

Project Update November 2024

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Project Title: Mapping Galapagos Invaders with Drones and Machine Learning: An Estimation of Spread Rates of Invasive Plants and Identification of Management Keys for Endemic

Update: Since my last report, I have been processing the collected aerial photography and satellite imagery. During this phase, I encountered challenges that extended the imagery processing timeline. Specifically, the satellite imagery required a pre-processing phase, including atmospheric correction, orthorectification, and subsetting to the study area. I successfully completed this step for all four islands. Following pre-processing, I began processing the images, starting with Santa Cruz Island. This stage involved image fusion, which combines the geometry of higher-resolution bands with the spectral data of lower-resolution bands. Unfortunately, the protocol provided by Laso et al. (2020) did not thoroughly describe this process and the first few attempts to carry it out were unsuccessful. Consequently, I experimented during three months with several tools across three different software programs to achieve the desired outputs. Once this issue was resolved, I proceeded with segmentation and object generation. This process was subsequently applied to the satellite images of the remaining islands. Simultaneously, I processed the drone imagery to create orthomosaics, successfully completing this task by August 2024. The processing of satellite images is expected to conclude by the end of December 2024. Once all imagery is ready, I will begin the machine learning phase to classify land cover. The final step will involve comparing the current land cover with the 2018 data to assess whether invasive plants are spreading in rural areas of the Galápagos. Given the delays in image processing, the publication is now projected to be ready by summer 2025. However, field observations and preliminary results from this project were presented at an international conference in Kraków, Poland, in September 2024.