MAN'S EFFECTS ON AQUATIC AND RIPARIAN ORGANISMS IN THE CANYONS OF CANYONLANDS AND ARCHES NATIONAL PARKS AND NATURAL BRIDGES NATIONAL MONUMENT

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♦ SUMMARY OF RESEARCH ACCOMPLISHMENTS

This is the third and final year of this project. In 1990 and 1991 we concentrated our efforts at Natural Bridges National Monument and Canyonlands National Park. In 1992, we performed work at Natural Bridges National Monument, and at Arches National Park. At Natural Bridges we sampled plant grids and small mammal grids along sections of canyon bottom containing or lacking a hiking trail to determine if the trail was influencing the distributions or abundances of plants or animals in the canyon bottom. We collected data in May and June. We sampled the area between Sipapu Bridge and Kachina Bridge (area containing the well used hiking trail), and an area about 3 kms long above Sipapu Bridge (area lacking a well used trail).

Four small mammal trap grids (70 live-traps/grid) were trapped in the area lacking a trail and an additional four were trapped in an area containing a trail in White Canyon. Each trap grid was trapped for four successive nights. Eight plant grids (4 up and 4 downstream of Sipapu Bridge) were examined for species composition and plant coverages. Each upstream grid consisted of 40 1 m^2 plots, while the downstream grids consisted of 40 additional plots plus 20 plots randomly located in the trail right of way.

At Arches we live trapped small mammals and sampled the vegetation in Courthouse Wash. At this site we sampled above and below the paved road running across Courthouse Wash to the west of "The Wall" to determine if hiker or packhorse usage below the road was influencing the plants or animals in this canyon bottom. Two 100 live-trap-grids were set up (one above and one below the road) and trapped for four consecutive nights. Small mammals were marked with ear tags and released to facilitate population estimation. One hundred 1 m^2 vegetation plots were examined above and another 100 below the bridge to determine plant species composition and coverage. In addition 40 1 m^2 plots were also examined in the trail right of way. The spatial arrangement of the plant plots was such that we could contrast vegetative characteristics in a canyon bottom containing the trail, in a canyon bottom lacking the trail and in the trail right of way per se. The Arches data sets were collected in October 1992.

♦ SIGNIFICANCE OF OBSERVATIONS

We will reserve final judgement on the significance of our observations in 1992 until we have finished data analyses. At this point we can, however, make some tentative comments.

At Natural Bridges the hiking trail enters the stream channel at Sipapu Bridge and continues downstream until Kachina Bridge. In 1990 our sampling revealed differences for some aquatic organisms in both the proportion of pools occupied and the densities of individuals per species between the area containing the hiking trail (below Sipapu) and the area lacking the trail (above Sipapu). Similar patterns held in 1991. Sand substrate is disproportionately common below Sipapu, while rock bottom is disproportionately common above Sipapu in the area lacking a trail. Differences in species abundances or distributions of aquatic animals appear to relate to differences in substrate, with species such as mayflies inhabiting areas with much sand and other species such as snails or caddisflies inhabiting areas with extensive rock substrate. We speculate that the negative impact of the trail on the vegetation (documented in 1990) is releasing sand from the soil and increasing sand infiltration. Rocks are present below Sipapu but are largely buried by sand. If our speculation is correct, then the hiking trail is having an indirect effect on the distribution and abundance of some aquatic organisms via its effect on the nature of the pool substrate. Our 1992 plant analyses are not complete, but appear to show similar patterns to the 1990 results. The small mammal analyses are likewise not complete.

♦ PROBLEMS THAT MIGHT IMPEDE PERFORMANCE

We see no unsolvable problems.

♦ WORK REMAINING TO BE PERFORMED

Field work is now complete. The only work remaining to be performed is to input the data, analyze the results, and write the final report. This will take several weeks, but we anticipate no problems with the analyses.