The Center for Watershed Stewardship at Penn State provides a unique graduate educational opportunity by engaging students in practical, applied problem-solving service learning programs conducted in collaboration with community-based watershed groups and their partner organizations. Established in 1998 as a joint initiative of the College of Agricultural Sciences and College of Arts and Architecture, the Center offers Masters and PhD students in Ecology, Environmental Pollution Control, Forest Resources, Landscape Architecture, and Wildlife and Fisheries Science a Watershed Stewardship Option to their disciplinary degree by completion of supporting coursework and a two-semester “Keystone Project” practicum in watershed assessment, planning and design.

The following portfolio was prepared by Jake Powell and Drew Siglin and represents the resulting efforts of the Center for Watershed Stewardship from 2011-2012 and the 2012 Keystone Project. Jake and Drew optioned in the Center for Watershed Stewardship through the Department of Landscape Architecture at Pennsylvania State University. Jake and Drew will each graduate in August 2012 with Master of Science in Landscape Architecture degree and an option in the Center for Watershed Stewardship.
Introduction

Watershed communities are diverse entities and the scope of work and deliverable products developed for each practicum are specifically crafted to address both the educational goals of the individual participating students and the priority needs defined by the sponsoring watershed group to more effectively advance its watershed stewardship mission. In this instance, both enrolled students (Jake Powell and Drew Siglin) as MS candidates in Landscape Architecture were interested in natural stream restoration design, the complex dynamics of human dimensions and social networks among disparate watershed stakeholders, and the challenges posed in communicating and building a widely supported stewardship ethic in the watershed community.

The students’ educational goals coincided well with several organizational priorities identified by the Penns Valley Conservation Association’s leadership. PVCA intended to play a more prominent “facilitator” role in implementation of agricultural best management and natural resource restoration practices by expanding its network of collaborating public and private agencies to mobilize available technical and financial resources and by interacting with individual owners to proactively assist in carrying out the work. Utilization of stream water temperature data initiated by the previous 2010 Keystone Project in educational and outreach programs was an opportunity recognized by PVCA. These data were used to target stream reaches and subwatersheds such as Muddy Creek in George’s Valley for concerted efforts to implement stream buffer corridors while concurrently diversifying specialized wildlife habitats on reverting early successional farmlands. This approach was identified by PVCA’s Watershed Committee as a high priority, ecologically holistic strategy with strong appeal in a landowner demographic shifting from working farms to rural residential ownerships valuing wildlife, landscapes of native vegetation, and natural surroundings.

Beginning Fall semester 2010, a pre-Keystone Project scoping and watershed orientation process was incorporated in a weekly watershed planning seminar to prepare for the practicum course starting Spring 2011 through Fall 2011. This practicum framework was organized to get a jump start on the work and to realign Option workload to reduce time demands in the fourth semester of the student’s graduate program with its focus on completion of their thesis research and defense. Actually, the practicum did overlap the final semester when both students and me met regularly in order to complete several important elements—primarily a March 22, 2012 Early Succession Forest Public Information meeting cohosted with PVCA. The added effort was highly successful and gave great impetus for a continuing initiative into the future with the potential to be a cornerstone program of PVCA and an excellent model for successful engagement of watershed stakeholders.
And, as is evident from the portfolio which follows documenting the 2012 Keystone Project, it is my sincere belief this work met the expectations and contributed in a meaningful way to the graduate educational goals and accomplishments of Jake Powell and Drew Siglin as future practitioners and professionals.

Lysle S. Sherwin
Instructor in Watershed Stewardship
May 15, 2012
George’s Valley is located between Egg Hill and First Mountain, southwest of Spring Mills, in Centre County, Pennsylvania. Muddy Creek, a tributary of Penns Creek that bisects the valley, is contained within a 13.3 square mile watershed. The stream originates at the head of George’s Valley in a complex of groundwater springs and seeps flowing at low gradient along the valley floor in an easterly direction.

The historic active agricultural land use of George’s Valley has transitioned to rural-suburban residential, medium size farmette acreages, and non-farming ownerships. Remaining farming practices mostly consist of mowed hayfields and silage crops. Consequently, extensive areas of low-lying, poorly drained former pastures and crop fields are reverting to native and non-native forests, wet meadows, and Palustrine shrub/scrub early-succession plant communities.

The Muddy Creek watershed was identified by the 2009 CWS class in the Penns Creek watershed assessment as needing site scale implementation regarding riparian buffers. This need for vegetated buffers was further confirmed upon reviewing summer 2011 data from stream temperature monitors placed by the CWS at upstream and downstream location in Muddy Creek. Data trends indicated that although the stream was classified as a high quality cold water trout fishery, peak summer temperatures created a thermal dam that limited migration of trout species to the cooler headwaters of Muddy Creek. It was determined by the CWS team that the increase in stream temperature was due in part to a lack of stream buffers.
George’s Valley/Muddy Creek
Project Description

The CWS team began by seeking funding sources that would support successional forest management. However, after beginning the grant writing process for the 2011 North American Wetlands Conservation Act Small Grants Program, it became apparent that not a sufficient number of stakeholders were willing to commit to the 25-year easement to create a watershed scale management plan. After several visits to the watershed and meeting with local landowners, the CWS team was impressed with the amount of conservation work already occurring in the valley outside of the immediate stream buffer zone. As a result, the team investigated how the goals for increasing stream buffers could be integrated into a larger conservation plan that utilized the current conservation practices exhibited by some landowners of the valley as a larger early successional habitat typology. Ensuing conversations between the CWS team, partner organizations, and landowners revolved around early successional habitat management with a specific focus on the American Woodcock.

An opportunity for landowners with varying management goals to implement site scale improvements within an overall habitat management plan became apparent. The numerous different habitats that benefit the American Woodcock and other early successional species provided flexibility when approaching landowners, as their individual goals and management ideas were often easily incorporated. The total size and diversity of participating landowners facilitated habitat enhancement that could address the full life cycle requirements of woodcock from singing/nesting grounds, brood range, feeding, diurnal resting and night roosting habitats in close proximity. This mosaic of habitat types is necessary for successful management.

Invasive plant species such as Autumn Olive, Honeysuckle, Multi-flora Rose, management was also a primary concern of Muddy Creek landowners and a strong motivation for cooperation in control efforts aimed at wildlife habitat improvements. While some landowners had begun to address the invasive species on their individual parcels, the outcomes were generally localized and have often not achieved the desired results. In addition to enhancing riparian buffers and wildlife habitat areas, another objective of the management plan was to greatly expand invasive species management and maintenance.

Typical reverting farm fields in George’s Valley
George's Valley Property Ownership Map

Upper Muddy Creek
- Muddy Creek and Tribs
- Penns Creek
- Local Roads
- State Roads
- Property Owners
- Township Boundary

Scale: 0 - 4,000 Feet
The 2011 stream temperature data from the Muddy Creek data loggers further indicated the need for stream buffers within the watershed. The data showed that a lack of riparian buffers were creating a thermal regime unsustainable to trout populations. This concerning fact help spur the education and outreach portion of the project.

The graphs to the right show hourly temperature readings from 3 sites along the stream. The data focuses on a 72 hour hot spell in mid-July 2011. During this period air temperatures ranged from a low of 70 degrees (F) to over 102 degrees (F) and no precipitation was recorded.

Note that 2011 was a wetter than average year. The 80 year mean annual discharge for Penns Creek is 446 cfs (cubic feet per second), recorded at the USGS gauge, which includes high winter and spring flows. Even during the drier summer months in 2011 the mean discharge exceeded 552 cfs. Higher discharges generally reflect greater groundwater recharge and high summer base flows which tend to lower stream temperatures. Thus even higher water temperatures would have resulted under more typical lower flow conditions.

- Site 1: Mouth of Muddy Creek

At this site a peak temperature reached 87 degrees (F) with 67 consecutive hours of water temperature above the brown trout stress threshold, effectively creating a “thermal dead zone”. Trout likely cannot survive exposure to these lethal temperatures for this duration of time.

- Site 2: Harter Road

At site 2, located about 1.0 mile upstream from Site 1, thermal conditions are less severe than at Site 1. However, during this period, peak temperature reached 82 degrees (F) and afternoon temperatures exceeded 76 degrees (F) for periods lasting 8 to 14 hours. Improved conditions are likely due to more extensive tree canopy shading the stream. Nonetheless, temperatures exceeding trout stress threshold levels occurred, indicating a need for riparian restoration.

- Site 3: Upper George’s Valley (Headwaters)

At Site 3 water temperatures remained well below stress threshold levels for brown trout during the July hot spell due to the proximity of the monitor to cold groundwater inputs and a well shaded stream channel.
After reviewing the habitat descriptions for early successional species with a focus on the American Woodcock the CWS team used GIS analysis to establish areas containing hydric soils as a foundation upon which to create a proposed management area. Hydric soils were considered important by the team because of their prominence in the Woodcock’s life cycle. These soils also tended to be sub-prime farmland and landowners would be more amenable to long term easements and converting marginal agricultural land to wildlife habitat.
George’s Valley / Muddy Creek

Proposed Management Areas

After hydric soils were located, the team referenced both aerial photography and field observations to delineate areas of reverting pasture and farmland adjacent to areas containing hydric soils. Areas of active farmland, small lot suburban development, forests, and upland hillsides were not included in the proposed management area. From this initial mapping exercise two core habitat areas were established that encompassed over 800 acres of potential early successional habitat divided among over 40 separate landowners.

Woodcock? A Neat Bird by Any Name!

By Lisa Williams – PA Game Commission Wildlife Biologist.

Timberdoodle, mud bat, bog sucker, woodcock – whatever we call him, this is one of the most interesting animals to be found in Georges Valley. Eyes too high, bill too long, legs too far to his rear ... a woodcock in the hand seems a cumbrous clown, an assemblage of spare parts. But watch this clown in his own element - a wet thicket in springtime - and you’ll see one of the greatest wildlife shows in Penns Woods. Subject of art, festivals, and odes penned by the great masters of wildlife management ... the Sky Dance of the humble woodcock will entertain anyone who ventures into their soggy haunts during springtime.

Aldo Leopold, Father of modern wildlife management, was truly enamored with this spectacle and devoted a section of his April entry in A Sand County Almanac to this description of the Sky Dance: “Suddenly the peenting ceases and the bird flutters skyward in a series of wide spirals, emitting a musical twitter. Up and up he goes, the spirals steeper and smaller, the twittering louder and louder, until the performer is only a speck in the sky. Then, without warning, he tumbles like a crippled plane, giving voice in a soft liquid warble that a March bluebird might envy. At a few feet from the ground he levels off and returns to his peenting ground, usually to the exact spot where the performance began, and there resumes his peenting.”

Nasal peents, twittering spirals, warbling free-falls: This is truly a show that can be enjoyed by anyone. To find a viewing location, search out a wet thicket with patchy openings of short grass or bare ground then listen for the distinctive evening ‘peent’ of the male woodcock. To the unfamiliar he sounds like an insistent frog or insect. But careful attention to the loudly-repetitive nasal peents, often coming from multiple males in different portions of the thicket, will soon verify that you have located a dance floor worthy of showing to friends and family.

The best viewing occurs just after sunset each warm evening through May. Seat yourself under a bush to the east of the dance floor, thus backlighting the dancers against the western sky. Then wait quietly and watch for the show to begin. As Leopold wrote: “He flies in low from some neighboring thicket, alights on the bare moss and at once begins the overture: a series of queer throaty peents spaced about two seconds apart ...”

After the initial warm up, he will launch himself into the air and begin his nightly attempt to impress a female. In a high-quality thicket, you may be fortunate enough to observe multiple dancers in the sky at once. If you are lucky enough to see sky dancers on the ground, you will see mini-versions of the turkey gobbler - strutting with heads thrown back toward fanned tails in vainglorious attempts to impress females watching silently nearby. Leopold advises us to “sit quietly, lest he fly away in a huff” ... and enjoy these antics of spring.

When the sky dance season ends in late May, woodcock busy themselves raising their brood of four chicks through the summer, before winging south for the winter. Leaving Georges Valley in October, our birds will return in March and April to nearly the exact area where they hatched. So decisions made by Georges Valley landowners directly affect the future of these neighbors!

American Woodcock description included in Fall newsletter
Targeted Management Area Map

- Upper Muddy Creek
- Proposed Management Area
- Muddy Creek and Tribs
- Penns Creek
- Local Roads
- State Roads
- Hydric Soils
- Township Boundary

- Upper Muddy Creek
- Proposed Management Area
- Muddy Creek and Tribs
- Penns Creek
- Local Roads
- State Roads
- Hydric Soils
- Township Boundary
In March of 2011 the CWS team sent a personalized letter and brochure regarding the American Woodcock to 40 landowners residing in the proposed management area. The intent of the letter and brochure was to inform residents of the project, provide information, and gauge interest from landowners. The response to the letter was positive, over a dozen landowners requested more information and another dozen expressed interest in the program.
Dear Mr. and Mrs. Dubois,

The Muddy Creek watershed of Georges Valley that you live in is truly special— the historic character of the agricultural land and natural habitat areas provide rewarding opportunities for residents to interact with nature in this beautiful valley. Recent changes to land use have threatened that connection to nature which is so important to many of us. Migratory birds are among the first species to be impacted by these changes. Several residents of George’s Valley are already taking the initiative to improve trout, bird, and animal habitat areas; to affect a positive and long-lasting change a larger scale approach is needed. Individually, you can help restore habitat areas of the priority species American Woodcock, as well as several other native species.

State wide since the 1960s, the population of the American Woodcock has declined. Most authorities attribute the decline of this fascinating bird to a loss of critical habitat caused by wetland forest destruction and residential development. The American Woodcock and many other species rely on a diverse mosaic of habitat types, ranging from streamside vegetative buffers to mowed agricultural fields. This mosaic is essential for the re-growth of American Woodcock populations. Elements of the mosaic such as streamside buffers also provide other benefits to fish habitat and help filter sediment that would otherwise enter the waterway.

The students in the Center for Watershed Stewardship (CWS) at Penn State University share your appreciation and concern for the health of the habitat surrounding Muddy Creek. For the “keystone project class,” Jake Powell and Drew Siglin are currently working with the Penns Valley Conservation Association and the U.S. Fish and Wildlife Service Partners for Fish and Wildlife to assess the current landscape mosaic along selected stream segments of Muddy Creek. The larger objective is to create a holistic plan, consistent with the desires and goals of individual landowners, for enhancement of vital habitats. Our report of these assessments can be used by local residents and groups to develop ideas and seek grants for preserving and restoring riparian buffers as well as bird population habitat. The information will be accessible to the public, individual landowner identities will remain anonymous.

We would like to welcome you, and any other residents of the watershed who own streamside (or adjacent) properties, to take part in this planning effort. Your participation in this project would allow the CWS team to access your property and potential habitat areas. Please be aware that by permitting access for a Penn State class, you are not assuming any liability. As a landowner in the Muddy Creek watershed, you have the opportunity to make a positive impact on the quality of stream in your neighborhood, as well as help to improve water quality and critical wildlife habitat on a watershed-wide scale.

If you are interested in working with us to benefit the Muddy Creek watershed and contribute to the American Woodcock habitat, please contact the class instructor, Lysle S. Sherwin at lss9@psu.edu or 814-865-5736.

Sincerely,

Tom Doman
Muddy Creek Landowner

George Kelly
PVCA Watershed Committee Chair

Jake Powell
Graduate Student

Lysle Sherwin
CWS Director

Drew Siglin
Graduate Student

P.S. If you are interested in previous “keystone projects” please visit our website at http://water.psu.edu/cws/
This project is in collaboration with the Penns Valley Conservation Association. Enclosed are several pamphlets and more information regarding the on-going conservation in George’s Valley and Penns Creek.
George’s Valley/Muddy Creek
Biologist Field Trip

To begin the process of providing site specific information to landowners and gauge the interest of potential funding agencies, a tour of George’s Valley was organized by the CWS and cosponsored by the PVCA. The tour was attended by representatives from 5 different state and federal agencies and 9 total properties with George’s Valley were visited. At each site a collaborative discussion regarding potential management strategies, funding possibilities, and future steps were discussed with representatives from the CWS and PVCA and the landowners. At the conclusion of the tour, a brainstorming session regarding the potential future of the project revealed the availability of funds and the exciting possibilities for the George’s Valley project. The field trip also revealed the value of landowners in the proposed management area remaining in contact with agency representatives that could provide property scale planning as well as leverage funding to implement these plans. The field trip further established partnerships with interested state and federal agencies as well as created connections between key landowners and the CWS team.
Map of properties visited by field trip guests

Property Ownership Key
01 - Doman
02 - Fuller
03 - Tucker/Lang
04 - R. Grove
05 - C. Grove
06 - K. Grove
07 - Marquardt
08 - Myers
09 - Korostoff
George's Valley/Muddy Creek
Community Outreach

The next effort by the CWS team to provide information and solicit feedback from landowners in the proposed management area was a newsletter sent to each individual landowner on December 1, 2011. The newsletter updated landowners on the status of the project, provided additional information about the Woodcock, and basic information about funding programs. The letter also invited each landowner to a public workshop where representatives from the prior field trip would present and be available for questions.
December 1, 2011

Dear Georges Valley Neighbor,

Last spring we sent a letter to over 40 residents of the Georges Valley community regarding the cooperative initiative by Penns Valley Conservation Association and the Center for Watershed Stewardship at Penn State to improve habitat for American Woodcock and other “early succession forest” wildlife. Over the course of the summer, more than a dozen landowners expressed positive interest and their willingness to consider specific ways and means to benefit these unique natural assets. The response was encouraging because it represents a sizable land area of about 800 acres with the potential to achieve significant habitat improvement under proper management.

In late May, Lisa Williams (a Georges Valley resident), and Pennsylvania Game Commission designated Woodcock biologist conducted a preliminary census of breeding Woodcock as a baseline to measure future response to management activities. Lisa found thirteen singing males along a two mile survey route even though the peak of the breeding season had past- further indication that Georges Valley and the Muddy Creek Watershed sustain a healthy, breeding Woodcock population and the area has excellent potential to respond to management efforts.

Cooperating landowners are essential along with contributions and networking by local organizations such as Penns Valley Conservation Association and the working partnerships developed among the conservation agencies to deliver the technical assistance and expertise, funding, and project implementation capacity. Feedback from landowners indicates that several are already embarking on cooperative projects with Pennsylvania Game Commission, USDA Natural Resource Conservation Service, US Fish and Wildlife Service Partners for Fish and Wildlife programs to enhance wildlife habitat on their land. The enclosed Muddy Creek “Update” briefly describes the primary programs available to assist landowners with contact information of personnel able to discuss the various programs in detail. Of course, the participation of additional landowners is welcome!

Also, please find enclosed a copy of “American Woodcock Habitat” – an excellent illustrated description in mostly non-technical terminology of the best management practices we are looking forward to seeing implemented in the watershed. On the related topic of elevated stream water temperatures resulting from inadequate riparian buffer habitat, a brief summary of monitoring data from Muddy Creek collected during a July 2011 hotspell is also enclosed.

If you are interested in working with us to benefit the Muddy Creek watershed and contribute to the American Woodcock habitat, please contact the class instructor, Lysle S. Sherwin at lss9@psu.edu or 814-865-5736.

Sincerely,

Tom Doman                    George Kelly                    Jake Powell                    Lysle Sherwin                    Drew Siglin
Muddy Creek Landowner                PVCA Watershed Committee Chair                       Graduate Student                                           CWS Director                                          Graduate Student
Additional information is included in “American Woodcock Habitat” booklet published by the Wildlife Management Institute (WMI). A complimentary copy of the WMI booklet and an article by Lisa Williams, PGC Woodcock biologist on the mystique and importance of the woodcock as a species of concern are enclosed.

**Planting native tree species in wetlands and along stream corridors is effective in creating early successional habitat areas and improving stream health. There are numerous recent examples of these plantings within George’s Valley.**

**Opportunities for Collaboration**
Achieving the goals outlined above will require cooperation, planning, and time. No single landowner alone can create all the habitats required to ensure a viable community of species, however, the combined effort of individual landowners within the Georges Valley community can add up to large benefits to species of concern. This cooperation allows landowners the freedom to manage their own property, while partnering with neighbors to accomplish large-scale management goals. Cooperation also entails communication, diplomacy, and understanding. Conservation is a long-term process both in planning and implementation. This process may seem daunting to some; however, the benefits of conservation are long lasting as well.

**Funding and Assistance Programs**

**Pennsylvania Game Commission**

**Private Landowner Assistance Program** is a program where PGC Regional Wildlife Diversity Biologists visit interested landowner properties and create wildlife management plans. (Contact: PGC Northcentral Region RWD Biologist Mario Giazzon, mgiazzon@pa.gov, (570) 547-7259). These plans focus on improving habitat for state birds and mammals of concern. This program may provide specific management strategies for landowners to apply for additional alternative funding sources.

**Voluntary Public Access- Habitat Incentive Program (VPA-HIP)**

Contact: Michael Pruss, PGC Private Lands Biologist, mpruss@pa.gov

This program aims to improve habitat on private lands that allow greater hunter access. Landowner benefits include liability protection to landowners who allow public hunting access, free subscription to PA Game News, free seedlings and nest boxes, enhanced ATV and Game law enforcement. Landowners may also receive additional benefits, including free Habitat Improvements (100% paid for, no cost-share required). The program may provide assistance with cutting non-commercial wooded areas, native shrub and grass planting, and further incentive payments for landowners involved in the USDA programs described below.
**Funding and Assistance Programs (continued)**

**USDA Natural Resource Conservation Service**

Contact: Scott D. Heckman, USDA Service Center, Mill Hall, PA 17751
(570) 726-3196 x 123; Scott.Heckman@pa.usda.gov

The Conservation Reserve Program (CRP) is a voluntary program for agricultural landowners. Through CRP, you can receive annual rental payments and cost-share assistance to establish long-term, resource-conserving covers on eligible farmland. Acreage enrolled in the CRP is planted to resource-conserving vegetative covers, making the program a major contributor to increased wildlife populations, water quality protection, and soil conservation.

The Environmental Quality Incentives Program (EQIP) provides financial and technical assistance to agricultural producers through contracts up to a maximum term of ten years in length. These contracts provide financial assistance to help plan and implement conservation practices that address natural resource concerns and for opportunities to improve soil, water, plant, animal, air and related resources on agricultural land and non-industrial private forestland.

The Wetlands Reserve Program (WRP) offers landowners the opportunity to protect, restore, and enhance wetlands on their property. Technical and financial support is provided to help landowners with their wetland restoration efforts. This program helps landowners establish long-term wetland conservation and protection practices. Restoration cost-share agreements may be offered to eligible landowners.

The Wildlife Habitat Incentive Program (WHIP) focuses on developing and improving wildlife habitat on agricultural land or non-industrial private forestland. WHIP provides both technical assistance and up to 75 percent cost-share assistance to establish and improve fish and wildlife habitat. WHIP cost-share agreements between NRCS and the participant generally last from one year after the last conservation practice is implemented but not more than 10 years from the date the agreement is signed.

**Game Commission Biologists Tour Georges Valley**

Wildlife biologists representing several Pennsylvania Game Commission (PGC) landowner assistance programs and US Fish and Wildlife Partners for Wildlife biologists toured potential early successional habitat project sites in Muddy Creek watershed on October 4 to evaluate habitat needs and discuss landowner objectives to help match program opportunities and landowner participation requirements. Several of the PGC commented favorably on the potential to enhance wildlife habitat given the landowner interest, diverse habitat types suitable for management, and a breeding population of woodcock to respond to habitat management actions.

A new program, VPA-HIP (Voluntary Public Access-Habitat Incentive Program) covers technical assistance, planning, and 100 percent payment of habitat improvement practices on property open to limited public access for hunting and trapping. For instance, a landowner may permit access only for small game hunting, or only deer hunting and limit the number of hunters allowed. Plans are underway to schedule more direct dialog on the programs between landowners and biologists in the coming year with the intent to have one or more “on the ground” demonstration projects in 2012.
Overview
The work in George’s Valley not only resulted in actual implementation of stream buffers and habitat; it has been a powerful catalyst for an expanding initiative to promote broader, proactive resource stewardship within the community. Looking ahead to the future, a growing number of landowners are becoming involved (as noted below) to build upon the foundation established through the collaborative work of the Keystone Project.

Implementation
• Doman: 5 acres of invasive species mowing and pre-CREP planting of Aspen, Alder and riparian shrubs.
• Tucker/Lang: Invasive species mowing and planting site scarification (3 ac.) 230 Aspen seedlings planted.
• Myers: 500 riparian shrubs planted on a 600’ tributary to Muddy Creek. 200 Alder seedlings planted in a wet meadow.
• Grove: 6 acres mowing of invasive species and 600 Aspen and riparian shrubs planted.
• Bierly: 4 acre CREP planting of 500 early successional forest trees and shrubs.
• Williams/Whitmer: Dormant willow cutting and native shrubs planted on unnamed tributary to Muddy Creek.

Planning
• Doman: Has initiated the planning phase for a CREP enrollment
• Korostoff: Has requested a comprehensive wildlife diversity plan prepared by the Pennsylvania Game Commission’s Landowner Assistance Program biologist.
• Myers: Has also requested a comprehensive wildlife diversity plan prepared by the Pennsylvania Game Commission’s Landowner Assistance Program biologist.
• Wallingford: Plans in preparation for extensive invasive control work during Summer 2012.
• Claar: Has enrolled in CREP with a commitment by PVCA to assist habitat planting on ineligible land.

Interested Landowners
Nine additional landowners expressed interest in improving wildlife habitat on their land. Two addition landowners have also expressed interest in controlling invasive species on their property, and another landowner would like to have a comprehensive wildlife plan prepared. Finally, the Muddy Paws Environmental Center is enrolling in the Wetland Reserve Program as an opportunity to enhance wetland and early succession forest habitat to expand the existing educational program.

Partnerships
One strength of the proposal is the collaborative partnership in Muddy Creek forged among the grass roots work of the PVCA and local landowners with Penn State University, The Center for Watershed Stewardship, Wildlife Management Institute, USDA NRCS, Pennsylvania Game Commission, Habitat Forever, US Fish and Wildlife Service, and Woodcock Limited of Pennsylvania.

Funding
• $5,000 PVCA grant for initiating early successional species habitat implementation projects. Funds were used to purchase Aspen and Alder seedlings, native shrubs, tree shelters, invasive mowing, labor and equipment, herbicide, and other project cost.
• $350 donation from Woodcock Limited of Pennsylvania for purchase of tree shelters.
• Multi-year National Fish and Wildlife Foundation grant to research direct seeding of early successional tree and shrub species is in preparation by Stroud Water Center and the Chesapeake Bay Foundation, the Harter Road management area properties are a primary research site in the proposal.
• PVCA watershed committee is in the process of developing a funding request for fall of 2012 to several private Pennsylvania foundations seeking ongoing support for the work being done in Muddy Creek.

Telling the Story
• “Young Forest”, the new Wildlife Management Institute (WMI) website under development by Chuck Fergus will feature the Muddy Creek Initiative as a transferable, successful model of landowner engagement to accomplish woodcock habitat enhancement on private lands. Mr. Fergus will be visiting summer 2012 to gather information for the website.
• Later in summer 2012, the Woodcock Program National Coordinator for the US Fish and Wildlife Service will also be touring the George’s Valley project sites and meeting with project leaders and landowners.
Upper Muddy Creek

- Property Owners
- Positive Indication of Landowner Interest
- For Follow Up

Muddy_Creek_and_Tribs
Penns_Creek
Local Roads
State Roads
Township Boundary

Participation Status Map 5-3-2011
The Martinec farm was included in a natural resource assessment in 2009/2010 by graduate students at the Penn State Center for Watershed Stewardship. The student team collected field data to assess riparian forest condition, aquatic insect diversity and abundance, trout spawning density, and fish habitat quality and management needs. In 2011/2012, the CWS team built upon this data to work toward implementing restoration practices along Penns Creek (which bisects the Martinec Farm) and the adjacent reverting pastures and riparian zones.

The CWS team produced numerous documents to aid in application for the National Resource Conservation Service Wildlife Habitat Improvement Program. Specifically, the project focused in Penns Creek Stream Habitat Improvement (395); Stream bank Protection (580); Early Successional Habitat (647) with Tree/Shrub Establishment (612). The USGS topo Map and NRCS soil map were gathered for the site. The CWS team created base maps, an invasive species control plan, and a WHIP conservation practices plan. Additionally, stream assessment fieldwork was conducted along a 1,259 foot reach of Penns Creek. Subsequent plans including current conditions and a stream restoration plan were developed.
The project encompasses two adjoining segments of upper Penns Creek on the David and Jan Martinec farm, Gregg Township, Centre County. First, a 1,030 ft. segment of abandoned pasture which was heavily grazed by cattle and sheep into the 1960’s would be the location of most of the stream habitat improvement. The second downstream segment is actively pastured and is fenced with a stone cattle crossing. The riparian corridor and adjoining terraces and uplands are in an early forest succession stage dominated by invasive exotic shrub species (primarily Russian olive and honeysuckle), multiflora rose, a mixture of native and non-native grasses and forbs and scattered black walnut, white ash and black willow trees.

The most apparent resource management problems and fish habitat deficiencies were related to extensive stream bank erosion and instability caused by the historic intensive livestock grazing. Of ten stream habitat parameters measured, “bank vegetative protection” and “condition of banks” ranked the extent and severity of erosion and failure. The score for both banks averaged 3.5 on a scale of 0-10 ranking the section as “marginal” and was the lowest scoring category. “Shelter for fish and macroinvertebrates” at 4 was the next lowest category score. Overall, stream habitat scored 102 of 200 total possible points. Interestingly, trout spawning “redds” counted in November 2009 found almost three times the number of redds (45) in the forested and fenced sections compared to 18 in an unfenced pasture and the fallow pasture where the proposed project would be implemented.

As a result of the initial assessment, in 2010 David Martinec cooperated with a PADEP Chesapeake Bay program to install a stone cattle crossing, regrade and plant 260 feet of eroded stream bank, and install 1,600 feet of cattle fencing with a 35-foot stream buffer in the active pasture. In July 2010 he made application to the USDA WHIP program for technical assistance and funding to address the stream habitat and bank erosion problems and to improve wildlife habitat, particularly woodcock, grouse and early successional songbirds, in the fallow pasture.

Additional assessment to quantify the length of stream improvement and stream bank protection was conducted in 2011 by faculty and graduate students of the CWS with assistance by Adam Smith, US Fish and Wildlife Service biologist in selecting conservation practices as presented in the Project Plan and Objectives below. About 1,259 linear feet of stream channel and eroded stream banks in the old pasture section are in degraded condition including mass-wasting of 3-4 foot high unvegetated vertical banks and active bedload deposition and sedimentation in the channel. Two additional sites in the active pasture downstream have accelerated bank erosion and will be evaluated for conservation practices pending award of WHIP funds.

Despite the significant degradation from past land use, the stream supports a naturally reproducing wild trout population. An important reason is that the stream maintains a stable year-round base flow of cold water at optimum temperatures for a highly productive trout fishery due to its location 2 miles downstream of the large spring source at Penns Cave. A trout population electrofishing survey was conducted in July 2008 by the US Fish and Wildlife Cooperative Wildlife Research Unit at Penn State on the adjoining L. Sherwin property upstream. The results documented a reproducing brown trout biomass of 99.8 kg/ha and a wild rainbow trout biomass of 4.1 kg/ha (103.9 kg/ha combined) which is well above the minimum criteria of 40 kg/ha for a brown trout Class A Wild Trout stream. A WHIP-funded stream habitat, riparian buffer, and wetland restoration project was conducted on the Sherwin property in 2009-2011.

A small vernal pool habitat also exists within the project area and the stream reach proposed for improvement is within 500 feet of a 0.4 acre vernal
pool wetland area currently being restored on the Sherwin property with a WHIP contract.

A primary objective is to physically stabilize and revegetate approximately 1,259 linear feet of eroded stream bank in the abandoned pasture section. The goal is to mitigate sediment loading and to enhance in-stream habitat for trout and associated cold water organisms. The proposed techniques used to improve fish habitat and reduce sediment loading will include mudsill cribbing, bank cover, bioengineering with bank sloping and riprap at the toe of slopes, tree root wad placement, and tree revetment installations. The site specific technique applied will be based on site characteristics such as flow and channel form. For example, mudsills will be utilized at steep, vertical banks greater than 2 feet in height adjacent to pool habitat and on outside bends. Low profile modified mudsills and bank cover will be used at ripples where erosion is greatest at the toe of the slope. Bank sloping with bioengineering planting are suitable alternatives along inside bends and lower gradient sections where erosive force is reduced. Installation of root wads and tree revetments [silt catcher tree tops] are suitable where bank excavation for sill logs or slope re-grading is impractical or undesirable due to existing trees, well-established roots or other constraints. Log vanes are proposed to increase channel scour and thalweg deepening at two locations and boulder clusters placed randomly to provide in-stream habitat at five locations.

Design and construction specifications will follow guidelines in the PA Fish and Boat Commission “Trout Stream Habitat Improvement” publication and the USDA NRCS “Stream Corridor Restoration” manual. The techniques incorporated in the work provide specific habitat benefits including overhead cover, varied depth and current regimes, security cover for juvenile trout and forage fish, protection and enlargement of critical spawning gravel substrate, as well as reduction of sediment loading to improve water quality and enhance macro-invertebrate species diversity and abundance.

To establish permanent vegetation on treated banks and disturbed sites, container-grown stock and dormant live stakes, posts and fascines of native tree and shrub species with high wildlife food and cover value and excellent bio-engineering characteristics will be planted. Those species would include silky willow, black willow, silky dogwood, viburnums, and other suitable species.

Invasive plant control by mechanical cutting and stump spot herbicide treatment to allow implementation of early successional habitat development for woodcock, ruffed grouse and associated non-game species is planned for an approximately 17 acre area. This area encompasses a riparian stream buffer in an approximately 1,030 ft. stream segment connected by a 50’ corridor extending upslope to a larger hawthorn thicket area. A minimum average stream buffer width of 50 feet will be established where possible on the north bank as determined by the existing state highway right of way. The buffer width on the south bank will be substantially wider on average with the perimeter boundary determined by topography of the hillside and the presence of desirable native species such as hawthorn and apple escaped from cultivation which will be preserved.

The woodcock and upland game habitat planting will utilize seedlings of various native early successional “pioneer” trees and shrubs such as aspen, alder, viburnums, dogwoods, hawthorn, meadowsweet spirea and others located within a planting scheme tailored to soil, moisture, shade tolerance, and related site conditions. Where desirable, early successional species with good stump sprouting characteristics already exist such as scattered aspen trees, will be cut during winter to encourage maximum sprouting and stem density.
This project was brought to the attention of the CWS team through the Penns Valley Conservation Association (PVCA). Local fisherman reported a small tributary to Spring Creek dumping sediment laden water into this blue ribbon trout stream during storm events. The PVCA partnered with the CWS to investigate the source of the sediment. Field research identified a 320 acre farm which had livestock grazing in the stream and high eroding stream banks. This farm was targeted as a potential candidate as for a stream buffer implementation. The CWS team created a basic livestock fencing plan that established a 50’ buffer on each side of the stream with 2 livestock crossings. The plan initially called for approximately 1,500 lineal feet of stream to be fenced and 2.5 acres to be planted as a buffer. This plan was provided to the PVCA which then contacted the landowner. The landowner agreed to the plan and funding was secured from the Chesapeake Bay Foundation. The plan was expanded by the PVCA and the landowner to encompass another 1,000 lineal feet of stream and 5 acres of pasture land upstream of the original CWS plan.

Results:

- Over 2,500 Lineal Feet of stream were fenced
- An average buffer width of 75’ was established along the entire length of the property owner’s stream.
- Over 6.5 acres of land were planted in a CREP buffer planting
- Sediment and nutrient loading to Penns Creek from this tributary was reduced
- This highly visible farm adjacent to Penns Creek Road and Penns Creek has become a model buffer planting for the PVCA to show other landowners seeking to better manage their water resources. The project also demonstrated the power of leveraging partnerships to accomplish strategic management goals.
Musser Farm before implementation (Spring 2011)

Musser Farm after implementation (Spring 2012)
This contiguous block of 210 acres near Harter Road meets a key management principle of the Federal and State Woodcock plans to assemble a “core” area capable of providing all required habitat types for successful Woodcock reproduction. Several ownerships are involved (Williams, Tucker/Lang, Grove, Marquardt, and Myers) - fortunately all these individual owners are actively implementing woodcock management practices.

Harter Road Management Area
Habitat Management Area

Results
- In total, during spring 2012 more than 15 acres were cleared of invasive species and planted to early successional species.
- This area will continue to be a focus of management as funding permits.
- The area will act as a demonstration venue for other local landowners for typical and alternative management techniques
- The management area acts a testing ground and catalyst for the model promoted by the George’s Valley initiative of multiple private landowners working together in a coordinated manner to accomplish a management goal larger than a single property.
- The vegetation, soils, prior land use, sizable acreage, and cooperative landowners has prompted the Stroud Water Center and Chesapeake Bay Foundation to select Harter Road Management area as a potential study site for a multi-year research grant funded by the National Fish and Wildlife Foundation. The research would evaluate methodologies for direct seeding of early successional forest species. The results of this study may provide a more effective large scale approach to early successional forest regeneration in Pennsylvania and the Mid-Atlantic Region.
The Tucker/Lang property is one of the primary properties in the George’s Valley early successional forest management plan. The landowners were instrumental in the early stages of the larger management plan and were interested in becoming a demonstration project for the larger management strategy. The 9 acre area of focus on the property is a former pasture that has not been grazed for over a decade. Historic drainage tiles attempt to drain the site; however, the area remains wet the majority of the year. The pasture is attempting to revert into a wet meadow complex but invasive species, mainly Autumn Olive (Elaeagnus umbellata) dominates the area with occasional Hawthorn thickets appearing in areas of slightly higher ground. The CWS team proposed a management scheme that removed the Autumn Olive from the 9 acre site and planted Aspen in 3.5 acres of the site.

Results
- The plan was implemented by the US Fish and Wildlife Partners for Wildlife in March of 2012.
- Over 9 acres of invasive species were removed
- Over 230 Aspen plantings were installed
- The site has been an example to neighboring landowners and residents of the George’s Valley of invasive species removal and early successional forest establishment.
Initial management plan

- Old Pasture Aspen Management 9 Ac.
- Aspen Planting (60 ft) 0.7 Ac.
- Aspen Planting (60 ft) 0.8 Ac.
- Aspen Planting (60 ft) 1.2 Ac.
George’s Valley Outreach Meeting

Public Outreach

The culmination of the George’s Valley Early Successional Forest management plan was a community workshop that connected PVCA members and George’s Valley landowners with state and federal representatives. The purpose of the workshop was to bridge the gap between the larger management goals set forth by the CWS team and the site specific needs and goals of individual landowners. The meeting consisted of informal presentations from agency representatives that covered the need for early successional forest management, funding alternatives, and management strategies. The meeting concluded with a question and answer session and an informal time for landowners to meet and speak with representatives.

The meeting created a space that allowed landowners to interact with the CWS team, PVCA members, and state and federal agency representatives.

Results

- The meeting further established partnerships with the six state and federal agencies
- Six agency representatives partnered with the CWS and PVCA
- Over 40 people participated in the meeting
- Provided an open forum for discussion of conservation related issues
Please Join Us

Early Successional Forest
Public Information Meeting

Featuring a panel discussion on the early successional forest wildlife habitat project in George’s Valley.

Learn About:

• Dramatic population decline of species dependent on young forests
• Actions needed to improve habitat and reverse the downward trend
• George’s Valley potential for habitat restoration
• State and Federal agency conservation programs: eligibility, services, and funding

Explore opportunities you may have through partnerships with local agencies and the Penns Valley Conservation Association.

Thursday, March 22nd 7:00pm
Penns Valley High School Cafeteria
Dessert potluck to follow

Moderated by
Lydale Sherwin, Penn State University Center for Watershed Stewardship

Panelists
Lisa Williams
PA Game Commission
lead woodcock biologist

Mario Giazzon, PGC
wildlife diversity biologist

Scott Heckman, USDA
Natural Resource Conservation Service

Dave Putnam
Wildlife Management Institute

Adam Smith
US Fish and Wildlife Service

Featuring a panel discussion on the early successional forest wildlife habitat project in George’s Valley.

PROJECT SPONSORS:

Co-hosted by the Penns Valley Conservation Association and the Penn State University Center For Watershed Stewardship.
A short PVCA business meeting will precede the panel discussion.
The combined efforts of the PVCA and CWS team in Penns Valley have created an increased awareness and concern regarding the valley’s water resources. Building on this awareness, the CWS team is currently working with the PVCA and the Penns Valley Area High School to implement a stream monitoring module into the 12th grade curriculum. A pilot program that introduces students to the ongoing CWS and PVCA sponsored stream temperature monitoring program will culminate in a field trip on May 21, 2012. The program will consist of an in class presentation by CWS team members and a field trip which allows students to launch and install stream monitoring equipment. Actual stream temperature data intended to be used in class curriculum to teach principles of ecology, mathematics, and biology.

In addition, stream temperature monitoring posters were exhibited at:

- PVCA’s Crickfest (August 2011)
- PSU School of Forest Resources Forest Fest (September 2011)
- PVCA Annual Meeting (November 2011)
- Cold Water Heritage Conference (February 2012)
- George’s Valley Outreach Meeting (March 2012)
Management Strategies

1. Plant continuous riparian (streamside) forests of tree and native shrubs and trees where absent.

Technical and financial assistance programs are available to agricultural landowners through a wide variety of county, state, and federal government programs and private organizations.

- Natural Resource Conservation Service: Conservation Reserve Program (CRP)
- Wildlife Habitat Improvement Program (WHIP)
- 360 Fish and Wildlife Service Partners for Fish and Wildlife
- Centre County Conservation District
- Penns Valley Conservation Association
- Penn State Center for Watershed Stewardship

2. In small headwaters with beets and pastures, consider planting "warm season" native grasses and perennial wildflowers. Advantages of warm season grasses include faster growth, reducing the need for pesticides, and providing excellent habitat, water, and grassland maintenance. Native grasses improve the quality of pastures, trap sediment, and provide excellent habitat, water, and grassland maintenance. Native grasses improve the quality of pastures, trap sediment, and provide excellent habitat, water, and grassland maintenance.

3. Ensure consistent domestic and agricultural water use to sustain waterfowl habitat levels and groundwater flows to reduce summer "base flow" critical in treating land watersheds such as Penns Creek.

4. Exclude livestock from streams by fencing and stabilized crossings. Measure increases BOD (Biochemical Oxygen Demand) at higher temperatures, increasing pollution stress on fish and aquatic life.

5. Protect critical groundwater recharge areas, emerging springs and wetlands. Keep by implementing "Best Management Practices" during logging operations. Examples include location of high roads and low crossings, installation of ditches, grabbers, and sedimentation basins, and navigation of disturbed sites. Leave silt of standing water buffers along perennial waterbodies and streams.

6. Soil "bioengineering" techniques such as tree plantings of four drift lines placed at water. It trap sediment and reduce deposition with cooling effect on flow.

- Slaters Valley (Muddy Creek headwaters)
- Lower Georges Valley (Muddy Creek)
- Slatersville Bridge (Muddy Creek)
The Center for Watershed Stewardship and PVCA are cooperating on a multiyear stream water temperature monitoring project at 5 locations covering the mainstem of Penns Creek between the source and Coburn, 3 sites on Muddy Creek subwatershed, and 2 points on the Shook farm on an unnamed tributary.

Digital data loggers collect temperature data hourly 24/7 from early summer into September. The objective is to identify “thermal hotspots” where planting buffers of native trees and grasses, and other management activities will result in lower summer water temperatures needed to sustain a healthy coldwater ecosystem and a highly productive wild trout fishery. Initiated in 2010 by the PVCA Watershed Committee, thermal monitoring will also be incorporated as an activity of the environmental education program in the Penns Valley School District supported by PVCA.

All aquatic organisms have a preferred temperature range. If water temperatures exceed the organism’s preferred range, increased stress and even mortality can take place. Water temperature also affects the ability for water to maintain dissolved oxygen levels. Organisms that depend on natural temperature regimes for key lifecycle changes can be negatively affected by abnormal temperature fluctuations.

Temperature fluctuations can be used to assess the health and ecological character of the watershed. While temperature levels naturally vary within all streams, the impacts from human activity may intensify temperature fluctuations, potentially creating unhealthy conditions for local ecosystems.
Transition in Thermal Regiment of Main Stem of Penns Creek From Headwaters to downstream 8 miles.