# A Preliminary Look at Species Composition & Cover Across Californian Wetlands Using the Bureau of Land Management's Wetland & Riparian Assessment, Inventory, & Monitoring Protocol

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## Background

California has lost approximately 90% of its historic wetlands since European colonization, leading to these ecosystems becoming a focal point for conservation and restoration (Wetlands (n.d.)). While riparian and wetland areas only cover 1-2% of the landscape in the western United States outside of Alaska (USFWS 2020), they support a higher biodiversity of species than surrounding upland areas. They also provide valuable *ecosystem services* such as water filtration, wildlife habitat, carbon storage, nutrient cycling, stream connectivity, and flood control (Lewis, 1995). They are also more susceptible to invasion from non-native plants than terrestrial areas due to their high resource availability and the higher rates of disturbance that they experience from events such as flooding (Zedler and Kercher, 2004). The Bureau of Land Management (BLM) Assessment, Inventory and Monitoring (AIM) protocol has been developed as a universal protocol to standardize long-term monitoring across a wide variety of BLM landscapes. The standard AIM protocol has been adapted for Riparian and Wetland (R&W) habitat following principles in the BLM's "National Aquatic Monitoring Framework" (BLM, 2015).

## Introduction

For the past three years (2022–2024), the California Native Plant Society (CNPS) has been part of a team of vegetation ecologists, including Colorado Natural Heritage Program (CNHP), collecting R&W monitoring data across the western U.S.. For 2022–2023, CNHP and CNPS shared the R&W sampling of 120 plots throughout California and Nevada. Most recently in 2024, CNPS sampled 120 plots across California and northwestern Nevada, including the Great Basin, the Mojave Desert, the Central Coast, and Northern California (Figure 1). Two monitoring areas are chosen for a deeper analysis: a) Molok Luyuk, an 8-mi. ridge straddling Lake and Colusa counties, and b) upper Fitzhugh Creek meadow system in Modoc County. These areas are of significance to both CNPS and the BLM with Molok Luyuk being added to Berryessa Snow Mountain National Monument in 2024 after years of support from a coalition of groups, and Fitzhugh Creek recently undergoing restoration efforts such as the installation of beaver dam analogues. Given the negative impact that non-native plants have on wetland areas, we will present the relative covers of exotic, native, and noxious plant species in wet to mesic meadows of Molok Luyuk and Fitzhugh Creek regions.


**Photo 1. Plot overview with mark up showing vegetation transects laid in a spoke pattern at CA-APFO-TW-22083 at Rowland Springs within the Modoc Plateau, NW Nevada, within recently built exclosure.**

## Methodology

The riparian and wetland (R&W) plots were selected by BLM field offices for a variety of monitoring purposes, including for restoration and resource assessment. Crews utilized ESRI's ArcGIS Field Maps and Survey123 to locate plots and collect data in forms developed by the BLM National Data Team. Vegetation data was collected using a Line-Point-Intercept (LPI) method and entered into Survey123. These areas were sampled in 2023 and 2024. Data was summarized and compiled by the BLM's National Operations Center (NOC) team to obtain the average absolute cover of exotic, noxious, and native species for the Molok Luyuk and Fitzhugh Creek areas, as defined by the 2024 BLM Noxious Plant List. Only wet and mesic meadows were selected for the purposes of this poster. Seven sites were chosen from Molok Luyuk and six from Fitzhugh Creek. The absolute covers were then expressed as ratios by adding them and dividing each type (native vs non-native vs noxious) by the total. These ratios were then modeled in pie charts.

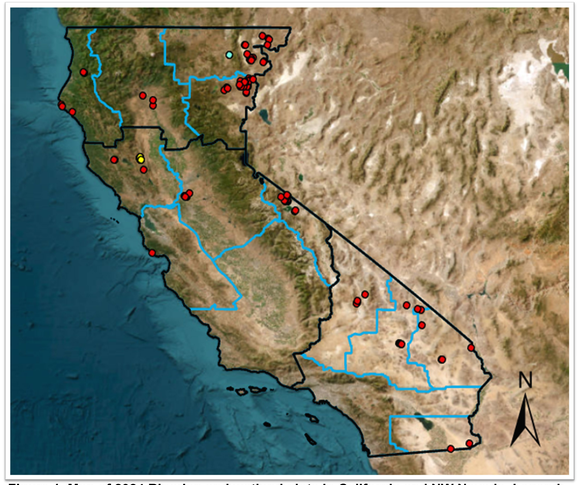


**Figure 1. Map of 2024 Riparian and wetland plots in California and NW Nevada. Legend: Red points = sampled sites, Yellow points = Molok Luyuk Sites, Teal points = Fitzhugh Creek sites, Black lines = California BLM Districts, and Blue lines = CA BLM Field Offices.**

## Results

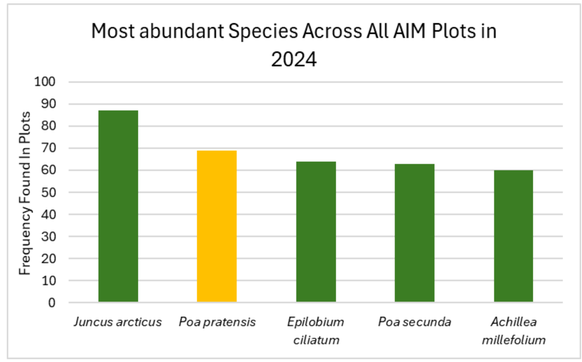


**Figure 2. Five most common plants found in the 120 riparian and wetland AIM plots in 2024. Bar colors: Green = Native species, Yellow = Non-native.**

## Results Continued

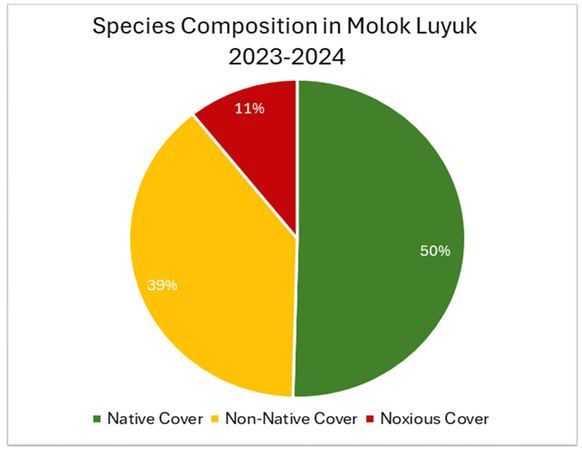


**Figure 3. Pie chart representing the cover ratios of Noxious, Non-Native, and Native species in seven Molok Luyuk sites from 2023 – 2024.**

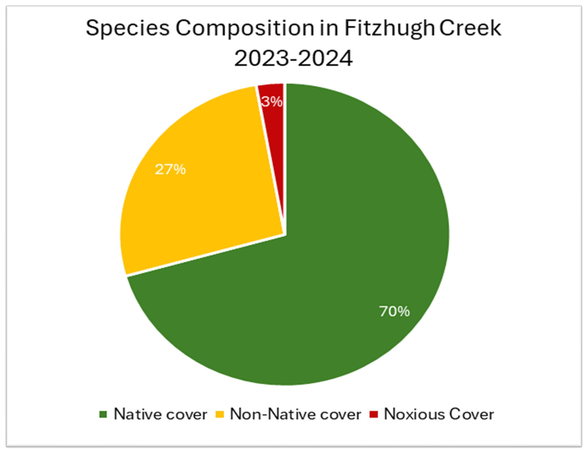


**Figure 4. Pie chart representing the cover ratios of Noxious, Non-Native, and Native species in six Fitzhugh Creek sites from 2023 – 2024.**

Across all 120 AIM sites, the five most common species found are in Figure 2. Baltic rush (*Juncus arcticus subsp. littorallis*) was the most common plant observed, found in 87 of 120 sites. Kentucky bluegrass *(Poa pratensis)* was the only prolific non-native weed in the top five and is the second most common plant. Fringed willowherb *(Epilobium ciliatum)* was the most common forb in all plots sampled. In the seven Molok Luyuk sites (Figure 4), the vascular plant cover ratios were evenly split between native (50%) and non-native/ noxious species (39% and 11%, respectively). In the six Fitzhugh Creek sites (Figure 5), native species made up a majority of the cover ratio (70%), as compared to non-native/ noxious species (27% and 3% cover, respectively). There were a total of 134 unique species identified for sites sampled in Molok Luyuk, and total of 110 unique species were identified within Fitzhugh Creek by crews.

## Discussion

While still in its early stages, Riparian and Wetland AIM has begun to provide valuable insight into species composition and abundance across many sensitive California habitats. Renewed focus has been brought to these systems for their ecosystem services, carbon sequestration abilities, cultural value to tribes, and biodiversity. Both the Molok Luyuk and the Fitzhugh Creek sites have a high native species cover ratio, with both areas containing at or over 50%. Climate change effects so far include hotter and drier weather in California, which is anticipated to aid the invasion of non-native species into native herbaceous species-dominated ecosystems (Sandel and Dangremond, 2011). While difficult to predict the implications climate change will have on rainfall and its effect on non-native species invasion, the preceding two winter seasons during both years of sampling were incredibly wet, and it is encouraging to see native resilience in highly anthropogenically disturbed systems. The covers of native, exotic, and noxious species are anticipated to fluctuate in the coming years as climate change continues to alter rain patterns, as future disturbance events occur, and as planned restoration projects are implemented and maintained with the baseline and post-restoration revisit data we collect.

**Photo 2 & 3: Locally rare Green's thistle (*Cirsium inamoenum*) with two native bee (Bombus) species. Photo 3. Non-native Bull thistle (*Cirsium vulgare*) visited by a Western Swallowtail (*Papilio rutulus*) on Rowland Springs, Modoc Plateau.**

## Citations

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BLM- AIM

CNPS- Hiring for AIM staff