



# Verifying the Effectiveness of Agricultural Best Management Practices

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**Chesapeake Bay Program**

*A Watershed Partnership*

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# Today's Agenda

- **CBP Agriculture Workgroup**
- **CBP Agricultural BMPs**
- **BMP Definitions and Effectiveness Values**
- **BMP Verification Development**
- **Agricultural BMP Verification**
- **Agricultural Verification Protocol Packet**
- **Questions & Answers**
- **More information**

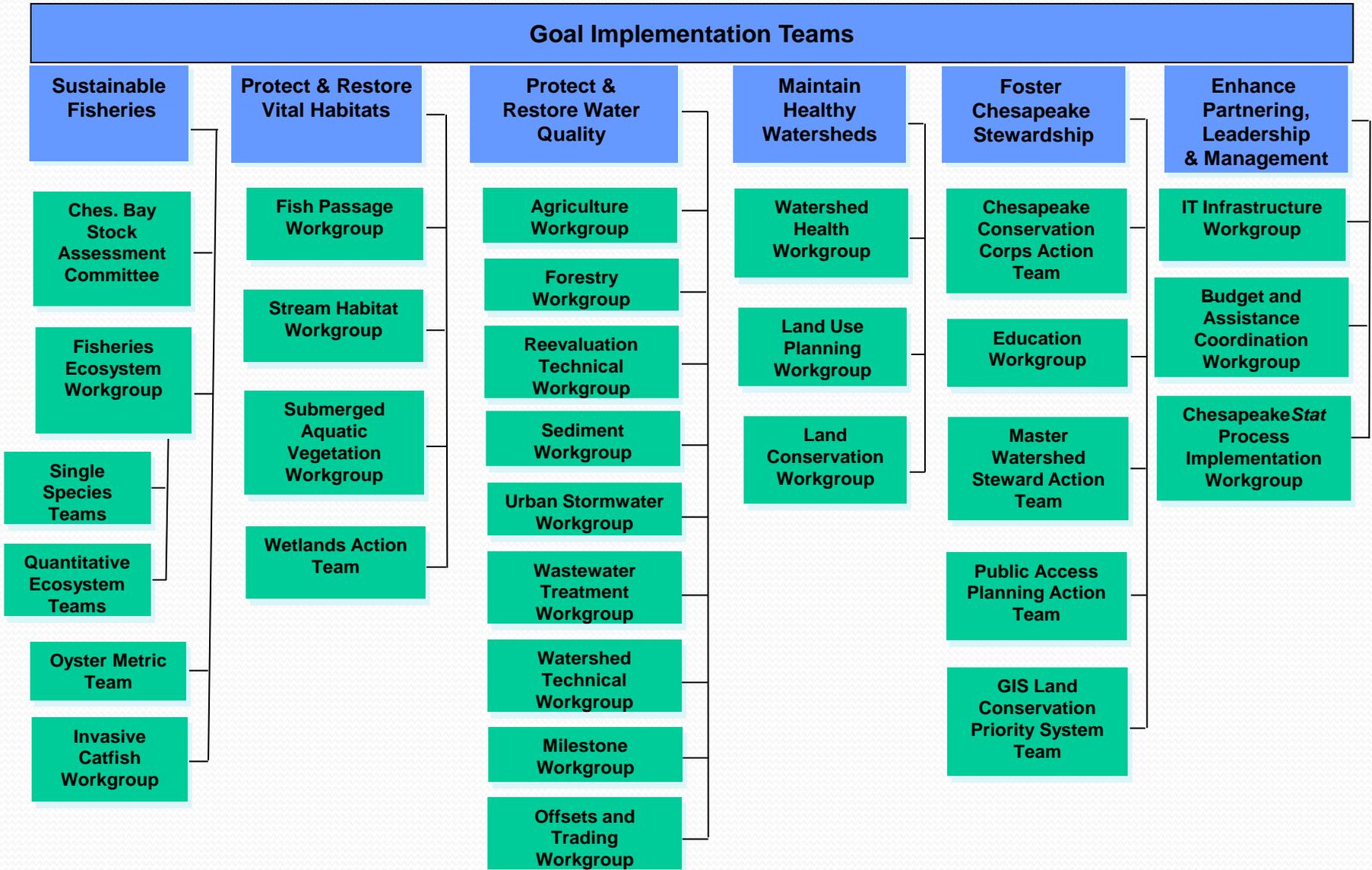
[http://www.chesapeakebay.net/groups/group/agriculture\\_workgroup](http://www.chesapeakebay.net/groups/group/agriculture_workgroup)



**Chesapeake Bay Program  
Agriculture Workgroup**



# CBP GIT Implementation Workgroup Structure 08-31-11



# Agriculture Workgroup

- What is the role of the Chesapeake Bay Program's Agriculture Workgroup (AgWG)?
  - Provide technical expertise and leadership on development and implementation of policies, programs, and research to reduce pollutant loads delivered from agricultural lands and animal operations to upstream waters and the Chesapeake Bay.

# Agriculture Workgroup

- What is the primary function of the Agriculture Workgroup for the Chesapeake Bay Program partnership?
- Provide a forum for discussion, exchange of information and evaluation between federal, state, and local agencies, conservation districts, universities, agri-business, and the corporate sector on sustainable and/or cost-effective agricultural production systems that benefit water and air quality.

# Agriculture Workgroup

- Who is represented on the Agriculture Workgroup for the Chesapeake Bay Program Partnership?
  - Academic Institutions (Land Grant)
  - Federal Agencies (Agricultural /Environmental)
  - State Agencies (Agricultural /Environmental)
  - Local Agencies (Conservation Districts)
  - NGO's (Agricultural/Environmental)
  - Industry (Agricultural)



# Chesapeake Bay Program Agricultural BMPs

# Agricultural BMPs

- Agricultural BMPs represent the largest and most diverse group of conservation practices and management systems within the Chesapeake Bay Program partnership.

# Approved CBP Agricultural BMPs

## **Nutrient Management**

- Nutrient Management
- Precision Agriculture
- Enhanced Nutrient Management

## **Conservation Tillage**

- Continuous No-Till
- Conservation Tillage

## **Cover Crops**

- Cover Crops – Late Planting
- Cover Crops – Early Planting
- Small Grain Enhancement – Late Planting
- Small Grain Enhancement – Early Planting

## **Pasture Grazing BMPs**

- Alternative Watering Facilities
- Stream Access Control with Fencing
- Prescribed Grazing
- Precision Intensive Rotational Grazing
- Horse Pasture Management

## **Other Agricultural BMPS**

- Forest Buffers
- Wetland Restoration
- Land Retirement
- Grass Buffers
- Forest Buffers
- Tree Planting
- Carbon Sequestration/Alternative Crops
- Conservation Plans/SCWQP
- Animal Waste Management Systems
- Mortality Composters
- Water Control Structures
- Non-Urban Stream Restoration
- Poultry Phytase
- Poultry Litter Management
- Dairy Precision Feeding and Forage Management
- Swine Phytase
- Ammonia Emissions Reductions

# Interim CBP Agricultural BMPs

## **Nutrient Management**

- Irrigation Management

## **Manure Management**

- Liquid Manure Injection
- Poultry Litter Injection
- Manure Processing Technology

## **Mortality Management**

- Mortality Incineration

## **Soil Amendments**

- Phosphorus Absorbing Materials

## **Nursery Management**

- Nursery Runoff Management

## **Non-Cost-Shared Practices**

- Tracking and Reporting

# Proposed CBP Agricultural BMPs

## **Manure Management**

- Heavy Use Area Poultry Pads
- Poultry Litter Management

## **Stormwater Management**

- Agricultural Stormwater Management

## **Sinkhole Management**

- Sink-Hole Grass Buffers



# **BMP Definitions and Effectiveness Values**

# BMP Definitions and Effectiveness Values

- The Chesapeake Bay Program partnership identified the need to scientifically support the systematic development of BMP definitions and effectiveness values in 2005-2006.
  - BMP definitions were very limited, many only being one or two sentences in description.
  - BMP effectiveness values were largely based on best professional judgment and limited scientific data.
  - Documentation for literature and data sources used, and best professional judgment decisions made, was very limited or non-existent.

# BMP Definitions and Effectiveness Values

- In 2006 the Chesapeake Bay Program partnership contracted with the University of Maryland's (UM) Mid-Atlantic Water Program (MAWP) to develop and implement a scientifically supported method of developing BMP definitions and effectiveness values.
  - BMP definitions would be descriptive of the practice standards, their operation and management, and potential regional variations.
  - BMP effectiveness values would be based largely on peer-reviewed scientific research and data with best professional judgment as needed.
  - Through documentation of literature and data sources used, and best professional judgment decisions made for future reference.

# BMP Definitions and Effectiveness Values

- The subsequent UM/MAWP final project report released in 2009 included the following:
  - definitions and effectiveness estimates for BMPs that states were implementing or proposing to implement as part of their efforts to meet the nutrient and sediment reduction goals necessary to restore the Bay
  - realistic, science-based estimates of expected nutrient and sediment reduction performance from these BMPs
  - provided and reflected current research and knowledge as well as average operational conditions representative of the entire Chesapeake Bay watershed

# BMP Definitions and Effectiveness Values

- As a result of the experiences stemming from the UM/MAWP “BMP Project”, the Chesapeake Bay Program partnership adopted a new protocol for future BMP evaluations in 2010.
  - “The Protocol for the Development, Review, and Approval of Loading and Effectiveness Estimates for Nutrient and Sediment Controls in The Chesapeake Bay Watershed Model”
  - A.K.A the “BMP Protocol” describes the evaluation process a BMP must go through to be approved by the partnership.
  - Establishes the “expert review panel” process for evaluating existing or new BMPs.
  - Underscores the use and documentation of scientific literature and data sources, best professional judgment where required, and a inclusive partnership review and decision process.

# BMP Definitions and Effectiveness Values

## BMPs Currently Scheduled for Review

- Nutrient Management Panel
- Conservation Tillage Panel
- Cover Crops Panel
- Poultry Litter Subcommittee
- Stormwater Retrofits Panel
- Stream Restoration Panel (incl. Regenerative Conveyance Systems)"
- LID and Runoff Reduction Panel
- Urban Fertilizer Management Panel
- Septic Panel Part 1 (review of efficiencies)
- Riparian Buffers Panel (grass and forest)
- Urban Tree Planting Panel
- Manure Treatment Technologies
- Erosion and Sediment Control (as proposed by WV)
- Illicit Discharge Elimination
- Impervious Disconnect
- Animal Waste Storage Systems
- Liquid Manure Injection/Incorporation
- Forest Management
- Septic Panel Part 2 (more broad view of systems)
- Urban Filter Strips and Upgraded Stream Buffers
- Floating Wetlands
- Cropland Irrigation Management
- MS4 Minimum Management Measures
- Shoreline Erosion Control
- Catch Basin Cleanout

An aerial photograph of a farm complex situated in a rural landscape. The farm features several large, white and red barns, silos, and a central building. The surrounding fields are meticulously maintained, with prominent curved terracing lines visible in the foreground, suggesting conservation practices like contour farming. The overall scene is bathed in warm, golden light, likely from the late afternoon or early morning. A blue decorative graphic is visible in the top left corner.

# Agricultural BMP Verification

# Agricultural BMP Verification

- The Agriculture Workgroup identified the need to scientifically support the development of an agricultural verification protocol.
  - Technical assistance obtained from Tetra Tech under the direction of the workgroup.
  - A summary verification report will document the findings from a national scientific literature search...
  - ...and through interviews with both regionally and nationally recognized verification experts.

# Agricultural BMP Verification

- The Agriculture Workgroup has used the BMP verification principles developed by the Water Quality Goal Implementation Team's (WQGIT) BMP Verification Steering Committee.
  - The workgroup considered multiple options for developing an agricultural verification protocol.
  - Both positive and non-positive attributes identified for each option.

# Agricultural BMP Verification

- Four distinct options have been considered by the Agriculture Workgroup to establish protocols for verifying agricultural BMPs.
  - Version 1
  - Version 2.1
  - Version 2.2
  - Version 3

# Agricultural BMP Verification

- Version 1:  
Create a limited and uniform verification protocol standard for all practices and programs.
- Not recommended by the workgroup.

# Agricultural BMP Verification

- Benefits
  - Simplistic approach.
  - Provides 100% model acceptance of reported practices.
  - Provides 100% of the model BMP effectiveness values.
- Concerns
  - Does not conform to the diversity of agricultural practices and implementation programs across six jurisdictions.
  - A limited verification protocol standard would not offer sufficient capacity for adequate BMP implementation reporting.

# Agricultural BMP Verification

- Version 2.1:  
Create diverse verification protocol options and identify the levels of data confidence for each protocol.
  - Limit the units of BMP implementation reported by the degree of relative data confidence
  - Not recommended by the workgroup.

# Agricultural BMP Verification

- Benefits
  - Multiple potential verification protocol options reflective of the diversity of agricultural practices and programs.
  - Application of 100% of the model BMP effectiveness values.
- Concerns
  - Produces varying levels of relative data confidence between the protocol options, as well as between practice types within a single protocol.
  - The scientific documentation to assign defensible relative data verification levels is not adequate.
  - Limiting the units of tracked BMPs that could be reported could jeopardize local community support.

# Agricultural BMP Verification

- Version 2.2:  
Create diverse protocol options and identify the levels of confidence for each protocol.
  - Limit the model reduction credits for the units of BMP implementation reported by the degree of relative data confidence.
  - Not recommended by the workgroup.

# Agricultural BMP Verification

- Benefits
  - Offers multiple potential verification protocol options that are more reflective of the diversity of agricultural practices and programs.
  - Provides 100% model acceptance of reported practices.
- Concerns
  - Produces varying levels of relative data confidence between the protocol options, as well as between practice types within a single protocol.
  - The scientific documentation to assign defensible relative data verification levels is not adequate.
  - Limiting the model credit values of reported BMPs could jeopardize the scientific defensibility of the BMP effectiveness values.

# Agricultural BMP Verification

- Version 3:  
Create diverse protocol options and apply a uniform minimum threshold of relative data confidence to all protocols.
  - Recommended by the workgroup on November 29, 2012.

# Agricultural BMP Verification

- Benefits
  - Multiple potential verification protocol options reflective of the diversity of agricultural practices and programs.
  - The scientific documentation to assign defensible relative data verification levels is adequate.
  - Provides 100% model acceptance of reported practices.
  - Provides 100% of the model BMP effectiveness values.
- Concerns
  - Produces varying levels of relative data confidence between the protocol options, as well as between practice types within a single protocol.
  - Requires attaining the standard confidence level threshold for reporting any BMP implementation.

# Agricultural Verification Protocol Elements



# Verification Protocol Elements

- **Verification Protocol Version 3.5 Matrix**
  - Statistical Data Confidence Threshold
    - All BMP data to be reported to and credited by the Chesapeake Bay Program models would be required to meet a minimum documented 80 percent level of statistical data confidence.
    - The figure of 80 percent is based on the mid-point of a range of documented data confidence levels identified by the Tetra Tech research study.

# Verification Protocol Elements

- **Verification Protocol Version 3.5 Matrix**
  - Agricultural BMP Verification Protocols  
Identified general categories of verification protocols.
  - Assessment Methods  
Assessment methods and entity that would be collecting and verifying the data.

# Verification Protocol Elements

- **Verification Protocol Version 3.5 Matrix**
  - Conservation Practice Category
    - Assessment methods and associated data confidence levels are affected by the type of agricultural BMPs being assessed.
    - Assessments methods were evaluated for each BMP category to determine if the method was realistically appropriate.
    - Significant verification efforts may still be required to meet the data confidence threshold.

# Verification Protocol Elements

- **Verification Protocol Version 3.5 Matrix**
  - Cost-Sharing Information  
Potential differences for BMPs designed and financed through federal, state, NGO and private sources for each assessment method.
  - Other BMP Information  
Ability of each assessment method to verify if the practice meets the BMP specification, a functional equivalent, or non-functional equivalent BMP. Identifies date of practice implementation for model reporting purposes.

# Verification Protocol Elements

- **Verification Protocol Version 3.5 Matrix**
  - Verification Methodology  
Methodologies to track, verify and report implemented practices. BMPs being assessed and verified through permit or financial incentive programs are limited to the period of the active permit or contractual agreement. Alternative assessment methods are also identified.
  - Verification Issues  
Limitations and potential verification issues that need to be addressed to obtain the statistical data confidence threshold requirements.

# Verification Protocol Elements

- **Verification Protocol Version 3.5 Matrix**
  - Relative Cost  
Relative costs in comparison to one another. Based on range of implementation costs identified in the Tetra Tech research report.
  - Relative Scientific Defensibility  
Relative comparative values are assigned to each assessment method pertaining to their scientific defensibility based on the findings of the Tetra Tech research report.

# Verification Protocol Elements

- **Verification Protocol Version 3.5 Matrix**
  - Relative Accountability  
Relative comparative values assigned to each assessment method pertaining to the accountability of the entity reporting, tracking and verifying the data.
  - Relative Transparency  
Relative comparative values assigned to each assessment method based on the transparency of the reported data by outside reviewers.

A man wearing a white hard hat, glasses, a blue short-sleeved button-down shirt, and blue jeans is kneeling in a cornfield. He is holding a white document or packet with two green square samples on it. The background shows a vast field of young corn plants under a clear blue sky. The text "Agricultural Verification Protocol Packet" is overlaid in white serif font on the right side of the image.

# Agricultural Verification Protocol Packet

# Verification Protocol Packet

- The Agricultural Verification Protocol Packet being developed will include the following elements:
  - Verification Protocol Matrix
  - Verification Guidance Document
  - Summary Verification Research Report
  - Verification Planning Tools

# Verification Protocol Packet

- Packet is intended to provide...
  - ...structure and expectations of verifying tracked data for reporting to the Chesapeake Bay Program for nutrient and sediment reduction credits.
  - ...guidance for agencies and partners to develop program specific and detailed data verification plans for submission to the Verification Review Panel and partnership for review.
  - ...guidance for the Verification Review Panel and the partnership to review and recommend verification plans.

# Verification Protocol Packet

- Estimated date of packet completion and Agriculture Workgroup recommendation...

February 2013



**Questions?**