

USDA Agricultural Research Service

National Program 212

Soil and Air

External Panel Retrospective Review: 2016-2020

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## Executive Summary

### Introduction

This retrospective review of NP212 Soil and Air (2016-2020) is intended to provide useful feedback to ARS regarding the accomplishments, and the potential impacts that those accomplishments may have on policy decisions and on-farm practices. The panel is composed of four members representing different geographic areas of the United States and a range of areas of expertise.

### The Review Process

For the review, the panel was provided with the following documents:

- NP212 Action Plan. Developed in 2015, the Action Plan presents an overview of the background of the project, and the research needs and products anticipated by the end of the project in 2020.
- NP212 Retrospective Review and Appendix. Produced during 2020, the Retrospective Review provides an overview of the project, descriptions of selected accomplishments that would be representative of each component of the project, and testimonials for selected accomplishments. The Appendix presents additional accomplishments for each component.
- Access to individual reports available on the ARS website.
- Template to guide writing of this report.

The panel met both with and without ARS personnel via video conferencing to discuss NP212 and the review process, and a half-day virtual meeting was held by ARS personnel to introduce the project, present accomplishments, and answer questions.

The project was organized around three general components: 1) Management and Stewardship of Soil Resources; 2) Managing Nutrients in Agroecosystems; and 3) Reducing Environmental Risk of Agricultural Operations. Each of these components is divided into three or four specific Research Topics. Each component was reviewed by two or three panel members with expertise in the component's topic area.

### Overview of the Panel's Findings

The following is a summary of the panel's conclusions for progress under each of the components.

*Component 1. Management and Stewardship of Soil Resources:* The primary goal of Component 1 was to develop approaches to reduce soil degradation, and in cases where the soil is degraded, to reverse that degradation. Research was conducted on a range of topics, including the impacts of residue management and cropping systems on soil conservation, the use of

amendments such as biochar to fortify soils, and investigations on the functions of the soil microbial community on the formation of soil organic carbon and nitrogen cycling, and the role of microorganisms in promoting soil health.

The panel was generally supportive of the work conducted under this Component, and praised the high level of productivity and high quality of the work, as evidenced by the large number of peer reviewed publications and efforts to transfer information to growers. The work was broadly relevant to the stated objectives, and is likely to have lasting impacts on soil quality and conservation.

*Component 2: Managing Nutrients in Agroecosystems:* Work conducted under Component 2 was generally focused on development of strategies to reduce loss of nutrients such as nitrogen and phosphorus from agricultural lands, including optimization of poultry litter and manure as sources of fertilizers.

The panel praised both the productivity and the relevance of the work, particularly with respect to improvements to existing approaches for modeling soil organic carbon, standardization of data collection strategies, and the practical application of the Annual Phosphorus Loss Estimator. Also noted as a highlight was the meta-analysis of 90 studies on the efficient use of poultry litter across crops, climates, and soil types. The panel generally regarded the work under Component 2 as being highly relevant to the goals of the project and very likely to have significant impacts on policy and practices by growers.

Component 3: Reducing Environmental Risk of Agricultural Operations: Work conducted under this component was intended to characterize and mitigate environmental impacts related to release of pathogens, emission of greenhouse gas and noxious odors from diverse animal operations, and movement of particulate matter off matter.

Progress under this component was generally very good, with practical applications. In general, the progress under this component was good, and much of the work was immediately applicable to managing pollutants to limit environmental impact. The panel praised the geographical scope and the productivity of much of the work, and indicated that the research was likely to result in guidance for policy makers and growers. The work was therefore relevant to the goals of the component, and aspects were at the leading edge of science.

### Conclusions

In general, the panel praised the high level of productivity accomplished by the NP212 team and the high quality of science that was exhibited by the accomplishments. Much of the work will provide important and practical guidance to growers, and to policy makers and regulatory agencies. The scientists participating in NP212 are to be commended for their commitment to excellence and to publishing in high impact journals, when appropriate. The quality of work

conducted under the individual components was generally high. Much of the work had been recently completed during the preparation of the report, such that the panel was not able to completely address the impact of the work; however, the panel believes that many of the impacts that will result from the accomplishments of NP212 will not be felt for a few years. The panel concluded that NP212 was successful and of generally high quality and with a potential for high impact.

