

HUC-12 Project
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Status of the HUC-12

Project History

The hydrologic Unit Code (**HUC-12 #102500060403**) part of the Stinking Water Creek in the Republican River basin was selected for the demonstration because it is an enclosed watershed. That means no water comes in or goes out except for precipitation and evapotranspiration. (HUC 12 Picture)

The area in the HUC 12 has the following land uses based on 2017 information: Irrigated acres 10,027, 15,475 acres of rain fed crops and 7957 acres of pasture, CRP, buildings shelter belts and roads for a total of 33,459 acres in the project.

The Project goals:

The project objective is to accurately measure precipitation, evapotranspiration (ETm) and ground water storage in the watershed. The enclosed HUC 12 watershed site eliminated many of the variables making it easier to assess and quantify.

Included in the project is a menu on the URNRD website (Beta testing) that makes available to growers the current ETm and 7-day projections or ET. This information should be helpful in managing the growers irrigation scheduling. The 7-day forecasts of ETo will be developed using state-of-the-art machine learning techniques.

The ETm data will provide ground-truth measurements to calibrate and verify ET estimates based on satellite and aircraft-based imagery that will permit the NRD's to accurately quantify real time consumptive water use for the NRD's on a daily basis.

Current Project Management

The HUC-12 project is being managed jointly by NEWBA , the URNRD and the UNL Daugherty Water for Food Institute (DWFI),

- DWFI is currently collecting and analyzing data from the LI-COR Eddy Covariance (EC) flux station, which has been functioning and collecting data for approximately a year now.
Currently three additional EC towers are being planned for 2020-2021.
- The DWFI Parallel-41 Team is responsible for acquiring and analyzing satellite data and combining it with ETm data. Measured ETm data, and eventually regional modeled ET results, will be provided through the Parallel 41 and URNRD websites.
- Residue measurements by NRCS. Not implemented yet.
- ET gauges and other common weather stations that measure reference evapotranspiration (ETO) are partly installed and functional.

- Satellite imagery will be used in conjunction with local weather data and ETm measurements to provide verified ET estimates over the entire watershed area. Air Scout fly overs can provide higher spatial and temporal resolution and will start after remaining LI-COR stations are installed and funding is secured.
- Education and promotions will be provided by WCR&E, URNRD and NEWBA.
- The collection of information from grower decision makers will be coordinated with NEWBA.
- A proposal by DTN *on installation of a comprehensive* weather station network along with meteorological modeling to better quantify precipitation over the watershed is being considered, but it is subject to available funding.
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Time Table

Because of funding the HUC-12 project is running a year behind schedule; however, the data collected by the LI-COR weather station is currently being evaluated and some of the data is being transferred to the URNRD website.

2020

Subject to funding

- Add 3 LI-COR Eddy Co-variance weathers stations to selected sites.
1 for \$9000.00 The balance of the additional stations is under discussion.
- Collect weather station data from existing weather stations that are capable of measuring ETo and compare the information with the LI-COR stations for reliability.
- Consider the DTN proposal to manage up to 27 additional weather stations to better quantify precipitation \$56,784.00
- Coordinating with the URNRD to put ETo data on the website that includes a 7-day forecast of ETo and ETm based on the measured crop coefficients through the flux towers and remote sensing.
- Contract approximately 10 Air Scout fly overs per growing season to get high resolution digital, thermal and NDVI imagery. The objective is to get an accurate assessment of growing crop health and the progression of the crop coefficient. \$23,000.00
- Do Residue measurements.
- Collect ET gage and precipitation data from participating growers on a weekly basis.
- Miscellaneous out of pocket labor costs. 10,000?

Total \$98,784

2021

- E additional LI-COR units \$155,000?
 - Collect weather station data from existing weather stations that are capable of measuring ETo and compare the information with the LI-COR stations for reliability.
 - DTN manage 27 weather stations to better quantify precipitation and forecasts \$44,634
 - Coordinating with the URNRD to put ETo data on the website that includes a 7-day forecast of ETo and ETm based on the measured crop coefficients through the flux towers and remote sensing.
 - Contract approximately 10 Air Scout fly overs per growing season to get high resolution digital, thermal and NDVI imagery. The objective is to get an accurate assessment of growing crop health and the progression of the crop coefficient. \$23,000.00
 - Do Residue measurements.
 - Collect ET gage and precipitation data from participating growers on a weekly basis.
 - Miscellaneous out of pocket labor costs. 10,000?
- Total \$232,634

2022

- Collect weather station data from existing weather stations that are capable of measuring ETo and compare the information with the LI-COR stations for reliability.
 - DTN manage 27 weather stations to better quantify precipitation and forecasts, \$44,634
 - Coordinating with the URNRD to put ETo data on the website that includes a 7-day forecast of ETo and ETm based on the measured crop coefficients through the flux towers and remote sensing.
 - Contract approximately 10 Air Scout fly overs per growing season to get high resolution digital, thermal and NDVI imagery. The objective is to get an accurate assessment of growing crop health and the progression of the crop coefficient. \$23,000.00
 - Do Residue measurements.
 - Collect ET gage and precipitation data from participating growers on a weekly basis.
 - Miscellaneous out of pocket labor costs. 10,000?
- Total \$77,634

2023

Evaluate and summarize the information collected over the last 3 years.
Make recommendations for implementation in the next larger watershed project.

Contributing Project Members

Dayle McDermitt, Christopher Neale, Nate Jenkins and Frank Kawpnioski