FROM PALEOINDIAN TO PROTOHISTORIC: THE CHRONOLOGY OF HUMAN OCCUPATION OF SALTON SEA TEST BASE

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ABSTRACT

Archaeological sites at Salton Sea Test Base provide evidence of the entire span of known human occupation of the Colorado Desert. Data include time-sensitive artifacts, obsidian hydration, and a suite of 20 radiocarbon dates. Early period occupation is evidenced by crescentics and stemmed and notched dart points. Evidence of later occupation is in the form of Cottonwood Triangular points, ceramics, and radiocarbon assays. Radiometric evidence indicates a relatively intensive Protohistoric occupation and supports the idea that there was a Protohistoric stand of Lake Cahuilla that may have lasted into the 18th century. Occupation during earlier Late Holocene lakestands is also indicated.

INTRODUCTION

Archaeological survey and test excavations at Salton Sea Test Base (SSTB) yielded evidence of nearly the entire sequence of known human occupation of the Colorado Desert (Apple et al. 1997). However, the evidence is not evenly distributed temporally. The sites that were tested appear to date primarily to a Protohistoric occupation, and this paper will focus primarily on evidence to that effect. I use the term Protohistoric here to denote the period between the earliest Spanish explorations in A.D. 1540 to approximately 1769 when the colonial period began in Alta California.

REGIONAL CHRONOLOGY

Native American occupation of the Colorado Desert can be divided into 5 periods, if you exclude the controversial pre-projectile point material (Figure 1).

The San Dieguito Period is generally dated from 10,000 to about 8,000 years ago. Large bifaces of varied morphology, flaked stone crescents, and domed scrapers, are often described as characteristic of this period. The temporal assignment of cleared circles and some trail segments to this period remains controversial and has not been supported by most recent work. Native American groups occupying the desert during this time are usually described as practicing a high degree of residential mobility as they focused their subsistence efforts on highly ranked resources. Population density is thought to have been low. Developed trails and cleared circles would be inconsistent with these characteristics.

The Archaic occupation of the Colorado Desert remains highly enigmatic due to a dearth of sites (Schaefer 1994). Comparing the Colorado Desert with the Mojave to the north, one is struck by the near absence of sites. In the Colorado Desert, we have divided the Archaic into two periods, based primarily on analogy to adjacent areas. Following this analogy, we would expect the Pinto series points to generally mark the Colorado Desert's Early Archaic from about 8000 B.P. to about 4000 B.P. The subsequent Late Archaic or Amargosa Period should be marked by the presence of Elko and Gypsum series points. Millingstones might be found throughout the Archaic but should be more frequent during the Late Archaic.

The Late Prehistoric, or Patayan, Period is marked by the introduction of the bow and arrow perhaps as early as 1500 years ago and the introduction of ceramics about 1200 years ago. Flood plain horticulture along the lower Colorado

River was also introduced at this time. Native American use of the Colorado Desert increased substantially during the Late Prehistoric as evidenced by numerous trails, shrines, and ceramic scatters.

The Protohistoric Period is treated separately here because this appears to have been a time of substantial territorial realignment among Yuman-speaking groups as chronicled by Forbes (1965). Whether such shifts were common earlier is a matter of conjecture, but it seems likely that the warfare and related population shifts were at least partially engendered by slave-raiding associated with the Spanish colonial period in the greater Southwest.

During the Late Prehistoric, and possibly the Protohistoric, the Salton Trough was periodically inundated by the Colorado River. The chronology of lake stands is relevant to the dating of the SSTB sites, all of which would have been completely inundated by high stands and exposed during recessional phases.

As shown on Figure 1, Waters (1983) identified four high stands, the last of which had ended by A.D. 1540. Waters thought it unlikely that a Protohistoric lake stand existed because of the absence of references to it in early historic accounts. However, Protohistoric Period archaeological sites have been reported along what may have been recessional shorelines, and Schaefer (1986) and Laylander (1994) have suggested that some sort of lacustrine interval occurred between Diaz' visit in A.D.1540 and the Anza expedition in 1775.

SSTB DATABASE

Grist for the chronological mill at SSTB includes 14 usable radiocarbon dates and numerous time sensitive artifacts, such as projectile points and ceramics. Only four obsidian hydration readings were obtained - too few to be useful for chronological analysis. The radiocarbon database covers primarily the last 400 to 500 years with one date of over 800 radiocarbon years. Flaked stone tools, on the other hand, indicate use of the area over at least 8000 years.

Flaked Stone Tools

Most of the 39 bifaces recovered from SSTB are at least generally time-sensitive. The earliest use of the area is evidenced by 2 eccentric crescentics and a large stemmed point, classified in the Lake Mojave series. It is noteworthy that the Lake Mojave point was manufactured from San Felipe obsidian and was the only artifact recovered from this source, which lies over 240 km (140 miles) to the south. This occurrence is consistent with models of large resource procurement areas and high mobility during the Paleoindian Period. A variety of large leaf shaped and straight-based bifaces may also date to this period or to the subsequent Archaic.

Three Pinto series points were collected during the KEA surveys, with 2 dart points assignable to the Elko series. Several untypable dart points were also found. Dart points of all types were generally found as isolated occurrences or with no clear association with the sandstone features typical of many SSTB sites. This implies a very different life-style for early times at SSTB.

Late Period occupation is evidenced by 3 Cottonwood Triangular points and 2 Desert Side-notched points. Arrow points were typically found in sites with ceramics and sandstone features, implying more lengthy residential stays and greater investment in non-portable materials equipment.

Radiocarbon Results

A total of 20 radiocarbon samples were assayed by Beta Analytic (Figure 2). Five were AMS dates; 3 were small samples requiring extended counting times. Six of the samples, including 2 AMS dates, came back as modern. Thirteen samples possibly date to the Late Prehistoric or Protohistoric Period, and one has a two-sigma span that would place it in the historic period.

The samples represent 17 separate sites with good geographic and elevational dispersion (Figure 3). Fourteen samples were from rock enclosures, 2 from fish bone concentrations, 2 from charcoal lenses, 1 from a fire-affected rock concentration, and 1 was from a basketry fragment that turned out to be modern.

There is one problem with these dates that needs to be addressed from the outset. That is the high frequency of modern assays -- fully 30%. Does this mean that our results are contaminated -- by military activities, for instance -- in ways that we cannot measure? Could many of our non-modern dates contain intrusive charcoal? After all, many are from bulk samples. While this possibility cannot be completely dismissed, I do not think that most of our results can be explained by mixing. Although most of the dates were from bulk samples, almost all were from discrete features, and it seems unlikely that mixing is a big problem. Also, there is the nearly complete absence of historic materials from the features themselves. While shrapnel and other ordnance was frequently observed during survey, our excavators never encountered it in a subsurface context. If mixing was ubiquitous, we should have seen more evidence of it. Rather, most subsurface contexts were sealed by a thick layer of blow sand, which appears to have been deposited soon after the sites were abandoned.

Rather than contamination, I believe that our results reflect problems with the radiocarbon calibration curve during the Protohistoric period (Figure 4). Normally, the curve should decline from the upper left to the lower right. If radiocarbon years were the same as calendar years, there would be a direct linear relationship. However, as you can see here, there's a dramatic bend in the curve during the Protohistoric. According to Beta Analytic (who processed these radiocarbon dates), measurement error, compounded by uncertainties in calibration can yield false "moderns." This appears to be at least partially responsible for some of our dating problems at SSTB.

COMPARISONS WITH LAKE CAHUILLA CHRONOLOGY

Assuming that the SSTB radiocarbon results do not suffer greatly from contamination, how do they compare with the reconstructions of the chronology for Lake Cahuilla? Examination of Figure 2 suggests three periods of use. First, we have a single date of 870 ± 50 radiocarbon years from a charcoal lens at -120 feet. Using the Pretoria calibration, this yields a two-sigma calendar date of A.D. 1035 to 1270, which corresponds reasonably well to Waters' recessional interval between A.D. 1170 and 1220 (see Figure 1).

Second, we have two dates of ca. 400 radiocarbon years from two different rock enclosures at -180 to -185 feet. These yield a weighted mean of 410 ± 40, and because of the multiple intercept problem, a two-sigma calibration of either A.D. 1430 to 1525 or A.D. 1560 to 1630. The earlier range corresponds with Waters' brief recessional episode in the A.D. 1400 to 1450 range (see Figure 1) and is our preferred interpretation. However, the later interval cannot be completely ruled out on current evidence.

Finally, we have a cluster of 10 late dates whose two-sigma dendrocalibrations place them potentially within the Protohistoric period. All of these came from features typical of Late period Native American cultural patterns, including rock enclosures, 2 fish bone concentrations and a charcoal lens. First, I would like to address the question of whether these could date to human occupation associated with the latest lacustrine interval documented by Waters. Figure 5 shows the oldest extreme of the two-sigma calibrations of these dates. Only 1 of the 10 has even a 5% probability of having been generated prior to A.D. 1540. Consequently, we can conclude that it is highly unlikely that this late cluster could relate to recessional shorelines of Waters' final lake stand.

On the other extreme, could our late features have been generated by Native American exploitation of the Salton Sea at the time of its creation in the early 20th century? The answer to this seems to be no as well. Native American exploitation of the 20th-century Salton Sea is probable, but it could not account for our fish traps that are above the highest stand of the Salton Sea, and which are convincingly associated with features yielding late dates. Moreover, our sites did not yield much if any historical habitation refuse, while prehistoric habitation refuse, such as flaked stone debitage, is commonly found. Based on these data, a good case cannot be made to argue that most of our late features date to the 20th century.

The third possibility is that our features do indeed relate to Native American use of recessional shorelines of a lake stand that post-dates the initial Spanish entrada as suggested by Schaefer (1986) and Laylander (1994). Laylander's Elmore site is just a few km south of SSTB at an elevation of -180 feet. During discussions of our dating dilemma, Beta Analytic suggested that we use the date averaging technique to decrease statistical uncertainty. This technique assumes that each sample is basically contemporaneous and that variation is due to sampling error. Figure 6 lists each of the 10 potentially Protohistoric dates for SSTB. Beta calculated a weighted average of 110 ± 20 radiocarbon years for this series and provided a two-sigma calibration of A.D. 1685 to 1740 or A.D. 1810 to 1930. Although the latter possibility represents the broader time range, the historical evidence makes a 19th-century lake stand at -180 feet and higher nearly impossible. Consequently, we conclude that the earlier range is the relevant portion of the calibration curve. Using the same technique at the Elmore site, Laylander's mean was 220 ± 20, calibrated to A.D. 1657 to 1681. While the difference looks large in radiocarbon years - no overlap at two standard deviations - the two sigma dendrocalibrations are much closer. Overall, we think these data provide additional support to the possibility that a Protohistoric stand of Lake Cahuilla occurred. Moreover, the data suggest the possibility that this stand may have lasted a generation or so longer than documented at the Elmore site and could have extended into the early years of the 18th century.

CONCLUSIONS

In summary, three Late Holocene occupations are indicated by the radiocarbon results. The first 2 of these occupations accord well with use of recessional shorelines predictable within Waters' Lake Cahuilla sequence, although lower lake levels could be implied by our data. The final occupation, which possibly could have been the most intensive, appears to have been Protohistoric in date.

As a final note, I would like to emphasize the importance of recognizing uncertainties involved in radiocarbon dating especially with regard to the Protohistoric Period. Bends in the calibration curve during this time-frame make interpretation of the data particularly tricky.

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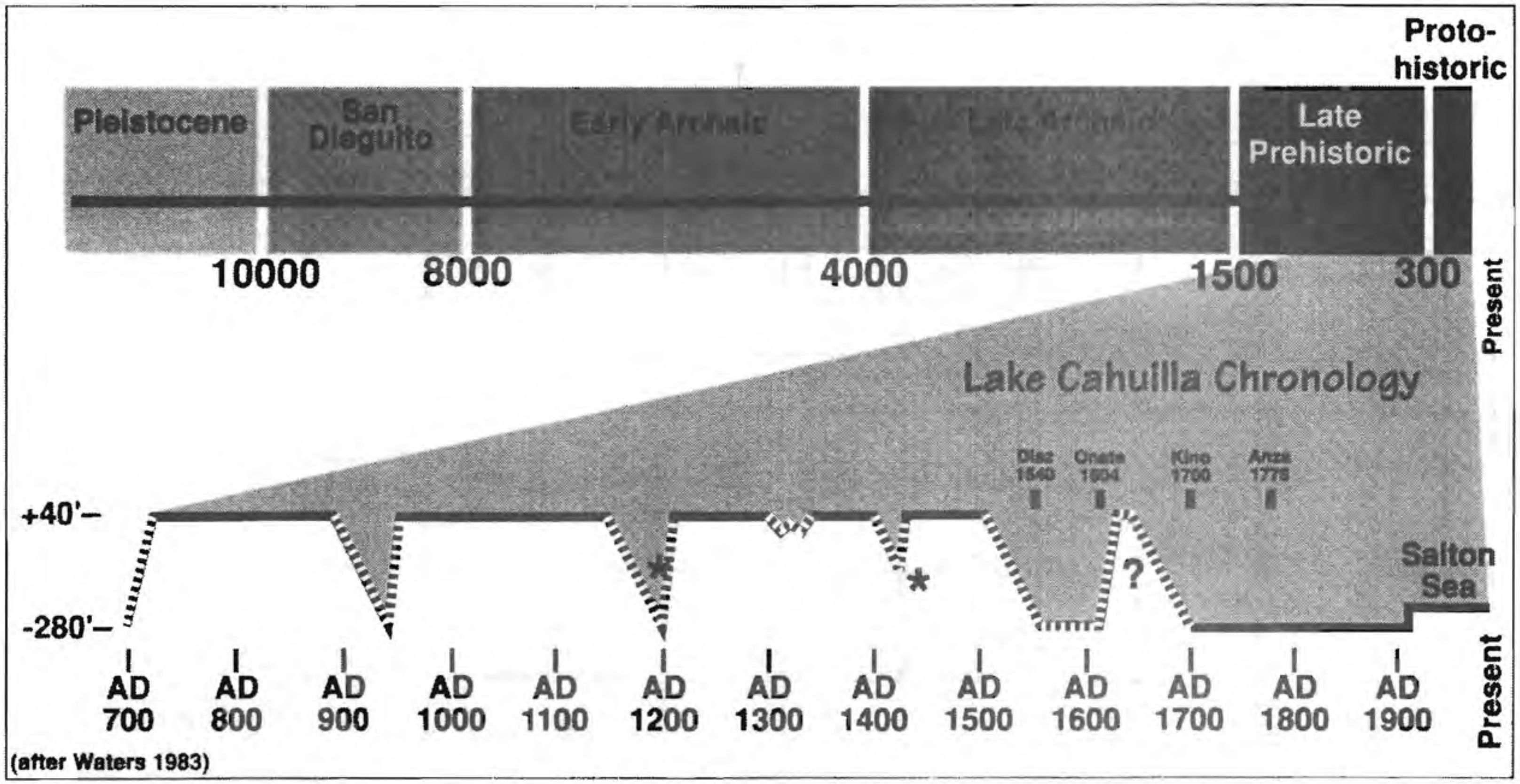


Figure 1. Time Line for Salton Basin.

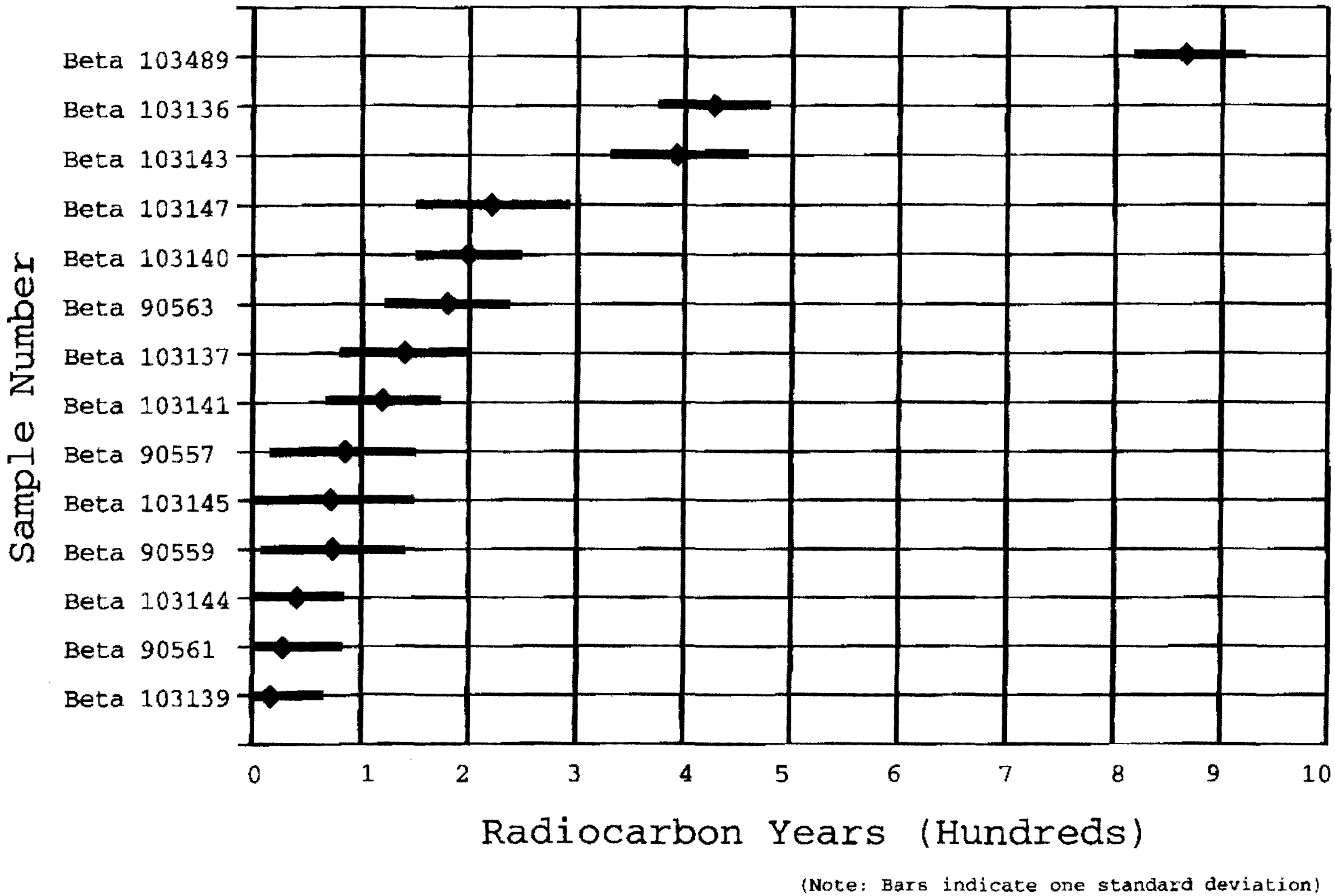


Figure 2. Plot of Radiocarbon Dates from Salton Sea Test Base.

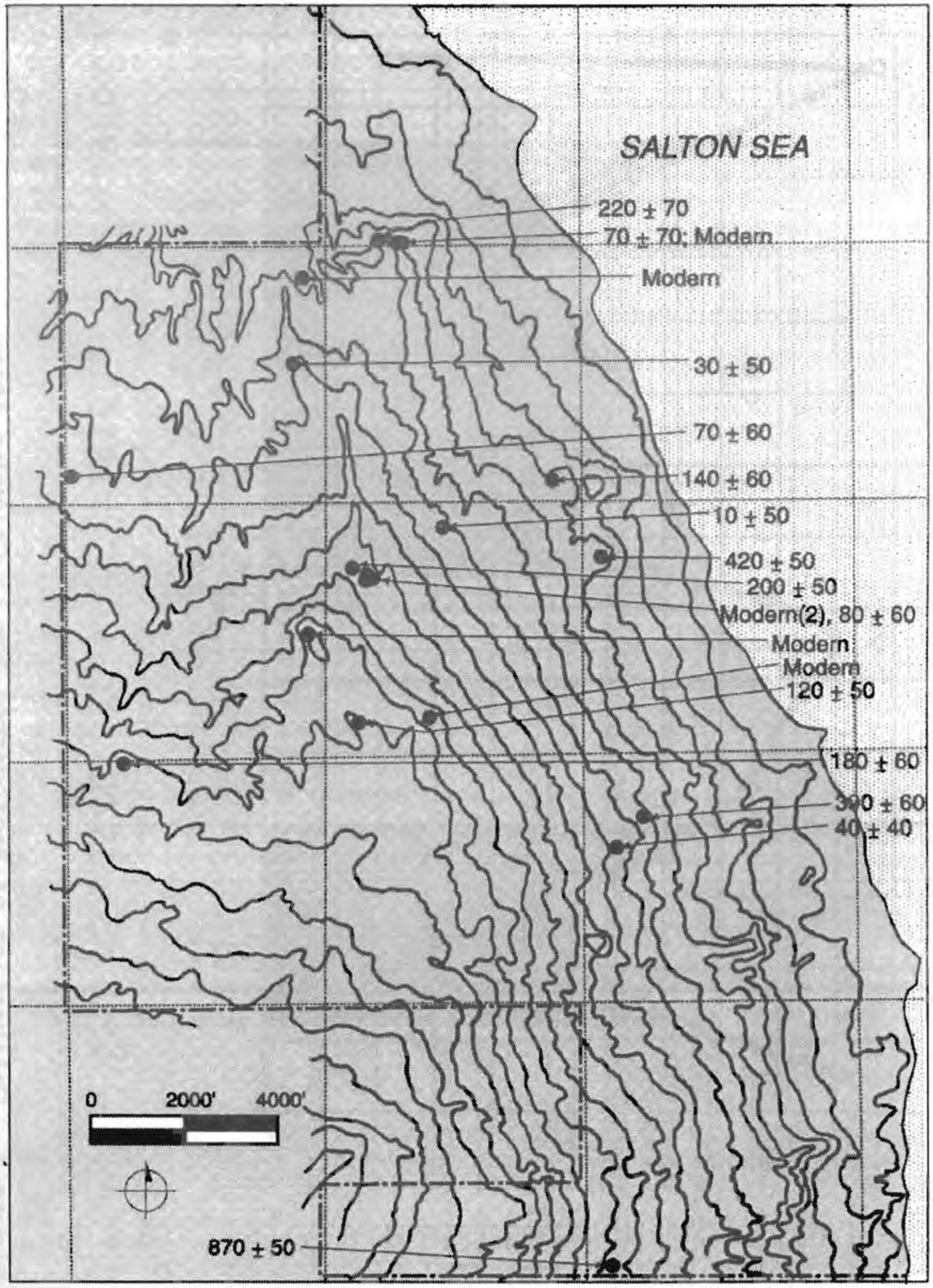
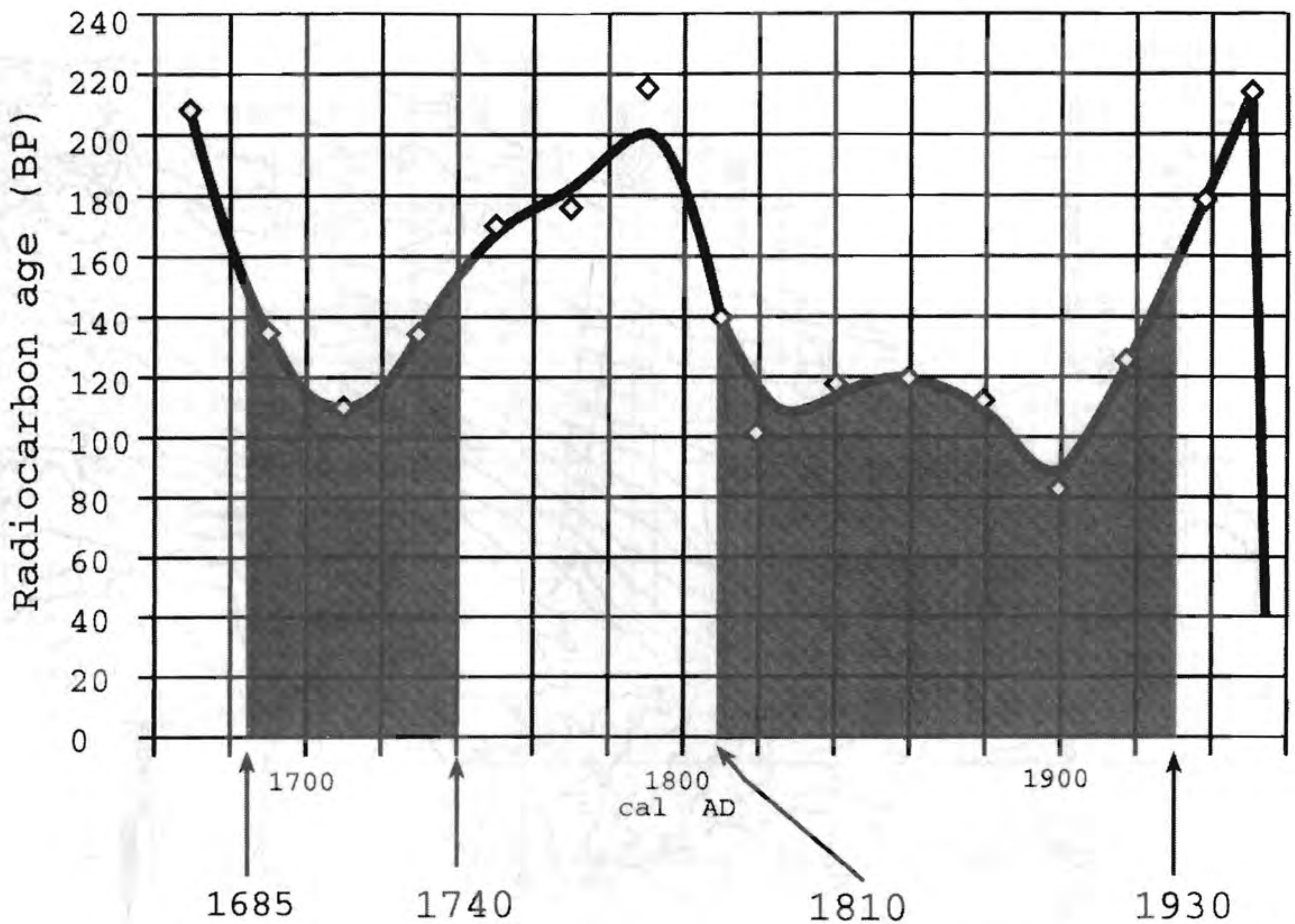
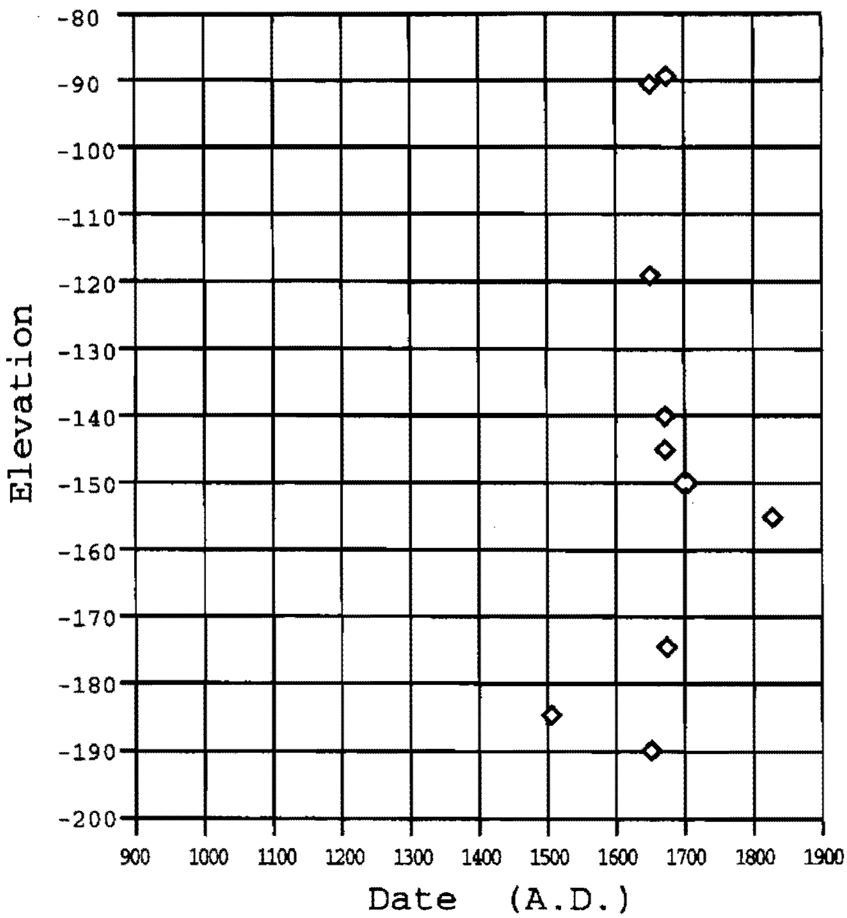


Figure 3. Location of Radiocarbon Dated Feature.



(SOURCE: Beta Analytic, Inc.)

Figure 4. Calibration of Radiocarbon Age to Calendar Years.



(Note: Plots are "early" end of 2-sigma dendrocalibrations)

Figure 5. Plot of Calibrated Late Radiocarbon Dates vs. Elevation

Conventional Dates In "Late Cluster"		Calibration
80 ± 60	200 ± 50	Weighted mean = 110 ± 20 B.P.
140 ± 60	120 ± 50	Calibrated results (2-sigma) = cal A.D. 1685-1740
70 ± 60	40 ± 40	cal A.D. 1810-1930
30 ± 50	70 ± 70	
180 ± 60	220 ± 70	

Figure 6. Dendrocalibration for the Mean of Late Date Cluster SSTB.