Proposal 6.

Table 1.

Your Name:	Matt Keefer
Goal Implementation Team:	Water Quality GIT; Forestry Workgroup
Project Title:	Assessing Multifunctional Riparian Forest Buffer Benefits
Project Type (See Section IV above)**:**	Work plan implementation Project: Includes components of Economic modeling, Baseline analyses, Environmental monitoring, and Environmental demonstration and assessment project
Goal/Outcome:	Vital Habitats Goal; Forest Buffer Outcome
Estimated Cost:	$65,000
Justification: Provide a 2 paragraph description of the work and why it is needed. It is recommended that you draw upon one or more work plans.	Riparian forest buffers are a key BMP identified in each jurisdiction's watershed improvement plan. Recent enrollments of riparian forest buffers in have declined across the Bay watershed. Without additional tools beyond the current offerings, Pennsylvania is unlikely to meet its goal. Adding greater flexibility in landowner eligibility, riparian forest buffer designs, allowable plant materials, and other elements, without compromising water quality, will help to reinvigorate interest in riparian forest buffers and accelerate participation across the Bay watershed. Allowing landowners to harvest products and produce an income from woody plants provides additional incentives to landowners to establish riparian forest buffers, to maintain them, and to retain them for the long-term. Virginia Tech has had some success with multifunctional buffer establishment.
	As previously mentioned, this project directly addresses several management approaches and key actions identified in the Forestry Workgroup's 2-year RFB work plan; including Leadership through establishing pilot projects; RFB Enhancements by establishing need for alternative funding options; RFB Technical Assistance by appealing to landowners' preferences and addressing their concerns; and more.
Methodology: Provide a 1-2 paragraph description of how the work is likely to be accomplished.	Funding would be provided to install multi-functional RFBs on private and/or public land in PA. These pilot sites would include several planting/buffer designs on a number of different sites/environmental conditions including a core, conventional buffer of at least 15 to 35 feet wide, and then alternative designs for a multifunctional buffer. Funding would also support an accompanying monitoring program to assess water quality improvements and tree and shrub species success and survivability. Our current assumption is that these designs and plantings would meet the definition of and receive the same level of credit as "Forest Buffers" in the Bay Model. Additionally, the project would explore potential markets for products produced from the buffers. Data would be compiled, analyzed, and reported to the Forestry Workgroup and other appropriate Goal Teams.
Cross-Goal Benefits: What other goals may be advanced through this work?	This project can help to advance the work of several Management Strategies: • Tree Canopy: these alternative buffers could be planted on non-farmland; thus increasing tree canopy in developed areas • Stream Health: by providing baseline data • Healthy Watersheds: relates to several key actions related to forest cover • 2017 and 2025 WIPs: Forest Buffers are a key BMP identified in each jurisdiction's watershed implementation plan.

	• Citizen Stewardship: by providing potential volunteer opportunities in the form of planting or maintenance; and also supporting community engagement in watershed improvement activities and understanding local food markets
Are you willing to serve as GIT lead (see description of the role in Section VI above) If no, suggest other GIT lead	Yes. Matt Keefer or Tracey Coulter from PA DCNR are willing to serve as GIT lead.

Table 2.

GIT Lead Name:	Matt Keefer
Goal Implementation Team:	Water Quality GIT; Forestry Workgroup
Project Title:	Assessing Multifunctional Riparian Forest Buffer Benefits
Refined Cost Estimate:	$65,000
Estimated Project Duration:	4 years
Statement of Work: Provide a detailed scope of work to be accomplished by the contractor, including information on methods, stakeholder participants, deliverables, due dates and intended uses of the products.	**Project Goals** 1. The project will result in the establishment of a demonstration multifunctional riparian forest buffer site in Pennsylvania that meets the Chesapeake Bay Program's definition of a riparian forest buffer. 2. The demonstration site will include several (3-5) MFRFB designs to showcase various arrangements and species mixes that represent a practical approach for a landowner to replicate, considering product production, management, harvesting, and maintenance needs. 3. Based on the buffer designs, PA DCNR will develop templates and communications tools for outreach to interested landowners and farmers. 4. These sites will provide opportunities to study and track several components of MFRFBs, including various designs, species survivability, maintenance requirements, pollutant reduction capacity (N, P, and sediment), change over time, income generation and product production potential, and acceptance into the Bay model. 5. The established sites will be available for demonstration and educational opportunities to promote both traditional and MFRFBs. 6. The data and information produced will contribute to the dialogue of refining and/or expanding existing state and Federal RFB programs. **Background and importance of the work** Riparian forest buffers are a key BMP identified in each jurisdiction's watershed improvement plan. They are an efficient and cost-effective BMP for reducing pollutant loading into streams by filtering and removing nitrogen, phosphorus, and sediment. Additionally, forest buffers provide wildlife habitat and clean air, provide cooling benefits for streams, and sequester carbon. Installation of riparian forest buffers has declined across the Bay watershed in recent years. Fluctuations in commodity prices, taking farmland out of production, and dissatisfaction with Federal cost-share programs are often cited as reasons for the decline. Without additional tools beyond the current offerings, Pennsylvania is unlikely to meet its goal. Multifunctional riparian forest buffers are similar to traditional forest buffers,

where trees are planted with the goal of establishing a streamside forest. What is unique about MFRFBs, is that they provide opportunities for landowners to harvest products and generate income from the buffer. The first 15 feet of the buffer are planted and managed as a traditional RFB. Beyond this inner zone, fruit- and nut-producing trees and shrubs along with woody florals and potentially biomass species are planted in the outer zones and managed for production. MFRFBs work like traditional riparian forest buffers, but offer opportunities for landowners to harvest crops such as fruits, nuts, and woody florals for income generation or personal use. These buffers also provide significant wildlife habitat value and have the potential to be aesthetically pleasing, which is often cited as a major concern by landowners.

Adding greater flexibility in landowner eligibility, riparian forest buffer designs, allowable plant materials, and other elements, without compromising water quality, will help to reinvigorate interest in riparian forest buffers and accelerate participation across the Bay watershed. Allowing landowners to harvest products and produce an income from woody plants provides additional incentives to landowners to establish riparian forest buffers, to maintain them, and to retain them for the long-term.

This work will help to fill gaps in the current understanding of MFRFBs, particularly with proven designs, load reductions, income generation potential, and management and maintenance requirements.

A group of partners in Virginia including the National Agroforestry Center, VA Department of Forestry, Virginia Tech, and Appalachian Sustainable Development has begun similar work in Virginia. This project seeks to build on this existing work.

References

Working Trees: Why add edible and floral plants to riparian forest buffers?
http://nac.unl.edu/documents/workingtrees/infosheets/WTInfoSheet-MultiFunctionalBuffer.pdf

Conservation Buffers: Design Guidelines for Buffers, Corridors, and Greenways
http://www.srs.fs.usda.gov/ pubs/gtr/gtr_srs109.pdf

How to Plan for and Plant Streamside Conservation Buffers with Native Fruit and Nut Trees and Woody Floral Shrubs Trozzo, Munsell and Chamberlain
http://pubs.ext.vt.edu/ANR/ANR-69/ANR-69.html

Native Fruit and Nut Trees and Shrubs of the Virginia Mountains and Piedmont Trozzo, Munsell and Chamberlain **http://pubs.ext.vt.edu/ANR/ANR-23/ANR-23NP.html**

Woody Florals for Income and Conservation Trozzo, Munsell and Chamberlain
http://pubs.ext.vt.edu/ANR/ANR-22/ANR-22NP.html

Barriers or obstacles

1. Identifying a landowner who would be willing to host the project. This could be a public or private landowner.
2. Procuring suitable planting stock of adequate quality for the plantings.

3. Designing a planting plan with tree and shrub species that could be easily replicated and installed across Pennsylvania and other Bay states.
4. Forecasting and understanding product markets and potential end consumers.
5. Designing the buffer to meet the Chesapeake Bay Program's definition of a "riparian forest buffer."

Methods (organized by Deliverables)

1. Establishment of a demonstration multifunctional riparian forest buffer site in Pennsylvania that meets the Chesapeake Bay Program's definition of a riparian forest buffer. The demonstration site will include several (3-5) MFRFB designs to showcase various arrangements and species mixes that represent a practical approach for a landowner to replicate, considering product production, management, harvesting, and maintenance needs.

    a. The demonstration buffers will meet the Chesapeake Bay Program's definition of a "riparian forest buffer."
    b. The demonstration buffers will be designed in a manner that considers the silvics of species selected, management and maintenance needs, and harvesting of the products.
    c. The designs of the buffers should be replicable and represent a practical approach for installing and managing a MFRFB.
    d. The designs will consider recommendations for multi-story cropping contained in: ***Conservation Buffers: Design Guidelines for Buffers, Corridors, and Greenways*** http://www.srs.fs.usda.gov/ pubs/gtr/gtr_srs109.pdf
    e. The buffer will include mostly native species that have the potential to grow well in Pennsylvania and most of the Chesapeake Bay watershed.
    f. The contractor will develop a species list and planting plan for PA DCNR approval.
    g. The designs will include a 15-foot natural RFB for zone 1 with alternative planting designs in an outer zone or segmented further into zones 2 and 3.
    h. One of the designs should include a woody biomass crop.
    i. The designs should consider aesthetic values of the buffer.
    j. The sites should be of sufficient size to represent a realistic planting project.
    k. The sites can be planted on the same ownership and stream reach or on separate locations to consider the variation among the design templates and site conditions.
    l. The sites should be planted according to current BMPs.
    m. The sites must accommodate groups for tours and other educational or research events.

2. After initial planting, annual maintenance for three years to ensure successful establishment. Maintenance activities include but are not limited to: replacement planting, invasive species control, tree tube and stake maintenance, etc.
    a. Contractor must receive PA DCNR approval for any chemical use, including herbicides, pesticides, and fertilizer.

b. Maintenance will follow current BMPs.

3. An agreement with the landowner to address longer-term considerations beyond the initial 4-year grant period including:

    a. Contractor must demonstrate that they or the landowner will commit to maintaining the MFRFB for a minimum of 15 years.
    b. The landowner agrees to grant access to PA DCNR for continued monitoring and use of the site for education programming and events.

4. For three years after the initial planting, an annual assessment of species survivability and "lessons learned" for the trees and shrubs planted specifically for income/product generation.

    a. The contractor will produce an annual report summarizing species survivability and "lessons learned" on maintenance and success of the trees and shrubs planted specifically for income/product generation.
    b. Species survivability can be expressed as a simple percentage of stems planted.
    c. "Lessons Learned" can be a qualitative assessment.
    d. There should be a report for each design, unless it's appropriate to generalize findings across the designs.

5. An assessment of the potential financial performance of each of the MFRFB designs.
    a. Contractor will produce a report that details the potential financial performance of each of the MFRFB designs.
    b. The report will consider potential markets and outlets for products, including wholesalers, restaurants, local consumers, and large urban centers such as Philadelphia and Baltimore/Washington DC.
    c. The assessment should utilize existing tools such as USDA's "NTFP Calculator" http://nac.unl.edu/tools/ntfp.htm as part of the analysis.
    d. The assessment will include a set of recommendations or "tips" for farmers and landowners considering installing a MFRFB.

Stakeholder Participants (potential)

- Pennsylvania Departments of Conservation and Natural Resources, Environmental Protection, and Agriculture
- PA Riparian Forest Buffer Advisory Committee
- Chesapeake Bay Program/ Forestry Workgroup
- Conservation NGOs
- Farmers
- Penn State, multiple entities
- Local municipalities

Due Dates (after awarded the grant)

6 months: design 3-5 MFRFBs
6 months: landowners/sites identified and agreement secured
1 year to 18 months: Buffers established

	2-4 years: species survivability assessments and lessons-learned 2-4 years: maintenance performed 2 years: assessment of potential financial performance completed **<u>Intended Uses of Products</u>** 1. Promote both traditional and multifunctional riparian forest buffers to farmers and other landowners based on the success and lessons learned from the demonstrations sites and the financial performance assessment. 2. Provide education opportunities. 3. Provide data to Chesapeake Bay Program and other partners for continued refinement and expansion of riparian forest buffer programs.
List specific deliverables/products to be provided by the contractor:	1. Establishment of a demonstration multifunctional riparian forest buffer site in Pennsylvania that meets the Chesapeake Bay Program's definition of a riparian forest buffer. The demonstration site will include several (3-5) MFRFB designs to showcase various arrangements and species mixes that represent a practical approach for a landowner to replicate, considering product production, management, harvesting, and maintenance needs. 2. After initial planting, annual maintenance for three years to ensure successful establishment. Maintenance activities include but are not limited: to replacement planting, invasive species control, tree tube and stake maintenance, etc. 3. An agreement with the landowner to address longer-term considerations beyond the initial 4-year grant period including: a. Continued maintenance of the site b. Access granted to PA DCNR for continued monitoring and use of the site for education programming and events. 4. For three years after the initial planting, an annual assessment of species survivability and "lessons learned" for the trees and shrubs planted specifically for income/product generation 5. An assessment of the potential financial performance of each of the MFRFB designs.
QAP: Will environmental data be generated, and will a quality assurance plan be required?	Secondary data will be used requiring a plan for ensuring data quality. Guidance for developing a QA plan for secondary data can be found at https://www.epa.gov/quality/quality-assurance-project-plan-requirements-secondary-data-research-projects. If data originates from sources other than federal reports and peer reviewed journals, a statement on data quality suitability will be required in the final report.
Qualifications: List skills and experience required of winning bidder:	1. Riparian forest buffer design, installation, and maintenance. 2. Understanding of economic markets for potential forest products such as nuts, fruits, woody florals, and biomass.
Bidders List: Due to federal procurement guidelines, project ideas MUST be open to competitive bidding. List at least three entities to include in the request for proposals	Stroud Water Research Center Penn State, Agricultural and Environment Center Penn State/USDA Ag Research Service Chesapeake Bay Foundation The Nature Conservancy, Pennsylvania Office Western Pennsylvania Conservancy Land Studies, Inc.

Reviewers List: The Trust will use external review to evaluate bids. List at least 3 potential reviewers without a conflict of interest with likely bidders.	Katie Commender, Appalachian Sustainable Development Kate MacFarland, USDA National Agroforestry Center Gary Bentrup, US Forest Service