

ARCHAEOLOGICAL SURVEY IN THE SOUTHWESTERN LAKE TITICACA BASIN

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RESUMEN

Este trabajo se refiere a un reconocimiento arqueológico sistemático llevado a cabo en el suroeste de la cuenca del lago Titicaca en el extremo sur del Perú. Nuestro reconocimiento cubrió aproximadamente 360 km² en la región Juli-Pomata y se descubrieron casi 500 sitios.

Un reconocimiento adicional permitió descubrir varios sitios más en el área de Ccapia y Desaguadero, al sur de la zona en cuestión. Los sitios reconocidos representan más de 1000 ocupaciones que van desde el último periodo arcaico (ca 5000-2000/1500 a.C. hasta el inicio del periodo Español (AD 1532-1700).

Se revisan diseños y metodologías de investigaciones anteriores describiéndose el área de estudio, entregándose tipologías tanto del sitio, de cerámica, de tumbas; como descripciones de sitios individuales, dibujos de cerámica, fotografías y fechas de ocupación. Finalmente se analizan los datos a la luz de investigaciones previas y se evalúa su importancia para la prehistoria del suroeste de la cuenca del Lago Titicaca.

ABSTRACT

This paper reports on a systematic archaeological survey and reconnaissance in the southwestern Titicaca Basin of far southern Peru. Our survey covered approximately 360 km² in the Juli-Pomata region and discovered almost 500 sites. Additional large-site reconnaissance discovered several dozen additional sites in the Ccapia and Desaguadero areas, south of the intensive survey zone. These single and multi-component sites represent more than 1000 occupations that range in date from the Late Archaic Period (ca. 5000 - 2000/1500 BC) to the Early Spanish Colonial Period (A.D. 1532 - 1700). In this paper, we review previous research in the region, describe the overall research design and methodology, describe the study area, provide a site typology, a ceramic typology, a tomb typology, individual site descriptions, ceramic drawings, photographs, and settlement data. Finally, we interpret these data in light of previous research and assess their importance for understanding the prehistory of the southwestern Titicaca Basin.

INTRODUCTION

At the time of Spanish contact, the Titicaca region was divided into a series of smaller polities or señoríos. One of the most powerful of these was the Lupaqa, located in the western and southwestern side of the lake (Figure 1). Archaeological sites in the Titicaca Basin have been studied for more than one hundred years on both the Peruvian and Bolivian sides. These previous investigations provide a chronological and cultural historical framework within which to understand the new archaeological data from this project. This previous research has also permitted archaeologists to develop models to understand the economic and political evolution of complex society in the region. The original purpose of the survey and reconnaissance was to test models of political economy of the later prehistory of the Lupaqa area. In particular, we were

interested in the nature of the Lupaqa polity prior to the Inca conquest and the origins of that polity in the context of Tiwanaku collapse around AD 1100. Our data have provided substantial insight into these critical problems of this period of Titicaca Basin prehistory.

As with any good settlement survey, the data collected were also relevant to a number of other problems beyond those of the primary research goals. For instance, our research has allowed us to define new pre-Tiwanaku polities in the Juli area that we have named Early Sillumocco and Late Sillumocco (Stanish and Steadman 1994). We have furthermore discovered contemporary pre-Tiwanaku polities in the Pomata-Yunguyu area. We have also discovered a number of early sites that represent the first settled villages in the southwestern Titicaca Basin that we have named the Pasiri culture. We have also identified a substantial Tiwanaku settlement system that provides insight into the nature of Tiwanaku expansion (Stanish and de la Vega 1992). A substantial Inca and Early Colonial Period settlement system was also discovered in the survey, data that provide insight into the expansion of the Inca state and early Spanish Colonial political and economic organization. Relict raised fields were also located in three areas. The association of fields and sites provides a powerful means of assessing models of raised field agricultural land use dynamics in the Titicaca region (Stanish 1994).

In this article, we will introduce the critical anthropological problems of the prehistory of the area. Furthermore, our research design and methodology will be described. Most importantly, this report contains the bulk of our survey and reconnaissance data presented in graphic, tabular, and descriptive form. Finally, we offer as many interpretations of these data as possible that help clarify a number of these problems in Titicaca Basin prehistory.

PREVIOUS RESEARCH

The research reported on in this book is based upon several years of preliminary work conducted in the Juli area (de la Vega 1990; Onofre 1989; Stanish and Steadman 1994) which in turn was based upon the previous research of dozens of other scholars for over a century. Upon our arrival in Juli in the summer of 1988, we had available a number of 16th century documents and various site reports on the prehistoric occupations of the region.

Some of the first modern archaeological reports in the Lupaqa area include the work of Franco and González (1936) who demonstrated that Lupaqa sites were associated with large, stone mortuary towers known as chulpas (and see Aldunate and Castro 1981; Bandelier 1905; Hyslop 1977). Curiously, some of these towers had Inca-like masonry. These data, combined with Rydén's work in the Bolivian side (1947, 1957), served to tie in the Lupaqa "chulpa" sites to the post-Tiwanaku/pre-Inca periods in the altiplano. Likewise, Vásquez and Vásquez et al. published brief reports (Vásquez, Carpio and Velasco 1935; Vásquez 1939) on the sites of Cutimbo and Tanka Tanka, both of which are found in the Lupaqa zone. The existence of chulpas, which were said by Cieza, Cobo, and Guaman Poma to be the burial towers of elite, suggested that the pre-Inca Lupaqa maintained a complex society with social and political hierarchies (Cieza 1553; Guaman Poma 1980:270; Rydén 1947:407).

In the survey area, E. Squier described and drew some cut stones on the Inca road that is constructed in an Inca style. He described these as "The Inca's Chair"

(Squier 1877:350). Near Challapampa, Tschopik (1946:506) first described the large, Late Horizon chullpas that are found along the north side of the hill that rings the low pampa zone. In the survey region, Hyslop noted some cut stone near the site of Lundayani (009) with an associated Inca occupation.

Marion Tschopik's work, published in 1946, included excavations at Chuquito in Late Horizon contexts, as well as a reconnaissance of a number of sites away from the lake. Tschopik correlated two basic ceramic styles to the Lupaqa area. She named these Chuquito (1946:28-29) and Allita Amaya (1946:34) and dated them to the Inca and pre-Inca periods respectively. This pioneering research provided us the first correlations of Lupaqa area sites with specific archaeological indicators. Tschopik also published drawings of Tiwanaku and Inca pottery, and developed a typology of chulpa types in the region. Alfred Kidder II reconnoitered the north and western Titicaca basin and had visited the Ilave Pampa (Kidder 1943). Kidder located a number of Tiwanaku and Pucara sites in his survey (his primary interest), two of which, known as Asiruni and Sarapa, were in the Ilave Pampa just north of Juli (Figure 2). Kidder's reconnaissance apparently ended just short of the northern part of our systematic survey and he apparently never published on major sites in the Juli-Desaguadero region.

John Hyslop's pathbreaking dissertation survey research (Hyslop 1976) represents the first systematic archaeological research design carried out in the region. Hyslop and Elias Mujica reconnoitered the area and systematically located sites described in the historical documents, corroborated reports by previous scholars, and developed some broad models to describe and explain the region's prehistory. Their work indicated that a number of site types and cultural periods were well-represented in the Juli-Desaguadero region. The dissertation, along with information in some subsequent publications (Hyslop 1977, 1984, 1990; Mujica 1990:172) provided a very useful chronology, as well as a typology of sites and tomb forms.

CHRONOLOGY

The most commonly used chronology in the southern Titicaca Basin, referred to here as the "Bennett-Ponce" chronology. Bennett's Early, Classic, and Decadent phases, generally correspond to Ponce's III-V. Ponce furthermore suggested two pre-Early Tiwanaku phases numbered Tiwanaku I and II. In Tiwanaku, Espacio, Tiempo, y Cultura, Ponce assigns developmental qualities to each of the five periods. Tiwanaku I and Tiwanaku II, for instance, were argued to be "formative" in character (Ponce 1972:75). Tiwanaku III and IV, in contrast, were characterized as "the second stage of a fully urban character" (Ponce 1972:75-76). The final stage, Tiwanaku V, was expansionistic or "imperial" in character (Ponce 1972:85). In the Ponce framework, therefore, there is an implicit evolutionary dynamic combined with a series of absolute dates.

We have adopted a dual chronological system that formalizes both historical and evolutionary approaches in central Andean archaeology in general, and the Titicaca Basin in particular. In the first instance, we use a broad evolutionary chronology that we feel is applicable to the Titicaca Basin as a whole. Parallel to this evolutionary chronology, we employ local historical chronologies for different areas such as the Juli region, the Desaguadero area, and so forth. We retain certain features of the Ica sequence (the Expansive Tiwanaku and Expansive Inca Periods, for instance, that generally

correlate to the Middle Horizon and Late Horizon respectively), but have altered this sequence to fit the Titicaca Basin cultural history according to our data. The general chronology is represented by eight periods: Late Archaic (ca. 5000 - 2000/ 1800 BC), Early Formative (ca. 1800/1300- 1300/900), Middle Formative (1300/900 - 500/200 BC), Upper Formative (500/200 BC - AD 400), Expansive Tiwanaku (AD 400 - 1100), Altiplano (AD 1100 - 1450), Expansive Inca (AD 1450 - 1532), and Early Spanish Colonial (AD 1532 - 1700). Alongside the general chronology are the local historical ones, providing a dual system for every area. The chronologies that we utilize are shown in Figure 3.

THE LATE ARCHAIC (CA. 5000 - 1800/1300 BC)

The earliest cultures in the Titicaca region are collectively designated as the Archaic Period. The Archaic Period occupations represent the first human populations in the Titicaca Basin and date to at least 5000 BC (Lumbreras 1974b:35). The Late Archaic was a period characterized by largely mobile hunters and collectors, low population densities, and a dependence upon lacustrine and nondomesticated flora and fauna. There has been very little work in the region on this period with the exception of a few brief and inaccessible reports (e.g. Palao 1989). A number of Late Archaic Period sites were discovered on our survey defined by distinctive lithic diagnostics, particularly bifaces. While these sites fall outside of our proposed research interests, their future study will serve to refine our understanding of the pre-agricultural periods in the southwestern Titicaca region.

THE EARLY FORMATIVE (CA. 1800/1300 - 1300/900)

The large time period from the earliest sedentary, primarily agricultural populations of the region to the emergence of the Tiwanaku state as an expansive polity comprises the Formative period in Titicaca Basin prehistory (circa 1800 BC - AD 400). Following Lumbreras, we recognize three large divisions in the Formative defined in evolutionary terms: the Lower, Middle and Upper Formative.

The Lower Formative is defined here as the time period from the earliest sedentary populations to the development of recognizable political and economic ranking in Titicaca Basin societies. This period began as early as 1800 BC in some areas in the north and south Titicaca regions, and beings as late as perhaps 1300 BC in other areas. The local expression of the Lower Formative in the Juli region is referred to as the Pasiri Period. We estimate it to begin around 1300 BC, perhaps a half millenium later than in other areas.

THE MIDDLE FORMATIVE (1300/900 - 500/200 BC)

In our evolutionary chronology, the Middle Formative represents the establishment of ranked society in the Titicaca Basin. It is during this period that we have evidence of the operation of a corporate labor organization well above the capacities of individual households. Such labor organization is associated with ranked, or simple chiefly societies in anthropological theory. The result of this more complex labor organization is particularly evident in the development of elaborate architecture and

ceramic traditions. The most important of the Middle Formative cultures are Qaluyu (ca. 1300-500 BC), and Early and Middle Chiripa (1300-850 BC and 850-500 BC respectively; see Chá vez 1988a:2). The Middle Formative societies flourished from at least the beginning of the first millennium BC (Qaluyu in the north and Chiripa and Chiripa-related sites in the south) to the middle to later first millennium BC with the establishment of the Upper Formative complex chiefdoms during Late Chiripa (500 - 200 BC), Cusipata (500 - 200 BC), Pucara (200 BC - AD 400), Kalasasaya (ca. 200 BC - AD 200), and Qeya (AD 200 - 400) times.

The Middle Formative represents the first period for which we have good settlement data in the Juli-Pomata region. It appears that the development of ranked society occurred relatively late in the Juli area compared with the northern and southern Titicaca Basins. The Early Sillumocco Period in the Juli area represents the local expression of the Middle Formative and dates to around 900 - 200 BC based upon stylistic comparisons made by Steadman (in Stanish and Steadman 1994) as well as a single c-14 date from an Early Sillumocco fill episode at the site of Palermo near Juli.

In the Pomata-Chatuma area, other simple ranked societies developed during this period. They are identified by a number of principal sites that are at least twice as large as contemporary sites in size and have evidence of corporate architecture. We have named the polity in the area Ckackachipata, after one of the largest sites in the area. Early Ckackachipata represents an autonomous polity contemporary with the Qaluyu, Cusipata, Early Sillumocco, and Middle and Late Chiripa polities in the Titicaca region. The Early Ckackachipata polity is similar to the Early Sillumocco one in scale and complexity, with the exception that it appears to have had a stronger relationship to the Chiripa and Tiwanaku areas.

THE UPPER FORMATIVE (500/200 BC - AD 400)

The Upper Formative represents the development of the first markedly ranked societies in the Titicaca region. These societies would correspond to models of complex chiefly organization in the anthropological literature. The adoption of hereditary social and political ranking, paralleled almost certainly by an economic hierarchy, marks the transition from the Middle to the Upper Formative period in the Titicaca region. The Upper Formative is therefore defined as the period in which complex chiefdoms developed and were the dominant political organization in the region.

A number of complex chiefdoms developed in the region at this time--possibly the Cusipata period in Pucara (500 - 200 BC), Pucara Classic (200 BC - AD 400), Late Chiripa (500 - 200 BC), Kalasasaya (ca. 200 BC - AD 200), and Qeya (AD 200 - 400). We believe that Kalasasaya ultimately replaced Late Chiripa in the southern Titicaca region and that Qeya, in turn, developed out of Kalasasaya (see Albarracin-Jordan and Mathews 1990, and Mathews 1993).

Complex, ranked societies developed earlier in the northern and southern Titicaca region than in the Juli-Desaguadero area by several centuries. In the Juli region, the Late Sillumocco Period represents the local expression of the Upper Formative complex chiefly society in the area. The Late Sillumocco period dates from approximately 200 BC to around AD 400 (Stanish and Steadman 1994:8). Another complex chiefly society developed south of the Juli region in the Pomata area out of the Early Ckackachipata polity of the Middle Formative. Our data suggest that the Late Ckackachipata polity is similar in size and scale to the Late Sillumocco polity.

EXPANSIVE TIWANAKU (AD 400-1100)

Sometime in the middle of the first millennium AD, the Tiwanaku peoples expanded out of the southern basin and established some type of control or influence over the entire Titicaca region. The development of Tiwanaku as an expansive state represented a new cultural phenomenon in the Titicaca region. In the earlier Upper Formative Period, complex chiefly polities such as Pukara, Late Sillumocco, Late Chiripa and so forth were much smaller in size. They generally covered a territory of no more than one or two day's travel from the principal site of what was probably the residence of the paramount lineage. Complex chiefly societies are regional polities composed of various alliances between groups in a territory that is fairly restricted. There is no real "state control" of discrete territorial units in any conventional sense, but rather a series of shifting alliances between the paramount lineage heads and neighboring groups. The relatively small territories of complex and simple chiefly societies under their control make it valid to characterize them with a single model of settlement.

Our research strongly suggests that Tiwanaku incorporated the southwest Titicaca Basin into its political and economic orbit. Due to the nature of Tiwanaku expansion, this control appears to have been established quite rapidly. We use the chronological and evolutionary term "Expansive Tiwanaku" for the Juli-Desaguadero region to refer to the period in which the Tiwanaku state maintained an actual control of the region.

The Expansive Tiwanaku Period in the Juli-Desaguadero area would therefore be roughly contemporary with Bennett's Classic and Expansive Periods and Ponce's Tiwanaku IV and Tiwanaku V. The low quantity and poor quality of the fragments recovered make it impossible to phase a site as either Tiwanaku IV, Tiwanaku V or both. In other words, we are unable to distinguish between Tiwanaku IV and V sites in the survey and simply use the term "Expansive Tiwanaku".

There are no Tiwanaku-related sites in the Juli-Pomata region prior to the Tiwanaku IV period, although some Qeya (Tiwanaku III) and Kalasasaya (Tiwanaku I/II) pottery fragments were found as trade wares into the region. Clearly, the pottery recovered on survey from Tiwanaku sites are either Tiwanaku IV or V, and in a number of cases we can actually type a sherd or two to one of these periods. However, with just surface collections of limited statistical value, it would be improper to phase sites as anything smaller than Tiwanaku at the present time. Hyslop had the same problem and simply phased sites as "Expansive Tiwanaku" referring to both Tiwanaku IV and V. We continue to use his cautious approach.

THE ALTIPLANO PERIOD

The collapse of the Tiwanaku state around AD 1100 ushered in the first political entities that 16th century writers recognized as the Aymara "kingdoms" or "se-or'os". The principal 16th century Aymara polities include the Colla to the north, the Pacajes to the south, and the Lupaqa in the west and southwest. Other smaller polities include the Canas, Cachi to the north, the very poorly understood "Omasuyus" to the east, and the Carangas to the south (Bouysse-Cassagne 1986; 1987) (Figure 1). Following Lumbreras (1974a; 1974b) and Hyslop (1976), the period from the collapse of the Tiwanaku polity to the Inca conquest in the Titicaca Basin is referred to as the "Altiplano Period". The Altiplano Period dates to approximately AD 1100 - 1450 and therefore approximates the Late Intermediate Period in the Rowe chronology. The Altiplano Period

is also occasionally referred to as the "Lupaqa" Period and the "Regional Development Stage" in other chronologies (Lumbreras 1974b:179).

The Lupaqa area is located in the southwest side of the lake between Desaguadero and Chucuito (Hyslop 1976, 1977). Our knowledge of the Lupaqa during the 16th century is quite good, thanks to ethnohistorical research on such documents as the *Visita* of Garci Diez de San Miguel (1964 [1567]) and other classic chronicles by writers such as Cieza de León [1553] and Bernabé Cobo (1956[1653]) (e.g. Julien 1978, 1982; Murra 1964, 1968, 1972, 1978; Pease 1973). According to Cieza de León, the Lupaqa were the single most powerful group to slow the southward expansion of the Inca empire. Lupaqa power and influence in the immediate pre-Inca periods is said by Cieza to have been so vast that it defeated its traditional northern rival, the Colla, and actually stopped Cuzco's conquest of the Titicaca Basin for a generation or more (Cieza [1553]: Bk.2).

One of the great questions facing Titicaca Basin archaeologists is the question of the hypothesized Aymara immigrations in the beginning of the first millennium AD. In the Titicaca region, the Aymara migration hypothesis is generally not accepted by archaeologists, but it generally adhered to by a number of historical linguists and social anthropologists. It has been most forcefully argued by Alfredo Torero (1987), an ethnohistorian who utilizes 16th and 17th century documents to reconstruct the distribution of Aymara, Pukina, and Quechua, the three great "lenguas generales" of 16th century Peru (Torero 1987:339).

The broad outlines of Torero's principal conclusion, that the Aymara are recent immigrants, are accepted by other linguists and anthropologists such as Bouysse-Cassagne (1987), Shady (1987), and Wachtel (1987). With the exception of Shady, however, each of these scholars explicitly argue for a southern origin of the Aymara, and not from the north as does Torero.

The significance of this debate for archaeological research in the Juli-Desaguadero area is profound. The study area lies in the heart of 16th century Aymara language distribution. If the majority of linguists are correct, then our study area would be the point at which the original Aymara entered the Titicaca Basin, essentially avoiding the hypothetical Pukina-speaking Tiwanaku and Colla peoples to the south and north respectively.

THE EXPANSIVE INCA PERIOD

A detailed account of the Inca conquest of the Titicaca region, known as Collasuyu, can be found in the histories of Bernabé Cobo (1979[1653]) and Cieza de León (1959[1553]). Although details vary in the accounts, we have a basic outline of the conquest. According to these histories, the first incursion into the Titicaca region was initiated by an early emperor known as Viracocha Inca, most likely in the middle of the 15th century. Viracocha Inca encountered the two large, powerful polities in the western Titicaca Basin--the Lupaqa and Colla--along with the several smaller political groups such as the Canas, Cachi, Pacajes, and the Omasuyus.

The Lupaqa and Colla were bitter enemies engaged in nondecisive conflict. The Inca negotiated with both sides, trying to manipulate them for his own political advantage (Cieza 1959[1553]:215-216). Fearing the alliance between the Lupaqa and the Inca, the Colla initiated a great battle with the Lupaqa at Paucarcolla (Cieza 1959[1553]:219). The Lupaqa won this battle, and their "king", known as Cari, returned to Chucuito and negotiated a peace with Viracocha Inca. The best interpretation of these histories

is that Viracocha Inca actually lost in his bid to directly control the Titicaca region south of the Colla area and had to settle for an alliance with the Lupaqa. At this point, the emperor Viracocha did not establish actual political control over the Titicaca region, but clearly established the Inca state as the dominant power in the region.

The histories indicate that the actual military incorporation of the region was accomplished by the later emperor Pachacutiq. Pachacutiq is said to have firmly brought the Titicaca basin into the Inca orbit about a generation later (Cieza 1959[1553]:232-235). He initiated a new campaign and was forced to fight the Collas again. Cobo relates that the Colla fought and lost a battle with the Inca near the town of Ayaviri. The Colla retreated to the town of Pucara while the Inca destroyed Ayaviri killing most of the population (Cieza 1959[1553]:232).

Cobo then relates that the Lupaqa "... received the Inca in peace and turned over his state to him. Thus the Inca honored him very much and in order to show him more favor, he stayed in Chucuito for a few days" (Cobo 1979[1653]:140). Cieza varies this account slightly, suggesting that all principal polities in the Titicaca area accepted the Inca authority (Cieza 1959[1553]:236). What seems clear in the documentary sources is that in this second military campaign under Pachacutiq, the entire Titicaca region was brought under Cuzco control.

THE EARLY SPANISH PERIOD

The first incursions into the Titicaca region by the Spanish conquerors took place after the conquest of Cuzco (Bouysse-Cassagne 1987:27). Francisco Pizarro sent three men to investigate the Titicaca region after his forces consolidated control in the central highlands. The expedition arrived at the lake on July 15, 1534 and left an eyewitness account of the area. Spanish authorities divided the conquered territories in 1534. The conquest, however, was not immediate and there was a period of several years in which indigenous authorities were politically autonomous. As late of 1538, for instance, the Lupaqa were able to mount resistance to Pizarro's army of 200 spanish and a number of indigenous troops at the bridge at Desaguadero (Bouysse-Cassagne 1987:27).

Pizarro's death in 1540 and the civil war delayed extensive spanish occupation of the region. The year 1545, however, marked a watershed for the spanish colonial occupation. At this time, the rich mines of Potosí were discovered (Bouysse-Cassagne 1987:31). While metal extraction was an important component in the Inca political economy, it was central to the spanish one. Cities were founded in the mining areas, and the progressive impoverishment of the Titicaca region began as people and resources were shifted to the south. The founding of La Paz, for instance, in 1548 represents such a shift. In spite of these changed political and economic circumstances, the spaniards could not ignore the huge populations of the Titicaca area, nor could the rich camelid herds and tuber agriculture productivity be abandoned. Substantial settlements were established on earlier Inca ones, and the Titicaca region became one of the major demographic centers of Charcas.

The Early Spanish Colonial occupation in the Juli-Desaguadero region is extensive. The modern town of Juli was one of the most important centers of political and religious life of the Spanish American Empire south of Cuzco. Juli was originally a Dominican stronghold that was quickly taken over by the Jesuits. It is one of the great Lupaqa "cabeceras" listed in the Garci Diez de San Miguel Visita. The town of Juli itself is home to four huge Colonial churches, a testimony to the early importance of this town.

METHODOLOGY OF THE SURVEY

The entire combined study area includes three zones: the Juli-Pomata Intensive Survey Area, the Ccapia Reconnaissance Area, and the Desaguadero River Reconnaissance area. The Juli-Pomata Intensive Survey Area lies along the lake between the Ilave Pampa in the north to the pampa directly south of Pomata. The northern end of the survey zone ended at the obvious landmark and cut stone steps seen in Figure 4. The total full regional coverage survey area is approximately 360 km². We surveyed along the lake shore and sampled the puna region in the Pasiri region. With a few exceptions, the settlement survey was intensive and systematic (100%). The exceptions included a military base near Pomata for obvious security reasons. We also did not survey near modern cemeteries, capillas, or apachetas out of respect for the religious sentiments of the local people. We likewise did not go inside of modern house compounds without permission.

Crews of three-four persons walked between 10 - 25 meters apart over the entire landscape locating sites. All sites were located on topographic maps and detailed data were recorded on a standardized field form. A sketch map was then often made on the reverse. Most sites were surface collected utilizing a "grab-bag" methodology with a conscious attempt to gather a representative sample. We are very confident that we recorded all extant sites in the survey area.

One of the most important observations in the survey was the size of each site. Site size was visually estimated on survey by each crew. When a site was discovered, the entire crew would stop and begin collecting and/or recording data. The crew chief would record the information on the field form while the rest of the crew would fan out and make artifact collections. The crew would then define the limits of artifact and/or architectural concentrations. The crew chief would then pace off or estimate the size of the site area and record it as an areal measurement such as "50 x 75 meters".

RESULTS FROM THE JULI-POMATA SURVEY

SITE TYPOLOGY

The criteria that were utilized for constructing the typology were site architecture, site function, topographic location, and outstanding geographical features. The use of these criteria facilitate comparisons through time.

Type 1. Large, artificial mounds (greater than 50 x 50 meters at base). These mounds are built with artificial fill that was used to construct non-domestic architectural features. The Type 1 sites represent a considerable labor investment and are one of the two elite/ceremonial site types in the study area. The mounds are not just collapsed structures, but rather represent considerable quantities of fill intentionally used to create architectural features. In this typology, the site of Chiripa, Pucara, and Qaluyu would be Type 1 sites.

Type 2. Small, artificial habitation mounds. These artificial mounds are small (generally less than 20 x 20 meters at base) and represent individual collapsed houses. The distinction between Type 1 and Type 2 is much more than merely size. Unlike Type 1, the fill found in this second type of site was not intentional fill moved to build corporate constructions. Rather, Type 2 sites represent collapsed domestic structures

that have turned into a mound. It is not unusual for Type 2 sites to have intrusive tombs placed on top. Type 2 sites are much more common than type 1 sites.

Type 3. Sites built on low, generally non-defendable natural hills with domestic terraces with some sort of corporate architecture on the hilltop. Type 3 sites represent the second elite/ceremonial site type in the region, along with the Type 1 artificial mound sites. The site of Incatunhuiri as described by Kidder (1943:49) is a typical example of this site type.

Type 4. Sites built on hillsides utilizing domestic terraces. The domestic terrace is the most common site in the survey area accounting for a significant percentage of the habitation sites and a majority of the total population (Table 1). Many of the hillsides in the region are terraced and used today for agricultural purposes. Our survey clearly indicates that a substantial number of these agricultural terraces may have originally been built for domestic purposes, and later plowed under for agriculture land use. The agricultural and domestic terraces are almost always faced with fieldstones. Today, one can observe house compounds built on the hillside terraces in a pattern that appears to go back for millennia.

Type 5. Pukaras. These are the classic, hilltop, fortified sites found throughout the altiplano and described by Hyslop (1976:110). These sites almost always have standing architecture surrounded by at least three, large defensive walls. We recognize two types of pukaras: major ones characterized by some resident population and massive wall architecture, and minor ones characterized by few artifactual or architectural remains in a much smaller walled area.

Type 6. Dispersed sites built on flat land usually near the lake or in the puna regions. These sites are inevitably artifact scatters. They lack any evidence of domestic terracing or other constructions. These sites could be destroyed Type 2 sites in some circumstances or represent very light or transient occupations. In at least one case, a lithic workshop was classified as a Type 6 site. Type 6 sites are rare in the region accounting for a small percentage of the habitation sites in survey.

Type 7. Large, urbanized sites. These sites are rare and refer principally to the large, sprawling concentrations of people typical of the Late Horizon and Early Colonial Period at sites such as Juli and Pomata. We consider an urban site to be one that contains a significant percentage of non-agricultural laborers. By this definition, urban sites appeared only relatively late in the Juli-Desaguadero region during the Inca occupation. They contained about 15% of the total population in the Late Horizon and Early Colonial Periods (Table 1).

Type 8. Cemeteries. Cemeteries are found throughout the survey area. Tombs are located in a variety of contexts, ranging from isolated ones away from habitation areas to large cemeteries with multiple tomb types. There are a number of tomb types in the Juli-Desaguadero region:

a) Cist or shaft tombs. Cist tombs are completely below-ground constructions. The range in size from shallow pits to one-meter deep shafts. Mouth diameters are around 35 - 50 centimeters, although some are larger. Cist tombs appear to be the most common type of tomb in the study area. Most tombs are stone-lined, but not

exceptionally well made. Based upon the size and human remains scattered on the surface, below-ground cist tombs rarely have more than two individuals, and usually contain only one. Cist tombs are rarely found in isolation, but are located in aggregated cemetery areas very close to habitation sites.

b) Slab-cist tombs. These are above ground constructions first described by Tschopik (1946:19). They are all post-Tiwanaku in date. Slab-cists are cist or shaft tombs with an encircling ring of stone slabs on the surface. The slabs are large, uncut, but selected for more or less uniform size. The slabs are set upright around the tomb. They average about one meter in diameter. In some cases, the below-ground depression is very slight, perhaps only 20 centimeters or so. In other cases, there is a fairly deep shaft with encircling slabs. There is evidence from our survey that in some cases Tiwanaku and Upper Formative sites were looted for the slabs for use in the later tomb constructions. Like cist tombs, slab-cists are generally found clustered in cemetery areas near habitation sites.

Slab-cists are fundamentally different from cist tombs in that they contain multiple burials. They appear to function in a manner similar to that of chulpas in that they are the burial area for large numbers of people and are visible from the surface. Like chulpas, slab-cists are most likely "mausoleums" for corporate groups, probably extended families.

c) Chulpas or fully above-ground tombs (Hyslop 1977). The term "chulpa" is listed in Bertonio's dictionary as a "grave or basket where they put the dead" (Bertonio 1612, Bk. 1, page 430). However, a much more common term in his dictionary is "Amaya uta" defined as a "burial in the ancient manner" (Bertonio 1612, Bk 1, p. 218), or a "grave like a house on the ground" (Bertonio 1612, Bk. 1, page 430). The term "Amaya uta" literally translates as a "house of the soul". We continue to use the term "chulpa" because it is so deeply entrenched in the scientific literature.

d) Intrusive tombs in type 2 pampa mounds or rockpiles. The abandoned type 2 pampa mounds were convenient places for burials. A number of rockpiles have tombs in them as well, similar to the intrusive tombs in the artificial mounds. The tombs tend to be isolated cist or slab-cist tombs.

Types 9-12. Petroglyphs, raised fields, caves and rockshelters, and miscellaneous. A number of petroglyphs are found throughout the study area. Generally, these were associated with a habitation site and included in the site description. We consider raised fields as a distinct site type although they were not registered in the survey as separate sites. Caves and rockshelters are rare near the lake but are more common above 4200 meters or so. Because the bulk of our survey area was near the lake where there are few geological formations with rock shelters, type 11 sites are not common in our study area. finally, miscellaneous sites include road cuts, clay sources, apachetas, lithic scatters, disturbed sites and the like.

CERAMIC TYPES UTILIZED IN THE JULI-POMATA REGION

The typology that we offer is based upon surface decoration, vessel form, and/or tempering materials. In other words, we define a particular type that reflects a coherent group of attributes that would most probably be recognized as a "style". It is important to note that the few types that we utilized represent a fraction of the various types that could be isolated, but the ones defined here were used to date the sites on survey.

EARLY FORMATIVE PERIOD

There is one Early Formative Period diagnostic ceramic type that we have defined in the entire study area. We call this the "Pasiri" type. Pasiri ceramics are defined by paste and surface treatment characteristics. They are poorly fired, unslipped, with heavy inclusions of fiber and sand. We do not have any complete vessels, nor do we have many rims. The few rims collected appear to be from thickened rim, slightly flaring ollas, and slightly thinner jar forms.

The precise chronological position of this ceramic type remains problematic as we do not have good stratigraphic association from excavations at our sites. However, a number of observations from surface collections suggests that this is the earliest ceramic type so far defined in the study area. In the first instance, the distribution of this ceramic type is not very widespread. It is found in only ten sites in the Intensive Survey region and in one site in the Reconnaissance Areas. Of these eleven sites, at least six have Late Archaic occupations. In fact, in every multi-component Late Archaic site, there are also Pasiri ceramics, a fact that suggests that the ceramic type is early.

MIDDLE FORMATIVE PERIOD

The Middle and Upper Formative Period ceramic types in the Juli area are called Early and Late Sillumocco respectively. The Early and Late Sillumocco Periods cover by far the largest absolute time of any in the region. The Early Sillumocco begins around 800 BC and Late Sillumocco ends around AD 400, about 1200 years. Likewise, the Early and Late Sillumocco Periods were characterized by some of the most intensive cultural changes in the Titicaca region. As a result, the two periods represent the greatest variety of ceramic types as represented by the following typology.

We define the division between Early Sillumocco and Late Sillumocco as based on a change from a predominantly fiber-tempered assemblage to a predominantly non-fiber-tempered one at around 200 BC (Steadman, in Stanish and Steadman 1994). There are five diagnostic types of Early Sillumocco period pottery used to date sites on the survey: Early Sillumocco Plain, Early Sillumocco Qaluyu Incised, Early Sillumocco Qaluyu Polychrome, Early Sillumocco Chiripa Polychrome Incised, and Early Sillumocco Chiripa Polychrome.

The Early Sillumocco Plain is by far and away the most common diagnostic in the survey region. It is similar in paste and finish to the Early Sillumocco decorated wares described below, and to plain wares from the site of Chiripa (Mohr 1966). The plain wares are exclusively manufactured in fiber-tempered pastes, and the vast majority are locally made. Shapes include ollas with short slightly flared or vertical necks, direct, rounded, or slightly rounded rims, or rims with interior thickening, and sometimes rim-to-body strap handles. Jars have somewhat taller slightly flared necks, also with direct rims, while bowl shapes are similar to those of the decorated wares; slightly flared or vertical with direct or thickened rims. Circular and horizontal body lugs are also found. The majority of vessels are burnished, most to a high or medium luster. Vessels are somewhat more likely to be unslipped; an unslipped brown with a dark smudged or incompletely oxidized paste is the most common. Among the slipped sherds, a red slip color on a red brown incompletely oxidized paste is the most popular, with the brown and dark brown slip colors following.

Early Sillumocco Qaluyu Incised ceramics found in the Juli area are similar to those illustrated from the sites of Qaluyu (Lumbreras and Amat 1968) and Marcavalle

(Chávez 1981). They are generally slipped red, red brown, or brown, and decorated with curvilinear designs executed in a wide line incision. Shapes include slightly flared bowls with thickened rims. Specimens are generally well-finished and burnished on both sides. Qaluyu-related incised ceramics are found in both the local sand-tempered and fiber-tempered pastes of the Juli area, and are most commonly oxidized to a red brown color, or incompletely oxidized with a dark core.

Early Sillumocco Qaluyu Polychrome ceramics are painted in dark brown or black on a light brown or cream background, with variants having a white, red brown, or brown background color. Specimens which preserve the rim section show that the rim itself and the interior of the vessels are slipped red. Vessel shapes consist of a flared or slightly flared bowl with a direct or thickened rim. Decorative motifs include checkered elements, lattices, chevrons, and rectangles. Vessels are predominantly manufactured in the local sand-tempered and fiber-tempered pastes and more rarely in a non-local sand-tempered paste. They are generally well-finished and burnished. This ceramic type is again very similar to specimens found at Qaluyu (Lumbreras and Amat 1968) and at Marcavalle (Chávez 1980). While black on cream decoration is more commonly found at Qaluyu, the red slipped rim and interior is a trait more characteristic of the Marcavalle specimens. In addition, the Juli sample incorporates some local variation, particularly in the range of slip colors and color combinations.

Early Sillumocco Chiripa Polychrome Incised ceramics are found in a variety of color combinations, including black and yellow on red, black on red, white on red, dark red on red, dark red and yellow on red, and red on red brown. Color areas are delineated by a fine or medium width incision, forming geometric or block color motifs. Shapes are mostly slightly flared or vertical bowls with direct or thickened rims. Unslipped or brown slipped ceramic tubes or trumpets with incised decoration were also found. These ceramics are manufactured exclusively in the fiber-tempered pastes, both the local version and a semi-local paste whose source is unknown. Vessels are generally incompletely oxidized and well-finished. Many of the specimens of this type found in the Juli area, particularly those with black and yellow on red designs, compare closely to specimens illustrated from the site of Chiripa (Bennett 1936; Mohr 1966). Others, particularly those with unusual colors, represent local Juli variations or temporal differences in the assemblage.

Early Sillumocco Chiripa Bichrome ceramics are generally painted in cream or yellow on a red background. Motifs are again geometric, including block color areas, pendant triangles and zig-zag lines. More rarely, different color combinations, such as black on red or red on red brown, are found. Vessel shapes are exclusively bowls with vertical, slightly flared, and flared wall profiles. Vessels are well finished, and manufactured in the same local and semi-local fiber-tempered pastes as the Chiripa-related polychrome incised ceramics. Again, most of these ceramics are similar to the cream on red painted specimens from Chiripa, while the rare or variant pieces are most likely due to temporal or local variation.

UPPER FORMATIVE PERIOD

Late Sillumocco pottery has four types: Late Sillumocco Plain, Late Sillumocco Polychrome Incised, Late Sillumocco Incised, and Late Sillumocco Qeya Polychrome. The Late Sillumocco assemblage is characterized almost exclusively by non fiber-tempered utilitarian and decorated wares. The use of fiber-temper persisted in this period

only on very a limited scale, and occurs only in minor quantities in one of the pastes, used for the manufacture of small number of utilitarian wares and Tiwanaku IV decorated ceramics. We anticipate being able to subdivide the Late Sillumocco Period in the future, since it is evident that some of the specimens assigned to this period bear more of a resemblance to Tiwanaku I ceramics and some are more clearly related to the later Qeya assemblage.

Late Sillumocco Plain wares are in the vast majority sand tempered and locally made. A small percentage are manufactured in the local fiber-tempered paste, or one of the semi-local sand-tempered pastes. The local sand-tempered specimens are mostly an unslipped black, gray, or gray brown, often with a micaceous appearance, and are most commonly incompletely burnished on the exterior only, although wiped finishes are also prominent. Other surface colors for these wares include an unslipped red brown, and less frequently a red or light brown slip. Vessels are generally oxidized or oxidized with smudged edges. Shapes include jars with flared or slightly flared necks and flat or angled rims, sometimes with incised fillets at the neck constriction and flared or slightly flared bowls with flat, triangular or rounded rims, sometimes embellished with incision on the rim, rim tabs, or horizontal handles. Flared straight-sided bowls are also found with loops or loop handles on the rim. Base shapes include a thickened edge version, as well as flat, ring, and pedestal forms. The locally made fiber-tempered wares of this period are very similar in surface finish, color, and shape to the sand-tempered wares, differing only in their pastes. The semi-local sand-tempered wares are found in roughly equal numbers of gray or dull gray brown unslipped wares and an unslipped red brown or light brown. Slipped specimens are again in the minority, and consist mostly of red or light brown slips. Most of these wares have wiped surfaces, and burnishes are found less frequently than on the locally made wares. Vessel shapes include jars with flared or slightly flared necks and rounded, thickened or flat rims, and slightly flared bowls with rounded rims. Both flat and ring bases are found. The Late Sillumocco plain wares exhibit both general and specific similarities to plain wares from Pucara (Chá vez 1992; Franquemont 1986) and Qalasaraya (Ponce 1971), but are most comparable to Qeya plain wares, particularly those from Qeya Qollu Chico (Wallace 1957).

Late Sillumocco Polychrome Incised are manufactured mostly in a semi-local sand-tempered paste, although some examples of the local sand-tempered pastes are also found. Specimens are decorated with red, light red, or pink, cream, yellow or white, and black on an unslipped or light brown slipped background, with color areas delineated by fine or medium width incised lines. Motifs are geometric: step blocks, chevrons, or rectangles. Vessels are burnished on the exterior only, and fired paste color is mostly a light brown. Shapes consist of direct-rimmed slightly convex or slightly flared bowls. These ceramics bear general similarities both to ceramics from Pucara (Rowe and Brandel 1971; Franquemont 1986; Chá vez 1992) and ceramics that date to the Qalasaraya period from Tiwanaku (Ponce 1971). However, they are not directly comparable to either of these two ceramic assemblages, but appear rather to be a local or semi-local production from the Juli area.

Late Sillumocco Incised pottery consist of unslipped or single color slipped ceramics with incised decoration. One group of these ceramics has an unslipped gray, gray brown or black surface color with a wiped or smoothed finish. Firing consists of an oxidized red brown paste core with dark lightly smudged edges. Incised motifs for this group are nested rectangles, fields of punctate dots, and squares. Examples exist with post-fire red and yellow paint in the incisions. Other incised wares are slipped

red or light red, or are an unslipped red brown. Designs are similar to the gray wares: parallel lines, double circles, nested triangles and fields of punctate dots. These ceramics are also sometimes found with red or yellow post-fire paint, and surface finish is again wiped or smoothed. Shapes consist of vertical sided bowls, and probably incensario shapes as well, and ring based forms, again suggesting an incensario shape. Ceramic tubes or trumpets are also found in the red or light brown slipped group. Except for the few trumpet specimens in one of the semi-local sand-tempered pastes, all these Late Sillumocco Incised ceramics are manufactured in the predominant sand-tempered local paste. These ceramics are closely comparable to incised specimens generally ascribed a Qeya date in the Tiwanaku sequence, such as those illustrated and discussed by both Bennett (1934) and Wallace (1957). The group of gray unslipped wares in particular are very similar to these Qeya ceramics, particularly those found at Qeya Qollu Chico, in their gray surface colors and motifs. The red and light brown slipped pieces, in contrast, show closest similarities to specimens from the northern Basin discussed by Chá vez (1985) and also ascribed by her to the Qeya or Early Tiwanaku period.

Late Sillumocco Qeya Polychrome painted sherds, very similar to those of the Qeya period in the Tiwanaku area (Bennett 1934; Bermann 1990; Wallace 1957), are decorated with diagonal lines triangles and triangle bands in black and red on a cream, white, light brown, or orange background or on an unslipped light brown background. Exterior surfaces are generally burnished, and interiors wiped. Vessel shapes include bottles and slightly flared bowls or cups. Two different paste groups are found in the Qeya Polychrome ceramics. One, consisting mostly of the local sand-tempered pastes, has a light brown fired paste color, and thick slips. The other has thinner slips and a smoother surface contour, and is manufactured in a non-local paste which is more similar to Tiwanaku IV and V pastes in its hard fired dense texture and red-orange color. Differences between these two groups may be temporal, or may be due to geographical variation.

TIWANAKU PERIOD

The Tiwanaku type represents a highly distinctive pottery style defined largely by surface decoration and vessel form. It is characterized by predominantly black-on-red or black-on-orange decorations. We also discovered Tiwanaku polychromes and black and white decorations on red or orange slips. The most common shapes are keros and tazones. Keros are found with and without bands around the body. Incense burners are also a common shape in the Tiwanaku ceramic assemblage in the region. We recognize six subtypes: Tiwanaku Polychrome; Tiwanaku Black on Red; Tiwanaku Black on Orange; Tiwanaku Black and White on Red; Tiwanaku Black and White on Orange; Tiwanaku Plain.

The vast majority of Tiwanaku pottery in the Juli-Pomata area would be classified as Tiwanaku IV and Tiwanaku V in the Bennett-Ponce typology. The repertoire of design types from these surface finds is quite limited compared with that published by Bennett (1934), Ponce (1981), and Alconini (1993) for Tiwanaku sites in the region. Goldstein (1989) also found a much greater variety of Tiwanaku styles in the Tiwanaku colony of Omo in the Moquegua Valley. The typical Tiwanaku base slips--red, orange and brown--are found on all sites. Polished black ware (Bennett 1934:396) is very rare and virtually no incised black wares were found on survey, although a few were found in excavations at the site of Sillumocco-Huaquina located near Juli. Black, orange and

white are used in the designs, generally as independent design elements. This latter design practice is described by Bennett as a characteristic of the Decadent or latest phase of Tiwanaku (Bennett 1934:456).

The two most common decorative motifs on the Tiwanaku materials from the study area are the "perpendicular wavy line" design and the step pattern (Bennett 1934:401). Flamingo motifs are also found in the survey area. Bennett (1934:402) considered these bird designs to be late. Occasionally, keros and tazones have interior decoration on the rim, particular the common "perpendicular wavy line" (Bennett 1934:401). We found very few typical Classic Tiwanaku designs such as condors, trophy heads, front-face deities and the like. Only a small fraction of the pieces showed evidence of having more than three colors ("two-color ware" in Bennett's stylistic classification-1934:397-398).

Plastic decoration on the Tiwanaku Plain subtype includes a number of pieces characterized by raised punctate necklace decorations identical to those described by Bermann (1990:503) from Lukurmata in Bolivia. We also found olla or jar handles with a raised cross motif. This motif is also found in Moquegua in Tiwanaku-related contexts (Stanish 1991:30).

It is important to note that most surface collections of Bennett were classified as Decadent. Likewise he noted that most of his first and second levels (highest) were Decadent as well (Bennett 1934:456). In contrast, the vast majority of his Classic examples came from excavated contexts. The pieces illustrated by Ponce (1981) and Goldstein (1989) come from excavations as well. It is therefore possible that the lack of variety in design types from the Juli-Desaguadero area is a sampling problem in that most of our sample is from surface sites. Analysis of the excavated materials will provide a much larger sample.

ALTIPLANO PERIOD CERAMIC TYPES

Altiplano Period diagnostics consist largely of bowls, jars, and olla forms. We have called the most common ware Pucarani (de la Vega 1990). This type is Altiplano Period in date and is locally manufactured. De la Vega's (1990) analysis of the Pucarani style includes several decorated varieties and five discrete pastes that are found in quantity on Pukara Juli. The paste is semi-compact with temper inclusion of quartz, feldspars, pyrite, and sand. We recognize five types: Pucarani Plain; Pucarani Black on Red; Pucarani Black and White on Red, Pucarani Red on Orange, Pucarani Red on Brown, and Pucarani Black on Orange.

Pucarani decorated bowls are characterized by deep, thin-walled vessels with black decoration on the interior. The decorated Pucarani style shows some stylistic links to Hyslop's Tanka Tanka Black on Orange, several pre-Inca Sillustani types, and to the Early Pacajes type identified by Albarracin-Jordan and Mathews (1990) from the Tiwanaku valley.

A small number of Altiplano Period diagnostics are classified as Sillustani, first identified and named by Tschopik (1946:22-27) and further discussed by Julien (1982), Revilla B. and Uriarte P. (1985), and Stanish (1991). Sillustani has both pre-Inca and Inca types. The pre-Inca types are poorly burnished on the exterior, have parallel black lines on red or reddish brown surfaces, and tend to have very thin walls. They are very rare in the research area.

In the Desaguadero area and further to the south, we discovered an additional Altiplano Period type that we have called Kelluyo. Kelluyo diagnostics are exclusively

straight-sided bowl forms. They are characterized by typical Altiplano Period design motifs: poorly executed black linear paint on the interior of the vessels.

LATE HORIZON

There are several distinct types of Late Horizon diagnostics in the Juli-Pomata, Ccapia, and Desaguadero areas. The most common shape by far is the bowl form, with Inca bottles or aryballoids quite common as well. This type is essentially Inca pottery manufactured in the Titicaca Basin. It therefore dates to the Late Horizon circa AD 1450 - 1532. These pieces are imitations of Cuzco pottery with bottle and bowls being the predominant forms. In particular, the use of Cuzco motifs and the distinctive double protuberance at the lip of bowls serves to identify this type.

Another Late Horizon type is Chucuito. Virtually all Chucuito types are bowl forms. It was first defined by Tschopik (1946:27-31) as two related wares: Polychrome and Black-on-Red. The dominant decorative motifs include animal and plant designs with smaller amounts of human, insect, and geometric designs. The Chucuito ceramics in the Juli-Pomata area are locally manufactured.

Pacajes is a Late Horizon type more common in the Desaguadero area and was first reported in detail by Rydman (1957:235-238) from a number of sites in Bolivia. Albarracin-Jordan and Mathews (1990:171) and (Mathews 1993) refer to this type as Pacajes-Inka and assign it a Late Horizon date. This ceramic type is almost certainly associated with the Pacajes region of the south basin.

Pacajes ceramic are easily recognized by the distinctive "llamita" designs (and similar, unrelated shapes) on the interior surface of bowls. Our Pacajes ceramics all appear to be Late Horizon in date given their similarity to Chucuito and Local Inca bowls. With one exception, all Pacajes examples from the Juli-Desaguadero study area are bowl forms. Sillustani types are found in both Altiplano and Late Horizon contexts, as determined by stratigraphic excavations and stylistic analysis (Julien 1983:116-125; Stanish 1991:13-14). Late Horizon Sillustani types are fairly easily distinguished by thicker lips, shallower bowl forms, finer exterior burnishing and more elaborate design motifs.

The Late Horizon Sillustani type was also first identified and named by Tschopik (1946:22-27) and further discussed by Julien (1982), Revilla B. and Uriarte P. (1985), and Stanish (1991). As with the pre-Inca types, virtually all Sillustani diagnostics are bowls. The primary defining characteristic of the Sillustani type is the set of parallel lines along the interior rim of burnished or polished bowls.

EARLY COLONIAL PERIOD

Early Colonial Period diagnostics are exclusively bowl forms that we have called Chocasuyu. The principal defining characteristic is a slightly everted lip with poorly executed black and occasionally white decoration. Albarracin-Jordan and Mathews (1990) found identical types and called them Late Pacajes. They also dated these to the Early Colonial Period. Decorative motifs come in several varieties, including plainwares, Black and White on Red, Red and White on Red/Orange, Black on Red, Red on Orange, Black on Orange, Black on Brown and Glazed types. Chocasuyu pastes tend to be similar to the earlier Local Inca ones. The Chocasuyu type appears to be locally manufactured, based upon paste similarities to the Local Inca and Chucuito types.

SETTLEMENT PATTERNS JULI-POMATA INTENSIVE SURVEY AREA LATE ARCHAIC PERIOD

We found seven Late Archaic sites in the Juli-Pomata region. The density of Archaic sites in the Juli-Pomata region is less than that discovered by Mark Aldenderfer in the only other intensive and systematic survey in the Peruvian side of the circum-Titicaca region. It is likely that we missed some Archaic lithic scatters. It is also likely that the sedimentation near the lake and lack of substantial cultural remains typical of Archaic sites has obscured many Archaic sites.

Four Archaic sites are lithic scatters with some diagnostic artifacts. Two Archaic sites are rock shelters with red figures painted on the walls that are typically Archaic in style. The rock art was identified by Mark Aldenderfer as dating from the Late Archaic to the Late Sillumocco, and possibly Tiwanaku Periods. One site, San Bartolomé-Wiscachani, is a Lower and Middle Formative site with a Late Archaic component. The Archaic Period settlement is beyond the scope of this research. Nevertheless, it is significant we discovered seven sites near the lake including the complex site of San Bartolomé -Wiscachani that represents the beginning of sedentary lifeways in the Basin. Intensive survey methodologies designed to uncover these preceramic sites will undoubtedly discover additional sites in the Juli-Pomata region.

THE LOWER FORMATIVE PERIOD

Again, it is important to emphasize that the definition of the Pasiri ceramic diagnostic is tentative. Presuming the validity of this type, however, we have identified a number of Lower Formative sites in the Intensive Survey Area and one site in the Ccapia Reconnaissance Area (Tacapisi). We did not locate any Early Formative sites in the Desaguadero Reconnaissance Area although our large-site size survey methodology was not suited to find such small sites.

The distribution of Pasiri sites in the Intensive Survey Area is seen in Figure 5. The most significant characteristic of this pattern is a generally even distribution of settlements along the lake edge, with a slight clustering of sites in the Moyopampa area. The Moyopampa area constitutes the richest ecological zone in the Intensive Survey Area. The slight clustering of the earliest village sites in the Moyopampa region is explained by a resource maximization strategy with a higher spacing of settlement in areas of less resources.

Pasiri ceramics are rare and difficult to distinguish on the surface. As a result, it is impossible to accurately estimate average site sizes for this period using intensive walkovers. However, in the five sites with Lower Formative occupations and without significant later occupations, the average site size is less than one hectare (0.80 ha.). The average site size of the later Middle Formative occupations is only slightly larger (0.92) so it is safe to assume that the Pasiri sites were certainly no larger than one hectare in average, and probably much smaller.

MIDDLE FORMATIVE PERIOD

The local Middle Formative occupation in the Juli region is called Early Sillumocco. The word, "Sillumocco" means "fingernail hill" and is a local toponym located a few kilometers due west of Juli. The Sillumocco Period was named after a site 158, called

Sillumocco-Huaquina, a classic type 3 site with a large semi-subterranean structure at the top of the hill. One carbon sample obtained from Early Sillumocco construction fill from Palermo provided an uncalibrated date of 2810 ± 80 years BP (corrected 940 ± 110 BC) corroborating the dates derived from the stylistic comparisons.

The Early Sillumocco settlement pattern in the Juli-Pomata Intensive Survey Region is seen in Figure 6. It is immediately apparent that the settlement choice is heavily concentrated on the lake shore with fully 85% of the total habitation area located below 4000 meters. There are three sites in the puna that constitute 15% of the population. It is significant that the largest cluster of Early Sillumocco sites is on low hills in, or on the periphery of, the Moyopampa raised field system. In fact, 41% of the population, as calculated by total habitation area, was located within one kilometer of the raised field areas in the entire intensively surveyed area (Table 1).

The survey data therefore strongly suggest that raised field agriculture was an important component of the Early Sillumocco economy. Raised fields are also found in the Pomata area and were constructed in the Challapampa zone due west of Pomata as well near some Middle Formative sites. Furthermore, lacustrine resources were intensively exploited, as evidenced by a large quantity of fish bone in middens excavated from Early Sillumocco components at Tumatamani and Sillumocco-Huaquina.

In summary, the Early Sillumocco settlement pattern is characterized by a lakeside settlement focus, the absence of fortified settlements, a general concentration of a substantial proportion of the population (41%) in the raised field areas and a lack of any archaeologically visible formal system of camelid pasturing.

UPPER FORMATIVE PERIOD

In the Juli area, the Upper Formative is represented by the Late Sillumocco Period. It is roughly contemporary with Classic Pucara, Tiwanaku I, and Qeya (Tiwanaku III). The Late Sillumocco dates to approximately 200 BC to AD 400 based upon stylistic comparisons to pottery from the north and south Titicaca Basin regions. One C-14 date from an initial Late Sillumocco floor at the site of Palermo dates to 2180 ± 80 BP (uncorrected) or 210 ± 150 BC (corrected).

The Late Sillumocco Period is characterized by a small reduction in the total number of sites and an increase in mean site size (Figure 7; Table 1). Total population increased and there was a major concentration of population in the raised field areas increasing from 41% of the population to almost 70% (Table 1). Land use in the puna is much reduced, constituting less than 6% of the total population concentrated in one relatively large site (333). The obvious conclusion from these settlement data is that natural population increase was directed toward the raised field areas with additional existing populations also pulled into this economic activity.

During the Late Sillumocco period, there is a distinctive site size hierarchy with sites ranging from small type 2 mounds to the large type 1 Tumatamani (001) and the impressive type 3 sites of Palermo (212) and Sillumocco-Huaquina (158). These three sites in particular are characterized by the presence of corporate architecture in the form of artificial mounds, stone enclosures and/or sunken courts. These sites most certainly represent the elite/ceremonial centers of the Late Sillumocco polity. Calculation of total habitation area indicate that more than half of the population during the Late Sillumocco Period lived in either the Type 1 or Type 3 sites, a figure up 20% from the earlier Early Sillumocco Period (Table 1).

There is a strong continuity between the Early Sillumocco and Late Sillumocco settlement patterns. The population in both periods were concentrated along the lake edge, relied to some degree on raised fields, were nucleated in relatively few settlements and were generally evenly spread along the landscape on the lake edge. Perhaps the most significant observation is that there was an increase in population but a reduction in the number of sites. In other words, mean site size increased and populations were drawn into a smaller number of larger sites.

TIWANAKU PERIOD

The Tiwanaku occupation in the region dates from approximately AD 400 to 1100. We discovered more than 40 Tiwanaku sites in the Juli-Pomata Intensive Survey Region. The Tiwanaku settlement pattern is shown in Figure 8. One of the most striking features of the Tiwanaku settlement pattern is the continuity of the Late Sillumocco pattern. Site location was essentially the same with lakeside and raised field areas favored locations. Virtually the same percentage of the population lived in the elite site types in both periods (Table 1). Mean site sizes were very high and a very large percentage of the population continued to live in the raised field areas.

Virtually all of the major Late Sillumocco sites continued to be occupied in the Tiwanaku period while some minor Late Sillumocco sites were abandoned. Most significantly, nine out of the ten sites that were abandoned were small. The three elite/ceremonial sites of Tumatumani, Palermo, and Sillumocco-Huaquina all continued to be occupied during this period and sites such as Tumucu (121) were founded for the first time by Tiwanaku utilizing similar architectural patterns as seen on the earlier Late Sillumocco Period sites.

Land use patterns between the Late Sillumocco and Tiwanaku Periods are similar as well. The distribution of population between the three economic zones--raised field, terrace agriculture, and camelid pastoralism--remained relatively constant (7:2:1 versus 6:3:1 for Late Sillumocco and Tiwanaku Periods respectively). These data suggest a strong continuity between the Late Sillumocco and Tiwanaku Periods indicating that the Tiwanaku state expanded into an already complex political and economic system dominated by the Late Sillumocco peoples.

In summary, the Tiwanaku settlement pattern is characterized by a lakeside settlement focus and the absence of fortified settlements, patterns very similar to the earlier Late Sillumocco pattern. Most major Late Sillumocco elite/ceremonial sites continued to be occupied in the Tiwanaku Period. At least one of these, Tumatumani, was architecturally enhanced as well. In most respects, the Tiwanaku pattern was an elaboration of the existing Late Sillumocco one.

THE ALTIPLANO PERIOD

The first major change in settlement patterning in the Juli-Pomata area since the Late Archaic Period occurred in the Altiplano Period. The Altiplano Period settlement pattern is shown in Figure 9. Sites continued to be built on the lakeshore but there was a notable expansion into the higher puna zones, particularly up the rivers. In spite of the fact that the population did not appreciably increase, there is a significant increase in the number of sites. This is the most significant pattern in the Tiwanaku/Altiplano Period transition: the nucleated settlements of the Late Sillumocco and Tiwanaku Periods gave way to a dispersed settlement pattern. Average site size decreased by a factor

of three from the Tiwanaku to the Altiplano Period. For the first time as well, there was major occupation of single household hamlets in the pampas, as represented by the type 2 small mounds that abounded in the Altiplano Period (Table 1). The percentage of the population living in single households in the pampas increased by a factor of two from the previous Tiwanaku Period even though the total percentage of the population living in the raised field areas decreased dramatically (Table 1).

Another prominent feature of the Altiplano Period settlement pattern is the development of hilltop fortified sites or pukaras. We located nine fortified sites in the Juli-Pomata Intensive Survey Area. Fortification walls are found at the site complex named Pukara Juli, on the Sapacollo hill, at the large hill located due northwest of Pomata, and at two major sites, Suankata and Tanapaca that fell just inside of the survey area.

Analysis of the settlement data indicate that there are two distinct fortified site types. Pukara Juli is typical of the first type--very large hills surrounded by at least three walls with substantial architectural remains inside and immediately adjacent to the walls. These major pukaras are huge in the area that they encircle. To date, we have identified six of these sites in the south and southwestern Titicaca Basin--Pukara Juli, Tanapaca, Llaquepa, Huichajaja, Tanka Tanka, and Cerro Carajuana. Hyslop described four of these sites--Pukara Juli, Llaquepa, Huichajaja, Tanka Tanka. Likewise, Vasquez et al. (1935) first reported Tanka Tanka.

The second type of pukara is characterized by small hills with surrounding defensive walls and very little architectural remains. These minor refuge sites are built in a similar manner as the major ones, but are considerably smaller and much more numerous. They rarely have more than a few structures and artifactual remains are meager. The available data indicate that the minor pukaras were not permanently occupied. There was no permanent habitation structures and little evidence of intensive use.

The survey provides data on the distribution and frequency of minor refuge sites and contemporary, non-defended settlements near the refuge sites. Minor refuge sites are distributed among numerous, undefended villages and hamlets. We hypothesize a settlement pattern in which major pukaras, minor pukaras and undefended sites comprised the Altiplano Period settlement pattern. This settlement pattern is dramatically distinct from the preceding Tiwanaku pattern and represents a profound change in the political and economic organization in the Altiplano Period.

The distribution of above-ground tombs closely parallels that of the habitation sites. The survey failed to discover any major chulpa cemetery areas. Rather, the above-ground tombs appear to conform to a pattern of territorial marking as suggested by Hyslop in 1976. These data could be interpreted to suggest the formation of distinct political-geographical units in this period, each associated with one major and possibly one or more minor refuge sites. In this case, the set of sites in the Juli area, including the San Bartolomé hill, would correspond to one of these groupings. Likewise, the sites in the El Molino/Challapampa area would comprise another.

EXPANSIVE INCA PERIOD

The Expansive Inca Period settlement pattern is shown in Figure 10. In many ways, the transition from the Altiplano to the Late Horizon Period is similar to the change between the Tiwanaku and the Late Sillumocco Period. That is, the Inca occupation does not represent any dramatic change from the Altiplano Period. The

difference is one of degree, not kind. Mean site size is only slightly higher than the Altiplano period, pulled higher by the founding of the large urbanized centers such as Juli and Pomata. The clear settlement choice during the Expansive Inca Period is near the lake. However, the movement into the puna that began in the Altiplano Period continued in the Late Horizon. About 14% of the population was living above 4000 meters under Inca occupation. Likewise, the shift away from the raised field areas continued with the result that 85% of the population lived in the terrace agricultural areas or in the camelid grazing lands (Table 1).

The main difference between the two periods is in the greater number of sites, an abandonment of the fortified refuge sites such Pukara Juli, and the founding of several regional political centers: Juli, Pomata, and possibly the Kajje region. The Late Horizon witnessed a "spike" in the population of the region. Extrapolating from the previous population growth rates, there was about twice the population during the Late Horizon than expected. These data suggest that populations were moved in the region under Inca control, a process consistent with ethnohistoric data on Inca mitimae in the region (Julien 1983).

One final note is that the location of Juli and Pomata as major Early Colonial political and religious centers appears to have been based largely on the existence of already large populations during the Late Horizon. Our data strongly suggest that the decision to intensively settle Juli and Pomata during the Early Colonial period reflects the demographic and cultural-geographical landscape left by the Inca state much more than it reflects a new administrative order imposed by Spanish authorities.

EARLY COLONIAL PERIOD

The settlement pattern during the Early Colonial Period in the Juli-Pomata survey area is very similar to the Late Horizon one. The Early Colonial Period settlement is shown in Figure 11. There are fewer sites in total, and the absolute population is lower, but the distribution of settlement is approximately the same as in the Late Horizon. Mean site sizes and overall population distributions were very similar to that of the Late Horizon (Table 1). Interestingly, the highest density of settlement in the puna is in the Early Colonial Period (25% of population as seen in Table 1) suggesting a very high reliance on camelid pasturing during this time. The substantial number of Early Colonial sites in the the puna may also help explain the location of the impressive Early Colonial church at the site of Lundayani.

THE RECONNAISSANCE AREAS

Once our resources were nearly expended in the Intensive Survey Area, we switched to a large-site reconnaissance strategy east to Yunguyu and south to Desaguadero. The reconnaissance strategy was designed to locate major sites in the Ccapia and Desaguadero areas. The methodology simply involved driving and/or walking to areas likely to have large sites. Likely areas were identified as low hills near the lake, elevated areas near raised field areas, and higher locations on colluvial flanks near water sources. These criteria derived directly from our experience in the intensive survey area. The criteria also were weighted to find pre-Altiplano Period site locations. While we did find a number of Altiplano through Early Colonial sites, we consciously sought out areas that were likely to have Tiwanaku and Formative Period sites.

The intent of the reconnaissance was to record large sites in the area and compare them to the Intensive Survey Area. We furthermore sought to sample various geographical areas to test for settlement densities and types, including the discovery of smaller sites. These data permitted us to compare the Ccapia and Desaguadero areas with the systematically surveyed Juli-Pomata area.

Ideally, we would like to continue resurveying the reconnaissance area with an intensive methodology. The large-site reconnaissance method most certainly missed many large, important sites in the area and virtually all smaller sites were not recorded. Nevertheless, the reconnaissance data are important because they document the existence of major sites and serve as the basis of future hypotheses.

The Ccapia Reconnaissance includes the edge of the lake around the large Ccapia mountain that dominates the southern Titicaca Basin (Figure 12). The Desaguadero Reconnaissance area was restricted to the Peruvian side of the river, from the town of Desaguadero to a distance several kilometers south (Figure 13). We discovered a number of important sites in both of these areas. The results from this reconnaissance are consistent with those from the Intensive Survey Area. That is, we found the full range of sites and site types in the Ccapia and Desaguadero areas as we did in the Juli-Pomata area. Sites ranged in date from the Late Archaic to the Early Colonial Period.

The reconnaissance data indicate that the Upper Formative and Tiwanaku occupations in these regions appears to have been even more intensive than in the Juli-Pomata area. The site of Kanamarca has the largest cut stone blocks in the entire study area. We also found a number of stone stelae and cut stone blocks on a number of Upper Formative and Tiwanaku sites, including two unreported Upper Formative steale with carvings at the site of Caninsaya.

The reconnaissance data supports the association of Upper Formative and Tiwanaku sites with raised field agriculture. In particular, the Chatuma area sites are adjacent to a huge raised field area, and there is a high density of pre-Altiplano Period sites. Likewise, the Desaguadero river area has a large number of raised field areas and correspondingly high density of Upper Formative and Tiwanaku Period settlements. The data also corroborate the pattern of intensive use of the lakeside area, with a marked drop off of settlement away from the lake edge proper.

These data also corroborate the pattern of Altiplano Period fortified sites with associated undefended hamlets. The pukaras of Calvario Pata, Huichajaja, Llaquepa, Pukara Chatuma, and Tanka Tanka all have associated smaller hamlets. Finally, numerous Late Horizon and Early Colonial sites were discovered in the region, many of which are not reported in this paper. The data suggest that a similarly high density of these sites, as found in the Intensive Survey Area, also characterize the Ccapia and Desaguadero zones.

DISCUSSION: THE SETTLEMENT HISTORY OF THE SOUTHWESTERN TITICACA BASIN

The survey and reconnaissance of the southwestern Titicaca Basin provides a systematic data base for addressing many anthropological problems in the prehistory of the region. In the preceding sections, we have provided settlement data, typologies and data from our research. In this concluding section, I seek to summarize the results of this research in light of some of the more important problems in the archaeology of the southwestern Titicaca Basin.

THE FORMATIVE PERIODS

The Early Formative occupation in the study area represents the first settled villages in the Titicaca region. The earliest permanently occupied sites in Juli-Desaguadero area are represented by small, undifferentiated hamlets that appear to be no more than one hectare in size, and probably much smaller. The first settled agricultural populations developed out of a hunting, collecting, and fishing economy of the Late Archaic. These Early Formative sites are generally located on low hills, and are sparsely spread over the landscape. There is no evidence of conflict, and the sites concentrate on economically rich areas near the lake. The Early Formative settlement pattern in the Juli-Pomata Intensive Survey Area suggests an optimizing strategy aimed at securing access to lacustrine, horticultural, and puna grazing areas. The settlement pattern is more-or-less evenly distributed, with some clustering in the richer ecological zones.

The Middle Formative occupation of the region is substantial, both in size and complexity. This period represents the formation of ranked societies in study area, oftentimes referred to in the literature as simple chiefly societies. The formation of ranked society in the Juli area is later by several centuries than either the northern Basin, in the Qaluyu area, or in the southern Basin at Chiripa. In these latter areas, ranked societies appear to have developed by at least 1100 BC, possibly earlier.

There are at least two political centers during this period: the site of Palermo which is at least 4.0 hectares in the Middle Formative, and Ckackachipata which is at least 5.0 hectares. The site of Kanamarca could also be a major center on par with Palermo, Ckackachipata, and Chiripa during its Middle Chiripa Period. The nature of the political and economic relationships between these Middle Formative polities remain poorly understood, but it is clear from our work that they were certainly not related to the Qaluyu polity to the far north, although there was stylistic borrowing as seen in the ceramic assemblage at Tumatumani (Stanish and Steadman 1994:72-75). The ceramic styles in both polities (Early Sillumocco and Early Ckackachipata) show stronger borrowing from the Chiripa polity, but again, the ceramic assemblage in at least the Juli region (Early Sillumocco) was locally manufactured and not incorporated into the Chiripa polity in any formal sense. The situation with the Ckackachipata polity is less clear, and it is geographically closer to the Chiripa area. Without an intensive ceramic attribute analysis, as that conducted by one of us (Steadman) for the Sillumocco area, we cannot draw too many conclusions from the surface artifact data. However, we recovered no Qaluyu-like fragments from the reconnaissance area and preliminary observations suggest that there were more Chiripa imports in the Ckackachipata area.

The Middle Formative settlements in the Desaguadero area also remains poorly understood vis à vis their political and economic relationship to the Chiripa area. Clearly, there is a substantial Middle Formative settlement concentrated along the Desaguadero River and southern Lake Titicaca edge. Ceramic diagnostics are related stylistically to Chiripa, but again, without an intensive analysis, the precise relationship remains unknown. Theoretically, we would expect there to be an additional comparable polity in the Desaguadero River area, particularly along the rich raised field areas along the river. We found no site comparable to Palermo, Ckackachipata, or Kanamarca in size or complexity in the Desaguadero Reconnaissance Area. However, it is quite possible that such a site exists on the Bolivian side of the river.

The Upper Formative is characterized by the formation of societies characterized by a highly ranked political structure and correspondingly complex economic system.

Archaeological research on the Upper Formative in the Titicaca Basin has historically focused on two areas: the northern Collao and the southern Pacajes area. These are the areas of Qaluyu/Pucara and Chiripa/Tiwanaku respectively. This bias in the research has led to an implicit or explicit view in the Titicaca Basin as being characterized by these two principal centers of cultural development that influenced, to varying degrees, neighboring areas. In many ways this view is reminiscent of the notion of nuclear centers of civilization, that of the "generators" of great art styles and culture that subsequently diffuse out to other areas. For instance, all decorated ceramic assemblages and carved stelae are evaluated as to whether they are in the Chiripa/Tiwanaku traditions or are more related to Qaluyu / Pucara types. Sites in between these two regions are identified as "Chiripa", "Qeya", "Pucara" and so on, on the basis of a few decorated surface sherds without regard to the rest of the assemblage or other site characteristics.

The Juli-Desaguadero data indicate that our traditional view of the Upper Formative must be revised. The Upper Formative was a time of intensive political development of numerous complex, autonomous and semi-autonomous complex chiefly polities. At least four, and most likely many more, polities existed immediately prior to the development of Tiwanaku. These would include Pucara, Chiripa/Qeya, Late Sillumocco, and Late Ckackachipata. We hypothesize additional such complex polities, such as those represented by the sites of Kanamarca and Amaizana China, and those possibly in the Desaguadero and Omasuyus area. Portugal's research at the site of Titimani stands as one such example for the eastern lake region (Portugal 1988).

Consistent with anthropological theory on complex chiefly societies, political boundaries were most likely fluid as competitive relationships and alliances between different groups constantly shifted. We expect certain "pan-Titicaca Basin" art styles to be interpreted in slightly different ways in different polities. This would be particularly evident in stone sculpture, ceramic vessels, and the like. At our excavations at Tumatumani, for instance, we observed significant "borrowing" of styles from both the north and south basin, plus a local "Juli" style best represented by Sillumocco polychrome ceramics.

The discovery of the Late Sillumocco and Late Ckackachipata polities raises the question of their relationship with Pucara and Qeya. We can more-or-less define the southernmost limits of Pucara settlement and/or influence in the western Titicaca Basin. Alfred Kidder (1943) reconnoitered the northern Basin and part of his survey covered the Ilave area (Kidder 1943:10-15) south of Chucuito. He described three Tiwanaku sites in the region including Incatunuhiri (1943:13), Asiruni and Sarapa (1943:10). Incatunuhiri is located near Ichu, directly northwest of Chucuito. Asiruni and Sarapa are located just north of our study zone in the Ilave Pampa. Incatunuhiri is a large, terraced hill that has both a Pucara and Tiwanaku occupation. It also has semi-subterranean sunken court with carved stone stelae. Asiruni and Sarapa did not produce many Pucara sherds, according to Kidder, and the rare occurrence of some incised wares does not constitute sufficient evidence for assigning these sites a Pucara cultural affiliation. Rather, they appear to be Sillumocco or Sillumocco-like sites with a major Tiwanaku occupation after AD 400. We have no Pucara sites in the Juli-Desaguadero research area. The southern limit of Pucara settlement is therefore located somewhere between Incatunuhiri and the Ilave Pampa, the northernmost limit of our survey (Figure 1).

In the southern Titicaca region, I argue that the first complex chiefdoms in the Titicaca region are represented by the Mamani phase or Late Chiripa in the Chiripa area. Chiripa Mamani dates to 400-100 BC in the Browman chronology and would

correspond to Late Chiripa in the Chávez chronology circa 650-200 BC (Chávez 1988:2). During this time, the first complex storage structures and semi-subterranean temple were built at the site (Browman 1980:809). I argue that the construction of this major corporate architecture correlated with the development of a complex chiefdom at Chiripa. The mound was formally walled and faced in the preceding Middle Formative or Chiripa Llusco and Chiripa Condori phases. The inhabitants of Chiripa in this earlier time had built a plaza area on the mound proper (Browman 1980:808). In the Upper Formative, the plaza area was replaced with a formal, walled, semi-subterranean temple area. In other words, the earlier plaza area was formally walled off with a construction technique that was to become typical of elite architecture in Titicaca area.

After the Mamani Phase, Browman reports a hiatus in the occupation of Chiripa with a rebuilding of the temple area around A.D. 400. This rebuilding would correspond to the later Qeya period (Browman 1978:809). Ponce assigns an average date of A.D. 299 for the Tiwanaku III or Qeya period, a date with which I generally agree based upon our admittedly limited data base. In his excavations at Lukurmata, Bermann obtained a single calibrated date of A.D. 430 \pm 80 from a housefloor with associated Tiwanaku III or Qeya ceramic fragments. Qeya therefore is contemporary with Late Pucara, Late Sillumocco, and Late Ckackachipata. The most appropriate interpretation of the data at the present time suggests that Qeya dates to approximately A.D. 200-400.

As we just noted, in the study area the two polities of Sillumocco and Ckackachipata of the Middle Formative continued on into the Upper Formative. In the Juli-Pomata area, quantitative data indicate that during the Late Sillumocco Period raised fields were extensively utilized. In the Chatuma area of the Ccapia Reconnaissance Area, extensive Ckackachipata sites are associated with raised fields. Based upon these settlement data, raised fields were the most important component of the regional political economy. In the Juli-Pomata area where we have good quantitative data and 100% coverage, the number of Upper Formative sites actually decreased from the Middle Formative but the mean size of individual sites and the total population increased. Mean site size in the field areas almost quadrupled and these sites were dramatically larger than average site sizes for the period as a whole. Most dramatic is the population movement away from the non-raised field suni zone in the center of the survey area toward the raised field zones where almost 63% of the population lived. Two of the river-edge Moyopampa sites in the Early Sillumocco Period were abandoned for a naturally high area nearby. Furthermore, two additional sites were built on the edge of the Moyopampa zone indicating that most of these relict fields were probably in use.

This immediate periphery of the field area (within one kilometer) was the optimal settlement location for populations utilizing the raised fields. Distances of more than two kilometers are inefficient and settlement directly in the swampy field areas would be cold, damp and less desirable than the low hills ringing the field areas. The settlement data therefore indicate a shift from the earlier period to an optimal "ringing" of the field areas near aqueducts and canals. This patterning is highly suggestive of a more formal organization of production than in the Early Sillumocco Period.

In the Desaguadero Reconnaissance Area, we also found a number of Upper Formative sites. We can very provisionally hypothesize a distinct polity in this region at this time, but intensive surface survey and intensive artifact analyses are necessary to define these with greater precision.

THE EXPANSIVE TIWANAKU PERIOD

Tiwanaku presence in the southwestern Titicaca Basin was overwhelming. Our data supports a model of Tiwanaku as an expansive state political system. We have demonstrated that the Juli-Desaguadero area was heavily populated in the Tiwanaku Period. Settlements are found along the lake and decrease in density into the puna. The survey data indicate that the Tiwanaku state maintained a particularly strong political control in this region during its later phases, most notably circa A.D. 800 - 1000. It is also likely that the earlier Tiwanaku Period settlement circa AD 400 - 800 was also heavily represented in the study area. There is no Early Tiwanaku settlement (pre-AD 400) although the existence of an occasional trade ware suggests contacts between the Upper Formative polities and the pre-Expansive Tiwanaku Period.

Our data from the Juli-Pomata Intensive Survey Area indicate that there was little change in settlement patterns between the Upper Formative and the Tiwanaku Period. Only two out of 11 major Upper Formative sites (one hectare and over) were abandoned in the Tiwanaku Period in the Intensive Survey Area. Excavations at Tumatumani, Palermo, and Sillumocco-Huaquina indicate that there was no hiatus in the occupation. In other words, the Tiwanaku state expanded into an already complex political and economic context with the incorporation of the Sillumocco polity around AD 400.

Similar patterns of settlement continuity are suggested by the data from the Ckackachipata polity and Desaguadero Reconnaissance Areas. Tiwanaku occupations are generally found associated with Upper Formative sites in the reconnaissance regions, a pattern similar to that of the Juli-Pomata area. Raised fields are strongly associated with Tiwanaku sites, corroborating the data from the Juli-Pomata region. We may presume that, in the same way that the Tiwanaku polity incorporated the Late Sillumocco polity, it also absorbed the Ckackachipata and related polities to the south.

The lack of any growth spike during the Expansive Tiwanaku Period in the Juli-Pomata Intensive Survey Area is instructive and contrasts markedly with the Altiplano/Inca Period transition. While we accept the notion of Tiwanaku as an expansive polity of some power and influence, these population data suggest that one component of Inca political economy--mitimaes--were not part of the Tiwanaku strategy, at least in the Juli-Pomata area. We therefore believe that it is inappropriate to use the Inca state as a direct analogy for the Tiwanaku. Populations do not seem to have been moved into the region as colonists, a very stark contrast to the population patterns evident in the Inca Period.

The Tiwanaku peoples constructed an archaic expansive state of impressive proportions. However, unlike the Inca, they either lacked the ability or the resolve to move large populations under their control. Tiwanaku expanded into an already complex political and economic context in the Upper Formative, as represented by the Late Sillumocco and Late Ckackachipata polities in the survey and reconnaissance areas. The strong continuity in settlement patterning between the Upper Formative and Tiwanaku periods suggests a co-option of existing political and economic institutions by the Tiwanaku state, as opposed to the imposition of new ones as seen in the Altiplano-Expansive Inca transition. The Tiwanaku state maintained and intensified raised field agriculture. In fact, based upon geographical locational data, the Upper Formative and Tiwanaku economic strategies were strikingly similar, exhibiting similar proportions of the population located in the raised field, terrace agriculture, and pasture lands respectively.

The settlement data indicate that the Tiwanaku population maintained a mixed economy of intensive and extensive agriculture, pastoralism, lake resource exploitation, and regional exchange. Intensive agriculture is represented by the raised fields. These fields date to the Tiwanaku Period, as evidenced by the location of major Tiwanaku sites adjacent to aqueducts, canals, and the field themselves. Extensive agricultural practices were represented by rain-fed terraced agriculture, typical of the area today. A number of Tiwanaku sites are found away from the raised field areas and geographically associated with rain-fed agricultural terraces. In short, both raised field and non-raised field areas were occupied by Tiwanaku sites.

The Tiwanaku settlement combined a heavy lakeside focus with settlements in the other ecological zones. The lakeside focus is indicative of the exploitation of the lake resources, although this proposition needs to be refined with excavation data. A few Tiwanaku sites are also found in the high puna area above 4000 meters above sea level, a settlement pattern that suggests a control of camelid grazing lands. The number of Tiwanaku sites in the puna is small, however, compared to the later Altiplano and Late Horizon Periods.

The co-existence of a locally manufactured Tiwanaku imitation pottery along with imported polychromes indicates the existence of a trade network of as yet unknown proportions or intensity. It is not known whether the locally produced ceramic type is chronologically later as in Moquegua (Bermann et al. 1989; Stanish 1991:9-10) or simply represents a local imitation of the genuine Tiwanaku ceremonial pottery. The existence of the non-local finewares, most likely produced in or near Tiwanaku itself, is indicative of a complex exchange relationship between a distant state center and local populations. Likewise, the difference in site types may represent a resident Tiwanaku administrative elite among a local support population. In this instance, it is fairly obvious that the type 3 sites represent elite centers given the existence of semi-subterranean temples, stelae and the like. We can hypothesize that the other site types represent the local population, with the exception of the the artificially mounded type 1 sites. This proposition remains to be tested in the future.

It is instructive to compare the survey data from the Juli-Pomata Intensive Survey Area with those from the Tiwanaku valley collected by Albarracin-Jordan and Mathews (1990). In the first instance, there is a substantial pre-Tiwanaku IV settlement in the Tiwanaku Valley. This is to be expected in the ancestral homeland of the Tiwanaku state. At Tiwanaku, there is an unbroken evolution of Tiwanaku settlement from the earliest Upper Formative Period (Tiwanaku I or Kalasasaya) to the dramatic expansion of Tiwanaku in its later phases. As I have just noted, the Upper Formative/Tiwanaku Period transition in the Juli-Desaguadero region is very different with Tiwanaku replacing an already complex polity. Excavations at two elite/ceremonial sites indicate that they were architecturally enhanced in the Tiwanaku period, an observation that supports political and economic continuity.

The number of sites in the Tiwanaku valley is an order of magnitude larger than the Juli-Pomata area. In a total survey of approximately 400 km², Albarracin-Jordan and Mathews discovered 100 Tiwanaku IV sites and 339 Tiwanaku V sites (1990:7,89,130). The methodologies of the Tiwanaku Valley Projects and the Lupaqa Project were similar. Likewise, the definition of a site is comparable in both projects. Therefore, the difference in settlement density between the Pacajes and Lupaqa area is empirically valid. Clearly, the core territory of Tiwanaku has a radically different and more intensely occupied history than the Lupaqa zone. The factors responsible for these different patterns in adjacent zones remain as central problems for future research.

THE ALTIPLANO PERIOD

The Late Intermediate Period or Altiplano Period settlement system differs from all preceding periods. In functional terms, there are two types of sites: fortified sites or pukaras and nonfortified residential sites that tend to cluster near these pukaras. Furthermore, there are two types of fortified sites. The first type, major pukaras, are very large hills surrounded by at least three walls with substantial architectural remains inside and immediately adjacent to the walls. The second type of pukara is characterized by small hills with surrounding defensive walls and very little architectural remains. These minor refuge sites are built in a similar manner as the major ones, but are considerably smaller and much more numerous. They rarely have more than a few structures and artifactual remains are meager.

In short, our data indicate a pattern of large Late Intermediate Period refuge sites more-or-less evenly spaced along the southwestern Lake Titicaca region. These major refuge sites are roughly similar in size, architecture and associated ceramic assemblages, although some variation within these sites is evident. Excavation data from at least one of these sites suggests that they were not permanently occupied, but were used as temporary refuge sites for nearby populations in times of danger. Associated with these major refuge sites are dozens of smaller ones, located near undefended hamlets and villages. This pattern appears to be typical of the Lupaqa region as a whole. We have identified a number of major refuge sites in the region between the Ilave Pampa and Copacabana. One obvious pattern that is evident is the relatively even spacing of the major sites. There is some variation in size between the major pukara sites, but it is significant that all sites are within the same order of magnitude. The largest sites are Pukara Juli, Tanka Tanka, and Cerro Carajuana with three others--Huichajaja, Llaquepa, Pukara Chatuma, and Tanapaca--roughly equivalent in area. The actual size of the area enclosed by defensive walls appears to be more a function of topography than of population size.

All major refuge sites other than Cerro Carajuana were ground checked. The remains of domestic architecture are found on all of the visited sites. The general architectural pattern is one of roundish houses built on domestic terraces. As with Pukara Juli, domestic architectural remains are found within the walls and immediately adjacent to the walls. Above ground burial towers, or chulpas are found within and near the fortified walls. Other chulpa cemeteries are found away from the sites themselves.

Ceramic collections were made at four of the five pukaras. The diagnostic material is uniformly Altiplano Period in date inside of the residential areas of the site. We have named the ceramic type Pucarani in the Juli-Pomata area and Kelluyo in the Desaguadero region. Diagnostic Pucarani ceramics show strong affinities to pre-Inca Sillustani and Chucuito types from the Collao region of the north Titicaca Basin (Tschopik 1946:21-44), although the Pucarani style is clearly a local type associated with the southwestern Titicaca area. There is some variation in the decorated ceramic styles between the five sites collected, but the Pucarani style is relatively homogeneous in the Juli-Pomata region compared to contemporary assemblages to the north (Tschopik 1946) and the south (Albarracin-Jordan and Mathews 1990).

One of the major questions facing the southern Titicaca Basin for the immediate post-Tiwanaku Periods is that of the hypothesized migration of Aymara speakers. Our data do not necessarily falsify nor support this hypothesis. There is indeed a substantial change in settlement patterns in the Tiwanaku/Altiplano Period transition that could support this model of Aymara migration. These data, however, could also be explained

by the dramatic political disruptions coincident with Tiwanaku collapse in the region. The probable drought around AD 1000 (Ortloff and Kolata 1993) may also explain these settlement changes, particularly a shift from nucleated near raised fields to a more dispersed pattern found upon camelid herding.

We would have expected to find fortified settlements in the Kelluyo and southern Desaguadero area to support the Aymara migration hypothesis. It is curious to have contemporary sites in the immediate lake region fortified, with other sites in the south unfortified. The fortification of the settlements in the region correlate to the demographically dense areas near the lake, and would therefore support models of internecine strife as opposed to a model of migrants moving into the region in fortified settlements. Furthermore, the Kelluyo ceramic type is distinct from the immediate lake area during the Altiplano Period. This suggests a cultural distinction between the two areas, another observation that would not support a southern migration of the Aymara in the wake of Tiwanaku collapse. In short, there is still much work to be done on this intriguing question. Linguistic and toponymic studies, combined with systematic archaeological work in the Caranagas area and the Lake Poopó region will help clarify this problem.

THE EXPANSIVE INCA PERIOD AND EARLY COLONIAL PERIOD

There is a massive Inca presence in the study area including major population movements within and from outside of the area. There were three major differences from the previous Altiplano Period: the walled sites were abandoned, larger towns were founded, and raised field areas were abandoned. Puna land use was intensified (19% of total population), a process that began in the preceding Altiplano Period.

The Inca did not utilize raised field areas and indicated by site location and the derived population data. This is most likely due to the altered ecological conditions specifically drought and lower average temperatures beginning around the Inca conquest. The Late Horizon settlement pattern is heavily weighted to terrace agricultural and lakeside urbanized areas, suggesting a maximization strategy in the region designed to produce and move commodities and locate populations in optimal agricultural land.

One of the most dramatic characteristics of the Inca occupation is the growth spike after a generally steady growth rate from the Middle Formative Period. This growth rate could not occur from natural population increases alone. These data leave little doubt that substantial populations migrated into the Juli-Pomata region during the Inca Period. This growth spike during the Expansive Inca Period can be explained, we believe, by two principal factors. The first factor is methodological. The intensive survey zone covered two major Inca administrative sites, Juli and Pomata. Had the systematic survey continued into the Chatuma area and beyond, we might expect some flattening of the curve with the inclusion of more pre-Inca sites away from Pomata. Even with this extension of the survey however, the growth spike almost certainly would still exist, albeit in a less severe form. This is supported by the discovery of numerous Late Horizon sites in the reconnaissance area.

The second explanation relates to Inca policies of population relocation in the form of mitimae colonists (D'Altroy 1992; Patterson 1991). As detailed in the introductory chapter, there are numerous historically documented cases of Inca mitimae colonists in the Titicaca Basin. A significant percentage of the new population was concentrated into the larger towns. In particular, the towns of Juli and Pomata were founded in this period. Figure 90 represents site sizes for the Tiwanaku through the Inca Periods.

These data indicate that there was a shift to a bimodal site distribution with a few very large sites and a number of smaller villages and hamlets in the Inca Period.

The transition from the Altiplano to Expansive Inca Period suggests substantial changes in the political economy of the southwestern Titicaca Basin. The highest rate of site abandonment occurs in this period. Likewise, there is a significant change in site size distributions during the Inca occupation. While the emphasis on small hamlets continued, the Inca built huge administrative settlements along the road system. In fact, approximately 50% of the population lived within 500 meters of the road in the Juli-Pomata area. Presumably, much of the population of these centers were imported colonists. Likewise, there is an intensification of pastoral and rain-fed terrace agricultural zones, and a virtual complete abandonment of the raised field areas in the low pampas.

There is a surprising continuity between the Inca Expansive and Early Colonial settlement patterns, and presumably economic organization. From a political and economic perspective, the needs of Spanish state were similar to that of the Inca, at least in the first generation. Through time, there was shift away from altiplano products to mining. Concomitantly, there was a political shift from the highlands (Inca empire) to the coastal valleys, particularly the Spanish ports. The changes wrought in the wake of the Spanish conquest altered the political economy of the central Andes resulting in the gradual decline of the Titicaca Basin economy.

The Early Colonial Period patterns are surprisingly similar to the Late Horizon ones. The general bimodal distribution characterized by very large and very small sites continued. There was an expansion into the puna and a continued occupation of the large towns originally founded by the Inca state.

	Period					
	FORM. MEDIO	FORM. TAR.	TIWANAKU	ALTIPLÁNICO	INCA	COLONIAL
TOTAL POP.(Ha)	23.04	32.72	62.86	74.16	178.49	153.75
TOTAL SITES	25	19	41	140	242	224
MEAN SIZE OF ALL SITES	0.92	1.72	1.53	0.53	0.73	0.69
TOTAL SITE IN RAISED FIELDS	11	12	17	44	48	43
POP. INDEX OF RAISED FIELD ZONE (Ha)	9.49	22.71	35.74	21.04	25.15	15.18
MEAN SIZE OF SITES IN RAISED FIELDS	0.86	1.89	2.10	0.48	0.52	0.35
POP. INDEX OF RAISED FIELDS AS % OF TOTAL	41	69	57	28	14	10
TOTAL SITES IN NON-RAISED FIELD SUNI	11	6	21	75	143	124
POP. INDEX OF NON-RAISED FIELD SUNI (Ha)	10.20	8.01	24.53	42.64	118.62	99.89
MEAN SIZE OF SITES IN NON-RAISED FIELD SUNI	0.93	1.33	1.16	0.57	0.83	0.80
POP. INDEX OF NON-RAISED FIELD SUNI AS % OF TOTAL	44	24	39	57	66	65
TOTAL SITES IN PUNA	3	1	3	21	51	57
POP. INDEX OF PUNA (Ha)	3.40	2.00	0.86	0.50	0.68	0.68
MEAN SIZE OF SITES IN PUNA	1.13	2.00	0.86	0.50	0.68	0.68
POP. INDEX IN PUNA AS % OF TOTAL	15	6	4	14	19	25

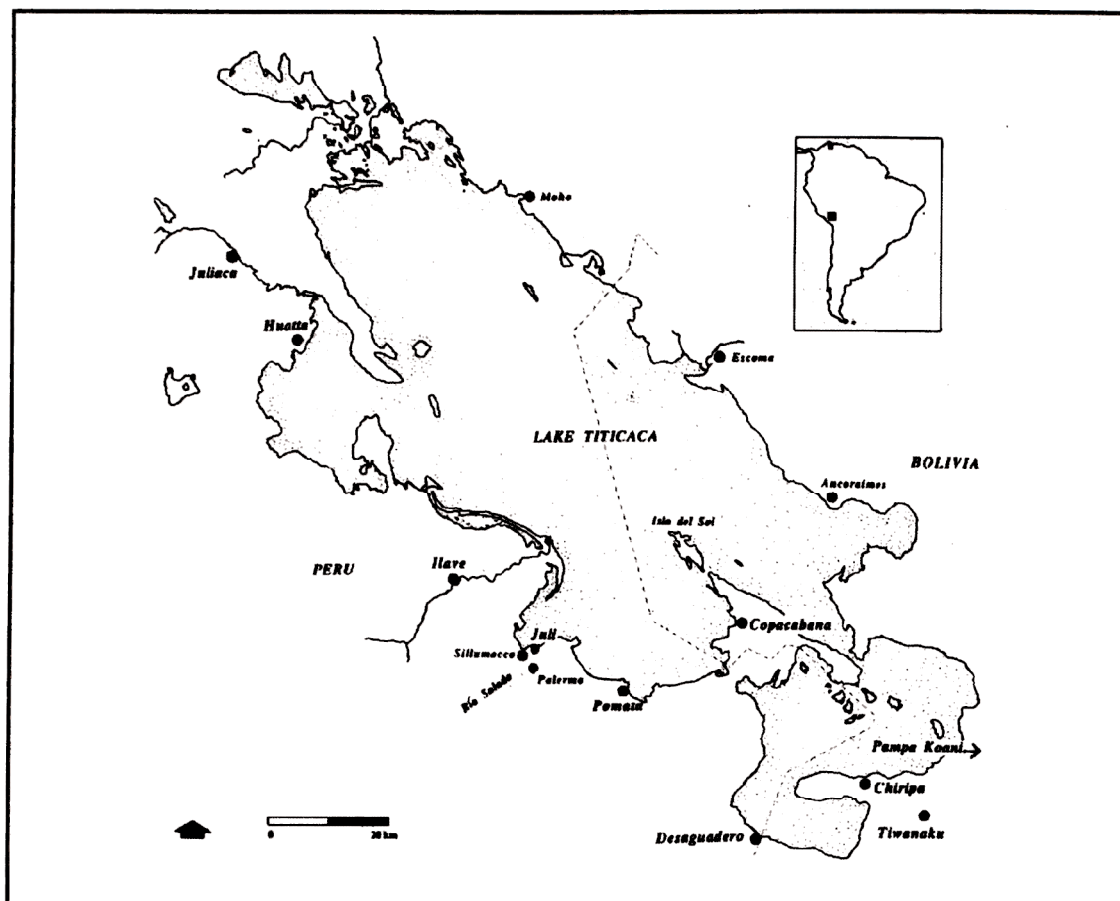


Figure 1. Titicaca Basin

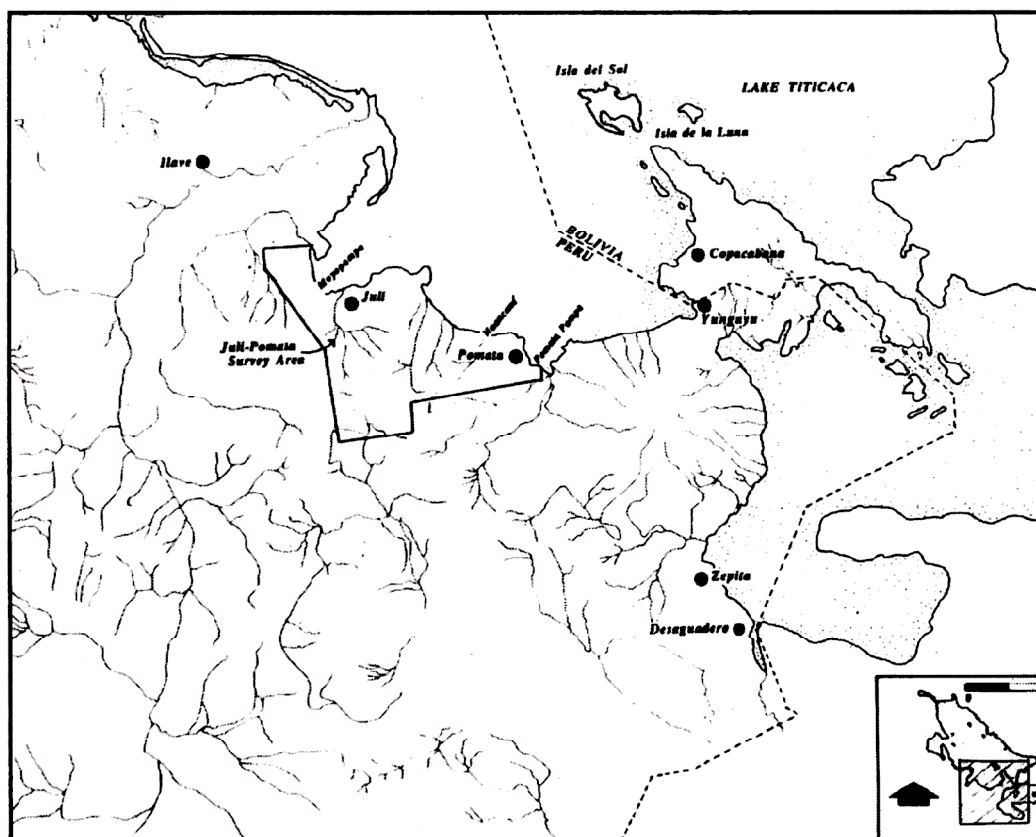


Figure 2. Southwestern Titicaca Basin

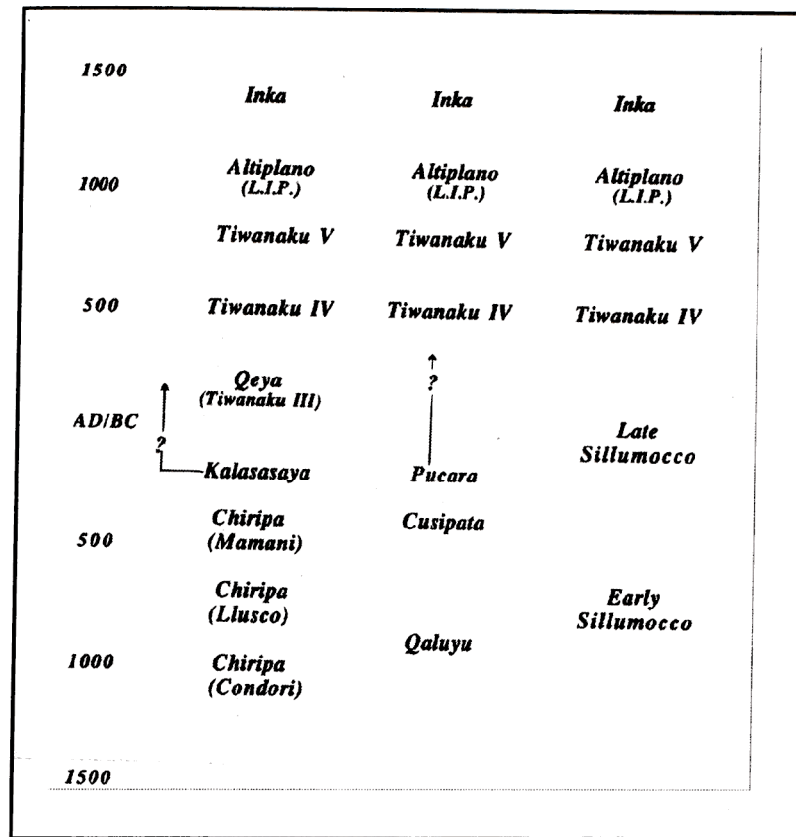


Figure 3. Chronology

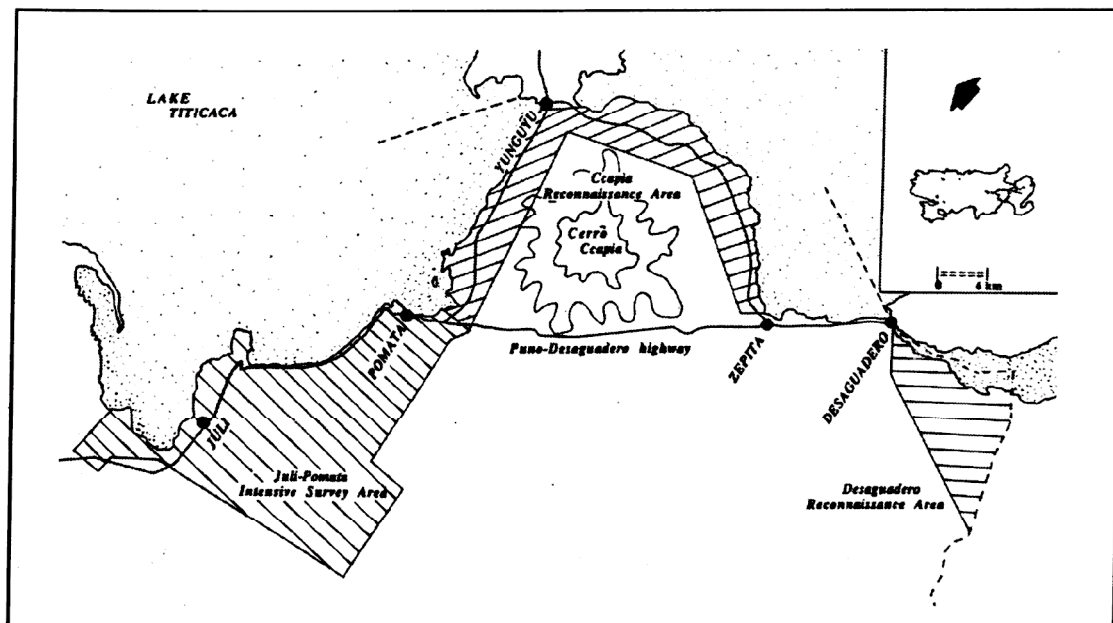


Figure 4. Study areas

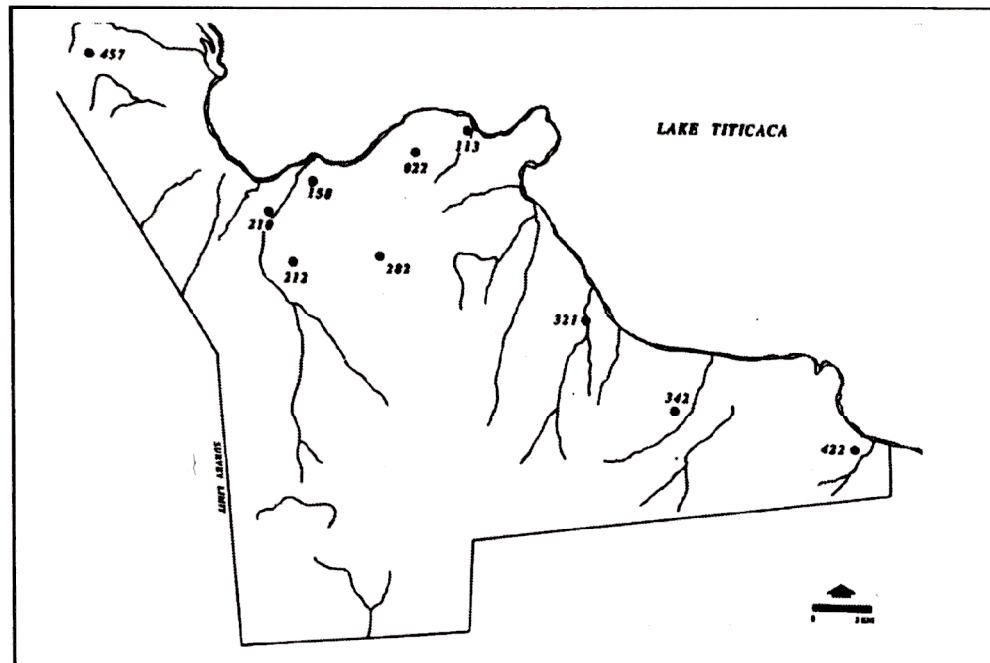


Figure 5. Lower Formative Period Settlement Pattern in the Juli-Pomata Intensive Survey Area

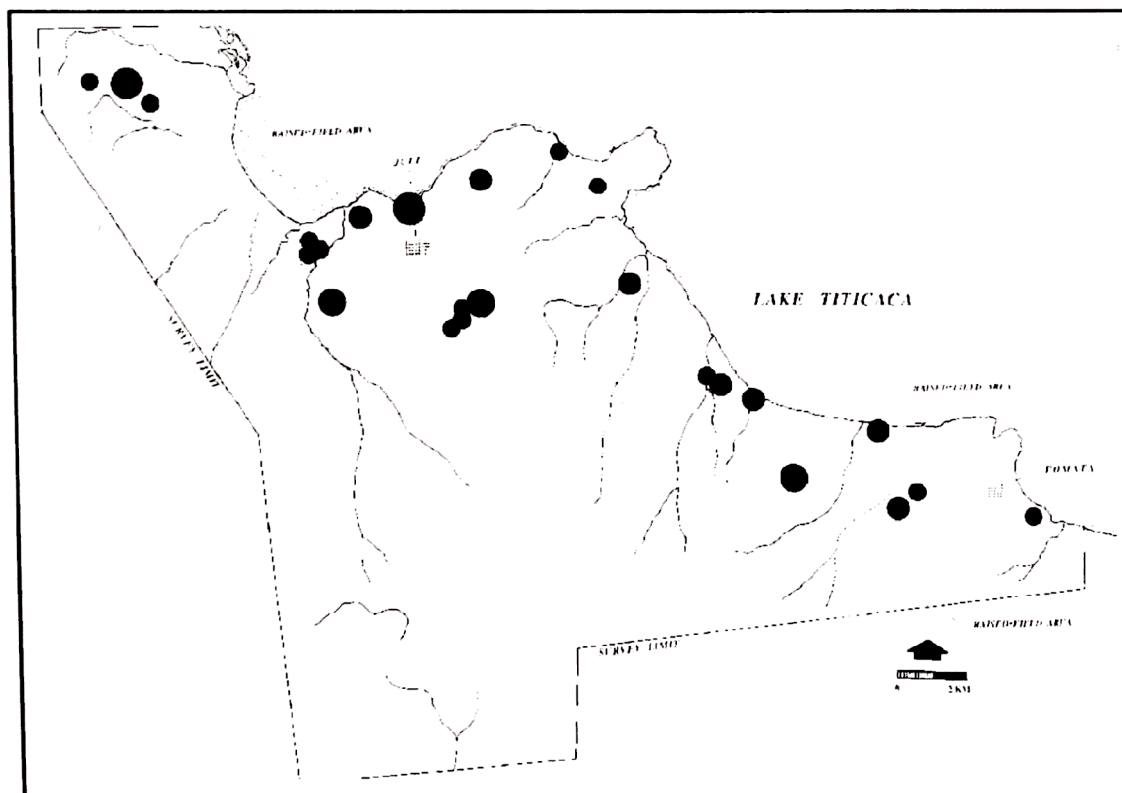


Figure 6. Middle Formative Period Settlement Pattern in the Juli-Pomata Intensive Survey Area

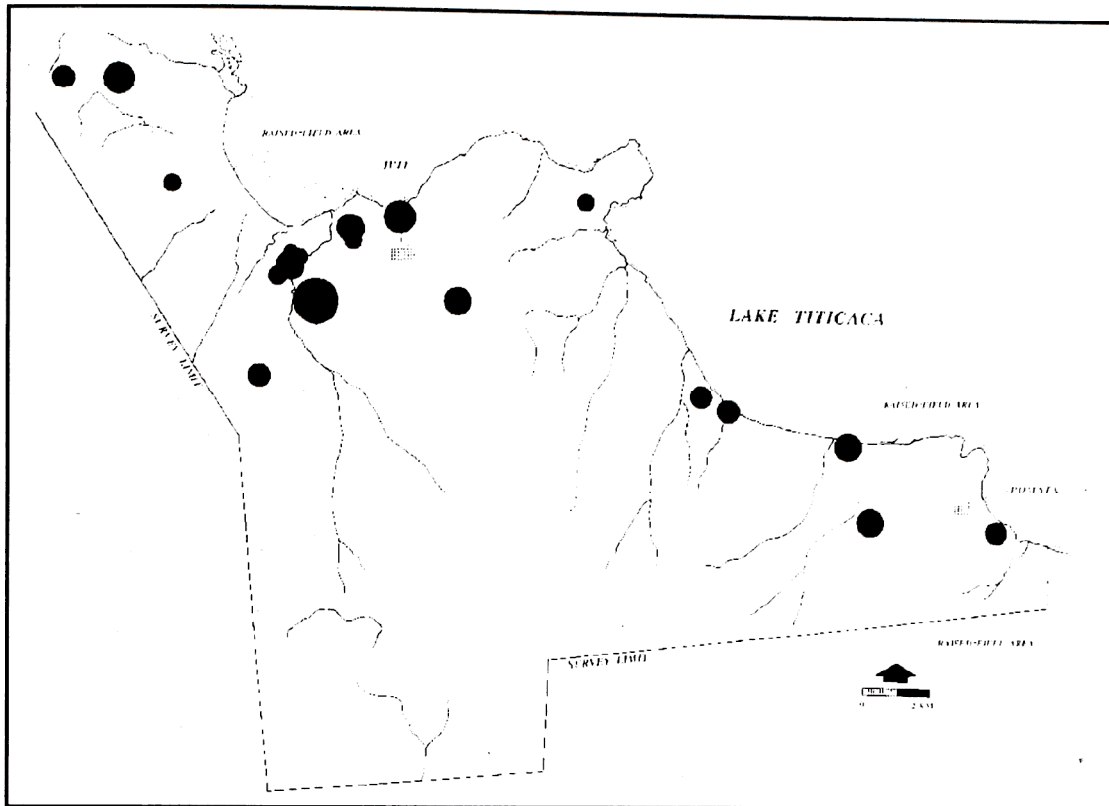


Figure 7. Upper Formative Period Settlement Pattern in the Juli-Pomata Intensive Survey Area

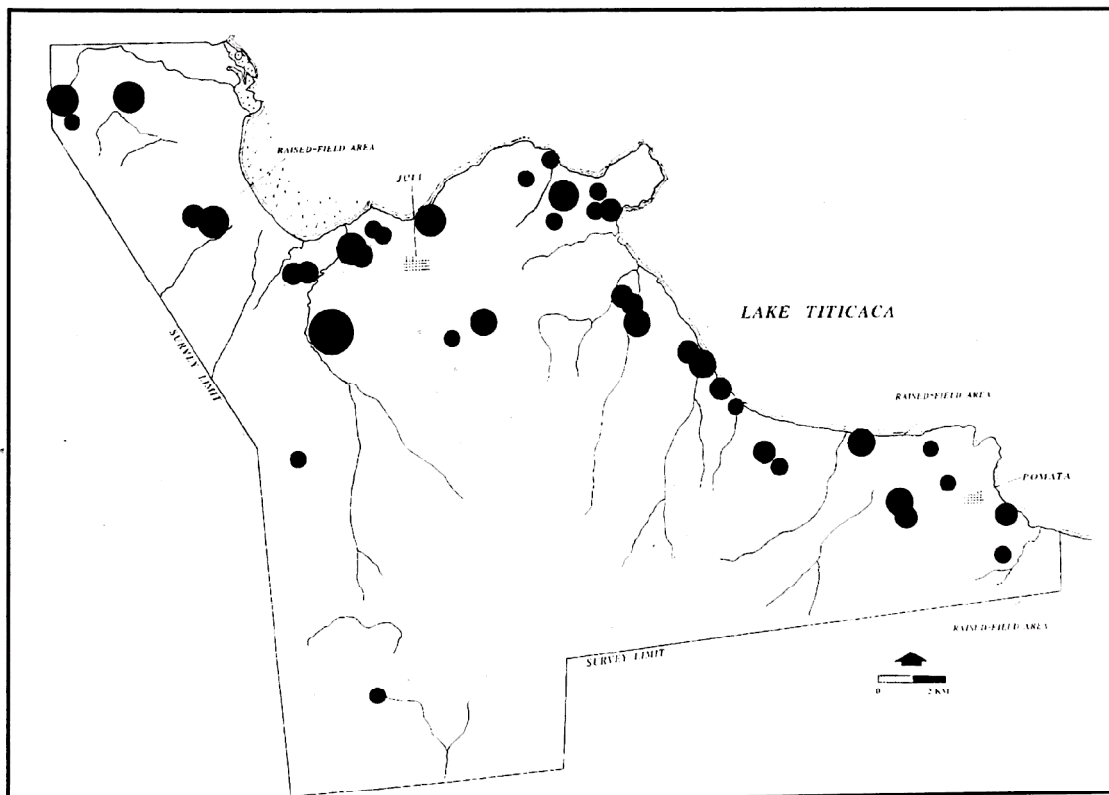


Figure 8. Tiwanaku Period Settlement Pattern in the Juli-Pomata Intensive Survey Area

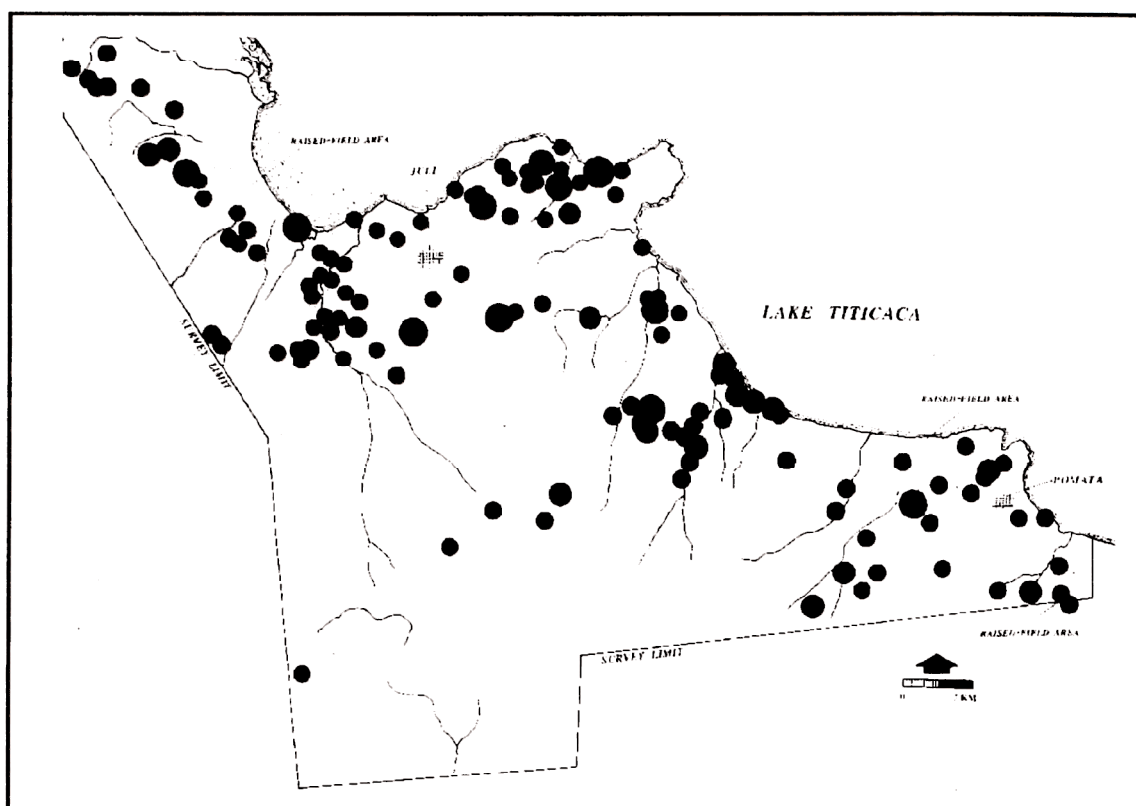


Figure 9. Altiplano Period Settlement Pattern in the Juli-Pomata Intensive Survey Area

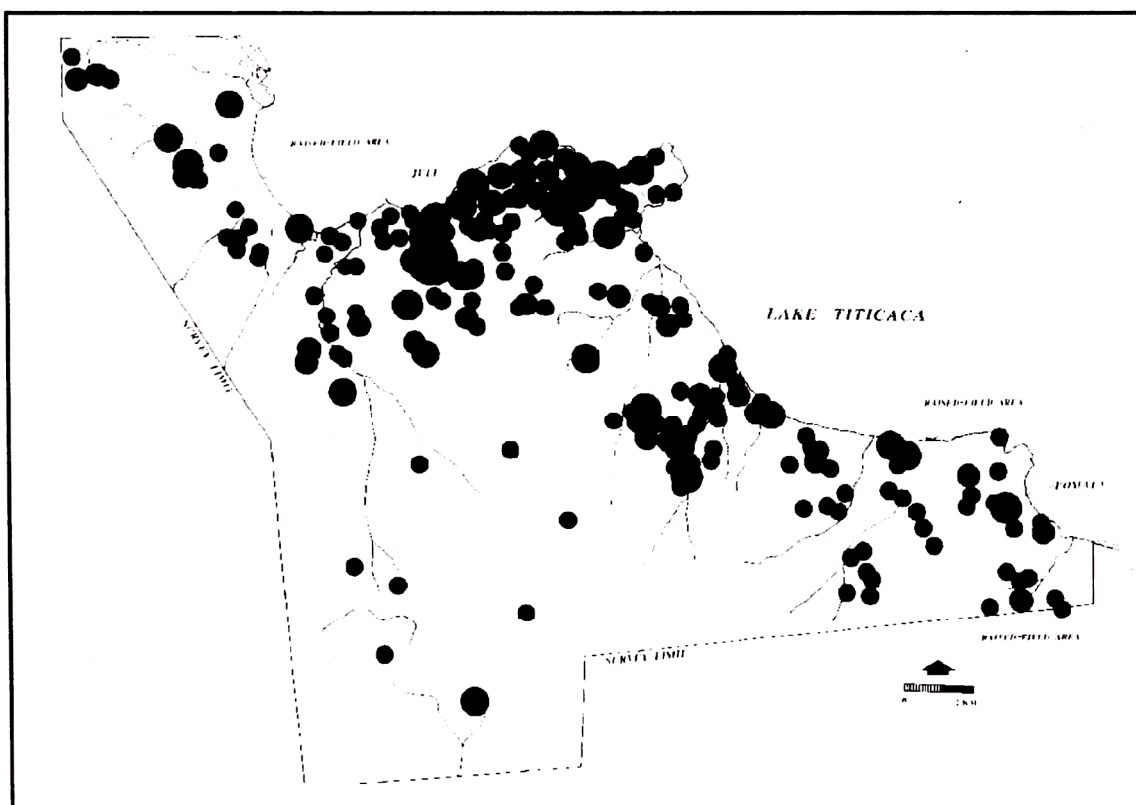


Figure 10. Inca Period Settlement Pattern in the Juli-Pomata Intensive Survey Area

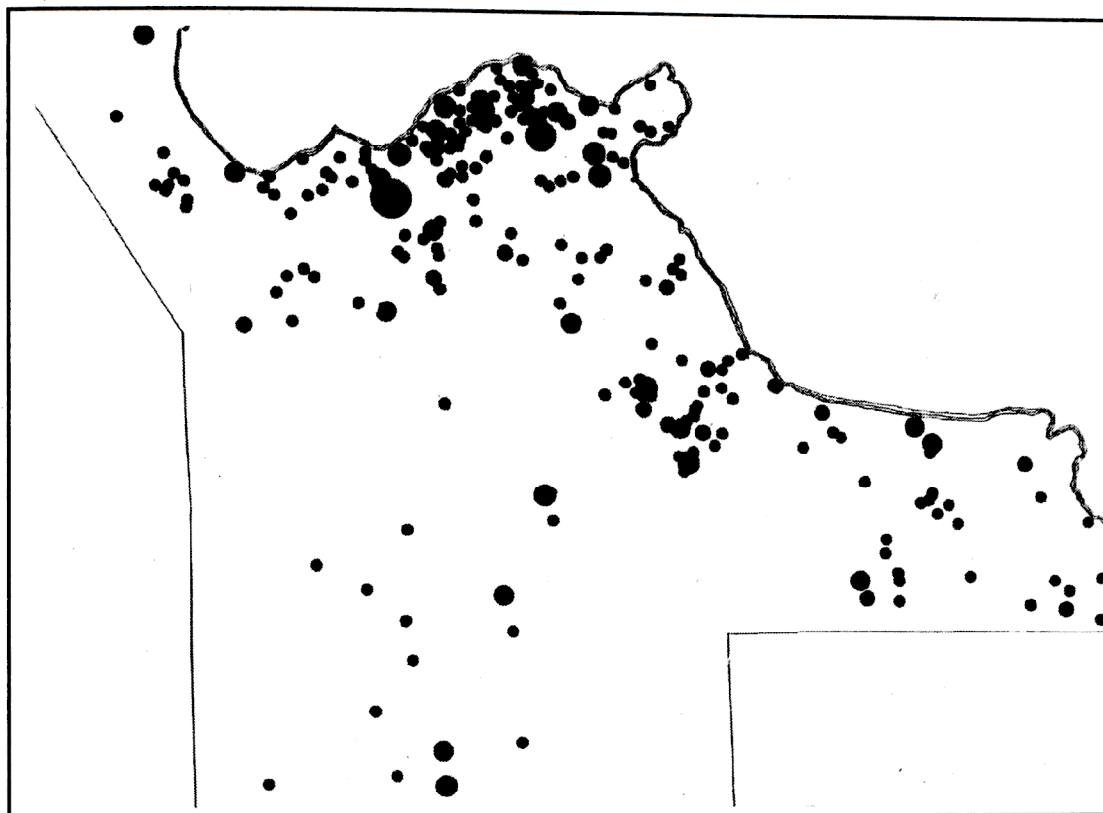


Figure 11. Early Colonial Period Settlement Pattern in the Juli-Pomata Intensive Survey Area

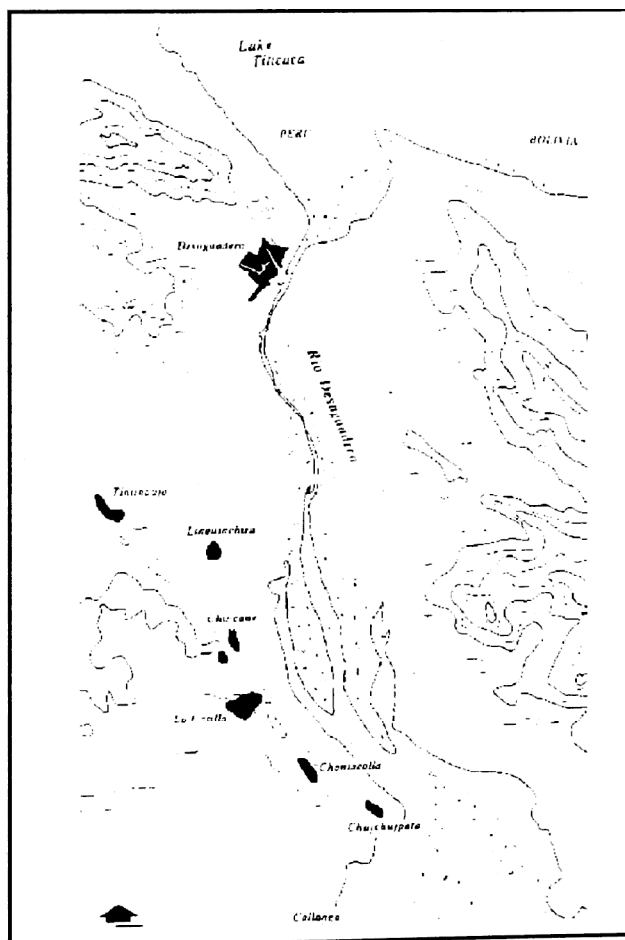


Figure 12. Sites in the Ccapia Reconnaissance Area

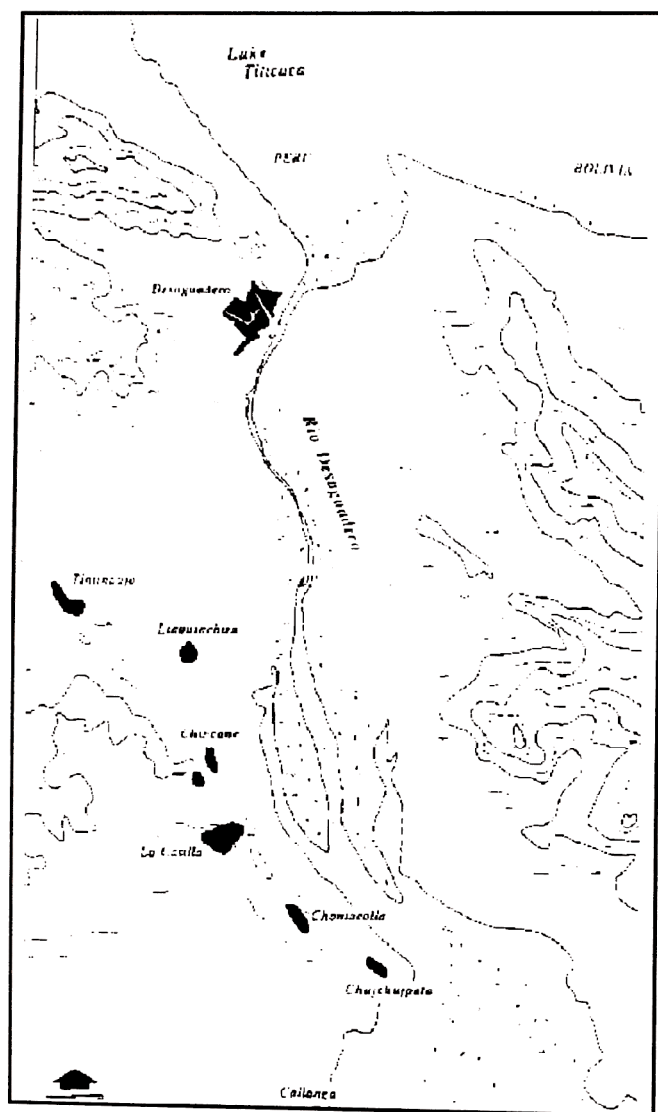


Figure 13. Sites in the Desaguadero Reconnaissance Area

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