

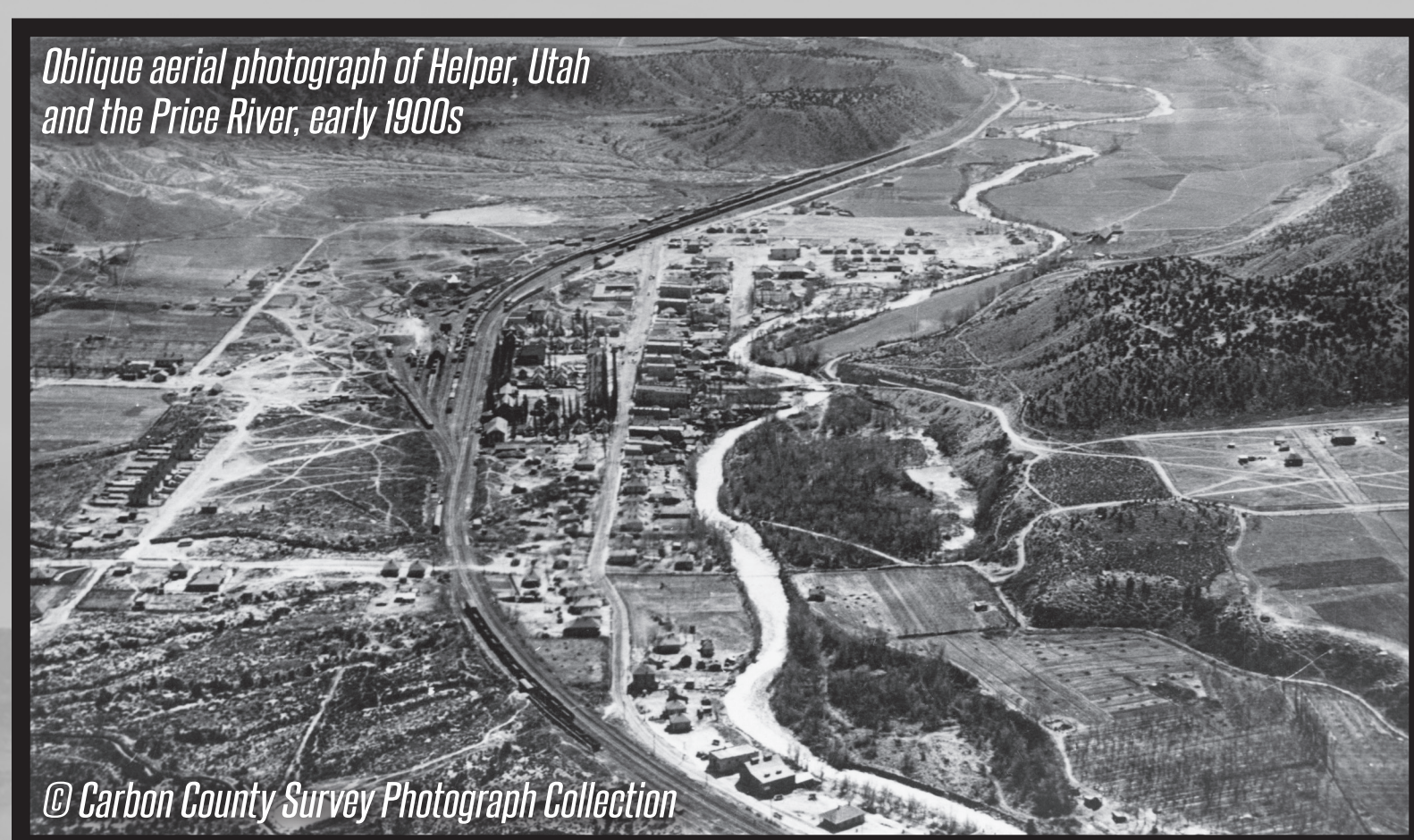
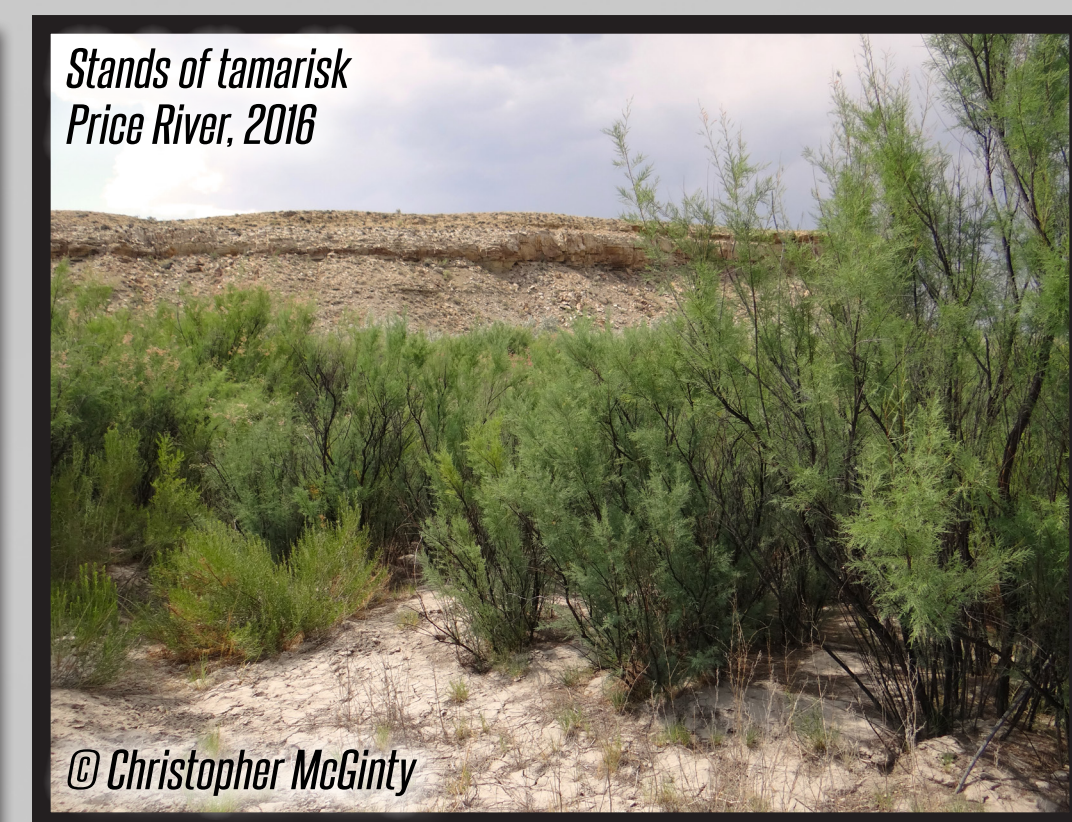
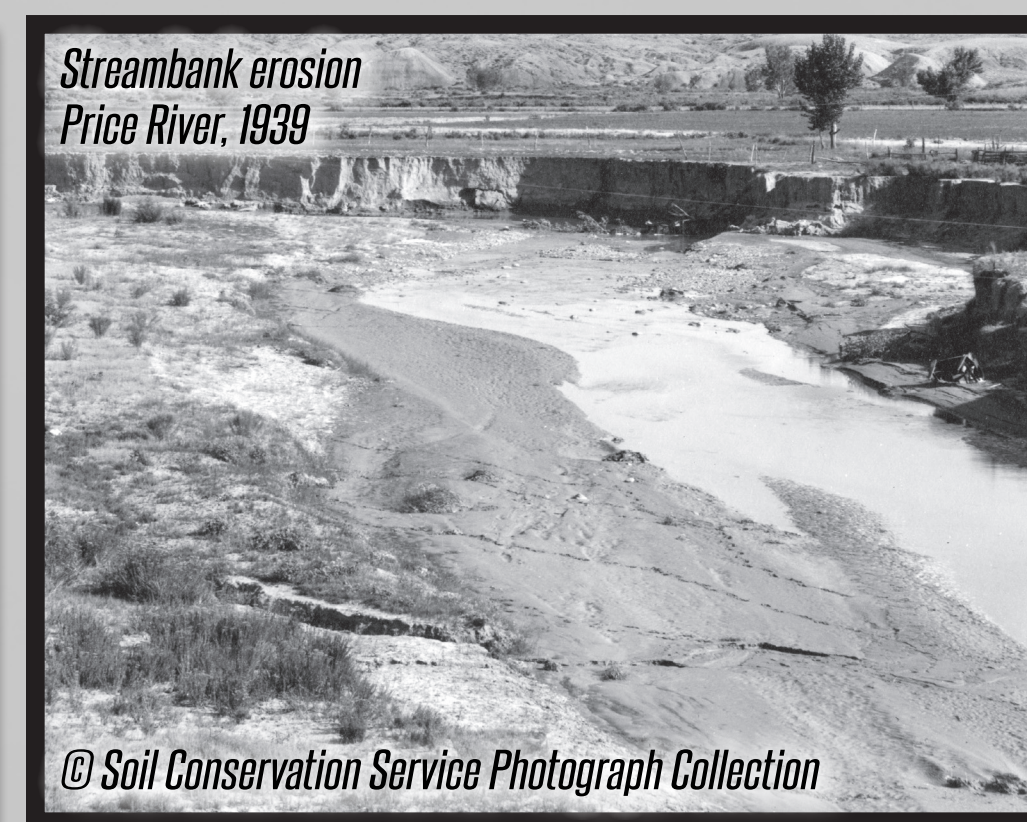
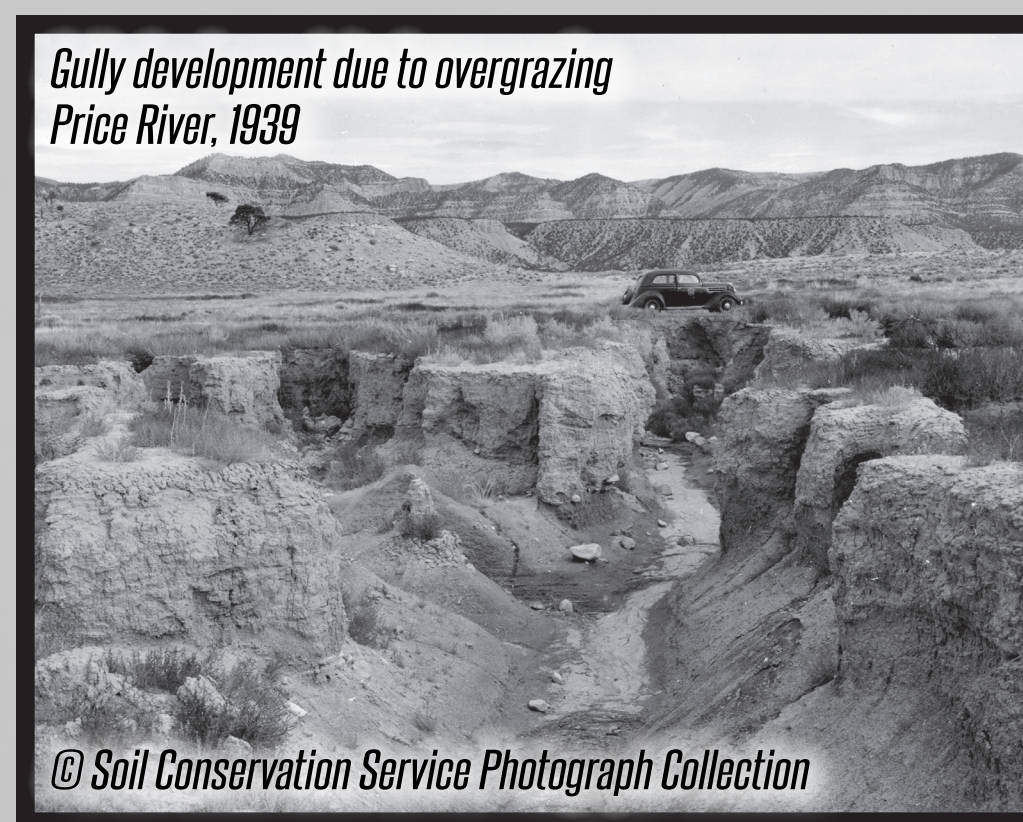
# USING HISTORIC AERIAL PHOTOGRAPHS TO ASSESS CHANGES IN DRYLAND RIVER SYSTEMS: THE STORY OF THE PRICE RIVER IN CENTRAL UTAH



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Within the past 100 years, an estimated 95 percent of dryland riparian habitats in the Southwestern United States have been altered, degraded, or destroyed. Water development projects and incongruent land management practices have changed flow regimes, suppressed fluvial processes, and altered riparian species composition, distribution, and structure. The Price River in central Utah has been impacted by invasive species, dewatering, overgrazing, and sedimentation. The proliferation of invasive species, such as tamarisk, presents one of the greatest threats. Tamarisk has narrowed the river channel, modified river sinuosity, displaced native vegetation, and reduced the quality of aquatic and terrestrial habitat.



Historic aerial and ground photographs serve as an invaluable source of information on historic landscape conditions and they can provide baseline assessments in land cover change studies. Knowledge of historic conditions can improve understanding, inform management decisions, and guide restoration activities. Specific to river restoration, historic photographs can provide information on the historic distribution and abundance of riparian land cover and they can provide information about historic channel features and characteristics. Historic aerial photographs were downloaded from state and federal agencies, mosaicked, and georeferenced to create a collection of images of the Price River riparian corridor, from Wellington, Utah, to the confluence of the Green River.

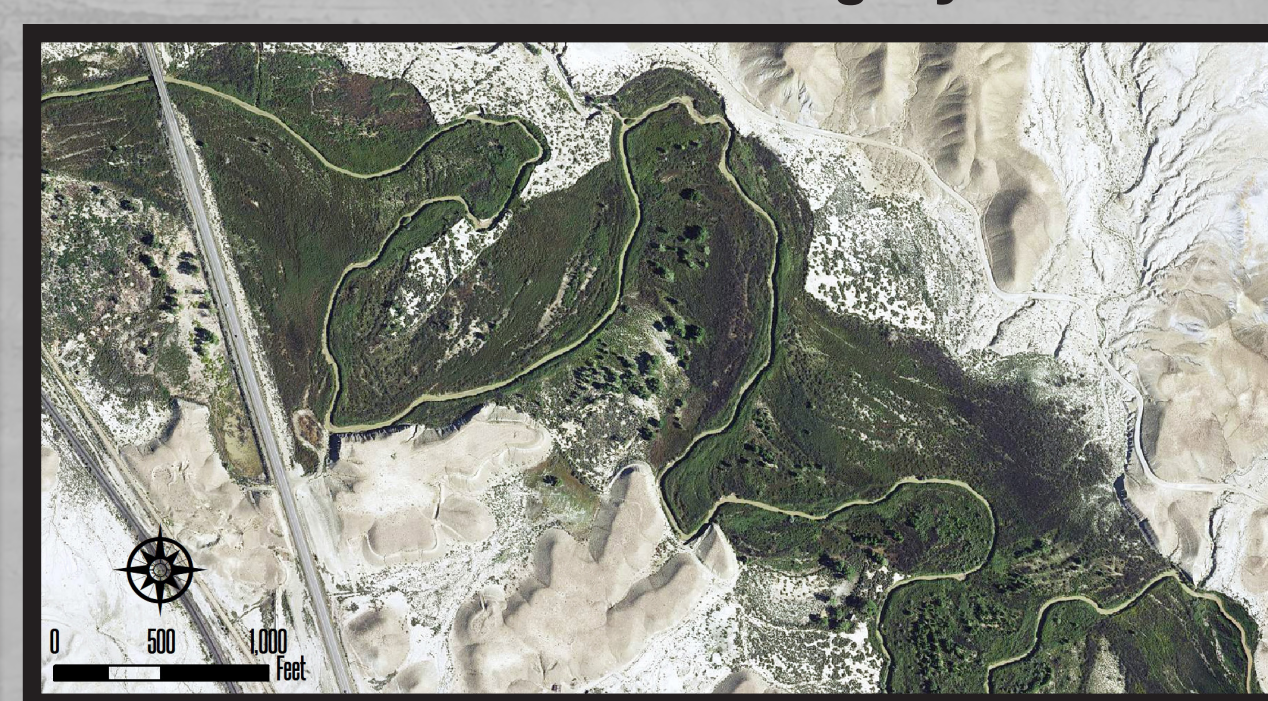
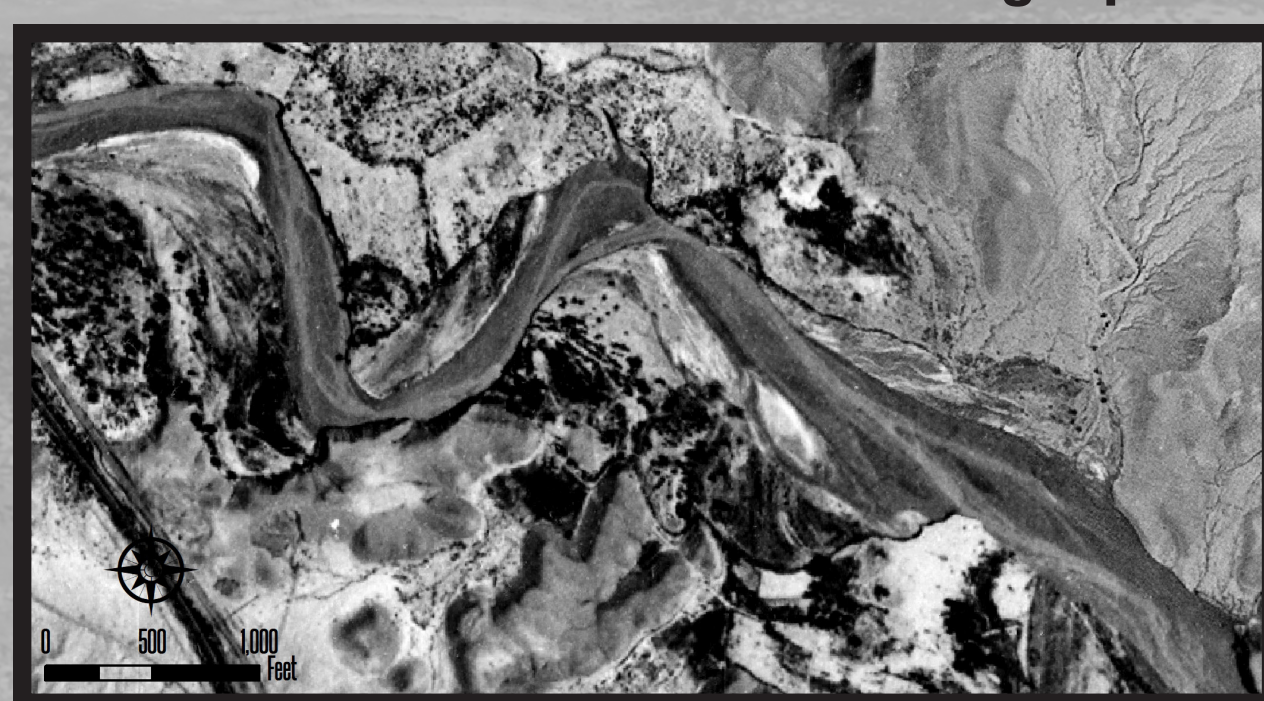
1938 Soil Conservation Service Black and White Aerial Photographs

1974 Bureau of Land Management Color Infrared Aerial Photographs

1997 U.S. Geological Survey Digital Orthophoto Quadrangles

2006 U.S. Department of Agriculture NAIP Aerial Imagery

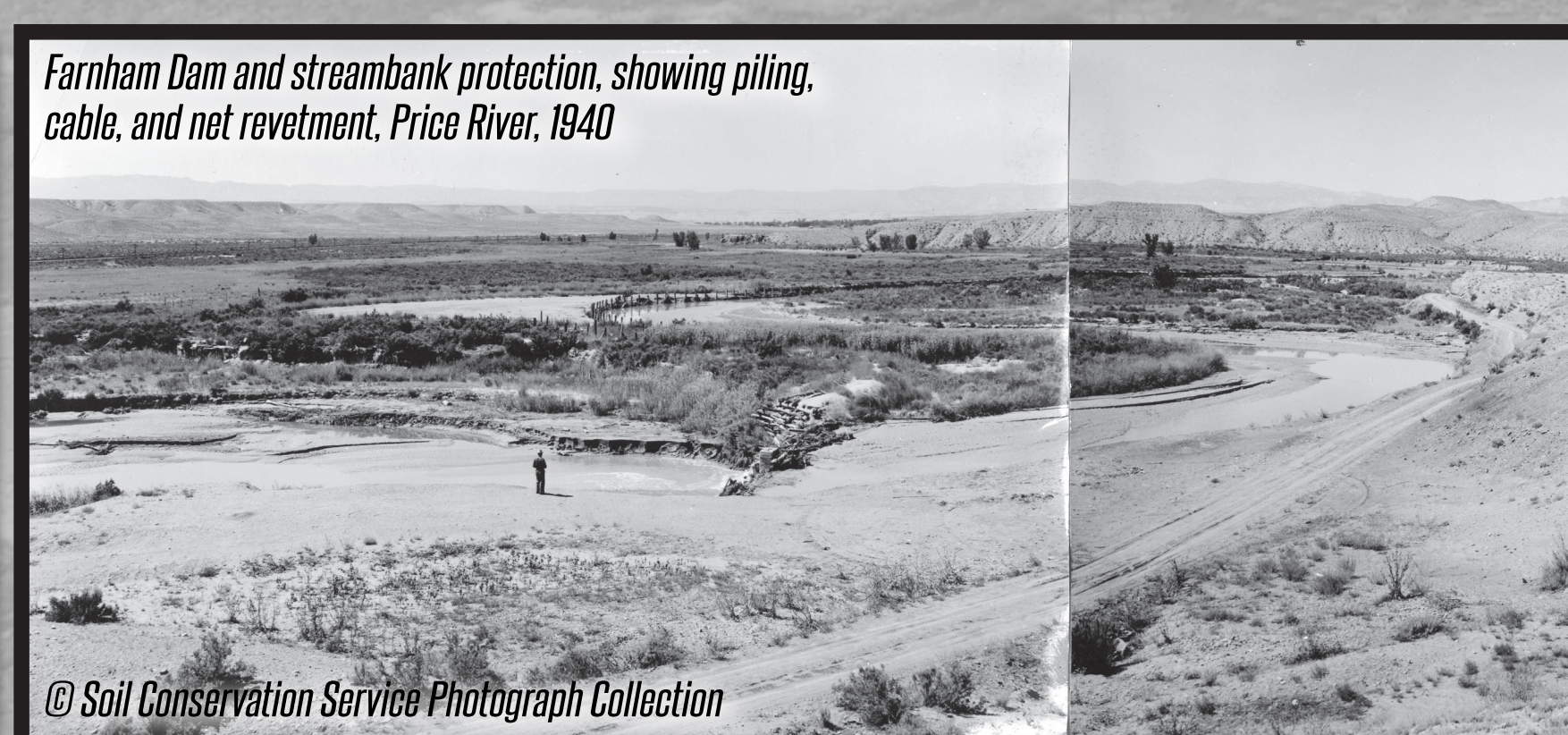
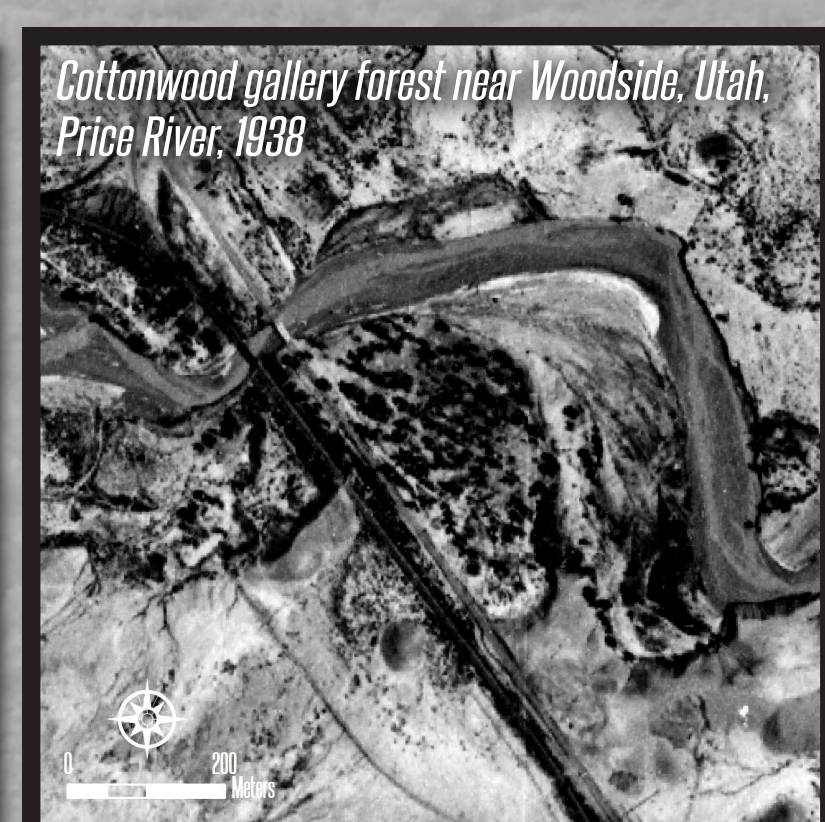
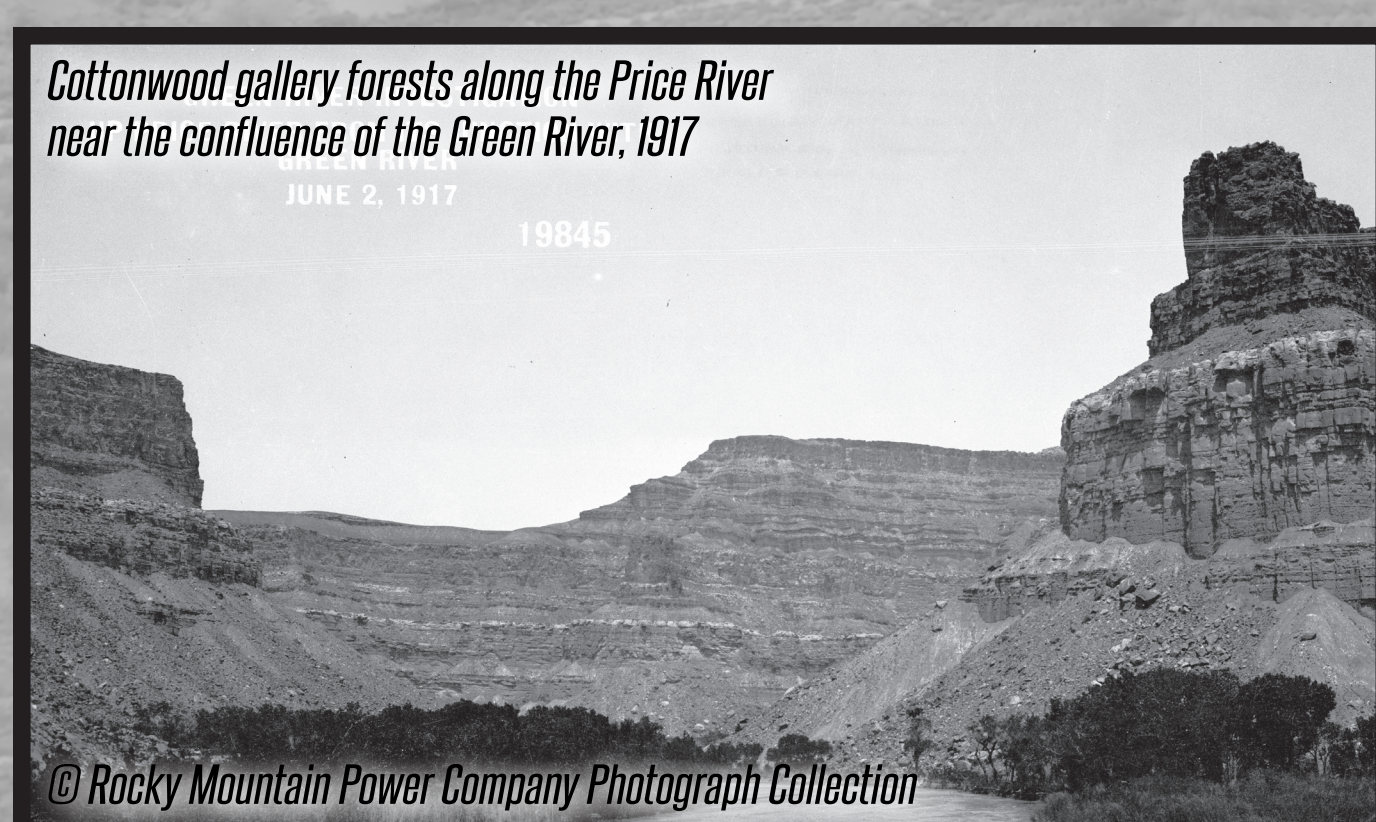
2014 U.S. Department of Agriculture NAIP Aerial Imagery



Regulated hydrologic regimes and tamarisk have transformed the channel morphology of the Price River. Multiple cross-section measurements revealed that the average channel width of the Price River has significantly decreased over the timeframe from 1938 to 2014. In 1938, the average channel width was 149 feet (45 meters) and the river was comprised of multiple threads and several point and mid-channel bars. By 1974, the average width decreased to 66 feet (20 meters), and by 1997, the average width decreased to 35 feet (11 meters). By 2014, the Price River was characterized by a narrow, confined, and incised channel with an average channel width of 26 feet (8 meters). This represents a total decrease of nearly 83 percent since 1938.

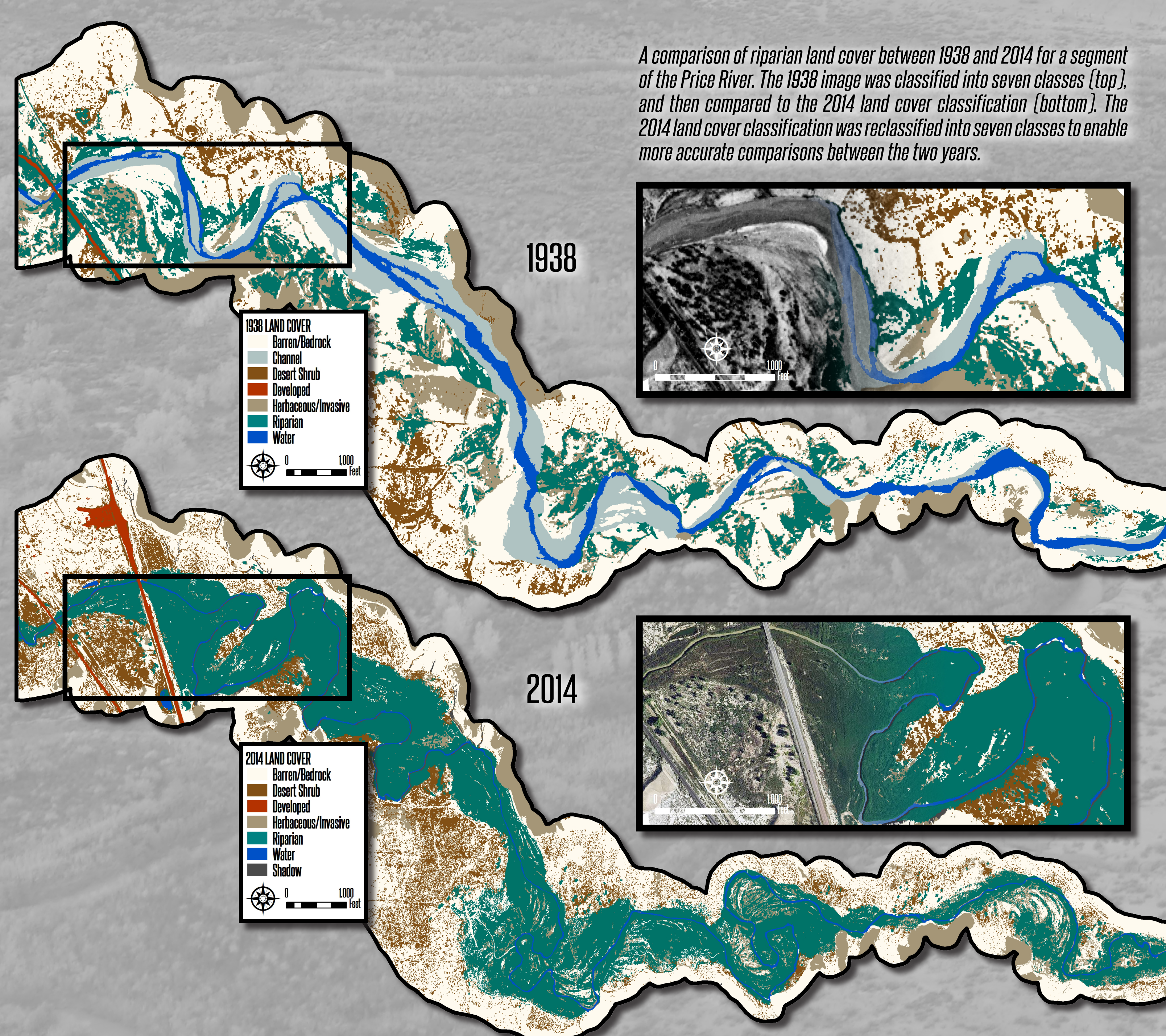
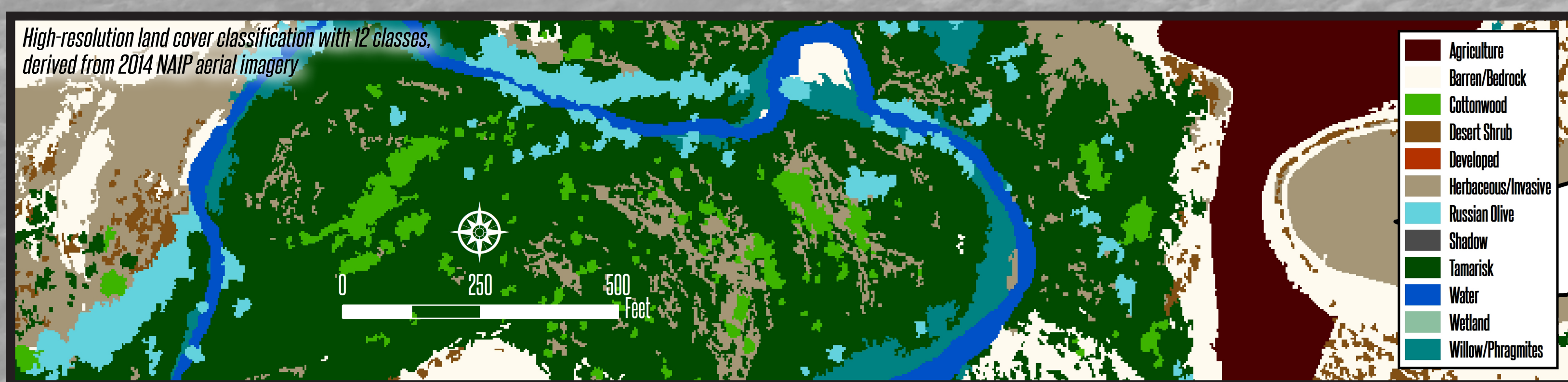


"The Price River was a rather turbulent and erratic little stream. In the summer, it would almost dry up unless there had been recent heavy rain in the mountains. In the winter, it would freeze over. In the spring, when the snow began to melt in the mountains, it got to be quite a large stream and was sometimes dangerous to cross."  
- Harvey Hardy, 1964



Historical accounts indicate that the Price River was lined with cottonwood trees prior to 1879. However, with regional settlement beginning in 1878 and the initiation of the Scofield irrigation project in 1883, the riparian vegetation within the Price River drainage began to change. The diversity of riparian plant species has declined and the species composition has shifted from native species, such as Fremont cottonwood and black willow, to more drought- and salt-tolerant invasive shrub species, such as tamarisk and Russian olive.

A high-resolution riparian land cover dataset was previously developed using the 2014 NAIP aerial imagery to support the design of a restoration plan for the Price River. While this dataset has been valuable in identifying the current distribution and composition of native and invasive plant species, the identification of targeted restoration sites remained unclear due to limited knowledge of historic riparian conditions. Historic aerial photographs for the Price River have enabled a more comprehensive understanding of this dryland river system. Between 1938 and 2014, there was a significant increase in total riparian land cover. In 1938, the riparian vegetation was patchy and dispersed and characterized by cottonwood gallery forests and willow stands. In 2014, the riparian vegetation blanketed the riparian corridor and largely consisted of dense monocultures of tamarisk.



For additional information, download the technical report at <https://bit.ly/2FCicZt> or contact Ellie Leydsman-McGinty at [eleydsman@gmail.com](mailto:eleydsman@gmail.com).

