

Proposed Sampling Design

Aquatic Snail Distributions Across a Range of Livestock Use Levels: Cascade-Siskiyou National Monument

Principal Investigators:

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Project Background and Objectives

The Cascade-Siskiyou National Monument (CSNM) was established by presidential proclamation on June 9, 2000, in recognition of the outstanding biological resources of the landscape. Biodiversity in this 52,000-acre national monument is heavily influenced by its location at the junction of the Cascade Mountains, Siskiyou Mountains, and the Great Basin influenced Upper Klamath Basin. Deixis Consultants was contracted by World Wildlife Fund to assist in designing and implementing a study to assess the potential for adverse impacts from livestock grazing on freshwater snail taxa and the habitats they use.

Aquatic snails, particularly the springsnails, demonstrate a high degree of endemism (species or sub-species found over a very limited distribution) in the vicinity of the CSNM. Grazing livestock also use the spring habitats in which many of these endemic snails are found. Springs present a year-round source of water and palatable forage; for these reasons, springs often concentrate livestock during the months of July, August, and September. Potential impacts to these habitats include degraded water quality (principally temperature, dissolved oxygen, and turbidity), altered spring substrate character (greater incidence of fine sediments that fill interstitial spaces), and direct trampling. All of these possible impacts are potentially detrimental to the native snails found in the CSNM's springs.

Study Design

This study will determine the differences in native, freshwater snail presence and diversity within and immediately adjacent to the CSNM between spring habitats that have been heavily grazed in comparison with those that have not been grazed or have been lightly grazed. At least 60 individual spring habitats will be surveyed over two years throughout the CSNM area. Thirty of these springs will be located in areas that receive heavy grazing pressure while the other thirty springs will be in areas that are either lightly grazed or not grazed at all. Ten springs from both utilization classes will be sampled during both field seasons, yielding a total of 80 samples from the 60 springs. Researches will select study sites to cover the range of habitat variation across the CSNM's varied landscape in June of 2003. Site selection will be done in consultation with Bureau of Land Management.

Sampling Technique

The Aquatic Mollusk Survey Protocol developed for Survey and Manage requirements of the Northwest Forest Plan form the basis for this study's collection methods (Furnish et al. 1997). In

springs of sufficient size, researchers will establish transects across the habitat unit. If several sub-habitats occur in a given spring, transects will be established to ensure inclusion of each of the sub-habitat types. Smaller springs will not have established transects but will have multiple samples taken across the range of subhabitat types. Collections will occur at randomly distributed sampling points along each transect. Specific collection techniques will vary by substrate type and the abundance of aquatic macrophyte cover. Researchers will use a dip net or sieve to dredge through areas of deep (> 10 cm) silt or sand. Researchers will hand collect or “brush” mollusks directly from habitats with rock substrate. In shallow areas with an abundance of aquatic macrophytes, researchers will remove plants from the water with a dip net and the “shake” mollusks from the vegetation over a collection bucket. Once shaken, vegetation will be “combed” and any remaining snails will be handpicked from the vegetation. Researchers will also sample the substrate beneath the macrophytes with the technique most suitable for the substrate type. Most springs can be thoroughly sampled in one hour.

Living specimens will be kept alive for identification and returned to the specific spring from which they were collected. Specimens that are difficult to identify in the field, as well as representative voucher specimens from each spring yielding freshwater snails, will be appropriately preserved for examination and identification/confirmation in the lab.

Collection sites will be visited during the summer (mid-July to mid-September). This is the optimal time to survey for freshwater snails as the current year’s cohort is large enough to readily collect and easy to identify. These attributes of late summer sampling are particularly important for those taxa that are both short-lived and semelparous (die after breeding). Generally, a single visit is sufficient to document species presence in these spring habitats. However, we have chosen to re-sample 10 springs in each utilization class to provide insight to inter-annual variation and sampling effectiveness.

In addition to information on mollusk taxa, researchers will measure several water quality parameters (water temperature, pH, total dissolved solids, dissolved oxygen), qualitatively assess spring size and discharge, note spring substrate characteristics (silt, sand, gravel, cobble, boulder, bedrock or any of the last 5 overlaid by silt), and identify key spring-riparian plant species. These water quality and spring habitat condition indicators are important to describing the direct impact, if any, of livestock on spring conditions.

Literature Cited

Furnish, J., R. Monthey, and J. Applegarth. 1997. Survey protocol for aquatic mollusk species from the Northwest Forest Plan. U.S. Department of Interior, Bureau of Land Management, Portland, OR.