



RE: WSF 2021 Annual Report #5242

This report is an outline for the upcoming 3rd year for the WSF #5242 – “Driving Water Savings Through Advanced Data Collection and Modeling in the Twin Platte Natural Resources District.” During 2020-2021, much time was spent on coordinating flow testing irrigation wells that have been signed up for the program. In 2019, 609 wells had been flow tested; in 2020, 403 wells were flow tested; in 2021, 346 wells were flow tested. The plan has been to work with the well drilling companies to get as many flow rates tested as possible. With this year (2022) being the final year to take flow tests, the TPNRD has purchased three ultrasonic flow meters to coordinate with well drillers and every irrigation well will be flow tested before the end of this summer, either by the well drillers or TPNRD staff. Approximately 800 irrigation wells still need to be flow tested.

In both 2020 and 2021, 60 flow meter sites or 45 flow meters have been located and installed throughout the district to double the validation sites of the previous year. In 2022 an additional 15 flow meter sites or 30 flow meters have been located and will be installed to triple the validation sites, for a total of 90 flow meter sites throughout the district.

To date the program has enrolled 276,650 acres, which is 88% of the total irrigated acres in the TPNRD; over 1,200 connections have been made between wells, meters, non-electric IoT devices, and 432 growers have registered. Several open houses were held in 2021 that were very helpful to get one-on-one time with growers. During 2022 those that have not signed up yet will be contacted and the TPNRD staff will come to them to sign up growers prior to the May 1st deadline.

The TPNRD Board has approved revisions to its Rules which require mandatory reporting after May 1, 2022 for all irrigated acres, for annual water use and irrigated crops. For irrigated acres enrolled in the Water Data Program prior to May 1, 2022, the district will provide the water use for the reports and the landowner is required to provide the irrigated crops for the reports. For irrigated acres not enrolled in the Water Data Program after May 1, 2022, the landowner will be required to purchase and install a meter, approved by the district, and provide the water use and the irrigated crops for the reports.

Background:

During the stakeholder process of the second increment Integrated Management Plan (IMP), stakeholders determined that actual water use needed to be measured and accounted for in the modeling. While the current modeling tools are considered a marked improvement over the original models, several questions arose upon completion of the Robust Review regarding the effect of

several key assumptions on the results. Additionally, accurate reporting of cropping practices, conservation measures, and crop types could also be included in the Robust Review.

The lack of direct measurements of water use is causing need for the assumptions being utilized in the Robust Review to be improved. After careful consideration of the different options, the TPNRD and the NDNR agreed that the approach of this project would significantly improve water management efforts in the TPNRD and provide a superior approach for completing the next Robust Review currently scheduled for 2023. The basic components of this new data collection method include:

- 1) Using power usage data to determine ground water pumping;
- 2) Calibration of the power record data against direct pumping rate measurements to compute actual ground water pumping;
- 3) Refinement of the methodology used to compute the crop demand and consumption of ground water due to irrigation in the TPNRD, which is the key driving factor underlying the results of the Robust Review; and
- 4) Automation of these and other computations for the grower and to ease future levels of effort required and to significantly improve water management capabilities.

The approach to completing the first two of these components is relatively straight-forward and would utilize practices that have already been developed and implemented. However, the mechanics behind the Robust Review will be significantly upgraded over the course of this project. The Ground water Evaluation Toolbox (GET), a ground water modeling platform, will be upgraded and leveraged to automate completion of the computations required to complete the Robust Review. This will facilitate both the testing of various methods for computation of irrigation water budgets and the efficiency of completion of future Robust Reviews. All data collection, processing, and execution of model simulations required for future Robust Reviews will be fully automated for the TPNRD and the NDNR, providing annual to daily scale feedback to water managers and water users. This will provide a true paradigm shift to growers and managers in the TPNRD, fully completing the transformation of water management and use from the reactive pattern of the past to a proactive approach for the future.

Time Frame:

This project will involve the development and delivery of a software solution that will allow the TPNRD to track agricultural ground water use within the NRD. The project will be completed over the course of four years. During Years 1-2, flow rate testing of wells in the TPNRD was completed by local well drilling companies. AgHub is a geospatial farm operation data platform that will be used by growers in the TPNRD to store and track data related to their farming practices. AgHub also gives the TPNRD estimates of water use across the district in real-time. Development of AgHub occurred in Year 1, with continuous improvements made to the platform over the remaining two years.

Evaluation of existing data and data supplied by the AgHub platform was front-loaded in Year 1, with less effort required in Years 2-4. Watershed and ground water model runs will be completed in Years 1-3 leading up to the Robust Review. The Robust Review will be completed in Year 4 and serve as the official measure of progress the TPNRD has made in meeting the second increment IMP goals

and objectives. During Years 1-4, validation of these components (the flow meter validation component) will run concurrently, and not wait until Year 4, allowing for changes to occur to the different components as needed.

Cost:

The total project cost after four years is estimated to be \$3,415,000.