Assessment of Penn State University Survey of Farms in Pennsylvania

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Purpose

A review of the Penn State University (PSU) survey of farms in Pennsylvania to guide decisions regarding the survey's suitability to generate best management practice (BMP) implementation data that could be reported to the Chesapeake Bay Program (CBP) and credited in the Bay Model.

Assessment Approach

- The assessment consisted of three components:
  - the degree to which practices tracked in the survey match BMPs used in the Bay Model,
  - the degree to which methods used in the survey met CBP verification requirements, and
  - the accuracy of the survey method as measured with field verification data.

Compliance with Verification Guidance

- The survey was designed as an alternative to the CBP requirement that 100 percent initial verification is required of most practices.
  - One exception to the full initial verification requirement allows for single-year BMPs to be statistically sub-sampled.
- Field verification methods addressed both practices that adhered to USDA or state design specifications for BMPs and those that were verified with visual indicators (VIs) for RIs. Training and staff expertise satisfied CBP verification guidance requirements.

Matchup with CB BMPs

- The PSU survey included practices that can be matched with BMPs and resource improvement practices (RIs) used in the Bay Model.

Statistical Analyses

IN ADDITION TO PSU'S STATISTICS

- Three measures used:
  - Proportion Correct (PC):

$$PC = (a + d)/(a + b + c + d)$$

  - Hit Rate (HR):

$$HR = a/(a + c)$$

  - False Alarm Ratio (FAR):

$$FAR = \frac{b}{a + b}$$

a=BMP Reported in Farmer Survey and Confirmed On Site
b=BMP Reported in Farmer Survey but Not Confirmed On Site
c=BMP Not Reported in Farmer Survey but Found On Site
d=BMP Not Reported in Farmer Survey and Not Found On Site

Statistical Analysis

Practice	Subcategory	Percent Correct	Hit Rate	False Alarm Rate
Nutrient Management Plan Acres	Row Crop Acres	0.85	0.77	0.13
Nutrient Management Plan Acres	Pasture Acres	0.81	0.62	0.19
Nutrient Management Plan Acres	Hay Acres	0.80	0.67	0.24
Nutrient Management Plan Acres	Privately Funded Act 38 Row Crop Acres	0.93	0.26	0.46
Nutrient Management Plan Acres	Privately Funded Act 38 Pasture Acres	0.94	0.14	0.60
Nutrient Management Plan Acres	Privately Funded Act 38 Hay Acres	0.93	0.09	0.69
Nutrient Management Plan Acres	Acres	0.95	0.21	0.68
Nutrient Management Plan Acres	Privately Funded NRCS 590 Pasture Acres	0.97	0.24	0.71
Nutrient Management Plan Acres	Privately Funded NRCS 590 Hay Acres	0.95	0.23	0.75
Nutrient Management Plan Acres	Acres	0.84	0.61	0.39
Nutrient Management Plan Acres	Acres	0.84	0.49	0.40
Nutrient Management Plan Acres	Manure Management Plans on Hay Acres	0.85	0.60	0.43
Nutrient Management Plan Acres	Advanced Nutrient Management	0.83	0.35	0.69
E&S Plans	Row Crop Acres	0.90	0.30	0.46
E&S Plans	Pasture Acres	0.92	0.30	0.48
E&S Plans	Hay Acres	0.93	0.27	0.44
E&S Plans	Barnyard Acres	0.96	0.17	0.73
NRCS Plans (privately funded)	Row Crop Acres	0.81	0.35	0.57
NRCS Plans (privately funded)	Pasture Acres	0.86	0.28	0.58
NRCS Plans (privately funded)	Hay Acres	0.85	0.31	0.58
NRCS Plans (privately funded)	Barnyard Acres	0.94	0.16	0.78
Stream Bank Fencing	Fencing Length (Ft.)	0.88	0.71	0.15
Stream Bank Fencing	Distance from Stream to Fence (Ft.)	0.87	0.74	0.19
Stream Bank Fencing	Public Funded Fencing (Ft.)	0.93	0.69	0.25
Stream Bank Fencing	Privately Funded Fencing (Ft.)	0.87	0.53	0.30
Stream Bank Fencing	Acres of Buffer	0.87	0.70	0.19
Stream Bank Fencing	Acres of Privately Funded Buffer	0.87	0.53	0.34
Riparian Buffers	Buffer Acres	0.71	0.45	0.50
Riparian Buffers	Privately Funded Buffer Acres	0.77	0.29	0.70
Riparian Buffers	Buffer Width	0.71	0.48	0.49

Statistical Analyses

- Although the False Alarm Rate was relatively high for some practices, the additional analyses by PSU demonstrated that the acres under practice had a low bias.
- Tt recommended additional analysis to determine county-to-county variability of accuracy. This was done and no bias was found.
- Tt also recommended that under- or over-reporting can and should be addressed to ensure the most accurate county-level reporting for credit in the Bay model. PSU has addressed this in their recommendations.

Conclusions

- PSU's methods are well documented and satisfactory.
- With the exception of riparian buffers, all BMPs were shown to be underreported by farmers.
- PSU recommends using farmer-survey data for all but riparian buffers for which a downward-adjusted estimate is calculated.
- Survey response was only 6,782 of about 20,000 surveys sent, so survey totals will underestimate actual BMP implementation.
- In future years, non-response bias should be evaluated to determine whether the results from returned surveys are applicable to non-respondents.