SPRINGS IN THE CROOKED RIVER BASIN, OREGON: HYDROGEOLOGIC SETTING, ECOLOGY, AND MANAGEMENT

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The Crooked River Basin in central Oregon has a high concentration of mapped springs on public land, where livestock utilize grazing allotments during the summer. Two types of springs commonly developed for livestock use across the state are rheocrene springs and fens, and each spring is associated with distinct wetland and aquatic communities. Species utilizing rheocrene spring habitat, such as the imperiled (S2) Pristine pyrg spring snail, are found near the spring orifice or along the springbrook. Fen species, particularly bryophytes such as the imperiled (S2) *Tomentypnum nitens*, are dependent upon a consistently shallow water table and peat development. Of 180 springs surveyed from 2013 – 2015 in the Crooked River Basin, 95% of diffuse-discharge springs and 79% of rheocrene springs were impacted by livestock and development. A spring development often results in all water being diverted from the groundwater-dependent ecosystem to a cattle trough, allowing easy access for livestock. In rheocrene springs, developments eliminate spring orifice and springbrook habitat. In fens, developments lower the water table, which can compact the peat soils and degrade the fen habitat. The Nature Conservancy, in collaboration with the U.S. Forest Service, is testing the efficacy of retrofitting existing spring developments to provide sufficient water for livestock while also protecting the groundwater-dependent ecosystems. Two retrofit designs were created: one each for rheocrene spring developments and fen spring developments. The rheocrene retrofit features modified springbox outflow piping intended to continuously maintain flow to the spring orifice and springbrook. The key component of the fen retrofit is a modified springbox that maintains the water table

elevation above a user-defined threshold. Two pilot retrofits were installed at Sand Spring and Horse Fen in the Ochoco National Forest within the Crooked River Basin during Fall 2016. We hypothesize that retrofitting the spring developments will result in the re-establishment of groundwater-dependent vegetation and macroinvertebrates in the historical spring orifice at Sand Spring and the peat wetland at Horse Fen. This presentation will discuss the engineering objectives, ecological goals, and preliminary monitoring results of the pilot study.