protocol for a river project being implemented by the Nature Conservancy in Belize. After adapting the Belizean version of the protocol to suit the conditions of Talamanca, Dr. McLarney began using the SVAP variant as part of the biomonitoring program to assess physical habitat qualities in conjunction with a locally adapted IBI and a locally adapted Biomonitoring Working Party macroinvertebrate index. The SVAP protocol was selected among several alternative habitat assessment protocols because it was the most user-friendly; with less than an hour of training, someone without aquatic ecology expertise can use the protocol to derive a score for stream health at little to no cost. This served ANAICR’s purpose to maximize local participation. Additionally, Dr. McLarney and his team conceived of a feature designed to engage participants by encouraging them to get into the stream, thereby shifting the focus of the Costa Rica SVAP toward education. This feature, called “Kick the Riffle,” instructs participants to step into the stream, kick up sediment, and measure the amount of time it takes for particulate matter to settle again. Researchers in Costa Rica have been very interested in incorporating more educational aspects into SVAP, and Kick the Riffle is just one example.

Several Costa Rican community groups are now doing SVAP and the results are often predictable. When unusual reports come in, a technical support team is dispatched to confirm or correct the information. Due to its success in the context, particularly as a tool for community engagement, Dr. McLarney brought the protocol back to the Little Tennessee watershed and began working with colleagues at the LTWA to adapt the protocol to reflect stream conditions in the southern Appalachian Mountains (LTWA SVAP). The LTWA SVAP has since been used to collect physical habitat quality data to supplement Biomonitoring Program activities.

The aim for the LTWA SVAP was to develop a protocol that could enable landowners and other citizens to identify areas of conservation concern due to poor aquatic habitat quality. To test the usability of the protocol by the public, the LTWA SVAP was implemented at 10 different sites within the upper Little Tennessee watershed (Jernigan and Liles 2010). Two surveyors conducted the entire adapted SVAP, which evaluated 13 categories important in determining stream health. At the end of the survey period, the evaluators recommended that adjustments be made to the SVAP to reduce the variance of the collected data and make it more scientifically valuable. One category in particular, hydrologic alteration, demonstrated a large variance among scores and, thus, the surveyors recommended it be removed and be replaced with a stream characteristic that was less subjectively measured. Although the
researchers did not deem the protocol as unflawed, in the end it was approved for use as a tool to rapidly evaluate stream health in the Southern Appalachians.

Even more recently, the original USDA SVAP was been adapted to the wadeable streams of the southern Appalachian Mountains, and renamed saSVAP, by researchers at the University of Georgia with the support of the Coweeta Long Term Ecological Research (LTER) program funded by the National Science Foundation (Sullivan et al. in press). At the local level, the saSVAP is in large part the product of the LTWA SVAP, including the LTWA’s involvement with biomonitoring and citizen science projects in the region, and Bill McLarney’s work in Costa Rica that translated directly to the work he does with volunteers in Macon County. For this most recent iteration of the protocol, experts in the fields of stream ecology, geomorphology, and hydrology revised the original SVAP to produce a protocol specifically for use in streams of this region. The protocol was designed for use by landowners, high school and community college students, and local scientists who wish to conduct a quick assessment of any stream in the area. The saSVAP provides descriptions of a range of stream conditions for each element of the protocol and each condition is accompanied with a picture to help surveyors accurately identify stream characteristics.

Since 2011, when the LTWA merged into the LTLT, the LTLT has been working with researchers from the Coweeta LTER, scientists from the University of Georgia, and others to further refine the saSVAP such that it remains scientifically valid, but straightforward enough for community volunteers to reliably use it. The newest iteration of the SVAP being used by the LTLT will form the basis of the Grade Your Stream program.

Moving forward, the LTLT wants to train people from all sectors of the community to implement the protocol in the Little Tennessee and nearby watersheds. The LTLT hopes to solicit input and buy-in from state and local agencies so that researchers, community groups and government agencies alike recognize the Grade Your Stream protocol as an efficient and reliable tool for measuring stream health. The data generated through the Grade Your Stream program will eventually be incorporated into the Biomonitoring Program database developed in collaboration by Dr. McLarney and the Coweeta Long Term Ecological Research (LTER) program in 2008⁹,¹⁰. The hope is that the Grade Your Stream protocol, and the publicly available and easily accessible data that it generates, will enhance awareness of regional biodiversity

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¹⁰ To access the data, go to [http://coweeta.uga.edu/ltwa/](http://coweeta.uga.edu/ltwa/)
locally while also fostering more public participation in prioritizing and enacting conservation measures.

2.6 SVAP APPLICATIONS AND LESSONS LEARNED: AT A GLANCE

<table>
<thead>
<tr>
<th>Location</th>
<th>Organization(s)</th>
<th>Objective(s)</th>
<th>Lesson(s) Learned / Outcomes</th>
<th>Reference(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>United States</td>
<td>US Natural Resource Conservation Service (NRCS), National Water and Climate Center, 7 NRCS state offices, 3 NRCS Institutes, US Environmental Protection Agency (EPA), University of Georgia (UGA)</td>
<td>Develop protocol for rapid assessment of stream health; Develop a protocol that is accessible and useful to people without formal training in stream ecology and monitoring techniques</td>
<td>Resulting SVAP best suited as template to be modified to reflect specific local habitats where it is implemented</td>
<td>Bjorkland et al. 2001</td>
</tr>
<tr>
<td>Hawaii, USA</td>
<td>US Department of Agriculture NRCS</td>
<td>Adapt SVAP for implementation in Hawaii (Hawaii SVAP; HSVAP)</td>
<td>Stream Bioassessment Working Group formed, consisting of representatives from multiple agencies, academic institutions, and community groups interested in stream assessments; Numerous changes needed for SVAP to reflect Hawaii’s unique stream conditions</td>
<td>USDA 2001</td>
</tr>
<tr>
<td>Australia</td>
<td>Government agencies</td>
<td>Enable evaluation of riparian zones with minimal training; Measure changes due to restoration; Educate non-experts regarding riparian systems; Identify future conservation projects</td>
<td>SVAP needed to be modified to exclusively examine riparian areas</td>
<td>Dixon et al. 2005</td>
</tr>
<tr>
<td>Georgia, USA</td>
<td>Warnell School of Forestry, UGA</td>
<td>Test cost-effective bioassessment tools as indicators of macrobenthic communities in headwater streams of the Georgia Piedmont, US</td>
<td>EPA Visual Habitat Assessment was useful indicator of macrobenthic species richness, but Louisiana waterthrush occupancy was a better indicator of macrobenthic species relative abundances.</td>
<td>Mattsson and Cooper 2006</td>
</tr>
<tr>
<td>Location</td>
<td>Organization(s)</td>
<td>Objective(s)</td>
<td>Lesson(s) Learned / Outcomes</td>
<td>Reference(s)</td>
</tr>
<tr>
<td>-------------------------</td>
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<td>------------------------------------------------------------------------------</td>
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<td>-----------------------------</td>
</tr>
<tr>
<td>North Carolina, USA</td>
<td>Watershed Working Group of the Atlantic Slope Consortium (ASC)</td>
<td>Test rapid assessment of intermittent coastal stream health</td>
<td>Survey score accuracy can be increased with replicate samples; multiple experts should survey each stream and confer on scores</td>
<td>Rheinhardt et al. 2007</td>
</tr>
<tr>
<td>Brazil</td>
<td>Academic scientists</td>
<td>Evaluate coherence between local ecological knowledge and SVAP results</td>
<td>Local farmers had tendency to overestimate stream health</td>
<td>Silva et al. 2008</td>
</tr>
<tr>
<td>North Carolina, USA</td>
<td>Little Tennessee Watershed Association (LTWA)</td>
<td>Introduce SVAP within the Little Tennessee River watershed</td>
<td>Visual aids, such as pictures, help surveyors</td>
<td>Jernigan and Liles 2010</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Contribute to the spectrum of existing approaches for protecting and improving stream health</td>
<td>Involving more surveyors for each stream reach will reduce or illuminate sources of variance in scoring</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Determine feasibility of using the protocol with the general public</td>
<td>Detailed scoring instructions needed in the protocol to standardize scoring methods for surveyors</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Identify possible improvements to the protocol</td>
<td>Hydrologic alteration category was of limited value for the LTWA’s purposes; better as an optional element dependent upon surveyor’s local knowledge</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Difficult to evaluate nutrient enrichment in mountain streams, in part due to ambiguity of this category for visual assessment; better as an optional element for use in scenario with visually obvious enrichment</td>
<td></td>
</tr>
<tr>
<td>Oregon, USA</td>
<td>Wildlife Conservation Society</td>
<td>Rapid evaluation of bird habitat</td>
<td>SVAP needed to be modified to measure bird habitat</td>
<td>Cooke and Zack 2009</td>
</tr>
<tr>
<td>Greece</td>
<td>Academic scientists</td>
<td>Comparison of two protocols for rapid evaluation of anthropogenic threats to riparian zones</td>
<td>Similar results produced by SVAP and the other protocol; SVAP is a useful scientific tool</td>
<td>Zogaris et al. 2009</td>
</tr>
<tr>
<td>Location</td>
<td>Organization(s)</td>
<td>Objective(s)</td>
<td>Lesson(s) Learned / Outcomes</td>
<td>Reference(s)</td>
</tr>
<tr>
<td>--------------</td>
<td>---------------------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------------------------------</td>
<td>---------------------------------------</td>
</tr>
<tr>
<td>New Jersey</td>
<td>Omni Environmental Corporation</td>
<td>Train community watershed organizations to implement locally-adapted SVAP</td>
<td>~60 non-profit and volunteer-based groups trained Trainees benefitted from both in-class and in-stream instruction and experience</td>
<td>Obropta and Yergeau 2011</td>
</tr>
<tr>
<td></td>
<td>Cooperative Extension Water Resources Program, Rutgers University</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Puerto Rico</td>
<td>University of Puerto Rico UGA</td>
<td>Evaluate efficiency of HSVAP within the highly urbanized Rio Piedras watershed</td>
<td>HSVAP is sufficient for general assessment of physical characteristics of streams in Puerto Rico; however, HSVAP required modifications to accurately assess ecological conditions in Puerto Rican streams HSVAP not appropriate for predicting water quality</td>
<td>de Jesús-Crespo and Ramirez 2011</td>
</tr>
<tr>
<td>New York</td>
<td>Buffalo State College University at Buffalo</td>
<td>Test reliability of SVAP as monitoring tool through comparison of SVAP overall stream scores and individual element scores at multiple sites within one watershed, over time</td>
<td>May not be advisable to link individual element scores to specific watershed management goals; however, linkages between individual element scores and watershed management goals may be improved by adapting the protocol to suit the area where it is implemented (as stated by the original SVAP developers)</td>
<td>Frothingham and Bartlett 2012</td>
</tr>
</tbody>
</table>
SECTION 3: SUGGESTED CHANGES TO THE GRADE YOUR STREAM PROTOCOL

This section concerns the LTLT’s modified saSVAP tool (hence referred to as the Grade Your Stream protocol, to reflect the name chosen by the LTLT staff) as it exists in spring 2014. The recommendations contained in this section are presented with the goal of helping the LTLT achieve its objectives through implementation of the Grade Your Stream program. We note that some of the suggested revisions apply only to the Grade Your Stream protocol as it exists in spring 2014, and that they may no longer be relevant as the Grade Your Stream program evolves. A complete version of the current Grade Your Stream protocol can be found in Appendix I: Grade Your Stream Protocol (Original).

Our recommendations are presented in two subsections to improve their accessibility:

1) General Improvements notes broad changes to the protocol’s language, layout, or approach that will improve data quality and participants’ experiences; and

2) Specific Edits to the Spring 2014 Grade Your Stream Protocol moves through the tool on an element-by-element basis and points to specific changes that may improve data quality and participants’ experiences, including modifications to word choice, question order, and illustrations.

3.1 GENERAL IMPROVEMENTS

3.1. A WORD CHOICE AND ORGANIZATION

The Grade Your Stream protocol may benefit from a number of changes to its wording and organization that make the protocol more user-friendly, transparent, and effective as an educational tool. Please see the Specific Edits to Grade Your Stream Protocol, Spring 2014 section, below. As an important first step, the staff at the LTLT created a new name for the modified saSVAP protocol, developing the moniker “Grade Your Stream.” We think this is exceptional because it is clear and sounds professional, and because it ties the name of this new protocol in with the “Shade Your Stream” initiative that the LTLT already advertises.

3.1. B COMMENT BOX

We recommend adding a comment box to the end of the Grade Your Stream score sheet to give volunteers a place to reflect on their scores and note any scoring issues or uncertainties they encountered, thus improving the quality of the data collected (Fig. 3). Additionally, a second, separate comment box may provide volunteers with space to describe problems experienced while surveying that are not specifically related to scoring or to give suggestions about how the surveying method may be
improved (Fig. 3). Comments about issues encountered during surveys that are provided by participants can be analyzed and improvements may be incorporated into the protocol the following year. The advantage of providing comment boxes at the end of the scoring sheet is that it may be an effective way to keep commenting to a constructive minimum: if a smaller comment box is provided within the scoring subsection for each element, many more less useful comments may be collected relative to a single larger comment box at the end that requires participants to self-edit to fit their comments into one box.

![SCORING SHEET](image)

**Figure 3** Example of a modified Grade Your Stream score sheet with two comment boxes incorporated to solicit additional participant input.
3.1. C PARTICIPANT FATIGUE & QUESTION IMPORTANCE

Participant fatigue is a common side effect of long surveys and may occur among volunteers completing a Grade Your Stream survey. One way to work around fatigue is to order the stream assessment elements such that the most important ones come first; therefore, participants’ attention is directed more towards scoring those elements. If education of participants is the primary objective for implementing this protocol, the elements should be ordered such that those that best teach participants about stream health are presented first. Likewise, if certain elements best describe a stream in dire need of restoration, and a main objective is to identify severely damaged streams, those elements should be prioritized in the protocol. Presenting elements in order of importance is probably a better way to ensure that participants focus on key elements rather than specifically stating which elements are most significant. The latter tactic can induce bias by making participants overly critical of certain features, resulting in recording of impartially low scores, or under-critical when scoring features that are not presented as “important.”

3.1. D SOCIAL CONTEXT OF STREAMS

Questions that address the social context of streams are lacking in the Grade Your Stream protocol as it currently exists because it was developed to assess the health of streams, not necessarily their use by, and benefit to, people. However, there are a number of ways that data about people and the social dimensions of stream systems could be helpful and informative, and the data needed to realize these benefits may be simple to acquire. Many Grade Your Stream participants will be landowners who are determining the baseline “grade” for their stream. Knowing how they are using the land around the stream may help identify the risks that might be faced by that stream, thus helping LTLT recommend more complete and precise actions to interested landowners. Over time, and with multiple seasons of survey data, the information collected regarding participants’ land use habits and demographic background may help LTLT further tailor the protocol to the population it serves and it could help make the protocol accessible to a wider base of volunteer participants. Further, this data may reveal biases among certain groups of participants. For example, self-described fishing enthusiasts might be found to grade elements relating to fish passage more harshly than cattle farmers using the stream primarily as a water source for livestock. This information can be very easily gleaned by asking the participant to answer one or a few short questions before or after the survey. Possible questions are: Is this stream valuable to you? Is this stream useful to you? Do you benefit from having this stream on your land? Does this stream affect your livelihood? Additionally, participants may be asked to elaborate on their responses (e.g., Why? How?).
3.1. EDUCATIONAL COMPONENTS

The value of the Grade Your Stream protocol as a teaching tool may be enhanced by the addition of a few components. First, at the top of each element, provide a general statement about the stream characteristic being measured to clarify its relevance. For example:

- For Element 1: “Bends in the stream slow the flow of water and reduce erosion,” helps explain that participants are being asked to grade the sinuosity of the stream.
- For Element 3: “Streamside vegetation covering a wide area adjacent to and extending away from the stream keeps the stream shaded and cool,” helps guide grading related to riparian buffer width.

Second, consider providing a section at the beginning of the protocol with key words and definitions as a helpful reference for participants to use throughout the survey. Alternatively, key words and definitions may be provided in callout boxes embedded throughout the protocol, appearing where they are most likely to be useful. When choosing which things to include in such boxes, consider that words such as “riffle” and “riparian” are not intuitive for non-scientists.

3.1. F CHANGES TO THE GRADE YOUR STREAM PROTOCOL AND SCORE SHEET

- Remind volunteers to examine the entire stream reach, first and foremost
  - We recommend adding a line at the beginning of the survey and on the top of the score sheet that reminds volunteers to walk the entire length of the stream reach being surveyed before they begin conducting the survey. Each element score that is assigned is expected to represent the average condition of the reach. Some reaches will be more diverse and heterogeneous, in which case subsections of the survey area could earn different scores. By reminding volunteers to walk the entire length of the survey area first, they will be more likely to recognize whether some areas of the stream differ from others and where assigning an average score will require additional thought.

- Include trespassing clause
  - Remind volunteers to respect private property lines that they do not have permission to cross. Include a short clause somewhere in the protocol that addresses the issue of trespassing.
3.2 SPECIFIC EDITS TO THE SPRING 2014 GRADE YOUR STREAM PROTOCOL

ELEMENT 1: CHANNEL CONDITION

- **Edit illustrations**
  - The written criteria focus on the presence of point bars, but point bars are not present in any of the illustrations and no explanation of point bars is provided. (Note: Our understanding is that point bars form as a channelized stream returns to a naturally sinuous and meandering state.)

- **Change criteria**
  - Change “point bars” to “number of bends”. Perhaps the criteria for this element should be changed so scores are based on the number of bends in the reach, as this would help quantify sinuosity.
**ELEMENT 2: BANK CONDITION**

| Right Bank | 4 | 3 | 2 | 1 |
| Left Bank  | 4 | 3 | 2 | 1 |

- **Change content**
  - As with all of the other elements, Element 2 will benefit from a brief explanation, provided above the images, of why and how bank condition affects streams. Perhaps it will be useful to explain that “riprap” increases erosion downstream by increasing the speed of water flow, or other relevant points.
**ELEMENT 3: RIPARIAN AREA QUANTITY**

- **Change vocabulary**
  - Change element name to “Streamside Vegetation.” The term “riparian” is not intuitive to a general population. If a goal is to increase the user’s fluency in stream-related vocabulary, put “riparian” in parentheses so it reads, “Streamside Vegetation (Riparian Area)”. Alternatively, “riparian” can be included in a definition box, as previously suggested.

- **Change criteria**
  - Change score 3: We noticed that the criterion, “Riparian buffer of natural vegetation covers entire floodplain,” appears in the score 3 column. Because riparian vegetation covering the entire extent of the floodplain is a highly desirable condition, we suggest this criterion be moved to the score 4 column.

- **Potentially conflicting criteria within score 1 and score 2**
  - Within each of the score 1 and score 2 columns, we recommend separating the different criteria using a word such as “or”. Alternatively the multiple criteria can be reduced to one criterion.
    - Having multiple, potentially conflicting criteria in one score column may be confusing to surveyors. In the score 3 column, the word “or” has been used to clarify that both criteria do not need to be satisfied to give the score of three, the presence of either criterion yields a score of three.
- **Edit illustrations**
  - The illustrations depict the perspective of a viewer that is standing in the streambed looking downstream, yet the scoring criteria reference the presence of gaps in streamside vegetation, which are not readily apparent from this perspective. We understand that gaining new illustrations for these metrics may not be immediately feasible, but it may be advantageous to include at least one illustration drawn from the perspective of a viewer standing on the bank of the stream. That way, gaps in vegetation are more apparent. Below is an example of the kind of angled view that will make clear what a gap in vegetation looks like:
ELEMENT 4: RIPARIAN AREA QUALITY

We suggest that the most important factor in riparian quality is presence/abundance of 3 major growth habits (trees, shrubs and grasses). The 3 types have different, though overlapping, roles in protecting and enriching the stream, so that it is easy to visualize a range of scores as follows:

<table>
<thead>
<tr>
<th></th>
<th>All 3 types well represented</th>
<th>2 types</th>
<th>1 type</th>
<th>No natural vegetation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Right Bank</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Left Bank</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

- **Change vocabulary**
  - This element contains several words or phrases that should be changed to be more user-friendly.
    - Growth habits: Botanists frequently talk about plants having “growth habits” but we recommend using “heights of plants” or “types of plants” in this context.
    - Shrub: The word “shrub” is open to interpretation, while “bushes/small trees” is a better catchall phrase for the low-growing vegetation that the protocol intends to identify.

- **Change content**
  - Why are these plants desirable? The second sentence alludes to the importance of having a variety of vegetation types, but it does not explicitly state this; this is problematic when one of the main goals of the program is to educate people about stream health. We recommend that this sentence be elaborated to explain why a variety of plants is desirable, and to emphasize that each kind of plant has a different root structure that holds soil differently, thus a variety of root types reduces bank erosion rates. Giving participants the “why” and “how” will not only help achieve the Grade Your Stream program’s educational goals, it will likely improve the quality of participant scoring.
  - Delete part of the 2nd sentence. The second half of the second sentence in this question, “so that it is easy to visualize a range of scores as follows,” seems unnecessary; perhaps it should be removed.
• **General comment**
  o The canopy cover illustrations are very well done!

• **Change content**
  o Add a general statement above the illustrations for this element to inform volunteers not to measure canopy cover unless the trees have leaves (i.e. this element should not be measured in winter). Alternatively, provide a space for volunteers to indicate when the survey was conducted so scores for canopy cover may be corrected to account for seasonality.
ELEMENT 6: NUTRIENTS

<table>
<thead>
<tr>
<th>No evidence of organic pollution sources near the stream.</th>
<th>Temporary sources (animal carcasses).</th>
<th>Livestock in pastures which are fenced away from the stream but with little or no vegetative buffer.</th>
<th>Access to the stream by livestock over a large area.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vegetable waste.</td>
<td>Dense human populations near to the stream.</td>
<td>Feedlots or animal pens poorly buffered, but without direct drainage, or which see occasional use.</td>
<td>Livestock with full access to tributary streams and ditches draining directly into the stream.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Unbuffered or barely buffered fertilized lawns or row crop fields.</td>
<td>Feedlots, trout farms or dog pens draining directly to the stream.</td>
</tr>
</tbody>
</table>

| 4 | 3 | 2 | 1 |

- **General comment**
  - Our recommendations for this element are best considered alongside recommendations for Element 7: Livestock, and Element 12: Trash and Garbage. Overall, Elements 6, 7, and 12 should appear in series as they are very closely related.

- **Change element name**
  - The title “Nutrients” is likely to be confusing to non-scientists. Most people think of nutrients in terms of the vitamins listed in the nutrition facts section on food packaging, not as the nitrogen, phosphorus and other elements produced by decomposition of organic materials. We suggest changing the title to something such as “Non-garbage pollution,” “Pollution that isn’t trash,” or “Pollution other than solid waste,” which clarifies an interest in waste products that are different from Styrofoam cups, tin cans, car batteries, etc.

- **Change score column 4**
  - After the element title is changed, score column 4 should be modified to correspond. For example, it may be changed to read, “No evidence of non-trash pollutants in the stream.”

- **Note on Element 7**
  - Element 7: While livestock is a component of non-trash pollution, it is important enough to be its own element and the illustrations that go along
with it are excellent. We suggest removing the word “livestock” from Element 6 and using this element to focus exclusively on non-livestock sources of organic pollution.

- Change score column 2
  o After score criteria related to livestock are removed from this element, the score column 2 should read, “Feedlots or animal pens are near the stream with little vegetation between them and the stream, but they do not drain waste products directly to the stream or they are used only occasionally. - or- Fertilized lawns or row crops are near the stream with little vegetation between the fertilized areas and the stream.”
  o Additionally, the score column 1 then should read, “Feedlots, trout farms, or dog pens draining waste products directly to the stream. -or- Fertilized lawns or row crops that go right up to the stream’s edge.”

- Change vocabulary
  ▪ Vegetable waste: We wonder what the phrase “vegetable waste” means to the average citizen, perhaps “food waste” or “compost” might better describe this kind of dumping.
  ▪ Animal carcasses: Additionally, “animal carcasses” seems very broad to us; we recall hearing that this refers to trapped nuisance animals (e.g., raccoons), oyster shell piles, and/or hunters’ gut piles so we suggest that the criteria list these specific items as “oyster shells,” “gut piles,” or “trapped nuisance animals.”
  ▪ After making the vocabulary changes suggested above, score column 3 should read, “Temporary items that will decay over time, such as oyster shells, gut piles, or trapped nuisance animals, or compost/food waste, or dense human populations, near to the stream.”
ELEMENT 7: LIVESTOCK

- **General comment**
  - Our recommendations for this element should be considered alongside recommendations for Element 6: Nutrients, and Element 12: Trash and Garbage. Overall, Elements 6, 7, and 12 should appear in series as they are very closely related.

- **Change content**
  - As with all of the other elements, Element 7 will benefit from a brief explanation, provided above the illustrations, about why livestock near streams reduces water quality. Otherwise, this is one of the clearest metrics in the protocol and no other changes are needed.
**Element 8: Pools**

<table>
<thead>
<tr>
<th>&gt; 4 pools/500 ft.</th>
<th>3-4 pools/500 ft.</th>
<th>1 pool / 500 ft.</th>
<th>No pools</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

Other considerations:

- Depth: >1.5 feet for a “deep” pool is a useful starting point, but pool depth necessarily varies with stream size. In general, if all pools are the same depth, it is probable that none will qualify as a “deep” pool.
- Diversity of types: Pools may be round or oblong, concentrated along one shore or deepest in mid-channel, and have their maximum depth at various points. A diversity of types should be equated with a healthy condition.
- In-pool structure: Undercut banks, tree roots, boulders, bedrock intrusions, etc. all add habitat value to pools.
- Sedimentation: In extreme cases, sedimentation may lead to the disappearance of pools. Short of that, accumulation of sediment in the middle, at the sides or at the tail of pools reduces volume, depth and habitat value.

- **Change content**
  - Add a general statement above the scoring criteria. Element 8, in particular, will benefit from a clear explanation about the importance of pools. This may be as simple as, “Pools slow the flow of water in the stream and provide good habitat for fish.”

- **Change criteria**
  - Pools or pool depth? The scoring columns refer only to the number of pools present in the reach, so it might be confusing to have so many “other considerations” below the scoring boxes without saying how these items contribute to the scoring process.
    - If counting the number of pools is sufficient to assign the score, consider removing “other considerations” entirely.
    - If the score cannot be assigned solely on the number of pools present, then the criteria in the scoring columns need to be expanded to reflect the additional considerations.

- **General comments about structure**
  - An alternative might be to modify this element so it looks more like Element 10: Available Habitat/Cover, which has a series of boxes containing illustrations of different types of habitat cover.
    - However, Available Habitat/Cover already asks surveyors to look for “deep pools,” “undercut banks,” and “secondary pools/scour pools.” Perhaps the “other considerations” listed under Element 8 are already covered within Element 10 and the “other considerations” list could be removed from Element 8 entirely.
o Improve clarity of “other considerations” in Element 8. If the decision is made to keep “other considerations” in some form, we have several recommendations for improving the clarity of this list:

- “Undercut bank” is not clear (especially not with the illustration from Element 10, which could be vastly improved with the addition of some shading or lengthening the lines indicating undercutting). An undercut bank is very different from the eroding banks seen in channelized streams and this should be clarified if undercut banks are going to be discussed here.

- “Sedimentation” should be defined, perhaps by saying, “Sedimentation is the settling of dirt and sand from land on the bottom of the stream. Over time, increased sedimentation makes pools disappear as the pools are filled with dirt.”

- The wording in “Diversity of types” could be changed to, “The more shapes, sizes, depths, and locations of pools, the healthier the stream.”
ELEMENT 9: BARRIERS TO FISH MOVEMENT

- **General comments**
  - The images for this element are really helpful to understanding what constitutes a barrier to fish passage and they connect well with the criteria listed below them.
  - The general information statement to be provided above the illustrations may read, “Fish movement is limited by artificial barriers and by shallow water.”

- **Change criteria**
  - In the column for score 4, change the criterion to, “No artificial barriers are present, and natural barriers, such as fallen trees, may be providing improved habitat for fish.”
**ELEMENT 10: AVAILABLE HABITAT/COVER**

<table>
<thead>
<tr>
<th>Woody Debris</th>
<th>Pools</th>
<th>Boulders</th>
<th>Bank Features and Side Channels</th>
<th>Other Habitat Features</th>
<th>Vegetation</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="Illustration" /></td>
<td><img src="image2" alt="Illustration" /></td>
<td><img src="image3" alt="Illustration" /></td>
<td><img src="image4" alt="Illustration" /></td>
<td><img src="image5" alt="Illustration" /></td>
<td><img src="image6" alt="Illustration" /></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Element</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Woody Debris</td>
<td>Greater than 75% of stream reach contains stable habitat; mix of logs, undercut banks, cobble riffles, boulders, or other habitats.</td>
</tr>
<tr>
<td>2. Pools</td>
<td>50-75% of stream reach contains stable habitat. There is adequate stable habitat and also newly developed potential habitat (e.g. recently fallen debris).</td>
</tr>
<tr>
<td>3. Boulders</td>
<td>25-50% of stream reach contains stable habitat; availability is limited, substrate frequently disturbed or removed.</td>
</tr>
<tr>
<td>5. Other Habitat Features</td>
<td>&lt;25% of stream reach contains stable habitat; lack of habitat is clear, substrate is unstable.</td>
</tr>
<tr>
<td>6. Vegetation</td>
<td></td>
</tr>
</tbody>
</table>

- **Edit illustrations**
  - As mentioned in the section for Element 8, the image for “undercut banks” is hard to understand. Extending the cut part of the bank higher above the water and shading the surface of the water along the bank are two ways to make this illustration more intuitive.
  - The illustration for “deep pools” looks more like a pond than like a pool in a stream. Consider modifying.

- **Change vocabulary**
  - Some of the headings for the habitat features in the boxes contain technical language that may not be intuitive for non-scientists. We have some suggestions for more clear word choices:
    - “Scour pool” could be changed to “turbulent pool.”
    - “Off channel habitat” could be improved with a descriptive heading such as “Pocket of water along the side of the stream where water flow slows down.”
    - “Macrophyte beds” could be changed to “Aquatic vegetation,” or “Plants growing in water and attached to rocks.”
ELEMENT 11: RIFFLE EMBEDDEDNESS

The approach is to disturb the substrate in a riffle and count the number of seconds until the water clears. To make a more objective score, it is best to perform numerous “kick tests” in different riffles and riffle types and basing the score on the mean.

<table>
<thead>
<tr>
<th>&lt;1 second (or no visible sediment)</th>
<th>2-5 seconds</th>
<th>6-9 seconds</th>
<th>&gt;10 seconds</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

- **General comments**
  - Element 11 is a great component of this protocol because it requires participants to be active in the stream. Additionally, the “kick test” described in this element is a standard way to sample for stream salamanders and invertebrates, and participants can be encouraged to look for such wildlife with a single line of text added after the description of the “kick test”, such as, “This is also a great way to find salamanders living in the stream! If you have a small net or a basket, hold it 1 foot downstream from where you are kicking, and after the water clears, pull it out of the water to see if you caught anything.” A few empty lines can also be added below the scoring criteria for participants to make note of what was seen. We think adding this kind of feature to the protocol, which encourages volunteers to be vigilant for wildlife, is an easy way to reward them for getting through some of the less exciting elements. We suggest making this element the very last one in the protocol so participants come away from the survey with this experience at the forefront of their minds.
  - This element will also benefit from a clear general statement about what is being tested with the “kick test.” The statement could read, “The kick test tells us about the rate of accumulation of dirt and sand on the bottom of the stream, and this in turn can tell us how much erosion is happening upstream of the reach we are surveying.”

- **Change vocabulary**
  - Riffle: The word “riffle” may not be familiar to participants; we think riffles can be described succinctly as “turbulent ripples.”
  - Embeddedness: The word “embeddedness” may not be intuitive, and should be replaced or explained as, “the degree to which sand and dirt is built up around rocks in the stream.”
ELEMENT 12: TRASH AND GARBAGE

- **General comments**
  - Our recommendations for this element should be considered alongside recommendations for Element 6: Nutrients, and Element 7: Livestock. Overall, Elements 6, 7, and 12 should appear in series as they are very closely related.
    - We suggest the trash element should be moved up in the list to fall just after Elements 6 and 7; this trash element should become the new Element 8.
    - Because organic garbage is scored in Element 6, we think it is redundant to examine it again in the trash element. The trash element should include three-dimensional objects (solid waste), toxic chemicals and their containers.
    - The general statement at the beginning of this element may read, “Trash is defined here as man-made solid waste items, including plastic, metal, glass, paper, milled wood, household dumping piles, and any items containing toxic chemicals.”

- **Change content**
  - Educational content: We think it is important to educate people about the significance of different trash items. A car battery sunken in a stream pool may not be unsightly, some people may not even notice it, but it is much more detrimental to stream health than an unsightly pile of aluminum cans, yet the pile of aluminum cans is more likely to attract attention. Improving the educational value of this element may easily be achieved with a second line of text under the general statement reading, “When thinking about the quality of the trash you see, keep in mind that an unsightly pile of cans and

---

**Quantitative**

<table>
<thead>
<tr>
<th>No or almost no trash</th>
<th>Trash occasionally visible</th>
<th>One or another form of trash constantly in view, but with no large concentrations</th>
<th>Large concentrations of trash nearly always in view</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

**Qualitative**

<table>
<thead>
<tr>
<th>No or almost no trash</th>
<th>Relatively inert materials</th>
<th>Organic materials</th>
<th>Toxic materials</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

---
bottles may be less damaging to a stream than a single car battery that may be leaking acid into the water.”

- **Change criteria and vocabulary**
  
  o Quantitative and qualitative metrics: The use of two metrics, a quantitative metric and a qualitative metric, is a great way to address different aspects of trash found in streams. The quantitative metric is clear and does not require modification; however, we have suggestions for the qualitative metric:

  ▪ Inert: In scoring column 3, the word “inert” may not be readily understandable to everyone, so a list of items that are “relatively inert” may be more effective. The criterion for a score of 3 may include, “glass and metal containers and fragments, barbed wire, old clothes, food wrappers, plastic pipes, building tiles, plastic bags, scrap lumber, pieces of cement, shopping carts, and other non-toxic items.”

  ▪ Organic materials: In scoring column 2, the criterion entails “organic materials,” which is addressed extensively in Element 6. One kind of trash that may be appropriate to specify here involves the wholesale dumping of household garbage, because a household trash bag is unlikely to contain a high number of toxic chemicals but rather a mix of inert trash items and food waste. Perhaps the criterion for a score of 2 should also be a list; it could read, “household trash piles, used diapers, broken appliances, Styrofoam packaging, lawn and brush clippings, dead animals, and any other items that are not necessarily toxic but will break down over time in the stream.”

  ▪ Toxic materials: We agree with making scoring column 1 exclusive to toxic materials, but again, this scoring criterion may benefit from being converted to a list; it could read, “old junk cars, tires, batteries, 50-gallon drums or other containers with unknown contents, toxic-looking runoff from spillways or pipes, and any other sources of hazardous waste products.”
ELEMENT 12: TRASH AND GARBAGE - REVISED

Suggested scoring criteria for Metric 11 take into account the amount, frequency and types of litter found. We here define 3 types of trash - toxic (chemicals, petroleum products, etc.), organic (garbage, dead animals, etc.) and relatively inert (plastic, metal, glass, paper and wooden products and fragments). We suggest that scores for this metric should reflect the mean of quantitative (amount and frequency) and qualitative evaluations. First work through the Quantitative, then use the Qualitative worksheet to adjust the score (Note: minimum possible score = 1).

### Quantitative

<table>
<thead>
<tr>
<th>No or almost no trash</th>
<th>Trash occasionally visible</th>
<th>One or another form of trash constantly in view, but with no large concentrations</th>
<th>Large concentrations of trash nearly always in view</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

### Qualitative

<table>
<thead>
<tr>
<th>Wholesale trash dumping</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>No need for worksheet score = 1</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Serious toxic concerns</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Equipment/cars</td>
<td>20</td>
</tr>
<tr>
<td>Containers/barrels of toxic or unknown substance</td>
<td>20</td>
</tr>
<tr>
<td>Battery</td>
<td>10</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Major organic inputs</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Diapers present</td>
<td>5</td>
</tr>
<tr>
<td>Dead animals</td>
<td>5</td>
</tr>
<tr>
<td>Food scraps</td>
<td>1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Inert substance</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Styrofoam</td>
<td>3</td>
</tr>
<tr>
<td>Lumber</td>
<td>1</td>
</tr>
<tr>
<td>Cans/glass</td>
<td>1</td>
</tr>
<tr>
<td>Wire</td>
<td>1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>If sum (from Quantitative)</th>
<th>Deduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 5</td>
<td>0</td>
</tr>
<tr>
<td>5 - 9</td>
<td>0.5</td>
</tr>
<tr>
<td>10 - 19</td>
<td>1</td>
</tr>
<tr>
<td>20 - 29</td>
<td>1.5</td>
</tr>
<tr>
<td>≥ 30</td>
<td>2</td>
</tr>
</tbody>
</table>

- **General comments**
  - See the General comments section under Element 12: Trash and Garbage, previous. In addition, consider the following:
    - At the end of the general statement for the beginning of this element and the educational content addition suggested above, add, “First complete the Quantitative scoring section, and then use the
Qualitative worksheet to adjust the overall score for this element. The lowest possible score is 1.”

- Change criteria and vocabulary
  - As mentioned in the “Change criteria and vocabulary” section for Element 12, above, we like the division of the criteria for the trash metric score into qualitative and quantitative components. In addition, we like the way the two scores are blended to create one overall trash score in this revised version of the metric.
  - As before, we believe the quantitative component is clear and does not require modification; however, we have the following suggestions for the qualitative component:
    - Serious toxic concerns: The second section of the qualitative component addresses potentially toxic trash items. We suggest minor revisions to the specific factors so that “Equipment/cars” also includes household appliances, perhaps “appliances/equipment/cars” is appropriate.
    - Major organic inputs: The third section of the qualitative component regards organic inputs; however, “dead animals” and “food scraps” along with other nutrient-adding substances are addressed extensively in Element 6. Element 6 does address dirty diapers or general household trash, and this kind of garbage might be appropriate to specify here, perhaps under a heading such as “Household garbage.” The specific items may then be “diapers,” and perhaps “mixed kitchen waste,” and each item may be given an appropriate weighted score.
    - Inert substance: The fourth section in the qualitative component is titled “Inert substance,” which may not be readily understandable to everyone. We suggest a heading such as “Slow decaying, low toxicity items.”
    - Overall score calculation box: Volunteers may find it easier to calculate their overall score for this element if more descriptive column headings are provided for this box. The heading “If sum” could be changed to “If sum from qualitative component is...” and “Deduction (from Quantitative)” could be changed to “Then deduct the following points from the quantitative score.”
3.3 CONCLUDING REMARKS

Overall, the Grade Your Stream protocol is an excellent and user-friendly tool. In general, the language is clear and the illustrations are exceptional. The edits we suggest above are targeted to help the Grade Your Stream protocol support LTLT in its primary objectives, mainly: to monitor stream health and prioritize streams for restoration and to provide educational outreach to the community, specifically as it relates to enhancing awareness of streams as important habitats. We believe the Grade Your Stream protocol has the potential to be one of the most versatile and powerful outreach tools available to LTLT, and that its educational value will appeal to many different groups of people. We also believe that a monitoring initiative such as the Grade Your Stream program is crucial to informing other stream restoration programs. We hope the changes suggested above will add to the usability and functionality of Grade Your Stream both as an educational tool and as a system for alerting LTLT staff to the streams that are most in need of restoration.
The following implementation plan includes an outline for important steps and considerations for the LTLT as it initiates the Grade Your Stream program. This plan was developed through consultation of program planning and implementation guides for similar volunteer monitoring programs, including water quality monitoring programs. In particular, many of the following suggestions were drawn from the Stream Survey Manual: A Citizen's Guide (Vol. I, Vol. II, and Appendix) prepared by the Maine Stream Team Program (MSTP) of the Maine Department of Environmental Protection (MSTP 2009a-c).

Along with consulting the implementation suggestions provided in the following sections, the LTLT should tap into the growing support network for citizen science programs that is emerging online. In particular, we recommend Citizen Science Central, hosted by the Cornell Lab of Ornithology\(^ {11} \). This site was developed to help organizers of PPSR initiatives engage in intentional design and planning. An intentional design approach ensures that PPSR programs are meaningful to all participants and outcomes are useful for a variety of means. The Citizen Science Central website includes information on different models for PPSR; links for more than a hundred citations for scientific literature regarding general information about PPSR and project findings (e.g., related to data quality, education, impacts, and science); and contains resources for education/communication, evaluation, and project design, including strategies to link research findings to management and decision making.

Citizen Science Central also offers a toolkit that provides a stepwise approach to project development and a variety of tools and resources for engaging scientists and volunteers. Elements of the toolkit include modules and resources to: choose a question, form a team, refine protocols, recruit participants, train participants, accept data, analyze data, disseminate results, and measure effects. Additionally, the LTLT should consider registering with the Volmonitor Listserver\(^ {12} \), an online forum that connects volunteer water monitoring program coordinators from across the United States. This forum involves questions, announcements, and discussions of reading topics related to the volunteer water monitoring community.

\(^{11}\) [http://www.birds.cornell.edu/citscitoollkit](http://www.birds.cornell.edu/citscitoollkit)  
\(^{12}\) [http://water.epa.gov/type/rsl/monitoring/listinstruct.cfm](http://water.epa.gov/type/rsl/monitoring/listinstruct.cfm)
4.1 PLANNING STAGE

“By failing to prepare, you are preparing to fail.”
— Benjamin Franklin

Before engaging stakeholders, the LTLT should delegate program responsibilities among staff members, develop a work plan to outline its upcoming activities, and acquire materials and resources for soliciting, training, and managing participants and conducting Grade Your Stream surveys. In particular, the program team should outline the overall time frame available for program development and planning. The first year of the Grade Your Stream program should focus on completing the activities listed in 4.2 Initial Activities. These include dedicating effort to acquiring funding and establishing important administrative dimensions of the program, as well as investigating opportunities for expanding the program into the Tuckasegee watershed in the future.

Program planning will be most effective if the core program team (e.g., the Steering Committee and program coordinators, described below) conducts a series of meetings and workshops to develop a work plan, schedule and budget, rather than holding a single, intensive planning workshop. This will allow the program managers time to process workshop discussions and will allow thoughtful, iterative development of program elements. Regardless of the process used, energy should be initially devoted to identifying program leaders and developing a clear work plan with a schedule and budget.

4.1. A ESTABLISH STRUCTURE FOR PROGRAM MANAGEMENT

A key first step in the development of a successful long-term program is to identify who will be responsible for planning, implementing, and overseeing program activities. Identifying leaders and articulating responsibilities of leaders, organizers, and participants a priori will ensure efficient implementation of the multi-dimensional Grade Your Stream program.

Key roles and responsibilities within the Grade Your Stream program will likely include the following:

- **Program Manager and Steering Committee**: Responsible for coordination and administration of the program, including planning and supervising Grade Your Stream activities, conducting program monitoring and evaluation, integrating Grade Your Stream activities with other LTLT projects and programs, hiring consultants and other contracted labor, and delegating responsibilities to others as needed.
- **Volunteer Coordinator**: Oversees outreach and community engagement activities related to the Grade Your Stream program, manages Grade Your Stream volunteers, organizes training sessions, invites participants, and is responsible for distributing surveying materials. Helps the Data Coordinator collect stream survey data.

- **Data Coordinator**: Responsible for collecting, organizing and storing data from stream surveys and Grade Your Stream program monitoring activities. Works closely with the Technical Team to produce program progress reports and provides information to support outreach activities and applications for funding.

- **Technical Team**: One or more individuals responsible for advising the Steering Committee and Program Manager on technical issues related to the Grade Your Stream protocol, data collection and management, training volunteer surveyors, conducting follow-up work as needed, and helping with written program progress reports and funding applications. Technical team members may include members of state/federal agency staff, local soil and water conservation district staff, scientists from the Coweeta Long Term Ecological Research (LTER) program, graduate students from the University of Georgia and other local universities and colleges, database managers, and/or private consultants.

- **Grade Your Stream Volunteers**: Responsible for completing required training activities, communicating with the Volunteer Coordinator regarding scheduling and other pertinent information, conducting stream surveys and providing survey data to the Data Coordinator in a timely manner, participating in program monitoring and evaluation activities, and recruiting other volunteers.

- **Grade Your Stream Data Users**: People or groups that will benefit from the information collected by the Grade Your Stream program, including the stream and protocol element scores (e.g., the Coweeta Long Term Ecological Research program).

It may be necessary for a single steering committee member or member of the LTILT staff to fulfill more than one role as the program starts up; however, as it grows, it is advisable to seek different people to be responsible for different aspects of the program to ensure each is adequately addressed.

A summary of common responsibilities for organizers and participants in stream survey programs, including recommendations for the number of people and estimates of time commitments, is presented in *Appendix III.A Common Responsibilities in Stream Surveys* (MSTP 2009a).
4.1. B DEVELOP A BUDGET AND SECURE FUNDING

Coordinating and administering a citizen science program can be expensive, depending upon the scope of the program and pre-existing resources. For example, providing technical oversight, training volunteers, and generating annual reports necessitates inputs of financial and human resources, including time. The LTLT should pursue fundraising activities and begin applying for grant funding at least a year before each survey season. This may not be possible in the first year of the Grade Your Stream program, but should be the goal for subsequent years. In the future, the data and results generated by volunteer surveys and Grade Your Stream program monitoring and evaluation activities should be reported in funding applications and leveraged for additional resources.

Programs with insufficient funding may compromise the achievement of program objectives by creating unnecessary constraints. Where possible, the LTLT should engage volunteers and professionals that can provide the bulk of their time, labor, and equipment for free or as “in-kind” contributions. It may be possible to borrow materials from volunteers or technical advisors. For examples of expenses that can be expected in the implementation of the LTLT’s Grade Your Stream program, which the LTLT should keep in mind when applying for funding and soliciting donations, refer to section F. Budget for Project and Secure Funding in the Stream Survey Manual: A Citizen’s Guide - Vol. I prepared by the Maine Stream Team Program (MSTP 2009a).

4.1. C IDENTIFY PRIORITY STREAM REACHES

The LTLT should generate a list of priority streams and/or stream reaches to be surveyed in the context of the Grade Your Stream program. A stream may be a “priority” stream because: (a) there is little or no information about the health of the stream; (b) there is a known specific problem with the stream; (c) the stream is known to be highly sensitive; (d) the stream may contain high-value habitat for cold water fisheries; or (e) the stream (or the water body into which it flows) may be/is valuable to the local community and the community wants to protect, maintain, or improve its value.

A list of priority streams can serve multiple purposes. Streams on the list that represent the range of stream conditions that exist in the watershed, which volunteers may encounter when conducting surveys, may be used for training and education sessions. Additionally, volunteers that are not landowners may want some guidance on where they should survey. A list of priority streams can direct volunteers to places where the LTLT is most interested in collecting data; having the list ready in advance will facilitate this process. Given limited resources for monitoring the
watershed, safety constraints, issues of access, and so on, it is wise for the LTLT to create a plan to prioritize streams based on their goals.

If volunteers are going to be directed to survey streams that the LTLT has identified as priorities, the LTLT should provide volunteers with a map and, if possible, GPS coordinates for the stream/reach. The MSTP (2009a), based on their experiences, also recommends that the Volunteer Coordinator or other member of the planning team to do a reconnaissance visit to possible access points prior to actual surveys to identify sites that are difficult to access or walk/survey.

Additional considerations when identifying priority streams and stream reaches for conducting training sessions include (see section C6g: Choose the reaches to be surveyed and then assign volunteers in MSTP 2009a for more details):

- Volunteer experience with stream assessments
- Stream accessibility
- Reach length and ruggedness (e.g., ease of travel along stream banks, sinuosity of the stream, density of the riparian area)
- Stream conditions (e.g., steepness of banks, uneven or slippery sections)

Grade Your Stream program leaders, such as the Steering Committee and Program Manager, may choose survey locations themselves or in collaboration with members of the Technical Team or other experts. Alternatively, the LTLT may defer to volunteers to choose survey locations or they may solicit community input, possibly through an online survey, regarding priority streams for the program. The MSTP (2009a) suggest that this is useful when the primary purpose of the survey is education. If the LTLT creates an online means for individuals to submit priority stream suggestions, it would be possible for landowners that are not personally interested in conducting the surveys to register their stream with the LTLT for Grade Your Stream volunteers to visit.

### 4.1. D SAFETY AND LIABILITY-RELATED ISSUES

Safety and liability issues, including access to private property, should be dealt with by the Steering Committee early in the planning process. For a list and short overview of key aspects of safety concerns and accessing private property, which should be considered before surveys take place, see Unit 4: Safety and Private Property in MSTP 2009a.

Although it is not mandatory, the LTLT should consider insurance coverage for organized public volunteer events. It may be possible to get “event insurance,” “accident/medical/injury insurance,” and/or “liability insurance” through private
insurance companies (MSTP 2009a). Alternatively, some conservation organizations and nonprofit groups offer insurance programs for volunteers and volunteer groups at reduced costs or for free. Insurance agents are likely a good source of information. For additional information on insurance and liability issues, please refer to the online resources listed in 7.6 Additional References and Recommended Resources, below.

In addition, the LTLT should obtain consent from everyone participating in the Grade Your Stream in some capacity to use their photo and/or other identifying information in program documents and/or publicity materials. Further, when volunteers become engaged in the program, they should be asked whether they agree to participate in Grade Your Stream program monitoring and evaluation activities. All volunteer consents should be recorded in writing and appropriately filed and stored.

4.1. E REVISE GRADE YOUR STREAM PROTOCOL

See suggested revisions in Section 3: Suggested Changes to the Grade Your Stream Protocol, above.

4.1. F SET SCHEDULE FOR KICKOFF EVENTS AND TRAINING SESSIONS

As soon as possible, identify dates and general times (e.g., morning or afternoon) for Grade Your Stream kickoff events, including publicity opportunities and initial training sessions. Setting the dates for program activities may be contingent upon identifying available venues and locations. Once the major kickoff events dates are set, work backwards to set dates for advertising, acquiring materials, and completing remaining initial activities (see 4.2 Initial Activities, below). The dates and locations for larger group events and surveys can be posted on the LTLT’s website in a similar manner to the Monitoring Avian Productivity & Survivorship (MAPS) Southern Appalachian Raptor Research 2013 LTLT-EBCI Site Sampling Schedule.

Things to keep in mind when scheduling stream surveys:

- Grade Your Stream Surveys should be implemented, ideally, during the late spring through early fall to reduce variability in scores due to seasonal conditions that may generate misleading results (MSTP 2009a). Stream survey dates should be recorded so seasonality and other temporally variable factors may be accounted for.
  - Measures of canopy cover (i.e. Element 5: Canopy Cover in the Grade Your Stream protocol) will inherently be lower for streams surveyed during winter given the mixed deciduous forest ecosystem of the southern Appalachian Mountains. Limiting surveys to the growing season will help control for this.
During warmer months, cold-water adapted species will be more stressed, so surveying during the summer will enable team members to best assess how well the stream is being shaded when temperatures are highest and canopy cover is at its maximum.

Summertime is a time when the conditions are more comfortable and enjoyable for being in the stream, and physically being in the stream is required for several of the elements.

It is ideal to avoid surveys after leaf-fall because it may be difficult to assign an accurate score for channel bottom characteristics (e.g., Element 10: Available Habitat/Cover in the protocol) after leaves have accumulated there.

However, survey timing should coincide with whenever a volunteer is willing to conduct a survey so as not to undermine the educational objectives of the Grade Your Stream Program.

- Avoid periods of heavy rains and snowmelt to reduce safety risks to volunteers associated with dangerous high flows.
- Avoid surveying during hunting seasons to minimize risks to volunteers.
- Avoid surveying during the spawning season of sensitive aquatic species.

A timeline worksheet, sample timelines and time commitment estimates from the Maine Stream Team’s Stream Corridor Surveys and Stream Watershed Surveys projects, which are similar to the Grade Your Stream program, are provided in Appendices III.A-E, below (MSTP 2009a).

### 4.1. G IDENTIFY POTENTIAL VOLUNTEERS

Before engaging the public and recruiting volunteers, the LTLT should identify ideal volunteer candidates, and publicity efforts should initially prioritize messages for these groups. It is important for volunteers to be in good health and physically capable of conducting Grade Your Stream surveys given the inherent risks of working in and around streams. Volunteers’ experience level and physical condition will affect the efficiency of the survey process.

Potential volunteers include:

- **Existing LTLT Biomonitoring Program volunteers** - The advantage of engaging this group is that they already have ample experience working in and around streams and they likely already have some knowledge on stream ecology and the importance of monitoring stream health. This group will probably be the most efficient surveyors, at least initially, and they will require less comprehensive training.
• **Other existing LTLT volunteers** - For example, individuals that participate in the LTLT’s Bird Monitoring and Stream Restoration activities may be good candidates for Grade Your Stream surveyors. Also, other LTLT stewardship volunteers (e.g., individuals that participate in the LTLT’s Property Management and Terrestrial Habitat Restoration activities, or that help with special events or provide office assistance) may be interested in being engaged. If not in actual surveys, they may be able to help organize and conduct training events or publicity activities.

• **Landowners** - This is a key group to engage in the Grade Your Stream program because these individuals possess the authority to make changes to the land that directly affects stream health. Improving their awareness of healthy stream ecology is paramount, assuming that their awareness will translate to behavioral changes that have positive impacts on the ecosystem. Additionally, the LTLT has the most to learn from this group as landowners with streams on their property have the most intimate knowledge of stream conditions over time. If they are engaged in the Grade Your Stream program, this segment of the community is most capable of providing regular and thorough monitoring of streams in the watershed. At a minimum, landowners should be notified of the program and any plans to conduct surveys on their property, and the LTLT should acquire written permission from landowners to publish, share, or in some other way make public the data and scores generated from surveys conducted on their land.

• **School groups** - This group may be an ideal target for larger events or activities focused on educational outcomes or shorter monitoring processes. It is recommended that stream community monitoring efforts focus on engaging teens 16 years and older. Given their greater attention spans and patience, they are likely to be more responsible. Students between 12 - 15 years of age may also make good survey participants, but if possible, make sure they are interested in the content prior to the event. Alternatively, students may be engaged through separate, more hands-on, education-oriented events in or near local streams or rivers. Activities that involve surveying or investigating the macroinvertebrate (aquatic insects, crustaceans, etc.) community or water quality can be very fun and informative, and may more effectively hold students’ attention. As many chaperones as possible should be involved in any situation involving children aged 17 or younger. Ideally, there should be no less than one adult per three students.

  o While teens may perform these surveys with adult supervision, surveys are not recommended for preteens and younger children unless there are many adult supervisors available (MSTP 2009a). The Maine Stream...
Team (2009a) recommends that survey locations be scouted and carefully selected to ensure they are safe (i.e., not steep, slippery, deep-water, etc.) when children are involved in surveying activities.

- **Other groups in the watershed to engage:**
  - Water quality monitoring groups
  - Other land trusts
  - Watershed associations/councils
  - Fishing community (i.e., anglers)
  - Hiking and other outdoor adventure-focused groups
  - Conservation Commissions
  - Youth Conservation Corps
  - AmeriCorps volunteers
  - Service organizations (e.g., Lions, Kiwanis, Rotary)
  - Community volunteers
  - Sporting groups
  - Boy Scouts and Girl Scouts
  - 4-H clubs
  - Environmental groups (e.g., local chapters of the Sierra Club, Audubon, The Nature Conservancy)

The LTLT may use different approaches to inform and solicit participants from these varying groups and may want to consider offering separate, customized training events for these different audiences. After being trained, individuals who are comfortable with the Grade Your Stream protocol may conduct surveys independently and submit the data to the LTLT data coordinator outside of organized stream survey events.

Prior to conducting surveys or participating in training events, interested persons should be notified of what they can expect, primarily for safety purposes and secondarily to ensure the best use of group surveying time. Additionally, potential volunteers should be contacted in advance to determine how much time they are interested in dedicating to the survey effort, both in the context of individual surveys and over the course of the surveying season. This may be a component of an initial survey that interested individuals fill out when indicating their interest in participating. Having this information will help the LTLT plan training events and
other large group survey events, and may help identify particular individuals for specific surveys (e.g., people that are interested in dedicating entire days to individual surveys may be directed to survey streams in more remote locations).

4.1. CREATE PARTICIPANT MANAGEMENT SYSTEM

A successful Grade Your Stream program will involve many people, including a large volunteer base. We recommend that the LTLT establish a database or similar means of keeping track of participants’ contact information, involvement, and other relevant details. Participants may include the Program Manager and Steering Committee, Volunteer Coordinator, Data Coordinator, members of the Technical Team, Grade Your Stream volunteers, Grade Your Stream data users, contract laborers and consultants, vendors and venue contact persons, etc. Establishing a system to keep track of program participants before individuals get involved will make it easier to plan events and manage activities once the program is underway.

Similarly, it will be important to create an easy way for interested people to sign up to receive program updates and to register for volunteer training. There are many means for doing this. One option is to use SurveyMonkey\(^\text{13}\) to create an online survey with a link embedded in the LTLT website that makes it easy for people to indicate their interest in the program and to submit their contact information and other relevant details. SurveyMonkey plans range from a Basic Plan (free) to a Select Plan ($204/yr) at the lower end of the cost spectrum, up to a Platinum Plan ($780/yr) at the upper end (Basic Plan: 10 questions each, up to 100 responses per survey; Select Plan: Basic Plan with unlimited questions and responses, enhanced security, Excel export and printable PDF of results).

Perhaps a better alternative is to register with CitSci.org\(^\text{14}\). CitSci.org is an online resource that “provides tools for the entire research process including: creating new projects, managing project members, building custom data sheets, analyzing collected data, and gathering participant feedback.” However, not all volunteers may have internet access, so other options should be considered.

\(^{13}\)https://www.surveymonkey.com/

\(^{14}\)http://citsci.org/cwis438/websites/citsci/home.php?WebSiteID=7
4.2 INITIAL ACTIVITIES

4.2. A COMMUNICATING WITH THE PUBLIC AND RECRUITING VOLUNTEERS

Once the LTLT creates the administrative infrastructure for the Grade Your Stream program and has set a schedule for activities through the program kickoff and inaugural survey season, it will be time to reach out to members of the community to notify them of the LTLT’s plans and opportunities for them to become involved. Public awareness is a goal of the Grade Your Stream Program as well as a key aspect of long-term program success. This program will provide a means to enhance public understanding of the relationships between community behavior and the quality of regional streams. Furthermore, Grade Your Stream program events are opportunities to provide education about best practices for landowners and to share the relevance and positive impact of the program, which can garner additional support from the community in terms of positive public perceptions, additional volunteers, and maybe even financial resources.

Communicating with the public from the onset of the program will help reduce misunderstandings that could undermine the process. Well in advance of field surveys, it is important to seek collaboration and avoid misunderstandings. Making the community aware of the program early on affords the Steering Committee time to address any issues (e.g., property owners who do not want volunteers to check their land). Early efforts to increase public awareness also create opportunities for community members to point out problem areas in the watershed/stream before surveys are conducted. Maintaining lines of communication with the watershed community should be a key aspect of the program throughout its duration.

Letters and press releases are good ways to solicit individual volunteers and help from other groups or organizations. Additionally, if surveys will be conducted on stream reaches located on private property, send notification letters to landowners in the survey area to encourage their participation and give them advance notice about the survey and a name and phone number to call if they have questions. While landowner participation in the program is optional, the MSTP (2009a) suggests that landowners may be more inclined to allow surveyors on their properties if they know what to expect. For sample letters for landowners, we refer you to the MSTP (2009c).

In its public outreach activities for the Grade Your Stream program, the LTLT should offer a combination of active individual involvement, such as volunteering to conduct surveys, as well as passive involvement, such as reading about the program in a local newspaper (MSTP 2009a). It may also suit the program well if there are opportunities for people to comment on the program and provide suggestions, offer knowledge or
information they may have that is relevant to the program, and present ideas that help promote behavior change (MSTP 2009a). The Maine Stream Team Program (2009a) has found that offering free education and technical assistance is also fruitful because people are more likely to alter their behaviors to benefit water quality when they understand the links between their actions and water quality. When landowners are notified of the program and invited to participate (e.g., through landowner letters), the LTLT can inform them of ways to access technical assistance regarding improving the health of their stream.

Communication with the public should take many forms and may include (but not be limited to):

- **Public Information Meetings** — To explain the purpose and procedures of the program. It is recommended that these be held before, during, and after surveys begin each year. Public meetings should include the following components:
  - Education on stream ecology and health
  - Information about known problems or sensitive habitats in the watershed/stream
  - Summary of Grade Your Stream program objectives and the LTLT’s organizational goals
  - Description of Grade Your Stream protocol and how members of the community can get involved
  - Question and answer session

- **Media coverage** — Some members of the community may prefer to learn about the program and its upcoming activities through the media rather than by attending meetings or volunteering (MSTP 2009a). To engage these individuals, invite the press to attend all public meetings and volunteer training sessions and distribute press releases to the local newspaper with written progress summaries. We encourage the LTLT to continue to partner with the Coweeta Listening Project and larger Coweeta LTER projects, and continue seeking coverage in the Franklin Press newspaper as the columns written by the LTLT’s UGA-ICON student collaborators have been generating local interest in the developing Grade Your Stream program.

Lastly, it may be useful to notify the local police and/or town offices prior to survey events. This will help reduce confusion and suspicion if the police or town office is called regarding suspicious people walking around and taking notes during surveying events (MSTP 2009a).
For an additional discussion of strategies for engaging the public and publicizing the Grade Your Stream program, see Section 6: Publicity.

4.2. B GATHERING SURVEY MATERIALS AND DEVELOPING TRAINING MATERIALS

Prior to training events, the Volunteer Coordinator and Program Manager will need to acquire and organize materials and supplies, and identify items that volunteers will need to bring themselves. The amount of materials will necessarily depend upon the event. For examples of materials and equipment, see section C5. Gathering Materials in MSTP (2009a).

4.2. C FIELD TESTING THE PROTOCOL (WITH LTLT BIOMONITORING PROGRAM VOLUNTEERS)

The LTLT should capitalize on its existing volunteer base as it initiates the Grade Your Stream program. Initial training activities and survey should involve existing LTLT volunteers, and the LTLT should solicit feedback regarding the protocol and ways to make training and surveying easier and more enjoyable for participants. Also, while field testing the protocol with this experienced group of community monitors, take pictures of the surveying process, including the perspective the surveyor should take when measuring each element in the protocol and a view of the wider context of the surveyor while measuring each element. These can be used for future training activities with new volunteers.

4.2. D TRAINING SESSIONS

As new volunteers are recruited, they will require some form of acclimation or training to become familiar with the scientific, participatory, and ecological aspects of the program and become proficient at using the Grade Your Stream Protocol to monitor stream health. Training may occur in a variety of ways. At one extreme, there are individuals that are introduced to the program and the survey methodology in the context of an environmental outreach event. These individuals will use the protocol primarily as an educational tool. They are “trained” informally through careful study of the protocol and through reading additional training materials provided by the LTLT or other organization; they will not receive face-to-face instruction from experts. Some of these individuals, for example private landowners, will become familiar enough with the survey that they will conduct it on their property and submit the results to the LTLT. At the other extreme, organizations or community groups will be trained to become trainers themselves. In between the ends of this spectrum, individuals may be trained to conduct surveys themselves,
independent of an organized event or bigger group activity. The following training-related recommendations apply primarily to this latter group.

For training sessions involving the individuals that will be conducted the surveys, the Stream Survey Manual (Volume I) by The Maine Stream Team of the Maine Department of Environmental Protection (2009a) suggests holding two training sessions followed by actual surveys: a short indoor (1-2 hours) session and an outdoor session (1-2 hours) (more details below). Training sessions may need to be scheduled to coincide with the needs of the trainees and may occur on the same day or not, depending on the availability of volunteers, the Volunteer Coordinator and technical advisors, and how the outdoor training session is designed.

**Indoor Training**: The indoor training session should last approximately 2 hours, including a 15-minute break. In these sessions it is critical to cover the following topics:

- Background on the LTLT and its work in the watershed
- Objectives of the Grade Your Stream program and how the survey data will be used
- Be clear about the purpose of the survey (examples from the MSTP 2009a)
  - To identify problems that may be impacting the stream
  - To develop solutions to the identified problems and create an action plan detailing solutions
  - To raise public awareness about local watershed management
- Clarify that the collected information is not being used for enforcement purposes
- Background on stream ecology and qualities of “healthy” streams
- Overview of protocol elements and exemplary pictures of local stream reaches (ideally using pictures from earlier field tests of the Grade Your Stream protocol)
- Demonstrate the filling out of the datasheet and stress the importance of—and methods for—keeping—accurate and detailed documentation
- Overview of steps to take before and after conducting a survey (e.g., receiving permission to access private land and submitting survey results, respectively)
- Importance of volunteer satisfaction and long-term engagement in the program
- Overview of survey process and the physical demands of conducting the surveys
• Details regarding how the data will be used and who will have access to sensitive information provided by volunteers, including their personal information and any survey results or Grade Your Stream program monitoring feedback they provide

• Field safety and accessing private property, including how to approach and discuss the survey with landowners, and how to respond to difficult people

• Solicit volunteer input regarding improvements to the protocol, thoughts about improving the overall program, opinions about what is working well, etc.

• Question and answer session

Additional topics to cover during an indoor training session may include:

- What a watershed is and how it works
- Tools for watershed management
- How stormwater runoff, nonpoint source pollution (e.g., eroded soil, excess fertilizers and pesticides, leaking petroleum), and degraded riparian buffers affect stream water quality
- Stream ecology and how changes to the stream’s ecology reduce recreational enjoyment
- How changes in water quality affect the local economy
- Examples of typical erosion and other pollution problems

**Outdoor Training:** It is imperative that new volunteers have opportunities to get into the field with experienced surveyors. After volunteers have been introduced to the protocol and have familiarized themselves with its elements, it will be time to get hands-on experience. If enough technical experts and trained Grade Your Stream surveyors are available, break the indoor training participants into smaller groups and lead volunteers in the field as they work through the protocol. Outdoor training sessions may occur on the same day as the indoor training session, or not. Conducting the outdoor training session on a different day will allow more time to be spent in the field. It may make sense to stage the outdoor training sessions over more than one field trip.

We recommend holding the first outdoor training session at an extreme stream site. To create a favorable first impression, we suggest starting with a high scoring (healthy) stream that is aesthetically pleasing and enjoyable to survey (e.g., easy to access). Then, take the group to repeat the training process at a stream that is representative of the other extreme (e.g., a much degraded, low scoring stream).
This will help volunteers orient themselves in terms of the protocol, the variable contexts of local streams, and the protocol in practice. After surveying two extreme streams, survey a couple of streams with more intermediate conditions.

During the outdoor training session, it is important for each volunteer to have an opportunity to practice filling out the survey form and receiving feedback. The Maine Stream Team Program (2009a) outlines two possible approaches to the outdoor training session:

- **Option A**: The training is essentially done while the assigned technical leader points out features along the course of the reach and then assists the group with filling out data sheets. Once the volunteers are comfortable with the survey process, they may proceed with the survey without direct supervision, though the technical leader typically stays with the group that day. The duration of this type of field training is typically less than 15 - 20 minutes of orientation (quickly reviewing the datasheets). The rest of the time is actually spent walking, making observations, and recording actual (not practice) data.

- **Option B**: Field training can also be conducted as a larger group, with one (or a small group) of technical leaders walking the large group through the steps of the field survey process. This is useful where technical support is limited, for smaller groups of volunteers, for groups that conduct training on a separate day from the survey, or for when the primary purpose of the survey is to educate many people about the stream all at once. Special care will need to be taken to ensure that each volunteer is comfortable with the process and each of the questions on the datasheet. Conducting a practice survey of a reach (including the filling out of data sheets and answering any questions) prior to an actual survey is strongly recommended. This allows volunteers to be aware of the stream corridor features to which they are supposed to be paying attention, as they walk along their reach. This type of field training is about 1 - 1.5 hours.

Indoor and outdoor Grade Your Stream training activities hosted by the Land Trust for the Little Tennessee and the Coweeta Long Term Ecological Research Laboratory, completed by graduate students from the University of Georgia’s Integrative Conservation PhD Program.
To evaluate the effectiveness of training in terms of how much volunteers are learning with respect to the characteristics of a healthy stream, do a short problem solving exercise after the training session is completed: Ask volunteers to identify areas within the survey reach that can or should be improved and make recommendations to eliminate or minimize those problems. This exercise points out weak areas in the training process and allows volunteers to share ideas on mitigation measures (MSTP 2009a). For more detailed information, as well as the ability to track training effectiveness over time, consider offering volunteers a short survey to gauge their understanding of stream ecology and satisfaction with their experience.

Training may involve real surveying and data gathering with help and oversight by the training supervisor/group leader. Training may also be conducted one-on-one with a new volunteer (e.g., a landowner) and trained survey supervisor.

It is important to hone your message and clearly communicate the nature of the survey protocol as well as the scheduling details and expectations for training and group survey activities. Additionally, volunteer recruiters and program leaders need to ensure that volunteers are aware of what the process entails and the conditions they are likely to encounter in the field. Important details to convey include:

- Location and time
- Kind of clothing and footwear that should be worn
- Degree of difficulty in terms of how physically challenging it is to reach the stream reaches to be visited, including details about whether or not volunteers will need to hike through the forest, shrubby riparian lands, marshy wetlands, or on very steep or uneven terrain
- Special safety considerations (Note: These should be scouted out well in advance of the survey, and make volunteers aware of potential hazards, such as weather, wildlife, etc.)
- Slipperiness of stream channels and banks
- Contingencies, including phone number for Volunteer Coordinator in case a volunteer must cancel, or to find out plans in the case of foul weather
- What to bring to training and field surveys (e.g., food, water, sunscreen, camera)
For all training sessions it is important that the organizers are prepared because volunteers are likely to be discouraged by an ill-planned, chaotic, initial training session. A successful initial training session includes (MSTP 2009a):

- Enthusiastic, knowledgeable trainers
- Short presentations that encourage audience participation and do not strain attention spans
- A low ratio of trainees to trainers
- Presentations that include why the monitoring is needed, what the program hopes to accomplish, and what will be done with the data
- An agenda that is followed (especially start and finish times)
- Good acoustics, clear voices, and interesting audiovisual aids
- Opportunities for all trainees to handle equipment, view demonstrations of sampling protocols, and practice sampling
- Instruction on safety considerations and accessing private property
- Refreshments (water/snacks) particularly for training events and full-day survey events with volunteers; free coffee or lunch for volunteers always improves morale
- Opportunities for trainees to meet one another, socialize, and have fun (allowing time for trainees to relax, discuss their common interests, and get to know one another and the Grade Your Stream program administrators enhances their experience and increases their sense of commitment to the other volunteers and the program as a whole)
- Time for questions and answers

In addition to the above considerations, the Maine Stream Team Program (2009a) recommends the following:

- Review the effectiveness of the training program by encouraging volunteers to fill out a training evaluation form at the end of each training session. This will also help the LTLT assess the effectiveness of individual trainers and their styles, any handouts and audiovisual aids, the general atmosphere of the training session, and what the volunteers liked most and least about the session. These results may be used to revise training protocols in the future to best meet program and volunteer needs.
- Conduct quality control checks. During the sampling season, after initial training session(s), follow-up with volunteers—ideally while they are in the field.
conducting surveys. Observe how volunteers are surveying and recording their observations to ensure that all volunteers are monitoring using proper and consistent protocols.

4.3 ONGOING ACTIVITIES

4.3. A ORGANIZING AND CONDUCTING SURVEYS

Once volunteers are trained and are comfortable with the surveying process, they will be able to conduct surveys on their own, without supervision. If they encounter questions regarding the surveying process or an element of the protocol, they should be encouraged to make a note of it (including the location, and take a picture, if applicable), and then follow up with the Volunteer Coordinator or a member of the Technical Team after the survey. The LTLT should encourage volunteers to record their thoughts and experiences while conducting surveys as this anecdotal information may be useful later on for publicity purposes or to help with monitoring and evaluation activities. Volunteers should also take pictures of the stream and their activities, if possible, for the LTLT to use (with permission) in annual program reports, publicity, and future training sessions.

To prioritize data collection and facilitate program monitoring efforts, it may be beneficial to ask volunteers to “register” or “log” their surveys (e.g., where and when), perhaps before and after the surveys are completed. This log may or may not be public. A public volunteer survey blog may generate excitement or interest in the program; however, it may create additional liabilities. If volunteers register for an upcoming survey, the LTLT can make sure the police and/or town office is aware. Be sure that volunteers are aware of safety issues and remind them to respect the wishes of landowners and to have fun! Also, do not forget to make arrangements for collecting completed datasheets and any other borrowed materials.

Additional considerations while conducting surveys (MSTP 2009a):

- **Provide additional support for volunteers in the field:** In addition to their initial training session, volunteers may need technical support. To save time for the Technical Team after volunteers are finished and less available, trainers may want to meet with volunteers again during surveys to answer any volunteer’s questions and to review survey forms to ensure that they are being properly completed.

- **Interacting with landowners:** Volunteers should be prepared to talk with private landowners. They should be encouraged to check in with landowners prior to conducting surveys on private property and they should be able to
discuss the survey and its goals to members of the community that are curious about it. Most importantly, volunteers should be reminded to respect the wishes of property owners at all times, regardless of the circumstances.

- Develop a handout with information about the program and the work the volunteers are doing for volunteers to carry with them to give to landowners or other interested people that they encounter (for examples, see Appendix E from the MSTP 2009c).

It may be useful to conduct Grade Your Stream surveys in multiple ways concurrently:

- Individuals that move around and conduct surveys at different locations over time (requires initial training)
- Individuals that conduct surveys on the same stream repeatedly (e.g., landowners with streams on their property) (requires initial training)
- Groups that conduct surveys on their own at different location over time (requires initial training)
- Group survey events involving a large concentrated effort with the help of technical advisors (like a training session, but without expectations of the group to conduct future surveys). This primarily suits an educational purpose as the effort dedicated to the event is not invested with the expectation of generation of future survey results, although these events may recruit people for one of the preceding options.

4.3. B COLLECTING SURVEY RESULTS FROM VOLUNTEERS

It is critical that the LTLT arrange a way for volunteers to get copies of the protocol and datasheets, and for volunteers to submit datasheets after surveys are completed. Similar programs arrange a collection spot at the town office. It may be useful to set up a Google site for the Grade Your Stream program where trained volunteers can access electronic copies of survey materials and they can submit completed survey forms, either as photocopies of hand-written datasheets or perhaps by filling out an online form that creates an electronic copy of the data. If the LTLT chooses to use an online means to collect data, such as through a Google site or through CitSci.org, it should also endeavor to collect original hard copies of data sheets as a back-up. If the data is submitted electronically following surveys, hard copies of data sheets may be mailed to the LTLT afterwards.

Once volunteers have submitted the data, the Data Coordinator will be responsible for it. For a list and short description of responsibilities that may be assigned to the Data Manager, see section C9. Managing the data, from the MSTP (2009a). Once the Data
Coordinator receives data, it should be reviewed to ensure that forms were filled in properly and completely. If any information is missing or incomplete, the Data Coordinator should work with the Volunteer Coordinator to contact the volunteers and ask them for the missing information. This should happen immediately, while the survey is still relatively fresh on the volunteer’s mind; the volunteer may be able to return to the field to collect the information while the conditions of the stream are still the same.

4.3. C  PREPARING AND DISTRIBUTING REPORTS

See Section 6: Publicity, below.

4.3. D  DATA MANAGEMENT AND ANALYSIS

Data management and analysis is a critical component of a successful citizen science program. If insufficient attention is devoted to this component of the Grade Your Stream program, it could fall short of its community engagement, educational, conservation, and scientific goals. Once the LTLT identifies who will be using the data that it generates through this program, the LTLT Data Coordinator and Steering Committee should work collaboratively with those individuals or groups to ensure the data is organized and managed in a way that is accessible and useful to these data users.

Survey data should be saved in two forms: hard copies of hand-written datasheets and electronically in computer files. Storing data electronically in a spreadsheet or database will be most useful for subsequent analysis and will make it easier to access, search, and share. It also uses less space. However, error can occur during data entry and electronic files can sometimes be lost, which is why saving both forms of survey results are recommended.

As the LTLT administers the Grade Your Stream Program and conducts follow-up monitoring and evaluation of the program itself, a lot of data will be generated. To ensure the data is safe and accessible for future analysis, if immediate analysis is not possible, the LTLT should invest time in establishing a robust data management system. Below, we outline important components of such a system, which the LTLT should keep in mind:

- **Data description** - For each type of data that is collected, metadata should be generated to cover the following:
  - Description - “what” type of data was collected
  - Source(s) - “who” collected the data
Geo-reference - “where” the data was collected
Date/time - “when” the data was collected
Purpose - “why” the data was collected and how it will be used

Data types
Grade Your Stream survey records

- Names of surveyors
- Survey dates
- Names and geographic coordinates of surveyed stream reaches
- Individual element scores
- Overall stream reach scores (i.e. overall score for survey unit)
- Photos of survey sites

- Records of consent for using participants’ photos and photographs

Summary statistics/trends

Surveys

- Number of surveys
- Frequency of surveys
- Number of streams surveyed
  - Total length of stream/riparian habitat areas surveyed (e.g., 100m for each survey)
- Number of stream reaches surveyed
  - Number stream reaches surveyed once
  - Number stream reaches surveyed more than once
- Number of private properties surveyed
  - Number of private properties surveyed once
  - Number of private properties surveyed more than once

Survey results

- Scores for individual protocol elements
- Scores for individual stream reaches
- Scores for individual streams
- Scores for groups of streams (e.g., on private property, in Macon County)
o Records of volunteer involvement
  ▪ Individual volunteers
    • Names and contact information
    • Demographic information (e.g., age, socio-economic background, gender, occupation, ethnicity, land ownership status)
    • Consent forms or liability waivers
    • Participation history
      o Attendance at volunteer events
      o Number, frequency, and location of surveys conducted
  ▪ Volunteer events
    • Number of events
    • Type of events
    • Attendance
    • Pictures of events
  ▪ Summary statistics/trends
    • Number of volunteers conducting surveys
    • Spatial distribution of volunteers
    • Diversity of volunteer base (based on demographic information)

o Related program information
  ▪ Restoration program records
    • Number of streams identified as priority restoration sites
    • Number of streams restored
      o Cumulative length of stream reaches restored
    • Number of properties to adopt stream best management practices; Number of properties participating in the Shade Your Stream program
  ▪ Records of LTLT activities
    • Number of outreach events
    • Outreach event attendance (e.g., at “Stream Mania Day”)
    • Outreach event participant feedback and survey results
Identifying the effectiveness of educational materials and event activities

- Frequency and number of publicity events, both active (e.g., school and community events) and passive (e.g., newspaper columns, mailers)
- Number of active participants in the “Adopt a Stream Program”
- Number of potential volunteers to express interest in Grade Your Stream training opportunities
- Number of different ways volunteers are thanked for their participation
- Number of mailers sent to volunteers with annual results and recognition of their contribution

Measures of dialogue between LTLT and the public
- Website traffic
- Number of phone calls

Volunteer feedback and survey results
- Regarding perceptions/attitudes
  - Satisfaction with their experiences as a volunteer
  - Suggested changes to the Grade Your Stream protocol
- Regarding their understanding of the Grade Your Stream protocol, individual elements of the protocol, stream health, and/or the importance of monitoring

Results of special assessments and/or experiments
- Comparisons between volunteer Grade Your Stream survey scores and scores generated by experts (i.e. LTLT staff, scientists)

Data management plan
- Storage and organization
- Framework for analyses
- Ownership and plan for sharing

Analysis of Grade Your Stream survey data will identify and help prioritize areas for future restoration activities in the watershed. The MSTP (2009a) recommends the Steering Committee and Technical Team work with the Data Coordinator to sort
stream reaches according to priority, based on the nature of intervention required to remedy suboptimal conditions, including impact, cost and technical level.

For guidance regarding the management and presentation of monitoring data, refer to the Environmental Protection Agency (EPA) Water Monitoring and Assessment, Chapter 6 Managing and Presenting Monitoring Data\(^\text{15}\) (see 7.6 Additional References and Recommended Resources, below). Also, the LTLT should explore the Bowser et al. (2013) reference below for more information regarding data policies for PPSR. These topics are extensive and too lengthy to cover in this document, so the aforementioned references are very strongly recommended as guides for the LTLT’s consideration regarding this important aspect of the Grade Your Stream program.

### 4.4 FUTURE PROGRAM DEVELOPMENT

In its inaugural year, the LTLT should focus on program development and field-testing the protocol. In coming years, there are a number of activities that could be pursued to enhance the quality, efficiency, and longevity of the program. The following identify potential areas for future program development:

- **Conduct stakeholder analysis and complete a formal strategic planning process for long-term program development and implementation:** A formal program planning activity is recommended to ensure the LTLT’s activities, particularly in the context of the Grade Your Stream program, are implemented to achieve the LTLT’s objectives. Programs that articulate explicit objectives and focus subsequent planning activities on those objectives have a higher probability of making efficient use of human and financial resources as they work towards a desired future scenario. Identifying objectives up front is important because, as Yogi Berra, a former New York Yankees baseball player and manager, once said, “If you don’t know where you are going, you might end up someplace else.” The LTLT should look into engaging in a formal structured decision making process to develop a strategic plan. For information about structured decision making (SDM), visit the SDM websites hosted by the US Fish and Wildlife Service National Conservation Training Center\(^\text{16}\) and Compass Resource Management Ltd\(^\text{17}\). Additionally, a formal stakeholder analysis may help guide

\(^{15}\) http://water.epa.gov/type/rsl/monitoring/vms60.cfm

\(^{16}\) http://nctc.fws.gov/courses/programs/decision-analysis/structured-decision-making-overview.html

\(^{17}\) http://www.structureddecisionmaking.org/
future expansion of the Grade Your Stream program and associated publicity activities.

- **Contract a data analyst:** Funding permitted, one option for staying on top of monitoring and making timely use of the Grade Your Stream survey results is to contract a local university to conduct data analyses (e.g., UGA Statistics Department\(^{18}\); Graduate Student Assistants - $35/hr.), and/or provide summer internships for students to analyze the data. The latter option requires you to identify someone in-house or affiliated with the LTLT to supervise and advise the student. Hiring a student to conduct the data analyses provides another educational opportunity, this time with a professional development element added to it.

- **Develop a smart phone application for conducting Grade Your Stream surveys.**

- **Develop an online training and education portal:** This can be used as a precursor to indoor training events or can be used for annual re-certification for trained volunteers. It may also be a place for landowners and other community members to suggest priority streams (and provide background info and justification for the submission).

- **Develop more comprehensive stream educational manual:** Produce a detailed manual on stream ecology, measures of stream quality and condition, the Grade Your Stream Program and protocol, and citizen-based stream protection measures. If funding is limited, the manual may be available primarily in electronic form. The *Citizen’s Guide for the Maine Stream Team Program* (*Volume I, Volume II*, and the *Appendix*) provides a nice template (MSTP 2009a).

- **Create and distribute mail-in postcard surveys for streamside landowners to do a rapid assessment** of stream conditions, perhaps as a precursor or annual follow-up to a full Grade Your Stream Survey. This may help identify priority streams or serve as a key monitoring strategy.

- **Expand program into the Tuckasegee River watershed:** Consider collaborating with the Watershed Association of the Tuckasegee River\(^ {19} \) as you begin scoping out a potential expansion of the program into the Tuckasegee River watershed.

- **Reinforce program efforts:** Before, during, or after surveys are conducted each year, the LTLT should pursue actions that bolster the Grade Your Stream

\(^{18}\) [http://www.stat.uga.edu/consulting](http://www.stat.uga.edu/consulting)

\(^{19}\) [http://watrn.org/](http://watrn.org/); email: info@watrn.org; phone: 828-488-8418
program motivations and objectives. Ideas suggested by the MSTP (2009a), some of which are already components of the above Implementation Plan or are already components of the LTLT’s existing programs, include:

- Using town-owned properties to set an example for land use. For example, areas of public access, such as parks near streams, should be managed or restored to demonstrate low-cost actions that increase stream health and bank stability, and limit and control stormwater runoff. The town of Franklin and other communities should be encouraged to develop an annual work plan, to address areas of chronic erosion within the stream watershed.

- Request that local towns incorporate a list of best management practices for reducing erosion, improving stream habitats and protecting water quality measures in building permits. Additionally, information regarding specific affected streams and the special measures that should be taken during construction can be included (see Appendix B from MSTP 2009c). It may be possible to ask contractors to sign a form confirming that they read the information and took the appropriate actions to protect stream water quality.

- Share findings broadly and use them to inform local regulations: The LTLT’s focus on education and awareness of stream health issues is well motivated given the importance of these program outcomes as critical foundations for the development of effective water quality protection guidelines and ordinances. The LTLT should work to integrate their findings into town planning and related processes. Grade Your Stream survey results may be used to justify a review of educational measures and standards for land use in the watershed. The MSTP suggests that comprehensive plans should acknowledge that surveys and/or other watershed protection efforts have already been implemented and are ongoing in particular areas of the watershed.

- For more ideas refer to the MTSP (2009a).
4.5 SUGGESTED TIMELINE

Summer 2014:

- Develop program administrative infrastructure, including steps outlined above in sections 4.1 Planning Stage and 4.3 Initial Activities. Explore Cornell’s Citizen Science Central\(^{20}\), and convert the existing LTLT Microsoft Excel volunteer database to a more efficient participant management system (e.g., through CitSci.org).
- Revise Grade Your Stream protocol.
- Field test protocol and conduct initial training sessions.
- Begin surveys in the Little Tennessee River watershed.

Fall 2014:

- Finish inaugural Grade Your Stream surveys and begin to collate, store, and distribute Grade Your Stream data (e.g., to the LTER).
- Begin first round of annual Grade Your Stream program monitoring and evaluation activities.
- Begin seeking funding for summer 2015; use results and summaries of program activities from preceding summer in proposals, as they become available.
- Recognize participants for their efforts: distribute certificates and awards for exemplary achievements (e.g., volunteer with the most completed surveys) to volunteers and landowners as part of the LTLT’s fall celebration and/or Biomonitoring Program Volunteer Appreciation Day.

Winter 2014-2015:

- Continue program monitoring and evaluation, including analysis of Grade Your Stream survey results to date, and identify opportunities to target additional volunteers or incorporate additional streams in the Grade Your Stream program in summer 2015.
- Begin preparing a work plan and materials for expanding the Grade Your Stream program into the Tuckasegee River watershed.

\(^{20}\) http://www.birds.cornell.edu/citscitoollkit
Spring 2015:

- Finish and distribute annual report with previous summer’s results.
- Recruit new volunteers.
- Make work plan for upcoming summer.
SECTION 5: MONITORING AND EVALUATION

This section provides guidelines for the monitoring and evaluation of LTLT programs, both those that are already underway and those associated with the Grade Your Stream program. These guidelines will assist the LTLT in implementing specific data collection strategies in support of its overall stated objectives (see Introduction, above). Careful monitoring and evaluation of program elements and outcomes is critical for determining the effectiveness of a given approach. By following these guidelines to determine which activities are working well or better than expected, and which are not, LTLT will be able to ensure that it is using its resources in the most efficient and cost-effective manner. The following measures of progress also serve as effective data collection strategies that may be used in support of funding and grant proposals.

Project monitoring is a continuous and recurring data collection effort intended to track programmatic output and expenditures, as well as key project characteristics. This includes such information as the number and cost of outreach materials produced, as well as information on volunteer demographics, measures of landowner engagement, and number of targeted or serviced streams. Evaluation techniques, in contrast, are used primarily on a one-time basis to draw conclusions regarding the effectiveness or impact of a single activity. Monitoring and evaluation techniques are not mutually exclusive, but rather integral components of robust program implementation. For example, a survey evaluating local volunteers' enjoyment and understanding of the Grade Your Stream protocol after a training session may be used as part of an ongoing monitoring effort of the implementation of the Grade Your Stream program, as multiple surveys are collected and compared over time.

To draw the most accurate representation of how well the program is working, a detailed data collection process should be developed in conjunction with the implementation strategy described above. Just as the Grade Your Stream protocol monitors and evaluates stream health and function, so should the processes described here facilitate monitoring and evaluation of the Grade your Stream program as it will be implemented by LTLT.

A key component of this process is the acquisition of baseline data. Using either information that has already been tracked—such as volunteer names or phone numbers, for example—or preliminary information gathered through a survey or other technique, it is critical to build a foundation upon which subsequent responses can be compared. Discrete data-gathering opportunities are useful, and are the basis for evaluation, as discussed above. However, it is only by comparing data through time, using the exact same methodologies and controlling for as many exogenous factors as
possible, that effectiveness through time can be ascertained. This will allow LTLT to measure whether objectives are being achieved as planned and the rate at which this is occurring.

Several elements must be kept in mind during data comparison. For example, despite using the exact same methodology to collect data, external factors may influence LTLT’s results. For much the same reason that Grade Your Stream surveys are recommended during seasons with peak foliage to ensure accurate reporting of stream shading, consider how the timing, audience, content, and context of your data-collection activities may affect the response(s) of interest. It is not always possible to work around exogenous, influential factors, but it is important to think critically about what these may be. Then, make an effort to control for these as much as possible and do so consistently across any instance of administration of identical surveys, counts, or other data-collection efforts.

To develop a successful monitoring plan, multiple components must be considered. First, a clear objective should be made for each element of the program: What does the LTLT seek to accomplish, specifically? What are the overall goals, and what actions, given available time and resources, can be taken to achieve these goals? Once objectives have been identified, consider what information is necessary to determine their effectiveness. Here, too, available time and resources should be considered. Additionally, if community members will be targeted as sources of information, their willingness to answer particular questions should be taken into account. The LTLT has a close working relationship with the local community and understands its fellow citizens well. To maintain this relationship, it is good practice to only ask questions that are necessary to determine critical monitoring or evaluation data, and to only collect data that will serve a pre-designated purpose; collection of additional, unnecessary data should be avoided. In addition, we suggest to keep data collection of community members’ opinions, such as interviews or surveys, as simple, clear, and time-effective as possible.

Using the strategies outlined above, we have taken each of the four primary objectives identified by the LTLT (see Introduction) and created preliminary monitoring and evaluation guidelines, presented in the following logistical frameworks (Tables 2-5). Although presented separately for clarity, there is significant overlap between them; many identical data collection strategies will be applicable to more than one objective.

Logistical frameworks (also called LogFrames) were developed in science and industry, and have been much used by non-government organizations since their adoption in the 1970s by the US Agency for International Developments (USAID). LogFrames are a useful way to organize and visualize the key components of a project.
or implementation strategy, and particularly useful in identifying how components are interconnected (CIDT; European Integration Office 2011). They are comprised of four columns and four rows. The first column (i.e. Description) is a narrative summary, which details the objectives of the project, beginning with the overall goal(s). The second column (i.e. Indicator(s)) details specific objective measures of the success of these goals through which progress will be evaluated, while the third column (i.e. Verification) suggests the monitoring mechanisms and information sources by which to verify the measures specified in the second column. The fourth column (i.e. Assumptions) identifies the assumptions inherent to these goals and measurements.

The content of each of these columns narrows in focus from broad (top row) to specific (bottom row). These rows serve to organize focus from the broader aims of a project to the specifics of how it will be carried out. The four rows, in order, are comprised of: goals, purpose, outputs, and activities (CIDT). Respectively, these state the objectives of the project, broader outcomes these objectives hope to accomplish, the specific results that are anticipated in light of these goals, and the detailed activities necessary or planned in order to achieve the anticipated outcomes. The following LogFrames should be read from left to right, and top to bottom.
## 5.1 OBJECTIVE: MONITOR STREAM HEALTH

Table 2 LogFrame for monitoring progress towards monitoring stream health and prioritizing streams for restoration objective. * See Section 6: Publicity, for a more detailed list of activities.

<table>
<thead>
<tr>
<th>Goal</th>
<th>Description</th>
<th>Indicator(s)</th>
<th>Verification</th>
<th>Assumption(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Goal</strong></td>
<td>1.1 Improvement in stream health through implementation of the Grade Your Stream protocol (GYS)</td>
<td>1.2.1 Increase in overall stream scores and individual element scores from recurring GYS surveys increase over time</td>
<td>1.3.1 GYS score statistics</td>
<td>Implementing the Grade Your Stream protocol will lead to increased awareness of stream health and a desire to improve it among the local community. Data collected will be consistent enough across users to show valid changes in stream conditions over time.</td>
</tr>
<tr>
<td><strong>Purpose</strong></td>
<td>2.1 Better understanding of stream health in region</td>
<td>2.2.1a More landowners (households) utilizing GYS</td>
<td>2.3.1a-b GYS survey records</td>
<td>Households who take part in the Grade Your Stream initiative will return their findings to LTLT. Volunteer activities will increase over time. Increased implementation of GYS will lead to an increase in the number of streams identified as viable restoration projects.</td>
</tr>
<tr>
<td></td>
<td>2.2 To identify and prioritize streams for restoration</td>
<td>2.2.1b Increase in number of streams surveyed</td>
<td>2.3.2 Restoration program records</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2.2.1c Greater frequency of volunteer GYS surveys</td>
<td>2.2.2 Streams identified for restoration</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2.2.2 Streams identified for restoration</td>
<td>2.2.2 Stream monitored</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Outputs</strong></td>
<td>3.1 Expanded stream monitoring efforts</td>
<td>3.2.1a Increase in number stream reaches surveyed for first time; increase in number of repeated surveys (i.e. stream reaches surveyed more than once)</td>
<td>3.3.1a GYS survey records</td>
<td>Both one-time and recurring usage of GYS will increase over time.</td>
</tr>
<tr>
<td></td>
<td>3.2 Greater number of streams restored</td>
<td>3.2.2a Increase in number of stream reaches restored; increase in cumulative length of stream reaches restored</td>
<td>3.3.1b GYS survey records; maps of surveyed streams</td>
<td>Funding will be available to restore priority streams.</td>
</tr>
<tr>
<td></td>
<td>3.2.2b Increase in number of stream reaches restored; increase in cumulative length of stream reaches restored</td>
<td>3.3.2 Restoration program records</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Activities</strong></td>
<td>4.1 Larger, more frequent volunteer events (e.g., training sessions) *</td>
<td>4.2.1 Number of volunteer events; volunteer event attendance</td>
<td>4.3.1 Records of volunteer involvement</td>
<td>Larger or more frequent events and additional publicity will foster greater community awareness and involvement in LTLT activities, which will lead to increased usage of GYS.</td>
</tr>
<tr>
<td></td>
<td>4.2 Greater interaction with local community *</td>
<td>4.2.2a Number of outreach events; outreach event attendance</td>
<td>4.3.2a-b Records of LTLT activities</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>4.2.2b Publicity efforts</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
5.2 OBJECTIVE: INCREASE LTLT’S VISIBILITY WITHIN THE COMMUNITY

Table 3 LogFrame for monitoring progress towards increasing LTLT’s visibility within the local community. * See Section 6: Publicity, for a more detailed list of activities.

<table>
<thead>
<tr>
<th>Description</th>
<th>Indicator(s)</th>
<th>Verification</th>
<th>Assumption(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Goal</td>
<td>1.1 Increase LTLT’s visibility and collaborative efforts within Macon County through implementation of Grade Your Stream (GYS) surveys.</td>
<td>1.2.1 Increase in GYS surveys undertaken</td>
<td>1.3.1 GYS survey records</td>
</tr>
<tr>
<td></td>
<td>1.2 Increase in number of volunteers conducting surveys</td>
<td>1.3.2 Records of volunteer involvement</td>
<td></td>
</tr>
<tr>
<td>Purpose</td>
<td>2.1 To increase the number of streams that are monitored by expanding the volunteer base</td>
<td>2.1.1 Increase in number of streams and stream reaches surveyed</td>
<td>2.3.1 GYS survey records</td>
</tr>
<tr>
<td></td>
<td>2.1.2 Increase in number, distribution, and diversity of volunteers conducting surveys</td>
<td>2.3.1b Records of volunteer involvement</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2.2 To increase public understanding of the importance of stream health and awareness of best practices for stream management</td>
<td>2.2.1a Number of outreach events; outreach event attendance</td>
<td>2.3.2a Records of LTLT activities</td>
</tr>
<tr>
<td></td>
<td>2.2.2a Number of properties to adopt best stream management practices</td>
<td>2.3.2b Restoration program records</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2.2.2b Number of properties to adopt best stream management practices</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Outputs</td>
<td>3.1 Expanded volunteer base</td>
<td>3.1.1 Increase in number, distribution, and diversity of volunteers conducting surveys</td>
<td>3.3.1a Records of volunteer involvement</td>
</tr>
<tr>
<td></td>
<td>3.1.2 Number of potential volunteers to express interest in training</td>
<td>3.3.1b Records of LTLT activities</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3.2 Greater number of stream reaches monitored</td>
<td>3.2.1a Increase in number of streams and stream reaches surveyed</td>
<td>3.3.2a-b GYS survey records</td>
</tr>
<tr>
<td></td>
<td>3.2.1b Increase in number of streams and stream reaches surveyed</td>
<td>3.3.2b Maps of surveyed streams</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3.2.2 Increase in regional coverage of streams monitored</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3.2.3 Increase in overall stream scores and individual element scores from recurring GYS surveys increase over time</td>
<td>3.3.3 GYS score statistics</td>
<td></td>
</tr>
<tr>
<td>Activities</td>
<td>4.1 Greater interaction with local community (e.g., through “Stream Mania” Day or the Adopt a Stream Program) *</td>
<td>4.2.1a Number of outreach events; outreach event attendance</td>
<td>4.3.1a-b Records of LTLT activities</td>
</tr>
<tr>
<td></td>
<td>4.2.1b Publicity efforts</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## 5.3 OBJECTIVE: INCREASE LTLT’S PARTNERSHIPS WITHIN THE COMMUNITY

Table 4 LogFrame for monitoring progress towards increasing LTLT’s partnerships within the local community. * See Section 6: Publicity, for a more detailed list of activities.

<table>
<thead>
<tr>
<th>Description</th>
<th>Indicator(s)</th>
<th>Verification</th>
<th>Assumption(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Goal</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.1 Increase LTLT’s visibility and collaborative efforts within Macon County.</td>
<td>1.2.1 Greater number of publicity events undertaken by LTLT, both active (e.g., school and community events) and passive (e.g., newspaper columns, mailers)</td>
<td>1.3.1 Records of LTLT activities</td>
<td>An increase in LTLT’s visibility in the local community will lead to an increase in community involvement in stream stewardship and monitoring activities, and will foster more partnerships between LTLT, other local agencies and organizations, and citizens.</td>
</tr>
<tr>
<td><strong>Purpose</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.1 To increase the number of streams that are monitored by expanding the volunteer base</td>
<td>2.2.1a Increase in number of streams and stream reaches surveyed</td>
<td>2.3.1a GYS survey records</td>
<td>Greater communication between LTLT and the local community regarding stream health will enhance ecological understanding and interest amongst local citizens, stimulating greater public demand for environmental education and management advice from LTLT.</td>
</tr>
<tr>
<td>2.2 To increase communication between LTLT and the local community</td>
<td>2.2.1 b Increase in number, distribution, and diversity of volunteers conducting surveys</td>
<td>2.3.1b Records of volunteer involvement</td>
<td></td>
</tr>
<tr>
<td><strong>Outputs</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.1 Expanded volunteer base</td>
<td>3.2.1a Increase in number, distribution, and diversity of volunteers conducting surveys</td>
<td>3.3.1a Records of volunteer involvement</td>
<td>Increasing LTLT’s visibility within the community will lead to a greater number of partnerships between LTLT and community members, and an increase in the number of volunteers participating in GYS.</td>
</tr>
<tr>
<td>3.2 Greater number of stream reaches monitored</td>
<td>3.2.1b Number of potential volunteers to express interest in training</td>
<td>3.3.1b Records of LTLT activities</td>
<td></td>
</tr>
<tr>
<td>3.3 More recurrent monitoring by landowners</td>
<td>3.2.2a Increase in number of streams and stream reaches surveyed</td>
<td>3.3.2a-b GYS survey records</td>
<td></td>
</tr>
<tr>
<td>3.4 Sustained volunteer participation</td>
<td>3.2.2b Increase in regional coverage of streams monitored</td>
<td>3.3.2b Maps of surveyed streams</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3.2.3 Increase in number of repeated surveys on private properties</td>
<td>3.3 GYS survey records</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3.2.4 Greater number of surveys completed by each volunteer</td>
<td>3.3.4 LTLT records of volunteer involvement</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Community members that are engaged and happy with their experience as volunteers will continue to be involved. (See Section 1: Citizen Science, for details on achieving this result.)</td>
</tr>
<tr>
<td>Description</td>
<td>Indicator(s)</td>
<td>Verification</td>
<td>Assumption(s)</td>
</tr>
<tr>
<td>------------------------------</td>
<td>------------------------------------------------------------------------------</td>
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<td>------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Activities</td>
<td>4.1 Recognition of volunteer participation *</td>
<td>4.2.1a Number of ways volunteers are thanked for their participation</td>
<td>Volunteers will appreciate recognition and be honest on post-training surveys.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4.2.1b Number of mailers sent to volunteers with annual results and recognition of their contribution</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4.2 Assessment of volunteer satisfaction *</td>
<td>4.2.2 Positive comments regarding volunteer satisfaction with their experiences</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>4.3.1a-b Records of LTLT activities</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>4.3.2 Surveys of volunteers</td>
<td></td>
</tr>
</tbody>
</table>
5.4 OBJECTIVE: PROVIDE EDUCATIONAL OUTREACH TO THE COMMUNITY

Table 5 LogFrame for monitoring progress towards providing educational outreach to the community. * See Section 6: Publicity, for a more detailed list of activities.

<table>
<thead>
<tr>
<th>Description</th>
<th>Indicator(s)</th>
<th>Verification</th>
<th>Assumption(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Goal</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.1 Enhance awareness of streams as important habitats for the maintenance of biodiversity, and conservation in general, and of best practices for stream management among local citizens.</td>
<td>1.2.1 Increased utilization of Grade Your Stream (GYS) surveys</td>
<td>1.3.1 GYS database</td>
<td>Additional education will increase public participation in LTLT’s programs and events.</td>
</tr>
<tr>
<td><strong>Purpose</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.1 To provide the community with the knowledge and tools necessary to identify and articulate issues of stream health</td>
<td>2.2.1a Volunteers express an understanding of the purpose for GYS surveys and of the individual elements of the protocol</td>
<td>2.3.1a Surveys of volunteers</td>
<td>Educational outreach will be understandable to non-experts and will enable trained volunteers to effectively conduct surveys and generate results that are comparable to those generated by LTLT’s staff and other experts.</td>
</tr>
<tr>
<td><strong>Outputs</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.1 Greater understanding of stream health among local citizens</td>
<td>3.2.1 Improvement in local stream conditions (e.g., less trash over short-term; expansion of riparian buffers over long-term)</td>
<td>3.3.1 GYS survey records</td>
<td>The local community will be more engaged and interested in stream health after educational outreach activities. This will incentivize collaboration between the community and LTLT and adoption of appropriate management practices within local streams.</td>
</tr>
<tr>
<td>3.2 Volunteers and homeowners will be able to identify healthy stream conditions, as well as appropriate stream management practices</td>
<td>3.2.2 Improvement in accuracy of GYS scores accuracy</td>
<td>3.3.2 Special assessments, experiments</td>
<td>Educational outreach and increasing LTLT’s visibility within the community go hand-in-hand. Educational activities will further community participation in the GYS program and other LTLT programs, and will foster greater environmental stewardship in the community.</td>
</tr>
<tr>
<td><strong>Activities</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.1 Greater interaction with local community (e.g., through &quot;Stream Mania&quot; Day or the Adopt a Stream Program) *</td>
<td>4.2.1a Number of outreach events; outreach event attendance</td>
<td>4.3.1a-b Records of LTLT activities</td>
<td></td>
</tr>
</tbody>
</table>
SECTION 6: PUBLICITY

Research has shown that volunteer attendance at a single event may not be enough to facilitate changes in behavior or guarantee long-term participation (NOAA Restoration Center). In order to maintain momentum, it is important to have strategies to keep volunteers involved over the long term by focusing on increasing a volunteer’s sense of personal efficacy. This section will contain recommendations for campaigns and other methods to further publicize the work of LTLT and to maintain an engaged citizenry.

Recommendations are listed in order of expected programming time, from least to greatest. Also included are approximate cost burdens for each recommendation ranging from $-$$$$.

- **Recommendation I**: Recognition of volunteer participation anniversaries - $
  
  - Send volunteers postcards of recognition on each anniversary since they began participating with saSVAP administration.
  
  - This activity will require both low time and cost input
  
  - An online service like www.sendoutcards.com could be used. This resource would allow you to create an online address book with notifications of upcoming anniversaries, and has multiple card templates that can be used.

- **Recommendation II**: Give the public access to photo point data - Free
  
  - Create a forum where photos taken at predetermined points by citizen scientists can be uploaded by the citizens themselves and viewed by anyone. You can recommend that the public visits these photo points during a Grade Your Stream survey or by citizens on their own time.
  
  - This forum could easily be created through the use of a group Flickr account (https://www.flickr.com/)
    
    - The California King Tide Initiative has already created one to document high tide events (http://www.californiakingtides.org/share-pictures/; Note their instructions for participants on how to upload photos).
  
  - This photo forum should serve as a means to show improvement in streams over time and is an easy way for citizens to participate in stream health monitoring even outside of Grade Your Stream.
• **Recommendation III**: Hold an annual photo contest - $

  o Hold an annual stream photo contest to showcase what streams mean to the volunteer base of LTLT. Entries can be requested of the volunteers, and the contest could be advertised in the Franklin Press to reach a wide audience.

  o The contest could be broken up into different categories, such as Stream Wildlife, Recreational Activities, etc. and the best photos (e.g., top three) in each would receive recognition.

  o The contest could be judged by LTLT staff or by the public through an online gallery. The winning photos could then be displayed in a gallery in the LTLT office, or even a local museum or art gallery.

  o Winning photos could also be published in the Franklin Press.

  o Another possible use for the winning photos would be to create a stream-themed calendar with them. Calendars can be created and ordered online from a number of stores (e.g., http://www.shutterfly.com/calendars; www.vistaprint.com/). These calendars could then be used as a fundraising item as well.

• **Recommendation IV**: Have an annual “Stream Mania” Day - $$$$ 

  o The Stream Mania day will be a widespread attempt to get multiple volunteers from a larger target group out in the streams across the county applying the Grade Your Stream protocol on the same day each year.

  o This outreach event ideally will extend beyond the normal volunteer pool and increase awareness of the protocol.

  o Stream Mania T-shirts could also be given out to participants.

  o Possibilities for a date to hold this event might be Earth Day on April 22nd or the EPA’s World Water Monitoring Day on September 18th.

• **Recommendation V**: Adopt a Stream program - Free, possibly $ for advertising the program

  o Different organizations or groups of citizens can take on stewardship of a stream in an “Adopt a Stream” program.
The program should suggest that these groups conduct seasonal and/or monthly monitoring of their stream, to gather consistent, long-term data.

By having the same group of citizen scientists conducting the protocol, there may be a higher degree of uniformity in their observations and increased scientific merit in their data.

This program could target schools, boy/girl scouts, youth groups, church organizations, etc.

It can also be suggested that a stream trash removal day is scheduled seasonally for each adopted stream.

- **Recommendation VI: Streamkeepers - $$**

  - Call the Grade Your Stream volunteers “Streamkeepers” in an effort to increase volunteer sense of stewardship and personal efficacy in protecting stream health.

  - Streamkeeper T-shirts could be designed for volunteers, which can themselves garner publicity when worn outside of volunteer events. These T-shirts could even be sold to raise funds.

  - In line with this, a “Junior Streamkeeper” program could be created. Kids would receive badges similar to the Junior Rangers program in USFS/NPS to promote youth stewardship and involvement in stream monitoring. Youths can earn these badges after completing tasks related to stream health.

    - Suggestions for activities can be found through the New York State Department of Environmental Conservation

    - **Junior Streamkeeper Pledge:**

      - I will have fun and enjoy being in and around streams.

      - I will not harm any stream’s health by throwing in garbage or other things that don’t belong.

---

• I will be a good example to others and share what I learn about streams with others.

  o Create a Streamkeepers Manual, which would extend beyond the current Shade Your Stream instructional material and include additional ways to conserve and protect stream health beyond riparian plantings. It could also include ways that “Streamkeepers” could talk to their neighbors and facilitate learning of best stream practices.

  ▪ Manual could include the Grade Your Stream protocol as well

• **Recommendation VII:** Video can be used to communicate to the public - $$$$$

  o LTLT could host a movie showing of Jeremy Monroe’s Hidden Rivers of Appalachia series

  o Existing collaboration with Freshwaters Illustrated could be used to create an educational video on stream health and even specifically on administering saSVAP.

• **Recommendation VIII:** Continued trainings and skill building activities - $ to $$

  o Research demonstrates that when citizens feel they are effective and empowered, they are more likely to remain involved with a project long term (Akin et al. 2013).

  o By frequently offering workshops and training session focused on stream monitoring, volunteers can continue to develop their expertise and feel that their participation is effective.

  o Initially, training session can focus on learning how to implement Grade Your Stream. As this program develops, workshops can move beyond basic administration of the protocol to focus in more specifically on possible areas of confusion. For example, a training session could be held that focused more narrowly on stream channel condition.

  o Volunteers who are especially knowledgeable about stream health could be asked to lead workshops. This would both increase sense of ownership in the volunteers and take some of the time commitment away from LTLT staff members.

• **Annual Report:** The MSTP program recommends generating a preliminary report, in collaboration with the Technical Team, soon after the survey season
is completed to maintain momentum and keep the program in the public eye. Lack of recognition is a significant cause for declines in volunteer participation projects (Akin et al. 2013). To avoid this, it is recommended that an annual report be produced that focuses explicitly on the results of volunteer Grade Your Stream monitoring over the previous year. This could be in addition to the current LTLT annual report, and be mailed directly to citizen participants in stream monitoring. The report should contain relevant statistics demonstrating the total impact of volunteers. The outcomes of the Grade Your Stream program, particularly in terms of changes in stream health may not be apparent in the near-term, so the types of accomplishments that are highlighted in the annual report may evolve over time. Examples of short- and long-term program results to report include:

- Total number of streams monitored in the watershed
- Total (approximate) feet of stream surveyed (i.e. cumulative length of stream reaches surveyed)
- Geographic coverage of surveys (e.g., the distance between the two furthest surveyed stream reaches)
- Volunteer hours spent monitoring
- Number of private properties that participated for the first time
- Number of new volunteers trained
- Diversity of volunteers participating (e.g., age range, number of males versus females)
- Number of stream reaches with improving scores (i.e., higher scores on follow-up surveys)
- Number of priority restoration streams identified
- Number of restoration projects initiated as a result of Grade Your Stream monitoring
- Number of new Shade Your Stream program participants recruited as a result of interactions with Grade Your Stream volunteers
  - Total number of trees planted through Shade your Stream program
- Amount of grant funding awarded to LTLT as a result of Grade Your Stream program outcomes

By presenting this data in an appealing manner, volunteers can see the significance of their collective impact, and ideally gain a sense of the meaningfulness of their input. This type of report can be presented as an
infographic that is easily created online through Piktochart\textsuperscript{22}. For an example, see Appendix II: Sample Annual Report Flyer.

Refer to section B7. Prepare and distribute final report from the MSTP (2009a) for additional information regarding the design and use of preliminary reports. After all of the stream survey results are collected and analyzed, they should be organized and reported in a more comprehensive final report. Producing a comprehensive final report in a timely manner is important to ensure transparency of the program and maintain open communication about the progress of the Grade Your Stream program between LTLT and the community. This will allow LTLT to demonstrate that the surveys have been completed, to maintain program momentum, and to enable volunteers to see how their data in being used. An overview of what a final report may entail, including who should review it, how it may be used, information it should contain, and to whom the report should be sent, is provided in section B7. Prepare and distribute final report by the MSTP (2009a).

\textsuperscript{22} http://www.piktochart.com
SECTION 7: REFERENCES

7.1 SOURCES FOR SECTION 1 (CITIZEN SCIENCE)


### 7.2 SOURCES FOR SECTION 2 (HISTORY OF SVAP)


7.3 SOURCES FOR SECTION 4 (IMPLEMENTATION PLAN)


- **Contents**
  - Examines user agreements, terms of use, legal policies, and privacy policies
  - How to craft data policies for citizen science projects within the data management lifecycle
  - For project managers
  - Volunteers’ rights and responsibilities


- **Contents**
  - For volunteer group leaders and volunteers
  - Basic watershed concepts, how to organize and carry out basic stream watershed surveys and stream corridor surveys
  - Standardized methods to enable comparisons


- **Contents**
  - Best Management Practices
  - Contact Information
  - Watershed Delineation
  - Letters: to Landowners and Police; Vehicle ID Card
- Volunteer Waiver Form
- Understanding GPS, Coordinate Systems, and Map Datum
- Flip Charts for Photo Identification
- Flow and Discharge: a simple estimation technique
- Stream Corridor Survey (SCS) Field Sheets: Instructions
- SCS datasheets: UTM
- SCS datasheets: Longitude/Latitude
- Rapid Geomorphic Assessment Picture Key
- Site Forms
- References
- Overview: Survey Techniques and Efforts for:
  - Maine Road-Stream Crossing
  - Dam and Natural Barriers
  - Classifications of Living Things
  - Some Common Unit Conversions

7.4 SOURCES FOR SECTION 5 (MONITORING AND EVALUATION)


7.5 SOURCES FOR SECTION 6 (PUBLICITY)


7.6 ADDITIONAL REFERENCES AND RECOMMENDED RESOURCES

- Citizen Science Central: http://www.birds.cornell.edu/citscitoolkit
- Environmental Protection Agency (EPA), Water Monitoring and Assessment: http://water.epa.gov/type/watersheds/monitoring/vol.cfm
- Environmental Protection Agency (EPA), Water Monitoring and Assessment, Chapter 6 Managing and Presenting Monitoring Data: http://water.epa.gov/type/rsl/monitoring/vms60.cfm

  o Contents
    ▪ Managing volunteer data - to ensure credible, organization, and value to potential data users
    ▪ Presenting data
    ▪ Producing reports

- Insurance and liability-related resources:
  o Nonprofit Risk Management Center
    ▪ Insurance for Volunteer Programs: http://nonprofitrisk.org/library/articles/insurance052004.shtml
  o Public Entity Risk Institute
    ▪ Insuring Volunteers: http://www.riskinstitute.org/peri/
    ▪ Myths About Nonprofit Liability and Risk Management http://www.riskinstitute.org/peri/
• The Logical Framework: A list of useful documents:
  http://mande.co.uk/2008/lists/the-logical-framework-a-list-of-useful-documents/


• Sweeney, K. 1989. The media director: Patagonia's guide for environmental groups. Ventura, California, USA.


• Environmental Protection Agency (EPA). Water educator resources for adults, elementary school, middle school, high school, and all ages. http://water.epa.gov/learn/resources/index.cfm

All group pictures were taken by the authors of this document during the ICON field visit to Franklin, North Carolina. All other pictures taken by Tara Gancos Crawford.
APPENDIX I. GRADE YOUR STREAM PROTOCOL (ORIGINAL)

Note: This is the complete LTLT-modified saSVAP protocol as of Spring 2014.

**SCORING SHEET**  
Stream Name: ______________________  
Date: __________________

<table>
<thead>
<tr>
<th>Element</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Element 1: Channel Condition</td>
<td></td>
</tr>
<tr>
<td>Element 2: Bank Condition</td>
<td></td>
</tr>
<tr>
<td>Element 3: Riparian Area Quantity</td>
<td></td>
</tr>
<tr>
<td>Element 4: Riparian Area Quality</td>
<td></td>
</tr>
<tr>
<td>Element 5: Canopy Cover</td>
<td></td>
</tr>
<tr>
<td>Element 6: Nutrients</td>
<td></td>
</tr>
<tr>
<td>Element 7: Livestock</td>
<td></td>
</tr>
<tr>
<td>Element 8: Pools</td>
<td></td>
</tr>
<tr>
<td>Element 9: Barriers to Fish Movement</td>
<td></td>
</tr>
<tr>
<td>Element 10: Available Habitat/Cover</td>
<td></td>
</tr>
<tr>
<td>Element 11: Riffle Embeddedness</td>
<td></td>
</tr>
<tr>
<td>Element 12: Trash and Garbage</td>
<td></td>
</tr>
</tbody>
</table>

Sum 1-12: __________________

Overall Score (Sum/12): _________

<table>
<thead>
<tr>
<th>Class Rating</th>
<th>SVAP scores</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very Poor</td>
<td>1.0 - 1.8</td>
</tr>
<tr>
<td>Poor</td>
<td>1.9 - 2.5</td>
</tr>
<tr>
<td>Fair</td>
<td>2.6 - 3.1</td>
</tr>
<tr>
<td>Good</td>
<td>3.2 - 3.6</td>
</tr>
<tr>
<td>Excellent</td>
<td>3.7 - 4.0</td>
</tr>
</tbody>
</table>
### Element 1: Channel Condition

<table>
<thead>
<tr>
<th>No point bars</th>
<th>&lt;3 point bars/500 ft.</th>
<th>3-4 point bars/500 ft., mostly next to the bank</th>
<th>&gt; 4 point bars/500 ft., especially if some are in midstream</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

### Element 2: Bank Condition

<table>
<thead>
<tr>
<th>Right Bank</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Left Bank</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

- Stable banks protected by roots, wood, and rock
- No man-made structures on banks
- Little erosion or bank failures
- No livestock or recreational access

- Moderately stable banks, protected by roots, wood, rock
- Few man-made structures on banks
- Erosion and bank failures present with some re-growth of vegetation
- Recreational and livestock access do not harm bank condition (e.g., low impact grazing)

- Moderately unstable banks with little protection by roots, vegetation or rock
- Man-made structures cover more than half the reach or the entire bank
- Livestock or recreational access are negatively impacting bank stability

- Unstable banks not protected by roots, wood, rocks, or vegetation
- Man-made structures (e.g., Riprap) dominate banks
- Multiple bank failures and erosion are evident
- Livestock or recreational access are negatively impacting bank stability
Element 3: Riparian Area Quantity

<table>
<thead>
<tr>
<th>Riparian Area Quantity</th>
<th>Right Bank</th>
<th>Left Bank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural vegetation</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>-or-</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Floodplain</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>No natural vegetation</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

Element 4: Riparian Area Quality

We suggest that the most important factor in riparian quality is presence/abundance of 3 major growth habits (trees, shrubs and grasses). The 3 types have different, though overlapping, roles in protecting and enriching the stream, so that it is easy to visualize a range of scores as follows:

<table>
<thead>
<tr>
<th>Riparian Area Quality</th>
<th>All 3 types well represented</th>
<th>2 types</th>
<th>1 type</th>
<th>No natural vegetation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Right Bank</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Left Bank</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>
**Element 5: Canopy Cover**

<table>
<thead>
<tr>
<th>% of Water Surface Shaded</th>
<th>Canopy Cover</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;75%</td>
<td>4</td>
</tr>
<tr>
<td>75-50%</td>
<td>3</td>
</tr>
<tr>
<td>50-25%</td>
<td>2</td>
</tr>
<tr>
<td>&lt;25%</td>
<td>1</td>
</tr>
</tbody>
</table>

**Element 6: Nutrients**

<table>
<thead>
<tr>
<th>Nutrient Source Type</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>No evidence of organic pollution sources near the stream.</td>
<td>4</td>
</tr>
<tr>
<td>Temporary sources (animal carcasses). Vegetable waste. Dense human populations near to the stream.</td>
<td>3</td>
</tr>
<tr>
<td>Livestock in pastures which are fenced away from the stream but with little or no vegetative buffer. Feedlots or animal pens poorly buffered, but without direct drainage, or which see occasional use. Unbuffered or barely buffered fertilized lawns or row crop fields.</td>
<td>2</td>
</tr>
<tr>
<td>Access to the stream by livestock over a large area. Livestock with full access to tributary streams and ditches draining directly into the stream. Feedlots, trout farms or dog pens draining directly to the stream.</td>
<td>1</td>
</tr>
</tbody>
</table>
Element 7: Livestock

<table>
<thead>
<tr>
<th>Access Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>No livestock access more significant than wandering dogs.</td>
<td></td>
</tr>
<tr>
<td>Restricted access, such as enclosures, or very small numbers (e.g. 3 ducks, a single horse).</td>
<td></td>
</tr>
<tr>
<td>Access ample, but partially restricted in time or space. Number of individuals should also be considered here. A herd of cattle inevitably causes more damage than 3 horses.</td>
<td></td>
</tr>
<tr>
<td>Extensive, continual and uncontrolled access by large groups, especially cows and pigs.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Score</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>
Element 8: Pools

Other considerations:

Depth: >1.5 feet for a “deep” pool is a useful starting point, but pool depth necessarily varies with stream size. In general, if all pools are the same depth, it is probable that none will qualify as a “deep” pool.

Diversity of types: Pools may be round or oblong, concentrated along one shore or deepest in mid-channel, and have their maximum depth at various points. A diversity of types should be equated with a healthy condition.

In-pool structure: Undercut banks, tree roots, boulders, bedrock intrusions, etc. all add habitat value to pools.

Sedimentation: In extreme cases, sedimentation may lead to the disappearance of pools. Short of that, accumulation of sediment in the middle, at the sides or at the tail of pools reduces volume, depth and habitat value.

Element 9: Barriers to Fish Movement

4 | 3 | 2 | 1
Element 10: Available Habitat/Cover

<table>
<thead>
<tr>
<th>Woody Debris</th>
<th>Pools</th>
<th>Boulders</th>
<th>Bank Features and Side Channels</th>
<th>Other Habitat Features</th>
<th>Vegetation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Logs</td>
<td>Deep Pools</td>
<td>Large Boulders</td>
<td>Undercut Banks</td>
<td>Cobble Riffles</td>
<td>Macrophyte Beds</td>
</tr>
<tr>
<td>Small Wood Accumulations</td>
<td>Secondary Pools, Scour Pools</td>
<td>Small Boulder Clusters</td>
<td>Off-Channel Habitats</td>
<td>Leaf Mats</td>
<td>Overhanging Vegetation</td>
</tr>
</tbody>
</table>

**Greater than 75% of stream reach contains stable habitat; mix of logs, undercut banks, cobble riffles, boulders, or other habitats.**

50-75% of stream reach contains stable habitat.
There is adequate stable habitat and also newly developed potential habitat (e.g. recently fallen debris)

25-50% of stream reach contains stable habitat; availability is limited, substrate frequently disturbed or removed. Lack of woody debris.

<25% of stream reach contains stable habitat; lack of habitat is clear, substrate is unstable.

| 4 | 3 | 2 | 1 |

Element 11: Riffle Embeddedness

The approach is to disturb the substrate in a riffle and count the number of seconds until the water clears. To make a more objective score, it is best to perform numerous “kick tests” in different riffles and riffle types and basing the score on the mean.

<table>
<thead>
<tr>
<th>&lt;1 second (or no visible sediment)</th>
<th>2-5 seconds</th>
<th>6-9 seconds</th>
<th>&gt;10 seconds</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>
Element 12: Trash and Garbage

Suggested scoring criteria for Metric 12 take into account the amount, frequency and types of litter found. The importance of amount and frequency should be obvious, but some discussion of types is needed. We here define 3 types of trash - toxic (chemicals, petroleum products, etc.), organic (garbage, dead animals, etc.) and relatively inert (plastic, metal, glass, paper and wooden products and fragments). We suggest that scores for this metric should reflect the mean of quantitative (amount and frequency) and qualitative evaluations.

### Quantitative

<table>
<thead>
<tr>
<th>No or almost no trash</th>
<th>Trash occasionally visible</th>
<th>One or another form of trash constantly in view, but with no large concentrations</th>
<th>Large concentrations of trash nearly always in view</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

### Qualitative

<table>
<thead>
<tr>
<th>No or almost no trash</th>
<th>Relatively inert materials</th>
<th>Organic materials</th>
<th>Toxic materials</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>
APPENDIX II: SAMPLE ANNUAL REPORT FLYER

ANNNUAL GRADE YOUR STREAM MONITORING RESULTS

THANKS TO OUR WONDERFUL VOLUNTEERS, THIS YEAR WE MANAGED TO:

- Plant trees through Shade your Stream Program!
- Initiate Stream Restoration Projects
- Monitor feet of stream

We couldn’t have done it without your input!

- Hours of volunteer time
- Total volunteers
### Table 3-5: Common Responsibilities for Organizers and Participants of Stream Corridor and Watershed Surveys

This Table presents common responsibilities for organizers and participants of both Stream Corridor Surveys (Level 1) (SCS) and Watershed Surveys (WS). *These recommendations for number of people and hours are estimates and will vary according to the size of the watershed or stream/river of interest. Also, for smaller projects, the project leader/steering committee may opt to take on roles of unfilled positions.*

<p>| TITLE                        | # of PEOPLE | TIME COMMITMENT per PERSON (hrs.) | RESPONSIBILITIES                                                                                                                                 |
|------------------------------|-------------|----------------------------------|--------------------------------------------------------------------------------------------------------------------------------|---|
| Steering Committee           | 4 - 8       | 20 - 40 hrs.                     | • Determine scope of project: survey techniques to use, where to survey, and resources (money, materials, people-hours) necessary to complete the project. |
|                              |             |                                  | • Gather existing data: including topographic, watershed, and tax maps.                                                                                         |
|                              |             |                                  | • Generate the landowner mailing list, as necessary.                                                                                                              |
|                              |             |                                  | • Notify landowners about survey and when it will take place. Send a letter to each landowner, including a contact number for those who do not want the stream to be accessed from their property (SCS) or to have their property surveyed (WS). Ensure this information is passed on to volunteers. |
|                              |             |                                  | • Make a list of properties to be excluded from the survey.                                                                                                         |
|                              |             |                                  | • Survey preparation (may collaborate with technical team):                                                                                                       |
|                              |             |                                  |   ✓ WS: divide watershed map into sectors                                                                                                                       |
|                              |             |                                  |   ✓ SCS: Define and number stream reach end-points, and determine logistics of access points, number of groups, etc.  |
|                              |             |                                  |   ✓ Check conditions: Stream depth / flow and other hazards at representative locations. Address identified safety concerns.                                            |
|                              |             |                                  | • Secure funding as needed. (This may add some additional time not noted in the time column.)                                                                |
|                              |             |                                  | • Set a schedule. Arrange training location, date and time.                                                                                                       |
|                              |             |                                  | • Provide snacks and beverages. While not necessary, it is often appreciated at the volunteer training.                                                          |
|                              |             |                                  | • Participate in the survey alongside volunteers (optional, but recommended).                                                                                     |
|                              |             |                                  | • Develop the format of the final report and distribution plan.                                                                                                    |
| Project Manager              |             |                                  |                                                                                                              |---|
| Volunteer Coordinator(s)     | 1 - 2       | 8 - 20 hrs.                      | • Advertise the survey in local papers, cable access channels, posters, etc.                                                                                   |
|                              |             |                                  | • Recruit volunteers to attend training and conduct the survey.                                                                                                    |
|                              |             |                                  | • Notify volunteers about training schedule and expectations.                                                                                                       |
|                              |             |                                  | • Plan ahead for safety issues. Make sure volunteers know what to expect, and come prepared for expected hazards with first-aid kits, emergency contact numbers, cell phones, appropriate attire, etc. (For more on safety, see Unit 4.) |
|                              |             |                                  | • Coordinate with technical team after the survey if a volunteer needs to be contacted.                                                                       |</p>
<table>
<thead>
<tr>
<th>TITLE</th>
<th># of PEOPLE</th>
<th>TIME COMMITMENT per PERSON (hrs.)</th>
<th>RESPONSIBILITIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data Coordinator</td>
<td>1</td>
<td>15 - 30 hrs.</td>
<td>• Compile survey data, collecting and organizing from the volunteers, and making sure forms are complete.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Photo management: Develop film and label pictures (as needed), or for digital photos, rename and compile pictures.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Data entry: Enter survey data into Excel spreadsheet (as needed).</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Submit survey data (watershed survey) to technical team or MDEP’s Maine Stream Team Program (if a stream corridor survey).</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Coordinate final report and printing.</td>
</tr>
<tr>
<td>Survey Volunteers</td>
<td>typically 6 - 20**</td>
<td>6 - 24 hrs.</td>
<td>• Attend full-day training, rain or shine. Bring bag lunch, bug spray, sunscreen, clipboard, pencils and tape measure.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Complete assigned survey (series of reaches for SCS or sector for WS) before the deadline set by the steering committee.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Submit full survey documentation to volunteer data coordinator.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(** For reasons of safety and data gathering needs, the minimum recommended number of people for “sector team” or “reach team” is 2. Generally, teams of 3-4 people are preferred. For these reasons, it is highly recommended that the steering committee examine watershed/stream maps and determine where the survey reaches/sectors will exist, so the appropriate number of volunteers and other positions may be recruited. Units 5 and 6 describe these considerations in more detail.)</td>
</tr>
<tr>
<td>Technical Team</td>
<td>2 - 6</td>
<td>8 - 20 hrs.</td>
<td>• Deliver training presentation at classroom portion of training session.</td>
</tr>
<tr>
<td></td>
<td>(1 per reach team or sector team)</td>
<td></td>
<td>• Lead small groups through field portion of training session and, sometimes, through the remainder of the survey efforts.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Conduct follow-up surveys to check volunteer survey data (for WS)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Technical team members are people who have experience conducting surveys (either SCS or WS). Some organizations that may be able to offer such staff include: local county Soil &amp; Water Conservation Districts, community water districts, consultants, watershed organizations, state agencies (e.g., MDEP, MDIFW).</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• May include steering committee members.</td>
</tr>
</tbody>
</table>
### III.B. EXAMPLE SURVEY TEAM DIVISION OF RESPONSIBILITIES (MSTP 2009A)

<table>
<thead>
<tr>
<th><strong>SURVEY TASKS</strong></th>
<th><strong>VOLUNTEER MEMBER ROLES</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Required</td>
</tr>
<tr>
<td>Make observations of stream channel, bank, riparian zone, geomorphology, nearby land uses, pollution (if any), organisms, etc.</td>
<td>YES</td>
</tr>
<tr>
<td>Fill out datasheets:</td>
<td></td>
</tr>
<tr>
<td>Stream corridor habitat/ pollution conditions</td>
<td>YES</td>
</tr>
<tr>
<td>Sketch of reach</td>
<td>YES</td>
</tr>
<tr>
<td>RapiC geomorphic assessment (RGA)</td>
<td>YES</td>
</tr>
<tr>
<td>Individual Site Forms</td>
<td>Optional</td>
</tr>
<tr>
<td>Take photographs</td>
<td>YES</td>
</tr>
<tr>
<td>Make measurements of stream depths and widths (widths may be estimated)</td>
<td>YES</td>
</tr>
<tr>
<td>Manage the Photograph flip chart (Appendix O)</td>
<td>Recommended</td>
</tr>
<tr>
<td>Collect GPS coordinates</td>
<td>Recommended</td>
</tr>
<tr>
<td>Make measurements or complete inventories of: temperature, water velocity of stream, quick macroinvertebrate inventory</td>
<td>Optional</td>
</tr>
</tbody>
</table>
## III.C.  EXAMPLE STREAM SURVEY PROGRAM TIMELINE (MSTP 2009A)

<table>
<thead>
<tr>
<th>MONTH</th>
<th>TASKS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Example 1</strong></td>
<td>Stream Corridor Survey (SCS) only</td>
</tr>
<tr>
<td><strong>March—April</strong></td>
<td>• Organize project leadership; assign responsibilities; gather existing data; set timeline; secure funding (see Unit 3).</td>
</tr>
<tr>
<td><strong>June</strong></td>
<td>• Send out letter to landowners on stream; do press release and/or volunteer recruitment.</td>
</tr>
<tr>
<td><strong>July</strong></td>
<td>• Train volunteers and conduct stream corridor survey (SCS); collect datasheets and pictures.</td>
</tr>
<tr>
<td><strong>August</strong></td>
<td>• Compile the SCS data; archive for organizational use; send copies to MSTP or MDIFW.</td>
</tr>
<tr>
<td><strong>Fall Winter</strong></td>
<td>• Write and review report.</td>
</tr>
<tr>
<td></td>
<td>• Create an action plan for using survey data (may involve presenting data to municipal officials, applying for grants for water quality monitoring or best management practices to reduce pollution or improve riparian buffers, etc.).</td>
</tr>
<tr>
<td><strong>Example 2</strong></td>
<td>Stream Corridor Survey (SCS) plus Watershed Survey (WS)</td>
</tr>
<tr>
<td><strong>March—April</strong></td>
<td>(Year 1)</td>
</tr>
<tr>
<td></td>
<td>• Organize project leadership; assign responsibilities; gather existing data; set timeline; secure funding (see Unit 3).</td>
</tr>
<tr>
<td><strong>June—July</strong></td>
<td>• Send out letter to landowners on stream; do press release and/or volunteer recruitment.</td>
</tr>
<tr>
<td><strong>August September</strong></td>
<td>• Train volunteers and conduct SCS; collect datasheets and pictures.</td>
</tr>
<tr>
<td><strong>October</strong></td>
<td>• Compile the SCS data; archive for organizational use and send copies to MSTP or MDIFW.</td>
</tr>
<tr>
<td></td>
<td>• The technical team may need to conduct follow-up visits of specific sites documented with Site Forms in or alongside the stream during the course of the SCS in order to further analyze the situation, rank severity of the problem or extent of highly valuable habitat, and then determine future action.</td>
</tr>
<tr>
<td><strong>Late Fall</strong></td>
<td>(Year 2)</td>
</tr>
<tr>
<td><strong>Early Spring</strong></td>
<td>• Write and review report and create an action plan for using survey data (may involve presenting data to municipal officials, applying for grants for water quality monitoring or best management practices to reduce pollution or improve riparian buffers, etc.).</td>
</tr>
<tr>
<td></td>
<td>• Use knowledge gained from SCS to help focus and prioritize watershed survey efforts. Use the SCS report to maintain project momentum and generate interest in future survey work.</td>
</tr>
<tr>
<td><strong>Spring</strong></td>
<td>• Conduct a WS (see Unit 6).</td>
</tr>
</tbody>
</table>
### Table 6-2: Sample watershed survey timeline

<table>
<thead>
<tr>
<th>MONTH</th>
<th>TASKS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>YEAR 1</strong></td>
<td></td>
</tr>
<tr>
<td>FEBRUARY-MARCH</td>
<td>• Seek funding opportunities (see Unit 3-F)</td>
</tr>
<tr>
<td><strong>YEAR 2</strong></td>
<td></td>
</tr>
<tr>
<td>MARCH–APRIL</td>
<td>• Form steering committee, appoint a technical team to oversee survey,</td>
</tr>
<tr>
<td></td>
<td>gather existing data, and design project</td>
</tr>
<tr>
<td>APRIL</td>
<td>• Hold public information meeting, send out letter to landowners in</td>
</tr>
<tr>
<td></td>
<td>watershed, press release, and/or volunteer recruitment</td>
</tr>
<tr>
<td>MAY</td>
<td>• Train volunteers and conduct survey</td>
</tr>
<tr>
<td>JUNE</td>
<td>• Wrap-up volunteer field work</td>
</tr>
<tr>
<td>JULY–SEPTEMBER</td>
<td>• Follow-up work by technical team</td>
</tr>
<tr>
<td>WINTER–SPRING</td>
<td>• Prepare and distribute report; meet with town officials and</td>
</tr>
<tr>
<td></td>
<td>community members to develop action plan</td>
</tr>
</tbody>
</table>
### III.E. SCHEDULING WORKSHEET (MSTP 2009A)

**Worksheet 6-1: SETTING A SCHEDULE**

<table>
<thead>
<tr>
<th>DATE</th>
<th>EVENT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Gather information about the watershed.</td>
</tr>
<tr>
<td></td>
<td>Investigate funding opportunities.</td>
</tr>
<tr>
<td></td>
<td>Design project and project schedule, including volunteer training date and location.</td>
</tr>
<tr>
<td></td>
<td>Meet with watershed stakeholders (e.g., local residents, municipal officials, neighborhood businesses, local conservation organizations [e.g., watershed councils, stream teams, land trusts, fishing groups] county soil and water conservation district (SWCD) and DEP staff) to identify preliminary interests and concerns, discuss feasibility, and seek funding.</td>
</tr>
<tr>
<td></td>
<td>Form steering committee.</td>
</tr>
<tr>
<td></td>
<td>Secure funding.</td>
</tr>
<tr>
<td></td>
<td>Recruit volunteers.</td>
</tr>
<tr>
<td></td>
<td>Run article/notice in local newspapers.</td>
</tr>
<tr>
<td></td>
<td>Hold public information meetings.</td>
</tr>
<tr>
<td></td>
<td>Get permission from landowners whose property you will need to access.</td>
</tr>
<tr>
<td></td>
<td>Advise local law enforcement about the survey.</td>
</tr>
<tr>
<td></td>
<td>Conduct training sessions for volunteers.</td>
</tr>
<tr>
<td></td>
<td>Begin the survey.</td>
</tr>
<tr>
<td></td>
<td>Volunteers complete and return survey forms to the volunteer coordinator.</td>
</tr>
<tr>
<td></td>
<td>Volunteer coordinator checks with each team to be sure work has been completed.</td>
</tr>
<tr>
<td></td>
<td>Technical staff conduct follow-up field work.</td>
</tr>
<tr>
<td></td>
<td>Technical advisors review volunteer data and report findings to steering committee.</td>
</tr>
<tr>
<td></td>
<td>Prepare preliminary summary of findings and share with volunteers.</td>
</tr>
<tr>
<td></td>
<td>Address any critical problems with the steering committee and consider contacting landowners.</td>
</tr>
<tr>
<td></td>
<td>Hold public meetings to present findings.</td>
</tr>
<tr>
<td></td>
<td>Prepare final report.</td>
</tr>
<tr>
<td></td>
<td>Begin efforts to seek funding to address problems and develop watershed protection strategies.</td>
</tr>
</tbody>
</table>