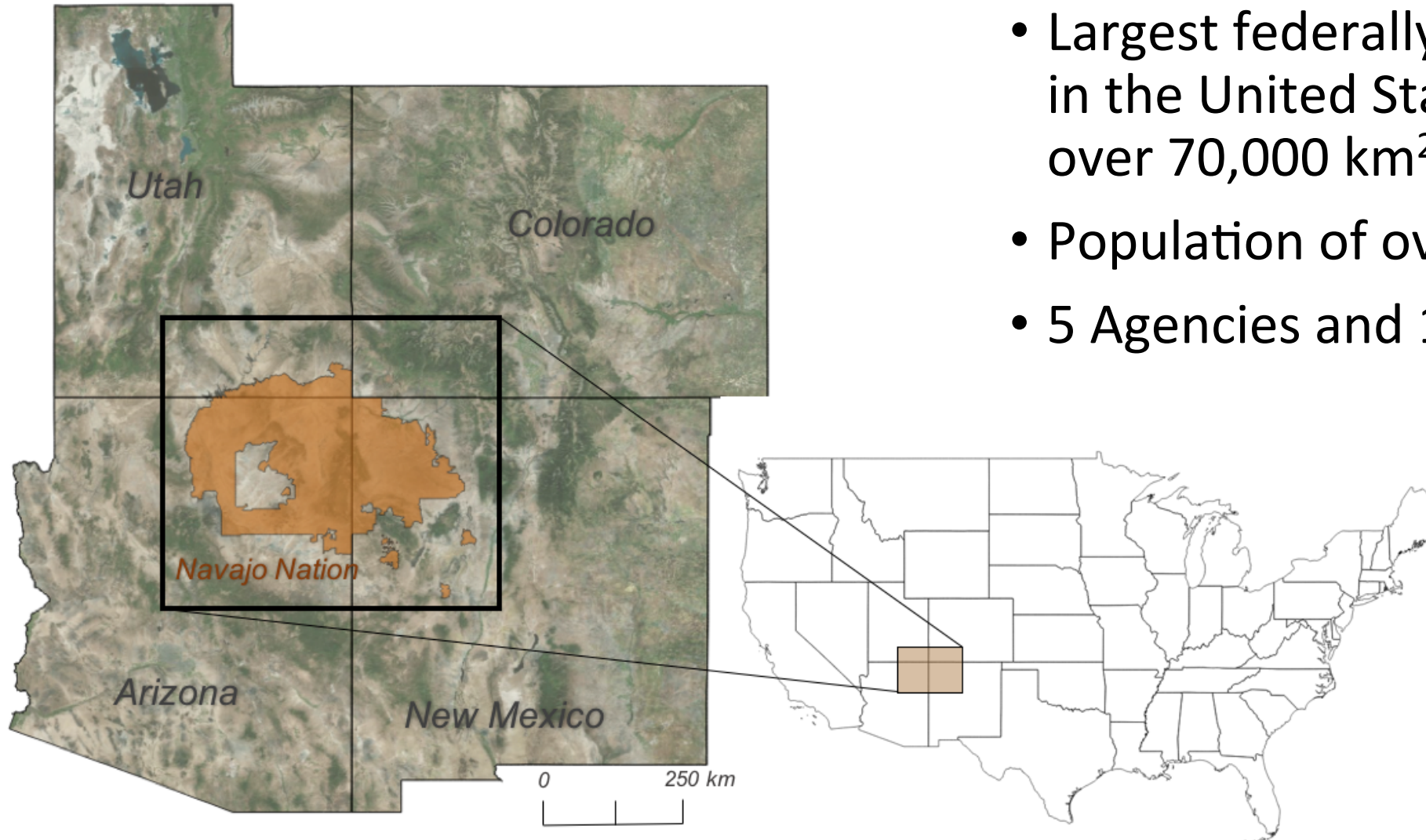


A large natural rock archway in a desert landscape. The arch is made of reddish-brown sandstone and frames a view of a blue sky. In the foreground, there are green trees and dry grass. A semi-transparent white text box is overlaid on the center of the image.

Satellite-based Drought Reporting on the Navajo Nation

Amber Jean McCullum PhD
Rachel Green
Carlee McClellan

Introduction: The Navajo Nation



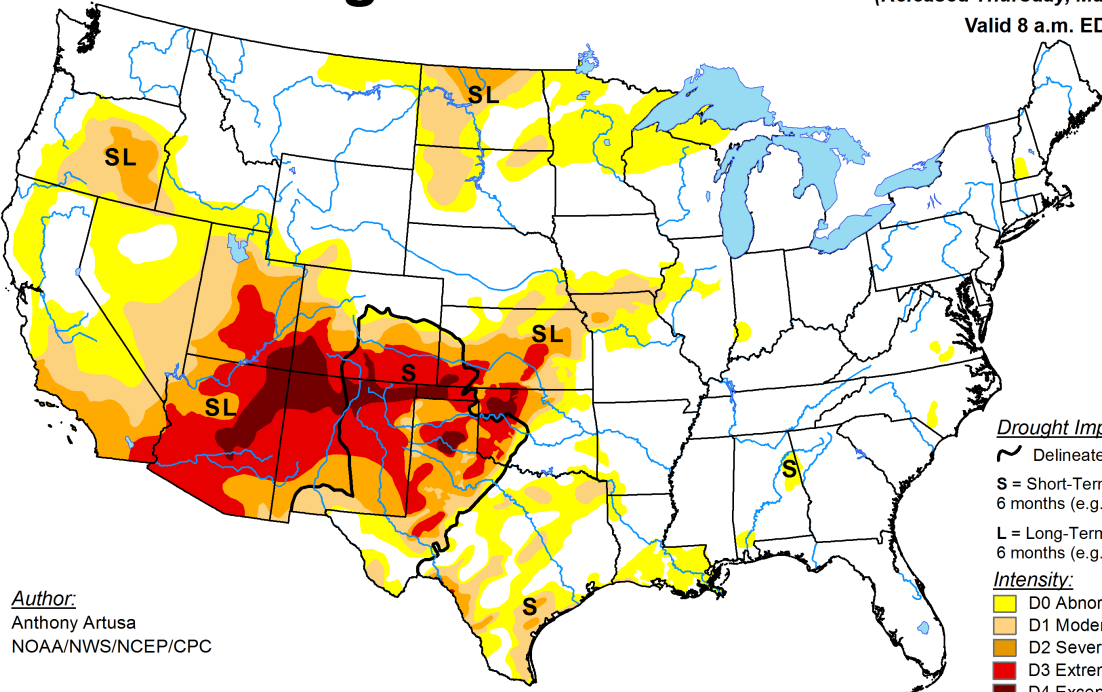
- Largest federally-recognized tribe in the United States in land area: over 70,000 km²
- Population of over 200,000
- 5 Agencies and 110 Chapters



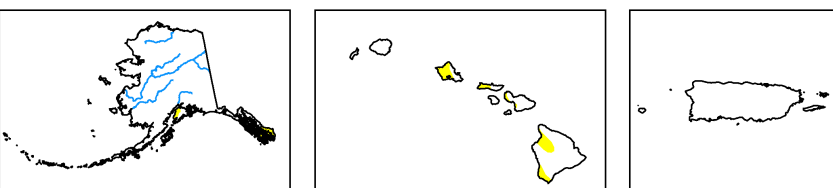
Introduction: Drought

U.S. Drought Monitor

May 29, 2018
 (Released Thursday, May 31, 2018)
 Valid 8 a.m. EDT

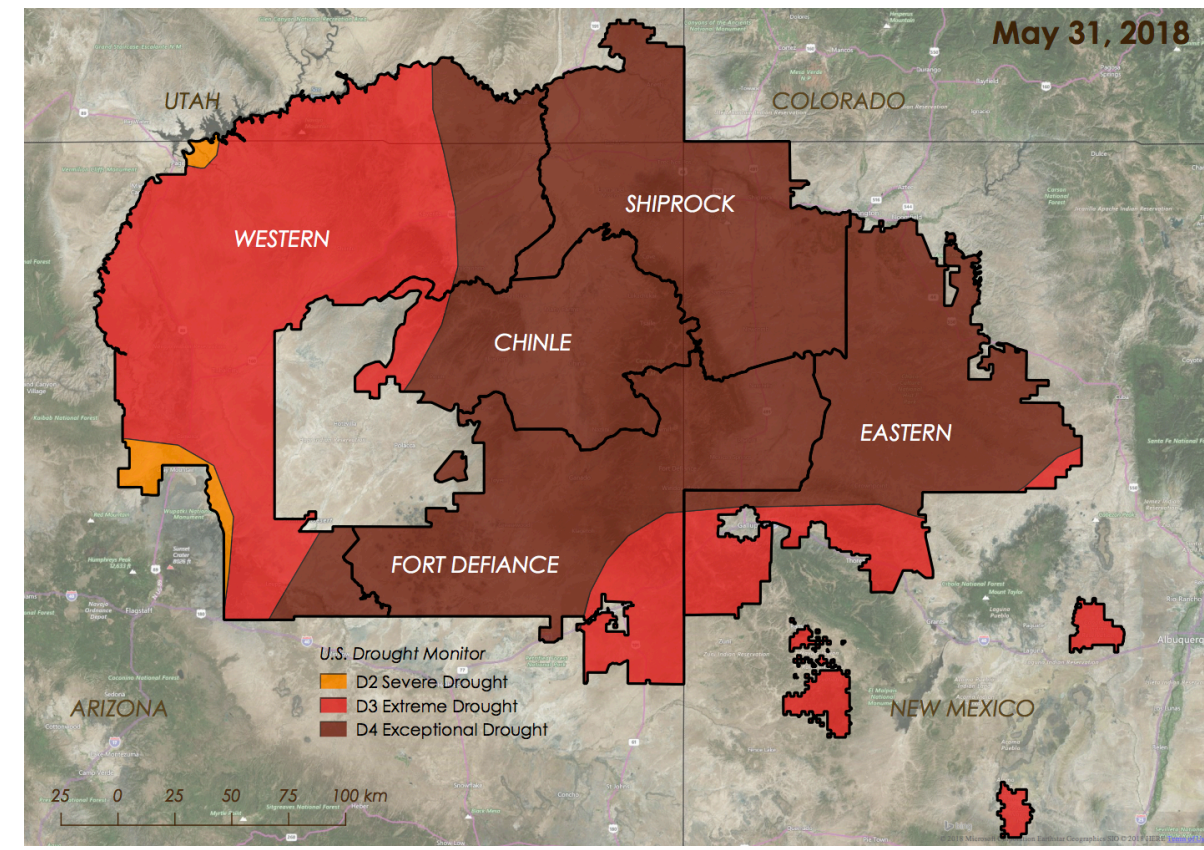


Author:
 Anthony Artusa
 NOAA/NWS/NCEP/CPC



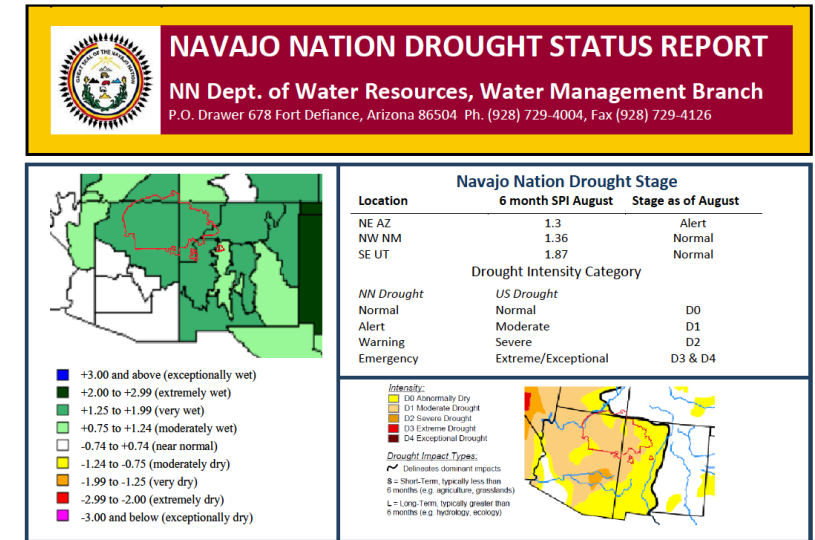
<http://droughtmonitor.unl.edu/>

The Navajo Nation: Prone to frequent and pervasive droughts



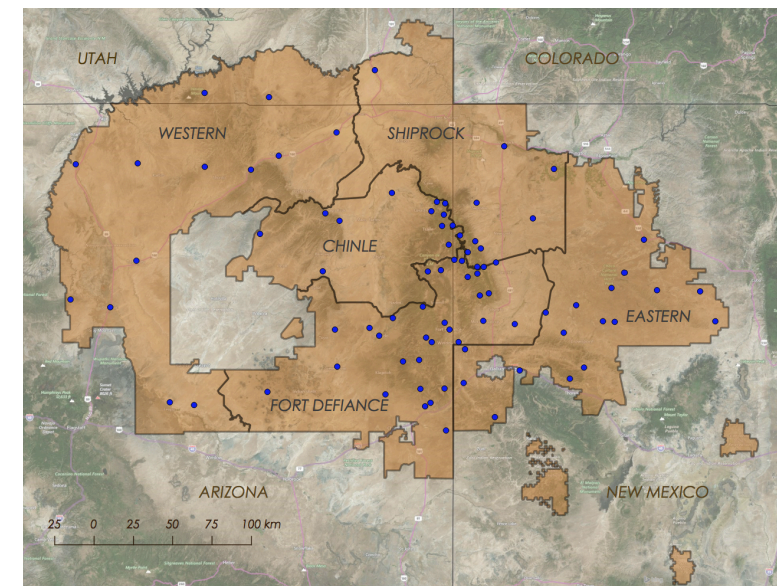
Introduction: Drought Reporting

- Navajo Nation Department of Water Resources (NNDWR) conducts monthly and annual drought assessments
 - Limited *in-situ* data
 - Coarse spatial resolution of regional drought indicators
- Reports to the Navajo Nation Commission on Emergency Management (NN CEM)
 - Drought Contingency Plan
 - Declare drought designation
 - Mitigation and action plans to reduce risk in advance of drought



6-Month SPI for August 2015 www.wrcc.dri.edu

September 30, 2015 U.S. Drought Monitor <http://droughtmonitor.unl.edu/>

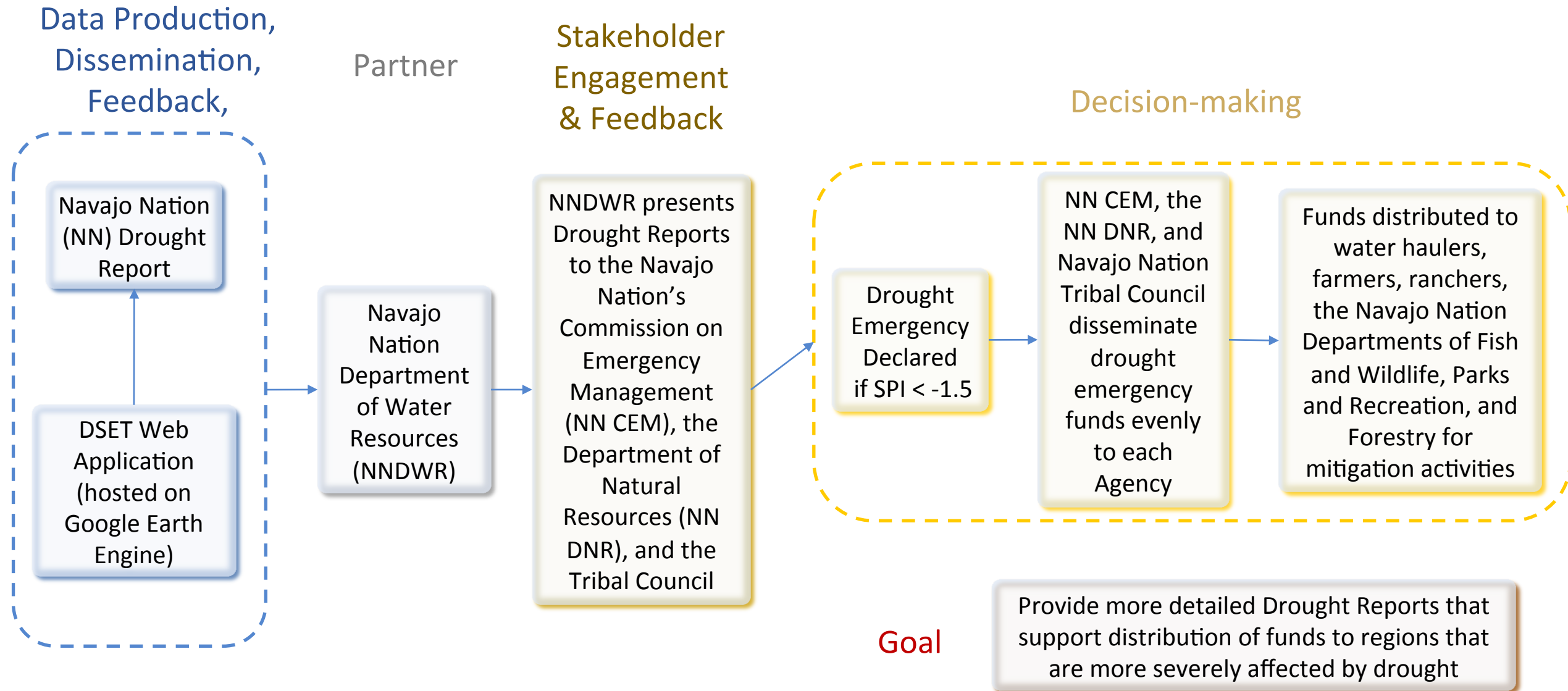


Introduction: Task Overview

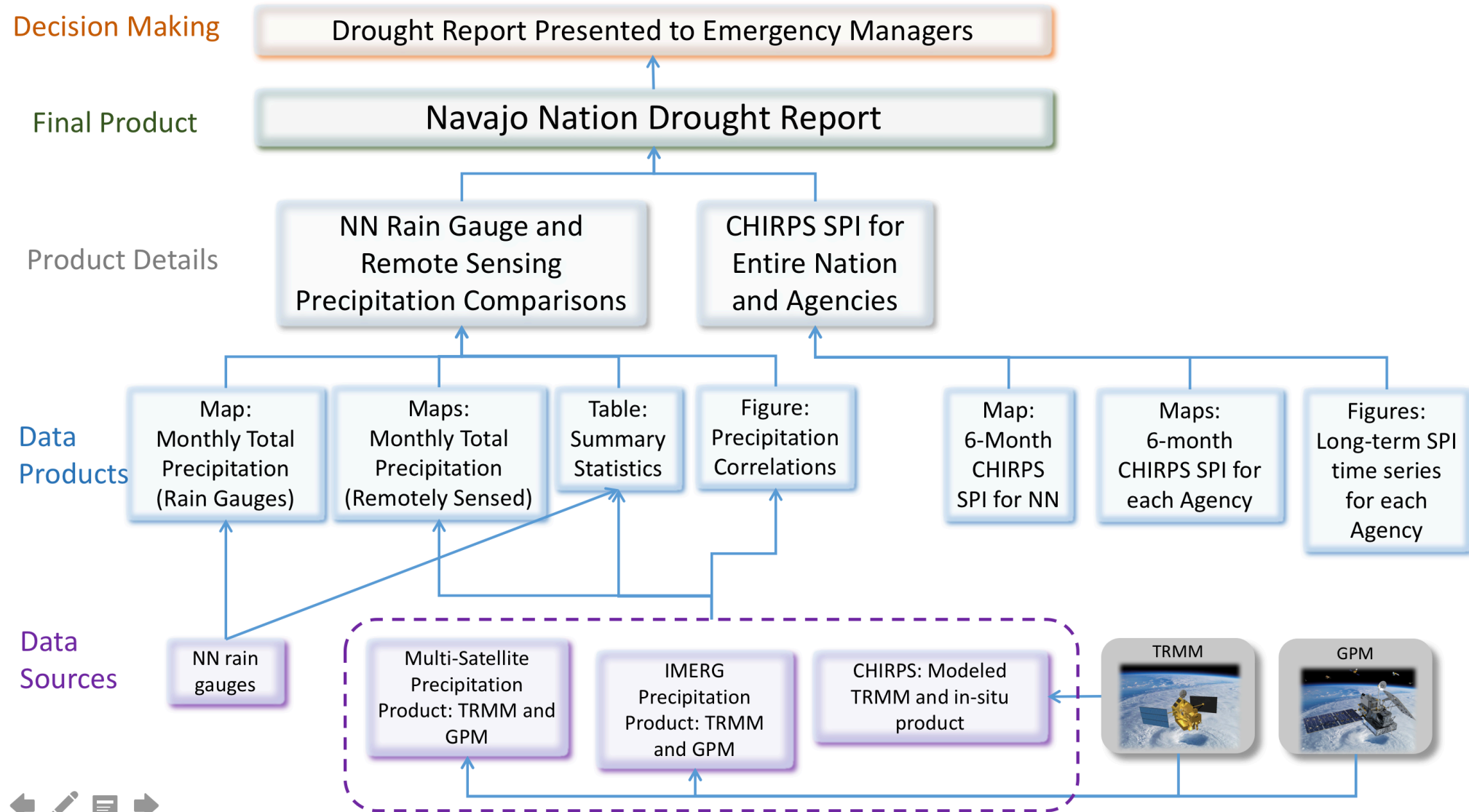


Vision	Improve NNDWR drought reporting through Earth Observations and <i>in-situ</i> data within a user-friendly web application
Objectives	<ul style="list-style-type: none">• Compare NNDWR in-situ data with remotely sensed and modeled data• Create the Drought Severity Evaluation Tool (DSET) as a web-application for the Nation that integrates: (1) integrates precipitation data from multiple sources, (2) generates drought indices, (3) produces maps and time series analyses of drought indicators for administrative boundaries on the Nation
Geographic Domain	The Navajo Nation: In the states of Utah, Arizona, and New Mexico
Project Partner	The Navajo Nation Department of Water Resources (NNDWR)
Decision-Maker(s)	Navajo Nation Commission on Emergency Management (NN CEM), the Navajo Nation Division of Natural Resources (NN DNR), and the Navajo Nation Tribal Council
Decision(s) Targeted	Drought emergency declarations and the dissemination of drought relief funding

Introduction: Information Flow



Introduction: Product Generation

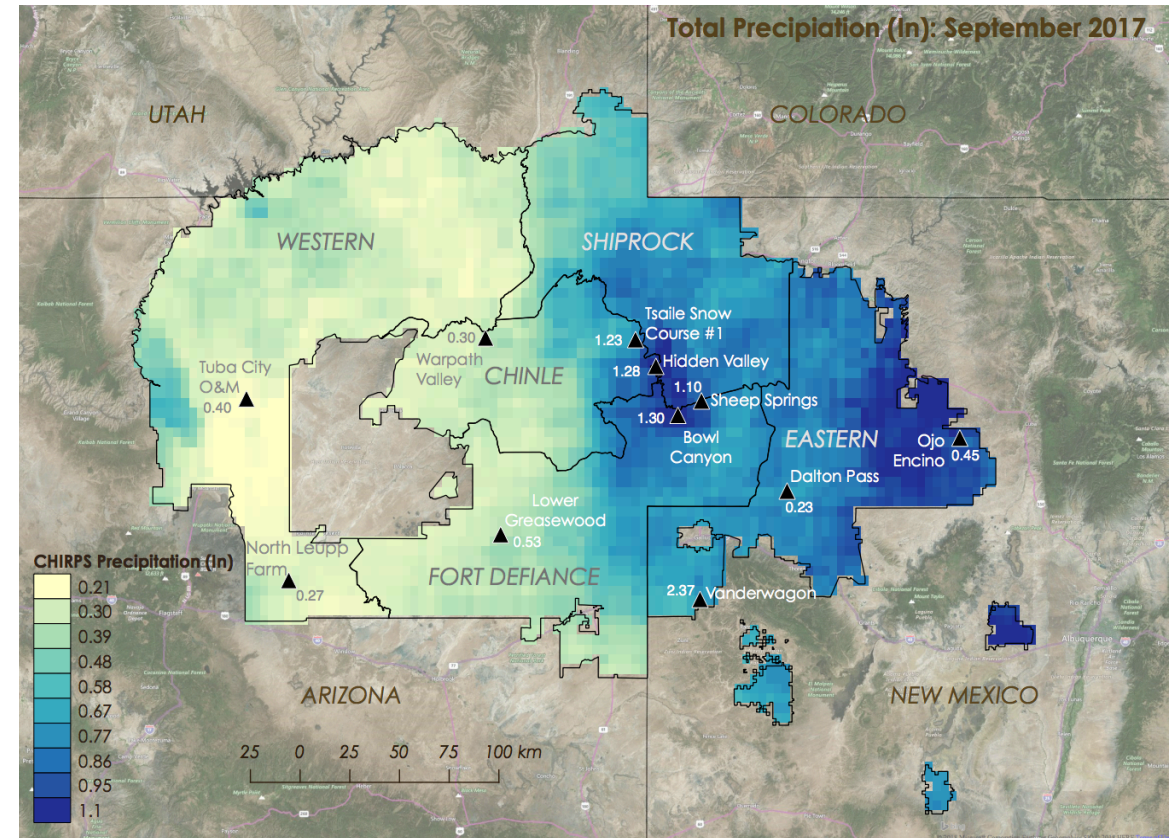


Key Accomplishment Highlight - Technical



- 11 NNDWR rain gauges
 - Down-selected based on record length, consistency, and location
 - Date Range: January 2011-December 2017

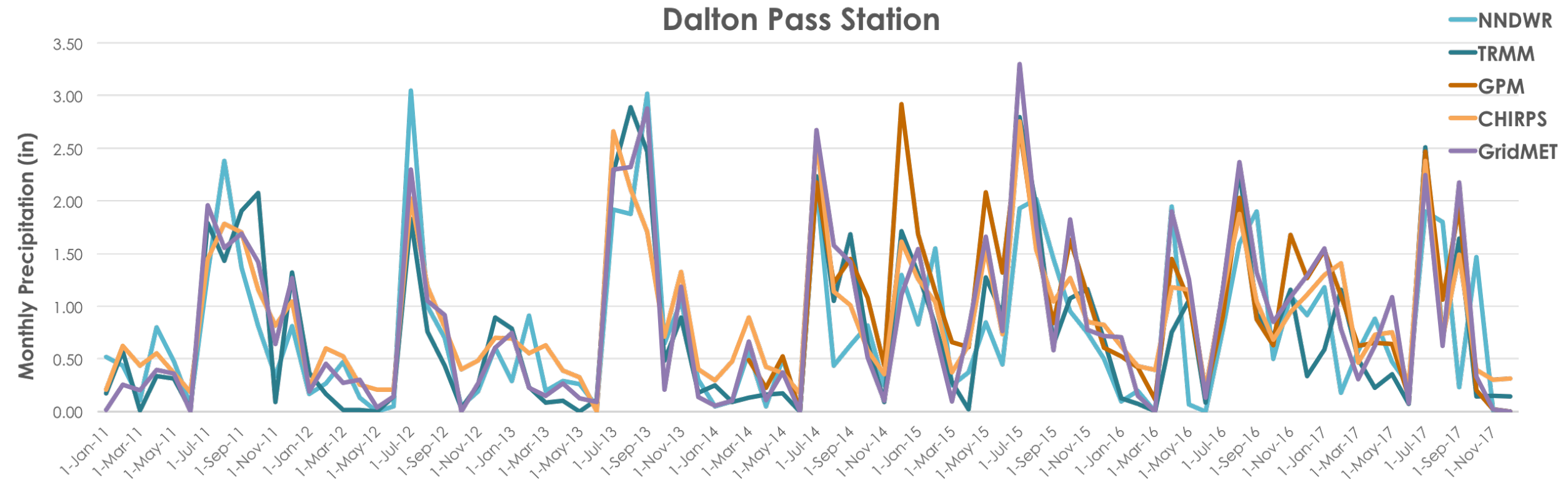
- Monthly total precipitation comparisons:
 - NNDWR rain gauges vs. CHIRPS (pixel location)
 - Agencies vs. CHIRPS (average totals for region)
 - Chapters vs. CHIRPS (average totals for region)



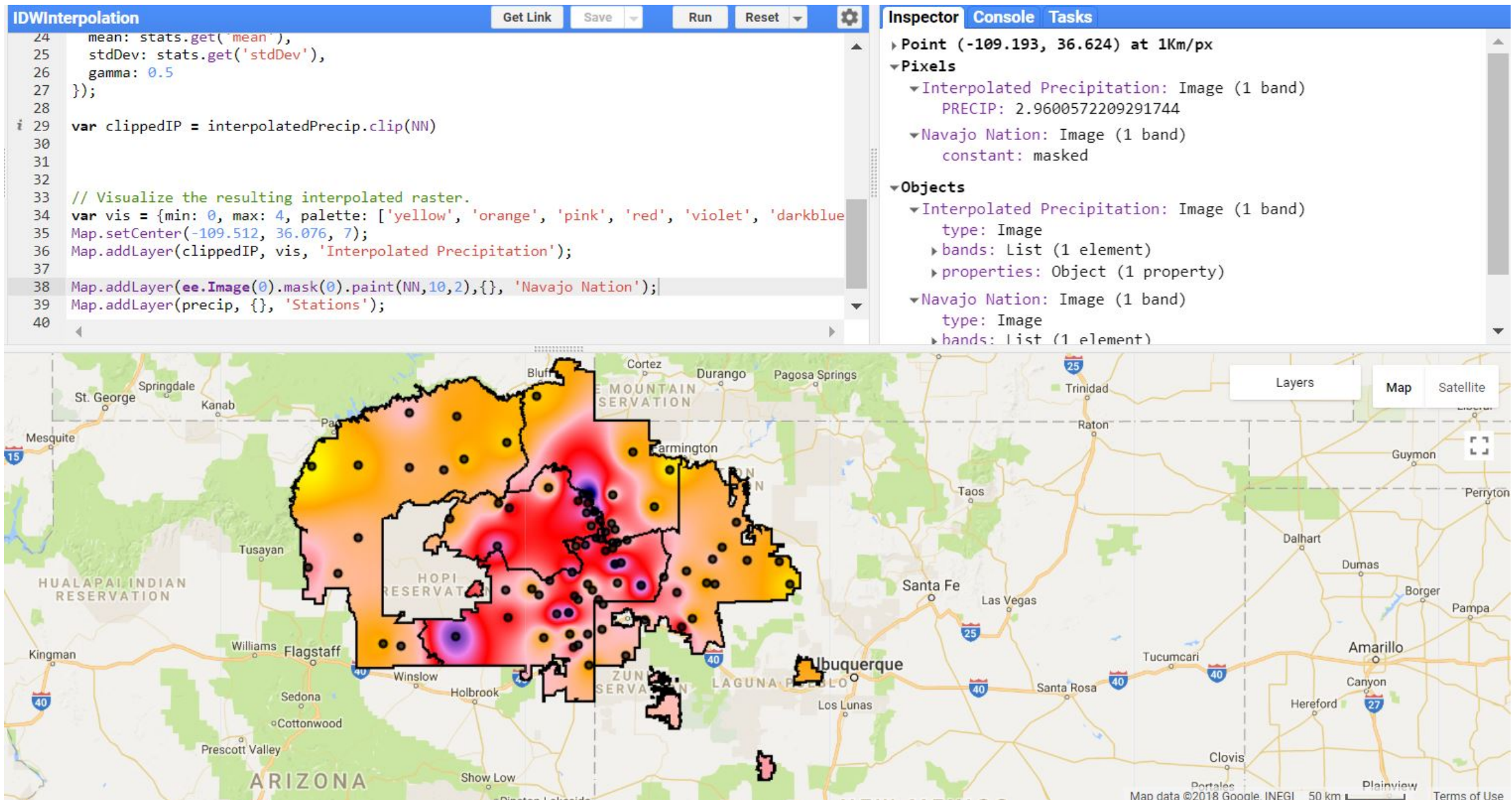
Key Accomplishment Highlight - Technical



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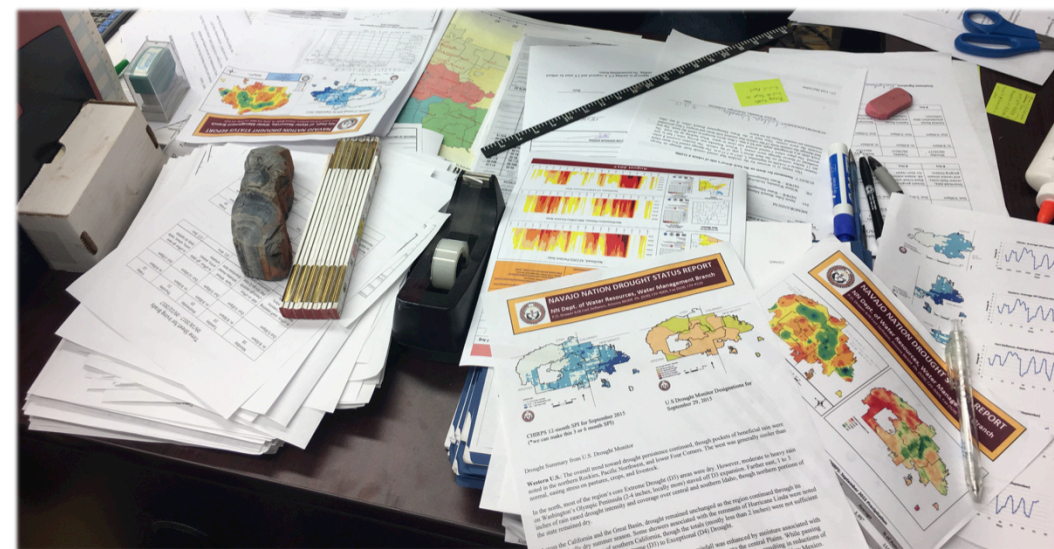


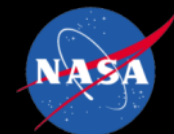
Key Accomplishment Highlight - Technical



Key Accomplishment Highlight - Stakeholder

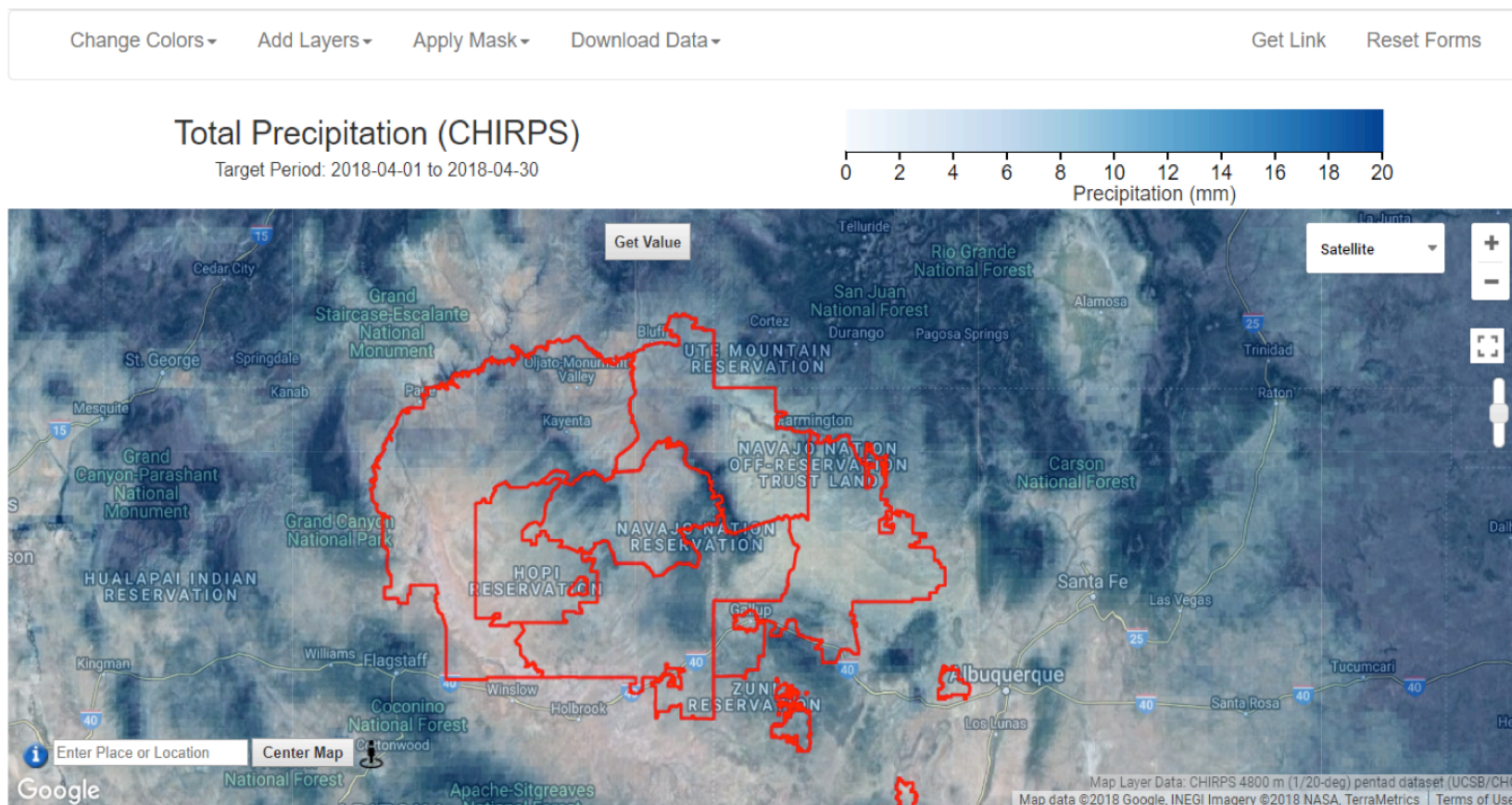
- 2 visits with NNDWR
 - Examined rain gauge data collection
 - Obtained rain gauge data for comparison with remote sensing sources
 - Discussed current techniques for comparisons and future ideas
 - Created mock outputs and desired features list for DSET
 - Presented at the New Mexico Geographic Information Council Annual meeting in Albuquerque





Key Accomplishment Highlight - Transition

- Currently formalizing partnership with the Desert Research Institute (DRI) to create a spin-off page of the Climate Engine Web Application for DSET



Justin Huntington and Britta Daudert

Next Steps and Anticipated Outcomes



- Continue to work with DRI and NNDWR partners
- Continue comparisons of NNDWR rain gauge and remotely-sensed and modeled data
- Integrate NN administrative boundaries and NNDWR rain gauge data into DSET
- Generate 6-month SPI values for NN administrative boundaries using CHIRPS in DSET
- Generate time series of data for drought reporting in DSET
- Beta DSET tool testing and revisions based on partner requests



Thank You Questions?

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