DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

PREPARED IN COOPERATION WITH THE
DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT

EXPLANATION

Radiocarbon dating is an important interdisciplinary tool for studies involving events and processes during the last 40,000 years of earth history, including studies involving marine transgressions and regressions, land subsidence, climatic changes, sedimentation rates and patterns, fault movements, and archaeology, among others.

The potential value of a radiocarbon date is diminished, however, if adequate site data are not taken with the sample and do not accompany the date in publication. At a minimum, published dates should include an accurate location for the dated sample, type of material dated and method of dating, nature of the site, depth below surface (or other accurately defined datum) of dated sample, stratigraphy of material overlying dated sample, and the significance of the date in the study.

Forty-six sites, encompassing a total of 76 separate dates (shown by symbol ◯ on map) are described below. Longitudes and latitudes listed for locations of dated samples in published sources have often proved to be in error, and the locations of radiocarbon sites shown on this map are based on published and unpublished maps and personal and written communications with collectors of the original material. Obvious discrepancies between actual and original published locations are noted. Dates shown as presented in the original sources and are in "(C^{14}) years before the present," where "present" means A.D. 1950. After each date, the laboratory identification number is listed where available and is followed by a brief description, including type of material dated, nature of site, depth below surface of dated sample, and stratigraphy of material overlying dated sample, where this information is available. Archaeological sites with University of California Archaeological Survey numbers are also identified by these numbers after the site title. References to radiocarbon date sources and to location sources of dated samples (where different) are listed for each date or group of dates. No comments on the significance of dates are included, and the reader is referred to the sources listed for further information.

SITE DESCRIPTIONS AND REFERENCES

1 BODEGA BAY REACTOR SITE, SONOMA CO.

>42,500 (Arizona-482) from peat-organic layer 40 ft below surface in reactor pit excavations on Bodega Head.

Damon, Paul E., Haynes, C. Vance, and Long, Austin, 1964, Arizona radiocarbon dates V: Radiocarbon, v. 6, p. 96 (date source).

>40,000 (UCLA-647) from wood 77 ft below surface in reactor pit excavations on Bodega Head.

Fergusson, G.J., and Libby, W.F., 1964, UCLA radiocarbon dates III: Radiocarbon, v. 6, p. 329 (date source).

Note: Published latitudes and longitudes for A-482 and UCLA-647 plot in the Pacific Ocean and the actual locality for both was the reactor pit excavation on Bodega Head as reported in the published texts (Julius Schlocker, USGS, oral communication, 1971).

>42,000 from three separate samples of wood 33 ft, 42 ft, and 44 ft (USGS W-1279) respectively, below surface in the reactor pit excavaton on Bodega Head.

Schlocker, Julius, and Bonilla, Manuel G., 1963, Engineering geology of the proposed nuclear power plant site on Bodega Head, Sonoma County, California: TEI-844, p. 1-37.

2 MILLERTON FORMATION, TOMS POINT, TOMALES BAY, MARIN CO.

>37,000 (Lamont-768C)
34,500 ± 3000 (Lamont-720A) from mollusk shell material from exposure of Millerton Formation on north side of Toms Point.

Richards, Horace G., and Thurber, David L., 1966, Pleistocene age determinations from California and Oregon: Science, v. 152, no. 3725, p. 1091-1092 (date source).

Johnson, Ralph Gordon, 1962, Mode of formation of marine fossil assemblages of the Pleistocene Millerton Formation of California: GSA Bull., v. 73, no. 1, p. 114 (location source).

TOMALES BAY SERIES, MARIN CO.

3 >34,000 (La Jolla-GAP-45) from mollusk shell material 27.1 to 28.6 m below MLLW in well near Dillon Beach.

4 340 ± 130 (La Jolla-GAP-43) from mollusk shell material 3.4 to 4.8 m below MLLW from submerged archaeologic site in White Gulch Bay.

5 1700 ± 190 (La Jolla-GAP-46) from mollusk shell material 6.4 to 7.5 m below MLLW off Manilla Marina.

6 3300 ± 180 (La Jolla-GAP-44) from mollusk shell material 16.6 to 16.9 m below MLLW in center of bay.

7 1200 ± 160 (La Jolla-GAP-47) from mollusk shell material 6.1 m below MLLW off Tomasini Point.

8 1020 ± 150 (La Jolla-GAP-48) from mollusk shell material 70 to 75 cm below MLLW in southern part of bay.

Bubbs, Carl L., and Bien, George S., 1967, La Jolla natural radiocarbon measurements V: Radiocarbon, v. 9, p. 266-267 (date source).

Dastoyler, Calvin C., 1966, Marine geology of Tomales Bay, central California: Scripps Institution of Oceanography and Pacific Marine Station, Research Report No. 6, p. 40 (location source).

9 TOMALES FLORA, MARIN CO.

29,050 ± 1100 (UCLA-736) from Pinus radiata cones ca. 40 ft below surface from exposure of Millerton Formation on Millerton Head, Tomales Bay.

Berger, Rainer, and Libby, W.F., 1966, UCLA radiocarbon dates V: Radiocarbon, v. 8, p. 491 (date source).

Mason, Herbert L., 1934, Pleistocene flora of the Tomales formation in Studies of the Pleistocene paleobotany of California: Carnegie Institution of Washington, Contributions to Palaeontology, Publication No. 415 (1934), p. 81-179 (location source).

10 COLMA, SAN MATEO CO.

10,540 ± 350 (USGS W-581) from wood in gravel and sand layer underlying 39 ft of silt and sand of stream terrace near Colma.

Rubin, Meyer, and Alexander, Corrinne, 1960, U.S. Geological Survey radiocarbon dates V: Radiocarbon, v. 2, p. 155.

11 SAN BRUNO FLORA, SAN MATEO CO.

10,170 ± 120 (UCLA-735) from wood of Pseudotsuga menziesii 21-32 ft below the surface from alluvial gravels near San Bruno (Locality 165A of Potbury, 1932).

Berger, Rainer, and Libby, W.F., 1966, UCLA radiocarbon dates V: Radiocarbon, v. 8, p. 491 (date source).

Potbury, Susan S., 1932, A Pleistocene flora from San Bruno, San Mateo County, California in Studies of the Pleistocene paleobotany of California: Carnegie Institution of Washington, Contributions to Palaeontology, Publication No. 413 (1934), p. 23-44 (location source).

COASTAL TERRACES, SAN MATEO AND SANTA CRUZ COUNTIES

12 2800 ± 300 (USGS W-1408) from willow roots from peat layer interbedded with dune sand overlying nature soil of lowest marine terrace at AÑo Nuevo Point; 8-10 ft below the surface.

13 10,200 ± 300 (USGS W-1376) from detrital wood fragments 50 ft below the surface from alluvial fill in the valley of AÑo Nuevo Creek.

14 >32,000 (USGS W-1413) from detrital charcoal 20-25 ft below surface from alluvium overlying lowest marine terrace at the mouth of Scott Creek.

15 1440 ± 250 (USGS W-1417) from detrital charcoal fragments 3-4 ft. below surface from alluvium at mouth of Laguna Creek.

Levin, Betsy, Ives, Patricia C., Oman, Charles L., and Rubin, Meyer, 1965, U.S. Geological Survey radiocarbon dates VIII: Radiocarbon, v. 7, p. 383 (date source).

William C. Bradley, University of Colorado, written communication, 1971, (location source).

16 >37,000 (Lamont-285) from mollusk shells from surface of lowest marine terrace at Santa Cruz.

Broecker, W.S., Kulp, J.L., and Tucek, C.S., 1956, Lamont natural radiocarbon measurements III: Science, v. 124, no 3213, p. 161 (date source).

Bradley, William C., 1956, Carbon-14 date for a marine terrace at Santa Cruz, California: GSA Bull., v. 67, p. 675-678 (location source).

17 THOMAS ARCHAEOLOGIC SITE, MARIN CO. (UCAS Marin-115).

633 ± 200 (Chicago-186)
911 ± 180
720 ± 130 Av. from charcoal from the lower level of the Thomas site.

Arnold, J.R. and Libby, W.F., 1951, Radiocarbon dates: Science, v. 113, no. 2927, p. 116 (date source).

Archaeological site records: University of California, Department of Archaeology, U.C. Berkeley (location source).

NORTH BAY CORES, MARIN, CONTRA COSTA, AND ALAMEDA COUNTIES

	(Kvenvolden, 1962)	(Corps of Engineers, 1963)	Depth below sediment surface
18	9955 ± 330	3-6	IF-3	64.5-65.0 ft.
19	8588 ± 620	4-3	IF-4	25.7-25.9 ft.
20	>30,000	5-8	IF-5	59.7 ft.
21	6210 ± 175	6-2	IF-6	11.0-11.3 ft.
	7925 ± 810	6-3	IF-6	20.5-20.8 ft.
	>30,000	6-11	IF-6	59.6 ft.
	>30,000	6-13	IF-6	69.3-69.6 ft.

Kvenvolden, Keith A., 1962, Normal paraffin hydrocarbons in sediments from San Francisco Bay, California: AAPG Bull., v. 46, no. 9, p. 1643-1652 (date source).

Corps of Engineers, 1963, Comprehensive survey of San Francisco Bay and tributaries, California - Appendix "E": U.S. Army Engineer District, San Francisco Corps of Engineers, San Francisco, California, Plates 17, 43 (location source).

22 BROADWAY TUNNEL, SAN FRANCISCO CO.

>27,000 (Lamont-227) from a limb of Juniperus californica from clayey to silty sand underlying dune sand in the excavation of the Broadway Tunnel; 105 ft below the surface.

Broecker, W.S., Kulp, J.L. and Tucek, C.S., 1956, Lamont natural radiocarbon measurements III: Science, v. 124, no. 3213, p. 158 (date source).

Julius Schlocker, USGS, oral communication, 1971 (location source).

23 SAN FRANCISCO CIVIC CENTER SKELETON, SAN FRANCISCO CO.

4900 ± 250 (USGS W-2463) from organic clay attached to human skeleton recovered from 73 ft below the surface, 46 ft below the 1853 surface, in the excavations for the BART Civic Center station. Overlying material consisted of clayey silt, dune sand, and artificial fill.

Julius Schlocker, USGS, oral and written communications, 1971 (location source).

San Francisco Bay Area Rapid Transit District press release dated July 27, 1970 (date source).

Henn, Winfield, and Schenk, Robert, 1970, An archaeological analysis of skeletal material excavated from the Civic Center Station of BART: unpublished report, Treganza Anthropology Museum, San Francisco State College (location and date source).

SOUTH BAY CORES, SAN MATEO AND ALAMEDA COUNTIES

	Sample no.	Depth below sediment surface	Dated material
24	2420 ± 180	7	2.0 ft	shell
	2300 ± 150	6	5.0 ft	shell
25	5730 ± 220	5	32.0 ft	shell
	7360 ± 320	1	50.0 ft	peat
26	5815 ± 200	3	20.0 ft	peat
27	4658 ± 200	4	19.5 ft	peat
28	6150 ± 275	2	23.0 ft	peat

Story, James A., Wessels, Vincent E., and Wolfe, John A., 1966, Radiocarbon dating of Recent sediments in San Francisco Bay: California Division of Mines and Geology, Mineral Information Service Bull., v. 19, no. 3, p. 47-50.

29 STANFORD VILLAGE ARCHAEOLOGIC SITE, SAN MATEO CO. (UCAS San Mateo-77)

2700 ± 350 (Lamont-187A)
3150 ± 300 (Lamont-187B) from composite charcoal samples 6.6 ft (avg.) below the surface from complex midden site on abandoned levee of San Francisquito Creek.

Broecker, W.S., Kulp, J.L., and Tucek, C.S., 1956, Lamont natural radiocarbon measurements III: Science, v. 124, no. 3213, p. 159 (date source).

Gerow, Bert A., with Force, Roland W., 1968, An analysis of the University Village Complex: Leland Stanford Junior University, 209 p. (location source).

Archaeological site records: University of California Archaeological Survey, Department of Archaeology, U.C. Berkeley (location source).

30 STANFORD MAN "I1", SANTA CLARA CO.

4400 ± 270 (UCLA-1425A)
4350 ± 125 (UCLA-1425B) from human skeleton from alluvial gravels 16.5-17 ft below the surface along present course of San Francisquito Creek.

Rainer Berger, UCLA, written communication to Bert A. Gerow, Stanford, 1970.

31 STANFORD LINEAR ACCELERATOR, SAN MATEO CO.

5480 ± 300 (USGS W-1579) from wood fragments from organic material overlain by 22-24 ft of alluvium from borehole near west end of Stanford Linear Accelerator along San Francisquito Creek.

Ives, Patricia C., Levin, Betsy, Oman, Charles L., and Rubin, Meyer, 1967, U.S. Geological Survey radiocarbon dates IX: Radiocarbon, v. 9, p. 515.

32 LEXINGTON DAM, SANTA CLARA CO.

>39,900 (Isotopes-5745) from wood fragments near surface from Santa Clara Formation exposure at Lexington Dam.

Thomas H. Rogers, California Division of Mines and Geology, written communications, 1971.

33 GLEN COVE ARCHAEOLOGIC SITE, SOLANO CO. (UCAS Solano-236)

1080 ± 200 (Michigan-886) from carbonized wood from Glen Cove site; 78 in. below the surface.

Crane, H.R., and Griffin, James B., 1960, University of Michigan radiocarbon dates V: Radiocarbon, v. 2, p. 43 (date source).

Archaeological site records: University of California Archaeological Survey, Department of Archaeology, U.C. Berkeley (location source).

34 FERNANDEZ ARCHAEOLOGIC SITE, CONTRA COSTA CO. (UCAS Contra Costa-259)

2180 ± 250 (UCLA-297) from charcoal from a depth of 76 in. below the surface in the Fernandez site.

Fergusson, G.J., and Libby, W.F., 1964, UCLA radiocarbon dates III: Radiocarbon, v. 6, p. 328 (date source).

Archaeological site records: University of California Archaeological Survey, Department of Archaeology, U.C. Berkeley (location source).

35 WEST BERKELEY ARCHAEOLOGIC SITE, ALAMEDA CO. (UCAS Alameda-307)

Note: Three different values have been published on the same set of charcoal samples from six levels in the West Berkeley site and are as follows:

(Crane, 1958)	(Radiocarbon Index, 1967)	(Gerow, 1968)	Level
2200 ± 400 M-121	2450 ± 300 M-121	2445 ± 250	96-108 in.
2700 ± 300	2700 ± 300 mistake		
3210 ± 300	3210 ± 300 M-122	3205 ± 300	132-144 in.
2880 ± 300 M-123	2800 ± 300 M-123	2875 ± 300	144-156 in.
3500 ± 300 M-124	3600 ± 350 M-124	3595 ± 250	156-168 in. (west)
3700 ± 350	3700 ± 350 mistake		
3860 ± 450 M-125	3860 ± 450 M-125	3855 ± 450	156-168 in. (east)
3140 ± 300 M-126	3140 ± 300 M-126	3135 ± 300	180-192 in.
2700 ± 400 M-127	2700 ± 400 M-127A unreliable		192-204 in.
3700 ± 300	3700 ± 300 M-127B	3195 ± 250	

Crane, H.R., 1958, University of Michigan radiocarbon date I: Science, v. 124, no. 3224, p. 669 (date source).

Deevey, Edward S., Flint, Richard Foster, and Rouse, Irving, eds., 1967, University of Michigan radiocarbon measurements: comprehensive index, 1950-1965: Am. Jour. of Sci., p. 88 (date source).

Gerow, Bert A., with Force, Roland W., 1968, An analysis of the University Village Complex: Leland Stanford Junior University, p. 174 (date source).

Archaeological site records: University of California Archaeological Survey, Department of Archaeology, U.C. Berkeley (locality source).

36 ALAMO ARCHAEOLOGIC SITE, CONTRA COSTA CO. (UCAS Contra Costa-308)

4450 ± 400 (UCLA-259) from charcoal from soil matrix of burial, 16.5 ft below the surface at Alamo site, San Ramon Valley.

Fergusson, G.J., and Libby, W.F., 1964, UCLA radiocarbon dates III: Radiocarbon, v. 6, p. 329 (date source).

Archaeological site records: University of California Archaeological Survey, Department of Archaeology, U.C. Berkeley (location source).

Note: Published latitude and longitude for this site are in error.

37 EMERYVILLE ARCHAEOLOGIC SITE, ALAMEDA CO. (UCAS Alameda-309)

2310 ± 220 (La Jolla-199) from charcoal from a depth of 2.44 to 2.67 m below the surface (not original) of the Emeryville site.

Hubbs, Carl L., Bien, George S., and Suess, Hans E., 1962, La Jolla natural radiocarbon measurements II: Radiocarbon, v. 4, p. 208 (date source).

Archaeological site records: University of California Archaeological Survey, Department of Archaeology, U.C. Berkeley (location source).

38 COYOTE ARCHAEOLOGIC SITE, ALAMEDA CO. (UCAS Alameda-13)

1685 ± 85 (Geochron GXI049) from a section of burned limb from a hearth at a depth of 55 ft below the surface in the Ala-13 site at Coyote Hills.

Rackerby, Frank, 1967, The archaeological salvage of two San Francisco Bay shellmounds: Department of Anthropology, San Francisco State College, Occasional Papers in Anthropology No. 3, p. 49.

Archaeological site records: University of California Archaeological Survey, Department of Archaeology, U.C. Berkeley (location source).

39 PATTERSON ARCHAEOLOGIC SITE, ALAMEDA CO. (UCAS Alameda-328)

2588 ± 200 (Chicago-690)
2090 ± 220
2339 ± 150 Av. from charcoal near the base of culture deposits at a depth of 11 ft below the surface in Patterson site (Coyote Hills site).

Libby, W.F., 1954, Chicago radiocarbon dates IV: Science, v. 119, no. 3083, p. 138 (date source).

Archaeological site records: University of California Archaeological Survey, Department of Archaeology, U.C. Berkeley (location source).

40 SAN JOSE CORE, SANTA CLARA CO.

14,350 ± 400 (USGS W-1145) from piece of redwood recovered from depth of 73 ft below the surface in core.

Meade, Robert H., 1967, Petrology of sediments underlying areas of land subsidence in central California: U.S. Geol. Survey Prof. Paper 497-C, 89 p.

41 ROEDER ARCHAEOLOGIC SITE, SACRAMENTO CO. (UCAS Sacramento-29)

1750 ± 500 from charred wood and basketry from 111 in. below the surface in Burial 123 of the Roeder site.

Crane, H.R. and Griffin, James B., 1959, University of Michigan radiocarbon dates IV: Radiocarbon, v. 1, p. 190 (date source).

Archaeological site records: University of California Archaeological Survey, Department of Archaeology, U.C. Berkeley (location source).

42 HOLLISTER ARCHAEOLOGIC SITE, SACRAMENTO CO. (UCAS Sacramento-21)

510 ± 150 (Michigan-866) from charred wood, basketry, and string from a depth of 54 in. below the surface in Burial 33 of the Hollister site.

Crane, H.R., and Griggin, James B., 1960, University of Michigan radiocarbon dates V: Radiocarbon, v. 2, p. 42-43 (date source).

250 ± 150 (Michigan-885) from charred wood and textile from composite sample from 37 and 42 in. below the surface in Burials 24 and 28 (mixed), respectively, of the Hollister site.

Crane, H.R. and Griffin, James B., 1962, University of Michigan radiocarbon dates VII: Radiocarbon, v. 4, p. 198-199 (date source).

Archaeological site records: University of California Archaeological Survey, Department of Archaeology, U.C. Berkeley (location source).

43 JOHNSON ARCHAEOLOGIC SITE, SACRAMENTO CO. (UCAS Sacramento-6)

2360 ± 400 (Chicago-691)
2460 ± 165
2410 ± 200 Av. from charcoal from depth of 36 to 48 in. below the surface of the Johnson site.

Libby, W.F., 1954, Chicago radiocarbon dates IV: Science, v. 119, no. 3083, p. 138 (date source).

620 ± 200 (Michigan-648) from charcoal from basketry and wood from Burial 67 in the Johnson site.

Crane, H.R. and Griffin, James B., 1958, University of Michigan radiocarbon dates III: Science, v. 128, no. 3332, p. 1122 (date source).

Archaeological site records: University of California Archaeological Survey, Department of Archaeology, U.C. Berkeley (locations source).

44 BLOSSOM ARCHAEOLOGIC SITE, SAN JOAQUIN CO. (UCAS San Joaquin-68)

4052 ± 160 (Chicago-440 and Chicago-522 [combined])

Arnold, J.R., and Libby, W.F., 1951, Radiocarbon dates: Science, v. 113, no. 2937, p. 116 (date source).

4100 ± 250 (Michigan-645) from composite charcoal sample from Blossom site.

4350 ± 250 (Michigan-647) from calcined bone in cremation pit 3, at a depth of 50 in. below the surface in the Blossom site.

Crane, H.R., and Griffin, James B., 1958, University of Michigan radiocarbon dates III: Science, v. 128, no. 3332, p. 1121-1122 (date source).

3080 ± 300 (Michigan-646) from calcined bone in cremation pit at approximately 86 in. below the surface in the Blossom site.

Crane, H.R., and Griffin, James B., 1959, University of Michigan radiocarbon dates IV: Radiocarbon, v. 1, p. 189 (date source).

Archaeological site records: University of California Archaeological Survey, Department of Archaeology, U.C. Berkeley (location source).

45 SHERMAN ISLAND SERIES, SACRAMENTO CO.

6600 ± 250 (USGS W-794)
10,690 ± 300 (USGS W-744) from organic silt and peat from core in the Sacramento-San Joaquin delta; W-794 from 32.5 to 33.0 ft. below the surface and W-744 from 57.5 to 58.0 ft below the surface.

Rubin, Meyer, and Alexander, Corrinne, 1960, U.S. Geological Survey radiocarbon dates V: Radiocarbon, v. 2, p. 156.

46 HOTCHKISS ARCHAEOLOGIC SITE SERIES, CONTRA COSTA CO. (UCAS Contra Costa-138)

1229 ± 200 (Chicago-689) from charcoal from Burial 18 in the Hotchkiss site.

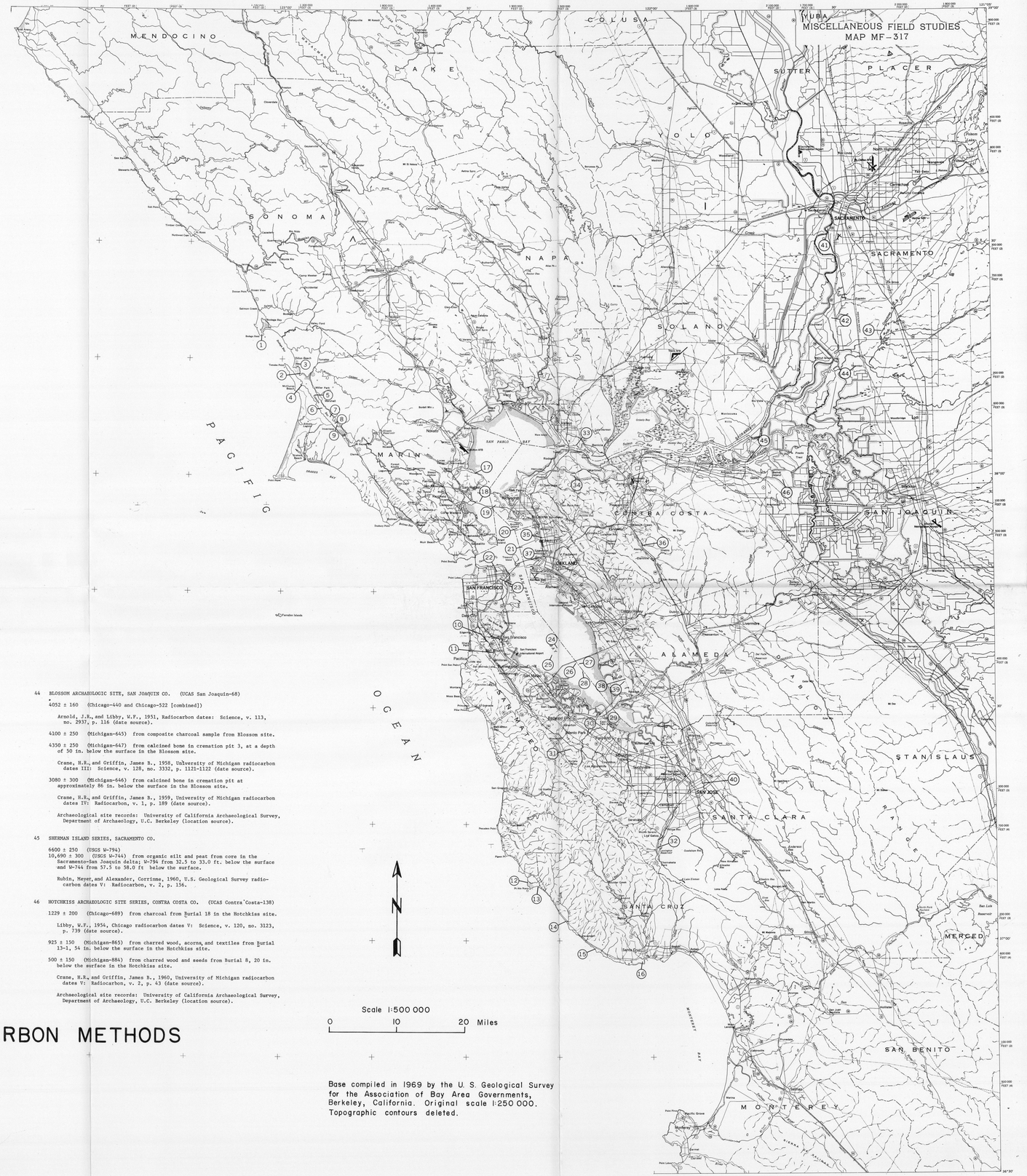
Libby, W.F., 1954, Chicago radiocarbon dates V: Science, v. 120, no. 3123, p. 739 (date source).

925 ± 150 (Michigan-865) from charred wood, acorns, and textiles from Burial 13-1, 54 in. below the surface in the Hotchkiss site.

500 ± 150 (Michigan-884) from charred wood and seeds from Burial 8, 20 in. below the surface in the Hotchkiss site.

Crane, H.R., and Griffin, James B., 1960, University of Michigan radiocarbon dates V: Radiocarbon, v. 2, p. 43 (date source).

Archaeological site records: University of California Archaeological Survey, Department of Archaeology, U.C. Berkeley (location source).



MAP SHOWING LOCATIONS OF SAMPLES DATED BY RADIOCARBON METHODS IN THE SAN FRANCISCO BAY REGION

Compiled by

Robert H. Wright

1971

MISCELLANEOUS FIELD STUDIES
MAP MF-317

Base compiled in 1969 by the U. S. Geological Survey for the Association of Bay Area Governments, Berkeley, California. Original scale 1:250 000. Topographic contours deleted.