

**Pacific Northwest Cooperative Ecosystem Studies Unit
Task Agreement
National Park Service**

Project Summary Report

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TASK AGREEMENT NO.: COOPERATIVE AGREEMENT NO.: EFFECTIVE DATES:
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COOPERATOR: Oregon State University

PROJECT TITLE: A Functional Assessment of Wetland/Riparian Communities in
Crater Lake National Park, and Lassen Volcanic National Parks

FISCAL YEAR FUNDING: 2004 **ACCOUNT:** 2131-0400-NII, 2131-0500-NII **NOT TO EXCEED** \$90,062

PROJECT SUMMARY:

Crater Lake National Park

This study sought to assess the health of wetlands in Crater Lake National Park (CRLA). To address this objective, during 2006 we visited and assessed the health of 76 wetlands throughout the park, covering an area equal to about 38% of the park's known wetland area. Of the wetlands visited, 61 were selected using a statistical procedure that drew a spatially balanced randomized sample from an existing map of CRLA wetlands and 15 were selected to represent coarsescale attributes apparently absent from the 61 statistically selected sites. Among the visited wetlands, we surveyed a total of 101 vegetation plots. We also characterized soil profiles and observed surface hydrologic conditions. Before beginning the field work, we used GIS and a variety of existing spatial data layers to quantitatively characterize all mapped CRLA wetlands.

Wetlands in CRLA occur in a variety of settings, including stream riparian areas, pond margins, aldercovered slopes, springs, montane meadows, and snowmelt depressions. Although occupying less than 1% of the park's area, these wetlands provide a variety of ecological services such as water storage, water purification, slope stabilization, carbon sequestration, thermoregulation, and support of plant and animal habitat and biodiversity. Many factors define wetland health (or integrity), including contaminants that could not be measured by this study. Only a few indicators of wetland health can be estimated rapidly and at reasonable cost across a large number of wetlands. One is the prevalence of native plant species, and from these data alone our data show most CRLA wetlands being relatively healthy. We found six nonnative plant species (<1% of all species we encountered) among 14 (18%) of the 76 wetlands we visited. From zero to four such species were found per wetland, but they never dominated the vegetation cover.

Our assessment of just 76 wetlands detected two-thirds of CRLA's known wetland flora. Among the 354 plant taxa (both wetland and upland) that we found in the visited wetlands were 10 that are listed by the Oregon Natural Heritage Program as rare or having limited distribution. We also found 20 species and subspecies that had not previously been reported from the park. In most wetlands, more than 45 plant species and 21 families were found, and most of the 100 m² plots we surveyed had more than 24 species and 15 families, with a maximum of 51 species. All but six of the selected sites were confirmed to be wetlands. Although the primary objective of this project did not include wetland boundaries or comprehensively identifying previously unmapped wetlands, we did incidentally discover at least 16 wetlands outside the Crater Lake caldera and 28 within it that had not been previously mapped by the National Wetlands Inventory. Our onsite GPS measurements also indicated that the NWI had underestimated the spatial extent of many wetlands. We recommend further attempts be made to identify and assess wetlands in the northeastern portion of the park, and to survey more wetlands in parts of the Bybee Creek area that we could not reach during 2006 due to a forest fire at that time.

Lassen Volcanic National Park

During 2005, we visited and assessed the health of 68 wetlands throughout Lassen Volcanic National Park (LAVO), covering an area equal to 39% of the park's wetland area. Of the wetlands visited, 47 were selected using a statistical procedure that drew a spatially balanced randomized sample from an existing map of LAVO wetlands. Among the visited wetlands, we surveyed a total of 78 plots dominated by herbaceous wetland vegetation and 15 plots dominated by wetland shrubs or trees. We also characterized soil profiles and observed hydrologic conditions. Before beginning the field work, we used GIS and a variety of existing spatial data layers to quantitatively characterize all mapped LAVO wetlands. Wetlands in LAVO occur in a variety of settings, including stream riparian areas, pond margins, alder-covered slopes, springs, montane meadows, and snowmelt depressions. Based on the hydrogeomorphic (HGM) classification system, about 45% of the wetlands are Depressions or Flats, 38% are Slope wetlands, 7% are Riverine, and 1% are Lacustrine Fringe. Based on the Cowardin classification system, 34% of the LAVO wetlands area is emergent vegetation, 24% is scrubshrub, 7% is forested, and the remainder is open water or aquatic bed. Slightly fewer than one-third of the wetlands retain some surface water year-round. At least one plant species characteristic of fens (an uncommon type of mossy groundwater-fed wetland) was found in 23 of the wetlands, but soil profiles provided definitive evidence of fen conditions in only two of the visited wetlands. We discovered three wetlands that appear to be a type – acid geothermal fen – that is rare globally and apparently had not been documented previously in the Sierra-Cascade system. Many factors define wetland health (or integrity), including contaminants in air, soil, vegetation, and water that were not measured by this study. Few indicators of wetland health can be estimated rapidly and at reasonable cost across a large number of wetlands. When health is defined solely by the prevalence of native plant species and scores from the California Rapid Assessment Method (CRAM), most LAVO wetlands appear to be relatively healthy. We found 19 disturbance-associated plant species (6% of all species we encountered) among 44 of the 68 wetlands we visited. From zero to six such species were found per

wetland, but never dominated the vegetation cover. They were more frequent near roads but not trails.

Our sample of just 68 wetlands detected 51% of LAVO's known wetland flora, and added six species to the LAVO plant list. Among the 338 plant taxa (both wetland and upland) we found in the visited wetlands were at least two that are listed by the California Native Plant Society as rare or having limited distribution. In most wetlands, more than 30 plant species were found, and most of the 100 m² herbaceous plots we surveyed had more than 13, with a maximum of 43. The plant species composition tended to be more unique in wetlands that were dominated by emergent (herbaceous) vegetation, not on lakeshores, at lower elevations, and intercepted by streams. Wetlands in LAVO perform a variety of ecological services. In each visited wetland, we visually assessed presumed indicators of nine of the most common ecological services (functions). Based on that, we found that more of LAVO's wetlands are likely to support native invertebrates, birds, and mammals at a high capacity than are likely to effectively support fish, filter suspended sediments, or maintain surface water temperatures.

Although major objectives of this project did not include mapping wetland boundaries or comprehensively identifying previously unmapped wetlands, we did incidentally discover 87 unmapped wetlands and found that the spatial extent of many mapped wetlands had been underestimated. All visited sites that had been previously mapped as wetlands were found by our field inspection to be wetlands. Attempts to develop spatial models for predicting occurrence of unmapped wetlands were only partially successful, due mainly to limitations of existing spatial data layers.

KEY PRODUCTS AND ACCOMPLISHMENTS

This project resulted in two technical reports (cited below) and a rich wetland dataset. Copies of the reports were presented to the Pacific Northwest Cooperative Ecosystem Studies Unit with this report. Tabular and digital data are on file at the Klamath Network office in Ashland, Oregon.

Adamus, P. R., and C. L. Bartlett. 2008. Wetlands of Crater Lake National Park: An assessment of their ecological condition. Natural Resource Technical Report NPS/KLMN/NRTR— 2008/115. National Park Service, Fort Collins, Colorado.

Adamus, P. R., and C. L. Bartlett. 2008. Wetlands of Lassen Volcanic National Park: An assessment of vegetation, ecological services, and condition. Natural Resource Technical Report NPS/KLMN/NRTR—2008/113. National Park Service, Fort Collins, Colorado.