Preface

The stimulus for this study occurred in 1973 when Peter Harrison and I independently identified ground patterns in the *bajos* Morocoy and Acatuch, Quintana Roo, as relics of Maya raised fields and canals. We subsequently learned that Alfred Siemens had photographed some of these patterns previous to 1973. The large areas covered by these patterns in the southern Quintana Roo area alone had major implications for Maya agricultural and cultural histories, and challenges concerning the proper interpretations to be given to these and other finds quickly developed. It was obvious that an interdisciplinary project was needed to solve various facets of the raised-field controversy. The Instituto Nacional de Antropología e Historia, Mexico, awarded a permit for the study. Unfortunately, by the time that funds were procured for an examination of the Quintana Roo patterns, the project was unable to meet the procedural requirements of INAH study. In addition, by 1979 much of the *bajos* Morocoy and Acatuch had been leveled as part of a large-scale agricultural project. These circumstances promoted a shift in study area to Pulltrouser Swamp, Belize.

This volume constitutes the analyses and brief interpretations of the data collected by the 1979 University of Oklahoma–National Science Foundation Pulltrouser Swamp Project. We felt that the initial Pulltrouser evidence was sufficiently significant to various issues of Maya prehistory, especially agricultural issues, to warrant more complete publication of the data beyond article summaries. In addition, during the preparation of this text we had no assurances that a second phase to the project would be funded. Fortunately, such funding was awarded by NSF through the auspices of the University of New Mexico. The results of the second phase will not be known for some time because of the large amount of data retrieved, and publication of that material is several years in

the future. For these reasons, it was decided that the presentation of the first phase of the project was useful.

The 1979 Pulltrouser Swamp Project was divided into two parts. The agricultural-ecological branch was headed by myself, principal investigator and geographer. Peter Harrison, coprincipal investigator and archaeologist, headed the settlement pattern program. Despite these needed managerial and technical divisions, the principal investigators attempted to facilitate involvement of all parties of either branch with one another's work. The main effort of the 1979 season lay with the agricultural-ecological section in that the identification of the ground patterns at Pulltrouser Swamp was the principal research goal.

Because of monetary and time constraints, the coprincipal investigator was not able to be with the project from the outset of the field season. However, our move to a new and "unknown" study location necessitated an immediate search of the swamp zone for settlements. These factors placed the burden of instigating a settlement survey and limited excavation on Nancy Ettlinger and myself, without the much needed guidance of the coprincipal investigator. The catalog system (operation, suboperation, and lots) and the survey implemented are thus the responsibility of Ettlinger and myself. On arrival, Harrison began the mapping and continued the settlement survey of the Pulltrouser South zone, while Ettlinger conducted the bulk of the excavations at Kokeal. The descriptions and interpretations of these excavations are hers, although Harrison guided the placement of certain excavations and assisted in some of the stratigraphic interpretation. Obviously, the settlement section of the project would have been enhanced had Harrison been able to guide these studies from the outset, but his scheduling and the structure of the 1979 project did not allow this.

Editorially, Harrison and I have altered the original texts in order to maintain cohesiveness among cross-disciplinary works and to adhere to accepted format and terminology. However, we have not attempted to alter descriptions or interpretations and, in some instances, we do not necessarily agree with the specifics in various sections of the text. Our broader interpretations appear in the final chapter.

An interdisciplinary project of this nature owes a large measure of its success to the abilities of its specialists to communicate with one another and to share a concern for the broader issues of the project beyond their own line of study. To this end the Pulltrouser Swamp Project had an exceptional team of personnel: codirector Peter D. Harrison (Middle American Research Institute, Tulane University,

and the University of New Mexico), Robert E. Fry (Purdue University), William C. Johnson (University of Kansas), Alan P. Covich (University of Oklahoma), Frederick M. Wiseman (Louisiana State University), Harry J. Shafer (Texas A&M University), Nancy Ettlinger (University of Oklahoma), Janice P. Darch (University of East Anglia, Norwich, England), Charles H. Miksicek (University of Arizona), and Alexandra C. Madeira. The project was also assisted in the field by Tanya Luhrman (Harvard University) and Charles Lincoln (Harvard University).

In addition, various laboratories and personnel assisted in several facets of the analysis, including Arturo Gómez-Pompa and the Instituto Nacional de Investigaciones sobre Recursos Bióticos (Xalapa, Mexico), B. L. Turner, C. P. Cowan, and the Plant Resources Center (University of Texas at Austin), Mary Pohl (Florida State University), V. R. Switsur of the Godwin Laboratory (Cambridge University), and Herb Haas of the Radiocarbon Laboratory (Southern Methodist University). Paul Bloom (University of Minnesota) has offered valuable criticisms of the soil work.

The project could not have progressed without the assistance of various other agencies and individuals. Norman Hammond encouraged our move to Belize, provided aerial photographs and the use of his field camp at Cuello, introduced us to various facilities and agencies in Belize, and made available the services of Charles Miksicek. John Yellen and the Anthropology Division of NSF facilitated our request to move field locations, and Elizabeth Graham Pendergast, then archaeological commissioner of Belize, and members of that office expedited the procedures to obtain permits to work in Belize. Tom Hester and Harry Shafer allowed us to utilize the University of Texas at San Antonio–Colha Project as a vehicle for lithic analysis.

The project was of such scope that the broader goals could not have been achieved without the services of various agencies and personnel who provided their services for minimal or no remuneration. Alan Covich, Frederick Wiseman, Alexandra Madeira, Tanya Luhrman, and Charles Lincoln provided field services without pay. All project staff performed laboratory analysis on their own time. Arturo Gómez-Pompa, B. L. Turner, C. P. Cowan, and Mary Pohl provided technical services without charge. In addition, the Soils Laboratory at Bedford College, University of London, and the Godwin Laboratory, Cambridge University, provided their facilities and services at reduced rates.

Foreign field projects depend on the cooperation of the host country, and the people and agencies of Belize were magnificent in this

regard. Beyond those mentioned previously, Harriot Topsey, the commissioner of archaeology, and his former assistant, Mark A. Gutchen, have continued to assist the project after the completion of the 1979 field season. The Cuello brothers extended their hospitality and allowed the use of the Cuello camp after Hammond's departure. The Royal British Air Force and the Belize Sugar Industries provided aerial photographs and other services. The landowners around Pulltrouser Swamp and the workers from the village of Yo Creek assisted the project as well.

Financial support was provided by NSF, Anthropology and Geography divisions, under grant BNS 78-12537. We thank John Yellen and Patricia McWethy for their cooperative efforts to fund the project from two divisions. In addition the project was assisted by the University of Oklahoma, Office of the President, dean of the Graduate School, and Department of Geography, which provided a field vehicle, release time for the project director, and numerous secretarial and other services during and subsequent to the director's tenure there. Indeed, without the services performed by James Bohland and by the personnel of Grants and Contracts at Oklahoma, the project would have been sorely pressed. Finally, Clark University has provided various services which facilitated the preparation of project reports and this text.

During analysis of the Pulltrouser data and preparation of the text, the editors have been assisted from numerous sources. We thank Norman Hammond, Alfred Siemens, Mary Pohl, Paul Bloom, the Colha and Cuello projects' staffs, David Friedel, Vernon Scarborough, William M. Denevan, Gordon Willey, Richard Leventhal, Don Rice, and Douglas Johnson for their discussions with us.

The director owes special thanks to several people without whose assistance the 1979 project and subsequent interpretations would have been impeded. I thank Alan P. Covich and Edward S. Deevey, Jr., who taught me to be more cautious and patient. Particular appreciation is extended to Nancy Ettlinger and Janice P. Darch, who held the field camp and project together for the entire field season. At one time or another these two acted as field cooks, accountants, drivers, and counselors in addition to their research activities. Without their enormous personal efforts and their abilities to put up with the director, it is doubtful that the project could have succeeded.

Finally, I extend my deepest gratitude to codirector Peter D. Harrison, whose untiring efforts, both personally and professionally, led to the establishment of the project. He unselfishly provided his field equipment and vehicle at personal financial sacrifice.

His field efforts and guidance have been essential to the project's achievements.

Much of the manuscript was typed by the secretarial pool, Clark University, without whose assistance its production would have been difficult. Herbert Heidt and the Cartographics Laboratory, Clark University, prepared most of the preliminary figures and maps.

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PULLTROUSER SWAMP

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