

## Identifying Climate Change Refugia for Riparian Zones in Montana

Kimberly Szcodronski\*, Montana Fish, Wildlife and Parks, Missoula

Alisa Wade, Office of Policy Analysis, U.S. Department of the Interior, Missoula

Sarah Burton, National Climate Adaptation Science Center, U.S. Geological Survey, Arvada, CO

Blake Hossack, Northern Rocky Mountain Science Center, U.S. Geological Survey, Missoula, MT

\*Indicates Presenter

\*\*Indicates Student Presentation

Identifying climate change refugia, defined as relatively buffered areas that are likely to maintain ecological function under plausible future climates, can serve as an important climate adaptation planning tool. Riparian areas are especially important for climate adaptation because they provide habitat for many species, cool neighboring waters, and are often buffered against change relative to surrounding uplands. We used climatic and landscape attributes to identify and map potential riparian climate refugia (100 m) across Montana. We included two landscape factors hypothesized to confer resiliency (riparian connectedness, landscape diversity) and two factors of projected climate change likely to impact riparian areas (increases in warm days, landscape runoff). For the climate factors, we considered a future atmospheric carbon emission scenario of RCP 8.5 and two plausible climate change scenarios, 1) moderately hot and wet [CNRM-CM5] and 2) hot and dry [IPSL-CM5A-MR]. We compared historical climate (1971-2000) to two future time periods, mid-Century (2040-2069) and end of Century (2070-2099). Although we found current riparian connectedness is greater in western Montana, riparian areas in eastern Montana are projected to be better protected against climate change, likely due to greater landscape diversity near riparian areas, projected increases in moisture, and a smaller relative increase in warm days. Predicted refugia for some areas, such as portions of southeast Montana, depended greatly upon the climate scenario. Agencies and stakeholders can use the maps we produced to prioritize conservation and restoration of targeted refugia areas and for broader climate adaptation planning.