TREE-RING
BULLETIN

VOL. 20 JANUARY/APRIL, 1954 NO. 3/4

A Quarterly

TREE-RING DATING IN THE AMERICAN ARCTIC

By J. L. GIDDINGS, JR.

DENDROCLIMATIC CHANGES IN SEMIARID REGIONS

By EDMUND SCHULMAN

INDEX TO AUTHORS, Vols. 1-20
INDEX TO PLACE NAMES, Vols. 1-20

PUBLISHED BY THE TREE-RING SOCIETY
with the cooperation of
THE LABORATORY OF TREE-RING RESEARCH
UNIVERSITY OF ARIZONA

Annual Subscription, $2.00

AN ACKNOWLEDGMENT

With this issue the principal phases of a program, begun in 1939, to develop and publish climatic-archaeologic ring chronologies of quantitative significance may, perhaps, be considered to be completed for the Colorado River basin. This is an opportunity, then, to acknowledge here, in addition to the support given by the editorial board, the very substantial behind-the-scenes aid which the *Tree-Ring Bulletin* has received during this interval.

My greatest debt is to Alsie French Schulman, the editor's unofficial consultant during the entire period. The highly responsible and able secretarial and technical assistance over a number of years by Gladys Phillips and C. Wesley Ferguson, Jr., is gratefully acknowledged. The *Bulletin* was fortunate, also, is having had the interested cooperation of Lillian Barry and W. R. Voris of the former Acme Printing Company and in recent years of Jess W. Toland of the Pima Printing Company.

—E. S.

TREE-RING DATING IN THE AMERICAN ARCTIC

J. L. GIDDINGS, JR.

The coniferous forests of the world tend to disappear with regularity toward two very different boundaries that are, nevertheless, determined by aspects of climate. These timberlines are the dry one beyond which moisture does not sufficiently nourish the tree and the cold one that does not give the tree enough time to grow. Too little work has been done at the high mountain timberlines of southerly latitudes to allow us to say much about the possibilities there, but in the arctic regions, where the upper line of tree growth sprawls out laterally to sea level and forms the "tree line," tree-ring dating has a rich potential field of research and application. As regards this latter, we can say now with great assurance that dendrochronology can be useful all around the northern rim of the continents. This is because of the detailed studies of Scandinavian botanists and foresters, which show that the northernmost forest in their area is limited by the temperature of the growing season, and by the climatic aspects of tree-ring work in Alaska and northern Canada, which show precisely the same thing. Thus far, the Europeans seem to restrict their studies of growth rings very largely to botanic and climatic matters. This author lacks knowledge as to whether or not tree-ring research has been applied in any way to the forests of Siberia.

The aims of arctic dendrochronology are only in a very small part identical with those of other investigations of tree growth. For this reason we shall summarize the uses to which tree-ring collections have been put in the American Arctic, and point up some of the positive results and difficulties met with during two decades of this areal research.

Climatic meaning. The rings of spruce trees in northern Alaska and along the lower Mackenzie River have been shown to reflect the temperature of the period of most intensive growth of the trees. This period is somewhat earlier along the sheltered rivers south of the Brooks Range than near the shore of the Arctic Sea in Canada. Thus a correlation of spruce growth in northern Alaska is strongest with mean June-July temperatures, while the July mean corresponds most nearly to tree growth at the Mackenzie River delta, as is the case with conifers at the limit of tree growth in Scandinavia. Although northern spruce trees continue to grow during the late summer, their sealing cells seem to record no appreciable further effect of climate.

The student who expects all trees near the tree line to record temperature accurately is sure to be disappointed, however. As is the case elsewhere, careful selection of the samples to be used is the first essential of dendrochronology. Circuit uniformity must be present (not to be confused with the fact that most arctic trees exhibit a cross section which is "off center") or there can be no crossdating even in the trees of one stand. Trees growing in peaty muskeg are often impossible of use because of a variety of ring distortions, including even spiralling of ring thicknesses

as seen in cross section. This phenomenon is not an aspect of the spiralling of "grain" which is always present in the best wood for crossdating. Needless to say, one could traverse Alaska negatively selecting trees that through distortions or strong local effects gave no climatic indications at all. On the other hand, it seems certain that if the averaged ring widths of groups of trees spaced dozens or hundreds of miles apart show a strong identity they are reflecting widely manifested departures in summer temperature.

One of the most fascinating possibilities in the broader climatic record in arctic trees may be just now coming to light. This is seen in the presence of crossdating qualities between spruce trees collected last summer near Churchill, on the western shore of Hudson Bay, and timberline spruce more than two thousand miles away in western Alaska. Surprisingly enough, a stand of trees near Churchill reaching back 350 years seems to bypass the Mackenzie trees for a better correlation with the more westerly trees responding to June-July temperature. We had not expected crossdating between these two areas because of a failure to find even a faint linkage between Alaskan and Scandinavian ring-widths. Yet it seems quite possible that the further study of tree growth about the tree line between Hudson Bay and Alaska will reveal further continuities of a single great climatic zone.

The climatic meaning of certain local belts or blocks of strong crossdating has not yet been solved. The most striking such area is that of the Yukon Flats region of the middle Yukon River, where the sensitive tree-ring record at river bottom differs considerably from the widespread temperature record of the timberline on neighboring mountains. These locally stamped chronologies can be either helpful or discouraging in archaeological or driftwood dating, but they do not alter the fact that the widespread temperature record exists pristine at the nearest extreme timberline. We do not yet know what happens as one approaches forested areas to the south where even the timberlines may result from a combination of factors other than arctic cold. Tree samples recently collected from south of the Alaska Range and from the forest border in southwestern Alaska may cast light on this subject.

Archaeological applications. The discovery of crossdating in the archaeological driftwood from St. Lawrence Island in the late 1930's led to overenthusiasm about the dating of many sites along the treeless shores of the Arctic. The St. Lawrence Island wood provided thousands of samples mainly from recent levels, and two chronologies were extended back to about 1550 A.D. One of these was later lengthened to 978 in wood excavated along the Kobuk. Other hundreds of promising samples of driftwood from earlier levels of the same sites and other sites of Alaska that are now on record but undated will undoubtedly be useful in time, but as yet we have added little to the chronologies first worked out from wood that we know originated either along western Alaska rivers or in the region of the Yukon Flats. More collections should be made along the big Arctic rivers. When that is done and chronological patterns are established for each river, then even more ancient driftwood villages can be dated. On hand just now for complete analysis are collections of wood from the Birnirk and other excavations at Point Barrow, from islands near the Colville River mouth, from points along the eastern shores of Bering Sea, and a

few other localities all visited by achaeologists other than the author.* Also to be completely studied are the collections of wood from excavations by the author in the Norton Bay region of Bering Sea. Cooperative effort in collection offers promise of eventual success in extending chronologies in driftwood of unknown origin, even though results are painfully slow to accumulate.

The archaeological use of river drift from a short river is an entirely different matter. We have been most successful in dating the sites of the Kobuk River, and now have a chronology nearly 1,000 years long (and quite parallel in its latest years with available records of June-July temperature) that can be used in the field and without much difficulty of interpretation. If the need should arise, local stands of timber would offer the means of dating almost any wooden structure built recently of local wood within the broader belt of known crossdating in the Arctic. Archaeological sites, unfortunately, seldom fall within this range of dating.

The dating of sea currents. Our ability to trace many selected logs of driftwood or objects made of driftwood back to their general source of origin along the Yukon and Mackenzie rivers offers many possibilities of following paths of driftwood that scatters itself all along the shores of the Chukchi Sea and the Bering Sea, and, to a limited extent, eastward around the shores of the Arctic Sea. Some conclusions as to sea currents have been published, including evidence of a northward current through Bering Strait and a meeting of this current with a west-flowing one near Point Barrow. Many lines of research can be seen in this direction. The broadest applicability of sea current dating would be realized, of course, only if the tree-ring sequences of all the major rivers flowing into the Arctic Sea were known.

Several other lines of research in tree-rings about the arctic tree line have been suggested or partly explored. One of these concerns crossdating in buried wood of the silt deposits in the regions of permafrost preservation. The first extensive sequence of prehistoric arctic crossdating was worked out in wood from such a deposit near Fairbanks, and the geological application of the results of this work seem promising.

One may well ask why so much of the dendrochronological work begun or suggested for the far north since the middle 1930's is still unfinished. The answer is partly that tree-ring dating in this region has applications that need never be concluded, but we must realize as well that this work is very demanding in energy and meticulousness. The researcher has to explore and collect in many almost inaccessible places, and then to sit endless hours measuring, plotting, and cross-comparing. As a primary discipline, arctic dendrochonology will progress as students learn the fascination of its precision as a research tool, but it cannot be expected to serve at all if it is not given long hours and proper care.

University of Pennsylvania
Philadelphia

*A very interesting and important collection has just come in (September, 1954) from Banks Island, a most inaccessible part of the Canadian archipelago, east of the mouth of the Mackenzie River.

DENDROCLIMATIC CHANGES IN SEMIARID REGIONS

EDMUND SCHULMAN

RECORDS IN LIVING TREES

How faithful are selected tree-rings as annual indices of rainfall? What is the geographical distribution and the length of those indices which are reliable? What may be deduced from those indices about climatic changes? The last of these three questions is the primary concern of this brief evaluation of the present status of arid-zone dendroclimatology.

For the western United States and adjacent areas, fairly complete answers to the first two questions are now possible. In all major drainage basins, trees on semiarid sites have been found which exceed 500 years in age and provide annual indices showing correlation coefficients with twelve-month rainfall of +0.70 to +0.85 or more; a few localities furnish ring sequences of 1,500 years or more in length. During the last 15 years, about one-third of a million rings from these trees have been reduced to growth series; the results illuminate and extend the vast amount of pioneer analysis of earlier decades on less sensitive trees and species such as *Sequoia gigantea.*

Certainly, the dendroclimatic data now available provide much valuable information on the details of climatic fluctuations in some areas during the past millenium. It has been known for 25 years, for example, that a great drought occurred in the Southwest in the late 1200's. Recently derived chronologies for the Colorado River basin now suggest that this was merely the final phase of a long drought, of sometimes phenomenal intensity, from A.D. 1215 to 1299, which was followed for about a century by phenomenally wet years and intervals. But it is not enough to make tentative estimates of the probable order of magnitude of such departures. It would, obviously, represent a major advance in our understanding of and practical allowances for climatic changes to place these and numerous other dendroclimatic fluctuations on a secure quantitative basis. Why has this not yet been satisfactorily done?

It is the opinion of the writer, after twenty years of intensive field and laboratory work on drought conifers, that only now have we the prospect of accumulating enough tree-ring series of sufficiently great fidelity and length to fully justify quantitative estimates of climatic changes from the growth rings of trees. It is noted once again in this journal, but only in passing, that certain exacting requirements must be fulfilled in order to yield a *significant* solution of the sometimes subtle problems of dendroclimatology, requirements which are shared with many another research area of apparently easy access. The long delay in attaining truly quantitative chronologies is directly related, however, to two simple statistical requirements in the derived regional series.

The crux of the matter is the *relative* rather than the *absolute* nature of the thickness of the annual ring in terms of rainfall. This thickness depends on the age of the tree, the location of the measured radius in the stem, the species, environment, and many other factors, not the least of which is the magnitude of the "random" term in radial growth.

Since it is necessary to work only with annual departures from the tree's individual and systematically changing mean growth rate, so-called trend or age curves need to be fitted to each series of measured ring-widths in the process of reduction to growth indices. It has long been recognized that even series several hundred years long cannot provide an absolute trend line, for any pronounced departure for some decades preceding or following the series could substantially modify the position of the fitted age curve. Thus, only minor refinements in fitting approximate trend lines to the series from drought conifers have been introduced in recent years. Obviously, such computations as the cumulative departure for given intervals in indices derived in this way can have only a very restricted meaning.

Another defect of almost all published tree-ring series is lack of homogeneity, which is an inevitable deficiency in an average growth curve based on trees of different ages; the use of individually standardized tree series at best corrects this deficiency only in part. Of the various conditions which lead to heterogeneity one may specially note the following: in most collections of tree samples, the use of only the longest series in any locality may result in too weak a statistical base; injuries or other effects during the life of an old tree often make part of its ring record unusable; in different localities which provide ring data for a regional mean, different maximum ages are found. Errors both in individual trend lines and in the averaging-out of random fluctuations are hidden in the resultant mean indices.

The finding during the past two years of forest stands of rainfall-sensitive pine trees in the phenomenal age class of 1500-1700 years (*Science* 119:396, 1954) now appears to justify analysis of tree-ring data in the western United States to a degree of precision not previously useful. Trend lines fitted by objective, precise techniques to a homogeneous and widely based 1500-year mean growth curve should permit a fairly secure placement of precisely fitted trends to an entire family of shorter, individually homogeneous curves in the same general climatic region. A limited application of this procedure to the Colorado River basin was responsible, among other results, for the recognition of the two-century fluctuation already noted.

Thus, it would appear that statistically homogeneous rainfall indices 1500 years or more in length may now be derived from trees in the upper Snake River basin and in central California; the Colorado River basin and the upper Missouri River basin may soon be added to this list. It should be noted that even in these long series neither width nor sensitivity of tree-rings can reveal any steady underlying change in climate over the entire period, if the total change is small. Nevertheless, it appears possible now to construct tree-ring indices for the listed regions from which significant rainfall parameters may be derived for at least the past millenium.

CLIMATIC-ARCHAEOLOGIC CHRONOLOGIES IN THE COLORADO RIVER BASIN

It seems appropriate in this final number of volume 20 of the BULLETIN to take an over-all look at the quantitative chronologies which have thus far been reported in beams from Indian ruins of the Southwest.

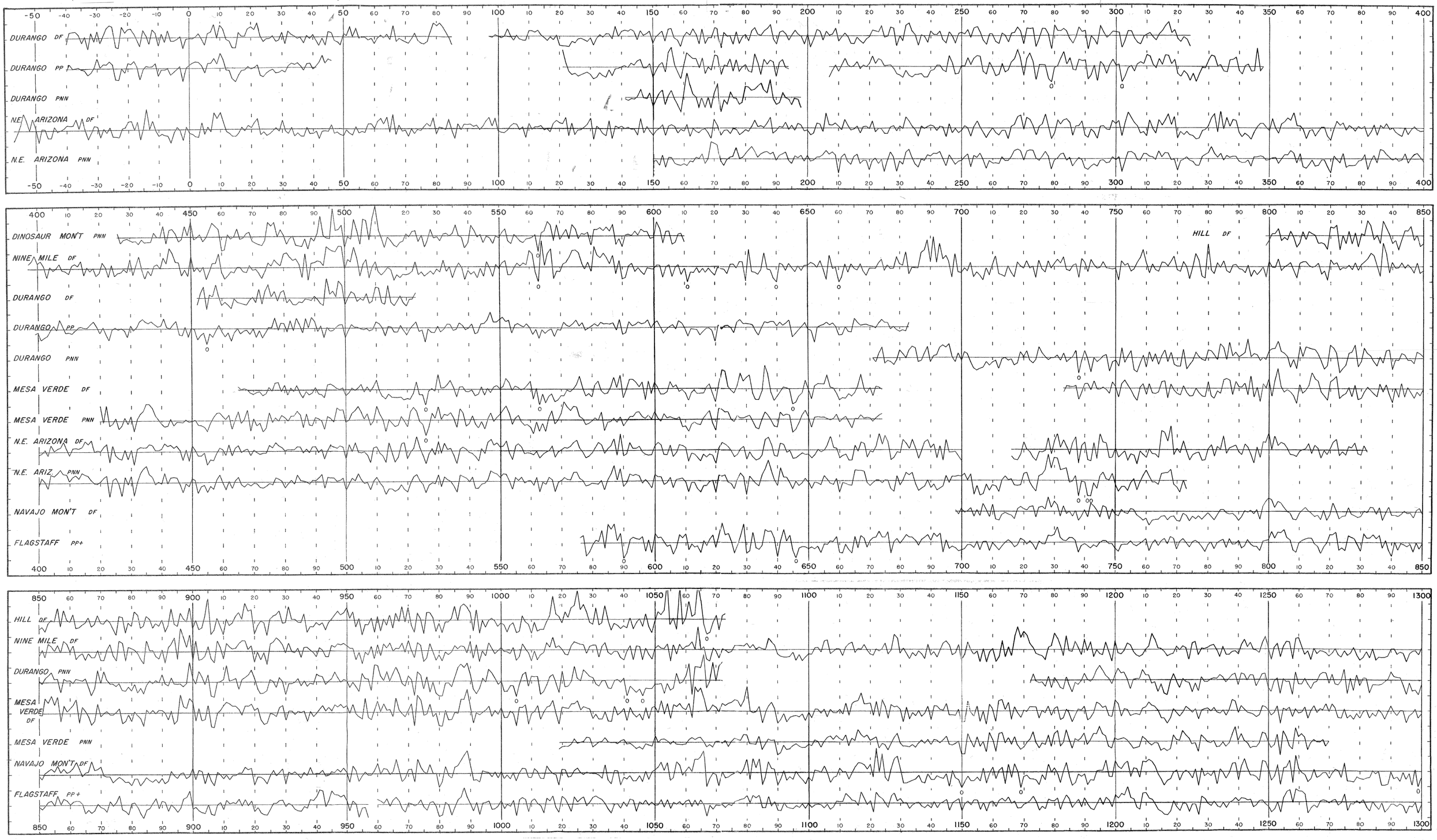
In the Colorado River basin, extensive, measured chronologies have now been derived for three main Pueblo areas: the Northern Periphery (Nine Mile Canyon, Hill Canyon, and Dinosaur National Monument), the San Juan basin (Durango, Mesa Verde, Northeast Arizona, and Navajo National Monument), and Flagstaff. A series of papers beginning in volume 12 of this BULLETIN contains the details of construction of each of the local master chronologies in these areas.

In similar form are the archaeological chronology for the Rio Grande, which is based largely on ponderosa pine, and a living-tree index for the same basin derived principally from Douglas-fir. Other related areas for which centuries-long indices of growth are available are Bryce Canyon, Grand Canyon North Rim, and Big Bend National Park.

The principal sub-region of the Colorado River basin for which no important archaeological extension of the living-tree chronologies is yet available is the Gila River basin of central and southern Arizona and New Mexico; however, the possible efficiency for dating beams from this and other such sub-regions by means of established master chronologies from nearby areas is surprisingly high, as shown by a skeleton-plot map based on living trees (*TRB* 8:28).

Unfortunately, an optimistic forecast may no longer be made for adjacent areas in northern Mexico. The results of an analysis of living trees in the state of Durango and especially a recent and as yet unpublished analysis of living-tree chronologies and nearby archaeological beams in Chihuahua suggest that direct tree-ring dating of ruins in those areas will be definitively done only in very few localities, if at all. It appears that localities favorable for tree-ring dating are rare, because the most suitable species, Douglas-fir, is of very limited distribution, and because low-latitude characteristics such as marked local variations in chronology, incidence of false and erratic growth, and tendency to short length of sequence are all very pronounced.

The far more objective nature of the evidence for reliability of the dates of ancient beams and the more significant information about past climate which measured and properly reduced tree-ring sequences may provide was perhaps recognized by most early workers in dendro-archaeology, but the labor required to put tree-ring dates on such a secure foundation can be very great when properly done, and time often seemed to permit only the use of reconnaissance methods, such as the unsupported skeleton-plot techniques, for the rapid analysis of the early flood of excavated wood. However, most of the beams of critical importance in Southwestern archaeology have since been analyzed in more quantitative form.



MASTER GROWTH INDICES FOR ARCHAEOLOGICAL AREAS OF THE COLORADO RIVER BASIN

Edmund Schulman, *Tree-Ring Bulletin*, 20(3/4), 1954

This chart is published at the standard horizontal scale of 2 mm per year to permit its direct use in beam-dating work. For the major areas, data from A.D. 1300 to 1900+ may be found in the references below.

The horizontal line on each curve is that of zero departure; in all curves an index departure of 100% is represented by one division at the left or right margin. Zeros below the curves indicate assumed locally absent rings in all component specimens. Plots of measured ring-widths of component specimens in each index and, in most cases, tables of mean growth departures, are published as follows in this BULLETIN:

Dinosaur	PNN	15(3), 1950.	
Durango	DF	15(4), 1949; 16(2), 1949; 18(4), 1952.	
Durango	PNN	16(2), 1949.	
Durango	PP	15(4), 1949; 16(2), 1949; 18(4), 1952.	
Flagstaff	PP+	14(2), 1947.	
Hill	DF	15(1/2), 1948.	
Mesa Verde	DF	12(3), 1946; 14(1), 1947.	
Mesa Verde	PNN	12(3), 1946.	
Navajo	DF	14(3), 1948.	
N. E. Arizona	DF	15(4), 1949; 18(4), 1952.	
N. E. Arizona	PNN	15(4), 1949.	
Nine Mile	DF	15(1/2), 1948; 16(2), 1949; 17(4), 1951.	

(Note: The curve here published includes a revision of the 1948 table for the interval A.D. 825-1200 on the basis of later collections.)

See also:
Bryce Canyon area, Utah . . . TRB 17(1/2), 1950.
Colorado basin, supplementary . . . TRB 20:30, 1954 (list of references).
Rio Grande basin, DF . . . TRB 19(3/4), 1953.
Rio Grande basin, PP+ . . . *Univ. Arizona Bull.* 24(3), 1953.

DF Douglas-fir, *Pseudotsuga taxifolia*
PNN Pinyon pine, *Pinus edulis*
PP Ponderosa pine, *Pinus ponderosa*

A general summary of the various climatic-archaeological chronologies in the Colorado River basin published in this journal are presented herewith in a master figure.* Of the local measured chronologies which are compared in this figure, four major ones—Mesa Verde Douglas-fir, Nine Mile Douglas-fir, Navajo Monument Douglas-fir, and Flagstaff ponderosa pine—were all derived as essentially independent composites with the dating anchored in local living trees. In another, the Mesa Verde pinyon pine, living-tree records measured but not plotted here strongly overlap the archaeological data from 1090 to 1270, so that this chronology also may be considered essentially independent. The general consistency in chronology from area to area and species to species, evident in the figure, thus takes on added significance.

This diagram includes some 32,000 measured rings, which document the interval preceding A.D. 1300. Data for later centuries in the four major chronologies just noted may be found in the detailed earlier surveys in this BULLETIN.

Not included in the figure are some miscellaneous growth curves for the localities within the Colorado River basin, principally representing single specimens, published in this BULLETIN as follows (species, A.D. interval, volume, and page):

Hill Canyon	DF	927-1042	17:30
S.E. Utah	DF	450- 674	16:21
S.E. Utah	PNN	1140-1250	16:21
Durango	DF	124- 196	17:30
Mesa Verde	DF	675- 700	Ms
Mesa Verde	DF	821- 896	13:31
Mesa Verde	PNN	463- 625	16:22
Mesa Verde	PNN	547- 665	16:23
Mesa Verde	PNN	710- 769	16:23
Mesa Verde	PNN	923-1076	16:23
Mesa Verde	PNN	1016-1074	17:30
Mesa Verde	PNN	1142-1213	13:31
Flagstaff	PP	1047-1132	16:21
Flagstaff	CBS	1072-1255	16:21
Forestdale	PP; PNN	967-1115	16:23
Point of Pines	PP	1155-1293	15:20

Dated archaeological beams of the Southwest necessarily represent, on the whole, the more sensitive types of chronology, and thus the climatic interpretation of the ring records in living trees applies to some extent to the archaeological chronologies also. However, the two limitations already noted in the discussion of records in living trees are specially severe in these chronologies.

First, the number of available specimens differs greatly from area to area and, in general, from decade to decade. Thus the various sequences in the figure have differing and changing weights. This defect is somewhat alleviated by the high fidelity of individual series and the tendency for the means of even two or three trees to represent well the details of short-term fluctuations.

Second, the average number of rings in the archaeological beams is relatively small, usually less than 100. Thus, the trend lines fitted to each specimen curve lead to standardized values in which long-term departures in growth, of the order of 50 years or more, are very largely eliminated. The archaeological series thus are indices of short-term variations only.

*Publication of this chart on a standard horizontal scale of 2 mm per year is made possible by a grant-in-aid from the A. E. Douglass Research Fund.

INDEX TO AUTHORS, VOLUMES 1-20, 1934-1954

20(2)	Antevs, E.	Tree-Rings and Seasons in Past Geologic Eras
1(4)	Baldwin, G. C.	Dates from Kinishba Pueblo
2(2)	————	Ring Record of the Great Drought (1276-1299) in Eastern Arizona
5(3)	————	Dates from King's Ruin
6(2)	————	see Schulman and ————
17(3)	Bannister, B.	Tree-Ring Dates for the Gallina Area, New Mexico
19(2)	Black, D. M.	see Ferguson and ————
5(3)	Brady, L. F.	An Effect of Starvation on Pine Trees
16(3)	Burgh, R. F.	A Fremont Basket Maker House in Dinosaur National Monument
15(3)	Campbell, T. N.	The Pioneer Tree-Ring Work of Jacob Kuechler
5(4)	Colton, H. S.	The Date of Three Turkey House
2(2)	Davis, H. F.	The Photography of a Charcoal Specimen, FA-21
1(1)	Douglass, A. E.	Editorial
1(2)	————	Accuracy in Dating—I
1(3)	————	Accuracy in Dating—II: the Presentation of Evidence
1(4)	————	Estimated Ring Chronology—I: 1800-1934, II: 1650-1800
2(1)	————	Estimated Ring Chronology—III: 1500-1650
2(2)	————	Estimated Ring Chronology—IV: 1350-1500, V: 1200-1350, VI: 1050-1200, VII: 900-1050
2(3)	————	Estimated Ring Chronology—VIII: 750-900
2(4)	————	The Central Pueblo Chronology
3(2)	————	Estimated Ring Chronology—IX: 600-750
3(3)	————	Typical Ring Record from Chaco Canyon, 700-850 A.D., CK-331
4(1)	————	Tree-Ring Work, 1937
4(3)	————	Estimated Ring Chronology—X: 450-600
5(1)	————	Estimated Ring Chronology—XI: 300-450
5(2)	————	Southwestern Dated Ruins—V
5(3)	————	Estimated Ring Chronology—XII: 150-300
6(1)	————	Notes on Beam Dating by Sap-Heart Contact
6(2)	————	Typical Site of Trees Producing the Best Crossdating
6(3)	————	Compression Wood and the Recent Chronology in Mesa Verde Firs
6(3)	————	Examples of Spiral Compression Wood
6(4)	————	Editorial: A Bibliography
6(4)	————	Estimated Ring Chronology 150-1934 A.D.
7(1)	————	Notes on the Technique of Tree-Ring Analysis—I
7(4)	————	Notes on the Technique of Tree-Ring Analysis—II
8(1)	————	Age of Forestdale Ruin Excavated in 1939
8(2)	————	Notes on the Technique of Tree-Ring Analysis—III
9(2)	————	Checking the Date of Bluff Ruin, Forestdale: A Study in Technique
9(3)	————	Advances in Dendrochronology, 1943
10(1)	————	Notes on the Technique of Tree-Ring Analysis—IV: Practical Instruments
10(2)	————	Notes on the Technique of Tree-Ring Analysis—V: Practical Instruments
11(2)	————	Tabulation of Dates for Bluff Ruin, Forestdale, Arizona
11(4)	————	Survey of Sequoia Studies
12(2)	————	Survey of Sequoia Studies—II
13(1)	————	Sequoia Survey—III: Miscellaneous Notes
14(2)	————	Photographic Tree-Ring Chronologies and the Flagstaff Sequence
15(4)	————	Note on the Early Durango Collections
16(1)	————	A Superior Sequoia Ring Record. [Ring photographs also in 16(3), 16(4), 17(3), and 17(4)].
5(1)	Eisendrath, D. B. Jr.	On Photographing the Rings of Oak Specimens
16(2)	Ferguson, C. W. Jr.	Additional Dates for Nine Mile Canyon, Northeastern Utah
17(3)	————	Early Height Growth in Douglas-fir
19(2)	———— and D. M. Black	Tree-Ring Chronologies on the North Rim of the Grand Canyon
4(1)	Flora, I. F.	see Haury and ————
6(3)	Fritz, E.	Problems in Dating Rings of California Coast Redwood

1(3)	Getty, H. T.	New Dates from Mesa Verde
1(4)	————	New Dates for Spruce Tree House, Mesa Verde
2(1)	————	Second Annual Tree-Ring Conference
3(1)	————	Third Annual Tree-Ring Conference
4(1)	————	Fourth Annual Tree-Ring Conference
8(1)	————	Sixth Annual Tree-Ring Conference
4(4)	Giddings, J. L. Jr.	Buried Wood from Fairbanks, Alaska
5(2)	————	Recent Tree-Ring Work in Alaska
7(2)	————	The Application of Tree-Ring Dates to Arctic Sites
9(1)	————	Dated Sites on the Kobuk River, Alaska
9(4)	————	Some Climatic Aspects of Tree Growth in Alaska
13(4)	————	Mackenzie River Delta Chronology
14(4)	————	Chronology of the Kobuk-Kotzebue Sites
18(1)	————	The Forest Edge at Norton Bay, Alaska
20(1)	————	Yukon River Spruce Growth
20(3/4)	————	Tree-Ring Dating in the American Arctic
11(1)	Gindel, J.	Aleppo Pine as a Medium for Tree-Ring Analysis
1(1)	Glock, W. S.	Report on the First Tree-Ring Conference
1(2)	————	Necessary Information on Tree-Ring Specimens from Living Trees
3(1)	————	Tree-Rings in Branches
4(4)	————	Tree-Ring Dating: Factors Pertaining to Accuracy
5(4)	Hall, E. T. Jr.	A Method of Obtaining a Plane Surface on Charcoal
12(4)	————	Preserving and Surfacing Rotted Wood and Charcoal
17(4)	————	Southwestern Dated Ruins—VI
2(3)	Hargrave, L. L.	The Field Collector of Beam Material
1(2)	Haury, E. W.	Climate and Human History
2(1)	————	Dates from Gila Pueblo
4(2)	————	Editorial
4(3)	————	Southwestern Dated Ruins—II
7(2)	————	New Tree-Ring Dates from the Forestdale Valley, East Central Arizona
9(2)	————	Some Implications of the Bluff Ruin Dates
4(1)	———— and I. F. Flora	Basketmaker III Dates from the Vicinity of Durango, Colorado
5(1)	Hawley, F.	Dendrochronology in Two Mississippi Drainage Tree-Ring Areas
5(1)	————	Southwestern Dated Ruins—IV
8(3)	Knipe, D. A.	A Date from Chaco Yuma West, Southern Arizona
5(2)	Lassetter, R.	The Value of Tree-Ring Analysis in Engineering
6(1)	————	Fifth Annual Tree-Ring Conference
10(4)	Lutz, H. J.	Swamp-Grown Eastern White Pine and Hemlock in Connecticut as Dendrochronological Material
5(4)	Lyon, C. J.	Objectives and Methods in New England Tree-Ring Studies
7(3)	————	Inter-Correlations between Growth Rates of Conifers in Northern New England
13(1)	————	Hemlock Chronology in New England
20(2)	————	Vertical Uniformity in Three New England Conifers
1(1)	McGregor, J. C.	Dates from Tsegi
2(4)	————	Additional Dates from Tsegi
3(2)	————	Dates from Tsegi and Nalakihu
3(2)	————	The Effect of a Volcanic Cinder Fall on Tree Growth
4(4)	————	Southwestern Dated Ruins—III
8(3)	————	Dates from Wupatki Pueblo
8(3)	————	Dates from Kinnikinnick Pueblo
7(3)	Meyer, H. A.	Growth Fluctuations of Virgin Hemlock from Northern Pennsylvania
1(2)	Miller, C. F. Jr.	Report on Dates on the Allantown, Arizona, Ruins
1(4)	————	Additional Dates from the Allentown, Arizona, Ruins
8(3)	Miller, J. L.	Dates from Fort Grant Pueblo, Southern Arizona
10(4)	Moinat, A. D.	Annual Growth of Pines in the San Juan Basin, Colorado, as Related to Precipitation and Streamflow
2(4)	Morris, E. H.	Archaeological Background of Dates in Early Arizona Chronology
15(4)	————	Basketmaker II Dwellings near Durango, Colorado
18(4)	————	Note on the Durango Dates

16(1)	Oswalt, W.	Dated Houses at Squirrel River, Alaska
16(4)	———	Spruce Borings from the Lower Yukon River, Alaska
18(1)	———	The Origin of Driftwood at Hooper Bay, Alaska
19(1)	———	Spruce Samples from the Cooper River Drainage, Alaska
1(3)	Peterson, A.	Specimens from the Pueblo Area Collected by the First Beam Expedition, 1923
3(3)	———	Further Data on First Beam Expedition Specimens, 1923
6(1)	———	Third Report of Hopi Specimens: Collection of Second Beam Expedition, 1928
7(2)	Scantling, F. H.	Tree-Ring Dates from a Mormon Church
12(4)	———	Photography of Charcoal
2(3)	Schulman, E.	Tree-Rings and Cycle Analysis
3(3)	———	Selection of Trees for Climatic Study
3(4)	———	Some Early Papers on Tree-Rings: J. C. Kapteyn
3(4)	———	Review of Some Recent Papers on Tree-Rings and Climate
4(3)	———	Classification of False Annual Rings in Monterey Pine
6(2)	———	Classification of False Annual Rings in West Texas Pines
6(3)	———	Climatic Chronology in Some Coast Redwoods
6(4)	———	A Bibliography of Tree-Ring Analysis
7(3)	———	Douglas Fir Chronology in Santa Catalina Mountains, Arizona
8(4)	———	Variations between Ring Chronologies in and near the Colorado River Drainage Area
10(3)	———	Dendrochronology in Mexico—I
10(4)	———	Notes on Dendrochronologies at the Arnold Arboretum
11(1)	———	Tree-Ring Work in Scandinavia
11(3)	———	Tree-Rings and Runoff in the South Platte River Basin
12(1)	———	Root Growth-Rings and Chronology
12(1)	———	The Range of Ring Sensitivity
12(3)	———	Dendrochronology at Mesa Verde National Park
13(2/3)	———	Dendrochronologies in Southwestern Canada
14(1)	———	An 800-Year Douglas Fir at Mesa Verde
14(3)	———	Dendrochronology at Navajo National Monument
15(1/2)	———	Dendrochronology in Northeastern Utah
15(3)	———	Chronology Characters at Ruins in the Gila Basin
15(4)	———	Early Chronologies in the San Juan Basin
16(2)	———	An Extension of the Durango Chronology
16(3)	———	A Dated Beam from Dinosaur National Monument
16(3)	———	Miscellaneous Ring Records—I
17(1/2)	———	Dendroclimatic Histories in the Bryce Canyon Area, Utah
17(4)	———	Miscellaneous Ring Records—III
18(2/3)	———	Definitive Dendrochronologies: a Progress Report
18(2/3)	———	Dendrochronology in the Big Bend National Park, Texas
18(4)	———	Extension of the San Juan Chronology to B.C. Times
19(3/4)	———	Rio Grande Chronologies
20(3/4)	———	Dendroclimatic Changes in Semiarid Regions
6(2)	——— and G. C. Baldwin	The Chronology in OL-12, a Dissected Ponderosa
3(3)	Senter, D.	The Application of Tree-Ring Analysis to Deposition Problems in Chaco Canyon, New Mexico
5(1)	Senter, F. H.	see Hawley
13(4)	Smiley, T. L.	Dates from a Surface Pueblo at Mesa Verde
15(3)	———	Tree-Ring Dates from Point of Pines
16(3)	———	Miscellaneous Ring Records—II
3(1)	Stallings, W. S. Jr.	Dates from Gallo Canyon, East-Central New Mexico
3(2)	———	Dates from Five Kiva House, Utah
3(4)	———	Some Early Papers on Tree-Rings: J. Kuechler
4(2)	———	Southwestern Dated Ruins—I
8(1)	———	A Basketmaker II Date from Cave Du Pont, Utah
19(1)	Transtrom, H. L.	A Large Increment Borer
20(1)	Van Stone, J. W.	Notes on Kotzebue Dating
13(4)	Watson, D.	Note on the Dating of Pipe Shrine House
6(3)	Weakly, H. E.	Tree-Rings as a Record of Precipitation in Western Nebraska
4(2)	Willey, G. R.	Notes on Central Georgia Dendrochronology

INDEX TO PLACE-NAMES, VOLUMES 1-20

Volume (issue number only for several individually paged bulletins): page. References to the states of Arizona, Colorado, New Mexico, Utah are omitted.

Abbreviations:

B	Basin	H	House	N	National
C	Canyon	Is	Island	P	Park
Cr	Creek	L	Lake	R	River
F	Forest	M	Monument	Spr	Spring
Ft	Fort	Mt	Mountains(s)		

Abiquiu ....4(2):5
Abo ....4(2):5
Acoma ....4(2):5
Agua Fria ....4(2):4
Ahteut ....9(1):3; 14:28; 20:6
Aklavik 13:27
Alamo ....4(2):4
Alaska ....3:31; 4(4):3; 5:16; 6:22; 7:11; 8:3; 9(1):2; 9:22; 9:26; 11:3; 13:15; 13:26; 14:26; 16:7; 16:26; 18:2; 18:6; 19:5; 20:2; 20:23
Alaska Range 5:16; 9:26; 13:27; 19:5; 20:24
Alberta 13:11; 18:16; 18:18
Albuquerque 3:6; 19:23
Alkali 13:11
Alkali Ridge ....2:36; 4(2):3
Allantown 1:15; 1:31; 2:32; 5:13; 8:14; 15:26
Alma 7:16
Alton 17:15
Ambler Is ....9(1):3; 14:27; 16:8; 20:6
Amoxiumqua ....4(2):5
Anderson Mesa 8:21
Animas RB ....4(1):7; 10:29; 11:24; 12:24; 17:15; 19:21
Antelope Valley 5:11
Antonito 19:23
Anvik 16:28
Archie's Landing 16:7
Arctic 7:10; 9:26; 13:27; 14:28; 16:27; 18:7; 20:23
Arenal 3:6
Argyle Cr 15:2; 16:10
Arkansas 3:31; 8:3; 9:20; 18:27
Arkansas R B 8:30; 11:24; 12:5; 18:10
Arnold Arboretum 10:30
Arrowhead ....4(2):4
Arroyo Hondo ....4(2):4
Arroyo Negro ....4(2):4
Artesia 18:24
Ashuelot 13:2
Atlanta ....4(2):6
Atlantic ....4(2):7; 9:22
Austin 3:27; 15:18
Australia 20:17
Awatovi ....4(3):3; 5:11; 17:27
Aztec 5:13; 6:16; 12:14
Babicora 3:6
Baker Ranch ....2:32; 4(4):6; 5:11
Balcony H 1:22; 1:24; 5:12; 12:20
Banff N P 13:10
Barkerville 13:22
Basin Mt 6:16
Bat Woman Cave 1:6
Bat Woman H ....2:37; 4(4):6
Bear C, Ariz 17:18
Bear C, Utah 15:3
Bear Ruin ....7:15, 8:21; 9(2):8
Beaver 9:28; 20:5
Bennett's Peak 2:33; 5:12
Benton 7:25
Bering Sea 7:10; 16:26; 18:2; 18:6; 20:24
Bering Strait 7:12; 9:23; 9:26
Berkeley 2:37
Betatakin ....4(4):6; 5:11; 14:18
Beth Mahsir 11:6
Beth Oren 11:8
Bettina 15:19
Bidahochi 8:21
Big Bend Mesa 17:28
Big Bend N P 18:12; 18:18; 19:23; 20:28
Big Piney 8:27
Birches 9:29
Birnirk 20:24
Black C 11:24
Black Horse Cr 2:35
Black Mesa 6:11; 6:16; 12:28
Black R ....9(1):7
Blanding 3:13; 8:27
Blue C 18:19
Bluff Ruin ....9(2):2; 9(2):7; 9:18; 11:10
Bone Awl H 12:20
Bonito Lava Flow 3:12
Bonito Terrace ....4(4):6; 5:11
Boot Spr 18:18; 19:24
Boston 10:30; 13:2
Bow Falls 13:12
Bow R 13:12
Bright Angel Point 19:12
British Columbia 13:10; 18:18
Broken Flute Cave ....2:31; 2:34; 4(3):3; 5:11; 9:20; 15:26
Brooks Range 20:23
Brownie Meadow 11:31
Bryce C N P 11:24; 17:2; 19:13; 20:28
Bryce Point 17:2
Butler Wash 16:21
Buzzard H 1:22; 5:12; 12:20
Cabezon 17:27
Calamity Cave ....2:37; 4(4):6
Calaveras Grove 11:26; 12:10; 13:5
California ....3:22; 3:29; 4(1):3; 6:19; 7:3; 9:22; 11:6; 11:26; 12:10; 13:5; 13:15; 16:31; 17:9; 17:23; 17:31; 18:17; 20:10; 20:27
Cambridge 13:2
Camp Lena 13:6
Camp Seven 11:27; 13:8
Camp Six 11:27; 12:11; 13:6
Campana 10:20

Canada .....4(3):4; 5:3; 7:10; 9:26; 13:10; 14:26; 18:5; 18:10; 20:23
Cañones .....4(2):4
Canyon Cr Ruin .....1:15; 4(3):3
Canyon de Chelly ....2:30; 4(3):3; 4(4):6; 5:11; 5:26
Canyon Del Muerto 2:34; 15:26; 18:31
Canyon Largo 17:27
Cape Darby 18:2; 20:5
Cape Royal 19:12
Capulin .....4(2):3
Carlsbad 8:27; 18:24
Carmel .....4(1):5; 4(3):5; 11:8; 20:10
Carrizo Cr 7:15
Carrizo Mt 2:35; 5:18
Casa Grande 2:4
Cascade Mt 19:22
Castle Park 16:19
Cebolla 19:23
Cebolleta .....4(2):5
Cedar City 8:27
Cedarvale 3:6
Cedro .....4(2):4
Chaco .....1:15; 2:8; 2:30; 3:19; 3:20; 4(2):3; 5:6; 5:13; 6:16; 7:16; 8:3; 8:21
Chaco Yuma 8:24
Chakpahu 5:11
Chamisalocita .....4(2):4
Channing Rock 18:18
Chavez 8:22
Chavez Pass 1:13; 5:13; 14:16
Cheesman 11:20
Chetro Ketl 2:8; 2:31; 3:19; 5:6; 5:13; 15:26
Chicago 5:3; 13:7
Chihuahua .....4(3):3; 10:19; 20:28
Chinlee 2:30; 5:12; 6:10; 6:16; 9:20
Chino Cr 5:23
Chino Valley 5:24
Chiricahua Mt 8:3; 8:24; 12:2
Chisos Mt 18:18
Chistochina 19:6
Chitina 19:5
Chukchi Sea 20:25
Chupadero .....3:6; 4(2):3
Churchill 20:24
Cinder Cone 3:30
Circle City 9:26; 20:2
Citadel Ruin 3:15; 5:11; 5:23; 8:21; 14:11
Clear Cr 8:22
Cliff Palace 1:22; 5:12; 12:20
Clifton 8:27
Cloudcroft 18:24; 19:22
Cochiti .....4(2):5
Coffee Dome 5:16
Colorado Plateau 2:29; 6:16; 14:18
Colorado R B 8:26; 9:19; 11:21; 11:32; 12:3; 12:24; 13:10; 15:2; 16:19; 17:3; 18:17; 19:20; 20:26
Colorado Spr 8:27; 9:22; 11:18
Columbus .....4(2):6
Colville R 20:24
Connecticut 10:26; 13:3
Converse B 11:27; 12:14; 13:5
Copper R 19:5
Cornelius Cave 16:13
Cornwall 13:4
Corona 3:6
Crystal R 12:4
Cuchillo H 17:21
Cueva Grande, Colo 16:13
Cueva Grande, Mex 10:23
Cundiyo .....4(2):4
Dark C 19:23
Darmstadt 15:19
Deadman's Flat .....4(4):6; 5:11; 5:23
Del Norte 17:16; 18:15; 19:32
Denver 1:23; 11:20
Desierto de los Leones 10:23
Devil's Den C 19:24
Dinosaur N M 15:5; 16:18; 20:28
Divide 17:18
Dogozshibito .....2:37; 4(4):6
Dolores 10:29; 11:24; 12:22; 14:4
Dorchester 7:24
Du Pont Cave 8:23; 9:21; 15:25; 18:36
Duchesne 11:24
Durango, Colo .....4(1):7; 4(3):3; 5:12; 5:18; 6:10; 8:3; 8:13; 8:27; 9(2):7; 9(2):8; 9:21; 10:29; 11:15; 12:24; 14:24; 15:24; 15:33; 16:2; 16:12; 17:16; 17:28; 18:30; 18:36; 20:28
Durango, Mex 10:19; 20:28
Eagle, Alaska 5:16
Eagle, Colo 11:24; 15:2
Eberswalde 3:29
Echo Cliffs .....4(3):3
Echo Cliffs Amphitheater 19:24
Edwards Plateau 15:18
Egypt .....4(1):3; 9:22
Ekseavik .....9(1):3; 14:27; 20:6
Elden .....4(4):6; 5:11; 5:20; 5:23; 8:19; 14:11
El Paso 3:6; 6:11; 10:20; 18:21
El Paso Gap 19:24
El Salto 10:18; 18:23; 19:23
Enfield 7:25
Engineer Cr .....4(4):3
England 20:18
Enterprise 11:26; 12:14; 13:5; 16:2
Escalante 16:20
Escavada 3:19
Estella 7:20
Ester Dome 5:16
Europe 11:2; 20:18
Fairbanks .....4(4):3; 5:16; 18:2; 19:5; 20:25
Fairlee 7:25
Falkland Is 20:17
Falls Creek Caves 10:29; 15:24; 15:33; 16:12; 17:28; 18:30; 18:36
Far View H 13:30; 16:22
Fewkes C 6:11; 6:23; 12:24
Fewkes' Ruin 5:11
Fish Cr Cove 16:20
Fisher's Tanks 2:29
Five Kiva H .....3:13; 4(2):3
Flagstaff ....1:4; 1:10; 2:3; 2:29; 3:3; 3:15; 4(1):2; 4(1):4; 4(1):8; 4(4):6; 5:11; 5:18; 5:20; 5:24; 6:4; 6:13; 6:19; 7:3; 7:29; 8:3; 8:18; 8:21; 8:27; 11:30; 12:15; 12:28; 13:8; 14:10; 14:18; 15:22; 16:21; 17:9; 20:28

Florida ....4(3):5
Forestdale ....6:2; 7:14; 8:2; 8:7; 8:14; 8:21; 9(2):2; 9(2):7; 9:18; 11:10; 15:21; 16:23; 20:30
Ft Apache 1:3; 2:11; 5:7; 5:13; 7:14
Ft Bragg 6:23
Ft Davis 6:12; 18:21
Ft Defiance ....4(3):3
Ft Garland 18:12; 19:23
Ft Good Hope 13:27
Ft Grant Pueblo 8:24
Ft Lewis 10:29
Ft McPherson 6:18
Ft Nelson 13:27
Ft Tuthill 2:29
Ft Valley 2:29
Ft Yukon 9:28; 18:7; 19:6; 20:5
Four-Name H 17:28
Fourth Terrace ....4(4):6
France 20:18
Franconia 7:24
Fraser R 13:11
Frazier Mill 11:31
Fredericksburg 15:18
Fresno 12:16
Fremont 16:19
Frijolito ....4(2):4
Gakona 19:6
Galisteo B ....4(2):4
Gallina 8:3; 17:21
Gallo C ....3:6; 4(2):3
Gallup 3:19; 8:27
Ganado 5:11
Gen Grant N P 11:26; 12:13; 13:5; 16:2
Georgia ....3:31; 4(1):3; 4(2):6
Germany 3:28; 15:18; 20:18
Giessen 15:18
Gila Cliff Dwellings 8:27
Gila Pueblo ....2:3; 4(1):7; 4(3):3; 5:11; 7:6; 8:4; 18:30
Gila R B ....1:14; 2:4; 2:11; 3:6; 7:19; 9(2):8; 11:23; 15:21; 17:16; 20:28
Gillespie County 3:27; 15:16
Glenwood Spr 8:27; 12:3; 15:2
Globe ....2:3; 3:6; 4(3):3; 8:27
Glorieta ....4(2):4; 8:30; 18:14; 19:24
Gobernador C ....4(2):3; 5:13; 16:13; 17:27
Goldstream ....4(4):3
Gondwana Land 20:19
Graham Mts 8:24
Gran Quivira ....4(2):5
Grand C 11:32; 13:15; 14:16; 19:12; 20:28
Grand Gulch 5:12
Great B 3:29
Green R B 11:24; 15:2; 16:19
Guadalupe Mt 18:16; 18:22; 19:23
Gulkana 19:10
Gunnison 8:27; 11:24; 12:3
Gyusiwa ....4(2):5
Hanover 5:29; 7:25; 20:11
Harney B 3:30
Hartland 7:25
Hartsell 11:22
Haugan 17:19
Hawikuh 5:13
Hayes County 3:27
Heidelberg 15:19
Hells Midden 16:19
Helsinki 11:2
Hemenway H 1:22; 5:12; 12:20
Heshotauthla 3:6
Hesperus 10:30
Hill C 15:5; 17:28; 20:28
Hill's Cabin 12:24
Hilmo 13:15
Himalaya Mts 10:31
Holbrook 5:23
Holland 3:28
Holman Pass 19:24
Holy Cross 16:28
Hooper Bay 18:6
Hopi ....2:29; 4(1):8; 5:11; 6:3; 6:10; 14:8; 17:27
Hospitibito 5:12
Hot Sulphur Spr 11:24
Hotham Inlet 14:28; 20:6
Howiri ....4(2):5
Hudson Bay 20:24
Hume L 11:27
Hungo Pavi 1:24; 5:6; 5:13
Hunt R 9:29; 13:15; 14:32
Hupobi ....4(2):5
Idaho 17:19; 19:24
Idaho Spr 11:18
Indian B 11:27; 13:5
Indian C 15:3
Indiana 5:3
Ingalik Range 18:2
Illinois ....4(1):3; 5:3
Iowa 5:3
Ipiutak ....9(1):2
Italy 3:28
Jack Smith Tank ....4(4):6; 5:11
Jackson 8:27
Jacob L 19:13
Jamaica Plain 10:30
Jämtland 6:22
Jasper 18:16; 18:18
Jeddito 1:14; 6:3; 7:5; 8:21; 17:27
Jemez ....4(2):5
Jena 11:2
Jerusalem 11:6
Johnson C 2:31; 3:20; 5:12; 6:16; 7:5
Judd's Pit H 2:30
Jug H ....See Mug H
Kaibab 8:27; 19:13
Kaltag 16:28
Kamloops 13:10
Kanab ....8:3; 9(2):7; 9(2):8; 9:21; 15:25
Kane 8:3
Kawaika-a 1:13; 5:11; 7:6; 17:27
Kayenta 1:13; 3:15; 5:23; 6:16
Keet Seel ....1:6; 1:13; 4(4):6; 5:11; 14:18
Ken-aki ....4(4):6; 5:11
Kennecott 19:10
Kentucky 5:3
Kiana 14:27
Kiatsuka ....4(2):5
Kiatuthlanna 5:13
Kiet Seel ....see Keet Seel
Kinbiniola 1:24; 5:6; 5:13
Kinchindi 5:7
King Is 7:13
King Karl Land 20:18
King's Ruin 5:23

Kings R B 11:27; 12:12; 13:6; 18:12
Kingston 17:16
Kinishba 1:14; 1:30; 2:11; 5:7; 5:13; 14:8
Kin-klee-chee 5:11
Kinklizin 5:6
Kinnazinde 5:11
Kinnikinnick 7:7; 8:2; 8:21; 14:11
Kintiel 5:11
Kinya-a 5:6
Kiruna 11:5
Klagetoh 5:11
Kobuk R .....7:13; 9(1):2; 14:26; 16:7; 20:6; 20:25
Kodak H 12:21
Kokopnyama 1:13; 5:11
Kokrines 9:29; 16:28
Korgen 11:5
Kotzebue .....7:10; 9(1):2; 14:26; 18:4; 19:7; 20:6
Koyuk 9:32; 16:28; 18:3; 19:7; 20:5
Koyuk R .....9(1):8; 18:7
Kukulik 7:11
Kuovhonvuopio 11:5; 13:15
Kuskokwim R 9:26; 18:7
Kyle 3:27; 15:16
Ladder H .....1:6; 4(4):6; 5:11
Laguna .....4(2):5
Lake George 8:31; 11:18; 12:8
La Madera 19:24
Lamy .....4(2):4
Lander 8:27
La Plata 2:36; 5:12; 7:5; 8:6
Las Padillas 3:6
Lassen N P 3:30
Las Trampas .....4(2):5
Las Vegas 19:24
La Vita .....4(2):5
Lebanon Mt 10:31
Leyit Kin 5:6
Liard R 13:27
Lincoln 3:6
Lincoln County 6:18
Lincoln N F 18:18; 19:24
Lino .....4(1):7; 7:15; 8:6
Little Bear Camp .....9(2):3
Little Colorado .....1:14; 2:11; 3:6; 3:15; 4(2):4; 5:13; 8:18; 11:24; 14:16
Little Diomede Is 7:13
Little Granary H 5:11
Llano .....4(2):4
Llano R 15:19
Llaves 17:22
Logan 8:27
Loloma Ki .....2:37; 4(4):6
Long C .....4(4):6
Long H 1:22; 5:12; 12:20
Long Mesa 15:4; 17:28
Los Aguajes .....4(2):4
Los Altos 13:5
Los Angeles 6:16; 19:2
Louisiana 3:31
Lower Pinary C 12:2
Lower Well 12:23
Lowry Ruin .....4(1):8; 4(2):3; 4(3):3; 5:12
Lukachukai Mt 2:31; 2:35; 5:18; 6:16; 9:22
Luna Pass 15:21
MacKenzie R 7:10; 13:26; 14:28; 18:2; 20:3; 20:23
Macon .....4(2):6
Madera C 6:12
Magdalena 19:24
Maine 13:2
Mancos C 13:30
Manzanares .....4(2):4
Marathon 18:18
Marigold Cave 16:18
Marshall 16:26; 18:7
Massachusetts 10:28; 10:30; 20:17
Maya 9:22
Mazatlán 10:20; 18:24
McDonald Observatory 6:11; 18:19; 19:23
McGrath 9:26; 16:28; 18:7
Medicine Cave .....4(4):6
Medicine Valley .....2:29; 3:12; 4(4):6; 5:11
Mediterranean Sea 11:6
Menasta Pass 19:6
Mesa Verde N P .....1:13; 1:21; 1:28; 2:4; 2:31; 3:6; 3:14; 4(1):8; 4(2):3; 5:12; 5:26; 6:10; 6:23; 7:4; 9:19; 12:18; 13:15; 13:30; 13:32; 14:2; 14:18; 15:6; 15:21; 15:26; 16:12; 16:22; 17:5; 17:18; 17:22; 17:28; 18:12; 19:21; 20:28
Mexico .....4(3):3; 8:3; 10:18; 18:10; 18:23; 19:22; 20:28
Mexico City 10:18
Midway Station 5:23
Mindeléeff's 15 .....1:24; 5:12
Minnesota 5:3
Minnie Maud Cr 15:2; 16:10
Mississippi R B 5:3
Missouri 5:3
Missouri R B 20:27
Mocho .....4(2):4
Moencopi 8:21
Mogollon .....1:13; 4(3):3; 7:14; 8:6; 8:19; 9(2):7
Mohawk F 13:4
Montana 17:18; 18:16
Monterey .....3:22; 4(3):4; 6:15; 20:10
Monument Valley 1:6; 2:37; 3:15
Mora 6:22
Morefield Well 12:24
Mound 20 .....5:7
Mt Carmel 11:6
Mt Evans 11:18
Mt Graham 8:24
Mt Lemmon 7:18
Mt Locke 6:11; 19:24
Mt Maggie 13:6
Mt Moses 13:6
Mt Wilson 2:16
Mug H 1:22; 5:12; 12:20
Mummy Cave .....1:3; 1:24; 2:30; 2:34; 5:12; 5:18; 8:4; 9(2):7; 9(2):8; 9:20; 12:28; 15:26; 18:30
Munoz C .....4(2):3
Naha 17:27
Naki C .....see Nokai C
Nalakihu .....3:15; 4(4):6

Nambe ....4(2):5
Nantack Ridge 15:21
Naslini Wash 5:26
Natural Bridges 3:13; 16:21
Navajo C 12:24; 14:2
Navajo Mt 1:6; 5:11
Navajo N M 14:18; 19:13; 20:28
Nebraska 6:18
Nevada 3:29
New Braunfels 15:18
New England 3:30; 5:27; 6:19; 7:24; 8:3; 10:32; 13:2; 20:10
New Fire H 12:21
New Hampshire 3:30; 5:29; 7:24; 10:28; 13:2; 20:14
New London 10:28; 13:3
New So Wales 20:17
New York 2:31; 14:11
Nine Mile C 15:2; 16:10; 16:18; 17:28; 20:28
Noatak R ....7:13; 9(1):3; 9:30; 13:27; 14:28; 18:5; 18:7; 19:7
Nogales Cliff H 17:21
Nokai C ....2:37; 4(4):6
Nome 18:2
Nord-trondelag 11:5
Norris B 5:15
No Cave 17:28; 18:30
No Conway 7:25
No Platte 6:19; 11:24; 18:10
No Rock Shelter 18:36
No Rim 19:12
Norton Bay ....7:13; 9(1):8; 9:30; 14:26; 18:2; 20:2; 20:25
Norway 11:2; 13:15
Norwich 7:25
Nulato 9:26; 16:26; 18:2; 20:2
Nutter Ranch 17:29
Oak Tree H 1:22; 1:24; 5:12; 12:20
Oaxaca 10:23
Obelisk Cave ....2:29; 2:34; 4(3):3; 5:12; 5:21; 8:4; 9:20; 15:26; 18:31
Ocalla ....4(2):7
Ocmulgee ....4(2):6
Okanogan Valley 13:10
Olger Ranch 17:28
Ontario 20:17
Oraibi 1:24; 3:24; 5:11; 6:3; 6:6; 12:22; 14:8
Oregon 3:29; 6:18
Organ Mt 19:24
Oslo 11:2
Ottawa 13:10
Ouray 15:5
Owens R 19:2
Painted Desert 8:18
Painted Kiva 5:12; 12:21
Pajarito Plateau ....4(2):4
Palestine 11:6
Palo Alto 10:10
Panguitch 17:15
Parowan 17:15
Pasadena 3:29
Patagonia 20:18
Paxson 19:6
Pecos ....3:6; 4(2):4; 11:24; 15:33; 18:12; 18:24; 19:21
Pedernales R 15:18
Pedro Dome 5:16
Peel Channel 13:26
Pena Negra ....4(2):4
Penasco Blanco 5:6; 5:13
Pennsylvania 5:7; 7:20; 13:3; 13:15; 18:6; 20:6
Penticton 13:10
Pie Town 19:24
Piedmont ....4(2):7
Piedra ....1:16; 4(1):8; 4(3):3
Pikes Peak 8:32; 9:22; 12:7
Pinal Mt 2:3
Pinaleno Mt ....see Graham Mt
Pindi ....4(2):4
Pine C 18:19
Pine Lawn 15:21
Pine R ....4(1):7; 4(3):3; 16:13
Pinedale, Ariz 1:13; 5:13; 8:22
Pinedale, Wyo 8:27
Pink Arrow 17:27
Pinyon 6:16
Pipe Shrine H 13:30; 13:32
Pisgah F 13:2
Pithouse (C) ....4(1):8; 5:12; 12:21
Pittsburgh 16:21
Plainfield 20:14
Platte Valley 6:18
Point Barrow 20:24
Point Hope ....7:10; 9(1):2; 18:7
Point Imperial 19:12
Point of Pines 15:20; 15:21; 15:25; 20:30
Poshu ....4(2):5
Posi ....4(2):5
Prater C 12:23
Prayer Rock 5:12
Prescott ....4(3):4; 5:23; 7:3; 11:30
Promontory Site 15:22
Puebla 10:20
Pueblo Bonito 2:7; 2:30; 5:13; 6:3; 7:4; 14:11
Pueblo C ....4(2):3
Pueblo del Arroyo 5:13
Pueblo Largo ....4(2):4
Pueblo Pintado 5:6
Purgatory 9:28
Puye ....4(2):5
Quarai ....4(2):5
Quebrada Chapultepec 10:20
Quebrada El Salto 10:20
Quebrada Huisache 10:20
Quesnel 13:10
Rainbow Bridge 1:6; 2:37; 3:15
Rainbow Lodge 6:16
Ranchos de Taos ....4(2):5
Rampart 9:28; 20:5
Rapids 19:6
Rattlesnake Point 17:22
Red and White C 5:26
Red C 17:2
Red Rock Valley ....2:29; 2:35; 4(1):7; 4(3):3; 5:11; 5:18; 6:10; 8:4; 9(2):7; 9(2):8; 9:20; 11:11; 15:26
Redcliff 11:24; 14:4
Redwood B 11:27; 12:11; 13:6; 13:15
Rehovot 11:8
Reindeer Corral 7:13
Rena 3:29
Riana Ruin ....4(2):4

Richardson 5:16; 19:5
Ridge Ruin 8:19
Rillito 8:24
Rincon Red H 5:11
Rio Chama 17:21
Rio Gallina ....4(2):3; 17:21
Rio Grande ....1:20; 2:4; 3:6; 3:14; 4(2):3; 5:18; 6:16; 9:22; 11:24; 17:15; 18:14; 18:18; 19:20; 20:28
Rio Pueblo 19:24
Rio Puerco ....4(2):4
Roosevelt ....4(3):3
Rowe ....4(2):4
Rubbish Ruin 5:11
Ruin 16 ....1:22; 5:12; 12:20
Russian Mission 16:28
Sacramento Lookout 19:24
Sacramento Mt 19:22
St George 17:15
St Johns 3:6
St Lawrence Is ....7:11; 9(1):8; 20:24
St Michael 18:4
Salida 8:27; 12:5; 18:12
Salt R B 7:15; 11:23; 17:16
San Antonio 15:16
San Carlos 15:20
San Clemente 3:6
San Cristobal ....4(2):4
San Francisco 12:16
San Francisco Mt ....2:5; 2:32; 4(1):8; 7:16; 8:6
San Ildefonso ....4(2):5
San Jacinto Mt 18:12
San Juan ....4(2):5
San Juan C ....4(2):3
San Juan R B ....2:36; 4(1):7; 4(2):3; 7:7; 8:6; 10:29; 11:24; 13:15; 15:24; 16:20; 18:14; 20:28
San Rafael C ....4(2):3
Sandia Mt 19:24
Sangre de Cristo Mt 18:12; 19:22
Santa Ana ....4(2):5
Santa Catalina Mt 7:18; 8:3; 17:18
Santa Cruz 6:22
Santa Cruz de Canada ....4(2):5
Santa Fe ....1:5; 2:4; 4(2):3; 5:18; 5:31; 8:4; 8:27; 9:21; 15:4; 19:33
Santa Rita Mt 8:3
Santa Rosa ....4(2):5
Savenac Nursery 17:19
Scandinavia 11:2; 13:2; 20:23
Scotia 6:22
Selawik R ....9(1):7; 14:28
Selbu 13:15
Sequoia N P 11:31; 12:11; 13:5; 13:15; 16:2
Seshukwa ....4(2):5
Sevier R 17:15
Seward Peninsula 7:13; 18:2
Shabik' eschee 7:16
Shaktoolik R 16:27; 18:7
Sheffield 7:20
Shfeya F 11:6
Shipaulovi 1:24; 5:11
Shiprock 2:33
Showlow ....1:13; 2:29; 5:13; 6:2; 7:6; 8:7; 8:12; 8:27; 9(2):2; 14:8
Shungnak ....9(1):2
Shungopovi 1:24; 5:11
Siberia 20:18; 20:23
Sichomovi 1:24
Sierra Ancha 1:13; 1:28; 2:3; 14:8
Sierra Madre Occidental 10:20
Sierra Madre Oriental 10:20
Sierra Nevada 3:29; 9:22; 11:26; 12:10; 18:10; 19:22
Silver City 8:27
Sinagua 8:19
Sky H 16:10; 17:29
Slana 19:6
Sliding Ruin 1:24; 2:30; 5:12; 15:26
Small Site ....4(4):6
Smith R 6:23
Snake R B 18:10; 20:27
Snaketown ....7:16; 9(2):8
Sodankylä 11:5
Solomon Ruin 1:24; 5:12
Sonora 10:19
Sosi 8:21
So Africa 20:17
So America 9:24
So Arizona 15:14
So Cave 16:12; 18:30
So Park 11:19
So Platte R B 11:18
So Rock Shelter 18:36
Spitzbergen 20:18
Spring Gulch C 19:24
Spring H 1:24; 5:12; 12:20; 16:23
Springville 11:26; 12:11; 13:5
Spruce C 12:24
Spruce Spr 14:18
Spruce Tree C 12:24; 17:18
Spruce Tree H 1:22; 1:24; 1:28; 5:12; 6:10; 12:20; 13:31; 17:18; 18:14
Square Tower H 1:22; 5:12; 12:21
Squirrel R ....9(1):3; 14:27; 16:7; 18:7
Star L ....4(2):3
Starkweather Ruin ....4(3):3
State College 7:23
Steamboat Spr 8:27
Steigen-Sorfold 11:5
Step H ....2:32; 4(1):8; 5:12; 12:20
Stevens 9:28; 18:7; 19:6
Stockholm 6:21; 11:2
Stoney Squaw Mt 13:16
S U ....9(2):8; 15:22
Sullivan County 7:20
Summit L 19:5
Sun Temple Point 6:11
Sunnyside 15:2
Sunset Crater 2:23; 3:11; 8:19
Swallows Nest ....1:6; 4(4):6; 5:11
Swarts Ruin 3:6
Sweden 6:21; 7:28; 11:2; 13:15; 20:17
Switzerland 18:17
Syria 11:6
Tallahogan C 17:27
Talpa ....4(2):5
Talus Rock Shelter 5:6
Talus Village 18:30
Tanana 9:29
Tanana R ....4(4):3; 9:28; 19:6
Tanana Valley 5:16
Tanque Verde 8:24
Taos ....4(2):4; 19:23

Taurus Mt 10:31
Tavaputs Plateau 15:2
Tecalote ....4(2):4
Te'ewi ....4(2):5
Tennessee ....4(1):3; 5:3; 5:14
Tennessee Valley 2:4; 5:15
Texas 3:27; 6:11; 6:15; 7:19; 8:3; 9:22; 15:16; 18:18; 19:21
Three Rivers ....3:6; 4(2):3
Three Turkey H 5:26
Thule 14:28
Tierra del Fuego 20:18
Tigara 7:10
Tocita 5:12
Tok 19:5
Tolland County 10:26
Tonto B 2:4
Tonto N M ....4(3):3
Tranquille 13:11
Trimble Spr 15:25
Tropic C 17:2; 19:13
Trout Cr Pass 11:18
Truckee R B 3:29
Tsegi ....1:6; 1:15; 2:37; 3:15; 4(4):6; 5:11; 8:3; 14:18; 15:14; 17:9; 19:13
Tseh Tso 5:7
Tshirége ....4(2):5
Tsiping ....4(2):4
Tsinklitzin 5:6
Tuba City 3:12
Tucson 1:12; 7:18; 8:24; 8:27; 17:18
Tule 10:23
Tunnel Mt 13:12
Tunque ....4(2):4
Turkey H ....1:6; 4(4):6; 5:11; 8:21; 14:11
Tusayan ....3:15; 4(3):3; 5:11; 8:21; 14:11
Twelve-Mile Summit 5:16
Twin Cave ....4(3):3
Twin Caves Pueblo ....1:6; 3:15; 4(4):6; 5:11
Twin Trees 17:28
Tyuonyi ....4(2):5
Uinta B 15:2; 17:29
Una Vida 5:6
Union 10:27
Unshagi ....4(2):5
Upper Sky H 17:28
Uppsala 11:2
Vandal Cave ....4(3):3
Verde 3:16; 5:23
Verde R B 11:24
Vermont 3:30; 5:28; 7:25; 13:2
Vernal 8:27
Vernon 13:10
Victoria 13:11
Virgin R B 11:24
Wagon Wheel Gap 19:23
Wakefield 7:25
Walnut C ....4(4):6; 5:25; 8:21; 16:21
Walpi 1:24; 5:11
Wardle Ranch 17:29
Warren 7:24; 20:14
Warren County 7:20
Wasatch Mt 15:2
Washington 13:10
Washington, D. C. 6:5; 8:2
Wayside Museum 14:16
Wetherill Mesa 12:24
Weott 6:23
White H ....1:24; 4(4):6; 5:12; 15:26
White Mound ....4(3):3; 7:15
White Mt 9:28; 13:15; 19:7
White R N F 12:4
White R 1:30
Whitmore C 15:2
Wijiji 5:6
Williams L 13:10
Willits 6:23
Willow Cr C 15:3
Windham County 10:26
Wingate ....4(3):3
Winona ....4(4):6 8:19; 14:11
Winslow 8:22
Wisconsin 5:3
Wisconsin Rapids 5:5
Wolfeboro 7:25
Woodland 8:3
Woody Mt 1:10; 2:29
Wupatki ....2:23; 3:15; 4(4):6; 5:11; 5:23; 7:4; 8:18; 14:11
Wyoming 8:27; 9:19; 16:20
Yale F 10:26; 13:4
Yampa C 15:5; 16:20
Yampa Plateau 15:3
Yampa R 16:19
Yavapai County 5:23
Yellowstone N P 12:10
Yukon Flats 9:23; 9:26; 16:27; 20:24
Yukon ....4(4):3; 5:16; 7:11; 9:26; 16:26; 18:2; 18:7; 19:6; 20:2; 20:24
Yuma 8:24
Zilth Nez Mesa 2:37
Zuni 7:16