

Precision Conservation: Using Technology to Optimize Conservation and Profitability in Agricultural Landscapes

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Abstract: USDA Farm Bill conservation programs provide landowner incentives to remove marginal lands from agricultural production and reestablish them to natural vegetation (e.g., native grasses, trees, etc.). However, removal of arable land from production imposes an opportunity cost associated with loss in revenue from commodities that otherwise would have been produced. Strategic implementation of conservation programs is essential to optimize environmental and economic benefits. We used precision agriculture tools (i.e., yield monitors, AgLeader and GIS software) to develop spatially explicit profit surfaces for soybean production fields in the Black Belt Prairie region of Mississippi. We identified field regions where profitability under Continuous Conservation Reserve Program Conservation Practice 33 (CP-33), Habitat Buffers for Upland Birds, exceeded that under commodity production. We compared profit surfaces for whole field agricultural production and alternative CP-33 enrollments (30, 60, 90, 120 ft) to spatially illustrate the economic advantages of strategic CP-33 establishment. Whole field profitability increased 69.52% (US\$2840.32–\$4814.80) with a 120-ft CP-33 buffer, 60.83% (\$2840.32–\$4568.21) with a 90-ft CP-33 buffer, 47.22% (\$2840.32–\$4181.53) with a 60-ft CP-33 buffer, and 28.54% (\$2840.32–\$3651.02) with a 30-ft CP-33 buffer. We demonstrate that profitability and conservation objectives can be optimized in working landscapes by using geospatial technology to facilitate strategic conservation program enrollment.

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