RESPONSE OF A FOREST ECOTONE TO IONIZING RADIATION

Progress Report

Peter G. Murphy, Principal Investigator
Michigan State University
East Lansing, Michigan

and

Rebecca R. Sharitz, Co-Investigator
Savannah River Ecology Laboratory
Aiken, South Carolina

October 15, 1974 - October 14, 1975

PREPARED FOR THE U.S. ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION UNDER CONTRACT E(11-1)-2283

This report was prepared as an account of work sponsored by the United States Government. Neither the United States nor the United States Energy Research and Development Administration, nor any of their contractors, subcontractors, or their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness or usefulness of any information, apparatus, product or process disclosed, or represents that its use would not infringe privately owned rights.
DISCLAIMER

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.
DISCLAIMER

Portions of this document may be illegible in electronic image products. Images are produced from the best available original document.
Abstract

Compositional and structural characteristics of three forest types, including aspen dominated, maple-birch dominated, and an intervening ecotone, were studied before and after irradiation in northern Wisconsin. Preirradiation findings are reported in papers by Murphy and Sharitz (1974) and Murphy, Sharitz, and Murphy (1974). A detailed analysis of the results obtained up to the present time (July, 1975) is presented in Summary Report No. C00-2283-6.

Irradiation occurred during the summer of 1972. By the summer of 1973 the density of viable tree seedlings at 10 m from the radiation source was substantially reduced in all three areas relative to the preirradiation densities of 1971. Re-establishment of tree seedlings has, as of June 1975, been prevented by the vigorous development of ground vegetation. At 20 m, the density of seedlings in the three areas increased during the period between 1971 and 1973 in response to the partially opened canopy. The overall density of seedlings of *Populus tremuloides* and *Acer rubrum* increased markedly in the three areas and *P. tremuloides* invaded some areas in which it had not been found prior to irradiation. By 1974 many of the seedlings at 20 m had reached the sapling size-class. Viable trees greater than 2.5 cm, dbh were eliminated at 10 m in all three areas by June 1974 and were reduced in density of 20 m.

Leaf litter production was reduced by up to 94% at 10 m and 64% at 20 m during the period between 1971 and 1973 in the irradiated areas. The reduction was greatest in the aspen area. Leaf litter reduction in the ecotone and maple-birch areas was less severe, averaging 56% at 10 m and 27% at 20 m. The rate and compositional characteristics of succession in the ecotone relative to aspen and maple-birch forest types is presently under study.
Legal Notice

This report was prepared as an account of Government-sponsored work. Neither the United States, nor the Energy Research and Development Administration, nor any person acting on behalf of the Commission:

A. Makes any warranty or representation, expressed or implied, with respect to the accuracy, completeness, or usefulness of the information contained in this report, or that the use of any information, apparatus, method, or process disclosed in this report may not infringe privately owned rights; or

B. Assumes any liabilities with respect to the use of, or for damages resulting from the use of, any information, apparatus, method, or process disclosed in this report.

As used in the above, 'person acting on behalf of the Commission' includes any employee or contractor of the Administration, or employee of such contractor, to the extent that such employee or contractor of the Commission, or employee of the Commission, or employee of such contractor prepares, disseminates, or provides access to, any information pursuant to his employment or contract with the Administration, or his employment with such contractor.
Preface

The investigations discussed herein were originally undertaken as a cooperative research effort with the Radiobiology of Northern Forest Communities Project of the Institute of Forest Genetics at Rhinelander, Wisconsin. While that project has been terminated, this study has continued as originally planned.

Approximately 15% of my time (Principal Investigator) has been devoted to the project since the beginning of the current term of the agreement. At least 15% of my time will be devoted to the project during the remainder of the current term. Dr. Rebecca Sharitz (Co-Investigator) has devoted approximately 15% of her time to the project and expects to devote a similar proportion of her time to the project during the remainder of the current term.
Activities for 1974 - 1975

Two sampling trips to the Enterprise Radiation Forest have already been made during the current contract period and one additional trip to collect leaf litter samples is scheduled for October, 1975. All sampling proposed in the 1974-75 renewal proposal has, therefore, been completed or is on schedule.

A detailed discussion and analysis of the data collected from the beginning of the project to July, 1975 can be found in the Summary Report (C00-2283-6) submitted with this progress report. As the Summary Report includes measurements made during the present contract period, that discussion will not be repeated here. Appended to the Summary Report are two reprints of publications concerning the preirradiation studies.

An oral presentation of the findings of this study was made in May, 1975 at the Fourth National Symposium on Radioecology at Corvallis, Oregon.

Future Sampling

We are interested in continuing observations on the influence of the opened forest canopy on the rate and compositional characteristics of succession, especially the interaction between ground vegetation and tree seedlings. We also wish to determine the rate at which leaf litter production and leaf area index returns to original preirradiation levels. We hope to continue these observations over a period of several years. The overall impact of the radiation stress will obviously depend upon the rate at which forest succession proceeds in the damaged areas. Information on succession in disturbed northern forest types is virtually non-existant.
References

