

#### **RESEARCH BRIEF**

# Building Bridges: Mapping Beaver Conflicts and Solutions in Montana Xiaofan Shen - Master of Environmental Science '26

National Wildlife Federation - Beaver Conflict Resolution

### The Need.

Beavers are master architects who transform landscapes by creating wetlands that teem with life. As an important keystone species, the dams they build are habitats for many other creatures like amphibians, insects, fish and even moose. Other ecological benefits they bring include increasing landscape resilience to wildfires, improving water quality, and restoring degraded waterways. However, their engineering feats often collide with human infrastructures leading to flooded roads, damaged property, and impaired agriculture. Historic trapping practices in the 1800s paired with the booming fur trade of beaver pelts at the time resulted in severe population declines and the loss of their ecological benefits for nearly two centuries. Today, with a better understanding of their role in ecosystem health, there is a pressing need for proactive, science-based solutions that balance conservation with human land use.



#### Photo Credit: Elissa Chott

## The Project.

Since 2019, the Beaver Conflict Resolution Program (BCRP) at the National Wildlife Federation (NWF) has mitigated humanbeaver conflicts using non-lethal strategies, such as pond levelers, exclusion fencing, and tree wrapping. In this project, Xiaofan focused on using geospatial analysis combined with data-driven tools to enhance beaver conflict management and conservation efforts. Two interactive dashboards were created – one for internal staff to track conflicts and project interventions in real time, and another for public engagement to promote awareness and understanding of beaver coexistence strategies. The project integrates field-collected data using ArcGIS Online, Survey123, and Dashboard, allowing structured visualization of beaverrelated conflicts and mitigation efforts. Additionally, new surveys were designed to improve systematic data collection, enabling field teams to record conflicts, training sessions, and project maintenance more efficiently. Data cleaning, analysis, and mapping processes were conducted to ensure accurate, up-to-date information that supports land managers in making informed, sciencebased conservation decisions.

## The Findings.

Xiaofan created these deliverables for this project:

- 1. Internal Dashboard: A tool for conservation practitioners to track and analyze beaver conflicts and management efforts.
- 2. External Dashboard: A public-facing resource that visualizes beaver conflict data, mitigation strategies, and conservation outcomes. (<u>https://nwf.maps.arcgis.com/apps/dashboards/00e044e3f1574ac</u>)
- 3. Survey123 Forms: Standardized data collection tools for field teams to efficiently record and update project-related information.
- 4. Compiled Reports and Data Sets: Cleaned, structured datasets that provide an accurate representation of beaver conflicts and resolutions.

The project revealed that damming is the most frequently reported beaver conflict in Montana. Non-lethal mitigation strategies, such as tree wrapping and exclusion fencing, are popular and have proven effective in reducing recurring conflicts. It is recommended that the survey be revised in the future based on on-the-ground feedback and that practitioners receive continued training on dashboard use. Expanding outreach, integrating predictive analytics, and incorporating other data sources (e.g., hydrological data, Montana Beaver Dam Census data and the Montana Beaver Restoration Assessment Tool) would further enhance the dashboards' effectiveness. These tools will serve as long-term resources for science-based beaver management and human-wildlife coexistence planning.

## The Impact.

By providing interactive dashboards and structured data collection tools, this project enables land managers and



conservationists to monitor beaver conflicts in real-time, assess mitigation effectiveness, and identify high-priority areas for intervention. These tools are built on previous work and designed to enhance data-driven conservation efforts, support sustainable land management, and foster coexistence between humans and beavers in the future. This project will contribute to human-beaver conflict resolution by promoting science-based management solutions that ensure that beaver populations continue to thrive, contributing to climate resilience, biodiversity conservation, and watershed health across Montana. The deliverables and tools from this project will continue to support local conservation efforts while serving as a model for other regions, promoting more sustainable and ecosystem-friendly approaches to wildlife management.



## The Student.

Xiaofan Shen – Research Assistant | Xiaofan Shen is a Master of Environmental Science candidate at the Yale School of the Environment, specializing in urban heat islands, urban planning, and urban ecology. Before YSE, She earned her bachelor's degree in Urban Forestry from the University of British Columbia, where she cultivated a deep interest in urban resilience and human-wildlife conflicts. Xiaofan's research focuses on applying geospatial analysis and remote sensing to tackle environmental challenges in urban areas. She is passionate about using data-driven solutions to create sustainable and inclusive cities. In her free time, Xiaofan enjoys playing musical instruments, swimming, and cooking with friends. <u>See what Xiaofan has been up to | Blog</u>