

LCRA Participation in Reservoir Evaporation Study in Texas

**Water Operations Committee Meeting
Aug. 20, 2024**



Why Reservoir Evaporation is Important

- **150,000 to 200,000 acre-feet per year from Highland Lakes**
- **Similar in scale to firm demands from lakes in 2023**
- **No effective way to reduce evaporation's impact**

Estimating Reservoir Evaporation

- **Magnitude of evaporation makes accurate estimates critically important**
- **Standard “pan evaporation” method has been used for more than 100 years and has limitations**
- **New methods are needed to capture more variables such as lake levels and wind direction**

Limits of Pan Evaporation

- Does not directly measure reservoir evaporation
- Known limitations create uncertainty in estimates
- The magnitude of these limitations was not fully understood



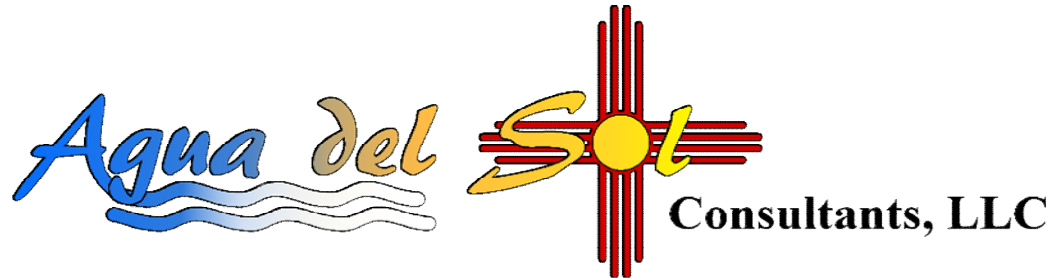
Study Participants



— BUREAU OF —
RECLAMATION



TEXAS A&M
UNIVERSITY®



US Army Corps
of Engineers®



Calibration Stations

- High-resolution meteorological instruments located in lake bodies

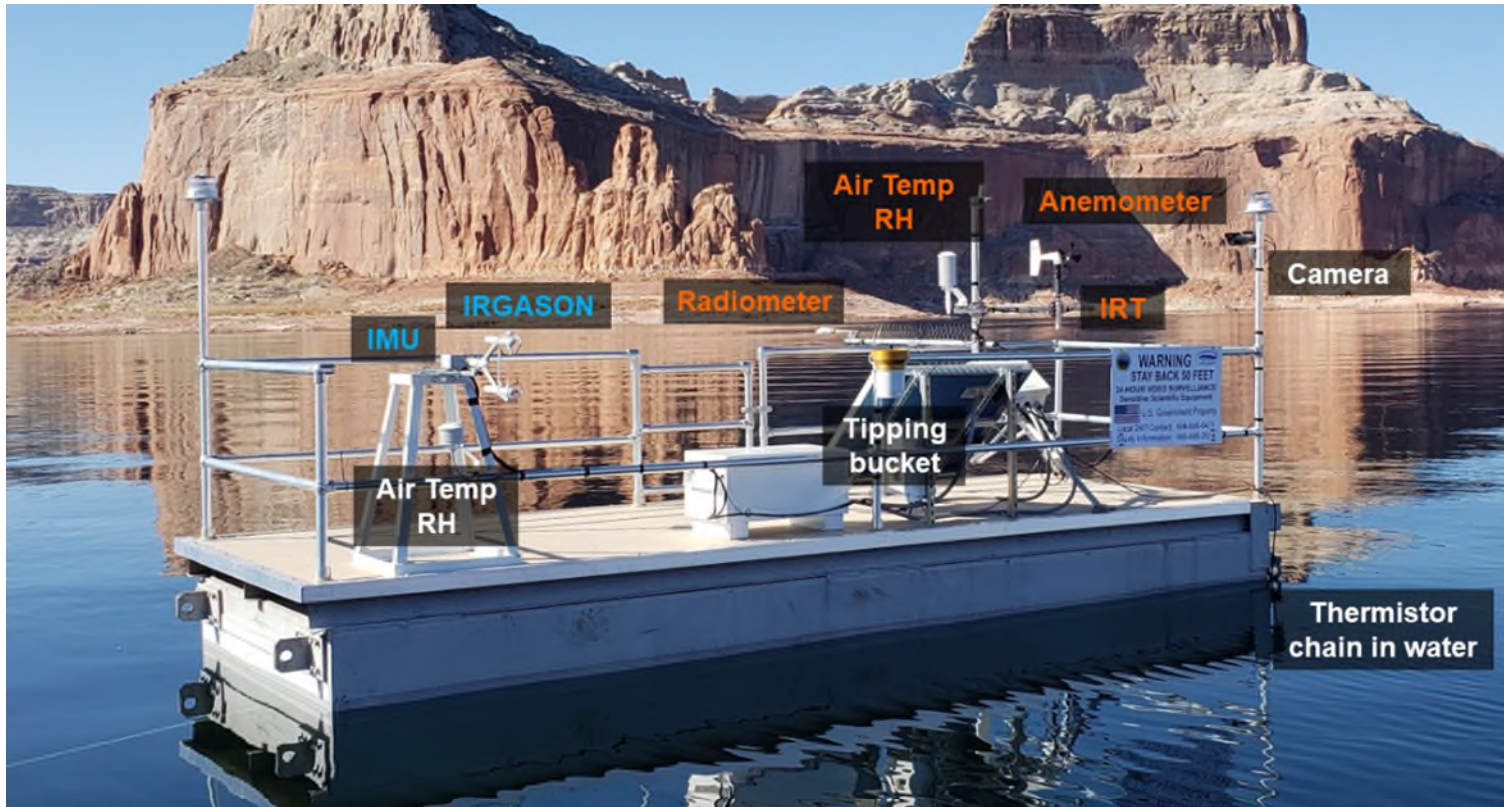


Photo courtesy of the Bureau of Reclamation



Overall Project Objectives

Develop

Develop better method to estimate reservoir evaporation that includes wind direction and lake levels



Automate

Automate computation of daily evaporation at 188 Texas reservoirs



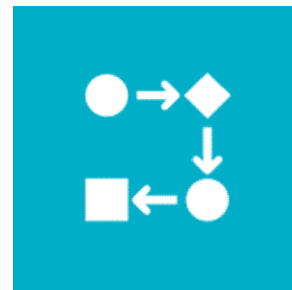
Calibrate

Adjust models to use high-resolution monitoring stations



Launch

Create online web tool to share information



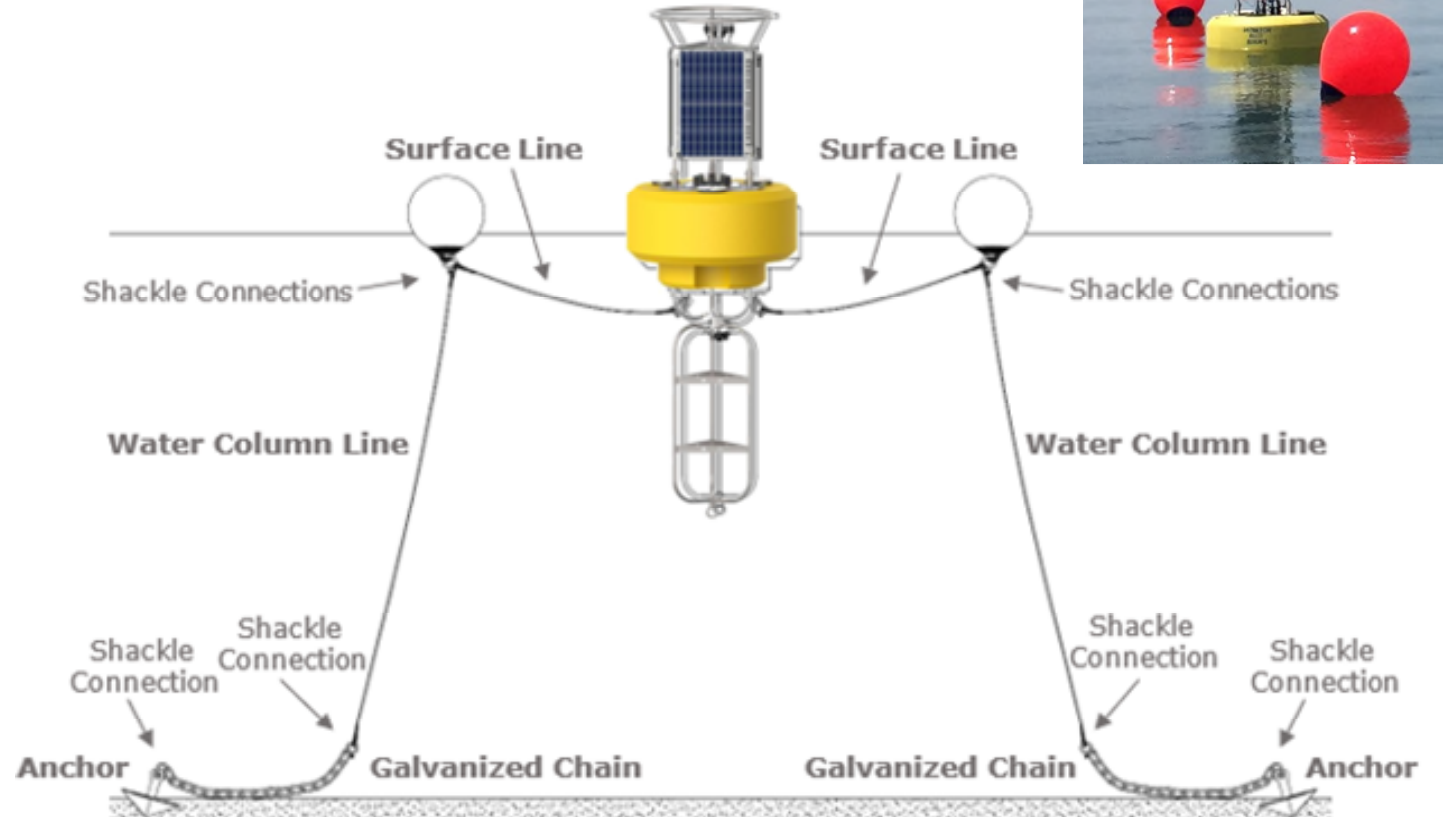
Progress of Evaporation Research

- **2019 – LCRA and Texas Water Development Board hosted workshop**
- **2019 – U.S. Army Corps of Engineers, LCRA and TWDB funded research by Texas A&M University and Desert Research Institute**
- **2020 – TWDB deployed high-resolution meteorological buoy on Lake Buchanan**
- **2023 – DRI launched online estimating tool for 188 Texas lakes**

Lake Buchanan Buoy

Measurements include:

- Air temperature and humidity
- Wind speed and direction
- Net radiation
- Barometric pressure
- Water surface temperature
- Water column temperature



Research Results

- **Creation of Daily Lake Evaporation Model used to estimate daily evaporation over large reservoirs and small ponds in Texas from 1980 to present**
- **Lake evaporation is higher in the fall than pan evaporation method estimated**
- **Wind speed and direction are major drivers of daily evaporation**
- **Texas has experienced increases in reservoir evaporation and its variability**

Progress in 2024

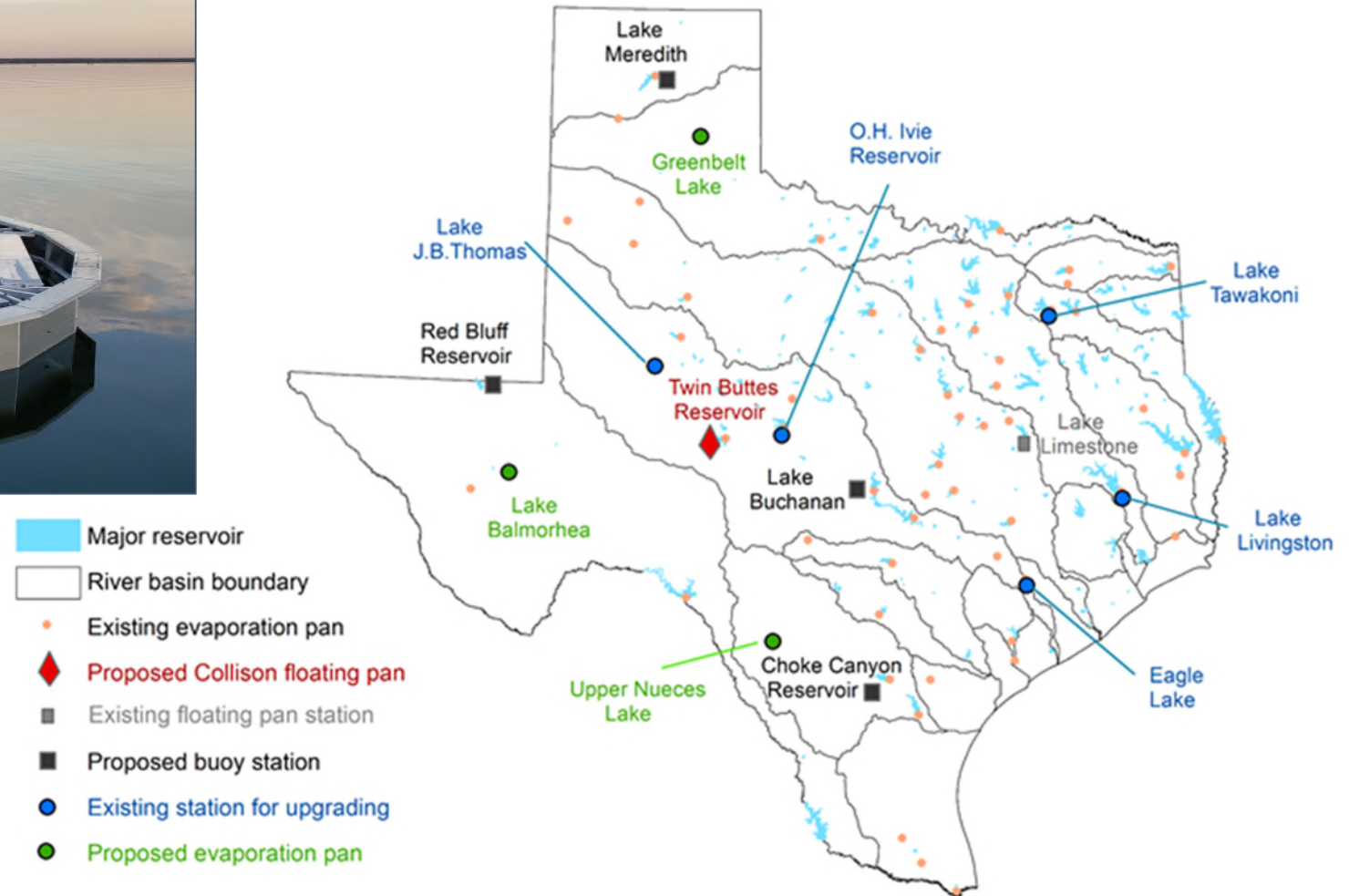
- **Texas A&M published research results in peer-reviewed journal**
- **LCRA and TWDB hosted workshop attended by representatives from more than 47 federal, state, local and academic institutions, as well as several countries**
- **Bureau of Reclamation awarded funding for more calibration work specific to Texas reservoirs**
- **National Aeronautics and Space Administration funded expanding technology to other western states**

Next Steps

Upgrades to Evaporation Monitoring



Photo courtesy of Agua del Sol Consulting



Project Timeline

- **2025-2026 – Deploy upgraded pan on Lake Buchanan**
- **2027-2028 – Peer review buoy-based evaporation estimates for Lake Buchanan, Choke Canyon Reservoir, Lake Meredith and Red Bluff Reservoir**
- **2028 – Add Arbuckle Reservoir to the online estimating tool**
- **2028 – Recalibrate Daily Lake Evaporation Model**



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