ACCPNA CAP Logic Model

Situation

- •Changing climate in the IPNW
- Unique spatial gradients of precipitation and temperature across the IPNW
- Variable community networks and economic bases across the study region
- High soil erosion rates and declining SOM linked to variable climate (wind, water)
- •Low and variable adoption of conservation tillage
- •Extractive, annual cropping with little crop diversity
- •Crops with low soil C returns linked to declining SOC
- •Effects of cropping system practices on SOC incompletely understood.
- •Soil C storage and N use efficiency linked to variable climate
- Projected increases in export market demand for food crops with rise in global population

Inputs

I1-Steering Committee (PIs and key collaborators)
I2-Participating research and teaching faculty at three Land Grant universities and ARS
I3-Faculty expertise (FE) and dedicated centers in climate change in the region

I4-FE in cropping systems modeling in response to climate change

I5-FE in conservation tillage cropping systems **I6-**FE in soil carbon sequestration and

17-FE in economic and social dimensions of adoption of agricultural practices.

dynamics

18-FE in pests, weeds and diseases of cereal crops **19**-FE in extension and education

I10- A Stakeholder Advisory Committee (SAC) representing industry, commodities, federal and state agencies, environmental groups

Activities

Ac1-Establish a transdisciplinary framework to develop regional approaches to climate change in agricultural systems of the region (I1-I10)

Ac2-Develop down-scaled climate models for the region (I1,I3,I14)

Ac3- Establish GHG, C, N, water field monitoring network that inform models, efficiency assessments and LCAs (I3,I4,I10,I5,I6)

Ac4-Develop agroecological zonation for the region (I1-I8,I10,I14) Ac5-Establish long-term

studies of cropping system alternatives at sites throughout the region (I1,I4,I12).

Ac6-Identify and respond to climate change effects on crops, pests, diseases and weeds

(14,18,19,110,111,112)

Ac7-Establish cyber infrastructure plan (I1, I14) Ac8-Establish physical infrastructure and management (I1, I15)

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O1-Current and future climate driven socioeconomic+biophysical AEZ delineation of the region (Ac1,Ac4) (D1.3, D9.5b,d) O2-. Regional and subregional C, N, water, energy budgets and GHG flux models, LCA models and management recommendations (Ac1-Ac5) (D1.4, D2.5, D3.4, D4.5b, D9.5c) **O3**- Spatial representation of adoption likelihood incorporating socioeconomic variability (Ac1-Ac6) (D1.5) **O4**-Vulnerability assessments and forecast driven management recommendations for climate-driven changes in crops and pressures from weeds, pests and pathogens (Ac6) (D5.5) **O5**- Sustainable network for researchers, industry, agencies, growers, citizens to dialogue over climate change issues (Ac14) (D 8.2) **O6**-Develop and share

transdisciplinary models of adoption of adaptation and

O1-O4 (AC1) (D3.4, D4.5a,

mitigation strategies, drawing upon data from

D9.5e)

Outputs*

Outcomes & Impacts

Knowledge

IM 1-Improved researcher, student and stakeholder knowledge of soil C, N and agricultural GHG dynamics and variations across the AEZs and their impact on climate change (O1-O7)

IM2-Greater awareness by stakeholders of the impact of climate on farming and effective approaches to adapt with projected climate change(07)

IM3-Delineation of potential interdisciplinary issues and interconnectivity pertaining to SOC in the region **(O6)**

Actions

IM4- Measurable adoption of agricultural practices designed to adapt to and mitigate climate change (O11)
IM5- web-based extension interface between ongoing project activities and data and researchers, stakeholders (O10) IM6-Linkage to appropriate Community of Practice for eXtension engagement (O11)

I =Input, Ac = Activity, O = Output, Im = Impact

^{*} D = deliverable. See Deliverables and Milestones, P. 18 of Project Narrative for a full key.

ACCPNA CAP Logic Model (p. 2 cont.)

Situation

- Export-cereal based agriculture with limited local value added industry
- Increasing farm size
- •Declining rural communities
- Rising farm input costs/ falling profitability
- •Regional bioenergy/ bioproduct demands for C
- Crop losses from weeds, plant pathogens, insects
- Unknown implications of climate change on these biotic constraints to production
- Projected climate change stressors require cropping system flexibility and adaptability

Components of Evaluation and Assessment Plan (see)

Inputs

I11-Existing networks of researchers extension specialists and cooperators (STEEP, CFF) **I12**-Existing university and ARS -operated experimental farms with long-trials and laboratories across the region **I13** -Transdisciplinary expertise and integrated undergraduate and graduate programs (e.g., ongoing NSF-IGERTs) 114 -Expertise in cyberinfrastructure (CI) and commitment to establishing regionwide interoperable CI. **I15**-Administrations of colleges and universities committed to regional collaboration and infrastructure support 116-Existing network of university and K-12 science

and agriculture educators

Activities

Ac9-Define the interinstitutional structure (I1, I15)

Ac10-Enhance extension climate-change knowledge transfer programming (19, I10)

Ac11-Establish and nurture appropriate Communities of Practice within eXtension to enhance climate-change technology-transfer programming (19, 110, 111) Ac12-Establish K-12 teacher and curriculum development programs in agriculture and climate change (116)

Ac13-Strengthen
undergraduate and
graduate transdisciplinary
experiences in agriculture
and climate change (113)
Ac14-Ensure that all
activities are informed by

stakeholders (19,110)

Process Evaluation

(Years 3 & 4) Student enrollment rates, multidisciplinarily in grad. student coursework and projects; instructor and stakeholder

surveys regarding level of input and collaboration, extension and cyberinfrastructure services delivery rates and perceived quality

Outputs*

O7-Team, methodology to fostering stakeholder input and education (*D7.2*, *D7.3*, *D 8.2*)

O8-Cyberinfrastructure interoperability and interfacing plan established (Ac7) (D8.1, D8,3)

O9-Interinstitutional collaborative agreement (**Ac8**) (*D6.2*, *D8.1,2,3*) **O10**-Face-to-face, print,

electronic stakeholder (traditional and nontraditional), research conferences/workshops

(Ac10) (D7.3, D 8.2, D9.5a) O11-Communities of

Practice programs (Ac11)

012-Climate change related K-12 teacher training workshops, agriculture and science curricula (Ac12) (D.6.1)

O13- Undergrad internships, ag systems and climate change capstone; grad courses: transdisciplinary C cycling

and integrated spatial modeling (Ac13) (D6.2)
O14-Evaluation and assessment plan developed (Ac9) (D7.5)

Outcomes & Impacts

Conditions

IM7- Strong links between the IPNW regional project and other efforts in the USA (LTERs, ULTRAs, other) **(08, 09)**

IM8-Average soil C storage in the region on track to 15% increase by 2030 **(02, 03)**

IM9-Average system-wide GHG emission reductions (on-site and off-site) of 15% by 2030

IM10-Increased crop production and water, N efficiencies of 15% by 2030 **(O1-O4)**

IM11-Better communication and coordination of producers, supporting industries, government agencies and researchers to produce win-win scenarios to address emerging C, N, energy, water, production, and GHG-related issues **(05)**

IM12-Increased number of trained professionals knowledgeable of climate change issues and management approaches (O10-O14)

Impact Evaluation

(Years 4 & 5)

Comparisons of model scenarios to monitoring studies & controlled trails, Pre- post test monitoring studies, stakeholder behavior change data, ag statistics and economic impact data

Monitoring and Formative Evaluation

(Years 1 & 2)

Program records, researcher interviews, observations, K-12 and post secondary instructor formative feedback, student course evaluations and interviews of SAC members and growers