**Indiana Smart Agriculture Report:**
**A Vision and Roadmap for Indiana Climate Smart Agriculture**

**Prologue:**

In February 2022, Solutions from the Land (SfL), a farmer led nonprofit corporation focused on land-based solutions to global challenges, and Purdue University's College of Agriculture, joined together to form and facilitate a special Work Group composed of Indiana agricultural thought leaders and value chain partners to explore and assess the impacts that potential extreme weather events and changing climatic conditions are having and are expected to have on the state's number one industry- agriculture. The Indiana Smart Agriculture (INSA) Work Group is Co-Chaired by Don Villwock, a farmer and past President of the Indiana Farm Bureau and Jason Henderson, Associate Dean of Purdue's College of Agriculture and Director of Extension.

The Co-Chairs first task was to identify and successfully recruit candidates to serve on the Work Group. As part of the recruitment process, candidates were advised that they would be joining a "self-directed" work group with the following mission:

- Review the impacts that extreme weather events and changing climatic conditions are having and are expected to have on the state's agriculture and forestry sectors;
- Determine any need for and benefits of developing an agricultural and forestry adaptive management strategy for the state based on climate smart agriculture principles, and;
- Develop an action plan for producing such a strategy if participants agree that it would be useful.

More than 90% of the individuals who were nominated agreed to serve on the Work Group. In addition to the farmers who were recruited, the project sponsors reached out to the United States Department of Agriculture (USDA) and the Indiana State Department of Agriculture (ISDA) for technical support, both of which responded affirmatively and appointed representatives to assist and serve on the Work Group.

Over the course of nine months, the Work Group met three times to discuss and assess the impact that climate change and other challenges are having on their operations and identify pathways that can help producers:

- sustainably increase agricultural productivity and livelihoods;
- enhance adaptive capacity and improve resilience; and
- deliver ecosystem services, sequester carbon, and reduce and/or avoid greenhouse gas emissions.

This report summarizes their work, findings, and recommendations.

**INSA Deliberations**

On March 7-8, 2022, the inaugural meeting of the Work Group was held in Indianapolis. The objectives for this first meeting were to welcome and onboard the members; review what science is telling us about weather and climate variations; discuss the challenges these changes are and will create for Indiana agriculture; and determine next steps.

Each member described their farming operation and what they hoped they could contribute and gain from this dialogue. They also talked about how the continuing pandemic, rising prices, disruptions in supply chains, market uncertainty exacerbated by war in Europe and weather-related challenges were further disrupting predictability. Out of this discussion consensus was achieved on the following points:

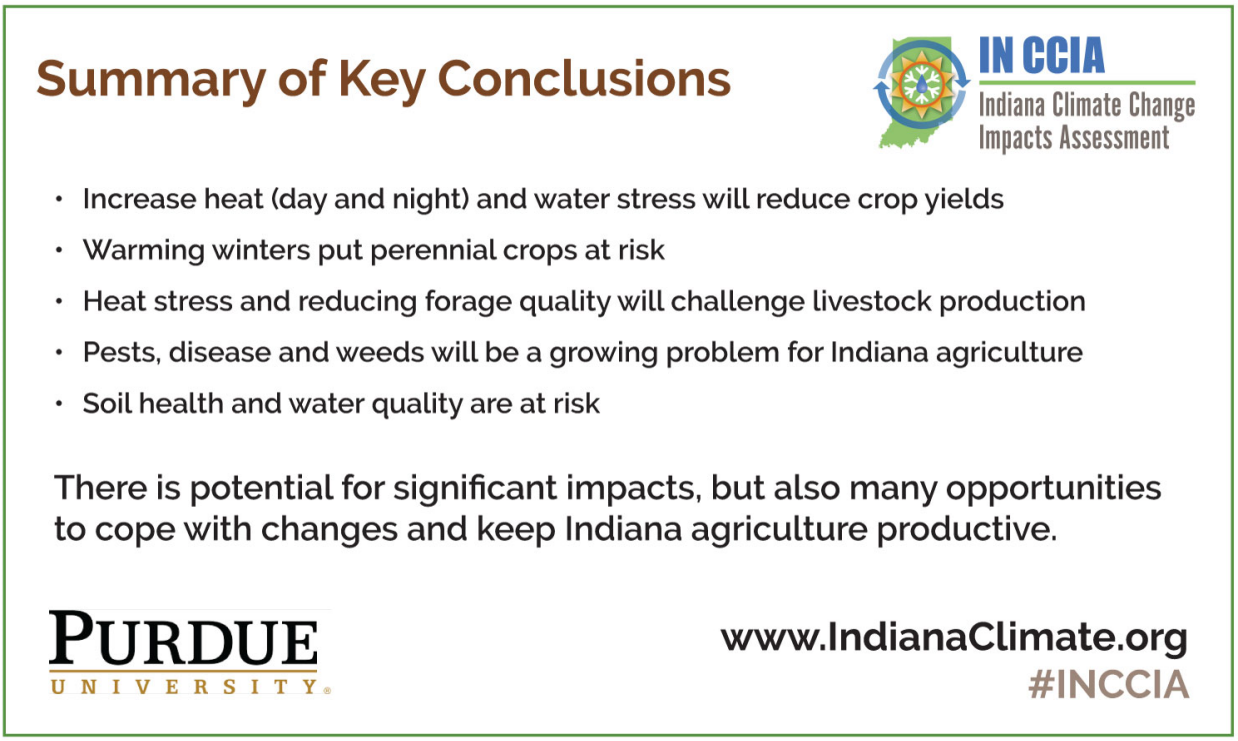
- changing climatic conditions are already happening and are a threat multiplier for Indiana agriculture
- Indiana farmers are willing to share failures and solve problems together
- adoption of climate smart production systems is expanding across the state
- the diversity of Indiana agriculture is an important asset; more diversification in what is produced and farming with nature would be helpful
- landscape scale solutions are needed to address these co-joined challenges
- more farmer leadership is needed to advance "collaborative conservation"
- the messenger matters: need to maintain perspective and patience
- Purdue Extension needs to spend more time "on farm"
- innovation and technology pathways for further improving sustainability are critically important
- rising fuel and energy prices will force change
- "can't keep doing what we are doing and expect different results"
- We are making progress, but we can and must do more and continue to innovate.

Following detailed presentations by Dennis Todey, Director of USDA's Midwest Climate Hub, on the findings of the 4th National Climate Assessment and Dr. Laura Bowling, Professor at Purdue University on the Indiana Agriculture in a Changing Climate report published in 2018 Bowling CSA ppt,. Both painted a clear picture of the multiple dimensions and impacts of climate change and noted while adaptation is a pathway to resilience and mitigation is a way agriculture can reduce or sequester greenhouse gas (GHG) emissions.

Top line take-away messages from these presentations included;

- Indiana is getting warmer and warming is expected to continue and intensify
- Indiana is getting wetter, especially the winter and spring seasons
- Growing seasons are getting longer, but planting may not be much earlier
- Warmer July nights are disrupting pollination and lowering corn yields
- More frequent and long duration flooding and drought events will create challenges
- Warming winters put perennials at risk
- Farm labor capacity will be reduced

- Pressures from pests, disease and weeds are expected to increase
- False springs will result in crop loses in perennial fruits
- Increased temperatures will create heat stress for livestock and will result in less available forage and reduced forage quality
- Mitigation measures will result in higher costs of production
- It will be harder to build soil organic matter




At the end of the inaugural meeting, consensus was reached on the following points:

1) While the topic of climate change is still volatile and some still may debate the causes of climate change, opinions have shifted over the past several years and most producers now acknowledge that climate change is real and is happening now.
2) Farmer state of readiness to adapt and prepare for further climate related challenges is suboptimal.
3) Climate data was not well known but is an important tool for both adaptation and mitigation strategies.
4) Private sector supply chains are moving to become more climate smart, and their mitigation strategies will force changes in farming systems going forward.
5) Science is important, and we must ground everything we do in sound science.
6) The younger generation is more open and ready to address climate challenges, and we would be well served to recruit a cross section of young producers to join this dialogue.

The Indiana Smart Agriculture (INSA) leadership team reconvened in Indianapolis on August 2, 2022, to continue their conversation about the current state of agriculture in Indiana and the impacts that extreme weather and changing climatic conditions are having on the state's agricultural industry. It was noted that the 2022 cropping season had been very challenging and

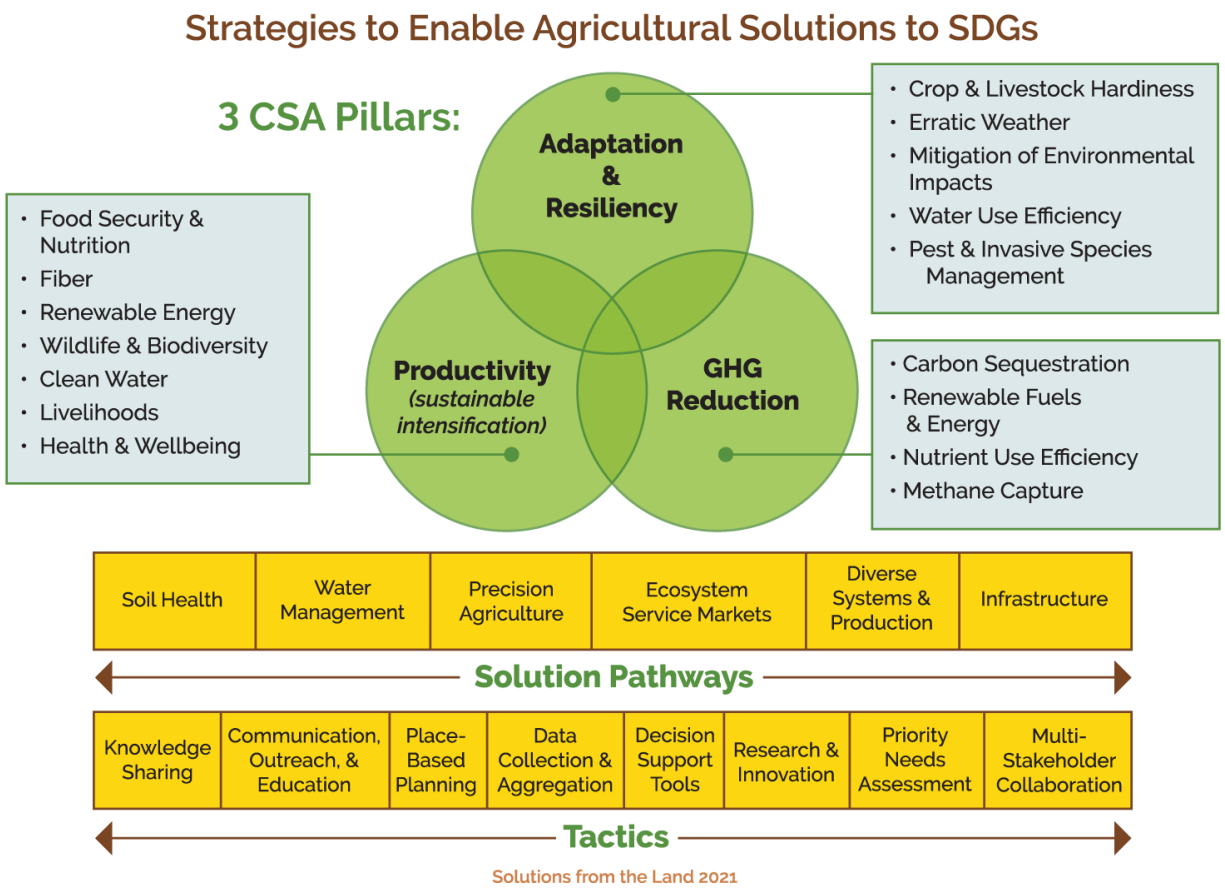
that the recent, extreme mid-summer rain events had “opened a lot of eyes” and created an opportunity to expand conversations about climate smart agriculture systems and practices.

The Work Group used this meeting to explore possible components of an adaptive management/mitigation report and pathways by which such a report could be developed.

The question was asked: “Are the changing climatic and weather conditions you are experiencing real and are you ready to provide leadership in helping producers sustainably intensify production, improve resilience and deliver agricultural mitigation services?” The consensus of the group was three-fold: these conditions are real; producers would benefit if an agricultural adaptive management strategy was developed; and value chain partners were increasingly signaling their expectation and preference that producers they source from should farm with climate smart systems. An example cited was the growing number of companies which had adopted environmental sustainability pledges and certification programs to measure cover crop, reduced tillage, water management, soil erosion and field buffer practice adoption. The group affirmed that if producers do not provide leadership in this arena, government, business and/or institutional investors will establish standards growers will be forced to meet.

It was also noted that this was a particularly good time to expand climate smart agriculture conversations with producers, as significant amounts of new federal funding for conservation and climate smart agriculture (CSA) programs are becoming available to assist with voluntary CSA practice adoption. The group again emphasized the need to recruit next generation producers to help lead this effort, as they are the ones who will be incurring the risk and adapting to these conditions for decades to come.

In terms of “how” best to initiate productive climate smart agriculture conversations, the consensus of the group was to focus on economic sustainability and environmental improvement issues. The group affirmed the need to facilitate wider conversations about systems and practices to help producers sustainably intensify production and improve resilience, leaving climate change solutions as a co-benefit which follows these first two pillars. (See figure 1)




(Figure 1)

Other priority focal points for conversations and messaging that were identified by the Work Group included: markets beyond food and beverage, such as biofuels and livestock solutions; the importance of data; demonstration of integrated CSA systems; research; and what a "new social contract" with the public might look like- one where farmers are valued and compensated for the full range of goods and ecosystem services they deliver from the land, including climate change mitigation and GHG reduction services.

The group then reflected on the audience they were targeting and observed that it followed a typical bell curve, with the early adopters and skeptics at each end and our core target in the center of the curve.

To recap, in response to the questions are climate change real, and are we prepared/doing enough, consensus was reached on the following points:

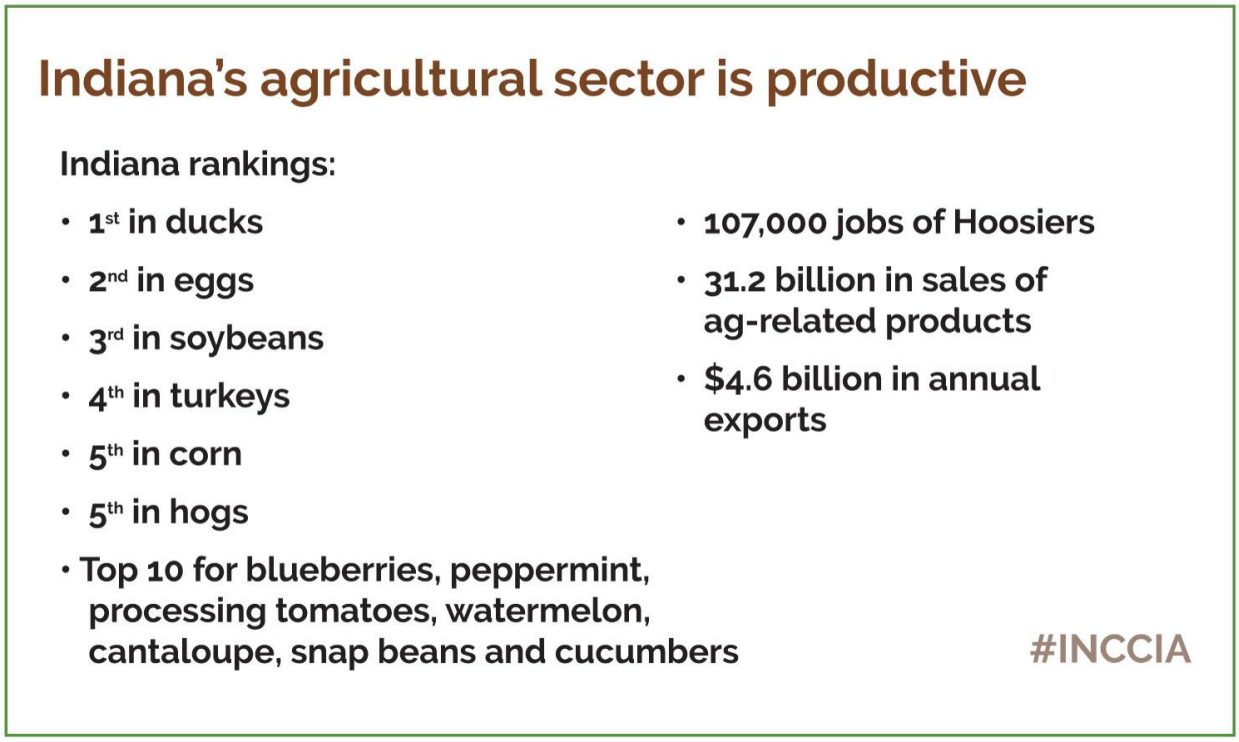
1. Climate change is real and it is not going to go away.
2. Driving forces for change are increasing (weather events, crop and livestock losses, expectations of value chain partners and institutional investors, growth in government CSA program resources).
3. Producers need to lead CSA conversations and adaptive management planning work.

4. The state and the ag industry as a sector would benefit from the development of a farmer-led adaptation/mitigation strategy for presentation to their peers, policy makers, researchers, and value chain partners.

The Work Group convened for a third meeting via Zoom on September 9th to explore how a climate smart agriculture strategy for Indiana might be developed. Out of this discussion, the following **plan of action** was developed:

1. A climate smart agriculture strategy for Indiana should be built around input received through a series of regional listening/sharing sessions the INSA Work Group could organize with convening help from Purdue Extension. It was noted that Purdue had Community Development professionals who could support this bottom up gathering of needs and priorities perhaps by "bolting" our session onto previously scheduled sector regional meetings.
2. Well respected farmer and forestry leaders with strong connections to commodity, livestock, specialty crop, small market, conservation, processor, aggregator, finance, technical service provider and youth groups along with ag retailers, crop consultant and value chain partners should be invited to join in "co-creating" a Indiana Climate Smart Agriculture Adaptive Management Plan which can be used to shape enabling policies, research priorities, and risk management strategies among others.
3. Possible components of such a plan might include:
    a. A science-based assessment of current and future conditions by updating the INCCIA vulnerability assessment completed in 2018 to include challenges as well as things Indiana agriculture is doing well (e.g. being the #2 state in green living cover).
    b. Adaptive management recommendations for:
        1) Research needs and priorities
        2) CSA production practices and systems
        3) Finance mechanisms and markets
        4) Hard infrastructure needs
        5) Technical infrastructure needs
        6) Water and soil management
        7) Education and communication outreach
        8) Decision support tools
        9) Others
    c. Enabling policy and program recommendations
    d. Partners and platforms we can/should align and collaborate with (e.g., 4R, Soil Health, and military installations)

**Path Forward-** Indiana agriculture is vibrant, innovative and productive!




Despite our amazing evolution over time and impressive production statistics, our future is not assured and changing climatic conditions, combined with other challenges, will erode the economic viability and environmental sustainability of farms, ranches and woodlands across the entire state. Climate change affects everyone, and no farming system, whether big, intermediate, or small; conventional, organic, or regenerative; will be untouched.

The good news is however there are pragmatic steps which can be taken to sustainably intensify production, improve resilience, and concurrently deliver mitigation services. This is the opportunity side of the climate change coin, and thankfully Indiana, with its storied academic institutions, centers of innovation and technology, conservation partnerships, and value chain collaboratives is well positioned to capitalize on.

**Towards this end we recommend and invite stakeholders from across the agriculture and forestry value chains in Indiana to join us in forming a diverse, multi-stakeholder, cross boundary collaborative that together will construct and build support for climate smart strategy and action plan which can guide future policies, programs, partnerships, and investments needed for Indiana agriculture to adapt and thrive.**

Given the speed and magnitude of the climate variation that is occurring, we suggest focusing on the next 10-20 years and use this period as the timeline for identifying, prioritizing, and championing pragmatic, science-based steps that can be taken to keep Indiana agriculture vibrant and productive for future generations. As evidenced by climate change shocks that productive agricultural breadbaskets across the globe have and are experiencing, there is no time to waste, and work on co-creating a climate smart agriculture strategy for Indiana agriculture must begin now. Please join us in addressing this clear and present threat.

**Respectfully Submitted,**
**Indiana Smart Agriculture Work Group**

**December 2022**

## Indiana Smart Agriculture Work Group

**Barry Fisher**, cash grain and livestock farmer, West- Central Indiana.

**Ben Wicker,** diversified grain, forage and cattle farmer in east central Indiana.

**Cameron Mills,** 4th generation regenerative agriculture farmer.

**Carrie Vollmer-Sanders- multi-generational** corn, soybeans, and wheat farmer focused on biodiversity and soil health in northeast Indiana and northwest Ohio

**Dan DeSutter,** regenerative/certified organic producer, west central Indiana

**Dennis Mouzin**, watermelon, sweet corn, cantaloupe, pumpkins, squash, and honey grower/packer/shipper in southern Indiana

**Dennis Todey,** director of the USDA Midwest Climate Hub at the National Laboratory for Agriculture and the Environment in Ames, IA.

**Dianna Rulon,** multi-generational corn and soybean operation in central Indiana with a focus on regenerative agriculture and soil health

**Don Villwock,** retiring white corn, seed soybeans, seed wheat and popcorn no-till sustainable farmer from Edwardsport Indiana.

**Hans Kok,** Independent Conservation Consultant based out of Indianapolis

**Jason Henderson,** Senior Associate Dean in the Purdue University College of Agriculture and Director of Purdue Extension.

**Jennifer Thum,** Deputy Director, Division of Soil Conservation, for the Indiana State Department of Agriculture (ISDA)

**Jim Moseley,** An Indiana farmer who has participated in agricultural policy for 35 years

**Joe Rorick,** Agronomist for Purdue Extension and the Indiana Soybean Alliance

**Kent Yeager,** Long time conservation farmer and farm policy advocate from Harrison County.

**Lisa Holscher,** Director, Indiana's Conservation Cropping Systems Initiative (CCSI)

**Mark Legan,** no till corn and soybeans with 100% cover crops, 2,200 sows producing 60,000 pigs per year

**Mike Shuter,** producer of corn and seed soybeans, in addition to managing the more than 4,000 hogs and 100 cattle produced on their farm, Frankton,

**Mike Starkey,** corn and soybeans (our primary cash crop), as well as wheat, hay, and beef cattle in Hendricks and Boone Counties.

**Rodney Rulon,** partner in Rulon Enterprises LLC, a fifth-generation family farm near Arcadia, IN sustainably producing corn and soybeans with no-till and cover crops

**Susan Brocksmith,** Dean Business and Public Service, Vincennes University, Co-owner Corn and Soybean Farm

**Tom Bechman,** Southdown sheep producer, Editor, Indiana Prairie Farmer

**Tom McKinney,** producer of Non GMO corn and soybeans, commercial corn, seed soybeans, Plenish soybeans and some commercial soybeans, uses cover crops on several hundred acres, Kempton, IN

**Ernie Shea,** Facilitator and President, Solutions from the Land

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**About Solutions from the Land**

Solutions from the Land (SfL) is a 501c3 nonprofit focused on land-based solutions to global challenges. SfL builds and facilitates state, national and global initiatives and alliances through which farmers, ranchers, foresters and collaborating partners showcase examples of innovation and proactively advocate for policies, partnerships, investments and research that will enable agricultural landscapes to deliver near-term, cost-effective, integrated solutions to global mega-challenges: food and energy security; sustainable economic development; and environmental improvement. For more information visit www.solutionsfromtheland.org

**About Purdue University's College of Agriculture**

Purdue University's College of Agriculture is one of the world's leading colleges of agricultural, food, life, and natural resource sciences. As a land-grant institution, we are committed to preparing our students to make a difference, wherever their careers take them; stretching the frontiers of science to find solutions to some of our most pressing global challenges; and, through Purdue Extension and engagement programs, helping the people of Indiana, the nation and the world improve their lives and livelihoods. For more information, see Purdue University College of Agriculture