FROM SCIENCE TO PRACTICE: FINDINGS FROM THE 2011 STRIPS PROJECT STAKEHOLDER MEETING (JUNE 21, 2011)

Prepared for the Stakeholders of the
Science-based Trials of Row-crops Integrated with Prairie (STRIPs)
Research Project at Neal Smith National Wildlife Refuge

GL Drake Larsen
Tricia G. Knoot
John C. Tyndall

Department of Natural Resource Ecology and Management
Iowa State University

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Introduction

Increasing demands on agriculture to supply a complex combination of food, feed, fiber, and fuel will likely serve as a catalyst for substantial changes in ecological, economic, and social systems in the Midwestern U.S., including alterations of traditional agricultural land-use patterns. One such change in land-use that may help meet both agricultural commodity demands and the rising need to ensure the provision of ecosystem services from agricultural lands includes the strategic incorporation of perennial vegetation within row crop-dominated landscapes (Boody et al. 2005; Schulte et al. 2006). In July 2007 an interdisciplinary group of researchers established a series of annual-perennial vegetation treatments on 14 watersheds at the Neal Smith National Wildlife Refuge; this project has become one of Iowa's key long-term agro-ecological research projects (see http://www.nrem.iastate.edu/research/STRIPs/). The *central hypothesis* of the research is that strategic placement of a small amount of native prairie vegetation within row crop-dominated landscapes will have disproportionate (greater and positive) effect on the functioning of biophysical (e.g., water quality and flow, biodiversity) and socioeconomic (i.e., quality of life, economic and social stability) systems. Comparative treatments ranged from conventional agriculture (100% annual vegetation), to reconstructed prairie (100% perennial vegetation), to mixed systems with strategically placed prairie vegetation covering 10 or 20% of the watershed.

Since the initiation of the project a tremendous amount of data has been collected and a number of illuminating findings are forthcoming. As summarized by Liebman and others (2010), more than proportionate gains in sediment trapping, nutrient retention, and native plant and bird conservation are evident. For example, within the experimental watersheds, the mixed-prairie species (at 10 or 20% cover) have reduced sediment loss by an average of 95% in each of two years (2008-2009), including one year characterized by intense rain events (2008). Data showed that the prairie buffers have significantly reduced losses of nitrogen and phosphorus in surface runoff as well. Due to the multifunctional nature of the practice itself (perennial strips), the scope of ecosystem function, and therefore services, extends well beyond the mitigation of pollutant transfer. For example, in the context of biotic response, bird species richness has (roughly) doubled in treatments with prairie establishments (L. Schulte, pers. comm., 2010).

Importance of stakeholder participation – The end goal of applied agro-ecological research is the transition of increased scientific knowledge into practical usage. As noted by Balmford and Cowling (2006), putting integrated research into practice requires close involvement, from the outset, with key stakeholders as well as direct guidance from implementing agencies and institutions. To this end, the STRIPs project has been guided by participation from a regional group of stakeholders (seen as leaders in Iowa), comprehensively representing diverse agricultural and environmental interests across the Midwest. The stakeholder group meets yearly to review research progress, provide input on future research direction and methodology, and deliberate on seminal decisions regarding the project. The stakeholder group has been active for six years and the level of engaged participation has been significant (N. Grudens-Schuck, pers. comm., 2010).

Stakeholder Event and Facilitated Discussion

As part of its annual summer stakeholder meeting series, the STRIPs project investigators hosted a facilitated discussion on June 21, 2011 at the Prairie Learning Center at Neal Smith National Wildlife Refuge (NSNWR). The goal of the meeting session was to address the broad question of transitioning from *science to practice; i.e. using research findings to guide on-the-ground implementation of targeted prairie strips*. Specifically, the project investigators sought to identify: (1) stakeholder perspectives on the opportunities and roadblocks to promoting widespread utilization of research findings; and, (2) the steps needed to enable such a transition.

Science to practice – The idiom *science to practice* was used to frame the topic for the June stakeholder meeting. Broadly defined, science to practice (STP) is the process of introducing research-based conservation science (in this case regarding prairie strips) to key user groups (e.g., farmers and land management agencies/institutions), with the goal of having the practice broadly adopted where appropriate and contributing to the fulfillment of short and long-term multi-scale environmental outcomes. In general the STP process involves multiple layers of action that often build upon each other (Nassauer and Opdam 2009). In the context of this long-term prairie strip research, the STP process involves:

- Producing peer-reviewed science that directly addresses agricultural management questions.
- Sharing of research and management recommendations with diverse audiences (e.g., general public, producers, extension and field agents, and the scientific community) via multiple media.
- Broadly integrating prairie strips into the suite of management options that farmers use.
- Contributing to the broader understanding of socio-ecologically resilient agricultural landscapes.

Event activities – Over 50 individuals were in attendance representing 18 organizations (Table 1). The participants represented five broad types of stakeholder interests, including: producers; agricultural non-governmental organizations (NGO's), such as commodity groups; environmental NGO's; state and federal agencies; and, state or federal research organizations.

Table 1. Groups represented at the 21 June meeting.

1. Area farmers	10. Natural Resource Conservation Service
2. Iowa Corn Growers Association	11. Neal Smith National Wildlife Refuge
3. Iowa Dept. of Agriculture and Land Stewardship	12. Practical Farmers of Iowa
4. Iowa Dept. of Natural Resources	13. Soil and Water Conservation District
5. Iowa Natural Heritage Foundation	14. The Nature Conservancy
6. Iowa Soybean Association	15. Trees Forever
7. Iowa State University	16. USDA - Agricultural Research Service
8. Land Stewardship Project	17. United States Fish and Wildlife Service
9. Leopold Center for Sustainable Agriculture	18. University of Minnesota

As stakeholders arrived at the event, they were given a name tag and were allowed to choose their preferred table to sit. The meeting was called to order and P. Drobney, Land Management and Research Demonstration Biologist at NSNWR, welcomed attendees to the event. STRIPs project investigators M. Helmers and M. Liebman provided an updated overview of the project and succinct summary of findings to date. Discussion facilitators then presented a general introduction to the discussion portion of the event, and the order and timing of activities. The facilitated discussion consisted of three main activities: (1) a 5-10 minute individual writing activity, consisting of a two-page written survey; (2) a small group discussion regarding the opportunities and roadblocks for transitioning from science to practice; and, (3) a full group discussion, which expanded on findings from the small groups, to address actions needed to speed progress in the transition from science to practice.

The ***individual survey*** (Appendix A) was used to allow participants an opportunity to prepare their thoughts for the subsequent group activity, while also providing an anonymous means of responding to the questions addressed. Specifically the survey asked for:

- An immediate view on the readiness of transitioning from science to practice.
- Open-ended thoughts on perceived opportunities and barriers for such a transition.
- An assessment of the role an individual or organization has in the transition process.
- Remaining questions that should be addressed to help facilitate the transition.

Following the writing activity, participants were briefly instructed on the two key issues to address in the ***small group discussion*** (taking place at each table): the opportunities and roadblocks related to transitioning from science to practice. We chose to use small group discussions (described as <10 people), given that a smaller number of individuals in a group encourages interactive dialogue (i.e., most participants have a chance to share their individual perspective); whereas in larger group discussions (>10 people), members are most influenced by a dominant speaker (Fay et al 2000). Each table of participants—roughly 3-6 participants per table—was joined by an Iowa State University graduate student or NSNWR intern who was tasked with recording the perspectives and ideas shared in discussion on large poster paper. After 20 minutes of small group discussion, participants were given a short break, during which time facilitators reviewed small group discussion notes and consolidated key discussion points. The ***full group discussion*** consisted of facilitators sharing overall small group discussion findings, i.e. key themes that emerged, while offering opportunities for group reflection on these themes. Facilitators then prompted discussion concerning steps needed to address any issues that may limit opportunities to move from science to practice. The two discussion parts shared approximately equal time in the one and a half hour session (see Appendix B for photographs of the various participant activities).

Findings

The following presents a synthesis of the findings from these discussion activities. The information is meant to support project investigators and stakeholders in **working together to realize the shared vision of increased annual-perennial systems in the Iowa landscape.** As such, the following

findings are organized into four main sections: A) categorization of the specific reported perspectives presented in Box 1; B) the identified roles that stakeholders described for themselves and others in capturing available opportunities; C) a synthesis of key findings as related to the specific reported perspectives and identified roles; and, D) a final note on steps for moving forward.

Box 1. Collection of stakeholder perspectives regarding ways researchers can build upon the available science (i.e., emerging research ideas) to expedite a transition from science to practice. Bulleted points represent the best attempt of the facilitators to capture the sentiments put forth throughout the discussion activities. The categorization of perspectives is described in detail in section A.

Science –

Research Ideas

- Initiate comparative research in different contexts: e.g., in different drainage scenarios and parts of the state, and on steeper slopes and flat ground.
- Initiate comparative trials: e.g., cool season vs. warm season, and no-till vs. tillage.
- Collect additional data: yield response adjacent to strips, nutrient lost/added from strips, water competition, and effectiveness of other mixes that may be used for biomass production or forage.
- Develop larger field and landscape scale research.
- Develop landscape level models of the impacts of prairie strips, parameterized by STRIPs data.
- Create economic models: e.g., comparison to CRP; full cost/benefit analysis.

To Practice –

Economic Incentives/Technical Tools

- Monetize the prairie (e.g., haying, grazing, biomass, and other economic benefits).
- Develop or highlight existing incentives for implementation.
- Develop specific technology for targeting strips at landscape and local scales.
- Focus on field efficiencies, and don't over-engineer the process.

Communication/Networking

- Develop on-farm research and demonstration sites across the state; whole field examples.
- Create pilot programs, possibly coordinated at the watershed or landscape scale.
- Challenge/encourage current stakeholders, who are currently landowners and managers, to implement (i.e., showcase) prairie strip practices on their land.
- Learn from agribusiness on how to speak to, sell to, inform, and/or convince farmers.
- Promote targeting tools for "precision conservation" playing on precision agriculture used conventional operations (yield monitoring, guidance systems, and GPS maps).
- Actively elicit more farmer input in how to move forward.
- Integrate prairie strips with other practices into a full conservation system.
- Facilitate peer-to-peer networking.
- Establish partnerships, such as contract hay arrangements, to facilitate scaling up.
- Create "how-to" manual/publications that outline management needs, including implementation protocol, maintenance and upkeep, and sediment accumulation.

A) Specific stakeholder perspectives - We first present a categorization of stakeholder perspectives gained through the individual survey, small group discussions, and full group discussion (Box 1). The collection of perspectives is presented using two thematic categories: *science*, broadly defined as existing and emerging questions regarding prairie strips; and, *to practice,* broadly defined as ideas for promoting the expanded use of prairies strips in the field through the development of economic/technical tools and communication/networking opportunities. While participants were asked directly about roadblocks and opportunities, many of the ideas discussed in the context of roadblocks were expressed in the form of research needs and current gaps in effective tools to help encourage farmers to adopt and implement the practice. When discussing opportunities in small groups and as a full group, stakeholders most often framed opportunities as ways to get beyond current perceived roadblocks, e.g., new research, communication strategies, and the development of technical tools. Thus, the presented categories of research ideas, communication/networking and economic/technical tools closely align with the way that stakeholders articulated opportunities. Furthermore, the categories were not discreet but highly interrelated; for example, research ideas, such as "create economic models…" directly inform economic incentive approaches, and the sentiment to "initiate research in different contexts…" may also serve to address the need to "develop on-farm research and demonstration sites across the state…" as a way to increase visibility of the practice.

B) Roles for stakeholders - STRIPs stakeholders represent a wide diversity of backgrounds and expertise related to agriculture and the environment, including scientists, farmers, representatives of environmental NGO's, agricultural NGOs, and state and federal agencies. Many of these individuals are actively engaged in real-world decision making regarding agricultural policy and practice. Given this, the stakeholder group is well suited to help identify the key roadblocks and strategize practical steps towards implementation. Furthermore, these groups are actively engaged in outreach/extension/education/marketing with Iowa farmers, and therefore poised to assist in serving as bridges between experimental research findings and farmer needs. Consequently, project investigators were interested in understanding more about the diverse roles in which stakeholders may play a part. Therefore, stakeholders were asked in both the individual writing activity and full group discussion about their perceived role, and the roles of others, in expediting the transition from an experimental understanding of prairie strips to widespread adoption (i.e., practice). Three key areas emerged regarding the role of stakeholders:

- **Relationships and network-building:** Some stakeholders viewed themselves as positioned to utilize their established relationships with landowners (e.g., easement holders, program enrollees) to identify leaders, conservation-minded individuals, and potential early adopters and to promote prairie strip adoption; potentially increasing practice visibility across the landscape. Furthermore, several stakeholders viewed their roles as leveraging their existing communication and policy positions to help promote the practice.

- **Better utilizing existing policy and programs:** There are existing policies/programs (e.g., NRCS buffer practices) and organizations (e.g., watershed groups, NGOs) that promote perennials in the agricultural landscape; some stakeholders expressed the notion that the prairie strip practice and science may receive additional institutional support through existing projects and grants that could coordinate landscape scale replication and demonstration efforts. Landowners may also receive support for practice implementation through current programs.
- **Identifying opportunities for demonstration and outreach:** Stakeholders also shared perspectives on opportunities for broadening visibility and applicability of the practice across different landscape contexts through current demonstration sites (e.g., ISU learning farms). However, there was agreement among stakeholders that widespread adoption will require a marketing approach that focuses on "selling" rather than "educating"; stakeholders suggested the creation of a farmer advisory board/committee to assist in creating a sales approach.

C) Synthesis of key findings - The collection of stakeholder perspectives concerning the main roadblocks and opportunities of moving from science to practices and their perceived roles in the process were used to frame an overall interpretation of key findings; summarized below.

- There was general **agreement that the science regarding the prairie strips was sound and sufficient** to merit transitioning from *science to practice*.
- The specific stakeholder perspectives (Box 1) aligned well with research concerning characteristics of innovations that promote adoption (Prokopy et al. 2008), and particularly the importance of the **observability** of a practice, combined with perceived **relative advantage**, or the ability of a farmer to be able to view the practice demonstrated in their region and readily identify characteristics that are an improvement on their current practices. For example, the suggestions (Box 1) of developing economic models to provide a full cost/benefit analysis of the practice and focusing on field efficiencies can help farmers more easily determine the relative advantage of the prairie strip practice, while the development of on-farm research and demonstration sites across the state can improve the observability of the practice.
- In particular, stakeholders expressed the importance of setting up **field demonstration sites**, which were described as a critical next step in moving from science to practice. Additional demonstration sites addressed many perceived communication needs (Box 1), including opportunities to educate (i.e., sell) farmers on benefits of strategically-placed prairie strips, encouragement of peer-to-peer knowledge exchange, and sites to help promote targeting tools. Moreover, such sites offer opportunities to carry out new research, especially research on the applicability/efficacy of the use of prairie strips in different landscape contexts.
- Stakeholders also expressed a strong need for **practical tools for targeting conservation practices** on the landscape. Foremost, they described that farmers and managers need technical tools to aid in the placement of practices at the farm scale. Ideally, the format/interface of these tools would be **compatible with existing precision agriculture tools**

(e.g., yield monitors, variable-rate application technologies, guidance systems, and GPS maps). Additionally, tools are needed to target areas and regions for coordinated, landscape-scale management efforts based on both biophysical and social criteria.

- A theme that emerged regarding opportunities and roles was the potential to leverage existing social and infrastructural resources in order to facilitate transition. Stakeholders identified numerous such opportunities, which we simplify according to three categories of resources: (1) **relationships and partnerships**—for instance, agricultural and environmental NGO's can assist by drawing upon their established relationships with landowners and managers to identify leaders and potential early adopters who can serve to connect to the broader landowner community; (2) **grants and other funding**—there are monies available to support efforts ranging from scientific research to implementation and demonstration of the practice on private lands, and STRIPs project stakeholders can assist in accessing these monies; and (3) **infrastructure**—there are current programs (e.g., conservation programs), organizations (e.g., watershed groups, NGOs, governmental agencies), and facilities (e.g. learning farms) already in place that help promote the addition of perennial systems into the Iowa landscape. Project leaders and stakeholders can potentially leverage the structure of this existing infrastructure to promote the adoption of prairie strips.

D) Next steps - Overall, this stakeholder discussion helped identify: opportunities that build upon the initial experimental findings at Neal Smith NWR; key leverage points for utilizing existing resources, including land that could increase the observability and perceived relative advantage of the practice in diverse landscape contexts; and communication, technical, and economic tools to encourage widespread adoption across the Iowa landscape. We found that stakeholders were open and motivated to take active roles in helping build these prairie strips into their current and future roles and projects. Key initial steps forward include:

- **Establish a farmer advisory board/committee** to help develop outreach/communication tools and specific messaging that resonates with the broad spectrum of farmers in Iowa.
- **Identify and pursue "working lands" grants** that would support the expansion of the experimental approach, while applying the experiments in different parts of Iowa. These study sites could serve as demonstration areas that provide farmers confidence in the efficacy of such practices in their area, while providing replication and proven applicability in different environmental conditions.
- **Identify land** that may already be used for agricultural experimentation, outreach, and/or education, or additional properties in which landowners are willing to help demonstrate the prairie strips in different contexts across Iowa. Draw upon the current stakeholder group to enlist their help in contacting potential collaborators to set up demonstration sites across the state. These demonstration areas help overcome the current perceived lack of widespread observability and replication issues.

- **Strengthen and build upon existing stakeholder relationships/networks** to leverage the diverse knowledge, experience, and resources that will be needed to take the initial steps including creating an advisory board, securing further research and extension funding, and setting up the infrastructure needed for the expansion of demonstration areas. To this end, a greater understanding is needed of (statewide) natural resource professionals' knowledge of and support for targeted prairie strips, and current relationships from which to build new partnerships. Regular stakeholder discussions and participatory events will be required to help develop a shared vision among the diverse interests.

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Neal Smith Agroecosystems Project Feedback

This project is studying the impacts of strategically integrating prairie buffer strips into row-cropped agricultural watersheds. We hypothesize these prairie buffer strips may enhance the health and diversity of Midwestern agricultural landscapes.

(1) Are we ready to transition from *science to practice*? ☐ YES ☐ NO

Comments:

(2) What **opportunities** do you see for transitioning from *science to practice*?

(3) What **road blocks** do you see for transitioning from *science to practice*?

Neal Smith Agroecosystems Project Feedback

(4) What role do you see for yourself, or your organization, in facilitating the transition from *science to practice*?

(5) What questions, or sorts of questions, do you have concerning moving this project forward from *science to practice*?

Background Information - please circle the appropriate response(s)

I come from a **[FARM]** and/or **[SCIENCE]** and/or **[POLICY]** background.

How familiar are you with this project?

[FIRST TIMER] or **[SOMEWHAT FAMILIAR]** or **[VERY FAMILIAR]**

Appendix B. Photos of the event

Photo 1: Project investigators, M. Helmers (shown here) and M. Liebman, provided a brief introduction to the STRIPs project prior to the facilitated discussion. Photo courtesy of the Leopold Center for Sustainable Agriculture.

Photo 2: D. Larsen introduces the facilitated discussion. Photo courtesy of the Leopold Center for Sustainable Agriculture.

Photo 3: The session begins with an individual writing activity. A. MacDonald and R. Ohde are pictured here. Photo courtesy of the Leopold Center for Sustainable Agriculture.

Photo 4: ISU graduate students and NSNWR interns record notes during the small group discussion. Graduate student, P. Eyheralde (in blue), is pictured here recording notes. Photo courtesy of the Leopold Center for Sustainable Agriculture.

Photo 5: Opportunities and Roadblocks were the focus of small group discussion. Ideas generated during small group discussions were recorded on large poster paper. Photo courtesy of the Leopold Center for Sustainable Agriculture.

Photo 6: Ideas from small group discussions were presented to the group as a platform for the large group discussion. Facilitator T. Knoot pictured here, summarizing key points from small group discussion notes. Photo courtesy of A. MacDonald.

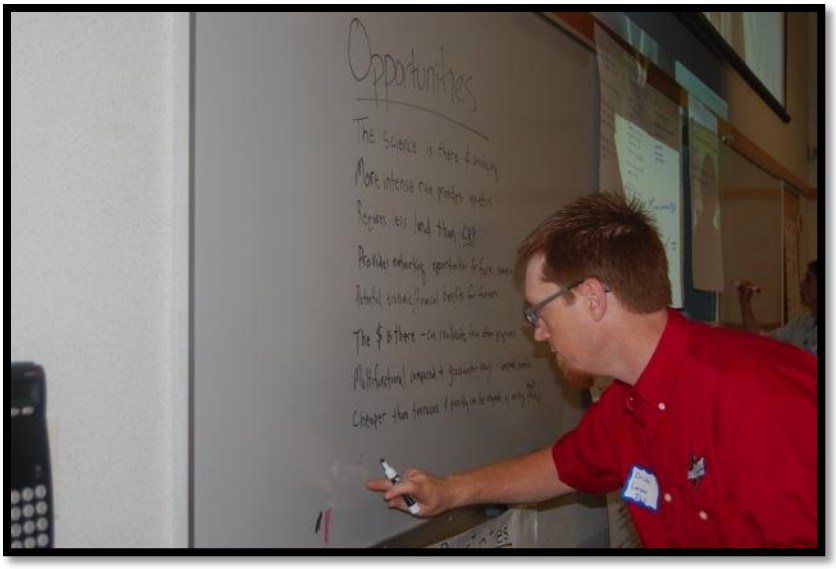

Photo 7: Facilitator D. Larsen records ideas presented during the large group discussion. Photo courtesy of the Leopold Center for Sustainable Agriculture.

Photo 8: The stakeholder meeting concluded with a tour of the research site. A flume at the terminus of an experimental watershed is seen here. Photo courtesy of the Leopold Center for Sustainable Agriculture.