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A Science of Networks Approach to Ancient Maya Sociopolitical Organization

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A Science of Networks Approach to Ancient Maya Sociopolitical Organization

by

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Dedication

To my parents

and grandparents

Acknowledgements

I have benefited immeasurably from the assistance, encouragement, and selflessness of many individuals and institutions over the course of researching and writing this dissertation. As a guess, easily over 250 people directly or indirectly contributed to the field research and other aspects; I am somewhat reluctant to see my name alone on this dissertation. In these acknowledgements I have singled out many of those that aided and abetted but ask the forgiveness of any that I have inadvertently overlooked or forgotten.

First, I would like to thank my family. It would not have been possible to finish this dissertation without them. I hope that my success in completing this dissertation makes them proud. Moral support and much-valued advice dispensed over the years by my parents and grandparents have helped me to survive graduate school. Their kindness and generosity has been inspirational—I cannot possibly express to them the depth of my gratitude for their optimism, encouragement, and support. It is to them, therefore, that I dedicate this dissertation: my parents, Harold N. and Elizabeth Aylesworth; my grandparents, John and Anne Cannon; my grandmother, Kathleen Aylesworth; and to the memory of my grandfather, Harold R. Aylesworth.

My field research was done under the auspices of the Programme for Belize Archaeological Project (PfBAP), directed by Fred Valdez, Jr. This project provided not only the location for the research but tremendous logistical and financial support through the well-established and comfortable R. E. W. Adams Archaeological Research Facility. The PfBAP both fed and housed me in the field and provided equipment, supplies and local laborers to complete research. Additionally, the PfBAP provided the institutional framework for the instruction of numerous undergraduate and graduate students who were trained by and assisted with the field research.

Many people do their research under the PfBAP umbrella, and many of them were in camp working on their own projects while I worked on my dissertation field research. The directors of a number of PfBAP sub-projects were helpful and collegial, so I would like to thank Brett Houk, Eleanor King, Brandon Lewis, Richard Meadows, Leslie Shaw, and Clint Swink for their camaraderie in camp. Stan Walling deserves special mention for his much-valued encouragement and well-thought-out advice. Staff members of a variety of PfBAP sub-projects, directed by the foregoing individuals, proved to be a lot of fun, dispensing advice and wisdom with tremendous senses of humor as well as simply being there for moral support. For this I thank Claire Allum, Marisol Cortes-Rincon, Peter Davis, Sandra Dias, David Hyde, Glen Jones, John Lowe, and Yoav Me-Bar. I would also like to thank David and Lisa McDow who were exceptionally collegial, David in particular giving unselfish and useful advice on many occasions.

Most field seasons at PfBAP began for me with a drive from Austin, Texas to Belize. In fact, I drove down at the beginning of each season and back to Texas at the end 5 times! These trips were always “interesting”; sometimes an adventure or misadventure took place, but the trip was always a valued learning experience and fun too. Mexico was a pleasant and beautiful country in which to drive. A lot of folks traveled with me or drove other vehicles down in a convoy. These road trips would have been a lot less fun without the colleagues that traveled with me, some of them on more than one trip: Sandra Dias, Shelly Fischbeck, David Hyde, Glen Jones, John Lowe, David McDow, Aníbal

Mendoza, Rissa Trachman, and others. Paul Hughbanks gave me useful advice and tips prior to my first trip.

In Belize, excavation was overseen by Shelly Fischbeck and Liwy Grazioso Sierra. They both did outstanding work with excellent attention to detail under often difficult conditions. Numerous others were involved in excavation and mapping including Marisol Cortes-Rincon, Amber Copeland, Norma García Huerta, Rigden Glaab, Carole Leezer, John, Lowe, Yoav Me-Bar, Aníbal Mendoza, Scott Speal, and M. D. Turner. Particularly inspiring were excavation volunteers, including Yann Desailly-Chanson, Glenn Dolese, David Parkhill, May and Jim Schmidt, and Rickie Swink. Excavations during the spring of 2002 at Dos Hombres, Group D were done by a particularly dedicated group of students. These included Denise Hendlmyer, Seth Mitchell, and Tesa Villalobos. The summer 2002 excavations were assisted by Erin Gredell and Sara Cizmas. In addition, dozens of field school students from the University of Texas at Austin and many other universities, Belizean students, and volunteers from England, France, Morocco, and Switzerland helped with excavation and mapping.

Belize, regrettably, is not my country of citizenship. I was therefore a guest in a foreign land while doing my dissertation field research. The responsibilities of being such a guest are not something I have taken lightly, I hope, and I would like to thank my many hosts, both individuals and institutions, who made this dissertation possible. Field research in Belize was done under a permit issued to Fred Valdez, Jr. by the Institute of Archaeology (IoA, formerly Department of Archaeology), National Institute of Culture and History. The highly dedicated, friendly, and efficient staff of the Institute of Archaeology was instrumental in getting my dissertation research done. I would like to thank Jaime Awe, Director, John Morris, Associate Director for Research and Education, and Brian Woodeye, Associate Director for Parks, Planning and Policy Management.

George Thompson, former Acting Commissioner in the Department of Archaeology issued the permits for some seasons. In addition to their work in the IoA office, Melissa Badillo and Joyce Tun joined us in the field and their assistance is greatly appreciated. My visits to the IoA in Belmopan were something to look forward to because of the cheerful disposition of the staff, including Teresa Batty and Sherilyne Jones. The assistance of Sherilyne Jones was crucial to solving immigration issues at the start of the 2003 season.

The PfBAP provided essential and valuable assistance by hiring and paying the wages of some extraordinary Belizeans. Excavation and mapping were carried out with the help and advice of Balthazar Canche, Mani Magaña, and Sergio Manzanillo. These fine gentlemen provided highly-prized advice about the flora and fauna, Belizean life and customs, and excavation. In camp, the PfBAP fed me well, with fine food prepared by Cruz Rivera, Mirna Sandoval, and others. Oscar and Alva Garcia did much to keep the camp running smoothly.

In addition to the required permits granted by the IoA, the Programme for Belize (PfB) granted permission to do research on their property to Fred Valdez, Jr., under whose supervision my dissertation field research was completed. Research on PfB land was done thanks to Executive Director Edilberto Romero and Herbert Haylock. Thanks is also due to Joy Grant, former Executive Director of the PfB. At the Programme for Belize's La Milpa Field Station, our nearest neighbors while in the field, Ramon Pacheco the station manager, and his staff (Gabriel, Mauricio, Stella, Valentin, and Vladimir) provided hospitality, friendship, and other assistance over the years.

Beyond the La Milpa Field Station and my fellow residents of the R. E. W. Adams Research Facility, my nearest neighbors in Belize lived in the community of Blue Creek. I have never known so many good-hearted, intelligent, helpful, and friendly people. It *may* have been possible to do my field research without the help of the people of Blue Creek, but it would have been much more difficult. I arrived knowing not a soul in Blue Creek, yet I left at the end of my field research with many friends. I am a great admirer of the Rempel family, in particular. It was a great pleasure getting to know such a talented family and I will never forget their hospitality. I would like to thank Peter Rempel, Abe Rempel, Albert Rempel, and Jacob Rempel, for many engaging and amusing conversations at Tres Leguas and for the tremendous support their skills and hospitality lent to my dissertation research directly and indirectly through their work with the PfBAP. The Neufeldt family, also at Tres Leguas, provided countless eggs and clean laundry, as well as occasional home-baked snacks and preserves. Jacob Friesen proved to have a great sense of humor. Thanks are also due to John Hiebert, Peter Braun and the staff at the Linda Vista Shopping Center.

Our neighbor to the south of the PfB property is the Chan Chich Lodge. Occasional visits to Chan Chich helped to relieve stress, with thanks to Norm Evanko, former managers Tom and Josie Harding, and current managers Nick and Brigitte Bougas. In Belize City, customs issues related to my vehicle and the export of samples was handled by Billy Valdes (thanks are also due to Fred Valdez and the IoA who dealt directly with the issue). Occasional visits to Belize City were made enjoyable thanks to the many helpful employees of the Princess Hotel (in particular Rigo, Rogelio, and Mary).

Analysis of collected materials was done in Belize by a variety of specialists who were supported by the PfBAP. David Hyde did analysis of chert and Marisol Cortes-Rincon did preliminary analysis of chert and obsidian. Rissa Trachman completed analysis of obsidian. Lauren Sullivan analyzed the ceramic sherds. Julie and Frank Saul (assisted by Lauri Thompson in the field) excavated and analyzed human remains. Leslie

Shaw undertook analysis of some of the faunal bone and shell. Outlines of field drawings were inked by Elizabeth Aylesworth while artifact drawings were done by Dee Turman. Sandra Dias assisted with the completion of ceramic type association matrices.

I was a guest in Belize for my field research but I was also a guest in the USA during the course of my doctoral work. Austin has been a great place to live and I am indebted to many who truly make the USA a country of many opportunities that are unavailable elsewhere. I have benefited from the assistance of many at the University of Texas at Austin, which has been a wonderful place for advanced study.

Many at the University of Texas at Austin provided for the completion of my Ph.D. in a wide variety of ways. Samuel Wilson, Chair of the Department of Anthropology helped to make the department a collegial place for graduate students. Andria Shively, Graduate Coordinator, as well as her predecessors Jenni Jones and Celeste Neathery often worked bureaucratic miracles. I would like to thank Anthropology Graduate Adviser Ward Keeler and his predecessor, Liza Shapiro, along with Susan Lane, Administrative Assistant, for their assistance in completing a variety of administrative matters. I took some very interesting courses from Claud Bramblett, James Denbow, and Fred Valdez, Jr., as well as from Julia Guernsey in the Department of Art and Art History. The staff of the Center for International Students and Scholars helped to make my graduate study here possible throughout many changes in government policy. Brian Roberts, Associate Dean for Research and Instructional Support in the College of Liberal Arts, visited Belize and spent time excavating in addition to the financial support that his office provides the PfBAP. Although not directly affiliated with the University of Texas at Austin, Geoffrey Connor, former Secretary of State for the State of Texas visited Belize and assisted with excavation. Both Brian Roberts and Geoffrey Connor had many engaging stories to tell and were very welcome guests in camp and in the field.

I have benefited from much financial support during the course of research and writing. I received a major International Education Fee Scholarship from the Center for Global Education Opportunities, University of Texas at Austin (formerly Study Abroad Office, under former director Ivy McQuiddy). The Department of Anthropology nominated me for a Continuing Fellowship which led to a Bruton Fellowship for the 2003-2004 academic year. The College of Liberal Arts through the assistance of Priscilla Ebert and the office of Barbara Meyers provided support in 2001-2002. In 2002 I received a departmental fellowship from the Department of Anthropology. Further, the Department of Anthropology provided employment in the form of teaching assistantships, thanks to the efforts of Fred Valdez. The PfBAP, again, thanks to Fred Valdez, Jr., provided a very significant level of research support that took many forms: room and board in Belize, wages for local field workers, transportation in the air and on the ground, equipment, supplies, and other indispensable infrastructure. I would also like to thank my parents and grandparents for significant financial support that I could not have done without.

I wrote most of this dissertation at the Mesoamerican Archaeological Research Laboratory (MARL), University of Texas at Austin. MARL (directed by Fred Valdez, Jr.), has been a wonderful place for me over the last several years, due in large part to the collegial atmosphere encouraged by the director and embraced by my colleagues. I would therefore like to thank my colleagues at MARL for their encouragement, collegiality, and friendship: Palma Buttles, Marisol Cortes-Rincon, Rigden Glaab, David Hyde, Richard Meadows, Micalea Obledo, Elizabeth Reid, Ann Scott, Lauri Thompson, Rissa Trachman, and William Wagner. MARL is located at the Texas Archeological Research Laboratory, directed by Darrell Creel. Under Darrell Creel's directorship, TARL provided much-valued administrative and technical assitance through indispensable

TARL staff and volunteers who include Dale Hudler, Jean Hughes, David Parkhill, Diane Ruetz, Ron Russell, and Carolyn Spock.

I started my Ph.D. in September 2001, thanks to the encouragement and advice of Fred Valdez, Jr. I met Dr. Valdez in 1999 and joined the PfBAP that year, thanks to an introduction by Paul Hughbanks (who thankfully must have had faith in me and likely gave me a good recommendation). Much of the support outlined above directly or indirectly stemmed from the efforts Fred Valdez, Jr. Over the last four years Dr. Valdez has acted as my advocate, supervisor, advisor, mentor and many other roles, never failing in his support and never ceasing to put up with my sometimes near-constant presence in his office. I am sure that I must have asked 1,001 times if he had a minute to spare. I suspect he often did not, but the response was always affirmative. In my opinion, some of the best traits a Ph.D. advisor can have are to be encouraging and supportive while not being heavy-handed or prone to micro-management. Dr. Valdez possesses these and more. In addition to instilling the values of collegiality and civility among graduate students, Dr. Valdez has taught me more about generosity in research (and other academic endeavors) than I will likely ever be able to live up to in my own undertakings. Under Dr. Valdez' guidance I learned more than I ever thought I would about the administration of an archaeological project. I thank him for being my mentor and hope that our relationship will not end with the completion of my dissertation.

While my dissertation supervisor played a critical and absolutely indispensable role throughout the course of completing my Ph.D., my friends and family members have been an integral part of my ability to get this dissertation finished. Sandra Dias has put up with my incredible level of stress throughout the dissertation writing and defense process and my frequently interminable absences and hours spent at the lab. I would like to thank her for her insight, input, and kindness throughout. My brother, James Aylesworth, is an inspirational figure in my life and I thank him for his moral support and sense of humor. Janice and Lou Marzari have been very supportive and interested in what I have been doing; this is much appreciated. I would also like to thank my many other relatives (especially aunts, uncles, and cousins) who have always been interested in what I am up to. My good friends at MARL have been there to help, lend a sympathetic ear, or serve as admirable role models. Thanks, therefore, is again due to Marisol Cortes-Rincon, David Hyde, and Rissa Trachman. Shelly Fischbeck, about to join the UT "family" not only helped in the field but has been a great friend. Palma Buttles deserves special mention for her suggestions about dissertation draft presentation, assistance in moments of crisis, friendship, hospitality, the fact that she is a wonderful chef, and her help and wise advice on many issues.

One of the last stages in this process was the review and examination by my dissertation committee. I could not have hoped for a more helpful, considerate, perceptive, and professional group of scholars to serve on my dissertation committee. All took the time to give me comments and feedback on a dissertation draft before the defense. Fred Valdez, Jr., acted as supervisor and read drafts under very strict time constraints, allowing me to finish writing, defend, and graduate without delay. Dr. Valdez provided many comments that have enhanced the final version. Richard E. W. Adams carefully reviewed the manuscript and gave many insightful comments that have improved my work. I got my start in Maya field archaeology in Belize back in 1991 where I was a field school student on Jaime Awe's project. Dr. Awe has given me a great deal of support and advice over the years and I would like to thank him for putting up with me! Although Dr. Awe is now Director of the Institute of Archaeology, he made time to travel to Austin for my defense. His astute comments on my dissertation and care in thoroughly reviewing the draft are much appreciated. Julia Guernsey provided many perceptive comments from both an art historical and anthropological perspective. These comments, and her abilities as an excellent editor, have greatly enhanced this dissertation. Thomas Hester, though now an emeritus professor, graciously agreed to sit on my dissertation committee. His years of experience and insights provided for most valuable contributions and comments. Samuel Wilson, though busy in his role as chair of the anthropology department, took the time to carefully consider a variety of important issues related to the ideas put forward in this dissertation.

As I look back on many of the people I have met in my travels towards this Ph.D. I am overwhelmed with reverence and appreciation. I feel fortunate to have been given so many opportunities and to have been given a chance to enter the world of Mesoamerican archaeology and anthropology. I am impressed by the kindness I have encountered and inspired by the friendships I have enjoyed with people of outstanding character and intellect. My sincere thanks go to one and all.

A Science of Networks Approach to Ancient Maya Sociopolitical Organization

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Was ancient Maya sociopolitical organization, overall, centralized or decentralized? Does the application of a new technique of analysis, borrowed from the science of networks (network theory), aid in understanding Classic period sociopolitical organization? This dissertation seeks to explore Classic Maya sociopolitical organization through the application of small world and scale free models derived from the science of networks. The research presented combines archaeological fieldwork in northwestern Belize, Central America with evidence from ancient Maya inscriptions to evaluate the potential of applying network theory methods to studies of ancient Maya sociopolitical organization.

This dissertation is divided into five chapters which provide an overview of the climate, physiography, flora, and fauna of the research area, an outline of previous archaeological research in the region, the general culture history of the area from the Paleoindian to the Postclassic periods, results of excavations and mapping at two sites very close to, or arguably part of the site of Dos Hombres, Belize. The final chapter is a

review of select aspects of ancient Maya sociopolitical organization focusing on issues related to centralized and decentralized models, which have dominated research for the last 30 years. Through the analysis of network graphs I show that the science of networks can be used to gain insight into ancient Maya sociopolitical interaction.

Taken as a whole, I find that Classic period sociopolitical interaction was decentralized and can be characterized as a scale free small world network. Further, network analysis provides insight into the roles of ancient Maya sites as hubs of the Classic period sociopolitical landscape. These findings, in general, tend to agree with previous attempts to rank sites based on volume of architecture and courtyard counts. Since the political system was dominated by few hubs with many links, it was vulnerable to dissolution if one or two of those hubs were destroyed. The presentation and analysis of network graphs yields insights into the nature of ancient Maya sociopolitical organization. Ceramic associations are briefly examined from a science of networks perspective. Results affirm that it is useful to apply network theory to the study of ancient Maya sociopolitical organization.

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Chapter 1: Introduction

One of the goals of this dissertation is to examine the applicability of concepts derived from the science of networks (network theory) to the study of ancient political organization. Before introducing network theory, some brief preparatory comments about the research area are presented.

The Maya area consists of southeastern Mexico, Guatemala, Belize, western Honduras, and northern El Salvador (Figure 1.1). Field research for this dissertation was conducted in and around the site of Dos Hombres, located in the Rio Bravo Conservation and Management Area which is owned by the Programme for Belize. As such, this work was part of the Programme for Belize Archaeological Project, directed by Fred Valdez, Jr. This conservation area is located in the Three Rivers Region, an area delimited on the west and north by the Rio Azul, and the Booth's River on the east (Adams 1995). The Three Rivers Region consists of about 1,600 km^2, with it's southern border arbitrarily placed at the site of Chan Chich (Adams 1995:5).

Of the sites currently known in the region, Dos Hombres is one of the largest. The other large sites in the region are La Milpa, Maax Na, Blue Creek, Gran Cacao, Great Savannah, Punta de Cacao, Chan Chich, all in Belize, and Rio Azul, Kinal, Chochkitam, and La Honradez, in Guatemala (Houk 1996:Figure 1.3). There are likely additional significant sites throughout the region, probably in areas including, but not limited to, the upper portion of northwestern Belize and the southeastern corner of Campeche, Mexico (some 5-6 courtyard sites have recently been documented by Šprajc [2001, 2002]). Although there are many large sites in the region, the field research aspect of this dissertation took place at some of the medium to smaller sized architectural groups within 2 kilometers of the Dos Hombres site center.

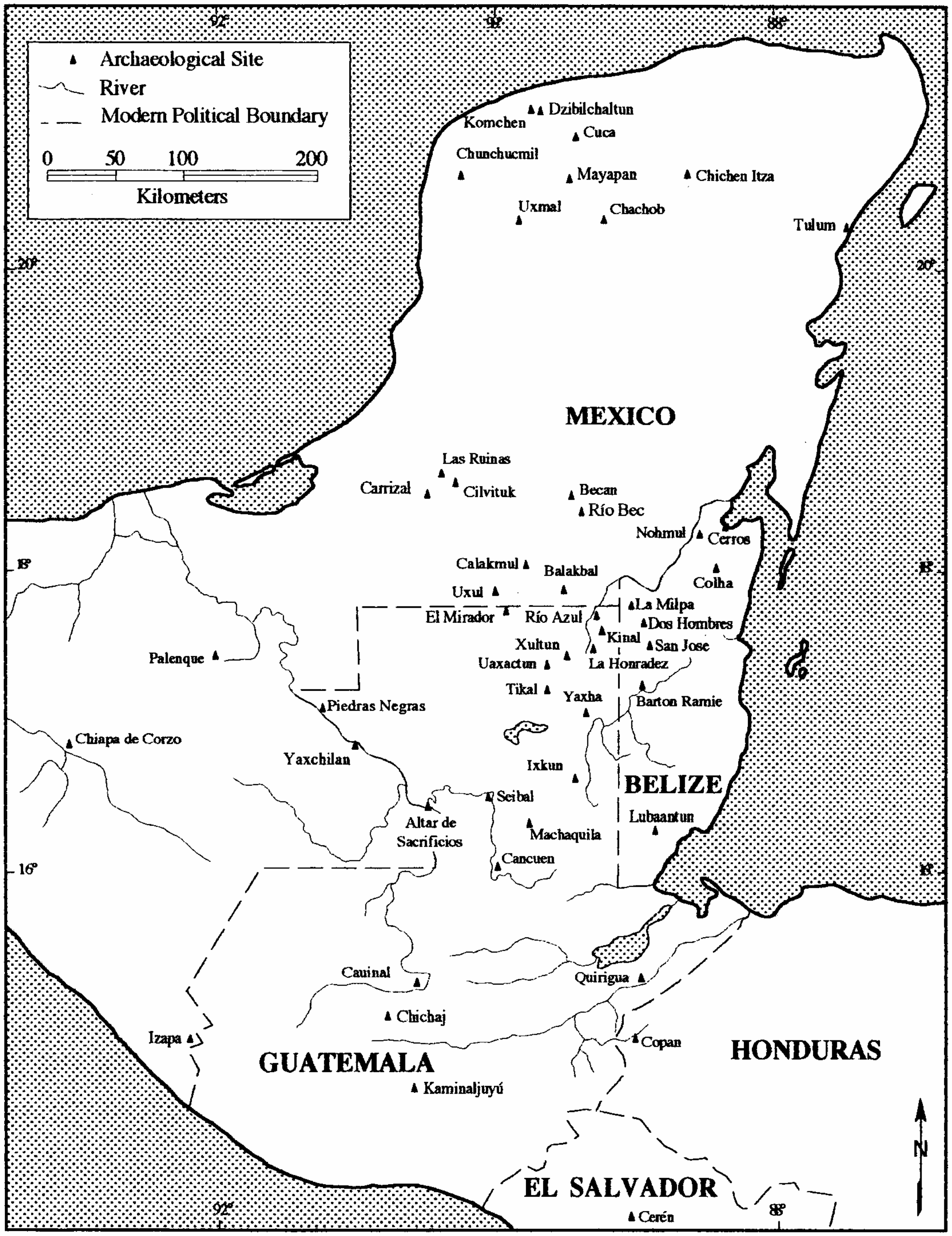

Figure 1.1 The Maya Area (after Houk 1996: Figure 1.1). Reprinted by permission from *The Archaeology of Site Planning: An Example from the Maya Site of Dos Hombres, Belize*, by Brett A. Houk. © 1996 by Brett A. Houk.

INTRODUCTION TO THE SCIENCE OF NETWORKS

Network theory is a branch of applied mathematics, with the same general subject matter as graph theory. Researchers engaged in the science of networks develop models, usually in the form of network graphs, which can be analyzed to understand characteristics of the network being studied and relationships between participants in a network. A simple graph is given in Figure 1.2, where it can be noted that the graph consists of nodes and links that connect them.

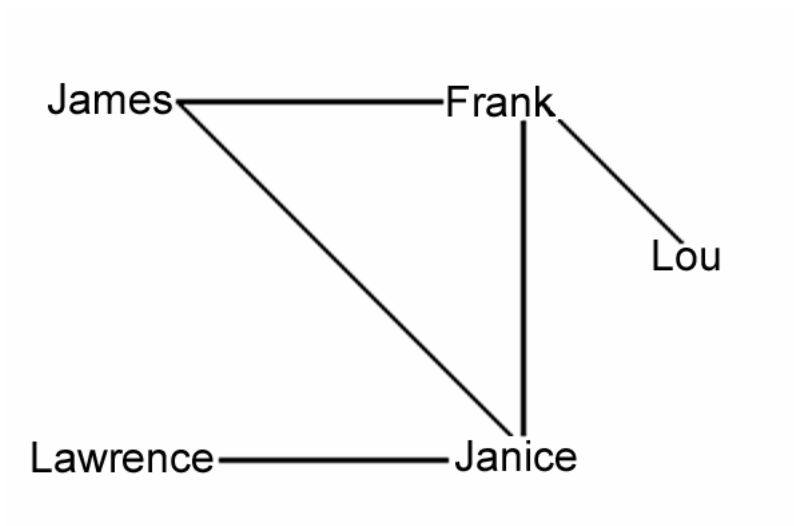

Figure 1.2. Example of a simple social network graph.

In the very simple social network graph of Figure 1.2, the nodes are people, and the links (lines) that connect them denote the fact that they have had direct contact with one another. For example, looking at the graph, one can see that Lawrence and Janice have had contact, but Lawrence has not had contact with Frank. Lawrence and Frank, however, are connected to one another through their links to Janice. Lou is connected to Lawrence through Frank and Janice. Other social connections can be seen in this social network graph, but the preceding are just a few examples. Many social, natural, and other phenomena can be conceptualized as networks—a cocktail party, a large business, food webs, electrical grids, the Internet, actors that have worked together, scientists that have published together (e.g. Barabási 2002; Watts 1999), and, it is argued in this dissertation, ancient Maya political organization.

Terms that have been used to describe the political organization of the ancient Maya include central place, hub, network, complexity, hierarchy, heterarchy, node, centralized, and decentralized. These terms, though they lend themselves to network analogies, have never been used from the perspective of social network analysis applied to the study of ancient Maya political organization. Indeed, it will be seen that network analysis may yield insight into more than just ancient Maya political organization; it may be used to conceptualize economic networks as well. In any case, the foregoing terms have often been used in loosely metaphorical terms that are not well-defined, yet all appear to have a network analogy in common. The publication of what is, in effect, ancient Maya sociopolitical network data (Martin and Grube 2000) allows for the analysis of ancient Maya sociopolitical networks using the science of networks.

Small Worlds and Aristocratic Networks

The most complex varieties of networks found in the real world are "small world" and "scale free" or "aristocratic" networks. The publication of a science of networks paper by Watts and Strogatz (1998) caused a flurry of research and publication in biology, mathematics, social science, and other fields (Barabási 2002; Buchanan 2002; see also Watts 1999). Analysis of ancient Maya sociopolitical networks in this dissertation focuses on the heart of these recent developments: small world networks (Watts and Strogatz 1998; Watts 1999) and aristocratic or scale-free networks (Barabási 2002). Scale free networks are characterized by power-law distributions rather than normal (bell curve) distributions. They are called "*scale free* because there is no typical number of arcs [links] per node" (Frommer and Pundoor 2003:177). To better understand the difference between power law distributions and normal distributions, an example is appropriate. If human height were a power-law rather than a normal distribution, most people would be very short. It would not be surprising, however, to once-in-a-while see a 100 foot tall person with one person in six billion over 8,000 feet tall (Barabási 2002). Instead, since human height follows a normal distribution, most people fall within about five feet to six feet in height. Power laws exist in nature and many examples can be cited besides human height, including the distribution of galaxies in the universe and flood patterns of the Nile River. Barabási's research is relevant here because he was the first to find power laws in the structure of networks (Frommer and Pundoor 2003).

Aristocratic/scale free networks explain the rapid spread of infectious disease as well as how ideas and fads spread quickly. In a scale free social-sex network examined by Barabási (2002) the hubs are promiscuous individuals which greatly impact the spread of disease throughout the network. Since scale free networks rely so heavily on relatively few hubs, they are particularly vulnerable to destruction if the well-connected hubs suddenly disappear. Visualizing ancient Maya sites as hubs provides insight into the fragility of sociopolitical networks. That is, if the ancient Maya sociopolitical network was scale free, it would have been vulnerable to dissolution should a few hubs suddenly disappear from the network. This will be examined more closely in Chapter 5.

Another sort of network recently characterized by network theorists is the small world network (Watts and Strogatz 1998). Research into small world graphs seeks to explain phenomena as diverse as the spread of infectious disease to networks of actors that have worked together to the occasional realization that the world is "small", such as when we realize a stranger is linked to us by a common acquaintance. That is, the workings of small world networks explain phenomena such as why so many film actors can apparently be linked to Kevin Bacon (i.e., six degrees of separation) even though hundreds of thousands of people are part of the network. Ancient Maya sociopolitical interaction may have been a small world network. That is, the network as a whole would have had a relatively short characteristic path length (i.e., relatively few steps or hops needed to travel across the network, for example, from Dzibanche to Tikal or from any site to any other). A number of ancient Maya interactions may be viewed as networks: trade (movement of obsidian or pottery); politics (political ties); conflict (war between sites); kinship (marriage between sites); ideology (movement of ideas); style (pottery styles), and many others. Each of these has the potential to be investigated from a science of networks perspective.

Many scientists and social scientists recognized the explanatory utility of network theory and applied these ideas to their research. Interest in the science of networks, however, has yet to take hold in archaeology and anthropology. Using some ideas borrowed from network science, this dissertation examines models of ancient Maya political organization. This examination comes from two perspectives; one in which evidence from hieroglyphic inscriptions is considered and another in which the applicability of a science of networks approach to sites without inscriptions is explored. Do ancient Maya sociopolitical interactions conform to a small world/scale free model? Does the ancient Maya sociopolitical network follow a normal or a power-law distribution? These questions will be explored in detail in Chapter 5.

STATEMENT OF THE RESEARCH PROBLEM

In general, Maya archaeologists tend to classify political organization into two categories: “centralized” or “decentralized”. In the Maya area (Figure 1.1), a large amount of research effort has been devoted to large sites ("elite" centers) and a relatively large amount of research has also been completed at the smallest scale, the household level ("commoner" households). There has been significant research on the "middle level" of small to medium-sized sites—a vast and variable segment of ancient Maya society (Culbert 1991). Although there are many examples of research at sites that are neither urban nor rural, some have claimed (e.g. Iannone and Connel 2003) that sites in the middle of the urban/rural continuum have been ignored by generations of Mayanists. Although it is not clear how urban and rural are defined in the argument that research has focused almost exclusively on these extremes, there are numerous examples of research that has taken place at sites that arguably fall in the middle. Such sites include Colha, Belize (Hester 1979, 1983; Hester, et al. 1980, Hester, et al. 1982; Hester, et al. 1994), Cahal Pech, Belize (e.g. Awe and Campbell 1988), Cuello, Belize (e.g. Hammond 1991), and many others.

Centralized and decentralized models tend to use comparative ethnographic models or inscriptions as evidence to support their merits. In fact, the analysis of inscriptions is usually used to infer highly centralized political organization in which a handful of sites dominated the Maya area throughout the Classic period. One may, however, consider centralized compared to decentralized models while viewing the ancient Maya political system as a network. The segments of the elite/middle/commoner and urban/middle/rural models are difficult to integrate, yet all ancient Maya sites, regardless of size or place in these schemes, had connections to the political network. Methods borrowed from network science are therefore used to evaluate the centralized versus decentralized debate.

In this dissertation, I apply network science methods to data from Classic period inscriptions and combine this analysis with the results of excavation at sites that fall in the middle of the urban/rural and elite/commoner dichotomies. Since such sites usually lack inscriptions (note, however, that many, such as Dos Hombres and Be Tan Chinam, have "plain" stela and altars), field research for this dissertation was aimed at examining the smaller to medium sized sites to see if archaeological signatures of scale free or small world networks may be recovered.

SIGNIFICANCE OF RESEARCH

Although a "network approach" is common in sociology and the natural sciences, it has very rarely been applied in anthropology and archaeology (see Hage and Harary [1996] for an effective anthropological application). It is possible to apply, albeit with caution, network science concepts to archaeological research and it may very well be fruitful to do so. One of the key difficulties is the temporal dimension. Most networks under study by social scientists are essentially "real-time" networks in which nodes such as human actors interact with each other, obviously, while they are alive. The perspective provided by archaeology, however, has a much greater time span, so rather than focusing on individual actors, this research focuses on sites as the nodes of research. As more becomes known about ancient Maya inscriptions and the dates of individual's lives, important insights may be gained into ancient Maya sociopolitical organization by the careful study of networks of rulers and other individuals identifiable in inscriptions rather than focusing at the coarser level of site interactions. The dimension of time is critical to understanding shifting sociopolitical relationships, but it is possible to consider longer term trends.

This research project has potential for introducing a new technique to ancient Maya archaeology and world archaeology in general. On a wider scale, this research will contribute to the study of networks in anthropology and throughout the social sciences as an innovative application. These approaches have potential for developing models of ancient Maya political organization and may help researchers to move beyond the current paradigms.

While the theoretical approaches suggested in this project are novel and untested, they have been shown to be very productive in other disciplines within the social sciences and natural sciences (Buchanan 2002, Watts 1999). Certainly this research will be significant at the level of Belizean archaeology and Maya archaeology, but, more importantly, to archaeology and anthropology in general. It is often the case that anthropologists borrow theoretical approaches from other disciplines; network science has tremendous potential for being one such borrowed approach, and this study may be viewed as a pilot project to test the applicability of network science to archaeological problems.

In addition to the preceding considerations, this dissertation contributes excavation data to the overall PfBAP research agenda. Field research began during the summer of 1999 and continued during the spring and summer of 2002 and the summer of 2003. Mapping and excavation at Be Tan Chinam (RB-31), a small site about 2 km from Dos Hombres, and mapping and excavation at Dos Hombres, Group D, a residential area about 200 m from the Dos Hombres site core, form the fieldwork component of this dissertation. These excavations have yielded some data that may contradict previous models of Maya political cycles of rise and decline. For example, the Early Classic period is often seen as a time of political contraction, at least from the point of view of the larger sites. My research, and that of the PfBAP in general (Fred Valdez, Jr., personal communication 2002), shows that the Early Classic is a time of expansion at smaller and medium-sized sites in the PfB area (cf. Hageman [2004:307, *passim*] for a different opinion).

This project has yielded important information about trade networks (e.g. the presence of Pachuca[1] obsidian), population (e.g. the expansion of small sites such as Group D, Dos Hombres in the Early Classic period), and settlement nucleation (mapping and reconnaissance in the periphery of Dos Hombres, particularly Be Tan Chinam and environs). It is hoped that continued postdoctoral research at a number of other small sites in the research area yields further comparative data.

ORGANIZATION OF THE DISSERTATION

This dissertation is organized into five chapters and seven appendices. Chapter 1 contains introductory material and the general themes to be covered.

Chapter 2 is an overview of the physical geography of the PfB area in general with a closer look at the immediate areas of Dos Hombres and Be Tan Chinam. This chapter provides background information on climate, geology, flora, and fauna of the research area.

Previous archaeological research in the area is documented in Chapter 3. The neighboring areas of Guatemala and Mexico are briefly discussed, while some detail is given on previous archaeological research on PfB property. What is known about the culture history of the area is summarized.

Chapter 4 details the excavations completed at Dos Hombres, Group D and Be Tan Chinam along with general information about some of the material recovered.

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[1] The term "Pachuca" is used throughout this dissertation to refer to obsidian from Sierra de las Navajas/Cruz del Milagro, central Mexico (Pastrana 1998).

Chapter 5 provides an overview of past approaches to ancient Maya sociopolitical organization and an introduction to the novel approaches put forward in this dissertation. The concept of complexity in Maya archaeology is reviewed along with a discussion of network science and its suitability to archaeological research, followed by concluding comments.

Seven appendices provide detailed information about excavation and analysis data. Appendix A presents the results of ceramic analysis. Appendices B and C provide information on the analysis of obsidian and chert artifacts, respectively. Appendix D presents the analysis of the minimal amount of human remains encountered in this research, while Appendix E presents the results of faunal bone and shell analysis. Appendix F lists the network data used to formulate the graphs presented in Chapter 5. Lastly, Appendix G contains facsimiles of the PfBAP forms used in this research for field and field laboratory recording.

Chapter 2: Environment of the Research Area

Completed under the auspices of the PfBAP, this dissertation research took place on the Programme for Belize (PfB) lands known as the Rio Bravo Conservation and Management Area (RBCMA). The RBCMA is private land, owned by PfB, and forms the largest private reserve in Belize (Zisman 1996). The PfB is a non-governmental not-for-profit company, holding the land in trust for the people of Belize under the terms of a formal agreement with the Government of Belize (Zisman 1996). The PfB reserve is comprised of 105,000 hectares (Dushku, et al. 2002), or about 4% of the total land area of Belize (Figure 2.1). Such a large area is difficult to protect so it has therefore been the locus of illegal hunting, timber theft, looting of archaeological sites, unauthorized cultivation, and smuggling across the Guatemalan Border (Zisman 1996). Adjoining the Maya Biosphere Reserve of Petén, Guatemala, which in turn adjoins the Calakmul Biosphere Reserve of Campeche, Mexico, the RBCMA is part of a 1,600,000+ hectare complex that is one of the largest remaining tracts of natural forest in Central America (Anonymous ca. 2002).

The majority of PfBAP research takes place on what is known as the “Rio Bravo parcel”, an area of about 45,000 hectares purchased by PfB from Gallon Jug Agroindustries in 1989 (Dushku, et al. 2002). This original tract was later augmented by a series of purchases and donations. Coca-Cola Foods, Inc. donated a total of 39,000 hectares and a total of 21,000 hectares was subsequently purchased from New River Enterprises, Ltd. The RBCMA name applies to the entire PfB conservation area, although archaeologists sometimes refer the original parcel of land purchased from Gallon Jug Agroindustries as the “Rio Bravo parcel” (various purchases are detailed by Dushku et al. 2002:Figure 2). As with almost all archaeological research conducted on

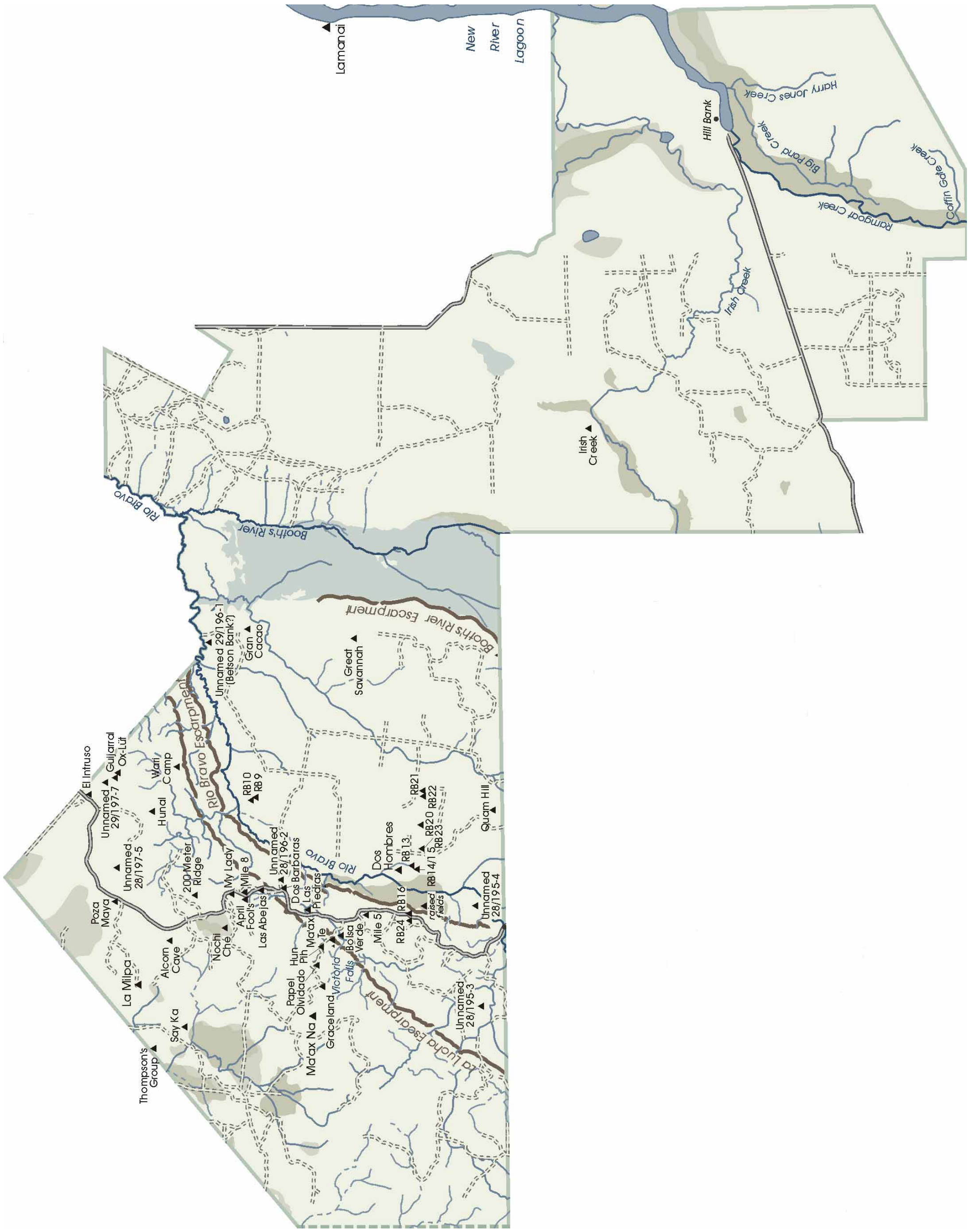

Figure 2.1. The PfBAP Research Area. Archaeological sites are denoted by triangles. (Courtesy R. E. W. Adams, cartography by Bruce Moses). Used by permission. © 2005 by The Programme for Belize Archaeological Project.

PfB land, this dissertation research was done within the confines of the original Rio Bravo parcel of the RBCMA (Figure 2.2).

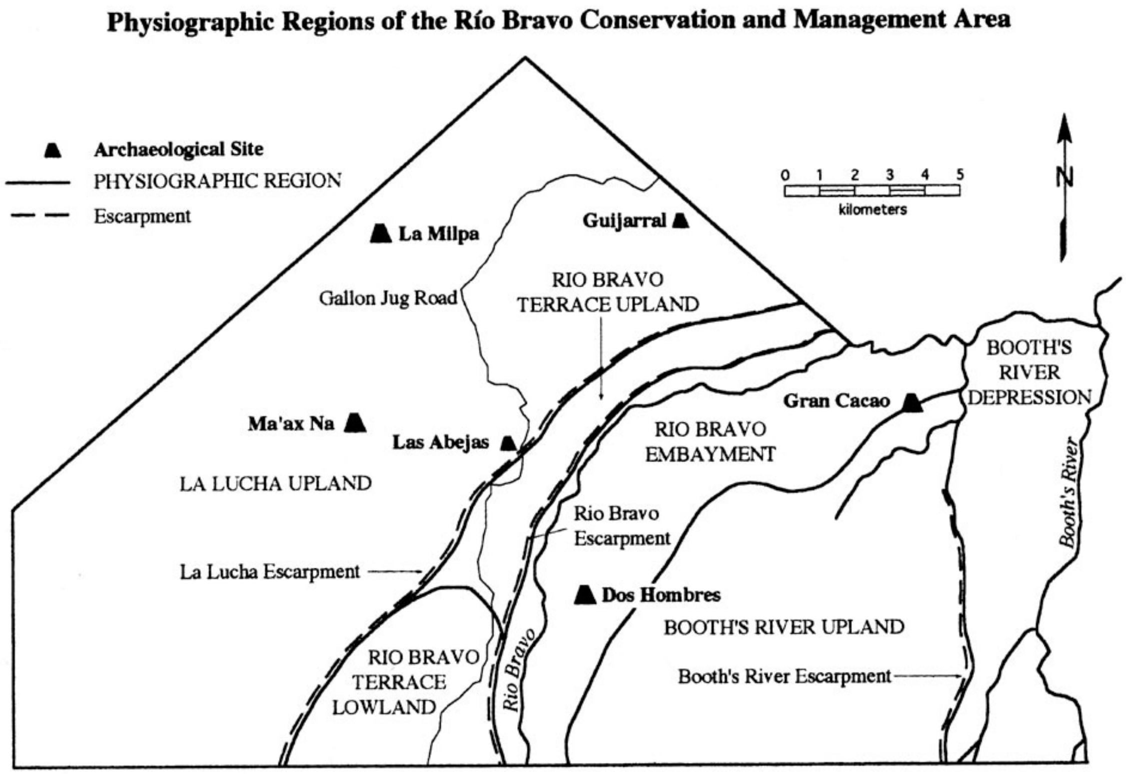

Figure 2.2 The Rio Bravo Conservation and Management Area and its Physiographic Regions (After Houk 1996:Figure 3.1, based on Brokaw and Mallory [1993:Figure 4]). Reprinted by permission from *The Archaeology of Site Planning: An Example from the Maya Site of Dos Hombres, Belize*, by Brett A. Houk. © 1996 by Brett A. Houk.

ENVIRONMENTAL SETTING OF THE RESEARCH AREA

The RBCMA section of the PfB reserve has a longer history of modern use and is more accessible due to the road that bisects the area. It has, therefore, seen more environmental and archaeological research than other parts of the PfB property. Since PfB is a conservation area, most detailed reports of the reserve have been results of studies of the reserve's plants and animals (e.g. Brokaw and Mallory 1993; Jacobson

1990a, 1990b). Zisman (1996) provides a list of research completed up to that time. More recently, some geoarchaeological research has been completed (Dunning, et al. 2003). Brokaw and Mallory (1993) divided the RBCMA region into six physiographic provinces with notable connections between topography and vegetation type. A general study of northern Belize land was accomplished by King et al. (1992), from which much of the information presented in this chapter is derived.

Climate

Lying between about 17˚ and 18˚ N latitude, the RBCMA is in a subtropical zone, specifically the "subtropical moist" zone according to the Holdridge Life System (Holdridge 1967) used by other researchers in the area (e.g. Brokaw and Mallory 1993; King et al. 1992). Climatic data for the Orange Walk district, in addition to being scant, does not have a lengthy history. As of the early 1990s there were only two functioning weather stations in the area (Gallon Jug and Tower Hill [King et al. 1992]), but recently a weather station has been added at PfB's La Milpa Field Station. Franklin et al. (2001) list four different rainfall observations for the Gallon Jug area, and one for Blue Creek, so it is likely that additional weather stations have been established since King et al. prepared their report. Much of the existing weather station data is limited to rainfall but some has included temperature and humidity as well as wind speed, wind direction and pan evaporation.

Temperature and Humidity

The hottest months reach mean maximum temperatures of 32.9˚C (about 91˚F) with the highest temperature recorded being 37.5˚C (about 99.5˚F). During the summer of 2003, an unscientific thermometer in the R. E. W. Adams Archaeological Research Facility read over 40˚C (about 104˚F). Coolest daytime temperatures occur between December and February reaching a mean minimum of about 17.7˚C (about 64˚F) and a mean maximum of 29.5˚C (about 85˚F). The range of daytime temperatures throughout the year does not exceed 5˚C (about 9˚F) (King et al. 1992:23). Mean relative humidity for the area is 80-88%, recorded at Corozal and Yo Creek (King et al. 1992:23).

Rainfall

The area has a three-month dry season from February to April and a double-peaked wet season with heavier rains typically falling in June and September/October. Taken as a whole, there is significant variation in rainfall within Belize, with the far south getting, on average, three times the rainfall of the far north. Available data for the closest weather stations with a reliable history indicate the RBCMA receives an average of about 1500 mm of rain per year (King et al. 1992:35).

The RBCMA is prone to hurricanes during the Atlantic hurricane season (June 1 through November 30, annually). Low lying areas were recently flooded by Hurricane Keith (2000 Atlantic hurricane season), which passed almost directly over the area and inundated the landscape with a storm-total of 448.1 mm of rain at Blue Creek (Franklin, et al. 2001). This rainfall caused flooding of the only road between Blue Creek and San Felipe, leaving the RBCMA inaccessible, save by boat, for several months. In some areas, such storms can drop the equivalent of a near record year's worth of rain over the course of several days.

Despite its quantity, the most notable feature of the area's rainfall is its unpredictability:

> A farmer who decides to plant because "the rains start about the middle of May around here" or who is confident that his crops will be well watered because "we always get 'x' inches in October" is at least as likely to be wrong as right (King et al. 1992:21)

Such unpredictable rainfall makes archaeological research difficult and must have led to some difficulty for the ancient Maya (presuming similar prehistoric patterns). At Santa Cruz, Orange Walk, only about 30 km north of the RBCMA, numerous dry spells were predicted by King et al., even in seasons which are overall quite wet. These dry spells within "rainy" seasons could lead to the destruction of crops that are sensitive to drought since in many years there is water deficiency during the wet season (King et al. 1992:23-25).

Physiography

Land Units and Geology

The highest level unit of land description is the "land region" which groups "land systems" with similar topography, soils, and vegetation together (King et al. 1992:33). The entire Rio Bravo parcel of the RBCMA falls into the Bravo Hills land region (where both Dos Hombres and Be Tan Chinam are located) whereas the remainder of the RBCMA falls into the Northern Coastal Plain land region.

The portion of the Bravo Hills land region that falls within the RBCMA consists of different land systems, including the "Neustadt Plain" (the northwest portion of the Rio Bravo parcel), and the "Gallon Jug Plain with Hills" land system, which makes up the remainder of the Rio Bravo parcel (King et al., 1992:44-45). The "Neustadt Plain" land system has "significantly less karst than the Gallon Jug Plain with Hills land system to the south-east. It contains mostly soils of the Jolja Subsuite" (King et al., 1992:47). The "Gallon Jug Plain with Hills" is "developed on limestones (early Tertiary

Cayo Group) mostly younger than the Cretaceous limestones further south…the karst is not so prominent, and most of the land system consists of undulating to rolling plain…, albeit interrupted by fault scarps…the soils may belong to the Yalbac Subsuite" (King et al. 1992:44). Most archaeological sites studied by the PfBAP, including in this dissertation, are located in the Gallon Jug Plain with Hills area. There is only a small amount of Neustadt Swamp on the PfB property, near the North Gate. Although the majority of Neustadt Swamp is known to archaeologists as the "Dumbbell Bajo", this lies outside the PfB property. The Northern Coastal Plain region, which makes up the majority of the eastern part of the RBCMA, will not be considered in detail here.

The Bravo Hills form the area

> along the Guatemalan and Mexican borders from the Belize Valley in the south to Blue Creek in the north, with Albion Island occurring as a northern outlier west of Orange Walk Town. The Booth's River Escarpment is its eastern boundary. Most of the land region is underlain by faulted hard Cretaceous and early Palaeogene limestones, which give rise to a stepped landscape of plains and karstic hills. The altitude ranges from 20 m at the base of the Booth's river escarpment to 301 m at Chasquitan on the Guatemalan border (latitude 17˚38' N). (King et al. 1992:35)

Soils in the area are mostly of the Yalbac Subsuite with most of the area consisting "of undulating to rolling plain" interrupted by rolling to steep slopes and escarpments (King, et al. 1992:44). The Yalbac Subsuite is quite extensive in Belize, covering large parts of Orange Walk district, and are believed to extend into Mexico and Guatemala (King, et al. [1992:221-225] provide a detailed description of this soil subsuite).

A more in-depth study of soils in the area of La Milpa was conducted by Dunning (1992) while Dunning, et al. (2003) consider the physical geography of Three Rivers area more broadly.

Flora

The modern day plants of the area have doubtless been influenced, but in unknown ways, by ancient Maya land uses (Brokaw and Mallory 1993). Maya farmers using land in the area during the 19th century were resettled elsewhere by the Belize Estates and Produce Company when the latter began managing the area. *Milpas* cleared during the 1970s and 1980s to plant marijuana are now overgrown. The area had been logged for selected species since the early 1800s, including mahogany (*Swietenia macrophylla*), Spanish cedar (*Cedrela mexicana*), and Santa Maria (*Calophyllum brasiliense*) (Brokaw and Mallory 1993). There are slashes on the bark of virtually all sapodilla (*Manilkara zapota*) trees, testifying to the presence of *chicleros* throughout the RBCMA area in more recent times.

Although inventories of species in other parts of Belize had been undertaken in the first half of the 20th century, it was not until the work of Brokaw and Mallory (1993) that detailed information was available for any part of northern Belize. Fortunately for this research, their research program was based in the original Rio Bravo parcel of the RBCMA. Brokaw and Mallory (1993: Table 1) identified 12 vegetation types in the area and declared that the great majority of trees within the RBCMA are evergreen broadleaf. According to the PfB, the RBCMA is home to 240 species of trees thus far identified (Programme for Belize n.d.). Stuart (2002) studied the vegetation of the eastern part of the RBCMA, an area outside the original Rio Bravo parcel.

Houk (1996:87) pointed out that a variety of terminologies have been used to describe the vegetation of the RBCMA and nearby areas since the 1930s. Since the report produced by Brokaw and Mallory was followed by Lentz (1999) and these are the most recent produced by vegetation experts, I have opted to use their terminology in this dissertation. Of Brokaw and Mallory's 12 vegetation types, two are of particular interest here as it is in these areas that Dos Hombres and Be Tan Chinam are located. Lentz (1999) identified species along a transect near Dos Hombres; these are given in Table 2.1.

Cohune Palm Forest – Be Tan Chinam

Cohune palm forest makes up only 0.6% of the Rio Bravo parcel of the RBCMA (Brokaw and Mallory 1993:Table 1), yet is quite important archaeologically since archaeological sites are often associated with it (Robichaux 1995). Indeed, Be Tan Chinam, with hills to the north of the site, is located at the northern edge of a sizeable area of cohune palm forest.

Soils underlying cohune palm forest typically are deep and well-drained (Brokaw and Mallory 1993:25). While patches of this type of vegetation occur in the southeastern part of the Booth's River Upland, pockets are found at the base of slopes in the Rio Bravo terraces (Brokaw and Mallory 1993). It is at the base of such a slope that Be Tan Chinam is located. Such stands of cohune denote the presence of rich soil, their presence perhaps "being both cause and consequence of rich soil conditions" (Brokaw and Mallory 1993:25). These areas are favored by modern farmers and were likely prime locations for ancient Maya agriculture. Despite the well-drained nature of these soils, standing water was observed over large areas around Be Tan Chinam during the 2000 rainy season frequently making the area difficult to walk through. This water usually drained within several days of no rainfall. Such temporary flooding was no

Table 2.1. Tree families and species identified near Dos Hombres (after Lentz 1999:Table 2)

Anacardiaceae
Astronium graveolens (glassy wood)
Metopium brownii (black poisonwood)
Spondias mombin (hog plum)
Annonaceae
Annona glabra
Apocynaceae
Aspidosperma cruenta (mylady)
Plumeria obtuse (cojoton)
Arecaceae
Sabal mauritiiformis (bayleaf, boton)
Bombacaceae
Pseudobombax ellipticum (mapola)
Boraginaceae
Cordia dodecandra (ziricote)
Burseraceae
Bursera simaruba (gumbolimbo)
Protium copal (copal)
Caesalpinaceae
Haematoxylon campechianum (inkwood)
Swartzia cubensis (bastard rosewood)
Cecropriaceae
Cecropia peltata
Clusiaceae
Calophyllum brasilinse (Santa Maria)
Clusia lundellii
Clusia rosea (matapalo)
Combretaceae
Bucida buceras (bullet tree)
Terminalia amazonia (nargusta)
Ebenaceae
Diospyros salicifolia
Erythroxylum
Erythroxylum guatemalense (redwood)
Euphorbiaceae
Gymnantheus lucida (pea)
Sebastiania confuse (chechen blanco)
Sebastiania tuerckheimiana (white poisonwood)
Fabaceae
Gliricidia sepium (madre de cacao)
Lonchocarpus guatemalensis (dogwood)
Lonchocarpus rugosus (dogwood)

Fabaceae continued
    Senna sp.
Flacourtiaceae
    Laetia thamnia
    Zuelania guidonia (waterwood)
Malpighiaceae
    Byrsonima bucidaefolia
Meliaceae
    Trichilia hirta
    Swietenia macrophylla (mahagony)
Menispermaceae
    Hyperbaena winzerlingii (pinch me back)
Mimosaceae
    Acacia sp. (2467) (tzukzuk (M))
    Pithecellobiun arboretum (wild tamarind)
    Zygia cognate
Moraceae
    Ficus oestediana (wild standing fig)
Polygonaceae
    Coccoloba acapulcensis
    Coccoloba belizensis
    Coccoloba cozumelensis
Rhizophoraceae
    Cassipourea guianensis (waterwood)
Rubiaceae
    Guettarda combsii (glassy wood)
    Simira salvadorensis (john crow redwood)
    Sapindaceae
    Cupania rufescens
    Matayba oppositifolia (boyjob)
Sapotaceae
    Manilkara zapota (chicle)
    Pouteria amygdalina
    Pouteria durlandii
    Pouteria reticulate (sapotillo)
Simaroubaceae
    Simarouba glauca (negrito)
Theaceae
    Trichospermum cambellii (moho)
Verbenaceae
    Vitex gaumeri (fiddlewood)

doubt a problem in ancient times as the Maya architecture at Be Tan Chinam was built atop artificial platforms or hilltops.

Scrub Swamp Forest – Dos Hombres

Houk (1996) identified the area around Dos Hombres as scrub swamp forest, but pointed out that as one walks through the forest trail to Dos Hombres one experiences a near complete cross-section of the vegetation types identified by Brokaw and Mallory (1993) (see also Figure 2.3). Scrub swamp forest is seasonally wet and occurs in clay-filled, poorly drained, slight depressions (*bajos*) that are scattered over the RBCMA (Brokaw and Mallory 1993). Vegetation similar to this is found in Petén and neighboring Mexico (Brokaw and Mallory 1993). Interestingly, Brokaw and Mallory assert that caution should be used when applying the term *bajo* as it has specific uses at RBCMA while elsewhere it is casually used for a range of low topography vegetation zones. It is not clear what, specifically, Brokaw and Mallory mean when referring to this specific usage of the term *bajo*.

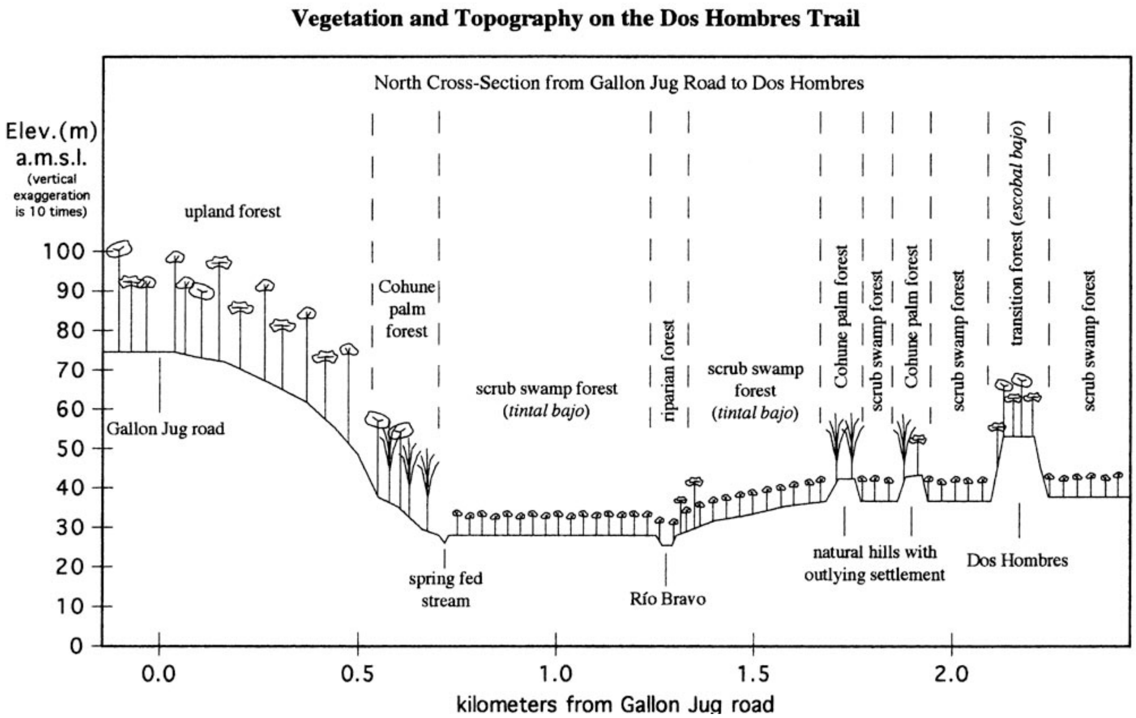

Figure 2.3. Vegetation and topography around Dos Hombres (after Houk 1996:Figure 3.3, used with permission). Reprinted by permission from *The Archaeology of Site Planning: An Example from the Maya Site of Dos Hombres, Belize*, by Brett A. Houk. © 1996 by Brett A. Houk.

Fauna

Many species of fauna were casually observed in the PfB area during the course of this research. Some of these species have been documented archaeologically by the PfBAP. The RBCMA is diverse in species; inventories of all vertebrate species have been completed with the exception of fish (Zisman 1996). A sample of the most commonly observed classes and/or phyla is given in this section, with accompanying tables based on finds from the lowland Maya area (Cozumel, after Hamblin [1984]). A more thorough list of species documented archaeologically can be found in Emery (2004:Appendix).

Pisces

Fish are taxonomically divided into two classes: *Osteichthyes* (bony fish) and *Chondrichthyes* (cartilaginous fish). *Chondrichthyes*, mostly sharks and rays, are not naturally occurring in the freshwater of the RBCMA, but it is not uncommon to find remains of stingrays, such as stingray spines, at Maya sites.

As noted above, no study of boney fish has been undertaken in the RBCMA. In studying the neighboring Aguas Turbias National Park (ATNP), Meerman et al. (2003) found no fish at all, but the ATNP contains fewer waterways and standing water than the RBCMA. The PfB rangers have caught people illegally fishing in various parts of the RBCMA, including the Rio Bravo, and fish bones have been found in archaeological contexts. Notably, a marine species, parrotfish (Scaridae, likely *Sparisoma* sp.), was recovered at Dos Hombres, Group D, but it is not unusual to find marine fish in inland archaeological contexts (Powis, et al. 1999; Wing and Scudder 1991). Table 2.2 lists fish recovered archaeologically at Cozumel and other lowland Maya sites.

Table 2.2. Pisces (adapted from Emery 2004 and Hamblin 1984:Table 3.1)

Class: Chondrichthyes (cartilaginous fishes)
- Order Squaliformes (= Selachii)-(sharks)
  - Orectolonidae (nurse sharks)
    - *Ginglymostoma cirratum* (nurse shark)
  - Carcharhinidae (requiem sharks)
    - *Galeocerdo cuvieri* (tiger shark)
    - *Carcharhinus sp.*
    - *Carcharhinus maculipinnis* (large black-tipped shark)
  - Pristidae
    - *Pristis* sp. (sawfish)
  - Sphyrnidae (hammerhead sharks)
    - *Sphyrna cf. S. mokarran* (great hammerhead shark)
    - *Sphyrna cf. S. zygaena* (common or smooth hammerhead shark)
- Order Rajiformes (= Batoidei)-(rays and skates)
  - Dasyatidae (stingrays)
    - *Dasyatis Americana* (southern stingray)
  - Mylobatidae
    - *Aetobatus* sp. (Eagle ray)

Class: Osteichthyes (bony fishes)
  - Muraenidae (moray eels)
    - *Muraena miliaris* (goldentail moray)
    - *Enchelycore nigricans* (viper moray)
  - Sphyraenidae (barracudas)
    - *Sphyraena barracuda* (great barracuda)
  - Serranidae (groupers and seabasses)
    - *Epinephelus sp.* (groupers)
    - *Mycteroperca sp.* (groupers)
  - Lutjanidae (snappers)
    - *Lutjanus sp.*
  - Pomadasyidae (grunts)
    - *Haemulon sp.*
  - Labridae (wrasses)
    - *Bodianus sp.* (hogfishes)
    - *Bodianus rufus* (Spanish hogfish)
    - *Halichoeres sp.*
  - Scaridae (parrotfishes)
    - *Sparisoma sp.*
    - *Sparisoma cf. S. viride* (stoplight parrotfish)
    - *Scarus sp.*
  - Acanthuridae (surgeonfishes)
    - *Acanthurus sp.*
  - Balistidae (triggerfishes)
    - *Balistes cf. B. vetula* (queen triggerfish)
    - *Melichthys niger* (black durgon)
  - Diodontidae (porcupinefishes and burrfishes)
    - *Diodon hystrix* (porcupinefish)

Amphibia

A wide variety of present-day Amphibia species have been observed opportunistically in the RBCMA, but few save for the marine toad (*Bufo marinus*) have been identified. While no amphibian remains were recovered in the course of this research, they have been reported archaeologically in Belize and elsewhere (Davis and Weil 1992; Hamblin 1984; Wing and Scudder 1991). Although the toad is noted for its psychoactive properties, it is likely that it and other amphibians were consumed as food in addition to other possible uses. Lee (1996) provides a good overview of the amphibians of the area as well as the reptiles. Table 2.3 lists some species recovered archaeologically elsewhere.

Table 2.3. Amphibia (adapted from Hamblin 1984:Table 4.1).

Salientia (frogs and toads)
- Bufonidae (true toads)
  - *Bufo marinus* (marine toad)
- Leptodactylidae (leptodactylid frogs)
  - ? *Leptodactylus sp.* (either *labialis* or *melanonotus*)
- Hylidae (hylid tree frogs)
  - *Smilisca baudinii* (= *Hyla baudinii* – Mexican tree frog)

Reptilia

No snake remains were recovered archaeologically in the course of this research and, to my knowledge none have ever been recovered in archaeological contexts in the PfBAP research area. Turtle remains are commonly found at Maya sites, and were recovered at Dos Hombres, Group D. Crocodiles have been seen in the RBCMA, but not documented archaeologically. Nevertheless, it is likely that many species of reptiles were present in the area during ancient Maya times as they have been recovered at other sites in the Maya area (e.g. Hamblin 1984).

The names given for snakes in this section are based on Garel and Matola (1996), but the work of Lee (1996), though not specifically focused on Belize, is more readily available. The PfBAP research area is home to many of the snakes of Belize, most non-venomous, but some venomous. Of the 50 non-venomous species listed by Garel and Matola, 33 are present in the Orange Walk district, while six of the nine venomous species are present. Casual observations have shown a variety of snakes to be present in the research area including the following non-venomous species: Boa Constrictor (*Boa constrictor*), Tropical Ratsnake (*Elaphe flavirufa*); Tropical Kingsnake, a.k.a. Coral snake (*Lampropeltis triangulum;* Cat-Eyed snake, a.k.a. Cohune Ridge Tommygoff (*Leptodeira frenata*); Green Tree snake (*Leptophis ahaetulla*); Green Vine Snake (*Oxybelis fulgidus*); False Fer-de-lance (*Xenodon rhabdocephalus*). The following venomous species have been observed: Central American Coral Snake (*Micrurus diastema*), Fer de Lance, aka Barba Amarilla (*Bothrops asper*), and Tropical Rattlesnake (*Crotalus durissus*). The lists given here are not exhaustive but the result of casual encounters in the field when identifications of species could be made.

Many other species, no doubt, are present in the research area. Table 2.4 lists *Reptilia* species recovered archaeologically elsewhere, including snakes as well as turtles and crocodiles.

Table 2.4. Reptilia (adapted from Hamblin 1984:Table 5.1)

Squamata (lizards and snakes)
- Sauria (lizards)
  - Iguanidae (iguanids)
    - *Anolis sp.* (anoles)
    - *Ctenosaura similis* (rock or false iguana)
    - *Iguana iguana* (green or common iguana)
    - *Sceloporus sp.* (spiny lizards)

Crocodilia (crocodiles and alligators)
- Crocodylidae (crocodiles)
  - *Crocodylus sp.*
  - *Crocodylus cf. C. acutus* (American crocodile)

Testudines (turtles)
- Kinosternidae (mud and musk turtles)
  - *Kinosternon cruentatum* (red-spotted mud turtle)
- Chelydridae(snapping turtles)
  - *Chelydra serpentine* (common snapping turtle)
- Emydidae (box and freshwater turtles)
  - *Pseudemys scripta*
  - *Geomyda pulcherrima*
- Cheloniidae (sea turtles)

Mammalia

Field guides to the mammals of the area have been written by Emmons and Feer (1990) as well as Reid (1998). Emmons and Feer's focus is rather broad, so Reid's work was more useful as a comprehensive overview of the area's mammals. Reid's (2001) smaller pocket guide was used more regularly to identify species seen in the field. Other researchers have documented more than 70 mammal species, about 50% of which are bats (Zisman 1996). The following species were observed in the field, (species names, where available, are from the aforementioned works of Reid): Opossum; Northern Tamandua or Ant Bear (*Tamandua mexicana*); Armadillo; Bat; Yucatán Black Howler monkey (*Alouatta Pigra*); Central America Spider Monkey (*Ateles geoffroyi*); Puma (*Puma concolor*), Jaguar (*Panthera onca*); Jaguarundi (*Herpailurus yaguarondi*);

Kinkajou (*Potos flavus*); Gray Fox (*Urocyon cinereoargenteus*); White-nosed Coati (*Nasua narica*); Tayra (*Eira barbara*); Collared Peccary (*Tayassu tajacu*); White-tailed deer (*Odocoileus virginianus*); Squirrel; Mouse; Rat; Northern Climbing Rat (*Tylomys nudicaudus*); Paca or "Gibnut" (*Agouti paca*).

Many unidentifiable mammal bones were recovered at Dos Hombres Group D, but identifiable species included deer (*Odocoileus virginianus*) and dog (*Canis familiaris*) or possibly fox. Table 2.5 lists species recovered archaeologically at Cozumel, including some obvious post European contact species.

Table 2.5 Mammalia (adapted from Hamblin 1984:Table 8.1; Olsen 1982:viii-ix)

- Marsupialia
  - Didelphidae (opossums)
    - *Philander opossum* (four-eyed opossum)
    - *Marmosa mexicana* (Mexican mouse opossum)
    - *Caluromys derbianus* (wolly opossum)
    - *Didelphis marsupialis* (common opossum)
- Chiroptera
  - Phyllostomidae (American leaf-nosed bats)
    - ? *Micronycteris megalotis* (Brazilian small-eared bat)
- Lagomorpha
  - Leporidae (hares and rabbits)
    - *Sylvilagus sp.* (cottontail rabbits)
- Rodentia
  - Cricetidae (cricetid rodents)
    - *Peromyscus cf. P. leucopus* (white-footed mouse)
    - *Peromyscus sp.* (white-footed mice)
    - *Sigmodon hispidus* (hispid cotton rat)
  - Erethizontidae (New World porcupines)
    - *Coendu mexicanus* (Mexican porcupine)
  - Dasyproctidae (pacas and agoutis)
    - *Cuniculus (= Agouti) paca*
- Carnivora
  - Canidae (coyotes, wolves, dogs, and foxes)
    - *Canis familiaris* (domestic dog)
    - *Urocyon cinereoargenteus* (gray fox)
  - Procyonidae (raccoons and relatives)
    - *Procyon cf. P. pygmaeus* (Cozumel Island raccoon)
    - *Nasua cf. N. nelsoni* (Cozumel Island coati)
- Perissodactyla
  - Equidae (horses and relatives)
    - *Equus caballus* (domestic horse)
- Artiodactyla
  - Tayassuidae (peccaries)
    - *Tayassu (=Dicotyles = Pecari) tajacu* (collared peccary)
  - Cervidae (deer and allies)
    - *Odocoileus virginianus* (white-tailed deer)
  - Bovidae
    - *Ovis aries* (domestic sheep)

Aves

Belize has about 530 species of birds today, about 150 of which are migratory (Matola 1995). Of these 530 species, 392 have been observed at the RBCMA (Anonymous ca. 2002). Many species are endangered yet still make an appearance on a daily basis within the reserve. Table 2.6 lists species recovered archaeologically elsewhere. Many of these are present in the RBCMA today.

Large bird bones were recovered at Dos Hombres, Group D. The species were not identifiable, but it is possible that they were ocellated turkey (*Meleagris ocellata*) or great curassow (*Crax rubra*) (the latter I have added to the suggestions given in Appendix E).

Table 2.6. Aves (adapted from Hamblin (1984:Table 6.1).

Pelicaniformes
- Sulidae (boobies and gannets)
  - *Sula leucogaster* (brown booby)
- Fregatidae (frigate birds)
  - *Fregata magnificens* (magnificant frigate bird, or man-o'-war bird)

Ciconiformes
- Ardeidae (herons and bitterns)
  - *Ardea cf. A. herodias* (great blue heron)
  - *Ardea (Hydranassa) tricolor* (Louisiana heron)
  - *Dichromanassa rufescens* (reddish egret)
  - *Nycticorax (Nyctanassa) violacea* (yellow-crowned night heron)
- Ciconiidae (storks)
  - *Mycteria Americana* (wood stork)

Falconiformes
- Accipitridae (hawks)
  - *Accipiter bicolor* (bicolored hawks)
  - *Buteo cf. B. magnirostiris* (roadside hawk)

Galliformes
- Cracidae (curassows, guans, and chachalacas)
  - *Crax rubra* (great curassow)
- Phasianidae (quails, pheasants, and peacocks)
  - ?*Dactylortyx thoracicus* (singing quail)

Gallus gallus (domestic chicken)
Meleagrididae
Meleagris gallopavo (domestic or common turkey)
Meleagris (Agriocharis) ocellata (ocellated turkey)
Gruiformes
Rallidae (rails, gallinules, and coots)
Prophyrula martinica (purple gallinule)
Fulica Americana (American coot)
Charadriiformes
Scolopacidae (woodcocks, snipe, and sandpipers)
Tringa cf. T. melanoleucus (greater yellowlegs-sandpiper)
Columbiformes
Columbidae
Columba leucocephala (white-crowned pigeon)
Psittaciformes
Psittacidae (parrots)
Ara cf. A. Militaris (green or military macaw)
Ara macao (scarlet macaw)
Aratinga sp. (parakeet)
Amazona xantholora (yellow-lored parrot)
Strigiformes
Tytonidae (barn owls)
Tyto alba (barn owl)
Piciformes
Picidae (woodpeckers, etc.)
Celeus cf. C. castaneus (chestnut-colored woodpecker)
Passeriformes
Icteridae (meadowlarks, blackbirds, and troupials)
Scaphidurus (Psomocolax) oryzivorus (giant cowbird)
Quiscalus (Cassidix) mexicanus (great-tailed grackle)

Mollusca

I could not locate any study of the Mollusca of the RBCMA, but many species were observed opportunistically during the course of this research. Some were recovered archaeologically and are reported in Appendix E. Interestingly, none of the species recovered in archaeological contexts were noticed in the wild, though they no doubt inhabit the area today. Shells were used for many purposes by the ancient Maya, including food (e.g. Andrews 1969; Eaton 1974; Feldman 1970). Andrews (1969) provides a comprehensive list of 192 species.

Gastropoda

The most notable univalve species recovered archaeologically are the *jute* (*Pachychilus* sp.) and the apple snail (*Pomacea flagelata*). Both of these have been documented archaeologically elsewhere and were undoubtedly consumed as foodstuff by the ancient Maya (Healy, et al. 1009). *Jute* shells were found in archaeological contexts both at Dos Hombres, Group D and at Be Tan Chinam.

Bivalvia

A few freshwater bivalves, clams identified as *Nephronaias* sp. were recovered from Dos Hombres, Group D. Like univalves, these are common finds at Maya archaeological sites.

Arthropoda

Insecta, Arachnida, and Crustacea

Numerous other species of Anthropoda are present in the RBCMA, none of which were documented archaeologically. As with fish, I do not know of a study of Anthropoda in the RBCMA area. While *Insecta* and *Arachnida* are not documented archaeologically, *Crustacea* are found at Maya sites. Table 2.7 lists species documented at Cozumel.

Table 2.7. Crustacea (adapted from Hamblin 1984:Table 3.1)

Class: Crustacea
- Subclass Malacostraca
  - Order Decapoda
    - Suborder Reptania
      - Tribe Brachyura (true crabs)
        - *Callinectes sapidus* (blue crab)
        - *Menippe mercenaria* (stone crab)

SUMMARY

The RBCMA is a physiographically diverse area that is home to a wide variety of Neotropical plants and animals. The area sits in a subtropical moist zone with marked wet and dry seasons, the wet season, however, being markedly unpredictable in terms of the regularity of rainfall. An increasing amount of ecological research has taken place on the property since the late 1980s. The establishment of the RBCMA by the PfB has also led to intensive exploration of the area by a variety of archaeological projects, to which we now turn.

Chapter 3: Archaeological Background and Culture History

INTRODUCTION

This chapter considers in detail the previous archaeological research accomplished in the immediate area (northwestern Belize) and in neighboring parts of Guatemala and Mexico. Northwestern Belize is detailed, but the northeastern portion of the department of Petén, Guatemala, as well as the southeastern and southwestern portions of the neighboring Mexican states of Campeche and Quintana Roo, respectively, are outlined. Northeastern Belize has received considerable archaeological attention for about 100 years (Hammond 1975, Pendergast 1993), but is considered beyond the realm of this chapter. A good review of the history of archaeological research in Belize has been written by David Pendergast (1993). The background in this chapter is largely limited to the area defined by R. E. W. Adams (1995) as the Three Rivers Region, the RBCMA being the approximate core of this area. Most of the known archaeological sites in the RBCMA and neighboring areas are shown in Figure 3.1.

Archaeological research in this part of the Maya area owes much to the efforts of R. E. W. Adams, who has conducted research in all of the countries of the Three Rivers region. The Three Rivers Region, as defined by Adams (1995), covers an important archaeological area of Belize, Guatemala, and Mexico. The region is bounded on the west by the Río Azul in Guatemala and Mexico, while in the north, the boundary is the Río Azul and Río Hondo. The Eastern boundary is the Booth's River. The RBCMA is arguably at the heart of this region, with two of the three rivers of the region crossing its expanse. While the Booth's River is closer to the eastern edge of the RBCMA, the Rio Bravo very nearly bisects the property, meandering from south to northeast. The immediate area northwest of the RBCMA, on the Belizean side of the border as well as the Guatemalan and Mexican sides, remains archaeological *terra incognita*.

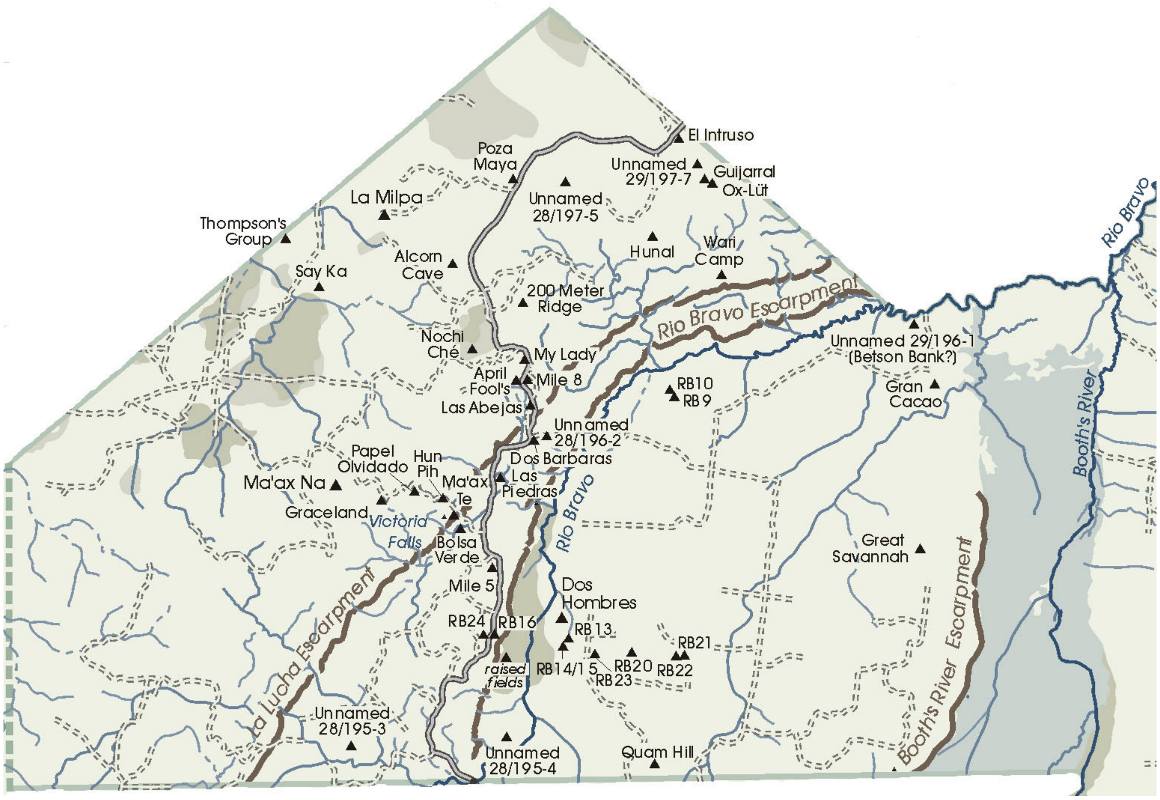

Figure 3.1. Archaeological Sites of the Rio Bravo Conservation and Management Area (Courtesy R. E. W. Adams, cartography by Bruce Moses). Used by permission. © 2005 by The Programme for Belize Archaeological Project.

PREVIOUS ARCHAEOLOGICAL RESEARCH IN NORTHWESTERN BELIZE

While exploration of archaeological sites in the Maya area began early in the history of Spanish colonialism, it can be seen from the above outline of previous research, not much attention was given to northwestern Belize until the 20th century.

Research on the Programme for Belize Land

The history of archaeological research has been well-documented by others, upon whose work this section draws heavily (Adams, et al. 2004; Houk 1996; Sullivan 1997). Although surrounding areas received attention from modern archaeologists slightly earlier, the RBCMA is approaching a 70 year span of archaeological research, sporadic at first, but continuous since the late 1980s.

J. E. S. Thompson and La Milpa

The first visit by a professional archaeologist to the area was brief. Thompson (1939) visited the largest known site in what is now the RBCMA in 1938 and named it La Milpa (Hammond 1991; Thompson 1939). Although Thompson briefly excavated at La Milpa, his research focus was the site of San Jose (Figure 3.1). La Milpa hosted no further archaeologists until the 1970s and 1980s.

Research from 1979-1991

La Milpa was visited by archaeologists David Pendergast in 1979 and John Morris in 1985, among other visitors (Guderjan 1991a, 1991b). Guderjan's Rio Bravo Project mapped the site in June 1988, around the time ownership of the site was transferred to PfB (Guderjan 1989). Subsequent to the establishment of the RBCMA, PfB brought in Ford and Fedick (1988) to assess the archaeological potential of the area. Guderjan's (1991c) Rio Bravo Project concomitantly did research at Chan Chich and used information from local informants to document 39 sites in the PfB and Gallon Jug Agribusiness lands. Guderjan, et al. (1991) remains a good guide to some of the sites in the area, and includes the first documentation of Be Tan Chinam, Group B, which they named the Mile 5 Site, after the odometer distance along the road from the gate at Cedar Crossing (Guderjan, et al. 1991:Figure 44).

With the establishment of the RBCMA in the late 1980s, the PfB, consulting a board of archaeologists, actively sought researchers to begin projects in the area. Following the reconnaissance work of Ford and Fedick as well as that of Guderjan's Rio Bravo Project, the PfB Archaeology Board invited Norman Hammond to begin a project at La Milpa, the largest site in the region and one of the largest site in Belize. The La Milpa Archaeological Project conducted research within the site center and the surrounding area up to a radius of 6 km from the site core. In 1991, R. E. W. Adams was invited to begin a long term archaeological research project in the remaining part of the RBCMA outside the La Milpa site center and its surrounding settlement area. Since the early 1990s, therefore, archaeological research in the area has grown tremendously, with the establishment of two long-term projects that call the area "home": the La Milpa Archaeological Project and the Programme for Belize Archaeological Project.

La Milpa Archaeological Project

Norman Hammond and Gair Tourtellot (Tourtellot, et al. 1993; Tourtellot, et al. 2003) began the La Milpa Archaeological Project (LaMAP) in 1992. The last research by LaMAP was done in the spring of 2002. The LaMAP goals involved creating a complete map of the site center and a number of cardinally-oriented transects radiating from the site center for settlement pattern studies. Research in the site center included excavations and a study of water management (Scarborough, et al. 1992).

The Programme for Belize Archaeological Project

As was the case with LaMAP, PfBAP began in 1992 in conjunction with a 20-year agreement with the Programme for Belize, landowner of the RBCMA (Adams 1994; Adams, et al. 2004; Adams and Valdez 1993, 1995). The project has involved field research every year since then, including several lengthy six-month field seasons. Principal goals of the PfBAP include survey and mapping to locate sites and provide descriptions to PfB along with suggestions about protection and access. Additionally, the project seeks to gain a regional perspective on the economic, political, and social structures of the region (Adams, et al. 2004). To date, the PfBAP has documented over 60 sites (Adams, et al. 2004)). The PfBAP, with its regional scope, is ideally suited to the study of ancient Maya political organization.

Having its antecedents in the Rio Azul Project and the Ixcanrio Regional project across the border in northeastern Petén, the PfBAP began under the direction of R. E. W. Adams. Since 1995 the project has been under the direction of Fred Valdez, Jr. The structure of the PfBAP is such that numerous independent yet associated projects can collaborate on PfB land under the overall supervision of one archaeologist to whom permission to excavate and explore is given both by the PfB and the Institute of Archaeology of Belize. The PfBAP does not do research of its own, but rather serves as the organizing structure under which a number of sub-projects co-exist and cooperate. That is, the Principal Investigator for the PfBAP is Fred Valdez, Jr., while the other projects working in the RBCMA are under his overall supervision. In addition to the five current sub-projects (detailed below) all directed by investigators who hold Ph.D.s, numerous graduate students have written theses and dissertations from research accomplished under the PfBAP umbrella (e.g. Geller 2004; Hageman 2004; Houk 1996; Kunen 2001; Lewis 1995; Lohse 2001; Robichaux 1995; Sullivan 1997). A number of other projects have also been completed, including work by Nicholas Dunning and Vernon Scarborough, Laura Levi, and Kathryn Reese Taylor (Adams, et al. 2004). The papers in Valdez (editor, 2005) summarize individual projects whereas Valdez (2005) provides a recent overview. Aylesworth and Valdez (2004) compiled the first 10 years of PfBAP research as the PfBAP has been an exceptionally prolific project, resulting in hundreds of publications, reports, presented papers, theses, and dissertations.

Dos Barbaras Archaeological Sub-Project

The Dos Barbaras Archaeological Sub-Project is directed by Brandon Lewis of Santa Monica College (Lewis 2005; Me-Bar and Lewis 2005). Lewis has been excavating and mapping the site for eight field seasons. Notable results include the excavation of a small stela, located near the center of Group B (Figures 3.2 and 3.3)

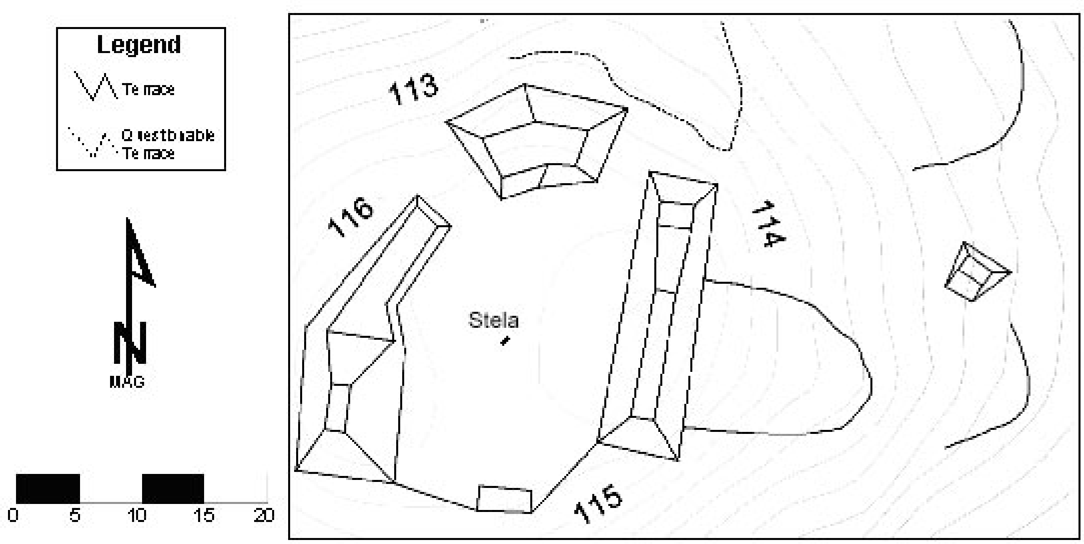

Figure 3.2. Dos Barbaras, Group B (courtesy B. S. Lewis and PfBAP). Used by permission. © 2005 by The Programme for Belize Archaeological Project.

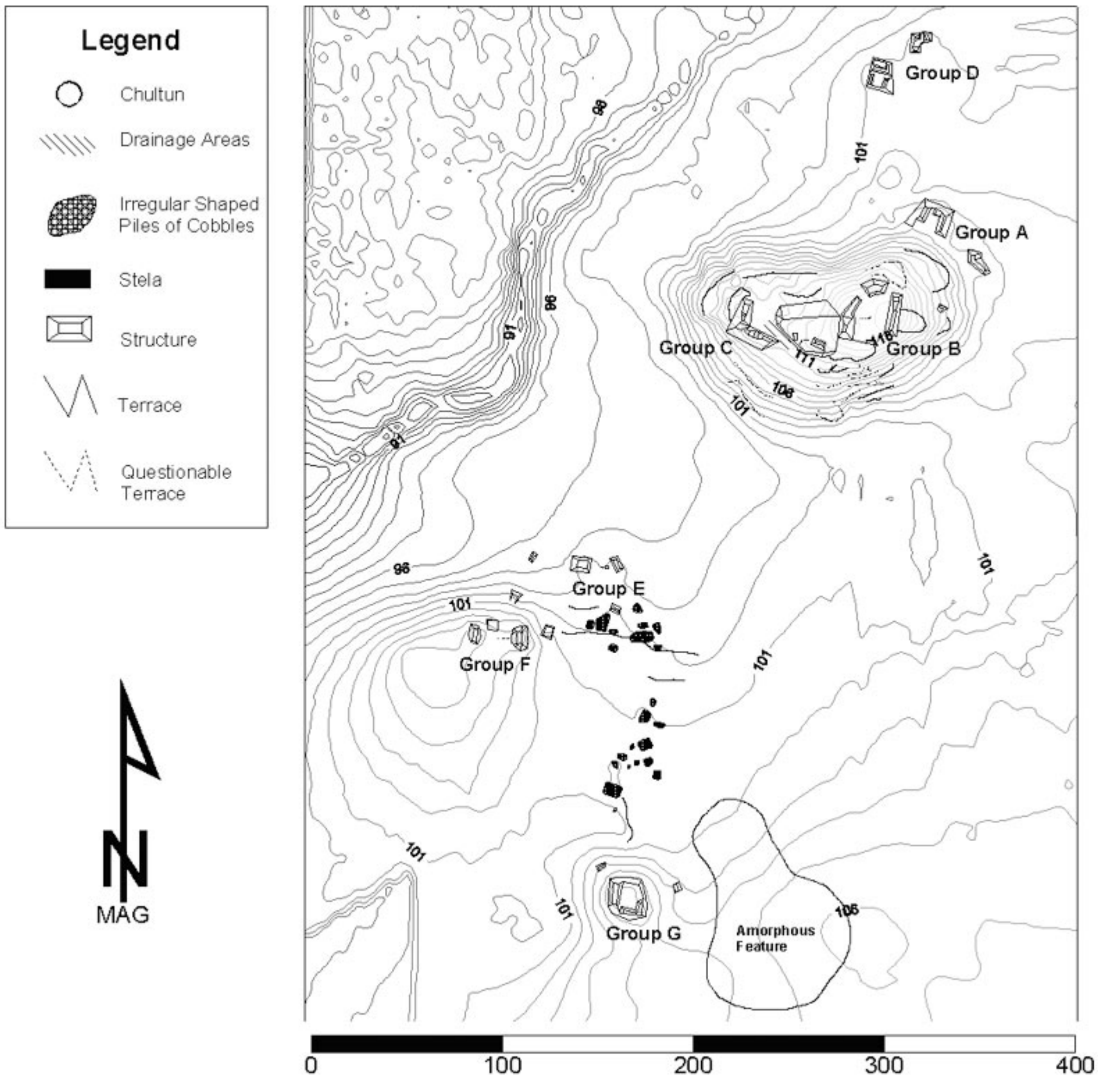

Figure 3.3. Dos Barbaras and environs (courtesy B. S. Lewis and PfBAP) Used by permission. © 2005 by The Programme for Belize Archaeological Project.

Formalized Landscape Sub-Project

Formalized Landscape Sub-Project is co-directed by Richard Meadows and Kay Sunahara. Their research focuses on reconnaissance and mapping of a large 2500 hectare research area (about 2.5% of the RBCMA, or 5% of the Rio Bravo parcel), near the south end of the Rio Bravo parcel, extending from the Gallon Jug Road west towards the Guatemalan border (Sunahara and Meadows 2005).

Maax Na Archaeological Sub-Project

The Maax Na Archaeological Sub-Project is directed by Leslie Shaw of Bowdoin College and Eleanor King of Howard University. The project, initiated in 1997, has created a map of the site core and surrounding settlement as well as excavating the site of Bolsa Verde (King, et al. 1999), peripheral to the site of Maax Na (King and Shaw 2003; Shaw, et al. 2005). A map of this large site is provided in Figure 3.4.

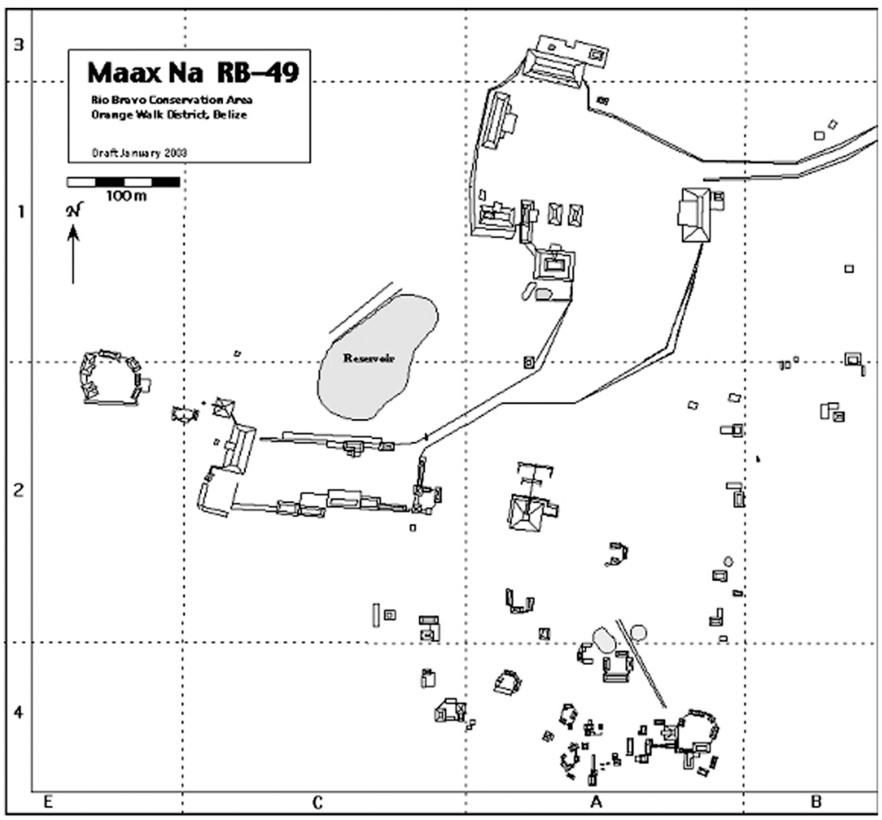

Figure 3.4. Map of Maax Na (courtesy Maax Na Archaeological Sub-Project and PfBAP). Used by permission. © 2005 by The Programme for Belize Archaeological Project.

Rio Bravo Archaeology Sub-Project

The Rio Bravo Archaeology Sub-Project is directed by Stanley Walling of Montclair State University. The study area for this project is about 2 km southwest of Dos Hombres along the Rio Bravo escarpment. One of the most interesting discoveries of recent research is the discovery of what appears to be a ball court in an arguable rural setting. The ball court structures are the largest thus far discovered in the RBAP's study area (Walling, n.d.; Walling, et al. 2005).

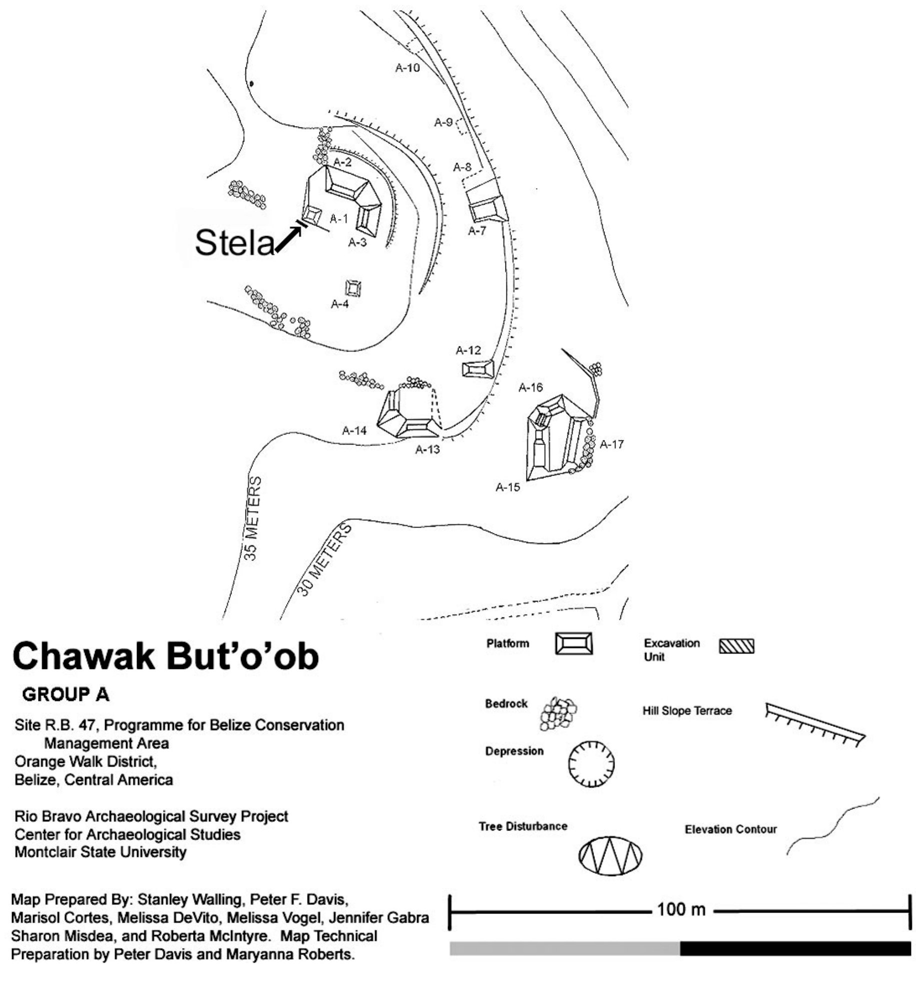

Figure 3.5. Map of Chawak But'o'ob showing stela location (courtesy S. L. Walling, P. F. Davis, Rio Bravo Archaeology Sub-Project, and PfBAP). Used by permission. © 2005 by The Programme for Belize Archaeological Project.

Three Rivers Archaeological Sub-Project

This sub-project, initiated in 1995, is directed by Fred Valdez, Jr. and Vernon Scarborough. Virtually all dissertations researched under the auspices of the PfBAP were aspects of the Three Rivers Archaeological Sub-Project (Geller 2004; Hageman 2004; Houk 1996; Kunen 2001; Lohse 2001; Robichaux 1995; Sullivan 1997; as well as this dissertation). Work related to a number of dissertations has been published in a recent volume that focuses on the archaeology of the Three Rivers region and in other publications (e.g. Hageman and Lohse 2003; Kunen 2004; Kunen and Hughbanks 2003).

Since the spring of 2001, much research has focused in the Medicinal Trail area, an elaborate settlement area located in the periphery of La Milpa and partially in the clearing of the La Milpa Field Station (Farnand 2002a, 2002b; Ferries 2002). Excavation and mapping of the Medicinal Trail area continued during the 2004 season (Chmilar 2005; Hyde 2005; Me-Bar 2005).

While work at the Medicinal trail has been ongoing, two new projects under the Three Rivers Archaeological Sub-Project began in 2004. Glaab's settlement survey between Dos Hombres and Gran Cacao began in the spring of 2004 (Glaab and Taylor 2005). Brett Houk rejoined the project to begin a project at the site of Say Kah, south of La Milpa (Houk and Lyndon 2005). An important finding of the 2004 season was the re-location of this site, long elusive to LaMAP researchers after Guderjan's original reporting of the site.

Archaeological Research in Adjacent Parts of Northwestern Belize

The areas adjacent to the RBCMA within Belize have received increasing archaeological attention since the late 1990s, although research at nearby Blue Creek began in the 1970s. Two projects have been working on the Gallon Jug Agribusiness property to the south: the Chan Chich Archaeological Project and the Punta de Cacao Archaeological Project, whereas one project has focused on land to the north of the RBCMA, that being the Maya Research Program's research area.

Chan Chich Archaeological Project

South of the RBCMA, the Chan Chich Archaeological Project, directed by Brett Houk, operated from 1996-1999, on the property of the Chan Chich Lodge, owned by Gallon Jug Agribusiness (Houk 1998, 2000; Houk and Robichaux 1996). Houk's project focused on producing a detailed map of the central 1 km^2 surrounding the site core. Excavations and mapping were directed at examining the sites chronology, overall layout, and thereby comparing it to sites in the region.

Punta de Cacao Archaeological Project

South of the RBCMA, but northeast of Chan Chich, Robichaux has been working at the site of Punta de Cacao since 2001 (Robichaux and Miller 2003; Robichaux et al. 2002). This project has focused on producing a map of the site and surrounding area to estimate population and examine community organization using a "multi nuclei" urban model inspired by geographical research. Robicahaux's research at Punta de Cacao follows up on ideas presented in his dissertation research done on the RBCMA (1995).

Maya Research Program

To the north and east of the RBCMA lies the site of Blue Creek. Archaeological research at the site can be traced back to the work of Mary Neivens in 1976 (Neivens 1991). Blue Creek was mapped as part of Guderjan's regional Río Bravo Archaeological Project. Subsequently, Guderjan and the Maya Research Program have focused on a regional project outside the RBCMA, having completed a map of about 20 km^2 around the Blue Creek site core. The regional project started by Guderjan is studying a portion of the area north of the RBCMA This project has focused on identifying discrete communities in the Blue Creek settlement area and identifying the functional interrelationships of the different settlements in the area (Guderjan, et al. 2003).

ARCHAEOLOGICAL RESEARCH IN ADJACENT GUATEMALA AND MÉXICO

The RBCMA sits along Belize's western border with Guatemala and is very close to Belize's northwestern and northern border with Mexico. Although modern political boundaries divide the area today, such divisions cannot be meaningfully applied to the ancient Maya. It is worthwhile, therefore, to briefly consider the archaeological history of the neighboring areas of Guatemala and Mexico. Northeast Petén, in particular shares the physiography of the Rio Bravo parcel of the RBCMA. Archaeological research has longer history in southern Campeche and southern Quintana Roo, Mexico (Adams 1981; Potter 1977).

Northeastern Petén, Guatemala

While northwestern Belize and the RBCMA received little archaeological attention prior to the late 1980s, the study of neighboring northeast Peten, Guatemala followed a somewhat similar trajectory. Due to the interests of oil companies, however, the archaeological sites of northeastern Petén were brought to the attention of archaeologists during the 1950s and 1960s (Adams and Gatling 1964). Early on, some brief forays were made into the region, but it was not until the 1980s that projects directed by R. E. W. Adams established a better understanding of the area.

Exploration that included documentation of archaeological sites was begun in the late 1950s and early 1960s by John Gatling, head of the Guatemalan office of the Sun Oil Company. Gating had instructed his survey crews to note the locations of any archaeological sites they encountered, and it was through these efforts that the major site of Río Azul was discovered (Adams and Gatling 1964). Ian Graham made several forays into the region, some with the assistance of Gatling and was able to visit and map the site of Kinal (Graham 1967). Following these brief visits and the cessation of Sun Oil Company's interest in the area, sites were heavily looted in the 1970s and early 1980s (Graham 1986), during which time Graham was able to briefly visit Río Azul and produce a map of the site (von Euw and Graham 1984).

In 1983, R. E. W. Adams began the five-season Río Azul Archaeological Project (Adams 2000), which worked at the site each dry season until 1987. The project focused on completing the map of the site center previously started by Graham, excavating in the site center, conducing a settlement survey around the area, and a test pit program aimed at documenting chronology of occupation throughout the site.

Following a brief hiatus, research began anew in northeastern Petén with the inception of the Ixcanrio Regional Project, also directed by R. E. W. Adams (2003).

Taking place on a larger regional scale than the prior Rio Azul Project, this research program focused on some continuing work at Rio Azul, but mainly focused on the site of Kinal and some smaller sites in the Bajo de Azucar region (Adams 2003).

Southeastern Campeche and Southwestern Quintana Roo, México

Clearly within the Three Rivers region is the far southeastern corner of Campeche, Mexico. Just bordering on the region to the north is southwestern Quintana Roo, Mexico. Between the RBCMA and Quintana Roo lies Guderjan's Maya Research Program project area, discussed above.

This part of Mexico saw early modern exploration and was extensively reconnoitered in the 1930s by Ruppert (Ruppert and Denison 1943). Although outside of the area, but still in southeastern Campeche, the Río Bec area has been well-studied and documented by a number of researchers since Ruppert including Potter (1977) and Adams (1981), the later having devised a settlement hierarchy for the Greater Petén region. More recently, Šprajc's (2001) reported on the significant site of Los Angeles, about 50km northeast of Río Azul and the medium-sized site of Tres Banderas, no doubt named for its proximity to the intersection of the Mexican, Belizean and Guatemalan border. Additionally, Šprajc's (2002) project has mapped the locations of dozens of sites in the area, both newly and previously discovered.

The research programs of southeastern Campeche appear to stand in marked contrast to those of neighboring southwestern Quintana Roo; there have been none in the latter area, at least to the best of my knowledge. While many parts of Quintana Roo have been explored and excavated, no projects have focused in this region near the Belizean border with the exception of Šprajc's project which appears to extend over the Campeche state line into Quintana Roo near the frontier with Belize.

OVERVIEW OF HUMAN OCCUPATION OF THE RIO BRAVO AREA

Having now gained a rudimentary understanding of the research that has been undertaken in the RBCMA and surrounding areas, it is worth reviewing what is known about the history of human occupation of the area. This section is not intended to be a comprehensive review, but to give an idea of the general developments in the area for the time periods considered in this dissertation. The RBCMA contains over 60 known ancient Maya archaeological sites although many more, no doubt, await discovery. Having received rather intense archaeological attention since 1992, a framework for the culture history of the RBCMA is now taking shape. The most recent synthesis of available information, drawing on ceramic analysis, is the work of Sullivan and Sagebiel (2003). This section is based on their work, as well as an excellent summary of the occupation of the larger Three Rivers region, provided by Houk (1996). The overview given in this section covers the Paleoindian to Postclassic periods, not the historical period, although it is known that the Belize Estate Company operated historically in the area. There is ample evidence from years of *chicle* harvesting and mahogany logging in the area, taking the form of scarred trees, mahogany stumps, and logging roads. Since this dissertation does not cover the historic period, no further detail is provided.

Table 3.1 gives an overview of the time periods and associated dates of the Three Rivers area, whereas Table 3.2 charts the regional ceramic complexes for the Rio Bravo area compared to a selection of other sites. Occupation in the area, documented by ceramic evidence, extends from the Middle Preclassic to the Late Classic with some scant Postclassic occupation (Sullivan and Sagebiel 2003) or visitation.

Table 3.1. Dates for Three Rivers Ceramic Phases (Courtesy Lauren A. Sullivan and PfBAP).

Time Period	Three Rivers (TR) Regional Ceramic Phase	Approximate Date
Terminal Classic	TR-Tepeu 3	A.D. 800/50-950
Late Classic	TR-Tepeu 2	A.D. 700-800/50
Late Classic	TR-Tepeu 1	A.D. 600-700
Early Classic	TR-Tzakol 3	A.D. 450-600
Early Classic	TR -Tzakol 1-2	A.D. 250-450
Late Preclassic	TR-Chicanel (Floral Park)	A.D. 100-250
Late Preclassic	TR-Chicanel (Early-Middle)	400 B.C.-A.D. 100
Middle Preclassic	TR-Mamon	600-400 B.C.
Middle Preclassic	TR-Swasey	800-600 B.C.

Paleoindian and Archaic

Paleoindian and Archaic occupation has been documented in a variety of areas of northern Belize (Hester, et al. 1996; Kelly 1993, MacNeish and Nelken-Terner 1983). No such early occupation has yet been discovered in the RBCMA, though a potential candidate for early occupation is the Booth's River Depression as it is similar physiographically to other parts of northern Belize where Paleoindian and Archaic occupation has been documented. Not far from the RBCMA, a Paleoindian point was recently discovered by sand quarrying activity near the town of August Pine Ridge (Valdez and Aylesworth 2005).

Preclassic

There is no evidence of Early Preclassic occupation in the RBCMA; occupation begins with the Middle Preclassic period.

Middle Preclassic

Some evidence of Middle Preclassic occupation of the RBCMA comes from the sites of Dos Hombres (Courtyard A-2) and La Milpa (Sullivan and Sagebiel 2003). Limited evidence of Mamom occupation is also present in the ceramics of Dos Hombres, Group D (Appendix A). South of the property, a "significant number" of Mamon ceramics has been recovered at the site of Chan Chich (Valdez and Houk 2000), along with a corroborating radiocarbon date (Sullivan and Sagebiel 2003).

Late Preclassic

Ceramics from the Late Preclassic and Protoclassic abound in the region, indicating an increase in population compared to the Middle Preclassic period (Sullivan and Sagebiel 2003). While Middle Preclassic ceramics surely point towards the presence of Middle Preclassic architecture in the area, it is only during the Late Preclassic that solid dating of construction becomes possible (Brown 1995; Houk 1996).

Classic

The Classic period has a number of important subdivisions: Early, Late, and Terminal. Each is considered separately in the following sections.

Early Classic

Charting Early Classic occupation in the RBCMA is complicated by a number of factors, including "the continued use of Late Preclassic monochromes (specifically Sierra Red) and some unslipped types into the Early Classic, as well as the use of Sierra Red on Early Classic forms (Sullivan and Sagebiel 2003:27). Sullivan and Sagebiel point out that this trend mirrors other parts of the Maya area during this time. Nevertheless, it seems that occupation of the RBCMA during the Early Classic was substantial, with significant architecture at Gran Cacao (Lohse 1995). There is also evidence of significant occupation and significant wealth at the site of Blue Creek and environs during this time period (Guderjan, et al. 2003). Houk (1996:118-119) states that "in general, the population of the Three Rivers Region continued to grow during the Early Classic, although some sites with Late Preclassic populations showed a decline (i.e., Dos Hombres and Las Abejas)…". Arguing for homogeneity of occupation in the area and favoring a model that relies on the conflation of time periods, Hageman (2004:307) argued that the "relative absence of Early Classic settlement in northwestern Belize…reflects an ancient reality". Hageman, however, provides little evidence to back this assertion even though there is evidence of significant Early Classic activity at many sites in northwestern Belize.

Late Classic

There is little ceramic evidence dating to the early Late Classic period. Very few Tepeu 1 ceramics have been recovered from the area—those that have been are consistently associated with later Tepeu 2 and Tepeu 3 types (Sullivan and Sagebiel 2003). The scarcity of early Late Classic ceramics is in marked contrast to some sites outside the region, such as Altar de Sacrificios, Barton Ramie, and Colha (Sullivan and Sagebiel 2003). As the Late Classic progressed, however, population apparently exploded with over 80% of ceramics recovered in the excavation of RBCMA sites dating to the later part of the Late Classic (Tepeu 2/3) (Sullivan and Sagebiel 2003). It is not unreasonable to state that all known sites within the RBCMA have significant Tepeu 2/3 occupation, regardless of their size or location. Within the immediate area of

Dates	Time Periods		Uaxactun	Tikal	Rio Azul	Three Rivers	Barton Ramie	Colha
1500								
1400							Late Facet	Ranas
1300	POSTCLASSIC	Late						Canos
1200							New ___?___ Town	
1100				CABAN	Incomplete/ Unnamed			
1000		Early					Early Facet	Yalam
900		Terminal	TEPEU 3	EZNAB	Yat	TR-Tepeu 3		
800		Late	TEPEU 2	IMIX	Ramirez	TR-Tepeu 2	Spanish Lookout	Masson
700	CLASSIC				Chacuta	TR-Tepeu 1	Tiger Run	Bomba
600			TEPEU 1	IK				
500			TZAKOL 3		Totbol	TR-Tzakol 3	Hermatige	Cobweb
400		Early	TZAKOL 2	MANIK				
300			TZAKOL 1		Mucu	TR-Tzakol 1-2		
200		Proto-classic		CIMI		TR-Chicanel (Floral Park)	Floral Park	Blossom Bank
100AD				CAUAC		______?_____	__________	
0			CHICANEL				Mount Hope	
BC100					Hilario			
200		Late		CHUEN		TR-Chicanel (Early-Middle)	Barton Creek	Onecimo
300	PRECLASSIC							
400				TZEC				Chiwa
500			MAMOM		Ordoñez	TR-Mamon		
600							Jenney Creek	
700		Middle		EB		TR-Swasey		Bolay
800					Incomplete/ Unnamed			
900								
1000								

Table 3.2. Regional ceramic complexes for the PfBAP (Three Rivers) and select sites. After Sullivan and Sagebiel (2003:Figure 3.1). From "Changing Political Alliances in the Three Rivers Region" by Lauren A. Sullivan and Kerry L. Sagebiel, in *Heterarchy, Political Economy, and the Ancient Maya: The Three Rivers Region of the East-Central Yucatan Peninsula*, edited by Vernon L. Scarborough, Fred Valdez, Jr., and Nicholas Dunning, Copyright © 2003 The Arizona Board of Regents. Reprinted by permission of the University of Arizona Press.

this dissertation research, Dos Hombres experienced rapid growth and expansion during the Late Classic. As Houk described, “Plaza A-1 was resurfaced, the Preclassic structures in Courtyard A-2 were buried by the Late Classic renovation of the group, and all the visible architecture south of Plaza A-1, including the Acropolis, was constructed between A.D. 650 and 800” (Houk 1996:122). In addition to the activity in the larger sites, the surrounding areas and smaller sites saw their populations peak during this time (Robichaux 1995).

Terminal Classic

The Terminal Classic, along with major changes throughout the central Maya lowlands, saw populations decline in the RBCMA both in rural areas and at larger sites (Houk 1996; Robichaux 1995; Sullivan and Sagebiel 2003; Tourtellot, et al. 1993). Terminal Classic occupation at sites such as La Milpa consisted of low-walled structures evidently made from stones taken from larger structures and built atop existing plazas. The evidence for such structures at Dos Hombres is somewhat problematical. Although it is not clear to which structures Houk (1996) refers (likely Structure D-9), he gave Group D at Dos Hombres as an example of such Late Classic stone robbing. The Group D example, along with that of Structure 86 at La Milpa (Tourtellot, et al.1993), was given by Sullivan and Sagebiel (2003:27) as evidence of Terminal Classic people robbing stone’s from earlier structures to build on Late Classic plaza surfaces. Excavation at Dos Hombres, Group D, however, has revealed that there are at least three mounded structures (D-3, D-8/D-9, and D-10)that have well preserved low stone walls in front of them. These appear to be no more than rooms appended to the front of mounded architecture which, insofar as those investigated are concerned, also date their latest construction phases to the Terminal Classic. The suggestion that

Group D "may represent a defensive [i.e., defensible] position for the Terminal Classic population", however, remains worth considering (Houk's 1996:124).

Postclassic

Some Early Postclassic ceramics were recovered at Gran Cacao (Durst 1995, 1996; Levi 1995) but the extent of any Postclassic occupation at the site is not clear. For sites on top of the Rio Bravo Escarpment, there is evidence of Postclassic visitation or pilgrimages. At Dos Hombres, obsidian projectile points have been found in Plaza A-1 that stylistically date to the Postclassic. Additionally, Houk (1995, 1996) documents an *incensario* found in the topsoil at the base of Stela 2 at Dos Hombres that is similar to a Late Postclassic specimen found at La Milpa (Hammond and Bobo 1994). Hammond and Bobo indicate that Late Postclassic visitation of La Milpa took place as early as the fifteenth century and as late as the seventeenth century. With well-documented Postclassic occupation at not-too distant sites like Lamanai and Colha, it is not surprising that people visited sites in the RBCMA during this time. Although it is clear that people visited the RBCMA during the Postclassic, evidence of permanent Postclassic occupation has not been identified. To the east of the Rio Bravo parcel, in the area of Gran Cacao and close to the New River Lagoon, are likely to be promising areas in which to search for Postclassic occupation.

SUMMARY

The RBCMA has numerous physiographic similarities to neighboring areas, particularly northeastern Petén, Guatemala. The Three Rivers region and the larger greater Petén area have seen archaeological exploration throughout modern times. It was not until the late 1980s with the establishment of PfB that the RBCMA received sustained archaeological attention as part of the overall objectives of PfB. Since 1992, the RBCMA has seen a number of projects investigating the area under the overall supervision of the PfBAP. At the same time, research at La Milpa intensified with the establishment of the LaMAP. Additionally, a variety of projects have commenced research to the north and south of the RBCMA, making northwestern Belize a very active area for archaeological research. There is no Paleoindian, Archaic, or Early Preclassic occupation yet found in the area. Archaeologists have, however, documented the lengthy human occupation of the area which is now known to date from the Middle Preclassic through the Terminal Classic. Human population clearly peaked during the Late Classic while previous population surges and declines remain possibilities. There is some scant evidence of Postclassic visitation to sites in the area, but no evidence of any sustained Postclassic occupation. Interestingly, the eastern portion of the RBCMA may prove to be the most fruitful research area for archaeologists who wish to investigate Paleoindian, Archaic, or Postclassic settlement.

Chapter 4: Excavations and Mapping

Excavation and mapping of two sites form the backbone of this dissertation research. This chapter provides a summary of excavation data and illustrations of selected architecture and artifacts. Appendices A, B, and C provide the details of ceramic, obsidian, and chert tool analysis, respectively. Structure and open space designations follow the alphanumeric system used by the Three Rivers Archaeological project and already in use at Dos Hombres. In this numbering system, structure numbers are consecutive within, but not across group designations (i.e., Structures A1-A10 would be followed by B1-10 rather than B11-20).

Beginning in 1999 and with additional work in subsequent years, Dos Hombres, Group D and Be Tan Chinam were mapped and excavated. Both were chosen for their proximity to Dos Hombres and can clearly be viewed as part of the greater Dos Hombres settlement area. Additionally, both sites exhibit characteristics of Plaza Plan 2 groups. Previous research in and around Dos Hombres had focused on settlement transects and the site center (Hageman 2004; Houk 1996; Lohse 2001; Robichaux 1995), so I opted to focus my efforts on two areas that had not been the subject of intense scrutiny: Group D, a residential area 200 m west of the Dos Hombres site center, and Be Tan Chinam (RB 31), about 2 km northwest of Dos Hombres, Plaza A-1.

Excavation was, overall, intended to yield data that could be used in a science of networks based comparison while investigating the similarities and differences between the two excavation locales. Chronology is important to understanding the population history of the RBCMA in that whereas most of the RBCMA has Late Classic occupation in the form of small household settlements, the smaller to medium-sized sites often have significant Early Classic occupation (Fred Valdez, Jr. personal communication 2002). These findings from field research relate directly to changes over time as seen in the Dynamic Model (Marcus 1992, 1998) and will be used to question the general applicability of such a model (Chapter 5). That is, while major centers have been seen as "dynamic", it seems that the smaller centers are dynamic as well, often experiencing growth at times when larger centers experience decline or lack of growth.

As a dissertation project, time and resources were limited so I rely heavily on comparative data provided by related research within the PfBAP area and throughout the Maya area. This comparative data, however, was supplemented by field research designed to provide new data specific to the questions being addressed here: do the sites reflect any characteristics of known networks?

INVESTIGATIONS AT DOS HOMBRES (RB-2), GROUP D

Excavation at Group D took place in three segments. The first began in early February, 2002 and continued until late April, followed by a short break. The second segment of the 2002 field season resumed in late May 2002 and continued until early June. This was followed by a third segment of one month of excavation and mapping from late May to late June, 2003. Analysis of artifacts was started in 2002, continued in 2003, and completed during the summer of 2004.

To simplify the recording of excavation data, each segment of field research was given a different sequence of Suboperation designations while all were part of RB 2 (Dos Hombres, Figure 4.1), Operation 33. All excavations that took place from February to April 2002 have a single alphabetic Suboperation designation (e.g., A, B, C, etc.). Excavation that took place from May to June, 2002, was given a dual alphabetic suboperation designation, beginning with A (e.g., AA, AB, AC, etc.). The final

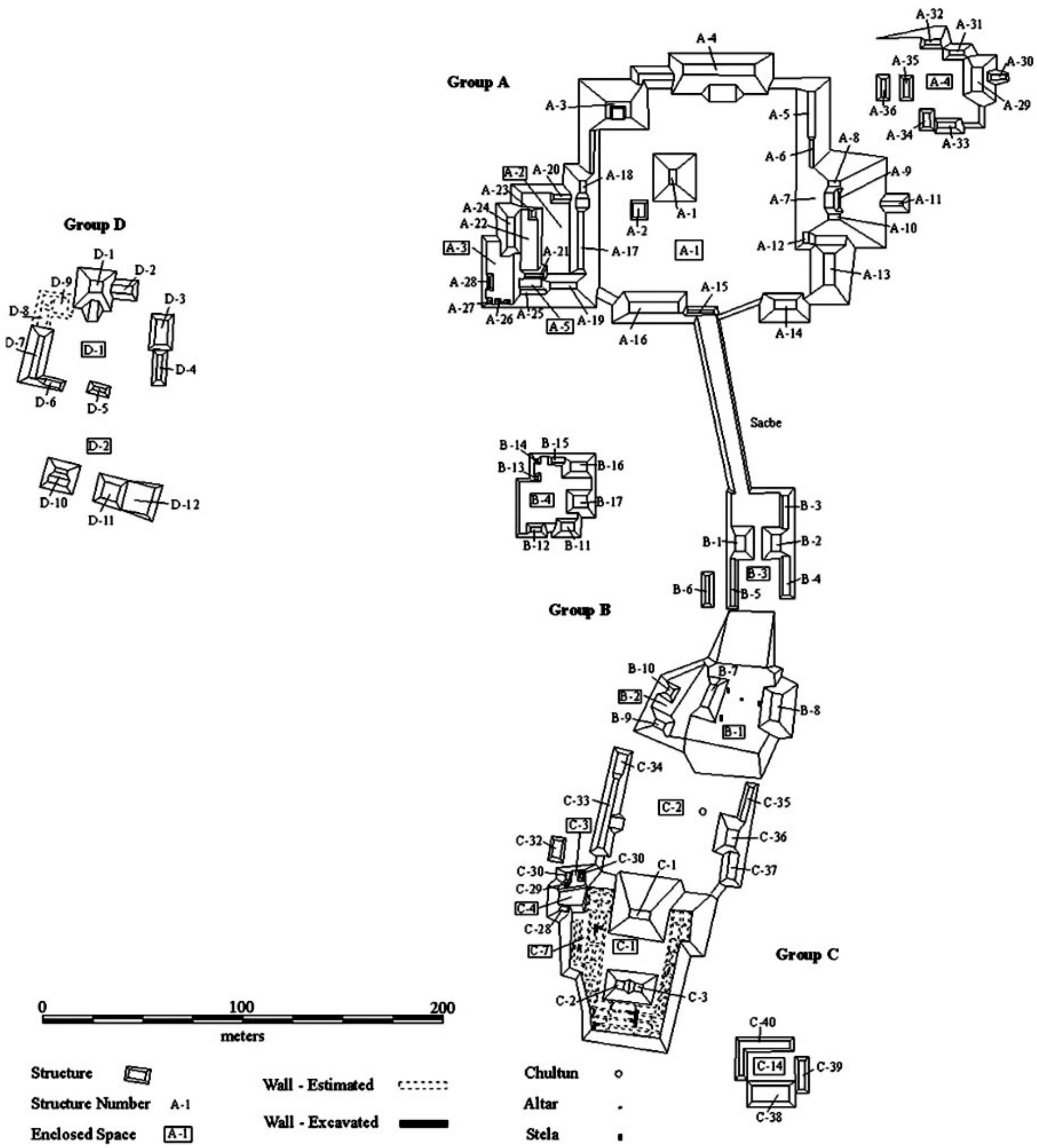

Figure 4.1. Map of Dos Hombres (see Figure 4.2 for modified map of Group D). After map by B. A. Houk; Group D by J. C. Lohse, E. Marzloff, and K. Doris. Used by permission. © 2005 by The Programme for Belize Archaeological Project.

excavations at the site were also given a dual alphabetic Suboperation designation, beginning with B (e.g., BA, BB, BC, etc.).

During the 2002 season, clearing of Plaza D-1 made it apparent that the previous map of the site would need to be revised. In the summer of 2003, the site was mapped with electronic surveying instruments (Figure 4.2).

Previous Research

In 1992, Dos Hombres was reported to PfBAP archaeologists by Peter Herrera, an employee of PfB (Houk 1996:107). Initially, Group D was designated as RB-1 whereas Group A was designated RB-2 (Houk 1996:107; Lohse 1999). The southern part of Dos Hombres was independently discovered and designated RB-12, later amended to be part of RB-2. There has been a significant amount of research in areas surrounding Dos Hombres, mostly in the form of settlement surveys. Robichaux (1995) and Walling et al. (2005) undertook research along a transect cut by an oil company (designated VA90-2). Lohse (2001) surveyed a lengthy transect that bisected the site center, and Hageman (2004) surveyed along a transect that extended northwest from the site center towards La Milpa. Houk (1995) reports details of investigations in the site center.

Group D, apparently the first architecture at the site of Dos Hombres visited by archaeologists, has received some attention. The group was first reported and described by Houk (1996:107, 124, 232; Houk, et al. 1993) although early efforts at Dos Hombres focused on mapping Groups A, B, and C. Group D was initially mapped in 1997 as part of a salvage operation of the looted tombs in Structure D-3, supervised by Lohse (1999). Figures 4.3, 4.4, and 4.5 document the architecture recorded by Lohse and his team. Houk (1996:124) suggested that Group D may have been a defensible location for

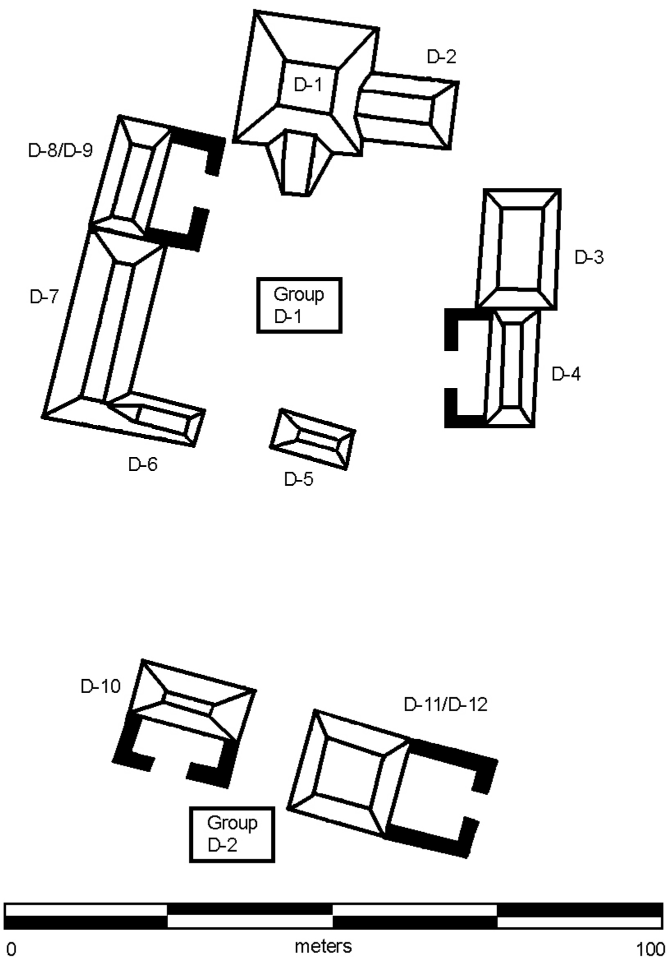

Figure 4.2. Dos Hombres, Group D. Redrawn after Lohse (1999:Figure 4). Used by permission. © 2005 by The Programme for Belize Archaeological Project.

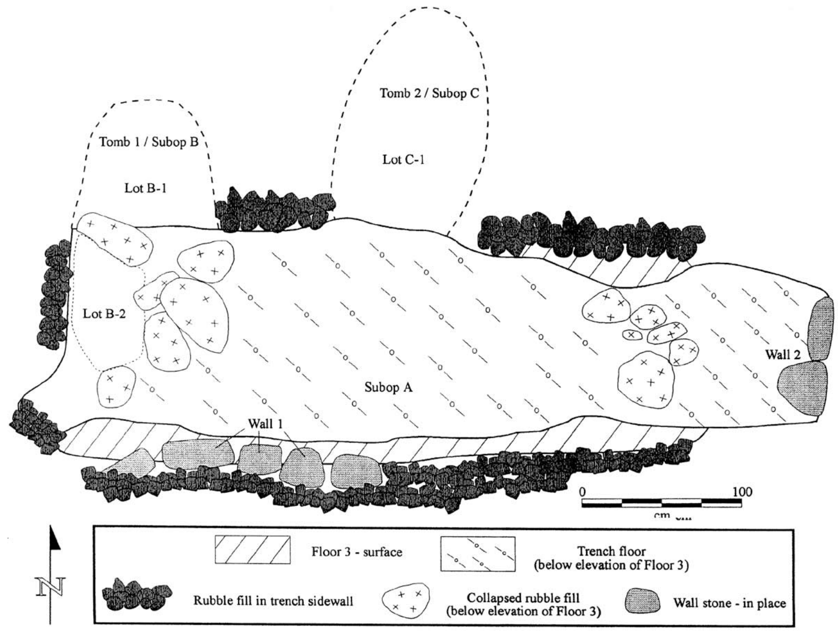

Figure 4.3. Dos Hombres, Group D, Structure D-3, plan of looter's trench and two burial chambers (Operation 12). After drawing by J. C. Lohse (1999:Figure 5). Used by permission. © 1999 by The Programme for Belize Archaeological Project.

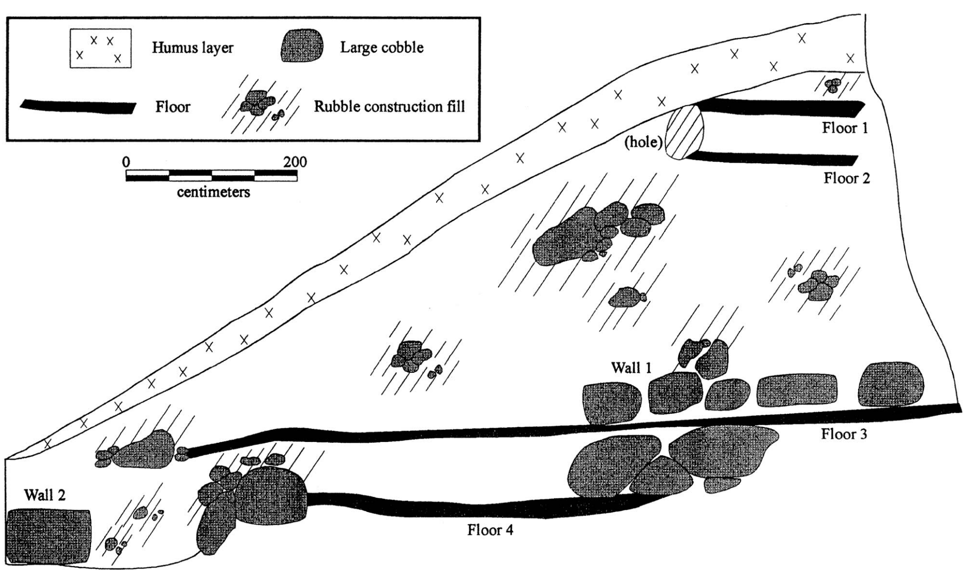

Figure 4.4. Dos Hombres, Group D, Structure D-3, profile of south side of looter's trench (Operation 12). After drawing by M. Naujock and J. Lohse (Lohse 1999:Figure 7). Used by permission. © 1999 by The Programme for Belize Archaeological Project.

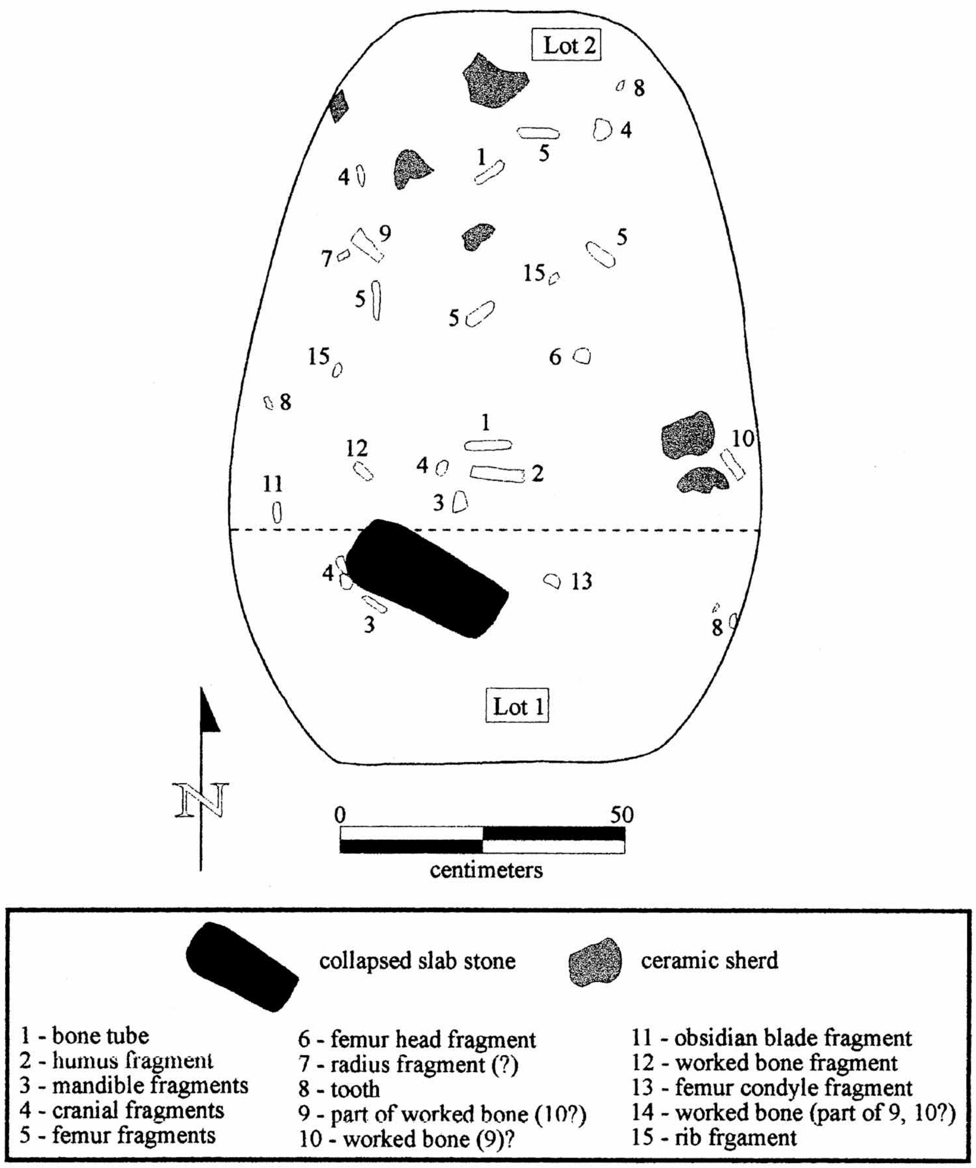

Figure 4.5. Dos Hombres, Group D, Structure D-3, Tomb 1 (Operation 12). After drawing by J. C. Lohse and J. M. Saul (Lohse 1999:Figure 6). Used by permission. Copyright © 1999 by The Programme for Belize Archaeological Project.

Terminal Classic settlement. The salvage operation of 1998 considered Group D to be a "minor civic-ceremonial plaza" (Lohse 1999:1). While little could be salvaged from the looted Structure D-3, some important findings were made by Lohse, who worked with Frank and Julie Saul. A number of artifacts were recovered, including worked bone and greenstone beads. Additionally, there was also a preponderance of Early Classic ceramics sherds. These finds are detailed below with the excavation of Structure D-3. Lohse (1999:9) speculated that "the occupants of the western plaza [Group D] may have been an important, perhaps even royal, though non-ruling family group or lineage". There are some artifactual affinities between Group D and Group B-4; both yielded Pachuca obsidian blade fragments (Appendix B; Trachman 2002).

Site Description and Location

Dos Hombres, including Group D, is located in the Rio Bravo Embayment physiographic province, following the scheme developed by Brokaw and Mallory (1993). The group is located about 200 m west of the southern edge of Plaza A-1, atop a limestone ridge about 25 m in height.

Group D-1

At the highest point of this ridge (northern end) sits Plaza D-1, with mounded architecture along the outer edges of a roughly 30 m by 30 m open plaza. All structures appear to face into the plaza. The Plaza D-1 ridge top was certainly modified, leveled by human construction with platform faces evident along the south and west sides. Several standing courses of this platform face are evident along the west side of Group

D-1, while the only visible surface evidence along the south edge is a course of stones protruding through the modern surface.

The map of the site produced by Lohse (see Group D in Figure 4.1) depicts nine structures in this group. Thorough clearing, however, and much time spent working at the group led to the emendation of that finding. Lohse's Structures D-8 and D-9 are possibly aspects of the same structure. An additional low platform-like structure was found near the center of Plaza D-1 and designated Structure D-13. Structures are described in detail in the subsequent sections.

Group D-2

Located immediately south of Group D-1, Group D-2 sits about five meters lower in elevation on the same ridge. This group, after Lohse's map, consists of Structures D-10, D-11 and D-12. Structure D-10 faces roughly south, while Structures D-11 and D-12 face roughly east. Structures D-11 and D-12 are arguable aspects of the same building and do not necessarily warrant two different structure numbers.

Excavations at Group D

The following sections detail the excavations at Group D, with Table 4.1 listing the structures of Group D and their associated operation and Suboperation designations. Table 4.2 lists suboperation definitions. Ceramics, obsidian, lithic tools, human remains, and faunal remains are discussed below, with detailed reports in Appendices A, B, C, D, and E, respectively.

Table 4.1. Dos Hombres, Group D excavated structures and associated (on or near) operations and suboperations.

Group	**Structure**	**Excavation**	
		Operation	**Suboperation**
D-1	D-1	33	A, BG
	D-3	12	A, B, C
		33	C, F, G, I, K, L, M, N, Q, R, S, T, U, V, W, BE, BF
	D-4	33	BJ, BK, BL
	D-5	33	D
	D-6/D-7	33	E
	D-8/D-9	33	B, J, P, BH, BI
	Plaza	33	A, E, H, O, U
D-2	D-10	33	BA, BB
	D-12	33	BC, BD
	D-13	33	AA, AB, AC, AD, AE, AF

Table 4.2. Dos Hombres, Group D, Suboperation Locations and Definitions. All are RB 2, Operation 33.

Subop.	Size (m)	No. of Lots	Location/Definition
A	1 x1	6	Plaza D-1, centered on and immediately south of Structure D-1
B	1 x 1	4	Structure D-9, center of terrace
C	1 x 1	3	Plaza D-1, south end of the west side of Structure D-3
D	1 x 1	2	Structure D-5, center
E	1 x 1	4	Plaza D-1, south end of east side of Structure D-7
F	1 x 1	4	Plaza D-1, along south side of Suboperation C
G	1 x 1	2	Plaza D-1, along west side of Structure D-3 near southwest corner of structure. Adjacent Suboperations C and F.
H	1 x 1	3	Plaza D-1, between northeast corner of Structure D-5 and Southwest corner of Structure D-4.
I	1 x 1	11	Plaza D-1, adjacent (west) side of Suboperation C
J	2 x 2	4	Plaza D-1, extension north and east of Suboperation B such that Suboperation B is the southwest quadrant of this suboperation
K	1 x 2	3	Plaza D-1, Structure D-3, along south side, southwest corner of Structure D-3, adjacent southeast corner of Suboperation G
L	1 x 3	1	Plaza D-1, Structure D-3, near southwest corner of structure, adjacent (east of) southern third of Suboperation G
M	1 x 2	2	Plaza D-1, off southwest corner of Structure D-3, along southern edges of Suboperations F and G
N	1 x 2	1	Plaza D-1, west of Structure D-3, extending along north edge and to northwest of Suboperation G
O	4 x 4	1	Plaza D-1, surface collection, northwest corner of plaza, off northeast corner of Structure D-7
P	2 x 2	5	Plaza D-1, combination of Suboperations B and J at level of large core fill
Q	1 x 0.5	1	Plaza D-1, extension west of Suboperation G's northern portion, running in between Suboperations C and N
R	2 x 2	2	Plaza D-1, Structure D-3, along south side of structure near southeast corner
S	1.5 x 2.5	5	Plaza D-1, Structure D-3, top of structure, along south side of looter's trench
T	1 x 3.5	1	Plaza D-1, Structure D-3, west side adjacent Suboperation N
U	1 x 1	9	Plaza D-1, adjacent south side of Suboperation H, northeast of Structure D-5
V	2 x 3		Plaza D-1, Structure D-3, adjoining north side of Suboperation T
W	2 x 3	2	Plaza D-1, Structure D-3, adjoining north side of Suboperation V
X-Z	Not used		

Subop.	Size (m)	No. of Lots	Location/Definition
AA	1 x 6	1	Plaza D-1, Structure D-13, oriented east to west across the width of structure and adjacent plaza space
AB	1 x 1	1	Plaza D-1, eastern portion of Suboperation AA
AC	1 x 1	4	Plaza D-1, adjacent (west) of Suboperation AB
AD	1 x 1	1	Plaza D-1, second to third meter from west side of Suboperation AA
AE	1 x 1	2	Plaza D-1, adjacent (west) of Suboperation AC
AF	1 x 1	2	Plaza D-1, adjacent (west) of Suboperation AE
AG-AZ	Not used		
BA	1 x 2	4	Plaza D-2, Structure D-10, inside southwest corner of terrace at front of structure
BB	1 x 2	2	Plaza D-2, Structure D-10, outside southwest corner of terrace at front of structure
BC	1 x 2	3	Plaza D-2, Structure D-12, inside north edge of terrace at front of structure
BD	1 x 2	2	Plaza D-2, Structure D-12, outside north edge of terrace at frond of structure
BE	0.75 x 0.75	2	Plaza D-1, Structure D-3, along southern edge (west half) of Suboperation S
BF	0.75 x 0.75	3	Plaza D-1, Structure D-3, along southern edge (east half) of Suboperation S
BG	3 x 4	2	Plaza D-1, Structure D-1, along primary axis at base of stair, subsuming Suboperation A
BH	1 x 2	9	Plaza D-1, Structure D-9, inside wall along northeast corner of structure
BI	1 x 2	5	Plaza D-1, Structure D-9, outside wall along northeast corner of structure
BJ	1 x 2	9	Plaza D-1, Structure D-4, inside wall of terrace near southwest corner of structure
BK	1 x 2	5	Plaza D-1, Structure D-4, outside wall of terrace near south west corner of structure
BL	1 x 1	2	Plaza D-1, Structure D-4, extension to south along west half of Suboperation BJ
BM-BZ	Not used		

Plaza D-1

Plaza D-1 was the most intensively investigated area at Group D. Excavations began with a number of test excavations in the open space of the plaza and proceeded with the excavation of small portions of structures.

Structure D-1

The group is dominated by Structure D-1, a square structure standing about four meters tall. This structure was almost completely gutted by looters, leaving only the outer shell of the building. Investigation of the looter's trench indicated one phase of construction. Excavation involved a test pit off the south side, center, of the structure and along what appears to be a stair along the primary axis. Excavation (Operation 33, Suboperation BG) along the east side of this stair yielded large quantities of Tepeu 2/3 sherds. A test pit in front of the structure (Operation 33, Suboperation A) found Tepeu 2/3 ceramics throughout, although there was a trace of Chicanel ceramics in the lot immediately above bedrock. This suggests that the structure dates to around Tepeu 2/3 times.

Structure D-3

This structure contained two tombs possibly dating to the Early Classic period, reported by Lohse (1999) in the results of his salvage operation (Op. 12). It is, therefore, possibly an eastern shrine but Group D does not follow the typical Plaza Plan 2 layout. Excavation for this dissertation exposed the southwest corner of the structure and portions of the south face and west face of the structure, while portions of the humus layer were removed from the front (west side) of the structure (Figure 4.7). There is no secure dating of the structure's construction sequence since the excavations reported here focused mostly around the structure and entered into the architecture itself only to a small extent.

Figure 4.6. Imitation Fine Orange ceramic sherd from Group D, Courtyard D-1 (Operation 33, Suboperation E, Lot 1). Drawing by Dee Turman. Used by permission. © 2004 by The Programme for Belize Archaeological Project.

Lohse's salvage operation recovered a number of shell and greenstone artifacts, as well as some partially reconstructible ceramic vessels, including a black fluted cylindrical tripod dating to the Early Classic (Lohse 1999:6). The salvage operations in the looter's trench revealed at least four construction sequences for the southern portion of the building. As Lohse suggested, it appears that the northern portion of the building (which contains the tombs) was originally built as part of a separate structure. This may be the case, but it could also be that the tombs were intrusive and their construction disturbed the architectural sequence above them. Excavation atop the south side of the structure (Suboperations S, BE, and BF) revealed Tzakol and Chicanel sherds in the first excavation lot (see Appendix A). While Suboperation S encountered this Early Classic context immediately, Suboperations BE and BF contained small quantities of

Tepeu 2/3 (with a Tzakol trace) along with Tepeu 2 sherds in their first lots. Since these Suboperations were immediately next to one another, these results are puzzling. Nevertheless, it seems clear that the last substantial construction of this portion of the Structure D-3 dated to Early Classic times, around the time attributed to the looted tombs. Several lots of sherds from the lowest excavation levels of this structure await analysis, though these excavations did not deeply penetrate the structure. Figures 4.8, 4.9, and 4.10 document artifacts recovered by Lohse (1999) near the looted tombs.

Excavation revealed a small terrace extending northward from the southwest corner of the structure (architectural terms follow the lexicon laid out by Loten and Pendergast [1984]). Along the west side of the terrace foot, plaster curved up from a plaza floor, but was broken and not preserved on the terrace face. The southwest corner of the terrace was slightly rounded in form, with squared cornerstones underlying plaster applied over top creating the slightly rounded corner (Figures 4.11-4.15). The south face of the terrace was well preserved and plastered continuously up the side of the structure. Where plaster was missing, an earlier application of plaster was evident (Figures 4.11 and 4.12). To determine the dimensions of the structure at it's base, we attempted to locate the southeast corner of the structure, but the area was heavily disturbed and occupied by a large *gumbolimbo* (*Bursera simaruba*) tree.

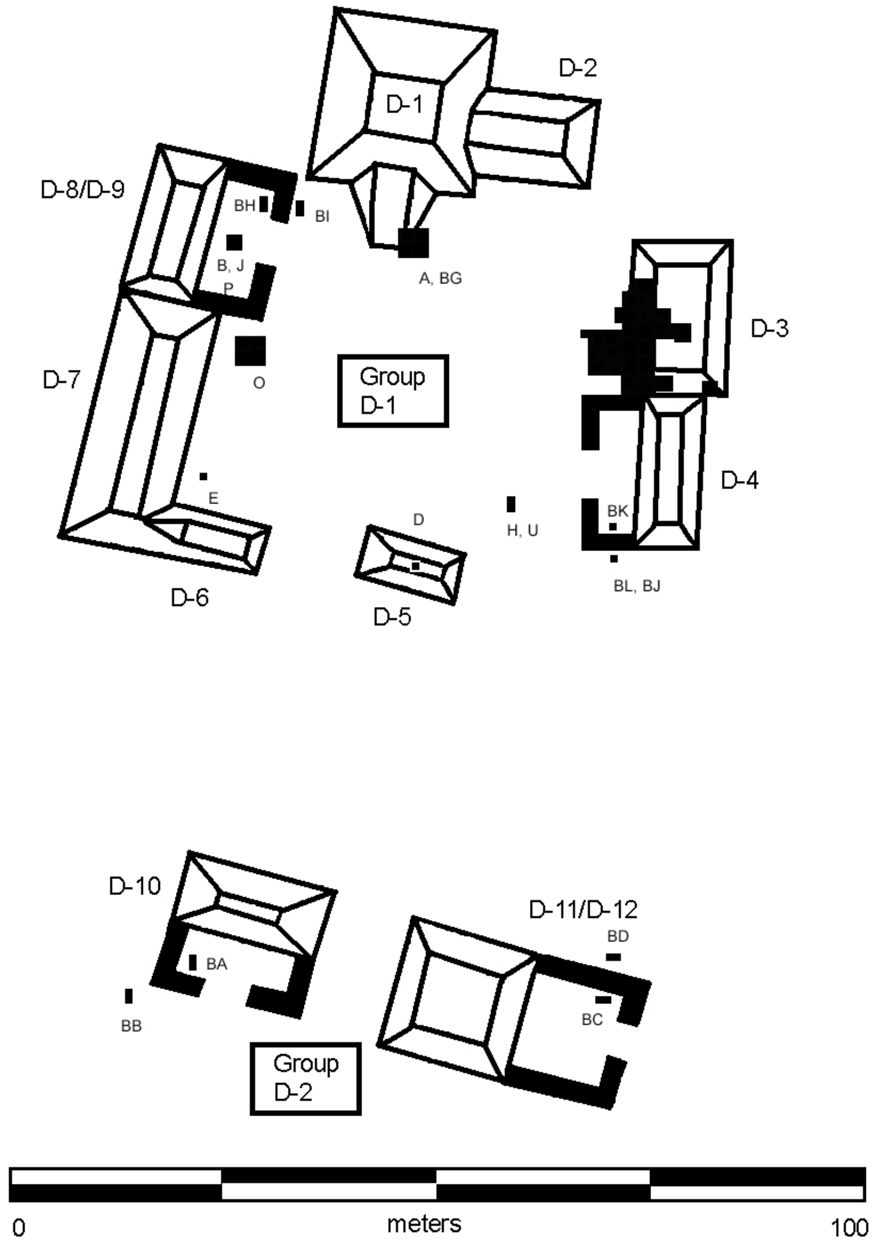

Figure 4.7. Dos Hombres, Group D with Excavation Units. Table 4.2 lists locations and relative positions of suboperations associated with Structure D-3.

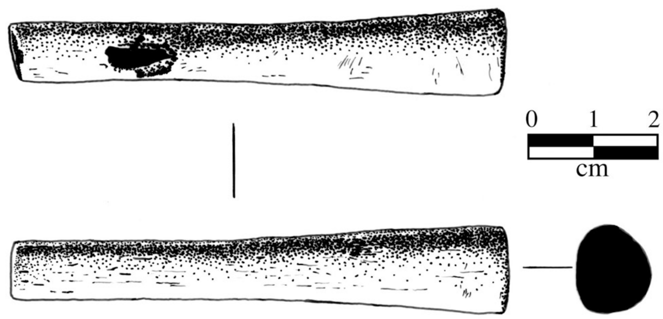

Figure 4.8. Bone Tube Recovered from Structure D-3, Tomb 1 (Operation 12, Suboperation B, Lot 2). Drawing by Dee Turman. Used by permission. © 2004 by The Programme for Belize Archaeological Project.

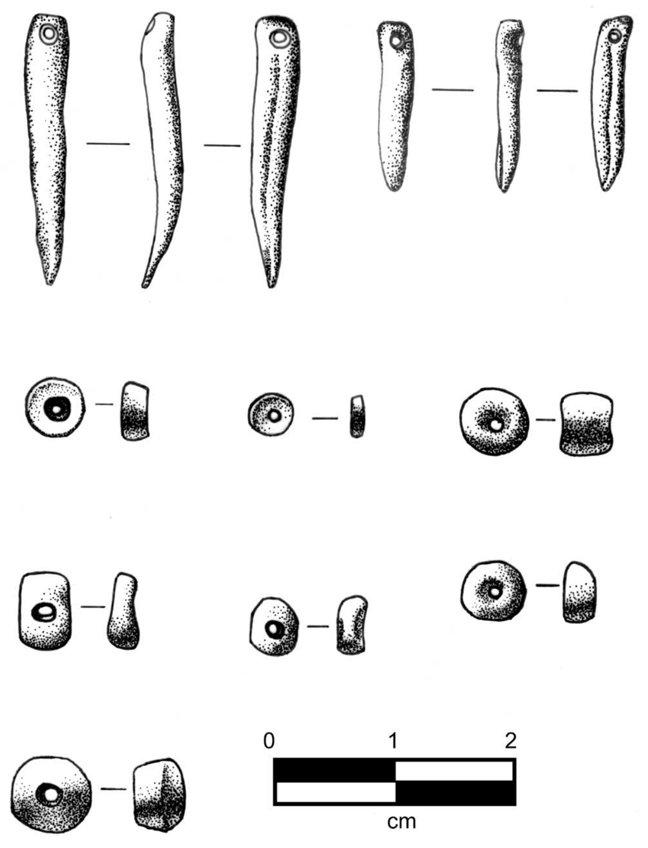

Figure 4.9. Worked bone (top) and greenstone beads (bottom) recovered from Structure D-3, Tomb 2 (Operation 12, Suboperation B, Lot 1). Drawing by Dee Turman. Used by permission. © 2004 by The Programme for Belize Archaeological Project.

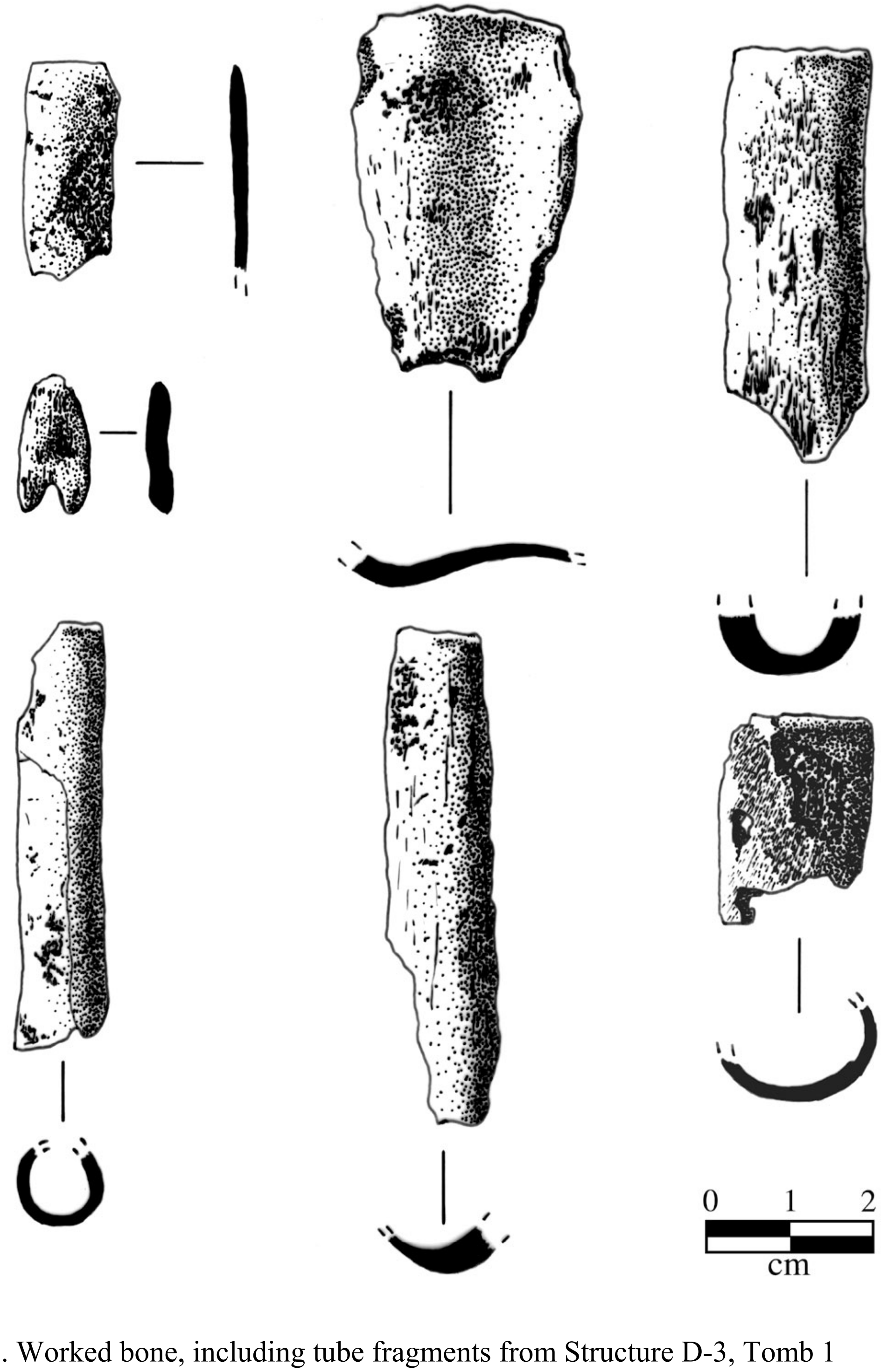

Figure 4.10. Worked bone, including tube fragments from Structure D-3, Tomb 1 (Operation 12, Suboperation B, Lot 2). Drawing by Dee Turman. Used by permission. © 2004 by The Programme for Belize Archaeological Project.

A test pit (Suboperation I) in the plaza in front of this structure revealed early occupation of Plaza D-1 dated to the TR-Chicanel phase, but the earliest ceramics from this excavation have not yet been analyzed. Excavation on top of the structure (Suboperation S) almost immediately encountered human remains in a matrix resembling sub-floor ballast. Since sub-floor like ballast was encountered atop the structure, I am inclined to add an additional construction phase above Lohse's Floor 1, shown in Figure 4.5. That is, the ballast encountered in Suboperation S likely originally underlay the terminal phase of architecture. The human remains encountered were very fragmentary, but the individual was aged at about 20-30 years. Few teeth were recovered, but two of the left front teeth exhibited small circular holes that would have served as sockets for greenstone or pyrite inlays (as in Romero 1970; Smith 1972:222-232; Stewart 1941). Further, the teeth exhibited no evidence of Linear Enamel Hypoplasia, possibly indicating relatively good childhood nutrition, often lacking in Maya populations (Appendix D). This individual was a primary, flexed burial atop Floor 1 with no preserved grave furniture or surrounding construction such as a crypt.

Although the map of Group D does not make this apparent, Structure D-3 appears to have served as an eastern shrine, making the group a possible example of the Plaza Plan 2 layout.

Figure 4.11. Dos Hombres, Group D, Structure D-3, south side (photo).

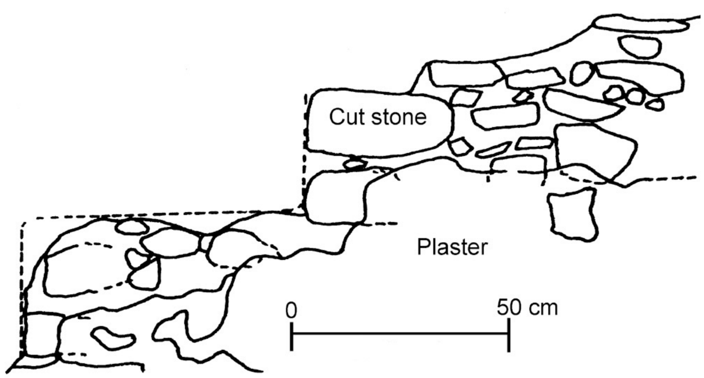

Figure 4.12. Dos Hombres, Group D, Structure D-3, south side, elevation.

Figure 4.13. Dos Hombres, Group D, Structure D-3, west side (photo).

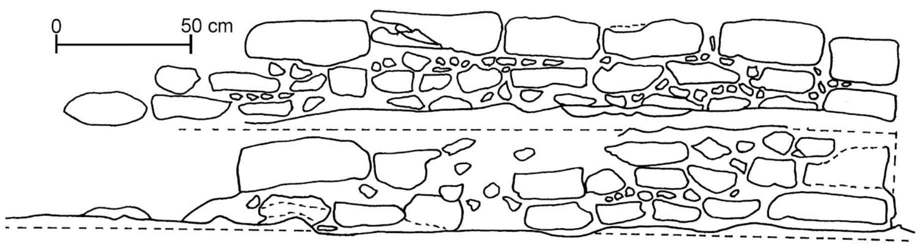

Figure 4.14. Dos Hombres, Group D, Structure D-3, west side, elevation.

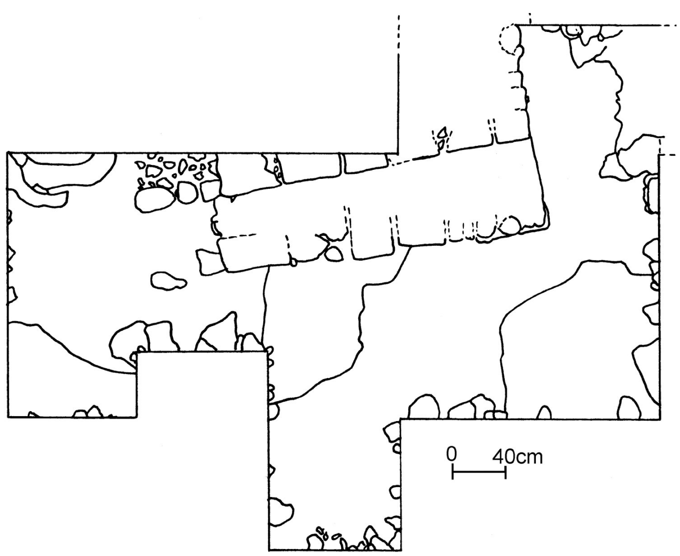

Figure 4.15. Structure D-3, plan.

Structure D-5

Structure D-5 is a low (ca. 50 cm tall) mound at the south end of Plaza D-1. The mound had several bifaces fragments on it's surface, with very loose ballast eroding around the mound. No cut stones were visible. A 1m x 1m test unit (Suboperation D) was placed near the center of this small mound and excavated only a short depth recovering large amounts of ceramics mixed with the ballast.

Structure D-8/D-9

Originally mapped in 1998 as one structure, closer examination and clearing appear to indicate that what was formerly designated as Structure D-9 is possibly an enclosed space appended to the front of Structure D-8. It is therefore suggested that they are possibly distinct rooms rather than distinct structures. It was not possible to investigate the interfaces and construction sequences of these structures. Therefore, it remains possible that "Structure" D-9 dates to a different period that Structure D-8. Structure D-10 in courtyard D-2 is analogous, as are Structures D-11 and D-12. Low lying visible courses of stone in front of structure D-10 were originally mapped as one structure with Structure D-10, whereas a low, similar feature east of Structure D-11 was originally mapped as a distinct structure (D-12). The original map of Group D, shown on the larger map of Dos Hombres (Figure 4.1) details these features, which have been amended in the more recent map (Figure 4.2).

Suboperations B, J, and P explored the construction sequence within the low lying walls of Structure D-9. Additional excavations were placed near the northeast corner, both inside (Suboperation BH) and outside (Suboperation BI) the wall. Unlike the similar wall in front of Structure D-10, no more than one course remained in place, making it difficult to determine the original location of the wall. Excavation could not associate these wall features with plaza floors.

One of the most significant contexts at Group D was an apparent midden, located within the enclosed space. Figures 4.16 - 4.17 and 4.19 - 4.21 illustrate some of the artifacts recovered. Important finds include Pachuca obsidian blade fragments (Appendix B) and shell tinklers as well as human teeth and a relatively large amount of faunal remains. This midden, likely secondary (see Appendix E), contained the larges assemblage of faunal remains recovered at the site and some human teeth, reported in Appendix D.

The midden context dates to Tepeu 2/3 with a Chicanel trace. The midden overlay a matrix of core fill, which in turn overlay a very solid and thick plaster floor which, based on ceramic sherds recovered, is Chicanel in date. Figure 4.18 details the construction sequence and midden material encountered.

Structure D-13

Structure D-13 is a small platform-like structure near the center of Plaza D-1; it escaped notice until the site was cleared and investigated in the spring of 2002. A small trench (Suboperations AA-AF) bisected this very-low mound in the hopes that the edges of the platform could be defined. The nature of this construction, if it was a platform at all, remains elusive as no cut stones were encountered and no evidence of plaster or other features was recovered. Nevertheless, this structure would have been the first one encountered by anyone entering Plaza D-1 in Late Classic times – it stood between the likely entrance to Plaza D-1 and Structure D-1. A profile of this small structure and some underlying plaster floors is given in Figure 4.21.

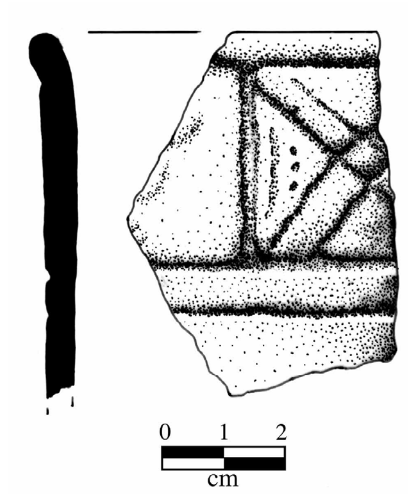

Figure 4.16. Cross-band motif on Cubeta Incised sherd from Structure D-9 (Operation33, Suboperation J, Lot 3). Drawing by Dee Turman. Used by permission. © 2004 by The Programme for Belize Archaeological Project.

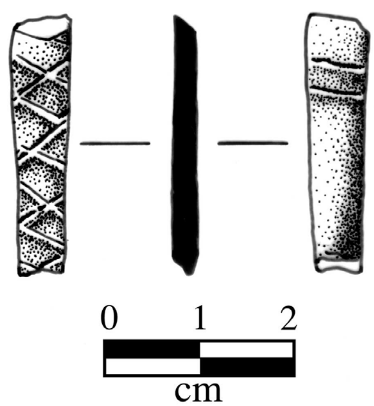

Figure 4.17. Worked bone from Structure D-9 (Operation 33, Suboperation J, Lot 3). Drawing by Dee Turman. Used by permission. © 2004 by The Programme for Belize Archaeological Project.

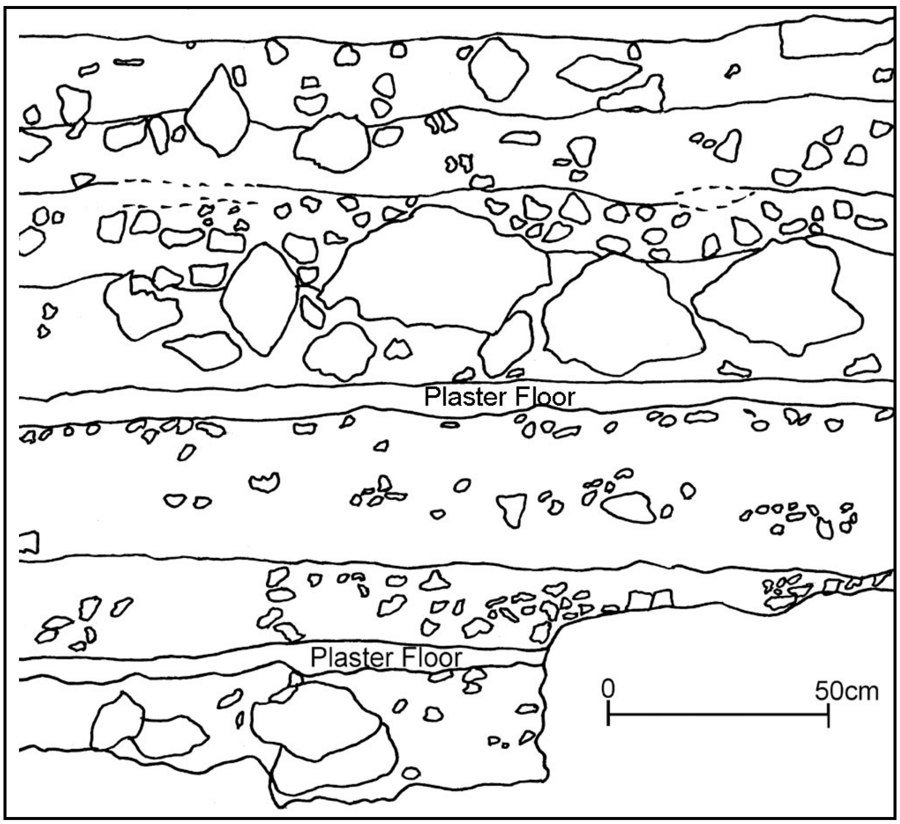

Figure 4.18. Profile, Suboperations B, J, and P.

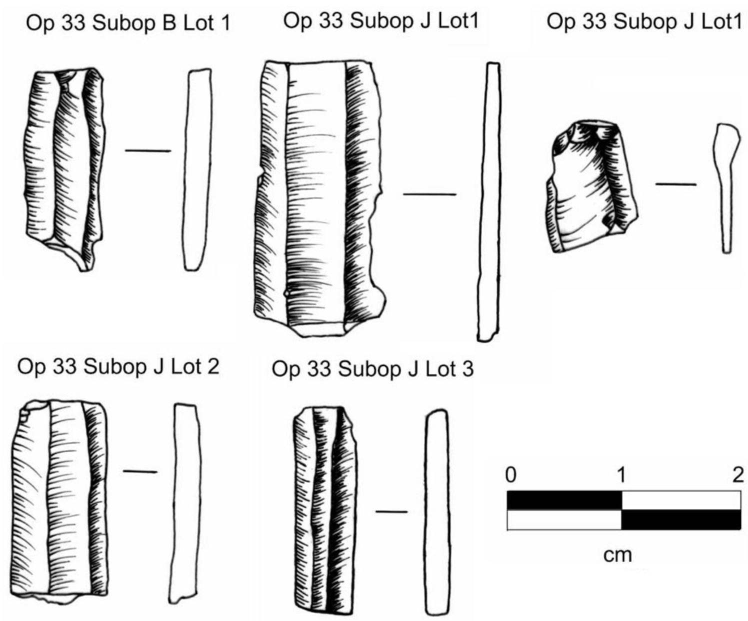

Figure 4.19. Obsidian from Structure D-9, Operation 33. Drawing by Dee Turman. Used by permission. © 2004 by The Programme for Belize Archaeological Project.

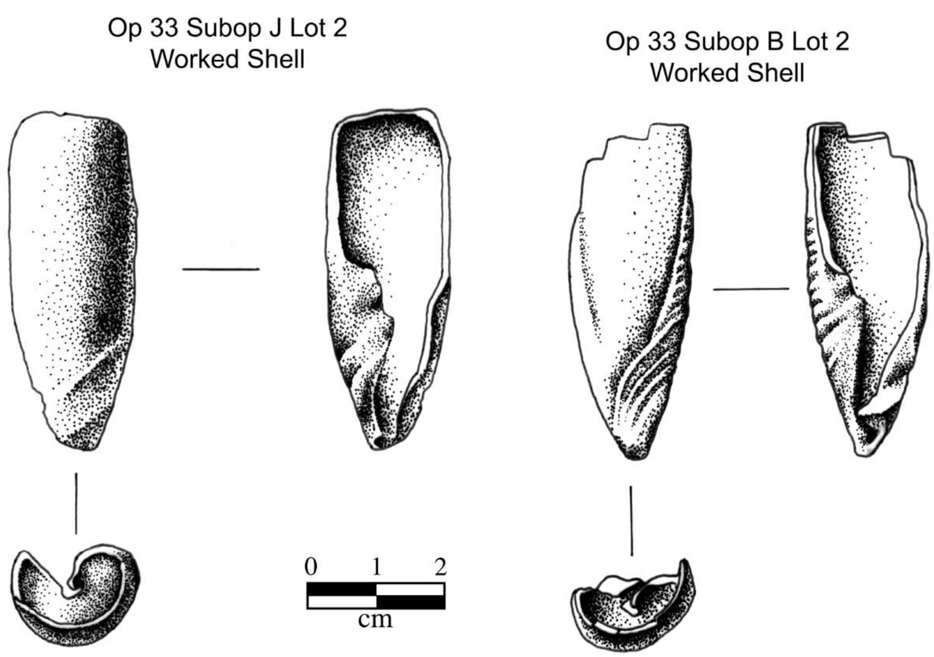

Figure 4.20. Worked shell (*Oliva sayana*?) from Structure D-9. Drawing by Dee Turman. Used by permission. © 2004 by The Programme for Belize Archaeological Project.

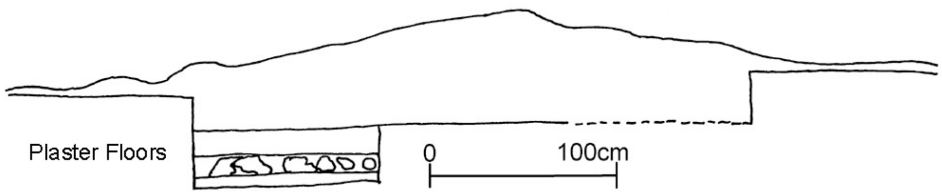

Figure 4.21. Profile of Structure D-13.

Courtyard D-2

Courtyard D-2, consisting of Structures D-10, D-11, and D-12 was investigated briefly in the summer of 2003 with the intention of understanding the low walls that extend from these structures.

Structure D-10

The walls forming an enclosed space in front of Structure D-10 are particularly well preserved, with several coursed still standing, corners easily visible, and a door at the center of the south side of the structure (Figure 4.2). These are similar to, yet better preserved than the apparent walls of Structure D-9, referred to by Houk (1996) as possible late constructions. The wall construction was evidently late, since Tepeu 2/3 sherds were recovered in the contexts closest to these walls (Suboperations BA and BB). The enclosed space formed by these walls (south of Structure D-10) had its earliest occupation during Chicanel.

Structure D-11/D-12

Similar to Structure D-10, Structure D-11 has a low platform with a low wall extending from it towards the east (Figure 4.2). Since Structure D-12 now appears to be an extension of D-11, it is not clear whether it should retain its distinct structure designation. Two Suboperations (BC and BD) were placed to gain a better understanding of the walls. Similar to Structure D-10, the construction around the walls previously designated Structure D-12 date to Tepeu 2/3, with an earlier phase dating to Tzakol and Chicanel.

Summary of Dos Hombres, Group D Analyses

Summaries of findings related to obsidian, formal stone tools, human remains, faunal remains and architecture are presented in this section. Ceramics, detailed in Appendix A, are discussed more fully in terms of network analysis in Chapter 5.

Obsidian

Obsidian, almost exclusively in the form of blade fragments, was recovered on almost every suboperation at Group D (Appendix B). A selection is illustrated in Figure 4.19 Since most contexts are construction fill, obsidian can only be loosely associated with the structures that were tested. Nevertheless, excavations on or around structures D-1, D-3, D-4, D-5, D6/D7, D-8/D9, D-10, D-12, D-13 as well as Plaza D-1, resulted in the recovery of obsidian artifacts. While sources of obsidian have not been chemically identified, green obsidian from the central Mexican source at Pachuca can be readily identified with the naked eye. Pachuca was found in contexts associated with Structure D8/D9 as well as structure D-10 (Appendix B). The only other context containing

Pachuca obsidian at Dos Hombres was the nearby B-4 Group (Trachman 2002), where it was recovered in a large deposit of obsidian associated with a burial. At Group D, Pachuca obsidian was recovered in a midden context (Suboperations B and J). No Pachuca obsidian was recovered at Be Tan Chinam (though thorough analysis of obsidian recovered at Be Tan Chinam is pending, Pachuca obsidian is easily detectable in a preliminary analysis).

The presence of green central Mexican obsidian from Pachuca at Group D implies that the inhabitants at the Group were active participants in Early Classic Mesoamerican networks of exchange in commodities and ideas. Although Pachuca obsidian is relatively rare in the RBCMA thus far, ceramic finds, such as a Teotihuacan style vessel found at the Barba Group (Hageman 2004), when considered along with Pachuca obsidian, indicate that the area was part of the larger Mesoamerican Early Classic network of interaction. It is likely that Pachuca obsidian will be found at additional sites in the RBCMA in the course of future investigations.

Formal Stone Tools

Appendix C details the results of analysis of the 102 chipped stone formal tools and tool fragments (obsidian is reported in Appendix B) recovered at Dos Hombres, Group D. The overall sample size is relatively small, so only general, cautions inferences can be drawn. Analysis shows that most of the tools were made from chert (a local material) with a few made from chalcedony (likely an imported material). Almost all lithic tools were recovered in collapse debris or construction fill, with a few recovered from a likely midden associated with Structures D8/D9. Most tools and tool fragments are from Late Classic and Terminal Classic contexts (Appendix C)

The assemblage of formal stone tools from Group D is non-specialized, likely produced locally (hammerstones and cores are present in the lithic collection) for local use (Appendix C). Compared with Be Tan Chinam, Group D's lithic assemblage contains a diverse array of biface types. Very few bifaces were recovered at Be Tan Chinam, whose inhabitants appear "to have relied more extensively on expedient tools" (Appendix C).

Human Remains

Very few human skeletal remains were recovered during the course of Group D excavations (Appendix D).Of those recovered, one maxillary left canine tooth of a Middle Adult, and one proximal hand phalanx were recovered in Suboperation J, Lot 3 (Appendix D). These isolated remains are from a likely midden context, not formal interments. The one interment found in the course of this dissertation research was found beneath the terminal floor of Structure D-3 (the same structure that contains the looted tombs documented by Lohse [1999]).

The burial was associated with Chicanel and Tzakol ceramic sherds (Appendix A), possibly dating it to the Late Preclassic/Early Classic. Given the location of the burial at the top of the structure (below the terminal floor, essentially in sub-floor ballast) it is more likely that the burial dates from the Early Classic period. It is possible, however, that the burial was intrusive. Since the floor that was likely above the burial is now gone. The lack of any crypt or other burial-related architecture along with the generally poor state of the surrounding matrix (very close to the humus layer) it could not be determined whether the burial was intrusive. No ceramic vessels or other grave furniture was found with the individual, so the suggestion that the burial could be of later date cannot be ruled out.

The human skeletal remains were recovered and subjected to a detailed analysis (excavated, analyzed, and reported by Julie Saul and Frank Saul in Appendix D). Despite the fragmentary state of the remains some very useful information has been provided thanks to the keen eyes and exceptional abilities of the analysts. The sex of the individual could not be determined, but age was estimated at 20-30 years based on very slight dental attrition (Appendix D). The burial position was primary, atop a floor that has not been excavated (i.e., not dated). The position was flexed with arms bent and both hands near the head. Although the remains were fragmentary, all portions of the body were represented (Appendix D provides further details). Most interesting for our purposes here are the teeth that were recovered.

The teeth recovered indicate that the individual had decorated dentition (the details of which are from Appendix D). The left maxillary lateral incisor crown had a 2 mm circular hole, 1 mm in depth with a flat floor. This hole likely contained a stone insert which was missing. Additionally, the left maxillary canine crown had a circular hole 3 mm in diameter, but again, the insert was missing. The right central maxillary incisor was recovered but did not exhibit decoration. Although other anterior maxillary teeth were not recovered, it is likely that the dental decoration was symmetrical.

The ancient Maya practiced a wide array of dental decoration (see, for example, Romero 1970 for an extensive inventory of varying kinds of dental decoration). Dental decoration is something that may lend itself to a science of networks analysis approach. It is something that can be directly tied to an individual person and documented in terms of the type of decoration present. Specific decoration types, time periods, locations, could be analyzed from a network perspective to gain insights into the distribution and links (through similar/the same types of dental decoration) between individuals even at different archaeological sites. Such network research would require a large data set, and only one individual was recovered in the course of this dissertation research. A network analysis of dental decoration, therefore, is not possible for the dental decoration date given in this dissertation.

Faunal Remains

The faunal remains recovered at Group D were analyzed by Leslie Shaw (Appendix E). Bone and shell were recovered in many of the suboperations at Group D: bone was found in 8 suboperations; and shell was found in 17 suboperations. Faunal bone was recovered associated with Structures D-3, D-6/D-7, and the Structure D-8/D-9 midden. Recovered shell is associated with Structures D-1, D-3, D-8/D-9, D-13, and Plaza D-1. Only the 2002 season faunal remains have been analyzed to date, the faunal remains recovered in 2003 for later analysis.

Deer (*Odocoileus virginianus*) was most prominent, but turtles, large birds such as ocellated turkey (*Meleagris ocellata*), and Canid remains were also found (Appendix E). Shaw (Appendix E) felt that there was some evidence of bone working as bone fragments from Suboperations B and J (a midden) had cut and/or smoothed edges. Since there was not a high frequency of modified bone, it is unlikely that Group D's inhabitants specialized in making bone objects. Making bone objects for household use, however, is not ruled out (Appendix D). Some of the work bone recovered at Group D and in the course of Lohse's (1999) research is documented in Figures 4.8, 4.9, 4.10, and 4.17. One of the most interesting finds is a parrotfish (Family Scaridae) dental bone found in Suboperation B.

Parrotfish bones are found at many inland sites throughout the Middle Preclassic to Terminal Classic, so the appearance of a marine species at Group D is not surprising (Appendix D). Shaw suggests that the presence of parrotfish does not necessarily indicate that it was consumed as food, but there may have been ritual meaning to the use of parrotfish bones. Indeed, parrotfish bones have an unusual appearance (see Figure E1), and may have been used for decoration or other purposes. In my opinion, this bone *may* have cut marks that could be the result of extracting this particular bone for use other than consumption as a foodstuff. Further, the presence of marine reef species at inland sites is interesting from a network perspective. Although little can be done with one find from one site (no comparable remains were recovered at Be Tan Chinam) it is possible that a larger scale network analysis of marine species found at a variety of sites could eventually be undertaken. Even without such a study, however, it is clear that inhabitants of Group D had access to the network (whatever its form) that transferred marine species inland unless they visited the coastal areas and did fishing themselves.

Another type of faunal remains that can be conceptualized from a network perspective are shell remains. Mostly freshwater species were recovered, all are common at Maya sites and were used as foodstuffs and for personal adornment (Appendix E). Some marine species were also found, including *Oliva sayana* (Figure 4.20) which were cut and used as "tinklers (Appendix E). The less common *Cypraea* sp. and *Strombus* sp. (conch) were also found. The presence of these exotic faunal remains from the Caribbean Sea demonstrate (as does the parrotfish bone) that the inhabitants of Dos Hombres Group D were active participant in network that reached Belize's coast.

Architecture

The buildings excavated at the site show evidence of earliest construction dating to the Late Preclassic, with significant activity during the Late Preclassic and Late Classic periods. Although there were few modifications of Group D during the Early

Classic period, paralleling the development of the site of Dos Hombres as a whole. Plaza excavations and the excavations within the enclosed space of Structure D-9 indicate that there were several refurbishings and replasterings of the plaza throughout the site's occupation. Little can be said of overall construction sequences because most if the excavations were in plazas.

INVESTIGATIONS AT BE TAN CHINAM (RB-31)

As with the investigations at Dos Hombre, Group D, the research at Be Tan Chinam had several segments. After an initial visit to the site, about four days were spent with two people recovering sherds from looter's back dirt off the back (east side) of Structure A-1. A preliminary reconnaissance of the area was made at that time, and several small outlying groups of architecture were discovered, along with the significant Group B. June and July of 2000, bracketed by a day or two at the end of May and beginning of August, saw the first excavations (Operations 1-8) at the site and the completion of a tape and compass map of the two largest groups of architecture. The surrounding area was explored at that time for additional groups. No further work was conducted at the site until the spring of 2003, with excavations lasting from early May until late June (Operation 10).

Previous Research

As part of his planned transect between Dos Hombres and La Milpa, Hageman (2004) discovered Group A while walking an abandoned logging road toward the location of his transect. Hageman had been working at the Barba Group, a small group of structures several hundred meters from Be Tan Chinam. In 1999 the site was brought to my and David McDow's attention by Hageman. McDow subsequently mapped Group A as part of his M.A. report (McDow 2000). Be Tan Chinam is divided by the Gallon Jug Road, the main, all-weather road that traverses the RBCMA. My reconnaissance on the west side of this road in 1999 located a hilltop group of architecture, which, it turns out, had been previously visited by Guderjan, et al. (1991:70, 73, Figure 44), who named it the "Mile 5 Ruin". There is some discrepancy between the UTM co-ordinates given by Guderjan for the site and our more recent findings, but we can remain almost certain that Be Tan Chinam, Group B, and Guderjan's Mile 5 Ruin are one and the same place.

Site Description and Location

Be Tan Chinam is located within the periphery of Dos Hombres, about 2km northwest of the Dos Hombres site center. Figures 2.1 and 3.1 label the site "Mile 5". In 1999, McDow (2000:Table 1) averaged 30 GPS points for Be Tan Chinam, which yielded a UTM position of east: 1963211.680 and north: Zone 16, 285768.736 (McDow's readings for Dos Hombres were east: 1961474.130; north: 16 287585.333). Figure 4.22 provides a map of some of the architectural groups.

The site is located within, but at the edge of a zone of *cohune bajo*, deemed to be the best type of land for agriculture in the RBCMA (King, et al. 1992, see Chapter 2). The *cohune bajo* zone continues for an unknown distance to the east and south of the site, but west of Group B, one encounters what appears to be *tintal bajo*, with its much denser and impenetrable modern vegetation. The site is located at the base of a large ridge in what Brokaw and Mallory (1993) termed the Rio Bravo Terrace Upland physiographic province of the RBCMA (see Figure 2.2). At least nine groups of architecture of varying sizes were located within 500 m of Group A. Although Group A is at the edge of the *bajo*, the group is built atop *bajo* soil which is seasonally inundated and very wet; this group, therefore, sits entirely atop a large platform which is higher at its south end than its north end, thereby forming a level surface as the natural *bajo* surface slopes down slightly towards the south. The group consists of a series of about 11 structures facing in to an open space about 30 m from north to south and 20 m from east to west. At the center of the plaza was an ostensible mound which we found to be the result of disturbance, likely a large tree fall. Nearby, on the surface, lay several large limestone boulders. Group A is a restricted access plaza, with a low platform edge north of structure A-1 forming a possible step into the plaza, unless this space was closed with a perishable wall or fence. What appear to be stairs are present on the west and south sides of the group, but these were not excavated and cannot be definitively identified. Additionally, the west side of the group is very close to the modern road and shows some evidence of bulldozer berms west of Structure A-6. It is likely that the road construction destroyed some mounds as the isolated structure between Groups A and B faces east and possible had other structures surrounding it that fell victim to road construction. Indeed, the hill on which Group B sits has a lengthy swath cut from it, reaching the top of the hill, from which material was no doubt removed for road fill.

Group B, similar to Dos Hombres Group D is located atop a modified ridge west of Group A. The hillside west and southwest of Group B appeared to be heavily modified and contained a series of deep depressions (possible quarries or reservoirs) that were left for future investigations. The south side of the hill exhibits the large bulldozer cut, mentioned above. Although the structures at the group are not looted, the bulldozer cut came very close to Structure B-1, causing the partial collapse of the southwest corner of the structure. Cut stones, including cornerstones, are visible in the collapsed debris and standing architecture exposed by the bulldozer cut. Access to

Group B is highly restricted. We could not discern where ancient access to the group might have been as most of the structures are close to one another.

Group C is a small group of architecture south of Group A where some excavations took place. This group vaguely resembles a ball court, but is believed to be too small for such a purpose and excavations of Structure C-1 did not reveal an architectural form consistent with a ball court. Additional small groups of architecture were located in a reconnaissance of the area, but none of these were mapped. There is a group very close to the road, southwest of Group C, another group about 100 m east of Group C, and a small group with a *chultun* atop a small hill east of Group A. South and southwest of Group B are two additional groups of small, low-lying architecture. The Barba Group (Hageman 2004; Hageman and Lohse 2003) is located several hundred meters to the east.

Excavations at Be Tan Chinam

Groups A, B, C, D, and F were investigated, with most excavation taking place at Group B, followed by Group A. Excavations did not reach the earliest occupation at the site for two reasons: to avoid damage to later architecture and problems caused by excavating down to the water table. Excavations in the Group A plaza attempted a test pit to bedrock, but the excavation could not be completed because the bottom of the unit kept filling with water. Nevertheless, significant progress was made in excavations and much was learned about the site. Table 4.3 lists suboperations and associated contexts while Table 4.4 lists suboperation definitions.

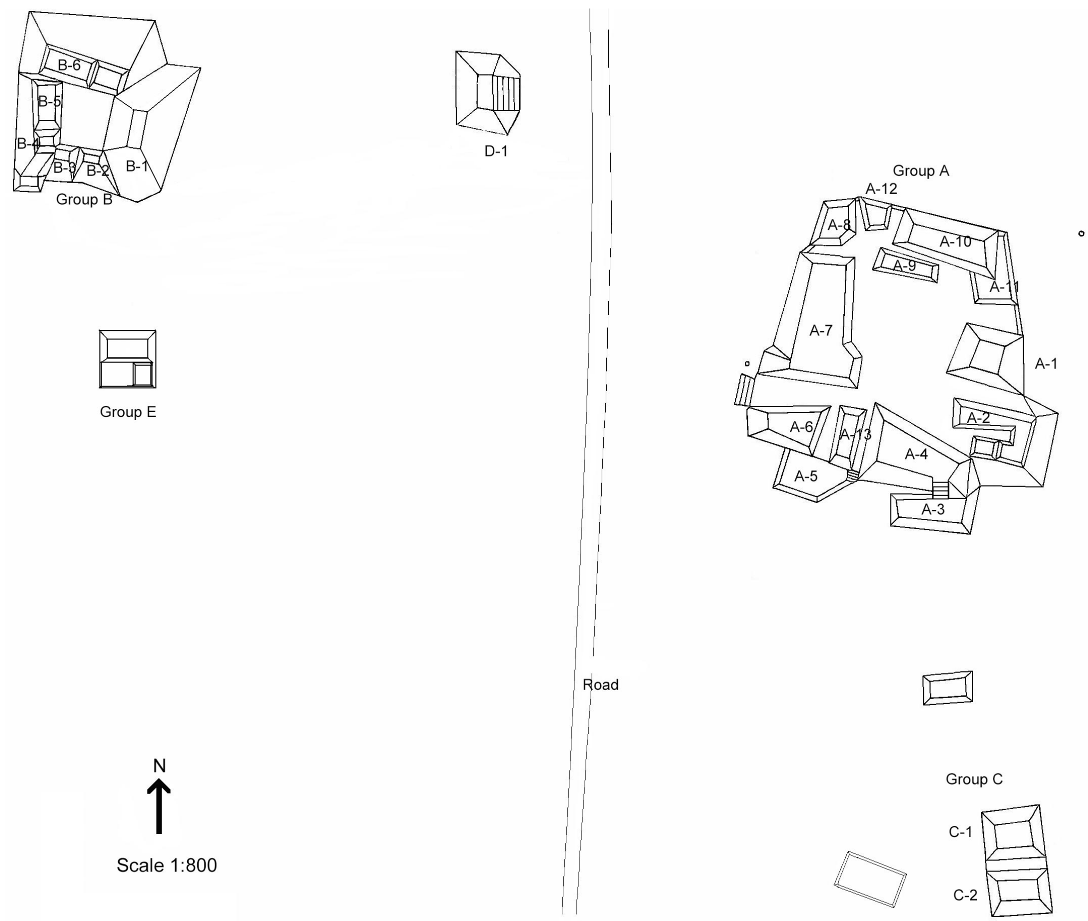

Figure 4.22. Be Tan Chinam, Groups A and B.

Table 4.3. Be Tan Chinam, excavated structures and associated (on or near) operations and suboperations.

Group	Location/ Structure	Excavation	
		Operation	Suboperation
A	Plaza	5	A, B
	Plaza	10	A, N, O
	A-1	10	V, U
	A-1	9	A
	A-2	10	B, C, O
	South of A-4	6	A
B	B-1	4	A, B
	B-1	10	E, F, G, H, J, K, L,M, P, T
	Plaza	3	A
	Plaza	10	I
	West of Group B	10	D
C	C-1	1	A
D	East of D-1	7	A
	South of D-1	2	A
F	Plazuela	8	A

Table 4.4. Be Tan Chinam, Suboperation Locations and Definitions. All are RB 31.

Op.	Subop.	Size (m)	No. of Lots	Location/Definition
1	A	1 x 5	17	Trench along Structure C-1 primary axis
2	A	1 x 2	1	side of raised logging road
3	A	1 x 1	5	Plaza, at base of Structure B-1, west sides
4	A	1 x 2	2	along possible north door jamb of structure
4	B	1 x 2	2	along stair of structure, collapse debris
5	A	1 x 1	5	Group A, plaza, west of Structure A-1
5	B	1 x 1	1	disturbed area, from tree fall
6	A	1 x 1	7	surface collection, just south of Group A
7	A	1 x 1	1	Just east of structure D-1
8	A	1 x 1	1	Group F plaza
9	Not Used			
10	A	1 x 1	5	Near southeast corner Group A Plaza
10	B	1 x 1	4	Open space, within structure A-2
10	C	1 x 1	4	Adjacent Suboperation B
10	D	1 x 1	2	West of Group B
10	E	3.5 x 2	10	Structure B-1
10	F	3.5 x 1	5	Structure B-1
10	G	3 x 2	4	Structure B-1
10	H	3.5 x 1	2	Structure B-1
10	I	1 x 1	4	Group B, plaza
10	J	3 x 2	2	Structure B-1
10	K	3 x 3	1	Structure B-1
10	L	2.5 x 2	3	Structure B-1
10	M	1 x 2	6	Structure B-1
10	N	1 x 1	12	Group A plaza, near altar fragments
10	O	1 x 1	10	Structure A-2
10	P	1 x 2	3	Structure B-1
10	Q	1 x 1	11	Group A plaza, near altar fragments
10	R	1 x 2	7	Structure A-2
10	S	1 x 2.5	4	Structure A-2
10	T	1 x 2	2	Structure B-1
10	U	1 x 3	2	Structure A-1
10	V	1 x 3	1	Structure A-1
10	W	0.5 x 0.7	1	Group A plaza
10	X-Z	Not used		

Group A

The most notable features of Group A include a broken altar found near the center of the plaza and the fact that the group follows a Plaza Plan 2 layout. Finding stone monuments at small groups in the RBCMA has become rather common, with such finds being made at Dos Barbaras (Figure 3.2, see also Lewis 2005) and Chawak But'o'ob (Figure 3.5 and S. L. Walling, personal communication 2004). A visit brief visit to the Barba Group during the 2000 field season revealed that this site may contain a small previously unreported stela very similar to the small stela butt found at Dos Barbaras in 1999. Excavations unit locations are shown in Figure 4.23.

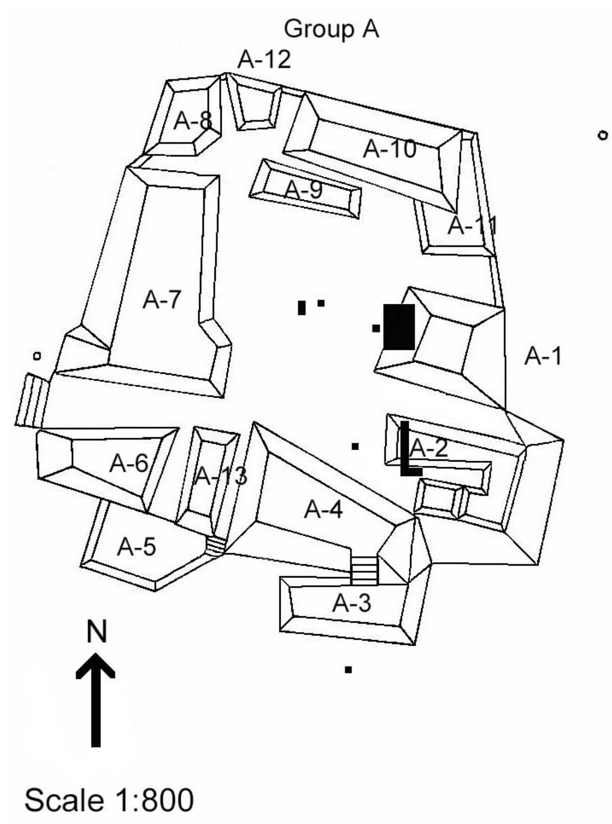

Figure 4.23. Be Tan Chinam, Group A, with excavation units. Units on architecture removed only humus and collapse debris.

Structure A-1

This structure, likely an eastern shrine, exhibited the only looter's trench known at the site, and was the first investigated in the summer of 1999 as a recovery operation. The looter's trench gutted most of the east side and center of the structure. Originally designated simply as "looter's trench" material, the recovered ceramics and lithics are herein given the designation Operation 9, Suboperation A, which contained only one lot of mixed provenience material from looter's back dirt. The ceramics recovered in this operation were predominantly Late Classic, but Early Classic and Late Preclassic types were also represented. An unusual spittoon-like partially reconstructible vessel, probably Early Classic in date, was recovered. Ceramics recovered from the front of this structure, near the modern surface dated to Tepeu 2/3.

The structure is roughly square and almost three meters in height, the tallest structure in Group A. Given this structure's prominence and location on the eastern side of the plaza, it is likely an eastern shrine, helping to define Group A as Plaza Plan 2 group in Becker's (2004) grammar of architecture. Plaza Plan 2 architecture is rather common at Maya sites, but is important here because of the location of Group B, another Plaza Plan 2 group very close to Group A. This counters suggestions made by Hageman and Lohse (2003) that what they term "first-tier" groups occur with no other similar groups in the vicinity. Plaza Plan 2 architecture will be given further consideration in Chapter 5.

Plaza A-1

As noted above, one of the most notable features of Group A is the presence of a broken altar. Originally noted in 1999, the area around three large chunks of limestone was not excavated until 2003. The area near the altar is heavily disturbed, likely the result of a tree-fall, which left the typical depression and embankment pattern. The embankment left by the tree-fall was briefly excavated to verify that it was a disturbed area (Operation 5-B). In 2003, part of the depression area was excavated (Operation 10, Suboperations N and O), but the original context of the altar could not be determined. Acting on the intuition that these large limestone chinks fit together, the pieces were rolled together and indeed formed a circular altar, designated Altar 1 (Figure 4.24). The altar showed no discernable carving or decoration. Since the altar's context seems to have been disturbed, it is difficult to date, although it sat atop a Tepeu 2/3 plaza floor. It is *possible* the altar was intentionally broken.

A

B)

Figure 4.24. Photographs documenting Be Tan Chinam, Altar 1. A) before excavation; B) after excavation and refitting of pieces.

Group B

Group B, atop a limestone ridge is much more restricted and smaller than Group A, but is clearly another example of the Plaza Plan 2 layout. Excavations (Figure 4.25) concentrated on elucidating chronology through plaza test pits and the excavation of the terminal construction of Structure B-1.

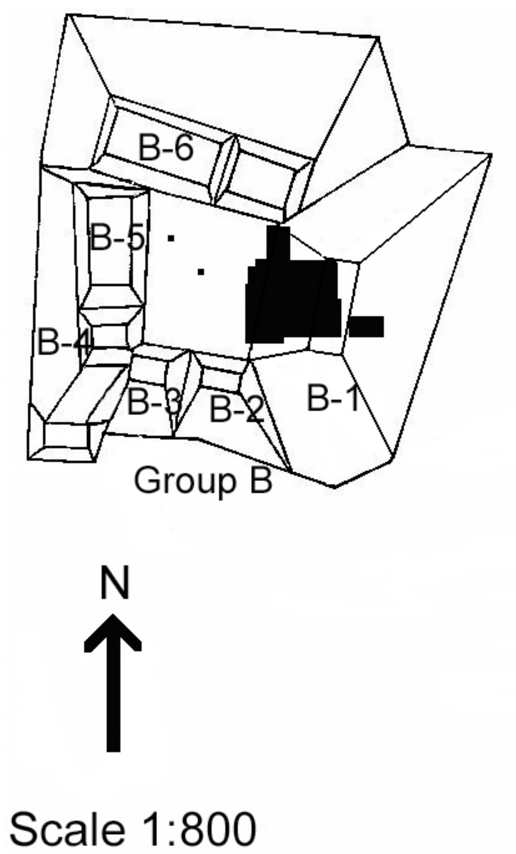

Figure 4.25. Be Tan Chinam, Group B, with excavation units. Most units on architecture removed only humus and collapse debris.

Structure B-1

Structure B-1 (Figure 4.26) stands about five meters tall at the east side of Group B. The structure was not looted, but had some damage from a bulldozer cut that removed some of the limestone underlying the structure's southeast corner. The mound had a visible door-jamb, part way up its western side and a clear break in the shape of the mound indicated that the ultimate phase of construction consisted of a basal platform topped by a stone structure. No vault stones were recovered in excavations, indicating that the structure had a perishable roof. Stairs were found in excavations along the western side of the structure. Ceramics recovered in excavations date the ultimate construction phase to Tepeu 2/3, but occasional lots were purely Tepeu 2 material (Appendix A). There was scant evidence of Tzakol sherds in some lots. This is a contrast with the earlier Tzakol and Chicanel ceramics recovered in Group A.

Plaza Excavations

Several excavation units were placed in the open spaces of Group B to investigate chronology. Of these, only Operation 3-A found plaster floors which were in poor condition. The earliest ceramics above bedrock were Tepeu 2. Operation 10-D, just west of Group D, recovered only Tepeu 2/3 sherds.

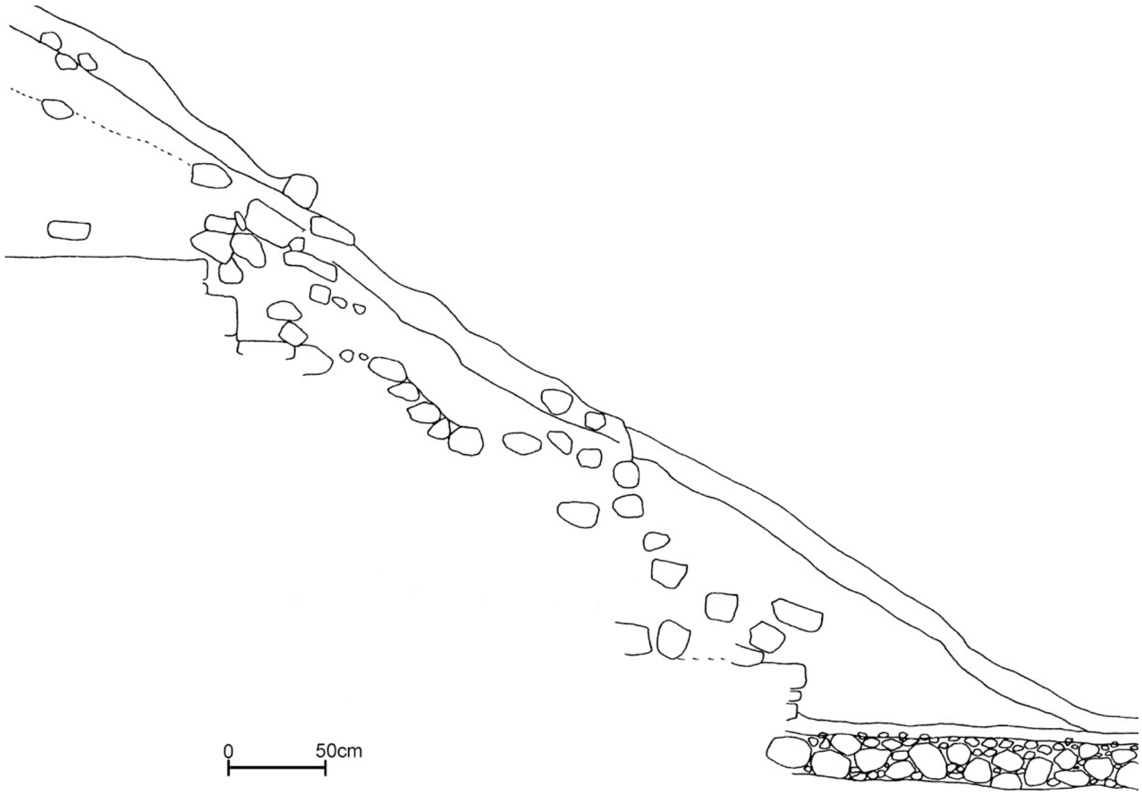

Figure 4.26. Bet Tan Chinam, Structure B-1, excavation profile.

Group C

Structure C-1

Ceramics recovered from Structure C-1 solidly date the structure to Tepeu 2. Operation 1, Suboperation A is illustrated in Figure 4.27. Lots (Operation 1-A-16 and 17) excavated in the open space at the south side of this structure (i.e., between Structures C-1 and C-2) reached bedrock and showed clear divisions with Chicanel and Early Chicanel ceramic types represented. Given the ubiquity of Tepeu 3 ceramics at Be Tan Chinam as a whole, it is likely this structure was abandoned during Tepeu 2.

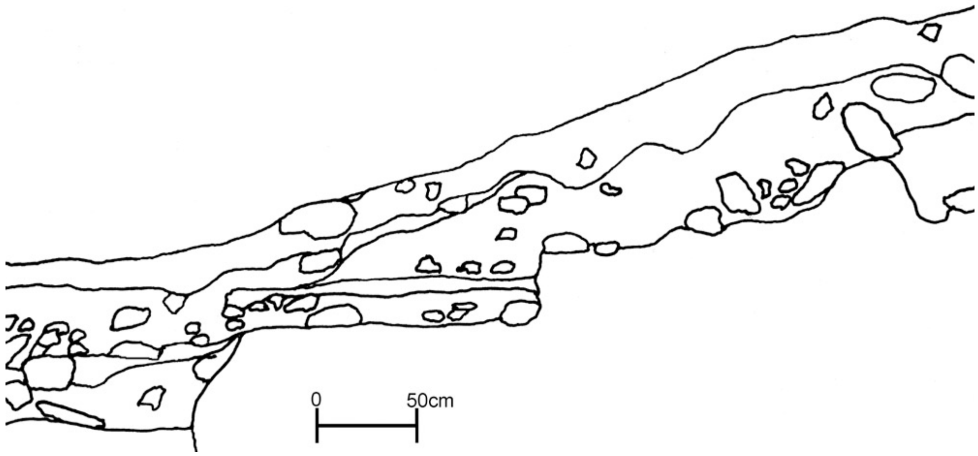

Figure 4.27. Be Tan Chinam, Group C, Structure C-1, excavation profile.

Summary of Be Tan Chinam Analyses

Summaries of findings related to obsidian, formal stone tools, and architecture are presented in these sections. No human remains were recovered and faunal remains have not yet been analyzed. Ceramics, detailed in Appendix A, are discussed more fully in terms of network analysis in Chapter 5. The lesser quantity and variety (compared to Dos Hombres, Group D) of artifact classes recovered at Be Tan Chinam is the result of less intensive and extensive excavation at Be Tan Chinam.

Obsidian

Obsidian, exclusively in the form of blade fragments, was recovered four excavations areas at Be Tan Chinam. Since most contexts are construction fill, obsidian can only be loosely associated with the structures that were tested. Nevertheless, excavations on or around structures B-1 and C-1 as well as the Group A plaza and Group B plaza recovered obsidian. Green obsidian from the central Mexican source at

Pachuca was not found at Be Tan Chinam. Since it has been found at nearby Dos Hombres, it is likely the case that it is present at Be Tan Chinam, it simply has not been recovered in excavation.

Formal and Informal Stone Tools

Appendix C details the results of analysis of the 106 chipped stone formal and informal tools and tool fragments (obsidian is reported in Appendix B) recovered at Be Tan Chinam. Since very few bifaces were recovered at Be Tan Chinam (10 of 106 tools) no useful comparisons can be made between the Be Tan Chinam and Dos Hombres, Group D assemblages. It is notable, however, that the Be Tan Chinam tool assemblage is dominated by utilized flakes. Chalcedony and other exotic materials were not documented in the Be Tan Chinam lithic tool assemblage. Almost all lithic tools were recovered in collapse debris or construction fill, with a few recovered from a likely midden associated with Structures D8/D9. Most tools and tool fragments are from Late Classic and Terminal Classic contexts with some from Early Classic contexts (Appendix C). Overall, as with Group D, the material quality is poor, and likely local.

Architecture

Few buildings were excavated at Be Tan Chinam. Of those that were excavated, the investigations focused on the terminal construction phases. There was significant activity at Be Tan Chinam during the Early Classic and Late Classic periods. Attempts to document a more complete chronology by placing test pits in the Group A plaza did no lead to success as excavators encountered the water table in excavations. Structure A-1 was examined only briefly. Structure B-1 had at least two notable phases (visible in

Figure 4.26). Little is known about the remaining architecture at the site, with the exception of Structure C-1, discussed above. The overall construction sequence at Be Tan Chinam is not yet well understood and would require significant further excavations.

SUMMARY

As a whole, Dos Hombres, Group D, and Be Tan Chinam had lengthy occupation histories. The inhabitants of Dos Hombres, Group D had access to resources such as Pachuca obsidian that were not encountered in excavations at Be Tan Chinam. It is possible that some of these apparent differences are simply the result of sampling error.

Excavations, particularly at Dos Hombres, Group D, recovered materials and human remains that could one day be analyzed (with data from many more sites) from a science of networks perspective. These include obsidian, dental decoration, ceramics (see Chapter 5), faunal remains, and lithic tools of imported material. Despite the differences in the material recovered at the two excavation sites, both have important similarities.

Dos Hombres Group D and Be Tan Chinam exhibit characteristic Plaza Plan 2 layouts, although this feature of Group D is not apparent if one simply looks at a map of the site. That is, Dos Hombres, Group D appears to have a northern rather than an eastern focus. Nevertheless, the eastern structure was rather important in that it contained two elaborate tombs. In contrast, a brief look at the layouts of Be Tan Chinam, Groups A and B shows that they are clear examples of Plaza Plan 2 architectural layouts. Plaza Plan 2 layouts are often invoked in discussions of ancient

Maya sociopolitical organization. These layouts will therefore be considered further as sociopolitical organization is considered in detail in the next chapter.

Chapter 5: Ancient Maya Sociopolitical Organization

Throughout its lengthy history, the study of ancient Maya sociopolitical organization has maintained its importance to Mayanists. This chapter synthesizes some of the more recent (ca. 25 years) models debated rather than providing a complete history of the topic. I will review each side of the centralized versus decentralized debate followed by the discussion of recent heterarchical approaches. This is followed by the application of a network science approach, in which ancient Maya sociopolitical interaction throughout the Classic period is presented on a series of graphs. The implications of insights from the graphs are discussed, followed by a consideration of power law and small world network characteristics and the question of the presence of these types of networks in the ancient Maya world. Following the analysis of data from inscriptions, I present an application of the science of networks to the study of the ceramics recovered in excavations for this dissertation. The application of network data from political inscriptions as well as data acquired from excavations at smaller sites like Dos Hombres and Be Tan Chinam is then considered. Lastly, the issue of how network science can be applied to understandings of sociopolitical interactions for which we do not have written records is discussed.

THE ARCHAEOLOGICAL STUDY OF POLITICAL ORGANIZATION

Political organization of ancient cultures can be studied archaeologically through the analysis of "settlement patterns and buildings whose ground plans reflect the social, political, and religious institutions of the archaic state" (Flannery 1998:15). A further important area of investigation is interaction between sites along with periods of strength and weakness in such interactions; these are areas for which archaeology may provide answers (Culbert 1991). Archaeological reconnaissance and mapping combined with excavation can provide information about population, monumental construction, and participation in trade networks–all areas noted by Culbert (1991) to be important to studies of Maya political organization. This chapter is not intended as an exhaustive review of all ideas put forward about Maya political organization, but is meant to overview some of the more widely published recent models.

The study of ancient Maya sociopolitical organization has recently been characterized by debates that can essentially be divided into two camps: (1) those that view the sociopolitical systems of the ancient Maya as centralized; (2) those that view the sociopolitical systems of the ancient Maya as decentralized. Even though the issues and debates are complex (an overview is provided below), all models are analogies used as heuristic tools that can be classified in this fashion. There were many complicated factors at play throughout ancient Maya civilization, the course of which clearly had cycles of growth and decline. The complexity of the area and length of time involved suggest that centralized and decentralized political organization are not necessarily competing approaches but may apply, one better than the other, for any given time or region in the Maya area. For now, rather than focusing on the applicability of centralized or decentralized models for different time periods, it is useful to consider the models in much more general terms, and to consider whether there are not alternatives to this apparently “either/or” option that may be limiting the development of new theories.

Political Organization in the Maya Area

One may classify approaches to the study of ancient Maya political organization any number of ways depending upon interests. This research was in part inspired by the realization that the essence of each model recently put forward to aid in the understanding of ancient Maya political organization can be generally understood in terms of whether the model takes a centralized or decentralized approach (Lucero 1999; Marcus 2003). This realization raised the issue as to whether other approaches were possible. For example, a model that posits several super-states that ruled over the entire Maya area (e.g. Marcus 1973) would be a highly centralized model whereas a model that specifies many independent states with loose control mechanisms is a decentralized model. This distinction is noted by Murphy (2000), although not exactly in these terms, as well as by Demarest (1996) who defines opposing sides as unitary state vs. segmentary state models.

Centralized Models

The centralized models include those that the Chases (Chase and Chase 1996) have applied to Caracol. One of the key lines of evidence used for inferring the existence of centralized control at Caracol is the network of causeways that lead to and from the site center. Sharer (1994:493), supporting the same argument for Coba, stated that “an extensive network of roadways connects the site core with a series of outlying sites, clearly reflecting its ancient centralized authority”. The same case has also been made for Calakmul (Folan, et al. 1995), a site considered by most to be at the top of any hierarchical political structure. The centralized models tend to support the existence of fewer large regional states (that is, regional, rather than pan-Maya centralization) over the existence of numerous independent "city-states" such as in the model based on Emblem Glyph distribution put forward by Mathews (1991). Interestingly, Emblem Glyphs were used by Marcus (1973) to argue for only four large regional states (i.e., a *centralized* model), whereas Mathews later used Emblem Glyphs to argue for *decentralized* political organization. The model developed by Marcus (1973) and followed later by Martin and Grube (2000), essentially rests on the concept of central places.

Adams and Jones (1981) favored a highly centralized model with only a few regional hierarchical states in which sites were scored on qualitative and quantitative grounds to arrive at an objective understanding of the number of levels in regional hierarchies. Regional states, centered on capitals at Tikal, Calakmul, Copán, Palenque, Yaxchilan, Uxmal, and Coba, controlled second order sites in the hierarchy which in turn controlled tertiary sites, which in turn controlled quaternary sites in their four-tiered hierarchical system.

Other researchers, such as Guderjan (1991d), essentially elaborated on the methodology introduced by Adams and Jones (1981). Through the addition of more, mostly qualitative, criteria it is not surprising that Guderjan came up with four more levels in his hierarchy. Such methods have been used to indicate dependence and independence archaeologically, particularly with respect to the erection of stelae. Houk (1996:122), for example, in speculating on the political independence of Dos Hombres, points out that Adams (1995) suggested that stelae at Dos Hombres may indicate the site's independence from La Milpa by the Late Classic. The recent finds of "plain" stela and altars at small sites such as Chawak But'o'ob, Dos Barbaras, and Be Tan Chinam complicate this issue. Since these monuments are all now "plain", we must put aside the issue of whether any of these monuments had texts and speculation about what those texts might or might not have stated (e.g. statements of independence, allegiance, etc). It is probably, however, that such now “plain” stela were painted, stuccoed, or otherwise decorated with texts or images that have not been preserved. Such “plain” stela are usually found in surface contexts, poor places for the preservation of paint or stucco. Regardless of issues related to textual statements, the mere presence of such monuments indicates that the political landscape cannot be reduced to the presence or absence of stela.

Chase and Chase (1996:803) characterized the application of decentralized models, particularly the Segmentary State model, as a “denigration of ancient Mesoamerican accomplishments” in that such models are overly simplistic and put too much emphasis on kin-based relationships in political organization. Essentially, Chase and Chase (1996, 2000) criticize the decentralized model as not attributing enough complexity to ancient Maya political systems, arguing that such models effectively reduce Maya politics to merely kin-based. It seems, however, that this statement may be more the result of the mischaracterization of the segmentary state by researchers subsequent to Southall (1956, 1988), than by any characteristics of ancient (or modern) Maya society. The idea that segmentary states have been misunderstood as having segmentary lineages as prerequisites was convincingly argued by Murphy (2000). Chase and Chase (1996:804) point out, and this is of some interest here in terms of alternatives to the centralized vs. decentralized debate, that “Southall (1956) developed the concept of the segmentary state as an intermediate type for African societies that had earlier been subdivided into ‘stateless uncentralized’ groups and ‘centralized state’ groups. While not adopting any particular model of centralized political authority, the Chases (1996) clearly argue for the overall hierarchy and centralized authority present at the site of Caracol. Additionally, the notion of “complexity” is not well-defined in this debate, other than simply asserting that one model sees ancient Maya political organization as more complex than the other. “Complexity”, however, is a powerful concept, and since it appears to be a central issue, it should be carefully defined and well understood by Mayanists attempting to formulate models of political organization. This is an issue to which I will return in a subsequent section.

Decentralized Models

Models that are essentially decentralized in nature include the galactic polity introduced to Maya archaeology by Demarest (1992, 1996), and the segmentary state model (Ball and Taschek 1991; Fox 1977; Fox and Cook 1996). While many other models have been used in the Maya area, these two have been the subject of most recent debates. There are similarities between each of these, and each will be briefly considered.

The Galactic Polity Model

The Galactic Polity model was introduced to Mayanists by Demarest (1992), who borrowed this analogy from the work of Tambiah (1976, 1977) in southeast Asia. This model certainly has appeal to Mayanists in that the organization of the state parallels cosmology, wherein subordinate centers, located along the cardinal directions, surround the center at the top of the hierarchy. Tourtellot, et al. (2003), for example, posit just such a pattern for La Milpa, although they do not explicitly invoke the Galactic Polity model. The Galactic Polity is decentralized in that the secondary centers in turn served as the “center” of their respective area; thereby something more akin to a constellation than a hierarchy was formed. In Tambiah’s view, the southeast Asian polities were never centralized, thereby reinforcing this as a decentralized model. Additionally, Houston (1993) viewed the Galactic Polity model as similar to the Segmentary State model, another decentralized model, to which we now turn.

The Segmentary State Model

In the segmentary state model, we again see an analogical model that is imported into ancient Maya society from distant lands. Southall's Segmentary State model was developed for a culture that exhibited segmentary lineages; these lineages contributed to the development of the state, but they are not a prerequisite for segmentary state political organization. It seems that in adopting Southall's model, other anthropologists have tended to insist that segmentary lineages are necessarily present for segmentary states to develop (Murhpy 2000). The application of the segmentary state model to the Maya area is no exception, for we see in the work of Fox and Cook (1996) the attempt to define past social organization in the Maya area from the segmentary structure of Maya lineages known ethnographically and ethnohistorically.

Overview of Centralized and Decentralized Models

More recent than her centralized model, Marcus (1993) has put forward what she terms a "dynamic" model, in which Maya political organization is best described as having oscillated between centralized (i.e., state) and decentralized (i.e., chiefdom) political organizations. Clearly, there has been a focus amongst Mayanists on the idea that Maya political organization was hierarchical in nature, while it remains debated whether, at any given time, political organization was centralized or decentralized.

The “centralized” vs. “decentralized” argument was a focal point of well-known debates of the 1990s (Marcus 2003). Marcus (2003:103) was critical of the “either/or” dichotomy because it failed to take into account changes over time (a reference to her dynamic model) and space. That is, the whole of ancient Maya political organization over space and time cannot be so easily characterized, in that “there were times when centralized and decentralized polities coexisted, and times when centralized polities broke down” (Marcus 2003:103). Additionally, Marcus points out that the term “segmentary state” is an oxymoron (Claessen 1992 in Marcus 2003), never having been intended for application to societies at the chiefdom or state level. Nevertheless, the concepts of centralization and decentralization remain key components in any model of ancient Maya sociopolitical organization, whether one agrees with the segmentary state model or not. The heart of the issue—what is meant by centralization and decentralization—remains uninvestigated.

In addition to temporal and spatial concerns, the question of centralized vs. decentralized models of political organization is one of scale. That is, while one may view the area around La Milpa as politically centralized, does the same hold for the greater Petén region or the Maya area as a whole? Additionally, does the idea of centralization or decentralization hold over time or did degrees of centralization and decentralization fluctuate? According to Marcus (2003:103) “there were times when centralized and decentralized polities coexisted and times when centralized polities broke down”. So, while the “either/or” distinction has been put to rest we are left, essentially, with an “and/then” scenario in which centralized and decentralized followed one another or existed for different areas at the same time. In this scheme, we have not moved beyond the theme of centralized and decentralized, even though there are alternatives to such hierarchical models.

It is indeed possible to move beyond poorly defined concepts of hierarchy in the study of ancient Maya political organization, and many Maya archaeologists, including those doing research in the Three Rivers Region, have recently considered the utility of heterarchy as a conceptual framework for examining a number of archaeological issues. It is to questions of heterarchy that we now turn, while a discussion of the alternatives to centralization and decentralization will be considered in subsequent sections.

Hierarchy and Heterarchy

The above models, whether they are centralized or decentralized in character share one common thread; they are all hierarchical. I do not mean to imply, however, a false opposition between heterarchy and hierarchy. Recent advances in archaeological approaches to understanding social and political organization have tended to re-evaluate the concept of hierarchy (a concept that has always been poorly defined in archaeological discourse). Some attempts (e.g. papers in Ehrenreich, et al. 1995; Scarborough, et al. 2003) to incorporate heterarchical concepts are a promising new direction in archaeological studies, not just for political organization, but for economic organization (e.g. Potter and King 1995) and political economy (e.g. Hageman and Lohse 2003; King and Shaw 2003; Tourtellot, et al. 2003).

> Heterarchy may be defined as the relation of elements to one another when they are unranked or when they possess the potential for being ranked in a number of different ways. For example, power can be counterpoised rather than ranked. Thus, three cities might be the same size but draw their importance from different realms: one hosts a military base, one is a manufacturing center, and the third is home to a great university. Similarly, a spiritual leader might have an international reputation but be without influence in the local business community. The relative importance of these community and individual power bases changes in response to the context of the inquiry and to changing (and

> frequently conflicting) values that result in the continual reranking of priorities. (Crumley 1995:3)

Perhaps one of the most important contributions of the heterarchical approach is that it reveals problems in strictly hierarchical interpretations at the most basic level: hierarchies come in different forms and archaeologists often apply the term uncritically (Crumley 1995). This is not to say that hierarchy does not exist, merely that the term should be used carefully. In advancing the cause of heterarchy, Crumley suggested that there are at least two kinds of hierarchy: scalar and control, and that researchers in archaeology and other fields often confuse the two leading to the misinterpretation of chains of causation. This is very clearly seen in models of ancient Maya political organization.

> Global-regional-local climate is an example of a scalar hierarchy: any level can affect any other. The American court system is an example of a control hierarchy: decisions at higher levels affect the operation of lower levels. Scalar hierarchies are routinely mistaken for control hierarchies; in essence, the position of an element in a structure is invariably given value. (Crumley 1995:2)

The preceding, I would argue, is true of all models of ancient Maya political organization that are not overtly heterarchical in nature: the central place model (e.g. Ball and Taschek 1991, Inomata and Aoyama 1996); the galactic polity model, the segmentary state model, *and* the unitary state model all confuse the difference between scalar and control hierarchies. That is, all consider that a smaller site (scale) is inevitably under the *control* of its nearest large site, throughout the hierarchy. In this sense, the attempts to rank sites based on counts of a variety of features including volume of architecture, presence of stelae, presence of ballcourts, etc. (e.g. Adams and Smith 1981; Guderjan 1991d) also use scalar features to infer control, such as access to labor for construction of large buildings and plazas.

Becker (2004) recently argued, rather convincingly, that Plaza Plan 2 groups are heterarchically organized at large sites such as Tikal. Plaza Plan 2 layouts, first recognized by Bullard (1960) though not named as such until later, with their eastern focus, occur throughout levels of the scalar settlement hierarchy; architectural groups both large and small, and presumably varying in wealth, exhibit very similar layouts. Becker (2004:132) concludes that a non-ranked, heterarchical view of such groups indicates that the Plaza Plan 2 layouts transcend status or wealth. Hageman and Lohse (2003) argued that Plaza Plan 2 layouts in northwestern Belize are directly related to high status because of their generally larger size and more formal layout. This finding seems to go against the heterarchical idea put forward by Becker, and further, seems to ignore the idea that the size of an architectural group is not necessarily directly attributable to wealth (Tourtellot 1988). Additionally, if Plaza Plan 2 groups are the "first-tier" in settlement, as Hageman and Lohse assert, then how might it be explained that the occurrence of such groups is so widespread? Although it may be the case that within the "Barba Territory" (Hageman and Lohse 2003: Figures 9.5 and 9.7) there is but one Plaza Plan 2 group, this finding conveniently ignores the location of Be Tan Chinam, only a few hundred meters away, in which there are at least two substantial architectural groups that follow the Plaza Plan 2 layout. It seems, as Becker asserts, and *contra* Hageman and Lohse, Plaza Plan 2 layouts cannot be used to infer hierarchy. Indeed, it is possible that the "Barba Territory" is part of the Be Tan Chinam settlement, which is in turn an aspect of the greater Dos Hombres settlement area. Hageman and Lohse's perspective, however, may be the result of a sample bias. That is, their findings are based on a relatively narrow transect that may not be as complete a sample as, for example, Tourtellot had in his survey of larger contiguous blocks. Since transects cut such a narrow swath across the landscape, they may not accurately sample how many architectural components, such as Plaza Plan 2 layouts, are in fact present in the area.

Despite some confusion over its applicability, the introduction of the concept of heterarchy into archaeology in general and Maya archaeology in particular has proven to be productive. In fact, heterarchy was rapidly embraced by Maya archaeologists, likely due to the intuitive appeal of the concept and the ease with which it fit our existing notions about ancient Maya society while answering the unfulfilled need for greater "complexity" in our approaches to understanding the Maya past. Having reviewed some of the key concepts in the centralized/decentralized dichotomy, I now shift attention to questioning some of the assumptions that remain at the heart of such models of ancient Maya sociopolitical organization. Let us now examine the very notions of centralized and decentralized, hierarchy, and complexity, each of which is a key, yet poorly defined, theme in any study of Maya political organization.

Heterarchical approaches are arguably an outgrowth of the early development of network science in that the modern use of the term stems from McCulloch's (1945) application of the term to neural nets. Although the roots of heterarchy as a concept have essentially been traced to an aspect of the science of networks, archaeologists have narrowly focused on the former aspect (heterarchy) while rarely considering the larger theoretical arena (network theory). Indeed, Crumley noted that the

> human brain, while reasonably orderly, was not organized hierarchically. This understanding revolutionized the neural study of the brain and solved major problems in the fields of artificial intelligence and computer design. To date, it has had little impact on the study of society" Crumley (1995:3)

Since Crumley wrote in the mid-1990s, however, the science of networks has had tremendous impact on the study of society and many other fields. It has seen little application in archaeology, yet its widespread utility seems to indicate that network theory warrants at least some attention from archaeologists, particularly since it has become very useful to other social scientists. It is to the discussion of network theory, which is but a portion of a larger system, that we now turn.

NETWORK THEORY AND COMPLEXITY THEORY

It can be argued that the use of network theory in archaeology is a logical outgrowth of the application of the concept of heterarchy. Crumley (1995) traces the modern intellectual roots of heterarchy to McCulloch (1945) who was studying the human brain, resulting in the conclusion that it was not hierarchically organized.

Complexity theory has tended to defy definition, but the work of Prigogine (1997; Nicolis and Prigogine 1989) provides an overview and synthesis. It has been stated that there are at least 31 different definitions with perhaps the most general being that "Truly complex things—amoebae, bond traders and the like—appear at the border between rigid order and randomness" (Horgan 1995:105). The problem with defining complexity is that "there is no one identifiable complexity theory" (Manson 2001:405). It seems that the term is a catch-all for many differing approaches in any number of disciplines that deal with the study of complex systems: managerial science, social science, natural science, and New Age philosophy have all laid claim to complexity theory (Thrift 1999 in Manson 2000).

It should not come as a surprise to archaeologists that researchers in many disciplines exhibit a "propensity for…borrow[ing] techniques from other disciplines or to speculate naively on subjects typically seen as outside their purview" (Manson 2000:405; see also Horgan 1995; Lo Presti 1996). With these ideas in mind, and realizing that complexity theory is ill-defined and heatedly debated, the larger issues of complexity theory will not be considered within the confines of this dissertation. I have chosen, therefore, to focus on but one aspect of what may be considered part of the complexity theory realm—the examination of particular aspects of network theory and how they may aid Maya archaeologists as an heuristic or analytical device. As an aspect of complexity theory, network theory can be more readily defined, but remains, in and of itself, a rather large field of inquiry.

Network Theory and Complexity Theory in Archaeology

Network theory has a long history in sociology, mostly in the form of social network analysis (e.g. Scott 2000; Wasserman and Faust 1994), but has seen a much more limited application in archaeology and anthropology. Hage and Harary (1996) successfully used graph theory (an aspect of network theory) to examine trade networks among Pacific islands while using several archaeological examples throughout. Complexity theory has been applied to archaeology in the Southwest of the U.S. by researchers associated with the Santa Fe Institute (Gumerman and Gell-Man 1994). None of these papers focus specifically on the applicability of network theory.

There have been few, if any, attempts to use concepts derived from complexity theory in Maya Archaeology. While Stanton's (2000) dissertation, on the surface, seems to examine ancient Maya political organization in terms of complexity theory, he in fact re-introduces the concept of heterarchy while claiming that he is examining complexity theory. His conclusion is rather obvious: "Can we view the ancient lowland Maya as a complex adaptive system? I believe the answer is yes" (Stanton 2000:595). Although I believe Stanton is correct in his assertion about complex adaptive systems in the ancient Maya world, his dissertation isn't really as much about complexity theory as it is about heterarchy; as such it is a very useful contribution. He thoroughly explores the concept of heterarchy, which is arguably a very useful conceptual framework for archaeologists, but he does not thoroughly explore complexity theory and its overall utility. As stated earlier, I think there is a clear link between the genesis of heterarchical concepts in archaeology and early conceptualizations of networks. It is therefore the case that Stanton's dissertation examines the best-known avenues of complexity theory that have previously been applied to archaeology and doesn't really break any new ground.

To push the development of new conceptual frameworks in Maya archaeology, in particular, the use of complexity theory, in itself a staggeringly large pursuit, it is important to gain a firm understanding of the basics of complexity theory. Since the field is so large, it is understandable why choosing but one small part of it (as did Stanton) is a defensible approach. Indeed, the same approach has been chosen in this dissertation as I focus solely on network science (specifically small worlds and scale-free models), indeed on relatively small, but crucial aspects of network theory: small worlds and scale free networks.

Application of Network Theory to Ancient Maya Sociopolitical Organization

Given the vastness of the fields of inquiry involved, one of the goals of this dissertation is merely to introduce some of the issues raised in network theory, particularly the principles of small world and scale free networks introduced in Chapter One. Admittedly, since I am just scratching the surface, I run the danger of naively applying poorly understood concepts! Nevertheless, I think it is an important contribution to introduce these concepts for discussion even though the final judgment as to their utility and/or applicability to archaeology in general and the ancient Maya in particular must await further study. The goal of this section, therefore, is to note some of the superficial similarities in findings between studies of ancient Maya political organization and those of some network theorists so that the notion of network theory can be raised for further consideration.

Some previous interpretations of site interaction in the Maya area can be viewed as inchoative applications of network theory in Maya archaeology (Matthews and Willey 1991:Figure 3.5; Schele and Mathews 1991:Figure 10.2), though these researchers did not view their interpretations in such terms. Long distance elite interactions can be interpreted in light of network theory in that such links are characteristic of "small world" networks (Watts 1999). Figure 5.1 illustrates how nodes are connected in small world networks. Freidel's (1981) work may also be interpreted in terms of small world networks, in which elites travel long-distances to pilgrimages and fairs at which exotic goods were acquired. The small world graph shown is a concept developed to explain the "six degrees of separation" concept discovered by sociologists in the 1960s (e.g. Milgram 1967) and popularized by a play (Guare 1990) and later film (Schepisi 1993).

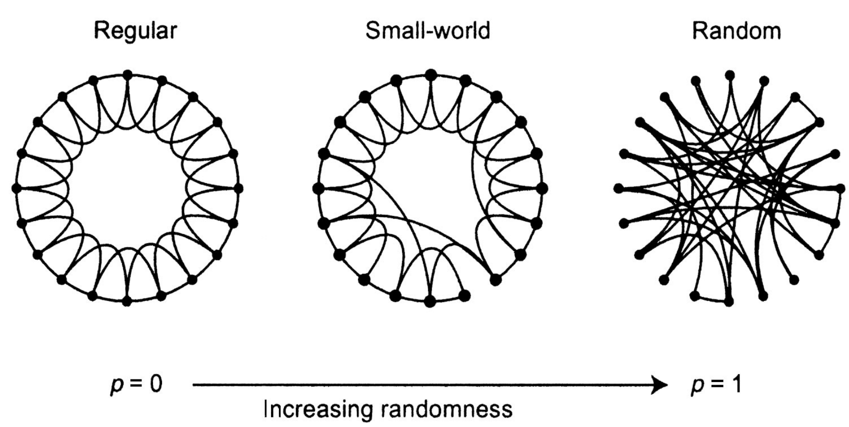

Figure 5.1. A graph of regular, small world, and random networks (from Watts and Strogatz 1998:Figure 1). Used by permission of Duncan J. Watts and Macmillan Publishers Ltd. From *Nature* (http://www.nature.com). © 1998 by Macmillan Publishers Ltd.

The application of the small world graph to ancient Maya archaeology may help archaeologists to conceptualize not only political interaction and links but also trade networks and the sudden and widespread appearance of certain iconography during the Preclassic (e.g. ancient "Olmec" small worlds). One "graph" that comes close to representing ancient Maya political organization as a social network appears in the work of Martin and Grube (2000:21), shown here in Figure 5.2 and redrawn in Figure 5.3. Figure 5.3 is a depiction of all the interactions in the Classic period documented by Martin and Grube (2000) though there are countless other interactions recorded in inscriptions and not given in these simplified versions. Rather than simply being a stylized representation of the interactions, the graphs in Figures 5.3–5.8 are representations of six different networks:

(1) all interactions (Figure 5.3) given by Martin and Grube (2000)

(2) statements of hierarchy (Figure 5.4)

(3) diplomatic contacts (Figure 5.5)

(4) family ties (Figure 5.6)

(5) other/unknown contacts (Figure 5.7)

(6) conflicts (Figure 5.8).

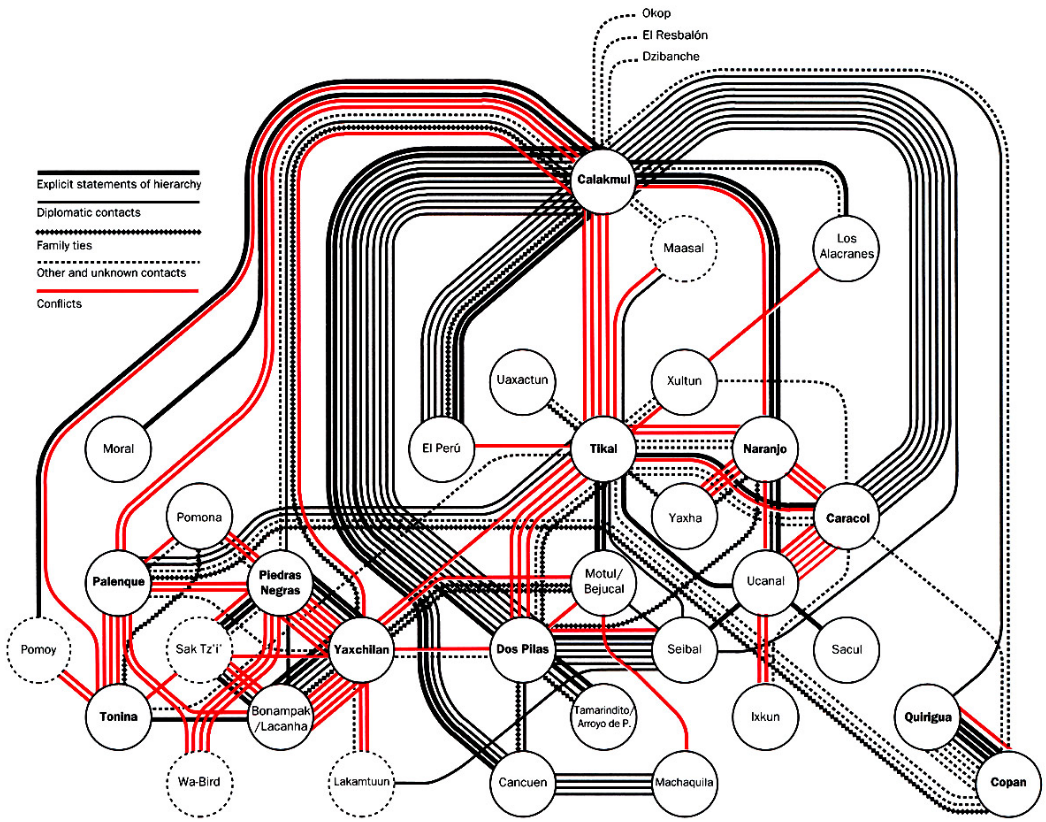

Figure 5.2. Martin and Grube's (2000:21) graph of Classic Maya political interaction. Used by permission. © 2000 by Simon Martin.

The data upon which these graphs are based are presented in Appendix F and taken from Martin and Grube (2000). Martin and Grube's data set is taken from inscriptions at a variety of sites in which various sorts of interactions are documented. In these inscriptions, interactions between individuals and/or ancient Maya settlements is documented. The data in Appendix F is an abstraction of the data in which all interactions are seen as inter-site rather than inter-personal. Many examples of the inscriptions and translations. For example, Yaxchilan Lintel 41 (Martin and Grube 2000:129) depicts a Yaxchilan ruler and his wife, who was from Motul de San José, an example of a kinship tie between sites. Since many individuals are named in Classic

Maya inscriptions (including many named as captives), it should be possible to eventually graph the social network of the interaction of numerous historically documented Classic Maya individuals. The data set required for such an undertaking is rather large and just starting to emerge in the literature. Nevertheless, such an undertaking could reveal new understandings of Classic Maya interaction and have the strength of interpretations based on diachronic data. For illustrative purposes, and following Martin and Grube's (2000:21)approach to graphing Classic period sociopolitical interaction, the time dimension in this data set conflates much of the Classic period. As an example, and to provide a general picture of the Classic Maya sociopolitical network, seeing sociopolitical interaction synchronically can be a useful perspective. Eventually, however, a diachronic perspective, taking into account the "real time" interactions of Classic Maya individuals may be possible and will yield a more "accurate" network graph of sociopolitical interactions.

The structure of the networks is the result of out put from *InFlow* social network analysis software (Krebs 2005). *InFlow* applies the Kamada-Kawai graph layout algorithm.

> The Kamada-Kawai algorithm is commonly described as a "spring-embedder," meaning that it fits with a general class of algorithms that represent a network as a virtual collection of weights (nodes) connected by springs (arcs) with a degree of elasticity and a desired resting length. The problem then is to reposition the nodes until all the springs are as relaxed as possible. (McFarland and Bender-deMoll 2004)

In Figures 5.3–5.8 the relative strength of links is shown by the thickness of the links connecting the nodes. Each link was characterized on a scale of 1-5 depending on how many times the particular type of interaction occurred between sites (five or more of the same type of interaction was scored as 5). Depicting ancient Maya sociopolitical interaction in such graphs can lead to important insights so it is therefore worth considering each graph in detail.

Figure 5.3 is the most complex graph in that is depicts all forms of interaction from the inscriptions tracked by Martin and Grube (2000). Data presented in this form lends itself to social network analysis and allows us to make new insights into ancient Maya sociopolitical organization that have, until now, gone unnoticed. For example, in attempting to gain insight into the hierarchical arrangement of ancient Maya sites archaeologists have tried to rank sites based on size and other characteristics (e.g. Adams 1981; Adams and Adams 2003; Flannery 1998; Inomata and Aoyama 1996; Turner et al. 1981). These types of analysis are useful attempts at gaining insight into ancient Maya political organization, but does analysis of the social network yielded by the hieroglyphic data corroborate the findings of rank/size and courtyard count estimates? It is difficult to compare the findings on a one-to-one basis, since the sites considered in the rank-size and courtyard count schemes do not entirely overlap with the sites for which we have documented interactions from the work of Martin and Grube (2000). Nevertheless, one may compare Table 5.1 (the findings of Adams [1981:Table 9.8]) and Turner et al. (1981: Figure 4.5) with Table 5.2 to assess the similarities and differences of the varied approaches. Table 5.2 provides a "power" score for each site in the overall network. The power score is a measure of informal power which combines two other measures—betweeness and closeness (Krebs 2005). Betweeness is a "measure of *control*—how much a node controls what flows in the network via the number of geodesics in the network that contain this node" (Krebs 2005) while closeness is a "measure of *access*—how quickly a node can access all other nodes via a minimum of hops" (Krebs 2005). The power metric measures nodes with "quick access [while] stand[ing] in the way of other nodes' access [to the network].

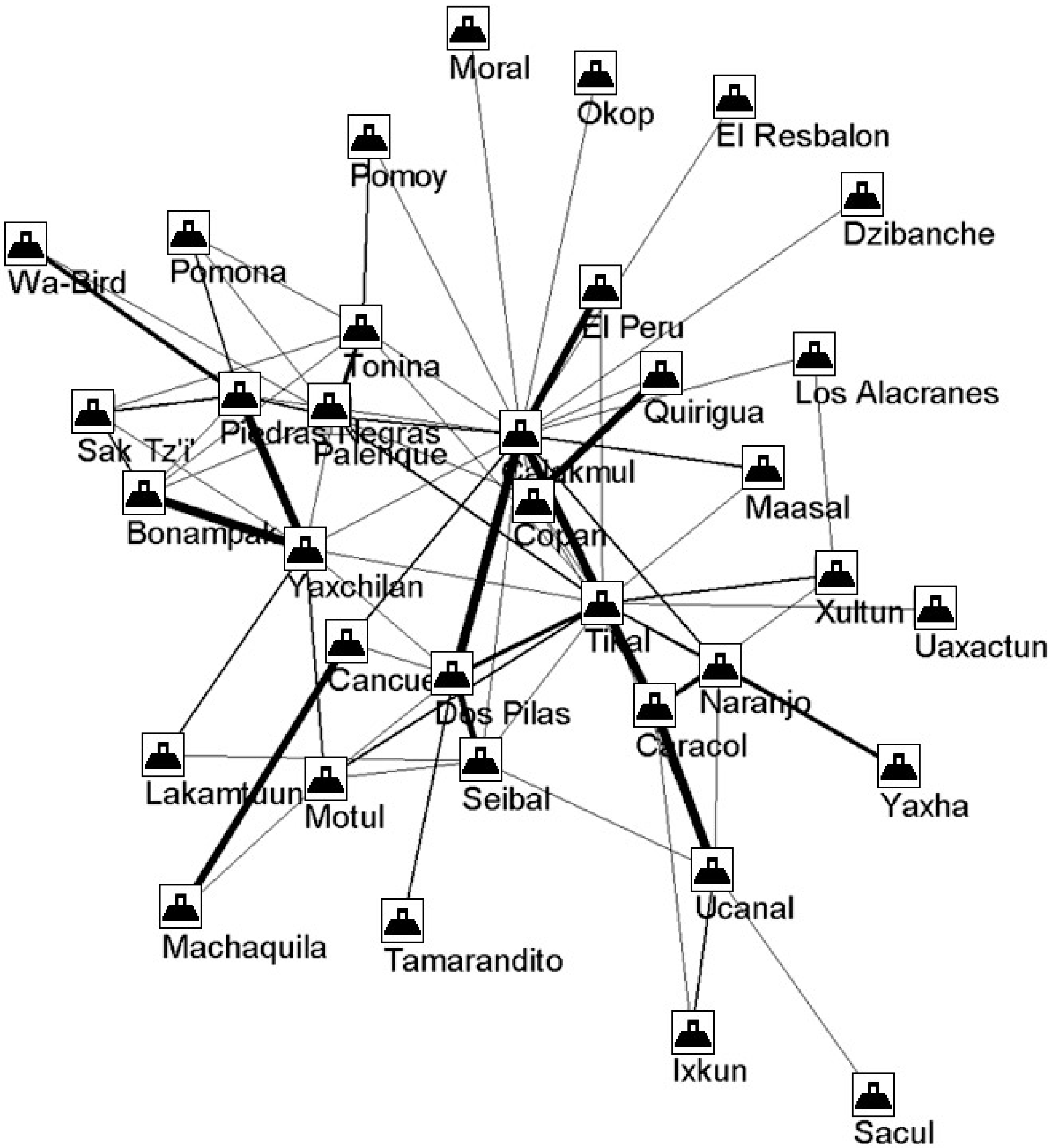

Figure 5.3. A social network analysis graph of Martin and Grube's (2000) data.

Table 5.1. Rank Ordering of Sites after Adams (1980:Table 9.8)

A. Central (n = 52)		
Site	**Factor**	**Group**
Tikal	85	8 (n = 1)
Calakmul	42+	7 (n = 2)
Naranjo	42+	
Mirador	32+	6 (n = 1)
Uaxactun	23	5 (n = 4)
Naachtun	21	
Kinal	20	
Yaxha	20	
Caracol	17	4 (n = 12)
La Honradez	16	
Nakum	16	
Nakbe	14	
Nohmul	12	
Lubaantun	11	
La Muñeca	11	
Oxpemul	11	
Ucanal	11	
Machaquila	10	
Polol	10	
Tayasal	10	
Uxul	9	3 (n = 19)
Alta Mira	8	
Chochkitam	8	
Ixkun	8	
Ixtutz	8	
San Estevan	7	
El Palmar	7	
Xultun	7+	
La Florida	6	
San Jose	6	
Balakbal	5+	
Benque Viejo	5+	
Altun Ha	5	
Chowacol	5	
Chunhuitz	5	
San Clemente	5	
Hatzcab Ceel	5	
Holmul	5	
Ixlu	5	

A. Central (n = 52) continued		
Site	**Factor**	**Group**
Baking Pot	4	2 (n = 6)
Cahal Pichik	4	
Itzimte	4	
Rio Azul	4	
Pusilha	3+	
Motul de San José	3	
El Encanto	1	1 (n = 7)
La Muralla	1	
Pared de los Reyes	1	
Santa Rita	1	
Uolantun	1	
Xmakabatun	1	
Yalitud	1	
B. Pasion (n = 11)		
Site	**Factor**	**Group**
Seibal	23	5
Altar de Sacrificios	8	3
Dos Pilas	5+	
Aguateca	5	
Cancuen	3+	2
Tamarindito	3+	
La Amelia	3	
El Caribe	3	
Ixoche	2	
Aguas Calientes	1	1
El Pabellon	1	
C. Usumacinta (n = 5)		
Site	**Factor**	**Group**
Yaxchilan	15	4
Piedras Negras	11	
Bonampak	3	2
San Lorenzo	3	
Yaxun	2	
D. Southeast (n = 2)		
Site	**Factor**	**Group**
Copan	14	4
Quirigua	6	3
E. Northwest (n = 2)		
Site	**Factor**	**Group**
Comalcalco	12	4
Palenque	11	
(Edzna)	(12 + 3 = 15)	

Table 5.2. Network Analysis of Power based on Figure 5.3.

0.585	Calakmul
0.470	Tikal
0.324	Yaxchilan
0.310	Palenque
0.297	Dos Pilas
0.284	Tonina
0.281	Seibal
0.280	Caracol
0.264	Piedras Negras
0.259	Ucanal
0.256	Copan
0.252	Naranjo
0.246	Motul
0.233	Cancuen
0.227	El Peru
0.227	Maasal
0.218	Pomoy
0.215	Los Alacranes
0.213	Xultun
0.210	Quirigua
0.207	Dzibanche
0.207	El Resbalon
0.207	Moral
0.207	Okop
0.202	Yaxha
0.201	Bonampak
0.200	Uaxactun
0.196	Sak Tz'i'
0.191	Lakamtuun
0.185	Pomona
0.181	Wa-Bird
0.176	Machaquila
0.175	Ixkun
0.173	Tamarandito
0.155	Sacul
0.243	AVERAGE

Power can be used for positive or negative purposes” (Krebs 2005). Most of the sites listed by Turner et al. (1981) are not listed in Martin and Grube’s (2000) analysis and are therefore not considered here. Notably, however, Turner et al. (1981) placed Naranjo at the top of their hierarchy, above Calakmul, while the current analysis places Calakmul at the top with Naranjo significantly lower on the list.

Although it is not possible to compare more of the results of the Turner et al. study with this research, there are striking similarities between the ordering of sites given in Table 5.2 and the work of Adams (1981) given in Table 5.1. There are, however, significant differences. The top two sites in this analysis are Calakmul and Tikal, sites that were ranked in the opposite order - second and first, respectively, in Adams’ analysis. There is, therefore, fairly close agreement between us. One may infer from this “switch” in order that Calakmul was a more active participant in the Classic period sociopolitical network than Tikal, despite the higher ranking of Tikal in rank/size estimates. This inference, along with others, however, may be an artifact of many factors which conspire against “accuracy”. For example, the preservation of inscriptions varies, the number of inscriptions from site to site varies (with sheer number of inscriptions being an important factor here, but does is it safe to infer superior position because of larger numbers of inscriptions?).

There are further common findings between Adams (1981) rankings and the current analysis. For example, the Usumacinta regional ranking of Yaxchilan, Piedras Negras, and Bonampak (Table 5.1) is the same in Table 5.2. In the Pasion region, while Adams ranks Seibal above Dos Pilas, these are reversed here, yet have similar scores, while Cancuen and Tamarandito are listed in the same order here as they are by Adams.

The general agreement between the two methods is striking yet the differences indicate that it may be fruitful to combine several approaches rather than attempting to rank sites on the basis of any single method.

Another interesting aspect of Adams (1981) study was that he attempted to rank sites within regions, rather than ranking the entire Maya area as a whole, as in Table 5.2. Table 5.3 is a social circle analysis of Figure 5.3 that resembles, to some extent, the regional divisions given by Adams (1981:Table 9.8). The cluster analysis in Table 5.3 lists sites together if they are part of the same "social circle". That is, each cluster is a group of nodes (sites) that can reach each other directly or indirectly within a maximum of two network steps. Looking at Table 5.3, one sees that the clusters make some geographic sense as well, with the notable exception of the largest, Custer 1. One should also note that membership in a cluster is not exclusive for it is possible for a site to belong to more than one cluster (e.g. Tikal, Caracol, and others are present in Clusters 1 and 3). Cluster 4 clearly contains the sites of Adams' Usumacinta region combined with not-too-distant Palenque. What Table 5.3 shows us is that although geography is a factor in ancient Maya interactions, it is not the overriding factor. Sites can be grouped in clusters based on their close (i.e. less than two steps) sociopolitical interactions even though they are very far apart geographically.

Table 5.3 Cluster analysis of Figure 5.3.

Cluster [1] Membership Calakmul Cancuen Caracol Copan Dos Pilas Dzibanche El Peru El Resbalon Los Alacranes Maasal Moral Naranjo Okop Pomoy Quirigua Seibal Tikal	Cluster [3] Membership Caracol El Peru Maasal Naranjo Tikal Uaxactun Ucanal Xultun Yaxha
Cluster [2] Membership El Peru Los Alacranes Maasal	Cluster [4] Membership Bonampak Palenque Piedras Negras Pomona Sak Tz'i' Tonina Wa-Bird

Turning away from considering the network as a whole, we can now consider each network individually in a distinct graph (Figures 5.4-5.8). Each one of these graphs can give us further insight into ancient Maya sociopolitical organization. Figure 5.4 graphs the explicit statements of hierarchy listed by Martin and Grube (2000). In this graph there are three components that are not connected to one another (note that sites that are not mentioned in hierarchical statements are excluded from the graph). The graph is non-directional, in that it does not specify which sites claim hierarchy over another, but is intended to show the extent of the network of sites claiming control over others. In this graph, one feature is notable: Ucanal serves as a bridge. The removal of Ucanal would cut off Tikal, Caracol, and Motul from the rest of their component, making them another, fourth, distinct component. Compare this to the imaginary removal of Naranjo or Dos Pilas, which would still leave all the remaining sites connected to their component. In a similar fashion, the removal of Bonampak makes Tonina an isolate, the removal of Tikal would make Caracol and Motul isolates, and the removal of Calakmul would make isolates of Cancuen, Pomoy, Moral, Los Alacranes, and El Peru. Although El Peru is now sometimes referred to as Waká, after a reading of the site's name from inscriptions, the traditional name is maintained here for the sake of clarity (Southern Methodist University 2005).

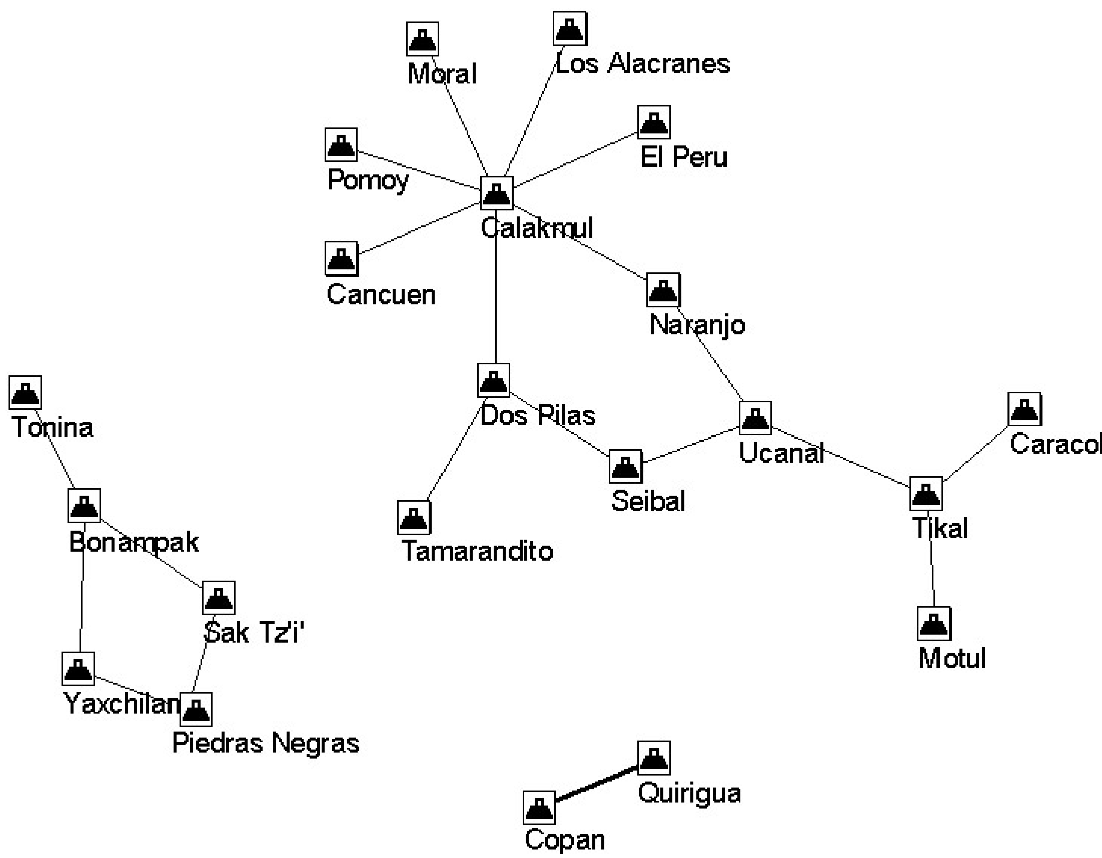

Figure 5.4. Explicit statements of hierarchy graph.

Similar “bridge” phenomena can also be observed in the diplomatic ties network, presented in Figure 5.5. For example, if Seibal were eliminated, all the sites above it, including Tikal, would become several distinct components (i.e., Tikal would be linked only to Palenque and Maasal while Lakamtuun and Motul would become isolates). Additionally, the removal of Calakmul makes isolates of El Peru and Caracol while creating a new component of Piedras Negras, Bonampak, Yaxchilan, and Sak Tz’i’. Dos Pilas, although it has strong diplomatic ties to Seibal and Calakmul, would not create any isolates or new components if it were removed since Calakmul also links to Seibal and Cancuen (indeed the link between Calakmul and Cancuen is stronger than the link between Dos Pilas and Cancuen).

Martin and Grube’s (2000) “family ties” are graphed in Figure 5.6. In this graph, there are four components and it is easy to see how many possible links could have brought components together. For example, a marriage between Tikal or Dos Pilas and Yaxchilan (bearing in mind that the Classic period is compressed in this graph) would have brought these sites greater importance (i.e., greater centrality) in the network. The same strategic advantage would not be had by a marriage between Naranjo and El Peru even though these sites belong to the same components as in the previous example. There would be less advantage in such a link because El Peru and Naranjo, for example, are not as central to their respective components.

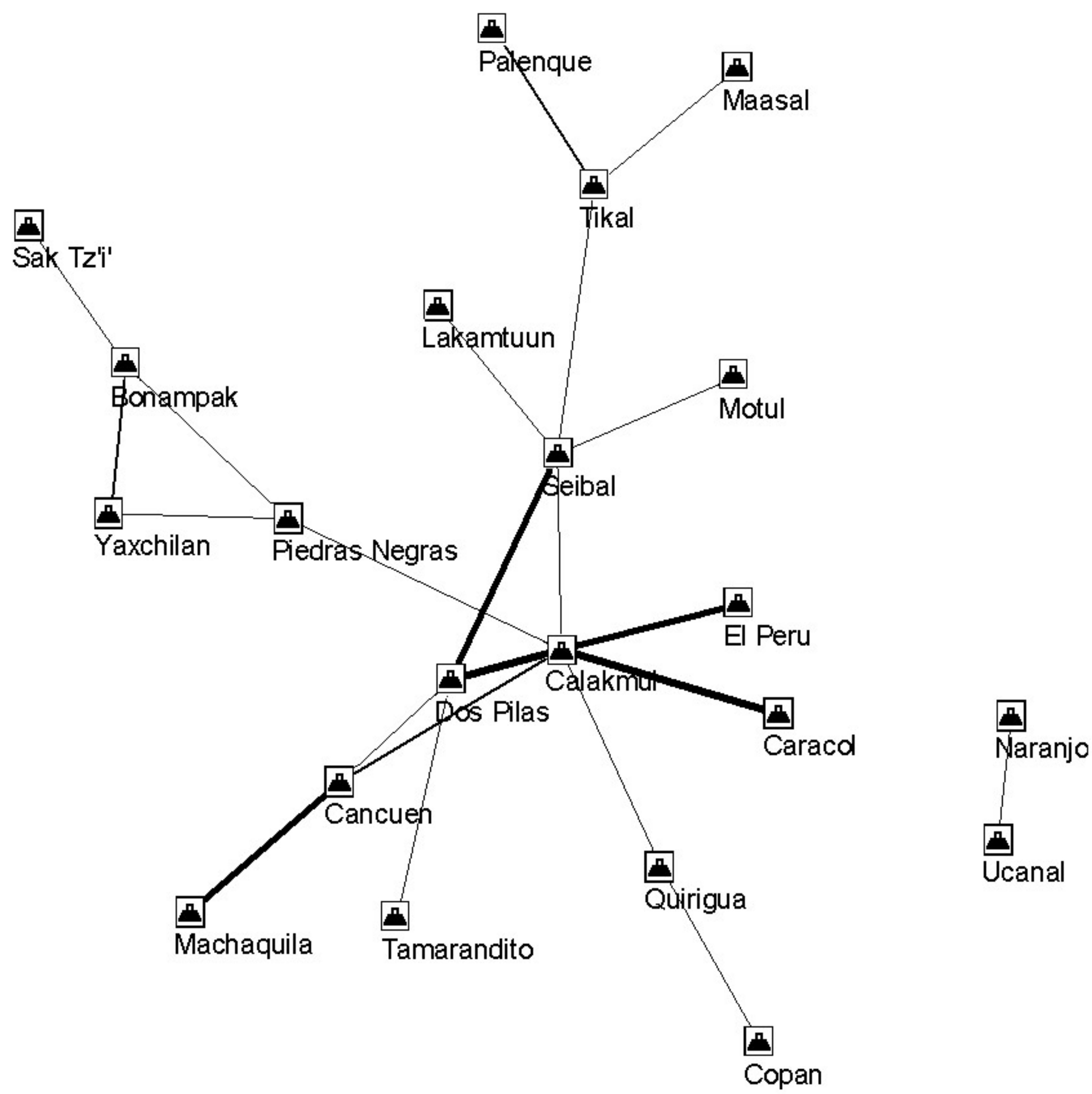

Figure 5.5. Diplomatic ties graph.

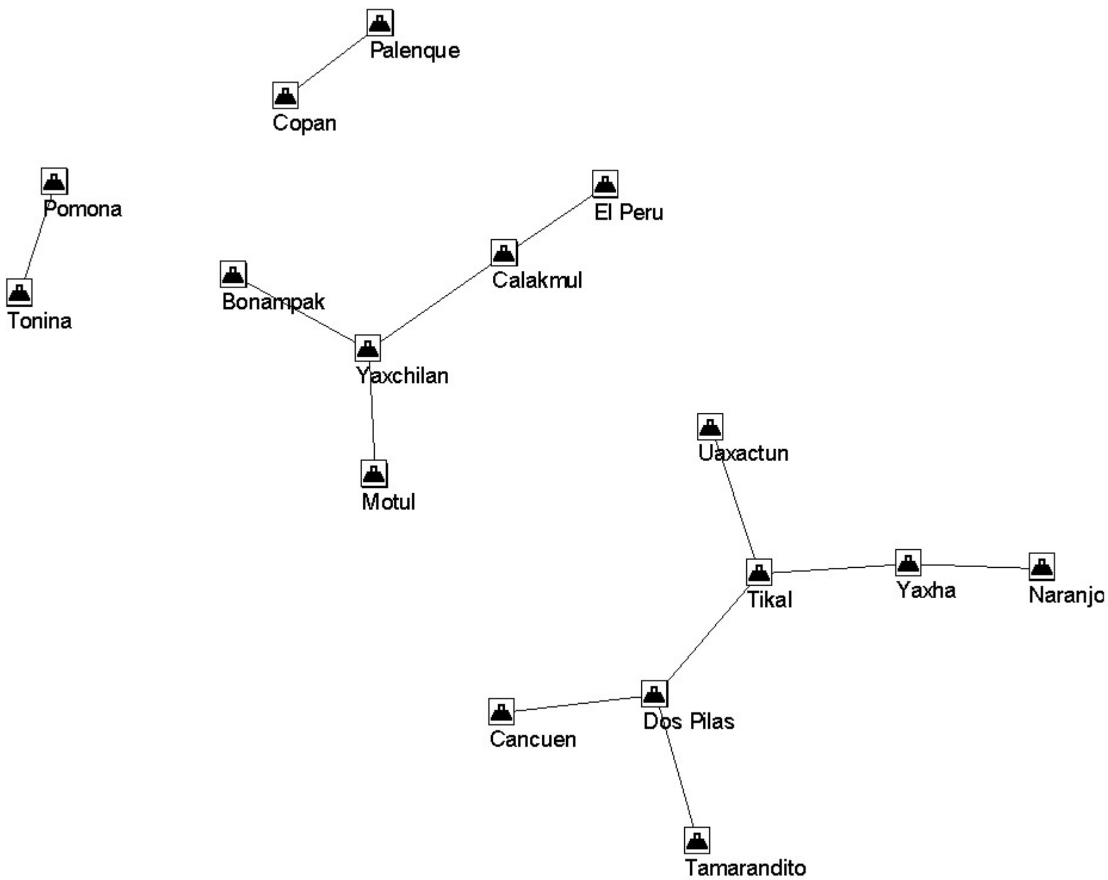

Figure 5.6. Family ties graph.

Figure 5.7 groups together the network graph of Martin and Grube's (2000:21) "other and unknown contacts" which will not be considered in detail here since the type of contact exhibited by each link in the network is not clear. Since the links given in this graph could be the result of many different types of activities they cannot be discussed as a cohesive network, as can "family ties" or "diplomatic contacts".

Conflicts are graphed in Figure 5.8. Aside from Figure 5.3, the graph of all the different categories of network links, this graph contains the most actors (sites). This could reflect the relative frequency of conflict throughout the Classic period or it could reflect the relative importance of mentioning conflicts in inscriptions. Tikal serves as a crucial bridge in this network, for its removal changes the network from one to multiple components, the entire right portion of the graph splitting into two additional components as well as isolating Maasal and El Peru.

Although the applicability of network theory concepts to elite interactions is readily visible through hieroglyphic evidence, the interaction between other segments of society is less apparent. While there are many problems with simply taking ancient political statements at face value, it is still worthwhile to consider them, whether or not the statements are "true". Additionally, there are numerous lines of evidence that may be used to argue for the presence of ancient Maya networks of interaction such as trade in goods such as obsidian and Colha chert (e.g. Hester, et al. 1994), fine ceramics, and many other materials that can be traced archaeologically. Additionally, the behavior of networks characterized by power law distributions may help to explain some aspects of the course of Mesoamerican sociopolitical and economic interactions. This is discussed below with respect to the field research findings and how artifacts found at even small sites reflect the larger network system.

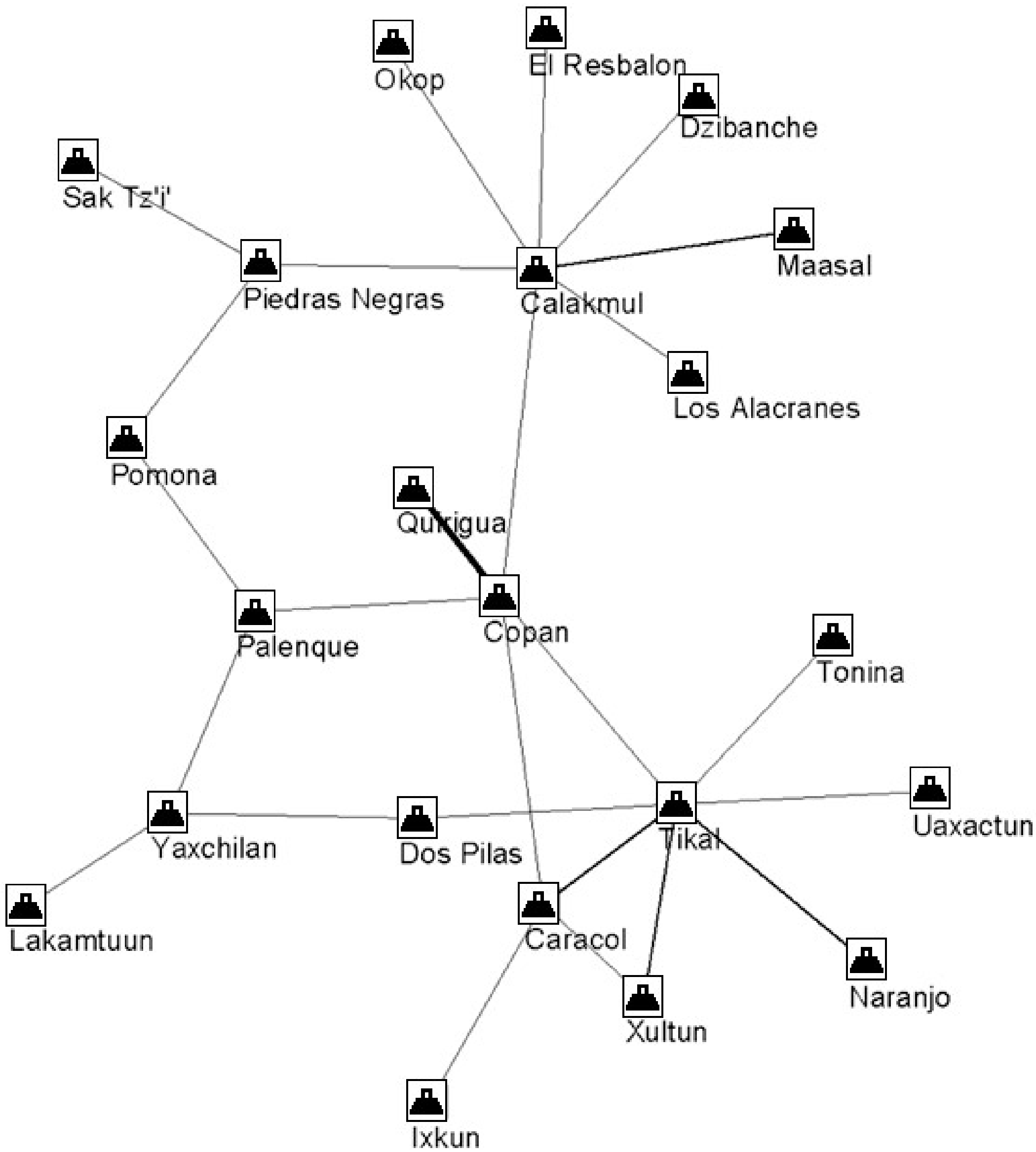

Figure 5.7. Other and unknown contacts graph.

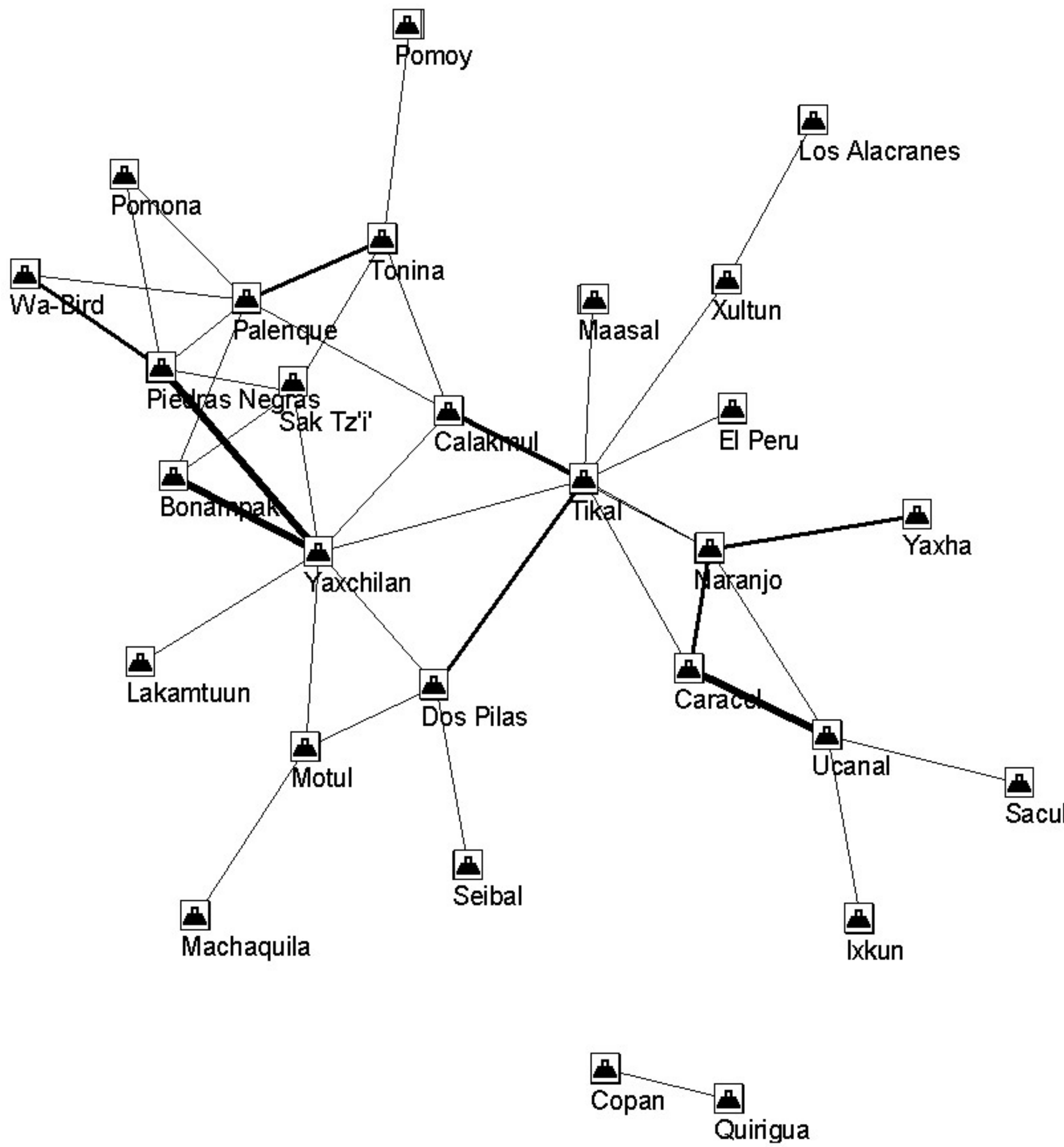

Figure 5.8. Conflicts graph.

Graphs of ancient Maya rank-size site distributions (Figure 5.9, see also Adams 1981; Adams and Adams 2003:Figures 2-5; Flannery 1998:Figure 2.1; Inomata and Aoyama 1996:Figure 5) as well as similar distributions for other archaeological areas (Figure 5.10) appear to fit what graph theorists and network theorists, among other disciplines, term a "power-law" distribution (Figure 5.11). Power-law curves, compared to bell curves, have a much more gradual curve towards zero. That is, they have "fat tails" (Buchanan 2002:84). Power-law curves are also indicative of a particular type of network—aristocratic networks, which have notable features, including small numbers of hubs. In a network theory sense, political or other central places, often invoked in archaeology, can be viewed as network hubs. Figure 5.12 details the distribution of the number of sites against the number of respective links.

In recent years there has been much debate between proponents of what might be termed centralized and decentralized models of ancient Maya political organization (Fox, et al. 1996). Graphs of sociopolitical relationships, such as those given in Figures 5.3-5.8 can be used to determine the centrality of networks. Looking at these figures, one can see that the graphed networks neither resemble highly centralized nor distributed networks. Figure 5.7 comes closest to a distributed network, but appears to have aspects of a decentralized network (compare to example in Figure 5.13). Indeed, most of these graphs appear to resemble decentralized networks.

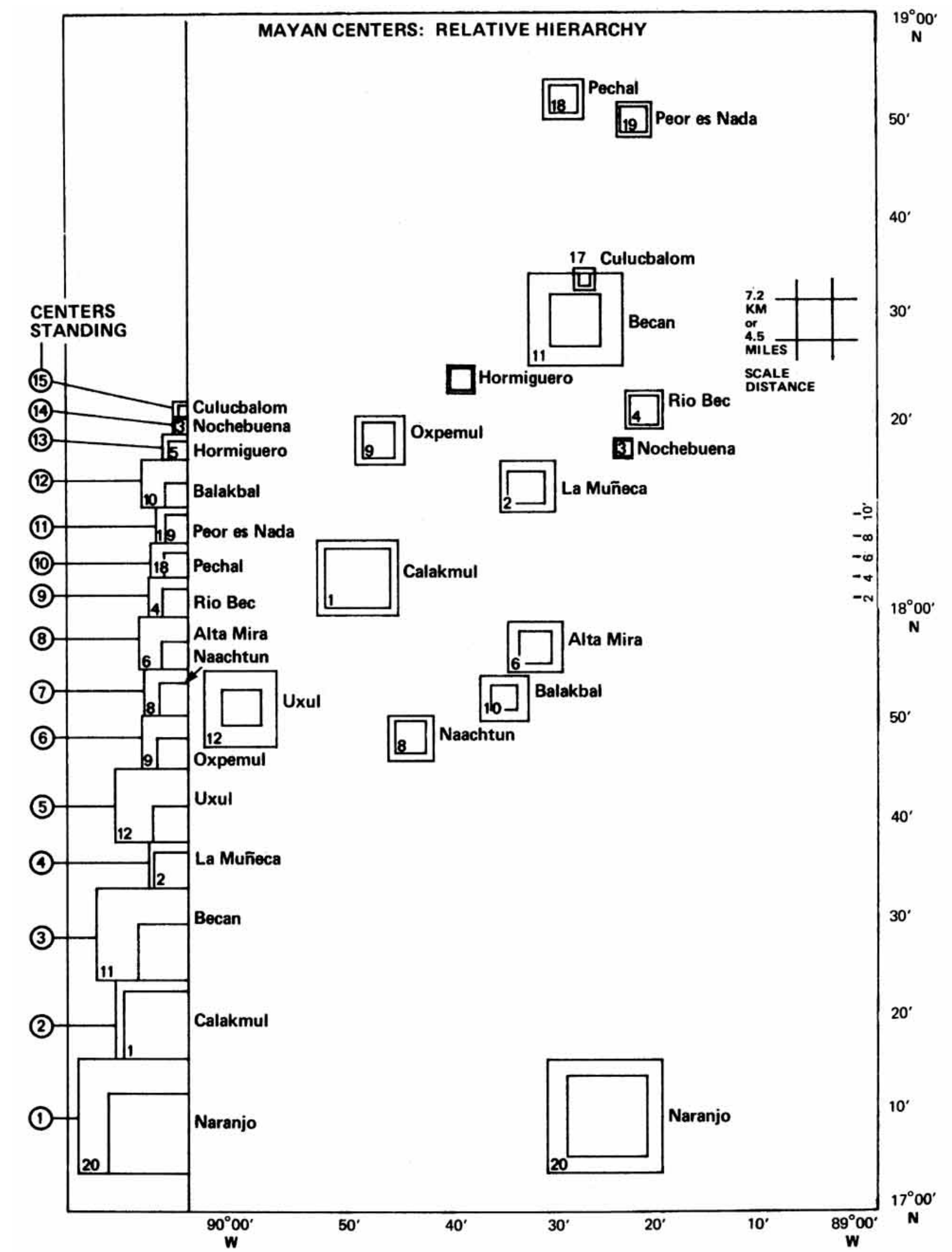

Figure 5.9. Graph of Ancient Maya Rank-Size distribution (after Turner et al. 1981:Figure 4.5). Reprinted by permission from *Lowland Maya Settlement Patterns*, edited by Wendy Ashmore. Copyright © 1981 by the School of American Research, Santa Fe.

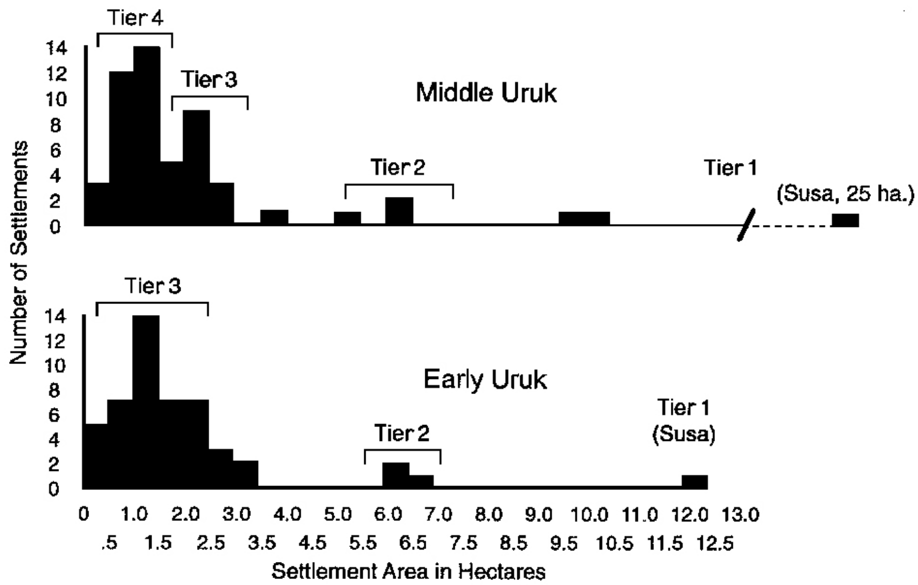

Figure 5.10. Rank size distribution of ancient Uruk settlements (after Flannery [1998:Figure 2.1]). Compare to Figure 5.12. Reprinted by permission from *Archaic States*, edited by Gary M. Feinman and Joyce Marcus. Copyright © 1998 by the School of American Research, Santa Fe.

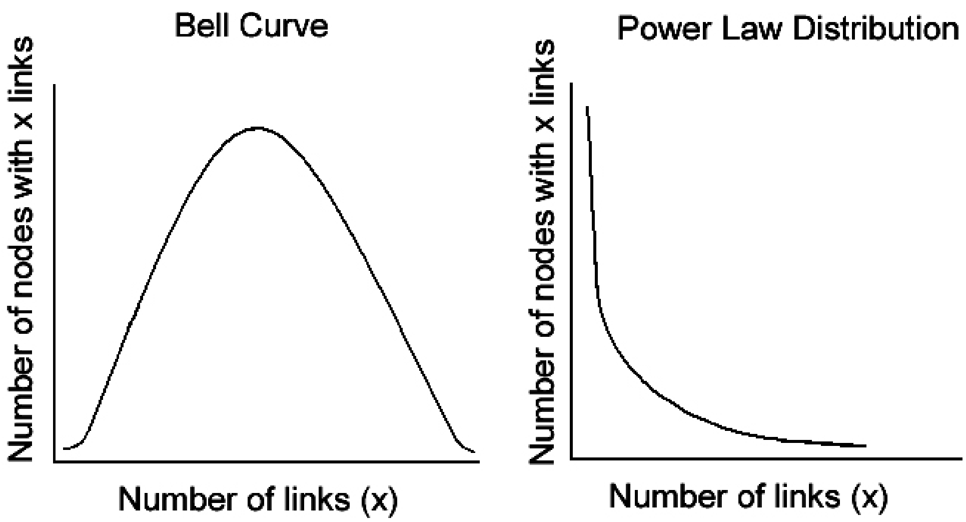

Figure 5.11. Stylized normal distribution (left) and stylized power-law distribution (right). If link distribution follows a bell curve, then most nodes have the same number of links without *any* nodes have a large number of links. In a scale-free network, most nodes have a few links and few nodes have very many links. After Barabási (1998:Figure 6.1).

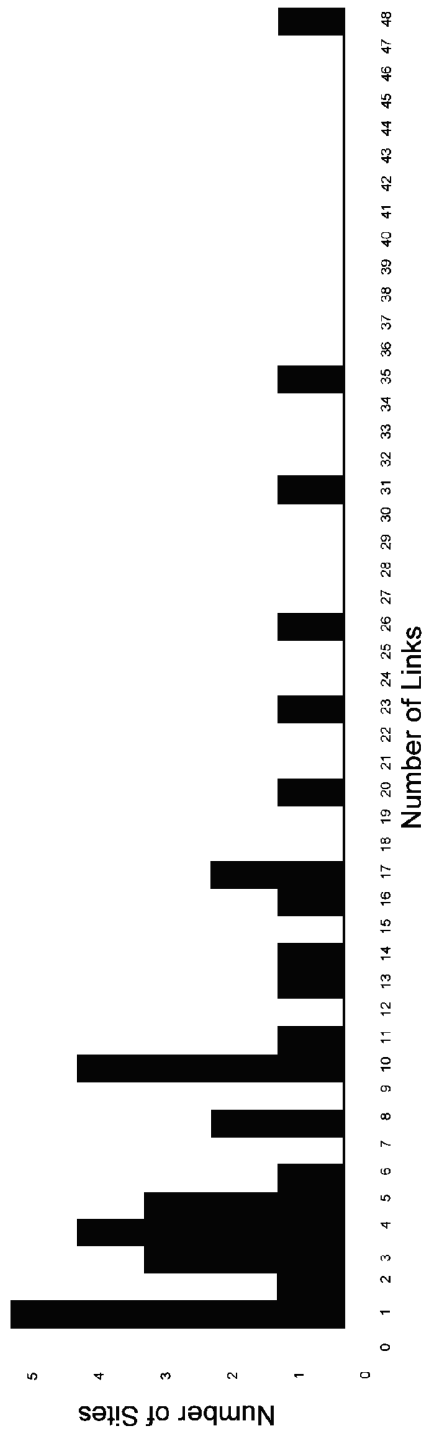

Figure 5.12. Numbers of Maya sites with numbers of links (data from Table 5.4).

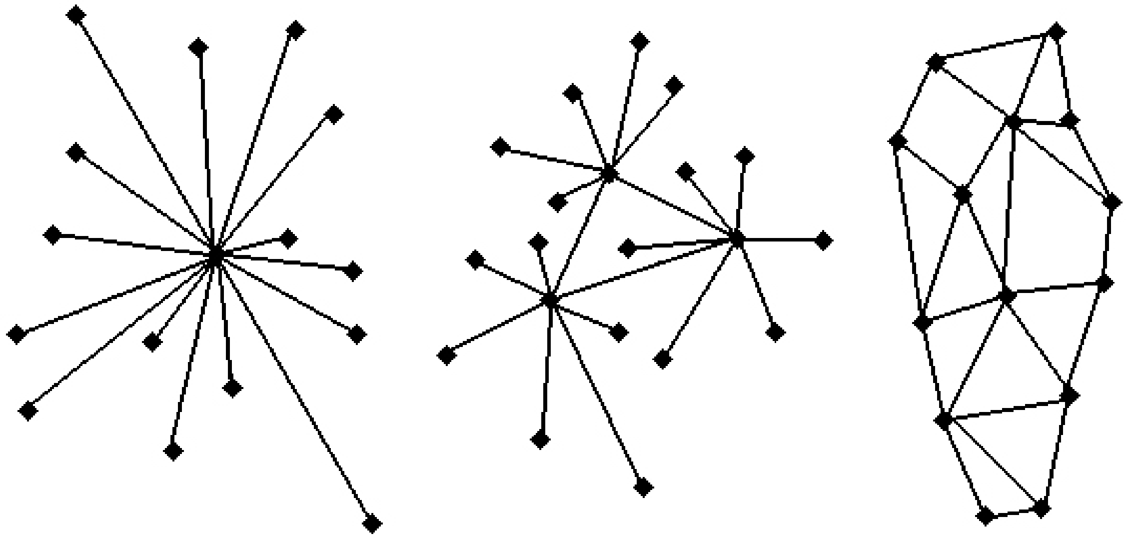

Figure 5.13. Different types of networks: centralized (left), decentralized (center) and distributed (right). Based on Paul Baran's conception in Barabási (1998:Figure.11.1).

The ancient Maya sociopolitical network depicted in the graphs of Figures 5.3-5.8 is shown to follow a power law distribution when the number of links per node (site) are tallied (Table 5.4).

The data from Table 5.4 can be represented as a graph, which displays a power-law distribution. This indicates that the Classic Maya sociopolitical landscape (at least considered as a whole, throughout the Classic period) was decentralized and dominated by relatively few hubs which had many links to other sites. Calakmul is at the top of the list, followed by Tikal.

Table 5.4. Number of links per site mentioned in inscriptions.

Score from Table 5.2	Site Name	No. Links
0.585	Calakmul	48
0.470	Tikal	35
0.324	Yaxchilan	31
0.310	Palenque	16
0.297	Dos Pilas	26
0.284	Tonina	10
0.281	Seibal	11
0.280	Caracol	20
0.264	Piedras Negras	23
0.259	Ucanal	13
0.256	Copan	14
0.252	Naranjo	17
0.246	Motul	8
0.233	Cancuen	10
0.227	El Peru	8
0.227	Maasal	4
0.218	Pomoy	3
0.215	Los Alacranes	3
0.213	Xultun	5
0.210	Quirigua	10
0.207	Dzibanche	1
0.207	El Resbalon	1
0.207	Moral	1
0.207	Okop	1
0.202	Yaxha	5
0.201	Bonampak	17
0.200	Uaxactun	2
0.196	Sak Tz'i'	10
0.191	Lakamtuun	4
0.185	Pomona	6
0.181	Wa-Bird	4
0.176	Machaquila	5
0.175	Ixkun	3
0.173	Tamarandito	4
0.155	Sacul	1

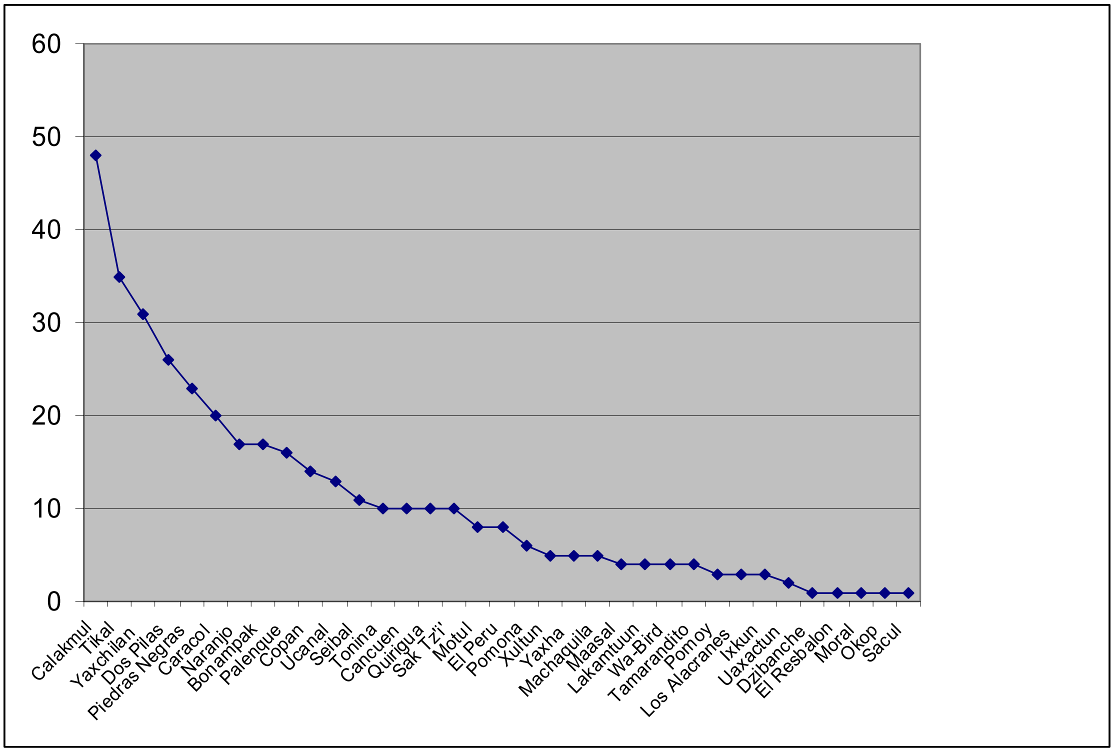

Figure 5.14. Chart showing Number of Links per Site

From Figure 5.14, it can be seen that 23 sites have 10 or less links, seven sites have 11-20 links, while only two sites have 21-30 links and two have 31-40 links, yet only one site has more than 40 (almost 50) links. This matches the power law distribution given in Figure 5.11. That is, it reflects a network wherein very few hubs have the most links.

The power analysis data from Table 5.2 can also be show on a simple chart (Figure 5.15), which also reflects power law characteristics. Remember that in a normal distribution phenomenon, such as human height, there are no outliers that are enormously different from the average. Figure 5.15 illustrates that the scores of most sites fall between about 0.015 and 0.3, yet there are two outliers, at almost 0.5 and 0.6. Additionally, there are no outliers at the low score end.

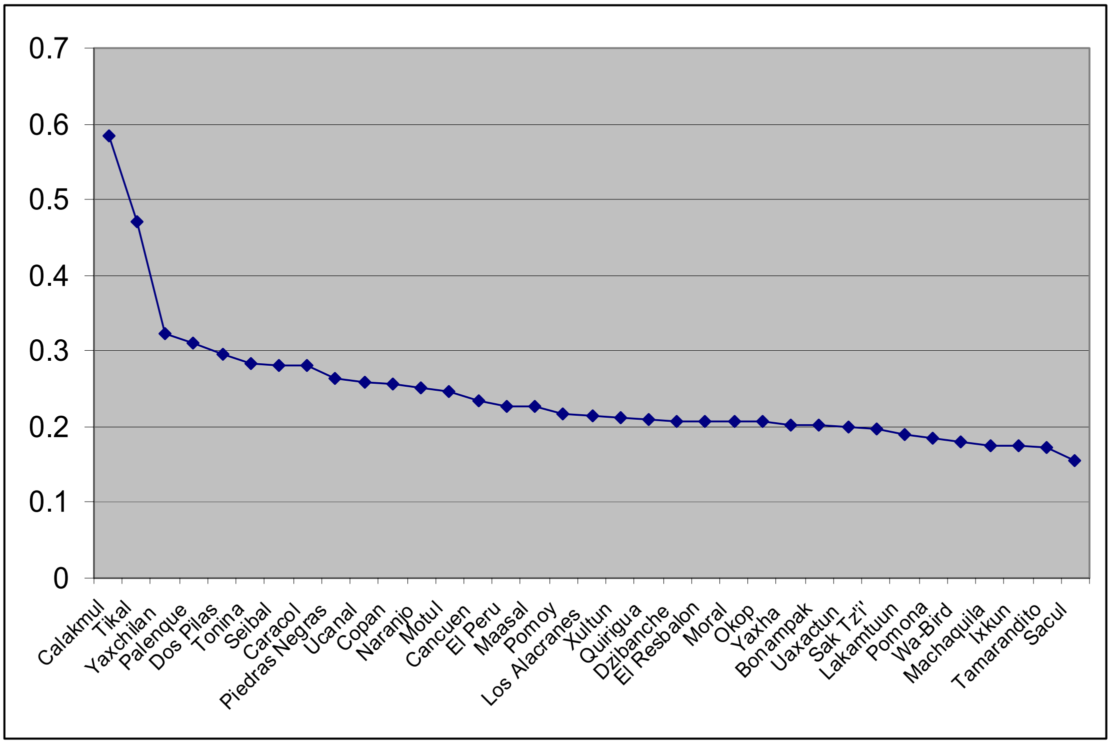

Figure 5.15. Chart of Power analysis scores.

Application of Network Theory to other Archaeological Data

It is apparent that methods borrowed from the science of networks could have wide utility in the study of ancient Maya sociopolitical organization. The above cases introduce the technique. While these approaches seem suited to analysis of data from inscriptions, what of the analysis of artifacts? Although all ancient Maya sites have ceramics, relatively few have inscriptions. Many sites have imported obsidian that can be chemically sourced, and many have faunal remains and a variety of stone tool types. The list of potential artifact categories is lengthy. Field research for this dissertation did not produce large quantities of faunal remains from both Dos Hombres, Group D and

Be Tan Chinam. Of the faunal remains recovered, few were identifiable to the species level. As such, the faunal data is not investigated in terms of network graphs. Although Pachuca obsidian was recovered at Dos Hombres, Group D, it was not found at Be Tan Chinam. Nevertheless, an attempt is made to graph the associations between Pachuca obsidian and the ceramic types with which it was found. Given a larger data set, a science of networks inspired analysis of faunal remains, chert tools, obsidian, eccentric lithics, and other remains could yield new ways of viewing associations not only within artifact classes, but between classes. What are available, from both excavated sites, and in large quantities suitable to comparative analysis, are ceramic sherds.

Ceramic types recovered during the course of this dissertation research present another "case study" in exploring the utility of network analysis to the study of the ancient Maya. The following charts and graphs are the result of analysis of the ceramic data given in Appendix A. For the purposes of comparison, only firmly identified types were used. Sherds described as "buff slipped", "black slipped", cream slipped", etc., without an assigned type:variety have been left out of the analysis since color of slip alone is not enough to assign a type. As a result, 14 different ceramic types were available for study from Be Tan Chinam, while 30 were available from Dos Hombres Group D. In the examples given here, a synchronic view is taken, in that all types, regardless of their temporal associations, are plotted in the same matrices. The resulting network graphs appear to reflect, in part, temporal groupings. In order to facilitate a network analysis of the associations between these ceramic types, two matrices were plotted (Table 5.5 and Table 5.6). The ceramics from each site will now be considered in more detail.

Ceramics from Be Tan Chinam

Excavations at Be Tan Chinam resulted in the firm identification of 15 different ceramic types. These types have been plotted in an association matrix, given in Table 5.5. In this matrix, a “1” is coded for each type of pottery found in a lot with another. For example, since Aguila Orange was found in one or more lots with Achote Black, there is a “1” coded in the cell where the type names intersect; since Achote Black was never found with Dolphin Head Red, there is a “0” coded in the cell where the type names intersect. Since the table is a matrix, the top right portion “mirrors” the bottom left portion.

Table 5.5. Matrix of pottery type associations from Be Tan Chinam

	Achote Black	Aguila Orange	Alexanders Unslipped	Cayo Unslipped	Chilar Fluted	Dos Arroyos Orange poly.	Fowler Orange-Red	Garbutt Creek Red	Guacamallo Red-on-Orange	Meditation Black	Polvero Black	Sierra Red	Subin Red	Tinaja Red
Achote Black	0	1	1	1	1	0	0	1	1	1	0	1	1	1
Aguila Orange	1	0	0	1	0	1	1	0	1	0	0	1	1	1
Alexanders Unslipped	1	0	0	1	0	0	0	0	0	0	0	0	0	0
Cayo Unslipped	1	1	1	0	1	0	0	1	1	1	0	1	1	1
Chilar Fluted	1	0	0	1	0	0	0	0	0	1	0	0	1	1
Dos Arroyos Orange poly.	0	1	0	0	0	0	0	0	0	0	0	1	0	0
Fowler Orange-Red	0	1	0	0	0	0	0	0	0	0	0	1	0	0
Garbutt Creek Red	1	0	0	1	0	0	0	0	0	1	0	0	1	1
Guacamallo Red-on-Orange	1	1	0	1	0	0	0	0	0	0	0	1	1	1
Meditation Black	1	0	0	1	1	0	0	1	0	0	0	0	1	1
Polvero Black	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Sierra Red	1	1	0	1	0	1	1	0	1	0	1	0	1	1
Subin Red	1	1	0	1	1	0	0	1	1	1	0	1	0	1
Tinaja Red	1	1	0	1	1	0	0	1	1	1	0	1	1	0

The ceramic data matrix for Be Tan Chinam was entered into UCINET (Borgatti, et al. 2002) social network analysis software for the computation of the ceramic "social network" graphs. These graphs (Figures 5.16[2] and 5.17) allow one to

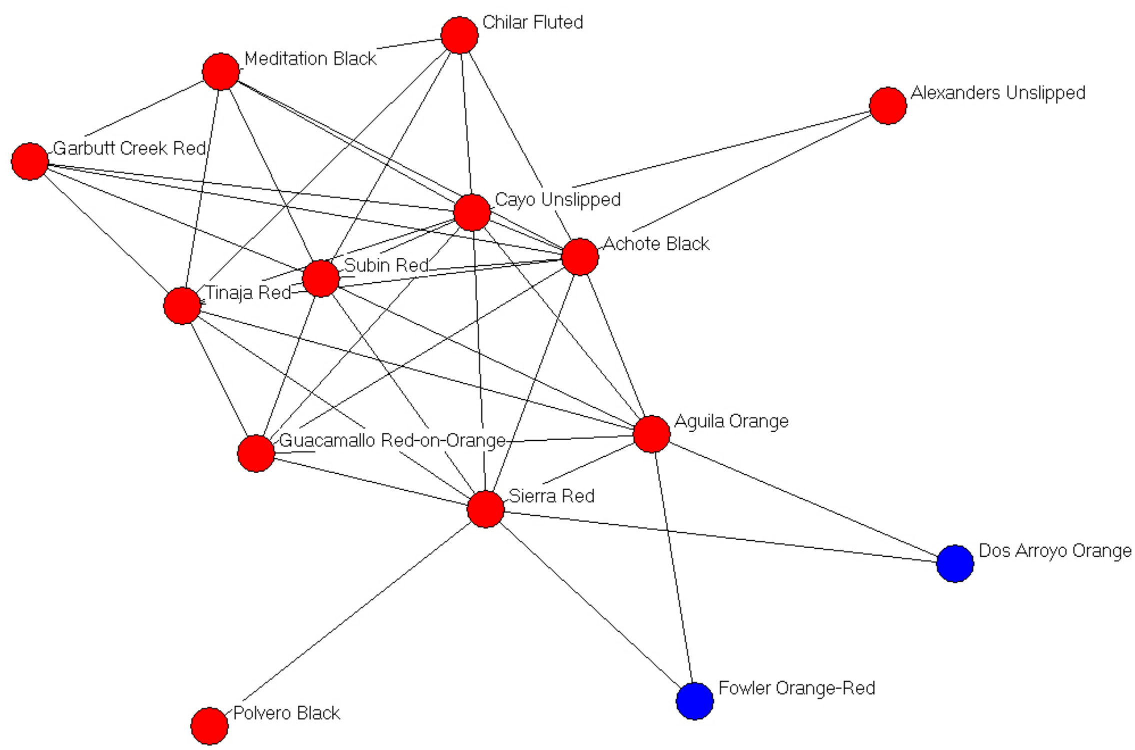

Figure 5.16. The ceramic "social network" of Be Tan Chinam with two factions.

visualize ancient Maya ceramic associations. Figure 5.16 depicts the ceramic association network with factions.

> In network terms, actors [ceramic types] are said to be equivalent to the extent that they have the same profiles of ties to other actors. It follows that we might define partitions of the network on the basis of grouping together actors on the basis of who they are tied to. (Hanneman 2001:88)

In Figure 5.16, Fowler Orange-Red and Dos Arroyos Orange polychrome form one faction, in that they share an association with Sierra Red and Aguila Orange. The

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[2] Figures 5.16 through 5.24 were drawn with *NetDraw: Graph Visualization Software* (Borgatti 2002).

remaining 12 pottery types form the other faction in this graph; all are closely tied to one another. Further, visualizing ceramic type associations in this way allows us to easily see, for example that Polvero Black occurs only with Sierra Red while Sierra Red is found in association with many pottery types but not, for example, Garbutt Creek Red or Alexanders Unslipped. There are many different possibilities for visualizing and parsing these data sets; just a few examples have been given here. It should be noted that although these graphs are two dimensional, it is possible to view the ceramic association networks in three dimensions on a computer (the same is true for the sociopolitical interaction graphs given previously). Nevertheless, two dimensions is best to view the networks on the printed page and is therefore used here.

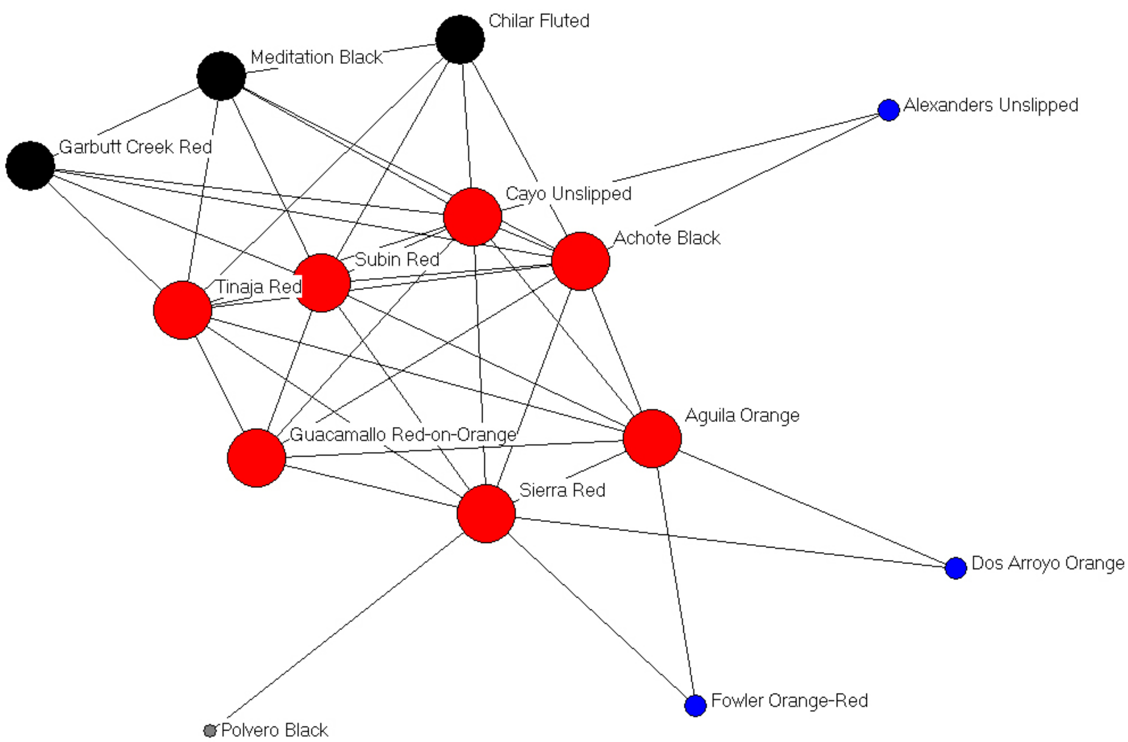

Figure 5.17. The ceramic “social network” of Be Tan Chinam with k-cores.

Figure 5.17 considers the same network from a different perspective (k-cores) so that more than two groups emerge.

> A k-core is a maximal group of actors [ceramic sherds in this example], all of whom are connected to some number (k) of other members of the group. To be included in a k-plex, an actor must be tied to all but k other actors in the group. The k-core approach is more relaxed, allowing actors to join the group if they are connected to k members, regardless of how many other members they may not be connected to… as k becomes smaller, groups sizes will increase. (Hanneman 2001:85)

Using such techniques in the analysis of the associations of ancient Maya pottery may prove useful to understanding "sub-groups" of pottery types. It is possible that such techniques may yield insights into associations that were meaningful to ancient people, but secure contexts (i.e., other than construction fill) would be needed to support the validity of such an analysis. Additionally, clustering of types may be the result of type designations given by the ceramic analyst. Nevertheless, a cursory review of the ceramic network figures reveals that the nodes (ceramic types) fall into a chronologically significant layout. This is not surprising, given the nature of the associations and contexts, but it is, at least, a useful way to visualize the inter-relationships of the ceramic types.

Ceramics from Dos Hombres Group D

The ceramics types recovered from Dos Hombres Group D were greater in variety than Be Tan Chinam (easily seen by the number of types given in Table 5.6 compared to Table 5.5). This result is likely a function of variation in excavations between the sites (i.e., more excavation at Group D than Be Tan Chinam), but it is also possible that the inhabitants of Group D simply had access to a greater variety of ceramics types than the inhabitants of Be Tan Chinam. Further excavation at Be Tan

Chinam would be required to fully explore this difference. As was done with the Be Tan Chinam data, the ceramic types recovered at Dos Hombres Group D are plotted in a matrix, given in Table 5.6. The matrix from Table 5.6 is given as network graphs in Figures 5.18 and 5.19 (using the same techniques as Figures 5.16 and 5.17).

Table 5.6. Matrix of pottery type associations from Dos Hombres, Group D

	Achote Black	Aguila Orange	Balanza Black	Cayo Unslipped	Chicago Orange	Chilar Fluted	Consejo Red	Cubeta Incised	Dolphin Head Red	Dos Arroyos Orange	Fine Orange	Fowler Orange-red	Gallinero Fluted	Garbutt Creek Red	Guitara Incised	Joventud Red	Kaway Impressed	Laguna Verde Incised	Macal Orange-red	Meditation Black	Polvero Black	Rio Bravo Red	Roaring Creek Red	Rubber Camp Brown	Sierra Red	Society Hall	Subin Red	Teakettle Bank Black	Tinaja Red	Zibal Unslipped
Achote Black	0	1	0	1	0	1	0	1	1	0	1	0	1	1	0	0	1	1	1	1	0	1	1	1	1	0	1	1	1	1
Aguila Orange	1	0	1	0	0	0	0	0	0	1	0	1	0	0	1	0	0	0	0	0	1	1	0	0	1	0	1	0	1	0
Balanza Black	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0
Cayo Unslipped	1	0	0	0	0	1	0	1	1	0	1	0	0	1	0	0	1	1	1	1	1	1	0	1	1	1	1	1	1	1
Chicago Orange	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	1	0	0	0	0	1	0	0	0	1	0	0	0	0	0
Chilar Fluted	1	0	0	1	0	0	0	1	1	0	1	0	0	1	0	0	0	0	0	1	0	1	0	0	1	0	1	1	1	1
Consejo Red	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Cubeta Incised	1	0	0	1	0	1	0	0	1	0	1	0	0	1	0	0	1	0	0	1	0	1	0	0	1	0	1	0	1	1
Dolphin Head Red	1	0	0	1	0	1	0	1	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	1	0	1	1	1	0
Dos Arroyos Orange	0	1	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1	1	0	0	1	0	0	0	0	0
Fine Orange	1	0	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0
Fowler Orange-red	0	1	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	1	1	0	0	1	0	0	0	0	0
Gallinero Fluted	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Garbutt Creek Red	1	0	0	1	0	1	0	1	1	0	0	0	0	0	0	0	1	1	0	1	0	0	1	1	1	0	1	1	1	1
Guitara Incised	0	1	0	0	1	0	1	0	0	1	0	1	0	0	0	0	0	0	0	0	1	1	0	0	1	0	0	0	0	0
Joventud Red	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0
Kaway Impressed	1	0	0	1	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	1	0	1	1
Laguna Verde Inc.	1	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	1	0	0	0	1	1
Macal Orange-red	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Meditation Black	1	0	0	1	0	1	0	1	1	0	1	0	0	1	0	0	0	1	0	0	0	1	0	0	1	0	1	0	1	1
Polvero Black	0	1	0	1	1	0	0	0	0	1	0	1	0	0	1	1	0	0	0	0	0	1	0	0	1	1	0	0	0	0
Rio Bravo Red	1	1	1	1	0	1	0	1	0	1	0	1	0	0	1	0	0	0	0	1	1	0	0	0	1	0	1	0	1	0
Roaring Creek Red	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Rubber Camp Brown	1	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0
Sierra Red	1	1	1	1	1	1	1	1	1	1	0	1	0	1	1	1	1	1	0	1	1	1	0	1	0	1	1	0	1	1
Society Hall	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0
Subin Red	1	1	0	1	0	1	0	1	1	0	1	0	0	1	0	0	1	0	1	1	0	1	1	0	1	0	0	1	1	1
Teakettle Bank Blk	1	0	0	1	0	1	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0
Tinaja Red	1	1	0	1	0	1	0	1	1	0	0	0	0	1	0	0	1	1	0	1	0	1	0	1	1	0	1	1	0	1
Zibal Unslipped	1	0	0	1	0	1	0	1	0	0	0	0	0	1	0	0	1	1	0	1	0	0	0	0	1	0	1	0	1	0

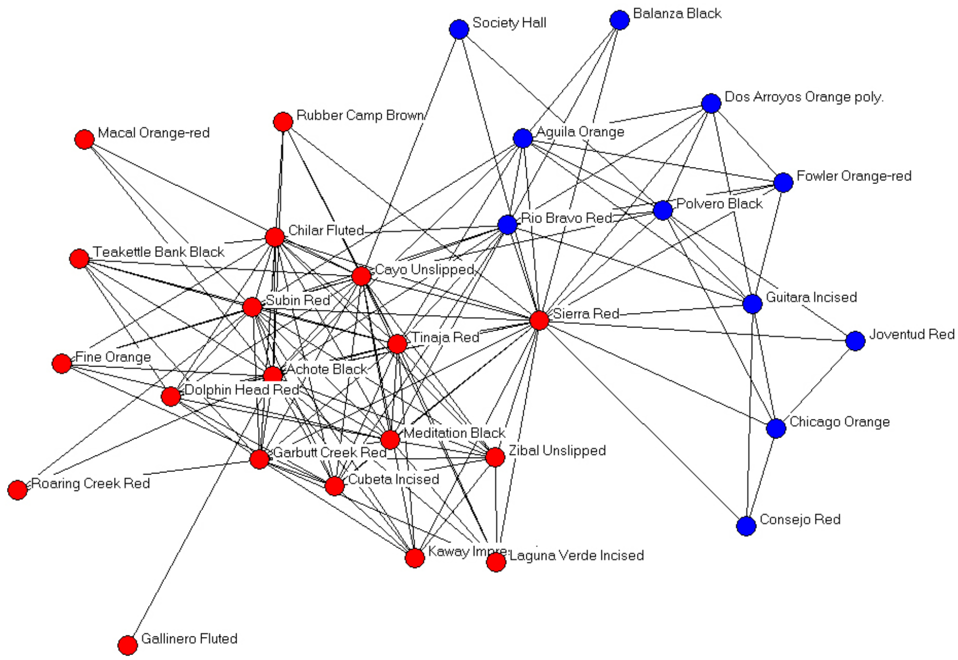

Figure 5.18. The ceramic "social network" of Dos Hombres, Group D showing two factions.

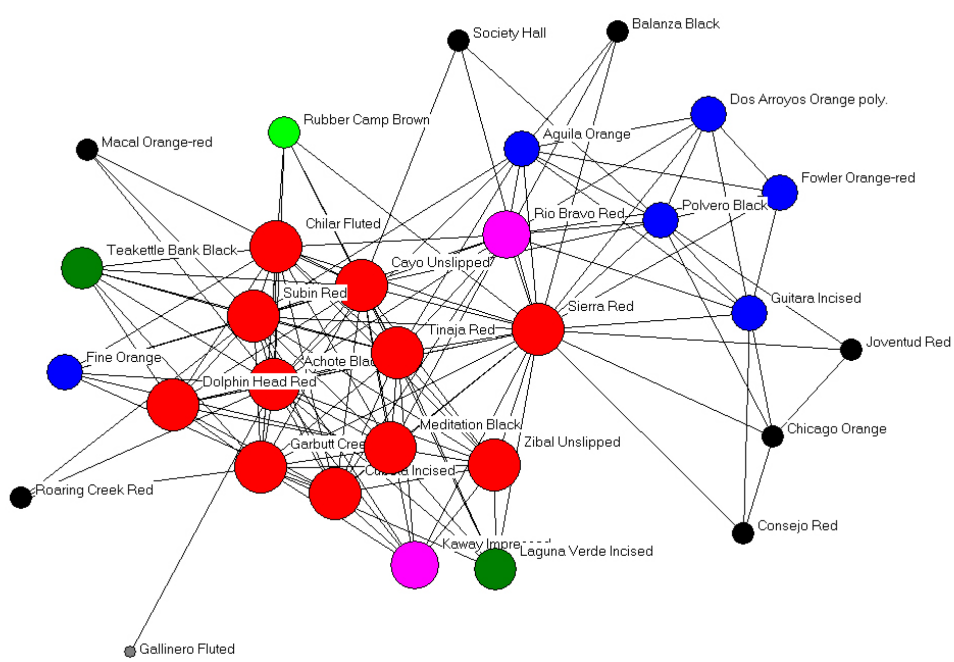

Figure 5.19. The ceramic "social network" of Dos Hombres, Group D with k-cores depicted by different sizes in nodes.

The ceramics recovered at Dos Hombres, Group D, reveal clear factions and k-cores that can be compared and contrasted to the results obtained from the Be Tan Chinam ceramic data. As an exercise in comparison, the following section examines the ceramic types that the two sites had in common with one another. These could, in turn, be compared in future research to the ceramics recovered in the Dos Hombres site center.

Comparison of Dos Hombres, Group D and Be Tan Chinam Ceramic "Social Networks"

This analysis of ceramics is not meant to imply that these "things" had associations free from human influence. To the contrary, the meaning and value of things are a result of human actions and motivations, how things are used, circulated, and discarded (see papers in Appadurai 1986). Viewed in this fashion, ceramics could be seen as having a "social life" that can be visualized in terms of network graphs. Although the archaeological contexts from which the data set are derived are less than perfect for this analysis, the faction and k-core analysis of the ceramic association networks can allow us to perhaps view the association of ceramic types from a perspective that would have been meaningful to ancient people, or perhaps such views will allow us to refine chronologies (given data analysis on a much larger scale at a larger number of sites).

Tables 5.7 and 5.8 provide matrices for the ceramics from Be Tan Chinam and Dos Hombres, but list only those ceramic types common to *both* sites. The resulting network graphs can then be compared to view similarities and differences, at least superficially, between the ceramic "social networks" of the sites. These are given in Figure 5.20 and Figure 5.21. Figures 5.22 and 5.23 allow the visual comparison of two factions within each network graph.

Table 5.7. Matrix of Be Tan Chinam ceramic type associations (only types found at both Be Tan Chinam and Dos Hombres, Group D are included).

	Achote Black	Aguila Orange	Cayo Unslipped	Chilar Fluted	Dos Arroyos Orange poly.	Fowler Orange-Red	Garbutt Creek Red	Meditation Black	Polvero Black	Sierra Red	Subin Red	Tinaja Red
Achote Black	0	1	1	1	0	0	1	1	0	1	1	1
Aguila Orange	1	0	1	0	1	1	0	0	0	1	1	1
Cayo Unslipped	1	1	0	1	0	0	1	1	0	1	1	1
Chilar Fluted	1	0	1	0	0	0	0	1	0	0	1	1
Dos Arroyos Orange poly.	0	1	0	0	0	0	0	0	0	1	0	0
Fowler Orange-Red	0	1	0	0	0	0	0	0	0	1	0	0
Garbutt Creek Red	1	0	1	0	0	0	0	1	0	0	1	1
Meditation Black	1	0	1	1	0	0	1	0	0	0	1	1
Polvero Black	0	0	0	0	0	0	0	0	0	1	0	0
Sierra Red	1	1	1	0	1	1	0	0	1	0	1	1
Subin Red	1	1	1	1	0	0	1	1	0	1	0	1
Tinaja Red	1	1	1	1	0	0	1	1	0	1	1	0

Table 5.8. Matrix of Dos Hombres, Group D ceramic type associations (only types found at both Be Tan Chinam and Dos Hombres, Group D are included).

	Achote Black	Aguila Orange	Cayo Unslipped	Chilar Fluted	Dos Arroyos Orange poly.	Fowler Orange-red	Garbutt Creek Red	Meditation Black	Polvero Black	Sierra Red	Subin Red	Tinaja Red
Achote Black	0	1	1	1	0	0	1	1	0	1	1	1
Aguila Orange	1	0	0	0	1	1	0	0	1	1	1	1
Cayo Unslipped	1	0	0	1	0	0	1	1	1	1	1	1
Chilar Fluted	1	0	1	0	0	0	1	1	0	1	1	1
Dos Arroyos Orange poly.	0	1	0	0	0	1	0	0	1	1	0	0
Fowler Orange-red	0	1	0	0	1	0	0	0	1	1	0	0
Garbutt Creek Red	1	0	1	1	0	0	0	1	0	1	1	1
Meditation Black	1	0	1	1	0	0	1	0	0	1	1	1
Polvero Black	0	1	1	0	1	1	0	0	0	1	0	0
Sierra Red	1	1	1	1	1	1	1	1	1	0	1	1
Subin Red	1	1	1	1	0	0	1	1	0	1	0	1
Tinaja Red	1	1	1	1	0	0	1	1	0	1	1	0

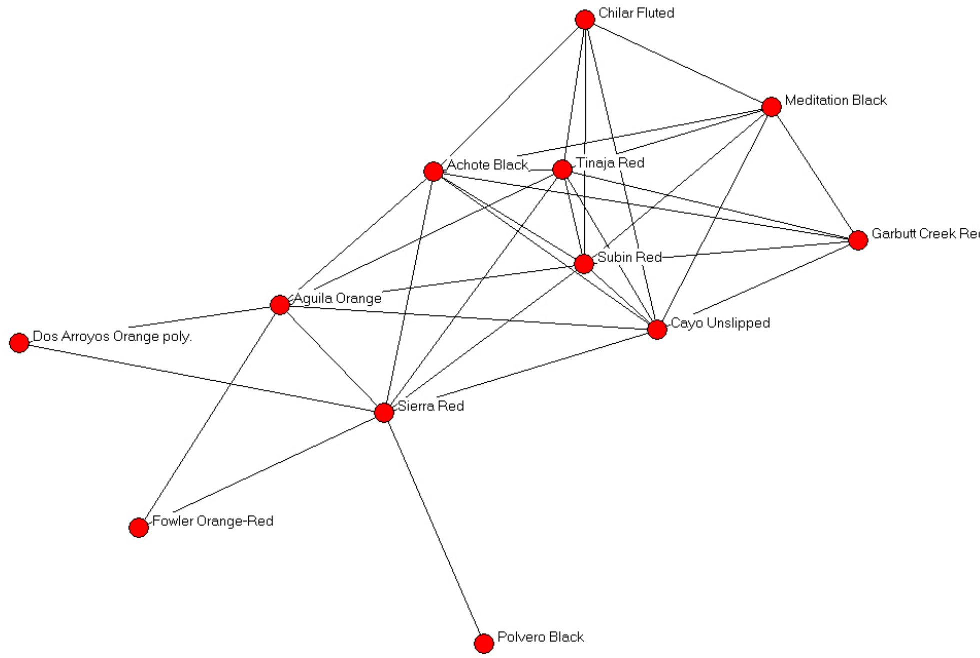

Figure 5.20. Be Tan Chinam ceramic associations, showing only types common between Be Tan Chinam and Dos Hombres, Group D.

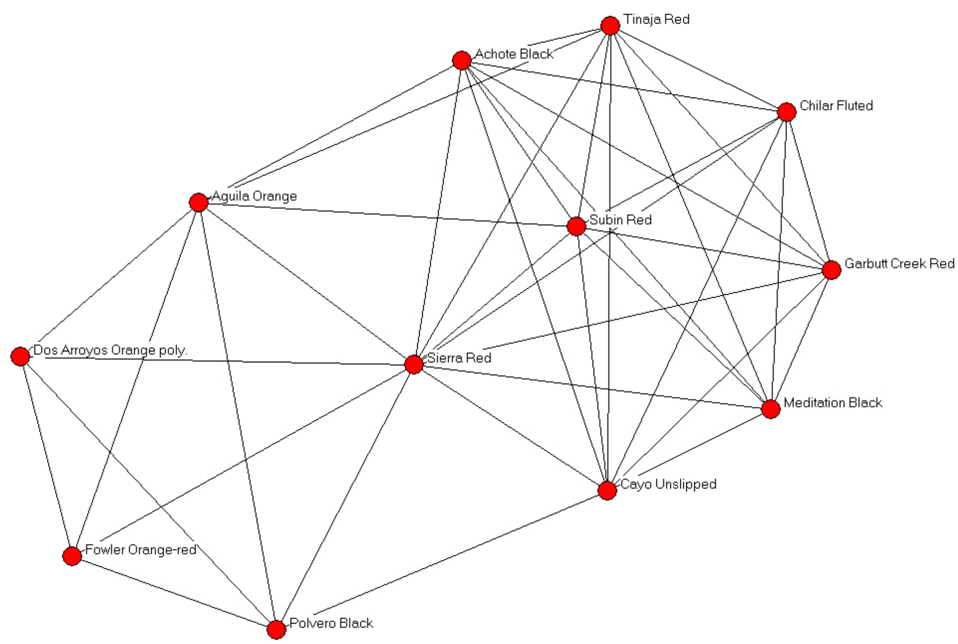

Figure 5.21. Dos Hombres, Group D ceramic associations, showing only types common between Be Tan Chinam and Dos Hombres, Group D.

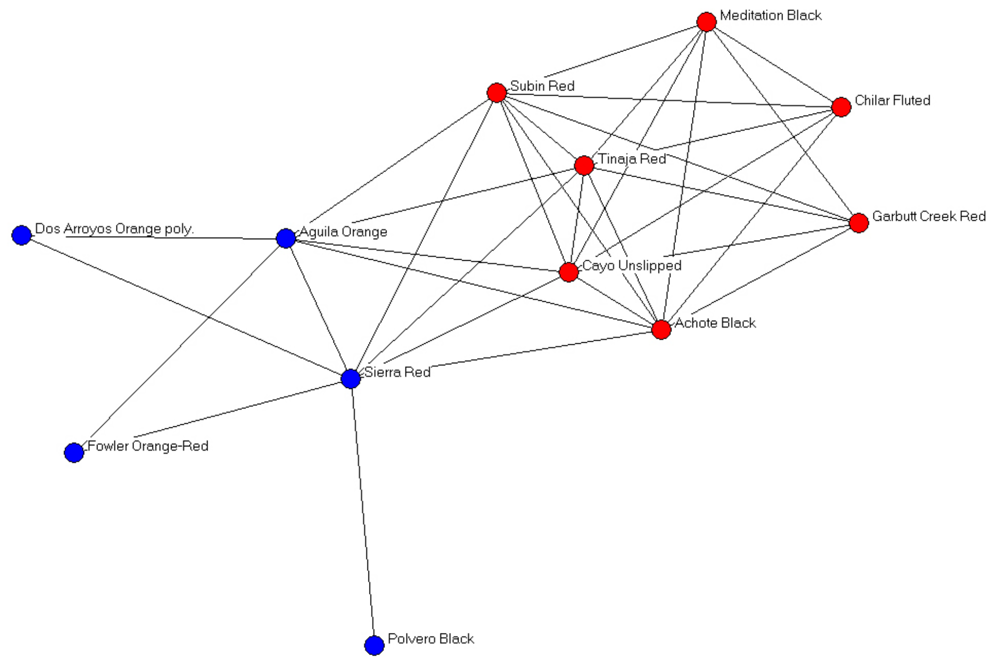

Figure 5.22. Be Tan Chinam ceramic associations, with two factions, showing only types common between Be Tan Chinam and Dos Hombres, Group D.

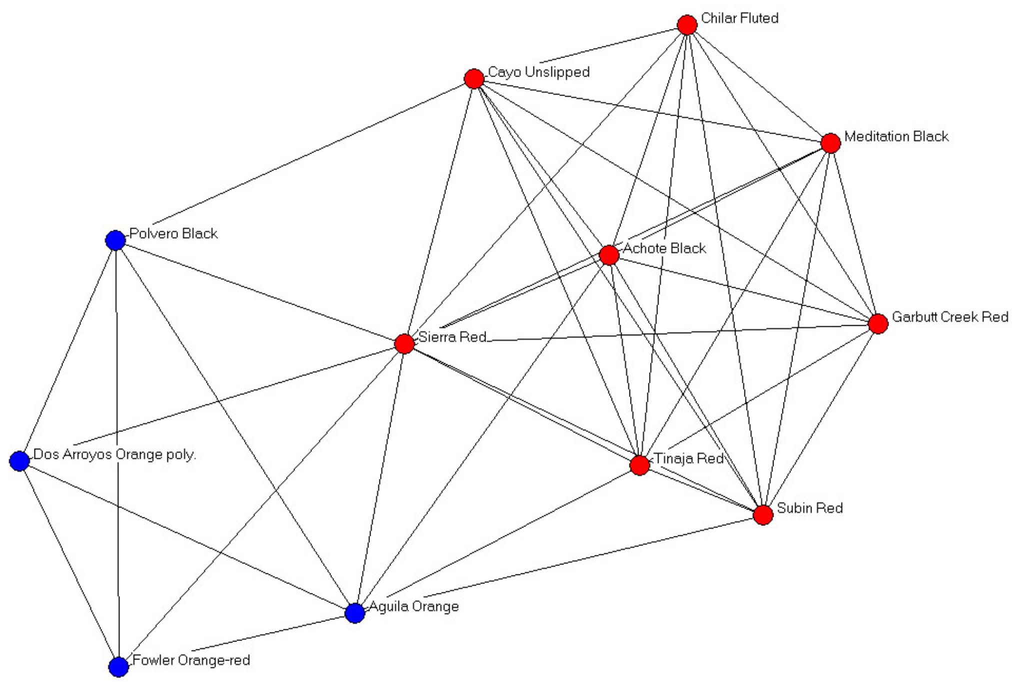

Figure 5.23. Dos Hombres, Group D ceramic associations, with two factions, showing only types common between Be Tan Chinam and Dos Hombres, Group D.

Visualizing ceramics in the context of "social" networks yields new insights into associations between ceramic types. Most of the ceramics recovered in field research for this dissertation were from construction fill or collapse debris so they are not, potentially, as useful as associations that may be drawn between, for example, whole vessels recovered in burials or special deposits or an analysis that uses only ceramics from sealed contexts. One way to improve the validity of ceramic social network analysis would be to use data from contexts with better temporal control. For example, if one were to use data from construction fill lots, then only "sealed" lots could be used. Lots such as collapse debris could be eliminated from consideration due to the disturbed nature of the context. For the purposes of this analysis (to provide illustrative examples) all identified ceramic types were used in the social analysis because relatively few ceramic types could be identified with a high degree of certainty. While it is productive to consider ceramic associations alone, it is also possible to analyze different classes of artifacts as members of the same network; Pachuca obsidian and ceramics are considered together in the next section.

Pachuca Obsidian in Ceramic Context

Pachuca obsidian, since it can be visually identified and is generally considered an Early Classic temporal "marker", is used in this example of the combination of ceramic and obsidian networks. Although it is possible to combine any number of different categories of archaeologically recovered material, Pachuca obsidian and ceramics were chosen here since the data yielded from dissertation field research was not sufficient in other categories such as faunal remains (species could rarely be identified). Given a larger data set with many species identifications (for example the work of Hamblin [1984], see Chapter Two), faunal remains could be analyzed from a network perspective, either as a network alone, or in conjunction with other types of remains such as obsidian and ceramics.

Table 5.9 is a "social network" matrix for Pachuca obsidian and associated ceramic types. In this table, only the lots containing identifiable ceramic types and identified Pachuca obsidian were used. It is therefore the case that Pachuca obsidian is associated with *all* these ceramic types (i.e., it is scored a "1" with all ceramic types). There are additional possibilities, such as considering the overall network of ceramics (e.g. Figure 5.18) and adding the associations of Pachuca obsidian and ceramics to that matrix. For the purposes of clarity and simplicity, only ceramic types found in the same lots as Pachuca obsidian are considered here. The following table (Table 5.9) and Figure 5.24 can therefore be considered, in part, a subset of the overall Dos Hombres network.

Figure 5.24 depicts the network of associations with two factions evident (nodes of each faction are drawn in different colors).

Table 5.9. Matrix of Dos Hombres, Group D ceramic types associated with Pachuca obsidian.

	Achote Black	Cayo Unslipped	Chilar Fluted	Cubeta Incised	Garbutt Creek Red	Kaway Impressed	Laguna Verde Incised	Meditation Black	Polvero Black	Sierra Red	Society Hall	Subin Red	Tinaja Red	Zibal Unslipped	Pachuca Obsidian
Achote Black	0	1	0	1	1	1	1	1	0	1	0	1	1	1	1
Cayo Unslipped	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1
Chilar Fluted	0	1	0	0	0	0	0	0	0	0	0	1	1	0	1
Cubeta Incised	1	1	0	0	1	1	0	0	0	1	0	1	1	1	1
Garbutt Creek Red	1	1	0	1	0	1	1	1	0	1	0	1	1	1	1
Kaway Impressed	1	1	0	1	1	0	0	0	0	1	0	1	1	1	1
Laguna Verde Incised	1	1	0	0	1	0	0	1	0	1	0	0	1	1	1
Meditation Black	1	1	0	0	1	0	1	0	0	1	0	0	1	1	1
Polvero Black	0	1	0	0	0	0	0	0	0	1	1	0	0	0	1
Sierra Red	1	1	0	1	1	1	1	1	1	0	1	0	1	1	1
Society Hall	0	1	0	0	0	0	0	0	1	1	0	0	0	0	1
Subin Red	1	1	1	1	1	1	0	0	0	0	0	0	1	1	1
Tinaja Red	1	1	1	1	1	1	1	1	1	1	0	1	0	1	1
Zibal Unslipped	1	1	0	1	1	1	1	1	0	1	0	1	1	0	1
Pachuca Obsidian	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0

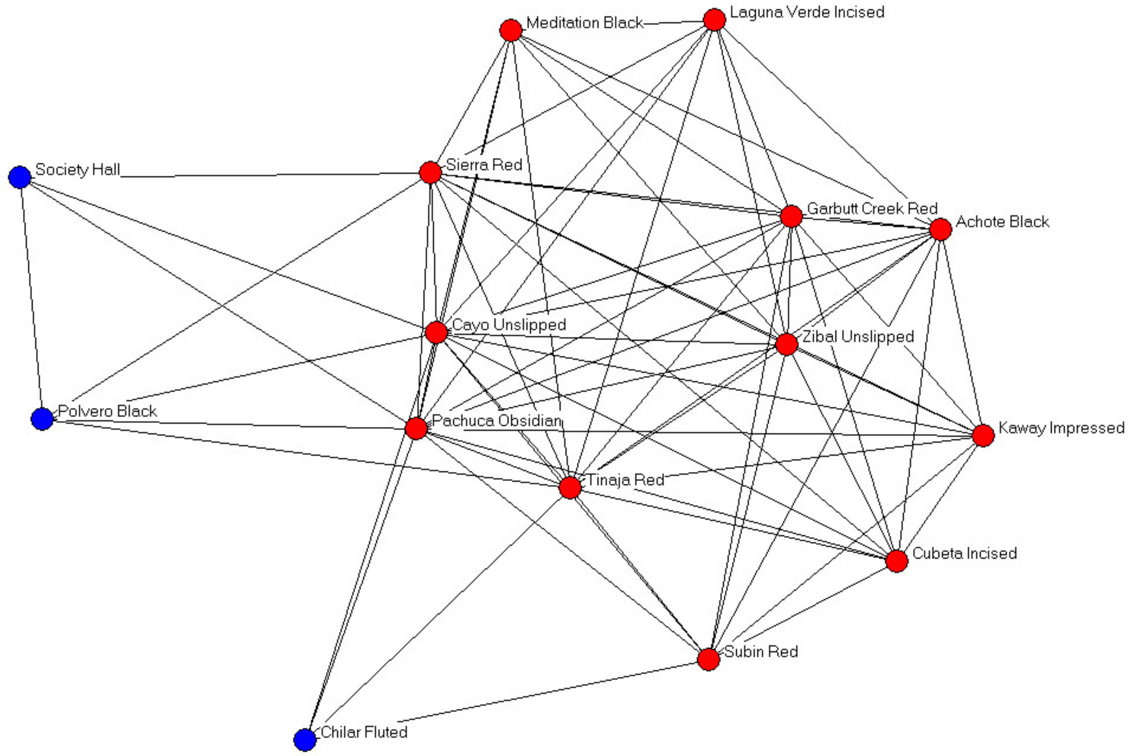

Figure 5.24. The "social network" of Pachuca obsidian and associated ceramic types from Dos Hombres, Group D. Two factions are shown in different (different color nodes).

APPLICATION OF FINDINGS

The science of networks is provides some promising techniques for new ways to conceptualize and visualize a variety of ancient Maya networks. In addition to ceramic association networks, ceramic and Pachuca obsidian association networks, and sociopolitical interaction networks, a variety of other artifact classes and information from inscriptions could be analyzed within a "network approach". It is difficult, given the nature of the field data and (thus far) lack of any hieroglyphs at the sites where fieldwork was undertaken, to integrate the findings from inscriptions with the findings from the artifact network analysis of Dos Hombres Group D and Be Tan Chinam. On a larger scale, in a much larger study, it may be possible to fully integrate these apparently divergent data sets. That is, a study of ceramic "social networks" could be combined with a social network analysis of historically documented individuals to gain further insight into many different issues relating to ceramics and sociopolitics.

In the study of sociopolitical networks from inscriptions, it is possible to produce network graphs of individuals mentioned in inscriptions (e.g., rulers, subordinates, captives, spouses, etc.), rather than simply considering sites. If such a study (a very large undertaking) were completed, a better understanding of Classic period sociopolitics may emerge (for an example of such an approach with historical Mexican data see Alcántara Valverde [2001]). On a coarser level of temporal resolution, the cyclical rise and fall of the Dynamic Model of Maya political organization (e.g. Marcus 1998) can be viewed in network theory terms. In the Dynamic Model, at some times political organization in the Maya area was more centralized, while at other times it was less so (Marcus 1989, 1992, 1993, 1998). Figure 5.25 depicts Marcus' conception of centralized organization (after Flannery 1998). The Dynamic Model applies to numerous archaeologically studied states (Marcus 1998) and can be supplemented by network science approaches. For example, Marcus offers little in the way of explanation as to why "the peaks of consolidation inevitably gave way to the valleys of dissolution" although she points out that "large-scale, asymmetrical, and inegalitarian structures were more fragile and unstable than commonly assumed" (Marcus 1998:94). Viewed as decentralized scale free (aristocratic) networks, one can gain insight into the vulnerability of the Maya sociopolitical network. For example, the relatively small number of hubs with many links may have been the *Achilles heel* of the system in that the disappearance of one (or several) hubs would have led to a complete network breakdown. That is, if Calakmul and/or Tikal were to "disappear" from the system due to warfare or other destruction, then the rest of the network would not maintain its cohesiveness.

Networks that follow power law distributions are termed aristocratic networks because they illustrate the process of the "rich getting richer" (Barabási 2002). That is, as these types of networks form, new nodes have a tendency to seek ties with the hubs that have the most existing connections rather than with other nodes that have relatively few connections in the network. In the ancient Maya case, then, there would be an increasing tendency for centralization over time, centered on sites such hubs as Tikal and Calakmul. For example, sites such as Be Tan Chinam and Dos Hombres, though of varying sizes, would have been likely to "link" in some fashion with a hub site such as Tikal or Calakmul. Such links may have been direct or indirect (through nearby sites such as Maax Na, La Milpa, Gran Cacao, Rio Azul, or others.

Although they are not directly included, I do not wish to imply that La Milpa, Rio Azul, or other sites that are not part of the network analysis in this chapter were not important; they would simply be part of a much larger, comprehensive study. There are many potential avenues of interaction to be explored in the future, including evidence that is not documented in carved-in-stone inscriptions. For example, Tomb 1 at Rio Azul links to Tikal while Rio Azul Stela 1 links to Uaxactun, the "Altar Vase" shows a link between Altar de Sacrificios, Tikal, Yaxchilan, and another site (R. E. W. Adams, personal communication 2005). The sources of data for a science of networks approach in Maya archaeology are varied and widespread.

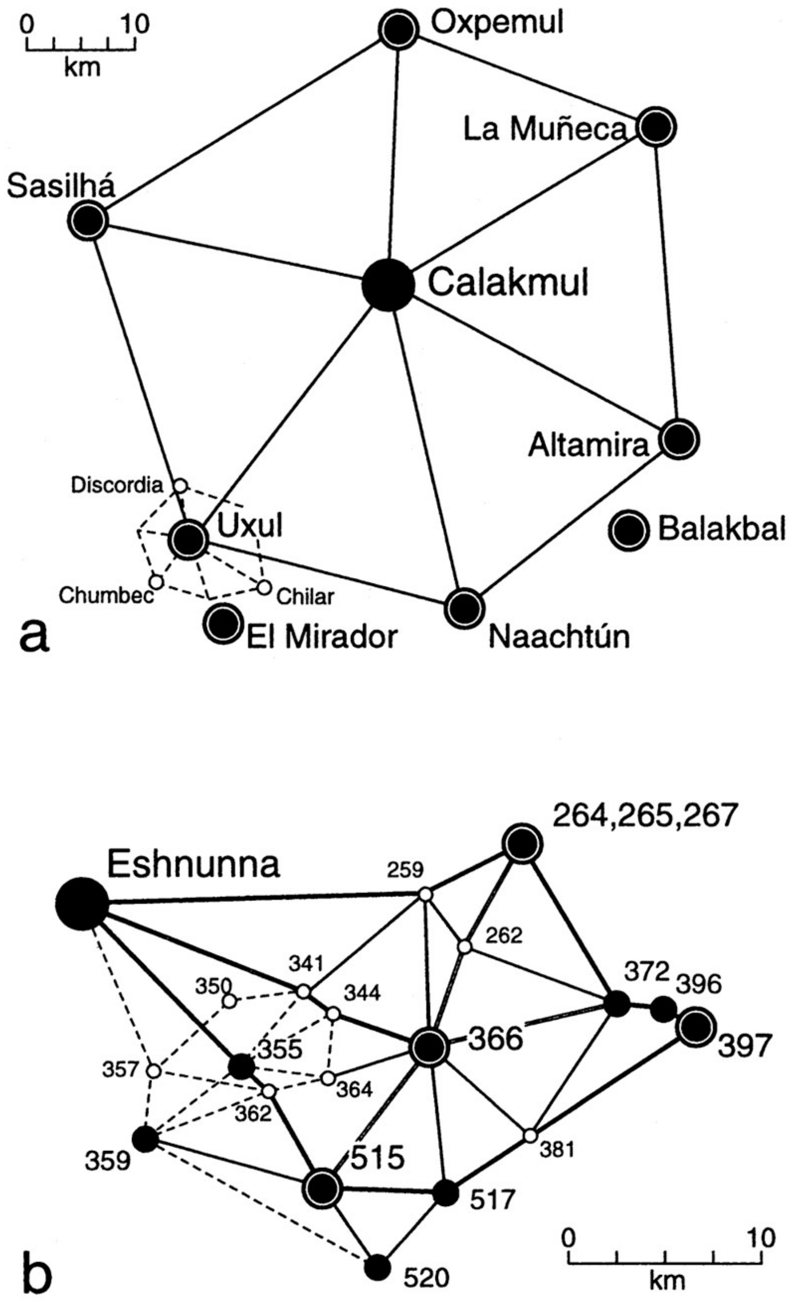

Figure 5.25. A Graph of Archaeological Central Places. (After Flannery 1998:Figure 2.2). Reprinted by permission from *Archaic States*, edited by Gary M. Feinman and Joyce Marcus. Copyright © 1998 by the School of American Research, Santa Fe.

During the Early Classic, the central Mexican site of Teotihuacan, although approximately 1000 km away, may have had significant “influence” in the Maya area. Such “influence” in the Maya area is a complex issue in and of itself, indeed it seems that the Maya also “influenced” Teotihuacan (see Braswell 2004 for a recent collection of papers on this fascinating issue). Whatever the nature or even existence of that “influence”, artifacts that are attributable on stylistic or other grounds to Teotihuacan can be found throughout the Maya area. Teotihuacan, during the Early Classic, was arguably a hub of primary importance in a pan-Mesoamerican aristocratic network, evidenced at both Dos Hombres and the environs of Be Tan Chinam. At Dos Hombres, Group D (Appendix B), and the B-4 Group (Trachman 2002), Pachuca obsidian was recovered. Additionally, Pachuca obsidian was found at Rio Azul (R. E. W. Adams, personal communication 2005), not too distant from the RBCMA. This unique looking obsidian would have been an obvious example of a connection to central Mexico for anyone possessing it. As the center of an aristocratic network, Teotihuacan would have had tremendous connections to many sites throughout the Maya area, including those of the RBCMA. Although Early Classic Teotihuacan style ceramics are found at large, medium, and small sites, Pachuca obsidian is not. This may be the result of archaeological sampling, in that Pachuca obsidian simply has not yet been found at some sites, or it may reflect the lack of participation of some sites in the Pachuca obsidian trade network.

The reach of Teotihuacan during the Early Classic is also evidenced in pottery recovered at the RBCMA. Very close to Be Tan Chinam, at the Barba Group, a tomb containing a Teotihuacan style vessel was excavated. A vessel of such apparent importance at such a small site, is, on the surface, surprising. When one considers, however, the characteristics of aristocratic networks, the widespread appearance of such artifacts throughout the Maya area can be attributed to Teotihuacan's likely role as a major hub of Early Classic Mesoamerican economic and sociopolitical networks. Whether the vessel was imported or made of local clays is an important consideration, but what matters is that the *style* of the vessel can be attributed to Teotihuacan even if the vessel was not imported from there. That is, style and ideas travel along networks, not just commodities and political interactions. At the same time, network theory offers some idea for the rapid breakdown of Early Classic networks that were connected in some way to Teotihuacan. If Teotihuacan was the major hub of an aristocratic network, as is asserted here, its destruction and rapid disappearance at the end of the Early Classic illustrates the potential fragility of aristocratic scale-free networks. Since no other hub had the number of links in any given network that Teotihuacan enjoyed, the distribution network for Teotihuacan style artifacts and Pachuca obsidian disappeared very rapidly. Early Classic Mesoamerican sociopolitical interactions, trade networks, and the transmission of styles and ideas, was, of course, very complex. The Teotihuacan example is given here as an example of the potential utility of viewing various Early Classic phenomena from a science of networks perspective. The complexities of the Teotihuacan Early Classic "influence" in the Maya area are reviewed by Braswell (2004).

The presence of Plaza Plan 2 layouts at both Dos Hombres, Group D and Be Tan Chinam is further evidence of participation in a larger network. Plaza Plan 2 layouts are ubiquitous in the central lowlands, and the RBCMA is no exception. It cannot, however, be argued that sites with such architectural layouts reveal a sociopolitical hierarchy, as was asserted by Lohse and Hageman (2003). There are simply too many sites in close proximity to one another with this same layout to argue for the placement of any one of these relatively small sites politically above the others. Indeed, excavations at Group D revealed a Plaza Plan 2 layout when none would have been apparent based simply on an examination of the architectural layout.

Lastly, many sites in the RBCMA, including Be Tan Chinam have "plain" stelae or altars. In a small world network in which there are few degrees of separation between sites, it should not come as a surprise that monuments are found in areas previously considered to be culturally lacking. In an ancient Maya "small world", no site, no matter how small, was very far removed from the sociopolitical network and the influence of hubs such as Tikal, Calakmul, or others.

SUMMARY AND CONCLUSIONS

Two important issues, among others, have been considered in this dissertation: (1) can the centralized vs. decentralized political organization debate be informed by looking at what the science of networks has to offer? (2) does the science of networks provide potentially useful heuristic/analytical devices in the study of ancient Maya political organization? The answer to these questions is clearly in the affirmative.

The application of network theory to archaeology appears to have tremendous potential that is not limited solely to the application of data gleaned from inscriptions. For example, it may be possible to map networks of sites based on the presence of ceramic types and thereby arrive at new understandings about ceramic distribution. The same may be said of producing network graphs of the distribution of obsidian from a variety of sources besides Teotihuacan. Since obsidian can be sourced, it is possible to draw network graphs of the incidence of the variety of obsidian sources at any given site and its neighbors to attempt to gain insight into the nature of trade networks. Additionally, the understanding of the nature of ancient Mesoamerican sociopolitical interactions from the perspective of network theory yields important new insights into the dynamics of the ancient Maya sociopolitical landscape.

Ancient Maya political organization may be viewed as a complex adaptive system, emerging from the actions of individual actors without any centralized hierarchical control. For example, in the "rich get richer" world of aristocratic networks, coercion or state-level control is not necessary to make some urban centers the main hubs of the sociopolitical network. Although this does not explain political organization or necessarily help us to understand it better, it does serve as a potentially important heuristic device from which we may be able to conceptualize debate anew and thereby gain novel insights and understandings. All political organization is necessarily complex. The criticism that some models are not complex enough and "denigrate" the achievements of ancient civilizations is beside the point. Ancient Maya political organization was arguably more complex than any modern democratic federal system. If we acknowledge the past as potentially more complex than present political forms we move away from evolutionary schemes which see some types of political systems requiring other systems as their foundation or prerequisite.

Complex networks, such as ancient Maya political organization, appear to have emerged without any overarching centralized hierarchical control. This is not to say that there was not centralized political organization present in the ancient Maya world, for certainly there was at some scales, at some times, in some places. Nevertheless, such centralized control did not develop by design; it was an emergent characteristic of what may be viewed (throughout the Classic period overall) as a decentralized network. It appears that the Classic period Maya were tending towards a higher degree of centralization, but the fragility of scale free networks did not survive the problems of the Terminal Classic, whatever the nature of those problems.

In this dissertation, I have applied the science of networks to sites with inscriptions and have shown that sites can be ranked based on their role in the network. I have also tried a limited application of network science to investigations at smaller sites without extant inscriptions, such as Dos Hombres, Group D and Be Tan Chinam. The extent of application and fit to these smaller sites is somewhat limited at present. Additional research would be required at similar small sites to develop a catalog of data to more fully apply network theory to this segment of Maya society.

Archaeology, as a discipline, typically borrows ideas from other social sciences and often follows the lead of anthropological theory. With the potential utility of network theory concepts suggested here, the study of ancient Maya political organization, with such an enormous data set of profound spatial and temporal depth unavailable in other disciplines, has a chance to add to the theoretical discourse of anthropology and other social sciences rather than simply borrowing from them.

Appendices

Appendices A through G contain the data sets that resulted from the analysis of pottery, obsidian, chert tools, human remains, faunal remains, the political interaction data used in computed the sociopolitical network graphs, and sample field recording forms. These appendices are included to ease future research and in the interest of reporting the analysis of material remains. The appendices contain work by the author as well as analysis completed by specialists. In the cases where analysis was done by specialists, they are listed as author(s).

APPENDIX A

Ceramic Data

Analysis by Lauren Sullivan

This appendix presents the results of the identification of the ceramic types recovered in excavations. Table A1 lists ceramics recovered from Dos Hombres (RB 2), Group D and Table A2 lists ceramics from Be Tan Chinam (RB 31). Illustrations and detailed descriptions of each ceramic type are provided by, for example, Adams (1971), Ball (1977), Gifford (1976), Sabloff (1982), Smith (1950), and Valdez (1987).

Table A.1. Ceramics Recovered from Dos Hombres, Group D (RB-2, Operation 33).

Provenience				Three Rivers Ceramic Complex	Type:Variety	Forms					Counts			
RB#	Op	Subop	Lot			Plate	Bowl	Jar	Cylinder	Other	Rim	Body	Base	Total
2	33	A	1	Tepeu 2-3	Achote Black		7				7	55		62
					Cayo Unslipped			6			9	5		14
					Chilar Fluted								1	1
					Cubeta Incised?							1		1
					Garbutt Creek Red		1				1			1
					Red Slipped	2					2			2
					Subin Red		2				2	4		6
					Tinaja Red			2			2	12		14
					Tinaja Red?							75		75
					Unidentified							1		1
2	33	A	2	Tepeu 2-3	Achote Black							45		45
					Cayo Unslipped			3			3	2		5
					Garbutt Creek Red		1				1			1
					Gunshot							20		20
					Subin Red		3				3	2		5
					Tinaja Red							65		65
					Unidentified		1				1	10		11
2	33	A	3	Tepeu 2-3	Achote Black							15		15
					Garbutt Creek Red		1				1			1
					Red Slipped							1		1
					Rubber Camp Brown		3				2	1		3
					Striated							1		1
					Tinaja Red							1		1
					Tinaja Red?							25		25
2	33	A	4	Tepeu 2-3	Subin Red		1				1			1
					Unidentified							3		3
2	33	A	6	Tepeu 2-3; Chicanel trace	Rubber Camp Brown							1		1
					Sierra Red		1				1			1
					Tinaja Red							3		3
					Unidentified		1				1			1
					Unidentified					handle		1		1
					Unslipped			3			3			3
2	33	B	1	Tepeu 2	Achote Black		1				1	10		11
					Cayo Unslipped			1			1	1		2
					Garbutt Creek Red		2				2			2
					Gunshot							25		25

Provenience				Three Rivers Ceramic Complex	Type:Variety	Forms					Counts			
RB#	Op	Subop	Lot			Plate	Bowl	Jar	Cylinder	Other	Rim	Body	Base	Total
					Polychrome						1			1
					Striated							4		4
					Tinaja Red?							15		15
2	33	B	2	Tepeu 2; Chicanel trace	Achote Black		2				2	150		152
					Cayo Unslipped			7			7	20		27
					Cayo Unslipped			2			2			2
					Garbutt Creek Red		4				4			4
					Gunshot							80		80
					Laguna Verde Incised							2		2
					Meditation Black							2		2
					Red Slipped	3					1	2		3
					Sierra Red						1	2		3
					Slateware?							1		1
					Slipped							12		12
					Striated							68		68
					Thin Late Classic Buff			3			3			3
					Thin Late Classic Buff			21				25		25
					Tinaja Red							1		1
					Tinaja Red?							194		
					Unidentified		2					21	1	22
					Unidentified						2	10	5	17
					Unidentified		21				1	20		21
					Zibal Unslipped			3			3			3
2	33	B	3	Tepeu 2; Chicanel trace	Aguila Orange?						1			1
					Cayo Unslipped			9			9	9		12
					Rubber Camp Brown		1				1			1
					Sierra Red?						6	14		20
					Striated			3				18		18
					Thin Late Classic Buff							8		8
					Tinaja Red							25		25
					Unidentified					drilled		1		1
					Unidentified						1	1		2
2	33	B	4	Chicanel	Sierra Red						1			1
					Unidentified							1		1
2	33	C	1	Tepeu 2-3; Tzakol trace	Achote Black							50		50
					Cayo Unslipped			4			1	3		4
					Subin Red		2				2			2

Provenience				Three Rivers Ceramic Complex	Type:Variety	Forms					Counts			
RB#	Op	Subop	Lot			Plate	Bowl	Jar	Cylinder	Other	Rim	Body	Base	Total
					Unidentified							40		40
					Unidentified			1			1			1
					Unidentified		1					1		1
2	33	C	2	Tepeu 3	Achote Black		4				2	20	1	24
					Cayo Unslipped			2			2	4		6
					Subin Red		5				5	1		6
					Tinaja Red			1			1	1		2
					Unidentified		1	2			2	11		13
					Zibal Unslipped			1			1			1
2	33	C	3	Tepeu 2-3	Achote Black		2				2			2
					Black Slipped							7		7
					Tinaja Red							1		1
					Tinaja Red?							20		20
					Unidentified							8		8
2	33	D	1	Tepeu 2-3	Achote Black		27				27	686		713
					Cayo Unslipped			52			52	21		73
					Cubeta Incised							1		1
					Garbutt Creek Red		11				11			11
					Meditation Black							1		1
					Striated							60		60
					Subin Red		30				30	30		60
					Thin Late Classic Buff			3			3	47		50
					Thin Late Classic Buff?							18		18
					Tinaja Red			8			8	250		258
					Unidentified		2	2			4	85	1	85
					Unidentified			1			1	20		20
2	33	D	2	Tepeu 3	Achote Black		5				5	85	1	91
					Cayo Unslipped			8			8			8
					Cubeta Incised							1		1
					Gunshot							25		25
					Red Slipped							1		1
					Subin Red		9				9			9
					Thin Late Classic Buff							2		2
					Tinaja Red							70		70
					Unidentified							9		9
2	33	E	1	Tepeu 3	Achote Black		4				4	70	2	76
					Cayo Unslipped			1			1	6		7

Provenience				Three Rivers Ceramic Complex	Type:Variety	Forms					Counts			
RB#	Op	Subop	Lot			Plate	Bowl	Jar	Cylinder	Other	Rim	Body	Base	Total
					Imitation Fine Orange?							1		1
					Striated							30		30
					Subin Red		2				2	3		5
					Tinaja Red			1			1	25		26
2	33	E	2	Tepeu 2-3	Achote Black							60		60
					Cayo Unslipped			4			4	6		10
					Garbutt Creek Red		2				2			2
					Striated							100		100
					Subin Red							3		3
					Thin Late Classic Buff							15		15
2	33	E	3	Tepeu 2-3	Achote Black		2				2	45		47
					Cayo Unslipped			11			8	3		11
					Striated							35		35
					Thin Late Classic Buff							10		10
2	33	E	4	Chicanel and Mamom	Black Slipped							10		10
					Joventud Red							1		1
					Sierra Red							4		4
					Striated							7		7
					Unidentified						1	12		13
2	33	F	1	Tepeu 2-3	Achote Black		2				2	12		14
					Cayo Unslipped			5			3	2		5
					Striated							10		10
					Subin Red		1				1			1
					Tinaja Red							20		20
					Unidentified					foot		6	1	7
2	33	F	2	Tepeu 2-3	Achote Black		2				2	35		37
					Cayo Unslipped			3			3	1		4
					Striated							14		14
					Subin Red		2				2			2
					Tinaja Red			1			1	12		13
					Unidentified							10	1	11
2	33	F	3	Tepeu 2; Tepeu 1 trace	Achote Black		1				1	7		8
					Cayo Unslipped			4			4			4
					Macal Orange-red						1	1		2
					Subin Red		2				2			2
					Thin Late Classic Buff							8		8
					Unidentified		1				1	7		8
					Unidentified					comal		1		1
2	33	F	4	Chicanel	Polvero Black?							13		13

Provenience				Three Rivers Ceramic Complex	Type:Variety	Forms					Counts			
RB#	Op	Subop	Lot			Plate	Bowl	Jar	Cylinder	Other	Rim	Body	Base	Total
					Sierra Red							20		20
					Striated							30		30
					Unidentified							17		17
2	33	G	1	Tepeu 2-3; Tepeu 1 trace	Achote Black		7				7	30		37
					Garbutt Creek Red		2				2			2
					Red Slipped							10		10
					Subin Red		2				2			2
					Tinaja Red							25		25
					Unidentified			2			1	5		6
					Zibal Unslipped			1			1			1
2	33	G	2	Tzakol?	Orange Slipped							25		25
2	33	H	1	Tepeu 2-3; Tzakol trace	Achote Black		1				3	28		31
					Cayo Unslipped				3		3	7		10
					Striated							12		12
					Unidentified		1	1			1	5	1	7
2	33	H	2	Tepeu 2-3; Tepeu 1 trace	Achote Black							37	1	38
					Cayo Unslipped			4			4	5		9
					Chilar Fluted						2	1		3
					Garbutt Creek Red			3			3			3
					Red Slipped	1					1	4		5
					Subin Red		10				10	1		11
					Thin Late Classic Buff							17		17
					Tinaja Red							56		56
					Unidentified					handle		11		11
					Zibal Unslipped			1			1			1
2	33	H	3	Tzakol?	Unidentified					foot			1	1
2	33	I	1	Tepeu 2-3	Achote Black		1				1	15		16
					Cayo Unslipped			2			2			2
					Cayo Unslipped			4			2	2		4
					Garbutt Creek Red		1				1			1
					Striated							10		10
					Subin Red		5				5			5
					Tinaja Red							20		20
					Unidentified		1				1	4		5
					Unidentified			1			1	21		22
					Zibal Unslipped			1			1			1
2	33	I	2	Tepeu 2	Achote Black		1				1	85		86
					Belize Red?							1		1
					Cayo Unslipped			10			10	8		18

Provenience				Three Rivers Ceramic Complex	Type:Variety	Forms					Counts			
RB#	Op	Subop	Lot			Plate	Bowl	Jar	Cylinder	Other	Rim	Body	Base	Total
					Garbutt Creek Red		2				2			2
					Subin Red		6					6		6
					Thin Late Classic Buff							28		28
					Tinaja Red			3			3	50		53
					Unidentified		1				1			1
2	33	I	3	Tepeu 2; Chicanel trace	Achote Black		1				2	12		14
					Ceramic Disc							1		1
					Sierra Red							2		2
					Striated							8		8
					Subin Red		2				2			2
					Tinaja Red							1		1
					Unidentified								1	1
2	33	I	4	Tepeu 2	Slipped							2		2
					Striated			1			1	3		4
					Tinaja Red							12		12
2	33	I	5	Chicanel	Black Slipped							4		4
					Sierra Red						1	4		5
2	33	I	6	Tzakol and Chicanel; possible Mamom trace	Dos Arroyos Orange-polychrome		1					1		1
					Joventud Red?							3		3
					Sierra Red							2		2
					Unidentified							4		4
2	33	I	7	Chicanel	Sierra Red							2		2
					Unidentified							2		2
2	33	I	8	Chicanel	Gunshot							10		10
					Sierra Red						1	7		8
2	33	I	9	Chicanel?	Cream Slipped?							2		2
					Unidentified			1			1	6		7
2	33	I	10	Chicanel	Gunshot							20		20
					Sierra Red							8		8
					Unidentified							15		15
2	33	J	1	Tepeu 2-3; Tepeu 1 trace	Achote Black		8				8	235		243
					Brown Slipped							7		7
					Cayo Unslipped			20			16	30		46
					Colander							1	1	2
					Cream Slipped			2			2			2
					Cubeta Incised							1		1
					Garbutt Creek Red		4				4			4
					Kaway Impressed		1				1			1

Provenience				Three Rivers Ceramic Complex	Type:Variety	Forms					Counts			
RB#	Op	Subop	Lot			Plate	Bowl	Jar	Cylinder	Other	Rim	Body	Base	Total
					Red Slipped	1					2			2
					Striated						3	156		159
					Subin Red		9				9			9
					Thin Late Classic Buff			2			2	260		262
					Tinaja Red			3			3	201		204
					Unidentified	3					3	26	1	30
					Zibal Unslipped			5			5			5
					Achote Black		9				9	355		364
					Cayo Unslipped			15			12	3		15
					Cayo Unslipped			2			2			2
					Colander						2	3		5
					Dolphin Head Red?		1						1	1
					Garbutt Creek Red		1				1			1
					Red Slipped	2						1	1	2
2	33	J	2	Tepeu 2	Striated			2			2	49		51
					Subin Red		1				1			1
					Thin Late Classic Buff							25		25
					Tinaja Red			1			1	190		191
					Unidentified							26		26
					Unidentified		1	1			2	64		65
					Unidentified					flute		1		1
					Zibal Unslipped			1			1			1
					Achote Black		9				7	155	2	164
					Black Slipped							10		10
					Cayo Unslipped			13			10	18		28
					Cubeta Incised				2		2			2
					Garbutt Creek Red		2				2			2
					Kaway Impressed		2				2			2
2	33	J	3	Tepeu 2-3; Chicanel trace	Red Slipped	1					1		1	2
					Sierra Red							4		4
					Slipped?							20		20
					Striated							55		55
					Tinaja Red?							200		200
					Unidentified			1			1	39		40
					Unidentified			2			2	40		42
					Black Slipped							13		13
2	33	J	4	Chicanel	Sierra Red		1				1	3		4
					Striated							10		10

Provenience				Three Rivers Ceramic Complex	Type:Variety	Forms					Counts			
RB#	Op	Subop	Lot			Plate	Bowl	Jar	Cylinder	Other	Rim	Body	Base	Total
2	33	K	1	Tepeu 2-3	Achote Black		9				9	30		39
					Cayo Unslipped			3			3			3
					Striated							21		21
					Subin Red		1				1			1
					Unidentified			1			1			1
2	33	K	2	Tepeu 2-3	Achote Black		4				2	65	2	69
					Cayo Unslipped			9			6	4		10
					Chilar Fluted						1	2	1	3
					Cream Slipped?			3			3			3
					Cubeta Incised							1		1
					Garbutt Creek Red		2				2			2
					Red Slipped							1		1
					Striated							20		20
					Subin Red		6				6			6
					Tinaja Red							55		55
2	33	L	1	Tepeu 2-3	Achote Black							5	1	6
					Subin Red?		1				1			1
					Tinaja Red							6		6
					Unidentified							3		3
2	33	Trench, Str. D-3, East burial		Tzakol	Fowler Orange-red			1			1			1
					Polychrome				6			6		6
					Polychrome	1						1		1
					Unidentified			1			1			1
2	33	Looter's Trench, Str. D-3		Tzakol and Chicanel	Orange Slipped			2			2	2		4
					Red Slipped			1			1	1		2
					Rio Bravo Red?							2		2
					Sierra Red						2	7	1	8
					Society Hall		1				1			1
					Sierra Red						1	1		2
					Black to Brown Slipped							1		1
					Orange Slipped							1		1
					Red and Black Mottled							1		1
					Unidentified						1	1		2
2	33	M	1	Tepeu 2-3	Achote Black		3				3	115	2	120
					Cayo Unslipped			10			8	6		14
					Garbutt Creek Red		3				3			3
					Meditation Black							4		4
					Subin Red		4				4			4

Provenience				Three Rivers Ceramic Complex	Type:Variety	Forms					Counts			
RB#	Op	Subop	Lot			Plate	Bowl	Jar	Cylinder	Other	Rim	Body	Base	Total
					Tinaja Red			1			2		70	72
					Unidentified							15	1	16
2	33	O	1	Tepeu 2; Chicanel trace	Achote Black		2				2	65		67
					Cayo Unslipped			2			2			2
					Chilar Fluted							1		1
					Sierra Red		1				1			1
					Striated							15		15
					Subin Red		2				1	1		2
					Tinaja Red							50		50
					Unidentified	1					1	1		2
2	33	P	1	Tepeu 2-3	Achote Black							10		10
					Red Slipped							3		3
					Striated							7		7
					Tinaja Red			1			1	6		7
2	33	P	3	Chicanel	Society Hall						2	2		4
					Unidentified						2			2
					Sierra Red						3	21		24
					Consejo Red?								1	1
					Brown Slipped		1				1			1
					Unidentified							4		4
2	33	P	4	Chicanel	Laguna Verde Incised						4			4
					Sierra Red?							14		14
					Sierra Red						1	10		11
					Unidentified						1			1
					Unidentified						1	3		4
					Brown Slipped						2			2
2	33	P	5	Chicanel	Brown Slipped						2	1		3
					Maroon Slipped							1		1
					Sierra Red							2		2
					Sierra Red?							11		11
					Slipped?							7		7
					Society Hall						3	2		5
					Unidentified					spout		3		3
2	33	Q	1	Tepeu 2-3	Achote Black		1				1	8	1	10
					Cayo Unslipped						2	6		8
					Garbutt Creek Red		1				1			1
					Striated							5		5
					Subin Red		2				2			2
					Tinaja Red			1			1	28		29

Provenience				Three Rivers Ceramic Complex	Type:Variety	Forms					Counts			
RB#	Op	Subop	Lot			Plate	Bowl	Jar	Cylinder	Other	Rim	Body	Base	Total
					Unidentified		1				1	1		2
2	33	R	1	Chicanel	Red Slipped							1	1	2
					Sierra Red?							1		1
					Unidentified							10	1	11
2	33	S	1	Tzakol and Chicanel	Orange Slipped							4		4
					Red and Black Mottled							1		1
					Red on Cream Slipped						1			1
					Red Slipped								1	1
					Rio Bravo Red		4				1	6	1	8
					Sierra Red						1			1
					Unidentified							18	3	21
					Unslipped						2			2
2	33	S	3	Tzakol and Chicanel	Aguila Orange							12	1	13
					Buff Slipped							22		22
					Dos Arroyos Orange-polychrome							1	1	2
					Fowler Orange-red							6		6
					Guitara Incised							1		1
					Joventud Red?							3		3
					Polvero Black							31		31
					Rio Bravo Red								1	1
					Sierra Red		6				6	94		100
					Striated							63		63
2	33	S	4	?	Red Slipped								1	1
					Unidentified							4		4
					Unidentified								1	1
2	33	T	1	Tepeu 2-3; Tzakol and Chicanel trace	Achote Black		2				2	7	1	10
					Aguila Orange?		2						2	2
					Cayo Unslipped			2			2			2
					Fowler Orange-Red?			1			1			1
					Red Slipped							1		1
					Sierra Red								1	1
					Striated							12		12
					Subin Red		1				1			1
					Tinaja Red			1			1			1
2	33	U	1	Tepeu 2-3; Chicanel trace	Achote Black		1				1	12		13
					Cayo Unslipped			1			1	4		5
					Meditation Black							2		2

Provenience				Three Rivers Ceramic Complex	Type:Variety	Forms					Counts			
RB#	Op	Subop	Lot			Plate	Bowl	Jar	Cylinder	Other	Rim	Body	Base	Total
					Sierra Red						1			1
					Striated							4		4
					Subin Red		1				1	1		2
2	33	U	2	Tepeu 2-3	Achote Black		4				4	28		32
					Cayo Unslipped			3			3	4		7
					Subin Red		1				1	1		2
					Tinaja Red							35		35
					Unidentified							1		1
2	33	U	3	Tepeu 2; Chicanel mix	Achote Black		1				1	2		3
					Sierra Red						2	4		6
					Unidentified							5		5
2	33	U	4	Tepeu 1; Chicanel trace	Black Slipped							4		4
					Sierra Red?							3		3
					Striated							4		4
					Unidentified							6		6
					Unslipped			1			1			1
2	33	U	5	Chicanel	Sierra Red							1		1
					Unidentified							2		2
2	33	U	6	Chicanel	Red to Brown Slipped								2	2
					Sierra Red						1	2		3
					Slipped							1		1
					Unidentified		1				1			1
2	33	U	7	Chicanel	Brown Slipped?							1		1
					Sierra Red						1	8		9
					Sierra Red?						1	14		15
					Unidentified							4		4
2	33	U	8	Tzakol and Chicanel	Aguila Orange							4		4
					Balanza Black		3					8	3	11
					Pucte Brown?		1				1			1
					Red to Orange Slipped							32		32
					Rio Bravo Red		8				1		7	8
					Sierra Red							6		6
					Striated							15		15
					Unidentified							23		23
					Unidentified		1						1	1
					Unidentified			1			1			1
					Unidentified		2	1			3			3
					Unidentified							1		1
2	33	V	1	Tepeu 2-3	Achote Black		1				1	9		10

Provenience				Three Rivers Ceramic Complex	Type:Variety	Forms					Counts			
RB#	Op	Subop	Lot			Plate	Bowl	Jar	Cylinder	Other	Rim	Body	Base	Total
					Cayo Unslipped			1			1			1
					Striated							3		3
					Tinaja Red							7		7
					Unidentified							2		2
2	33	V	2	Tzakol; Chicanel trace	Aguila Orange?		1				1			1
					Red Slipped							1		1
					Red to Brown Slipped							1		1
					Sierra Red							1		1
					Slipped							3		3
					Striated							8		8
					Unidentified		1	1				1	2	3
					Unidentified							8		8
2	33	W	1	Tepeu 2-3	Unidentified							3		3
2	33	W	2	Tepeu 2-3	Achote Black		2				2	15		17
					Cayo Unslipped			1			1			1
					Striated							4		4
					Tinaja Red							12		12
					Unidentified							2		2
					Unidentified					drum				1
2	33	AB	1	Tepeu 2-3	Achote Black		11				11	30	3	
					Black Slipped							10		
					Cayo Unslipped			9			9	10		
					Subin Red		2				2	3		
					Slipped							22		
					Striated							6		
					Tinaja Red							35		
					Unidentified			1			4	18		
2	33	AC	1	Tepeu 2-3	Achote Black		8				8	85		93
					Cayo Unslipped			7			5	3		8
					Gunshot							30		30
					Orange Slipped							1		1
					Red Slipped?							15		15
					Slipped							10		10
					Striated							50		50
					Subin Red		3				3	5		8
					Tinaja Red							25		25
					Unidentified						1	1	2	4
2	33	AC	2	Tepeu 2; Chicanel trace	Achote Black						1	85		86
					Black Slipped							6	12	18

Provenience				Three Rivers Ceramic Complex	Type:Variety	Forms					Counts			
RB#	Op	Subop	Lot			Plate	Bowl	Jar	Cylinder	Other	Rim	Body	Base	Total
					Cayo Unslipped			14			11	3		14
					Red Slipped								2	2
					Sierra Red							1		1
					Striated							26		26
					Subin Red?							4		4
					Tinaja Red							60		60
					Unidentified							4		4
2	33	AC	3	Chicanel; poss. Mamom trace	Joventud Red?							1		1
					Polvero Black?							4		4
					Red to Brown Slipped						1			1
					Sierra Red						1	5		6
					Sierra Red?							7		7
					Striated							2		2
					Unidentified							2		2
2	33	AC	4	Chicanel?	Black Slipped							2		2
					Orange Slipped							1		1
					Red Slipped						1			1
					Sierra Red?							8		8
					Striated							5		5
					Unidentified							10		10
2	33	AD	1	Tepeu 2-3	Achote Black		12				12	95		107
					Cayo Unslipped			15			15			15
					Ceramic Bird head							1		1
					Ceramic Disc?							1		1
					Chilar Fluted						1			1
					Garbutt Creek Red		1				1			1
					Red Slipped	1					1			1
					Red Slipped							4		4
					Striated							35		35
					Subin Red		6				6	4		10
					Tinaja Red							65		65
					Unidentified			1			1	15	1	17
2	33	AE	1	Tepeu 2; Tepeu 1 trace	Achote Black		9				9	75		84
					Cayo Unslipped			6			6			6
					Chilar Fluted							1	1	2
					Meditation Black							5		5
					Red Slipped							9		9
					Striated							40		40

Provenience				Three Rivers Ceramic Complex	Type:Variety	Forms					Counts			
RB#	Op	Subop	Lot			Plate	Bowl	Jar	Cylinder	Other	Rim	Body	Base	Total
					Tinaja Red							80		80
					Unidentified			1			1			1
					Unidentified			3			3			3
					Unslipped						1			1
2	33	AE	2	Tepeu 2; Tepeu 1 trace	Achote Black		4				4	65		69
					Cayo Unslipped			5			5	2		7
					Cubeta Incised		1				1			1
					Garbutt Creek Red		1				1			1
					Meditation Black		1				1			1
					Subin Red		3				3	4		7
					Thin Late Classic Buff							20		20
					Tinaja Red			1			1	75		76
					Unidentified		2				1		1	2
					Whistle fragment?							1		1
2	33	AF	1	Tepeu 2-3	Achote Black		15				15	330	1	346
					Cayo Unslipped			20			20	12		32
					Garbutt Creek Red		1				1			1
					Meditation Black							3		3
					Red Slipped							8		8
					Striated							20		20
					Subin Red		11				11			11
					Tinaja Red			2			2	150		152
					Unidentified			1			1	24		25
2	33	AF	2	Tepeu 2-3; Chicanel trace	Achote Black							55		55
					Cayo Unslipped			6			6	2		7
					Gunshot							20		20
					Meditation Black		1				1			1
					Orange to Brown Slipped?		1				1			1
					Sierra Red							2		2
					Striated							25		25
					Striated			1			1			1
					Subin Red		4				4			4
					Unidentified							8	1	9
2	33	BA	1	Tepeu 2-3	Cayo Unslipped						1			1
					Chilar Fluted							1		1
					Gunshot							15		15
					Striated							18		18
					Subin Red		1				1			1

Provenience				Three Rivers Ceramic Complex	Type:Variety	Forms					Counts			
RB#	Op	Subop	Lot			Plate	Bowl	Jar	Cylinder	Other	Rim	Body	Base	Total
					Tinaja Red							31		31
					Unidentified		1				1	20		21
2	33	BA	2	Tepeu 2	Achote Black		3				1	12		13
					Cayo Unslipped							4		4
					Tinaja Red							6		6
					Unidentified							4	1	5
2	33	BA	3	Tepeu 2-3 and Chicanel	Black Slipped							63		63
					Cayo Unslipped			1			1			1
					Polvero Black							2		2
					Red Slipped?							50		50
					Sierra Red						1	19		20
					Sierra Red?			1			1			1
					Slipped							20		20
					Society Hall		2				2			2
					Society Hall style?						1			1
					Striated							47		47
					Unidentified		1				1	9		10
					Unidentified					foot			1	1
					Unidentified							1		1
					Unslipped						1			1
2	33	BA	4	Chicanel	Black Slipped							12		12
					Brown and Black Mottled		1				2	2		4
					Red Slipped			1				1		1
					Sierra Red						3	5		8
					Society Hall		3				2	1		3
					Unidentified						1			1
					Unslipped							4		4
2	33	BB	1	Tepeu 2-3	Achote Black		3				3	17		20
					Cayo Unslipped			1			1			1
					Garbutt Creek Red		2				2			2
					Gunshot							15		15
					Subin Red		1				1			1
					Tinaja Red							22		22
					Unidentified							4	1	5
2	33	BB	2	Tepeu 2-3; Tzakol trace	Achote Black		1				1	40		41
					Slipped							3		3
					Subin Red		3				3			3
					Tinaja Red							33		33
					Tinaja Red?							24		24

Provenience				Three Rivers Ceramic Complex	Type:Variety	Forms					Counts			
RB#	Op	Subop	Lot			Plate	Bowl	Jar	Cylinder	Other	Rim	Body	Base	Total
					Unidentified								1	1
					Unidentified								1	1
					Unidentified		2				2	16		18
2	33	BC	1	Tepeu 2-3; Tzakol trace	Achote Black		2				2	23		25
					Cayo Unslipped							3		3
					Subin Red		1				1			1
					Tinaja Red							4		4
					Unidentified							2	1	3
					Unidentified	1					1			1
2	33	BC	2	Tepeu 2-3; Tzakol and Chicanel trace	Achote Black							12		12
					Aguila Orange							1	1	2
					Red Slipped			1			1			1
					Sierra Red						3	1		4
					Subin Red		2				2			2
					Tinaja Red							4		4
					Unidentified							2		2
					Unidentified			1			1			1
2	33	BC	3	Tzakol and Chicanel	Aguila Orange								1	1
					Balanza Black?							2		2
					Black Slipped							6		6
					Brown Slipped							1		1
					Gunshot							30		30
					Orange Slipped							15		15
					Polychrome		2				2			2
					Red Slipped							18	1	19
					Rio Bravo Red								2	2
					Sierra Red						1			1
					Sierra Red?		5				5	49		54
					Striated							12		12
					Unidentified			4			4	13	4	21
2	33	BD	1	Tepeu 2-3: Tzakol trace	Achote Black		4				4	24		28
					Black Slipped							15	1	16
					Cayo Unslipped			13			13	3		16
					Chilar Fluted				1		1	2	1	4
					Dolphin Head Red		2				2			2
					Garbutt Creek Red		2				2			2
					Orange Slipped							1		1
					Red Slipped							1		1

Provenience				Three Rivers Ceramic Complex	Type:Variety	Forms					Counts			
RB#	Op	Subop	Lot			Plate	Bowl	Jar	Cylinder	Other	Rim	Body	Base	Total
					Slipped							18		18
					Striated							33		33
					Subin Red		15				15			15
					Subin Red							13		13
					Teakettle Bank Black			1			1			1
					Tinaja Red			1				1		1
					Unidentified						3		1	4
					Unidentified							1		1
2	33	BD	2	Tepeu 2; Tzakol and Chicanel trace	Achote Black		13				9	30	1	40
					Black Slipped							19		19
					Buff Slipped							6		6
					Cayo Unslipped			11			11	6		17
					Chilar Fluted						1	1		2
					Cubeta Incised							1		1
					Gunshot							15		15
					Meditation Black		1				1	2		3
					Orange to Buff Slipped?						1			1
					Polychrome		1				1			1
					Red on Buff			2				2		2
					Red Slipped	1					1	7		9
					Rio Bravo Red								1	1
					Striated			1			1	25		26
					Subin Red		17				17	1		18
					Unidentified							39	2	41
					Unidentified			20			1	27		28
2	33	BE	1	Tepeu 2-3; Tzakol trace	Achote Black		3				3	28		31
					Buff Slipped							1		1
					Cayo Unslipped			2				2		2
					Red Slipped?							11		11
					Rio Bravo Red							1	1	2
					Striated							14		14
					Tinaja Red							7		7
2	33	BE	2	Chicanel: Mamon trace	Buff Slipped			1			1			1
					Gunshot							15		15
					Joventud Red							1		1
					Polychrome		1				1			1
					Sierra Red						2	6		8
					Unslipped							4		4
2	33	BF	1	Tepeu 2	Red Slipped								1	1

Provenience				Three Rivers Ceramic Complex	Type:Variety	Forms					Counts			
RB#	Op	Subop	Lot			Plate	Bowl	Jar	Cylinder	Other	Rim	Body	Base	Total
					Tinaja Red							1		1
					Unidentified							2		2
2	33	BF	3	Tzakol and Chicanel	Aguila Orange							4		4
					Dos Arroyos Orange poly.								1	1
					drilled sherd disk							1		1
					Sierra Red						1	7		8
					Striated							6		6
					Unidentified								1	1
					Unidentified							1		1
2	33	BG	1	Tepeu 2-3; Tzakol trace	Achote Black		7				7	285		292
					Garbutt Creek Red		3				3			3
					Gunshot							150		150
					Red Slipped							3	1	4
					Roaring Creek Red	1					1			1
					Slateware?							4		4
					Slipped							15		15
					Subin Red		6				6			6
					Tinaja Red?							222		222
					Unidentified						2			2
					Unidentified							19		19
2	33	BG	2	Tepeu 2-3	Achote Black		2				2			2
					Achote Black		22				19	314	5	338
					Black Slipped							7		7
					Black Slipped	1					1	63	1	65
					Buff Slipped			10				10		10
					Cayo Unslipped			16			16	20		36
					Chilar Fluted							1		1
					Cream Slipped			1			1	21		22
					Cream Slipped?			4			4			4
					Cubeta Incised							1		1
					Dolphin Head Red		1				1			1
					Gunshot							305		305
					Gunshot							70		70
					Meditation Black		2				2			2
					Red Slipped	1		2			2	117	1	120
					Sherd disc					2		2		2
					Slipped							57		57
					Striated			1				122		122
					Subin Red		18				18	6		24

Provenience				Three Rivers Ceramic Complex	Type:Variety	Forms					Counts			
RB#	Op	Subop	Lot			Plate	Bowl	Jar	Cylinder	Other	Rim	Body	Base	Total
					Tinaja Red							117		117
					Tinaja Red							35		35
					Tinaja Red?							39		39
					Unidentified			19				19		19
					Unidentified			1				1		1
					Unidentified							2		2
					Unidentified					foot			2	2
					Unidentified		3				3			3
					Unidentified			2			2	64		66
2	33	BH	1	Tepeu 2-3	Cayo Unslipped			1			1			1
					Cream Slipped			1			1			1
					Slipped							17		17
					Striated							6		6
					Tinaja Red							32		32
					Unidentified						1	8		9
2	33	BH	2	Tepeu 2-3; Tzakol trace	Achote Black		1				1	47		48
					Cayo Unslipped			3			3	4		7
					Chilar Fluted							1		1
					Cubeta Incised		1				1	3		4
					Fine Orange							1		1
					Gunshot							35		35
					Imitation Fine Orange?							1		1
					Meditation Black							6		6
					Orange polychrome		1				1			1
					Red and Black Mottled			1				1		1
					Red Slipped							7		7
					Striated							21		21
					Subin Red		2				3			2
					Tinaja Red?							56		56
					Unidentified			1			2	8		10
2	33	BH	3	Tepeu 2-3; Chicanel trace	Achote Black							43		43
					Achote Black							25		25
					Black Slipped	1							1	1
					Cayo Unslipped			2			2			2
					Cayo Unslipped			1			1			1
					Cubeta Incised							1		1
					Gunshot							95		95
					Sierra Red		1				1	4		5
					Striated							22		22

Provenance				Three Rivers Ceramic Complex	Type:Variety	Forms					Counts			
RB#	Op	Subop	Lot			Plate	Bowl	Jar	Cylinder	Other	Rim	Body	Base	Total
					Subin Red		1				1			1
					Tinaja Red							18		18
					Unidentified		1				1	14		15
					Unslipped							4		4
2	33	BH	4	Chicanel	Chicago Orange							3		3
					Joventud Red?							1		1
					Orange slipped							1		1
					Polvero Black							5		5
					Red and Black Mottled						2	1		3
					Sierra Red						1	21		22
2	33	BH	9	Chicanel	Chicago Orange						1	7		8
					Polvero Black							3		3
					Sierra Red						1	15		16
					Unidentified							1		1
2	33	BI	1	Tepeu 2-3	Achote Black							18		18
					Cayo Unslipped			3			3	1		4
					drilled sherd disk									1
					Garbutt Creek Red		1				1			1
					Striated							14		14
					Unidentified							21		21
					Unidentified			7				7		7
2	33	BI	2	Tepeu 2-3	Achote Black		10				10	136	2	148
					Black Slipped							110		110
					Cayo Unslipped			15			11	31		42
					Cream Slipped			4			4	3		7
					Cubeta Incised							2		2
					Dolphin Head Red		2				2	1		3
					Garbutt Creek Red		7				7	6		13
					Gunshot							110		110
					Gunshot							23		23
					Red Slipped			1			1	85		86
					Sierra Red					1	1			1
					Striated							27		27
					Striated							7		7
					Subin Red							1		1
					Tinaja Red							48		48
					Unidentified			14				14		14
					Unidentified							16		16
					Unidentified								1	1

Provenience				Three Rivers Ceramic Complex	Type:Variety	Forms					Counts			
RB#	Op	Subop	Lot			Plate	Bowl	Jar	Cylinder	Other	Rim	Body	Base	Total
2	33	BI	3	Tepeu 2; Chicanel trace	Black Slipped							146		146
					Cream Slipped							14		14
					Garbutt Creek Red		1				1			1
					Red Slipped							189		189
					Red Slipped						1			1
					Red Slipped								1	1
					Red Slipped							39		39
					Sierra Red						3			3
					Striated							63		63
					Unidentified						2			2
2	33	BI	4	Chicanel; Mamon trace	Buff Slipped			1			1			1
					Chicago Orange							6		6
					Joventud Red						1	4		5
					Red and Black Mottled							4		4
					Sierra Red						2	28		30
					Striated							10		10
					Unidentified						1			1
					Unslipped							16		16
2	33	BJ	1	Tepeu 2-3	Achote Black							7		7
					Gallinero Fluted							2		2
					Gunshot							38		38
					Unidentified		1	1			2	12		14
					Unidentified							1		1
2	33	BJ	2	Tepeu 2-3	Achote Black							30		30
					Cayo Unslipped			7			7	4		11
					Cream Slipped						2	14		16
					Garbutt Creek Red		1				1			1
					Gunshot							76		76
					Meditation Black		1				1			1
					Red Slipped							6		6
					Striated							67		67
					Tinaja Red							58		58
					Unidentified						1			1
					Unslipped							93		93
2	33	BJ	3	Tepeu 2	Achote Black		3				3	35		38
					Black Slipped							21		21
					Cayo Unslipped			1			1			1
					Cubeta Incised							1	1	2

Provenience				Three Rivers Ceramic Complex	Type:Variety	Forms					Counts			
RB#	Op	Subop	Lot			Plate	Bowl	Jar	Cylinder	Other	Rim	Body	Base	Total
					Garbutt Creek Red		1				1			1
					Gunshot							75		75
					Striated							15		15
					Subin Red		2				2			2
					Tinaja Red							37		37
					Unslipped							15		15
2	33	BJ	4	Tepeu 2-3; Tzakol/Chicanel trace	Achote Black		1				1	89		90
					Cayo Unslipped			2			2			2
					Cream Slipped							23		23
					Sierra Red						4			4
					Striated							58		58
					Subin Red		3				3			3
					Tinaja Red							64		64
					Unidentified		1				1	1		2
					Unidentified		2					27	2	29
2	33	BJ	5	Tepeu 1	Cream Slipped							3		3
					Striated							4		4
					Unidentified						6			6
					Unidentified							8		8
					Unslipped			2				2		2
					Zibal Unslipped			2			2			2
2	33	BJ	6	Chicanel; Mamon trace	Black Slipped							70		70
					Cream Slipped							43		43
					Gunshot							80		80
					Joventud Red							8		8
					Polvero Black							10		10
					Red Slipped							43		43
					Red Slipped							37		37
					Sierra Red						8	120		128
					Striated							79		79
2	33	BJ	7	Chicanel; Mamon trace	Black Slipped						1	14		15
					Buff Slipped							12		12
					Chicago Orange						1	17		18
					Consejo Red						5	18		23
					Guitara Incised						1			1
					Gunshot							165		165
					Sierra Red						1	48		49
					Unidentified							1		1
2	33	BJ	8	Chicanel	Polvero Black							2		2

Provenience				Three Rivers Ceramic Complex	Type:Variety	Forms					Counts			
RB#	Op	Subop	Lot			Plate	Bowl	Jar	Cylinder	Other	Rim	Body	Base	Total
					Sierra Red							4		4
2	33	BK	1	Tepeu 3	Cayo Unslipped						1			1
2	33	BK	2	Tepeu 2-3	Achote Black							54		54
					Cayo Unslipped			12			12			12
					Cubeta Incised								1	1
					Garbutt Creek Red		1				1			1
					Red Slipped	1						34	1	35
					Slipped							23		23
					Striated							14		14
					Subin Red		2				2	3		5
					Thin Late Classic Buff?							8		8
					Tinaja Red							1		1
2	33	BK	2	Tepeu 2-3	Unidentified					foot		4	1	5
2	33	BK	3	Tepeu 2	Achote Black							6		6
					Cayo Unslipped			1			1			1
					Tinaja Red							8		8
					Tinaja Red?							1		1
2	33	BK	4	Tepeu 2	Achote Black		2				2			2
					Cayo Unslipped			1			1			1
					Gunshot							43		43
					Striated							5		5
					Tinaja Red			21				21		21
					Unidentified							1		1
2	33	BK	5	Tepeu 2	Achote Black		1				1			1
					Red Slipped							13		13
					Striated							21		21
					Subin Red		1				1			1
					Tinaja Red?			10				10		10
					Unslipped							6		6
2	33	BL	1	Tepeu 2-3	Achote Black		3				1	2		3
					Achote Black		1				1			1
					Black Slipped							23		23
					Cayo Unslipped			2			2			2
					Garbutt Creek Red		3				3			3
					Red Slipped							37		37
					Striated							21		21
					Subin Red		1				1			1
					Tinaja Red							18		18
					Unidentified						2			2

Provenience				Three Rivers Ceramic Complex	Type:Variety	Forms					Counts			
RB#	Op	Subop	Lot			Plate	Bowl	Jar	Cylinder	Other	Rim	Body	Base	Total
2	33	BL	2	Tepeu 2-3	Achote Black							16		16
					Gunshot							5		5
					Striated			1				1		1
					Subin Red		1				1			1
					Tinaja Red							7		7
					Unidentified							3		3

Table A.2. Ceramics Recovered from Be Tan Chinam (RB-31).

Provenience				Three Rivers Ceramic Complex	Type:Variety	Forms					Counts			
RB#	Op	Subop	Lot			Plate	Bowl	Jar	Cylinder	Other	Rim	Body	Base	Total
31	1	A	4	Tepeu 2	Achote Black		1				1	13		14
					Cayo Unslipped			1			1			1
					Chilar Fluted							1		1
					Gunshot							20		20
					Subin Red							2		2
					Unidentified							3		3
31	1	A	5	Tepeu 2	Achote Black		1				1	5		6
					Gunshot							8		8
					Unidentified			1			1	5		6
31	1	A	7	Tepeu 2	Achote Black						1	16		17
					Cayo Unslipped			1			1	4		5
					Gunshot							35		35
					Red Slipped							5		5
					Subin Red		2				2	1		3
					Thin Late Classic Buff							6		6
					Tinaja Red			1			1	27		28
					Unidentified							7		7
31	1	A	8	Tepeu 2	Achote Black							15		15
					Gunshot							25		25
					Red Slipped		1				1			1
					Subin Red		3				3			3
					Thin Late Classic Buff							10		10
					Tinaja Red			3			3	26		29
					Unidentified			1			1			1
31	1	A	8	Chicanel	Ceramic Monkey Head									1
31	1	A	9	Tepeu 2	Striated							4		4
					Tinaja Red							2		2
					Unidentified							2		2
31	1	A	10	Tepeu 2?	Achote Black?							1		1
					Gunshot							4		4
					Red Slipped							1		1
					Striated							10		10
					Unidentified							6		6
31	1	A	11	Tepeu 2?	Unidentified							4		4
					Slipped							1		1
31	1	A	15	?	Unidentified							2		2
31	1	A	16	Chicanel	Polvero Black?							1		1
					Red Slipped							3		3
					Sierra Red							5		5
					Striated							3		3
					Unidentified							2		2
31	1	A	17	Early	Buff Slipped?							3		3

Provenience				Three Rivers Ceramic Complex	Type:Variety	Forms					Counts			
RB#	Op	Subop	Lot			Plate	Bowl	Jar	Cylinder	Other	Rim	Body	Base	Total
				Chicanel	Gunshot							25		25
					Polvero Black							4		4
					Red and Black Mottled		1				1			1
					Sierra Red		2	1			4	12	1	17
					Sierra Red: Variety Unspecified (Maroon)							2		2
					Striated							2		2
					Unidentified							12		12
					Unslipped			1				2		2
31	3	A	1	Tepeu 2-3	Achote Black		2				2	15		17
					Achote Black?							8		8
					Gunshot							16		16
					Red Slipped							4		4
					Tinaja Red							3		3
					Unidentified							7		7
31	3	A	2	Tepeu 2-3	Achote Black							10		10
					Alexanders Unslipped			1			1			1
					Cayo Unslipped			1			1			1
					Gunshot							10		10
					Red Slipped?							3		3
					Unidentified							7		7
31	3	A	3	Tepeu 2	Slipped?							1		1
					Striated							2		2
					Tinaja Red?			1			1			1
					Unidentified							3		3
31	4	A	1	Tepeu 2-3?	Unidentified							3		3
31	5	A	1	Tepeu 2-3	Achote Black							23		23
					Gunshot							20		20
					Tinaja Red?							10		10
					Unidentified			2				7		7
31	5	A	2	Tepeu 2; Tzakol and Chicanel trace	Achote Black							123		123
					Aguila Orange		2				1	2		3
					Black Slipped								1	1
					Cayo Unslipped			7			8			8
					Garbutt Creek Red: Var. Un.		4				4			4
					Guacamallo Red-on-Orange			1			1			1
					Gunshot							82		82
					Orange Slipped							1		1
					Red Slipped							7		7
					Rio Bravo Red?								1	1
					Sierra Red						1	20		21
					Striated							3		3

Provenience				Three Rivers Ceramic Complex	Type:Variety	Forms					Counts			
RB#	Op	Subop	Lot			Plate	Bowl	Jar	Cylinder	Other	Rim	Body	Base	Total
					Subin Red		4				4			4
					Thin Late Classic Buff							10		10
					Tinaja Red							99		99
					Unidentified		1				2	6	3	11
					Unslipped			1			1			1
31	5	A	3	Tzakol and Chicanel	Aguila Orange							5		5
					Black Slipped?							4		4
					Buff Slipped							2		2
					Dos Arroyos Orange polychr.		1				1	4		5
					Red Slipped							3		3
					Sierra Red						3	21		24
					Striated							15		15
					Unidentified		3	1			1	15	2	18
31	5	A	4	Tzakol?	Aguila Orange?							1		1
					Gunshot							85		85
					Striated							2		2
					Unidentified			1			1	1		2
31	5	A	5	Tzakol and Chicanel	Aguila Orange							2		2
					Dos Arroyos Orange polychr.?		1				1		1	2
					Fowler Orange-Red			4			1	3		4
					Red Slipped			3				3		3
					Sierra Red						1			1
					Striated							26		26
					Unidentified								1	1
					Unidentified							4		4
31	5	B	1	Tepeu 2-3; Chicanel trace	Achote Black		15				2	145		147
					Cayo Unslipped			2			2	3		5
					Gunshot							20		20
					Sierra Red							3		3
					Striated							12		12
					Subin Red		2				2	2		4
					Tinaja Red							78		78
					Unidentified		1				1			1
31	6	A	1	Tepeu 2-3	Achote Black							4		4
					Cayo Unslipped			1			1	1		2
					Subin Red		1				1	1		2
					Tinaja Red?			2			2	7		9
					Unidentified							7		7
31	6	A	2	Tepeu 2-3	Achote Black		5				5	46		51
					Black Slipped			1			1			1
					Cayo Unslipped			6			6	2		8
					Striated							12		12
					Subin Red		2				2			2
					Tinaja Red			1				46		46

Provenience				Three Rivers Ceramic Complex	Type:Variety	Forms					Counts			
RB#	Op	Subop	Lot			Plate	Bowl	Jar	Cylinder	Other	Rim	Body	Base	Total
					Unidentified			1			1	13		14
					Achote Black		3				3	1	1	5
					Buff to Brown Slipped							1		1
					Meditation Black							2		2
31	6	A	3	Tepeu 2	Orange Slipped?							1		1
					Striated							2		2
					Subin Red		1				1	5		6
					Tinaja Red							6		6
					Unidentified							5		5
					Achote Black							7		7
					Black Slipped?							4		4
					Cayo Unslipped			1			1	1		2
31	6	A	4	Tepeu 2	Gunshot							4		4
					Striated							5		5
					Tinaja Red							4		4
					Unidentified							6		6
					Achote Black		6				6	55		61
					Black Slipped							1		1
					Cayo Unslipped			1			1			1
					Chilar Fluted				1		1			1
					Meditation Black		1				1			1
31	6	A	5	Tepeu 2	Striated							6		6
					Subin Red?							3		3
					Tinaja Red							1		1
					Tinaja Red?							17		17
					Unidentified							17		17
					Unslipped			2			2			2
					Achote Black		2				2	14		16
					Red Slipped							5		5
31	6	A	6	Tepeu 2	Striated							6		6
					Tinaja Red							8		8
					Unidentified							3		3
					Achote Black		3				3	33	2	38
					Cayo Unslipped			5			5	2		7
					Garbutt Creek Red: Var. Un.		1				1			1
					Gunshot							30		30
31	7	A	1	Tepeu 2-3	Red Slipped?							7		7
					Striated							2		2
					Subin Red		4				4			4
					Tinaja Red							28		28
					Unidentified								1	1
31	8	A	2	Tepeu 2-3	Achote Black						2	45		47
					Cayo Unslipped			2			1	2		3
					Gunshot							26		26

Provenience				Three Rivers Ceramic Complex	Type:Variety	Forms					Counts			
RB#	Op	Subop	Lot			Plate	Bowl	Jar	Cylinder	Other	Rim	Body	Base	Total
					Striated							4		4
					Tinaja Red							20		20
31	10	A	1	Tepeu 2-3	Achote Black							20		20
					Cayo Unslipped			3			3			3
					Cream Slipped?							4		4
					Garbutt Creek Red		2				2			2
					Striated							2		2
					Subin Red		1				1			1
					Tinaja Red							26		26
31	10	A	2	Tepeu 2; Tzakol trace	Achote Black		7				2	108	1	111
					Black Slipped							3		3
					Cayo Unslipped			6			6	8		14
					Garbutt Creek Red		4				4			4
					Meditation Black							8		8
					Striated							49		49
					Subin Red		2				2			2
					Tinaja Red			2			2	107		109
					Unidentified	1					1			1
					Unidentified								2	2
					Unidentified						1			1
					Unidentified					drum		1		1
31	10	A	3	Tepeu 2 and Tzakol	Aguila Orange						1	1	1	3
					Black Slipped?							8		8
					Polychrome	1					1			1
					Rio Bravo Red?							1		1
					Striated							18		18
					Tinaja Red							21		21
					Unidentified							6		6
					Unslipped			2			2			2
31	10	A	5	Tzakol; Chicanel trace	Aguila Orange							10		10
					Dos Arroyos Orange poly.		2					2		2
					Sierra Red						1	1		2
					Striated							6		6
					Unidentified							2		2
31	10	B	1	Tepeu 2-3	Achote Black							2		2
					Cayo Unslipped							1		1
					Cream Slipped?							2		2
					Striated							3		3
					Tinaja Red							5		5
					Unidentified			1			1	13		13
31	10	B	2	Tepeu 2-3	Achote Black							3		3

Provenience				Three Rivers Ceramic Complex	Type:Variety	Forms					Counts			
RB#	Op	Subop	Lot			Plate	Bowl	Jar	Cylinder	Other	Rim	Body	Base	Total
					Cayo Unslipped							2		2
					Chilar Fluted							1		1
					Striated							6		6
					Tinaja Red?							9		9
					Unidentified							4		4
31	10	B	3	Tepeu 2	Achote Black		1				1			1
					Cayo Unslipped			4			4			4
					Red Slipped?							14		14
					Slipped?							11		11
					Subin Red		3				3	3		6
					Unidentified		2				2			2
31	10	C	2	Tepeu 2-3	Achote Black							6		6
					Cayo Unslipped			1			1			1
					Chilar Fluted							2		2
					Slipped?							4		4
					Striated							9		9
					Tinaja Red							13		13
31	10	C	3	Tepeu 2-3	Achote Black		1				1	16		17
					Cayo Unslipped			14			9	19		19
					Red Slipped		2				2			2
					Slipped?							12		12
					Striated							33		33
					Subin Red		2				2			2
					Tinaja Red							39		39
31	10	D	1	Tepeu 2-3	Unidentified							17		17
31	10	D	2	Tepeu 2-3	Achote Black							2		2
					Cayo Unslipped		1				1			1
					Garbutt Creek Red		2				2			2
					Slipped?							4		4
					Unidentified		1				1			1
					Unidentified							6		6
31	10	E	1	Tepeu 2-3	Achote Black?							10		10
					Tinaja Red							4		4
					Unidentified							20		20
31	10	E	2	Tepeu 2-3	Achote Black		1				1	16	1	18
					Black Slipped							4		4
					Cayo Unslipped			4			4			4
					Garbutt Creek Red		1				1			1
					Subin Red		1				1			1
					Tinaja Red?							12		12
					Unidentified			1			1	3		4
31	10	E	4	Tepeu 2	Cream Slipped?							2		2
					Unidentified		1				1			1
31	10	E	5	Tepeu 2	Achote Black?							66		66
					Cayo Unslipped			6			6	1		7

Provenience				Three Rivers Ceramic Complex	Type:Variety	Forms					Counts			
RB#	Op	Subop	Lot			Plate	Bowl	Jar	Cylinder	Other	Rim	Body	Base	Total
					Gunshot							30		30
					Striated							23		23
					Subin Red		1				1			1
					Tinaja Red							38		38
					Unidentified			1			1			1
31	10	E	6	Tepeu 2	Achote Black							12		12
					Black Slipped							3		3
					Cayo Unslipped			5			2	3		5
					Slipped?							5		5
					Striated							12		12
					Subin Red		1				1			1
					Tinaja Red							17		17
					Unidentified							5		5
31	10	E	7	Tepeu 2	Achote Black							3		3
					Meditation Black							1		1
					Tinaja Red							4		4
					Unslipped							1		1
31	10	E	8	Tzakol	Gunshot							6		6
					Unidentified							2	1	3
31	10	E	9		Unidentified			5				11		11
31	10	E	10		Unidentified	1		4				10		10
31	10	F	1	Tepeu 2-3	Achote Black							5		5
					Gunshot							23		23
					Slipped							9		9
					Subin Red		2				2			2
					Tinaja Red							11		11
					Tinaja Red							8		8
					Unidentified						1			1
					Unidentified							6		6
31	10	F	2	Tepeu 2-3	Achote Black?							3		3
					Cayo Unslipped			1			1			1
					Slipped							1		1
					Tinaja Red?							6		6
					Unidentified							2		2
31	10	F	3	Tepeu 2	Black Slipped							13		13
					Cayo Unslipped			1			1	2		3
					Subin Red		1				1			1
					Tinaja Red?							21		21
					Unidentified			1			1	3		4
31	10	F	5	Tepeu 2	Achote Black		1				1			1
					Slipped							4		4
					Tinaja Red?							5		5
					Unidentified			1			1			1
					Unidentified		3				3	6		9
31	10	G	1	Tepeu 2-3	Cayo Unslipped			1				1		1

Provenience				Three Rivers Ceramic Complex	Type:Variety	Forms					Counts			
RB#	Op	Subop	Lot			Plate	Bowl	Jar	Cylinder	Other	Rim	Body	Base	Total
					Gunshot							2		2
					Tinaja Red							1		1
					Unidentified							1		1
					Gunshot							3		3
31	10	G	4	Tepeu 2-3?	Achote Black							5		5
					Tinaja Red							8		8
					Unidentified		1						1	1
31	10	H	2	Tepeu 2-3	Black Slipped							3		3
					Cayo Unslipped							3		3
					Slipped							4		4
					Tinaja Red?							5		5
					Unidentified							10		10
31	10	I	1	Tepeu 2-3	Cayo Unslipped			1				1		1
					Unidentified		1				1	3		4
					Unidentified							28		28
31	10	I	2	Tepeu 2-3	Cayo Unslipped			2			2	1		3
					Gunshot							5		5
					Slipped							2		2
					Unidentified							11		11
31	10	I	3	Tepeu 2	Achote Black							1		1
					Red Slipped							2		2
					Unidentified		2				2			2
31	10	I	4	Tepeu 2	Achote Black							4		4
					Subin Red							2		2
					Tinaja Red							12		12
					Unidentified							11		11
31	10	J	1	Tepeu 2-3	Garbutt Creek Red		1				1			1
					Tinaja Red							11		11
					Unidentified							2		2
					Unidentified							1		1
31	10	J	2	Tepeu 2-3	Cayo Unslipped			1			1			1
					Subin Red		1				1			1
31	10	K	1	Tepeu 2-3	Achote Black							2		2
					Tinaja Red							2		2
					Unidentified							5		5
31	10	L	1	Tepeu 2-3	Garbutt Creek Red		1				1			1
					Slipped?							3		3
31	10	L	2	Tepeu 2-3	Garbutt Creek Red		1				1			1
					Slipped							1		1
					Tinaja Red							1		1
					Unidentified							3		3
31	10	L	3	Tepeu 2-3	Achote Black							4		4
					Cream Slipped			1			1			1
					Gunshot							6		6
					Subin Red							1		1

Provenience				Three Rivers Ceramic Complex	Type:Variety	Forms					Counts			
RB#	Op	Subop	Lot			Plate	Bowl	Jar	Cylinder	Other	Rim	Body	Base	Total
					Unidentified							3		3
31	10	M	1	Tepeu 2-3	Cayo Unslipped							1		1
					Cream Slipped?							1		1
					Unidentified							2		2
31	10	M	2	Tepeu 2-3	Gunshot							6		6
					Slate? Fake slateware?							1		1
					Slipped							2		2
					Unidentified							1		1
31	10	M	3	Tepeu 2-3?	Gunshot							2		2
					Unidentified							1		1
31	10	M	4	Tepeu 2-3	Achote Black							9		9
					Cayo Unslipped			1			1			1
					Striated							2		2
					Subin Red							1		1
					Unidentified							10		10
					Unidentified							2		2
31	10	M	5	Tepeu 2	Cayo Unslipped			3			3	25		28
31	10	M	6	Tepeu 2	Garbutt Creek Red		1				1			1
					Gunshot							4		4
					Meditation Black							2		2
					Slipped							6		6
					Unidentified							4		4
31	10	N	1	Tepeu 2-3?	Unidentified							3		3
31	10	N	2	Tepeu 2-3?	Black Slipped							2		2
					Cream Slipped?							4		4
					Unidentified							2		2
31	10	N	3	Tepeu 2	Achote Black							4	1	5
					Red Slipped							2		2
					Slipped?							2		2
					Subin Red		1				1			1
					Unidentified	1					1			1
31	10	N	4	Tepeu 2	Achote Black							1		1
					Garbutt Creek Red		1				1			1
					Slipped							2		2
					Striated							2		2
					Tinaja Red							1		1
					Unidentified							1		1
31	10	N	5	Tzakol	Aguila Orange							3		3
					Striated							1		1
					Unidentified							3		3
31	10	N	6	Chicanel	Unidentified						4	12		16
					Unslipped			1			1			1
31	10	N	7	Tepeu 2; Tzakol trace	Achote Black							13		13
					Gunshot							10		10
					Slipped		3				3			3

Provenience				Three Rivers Ceramic Complex	Type:Variety	Forms					Counts			
RB#	Op	Subop	Lot			Plate	Bowl	Jar	Cylinder	Other	Rim	Body	Base	Total
					Striated							12		12
					Tinaja Red							5		5
					Unidentified						1	4		5
31	10	N	8	Chicanel	Unidentified			1			1			1
31	10	N	10	Tzakol	Aguila Orange		4				3	1	1	5
					Striated							6		6
					Unidentified							3		3
31	10	N	11	Tzakol	Aguila Orange							1		1
					Red and Black Mottled							1		1
					Sierra Red		1				1	2		3
					Striated							1		1
31	10	O	1	Tepeu 2-3	Cayo Unslipped			1			1	1		2
					Tinaja Red							1		1
					Unidentified							3		3
31	10	O	2	?	Striated							2		2
					Unidentified							3		3
31	10	O	3	Tepeu 2	Dolphin Head Red		1				1			1
31	10	O	4	Tepeu 2	Meditation Black		2				2			2
					Tinaja Red							3		3
					Unidentified							1		1
31	10	O	5	Tepeu 2-3?	Unidentified							3		3
					Unidentified							1		1
31	10	O	6	Tepeu 2-3	Black Slipped							4		4
					Cayo Unslipped							7		7
					Striated							9		9
31	10	O	9	Tepeu 2	Achote Black		1				1	3		4
					Cayo Unslipped			1			1			1
					Cream Slipped			1			1			1
					Meditation Black							1		1
					Striated							2		2
					Tinaja Red							3		3
31	10	O	10	Tepeu 2	Achote Black							6		6
					Cayo Unslipped			4			4	2		6
					Striated							8		8
					Subin Red		1				1			1
					Unidentified							2		2
31	10	P	2	Tepeu 2-3	Tinaja Red							4		4
					Unidentified							12		12
31	10	P	3	Tepeu 2-3	Achote Black							2		2
					Subin Red							3		3
					Unidentified							2		2
31	10	Q	1	Tepeu 2-3	Achote Black							2		2
					Red Slipped							1		1
					Striated							2		2
31	10	Q	2	Tepeu 2	Black Slipped					lid	1			1

Provenience				Three Rivers Ceramic Complex	Type:Variety	Forms					Counts			
RB#	Op	Subop	Lot			Plate	Bowl	Jar	Cylinder	Other	Rim	Body	Base	Total
					Tinaja Red			1			1			1
					Unidentified							2		2
31	10	Q	3	Tepeu 2	Achote Black							8		8
					Cayo Unslipped							2		2
					Gunshot							12		12
					Striated							4		4
					Tinaja Red							14		14
31	10	Q	4	Tepeu 2	Red Slipped							4		4
					Striated							15		15
					Unidentified							2		2
31	10	Q	6	Tepeu 2	Striated							6		6
					Tinaja Red							3		3
31	10	Q	7	Tepeu 2	Gunshot							7		7
					Meditation Black							2		2
					Tinaja Red							2		2
31	10	Q	8	Tepeu 2	Cayo Unslipped			2			2	2		4
					Meditation Black							2		2
					Tinaja Red							25		25
31	10	Q	9	Tepeu 2	Red Slipped							15		15
					Striated							8		8
31	10	R	1	Tepeu 2-3	Achote Black							4		4
					Cayo Unslipped			1			1	1		2
					Subin Red							1		1
31	10	R	2	Tepeu 2-3	Achote Black							1		1
					Cayo Unslipped			1			1			1
					Tinaja Red			3			2	1		3
31	10	R	7		Unidentified							1		1
31	10	S	1	Tepeu 2-3	Achote Black		1				1	2		3
					Striated							1		1
					Subin Red		1				1	1		2
					Thin Late Classic Buff							3		3
					Tinaja Red							4		4
31	10	S	2	Tepeu 2-3	Achote Black							4		4
					Subin Red							2		2
					Unidentified							1		1
31	10	S	3	Tepeu 2-3	Achote Black							3		3
					Tinaja Red							2		2
31	10	U	2	Tepeu 2-3	Achote Black		3					3		3
31	10	V	1	Tepeu 2-3	Achote Black		2				2	59		61
					Cayo Unslipped			2			2			2
					Garbutt Creek Red		1				1			1
					Gunshot							30		30
					Subin Red		1				1			1
					Tinaja Red							48		48
					Unidentified							12		12

APPENDIX B

Obsidian Data

Analysis by Rissa Trachman and Marisol Cortes-Rincon

Analysis of the 2002 and prior obsidian was completed by Rissa Trachman while a preliminary analysis of the obsidian recovered during the 2003 season was done by Marisol Cortes-Rincon. Four tables are presented. Tables B1 and B2 contain the analysis by Rissa Trachman while Table B3 presents the analysis by Marisol Cortes-Rincon.

Table B1. Unifacial Obsidian Blades, analysis by Rissa Trachman.

Provenience				# Spec.	Category[3]	Type p=proximal m=medial d=distal	L	W	Th.	Wear Type[1]	Platform[2]	Weight (g)
RB #	Op	SubOp	Lot				(maximum value in mm)					
2	33	A	1	1	PBF	p/3rd	26.26	9.01	3.18	dorsal tr	single	0.80
				2	PBF	m/3rd	26.48	12.09	2.97	dors/ventr tr	n/a	1.04
2	33	A	2	1	PBF	m/3rd	18.78	10.90	2.71	dors/ventr tr	n/a	0.58
2	33	A	6	1	PBF	m/3rd	8.59	6.98	1.83	nicking	n/a	0.10
2	33	B	1	1	PBF	m/3rd	17.52	7.54	1.80	sl nicking	n/a	0.27
2	33	B	2	1	UF	Undetect-able	9.98	14.73	5.89	ground*	n/a	0.87
				2	PF	d rejuv flake	28.58	25.45	8.66	dors/ventr tr	single	5.75
				3	PBF	m/3rd	6.82	13.53	1.91	nicking	n/a	0.15
2	33	B	3	1	PBF	p/??	20.85	6.32	3.31	dors/ventr tr	undetect.	0.32
				2	PBF	p/3rd	32.07	8.51	2.47	ventr tr/notch	single	0.72
				3	PBF	m/3rd	11.10	9.58	3.74	ventral tr	n/a	0.30
				4	PBF	m/3rd	9.54	10.57	2.37	?no wear*	n/a	0.29
2	33	D	1	1	PBF	p/2nd	27.30	11.22	2.92	nicking	single	0.85
				2	PBF	p/2nd	19.26	12.53	2.53	misc patt wr	single	0.54
				3	PBF	m/2nd	17.93	11.95	2.83	dors/ventr tr	n/a	0.55
				4	PBF	m/3rd	13.40	10.20	2.60	ventral tr	n/a	0.41
2	33	D	2	1	PBF	p/2nd	37.92	12.26	3.60	misc patt wr	abraded s	1.74
2	33	E	1	1	PF	d rejuv flake	18.87	13.72	4.12	?? dorsal tr	crushed	0.90
2	33	E	2	1	PBF	p/3rd	31.15	13.87	3.36	dors/ventr tr	abraded s	1.61
				2	PBF	p/3rd	28.91	11.69	2.70	misc patt wr	single	0.76
				3	PBF	p/3rd	22.05	12.36	2.65	notching	n/a	0.91
2	33	E	3	1	PBF	p/3rd	27.87	8.79	2.25	misc patt wr	multi	0.48
				2	PBF	m/3rd	18.49	10.37	3.12	dorsal tr	n/a	0.69
				3	PBF	m/3rd	7.60	9.93	2.98	fracturing	n/a	0.23
				4	PBF	m/3rd	8.91	10.15	1.55	fracturing	n/a	0.11
				5	PBF	m/3rd	4.81	9.56	2.67	fracturing	n/a	0.11
				1	OS?	n/a	19.10	17.48	15.23	polished?	n/a	6.55
2	33	F	2	1	PF	p/util	23.88	20.93	7.77	dorsal tr	single	3.20
2	33	G	2	1	PBF	m/3rd	17.49	7.28	2.34	sl nicking	n/a	0.30
2	33	H	1	1	PBF	m/3rd	28.57	9.42	4.07	misc patt wr	n/a	1.29
2	33	I	5	1	PBF	p/3rd	10.76	7.32	2.05	sl nicking	abraded s	0.14
				2	PBF	d/3rd	15.42	9.76	2.54	nicking	n/a	0.26
2	33	J	1	1	PF	whole/util	22.58	37.56	6.84	ventr tr/notch	multi	4.31

Provenience				# Spec.	Category[3]	Type p=proximal m=medial d=distal	L	W	Th.	Wear Type[1]	Platform[2]	Weight (g)
RB #	Op	SubOp	Lot				(maximum value in mm)					
2	33	J	1	2	PBF	p/3rd	26.77	12.23	3.12	dorsal tr	abraded s	1.04
				3	PBF	p/3rd	10.15	10.08	3.59	dorsal tr	multi	0.31
				4	PBF	p/3rd	11.38	8.12	2.12	no wear	ground s	0.16
				5	PBF	m/3rd	24.50	11.52	2.20	misc patt wr	n/a	0.88
				6	PBF	m/3rd	15.72	12.98	3.41	ventral tr	n/a	0.86
				7	PBF	m/3rd	30.04	10.57	2.62	dorsal tr	n/a	0.81
				8	PBF	m/3rd	18.31	14.82	3.34	dors/ventr tr	n/a	1.02
				9	PBF	m/3rd	10.27	11.27	2.68	misc patt wr	n/a	0.36
				10	PBF	m/3rd	20.11	9.75	3.05	dors/ventr tr	n/a	0.76
				11	PBF	m/3rd	21.07	17.09	3.52	misc patt wr	n/a	1.54
				12	PBF	m/3rd	20.93	12.28	2.11	fracturing	n/a	0.49
				13	PBF	m/3rd	12.46	5.45	2.21	fract/m patt w	n/a	0.09
				14	PBF	m/3rd	5.86	12.47	2.96	nicking	n/a	0.22
				15	PBF	m/3rd	7.43	10.02	1.49	ventral tr	n/a	0.13
2	33	J	2	1	PBF	m/3rd	17.95	9.12	2.58	no wear	n/a	0.49
				2	PBF	m/3rd	17.26	12.33	3.02	dors/ventr tr	n/a	0.78
				3	PBF	m/3rd	25.05	15.58	3.43	dors/ventr tr	n/a	1.70
				4	PBF	m/3rd	13.79	6.08	1.35	no wear	n/a	0.12
				5	PF	d/util?	9.90	13.82	2.28	dorsal tr	n/a	0.22
2	33	J	3	1	PBF	m/3rd	18.48	5.70	1.96	no wear	n/a	0.27
2	33	K	3	1	PBF	m/3rd	19.31	11.91	3.16	misc patt wr	n/a	0.92
2	33	M	1	1	PBF	m/3rd	23.43	10.25	3.18	dorsal tr	n/a	0.87
2	33	M	2	1	PBF	p/3rd	26.20	13.41	2.57	dors/ventr tr	abraded s	1.08
				2	PBF	m/3rd	20.38	6.38	2.27	dors/ventr tr	n/a	0.39
				3	PBF	m/3rd	34.16	8.90	2.05	no wear	n/a	0.71
2	33	N	1	1	PBF	p/3rd	36.73	6.99	1.78	no wear	abraded s	0.38
				2	PBF	p/3rd	38.42	12.24	3.28	dors/ventr tr	abraded s	1.57
				3	PBF	p/3rd	23.56	13.45	2.86	nicking	abraded s	1.04
				4	PBF	m/3rd	18.19	5.84	1.66	nicking	n/a	0.15
				5	PBF	m/3rd	15.83	9.25	2.43	dors/ventr tr	n/a	0.40
2	33	O	1	1	PBF	p/3rd	34.62	14.11	3.60	dorsal tr	abraded s	2.01
				2	PBF	p/3rd	6.88	12.20	2.99	nicking	abraded s	0.23
				3	PBF	p/3rd	25.92	14.20	4.45	dorsal tr	crushed	1.35
				4	PBF	m/3rd	16.34	12.66	2.65	nicking	n/a	0.68
				5	PBF	m/3rd	10.50	18.11	2.66	dorsal tr	n/a	0.31
				6	PBF	m/3rd	36.14	11.89	3.42	notc/trimming	n/a	1.83
				7	PBF	m/3rd	25.88	10.33	3.26	dors/ventr tr	n/a	1.00
2	33	R	1	1	PBF	m/3rd	4.36	8.12	1.39	undetectable	n/a	0.04
2	33	S	2	1	PBF	m/3rd	14.95	9.51	2.21	dorsal tr	n/a	0.37
				2	PBF	m/3rd	20.10	7.15	2.49	sl nicking	n/a	0.36

Provenience				# Spec.	Category[3]	Type p=proximal m=medial d=distal	L	W	Th.	Wear Type[1]	Platform[2]	Weight (g)
RB #	Op	SubOp	Lot				(maximum value in mm)					
2	33	S	2	3	PBF	m/3rd	23.98	11.89	2.65	dorsal tr	n/a	1.04
				4	PrF	whole	n/a	n/a	n/a	no wear	single	0.16
2	33	T	1	1	PF	d	20.26	18.20	8.03	no wear	n/a	2.61
				2	PBF	m/3rd	15.88	13.69	3.67	notc/trimming	n/a	0.99
2	33	U	2	1	PBF	m/3rd	19.38	9.23	3.22	ventral tr	n/a	0.69
				2	PBF	m/3rd	12.89	13.24	3.10	ventral tr	n/a	0.45
2	33	U	5	1	PBF	p/3rd	23.13	11.35	3.20	nicking	abraded s	0.94
2	33	AB	1	1	S	wh, end&side	31.86	19.96	9.57	dors/ventr tr	multi	5.32
2	33	AC	1	1	PBF	m/3rd	18.10	10.55	2.57	ventral tr	n/a	0.57
2	33	AC	2	1	PBF	m/3rd	18.28	9.24	2.20	dors/ventr tr	n/a	0.41
2	33	AD	1	1	PBF	m/3rd	6.37	6.99	1.54	nicking	n/a	0.08
				2	PBF	m/3rd	17.13	8.06	2.18	nicking	n/a	0.31
2	33	AF	1	1	PBF	m/3rd	22.68	9.83	2.80	dors/ventr tr	n/a	0.68
				2	PBF	m/3rd	24.88	13.82	2.93	notching	n/a	1.32
2	33	AF	2	1	PBF	m/3rd	21.34	8.41	2.67	notc/trimming	n/a	0.63
				2	PBF	m/3rd	6.81	10.34	3.14	dorsal tr	n/a	0.22
				3	PBF	m/3rd	11.16	8.65	2.37	nicking	n/a	0.30
31	1	A	13	1	PBF	p/3rd	37.69	13.06	3.69	nicking	ground	1.68
				1	PBF	m/3rd	24.00	14.46	4.08	dors/ventr tr	n/a	1.57
31	4	A	3	1	PBF	p/3rd	10.78	12.02	2.42	nicking	abraded	0.27
				2	PBF	m/3rd	13.57	13.03	2.01	nicking	n/a	0.37
				3	PBF	m/3rd	23.22	12.21	2.74	sl nicking	n/a	0.71
				4	PBF	m/3rd	14.23	9.14	2.22	dors tr	n/a	0.30
				5	PBF	m/3rd	18.63	8.20	1.86	no wear	n/a	0.21
31	5	A	5	1	PBF	m/3rd	17.73	8.04	2.13	sl nicking	n/a	0.28
31	5	B	1	1	PBF	p/3rd	21.06	11.77	2.89	dors tr	abraded s	0.68
				2	PBF	d/3rd	17.18	9.92	1.20	dors/ventr tr	n/a	0.23
31	6	A	2	1	PBF	m/3rd	15.04	8.79	2.15	ventr tr	n/a	0.32

[1]Wear Types: nicking = nicking; sl = slight; dors = dorsal; ventr = ventral; tr = trimming; misc patt wr = miscellaneous patterned wear

[2]Platform Type: single = single facet platform; multi = multiple facet platform; abraded s = abraded single facet platform; ground s = pecked and ground single facet platform ;undetect. = undetectable; crushed = crushed platform (in manufacture); n/a = no platform present (for medial and distal segments)

[3]Category: OS = obsidian sphere’ PBF = pressure blade fragment; UF = uniface fragment; PF = percussion flake; S = scraper; PrF = pressure flake

Table B2. Unifacial Obsidian Blades, analysis by Rissa Trachman. Central Mexican Pachuca obsidian only, extracted from Table B1.

Provenience				# Spec.	Category[3]	Type p=proximal m=medial d=distal	L	W	Th.	Wear Type[1]	Platform[2]	Weight (g)
RB #	Op	SubOp	Lot				(maximum value in mm)					
2	33	B	1	1	PBF	m/3rd	17.52	7.54	1.80	sl nicking	n/a	0.27
2	33	B	2	3	PBF	m/3rd	6.82	13.53	1.91	nicking	n/a	0.15
2	33	J	1	4	PBF	p/3rd	11.38	8.12	2.12	no wear	ground s	0.16
				5	PBF	m/3rd	24.50	11.52	2.20	misc patt wr	n/a	0.88
2	33	J	2	1	PBF	m/3rd	17.95	9.12	2.58	no wear	n/a	0.49
2	33	J	3	1	PBF	m/3rd	18.48	5.70	1.96	no wear	n/a	0.27

[1]Wear Types: nicking = nicking; sl = slight; dors = dorsal; ventr = ventral; tr = trimming; misc patt wr = miscellaneous patterned wear

[2]Platform Type: single = single facet platform; multi = multiple facet platform; abraded s = abraded single facet platform; ground s = pecked and ground single facet platform ;undetect. = undetectable; crushed = crushed platform (in manufacture); n/a = no platform present (for medial and distal segments)

[3]Category: OS = obsidian sphere' PBF = pressure blade fragment; UF = uniface fragment; PF = percussion flake; S = scraper; PrF = pressure flake

Table B3. Unifacial Obsidian Blades, analysis by Marisol Cortes-Rincon.

Provenience				L	W	T	Wt(g)	Form[1]	Comment
RB	Op	SubOp	Lot	(maximum value in mm)					
2	33	BA	1	32.59	10.43	2.25	1.19	3	Pachuca
2	33	BA	3	14.84	8.11	2.82	0.26	4	
				38.15	13.32	2.31	1.59	6	
				17.19	8.77	2.82	0.37	4	
				17.53	10.02	2.66	0.58	3	
				11.5	10.57	2.22	0.32	3	
				43.88	9.55	2.28	1.37	3	Pachuca
2	33	BA	4	15.36	9.66	2.26	0.30	3	
2	33	BB	2	18.25	13.05	13.28	0.79	2	
				21.17	13.68	3.38	1.19	2	
				13.3	10.51	1.62	0.30	3	
				15.43	10.27	1.69	0.28	3	
2	33	BD	1	38.53	16	3.63	2.31	6	
2	33	BD	2	21.05	7.47	1.54	0.10	3	
2	33	BG	1	17.9	7.99	1.76	0.22	4	
				37.81	11.22	2.65	1.37	6	
				11.76	8.09	1.65	0.21	3	
				16.97	6.12	1.18	0.17	3	
2	33	BG	2	30.14	10.36	2.93	1.10	2 or 3	
				29.88	7.94	2.54	0.65	6	
				16.33	8.65	2.41	0.38	6	
				23.62	12.25	2.1	0.75	3	
				16.61	15.17	1.89	0.67	3	
				23.3	7.81	1.81	0.31	6	
				19.99	9.36	2.75	0.55	2 or 3	
				10.37	12.41	3.08	0.46	3	
				13	11.81	2.76	0.55	3	

Provenience				L	W	T	Wt(g)	Form[1]	Comment
RB	Op	SubOp	Lot	(maximum value in mm)					
2	33	BH	2	28.17	10.97	3.01	1.10	6	
				20.48	13.42	1.97	0.73	2	
2	33	BH	4	14.29	8.77	2.49	0.60	3	
2	33	BI	2	27.02	12.61	2.13	1.06	3	
				26.11	10.34	3.47	1.17	6	
				21.6	8.47	2.84	0.50	3	
2	33	BJ	2	23.45	10.76	2.36	0.86	3	
				19.52	10.09	2.67	0.59	2	
				25	10.33	2.84	1.00	4	
2	33	BJ	3	12.18	8.8	1.92	0.27	4	
				17.63	12.28	1.93	0.64	3	
				31.85	10.68	2.6	1.04	6	
2	33	BJ	4	36.33	12.82	3.58	1.93	6	
				21.98	8.33	2.07	0.42	6	
				12.93	10.22	1.42	0.30	3	
2	33	BK	2	28.41	9.95	2.18	0.85	6	
				20.24	12.09	2.67	0.89	3	
				13.44	9.7	1.96	0.32	3	
2	33	S	4	14.23	7.6	2.42	0.29	3	

[1]FORM: 1=Complete; 2=Distal Fragment; 3=Medial Fragment; 4=Proximal Fragment; 5= Cobble; 6=medial & proximal comb.

APPENDIX C

Lithic Tool Data

Analysis and text by David M. Hyde and Marisol Cortes-Rincon

Edited by Grant R. Aylesworth

This appendix presents the results of an analysis of stone tools recovered from Dos Hombres, Group D and from Be Tan Chinam, both in northwestern Belize. For the purposes of this report, tools "are objective pieces that have been intentionally modified or modified by use to produce a product that has less weight than before it was modified" (Andrefsky 1998:75). There are 102 tools in this analysis from Dos Hombres and 106 from Be Tan Chinam, most of which were recovered from construction fill. As a result of the fill context, specific inferences regarding the functions that the assemblages represent must be taken with caution. Although debitage was recovered in the excavations, this paper addresses only formal tools. Some obsidian was recovered but it is discussed in Appendix B. The tool typology used for this analysis was established by Hyde (2003) using Andrefsky's (1998) morphological typology flow chart as a starting point and modifying it as necessary to match the specimens in the Three Rivers region.

Dos Hombres, Group-D

Although not all the tools have raw material type recorded, 80% have been. By far the overwhelming raw material type used for stone tool production was chert (94%). Chalcedony is the only other raw material type recorded (not including obsidian). No discernable pattern was found for the preferential use of the chalcedony for a particular tool type. All tool types made from chalcedony were also manufactured from chert. Additionally no intrasite-specific focus of this material type was discerned. Chalcedony tools were recovered in front of Structure D-3, between Structures D-3 and D-4, and in Structure D-9.

Structure D-1 Stair

Excavations east of the stair that extends from the south side of Structure D-1 resulted in the recovery of four lithic tools, all dating to the Late to Terminal Classic Period (this date, as with other dates in this report, are based on associated ceramics analyzed by Lauren A. Sullivan). All four lithic tools are from the same lot and consist of two battered cobble hammerstones, a narrow bipointed biface, and a biface of unknown type. With so few tools recovered little can be said regarding the assemblage.

Structure D-3

There is total of 32 formal lithic tools from Structure D-3 and the area of Plaza D-1 directly in front of it (Suboperations C, F, I, K, M, N, Q, R, S, T, and W). The overwhelming majority of the tools are from the Late or Terminal Classic. Two unknown bifacial tools date to the Early Classic whereas one hammerstone was recovered from the structure but is undated.

The tools recovered from the structure were not dissimilar in forms from those in the courtyard. The assemblage of formal tools is dominated by expedient tools based on the dominance of cores and scrapers. Additionally, there are two battered cobble hammerstones indicating that some level of stone tool production was occurring at or near the structure.

Of the bifacial tools recovered, most are part of the oval biface system (Hester 1985; Shafer 2000) which is related to agricultural activities (Lewenstein 1987; Shafer and Hester 1986) (Table C1). The remaining tools are not as well understood functionally. The large narrow bipointed bifaces are thought to have possibly functioned as mason tools (Meadows 2000), as were general utility bifaces (GUB) (Eaton 1991).

Table C1. Late and Terminal Classic Tools from Structure D-3 and immediate courtyard area.

Description		Structure D-3	Courtyard
NON-BIFACIAL TOOLS	Multidirectional cores	6	5
	Bifacial Cores	-	3
	Scrapers	3	3
	Battered Cobble Hammerstones	-	2
	SUBTOTAL	9 (90%)	13 (68%)
BIFACIAL TOOLS	Oval Bifaces	-	3
	Bifacial Celt	-	1
	Large Narrow Bipointed Biface	1	-
	Bi-Convex GUB	-	1
	Ground Bit GUB	-	1
	SUBTOTAL	1 (10%)	6 (32%)
TOTAL		**10**	**19**

Structure D-4

Excavation of Structure D-4 (Suboperation BK) resulted in the recovery of two lithic tools, dating to between the Late Classic and the Terminal Classic. One specimen is a biface of fair quality recycled into a hammerstone. The other is a bifacial celt of good quality chert.

Structure D-5

A total of five tools recovered from a single excavation unit in Structure D-5 (Suboperation D), all dating to the Late to Terminal Classic. Three of the tools are associated with agriculture while one, a truncated general utility biface, may have functioned as a mason's tool. One hammerstone rounds out the assemblage from this structure.

Structure D-9

Twenty-six tools were recovered from structure D-9 (Suboperations B, J, P, and BH). An example is given in Figure C1. All dated specimens (n=22) fall into the Late to Terminal Classic Period. This assemblage consists mostly of bifacial tools (65%) with the majority of these being agricultural tools (Table C2). Informal tools are present in small numbers and include three scrapers and a perforator as well as a couple of cores.

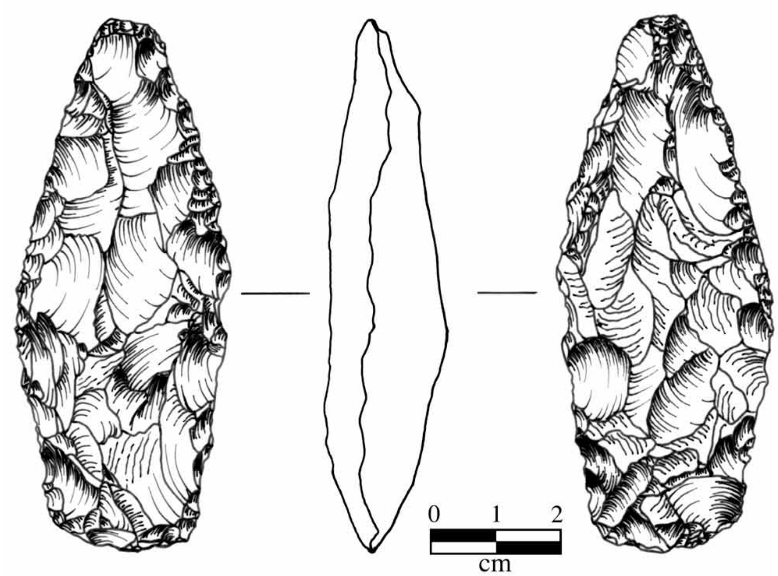

Figure C1. Biface from Structure D-9, Suboperation B, Lot 2. Drawing by Dee Turman. Used by permission. © 2004 by The Programme for Belize Archaeological Project.

Structure D-10

Three tools were recovered from Structure D-10 (Suboperation BA), two that date to the Late Preclassic or ProtoClassic and one that dates to the Late to Terminal Classic. The earlier specimens are bifaces of unknown type, one exhibiting a triangular form. The latter tool is a thin biface of good quality chert generally associated with caches and other special deposits. The fact that the context for this specimen was subfloor ballast, however, limits its significance.

Structure D-12

A single lithic tool, a multidirectional core, was recovered from Structure D-12 (Suboperation BC) dating to the Late to Terminal Classic.

Table C2. Late and Terminal Classic Tools from Structure D-9 (excluding the hammerstones)

Description		Courtyard - ca. SE
NON-BIFACIAL TOOLS	Multidirectional Core	2
	Test Core	1
	Scraper	3
	Drill/Graver/Perforator	1
	SUBTOTAL	7 (35%)
BIFACIAL TOOLS	Oval Biface	7
	Bifacial Celt	2
	Ground Bit GUB	2
	Large Narrow Bipointed Biface	1
	Small Lenticular Biface	1
	SUBTOTAL	13 (65%)
TOTAL		**20**

Structure D-13

Twelve tools were recovered from a mound located in the approximate center of Plaza D-1 (Suboperations AA, AB, AC, AD, AE, and AF) all dating to the Late to Terminal Classic. There is no dominant tool type from D-13, with no more than two specimens of any type present (see example in Figure C2). In general, there is a mix of bifacial and non-bifacial tools as well as one hammerstone, all in small numbers.

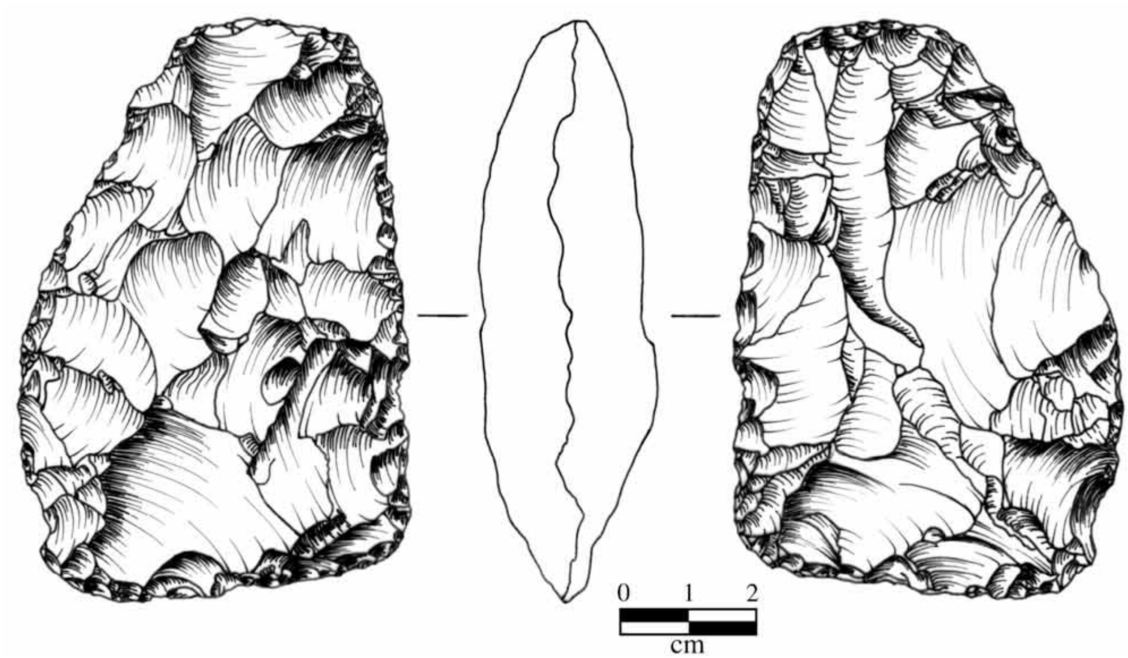

Figure C2. Biface from Structure D-13, Suboperation AC, Lot 1. Drawing by Dee Turman. Used by permission. © 2004 by The Programme for Belize Archaeological Project.

Plaza D-1 near Structures D-6 and D-7

A single excavation unit (Suboperation E) was located in the approximate right-angle crook of Structures D-6 and D-7. Two tools were recovered, both dating to the Terminal Classic. Both specimens are of good quality chert. One is an oval biface, used for agricultural endeavors while the other is a ground bit general utility biface.

Three tools were recovered in a surface collection near the northeast corner of Structure D-7 (Suboperation O). All dated to the Late to Terminal Classic. As with Suboperation E, Suboperation O consists of an agricultural tool and a ground bit GUB. Additionally, there is a large narrow bipointed biface. No specific activity or function is apparent at these two loci (Suboperations E and O).

Plaza D-1 near Structure D-4

Two lithic tools were recovered form excavations south of Structure D-4, one dating to the Middle to Late Preclassic and the other dating to the Late to Terminal Classic. The earlier tool is an oval biface manufactured from good quality chert and related to agriculture. The later tool is a utilized flake made from chert of fair quality material.

Plaza D-1 Southeast Corner

Two excavations (Suboperations H and U) were placed in the southeastern portion of Plaza D-1 between Structures D-4 and D-5. Ten formal tools were recovered from these excavations all dating to the Late to Terminal Classic (see Figure C3). The assemblage from these suboperations is, overall, not very revealing (Table C3). Two bifaces of good quality material were recovered, one of which was a recycled bifaces, indicative of the high curatorial value of good material. Additionally, three cores were recovered along with a scraper. Two bifaces believed to be mason tools were found.

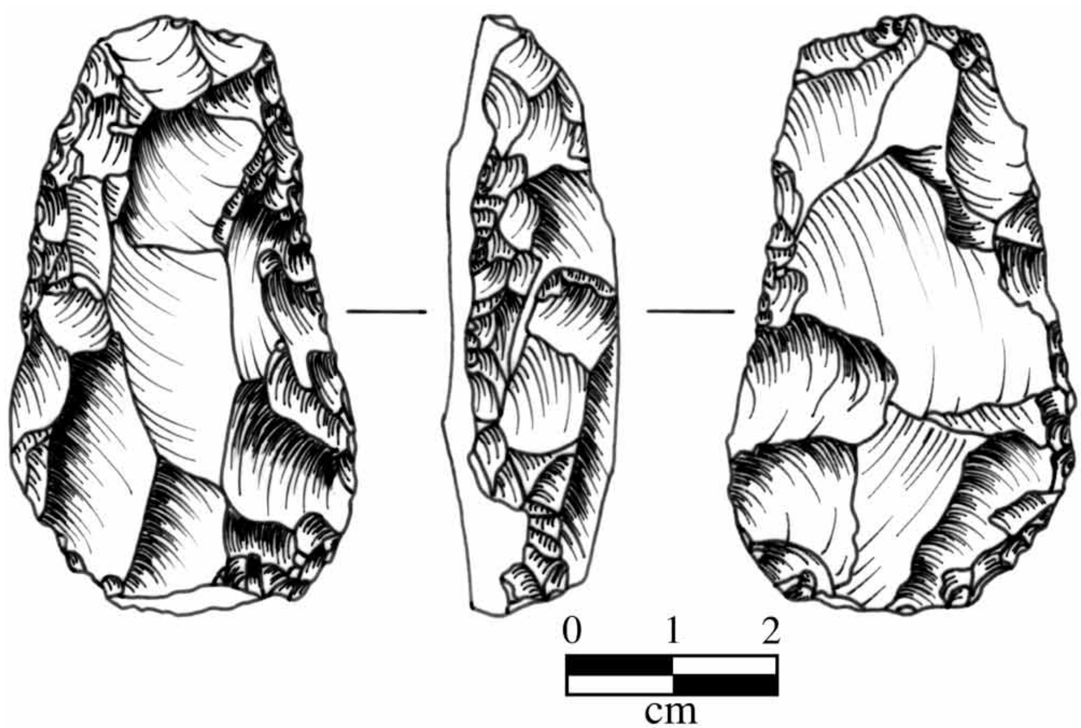

Figure C3. Biface from Plaza D-1 excavations, Operation 33, Suboperation U, Lot 1. Drawing by Dee Turman. Used by permission. © 2004 by The Programme for Belize Archaeological Project.

Table C3. Late and Terminal Classic Tools from courtyard - ca. southeast

Description		Courtyard - ca. SE
NON-BIFACIAL TOOL	Multidirectional cores	1
	Bifacial Cores	2
	Scrapers	1
	SUBTOTAL	4 (40%)
BIFACIAL TOOLS	Oval Bifaces	1
	Ground Bit GUB	1
	Large Narrow Bipointed Biface	1
	Misc. Recycled Biface	1
	Unknown Type	2
	SUBTOTAL	6 (60%)
TOTAL		**10**

Dos Hombres Discussion

The stone tool assemblage of Group D at Dos Hombres appears to be non-specialized. The assemblage consists of a mix of formalized tool forms such as narrow bipointed bifaces, oval bifaces and bifacial celts, but also less formal non-bifacial tool forms such as cores, scrapers, and utilized flakes. Given the size and complexity of Dos Hombres, the lack of a non-specialized stone tool signature is expected (Hyde 2003). The presence of hammerstones as well as high quantities of cores suggests a fair amount of local production took place at Group D, likely for expedient tools utilized locally. The poor quality of most local chert led to recycling and curation of good quality material.

Overall the sample size is small which makes conclusions, beyond anything general, difficult. Additional excavations at the group, should they occur, will not only add to our understanding of the lithic technological organization at Group D but also at Dos Hombres overall.

Be Tan Chinam

The excavations at Be Tan Chinam were conducted at two discreet groups, Group A and Group B; the lithics in this analysis are from both groups.

Group A

Structure A-1

Little temporal control exists for the stone tools (example given in Figure C4) recovered from Structure A-1 (Operations 5-A and 10-U). Four of the six tools in this assemblage were collected from a looter's trench, including all three oval bifaces. One general utility biface was recovered associated with Late Preclassic and Early Classic ceramics.

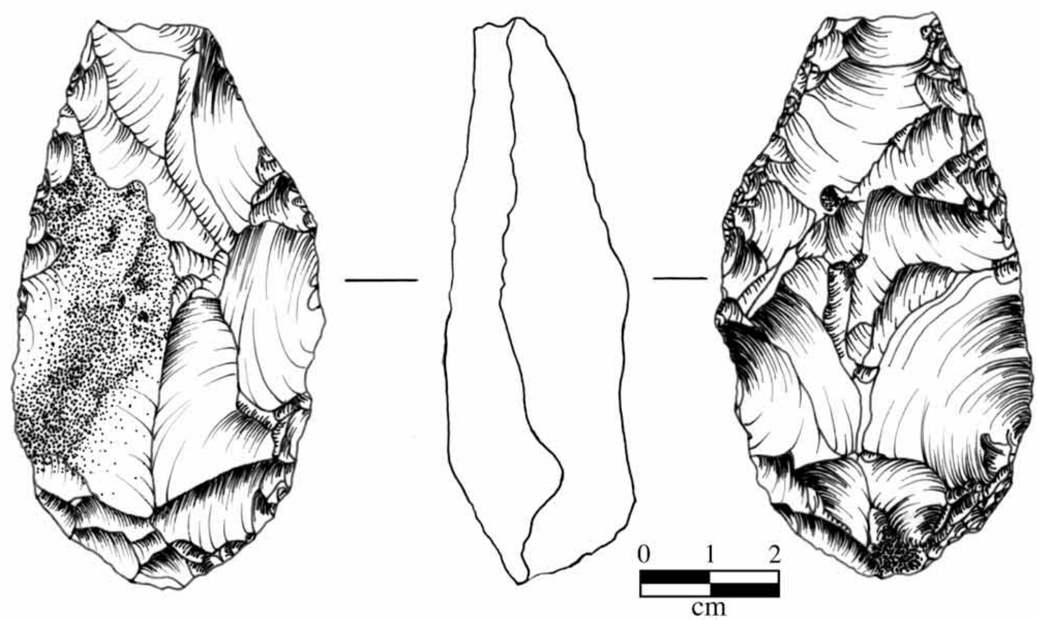

Figure C4. Biface from plaza in front of Structure A-1 (Operation 5, Suboperation A, Lot 3). Drawing by Dee Turman. Used by permission. © 2004 by The Programme for Belize Archaeological Project.

Structure A-2

Lithic materials were recovered from three excavation units placed on or near Structure A-2 (Operation 10, Suboperations B, C, and O). As with most of the material from this site, utilized flakes are the dominant recovered type. One multidirectional core was recovered along with three hammerstones. Based on this assemblage, it seems clear that some lithic production, likely informal tools, was occurring nearby. No bifacial tools were recovered.

Group A Plaza

Three excavation units were placed in the Group A plaza. Two of these excavations (Operation 10, Suboperations N and Q) were placed near a broken altar, and the other (Operation 10, Suboperation A) was placed in the southeastern portion of the plaza. The lithics recovered from near the altar (n = 8) are all non-bifacial tools consisting mostly of utilized flakes. Although the materials from these units date between the Late Preclassic through the Late Classic no difference is observed in the types of lithic artifacts present between time periods. Additional types present include two drill-like tools and a multidirectional core.

Suboperation A was overwhelmingly dominated by utilized flake tools with only four of 46 tools bifacial, all dating to the Late Classic. The balance of the assemblage consists of a couple cores, and drill-like tools.

South of Group A

Two Late to Terminal Classic multidirectional cores were recovered from a unit placed south of Group A (Operation 6, Suboperation A).

Group B

Structure B-1

Twenty tools were recovered from a number of excavation units on and around Structure B-1 (Operation 10, Suboperations E, F, H, J, L, and M). The assemblage is dominated by an informal tool technology. Aside from 14 utilized flakes, the only other tools collected are two hammerstones and two multidirectional cores, types used in lithic reduction. Except for one Early Classic utilized flake, all other specimens are Late or Late to Terminal Classic.

Group B Plaza

Operation 10, Suboperation I was placed in the plaza of Group B from which six lithic tools were recovered, all but one being informal utilized flakes. The other tool type was drill-like tool. Like the materials from Structure B-1, these materials date to Late or Late to Terminal Classic.

West of Group B

The final locality from which lithic tools were recovered was west of Group B (Operation 10, Suboperation D). Just two utilized flakes were recovered from this unit, both dating to the Late to Terminal Classic.

Be Tan Chinam Discussion

The lithic tool assemblage at Be Tan Chinam is dominated by informal utilized flakes which account for nearly 70% of the tools. Just 10 of the 106 specimens are bifaces. There are too few bifacial tools to make any conclusions about the differences between the groups. The assemblages between the two groups, however, are very similar (Table C4). Both Group A and B are dominated by utilized flakes, with a number of cores present.

Table C4. Non-Bifacial tool distributions for Be Tan Chinam.

Description		Group A	Group B
NON-BIFACIAL TOOLS	Utilized Flakes	52 (80%)	21 (88%)
	Drill/Graver	3 (5%)	1 (4%)
	Scraper	2 (3%)	-
	Multidirectional Cores	8 (12%)	2 (8%)
	TOTAL	65 (100%)	24 (100%)

Conclusions

The assemblages from Dos Hombres, Group D and Be Tan Chinam are distinct from each other with regards to the ratio of bifacial to non-bifacial tools. Dos Hombres, Group D is dominated by a diverse array of biface types whereas Be Tan Chinam has very few bifaces and appears to have relied more extensively on expedient tools. Some similarities include general poor quality of raw material, with no very good material present at all. Additionally, even though some large structures and one altar were investigated there are no ceremonial lithic implements. Metric data on all analyzed lithics is presented in Table C5.

Table C5. Lithic Artifact Metric Data and Time periods.

RB #	Provenience (Op-Subop-Lot-artifact No.)	Artifact [1]	Context	L(mm)	W(mm)	T(mm)	Wt(g)	Time Period (based on associated ceramics)
2	33-B-2-1	10	Structure D-9	82.0	34.0	19.0	47.7	Lt to Term Cl.
2	33-B-2-2	5	Structure D-9	33.6	20.3	5.6	4.2	Lt to Term Cl.
2	33-B-2-3	2	Structure D-9	56.7	56.9	18.9	79.1	Lt to Term Cl.
2	33-B-2-4	1	Structure D-9	15.0	51.9	19.9	17.0	Lt to Term Cl.
2	33-B-2-5	20	Structure D-9	59.4	38.6	15.8	31.2	Lt to Term Cl.
2	33-B-3-1	18	Structure D-9	50.4	45.0	15.1	51.5	Lt to Term Cl.
2	33-B-3-2	18	Structure D-9	42.2	35.4	11.7	19.6	Lt to Term Cl.
2	33-C-2-1	23	Courtyard - Structure D-3	116.5	70.0	59.9	650.1	Term Cl.
2	33-C-2-2	24	Courtyard - Structure D-3	79.6	58.8	46.0	172.2	Term Cl.
2	33-C-2-3	18	Courtyard - Structure D-3	51.5	37.8	11.8	25.5	Term Cl.
2	33-C-2-4	24	Courtyard - Structure D-3	34.0	36.3	24.8	26.4	Term Cl.
2	33-D-1-1	4	Structure D-5	65.9	46.8	30.5	78.8	Lt to Term Cl.
2	33-D-1-2	2	Structure D-5	68.9	71.3	23.2	124.1	Lt to Term Cl.
2	33-D-1-3	2	Structure D-5	38.8	47.0	17.3	36.6	Lt to Term Cl.
2	33-D-2-1	27	Structure D-5	66.9	57.3	28.1	129.3	Lt to Term Cl.
2	33-D-2-2	1	Structure D-5	35.6	30.2	12.8	10.7	Lt to Term Cl.
2	33-E-1-1	5	Courtyard - Structures D-6 & D-7	58.4	49.1	8.9	38.5	Term Cl.
2	33-E-4-1	1	Courtyard - Structures D-6 & D-7	58.4	49.1	8.9	38.5	Term Cl.
2	33-F-1-1	23	Courtyard - Structure D-3	51.5	44.2	23.8	52.6	Term Cl.
2	33-F-3-1	5	Courtyard - Structure D-3	39.3	41.2	8.4	19.3	Term Cl.
2	33-H-1-1	24	SE Courtyard	75.5	67.1	43.4	187.2	Lt to Term Cl.
2	33-H-2-1	9	SE Courtyard	54.0	39.4	26.9	55.7	Lt to Term Cl.
2	33-I-1-1	1	Courtyard - Structure D-3	56.9	46.8	22.1	50.9	Term Cl.
2	33-I-11-1	18	Courtyard - Structure D-3	51.2	44.9	15.2	34.9	Term Cl.
2	33-I-2-1	1	Courtyard - Structure D-3	48.6	51.4	21.0	50.8	Term Cl.
2	33-I-2-2	3	Courtyard - Structure D-3	49.9	71.2	37.9	176.4	Term Cl.
2	33-I-2-3	1	Courtyard - Structure D-3	39.0	40.6	19.1	22.6	Term Cl.
2	33-J-1-1	1	Structure D-9	62.9	45.6	18.1	49.4	Lt to Term Cl.
2	33-J-1-2	18	Structure D-9	75.2	51.4	18.5	68.8	Lt to Term Cl.
2	33-J-1-3	5	Structure D-9	39.8	30.5	6.4	8.4	Lt to Term Cl.
2	33-J-1-4	1	Structure D-9	39.9	40.6	18.0	23.4	Lt to Term Cl.
2	33-J-1-5	1	Structure D-9	45.5	44.1	19.4	36.1	Lt to Term Cl.
2	33-J-2-1	1	Structure D-9	49.6	81.7	14.4	63.6	Lt to Term Cl.
2	33-J-2-2	25	Structure D-9	88.8	77.1	60.1	412.2	Lt to Term Cl.
2	33-J-2-3	23	Structure D-9	75.2	61.6	46.8	198.9	Lt to Term Cl.
2	33-J-3-1	1	Structure D-9	66.9	52.9	25.6	97.8	Lt to Term Cl.

RB #	Provenience (Op-Subop-Lot-artifact No.)	Artifact [1]	Context	L(mm)	W(mm)	T(mm)	Wt(g)	Time Period (based on associated ceramics)
2	33-J-3-2	27	Structure D-9	55.5	58.6	27.6	117.4	Lt to Term Cl.
2	33-K-1-1	2	Courtyard - Structure D-3	78.6	60.3	28.7	151.1	Lt to Term Cl.
2	33-K-2-1	23	Courtyard - Structure D-3	78.6	60.3	28.7	151.1	Lt to Term Cl.
2	33-M-1-1	24	Courtyard - Structure D-3	38.1	27.0	8.1	8.1	Lt to Term Cl.
2	33-M-1-2	23	Courtyard - Structure D-3	72.0	56.6	31.8	116.6	Lt to Term Cl.
2	33-N-1-1	23	Courtyard - Structure D-3	77.1	59.4	53.2	335.9	Term Cl.
2	33-N-1-2	18	Courtyard - Structure D-3	44.9	35.8	13.0	13.6	Term Cl.
2	33-N-1-3	26	Courtyard - Structure D-3	58.8	47.1	36.8	127.1	Term Cl.
2	33-O-1-1	5	Courtyard - Structure D-7	56.4	44.9	10.9	28.5	Lt to Term Cl.
2	33-O-1-2	2	Courtyard - Structure D-7	53.5	55.0	21.1	76.9	Lt to Term Cl.
2	33-O-1-3	9	Courtyard - Structure D-7	42.6	34.1	18.5	24.6	Lt to Term Cl.
2	33-P-3-1	23	Structure D-9	45.2	20.6	19.6	19.9	Lt to Term Cl.
2	33-P-4-1	1	Structure D-9	35.8	32.6	19.5	18.5	Lt to Term Cl.
2	33-P-4-2	9	Structure D-9	45.9	27.1	16.8	19.9	Lt to Term Cl.
2	33-Q-1-1	26	Courtyard - Structure D-3	65.1	42.6	43.8	190.3	Term Cl.
2	33-R-2-1	18	Structure D-3	43.9	33.9	11.1	14.8	Lt to Term Cl.
2	33-R-2-2	23	Structure D-3	70.6	63.2	28.5	121.8	Lt to Term Cl.
2	33-R-2-3	23	Structure D-3	68.9	56.8	36.0	152.6	Lt to Term Cl.
2	33-R-2-4	23	Structure D-3	98.0	66.5	37.2	252	Lt to Term Cl.
2	33-R-2-5	18	Structure D-3	29.7	21.4	11.1	7.9	Lt to Term Cl.
2	33-R-2-6	9	Structure D-3	44.5	28.9	17.2	16.7	Lt to Term Cl.
2	33-S-3	17	Structure D-3	30.42	13.11	9.07	3.26	Ea Cl.
2	33-S-3	17	Structure D-3	46.75	37.98	19.1	33.55	Ea Cl.
2	33-S-5	26	Structure D-3	121.48	88.81	42.92	319.00	Undated
2	33-T-1-1	18	Structure D-3	39.5	28.5	13.1	16.8	Lt to Term Cl.
2	33-T-1-2	23	Structure D-3	66.3	47.9	30.3	106.8	Lt to Term Cl.
2	33-U-1-1	16	SE Courtyard	57.0	33.0	15.0	32.9	Lt to Term Cl.
2	33-U-2-1	5	SE Courtyard	26.8	30.9	5.3	4.5	Lt to Term Cl.
2	33-U-8-1	1	SE Courtyard	36.4	30.3	14.9	19.5	Lt to Term Cl.
2	33-U-9-1	23	SE Courtyard	52.2	33.7	26.8	49.4	Lt to Term Cl.
2	33-U-9-2	17	SE Courtyard	28.6	22.0	9.7	4.6	Lt to Term Cl.
2	33-U-9-3	17	SE Courtyard	55.1	45.2	21.9	56.1	Lt to Term Cl.
2	33-U-9-4	24	SE Courtyard	72.6	64.6	32.7	131.3	Lt to Term Cl.
2	33-U-9-5	18	SE Courtyard	44.7	30.9	8.9	12.7	Lt to Term Cl.
2	33-W-2-1	23	Structure D-3	52.9	48.6	31.3	71.3	Lt to Term Cl.
2	33-W-2-2	23	Structure D-3	63.3	48.8	24.9	79.2	Lt to Term Cl.
2	33-AA-1-1	18	Structure D-13	39.7	31.2	15.8	18.5	Lt to Term Cl.
2	33-AB-1-1	17	Structure D-13	54.8	65.4	33.5	130.6	Lt to Term Cl.

RB #	Provenience (Op-Subop-Lot-artifact No.)	Artifact [1]	Context	L(mm)	W(mm)	T(mm)	Wt(g)	Time Period (based on associated ceramics)
2	33-AB-1-2	1	Structure D-13	61.4	52.3	17.8	54.3	Lt to Term Cl.
2	33-AB-1-3	5	Structure D-13	67.4	66.9	21.0	74.4	Lt to Term Cl.
2	33-AC-1-1	16	Structure D-13	89.0	59.0	23.0	134.9	Lt to Term Cl.
2	33-AC-1-2	18	Structure D-13	49.2	37.9	21.8	27.5	Lt to Term Cl.
2	33-AC-2-1	25	Structure D-13	80.6	73.0	62.1	326.5	Lt to Term Cl.
2	33-AC-4-1	16	Structure D-13	58.0	51.9	26.9	90.1	Lt to Term Cl.
2	33-AD-1-1	1	Structure D-13	54.1	34.6	27.8	38.0	Lt to Term Cl.
2	33-AD-1-2	23	Structure D-13	61.0	51.5	33.4	111.8	Lt to Term Cl.
2	33-AE-2-1	26	Structure D-13	84.6	71.3	49.7	331.6	Lt to Term Cl.
2	33-AF-1-1	23	Structure D-13	68.2	61.2	49.5	180.9	Lt to Term Cl.
2	33-BA-3	8	Structure D-10	63.53	29.54	6.38	16.64	Lt to Term Cl.
2	33-BA-4	17	Structure D-10	65.73	41.77	11.08	24.85	Mixed
2	33-BA-4	17	Structure D-10	56.13	26.52	13.41	22.94	Mixed
2	33-BC-3	23	Structure D-12	60.32	37.56	23.99	40.58	Lt to Term Cl.
2	33-BG-2	9	Structure D-1 - Stairs	131.79	62.21	40.08	367.49	Lt to Term Cl.
2	33-BG-2	17	Structure D-1 - Stairs	49.18	35.29	20.24	41.12	Lt to Term Cl.
2	33-BG-2	26	Structure D-1 - Stairs	78.14	64.44	39.12	258.00	Lt to Term Cl.
2	33-BG-2	26	Structure D-1 - Stairs	95.69	52.4	47.43	367.50	Lt to Term Cl.
2	33-BH-3	26	Structure D-9	83.07	78.73	31.73	432.10	Lt to Term Cl.
2	33-BH-3	2	Structure D-9	79.18	68.6	20.86	133.30	Lt to Term Cl.
2	33-BH-7	2	Structure D-9	56.98	47.88	19.19	58.67	Undated
2	33-BH-7	23	Structure D-9	36.47	35.95	28.38	47.33	Undated
2	33-BH-8	23	Structure D-9	40.62	32.75	22.1	32.50	Undated
2	33-BH-8	23	Structure D-9	54.32	45.56	22.93	45.36	Undated
2	33-BJ-2	19	Structure D-4, south of	36.85	23.76	5.07	2.55	Lt to Term Cl.
2	33-BJ-7	1	Structure D-4, south of	88.96	40.47	18.04	79.92	Mid to Lt PrCl.
2	33-BK-2	26	Structure D-4	57.2	40.02	31.75	114.60	Lt to Term Cl.
2	33-BK-4	2	Structure D-4	40.73	40.18	20.59	34.20	Lt Cl.
31	5-A-3-1	3	Structure A-1	83	42	28	95.1	Mixed
31	6-A-2-1	23	South of Group A	81	48	43	151.3	Lt to Term Cl.
31	6-A-2-2	23	South of Group A	78	67	51	316.8	Lt to Term Cl.
31	10-A-1	19	Group A - Plaza	19.82	18.15	9.09	4.00	Lt to Term Cl.
31	10-A-1	19	Group A - Plaza	24.39	13.28	7.26	2.00	Lt to Term Cl.
31	10-A-1	19	Group A - Plaza	12.82	15.18	2.85	0.20	Lt to Term Cl.
31	10-A-1	19	Group A - Plaza	17.69	11.80	7.24	0.80	Lt to Term Cl.
31	10-A-2	2	Group A - Plaza	44.67	39.08	21.26	44.20	Lt Cl.
31	10-A-2	8	Group A - Plaza	27.91	23.73	3.62	3.00	Lt Cl.
31	10-A-2	17	Group A - Plaza	40.85	35.04	9.53	14.90	Lt Cl.

RB #	Provenience (Op-Subop-Lot-artifact No.)	Artifact [1]	Context	L(mm)	W(mm)	T(mm)	Wt(g)	Time Period (based on associated ceramics)
31	10-A-2	18	Group A - Plaza	43.15	34.13	9.16	17.60	Lt Cl.
31	10-A-2	19	Group A - Plaza	22.73	15.16	3.02	0.70	Lt Cl.
31	10-A-2	19	Group A - Plaza	22.51	12.39	7.11	1.80	Lt Cl.
31	10-A-2	19	Group A - Plaza	41.74	39.20	19.56	41.34	Lt Cl.
31	10-A-2	19	Group A - Plaza	63.71	37.13	5.97	15.67	Lt Cl.
31	10-A-2	19	Group A - Plaza	34.64	18.89	3.16	2.87	Lt Cl.
31	10-A-2	19	Group A - Plaza	25.75	24.39	7.04	4.24	Lt Cl.
31	10-A-2	20	Group A - Plaza	45.63	24.57	10.26	15.00	Lt Cl.
31	10-A-2	29	Group A - Plaza	64.57	59.81	48.85	120.04	Lt Cl.
31	10-A-2	29	Group A - Plaza	34.05	29.14	23.01	27.69	Lt Cl.
31	10-A-3	19	Group A - Plaza	26.96	26.00	5.77	2.62	Ea/Lt Cl.
31	10-A-3	19	Group A - Plaza	58.97	50.35	14.21	45.89	Ea/Lt Cl.
31	10-A-3	19	Group A - Plaza	27.63	26.05	9.34	5.88	Ea/Lt Cl.
31	10-A-3	19	Group A - Plaza	55.10	36.27	19.11	34.01	Ea/Lt Cl.
31	10-A-3	19	Group A - Plaza	26.05	14.48	9.39	6.24	Ea/Lt Cl.
31	10-A-3	19	Group A - Plaza	27.54	21.48	4.76	1.80	Ea/Lt Cl.
31	10-A-3	19	Group A - Plaza	59.05	39.54	17.89	43.00	Ea/Lt Cl.
31	10-A-3	23	Group A - Plaza	37.65	46.76	19.97	36.50	Ea/Lt Cl.
31	10-A-3	23	Group A - Plaza	83.27	59.08	41.29	236.00	Ea/Lt Cl.
31	10-A-4	2	Group A - Plaza	60.27	59.16	20.69	67.93	Undated
31	10-A-4	19	Group A - Plaza	30.66	18.99	10.94	5.53	Undated
31	10-A-4	19	Group A - Plaza	41.35	37.35	13.30	14.87	Undated
31	10-A-4	19	Group A - Plaza	33.42	22.77	13.86	7.43	Undated
31	10-A-4	19	Group A - Plaza	42.36	32.04	8.09	10.54	Undated
31	10-A-4	19	Group A - Plaza	38.12	27.85	4.38	3.10	Undated
31	10-A-4	19	Group A - Plaza	27.43	20.51	4.45	2.22	Undated
31	10-A-4	19	Group A - Plaza	19.52	14.78	6.18	1.68	Undated
31	10-A-4	19	Group A - Plaza	20.49	11.24	4.33	0.17	Undated
31	10-A-4	19	Group A - Plaza	32.09	16.50	4.53	2.16	Undated
31	10-A-4	19	Group A - Plaza	21.68	15.07	5.12	1.34	Undated
31	10-A-4	19	Group A - Plaza	21.17	12.58	5.25	1.24	Undated
31	10-A-4	19	Group A - Plaza	24.40	12.57	6.19	1.31	Undated
31	10-A-4	19	Group A - Plaza	18.75	11.63	7.30	1.50	Undated
31	10-A-5	19	Group A - Plaza	27.92	14.95	4.17	1.79	Ea Cl.
31	10-A-5	19	Group A - Plaza	39.31	26.89	7.97	6.03	Ea Cl.
31	10-A-5	19	Group A - Plaza	22.73	18.07	4.46	1.62	Ea Cl.
31	10-A-5	19	Group A - Plaza	43.56	27.87	5.70	4.63	Ea Cl.
31	10-A-5	19	Group A - Plaza	30.61	12.26	5.23	1.88	Ea Cl.

RB #	Provenience (Op-Subop-Lot-artifact No.)	Artifact [1]	Context	L(mm)	W(mm)	T(mm)	Wt(g)	Time Period (based on associated ceramics)
31	10-A-5	19	Group A - Plaza	25.39	39.09	7.01	4.64	Ea Cl.
31	10-B-4	18	Structure A-2	81.50	63.48	23.27	130.08	Undated
31	10-B-4	19	Structure A-2	43.08	34.80	9.01	12.46	Undated
31	10-B-4	19	Structure A-2	57.59	40.53	11.24	32.97	Undated
31	10-B-4	19	Structure A-2	66.10	49.23	15.50	46.43	Undated
31	10-B-4	19	Structure A-2	37.65	25.27	9.06	7.33	Undated
31	10-B-4	23	Structure A-2	60.40	62.97	26.04	40.98	Undated
31	10-C-2	19	Structure A-2	68.36	26.49	12.75	31.20	Lt to Term Cl.
31	10-C-2	19	Structure A-2	27.83	19.11	6.99	3.19	Lt to Term Cl.
31	10-C-2	19	Structure A-2	32.28	20.60	8.90	4.33	Lt to Term Cl.
31	10-C-4	19	Structure A-2	67.45	45.38	15.75	4.26	Undated
31	10-C-4	19	Structure A-2	49.98	30.45	9.77	15.83	Undated
31	10-C-4	19	Structure A-2	31.09	20.20	6.66	4.40	Undated
31	10-C-4	26	Structure A-2	26.47	38.55	17.22	27.28	Undated
31	10-C-4	26	Structure A-2	48.78	43.42	27.01	77.60	Undated
31	10-C-4	26	Structure A-2	57.83	56.86	34.85	185.88	Undated
31	10-D-1	19	West of Group-B	23.94	42.87	14.43	14.10	Lt to Term Cl.
31	10-D-2	19	West of Group-B	42.37	16.69	13.63	9.32	Lt to Term Cl.
31	10-E-2	19	Structure B-1	49.25	23.90	13.55	20.08	Lt to Term Cl.
31	10-E-2	19	Structure B-1	39.62	28.59	5.52	6.50	Lt to Term Cl.
31	10-E-2	19	Structure B-1	31.99	31.42	8.62	10.96	Lt to Term Cl.
31	10-E-2	19	Structure B-1	35.14	48.53	16.39	28.83	Lt to Term Cl.
31	10-E-2	26	Structure B-1	46.47	53.35	29.27	80.44	Lt to Term Cl.
31	10-E-4	19	Structure B-1	25.51	31.60	6.25	5.04	Lt Cl.
31	10-E-4	26	Structure B-1	60.65	70.49	49.54	216.02	Lt Cl.
31	10-E-6	19	Structure B-1	30.39	25.73	6.49	4.92	Lt Cl.
31	10-E-6	23	Structure B-1	28.55	25.02	17.47	14.14	Lt Cl.
31	10-E-8	19	Structure B-1	28.08	24.19	6.29	3.11	Ea Cl.
31	10-F-3	19	Structure B-1	32.50	12.08	10.71	3.39	Lt Cl.
31	10-H-2	19	Structure B-1	34.70	31.44	12.57	14.00	Lt to Term Cl.
31	10-I-1	19	Group B - Plaza	55.54	25.93	4.97	8.52	Lt to Term Cl.
31	10-I-1	19	Group B - Plaza	67.08	36.98	10.30	29.80	Lt to Term Cl.
31	10-I-2	19	Group B - Plaza	39.85	18.42	15.23	12.38	Lt to Term Cl.
31	10-I-3	19	Group B - Plaza	60.87	34.89	8.99	116.19	Lt Cl.
31	10-I-4	19	Group B - Plaza	68.16	32.67	15.27	37.38	Lt Cl.
31	10-I-4	20	Group B - Plaza	29.72	16.30	5.72	3.16	Lt Cl.
31	10-J-1	19	Structure B-1	40.52	24.52	6.04	??	Lt to Term Cl.
31	10-L-2	23	Structure B-1	112.87	81.81	82.01	342.40	Lt to Term Cl.

RB #	Provenience (Op-Subop-Lot-artifact No.)	Artifact [1]	Context	L(mm)	W(mm)	T(mm)	Wt(g)	Time Period (based on associated ceramics)
31	10-L-3	2	Structure B-1	69.70	53.34	22.78	73.87	Lt to Term Cl.
31	10-M-3	8	Structure B-1	96.22	44.29	7.72	32.60	Lt to Term Cl.
31	10-M-4	19	Structure B-1	45.12	24.33	5.60	6.29	Lt to Term Cl.
31	10-M-4	19	Structure B-1	26.08	17.99	5.15	2.88	Lt to Term Cl.
31	10-M-6	19	Structure B-1	26.14	16.12	7.54	6.63	Lt Cl.
31	10-M-6	19	Structure B-1	33.01	16.84	4.57	1.16	Lt Cl.
31	10-N-11	19	Group A - Plaza ca. Altar	35.07	20.86	3.51	2.00	Ea Cl.
31	10-N-11	20	Group A - Plaza ca. Altar	34.21	25.53	15.00	7.66	Ea Cl.
31	10-N-6	19	Group A - Plaza ca. Altar	37.21	27.14	16.64	23.10	Lt PrCl.
31	10-N-6	19	Group A - Plaza ca. Altar	60.14	36.59	10.40	21.23	Lt PrCl.
31	10-N-7	19	Group A - Plaza ca. Altar	90.91	32.84	13.46		Lt Cl.
31	10-O-8	19	Structure A-2	51.07	31.62	9.26	5.73	Undated
31	10-Q-7	23	Group A - Plaza ca. Altar	55.24	45.46	36.79	94.00	Lt Cl.
31	10-Q-8	19	Group A - Plaza ca. Altar	48.85	28.65	12.04	15.95	Lt Cl.
31	10-Q-9	20	Group A - Plaza ca. Altar	42.11	15.16	9.92	6.36	Lt Cl.
31	10-U-1	23	Structure A-1	21.05	23.94	21.32	14.55	Undated
31	LT-1	1	Structure A-1, Looter's Trench	63	41	18	38.3	Mixed
31	LT-2	1	Structure A-1, Looter's Trench	64	43	20	52.7	Mixed
31	LT-3	23	Structure A-1, Looter's Trench	77	69	30	185.2	Mixed
31	LT-4	1	Structure A-1, Looter's Trench	95	54	21	88.6	Mixed

[1]Artifact types:

1 Oval Biface
2 Bifacial Celt
3 Bi-Convex GUB
4 Truncated GUB
5 Ground Bit GUB
6 Thin Laurel Leaf Biface
7 Thin Constricting Stem Biface
8 Unknown Thin Biface Type
9 Large Narrow Bipointed Biface
10 Small Lenticular Bipointed Biface
11 Plano Convex Biface
12 Straight Stemmed Biface Point
13 Constricting Stem Biface Point
14 Unknown Biface Point Type
15 Eccentric
16 Miscellaneous Recycled Biface
17 Unknown Biface Type
18 Scraper
19 Utilized Flake
20 Drill/Graver
21 Unidirectional Blade Core
22 Unidirectional Flake Core
23 Multidirectional Core
24 Bifacial Core
25 Test Core
26 Battered Cobble Hammerstone
27 Battered Biface Hammerstone
28 Abrading Stone
29 Miscellaneous Chunk

APPENDIX D

Human Remains Data

Analysis and text by Julie M. Saul and Frank P. Saul

We completed analysis of human bone recovered from Dos Hombres, Group D (RB 2, Operation 33). No human remains were recovered from RB 31. Human bones were recovered from two lots: Suboperation J, Lot 3, a possible midden, and Suboperation S, Lot 2, a burial near the top of Structure D-3 at Dos Hombres.

RB 2 -33-J-3

The following material was recovered in this possible midden context:

1 maxillary left canine tooth, Middle Adult

1 proximal hand phalanx

RB 2 -33-S-2

Sex: Unknown (too fragmentary and incomplete)

Age: 20-30 years

Based on very slight dental attrition

Cranial Shaping: Unknown

Dental Decoration: Romero (1970) E 1 (insert)

Left Maxillary Lateral Incisor Crown:

Circular hole, 2mm diameter, 1 mm deep with a flat floor is present.

Insert is missing.

Left Maxillary Canine Crown:

Tooth crown is split vertically through the hole for an insert (insert missing)

Circular hole is 3mm diameter.

The right central maxillary incisor is present, with no decoration. Other anterior maxillary teeth were not recovered.

Dental Findings:

Caries Cavities: two carious teeth in the 18 teeth recovered (2/18) [cervical caries]

LEH: None

LSAMAT: None

No other dental information is available

Skeletal Findings:

Too eroded, fragmentary

Position:
- Primary burial on floor
- Flexed, with head south and hips north, on left side (facing west)
- Arms bent with both hands near head (one hand under skull)
- Knees are under chin, with the right leg more tightly flexed (right knee points south) and left leg less tightly flexed (knee points more southwest)

Condition:
- Bone is very fragmentary, incomplete and eroded, but all portions of body are represented.

The following excerpts from various sources explain what some of the terms used represent:

Linear Enamel Hypoplasia (LEH)

Linear enamel hypoplasia represents a developmental arrest in the formation of enamel or underlying tissue during the process of tooth crown formation. As the tooth crown is formed, the arrest line becomes a permanent record of a nonspecific systemic disturbance, such as malnutrition, infection, and/or various other disease processes that occur during childhood. Since the timing of enamel formation has been studied in modern populations, the location of the arrest line on the crown serves as a clue to the timing of the disturbance.

These arrest lines are common among the ancient Maya, usually occurring on permanent teeth in a location that represents 3-4 years of age. This coincidentally is the traditional time of weaning among many “primitive” peoples, and indeed, at the time of European contact, Bishop de Landa ([1937] 1978) wrote that the Maya weaned their children at 3-4 years of age. At the time of weaning, the young Maya child would lose the protein-rich, anti-infectious disease agent staple of mother's milk, and be put on the maize dependent, protein deficient diet. Such a drastic change, leading to protein deficiency and malnutrition, also lessens one's immunity to infectious disease. It is possible, but not by any means certain, that the rigors of weaning might have contributed to this developmental arrest.

Lingual Surface Attrition of the Maxillary Anterior Teeth (LSAMAT)

Dental wear, or attrition, is not usually considered to be a cultural modification. However, the presence and degree of oblique lingual attrition of the maxillary anterior teeth points to a specific, somewhat unusual activity (although presumably not a deliberate attempt to modify the teeth) resulting in a distinctive dental modification not found in all groups. LSAMAT, with lower anterior teeth showing "normal" horizontal wear, was first described by Turner and Machado (1983) as seen in an Archaic Brazilian site, and then by Irish and Turner (1987) in Prehistoric Panamanians. Found in combination with a high incidence of caries, Turner, Irish and Machado theorize that the use of the maxillary incisors and tongue to manipulate a high carbohydrate, gritty food such as manioc root (much as we eat artichokes) might account for this unusual wear. As organic materials are rarely preserved, the presence or absence of LSAMAT may give us the only clues we will find to the use of such a specific foodstuff over time and through space.

APPENDIX E

Faunal Remains Data

Analysis by Leslie Shaw

This appendix is divided into two sections: one for faunal bone and one for shell. Results of preliminary faunal analysis from Dos Hombres (RB 2), Group D are presented in two tables, each with accompanying comments. Tables E1 presents the analysis of faunal bone while Table E2 presents the analysis of shell. Analysis of all recovered faunal remains from 2002 and previous seasons has been completed. Analysis of faunal remains recovered in 2003 has not been undertaken.

Faunal Bone

The following comments and Table E1 refer to faunal bone analysis for Dos Hombres (RB-2), Group D, Belize.

1. The types and frequency of species is rather typical of interior sites, with deer (*Odocoileus virginianus*) being most prominent. The low number of turtles, given that the site is near a river, is a little surprising, but they are present in most contexts, so they were being used.
2. The bird recovered mostly seem to be large birds, such as ocellated turkey (*Meleagris ocellata*), chachalacas (*Ortalis vetula*) and such—no evidence of domestic turkey which is rare for these time periods anyway.
3. The assemblage overall was very fragmented. This could mean that excavations did not encounter a primary midden, and/or it could mean people were heavily processing every bit of meat they got. The variations in weathering could indicate a type of yard disposal—trash was dumped outside, dogs and rodents ate it, then it was moved away as fill.
4. The burnt and calcined bone (meaning burnt so intensively it has essentially turned to carbon) suggests that the debris came from cleaning out cooking pots and hearths.

5. The parrotfish obviously indicates some type of connection to the coast. Marine fish, and particularly parrotfish, are found at many inland sites, dating from Middle Preclassic through to the Terminal Classic. The presence of parrotfish at RB 2 is, therefore, not beyond what might be expected. It may be suggested that there may have been ritual meaning to the use of parrotfish bones, as its presence is not necessarily evidence of fish having been traded for consumption as foodstuff. Nevertheless, such ritual use is conjecture at this point. Without a full comparative collection it was not possible to identify the genus of parrotfish, so the family name is given, which includes several genera.
6. I think most of the *Canid* material is domestic dog but it is difficult to distinguish between that and fox with fragmentary bone remains.
7. There is evidence of bone working in both Operations B and J, with bone fragments showing cut and/or smoothed edges. This would also be relatively common in household trash as I think most households would have made their own bone tools. There was probably also manufacture of bone objects by specialists but I would expect a higher frequency of modified bone.

A)

B)

Figure E1. Parrotfish (Family Scaridae), upper dental bone from Suboperation B, Lot 2. A) view from top; B) view from bottom. Scale is in centimeters. Photos by G. R. Aylesworth.

Table E1. Analyzed Faunal Bone from Dos Hombres, Group D.

Provenience				Quantity	Taxon	element	side	MNI	Comments
RB#	Op	SubOp	Lot						
2	33	B	2	1	*Odocoileus* or *Mazama*	molar or premolar	-	1	immature
				4	large mammal	diaphysis fragments	-	-	
				1	large mammal	diaphysis fragments			with cut edge
				1	large mammal	diaphysis fragments			prob. cut edge/burned
				1	medium mammal	diaphysis fragments			
				1	probably large bird	diaphysis fragments			with 8 small fragments
				2	large turtle (Family Emydidae)	carapace and plastron			
				1	Parrotfish (Family Scaridae)	upper dental			Marine
				4	unknown	unknown			
2	33	B	3	2	*Odocoileus virginianus*	humerus-distal end	-	1	probably from same bone
				2	medium-large mammal	diaphysis fragments	-		
				1	probably *Crysemeys*	Carapace	C	1	
				1	probably large bird	Unknown	-	-	
				8	unknown	bone fragments	-	-	
2	33	E	2	1	medium mammal	diaphysis fragment			heavily burned
				1	large turtle	carapace fragment	-	-	
				1	small turtle	Unknown	-	-	
				1	unknown	Unknown	-	-	
2	33	I	10	1	turtle - probably *Kinosternon* sp.	carapace fragment	-	1	
2	33	J	1	2	*Odocoileus virginianus*	metapodial-distal epiphysis	-	1	
				1	*Odocoileus virginianus*	tibia diaphysis	-	-	
				1	probably *Canis*	canine tooth	-	1	old age/ worn
				1	probably *Canis*	metatarsel/carpal proximal	-	-	
				1	medium carnivore *(Canis?)*	femur, distal epiphysis	L	-	immature

Provenience				Quantity	Taxon	element	side	MNI	Comments
RB#	Op	SubOp	Lot						
2	33	J	1	5	large mammal	diaphysis fragments	-	-	
				1	large mammal	vertebra fragment	C	-	burned
				1	large mammal	diaphysis fragments	-	-	burned
				1	large mammal	rib fragment	-	-	burned
				1	large mammal	carpal/tarsal fragment	-	-	
				6	medium-large mammal	fragments unknown	-	-	
				3	medium mammal	epiphysis fragments	-	-	
				1	medium mammal	diaphysis fragments	-	-	calcined
				4	mammal	unknown	-	-	
				2	large turtle	carapace fragments	-	-	
2	33	J	2	1	*Odocoileus virginianus*	metapodial fragment	-	1	
				1	large mammal	carpal/tarsal fragment	-	-	
				4	large mammal	diaphysis fragments	-	-	
				1	large mammal	longbone or antler	-	-	modified, smooth on one end, weathered
				1	large mammal	epiphysis fragment	-	-	
				1	probably large mammal	diaphysis fragment	-	-	modified, poss. awl
				6	medium-large mammal	diaphysis fragments	-	-	heavily calcined
				2	medium-large mammal	skull or flatbone	-	-	
				1	medium mammal	diaphysis fragment	-	-	heavy rodent gnawing
				4	medium-large bird	diaphysis fragments	-	-	
2	33	J	3	1	*Odocoileus virginianus*	tibia diaphysis fragment	-	1	
				10	large mammal	diaphysis fragments	-	-	variable weathering
				2	large mammal	probably flat bone	-	-	
				2	medium-large mammal	diaphysis fragments	-	-	heavily burned

Provenience				Quantity	Taxon	element	side	MNI	Comments
RB#	Op	SubOp	Lot						
				2	medium mammal	diaphysis fragments	-	-	
2	33	J	3	1	small-medium mammal	unknown	-	-	
				1	large turtle	carapace	-	1	
				1	probably turtle	carapace/plastron	-	-	
				6	Unknown	unknown	-	-	
2	33	P	3	1	probably *Canis familiaris*	metatarsal/carpal	-	1	very weathered
				1	probably medium mammal	unknown	-	-	heavily burned
2	33	Q	1	1	probably *Kinosternon* sp.	carapace fragment	-	1	
2	33	T	1	1	medium mammal	diaphysis fragment	-	-	heavy rodent gnawing
2	33	U	9	3	large mammal	diaphysis fragments			
				2	small dog or fox	2 canines	1 R 1 L	1	probably from one animal
				1	small dog or fox	incisor	-		
				1	small dog or fox	premolar	-	-	

Shell

The following comments and Table E2 refer to shell analysis for Dos Hombres (RB-2), Group D, Belize.

Jute (Pachychilus) with tips missing were used for food, but the others probably were as well. Healy, et al. (1990) provide a good discussion of *jute* use. I think *jute* are more common in Rio Bravo than *Pomacea* because *jute* prefer moving water, while *Pomacea* favor standing water. The size of *Pomacea* can sometimes provide information (therefore size is indicated in Table E2) but this sample is so small that not much can be said. Miksicek (1991) wrote a good discussion of *Pomacea* size. The numbers of marine shell are low and fragmentary. *Cyprecea* (cowerie) is relatively rare but has been found in Maya sites before. *Oliva* is a common shell and they are often described as tinklers. The freshwater clam (*Nephronaias* sp.) is common at Maya sites, likely used because of their shiny interior surface. It does not, however, preserve well.

Table E2. Analyzed Shell from Dos Hombres, Group D.

Provenience				**Quantity**	**Taxon**	**Comments**	**MNI**
RB#	**Op**	**SubOp**	**Lot**				
2	33	A	2	1	*Pachychilus* sp.	medium, fragment	
2	33	A	3	2	*Pomacea* sp.	fragments	
2	33	A	6	2	*Pachychilus* sp.	medium, tips missing	2
				4	*Pachychilus* sp.	fragments	
				1	*Pomacea* sp.	fragment	
				1	land snail		
2	33	A	7	9	*Pachychilus* sp.	small-medium, all tips missing	
2	33	B	1	1	*Pachychilus* sp.	medium, tip missing	
2	33	B	2	1	*Oliva sayana*	cut to create tinkler	1
				2	*Pomacea* sp.	small fragments	
				3	unidentified	small fragments	
2	33	B	2	2	*Pachychilus* sp.	medium, tip missing	
2	33	B	2	2	*Pachychilus* sp.	1 tip missing	
				1	*Pachychilus* sp.	small fragment	
				1	*Cypraea* sp.	fragment	1
				5	*Pomacea* sp.	small fragments	
2	33	B	4	1	*Pachychilus* sp.	medium, tip missing	
2	33	C	1	1	*Pachychilus* sp.	fragment	
2	33	C	2	1	*Pachychilus* sp.	medium, fragment	
				1	*Pomacea* sp.	large individual	
2	33	E	2	2	*Pachychilus* sp.	large, 1 tip missing	
				2	*Pomacea* sp.	medium	2
2	33	G	2	3	*Pomacea* sp.	from large individual	
2	33	H	2	1	*Pachychilus* sp.	small, tip missing	
2	33	I	2	1	*Pachychilus* sp.	medium, fragment	
2	33	I	5	1	*Pachychilus* sp.	medium, tip present	
				1	*Pomacea* sp.	fragment	
2	33	I	6	2	*Pachychilus* sp.	medium, tip missing	
2	33	I	8	2	*Pachychilus* sp.	fragments	
				1	land snail		
				4	unidentified	fragments	

Provenience				Quantity	Taxon	Comments	MNI
RB#	Op	SubOp	Lot				
2	33	I	9	1	*Pachychilus* sp.	fragment	
				2	*Pomacea* sp.	small fragments	
2	33	I	10	1	freshwater bivalve - unid.	cut and shaped, with hole	
2	33	I	10	14	*Pachychilus* sp.		
2	33	I	10	4	*Pachychilus* sp.	fragments	
				4	*Pomacea* sp.	fragments, small individuals	
				8	freshwater bivalves	fragments, small individuals	3
				6	*freshwater bivalves*	Very small fragments	
				5	unidentified	fragments	
2	33	I	11	22	*Pachychilus* sp.	all but 1 with tip snapped off	22
				3	*Pachychilus* sp.	fragments	
				6	*Pomacea* sp.	fragments	
				4	*Nephronaias* sp.		2
				2	*Nephronaias* sp.	fragments	
				2	freshwater bivalve - unid.	fragments - different than *Nephronaias*	1
				6	land snail		
2	33	J	1	1	*Pomacea* sp.	fragment	
				1	*Cypraea* sp.	fragment, cowerie - marine	1
				1	probably conch	2 pieces fit together, worked into rectangle	
				2	*Pachychilus* sp.	medium, tips missing	
2	33	J	2	1	*Oliva sayana*	worked edge, tinkler style	1
2	33	J	3	1	*Pachychilus* sp.	medium, tips missing	
2	33	K	1	2	*Pomacea* sp.	fragments	
2	33	K	2	3	*Pomacea* sp.	fragments, 2 from large individual	
2	33	K	3	2	*Pomacea* sp.	fragments, 1 from very large individual	
2	33	M	2	1	prob. *Strombus* sp.	modified marine shell, hole drilled	
				2	*Pomacea* sp.	fragments, 1 small individual	
2	33	N	1	3	*Pachychilus* sp.	all with tips missing	4
				2	*Pomacea* sp.	fragments	
2	33	P	1	1	*Pachychilus* sp.	medium, tip missing	
2	33	P	3	22	*Pachychilus* sp.	small to large, all tips missing	22
				2	*Pachychilus* sp.	fragments	
				4	land snail		
2	33	P	4	1	marine shell, *Strombus* sp.	Hole drilled from interior side	1
				33	*Pachychilus* sp.	very small to medium, all but 3 missing tips	
				1	*Pachychilus* sp.	fragment	
				2	*Pomacea* sp.	small individuals	
				7	*Pomacea* sp.	fragment	
				5	freshwater bivalve	prob. *Nephronaias*, small individuals	3
				20	freshwater bivalve	small fragments	
				8	land snails		
2	33	P	5	22	*Pachychilus* sp.	large to small, all but 2 missing tips	22
				1	land snail		

Provenience				Quantity	Taxon	Comments	MNI
RB#	Op	SubOp	Lot				
2	33	Q	1	1	*Pachychilus* sp.	medium, tip missing	
2	33	S	2	1	freshwater bivalve	small fragment	
2	33	U	4	1	*Pachychilus* sp.	medium, tip missing	1
2	33	U	6	1	*Pachychilus* sp.	small, tip missing	
				1	land snail		
2	33	U	7	4	*Pachychilus* sp.	all with tips missing	4
				1	land snail		
2	33	U	8	1	probably conch	shaped edge with cut grooves (rasp?)	
				7	*Pachychilus* sp.	small- medium, prob. Tips missing on all	
				3	*Pachychilus* sp.	fragments	
				3	land snail		
				1	unidentifiable	fragment	
2	33	U	9	8	freshwater bivalves	fragments	6
				8	freshwater bivalves	small fragments	
				35	*Pachychilus* sp.	all with. tip ends broken	35
				6	*Pachychilus* sp.	fragments (including 2 tip ends)	
				2	bivalve	probably *Neph*., MNI=2, small individuals	
				1	*Pomacea* sp.	complete	
				16	*Pomacea* sp.	fragments	
				7	land snail		
2	33	AB	1	1	*Pachychilus* sp.	large, tip missing	
2	33	AC	3	1	*Pachychilus* sp.	small, tip missing	
2	33	AC	4	4	*Pachychilus* sp.	small, 3 tips missing	
2	33	AE	1	1	*Pachychilus* sp.	small, tip missing	
2	33	Str. D-3		1	*Pachychilus* sp.	medium, tip missing (looter's trench)	

APPENDIX F

Network Data

This appendix provides the data used for the links in the network graphs. Data is derived from Martin and Grube (2000:21). Each site is preceded by an arbitrary site number (001-035), which is given in Table F1. In Table F2, each site is followed by a list of the networks in which it participated. For example, Site 001, Okop, did not participate in the Hierarchy, Diplomatic, Family, or Conflict networks, so no information is listed for each of these networks. Okop did participate in the Other/Unknown network, with site 004 Calakmul. The number following the linked site indicates the strength of the link (1-5) with one equivalent to one documented interaction, two signifying two documented interactions, and so forth, with the exception of five, which signifies 5 or more documented interactions.

Table F1. Sites and their arbitrary numbers.

001 Okop
002 El Resbalon
003 Dzibanche
004 Calakmul
005 Maasal
006 Los Alacranes
007 Uaxactun
008 El Peru
009 Tikal
010 Xultun
011 Naranjo
012 Caracol
013 Yaxha
014 Ucanal
015 Sacul
016 Quirigua
017 Copan
018 Ixkun
019 Seibal
020 Motul
021 Dos Pilas
022 Tamarandito
023 Machaquila
024 Cancuen
025 Lakamtuun
026 Yaxchilan
027 Piedras Negras
028 Bonampak
029 Wa-Bird
030 Tonina
031 Sak Tz'i'
032 Pomona
033 Palenque
034 Pomoy
035 Moral

Table F2. Raw network data for each site.

==

001 Okop

==

Network : Hierarchy

- -

Network : Diplomatic

- -

Network : Family

- -

Network : Other/Unknown

- -

004 Calakmul	1

Network : Conflicts

- -

==

002 El Resbalon

==

Network : Hierarchy

- -

Network : Diplomatic

- -

Network : Family

- -

Network : Other/Unknown

- -

004 Calakmul	1

Network : Conflicts

- -

==

003 Dzibanche

==

Network : Hierarchy

- -

Network : Diplomatic

- -

Network : Family

- -

Network : Other/Unknown

- -

004 Calakmul	1

Network : Conflicts

- -

==

004 Calakmul

==

Network : Hierarchy

- -

008 El Peru	2
011 Naranjo	2
024 Cancuen	2
006 Los Alacranes	1
021 Dos Pilas	1
034 Pomoy	1
035 Moral	1

Network : Diplomatic

- -

012 Caracol	5
021 Dos Pilas	5
008 El Peru	4
024 Cancuen	2
016 Quirigua	1
019 Seibal	1
027 Piedras Negras	1

Network : Family

- -

008 El Peru	1
026 Yaxchilan	1

Network : Other/Unknown

- -

005 Maasal	2
001 Okop	1
002 El Resbalon	1
003 Dzibanche	1
006 Los Alacranes	1
017 Copan	1
027 Piedras Negras	1

Network : Conflicts

- -

009 Tikal	4
033 Palenque	2
011 Naranjo	1
026 Yaxchilan	1
030 Tonina	1

==

005 Maasal

==

Network : Hierarchy

- -

Network : Diplomatic

- -

009 Tikal	1

Network : Family

- -

Network : Other/Unknown

- -

004 Calakmul	2

Network : Conflicts

- -

009 Tikal	1

==

006 Los Alacranes

==

Network : Hierarchy

- -

004 Calakmul	1

Network : Diplomatic

- -

Network : Family

- -

Network : Other/Unknown

- -

004 Calakmul	1

Network : Conflicts

- -

010 Xultun	1

==

007 Uaxactun

==

Network : Hierarchy

- -

Network : Diplomatic

- -

Network : Family

- -

009 Tikal	1

Network : Other/Unknown

- -

009 Tikal	1

Network : Conflicts

- -

==

008 El Peru

==

Network : Hierarchy

- -

004 Calakmul	2

Network : Diplomatic

- -

004 Calakmul	4

Network : Family

- -

004 Calakmul	1

Network : Other/Unknown

- -

Network : Conflicts

- -

009 Tikal	1

==

009 Tikal

==

Network : Hierarchy

- -

020 Motul	2
012 Caracol	1
014 Ucanal	1

Network : Diplomatic

- -

033 Palenque	2
005 Maasal	1
019 Seibal	1

Network : Family

- -

007 Uaxactun	1
013 Yaxha	1
021 Dos Pilas	1

Network : Other/Unknown

- -

010 Xultun	2
011 Naranjo	2
012 Caracol	2
007 Uaxactun	1
017 Copan	1
021 Dos Pilas	1
030 Tonina	1

Network : Conflicts

- -

004 Calakmul	4
021 Dos Pilas	3
011 Naranjo	2
005 Maasal	1
008 El Peru	1
010 Xultun	1
012 Caracol	1
026 Yaxchilan	1

==

010 Xultun

==

Network : Hierarchy

- -

Network : Diplomatic

- -

Network : Family

- -

Network : Other/Unknown

- -

009 Tikal	2
012 Caracol	1

Network : Conflicts

- -

006 Los Alacranes	1
009 Tikal	1

==

011 Naranjo

==

Network : Hierarchy

- -

004 Calakmul	2
014 Ucanal	1

Network : Diplomatic

- -

014 Ucanal	1

Network : Family

- -

013 Yaxha	1

Network : Other/Unknown

- -

009 Tikal	2

Network : Conflicts

- -

012 Caracol	3
013 Yaxha	3
009 Tikal	2
004 Calakmul	1
014 Ucanal	1

==

012 Caracol

==

Network : Hierarchy

- -

009 Tikal	1

Network : Diplomatic

- -

004 Calakmul	5

Network : Family

- -

Network : Other/Unknown

- -

009 Tikal	2
010 Xultun	1
017 Copan	1
018 Ixkun	1

Network : Conflicts

- -

014 Ucanal	5
011 Naranjo	3
009 Tikal	1

===

013 Yaxha

===

Network : Hierarchy

- -

Network : Diplomatic

- -

Network : Family

- -

009 Tikal	1
011 Naranjo	1

Network : Other/Unknown

- -

Network : Conflicts

- -

011 Naranjo	3

===

014 Ucanal

===

Network : Hierarchy

- -

009 Tikal	1
011 Naranjo	1
019 Seibal	1

Network : Diplomatic

- -

011 Naranjo	1

Network : Family

- -

Network : Other/Unknown

- -

Network : Conflicts

- -

012 Caracol	5
018 Ixkun	2
011 Naranjo	1
015 Sacul	1

==

015 Sacul

==

Network : Hierarchy

- -

Network : Diplomatic

- -

Network : Family

- -

Network : Other/Unknown

- -

Network : Conflicts

- -

014 Ucanal	1

==

016 Quirigua

==

Network : Hierarchy

- -

017 Copan	3

Network : Diplomatic

004 Calakmul	1
017 Copan	1

Network : Family

Network : Other/Unknown

017 Copan	4

Network : Conflicts

017 Copan	1

017 Copan

Network : Hierarchy

016 Quirigua	3

Network : Diplomatic

016 Quirigua	1

Network : Family

033 Palenque	1

Network : Other/Unknown

016 Quirigua	4
004 Calakmul	1
009 Tikal	1
012 Caracol	1
033 Palenque	1

Network : Conflicts

016 Quirigua	1

018 Ixkun

Network : Hierarchy

Network : Diplomatic

Network : Family

Network : Other/Unknown

012 Caracol	1

Network : Conflicts

014 Ucanal	2

019 Seibal

Network : Hierarchy

014 Ucanal	1
021 Dos Pilas	1

Network : Diplomatic

021 Dos Pilas	4
004 Calakmul	1
009 Tikal	1
020 Motul	1
025 Lakamtuun	1

Network : Family

Network : Other/Unknown

Network : Conflicts

- -

021 Dos Pilas	1

==

020 Motul

==

Network : Hierarchy

- -

009 Tikal	2

Network : Diplomatic

- -

019 Seibal	1

Network : Family

- -

026 Yaxchilan	2

Network : Other/Unknown

- -

Network : Conflicts

- -

021 Dos Pilas	1
023 Machaquila	1
026 Yaxchilan	1

==

021 Dos Pilas

==

Network : Hierarchy

- -

022 Tamarandito	2
004 Calakmul	1
019 Seibal	1

Network : Diplomatic

- -

004 Calakmul	5
019 Seibal	4
022 Tamarandito	1

024 Cancuen	1

Network : Family

- -

009 Tikal	1
022 Tamarandito	1
024 Cancuen	1

Network : Other/Unknown

- -

009 Tikal	1
026 Yaxchilan	1

Network : Conflicts

- -

009 Tikal	3
019 Seibal	1
020 Motul	1
026 Yaxchilan	1

==

022 Tamarandito

==

Network : Hierarchy

- -

021 Dos Pilas	2

Network : Diplomatic

- -

021 Dos Pilas	1

Network : Family

- -

021 Dos Pilas	1

Network : Other/Unknown

- -

Network : Conflicts

- -

==

023 Machaquila

==

Network : Hierarchy

- -

Network : Diplomatic

- -

024 Cancuen	4

Network : Family

- -

Network : Other/Unknown

- -

Network : Conflicts

- -

020 Motul	1

==

024 Cancuen

==

Network : Hierarchy

- -

004 Calakmul	2

Network : Diplomatic

- -

023 Machaquila	4
004 Calakmul	2
021 Dos Pilas	1

Network : Family

- -

021 Dos Pilas	1

Network : Other/Unknown

- -

Network : Conflicts

- -

==

__025 Lakamtuun__

==

Network : Hierarchy

- -

Network : Diplomatic

- -

019 Seibal	1

Network : Family

- -

Network : Other/Unknown

- -

026 Yaxchilan	1

Network : Conflicts

- -

026 Yaxchilan	2

==

__026 Yaxchilan__

==

Network : Hierarchy

- -

027 Piedras Negras	2
028 Bonampak	2

Network : Diplomatic

- -

028 Bonampak	2
027 Piedras Negras	1

Network : Family

- -

020 Motul	2
004 Calakmul	1
028 Bonampak	1

Network : Other/Unknown

- -

021 Dos Pilas	1
025 Lakamtuun	1
033 Palenque	1

Network : Conflicts

- -

027 Piedras Negras	5
028 Bonampak	5
025 Lakamtuun	2
004 Calakmul	1
009 Tikal	1
020 Motul	1
021 Dos Pilas	1
031 Sak Tz'i'	1

==

027 Piedras Negras

==

Network : Hierarchy

- -

026 Yaxchilan	2
031 Sak Tz'i'	2

Network : Diplomatic

- -

004 Calakmul	1
026 Yaxchilan	1
028 Bonampak	1

Network : Family

- -

Network : Other/Unknown

- -

004 Calakmul	1
031 Sak Tz'i'	1
032 Pomona	1

Network : Conflicts

- -

026 Yaxchilan	5
029 Wa-Bird	3
032 Pomona	2

033 Palenque	2
031 Sak Tz'i'	1

==

028 Bonampak

==

Network : Hierarchy

- -

026 Yaxchilan	2
030 Tonina	1
031 Sak Tz'i'	1

Network : Diplomatic

- -

026 Yaxchilan	2
027 Piedras Negras	1
031 Sak Tz'i'	1

Network : Family

- -

026 Yaxchilan	1

Network : Other/Unknown

- -

Network : Conflicts

- -

026 Yaxchilan	5
031 Sak Tz'i'	2
033 Palenque	1

==

029 Wa-Bird

==

Network : Hierarchy

- -

Network : Diplomatic

- -

Network : Family

- -

Network : Other/Unknown

- -

Network : Conflicts

- -

027 Piedras Negras	3
033 Palenque	1

==

030 Tonina

==

Network : Hierarchy

- -

028 Bonampak	1

Network : Diplomatic

- -

Network : Family

- -

032 Pomona	1

Network : Other/Unknown

- -

009 Tikal	1

Network : Conflicts

- -

033 Palenque	3
034 Pomoy	2
004 Calakmul	1
031 Sak Tz'i'	1

==

031 Sak Tz'i'

==

Network : Hierarchy

- -

027 Piedras Negras	2
028 Bonampak	1

Network : Diplomatic

- -

028 Bonampak	1

Network : Family

- -

Network : Other/Unknown

- -

027 Piedras Negras	1

Network : Conflicts

- -

028 Bonampak	2
026 Yaxchilan	1
027 Piedras Negras	1
030 Tonina	1

===

032 Pomona

===

Network : Hierarchy

- -

Network : Diplomatic

- -

Network : Family

- -

030 Tonina	1

Network : Other/Unknown

- -

027 Piedras Negras	1
033 Palenque	1

Network : Conflicts

- -

027 Piedras Negras	2
033 Palenque	1

===

033 Palenque

===

Network : Hierarchy

- -

Network : Diplomatic

- -

009 Tikal	2

Network : Family

- -

017 Copan	1

Network : Other/Unknown

- -

017 Copan	1
026 Yaxchilan	1
032 Pomona	1

Network : Conflicts

- -

030 Tonina	3
004 Calakmul	2
027 Piedras Negras	2
028 Bonampak	1
029 Wa-Bird	1
032 Pomona	1

===

034 Pomoy

===

Network : Hierarchy

- -

004 Calakmul	1

Network : Diplomatic

- -

Network : Family

- -

Network : Other/Unknown
- -

Network : Conflicts
- -

030 Tonina	2

===

035 Moral

===

Network : Hierarchy
- -

004 Calakmul	1

Network : Diplomatic
- -

Network : Family
- -

Network : Other/Unknown
- -

Network : Conflicts
- -

APPENDIX G

Field Recording Forms

Provided by Palma Buttles, courtesy PfBAP

This appendix provides copies of the forms used in the field and in the field laboratory for recording excavation and analysis information. Forms were originally printed on letter size, acid neutral paper, but are reduced here to fit within formatting guidelines.

PfBAP **- Lot Record Form** **RB____________**

Project:____________________________________ Site____________________________________

Recorder: | Excavator(s):

Operation__________ SubOp__________ Lot__________ | Date Opened______________ Date Closed______________

Lot Type
(Check Appropriate)
☐ Burial ☐ Cache ☐ Construction Fill ☐ Floor ☐ Hearth ☐ Humus ☐ Interface
☐ Midden ☐ Surface ☐ Wall ☐ Other____________________________________

Lot Location
Horizontal____________________________________ Vertical____________________________________

Lot Description

____

____

____

____

____

____

Materials Observed and Collected (O=Observed, C=Collected)
☐ Bone ☐ Ceramic ☐ Groundstone ☐ Lithic
☐ Obsidian ☐ Shell ☐ Other______________

***Collected Samples** (Check Appropriate and Define Below)
☐ Botanical ☐ Bone ☐ Carbon ☐ Flotation
☐ Hydration ☐ Soil ☐ Other____________________
**ALL collected samples must be accompanied by a Sample Record Form*

Association Schematic
Physically Below _____ _____ _____ _____ _____
Physically Above _____ _____ _____ _____ _____
Associated With _____ _____ _____ _____ _____

Termination/Elevations
☐ Cultural______________ (type) ☐ Arbitrary______________ (type)
Beginning Elevation____________ Ending Elevation____________
Total Thickness of Lot_________ (e.g., 10cm, 38cm, 1.2m, etc.)

Documentation *Photographs*
Photographer____________________________________
B&W Roll_______ Frames________________
Color Roll_______ Frames________________

Illustrations/Maps (Check Appropriate)
☐ Plan Map ☐ Artifacts
☐ Profile ☐ Other__________________________

Comment, Descriptions, Interpretations

____

____

____

____

____

____

____

____

____

____

____ PfBAP 98

Figure G1. Lot Record Form. Used by permission. © 1998 by The Programme for Belize Archaeological Project.

PfBAP **- Lot Definition Form**

RB__________
OP__________

Project______________________________ Site____

SupOp	Lot	Date Opened	Date Closed	Definition

PfBAP 98

Figure G2. Lot Definition Form. Used by permission. © 1998 by The Programme for Belize Archaeological Project.

PfBAP **- Completed Lot Inventory Form**

RB__________
Op__________

Project______________________________ Site____

SubOp	Lot	Date Opened	Date Closed	Total No. of Bags	Description

PfBAP 98

Figure G3. Lot Inventory Form. Used by permission. © 1998 by The Programme for Belize Archaeological Project.

PfBAP **- SubOp Tracking Form**

RB_________
OP_________

Project____________________________ **Site____**

SubOp	Size	Date Opened	Date Closed	Location/Definition	# of Lots

PfBAP 98

Figure G4. SubOp Tracking Form. Used by permission. © 1998 by The Programme for Belize Archaeological Project.

PfBAP **- Sample Record Form** RB____________

Project:____________________________________ Site______________________________________

Recorder:	Date
Operation__________ SubOp__________ Lot__________	Estimated Sample Age:__________________________________

Sample Type
(Check Appropriate)

☐ Botanical ☐ Bone ☐ Carbon ☐ Flotation ☐ Hydration ☐ Shell
☐ Soil ☐ Other____

Location
Horizontal____ Vertical____

Description

____
____
____
____
____

Context

____
____
____
____

Factors Affecting Validity or Context

____
____
____

Documentation *Photographs*	*Illustrations/Maps (Check Appropriate)*
Photographer________________________________	☐ Plan Map ☐ Profile
B&W Roll________ Frames__________________	
Color Roll________ Frames__________________	☐ Other________________________________

Comment, Observations, and Significance

____
____
____
____
____
____
____
____
____

PfBAP 98

Figure G5. Sample Record Form. Used by permission. © 1998 by The Programme for Belize Archaeological Project.

PfBAP **- Burial Documentation Form**

RB_________

Op_________

Project______________________________ **Site**______________________________

Burial Number__________________________ **Date(s) Excavated**__________________________

Provenience (Subop/Lot)____________________ **Excavated by**__________________________

Analyst(s)____________________________ **Documented by**__________________________

Check (✓) appropriate ☐ below

Physical Description: ☐ **Lot Form Completed** ☐ **Plan Map** *(Attach)* ☐ **Photograph** *(Note rolls and frames)*

(Include any pertinent measurements, e.g. position, orientation, etc.)

Descriptive Context:

Inventory of Burial Furniture: ☐ **Photograph** *(Note rolls and frames)*

Samples Taken: ☐ **Sample Form** *(Sample Form must be completed for each sample taken)*

Temporal Designation: *(Include method of temporal designation)*

Comments and Interpretations: *(Continue on reverse)*

PfBAP 98

Figure G6. Burial Documentation Form. Used by permission. © 1998 by The Programme for Belize Archaeological Project.

PfBAP **- Cache Documentation Form**

RB________
Op________

Project____________________ **Site**____________________

Cache Number____________________ **Date(s)**

Excavated____________________

Provenience (Subop/Lot)____________________ **Excavated by**____________________

Analyst(s)____________________ **Documented by**____________________

Check (✓) appropriate ☐ below

Physical Description/Composition: ☐ **Lot Form Completed** ☐ **Plan Map** *(Attach)* ☐ **Photograph** *(Note rolls and frames)*
(Include any pertinent measurements, e.g. position, orientation, etc.)

Descriptive Context:

Inventory of Cache Contents: ☐ **Plan Map** *(Attach)* ☐ **Photograph** *(Note rolls and frames)*

Samples Taken: ☐ **Sample Form** *(Sample Form must be completed for each sample taken)*

Temporal Designation: *(Include method of temporal designation)*

Comments and Interpretations: *(Continue on reverse)*

PfBAP 98

Figure G7. Cache Documentation Form. Used by permission. © 1998 by The Programme for Belize Archaeological Project.

PfBAP - Photo Log

Film Type______________________
Photographer(s)______________________

Roll	Frame	Direction	Date	Project - Site	Op	Subop	Lot	Description

UT 2001

Figure G8. Photo Log. Used by permission. © 2001 by The Programme for Belize Archaeological Project.

PfBAP - Daily Bag Inventory

Project________________________

Date________to________

RB________Site________________

Date	Provenience			Materials Collected										*Samples Collected			# Bags	
Date	Op	Subop	Lot	Faunal Bone	Human Bone	Ceramic	Green Stone (Jade)	Ground Stone	Lithic	Obsidian	Shell	Snail	Other Materials	*Charcoal	*Soil Sample	*Other Samples	Total Number of Bags	Initials

Page________of________

*Samples must be accompanied by completed Sample Forms

PfBAP 98

Figure G9. Daily Bag Inventory. Used by permission. © 1998 by The Programme for Belize Archaeological Project.

PfBAP - Artifact Catalogue

Project____________

Date________to________

RB________Site________

Date	Provenience			Bone			Ceramic			Ground Stone		Lithic		Obsidian		Shell				Samples	Other	*Comments
Date	Op	Subop	Lot	Faunal	Human	Modified	Sherds	Vessel or Figurine	Modified	Green Stone (Jade)	Other Stone	Debitage	Tool	Obsidian	Blade	Snail	Fresh Water	Marine	Modified	Samples	Other	Comments and Specimens Removed

Page________of________

*Please note any specimens removed for illustration, sampling, etc. in the comments column

PfBAP 98

Figure G10. Artifact Catalog. Used by permission. © 1998 by The Programme for Belize Archaeological Project.

PfBAP **- Ceramic Analysis Form (2002 Season)**

Project____________________

Date________ to________

RB________ Site____________________

Provenience					Forms					Counts				
Op	Subop	Lot	Temporal Designation	Type:Variety	Plate	Bowl	Jar	Cylinder	Other	Rim	Body	Base	Total	*Comments

Page _____ of_____

*Please note specimens removed for illustration, sampling, etc.

v.1.0 PfBAP 98

Figure G11. Ceramic Analysis Form. Used by permission. © 1998 by The Programme for Belize Archaeological Project.

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Vita

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