**Research Alignment Grid**

**Project Team Members:** Madi, Mahsa, Spencer

**Project Title:** Advancing the Use of Artificial Intelligence and Machine Learning in the Development of Useable Tree-ring Proxy based Reconstruction of Streamflow

| **Goal:** To extend historical streamflow records with tree-ring proxies, provide past information on water availability and variability, and assist water managers on making better water resources decisions in the southeast United States. |
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| **Project Objective1**  **(insert more rows as needed)** | **Impact2** | **Assessment3** | **Method4** |
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| **EXAMPLE**  Develop a new prairie pothole hydrology algorithm for use in hydrologic models | Hydrologic Forecasting Operations: Use by NWC, NCRFC, and MBRFC  Research Community: algorithm incorporated into NextGen Framework and research paper published  Students/Instructors: Development and testing of algorithm packaged as a tutorial/course module | Algorithm proven: tested for set of evaluation metrics and use cases defined by the NWC and RFCs  Scientific advancement: use of NextGen Franmework and citation of published paper  Learning Module Used: Module delivered in workshop or course | Method: Python programming  Research Integrity: Provide accompanying reproducibility enablers with open source products  Education: Develop one learning module to train how to modify the NextGen framework with a process advancement; deliver at CIROH DevCon 2025 |
| **Your Project…**  Utilize and compare AI/ML models for streamflow reconstruction to traditional reconstruction methods in the southeast United States using tree-ring based proxies. | TVA: longer and more complete streamflow record to better inform decisions  Research Community: Understanding the ecological and hydrological impact of changing water levels is essential for sustainable resource management, energy production, and ecological preservation. | Machine learning output tested against observed data for accuracy and understanding.  Method assessment: Skill statistics for AI/ML model output versus manual output?  Impact assessment: ? | Method: Manual reconstructions using observed streamflow & tree-ring proxies with correlation, stability analysis, SLR, bias correction, skill stats (previously published methods) for comparison with AI/ML results.  Method: AI/ML reconstructions with tree-ring proxies using ? program. |

**1Objective:** How will you achieve your project goal/impacts? Include both research and relevant broader impact goals

**2Impact**:What are the specific anticipated impacts (research + broader) associated with the objective?

**3Assessment:** How will success be measured? What will you prove the objective has been accomplished? Two aspects: method completed and impact achieved.

**4Method**:How will the objectives be accomplished? What are the key activities?