## ABSTRACT

The Salmon Creek Watershed in Sonoma County, California, USA, is home to a variety of wildlife, and many of its residents are mindful of their place in its ecology. In the past half century, several of its native and rare species have become threatened, endangered, or extinct, most notably the once common Coho salmon and Chinook salmon. The cause of this decline is believed to be a combination of global climate change, local land use, and land cover change. More specifically, the clearing of forested land to create vineyards, as well as other agricultural and residential uses, has led to a decline in biodiversity and habitat structure. I studied sub-scenes of Landsat data from 1972 to 2013 for the Salmon Creek Watershed area to estimate forest cover over this period. I used a maximum likelihood hard classifier to determine forest area, a Mahalanobis distance soft classifier to show the software's uncertainty in classification, and manually digitized forest cover to test and compare results for the 2013 30 m image. Because the earliest images were lower spatial resolution, I also tested the effects of resolution on these statistics. The images before 1985 are at 60 m spatial resolution while the later images are at 30 m resolution. Each image was processed individually and the training data were based on knowledge of the area and a mosaic of aerial photography. Each sub-scene was classified into five categories: water, forest, pasture, vineyard/orchard, and developed/barren. The research shows a decline in forest area from 1972 to around the mid-1990s, then an increase in forest area from the mid-1990s to present. The forest statistics can be helpful for conservation and restoration purposes, while the study on resolution can be helpful for landscape analysis on many levels.