



The Impact of Climate Change on Wild Rice within the White Earth Nation



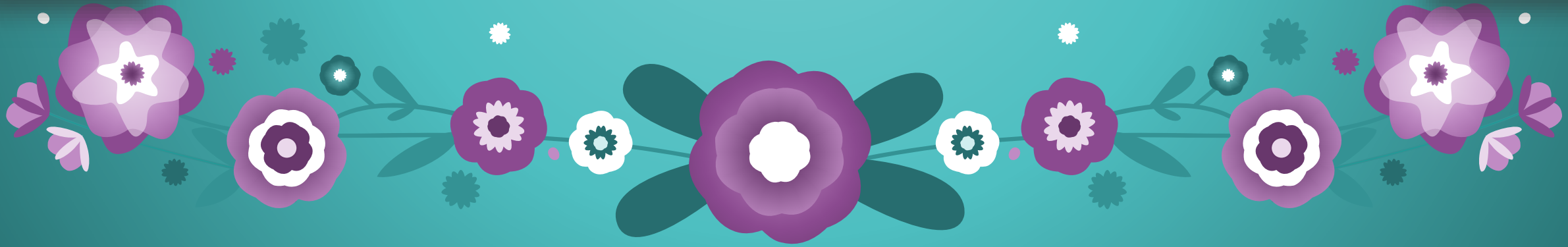
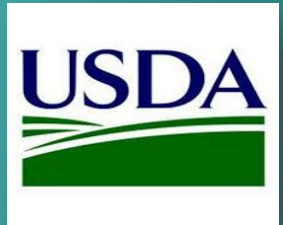
Misko Giizhik Ikwe

Toni Umana

White Earth Tribal and Community College

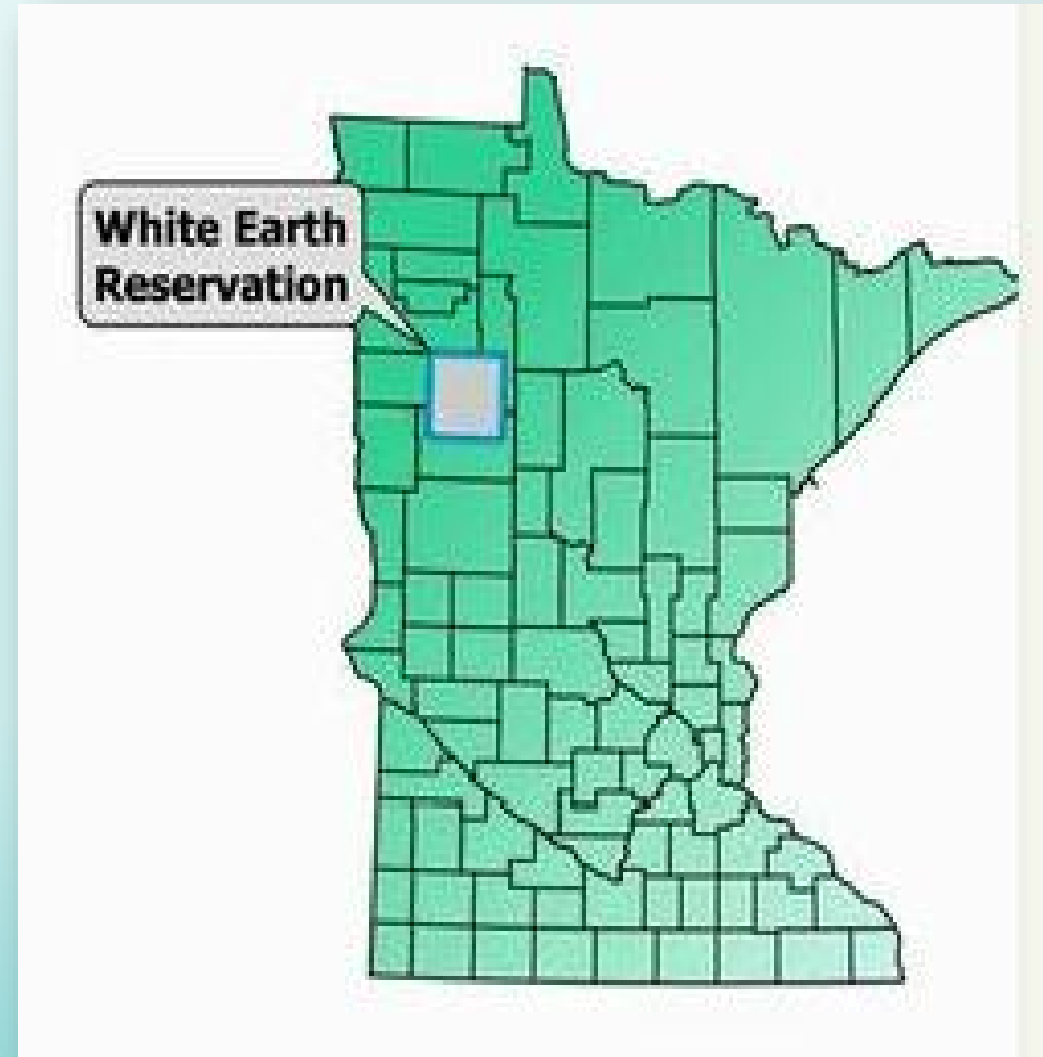
White Earth Reservation Minnesota

2016 NASA/Kiksapa ELO Summer Research Experience
for Undergraduates (REU)
NASA Cooperative Agreement
NNX14AK04A



Discussion Overview

- Climate Change, Extreme Weather Events and Wild Rice
- Background
- Objective Statement
- Materials and Methods
- Results and Discussions
- Recommendations for Future Work
- Acknowledgements
- Questions



We have harvested wild rice for hundreds of years, and still do it the same way today!



Our story intertwines with wild rice a long
time ago!



This is Our Staple and Our Sustainability



Project Objective

- To determine if climate change and extreme weather events impact wild rice production on lakes within the White Earth Nation.



Materials and Methods

- Develop Basemap in GIS
- Analyze Historic and Projected Climate Variability (temperature and precipitation)
- Analyze Extreme Weather Events
- Analyze Phenology (start of season)
- Compile Wild Rice Traditional Knowledge

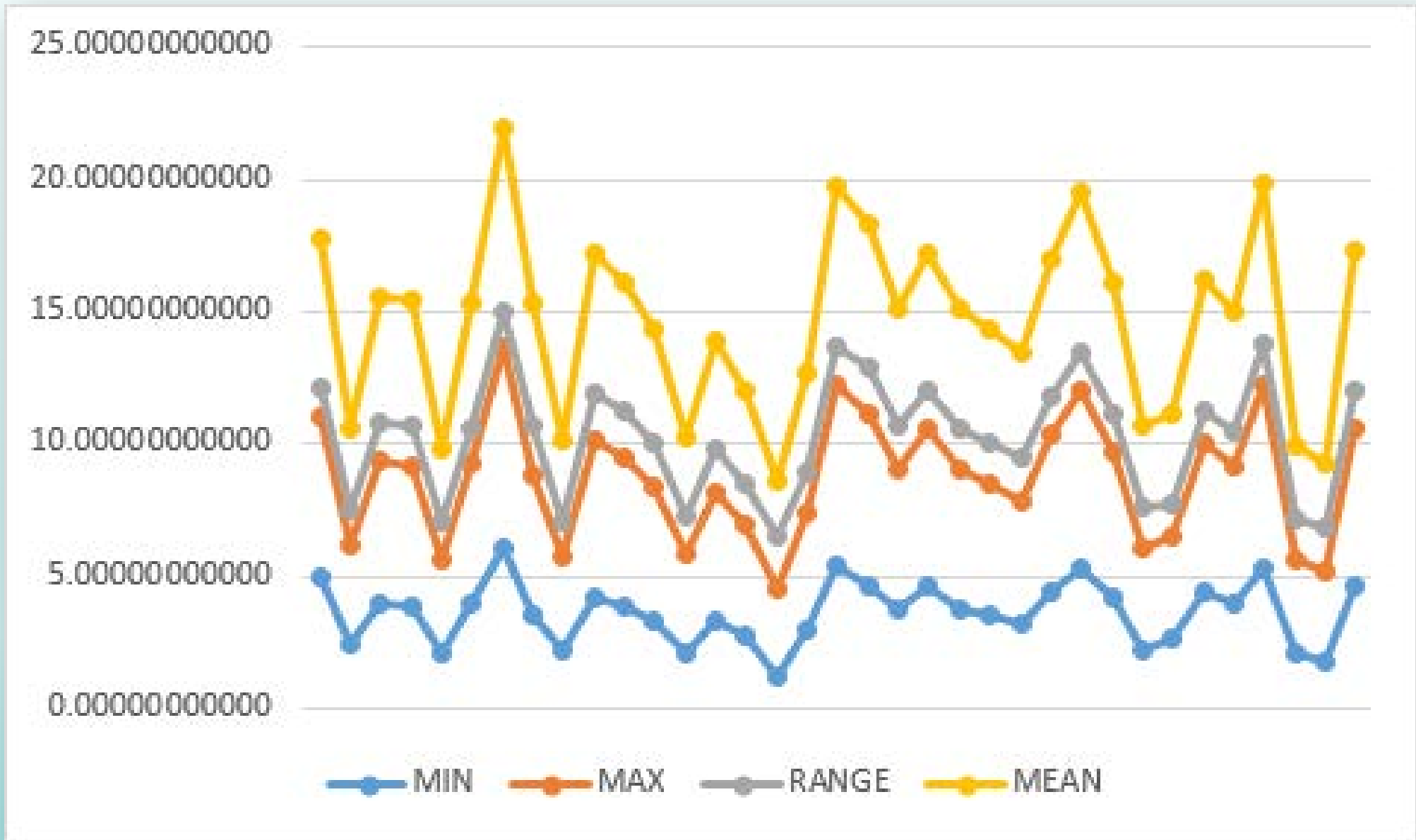


Preliminary Results and Discussion

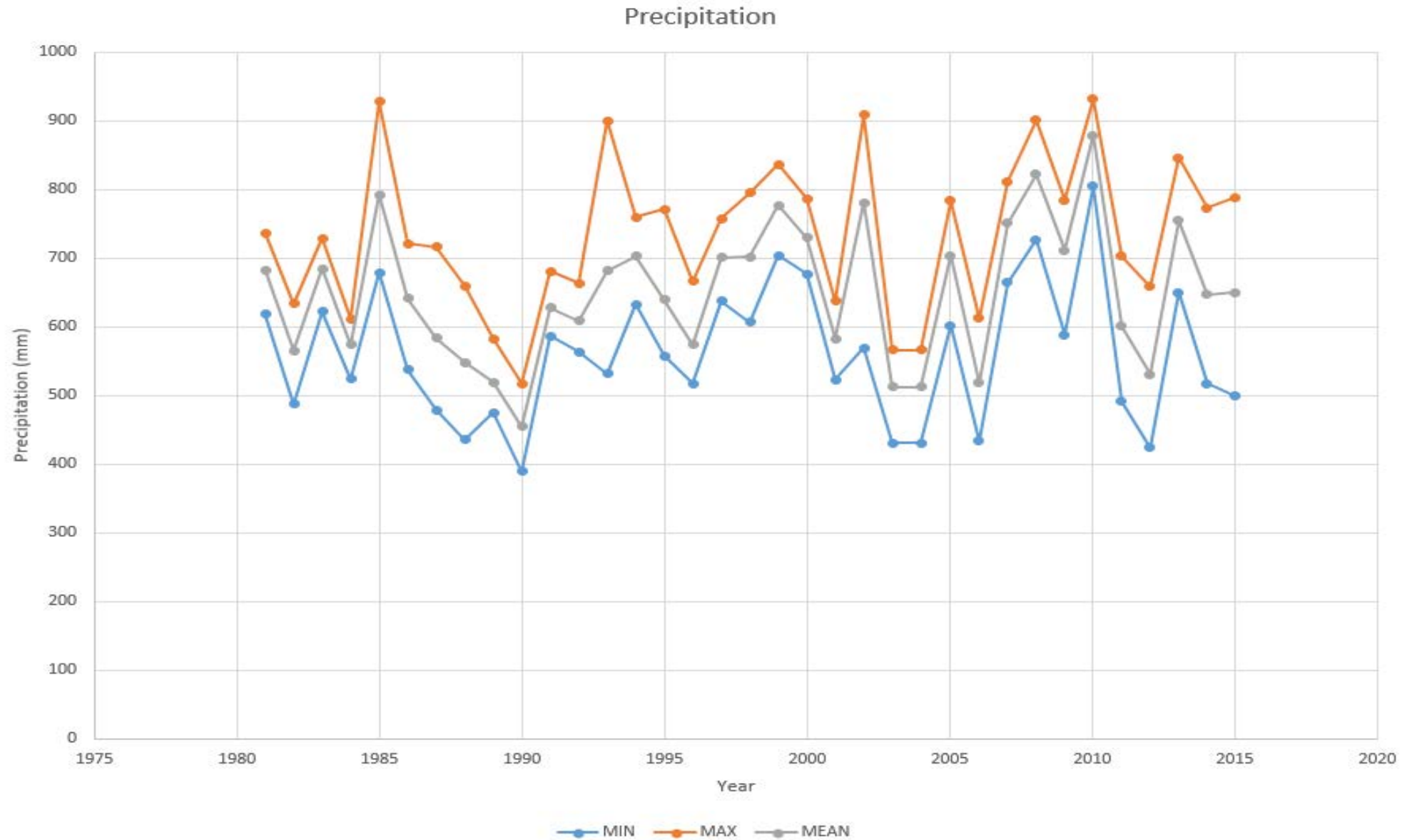
- The farther north you are, the more drastic the variability
- The data shows we have already experienced a lot of change.
- Our way of life will change dramatically.



Our Temperatures from 1981-2015

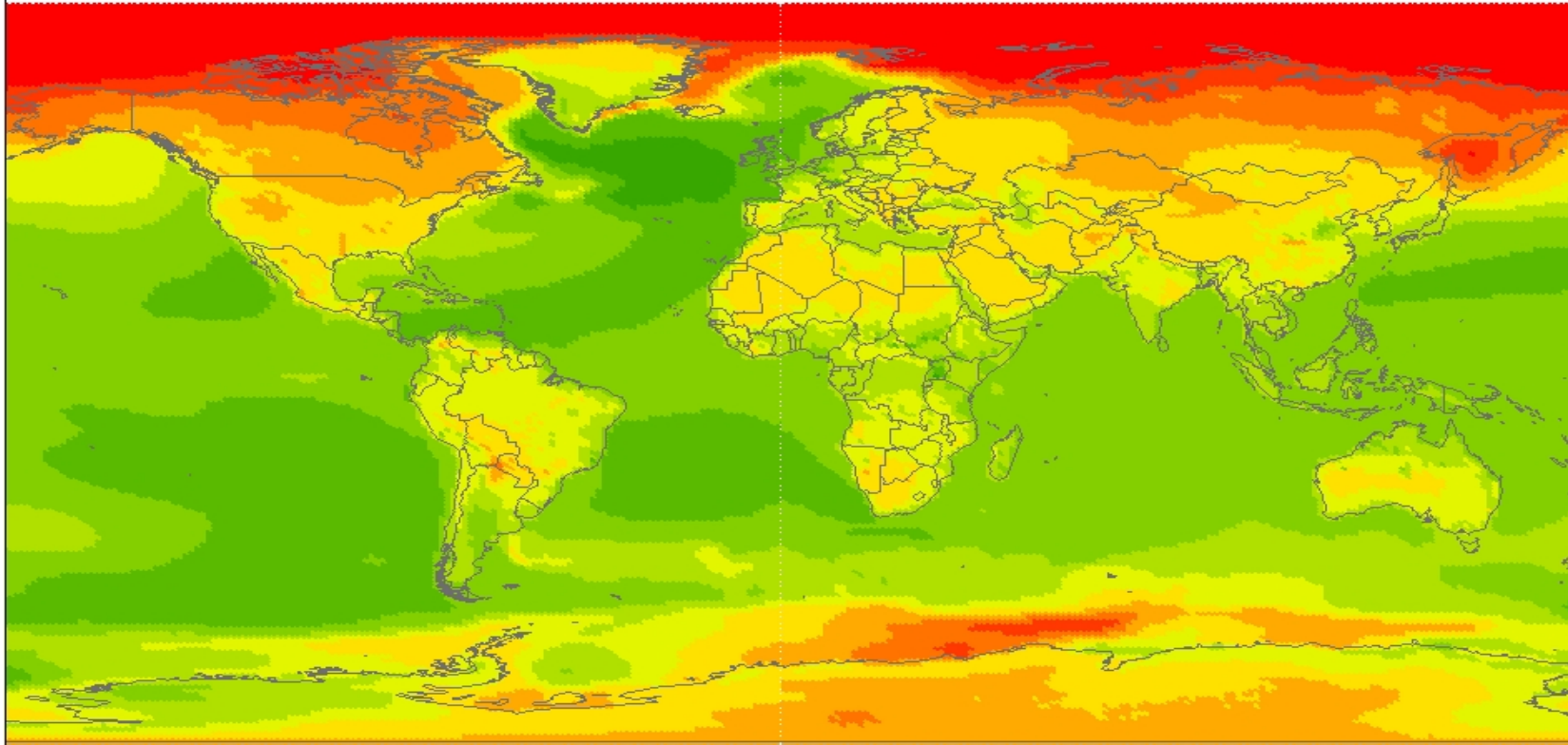


Our Precipitation 1981-2015



Projected Global Temperatures

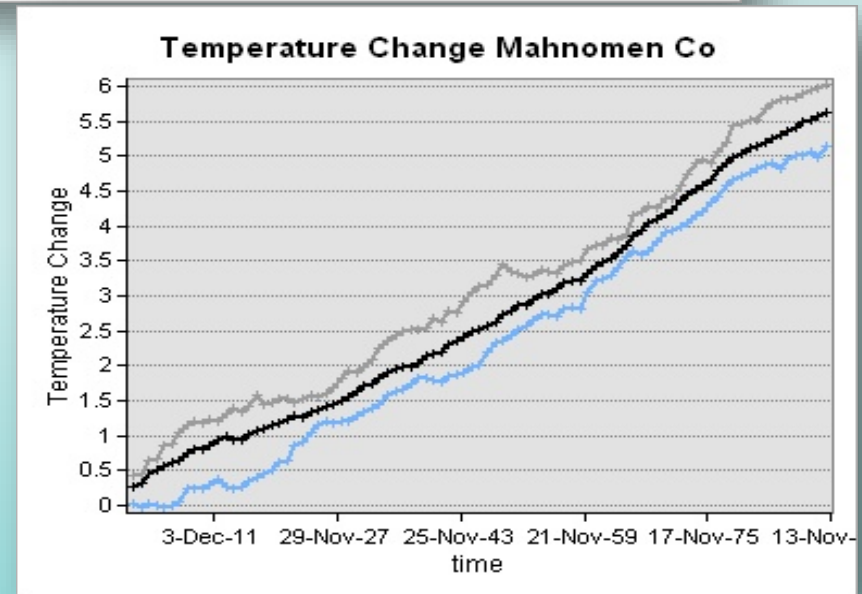
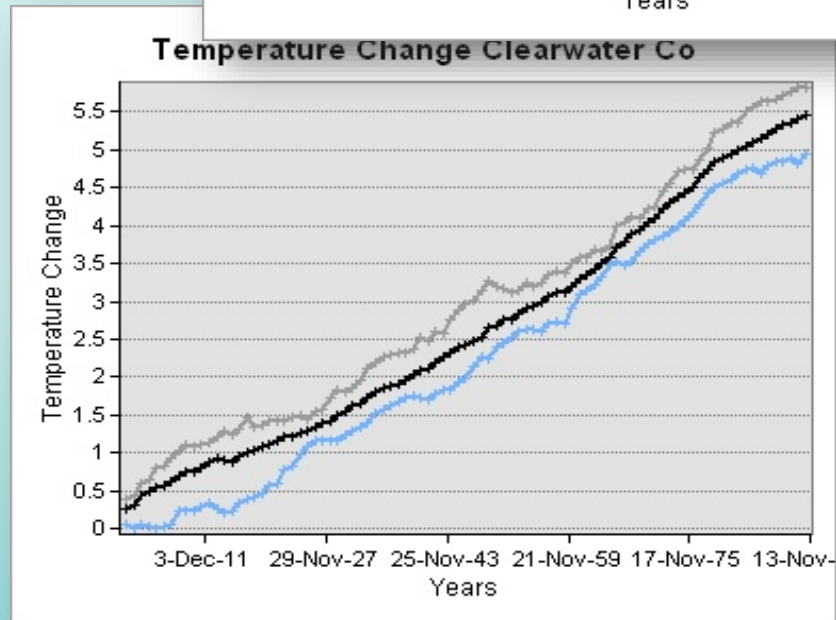
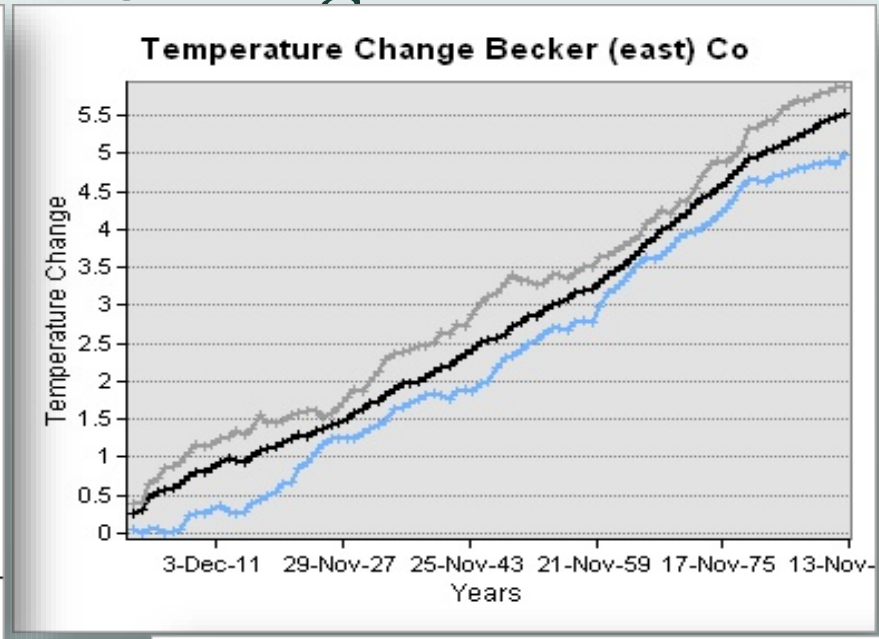
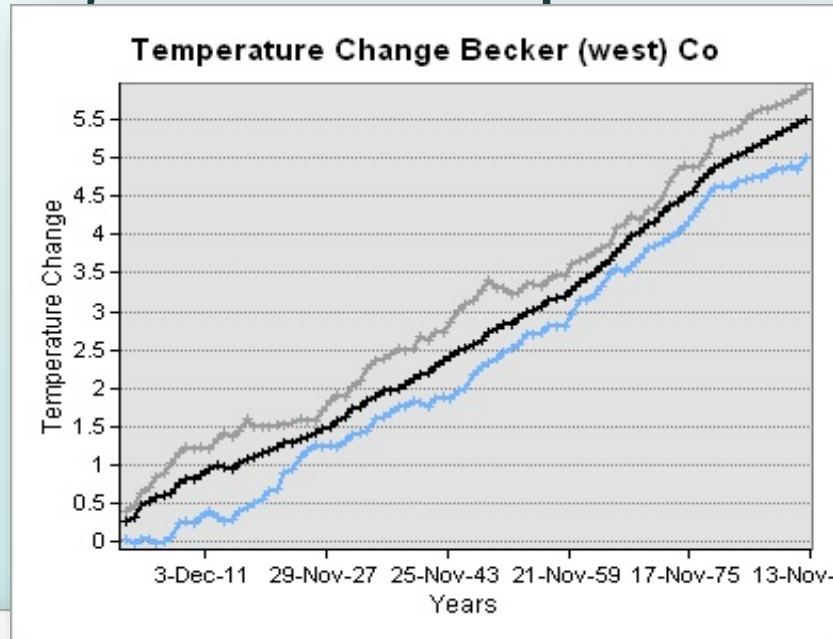
Annual Temperature Anomaly 2050



Legend

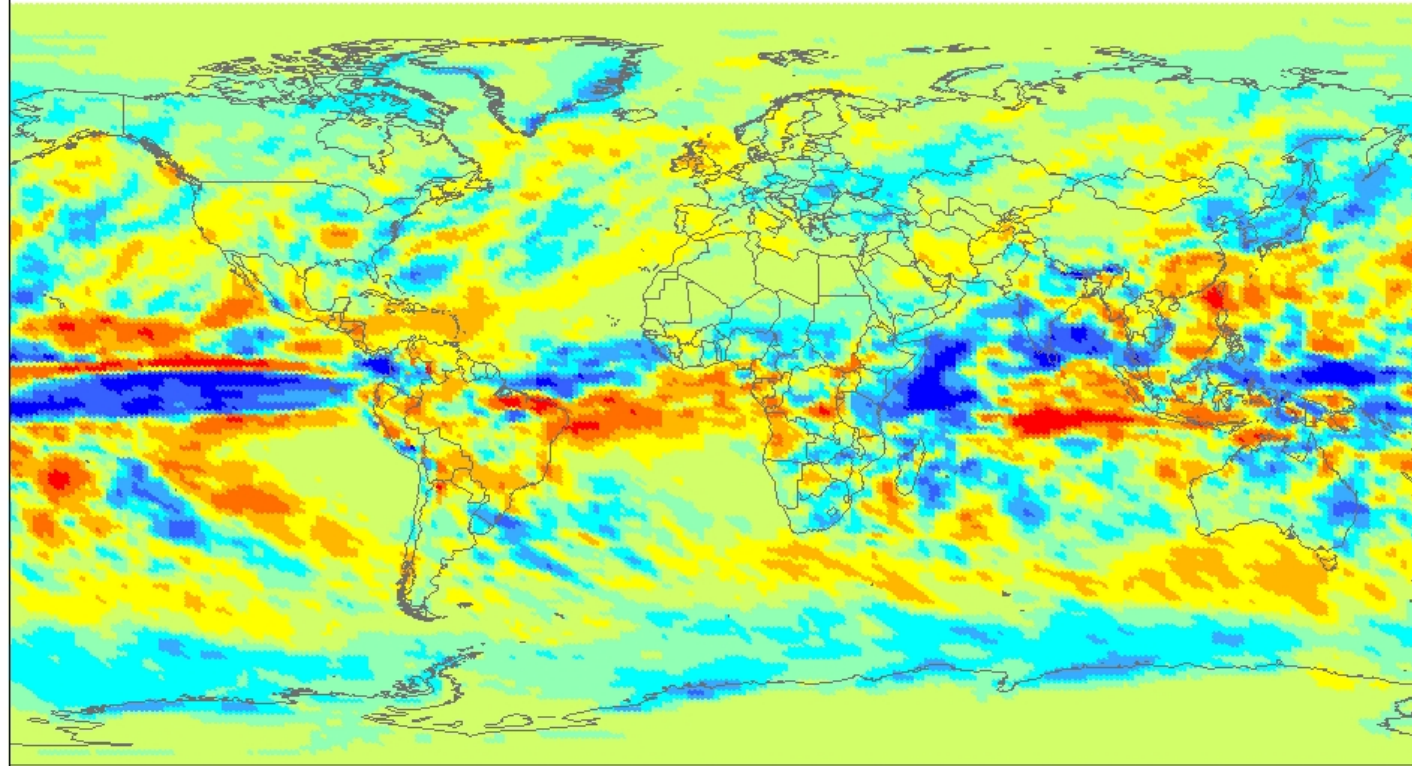
atas_2050_rcp85	1.18 - 1.44	2.49 - 2.97
atas20yave	1.45 - 1.74	2.98 - 3.56
-0.31 - 0.69	1.75 - 2.08	3.57 - 4.21
0.70 - 1.17	2.09 - 2.48	4.22 - 5.43

Projected Temperature Change 2011-2090



Projected Global Precipitation

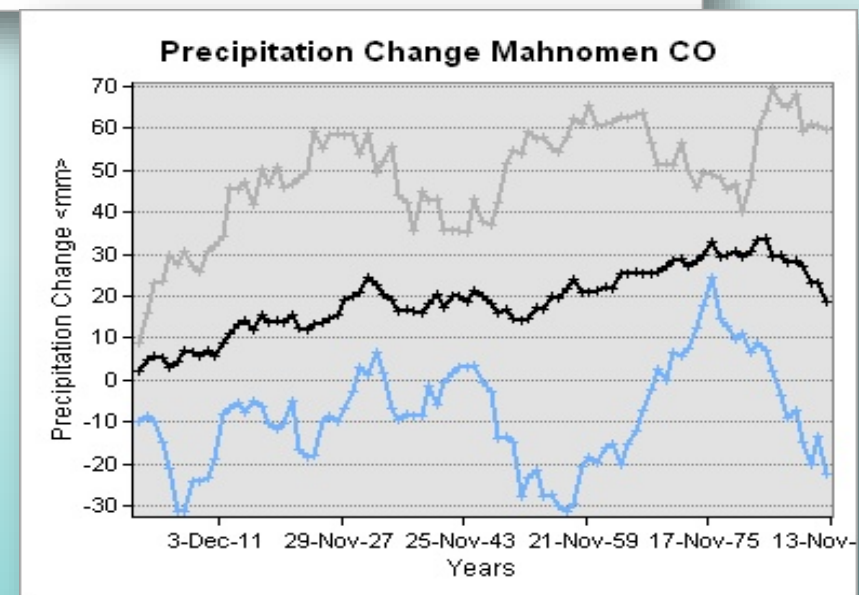
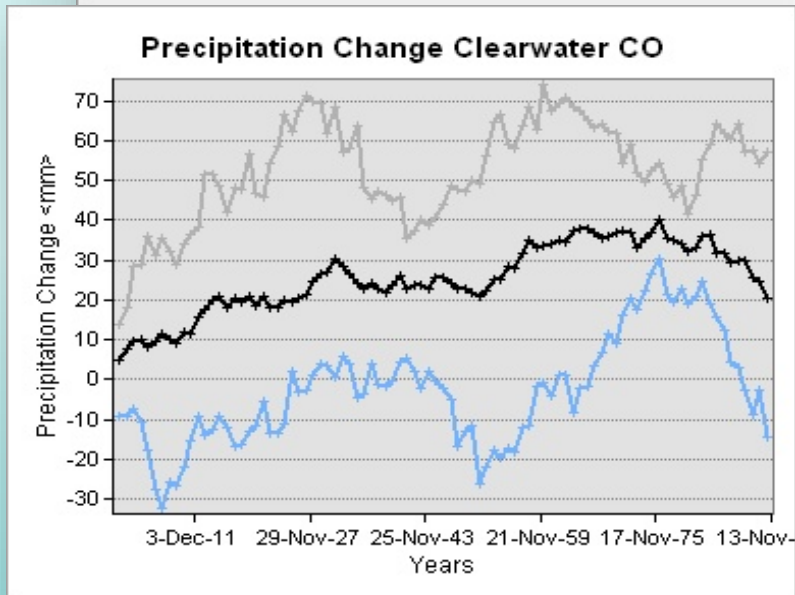
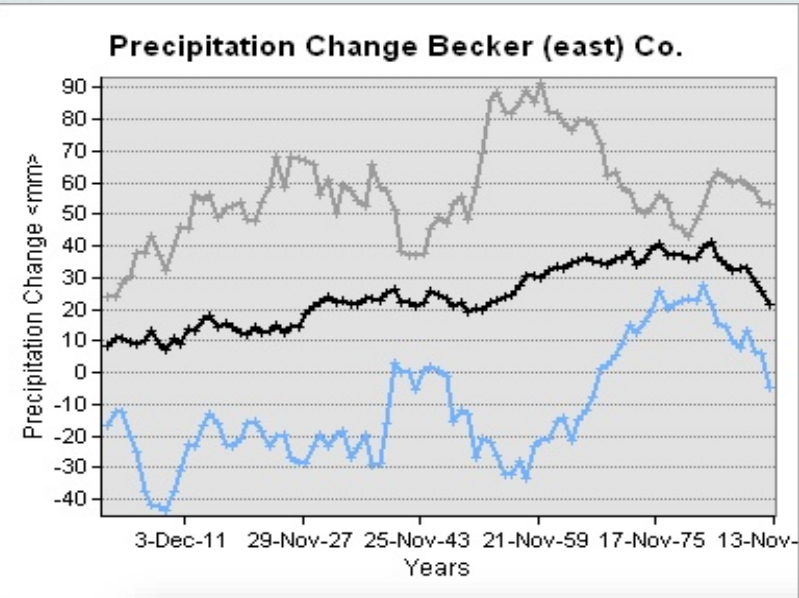
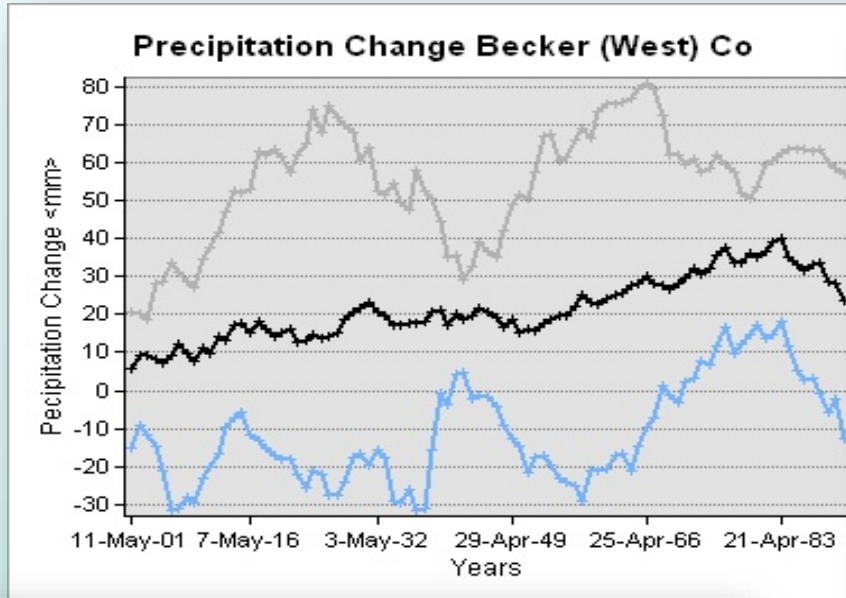
Annual Precipitation Annomaly 2050



Legend

appt20yave_Layer	● -19.84 - -9.30	● 8.79 - 16.46
appt20yave	● -9.29 - -2.13	● 16.47 - 28.59
● -98.25 - -39.60	● -2.12 - 3.36	● 28.60 - 45.37
● -39.59 - -19.85	● 3.37 - 8.78	● 45.38 - 107.76

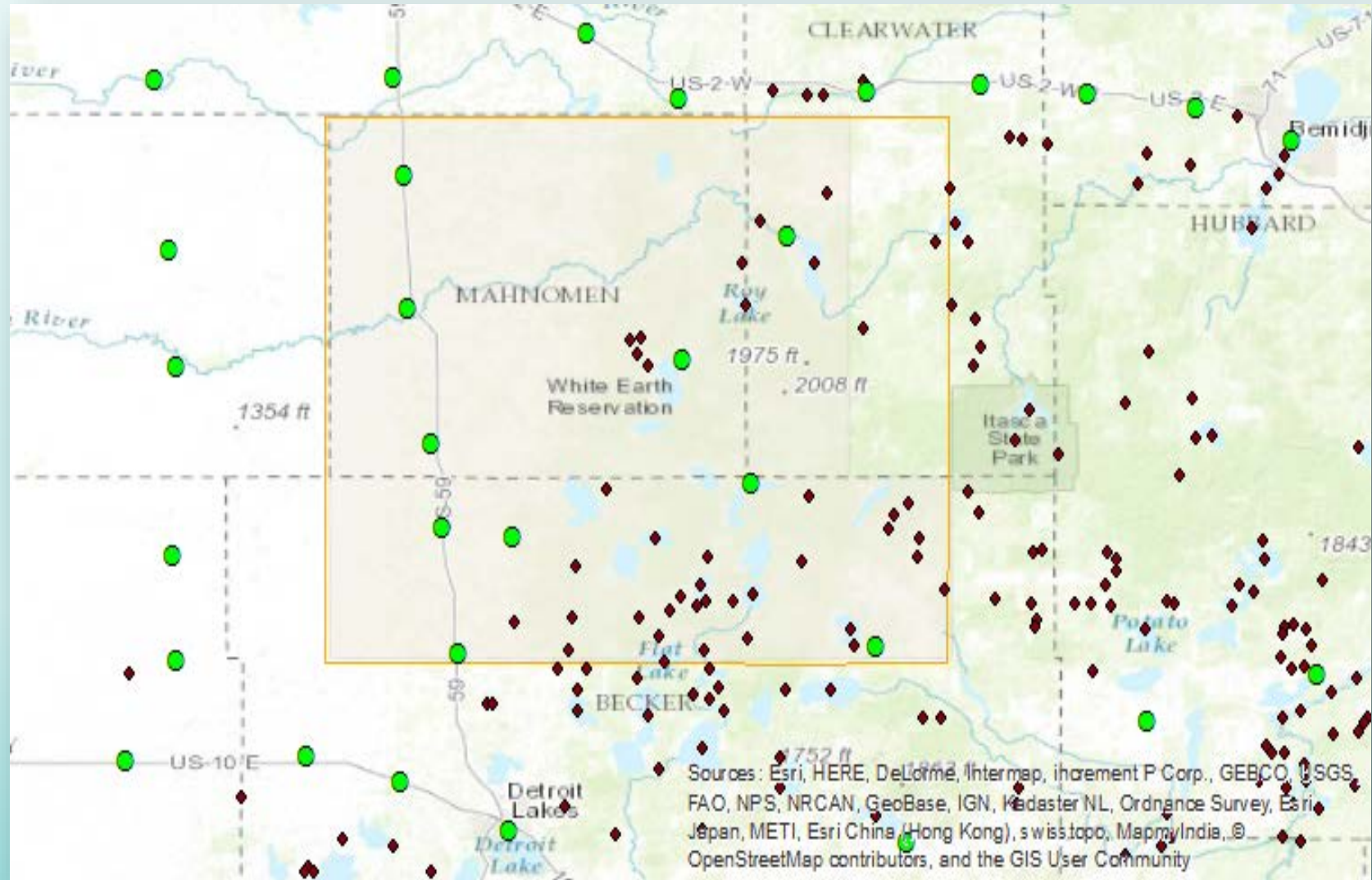
Projected Precipitation Change 2011-2090



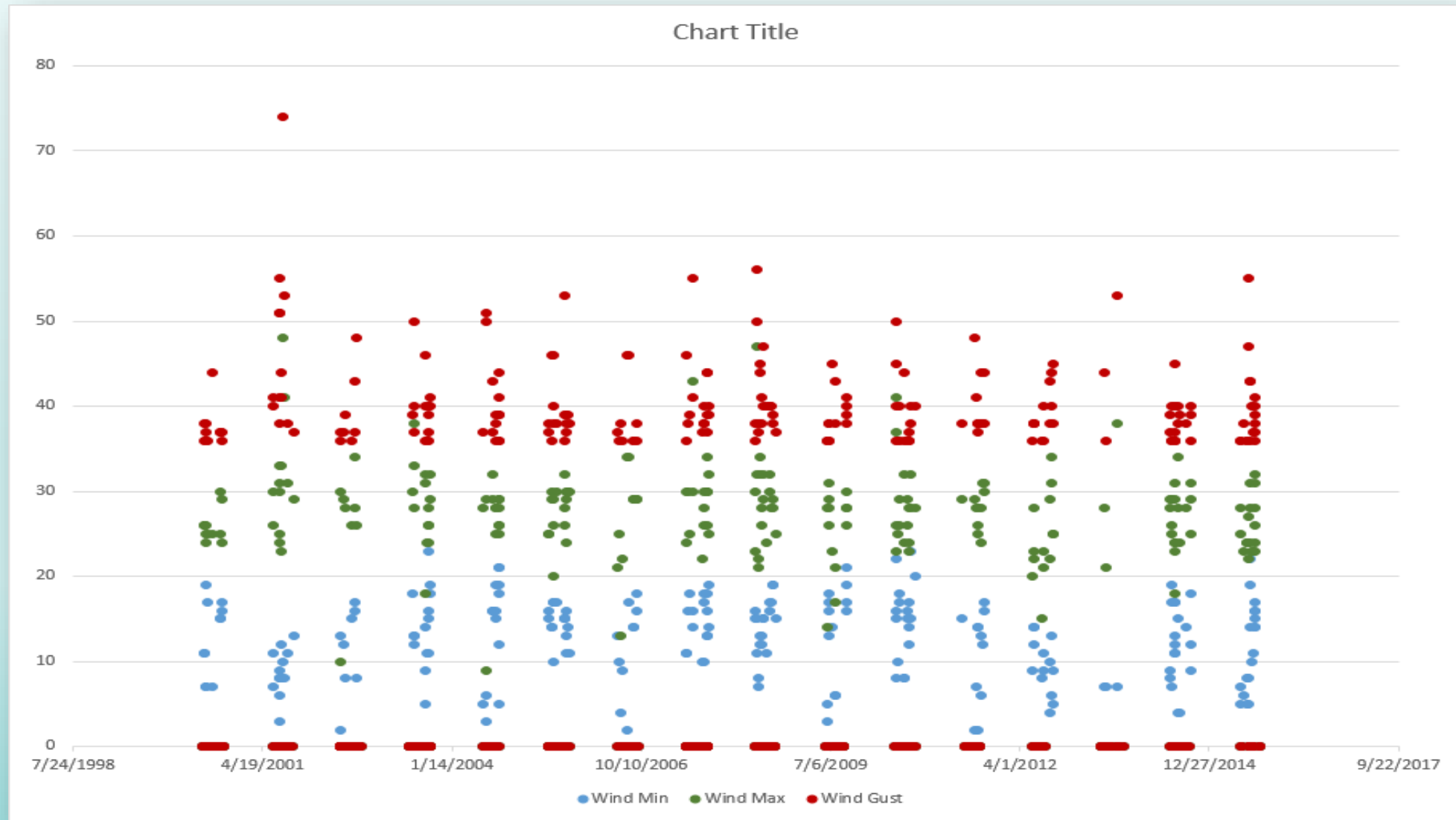
Extreme Weather Events Map

- Green Circles = Towns
- Red Triangles = Lakes with Wild Rice
- Yellow Border = White Earth Reservation

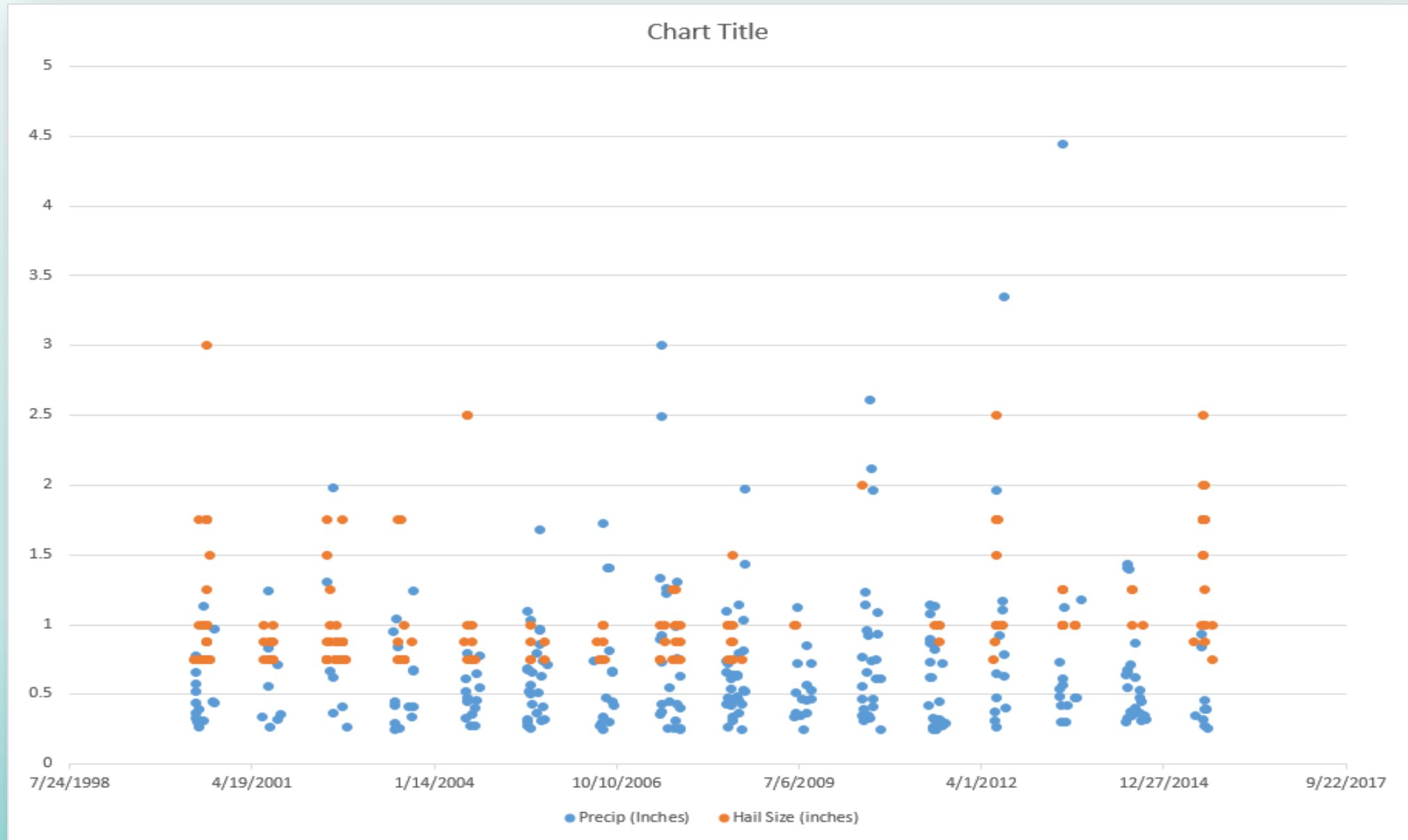
**some layers of the map are courtesy of Hannah Smith, Previous REU Intern*



Graphs of our Extreme Wind Events 2000-2015

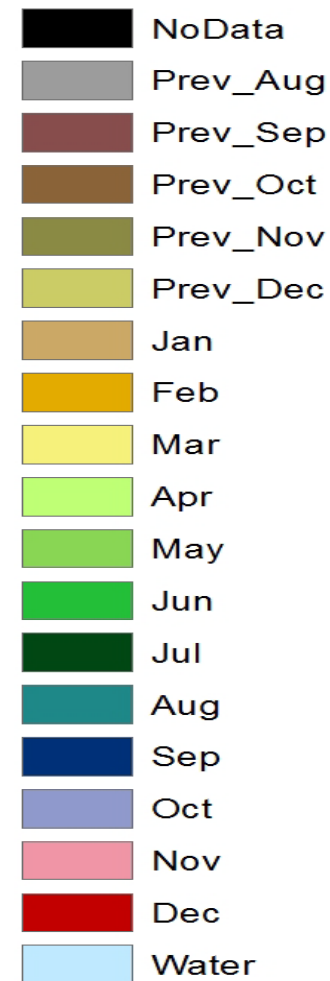


Hail and Extreme Precipitation Events 2000-2015



The Change in our Start of Season 1989-2015

Start of season



Wild Rice Traditional Knowledge

- This has been the hardest part of my research and is not concluded yet.




Recommendations for Future Work

- Ongoing research
- Projected rice productivity
- Develop wild rice production model
- Correlation of in situ data with extreme events
- Drought
- Improve monitoring
- Policies to protect wild rice





Literature Review

- Titley, David W., et al. *Attribution of Extreme Weather Events in the Context of Climate Change*. Washington D.C.: The National Academies Press, n.d. Print.
 - Peacock, Thomas, and Marlene Wisuri. "A Chapter Road Map." *Ojibwe Waasa Inaabidaa - We Look in All Directions*. Fourth ed. Afton MN: Afton Historical Society Press, 2006. 22-27. Print.
 - Personal communication; White Earth Department of Natural Resources, Ricing families, Community Elders, USDA Research team from Morris University.
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Acknowledgements

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- My beautiful daughters and grandson – Elaina, Emily and Carter – for all your patience and encouragement!
- My parents – Candace and Mauricio Trejos – for always teaching me to be a voice for what I believe in!
- * (Names of Ricers and Elders will be added after the data is compiled.)
- ** *Pictures courtesy of Toni Umana and Google Images*

?? Questions ??



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That is all,
Thank you

