**Mapping functional old growth using species distribution modeling with Earth Observations**

Old-growth forests play a critical role in mitigating climate change and fighting against biodiversity loss. Information about where old growth is and how it changes over time will provide foundational management insight. Earth observations have often been used to map forest attributes, including canopy cover, forest height, and forest biomass, that are then used to identify old-growth forest on a structural basis.

In this study, we present a framework of monitoring old-growth forest through the lens of biodiversity using species distribution models. We analyzed 450 species from eBird data in California, Oregon, Washington, Idaho, and Montana. Only species with at least 30 observations from 2010 to 2023 were included in the analysis. Landsat surface reflectance from 1984 to 2023 was processed using continuous change detection algorithms to characterize spectral trajectories for the study area. For each species, a species distribution model was built using Maxent. All the SDM models for old-growth indicator species were integrated to calculate a relative old-growth forest score. The resulting SDM-based old maps can be evaluated together with land surface disturbance to understand old-growth dynamics.