

VEGETATION SURVEY OF RESTORED WETLANDS IN CALIFORNIA CENTRAL VALLEY, USING UNMANNED AERIAL VEHICLES (UAV) IMAGERY

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Abstract: Recent advances in unmanned aerial vehicles (UAV) have led to monitoring vegetation changes in restored wetlands using object-based image analysis (OBIA) and spectral indices in remote sensing. The objective of the study was to map vegetation on selected restored wetlands in California Central valley (CCV), quantify seasonal vegetation coverage, and assess vegetative health using visual and multi-spectral UAV image analysis. UAV imagery at eight privately managed restored wetlands in three regions of the CCV (Sacramento, Delta, and San Joaquin), once in the summer and fall, from 2020 to 2022 using a DJI Phantom 4 PRO flying at an average height of 120 m above ground height with side and front overlaps of 80% were acquired. The product UAV image collection was processed to create orthomosaic images with a 5 cm/px spatial resolution using the ortho mapping workspace within the Agisoft Photoscan and ArcGIS Pro 3.0.2 (Esri, Redlands, California, USA) software. Interannual phenological changes in wetland vegetation were calculated for 3-band (RGB data) UAV imagery collected, applying the Visible Atmospherically Resistant Index (VARI). Results of the VARI assessment showed an increase in vegetation at two sites in Colusa (1% Dobson and 5.3% Paulo) between the summer and Fall 2021 that may be attributed to the fact that they were undergoing irrigation. Substantial declines in vegetation at two other sites in Colusa (67.1% Bressler and 37.6% Myres) may indicate mechanical removal such as mowing or disking. Sites in the Delta region experienced marked increases in vegetation between the two sampling periods. The information gained from UAV survey could help wetland resource managers and landowners in determining site-specific courses of action to protect and enhance wetland functions.

Keywords: Central valley; Restored wetlands; UAV; VARI; Vegetation