Custom, automated climate reports for the Kaibab National Forest

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Support from SW Climate Adaptation Science Center

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Climate MicroApps: Assessment and Innovation in Climate Decision Support Tools for Land Managers

View

Principal Investigator : Michael Crimmins

Dates

Release Date : 2022
Start Date : 2022-09-01
End Date : 2023-08-31

Summary

The quantity and availability of weather- and climate-related data has grown dramatically over the past decade due in part to improvements in computing speed, internet bandwidth and data visualization tools. Ideally, these improvements should help information reach experts in the relevant domain and inform decision making, leading to better weather- and climate-related decision-making and risk management. Decision support tools (DSTs) often serve as the intermediary between raw data and actionable information and decision making. The design of these DSTs is critical to ensure they present actionable information for a wide variety of potential users. This can lead to mis-specified tools with a 'one size-fits no one' problem where the generic functions in weather and climate DSTs are not sufficiently focused on discrete data-driven information needs.

In this project, we propose to examine open source, data access development tools that promote use of increasingly diverse weather and climate datasets, and to leverage these tools in the creation of new DSTs and climate services. Information System (RCC-ACIS) and open source development tools like R-Shiny can be brought together to quickly prototype custom data access and visualization tools for specific purposes based on the needs expressed by natural resource managers in mix of formal interviews, informal conversations, and survey responses. This mode of climate services development has the potential to quickly and flexibly connect an ever-increasing array of climate data and information to managers who have little time to learn complex decision support tools, but who decidedly want to incorporate these information into their decision making and planning.

Child Items

Colorado River; Credit USGS

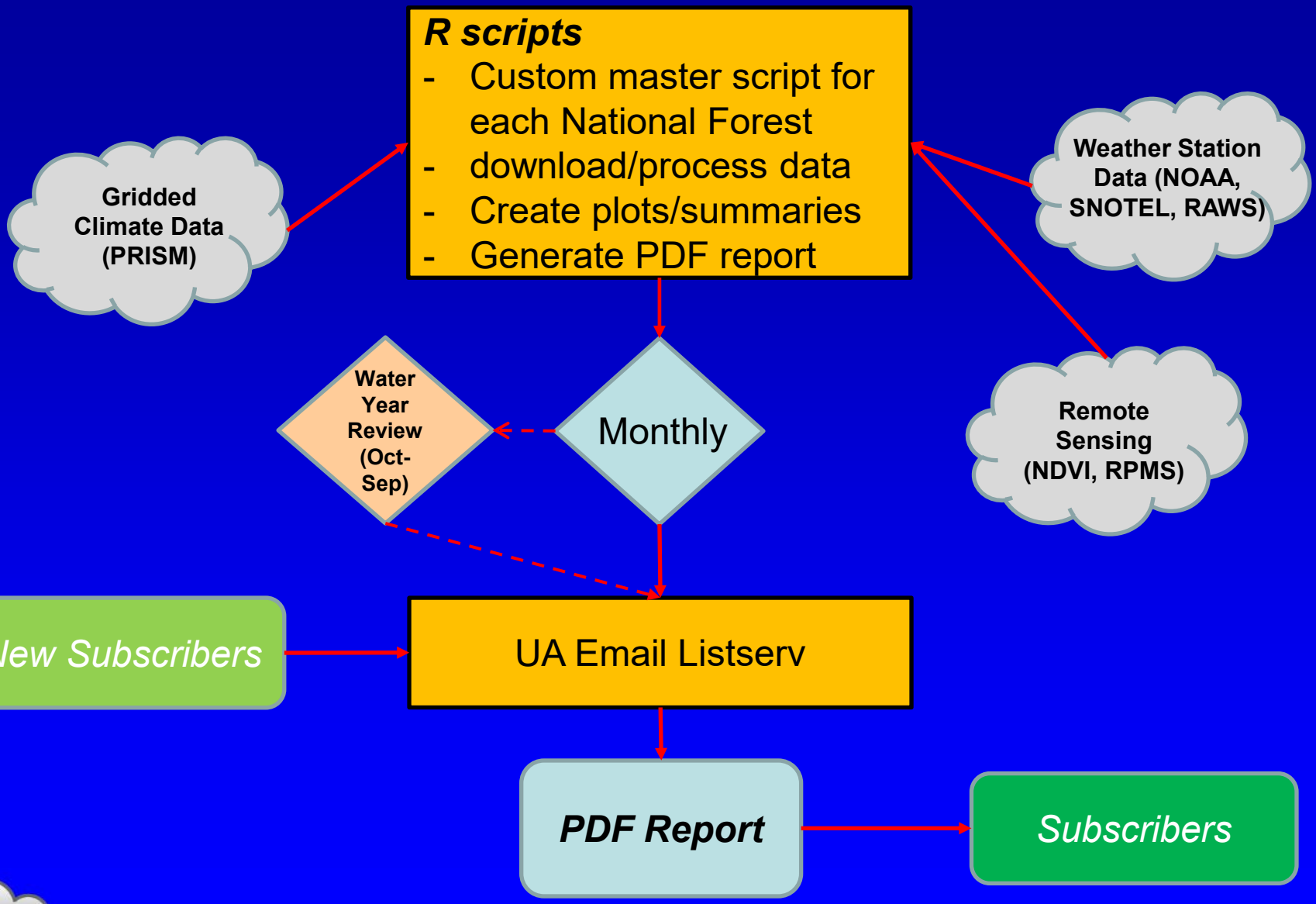
Map »

- 1-year of funding to innovate and test new climate service approaches (2022-2023)

Automated Reporting

- Advances in data science and business analytics have made automated reporting tools easier to use
- Weather and climate data has also become easier to access and more timely
- A land manager (USFS-KNF) approached us in September 2022 with this very idea of automated climate reporting!

How does it work?



Data and Indices

- Gridded Climate (PRISM, 4km): Monthly Precipitation, Min/Max Temperature, drought indices
- Weather Stations (NOAA, SNOTEL, RAWS…): Daily temps, precip, snow depth/water, RH, wind, fire danger indices
- Remote sensing: vegetation indices (NDVI, RPMS), snow cover, soil moisture estimates…
- Other data types…? (any data that are automatically posted online)

Report Components

- Maps and summary stats of seasonal drought index values, temp and precip rankings (flexible season definitions)
- Summary tables of station data
- Maps of vegetation condition and/or other remote sensing products
- Updated monthly, longer water-year summary in October (with annual climate change metrics including trends and rankings)
- Supporting web page with interactive maps and data tables

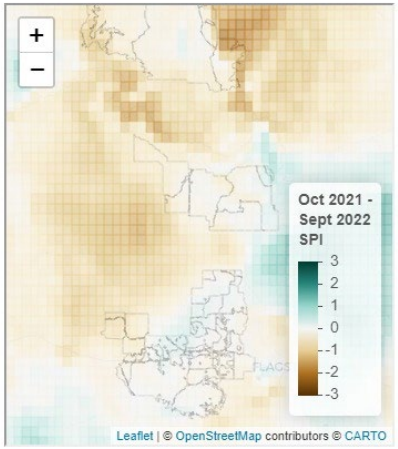
Kaibab National Forest Monthly Climate Updates

Updated: 03-15-2023

This page hosts recent and past climate update reports focused on the Kaibab National Forest (KNF) in northern Arizona. These reports detail recent climate and drought conditions across the KNF using various data sources including interpolated temperature and precipitation data (PRISM Climate), weather station observations (RCC-ACIS), and vegetation condition estimates from remote sensing products (RPMS). Data are accessed from these various sources and then summarised into a series of maps and tables that update automatically to produce current season reports the first week of each month and then again for the entire previous water year in early October. Past reports are posted below in printable PDF format and as an interactive HTML page.

You can sign up to the KNF Climate Update listserv to get monthly updates through the following steps:

- Send an email to list@list.arizona.edu with the following elements in the subject line… "Subscribe knf_drought_and_climate_reports FirstName LastName" (Replace FirstName and LastName with your own name).
- OR email Mike Crimmins to have your email address added to the listserv.



Monthly Updates

▶ **2022**
▶ **2023**

Water Year Reports

- Oct 2019 - Sep 2020
- Oct 2020 - Sep 2021
- Oct 2021 - Sep 2022

https://cals.arizona.edu/climate/reports/KNF/

Kaibab National Forest Climate Report: October 2021 - September 2022

Highlights

- Average 12-month Standardized Precipitation Index (SPI) for Kaibab National Forest was **-0.21** (Near Normal).
- Average precipitation was 16.73 inches, which was -1.2 inches different from the long-term average. This value was the 55th driest year on record (128 years).
- Average temperature was 51.4 degrees F, which was 2.06 degrees F different from the long-term average. This value was the 9th warmest year on record (128 years).

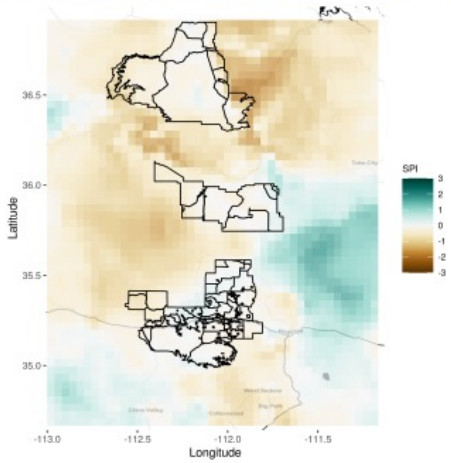


Figure 1: Drought Status for the Kaibab National Forest (Oct 2021 -Sept 2022, 12mo. SPI)

Table 1: KNF District-level Summary Statistics

District	Minimum SPI	Mean SPI	Maximum SPI	%Area SPI<-1	Total Precip [in.]	Precip Anom [in.]
North Kaibab	-1.95	-0.38	0.26	8	16.14	-1.80
Tusayan	-0.89	-0.17	0.4	0	14.38	-0.99
Williams	-0.8	-0.08	0.39	0	19.66	-0.80

Note:
2022 water year (Oct - Sept) SPI and climate statistics for each district within the Kaibab National Forest. Statistics are calculated based on the average of all SPI grid cells lying within a district boundary.

KNF Climate Report - University of Arizona