**WyACT – Upper Snake River Project – September 2022 Workshop Outcomes Overview**

The kick-off event for the initial Upper Snake River project of the University of Wyoming's NSF EPSCOR-funded Wyoming Anticipating Climate Transitions (WyACT) project took place at the UW-NPS Research Station in Grand Teton National Park on September 22, 2022. The Upper Snake River Project intends to bring together UW researchers with regional partners to evaluate what ecological, societal, and economic consequences will follow changes in the flows of the Upper Snake River in Wyoming over the next 10, 25, or 50 years.

The initial workshop included participation from UW (22), NPS staff (9), and participants from the USFS (3), the Snake River Fund (2), Wyoming Game and Fish, Trout Unlimited, Teton County, Teton Conservation District, Jackson Hole Wildlife Foundation, and the Consortium for Scenario Planning. Discussions pointed to clear opportunities to work collaboratively on strategic research and initiatives around the Upper Snake River. The initial discussions at the workshop focused on pressing problems, drivers of potential changes, management questions, and opportunities for collaboration and outreach focused on the changing water availability in the Snake River in a globally warming climate.

Discussions highlighted a general need to better understand the health of the Upper Snake River system and how it is changing. Several points about future concerns help to frame plans for next steps for the project:

**Time frame**
Time horizons of greater than 10 years have been challenging to anticipate. Many decisions are made annually based on seasonal runoff projections, while long-term climate change projections often focus at continental to global scales and the end of the century. Locally focused scenarios of potential future conditions for the next 10-40 years would be useful, indeed, critical for decision making.

**Potential hydrologic changes**
Water availability along the Snake River was a major concern. Changes to the flows along the Snake River and its tributaries will likely result over 10-40 years from a transition from snow to rain as the dominant mode of winter precipitation. Specific concerns tied to water flow include changes in the timing, duration, and magnitude of both peak Spring and minimum Fall flows. Additionally, changes in water temperature relative to species' tolerances are a major concern as well as changes in groundwater storage, glaciers and snow fields, and stream connectivity.

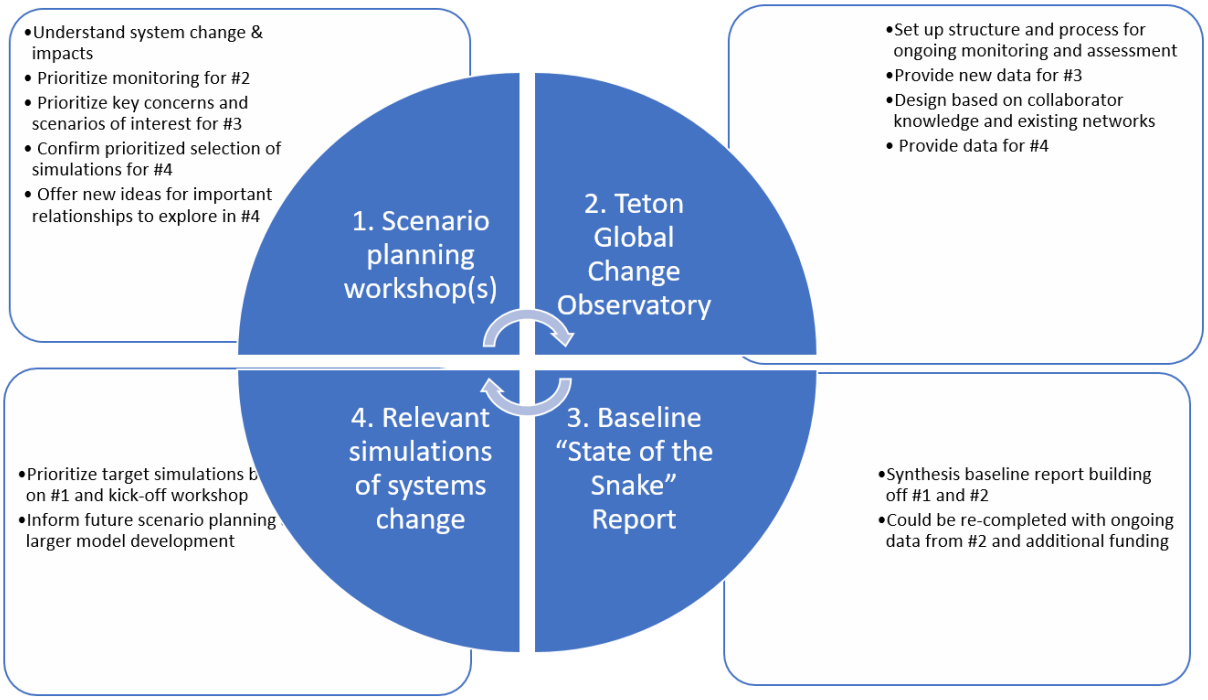
**Interacting drivers of concern**
Additional drivers of change that may shape the outcomes over 10-40 years include

- shifts in recreational use of the Teton region, including
    - increases in visitation from other regions with larger climate impacts,
    - shifts locally across different sites and types of use, and
    - changes from peak to shoulder seasons—potentially due to factors such as regional wildfire smoke;

- increases in the regional (human) population both permanently and seasonally;
- range and population expansions of non-native, invasive, or damaging species;
- changes in the management of Jackson Lake as a reservoir;
- effects of aging and changing infrastructure on water flow, nutrient pollution, and habitat;
- changes in riparian vegetation with consequences for both aquatic and terrestrial animal habitat and migrations; and
- transformation of the upland vegetation cover and function with consequences for snow accumulation and runoff patterns.

A particular concern relates to proactive versus reactive management decisions across different jurisdictions, and how such changes can influence infrastructure, habitat, and water flows in ways that may influence vulnerability and shape climate adaptability.

**Useful next steps:**
WyACT identified four actions that can feed on each other both over the next year and over a longer time frame to help anticipate future changes to the Upper Snake River system.




1. **Facilitate a framework or forum for continued collaboration, including scenario planning workshops** – Discussions highlighted a strong interest in having UW facilitate the development of a regular forum for collaboration among the various regional partners, including some not represented at this workshop.

***Action**:* WyACT will plan follow-up meetings for January (in Moose) and May (at the AMK). We will work with the partners on the WyACT goal of developing specific future scenarios to help regional decision making tied to the Snake River. We plan to use the May meeting, specifically, for scenario planning.

2. **Develop a "Teton Global Change Observatory"** – Long-term monitoring is needed to understand the health of the Snake River system and its changes. Observations could involve fieldwork and strategic sensor deployment on the Snake River and its tributaries; in Jackson Lake, near-by alpine lakes, and within both riparian and upland vegetation; as well as analyses of human activities. Groundwater monitoring could also be key. Hypotheses about future changes, how they will integrate across the socio-environmental system, and what indicators could guide policy decisions should shape the observatory design.

***Action**:* WyACT will work with partners, and through programs such as the UW-NPS Small Grants program, to enable UW researchers, students, and partners to develop, deploy, and conduct a strategic monitoring and research program in the region. Follow up discussions in Fall 2022 and a January 2023 meeting will aim to advance this goal.

3. **Launch a baseline "State of the Snake" report** – Synthesizing various datasets and tracking trends of concern in Upper Snake system would help planning beyond existing annual-seasonal flow projections. Communicating information about the health of the system would both inform decisions and create the space for decisions by educating stakeholders and the general public about concerns and changes. Related research could also help to define ecosystem health, and related indicators, in the context of global change: what does healthy change look like for the Upper Snake River system?

***Action**:* WyACT will work with partners to launch a "State of the Snake" report, potentially by developing a UW class that would engage advanced students and post-docs in synthesizing information and preparing a document. The effort would create a venue for sharing knowledge as well as providing professional development opportunities to students.

4. **Provide relevant simulations of system changes** – Long-term monitoring would be usefully paralleled by simulations of how the system may change over the next 10-40 years. Climate, hydrologic, ecological, and socio-economic modelling could help anticipate the local changes in factors such as snowfall, streamflow, fish populations, riparian vegetation, and recreational tradeoffs. Specific ideas for simulations to designed to answer management-relevant questions came out of the initial workshop discussions and should be pursued.

***Action**:* WYACT will work with partners to develop relevant simulations as a means to inform scenario planning and other assessments useful for decision making, and develop a portal for sharing simulated projections of possible changes. Short-term (1-2 yrs) work may use climate or hydrological simulations available through the Greater Yellowstone Climate Assessment to consider ecological and socio-economic outcomes, but longer-term work will involve refined modelling to better understand the full range of possible outcomes and uncertainties.