### 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 dynamics
- **I7**: FE in economic and social dimensions of adoption of agricultural practices.
- **I8**: FE in pests, weeds and diseases of cereal crops
- **I9**: 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 (I4, I8, I9, I10, I11, I12)
- **Ac7**: Establish cyber infrastructure plan (I1, I14)
- **Ac8**: Establish physical infrastructure and management (I1, I15)

### Outputs*

- **O1**: Current and future climate driven socio-economic + 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 mitigation strategies, drawing upon data from O1-O4 (AC1) (D3.4, D4.5a, D9.5e)

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*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.)

**Situations**
- 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

**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)
- *I14*-Expertise in cyberinfrastructure (CI) and commitment to establishing regionwide interoperable CI.
- *I15*-Administrations of colleges and universities committed to regional collaboration and infrastructure support
- *I16*-Existing network of university and K-12 science and agriculture educators

**Activities**
- *Ac9*-Define the inter-institutional structure (*I1, I15*)
- *Ac10*-Enhance extension climate-change knowledge transfer programming (*I9, I10*)
- *Ac11*-Establish and nurture appropriate Communities of Practice within extension to enhance climate-change technology-transfer programming (*I9, I10, I11*)
- *Ac12*-Establish K-12 teacher and curriculum development programs in agriculture and climate change (*I16*)
- *Ac13*-Strengthen undergraduate and graduate transdisciplinary experiences in agriculture and climate change (*I13*)
- *Ac14*-Ensure that all activities are informed by stakeholders (*I9, I10*)

**Outputs**
- *O7*-Team, methodology to fostering stakeholder input and education (*D7.2, D7.3, D8.2*)
- *O8*-Cyberinfrastructure interoperability and interfacing plan established (*Ac7*) (*D8.1, D8.3*)
- *O9*-Interinstitutional collaborative agreement (*Ac8*) (*D6.2, D8.1, D8.3*)
- *O10*-Face-to-face, print, electronic stakeholder (traditional and non-traditional), research conferences/workshops (*Ac10*) (*D7.3, D8.2, D9.5a*)
- *O11*-Communities of Practice programs (*Ac11*)
- *O12*-Climate change related K-12 teacher training workshops, agriculture and science curricula (*Ac12*) (*D6.1*)
- *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*)

**Conditions**
- *IM7*-Strong links between the IPNW regional project and other efforts in the USA (LTERS, ULTRA, other) (*O8, O9*)
- *IM8*-Average soil C storage in the region on track to 15% increase by 2030 (*O2, O3*)
- *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
- *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 (*O5*)
- *IM12*-Increased number of trained professionals knowledgeable of climate change issues and management approaches (*O10-O14*)

**Components of Evaluation and Assessment Plan**
- (see)
  - 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
  - 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
  - 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