Riparian Vegetation Change Along the Snake River in the Fort Hall Area: A 2016–2024 Analysis and 2032 Landscape Forecast

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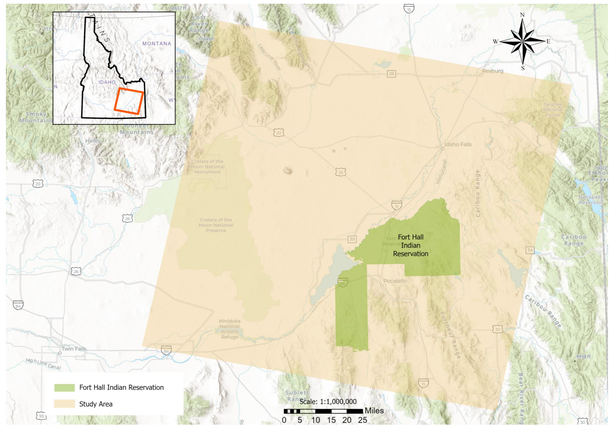
Abstract

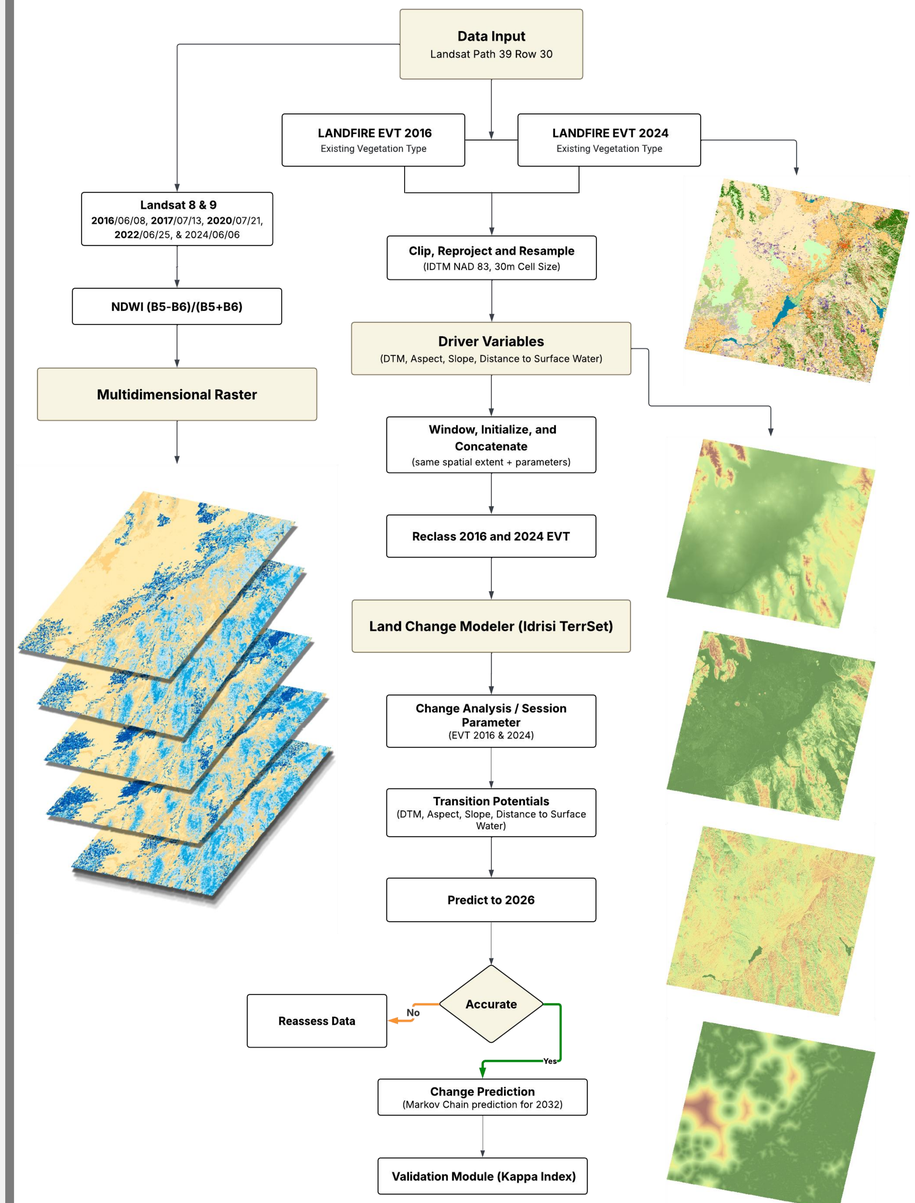
Riparian vegetation along the Snake River in the Fort Hall area is vital for water filtration, preservation of local biodiversity, and stream bank stabilization. This study showcases how riparian land cover has changed between 2016 and 2024 and projects the future landscape of 2032 based on current trends and future transition potentials. This analysis was completed using remote sensing data and geospatial modeling. LANDFIRE Existing Vegetation Type (EVT) data from 2016 and 2024 were processed in ArcGIS Pro and IDRISI TerrSet. The Land Change Modeler (LCM) in TerrSet was used to analyze land cover transitions and generate a CA-Markov chain prediction for 2032, which uses LiDAR-derived elevation, slope, aspect, and distance to surface water as driver variables along with land cover/land use transition potentials. Multidimensional Normalized Difference Water Index (NDWI) values derived from five Landsat scenes 2016, 2017, 2020, 2022, and 2024 were examined using a Mann-Kendall spatial trend analysis to identify areas where statistically significant changes in vegetation moisture exist. By 2032, **5,351 acres** of riparian land are projected to change to development, and **2,675 acres** to open water. These findings are intended to support water and land management decisions on or near Fort Hall Indian Reservation.

Introduction

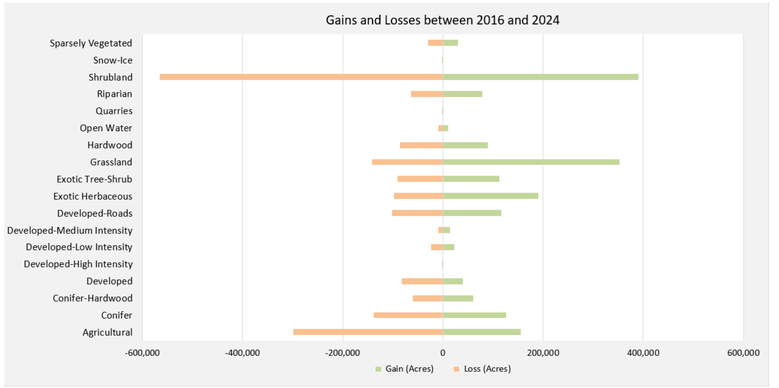
The Snake River in the Fort Hall area of southeast Idaho passes through a landscape where Indigenous territory, water resources, and agricultural land use intersect. The riparian corridor along its banks has been an important feature of the region providing support for water filtration and local biodiversity. The increase of environmental and human-driven pressures have placed these systems under growing stress, impacting the ecological and hydrological function the corridor provides. Being able to quantify, visualize and project the extent of change and future landscape conditions is vital for informing land and water management decisions that could impact the corridor moving forward.

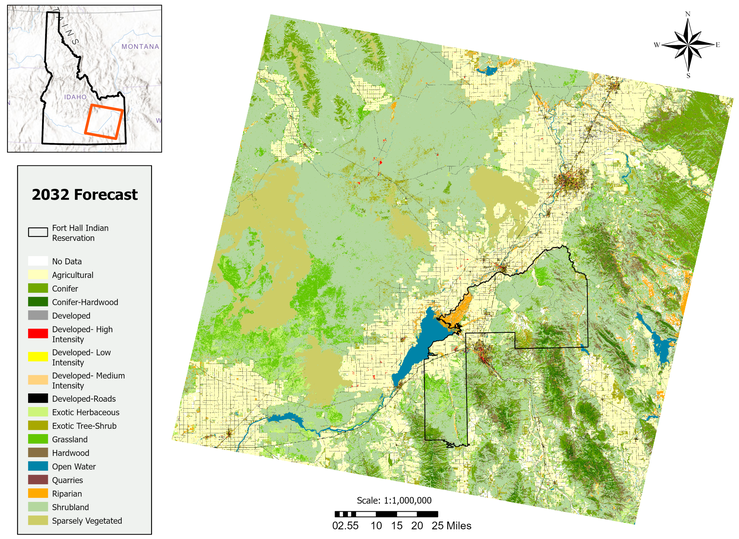


Methods



Results





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