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Study Title: Dynamic Spatial Patterns During Succession: Resolving Patterns and Mechanisms using Grid-Based Spatial Automata Models

Key Words: terrestrial plant upland other vegetation grasses ecology
herbs succession survival pyroclastic flows archives

Abstract: (Project Summary from NSF Research Grant). Our major objective is to investigate how the spatial relationships among individual plants contribute to successional dynamics and influences the spatial patterns that result. We propose to investigate the effects of spatial interactions at the individual level on population dynamics and ecosystem succession on the Pumice Plain near Mount St. Helens, Washington. Spatial analyses of annual field survey data will test the significance of number, size, and species of neighboring plants on growth, survival, and recruitment. Computer models using grid-based spatial automata will implement alternative life histories and individual-level interactions to simulate spatial dynamics during primary succession. The results of this study will provide insights into integration of spatial dynamics across three levels of ecological organization: at the individual level, spatially modified growth rates; at the population level, spatially modified recruitment and mortality; at the ecosystem level, dynamic spatial patterns during succession.

Research Sites: Pumice Plain north of Mount St. Helens; along Truman Trail. 6 12x14 m vegetation plots established with the assistance of the MSHNVM staff.

Type of Measurement(s): Number of individuals of each plant species in 1x1 quadrates in each plot. Individual marked plants (about 100 per plot) are measured for canopy diameter along N-S axis.

Frequency of Measurement(s): Field measurements are conducted each year in September in all 6 plots.

Data Storage: The original data sheets for field surveys are retained by USFS staff (Charles Crisafulli); data are also entered into Quattro Pro spreadsheets stored on diskettes; copies of diskettes are held by USFS staff.

Long-term plans, Data available for collaborative efforts: Current field studies are a continuation of efforts conducted annually by USFS staff since 1983. All data collected to date are available upon request in Quattro Pro spreadsheet format on diskettes for PCs. A new NSF proposal has been submitted (M. W. Paschke and W.M. Childress) to determine N and C limitations on primary succession on the Pumice Plain. This study will utilize field plots similar to the above sites, and will allow continuation of plot surveys as before for an additional 4 years. Additional proposals to examine landscape successional patterns are now being considered.