**Introduction**

Climatic variables play an important role in determining the present/current status of dryland agriculture land use. Thus, future changes in climate variables will likely influence future dryland agriculture land use.

Huggins et al. (2011) developed a methodology to delineate the REACCH (Regional Approaches to Climate Change for Pacific Northwest Agriculture) study area into agroecological classes (AECs): three dryland and one irrigated AEC (Table 1) using National Agricultural Statistical Service (NASS) cropland data-layer of actual land use/cover (Fig. 1).

**Objectives**

- Identify important bioclimatic predictors which can discriminate between current dryland AECs and.
- Use identified bioclimatic predictors with future climate scenarios to evaluate changes in dryland AECs given current production technology.

**Methodology**

- Subcategorized AECs into stable and dynamic AECs (Fig. 3) in ArcGIS.
- Selected important predictors using different variable selection methods in R.
- Assess shifts in AECs using Random forest model with selected significant bioclimatic predictors under three different time periods (2030, 2050, 2070) and two different climate change scenarios (Representative Concentration Pathway) RCP 4.5 and RCP 8.5 (Abatzoglou and Brown, 2012).

**Results and Discussion**

The best identified bioclimatic predictors for stable and dynamic AECs were:

1. Holdridge evapotranspiration index
2. Precipitation during June, July and August
3. Precipitation of the warmest four-month season (June, July, August, September)
4. Percent spring precipitation (March, April, May)
5. Percent precipitation during February, March, April and May

Overall classification accuracy and kappa were 72% and 66% for current stable and dynamic AECs.

**Fig. 1. Cropland data layer for the REACCH study area (NASS, 2010).**

**Fig. 2. Agroecological Classes for years 2007 and 2014.**

**Fig. 3. Agroecological Classes for years 2007 through 2014.**

**Fig. 4. Present dryland AECs.**

**Fig. 5. Shifts in REACCH dryland AECs for 2070 for RCP 4.5 and 8.5.**

**Table 1. Percentage of fallow as criterion to delineate AECs.**

<table>
<thead>
<tr>
<th>Agroecological Classes (AECs)</th>
<th>Percent Fallow</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Crop (AC) (limited annual fallow)</td>
<td>&lt;10%</td>
</tr>
<tr>
<td>Annual Crop-Fallow Transition (AC-T) (e.g. rotations with fallow every 3rd year)</td>
<td>10 to 40%</td>
</tr>
<tr>
<td>Grain-Fallow (GF), 2-year</td>
<td>&gt;40%</td>
</tr>
<tr>
<td>Irrigated</td>
<td>&lt;10%; Mean annual precipitation of &lt;310 mm</td>
</tr>
</tbody>
</table>

**Table 2. Number of pixels (4 x 4 km) classified in each AEC for present and future scenarios.**

<table>
<thead>
<tr>
<th>Year</th>
<th>Stable AECs</th>
<th>Dynamic AECs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Present</td>
<td>276 271 455</td>
<td>205 235 262</td>
</tr>
<tr>
<td>Accuracy (%)</td>
<td>80 74 88</td>
<td>61 55 59</td>
</tr>
<tr>
<td>Reliability (%)</td>
<td>74 70 84</td>
<td>72 78 63</td>
</tr>
</tbody>
</table>

**Future scenario (RCP -4.5) |**

- 2030: 167 192 530
- 2050: 150 163 570
- 2070: 165 130 524

**Future scenario (RCP -8.5) |**

- 2030: 184 173 488
- 2050: 169 99 499
- 2070: 94 96 533

**References:**


**Acknowledgement:** This study is part of the project, “Regional Approaches to Climate Change for Pacific Northwest Agriculture”, funded through award #2011-68002-30191 from the USDA National Institute for Food and Agriculture.