

Motivation

Best Management Practices (BMPs) are methods or system of methods capable of preventing or reducing nonpoint source (NPS) pollution.

Having BMPs perform as intended is critical to realize needed water quality improvements. Assessing BMP performance is challenging.

There is a need for simple survey-like, BMP-specific assessment tools that allow a trained assessor to accurately and efficiently determine BMP quality and infer BMP performance without expensive, long-term monitoring.

In Virginia, BMPs installed with the aid of an incentive or cost-share program are required to meet construction standards and operating protocols developed by the Virginia Department of Conservation and Recreation (DCR) and the Natural Resource Conservation Services (NRCS). BMPs installed without cost-share are not. Significant numbers of BMPs are installed without cost-share.

The objectives of this study were to develop a set of survey-like assessment tools to quantify the quality of selected agricultural best management practices and using these tools determine if differences in quality exist between cost-share and non cost-share BMPs.

Assessment Tool Development

BMP quality assessment criteria were gleaned from BMP construction standards and operating protocols developed by state and federal agencies, and from expert opinion (Figure 1). These criteria were defined with respect to design, site selection, implementation, and maintenance. Survey-like assessment tools were developed for sixteen different BMPs based on the selected criteria (Figure 2). To be incorporated into an assessment tool, a criterion had to relate directly to BMP performance and quality and be easily observed or readily measured.

Stream Protection BMP Assessment Tool Biological Systems Engineering, Virginia Tech
 DCR # WP-2; Specs: NRCS 382 Fencing, 472 Use Exclusion
 Definition: Protection by fencing along streams to reduce erosion, sedimentation, and the pollution of water from agricultural nonpoint sources.

Category This BMP is implemented with: A. Financial assistance B. No financial assistance
 Site ID Number: _____
 Date/Time: _____

In1. (Interview) When did you erect the stream fence?
 In2. (Interview) Do you control the land on both sides of the stream?
 A. Yes B. No
 In3. (Interview) Do livestock graze on both sides of the stream?
 A. Yes B. No
 Ss1. (Interview) Is the purpose of the fence to restrict livestock access to the stream?
 A. Yes (5) B. No (1)
 Ma1. (Interview) How often do you inspect your fences?
 A. As needed (5) B. Once a year (3) C. Never (1)
 In4. Kind of barrier (fence):
 A. Non-electric standard woven wire B. Barbed wire
 C. High tensile electric wire D. High tensile non-electric
 E. Wooden board F. Boulders/earth fill
 G. Other (specify) _____
 Ds1. (*2) Distance from stream to barrier (fence) is:
 A. ≥ 25 feet (5) B. 11-24 feet (3) C. < 10 feet (1)
 Ds2. (*2) Is there adequate vegetation between the fence and the stream to serve as an effective filter strip?
 A. Yes (5) B. No (1)
 Ds3. (*2) Are livestock restricted from the stream on both sides?
 A. Yes (5) B. No (1)
 Im1. Are protected stream crossings available?
 A. Not needed (5) B. Yes (5) C. No (1)
 Im2. Is shade provided to the livestock (may be portable)?
 A. Yes (5) B. No (1)
 Im3. Are alternative water sources available to livestock?
 A. Yes (5) B. No (1)
 Im4. Are the fence lines free from signs of heavy traffic?
 A. Yes (5) B. No (1)
 Ma2. (*3) What evidence exists of worn or damaged fence?
 A. 0% No wear or damage (5)
 B. <10% Little wear or damage (leaning posts, sagging wires) (4)
 C. 10-20% Moderate wear or damage (a few broken posts, missing wires, or boards) (3)
 D. >20% Extensive wear or damage (several broken posts, missing wires, or boards) (2)
 E. Gaps large enough for animals to fit through (1)
 Ma3. Are fence lines clear of vegetation or debris and well maintained?
 A. Yes (5) B. No (1)

*Indicates relative weight given to question

Figure 2. Stream Protection BMP Assessment Tool

Study Area

We assessed 150 cost-share and 155 non-cost-share practices in the James River Basin. Observations were made in 13 different Soil and Water Conservation Districts.

BMPs for which Assessment Tools were Developed

- Alternative water systems
- Animal waste storage facilities
- Grass filter strips
- Grazing land protection systems
- Late winter split application of nitrogen on small grain
- Loafing lot management systems
- Permanent vegetative cover on critical areas
- Permanent vegetative cover on erodible crop land
- Protective cover for specialty crops
- Reforestation of erodible crop and pasture land
- Sidedress application of nitrogen on corn
- Small grain cover crops nutrient management
- Small grain cover crops fertilized and harvested
- Stream fencing
- Streambank stabilization
- Wooded buffer/filter areas

Assessment Tool Scoring

Overall BMP quality scores ranged from 1 to 5. Higher scores indicated better BMP quality. Assessment tool questions were weighted according to their relevance to overall BMP quality. Statistical analyses were performed to detect differences between cost-share and non-cost-share BMP quality.

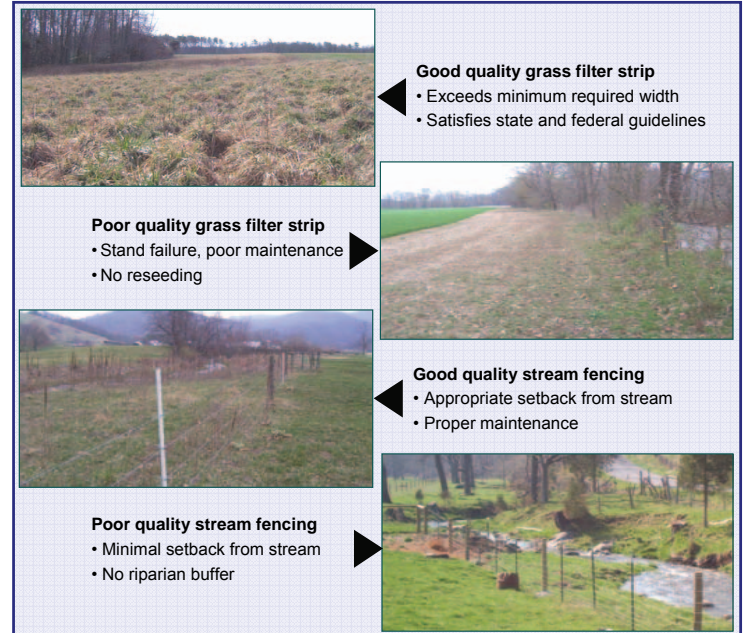
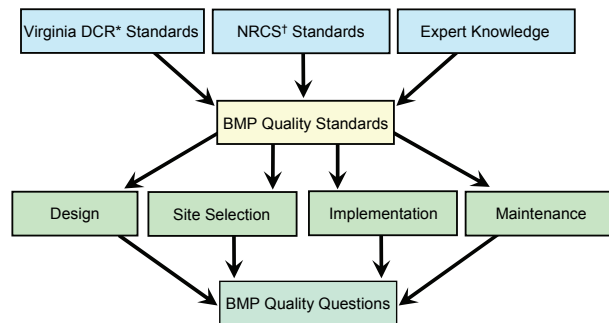


Figure 3. Representative BMPs



*Virginia Department of Conservation and Recreation
 †USDA Natural Resources Conservation Service

Figure 1. BMP Assessment Tool Development

Results and Conclusions

- Using the tools developed in this study, the quality of cost-share and non cost-share BMPs assessed in the James River Basin were roughly equal.
- The tools developed through this effort were part of a proof of a concept study that involved assessment tool development and preliminary testing.
- Further testing of the assessment tool is needed and it should be coupled with water quality monitoring studies.
- Government agencies can use these tools to evaluate BMP performance before long-term monitoring can detect improvements in water quality.
- This method of BMP assessment shows promise as a rapid and inexpensive means to evaluate BMP performance.

Citation: Benham, B.L., J.H. Robbins, K.M. Brannan, S. Mostaghimi, T.A. Dillaha, J.W. Pease, E.P. Smith. 2005. Development of Survey-like Assessment Tools to Assess Agricultural Best Management Practices Potential. *J. Soil and Water Conserv.* 60(5). pp 251-259.