

Preface

This book is a report of investigations of several small ponds on the arctic tundra near Barrow, Alaska. The main study, which ran from 1971 through 1973, was funded from three sources: The National Science Foundation, the State of Alaska through the University of Alaska, and individual companies and members of the petroleum industry. The NSF funding was under the joint sponsorship of the U.S. Arctic Research Program (Division of Polar Programs) and the U.S. International Biological Program (Ecosystem Analysis Program). The U.S. Tundra Biome Program was under the overall direction of Jerry Brown of the U.S. Army Cold Regions Research and Engineering Laboratory and consisted of aquatic and terrestrial sections. A companion volume to this reports the findings of the terrestrial projects (Brown et al. in press).

The principal investigators of the aquatic projects were:

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Other scientists who took part in the project were Staffan Holmgren (Uppsala University), Tom Fenchel (Aarhus University), Stanley Dodson (University of Wisconsin), John Kelley (University of Alaska), Patrick Coyne (U.S. Army, CRREL), Ralph Daley (North Carolina State University), Richard Prentki (University of Alaska), Tor Traaen (Norwegian Institute for Water Research), Donald Stanley (North Carolina State University), and Jawahar Tiwari (North Carolina State University).

Additional information on the macrobenthos came from a study in 1975, 1976, and 1977 carried out by Samuel Mozley and Malcolm Butler (University of Michigan) which was funded by the U.S. Department of Energy.

There are a number of possible approaches to the study of the ecology of tundra ponds. We concentrated first on measuring the fluxes of carbon, nitrogen, and phosphorus through the ecosystem. Next, we used a variety of manipulations, ranging from changed light conditions for plankton in a small bottle to an increase in phosphate in a whole pond, to investigate the controls of various processes. While the field work was going on, we also constructed a mathematical model of the ecosystem. This left little time for detailed studies of the ecology of individual species although several dominants, such as *Daphnia middendorffiana* and a *Chironomus* sp., were examined. Most effort was put into nutrient cycling studies and into investigations of the lower trophic levels. Some areas, such as the control of zooplankton species composition or the physiology of individual species of algae, were not well studied.

Most of this book was written during the summer of 1974, and was later edited for consistency of style and overall integration. The portion of Chapter 7 on the insect larvae was completely rewritten in 1978, and, by the author's request, the section of Chapter 6 by R. Stross was not edited.

The book is organized in a conventional fashion with the physical and chemical information first followed by the descriptions of the primary producers, secondary consumers, etc. Each chapter ends with an extensive summary; a good idea of the important parts of the limnology of the pond can be gained from these. Chapter 1 consists of a summary of the conclusions of the overall study but only those conclusions that are most interesting to an ecologist. In this way, we attempt to answer the question, "What new things did you discover?"

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