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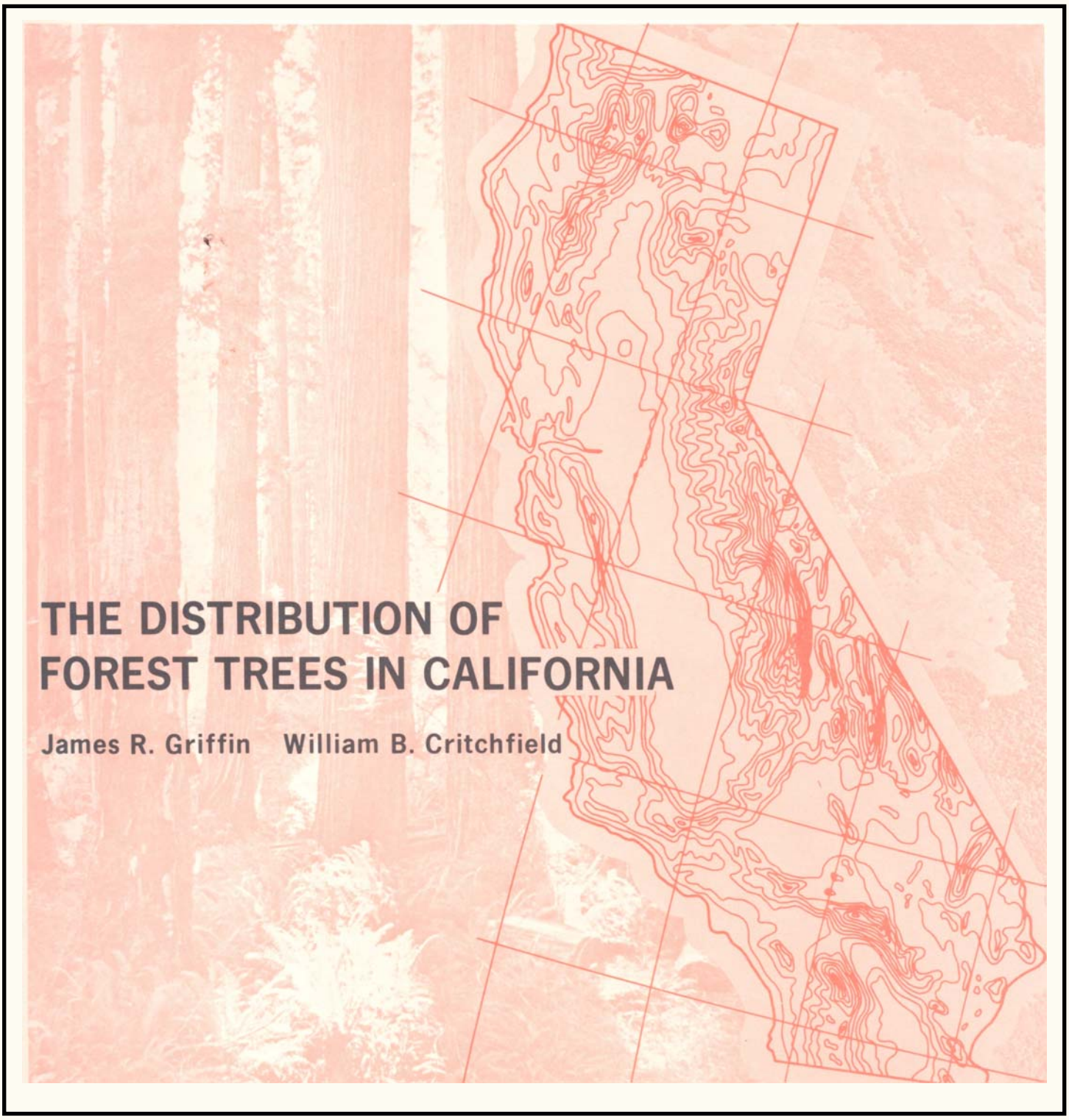

THE DISTRIBUTION OF FOREST TREES IN CALIFORNIA

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The Authors

JAMES R. GRIFFIN was until 1967 a plant ecologist on the Station's silvicultural research staff headquartered at Redding, California. Since then he has been Associate Research Ecologist with the University of California's Museum of Vertebrate Zoology, Berkeley, and stationed at Hastings Natural History Reservation, Carmel Valley, Calif. He earned bachelor's (1952) and master's (1958) degrees in forestry and a doctorate (1962) in botany at the University of California, Berkeley. He joined the Forest Service in 1962. **WILLIAM B. CRITCHFIELD,** a research geneticist, heads the Forest Service's Pioneer Research Unit on Hybridization and Evolution of Forest Trees, with headquarters in Berkeley, Calif. He is a native of Fargo, N.D. He earned a bachelor's degree (1949) in forestry and a doctorate (1956) in botany and genetics at the University of California, Berkeley. He then joined the Cabot Foundation for Botanical Research at Harvard University as a forest geneticist. From 1959 until he became a pioneer research scientist in 1971, he was a member of the Station's forest genetics research staff.

California's natural vegetation, reflecting the climatic and topographic diversity of the State, includes a varied assortment of tree species. Some of them cover millions of acres; others are so rare that every individual could easily be counted. Twenty-one species grow naturally only within the State. Trees dominate the vegetation on more than a third of the land area of California. Because of their dominant ecological role and the economic importance of some species as wood-producers, a wealth of information has accumulated on tree distribution. Some of this information has been published in scattered sources, often in the form of small-scale distribution maps, but much of it is unpublished. Although data for "definitive" maps of some species are still lacking, enough distributional information is available to assemble this preliminary atlas.

Natural distributions of 86 forest and woodland species are mapped here. The choice of species to be included or excluded was dictated partly by the coverage of our principal source of information: the Vegetation Type Map (VTM) survey of California. Tree-like willows *(Salix* sp.*)* were not identified to species by VTM crews, and this genus is not included. Desert areas were excluded from VTM coverage, so we have also omitted desert wash and oasis species for lack of data.

With these limitations, we have included as many traditional "trees" as possible. Species which are shrubby over most of their range, and tree-like only in favorable spots, are omitted. Some species in genera such as *Acer, Ceanothus, Prunus,* and *Rhamnus* are in this category.

Some woody plants have commonly occurring tree and shrub forms, and the total range of these species is shown on the maps. This situation is common in the oak family. The *Quercus garryana* map, for example, includes the ranges of the shrubby varieties *breweri* and *semota* as well as that of the typical tree. The original VTM data often distinguished between the tree and shrub forms of a species, but there is no practical way to show this kind of detail at the scale of these maps.

Geographic coverage of this atlas is limited to California and that part of Nevada adjacent to Lake Tahoe. This corner of Nevada is floristically related to California, and was included in the VTM survey. On a few maps, isolated stands in other parts of western Arizona, western Nevada, and southern Oregon are shown when they are of special significance to California distribution patterns.

The distribution of all species is shown at the same scale. For species with restricted ranges, we have included map inserts at larger scales to show greater detail. Most of the map inserts are adapted from the U.S. Geological Survey 1:500,000-scale map of California.

The maps are supplemented by descriptive notes on genera and species. The species notes cover pertinent data that cannot be shown on a map, including elevational limits, geographical relationships of species, natural hybridization and intergradation between species, and the ecological role of the species in the plant communities of which it is a component. Historical notes are included, particularly for rare or endemic species. The principal published and unpublished sources of information used to supplement VTM and other Forest Service data are summarized by species. In some cases, the references cited add little to unpublished distribution data, but we have included them because they provide other kinds of information on the species and its ecological context.

Scientific names follow the usage in Little (1953) except for a few instances in which Munz (1959, 1968) and other California authorities usually differ. Common names from Little (1953) are supplemented by names of widespread usage in California.

The major physiographic features of California are illustrated and labeled in *figures 1* and *2,* and county names are shown in *fig. 3.* Some local place names are shown on the inset maps. The locations of most other place names mentioned in the text are listed to the nearest half-minute of latitude and longitude in *Geographic Location of Place Names.* The coordinates designate a central point of linear features (rivers and streams) and areal features (mountain ranges and valleys). We have excluded only larger towns and cities, which can readily be located in a standard atlas or on a road map of California. Local place names sometimes provided useful clues to tree distribution; the many names incorporating "quaking aspen" in the northeastern part of the State nearly always indicate an isolated grove of *Populus tremuloides,* and throughout the length of the Sierra Nevada "tamarack" place names refer to *Pinus contorta.*

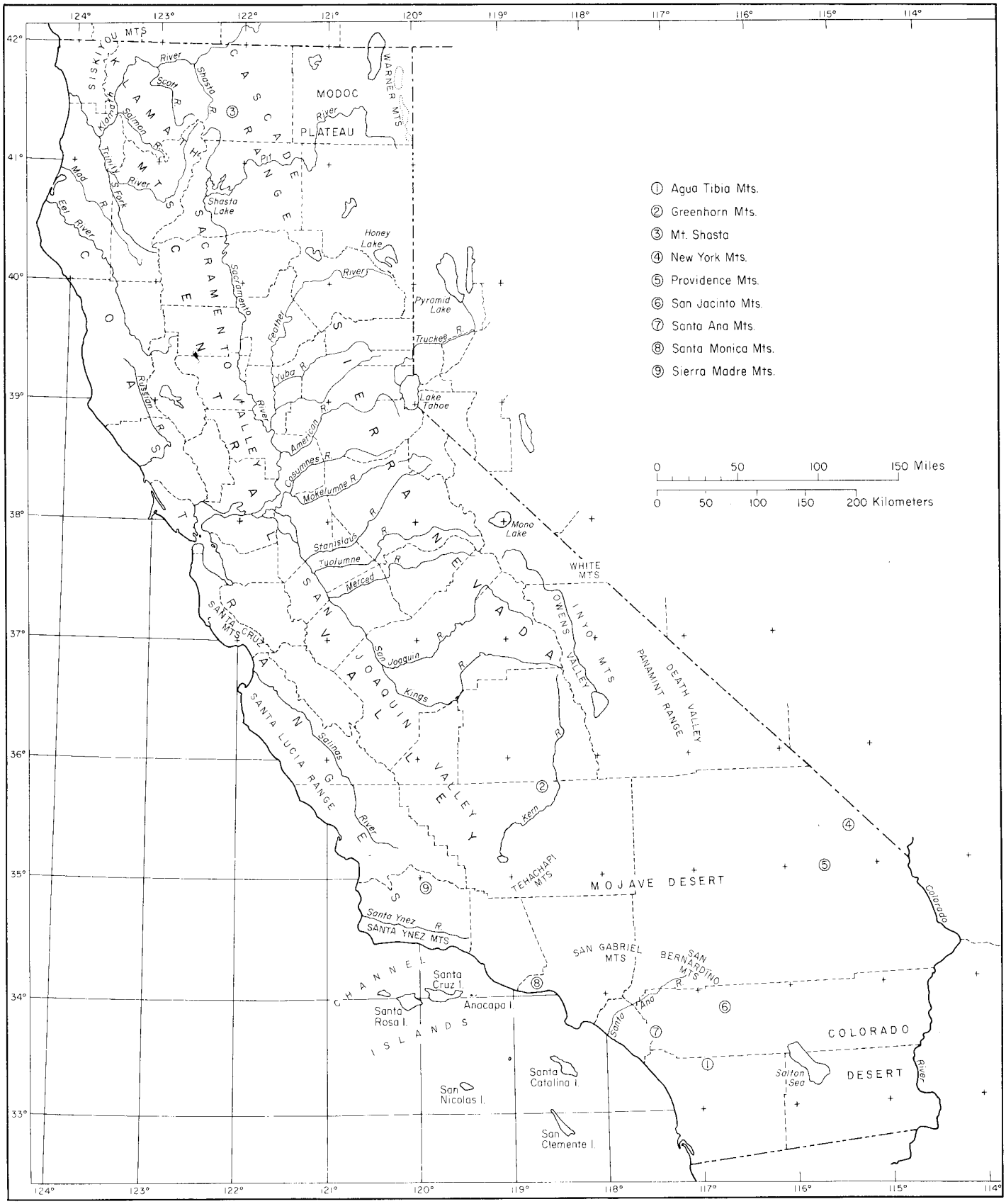

Figure 1–Names of important physiographic features of California.

Figure 2–Relief map of California (prepared by U.S. Geological Survey).

SOURCES OF INFORMATION

Our major sources of distribution data were the maps, notes, plot records, and herbarium specimens of the VTM survey. Between 1928 and 1940, VTM field crews, under the direction of Albert E. Wieslander, mapped almost half of California's vegetation. Mapping was concentrated in the south Coast Ranges, southern California, and the central Sierra Nevada *(fig. 3).* Preliminary work was started in scattered parts of the north Coast Ranges. Special surveys mapped the vegetation of Lassen, Sequoia, and Yosemite National Parks.

Early prospects of the VTM survey were outlined by Wieslander (1935). Jensen (1939) summarized progress in the Santa Cruz Mountains. Wilson (1941) reported on work in the Lake Tahoe region of western Nevada. Field work finally covered 40 million acres, but the full results of the project were never summarized. Colored vegetation type maps were published between 1932 and 1943 for 23 15- and 30-minute quadrangles, mostly in southern California but including a few in other parts of the State. Most of the remaining sheets were issued as generalized blue-line prints (Pacific Southwest Forest and Range Exp. Stn. 1963b). However, the original field type maps, a separate series of maps showing scattered occurrences of trees, and the associated notes and photographs contain an abundance of unpublished tree distribution data. We also referred to the 25,000 herbarium specimens collected by the VTM field crews, now in the Herbarium of the University of California at Berkeley. The initial motivation for this publication was the desire to condense all of these scattered VTM sources into one set of conveniently available species distribution maps.

Another important source of information was the State Cooperative Soil-Vegetation (SV) survey (Pacific Southwest Forest and Range Exp. Stn. 1963a). In 1947 the SV survey replaced the VTM survey as the major vegetation mapping project in California (California Forest and Range Exp. Stn. 1958). The SV survey has worked mainly in privately owned areas not covered by the VTM crews *(fig. 3).* Most of the SV survey's tree data appear as species symbols on 7.5-minute maps. Legends for the more recent SV maps–for example, the Shasta County quadrangles–also contain supplementary notes on tree ranges (Mallory et al. 1965). We compiled distributions directly from the published sheets. Preliminary copies of unpublished SV sheets were also consulted.

Other Forest Service data came from Forest Survey plots, forest insect and disease survey plots, correspondence with personnel of the National Forests, and special items, such as an old forest type map for the Shasta National Forest.

Several partial compilations of individual species distributions have been made from these sources at different times. Some southern California VTM data were summarized on large-scale linen maps. Later, range maps for many species were compiled from VTM data on blue-line prints for parts of the Sierra Nevada and Coast Ranges. In the early 1960's another compilation project from VTM, SV, and Forest Survey data was begun. All of these maps accumulated in the files of the Pacific Southwest Forest and Range Experiment Station. Unfortunately, none of the compilations was complete for any one species. We have used them all, checking them against the original field maps and adding to them from more recent surveys.

Preliminary maps prepared from these sources were the basis for the California distribution of 28 species mapped in *Silvics of Forest Trees of the United States* (Fowells 1965). The same sources were used for the distribution maps of pines native to California prepared by Critchfield and Little (1966). Both sets of maps have recently been issued in a different format by Little (1971). Unfortunately, few significant corrections were made to the Fowells (1965) or Critchfield and Little (1966) maps.

This atlas stems from sources independent of Sudworth's early compilation of tree distribution notes (Sudworth 1908), which was often used as the basis for older maps of California trees. Such maps, extrapolated from a limited number of specific points, are less helpful than the original list of localities on which they were based. Our maps do, however, substantiate the general accuracy of Sudworth's early records. We examined Sudworth's files and checked the origin of some of the questionable reports on California species. Conspicuous discrepancies and errors in the literature are mentioned in the species notes.

Herbarium specimens were used to a limited extent in preparing these maps, especially for those species with little or no vegetation type map data. We made partial checks of the following herbaria: University of California, Rancho Santa Ana, U.S. National, Gray, and Arnold Arboretum. All tree specimens in the Jepson, Humboldt State College, and California Polytechnic College herbaria were checked.

Preliminary versions of our maps were circulated to universities and colleges, government agencies, and other organizations. The staffs of several National Forests, the U.S. Bureau of Land Management, and the Death Valley and Joshua Tree National Monuments provided useful information. The following individuals contributed significantly, encouraging the early phases of the work or adding localities during the review process: Gordon L. Allenbaugh, Kenneth N. Boe, Robert Z. Callaham, J. Robert Haller, Donald V. Hemphill, John Thomas Howell, James L. Jenkinson, LeRoy C. Johnson, Thomas W. Koerber, James I. Mallory, Jack Major, William W. Oliver, Ralph N. Philbrick, Robert F. Powers, Douglass F. Roy, Philip W. Rundel, John O. Sawyer, Clifton F. Smith, Chester O. Stone, Steven N. Talley, John H. Thomas, Dale A. Thornburgh, John M. Tucker, Ernest C. Twisselmann, and Philip V. Wells.

The final versions of the maps were prepared by Audrey E. Kursinski of the Pacific Southwest Forest and Range Experiment Station. We are indebted to her for her major contributions.

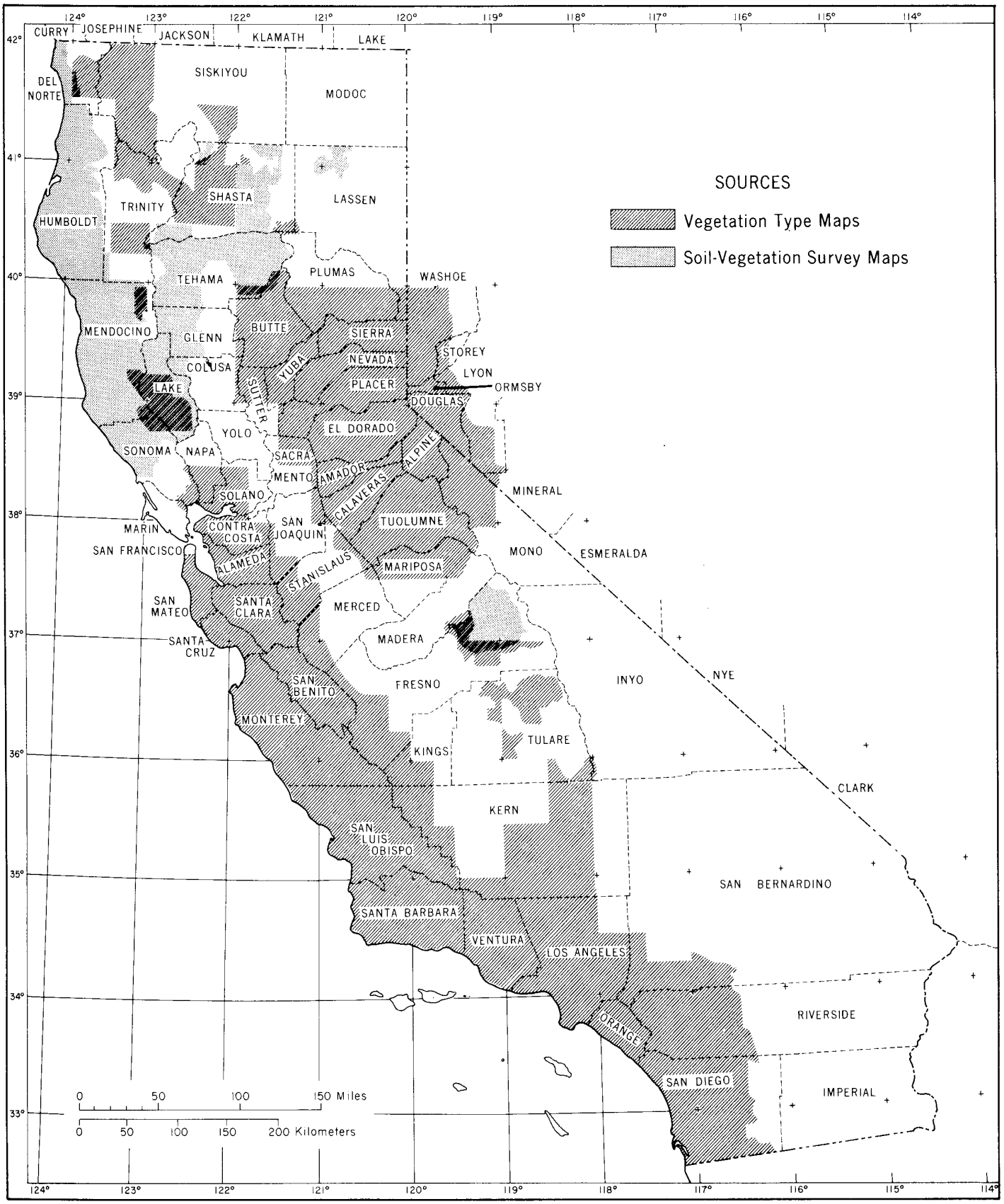

Figure 3–County names and coverage of vegetation maps.

LIMITATIONS OF MAPS

Despite the broad coverage of the VTM and SV surveys, sizable parts of California still have no satisfactory vegetation map coverage *(fig. 3).* Southwestern Trinity County is a good example. This situation left gaps in the maps of widespread species. We tried to find definite localities within these gaps from herbarium records, published information, personal field observations, and interviews with local experts. We resisted the urge to extrapolate distributions across the larger gaps. Only with the most common species, in areas where we had some field experience, did we extend solid distributions across areas with no vegetation type data. We prefer to show the incompleteness of the field work rather than fill in gaps to improve map appearances. In general, we bridged the gaps with dotted lines. These lines suggest that the species is common within the area but that vegetation type data for the region are incomplete or lacking.

Since the bulk of our data comes from vegetation type surveys, the resulting maps tend to be conservative. A species had to be a conspicuous element of the vegetation before it was listed as part of the "type"–20-percent canopy coverage in the old VTM survey and 5-percent coverage on a 10-acre minimum in the present SV survey. Thus, in a locality shown on our maps as a spot, the tree will most likely be common in the appropriate habitat within the mapped area. It is possible, however, that scattered individuals of the species may be present some distance from the mapped locality. External boundaries of the distributions are more accurately portrayed in the original data and our compilations than are internal boundaries.

The "X's" on the maps refer to three different kinds of data on the California mainland. In some cases an X designates only one isolated tree or at most a few scattered individuals. In other cases the X is based on an herbarium specimen or other record which gives no clue to the size of the population. Also shown as X's are isolated "type" areas less than 2 miles across, which could not be realistically plotted as a spot at the scale of our maps. It would have been desirable to treat these three categories separately. The compilations we used were not consistent, however, and it was impractical to maintain different symbols for each kind of locality. On the California islands, which lack type-map data, an X indicates the presence of the species on the island but not its location.

The ranges of 15 species, either endemics or of limited distribution in the State, are shown at larger scales on insert maps. On the inserts, X's indicate either typed areas less than one-third to one-half mile across or stands of unknown extent.

Since most of the VTM data was gathered in the 1930's, we cannot vouch for the present existence of all mapped localities. This is particularly true of metropolitan southern California, where the distribution of riparian trees is known to have been altered. Where we know that a tree population has been exterminated near the limits of its range–for example, the MacNab cypress stand in Whiskeytown Lake–we have shown the locality as extinct (E). One apparent difficulty may be encountered in relocating mapped localities in the field. The VTM survey crews did much of their field work on foot, and consequently many of their isolated localities cannot be seen from paved, public roads.

Although we have been careful about the reliability of the sources we used, we have probably perpetuated some old errors and created new ones. In general, the accuracy of tree identifications by the VTM and SV surveys was excellent. We found only one gross error on the VTM maps: *Populus trichocarpa* and *P. fremontii,* which probably hybridize and intergrade in places, were sometimes confused.

Although these maps were assembled in the late 1960's–six decades after Sudworth's classic work on western trees–his introductory comment on tree ranges is still as applicable as ever: "Much is yet to be learned of where the trees of this region grow" (Sudworth 1908).

PLANT COMMUNITIES AND TREE DISTRIBUTION

In the descriptive notes the distribution of each species is presented in its ecological context, including the plant community or communities in which the tree commonly appears. Merriam's "life zones" have often been used for this purpose in the past, but the traditional zones must be so altered and subdivided to fit vegetation patterns in parts of California that they are of limited value. We have adapted the "plant communities" of Munz (1959) with minor modifications, and these names are capitalized in the text. Climate plays a major role in the distribution of these zonal plant communities, although differences in soil parent material or frequent fires may locally override climatic effects.

Species with Pacific Northwest affinities also appear in the "vegetation zones" of Franklin and Dyrness (1969). The plant community names adapted from Munz, together with related vegetation units, are outlined in *table 1.* Some interrelationships between plant communities and tree distribution are considered more fully below.

California Woodlands

The Foothill Woodland covers a vast area around the Central Valley and at lower elevations in the Coast Ranges. In a general way this mixture of open savanna and denser

Table 1–*Comparison of plant communities,* [1] *vegetation zones ,*[2] *vegetation types ,*[3] *and forest cover types* [4]

Plant communities	Related vegetation units
Foothill Woodland	California oakwoods (K), Digger pine-oak type (SAF)
Northern Oak Woodland Southern Oak Woodland	Oregon oakwoods (K), Interior valley zone (F&D), Oregon white oak type (SAF)
Northern Juniper Woodland	Juniper steppe woodland (K), *Juniperus occidentalis* zone (F&D), Western juniper type (SAF)
Pinyon-Juniper Woodland	Juniper-pinyon woodland (K), Pinyon-juniper type (SAF)
Mixed Conifer Forest (Yellow Pine Forest) westside-pine phase eastside-pine phase mixed phase white fir phase	West of the Sierra Nevada-Cascade crest: Mixed conifer forest (K); Mixed conifer zone, *Abies concolor* zone (F&D); Pacific ponderosa pine type, Ponderosa pine-sugar pine-fir type, California black oak type (SAF) East of the Cascades: Ponderosa shrub forest (K), *Pinus ponderosa* zone (F&D); Interior ponderosa pine type, white fir type (SAF)
Red Fir Forest	Red fir forest (K), *Abies magnifica shastensis* zone (F&D), Red fir type (SAF)
Lodgepole Forest	Lodgepole pine type (SAF)
Subalpine Forest	Lodgepole pine-subalpine forest (K), *Tsuga mertensiana* zone (F&D)
Bristlecone Pine Forest	Great Basin pine forest (K); Bristlecone pine type, Limber pine type (SAF)
Mixed Evergreen Forest	California mixed evergreen forest (K), Mixed evergreen zone (F&D), Oak-madrone type (SAF)
Douglas-fir Forest	*Tsuga heterophylla* zone (F&D), Pacific Douglas-fir type (SAF)
Redwood Forest	Redwood forest (K), Redwood type (SAF)
North Coastal Coniferous Forest	Cedar-hemlock-Douglas-fir forest (K); *Picea sitchensis* zone, *Tsuga heterophylla* zone, Port-Orford-cedar variant (F&D); Sitka spruce type, Port-Orford-cedar/Douglas-fir type (SAF)
Closed-cone Pine Forest	Pine-cypress forest (K)

[1] Munz (1959).

[2] Franklin and Dyrness (1969).

[3] "Potential natural vegetation types"–see Kuchler (1964).

[4] Society of American Foresters (1954).

woodland vegetation forms a transition zone between the grassland of the valley plains and the Mixed Conifer Forest of the mountains. The Foothill Woodland is a particularly "Californian" community–four of its common trees are strictly endemic to the State. Many of its shrubs and herbs are also endemic. Blue oak and Digger pine characterize the community. Neither species ranges far beyond the community type. Pure blue oak savannas do spread farther down into the valleys than the pine, while Digger pine woodland reaches higher within the forests than the oak on rocky spots. The other two endemic trees are valley oak and California buckeye. Both have a large portion of their distribution within the Foothill Woodland. In the Sierra Nevada-Cascade foothills, the "live oak" in the community is *Quercus wislizenii;* in the south Coast Ranges it is replaced by *Q. agrifolia.*

In the north Coast Ranges, where blue oak gives way to Oregon white oak, the Foothill Woodland shifts to the Northern Oak Woodland. This poorly defined community occupies the drier, warmer slopes and canyon bottoms within the Mixed Evergreen and Douglas-fir Forests. Although Oregon white oak is a dominant in the Northern Oak Woodland, it has a much broader distribution than the community type.

In southern California, the Foothill Woodland's homolog is the Southern Oak Woodland. Blue oak is replaced by Engelmann oak, and coast live oak assumes greater importance. Knapp (1965) distinguished the live oak woodland of the southern California islands from that of the mainland. Like several other southern California communities, the Southern Oak Woodland has floristic affinities with regions to the east. Some of the *Juglans californica* stands in the Southern Oak Woodland are reminiscent of *Juglans major* within oak woodlands of Arizona and New Mexico.

Interior Woodlands

The Northern Juniper Woodland occurs to the east of the Mixed Conifer Forest. Western juniper is typically the only tree present. In places, this community is a narrow transition zone between the forested slopes and the sagebrush flats. But in other areas, particularly on the lava flows of the Modoc Plateau, it is an extensive, well developed community. The Northern Juniper Woodland extends northward into Oregon, and many of its plants are typical of interior regions. In the central Pit River drainage, the Northern Juniper Woodland merges with disjunct stands of the Foothill Woodland. In several portions of the Pit and Klamath River drainages, Oregon white oak is associated with western juniper. The geographic separation of Northern Oak Woodland from Northern Juniper Woodland is not great.

South of Lake Tahoe, the desert-border woodland shifts from the Northern Juniper Woodland to the Pinyon-Juniper Woodland. This is the westernmost phase of a huge pinyon and juniper formation in the southwestern United States and northern Mexico. These woodlands occupy the zone between the conifer forest of the higher mountains and the desert scrub of the alluvial fans and valleys. The species of juniper and pinyon involved vary geographically. In California, the common juniper of the Pinyon-Juniper Woodland is *Juniperus osteosperma,* but in the western extreme of the community the shrubby *J. californica* replaces it. The typical pinyon is *Pinus monophylla* except in the south, where it is replaced by *P. quadrifolia.*

Montane Forests

We have substituted the name Mixed Conifer Forest for Munz's Yellow Pine Forest. "Yellow pine" is not a widely used name for *Pinus ponderosa,* and this single pine species is insufficient to characterize this complex, "mixed" forest type. The Mixed Conifer Forest is the great montane forest formation of the Sierra Nevada-Cascades in California, bordered by the Foothill Woodland on the west and the Northern Juniper and Pinyon-Juniper Woodlands on the east. At higher elevations the Red Fir and related Forests replace the Mixed Conifer Forest.

The Mixed Conifer Forest contains variable combinations of ponderosa pine, incense-cedar, sugar pine, Douglas-fir, white fir, and California black oak. All these species are widely distributed in southern Oregon, but well developed mixtures of all six species are mostly confined to California. In warm, dry western portions of the forest, ponderosa pine usually dominates the community. At times the westside-pine phase is only a narrow transition belt between the Foothill Woodland and the truly mixed phase of the forest at middle elevations. The mixed phase is always a broad and conspicuous part of the forest, but in protected areas–particularly at higher elevations –white fir gradually dominates the mixture. A white fir phase of the mixed community usually lies just below the Red Fir Forest. In the southern Sierra Nevada the relict groves of the giant sequoia occur in and tower over the Mixed Conifer Forest.

On the eastern flank of the Mixed Conifer Forest, relatively pure pine stands reappear. In the north, ponderosa pine dominates the eastside-pine phase. Extensive eastside-pine communities grow on the Modoc Plateau, and only on the higher ridges are there enough white fir or incense-cedar trees to form a mixed forest. These Modoc Plateau eastside-pine stands can be viewed as the southern extreme of the interior Oregon pine forests. From Lassen County southward, Jeffrey pine increasingly replaces ponderosa pine in the eastside-pine phase. In Mono County extensive stands of Jeffrey pine occur, and Jeffrey pine forest is well developed on the Kern Plateau.

In the Klamath Mountains, Mixed Conifer Forest appears locally in typical form. North and west of the Pit River, Douglas-fir is often a more important part of the mixture. Hardwoods also increase in dominance, and the Mixed Conifer Forest merges with the Mixed Evergreen Forest.

In southern California, the Mixed Conifer Forest occurs on the higher ridges in a more typical form than in the depleted disjunct stands of the south Coast Ranges. Douglas-fir is absent in southern California. Bigcone Douglas-fir does not effectively replace it except in local, lower-elevation situations. Coulter pine is often added to the lower portion of the southern California Mixed Conifer Forest.

The Mixed Conifer Forest and the higher-elevation forests are not clearly separated formations, for both are characterized by tall conifers. The Red Fir Forest is dominated by almost pure stands of red fir over large areas. Jeffrey and western white pines are minor elements in the fir communities. In the Cascades, and especially in the Siskiyou Mountains, red fir is gradually replaced by noble fir, suggesting the northern affinity of the Red Fir Forest. Other northern conifers just entering California in the high-elevation forests of the Siskiyou Mountains are: Pacific silver fir, subalpine fir, Alaska-cedar, and Engelmann spruce.

The Lodgepole and Subalpine Forests may not be worth distinguishing from each other in some cases. They lie between the Red Fir Forest and timberline. Lodgepole pine communities dip down into the Red Fir and Mixed Conifer Forests around lakes and wet meadows. The most characteristic subalpine trees in California are whitebark pine and mountain hemlock. Neither species grows in the poorly defined Subalpine Forest on the highest southern California peaks.

The desert ranges of southeastern California high enough to support forest above the Pinyon-Juniper Woodland lack any form of the Mixed Conifer Forest. Instead they are covered with the western fringe of an extensive interior mountain community, the open Bristlecone Pine Forest. Bristlecone pine and limber pine characterize this forest. Limber pine continues westward, and is part of the Subalpine Forest at the southern and eastern borders of this community. The Rocky Mountain white fir colonies in the eastern Mojave also fit into this pattern of interior species entering southeastern California.

Coastal Forests

The Mixed Evergreen and closely related Douglas-fir Forests are very important in the Klamath Mountains and north Coast Ranges east of the Redwood Forest. These communities extend well into southwestern Oregon in their typical California form. Madrone and tanoak are conspicuous in the Mixed Evergreen Forest, less important in the Douglas-fir Forest. Giant chinquapin is widely scattered, and several oaks–particularly canyon live oak–are important in the type.

In a restricted sense, the Mixed Evergreen Forest reappears in the Mixed Conifer Forest of the northern Sierra Nevada. This high-precipitation part of the Sierra Nevada has a large distribution of madrone. Within the madrone region is a smaller distribution of tanoak, and in the central portion of the tanoak range is a small population of giant chinquapin. Many understory plants from the coastal forests also appear in this mesic, northern Sierra Nevada region.

Douglas-fir is not important in the coastal forests south of the Santa Cruz Mountains, and the Mixed Evergreen Forest of the south Coast Ranges becomes more of a mixed hardwood forest without conifers, although Coulter pine is a minor clement in places. As tanoak and madrone drop out, the southern extremes of the community are essentially reduced to coast live oak forest.

The North Coastal Coniferous Forest is a heterogeneous group of forest types that are well developed in the north, but are difficult to recognize in their southern extremes in California. Sitka spruce and grand fir form one phase of these northern forests at low elevations. The spruce is conspicuous between the coast and the Redwood Forest. Grand fir continues further inland into the redwood belt. Western hemlock is scattered in the Redwood Forest and locally dominates the Douglas-fir Forest. Western red-cedar is restricted to very moist, sometimes boggy habitats within the same general region.

The Closed-cone Pine Forest consists of disjunct stands of closely related closed-cone pines and closed-cone cypresses. These groves of pines, cypresses, or both, are scattered along the coastline and on the southern California islands. A special phase, which includes bishop pine, the "Bolander" form of shore pine, and Mendocino cypress, grows on sterile, podzolized soils in Mendocino County. A tiny homolog of this phase occurs on the Monterey Peninsula, where bishop pine and Gowen cypress are mixed together on a similar soil situation. Bishop pine also grows in pure stands in a number of areas. Monterey pine forms relatively pure stands, with scattered coast live oaks. Monterey pine does not really form mixed communities with either of the two cypresses that occur on the Monterey Peninsula. Knapp (1965) included the southern California Torrey pine groves as a part of his California coastal closed-cone pine and cypress forests.

A series of more inland pine-cypress communities is related to the coastal Closed-cone Pine Forest. In these inland stands, knobcone pine replaces bishop and Monterey pines and Sargent and MacNab cypresses replace the Mendocino cypress. These inland trees also have closed cones.

Riparian Forests

Munz (1959) did not discuss any riparian forest communities, but distinctive communities are found along portions of many streams. So many dominant species are involved over such a wide elevational range that it is difficult to characterize riparian community types. Yet three general types are apparent. The first type is a group of distinctly "Californian" communities. They grow along larger streams flowing from the lower portion of the Mixed Conifer and Mixed Evergreen Forests through the Foothill Woodland, out into the valleys. California sycamore, California boxelder, and Fremont cottonwood are important at lower elevations, together with several willows. Knapp (1965) called this community the *California sycamore bottomland woods.* At higher elevations bigleaf maple may be present, and white alder becomes dominant in what Knapp (1965) called the *California white alder bottomland woods.* On the fertile valley flood plains, valley oak may be part of the riparian forest (Thompson 1961). Hinds walnut is important along the lower Sacramento River.

In the second type of riparian community, species from the north are conspicuous. Red alder along the coastal streams is a good example. Black cottonwood also grows along the coastal streams and reappears at higher elevations in the mountains. Oregon ash might be put in this group.

The third type includes species that are related to widespread continental communities. Included here are narrowleaf cottonwood, water birch, and velvet ash. The few California colonies of western hackberry are not in riparian forests, but they survive in moist spots and are related to this group.

SPECIES NOTES

Abies firs

(Pinaceae Pine Family)

About 40 species of firs have been described in the Northern Hemisphere. Of the nine species native to the United States and Canada, seven grow in California and are mapped in this atlas. One species, bristlecone fir, is endemic to California.

Abies amabilis (Dougl.) Forbes

Pacific silver fir *Map 1*

This fir is common in the Olympic and Cascade Mountains of the Pacific Northwest, but rare in California (Fowells 1965). In the north it grows in the cool, wet forests of the "*Abies amabilis* zone" (Franklin and Dyrness 1969). South of Crater Lake, Oregon, Pacific silver fir is found only as isolated groves in western Siskiyou County, California. In 1928, Roxana S. Ferris and Doris K. Kildale collected Pacific silver fir near Hancock Lake in the Marble Mountains but labeled their specimens *A. lasiocarpa* (Gillespie 1931). While mapping for the VTM survey in 1932, Alfred K. Crebbin mapped and correctly identified *A. amabilis* stands near Hancock Lake and Ukonum Lake. Haddock (1961) later publicized these two localities. They were described in greater detail by Lewis (1966). Additional stands were discovered in the Siskiyou Mountains between Copper Butte and Joe Creek by Eugene L. Parker in 1961. The California stands range from 5,600 to 7,000 feet elevation.

Other references: Sawyer and Thornburgh 1969.
Personal correspondence: Eugene L. Parker, Sept. 25, 1961; June 10, 1970.

Abies bracteata D. Don

bristlecone fir, Santa Lucia fir *Map 2*

Bristle cone fir is the rarest and most unusual fir in North America. It is found only in parts of the Santa Lucia Mountains, California. Here it is locally common within the Mixed Evergreen Forest above the Redwood Forest. The fir tends to be concentrated in steep, rocky, fire-resistant spots at elevations from 2,000 to 5,000 feet. The most inland stand, 13 miles from the Pacific Coast, is in Anastasia Canyon.

The southern limit has been listed as San Carpoforo Creek, in or near San Luis Obispo County (Jepson 1910, Van Rensselaer 1943), but the existence of these stands has been questioned (Howitt and Howell 1964, Little 1971). Olson (1968b) photographed a bristlecone fir population on Marmolejo Creek, 7 miles into San Luis Obispo County. A 1927 specimen collected by Chester Dudley on "upper Las Tablas Creek" (Hoover 1970) would be from a locality several miles farther south, but we have no confirmation of this locality.

We also have no confirmation of local rumors that the fir grows as far north as Danish Creek or Mount Carmel. The northernmost tree recorded by the VTM was on Skinner Ridge. It may not have survived the last fire in that area. Shreve's (1927) record of this fir at the 750-foot elevation on the North Fork of the Little Sur River is questionable, and the stand cannot be relocated. One disjunct colony of fir does grow at the 600-foot elevation on the Big Sur River near Ventana Camp.

In 1831, Thomas Coulter collected bristlecone fir on the ridge west of Mission San Antonio. The following year, David Douglas probably found the fir at the same locality. Both botanical explorers sent their specimens to Europe, and competing names *(bracteata* versus *venusta)* were published in 1836. The name based on Coulter's material appeared slightly earlier.

Other references: Eastwood 1897, Griffin 1968, Olson 1968a, Talley 1970.
Personal Correspondence: Neil Havlik, Sept. 24, 1970.

Abies concolor (Gord. & Glend.) Lindl. *(lowiana* [Gord.] A. Murr.)

California white fir, white fir *Map 3*

White fir is widely distributed in the western United States from southern Oregon to New Mexico, and south into Mexico (Fowells 1965). The California form of this variable fir is sometimes considered a separate variety or species.

In California, white fir is common–often dominant–in the higher-elevation phases of the Mixed Conifer Forest. Near its upper limits, white fir is often associated with red fir, but the two species are not known to hybridize in nature. White fir is the only fir in the depauperate Mixed Conifer Forest of the Warner Mountains. Several colonies survive near springs in the barren range east of the Warner Mountains in northwestern Nevada (Critchfield and Allenbaugh 1969). White fir is strangely absent from the relict stands of Mixed Conifer Forest in the Santa Lucia Mountains. Shreve (1927) erred in listing it as native to this mountain range.

The Clark and Kingston Mountain stands in the Mojave Desert are closely related to the Rocky Mountain form of white fir, which differs from California white fir in its morphological and chemical characters. To a lesser degree this interior fir influence is evident in other southern California populations as far north as the Tehachapi Mountains.

In northwestern California, white fir is increasingly influenced by grand fir. These intermediate stands occur in the same montane habitats as white fir farther south. They are a minimum of several miles inland and at least 1,000 feet higher than typical grand fir (see section on grand fir). The influence of grand fir is evident as far south as the mountains of Humboldt and Trinity Counties. Traces of grand fir also extend east to the Warner Mountains. On two occasions in recent years, fir logs with red bark like that of grand fir have

been observed there, but no intact trees with red bark have been found yet.

Other references: Applegate 1938, Clokey 1951, Daniels 1969, Grinnell 1908, Grinnell and Storer 1924, Hamrick 1966, Hemphill 1952, Howell 1940-42, Little 1966a, Miller 1940, Milligan 1968, Raven 1950-53, Roof 1969a, Wells and Berger 1967, Wolf 1938.

Abies grandis (Dougl.) Lindl.
grand fir *Map 4*

Grand fir is common at middle elevations in the interior mountains of the upper Columbia River basin from northern Idaho to British Columbia. It is also widely distributed in western Washington and Oregon at lower elevations (Fowells 1965, Franklin and Dyrness 1969). Farther south, in California, it is increasingly restricted to the vicinity of the coast, where it grows in lower-elevation, more temperate habitats than stands of white fir or white fir- grand fir intermediates (see section on white fir).

In this coastal strip, grand fir is scattered in the North Coastal Coniferous Forest and the Redwood Forest, usually below 2,000 feet. It is also found in the Closed-cone Pine Forest on the immediate coast. Joseph P. Tracy noted one stand unusually far inland in Humboldt County, on the Van Duzen River near Dinsmores. The most interior outpost of grand fir found by the SV survey was on Asbill Creek at 2,000 feet elevation in northeastern Mendocino County. The traditional southern limit has been near Fort Ross, but Knight (1965) recently discovered grand fir south of the Russian River on Willow Creek. Sudworth's (1908) reports of grand fir at elevations above 3,000 feet in Humboldt County were probably based on intergrades with white fir.

Other references: Powell 1968, Tracy (n/d).

Abies lasiocarpa (Hook.) Nutt.
subalpine fir *Map 5*

This is the most widely distributed fir in North America, scattered from Alaska to southern Arizona (Fowells 1965). In the interior, subalpine fir often forms the highest elevation forest zone, but toward the coast it is ecologically replaced by the "*Tsuga mertensiana* zone" (Franklin and Dyrness 1969). Subalpine fir ranges south along the Cascades as far as the Mountain Lakes Wilderness Area in Oregon, often in high-mountain valley bottoms and frost pockets. Farther south in Oregon only one small, shrubby colony is known, on Mount Ashland (Waring 1969). This tiny stand probably furnished the basis for Sudworth's (1908) report of subalpine fir on the north side of the Siskiyou Mountains.

This species was not known to extend south into California until 1969, when Sawyer, Thornburgh, and Bowman (1970) discovered it on Russian Peak. They found healthy, expanding populations in the Sugar Lake and Duck Lake basins at elevations from 5,800 to 6,000 feet. These relict stands of fir are surrounded by larger populations of Engelmann spruce.

For several years questions have arisen about the identity of several fir colonies in the Marble Mountains, particularly near Deep Lake. One suggestion was that they were *A. amabilis*, which does occur elsewhere in the Marble Mountains. But after comparing Deep Lake and Russian Peak material, Donald Hemphill now states that the Deep Lake firs are *A. lasiocarpa*. It is possible that other Marble Mountain fir colonies may also be *A. lasiocarpa*. The Deep Lake locality is not shown on Map 5.

Other references: Lewis 1966, Sawyer and Thornburgh 1969, 1970.
Personal correspondence: Donald V. Hemphill, Jan. 25, 1972.

Abies magnifica A. Murr. (including var. *shastensis* Lemm., Shasta red fir)
California red fir, red fir *Map 6*

In California, *Abies magnifica* dominates the Red Fir Forest of the Sierra Nevada-Cascade Ranges. From Lassen Peak, California, to the vicinity of Crater Lake, Oregon, red fir is usually represented by var. *shastensis*, which has cones with partly exserted bracts. In this region the influence of noble fir (an exserted-bract species) is increasingly evident from south to north and from east to west. North of about 44° north latitude, Shasta red fir is completely replaced by typical noble fir. There are no sharp geographic boundaries within this species complex, and we have shown red and noble fir distribution on the same map. In general, however, the high-elevation firs north and west of the Klamath River resemble noble fir more than red fir. Below the Klamath River the high-elevation firs are more consistently Shasta-like. The Coast Range arm of Shasta red fir distribution extends southward to Snow Mountain in Lake County (Hemphill 1952).

In the northern and central Sierra Nevada the hidden-bract cone type prevails. But in the southern Sierra Nevada red fir again has cones with exserted bracts. The southern limit of the species is on Sunday Peak, just into Kern County (Twisselmann 1967).

We have little information on the extent of red fir on the eastern slopes of the Sierra Nevada. It is probably more common in Inyo and Mono Counties than our map suggests. Oosting and Billings (1943) stated that red fir does not occur east of Mount Rose, Nevada, but the VTM survey found one disjunct locality in the Virginia Range, some 10 miles east of Mount Rose. Red fir is absent from the high-elevation fir forest of the Warner Mountains.

Other references: Franklin 1964, Howell 1940-42, 1946-49, Little 1966a, Parker 1963, Raven 1950-53.

Abies procera Rehd.
noble fir *Map 6*

Noble fir is widespread in the higher elevation forest of the Washington and Oregon Cascades (Fowells 1965). There it is

important in the "*Abies amabilis* zone" and is scattered up into the "*Tsuga mertensiana* zone" (Franklin and Dyrness 1969). Typical noble fir does not extend south into California, but intermediate forms between noble fir and the Shasta form of red fir are common in the Siskiyou Mountains (Franklin 1964, Parker 1963). (See section on red fir.) A few stands with noble fir characteristics have been found in the Marble Mountains (Lewis 1966). According to Sawyer and Thornburgh (1969), the largest "noble fir" stand south of the Klamath River may be on North Trinity Mountain, Humboldt County. Individual trees with some noble fir-like characters are widely scattered in the Shasta red fir forests of the north Coast Ranges and Klamath Mountains. Baker (1954) collected one such specimen as far south as Black Butte, Glenn County.

Acer maples

(Aceraceae Maple Family)

Some 120 tree and shrub species of maples are recognized in the Northern Hemisphere. One species crosses the Equator to Java. Thirteen species grow in North America, with four ranging into California. Two of the California species are typically trees. Neither *Acer circinatum* Pursh nor *A. glabrum* Torr. is predominantly of tree size or form in California, and they are not mapped.

Acer macrophyllum Pursh

bigleaf maple *Map 7*

Bigleaf maple is common along the Pacific Coast from British Columbia to southern California (Fowells 1965). Sargent (1891) and Jepson (1910) listed the extreme southern limit as Hot Springs Valley[1] in San Diego County, but the southern limit shown on our map is based on a single tree found in 1969 growing at Oasis Spring in the Laguna Mountains. Bigleaf maple survives on Santa Cruz Island (Munz 1935). The Sierra Nevada distribution extends south to Sequoia National Park (Rockwell and Stocking 1969), but it is not common south of Mariposa County. No localities east of the Sierra Nevada-Cascade crest came to our attention.

In southern and central California this species is usually riparian. In the northern Sierra Nevada, and particularly in the north Coast Ranges and Klamath Mountains, bigleaf maple is more generally distributed, scattered on shady uplands well away from the streams. This maple spans a broad elevational range in the mountains. In contrast to *Acer negundo,* bigleaf maple does not extend down into the riparian forests along the Central Valley rivers (Jepson 1910).

Bigleaf maple seldom appeared on vegetation type maps. Our compilation is too generalized in northern areas, and in the south all of the scattered riparian localities could not be shown.

[1]See Geographic Location of Place Names, footnote 1, for comment on this place name.

Other references: Boughey 1968, Bowerman 1944, Grinnell 1908, Howell 1940-42, 1970, Howitt and Howell 1964, Knight, Knight, and Howell 1970, Lewis and Gause 1966, Peterson 1966, Powell 1968, Raven and Thompson 1966, Ripley 1969, True 1970, Twisselmann 1967.
Personal communication: Reid Moran, Oct. 12, 1970.

Acer negundo ssp. **californicum** (T. & G.) Wesmael

California boxelder *Map 8*

Boxelder, including its various races, is found throughout much of the United States and south central Canada (Little 1971). It seems to be naturally absent from Oregon and Washington although now widely planted there (Peck 1961). The California subspecies is confined to the State. Here boxelder is usually riparian, often at relatively low elevations. In contrast to bigleaf maple, boxelder follows streams out into the Central Valley. An isolated stand on Yreka Creek in Siskiyou County is far north of the Sacramento Valley distribution (Jepson 1909-36). Although the species may be common along a given stream–for example, the San Lorenzo River in Santa Cruz County–it is not found on all streams in a region. The species seldom appeared on VTM maps.

Other references: Boughey 1968, Bowerman 1944, Howell 1970, Howitt and Howell 1964, Munz 1935, Peterson 1966, Rubtzoff 1953, Twisselmann 1967.
Personal communication: Reid Moran, Oct. 12, 1970.

Aesculus buckeyes

(Hippocastanaceae Buckeye Family)

There are 13 species of buckeyes, all in the Northern Hemisphere. Seven are native to North America, and California has one species, an endemic. Although California buckeye is not always of tree stature, it is mapped in this atlas. A more shrubby species, *Aesculus parryi* A. Gray, occurs in Baja California and grows to within a few miles of the California state line. The California buckeye is more closely related to Asiatic species than to *A. parryi* (Hardin 1957).

Aesculus californica (Spach) Nutt.

California buckeye *Map 9*

A large portion of California buckeye's range lies within the Foothill Woodland which encircles the Central Valley. Although sometimes shrubby, buckeyes in favorable habitats may exceed 45 feet in height. A few individuals appear along stream beds well out onto the floor of the valley–for example, near Modesto. Some colonies reach up to 5,200 feet elevation on Lockwood Creek in Fresno County. The general upper limits of buckeye in the Sierra Nevada, mapped by Vansell, Watkins, and Hosbrook (1940), are shown on Map 9 as a solid line. Jepson (1891) listed buckeye for the Sutter Buttes in the Sacramento Valley, and we have shown it there, although this

occurrence was not confirmed by the VTM survey. The southern limit of the Sierra Nevada-Tehachapi Mountains distribution is on the edge of Antelope Valley in Los Angeles County. We have omitted from the map an isolated occurrence at a spring below Pigeon Pass, on the northeast side of the Box Springs Mountains near Riverside, which Frank C. Vasek suggests was planted by Indians. Buckeye is absent from Santa Barbara County. A few isolated trees were noted by VTM survey crews in northwestern San Luis Obispo County, but significant Coast Range populations start in Monterey County.

In the southern part of its range buckeye tends to form thickets on steep north slopes. In the north, it often grows on rocky canyon bottoms or south aspects. In Humboldt County buckeye continues much farther west than the Foothill Woodland. It is scattered across the Mixed Evergreen and Redwood Forests into the cool, wet Mattole River region. Scattered trees grow on the old terraces along the lower Trinity River between Hawkins Bar and Salyer. Jepson (1910) and Sargent (1926) mentioned buckeye on the South Fork of the Salmon River in Siskiyou County, but we could find no confirmation of this locality even in Jepson's field notes. The single locality in northern Trinity County is based on an old report of buckeye on Canyon Creek (Eastwood 1902), and has no recent confirmation. Jepson (1909-36) reported buckeye in the Sacramento River Canyon near the Shasta-Siskiyou county line.

Other references: Behr 1891, Buttery and Green 1958, Benseler 1968, Eastwood 1902, Hardin 1957, Hoover 1970, Howitt and Howell 1964, Klyver 1931, McClintock and Knight 1968, Parish 1894, Ripley 1969, Roof 1959, Sargent 1926, Stebbins 1968, Twisselmann 1967.
Personal correspondence: Frank C. Vasek, June 10, 1970.

Alnus alders

(Betulaceae Birch Family)

About 30 species of shrub and tree alders have been described. With the exception of one Andean species, all are in the Northern Hemisphere. Of the 10 species in North America four range into California. Neither *Alnus sinuata* (Reg.) Rydb. nor *A. tenufolia* Nutt. is predominantly of tree size or form in California, and neither was mapped.

Alnus rhombifolia Nutt.
white alder *Map 10*

White alder ranges from southern California northward to southern British Columbia and eastward to Idaho. In California it is strictly riparian, and restricted to the most permanent streams. Thus, Jepson (1910) speaks of white alder as a more reliable sign of water than either sycamore or cottonwood. It spans a great elevational range–from below 100 feet to over 8,000 feet (Jepson 1910). White alder follows some Sierra Nevada streams out of the foothills into the edge of the Central Valley. Twisselmann (1967) mentions one isolated colony along the Kern River surprisingly near Bakersfield.

In northern California white alder is absent from the immediate coast, where it is replaced by red alder. White alder is the only alder in southern California. East of the Sierra Nevada-Cascade crest white alder is rare. White alder is scattered on several creeks west of Susanville. The VTM survey found one small stand one mile northwest of Genoa, Nevada, and collected a specimen west of Pyramid Lake.

Other references: Boughey 1968, Bowerman 1944, Grinnell 1908, Higgins 1952, Hoover 1970, Howell 1940-42, Parish 1930, Raven and Thompson 1966, Roof 1959, Thomas 1961, Tracy (n/d).
Personal communication: Charles J. Kraebel (n/d).

Alnus rubra Bong.
red alder *Map 11*

Red alder grows abundantly in a narrow strip along the Pacific Coast from San Luis Obispo County northward to southeastern Alaska. Many references report red alder in the Santa Ynez Mountains of Santa Barbara County, but these reports seem to be based on white alder (Smith 1952, Van Rensselaer 1948).

Although often riparian, red alder does grow on moist uplands within the coastal fog zone in northern California. North of San Francisco isolated colonies of red alder probably grow much farther inland than our type map sources suggest.

Other references: Fowells 1965, Howell 1970, Hoover 1970, Little 1971, Powell 1968, Thomas 1961, Tracy (n/d).

Arbutus madrones

(Ericaceae Heath Family)

About 20 tree and shrub species of madrones are recognized. Three species grow in North America, with one ranging into California. Outside California the closest madrone species is *Arbutus arizonica* (A. Gray) Sarg. in southern Arizona (Little 1950).

Arbutus menziesii Pursh
madrone, Pacific madrone *Map 12*

Madrone grows from southwestern British Columbia to southern California (Fowells 1965). The relict stands in southern California are few and far between (Axelrod 1967b). The extreme southern limit is near Palomar Mountain, San Diego County (Jepson 1910, Meyer 1931). Sudworth (1908) reported a few shrubby individuals in the Santa Monica Mountains, but there is no recent mention that this colony still survives (Raven and Thompson 1966). One relict stand exists on Santa Cruz Island (Axelrod 1967b).

From the Santa Lucia Mountains northward madrone becomes common and is an important part of the Mixed Evergreen Forest. It is also widespread in the Redwood and

Douglas-fir Forests. Scattered populations extend across the Klamath Mountains into the McCloud-Pit River drainage. In southern Shasta County there are colonies on Clover Creek and the North Fork of Battle Creek. There seems to be a distinct gap across eastern Tehama County. Madrone is fairly common in the northern Sierra Nevada in the lower portion of the Mixed Conifer Forest between Butte and Calaveras Counties. The southern limit in the Sierra Nevada appears to be Sudworth's (1908) report of this species on Pilot Ridge.

Other references: Behr 1896, Boughey 1968, Bowerman 1944, Eastwood 1896, Howell 1970, Howitt and Howell 1964, McClintock and Knight 1968.
Personal correspondence: E. Bruce Barron, Sept. 25,1970.

Betula birches

(Betulaceae Birch Family)

About 40 species of birches have been described in the Northern Hemisphere. At least seven tree species occur in North America. Two birches grow in California. *Betula glandulosa* Michx., a relatively rare shrub in montane, boggy habitats in northern California, is not mapped. Water birch is a marginal "tree" in California, although clearly of tree stature in much of its range.

Betula occidentalis Hook. (*fontinalis* Barg.)
water birch *Map 13*

Water birch ranges widely through the interior mountains from western Canada south to Arizona and New Mexico. California is on the western fringe of its main distribution. This birch grows near springs and permanent streams in a few Mojave Desert spots–for example, in Jail Canyon, Panamint Mountains, at 8,500 feet elevation. The White Mountains also have a few birch colonies at elevations of 5,500 to 8,000 feet (Lloyd and Mitchell 1966). The main concentration of water birch colonies is on the east side of the southern Sierra Nevada. Here most creeks running into the Owens Valley between Laurel Creek, Mono County, and Olancha Creek, Inyo County, are lined with water birch (Maciolek and Tunzi 1968, Major and Bamberg 1963, McMinn 1951). The southernmost eastside Sierra Nevada locality that we know of is Haiwee Creek (Davidson 1911). Although Sudworth (1908) and others have reported birch in Kern County, Twisselmann (1967) was unable to confirm these rumors. A few disjunct colonies of birch appear on the west side of the Sierra Nevada in the upper Kings and Kern River drainages (Jepson 1910, McMinn 1951, Rockwell and Stocking 1969).

North of Mono County is a huge gap in the distribution of this birch. The next reported birch localities to the north involve the Feather River area in Butte and Plumas Counties (McMinn 1951). These reports may be based on *Betula glandulosa,* which does grow in this region. We have not found any Feather River specimens of water birch.

Both water birch and *B. glandulosa* have been found in the Warner Mountains. A number of scattered populations of water birch appear in the upper Sacramento, Shasta, Scott, and Salmon River drainages. Additional Siskiyou County specimens came from Seiad and Cottonwood Creeks. Jepson (1909-36) collected this species on Grouse Creek in Humboldt County. Several of these northern California stands must follow streams down almost to the 2,000-foot elevation.

Other references: Clokey 1951, Roof 1969a, Wells and Berger 1967.

Castanopsis (Chrysolepis) chinquapins

(Fagaceae Beech Family)

Some 30 species of chinquapins have been described, mostly in tropical Asia. Only two species grow in North America. Both are found in California. One species–giant chinquapin–can be a tree or a shrub. It is mapped in this atlas. The other species, *Castanopsis sempervirens* (Kell.) Dudl., is always a shrub. Hjelmqvist (1948, 1960) separated the North American species from the main Asian group under the name *Chrysolepis.* This new genus has not yet received wide recognition in California.

Castanopsis chrysophylla (Dougl.) A. DC. (including the shrubby var. *minor* Benth. golden chinquapin)
giant chinquapin *Map 14*

This species ranges from San Luis Obispo County northward to southwestern Washington. In California the tree form is well developed only from Marin County northward (Roof 1969b, 1970). Giant chinquapin trees are widely scattered in the Redwood and Mixed Evergreen Forests. The shrub form is found throughout the range of the species, usually in sterile chaparral habitats. Old references to *Castanopsis chrysophylla* in southern California–for example, in the San Jacinto Mountains (Sargent 1926)–are based on *C. sempervirens*.

In western Siskiyou County the shrub form of *Castanopsis chrysophylla* overlaps that of *C. sempervirens.* The two species probably hybridize in such areas. Cooke (1940) reported *Castanopsis chrysophylla* as an important part of the chaparral on Mount Shasta. Perhaps *Castanopsis* shrubs at lower elevations show some *C. chrysophylla* influence, but typical *C. chrysophylla* shrubs do not seem to grow on Mount Shasta.

A notable disjunct population of giant chinquapin is in El Dorado County, near the Blodgett Forest, where chinquapin trees are scattered within the mesic Mixed Conifer Forest together with tanoak and madrone. The mixture is reminiscent of the coastal occurrences of giant chinquapin.

Other references: Eastwood 1902, Howell 1970, Oberlande: 1953, Powell 1968, Shreve 1927, Thomas 1961, Wells 1962
Personal correspondence: Kenneth Beatty, Nov. 13, 1970.

Celtis hackberries

(Ulmaceae Elm Family)

About 70 tree and shrub species of hackberries grow in both temperate and tropical regions. Of the seven species in North America, five are trees. Only one, a small tree, ranges into California.

Celtis reticulata Torr. *(douglasii* Planch.)
western hackberry, netleaf hackberry *Map 15*

This hackberry occurs in moist spots throughout the drier parts of North America. It is scattered from western Washington south to Arizona, Texas, and northern Mexico. California is on the western margin of the main hackberry distribution. This situation resembles that of water birch, but of the two species, hackberry is rarer in California.

The southernmost colony is in Thing Valley, San Diego County. Another grows near Banning in Riverside County. Several groves are mapped in the mountains of the Mojave Desert, and there are probably other desert localities. In Kern County a group of colonies is found in the Caliente-Tehachapi area, and another colony grows at Democrat Hot Springs on the Kern River (Twisselmann 1967). The northernmost recorded outpost in California is near Independence in Inyo County.

Other references: Adams 1957, Clokey 1951, McMinn 1951.

Chamaecyparis false-cypresses

(Cupressaceae Cypress Family)

All the false-cypresses are forest trees. Three species are native to Japan, Taiwan, or both. In North America three species are recognized. Two extend into California. The third American species is scattered along the Atlantic and Gulf Coasts. False-cypresses are closely related to the true cypresses and have been included in *Cupressus* in the past.

Chamaecyparis lawsoniana (A. Murr.) Parl.
Port-Orford-cedar *Map 16*

Port-Orford-cedar's northern limit is near Coos Bay, Oregon. The species extends south about 220 miles to the central Mad River drainage in Humboldt County. Fowell's (1965) statement of a total range spread of 130 miles is in error. Reports (Knight 1970, Roof 1959) that Port-Orford-cedar grows south of Ferndale are questionable.

In both Oregon and California this species is mixed into a wide variety of forest communities (Franklin and Dyrness 1969). In California it associates with *Thuja plicata* in wet coastal sites near the mouth of the Klamath River. It continues eastward through the Redwood, Douglas-fir, and Mixed Evergreen Forests. Away from the coast Port-Orford-cedar increasingly appears on serpentine soils. The eastern limit of the main distribution is near Indian Creek north of Happy Camp.

Port-Orford-cedar reappears farther inland on the upper Trinity and Sacramento River systems, predominantly on serpentine soils. Although not conspicuous, it is common on the west side of the Sacramento River Canyon from Scott Camp Creek south to Shotgun Creek. It is probably more common on the upper reaches of the Trinity and East Fork of the Trinity Rivers than our incomplete data indicate.

Chamaecyparis nootkatensis (D. Don) Spach
Alaska-cedar *Map 17*

Alaska-cedar occupies a coastal strip from Prince William Sound, Alaska, south through British Columbia (Fowells 1965). In Washington it is an important tree in the "*Tsuga mertensiana* zone" of the western Cascades (Franklin and Dyrness 1969). In Oregon it continues down the Cascades, finally disappearing south of the divide between the Rogue and Umpqua Rivers.

Alaska-cedar is rare in California. In 1939 it was discovered by Oliver V. Matthews on Mount Emily and by Doris G. Niles on Little Grayback (Mason 1941). Whittaker (1961) later noted it on Preston Peak. Several colonies occur on the Oregon side of the Siskiyou Mountains, one on Whiskey Peak (Sargent 1926). In recent years several additional localities have been found in the Preston Peak region, the southernmost at Elk Hole. In most of these southern localities, the trees are relatively small–at times forming almost a ground cover. One of the better stands covers a north-facing cirque above Bear Lake at 5,000 feet.

Other references: Sawyer and Thornburgh 1969.
Personal correspondence: Donald V. Hemphill, Nov. 11, 1970; John O. Sawyer, July 29, 1970, July 6, 1971.

Cornus dogwoods

(Cornaceae Dogwood Family)

Cornus is a genus of small trees, shrubs, and rarely herbaceous perennials. It has some 40 species in the Northern Hemisphere, with one species south of the Equator in Peru. About 16 species grow in the United States, six in California. Only one of the latter is consistently tree-like. The other species are mostly riparian shrubs.

Cornus nuttallii Audubon
Pacific dogwood *Map 18*

Pacific dogwood is a small tree, sometimes a shrub. It ranges north to British Columbia and east to central Idaho. In California, this dogwood is most abundant in the north Coast Ranges, Klamath Mountains, and northern Sierra Nevada. This species thrives in the understory of coniferous forests. Since it is seldom dominant in a community, it does not often appear on vegetation type maps, and the map in this atlas is rather incomplete.

In the Coast Ranges from Mann County southward, Pacific

dogwood is rare. One possibly native tree was found on Mount Tamalpais and there has been one unconfirmed report of trees on Bolinas Ridge (Howell 1970). A locality near Russ Gardens in San Francisco (Behr 1891) has long been extinct. One tree, supposedly native, survives above Glenwood in Santa Cruz County (Thomas 1961). A second, more questionable, Santa Cruz County report (not shown on the map) concerns one tree on Ben Lomond Mountain. In the Santa Lucia Mountains, Roxana S. Ferris found an apparently native tree in upper San Antonio Canyon. Thus, the south Coast Ranges may have some relict native trees but no significant populations.

The Sierra Nevada distribution stops in northern Kern County near Basket Peak (Twisselmann 1967). Pacific dogwood seems to cross the Sierra Nevada- Cascade crest only in the Pit River region. Some populations appear in the Mixed Conifer Forest of eastern Shasta County, and a few trees make it into Modoc County.

In southern California Pacific dogwood reappears in a few scattered localities in the San Gabriel (Cascade Canyon), San Bernardino, San Jacinto (Dark Canyon), and Cuyamaca Mountains and on Palomar Mountain (Munz 1935).

Other references: Behr 1896, Hall and Hall 1912, Powell 1968, Roof 1959, Stebbins 1968, True 1970.

Cupressus cypresses

(Cupressaceae Cypress Family)

As a genus the cypresses are widely distributed in the Northern Hemisphere. Most of the individual species, however, have relatively small ranges. Altogether some 25 species are now recognized. Fifteen cypresses are found in North America, with 10 species growing in California. Of these, eight are endemic to the State, and the other two are basically Californian species. The term "cedar," commonly used in California place names, often refers to a cypress locality.

Cupressus abramsiana C. B. Wolf (C. *goveniana* var. *abramsiana* [C. B. Wolf] Little)

Santa Cruz cypress *Map 19*

This cypress is confined to four populations in the Santa Cruz Mountains. Wolf (1948) discussed the Bonny Doon and Eagle Rock groves. The Butano Ridge stand, which Wolf looked for but could not find, was relocated in 1949 (McMillan 1952). The VTM survey mapped a fourth stand near Boulder Creek which Thomas (1961) called the Brackenbrae grove. These cypress populations all grow in sterile, sandy, chaparral habitats within a Redwood-Mixed Evergreen Forest mosaic.

The southernmost grove, along Martin Road near Bonny Doon, is probably the best known stand. These cypresses, at 1,600 feet elevation, associate with knobcone pine on sandstone outcrops and with ponderosa pine on deeper soils. Seven miles north, near Eagle Rock lookout, is the smallest grove. This stand numbers less than a hundred trees. At 2,500 feet, it is the highest-elevation grove. The larger Brackenbrae population is 3 miles east of Eagle Rock. It lies on the east side of Boulder Creek canyon around the 1,000-foot level. The cypress trees are scattered within knobcone pine thickets. The northernmost stand is 7 miles northwest of Eagle Rock on the south side of Butano Ridge.

Wolf (1948) considered Santa Cruz cypress as intermediate between the rare, coastal Gowen cypress and the widespread, more interior, serpentine-soil Sargent cypress. McMillan 1956) also discussed some of the intermediate features of Santa Cruz cypress. Little (1970, 1971) recognized Santa Cruz cypress as a variety of Gowen cypress. All four of these variable Santa Cruz cypress populations should be restudied in relation to Gowen and Sargent cypresses. In a geographic sense the Santa Cruz cypress can be viewed as a non-serpentine form of Sargent cypress that survives on sandy soils in the Santa Cruz Mountains. There are serpentine outcrops in the Santa Cruz Mountains, but they have no cypresses.

Other references: Zavarin, Lawrence, and Thomas 1971.

Cupressus bakeri Jeps. (including ssp. *matthewsii* C. B. Wolf, Siskiyou Cypress)

Baker cypress, Modoc cypress *Map 20*

The southern outposts of Baker cypress are in Plumas County. In 1924, H. F. Wilcox collected specimens near Wheeler Peak (Wagener and Quick 1963). This 3-acre grove lies at 6,500 feet. Five miles to the north near Mud Lake is a larger stand that reaches up to 6,900 feet within the Red Fir Forest. These two stands are the highest-elevation localities of any California cypresses.

Separated from Mud Lake by a gap of more than 60 miles of Sierra Nevada -Cascade terrain is a series of groves in the Burney Springs-Cypress Camp region of Shasta County. Here the cypresses are scattered in a huge brushfield within the Mixed Conifer Forest at elevations of 4,500 to 5,000 feet. An outlying colony of this population on the "North Fork of South Fork of Cow Creek" (Sudworth 1908) was clearly described in a letter from J. C. LaPlant to Sudworth, but it seems to be extinct now (Griffin and Stone 1967).

The largest Baker cypress population sprawls over some 7,000 acres of recent basalt near Timbered Crater (Stone 1965). This stand, near the corner of Modoc, Shasta, and Siskiyou Counties, ranges in elevation from 3,500 to 4,000 feet. It was discovered by Milo S. Baker in 1898. In 1909, Jepson described Baker cypress as a new species from Baker's specimen. Previously Baker cypress had been confused with the rather unrelated MacNab cypress.

A 55-mile gap separates the Timbered Crater cypresses from the next population, on the north slope of Goosenest Mountain at about 5,500 feet (Wolf 1948). About 40 miles farther north in the Cascades, near Prospect, Oregon, is the extreme northern limit of Baker cypress (Little 1970).

Two groups of cypress populations are scattered across the Siskiyou Mountains–one in the Seiad Creek region of California and the second in the Miller Lake - Steve Peak area of Oregon (Wolf 1948). The VTM survey also mapped Baker cypress on the East Fork of Elk Creek, southeast of Happy Camp.

The Sierra Nevada-Cascade groves are on various types of basic igneous rock. In contrast, the cypresses in the Siskiyou Mountains tend to grow on or near serpentine soils.

Wolf segregated the groves in the Siskiyou Mountains and the Goosenest Mountain stand as ssp. *matthewsii*. Since Wolf did not know about the Prospect, Elk Creek, or Plumas County populations, they did not enter into the subspecies consideration. Perhaps the whole subspecies problem should be reviewed.

Other references: Sudworth (n/d).

Cupressus forbesii Jeps. (*C. guadalupensis* var. *forbesii* [Jepson] Little)
Tecate cypress *Map 21*

Tecate cypress was probably collected in 1872 by James G. Cooper in the Santa Ana Mountains of Orange County (Wolf 1948). This cypress was known from the San Ysidro Mountains of San Diego County in 1880. At various times this taxon was called Gowen cypress, Guadalupe cypress, Monterey cypress, and Sargent cypress. In 1907 Charles N. Forbes brought the problem to Jepson's attention, and Jepson described Tecate cypress as a new species (Jepson 1922). Little (1970, 1971) recognized Tecate cypress as a variety of *Cupressus guadalupensis.*

Wolf's (1948) discussion of the range of Tecate cypress is still essentially complete. The VTM survey provided more detail on areas of cypress dominance, but no new population centers have been found.

The bulk of the California distribution lies on the slopes of Otay Mountain. The cypress is common in the chaparral above the 2,000-foot level, and stragglers are found as low as 1,000 feet elevation. This stand continues across the border into Baja California. Five miles to the east are additional colonies in the Tecate Peak-Potrero Creek area. The Tecate Peak trees also range across the Mexican border.

Some 17 miles north of Potrero Creek near the Guatay Campground is a smaller population of Tecate cypress. It is scattered in chaparral around the 4,000-foot level.

The northernmost grove, in the Santa Ana Mountains, is isolated from the San Diego stands by more than 100 miles. It is scattered on the northwest slopes of Sierra Peak, with a few individuals across the Santa Ana River. Most of this stand has burned twice since 1950 but has reproduced well.

Several disjunct groves extend the range of this cypress about 150 miles south of the San Diego County stands into Baja California (Little 1971).

Cupressus goveniana Gord.
Gowen cypress *Map 22*

Gowen cypress is restricted to two populations on the Monterey Peninsula. The larger and better known grove is in Del Monte Forest, between Congress Road and the Pacific Grove- Carmel Highway. This stand is often called the Huckleberry Hill grove. It was discovered by Karl T. Hartweg in 1847.

The cypresses grow on late Pleistocene beach terraces with partially podzolized soils. The Gowen cypress shares this sterile, acid, poorly drained habitat with bishop pine and a number of disjunct or endemic shrubs and herbs. Deeper, more fertile soils surrounding the Gowen cypress grove support Monterey pine forest. The Huckleberry Hill cypress grove lies 2 miles inland from the Monterey cypress stand at Point Cypress.

The other Gowen cypress grove is about 5 miles to the south, near Gibson Creek. This grove is within the Point Lobos State Reserve, but is isolated by 1 mile from the Point Lobos Monterey cypresses. The Gibson Creek cypresses are again surrounded by Monterey pine forest, but no bishop pine is associated with them. On some maps this slope above Gibson Creek is also, unfortunately, labeled "Huckleberry Hill."

Gowen cypress is closely related to Mendocino cypress. The whole ecological situation at Huckleberry Hill is reminiscent of the Mendocino cypress pygmy forest barrens on podzol soils near Fort Bragg (Jenny, Arkley, and Schultz 1969). Gowen cypresses grow less vigorously than Mendocino cypresses and form shorter, broader crowns–even on fertile soils. The tallest Gowen cypress that James R. Griffin could find in 1970 at Huckleberry Hill was only 40 feet in height.

Other references: Seeman 1970, Zavarin, Lawrence, and Thomas 1971.

Cupressus macnabiana A. Murr.
MacNab cypress *Map 23*

MacNab cypress is one of the more common California cypresses. It is widely scattered on relatively poor soils in the Foothill Woodland and Chaparral of northern California. Some populations, composed of only a few trees, are separated by scores of miles from the nearest cypress, but other populations form the dominant cover over thousands of acres. MacNab cypress is often shrubby, particularly in frequently burned habitats. However, in 1965, James R. Griffin found one old-growth MacNab cypress near Round Mountain, Shasta County, that was 55 feet tall and 26 inches in diameter. Paul J. Zinke in 1949 noticed some MacNab cypresses about 60 feet tall in southeastern Mendocino County.

The southern limit for MacNab cypress in the north Coast Ranges is Hooker Canyon (Cavedale Road) in southeastern Sonoma County. In 1905, G. Syme wrote to Sudworth describing two additional groves in the Hooker Canyon vicinity: one 4 miles north and the other 2 miles southeast. We

do not know the current status of Syme's Sonoma County localities.

In the north Coast Ranges MacNab cypress is locally abundant. There it is usually found on soils derived from serpentinized, ultrabasic rocks. It is sometimes associated with Sargent cypress. When these two species grow together, MacNab cypress tends to be the shrubbier species and grows more often on the upper slopes. The westernmost stand was mapped by the SV survey on Red Mountain, northwestern Mendocino County. Apparently a few MacNab cypresses occur there within an extensive Sargent cypress population. Our vegetation type information from northern Napa County is scanty, and additional MacNab cypress groves may well be present there.

The Shasta and Tehama County stands were recently described in detail (Griffin and Stone 1967). Since that review two additional colonies have been located in Shasta County. In 1967, James R. Griffin found a small grove between the Round Mountain and Montgomery Creek populations. E. Bruce Barron located a grove several miles east of the Ash Creek population. The best known Shasta County stand was destroyed by the construction of Whiskeytown Lake.

There still seems to be a 55-mile gap between the scattered Nevada County cypresses and the Amador County grove near River Pines (the Aukum stand of Wolf [1948]). Willis W. Wagener told Munz (1968) of another Amador County grove east of Amador City. Chester 0. Stone has been unable to locate this grove in the field.

In the Sierra Nevada - Cascade foothills, MacNab cypress grows on a variety of rock types–greenstone, gabbro, basalt, and conglomerates (Griffin and Stone 1967). The River Pines, Grass Valley-Nevada City, and Magalia stands are on serpentine.

MacNab and Sargent cypresses are the only California cypresses whose distributions overlap. Wolf (1948) discounted all suggestions of hybridization between them, and in many places where they meet there are no intermediates. But field observations increasingly suggest some hybridization, particularly in northern Napa County.

Other references: Sudworth (n/d), True 1970.
Personal correspondence: E. Bruce Barron, Jan. 12, 1970, Chester O. Stone, Dec. 11, 1969.

Cupressus macrocarpa Hartw.
Monterey cypress *Map 24*

Monterey cypress is restricted to two populations on and near the Monterey Peninsula. Both groves are on the immediate seacoast. Cypresses on the granitic headlands have gnarled, picturesque form, while individuals in more sheltered spots are large, broad-crowned trees.

The larger population is scattered along the Seventeen Mile Drive in Del Monte Forest between Point Cypress and Pescadero Point. Greene (1929) gave a detailed account of this stand before the start of much golf course and residential development in the area. At that time, the inland edge of the cypress grove was being crowded out by the more aggressive Monterey pine forest.

Three miles south of Pescadero Point, across Carmel Bay, is the second Monterey cypress population. It is within, and the main reason for the establishment of, the Point Lobos State Reserve.

Inland from both Monterey cypress populations are Gowen cypress groves (see section on Gowen cypress). Although Monterey and Gowen cypresses belong to the same group of related coastal species, they are relatively distinct (Zavarin, Lawrence, and Thomas 1971). There has never been any serious attempt to consolidate them into one species. Both were discovered by Karl T. Hartweg. Monterey cypress was found in 1846 a few months before Gowen cypress. Why some of the earlier botanical explorers who visited the Monterey area did not find these cypresses is not clear.

Monterey cypress has been extensively planted along the California coastline. Some of the old plantings are becoming naturalized (Hoover 1970, Howell 1970). A few could easily be mistaken for natural populations in the future.

Cupressus nevadensis Abrams (*C. arizonica* var. *nevadensis* [Abrams] Little)
Piute cypress *Map 25*

Piute cypress groves are sprinkled along 45 miles of the central Kern River drainage (Twisselmann 1967). The small cypress trees grow in Chaparral and an arid phase of the Foothill Woodland on a variety of soil types. The northernmost grove was discovered in 1969 by Robert Luthey 1 mile west of Corral Creek Campground in Tulare County. The largest and best known stand is on the north slope of Bald Eagle Peak, south of Bodfish, between 4,000 and 6,000 feet. Abrams collected the type specimen of this species at this grove in 1915. The southernmost grove was mapped by the VTM survey in Back Canyon near the head of Caliente Creek. Wolf (1948) knew of only three Piute cypress populations. At least six new localities have been found. Perhaps a few additional groves have yet to be discovered.

Piute cypress is clearly related to Arizona cypress, and Little (1966b, 1971) recognized it as a variety of Arizona cypress.

Other references: Twisselmann 1962.
Personal correspondence: Ernest C. Twisselmann, May 10, 1968.

Cupressus pygmaea (Lemur.) Sarg. (*C. goveniana* var. *pigmaea* Lemm.)
Mendocino cypress *Map 26*

The bulk of Mendocino cypress distribution lies between Fort Bragg (Virgin Creek) and Albion (Little Salmon Creek). There stunted cypresses grow on an extremely acid, sterile, podzol soil developed on old beach terraces (Jenny, Arkley,

and Schultz 1969). These "pygmy" cypresses are associated with *Pinus contorta* and *P. muricata.* Fertile soils surrounding the cypress barrens support productive Redwood Forest. This species has been called pygmy cypress, but this name is misleading. "Pygmy" cypresses which grow on better soils form large trees–well over 100 feet tall.

Several Mendocino cypress populations are scattered south of Point Arena (Galloway Creek, Slick Rock Creek, Roseman Creek). Wolf (1948) referred to these as the "Anchor Bay" locality. The soil sterility in these spots is not as extreme as in the Fort Bragg barrens (McMillan 1956). These cypresses are again associated with *Pinus muricata.*

The southernmost grove was recently found and mapped by the SV survey in Sonoma County (Powell 1968). It is in Miller Gulch south of Plantation. This Mendocino cypress grove, which is on a partially podzolized soil, is only 9 miles west of "The Cedars," a large Sargent cypress population on serpentine.

John G. Lemmon described Mendocino cypress in 1895 as a variety of Gowen cypress. Charles S. Sargent described it as a separate species in 1901. Since then there has been much confusion and debate about the taxonomic status of these cypresses. Little (1970, 1971) recognizes Mendocino cypress as a variety of Gowen cypress.

Other references: Zavarin, Lawrence, and Thomas 1971.
Personal correspondence: Ray T. Collette, Jr., Aug. 21, 1970.

Cupressus sargentii Jeps.
Sargent cypress *Map 27*

Sargent cypress is not at all rare. It is locally abundant in scattered populations along 400 miles of the Coast Ranges. Some of the most extensive stands are in the Eden Valley region of eastern Mendocino County. Almost all Sargent cypresses are restricted to soils derived from serpentine. In the north Coast Range Sargent cypress tends to be concentrated near creeks and lower canyon slopes. In protected spots and on better soils the trees may be 50 to 100 feet tall. At times Sargent cypress forms vast dense shrubby thickets on ridges, as on Cedar Roughs in Napa County.

The northern limit is on Red Mountain north of Cummings in Mendocino County. The southernmost grove is in Chiminea Canyon near Zaca Peak, Santa Barbara County. Compared to the distribution of Gowen or Mendocino cypress, Sargent cypress is a relatively interior species. Mount Tamalpais, Marin County, and Alder Creek, Monterey County, are the most nearly coastal Sargent cypress localities. The most interior trees are on Little Stony Creek in Colusa County. Sargent cypress meets MacNab cypress in a number of places in the north Coast Ranges (see section on MacNab cypress).

When Sargent cypress became known to the botanical community is not certain. Jepson described it as a new species in 1909, but he had seen Sargent cypress on Cedar Mountain in Alameda County as early as 1880. And the name "Cedar Mountain" was already in general use at that time. Sargent cypress has been confused with a number of other California species. It is probably most closely related to Santa Cruz and Gowen cypresses.

Other references: Hardham 1962, Howell 1970, Wolf 1948, Zavarin, Lawrence, and Thomas 1971.

Cupressus stephensonii C. B. Wolf (*C. arizonica* var. *stephensonii* [C. B. Wolf] Little)
Cuyamaca cypress *Map 28*

Local ranchers knew of cypresses in the King Creek region of Cuyamaca Peak in San Diego County as early as 1900 (Wolf 1948). Later J. Bert Stephenson, the Descanso District Ranger, became interested in these trees and distributed specimens to several herbaria. Wolf described the cypresses as a new species in 1948.

The type locality on upper King Creek is still the only known stand of this species. Thus, this cypress has the most restricted range of any tree in California. Fires which swept the Cuyamaca region in 1950 and 1970 further reduced the size of this single population. The young cypresses are scattered within chaparral at the 4,000-foot level.

Many references to this cypress have been vague about whether the grove was in the Cuyamaca Rancho State Park or in the adjacent Cleveland National Forest. Apparently the species grows in both, with the larger portion of the existent population on the National Forest (Little 1970).

Cuyamaca cypress, like Piute cypress, is closely related to Arizona cypress. Little (1966b) recognized both as varieties of Arizona cypress.

The Cuyamaca cypress grove is only about 6 miles from the Guatay locality of the unrelated Tecate cypress.

Fraxinus ashes

(Oleaceae Olive Family)

Tree and shrub ash species number about 65—all in the Northern Hemisphere. Of 16 species in the United States, four extend into California. Two species–*Fraxinus anomala* Torr., growing on several ranges in the Mojave Desert, and *F. dipetala* Hook. & Am., widely scattered in chaparral habitats from Siskiyou County southward–are not consistently of tree size or form. Neither is mapped. The two species included here, *Fraxinus latifolia* and *F. velutina,* were both classified as subspecies of the eastern *F. pennsylvanicum* by Miller (1955).

Fraxinus latifolia Benth.
Oregon ash *Map 29*

Oregon ash ranges from British Columbia to southern California in riparian habitats. In southwestern Oregon it is common in swales and swamps. In California, Oregon ash is very conspicuous in the canyons of the Pit and Sacramento Rivers. It was probably a minor component of the pristine riparian forest of the Sacramento Valley. "Ashes" were

noticed on the lower Sacramento, Feather, and Yuba Rivers by early travelers (Thompson 1961).

In the south Coast Ranges, Oregon ash is rare (Thomas 1961). Jepson (1910) reported the Coast Range southern limit as near Gilroy.

South of the Kern River Oregon ash becomes increasingly similar to the closely related *Fraxinus velutina,* and there is no sharp boundary between the two species (Munz and Laudermilk 1949). Twisselmann (1967) states that most ashes in Kern County are intermediate in one or more characters between Oregon and velvet ash. The large distribution of *Fraxinus latifolia* shown by Little (1971) in southern California is probably not based on typical Oregon ash.

Other references: Howitt and Howell 1964, Rubtzoff 1953, True 1970.
Personal communication: Audrey E. Kursinski (n/d).

Fraxinus velutina Torr. (including *F. oregona* var. *glabra* Lingelsh. ex Rehd.)
velvet ash, Arizona ash *Map 29*

Velvet ash is a variable species that intergrades with and replaces Oregon ash in southern California (see section on Oregon ash). Some of the localities included in velvet ash here have been called Oregon ash in the older literature–often as var. *glabra.* Munz (1959) refers all of the southern California ashes to *F. velutina* var. *coriacea* (Wats.) Rehd.

The larger portion of velvet ash distribution lies outside California. Velvet ash is scattered in wet places across the deserts into Utah, east to Texas, and south into Mexico.

Other references: Boughey 1968, Clokey 1951, Coville 1893, Jepson 1910, Lewis and Gause 1966, Raven and Thompson 1966, Wolf 1935.
Personal communication: Peter G. Sanchez, Aug. 4, 1970.

Juglans walnuts

(Juglandaceae Walnut Family)

Ten to 20 species of walnuts have been described, mostly in the Northern Hemisphere but with some South American species. Six species are native to the United States, and two of these are endemic to California. The closest walnut outside of California is Arizona walnut (*Juglans major* [Torr.] Heller*)* in Arizona (Little 1950).

Juglans californica S. Wats.
southern California black walnut, California walnut *Map 30*

Juglans californica is locally common in the Southern Oak Woodland from the Santa Ynez Mountains eastward to the Santa Ana Mountains. It usually grows below the 2,500-foot level. This walnut tends to be more shrubby in form than *J. hindsii,* but *J. californica* is often massive in size for a "shrub" (Jepson 1910).

Juglans californica is clearly native in southeastern Santa Barbara County. Axelrod (1967b) viewed a *J. californica* colony on Jalama Creek in western Santa Barbara County as a natural disjunct locality. One apparently natural disjunct colony occurs to the east of the main population in San Bernardino County near Etiwanda.

This walnut is becoming established well beyond its natural limits. McMinn (1951) mentioned *J. californica* in San Luis Obispo County, but Hoover (1970) did not know of any walnuts native to the county. Munz (1968) implied that *J. californica* was native to Monterey County, but the Arroyo Seco specimen in question is probably not indigenous (Howitt and Howell 1964). A Cuyamaca Peak specimen from San Diego County is also questionable.

Other references: Boughey 1968.
Personal communication: Reid Moran, Oct. 12, 1970.

Juglans hindsii Jeps.
Hinds walnut (California black walnut) *Map 31*

Few things are certain about the natural distribution of this walnut. One fact is that Richard B. Hinds found walnut scattered along the pristine riparian forest of the lower Sacramento River when he sailed up the river in H.M.S. Sulphur in 1837. There is also evidence that natural populations existed in the Walnut Creek region of Contra Costa County before Spanish settlement. Most of the other traditional localities, such as Mitchell Canyon (Bowerman 1944), Mount Hamilton (Sharsmith 1940), or Atlas Peak and Gordon Valley (Jepson 1917), are based on individual old trees or small groves of trees which were thought to pre-date European settlement. In 1911, Jepson counted 98 annual rings of one tree on Atlas Peak.

The situation is now hopelessly confused, for *J. hindsii* is widely naturalized in central California along the larger creeks and streams. Numerous streams that leave the inner Coast Range foothills in Colusa, Glenn, and Tehama Counties now have stands of large trees that look like natural populations. Yet, these must be relatively recent in origin. Jepson and his colleagues were concerned about the status of *J. hindsii,* and we believe they would have discussed these obvious, easily accessible populations if they had existed as natural-appearing stands in the early 1900's.

Aside from the serious problem of naturalization since Europeans settled in California, there is an older question of Indian influence on walnut distribution. Jepson (1910) observed that some walnut localities coincided with Indian encampments. Jepson and others later emphasized this correlation without adding any facts. Thomsen (1963) studied this problem from a paleobotanical point of view and largely discounted Indian influence on *J. hindsii* distribution.

Other references: Jepson 1892, Jepson (n/d).

Juniperus junipers

(Cupressaceae Cypress Family)

From 40 to 60 tree and shrub species of junipers have been described. They are widely scattered in the Northern Hemisphere. One species grows in the Southern Hemisphere as far south as Rhodesia. Thirteen species are native to the United States. Four junipers range into California, but two of these are not consistently tree-like. *Juniperus communis* var. *saxatilis* Pall. is always a low or prostrate shrub. *Juniperus californica* Carr., which we have omitted, is a more marginal case. In habit California juniper is usually shrubby, but occasionally the shrubs are quite large. One California juniper "shrub" in a fire-proof habitat in Shasta County is 32 feet tall and 40 feet broad. Both of these junipers were mapped by Little (1971). Rocky Mountain juniper, *J. scopulorum* Sarg., comes close to the California border in southern Nevada (Fowells 1965), and there are unconfirmed rumors that this species occurs in Modoc County.

Juniperus occidentalis Hook.
western juniper *Map 32*

Western juniper is a tree of open woodlands, widely distributed in the western United States from southern Washington and western Idaho to southern California (Vasek 1966).

Vasek (1966) recognized two subspecies of western juniper: *occidentalis* and *australis.* Subspecies *occidentalis,* the more northern entity, dominates the Northern Juniper Woodland on the Modoc Plateau. It continues northward on similar relatively low-elevation, volcanic habitats. This form of western juniper is scattered westward across the Cascades into the Scott Valley near Callahan. In the central Klamath River Canyon, western juniper grows as low as 2,000 feet in elevation. East of the Warner Mountains in northwestern Nevada *J. occidentalis* may hybridize with *J. osteosperma* (Vasek 1966).

Subspecies *australis* occurs in higher-elevation habitats, at times approaching 11,000 feet. Along the Sierra Nevada this subspecies is often associated with Jeffrey pine and other subalpine trees on dry, exposed ridges. The northern limit is near Susanville (Vasek 1966). The Sierra Nevada populations extend south to Owens Peak in Kern County (Twisselmann 1967). In west-central Nevada the VTM survey found scattered western junipers on the ridges above the widespread Utah juniper woodland. Disjunct populations of western juniper occur in the San Gabriel and San Bernardino Mountains. There are scattered trees in the Panamint and Inyo Mountains. Two relict individuals, possibly hybrids with Utah juniper, survive in the White Mountains (Vasek 1966).

We have no confirmation of Sudworth's (1908) report of western juniper near Canyon Creek Lakes in the Trinity Alps. Perhaps this report was based on *J. communis.* Jepson did collect western juniper in southeastern Trinity County in 1897 on Soldier Ridge (Vasek 1966). This Trinity County report appears as an excessively large distribution in Fowells (1965) and Little (1971). The report of *J. californica* in Jackson County, Oregon (Little 1953), is probably based on western juniper. The northern limits of *J. californica* are far to the south in Shasta County (Little 1971), but *J. occidentalis* crosses the California state line into Jackson County, Oregon, near Mount Ashland.

Other references: Griffin and Powell 1971, Grinnell and Storer 1924, Howell 1940-42, 1946-49, Lewis and Gause 1966, Raven 1950-53.
Personal correspondence: Peter G. Sanchez, Aug. 4, 1970, Frank C. Vasek, Dec. 1966.

Juniperus osteosperma (Torr.) Little
Utah juniper *Map 33*

In habit Utah juniper is intermediate; it is larger and more often tree-like than California juniper, but smaller than western juniper. The bulk of Utah juniper's range is outside of California. It spreads across the Great Basin and adjacent regions from southern California northward to southern Montana and eastward to New Mexico (Vasek 1966).

In California it is dominant in the Pinyon-Juniper Woodland of the desert ranges. Little detailed information is available about the distribution of this community. We have even less data on which woodlands contain Utah juniper.

Disjunct populations of Utah juniper occur in the San Bernardino Mountains (Vasek 1966). There Utah juniper grows from 4,500 to 6,000 feet, between the desert California juniper and the montane western juniper. Another disjunct stand lies within a California juniper woodland north of the San Gabriel Mountains just west of Phelan.

The VTM survey mapped areas in which Utah juniper was dominant in west-central Nevada. This population crosses the State line and is scattered along the eastern fringes of Sierra Valley. There is some hybridization between Utah and western juniper in this region northwest of Reno. Utah juniper populations also approach California in the northwestern corner of Nevada. Milligan (1968) found a few Utah junipers near Jess Valley, Modoc County, in an area that is predominantly covered with western juniper.

Other references: Clokey 1951, Lloyd and Mitchell 1966, Weislander and Jensen 1945, Wells and Berger 1967.
Personal correspondence: Peter G. Sanchez, Aug. 4, 1970, Philip V. Wells, Sept. 23, 1970, Frank C. Vasek, Dec. 1966.

Libocedrus (Calocedrus) incense-cedars

(Cupressaceae Cypress Family)

This genus has about 12 species in both Northern and Southern Hemispheres. The three species in the Northern Hemisphere–in China, Taiwan, and North America–are some-

times separated into the genus *Calocedrus*. This genus is receiving increasing, but far from unanimous, usage in California (Munz 1968).

Libocedrus decurrens Torr.
incense-cedar *Map 34*

Incense-cedar is largely an Oregon and California species (Fowells 1965). In Oregon it is common in the Mixed Conifer Forest of the eastern Siskiyou and western Cascade Mountains (Franklin and Dyrness 1969). Its northern limit is near Mount Hood. Several stands in Baja California mark the southern limit.

Incense-cedar is sprinkled through the relict Mixed Conifer Forest of southern California, from the Laguna Mountains north to the Tehachapi Mountains and Sierra Madre. The VTM survey mapped several small colonies in the San Emigdio Range (see also Twisselmann 1967). In northern Santa Barbara County the VTM survey found spots where this species had been recently eliminated by fire–snags still standing but no seedlings or saplings to be found.

In the Santa Lucia Mountains there are small stands mostly near streams. An interesting population survives in the arid region to the east of the Santa Lucias in the Clear Creek-San Benito Mountain region. In this highly serpentinized, ultrabasic-rock habitat, incense-cedars are not confined to canyon bottoms but even appear on the most exposed slopes. Scattered stumps in the chaparral and on bald talus slopes suggest that incense-cedar was more widespread before intensive mining activity in this region.

In the Sierra Nevada, from the Greenhorn Mountains northward (Twisselmann 1967), incense-cedar is an important part of the Mixed Conifer Forest over a broad elevational range. At lower elevations it is at times more abundant than the associated pines. Incense-cedar is locally common east of the Sierra Nevada- Cascade crest in the "eastside-pine" phase of the Mixed Conifer Forest. A few colonies appear in the northern Warner Mountains.

In the north Coast Ranges and western portion of the Klamath Ranges incense-cedar tends to be restricted to serpentine soils. Good examples of such serpentine colonies can be seen near Boonville, Mendocino County, and west of Miranda, Humboldt County. To the east, particularly at higher elevations, incense-cedar gradually becomes less restricted to specialized soil situations and is a regular component of the Mixed Conifer Forest.

A few old plantations might be mistaken for natural stands, including those at Kinevan Canyon and Zaca Lake in Santa Barbara County (Van Rensselaer 1948), and on Copernicus Peak in Santa Clara County (Sharsmith 1945).

Other references: Applegate 1938, Brewer (n/d), Grinnell 1908, Klyver 1931, Lewis and Gause 1966, Meyer 1931.

Lithocarpus tanoaks

(Fagaceae Beech Family)

Tanoak is largely an Asian genus. More than 100 tree and shrub species are scattered from Japan to Indonesia. Only one species grows in North America, mostly in California.

Lithocarpus densiflorus (Hook. & Arn.) Rehd. (including the shrubby var. *echinoides* [R. Br.] Abrams)
tanoak *Map 35*

The northern limit of tanoak is near the Umpqua River in southwestern Oregon (Fowells 1965). In both Oregon and California, tanoak is an important part of the Mixed Evergreen Forest. In California it is also an understory species in portions of the Redwood and Douglas-fir Forests. Throughout its range, tanoak frequently associates with madrone.

In San Luis Obispo and Santa Barbara Counties, tanoak is restricted to the most mesic portions of the southern phase of the Mixed Evergreen Forest. Some of these south Coast Range populations are shrubby (Hoover 1970). The VTM survey mapped tanoaks near the eastern end of the Santa Ynez Mountains in Ventura County. Sudworth's (1908) report of tanoak on Mount Pinos, which is perpetuated by Fowells (1965) and Little (1971), is probably in error. Axelrod (1967b) reported tanoak in the Topatopa Mountains of Ventura County, but this locality did not appear in the VTM records.

In parts of Shasta as well as adjacent Trinity and Siskiyou Counties, tanoak is common in a shrubby form on many rocky, exposed ridges, but in protected spots trees up to 50 feet tall can be found. Although Cooke (1940, 1941) excluded tanoak from the Mount Shasta flora, it does grow in the brushfields south of Mount Shasta City.

South of Clover Creek, Shasta County, there seems to be a 50-mile gap in tanoak distribution. Then from Butte County to El Dorado County tanoak is again locally abundant in the middle-elevation Mixed Conifer Forest. Most of these tanoaks are trees but not as large as the coastal tanoaks.

Scattered occurrences of tanoak, usually shrubby in form, are present in Tuolumne and Mariposa Counties. The southernmost record we could find was Jepson's (1910) collection at Devils Gulch in Mariposa County.

Other references: Griffin and Powell 1971, Havlik 1970, Hemphill 1962, McMinn 1951, Oberlander 1953, Roy 1957.

Lyonothamnus Lyontree

(Roseaceae Rose Family)

This genus has no close relatives in the Rose Family. The fossil record suggests that *Lyonothamnus* trees grew in many parts of the western United States in the Tertiary period (Banwar 1970). Now this relict genus only has one species, which is confined to parts of the southern California islands.

Lyonothamnus floribundus A. Gray
Catalina-ironwood, Lyontree *Map 36*

Catalina-ironwood is restricted to four of the southern California islands. A tree form with entire leaves (ssp. *floribundus*) is found only on Santa Catalina Island (Raven 1963, Thorne 1967). A shrubby form with pinnate leaves (ssp. *asplenifolius* [Greene] Raven) grows on Santa Cruz, Santa Rosa, and San Clemente Islands. Older references suggest that both forms grow on Santa Catalina Island, but Raven (1963) and Thorne (1967) doubt that ssp. *asplenifolius* grows there.

William S. Lyon made the type collection on Santa Catalina Island in 1884, but Jepson (1910) suggests that earlier collections had been sent to Europe.

Picea spruces

(Pinaceae Pine Family)

About 35 to 40 species of spruces have been described. All are trees and all are native to the Northern Hemisphere. Eight species grow naturally in North America, three ranging into California.

Picea breweriana S. Wats.
Brewer spruce, weeping spruce *Map 37*

Compared to most North American spruces, Brewer spruce has a restricted range. Yet it is not as rare as the literature suggests. It is far more common, for example, than either of the spruces native to northern Mexico.

Populations of Brewer spruce are sprinkled on higher ridges across 140 miles of the Klamath Mountains. The impression of rarity is due partly to the steep terrain and difficult access of Brewer spruce habitats. The northern outpost, according to Matthews (1966), is on Iron Mountain, Oregon, near the 4,000-foot level. Brewer spruce is locally common in the western Siskiyous in Oregon and both eastern and western Siskiyous in California. It usually occurs above the 5,000-foot level, but extends as low as 3,300 feet on Knopti Creek in Del Norte County (Sawyer and Thornburgh 1969). Brewer spruce seldom grows in pure stands, but it is a minor component in a variety of communities.

Dennis Anderson collected Brewer spruce at East Weaver Lake in Trinity County. This is probably the southern limit for the species.

Disjunct eastern colonies of spruce appear in Castle Crags (Haddock 1938) and the Castle Lake region. This region is not far from the place where Josiah D. Whitney found a single spruce in 1862. He collected a specimen on a volcanic cone north of Strawberry Valley, probably Black Butte. Whitney gave the specimen to Brewer, whose journal indicates that it was the only example seen of this remarkably weeping tree. Brewer spruce was formally described in 1885 from a specimen collected by Thomas J. Howell in the Siskiyou Mountains.

Other references: Brewer (n/d), Sawyer and Thornburgh 1970, Tracy (n/d).
Personal correspondence: Dennis Anderson, June 13, 1970.

Picea engelmannii Parry
Engelmann spruce *Map 38*

This spruce is widely distributed in the higher mountains of western North America from central British Columbia to southern Arizona (Fowells 1965). In California, however, it is rare. Engelmann spruce is clearly related to the widespread eastern white spruce *(P. glauca* [Moench] Voss*)*. Both spruces have been placed in the same species by some botanists.

In the Oregon Cascades Engelmann spruce is a minor component of the "*Tsuga mertensiana* zone" (Franklin and Dyrness 1969). Farther south, in the Siskiyou Mountains of Oregon, Jepson (1909) found a disjunct stand of Engelmann spruce in 1906. This stand, on the East Fork of Ashland Creek, is near the California border, and Jepson anticipated finding it across the state line.

In 1921 W. H. Snell, a forester for the Southern Pacific Company, finally found this spruce in California–but some 90 miles southeast of Mount Ashland. This spruce stand is scattered in a strip along Clark Creek for almost 2 miles. It is within the Mixed Conifer Forest at elevations from 4,000 to 4,500 feet.

A much larger spruce population was later found in the Russian Peak region of Siskiyou County. On the east slope of the mountain, spruce is concentrated in the valley bottoms of Horse Range, Duck Lake, and Sugar Creeks. Individual trees occur along Sugar Creek as low as 3,300 feet. On the western slope the spruce grows mainly along Music Creek and Blakes Fork of South Russian Creek. In several spots on Russian Peak individual Brewer spruces are scattered down into the Engelmann spruce groves. The upper limit of Engelmann spruce is about 6,500 feet. Engelmann spruce groves begin in the Red Fir Forest and extend down into the Mixed Conifer Forest.

Around 1908 Laura F. McDermott, a student of Jepson, collected specimens of what she called Engelmann spruce on Mount Rose, Nevada (Jepson 1909). The circumstances of this collection are now confused. A University of California janitor seems to have lost the cones of this collection before Jepson saw them. The foliage specimens cannot be located, although mountain hemlock specimens collected by McDermott on the same trip are in the Jepson Herbarium.

Other references: Jepson (n/d), Sawyer and Thornburgh 1969, 1970, Sudworth (n/d).

Picea sitchensis (Bong.) Carr.
Sitka spruce *Map 39*

Sitka spruce is common in a coastal strip from southern Alaska to northern California (Fowells 1965). It seldom grows more than 30 miles inland.

The main distribution in California stops in Humboldt County south of Ferndale. Farther south, scattered Sitka

spruce stands reappear in Mendocino County between Fort Bragg and Big River (Jepson 1910). Three trees in Russian Gulch are the southern limits of the species, according to John Olmsted.

Sitka spruce is an important constituent of the North Coastal Coniferous Forest. It is particularly common in boggy areas around the mouths of the larger rivers. Red alder is a frequent associate.

Personal communication: John Olmsted (nod).

Pinus *pines*

(Pinaceae Pine Family)

The pines are a large and diverse genus of trees, with about 94 species in the Northern Hemisphere. One species crosses the Equator in Sumatra. Fifty-nine pines grow in North America. *Pinus* is better represented in California than any other genus of trees, with 19 species. Three pines are strictly endemic to the State. Another eight are basically California species, but range into Baja California, Nevada, or Oregon.

Pinus albicaulis Engelm.

whitebark pine *Map 40*

This subalpine species ranges from central British Columbia south to central California and east to Wyoming (Critchfield and Little 1966). Through much of its range whitebark pine is characteristic of timberline, where it often forms dense thickets.

In California, the bulk of whitebark pine's distribution is along the crest of the Sierra Nevada, in areas where we had very limited vegetation type data. In the southern Sierra Nevada this pine sometimes grows as high as 12,000 feet (Howell 1940-42). North of the Lake Tahoe-Mount Rose area the mountains are no longer high enough to support extensive whitebark pine stands. The VTM survey found a few trees on Peavine Peak, Nevada, northwest of Reno, and there is another outlier in the Virginia Range, Nevada. Whitebark pine grows on Castle Peak in Nevada County (Howell 1943). An old report of this pine on Mount Fillmore in Plumas County seems to be based on *Pinus monticola*. We have no confirmation of Sudworth's (1908) reports of this pine on Spanish Peak or Mount Pleasant in Plumas County.

In the southern Cascades, whitebark pine is common on the high ridges of Lassen Volcanic National Park. It grows on Magee Peak in Shasta County. Scattered stands appear on the highest peaks northeast of Mount Shasta. It encircles Mount Shasta, forming a true timberline (Cooke 1940). The VTM survey found a couple of trees on Black Butte just west of Mount Shasta near the 6,000-foot level. Whitebark pine is common on the higher portions of the Warner Mountains, but we have no type-map information.

In the Klamath Ranges the species is rare–confirmed localities are Mount Eddy, Thompson Peak, Russian Peak, and the Marble Mountains. A few trees occur just north of the California line on Mount Ashland, Oregon (Waring 1969), but the Donomore Meadows locality shown on the maps in Critchfield and Little (1966) and Little (1971) just inside California is probably in error. The Humboldt County locality in Little (1971) must be improperly plotted.

Other references: Billings 1954, Klyver 1931, Lewis 1966, Little 1966a, Maciolek and Tunzi 1968, Major and Bamberg 1963, Peirson 1938, Raven 1950-53, Rockwell and Stocking 1969, Sawyer and Thornburgh 1969, 1970.
Personal correspondence: G. Ledyard Stebbins, Jr., Aug. 6, 1970.

Pinus aristata Engelm.

bristlecone pine *Map 41*

The eastern race of bristlecone pine is common in subalpine forests in parts of Colorado and New Mexico (Bailey 1970). The western race, which Bailey (1970) has named *Pinus longaeva*, extends westward from Utah across the high desert ranges, and just enters the eastern portion of California. In California these ancient pines are common only in the White Mountains at elevations of 9,500 to 11,500 feet, where they dominate the Bristlecone Pine Forest. Even in the White Mountains bristlecone pine is well developed only on dolomitic soils (Wright and Mooney 1965). Scattered populations also appear in the Inyo and Last Chance Mountains, and on Telescope Peak in the Panamint Range. Bristlecone pine was more widely distributed in this region in the recent past (Mehringer and Ferguson 1969).

Other references: Clokey 1951, Little 1956, Lloyd and Mitchell 1966, Powell 1963.

Pinus attenuata Lemm.

knobcone pine *Map 42*

This closed-cone pine reaches its northern limits in the Oregon Cascades, near the North Fork of the Middle Fork of the Willamette River (Critchfield and Little 1966). To the southwest it is abundant in the western Siskiyou Mountains of Oregon. Knobcone pine is widely scattered across the Klamath Mountains in California, where it grows over a wide range of elevations within several forest types–usually on rocky slopes. Much of the northwestern distribution is on serpentine soils.

Knobcone pine ranges eastward over the Cascade Range. On Mount Shasta it approaches 6,000 feet at its upper limits. The pine extends into southwestern Modoc County where we have little vegetation type data. Newcomb (1962) mentioned an old report of knobcone pine in north-central Modoc County, but we could not confirm this locality. Applegate (1938) found one isolated tree on Hippo Butte in the Lava Beds National Monument.

The SV survey mapped two disjunct populations in eastern

Tehama County: several small colonies on Inskip Butte and larger stands in Darling Ravine. The discontinuous Sierra Nevada distribution reaches its southern limits in Yosemite National Park (Cole 1963, Jepson 1910). Munz (1968) mentioned a knobcone pine collection in Tulare County, but there seems to be little evidence for a native population in this region (Rockwell and Stocking 1969). Munz's report may be based on knobcone pine planted along the Mineral King road.

In the Coast Ranges, this species forms dense stands on poor soils within the chaparral zone. Lake County has extensive areas of such frequently burned knobcone pine thickets. Our Napa County data are incomplete, and additional stands may well be found there. Native stands are absent from Mann County, but knobcone pine was planted on Mount Tamalpais near Laurel Dell. This plantation burned in 1945 but successfully regenerated (Howell 1970). Near Swanton in the Santa Cruz Mountains the distribution of knobcone pine meets that of the closely related Monterey pine, and a few natural hybrids have been found. It was in the Santa Cruz Mountains that Karl T. Hartweg first collected knobcone pine in 1845. Coleman's (1905) mention of knobcone pine on the Monterey Peninsula must be in error. Sudworth (1908) and Jepson (1923) repeated this error without any confirming evidence. In San Luis Obispo County the best-known population (Hoover 1970) lies southeast of Cuesta Pass. The VTM survey also found a tree 10 miles to the northwest and a tiny colony east of the Salinas River near Pilitas Creek.

In southern California is a group of populations in the San Bernardino Mountains. A small population grows on Pleasants Peak in the Santa Ana Mountains. A stand near Ensenada, Baja California, some 150 miles away, is the southern limit for the species.

Our map corrects several errors in the knobcone pine maps of Critchfield and Little (1966) and Little (1971). We cannot re-establish the basis for the Butte and Plumas County localities. The stand in southwestern Mendocino County is based on an SV survey error. A re-examination of the VTM data for Santa Barbara County suggests that the mapped locality was not native. Van Rensselaer (1948) cautioned that knobcone pine was planted in several spots in Santa Barbara County.

Axelrod (1967a) suggested that knobcone pine grew in the Purisima Hills of western Santa Barbara County within recent decades. The specimens Axelrod cited lend little support to his suggestion. Loye Miller's 1925 knobcone collection (UCLA 6176, 6177) is labeled "near Lompoc" and implies nothing about a native tree on Purisima Ridge. Carl C. Epling's 1940 cone collections (sample B) and Carl B. Wolf's 1931 specimen (RSABG 2313) both came from Purisima Ridge, but appear to be bishop pine–not knobcone pine. In agreement with Newcomb (1962), we find no conclusive evidence for native stands in Santa Barbara County.

Other references: Bowerman 1944, Constance 1935, Lewis 1966, Stebbins 1968.

Pinus balfouriana Grey. & Balf.
foxtail pine *Map 43*

Several California plant species have disjunct distributions in the Klamath Mountains and the southern Sierra Nevada, 300 to 400 miles apart. Foxtail pine is a good illustration of this pattern. The northern distribution includes several scattered stands in the Marble Mountains (Lewis 1966). Sawyer and Thornburgh (1969) found a stand near High Lake on Russian Peak. Additional stands grow on Mount Eddy and the Scott Mountains, the bulk of the northern trees being in the Trinity Alps. Outliers of the northern group occur on North and South Yolla Bolly.

The Sierra Nevada stands center around the upper South Fork of the Kern River drainage. There foxtail pine is the dominant tree of the extensive Subalpine Forest (Twisselmann 1971). Foxtail pines on the east side of the Sierra Nevada are only 20 miles from the closely related bristlecone pine in the Inyo Mountains. Sudworth's (1908) report of foxtail pine on the Kings-San Joaquin River divide has not been confirmed. The southern known limit of the Sierra Nevada populations is a stand on Sirretta Peak, first encountered by Victor Aubin in 1966. Specimens from this stand were first collected by Tony Gasbarro of the Forest Service in June, 1967.

Other references: Harvey and Mastrogiuseppe 1971, Little 1966a, Mastrogiuseppe [1968] , Rockwell and Stocking 1969, Sawyer and Thornburgh 1970, Twisselmann [1971] .
Personal correspondence: Ronald J. Mastrogiuseppe, Feb. 17, 1969, John Thomas Howell, Feb. 29, 1972.

Pinus contorta Dougl. (including *P. murrayana* Grey. & Balf.)
lodgepole pine, shore pine *Map 44*

Lodgepole pine extends from the central Yukon down to Baja California and east to South Dakota (Critchfield and Little 1966). Within this area it grows at a wider range of elevations–sea level to 12,000 feet–than any other pine. Several names have been applied to regional forms of this variable species. Critchfield (1957) recognized four subspecies. Three of them grow in California, and one grows only in California.

The Sierra Nevada-Cascade form of lodgepole pine is ssp. *murrayana.* This is the "tamarack" of California mountain place names. It is scattered westward in typical form to the Marble Mountains (Lewis 1966) and the eastern Siskiyous (Waring 1969). John Jeffrey first collected this subspecies in the Siskiyou Mountains in 1852. To the east, lodgepole pine is more common on the Modoc Plateau than shown on our map. It continues south in the Sierra Nevada as part of the Red Fir, Lodgepole Pine, and Subalpine Forests. On the Kern Plateau lodgepole pine is common around meadows in a Jeffrey pine phase of the Mixed Conifer Forest. Disjunct colonies grow in the White Mountains (Critchfield 1957, Powell 1963, Lloyd and Mitchell 1966); the largest is a nearly pure stand of about

200 acres near Cabin Creek at an elevation of 10,200 to 10,500 feet. Larger populations appear on the San Gabriel, San Bernardino, and San Jacinto Mountains in southern California.

Shore pine, ssp. *contorta,* is sprinkled along the coastal bluffs and sand dunes as far south as Manchester, Mendocino County. A highly localized closed-cone form, ssp. *bolanderi,* grows on the podzol soils near Fort Bragg in association with Mendocino cypress and bishop pine (Jenny, Arkley, and Schultz 1969, McMillan 1956). An unnamed closed-cone race grows on the low mountains of central Del Norte County.

Other references: Applegate 1938, Grinnell 1908, Lewis and Gause 1966, Maciolek and Tunzi 1968, McKeever 1961, Sawyer and Thornburgh 1969, Twisselmann 1967, 1971
Personal communication: Richard May (n/d).

Pinus coulteri D. Don
Coulter pine *Map 45*

Since the VTM survey covered almost the entire California range of Coulter pine, our map is relatively complete. Only one significant correction to the Critchfield and Little (1966) and Little (1971) versions of this map was noted. We find that the Ventura County localities for Coulter pine were erroneously compiled. The original VTM survey records and current opinions of Clifton F. Smith and Ernest C. Twisselmann suggest that Coulter pine does not grow there. We can now find no evidence for native Coulter pine in Ventura County–a rather strange absence since so much habitat there seems appropriate.

Several colonies on sandy soils near the Nortonville - Somersville area of Contra Costa County form the extreme northern limit for Coulter pine. It covers a larger area on Mount Diablo about 4 miles to the southwest (Bowerman 1944). Rumors of Coulter pine farther north seem to be based on planted Coulter pine in Colusa County and on native Digger pine in Tehama County.

Coulter pine is prominent in the southern California Mixed Conifer Forest, particularly on the lower edges where repeated fires are converting the forest to chaparral. In a number of areas Coulter pine's distribution overlaps that of Jeffrey pine, and some hybridization occurs (see comments under Jeffrey pine). Coulter pine extends southward into Baja California.

Thomas Coulter collected Coulter pine near Cone Peak in the Santa Lucia Mountains in 1831. Coulter's colleague and competitor, David Douglas, also collected this pine about the same time but did not publish it as a new species (Griffin 1964a).

Pinus edulis Engelm.
pinyon *Map 46*

This small, slow-growing pine ranges over much of Colorado, Utah, Arizona, and New Mexico (Critchfield and Little 1966, Fowells 1965). Over this distribution it is usually associated with one of several juniper species in an open "pinyon-juniper" woodland below the ponderosa pine forests.

The pinyon groves in California are the extreme western outposts of this interior species. These pinyon stands on the New York Mountains (Wolf 1938) are associated with singleaf pinyon. Munz (1959) lists an outlier of pinyon in the Little San Bernardino Mountains, but we have omitted this unconfirmed locality.

Pinus flexilis James
limber pine *Map 47*

Pinus flexilis ranges from southern Alberta east to South Dakota and south to New Mexico, where it intergrades with *Pinus strobiformis* (Critchfield and Little 1966). Limber pine's western distribution spreads over the desert mountain tops of southern and east-central California as far north as the Sweetwater Mountains. Several old maps incorrectly show limber pine much farther north in the Warner Mountains (Critchfield and Allenbaugh 1969).

This subalpine species is common on the east side of the Sierra Nevada crest in Inyo County–where we have no vegetation type data. A westside locality on the South Fork of the Kings River mentioned by Sudworth (1908) cannot be confirmed (Bacigalupi 1933).

The western limit of limber pine is in the Mount Pinos region of Kern and Ventura Counties. Ernest C. Twisselmann reports a limber pine on Brush Mountain northwest of Mount Pinos. Twisselmann (1967) mentioned limber pine on nearby Frazier Mountain in Ventura County, but neither Twisselmann nor we can confirm this now.

Other references: Clokey 1951, Howell 1946-49, Little 1966a, Lloyd and Mitchell 1966, Major and Bamberg 1963, Miller 1946, Peirson 1938, Roof 1969a.
Personal correspondence: Ronald J. Mastrogiuseppe, Feb. 17, 1969, Ernest C. Twisselmann, July 29, 1969, Feb. 2, 1970.

Pinus jeffreyi Grey. & Balf.
Jeffrey pine *Map 48*

Although basically a California species, Jeffrey pine extends 60 miles in the Klamath Mountains of Oregon to Myrtle Creek, almost entirely on serpentine soils. Throughout the Klamath Mountains and north Coast Ranges of California, Jeffrey pine predominates on serpentine soils. In this region Jeffrey pine grows on non-serpentine soils only on the higher ridges above 5,000 feet elevation, but on serpentine it extends as low as 200 feet.

North of the Pit River, in both the Cascades and Modoc Plateau, few Jeffrey pines grow. The eastern Siskiyou County stands shown in Critchfield and Little (1966) and Little (1971) seem to be in error. The main population in the Warner Mountains stops south of Cedar Pass. We have seen no native Jeffrey pines north of there, although John W. Duffield and Harry A. Fowells collected Jeffrey pine near the Buck Creek Ranger Station in the northern Warner Mountains. Jeffrey pine

has been extensively planted on the Modoc National Forest, and the Jeffrey pines at Sugar Hill and Hackamore are planted.

From Butte to El Dorado Counties, on a series of serpentine outcrops, Jeffrey pine is often found within the Mixed Conifer Forest at relatively low elevations. It occurs at 1,600 feet at Pulga. The normal pattern throughout the Sierra Nevada and in southern California is for ponderosa pine to occur in the Mixed Conifer Forest, with Jeffrey pine predominating at higher elevations in the Red Fir and Subalpine Forests. Where Jeffrey and ponderosa pines overlap, in the Sierra Nevada and elsewhere in the State, they often hybridize (Haller 1962). Chester B. Beaty found a few relict Jeffrey pines east of the Sierra Nevada in Jeffrey Mine Canyon in the White Mountains.

In the south Coast Ranges the only Jeffrey pine population is restricted to the highly serpentinized Clear Creek - New Idria region of San Benito County. This is the only place where the related Digger, Coulter, and Jeffrey pines grow together in mixed stands (Griffin 1965). Some hybridization between Coulter and Jeffrey pines occurs there. On Chews Ridge in Monterey County Jeffrey pine and hybrids between Coulter and Jeffrey pine grow within a Coulter pine forest (Zobel 1951). The Jeffrey pines on Chews Ridge, however, are thought to be planted (Zobel 1952). Periodically there are rumors of native Jeffrey pines in other parts of the Santa Lucia Mountains, but none of these reports has been confirmed.

In southern California Jeffrey pine increases in importance in the Mixed Conifer Forest and gradually replaces ponderosa pine, particularly in the interior areas (Haller 1962). Jeffrey pine occurs with Coulter pine in a number of places in southern California. Natural hybrids are present in the Laguna, San Bernardino, and San Jacinto Mountains (Zobel 1951). The Imperial - Riverside County locality shown in Little (1971) is in error—it coincides with the Salton Sea.

The southern limit of Jeffrey pine is in the Sierra San Pedro Martir, at least 150 miles south of the border in Baja California.

Other references: Grinnell and Storer 1924, Hemphill 1952, Howell 1940-42, 1946-49, Klyver 1931, Raven 1950-53, Twisselmann 1967.
Personal communication: Chester B. Beaty, Apr. 18, 1967.

Pinus lambertiana Dougl.
sugar pine *Map 49*

The northern limit of sugar pine is in Clackamas County, Oregon (Critchfield and Little 1966). In Oregon, sugar pine is common in the Mixed Conifer Forest of the Cascades and Siskiyou Mountains (Fowells 1965). In the Klamath Mountains and north Coast Ranges of California, sugar pines mix into several forest types as far south as the Mount St. Helena region. Several disjunct colonies of sugar pine grow in coastal Humboldt County in the Kings Range, and a large sugar pine population occurs at the inner edge of the Redwood Forest in the Gualala River region of Mendocino and Sonoma Counties.

In the Cascade - Sierra Nevada Range sugar pine is an important part of the Mixed Conifer Forest over a broad elevational range. Sugar pine is scattered in favorable habitats east of the Cascade crest as far as Island Butte, Lava Beds National Monument (Applegate 1938) and the Big Valley Mountains in Modoc County. Although conspicuous in the Mixed Conifer Forest above the 4,000- to 5,000-foot level, sugar pine does grow at an elevation of 2,000 feet west of Brownsville, Grass Valley, Applegate, and Garden Valley in the northern Sierra Nevada foothills. East of the Sierra Nevada, populations are scattered around the Lake Tahoe basin. A disjunct colony grows east of the main distribution on Owens Peak in Kern County (Twisselmann 1967).

Disjunct stands survive in Monterey County in the Cone Peak-Devils Canyon region and on Junipero Serra Peak. We have found no confirmation for Sudworth's (1908) report of sugar pine in the Santa Cruz Mountains.

Sugar pine is found at higher elevations across the San Gabriel, San Bernardino, and San Jacinto Mountains. Smaller populations occur on Hot Springs Mountain and the Cuyamaca Mountains in San Diego County. The southern limit is on Sierra San Pedro Martir in Baja California.

Other references: Klyver 1931, Powell 1968, Rockwell and Stocking 1969.

Pinus monophylla Torr. & Frem.
singleleaf pinyon *Map 50*

Singleleaf pinyon ranges from southern Idaho to Baja California, but is particularly abundant in Nevada (Critchfield and Little 1966). One outlier of the western Nevada population occurs southeast of Loyalton in Sierra County. Our limited data for the region suggests that from Alpine County southward, singleaf pinyon is common in the Pinyon-Juniper Woodland on arid ranges east of the Sierra Nevada. Singleleaf pinyon continues along the lower eastern slope of the Sierra Nevada into the Tehachapi Mountains, and forms an extensive woodland east of the South Fork of the Kern River. A few small stands of singleleaf pinyon occur west of the Sierra Nevada crest in the Tuolumne, San Joaquin, and Kings River drainages. Some of these westside stands, particularly the colony near Rancheria Creek above Hetch Hetchy, have been viewed as Indian introductions (Harwell 1937).

Singleleaf pinyon is common in northern Ventura County. In the upper Cuyama Valley the singleleaf pinyon woodland almost forms a "forest" (Twisselmann 1967). A few trees occur on top of the 8,000-foot Frazier Mountain. Eben McMillan found one tree on Caliente Mountain in San Luis Obispo County (Hoover 1970).

One singleleaf pinyon survives in a California juniper stand on the west side of the San Bernardino Mountains in the Santa Ana River Gorge (Axelrod 1967b, Sudworth 1908). In southern Riverside and San Diego Counties, Parry pinyon replaces singleleaf pinyon, with little overlap. A few singleleaf

pinyons appear in the Parry pinyon woodland near the California border. The southernmost singleleaf pinyon individuals are about 250 miles south of the California line in Baja California.

Other references: Clokey 1951, Cole 1963, Grinnell 1908, Grinnell and Storer 1924, Klyver 1931, Lewis and Gause 1966, Little 1956, Lloyd and Mitchell 1966, Miller 1946, Rockwell and Stocking 1969, Roof 1969a, St. Andre, Mooney, and Wright 1965, Weislander and Jensen 1945, Wells and Berger 1967.
Personal communication: Donald M. Black, July 7, 1970.

Pinus monticola Dougl.
western white pine *Map 51*

In the Rocky Mountains, western white pine ranges from southeastern British Columbia down into central Idaho (Critchfield and Little 1966). Throughout the Cascades this pine is a minor component in several higher-elevation forest types. In California it continues southward along the Sierra Nevada to the ridge between Big Meadow and Long Meadow in southern Tulare County. Western white pine is common in the Red Fir Forest. It is more common on the eastern slope of the southern Sierra Nevada than suggested by our incomplete data.

In the Klamath Mountains, western white pine is common as far south as the Trinity Alps region. Disjunct stands grow on Bully Choop and both North and South Yolla Bolly. In Del Norte County, western white pine is conspicuous on serpentine soils. On the Smith River near Panther Flat Campground it extends down to 500 feet elevation on serpentine.

Sudworth (1908) and other old references to western white pine in southern California all seem to be wrong.

Other references: Applegate 1938, Cooke 1940, Howell 1940-42, Klyver 1931, Little 1966a, Raven 1950-53.

Pinus muricata D. Don (including *P. remorata* Mason)
bishop pine *Map 52*

Thomas Coulter first collected bishop pine near San Luis Obispo in 1830. Since then the mainland distribution of this remarkably variable pine within the Closed-cone Pine Forest has become well known. One of the last populations to come to public attention was the northernmost stand on Luffenholz Creek near Trinidad Head, Humboldt County (Metcalf 1921). It is possible that the species did extend farther north, for Mason (1949) reported one tree in the coastal forest near Crescent City.

Critchfield and Little (1966) suggested that the range of bishop pine might almost overlap that of the more interior knobcone pine in southern Mendocino County. The SV survey map that this item was based on seems to be wrong–probably only bishop pine grows in the vicinity. Knobcone and bishop pines do approach within a few miles of each other near Lopez Canyon in San Luis Obispo County. We do not support Axelrod's (1967a) suggestion that knobcone pine recently grew within the bishop pine stands on the Purisima Hills of Santa Barbara County (see section on knobcone pine).

In Del Monte Forest on the Monterey Peninsula a bishop pine stand grows within the Monterey pine forest. The bishop pine associates with Gowen cypress on a sterile, partially podzolized soil. Wolf (1948) probably erred when he reported that bishop pine also grew at the Gibson Creek stand of Gowen cypress.

Linhart, Burr, and Conkle (1967) give a detailed account of bishop pine on Santa Cruz and Santa Rosa Islands. An island form of bishop pine with relatively symmetrical, smooth cones has been called *P. remorata.* This cone type also appears in the mainland populations in Santa Barbara County (Linhart, Burr, and Conkle 1967), and as far north as Marin County (Howell 1970). Axelrod (1967a) suggests that *P. remorata* grows on a different soil type than *P. muricata* on Burton Mesa in Santa Barbara County.

In Baja California there is a mainland occurrence of bishop pine near San Vicente. The southern limit of the species is on Cedros Island. The Cedros Island pine (*P. muricata* var. *cedroensis* Howell) differs from mainland bishop pine, and is difficult to distinguish from the Guadalupe Island form of Monterey pine (*P. radiata* var. *binata* Lemm.).

Other references: Critchfield 1967, Duffield 1951, Libby, Bannister, and Linhart 1968.

Pinus ponderosa Laws.
ponderosa pine *Map 53*

Ponderosa pine has an enormous distribution in western North America–almost as great as that of lodgepole pine (Critchfield and Little 1966). Ponderosa pine does not extend as far north into Canada as lodgepole pine, but various forms of ponderosa pine go farther south into Mexico.

Within California, ponderosa pine is one of the most widespread conifers in lower and middle elevation forests. It is important in all phases of the Mixed Conifer Forest. In the Klamath Mountains and north Coast Ranges ponderosa pine is also a minor component in open parts of the Mixed Evergreen and Douglas-fir Forests. In this region ponderosa pine is usually replaced on serpentine soils by Jeffrey pine. The north Coast Range distribution ends on the floor of the Napa Valley near St. Helena. In the south Coast Ranges ponderosa pine is scattered in the Mount Hamilton Range. In the Santa Cruz Mountains it is confined largely to special sandy habitats (Griffin 1964b). Ponderosa pine is common in the Santa Lucia Mountains. Occasional trees grow within a half mile of the coastline.

The Cascade-Sierra Nevada stands of ponderosa pine are virtually continuous southward into the Greenhorn Mountains of Kern County. South of the Kern River ponderosa pine grows on Breckenridge Mountain, but not on the Piute Mountains (Twisselmann 1967). In Shasta County individual pines are scattered along creek beds out into the Sacramento Valley at an elevation of 500 feet. In the Sierra Nevada

foothills scraps of ponderosa pine forest can be found below 2,000 feet in many areas, and individual trees follow stream courses to the 500-foot level in El Dorado County. East of the Sierra Nevada ponderosa pine is not common. In Nevada small stands occur as far east as the Virginia Range on special soils altered by hot spring activity. The VTM survey found a relict stand in the extremely arid region south of Pyramid Lake. In Mono and Inyo Counties most of the eastside ponderosa pines grow as riparian trees along creeks (Haller 1962). Several colonies of ponderosa pines survive in the White Mountains (Lloyd and Mitchell 1966).

In southern California there was some confusion between ponderosa and Jeffrey pines in the VTM mapping. When both species were clearly indicated in the vegetation type maps for a Oven locality we have followed the VTM identifications. This results in scattered ponderosa pine localities on the map in the Mount Pinos region where Vogl and Miller (1968) noticed only Jeffrey pines. The VTM maps also indicated ponderosa pines farther south in San Diego County than J. Robert Haller has found them. Haller is not sure that any ponderosa pines occur south of the Cuyamaca Peak region.

On the Modoc Plateau ponderosa pines are common in the open forest above the Northern Juniper Woodland. These "eastside" ponderosa pines are often morphologically and physiologically different from those of the main California distribution. They can be viewed as a more interior race (Haller 1962). At higher elevations in the Warner Mountains ponderosa pine tends to merge with Washoe pine (Haller 1961). A few ponderosa pines exist on sand dunes at the eastern end of the Madeline Plain, Lassen County in a very arid region (Griffin 1970). Critchfield and Allenbaugh (1969) described a grove of ponderosa pine in the extreme northwestern corner of Nevada and a tiny colony 20 miles farther east on Bald Mountain.

Other references: Clokey 1951, Duffield and Cumming 1949, Hemphill 1963, Jenkinson 1966, Klyver 1931, Lewis and Gause 1966.
Personal communication: Chester B. Beaty, Apr. 16, 1967.

Pinus quadrifolia Parl.
Parry pinyon *Map 54*

Parry pinyon is confined to a strip some 220 miles long (Critchfield and Little 1966). The bulk of this distribution is in Baja California. In California there are scattered trees in southeastern San Diego County. To the northwest, additional trees survive in fire-resistant spots between 4,000 and 6,000 feet on the steep eastern slope of the Laguna Mountains. A few singleleaf pinyons are also scattered in this region.

The main Parry pinyon population in California is in Riverside County. This population starts in the Santa Rosa Mountains and runs northwestward to Thomas Mountain and the head of Bautista Canyon. In general singleleaf pinyon lies on the eastern slopes in this area while Parry pinyon grows on western drainages. These Parry pinyons are not characteristically in open woodlands, but grow within dense chaparral communities. Parry pinyon does occur with Jeffrey pine in Garner Valley and Pine Meadows.

Personal correspondence: Eugene N. Anderson, Jr., Apr. 23, 1970.

Pinus radiata D. Don
Monterey pine *Map 55*

This pine has intrigued travelers to the Monterey Peninsula since Sebastian Vizcaino's visit in 1602. The scientific discovery came much later in 1830 when Thomas Coulter collected specimens at Monterey.

Monterey pine has a widespread fossil record in coastal California (Axelrod 1967a). But now Monterey pine survives naturally in only three mainland areas (Critchfield and Little 1966, Roy 1966b). The northernmost stand is in the Año Nuevo-Swanton vicinity. Over 30 miles to the south lie the more extensive Monterey-Carmel populations, and 65 miles farther south are the Pico Creek - Cambria groves. The southernmost stand on Guadalupe Island, 460 miles south of Cambria, differs in morphology from the mainland stands (see section on bishop pine).

The general boundaries of the three mainland localities have been well known for almost a hundred years. The precise natural limits, however, can no longer be determined. Natural seedlings from planted trees have obscured the edges of the pristine Monterey pine forests. We have no way of proving whether apparently non-planted trees in favorable habitats are relicts from native colonies. The three trees which Hoover (1970) describes near Avila illustrate this problem.

Another old boundary question concerns the Monterey stand. In 1784 John Sykes, the illustrator for the Vancouver Expedition, sketched near Toro Creek some trees that appear to be Monterey pines (Van Nostrand 1968). The locale is about 5 miles east of the traditional Monterey pine forest boundary. The pines in the illustration disappeared, and for perhaps a century pine trees were not known in that vicinity. Recently Monterey pines have been widely planted in the neighborhood.

At the Swanton locality Monterey pine meets the closely related knobcone pine, and some natural hybrids can be found. On the Monterey Peninsula a small bishop pine stand in Del Monte Forest is surrounded by Monterey pine forest. Here natural hybrids seem to be very limited if present at all (Forde 1964).

Despite the unimpressive "forestry" quality of the native California stands, Monterey pine has become one of the most widely planted and commercially valuable timber pines in the world. Hundreds of thousands of acres of Monterey pine have been planted in the Southern Hemisphere, particularly in Australia, New Zealand, and South Africa. When grown in a mild climate–free of its California pests and diseases–Monterey pine displays remarkably good growth.

Other references: Critchfield 1967, Libby, Bannister, and Linhart 1968.

Pinus sabiniana Dougl.

Digger pine *Map 56*

David Douglas collected this California endemic in 1831 while visiting Mission San Juan Bautista (Griffin 1964a). Digger pine is common throughout most of the Foothill Woodland at elevations of 1,000 to 3,000 feet from Shasta County to Los Angeles County (Griffin 1962). Low-elevation stands of Digger pine on the floor of the Sacramento Valley approach 100 feet elevation near Dunnigan, Natoma, and Oroville. Scattered groves occur in dry, rocky slopes within the Mixed Conifer Forest up to the 6,000-foot level. Such groves, particularly in the north, tend to be on sterile soils from serpentine rock (Griffin 1965). A few trees approach the 7,000-foot level near Sawtooth Peak in southwestern Inyo County.

Some distribution maps show Digger pine on the Sutter Buttes in the Sacramento Valley. Local rumors suggest that a few trees may have existed on the North Butte in the past, but no Digger pines seem to be there now. Jepson (1891) mentioned no pines in his early account of a trip to the Buttes, nor did the VTM survey record any there.

One strange feature of Digger pine's distribution is a 55-mile-wide gap in the southern Sierra Nevada foothills. This gap is difficult to explain, for the topography, soils and general vegetation are rather constant across this area. But for some reason Digger pine is missing from the Foothill Woodland between the Kings River and the South Fork of the Tule River. Josiah D. Whitney commented on this gap as early as 1865.

Several old reports place Digger pine in San Bernardino and San Diego Counties, but these rumors seem to be based on Coulter pine. The extreme southern limit is on Piru Creek in Ventura County (Axelrod 1967b).

Since the 1830's, when David Douglas mixed up some of his Oregon and California field observations, there have been many rumors of Digger pine growing in Oregon. All of these reports are questionable. Oliver V. Matthews did, however, find a Digger pine growing near the Rogue River west of Gold Hill, Oregon, in 1945. There is no evidence that this tree was a relict of a natural population. Yet several California species do occur naturally in this region. If Digger pine did grow in Oregon, the Medford- Grants Pass portion of the Rogue River Valley would certainly be an appropriate habitat. Jepson's (1910) report of the northern limit on the South Fork of the Salmon River in Siskiyou County seems to stand. The extreme northwestern outlier was probably on Redwood Creek, where C. Hart Merriam reported a few trees at the "Bair Ranch" in 1907. We have been unable to confirm this report.

One interesting population of Digger pines is on the fringe of the Northern Juniper Woodland in the central Pit River drainage (Griffin 1966). The pines there, ranging up to 5,000 feet on the Hat Creek Rim, are completely isolated from the main Foothill Woodland populations. These Modoc Plateau groves are in dramatic contrast to the southern Monterey County habitats, where Digger pine populations come almost down to the surf. The single tree that Coleman (1905) reported on the Monterey Peninsula was probably planted there.

Other references: Knight 1969, Sudworth (n/d).

Pinus torreyana Parry

Torrey pine *Map 57*

One of the truly rare conifers, Torrey pine is now restricted to two places in southern California. The mainland population is sprinkled along the low coastal bluffs on both sides of the Soledad Valley north of San Diego. Parry collected specimens from this stand in 1850. Jepson (1910) estimated that the pine covered a strip 8 miles long. Our map, based on 1931 VTM survey data, shows less than a 5-mile range. Recent estimates place the total number of trees in the mainland population at around 6,000. Most of the remaining pines south of Soledad Valley are in the Torrey Pines State Reserve. Recently 170 acres of the northern grove, with some 1,500 trees, were added to the reserve.

The Santa Rosa Island population is some 175 miles to the northwest. Haller (1967) estimated the stand as one-half mile long and one-quarter mile wide, ranging in elevation from 200 to 500 feet.

Pinus washoensis Mason & Stockwell

Washoe pine *Map 58*

This high-elevation relative of ponderosa pine is scattered in widely separated spots along the western edge of the Great Basin. It first came to botanical attention through the VTM survey. The field crew mapping on the east slope of Mount Rose, Nevada, noticed that it differed from the local Jeffrey and ponderosa pines, and in 1945 Washoe pine was formally described as a new species.

On Mount Rose, Washoe pine occupies hundreds of acres near the head of Galena Creek at an elevation of 7,000 to 8,000 feet. It is surrounded by Jeffrey pine. Typical ponderosa pine occurs at a lower elevation less than 2 miles away. In 1961, Haller reported on a more extensive stand of Washoe pine in the southern Warner Mountains of Modoc County. Critchfield and Allenbaugh (1965) found several hundred Washoe pines on the Bald Mountain Range 20 miles northwest of Mount Rose. According to Haller (1961), Washoe pines may also be occasional in a variable population of ponderosa and Jeffrey pines between Hobart Mills and Boca. Haller has found individual Washoe pines on Last Chance Creek in Plumas County, and John Thomas Howell discovered several trees near Butte Lake in Lassen Volcanic National Park.

On Mount Rose and the Bald Mountain Range, Washoe pines are isolated from and morphologically distinct from

ponderosa pine. In the Warner Mountains Washoe pines are recognizable at higher elevations (around 8,000 feet) and typical ponderosa pines at lower elevations, but there is a broad zone of intermediates. Haller (1965) reports that farther north in Oregon Washoe pine and the interior form of ponderosa pine are even less distinct.

Other references: Mason and Stockwell 1945, Smith 1971. Personal correspondence: J. Robert Haller, Oct. 14, 1969.

Platanus sycamores

(Plantanaceae Sycamore Family)

The sycamore family has only one genus with about 10 species, all in the Northern Hemisphere. Seven species of sycamores grow in North America, three in the United States. The Arizona sycamore, *P. wrightii* S. Wats., is closely related to the California sycamore, *P. racemosa,* and has been considered a variety of *racemosa* by Benson (1943). We could find no support for the suggestion (Benson and Darrow 1945, Little 1950) that *P. wrightii* grows locally in "southeastern" California.

Platanus racemosa Nutt.
California sycamore *Map 59*

California sycamores never grow on dry, upland slopes. Instead they congregate along live streams, around springs, or in gullies with underground water. Yet the over-all distribution of this species resembles that of no other riparian tree in California.

In the Central Valley, sycamore grows at low elevations along streams from Shasta County (Jepson 1908, 1910) to Kern County (Twisselmann 1967). It was conspicuous in the pristine riparian forests in the Sacramento Valley (Thompson 1961). Although sycamore is locally abundant in parts of the Central Valley, its distribution is spotty. Our data are incomplete for the central portion of the valley. Even so, sycamores are missing from many streams where we would have expected them. Jepson (1910) remarked on the absence of sycamores in the north Coast Ranges and the west side of the Sacramento Valley. We have found no sycamore records for that region either.

In the south Coast Ranges and in southern California sycamore trees are sprinkled abundantly through a wide elevational range. Every likely canyon and creek bottom has sycamores. As Jepson (1910) observed, sycamore is one of the most widely distributed arboreous species there. Sycamore is not known to extend eastward into the Mojave region. The sycamores on Santa Catalina Island appear to be planted (Thorne 1967). California sycamores do continue southward into Baja California.

Other references: Howell 1970, Klyver 1931, Raven and Thompson 1966, Thomas 1961.

Populus poplars, cottonwoods

(Salicaceae Willow Family)

Populus is a large, widespread genus in the North Temperate Zone, with some 30 to 35 species. About 15 poplar species are native to North America, four extending into California.

Populus angustifolia James
narrowleaf cottonwood *Map 60*

This interior cottonwood ranges from southern Alberta, Canada, south into Chihuahua, Mexico. It is the common cottonwood in much of the Rocky Mountain region. California is on the western edge of this distribution. Munz (1959) listed collections from Lone Pine Creek and Division Creek on the east side of the Sierra Nevada. Lloyd and Mitchell (1966) reported narrowleaf cottonwood on Wyman Creek in the White Mountains. The *Populus acuminata* Rydb. reported by DeDecker from Lone Pine Creek (Munz 1968) may be a hybrid derivative of some combination of *P. angustifolia, P. trichocarpa,* and *P. fremontii,* all of which grow there.

Other references: Clokey 1951, Little and Archer 1965.

Populus fremontii S. Wats. (including in part var. *arizonica* [Sarg.] Jeps., *pubescens* Sarg., and *macdougalii* [Rose] Jeps.)
Fremont cottonwood *Map 61*

This variable cottonwood species stretches across the Southwest in wet places from California to Utah, Texas, and Mexico (Little 1971). A number of specific and varietal names have been proposed within the *P. fremontii* complex.

Our distribution map for this riparian species is not entirely satisfactory. The species is so spotty that it was seldom typed on vegetation maps. Even if we had data on every spring, seep, creek, and irrigation ditch, we could not adequately plot all the localities. Fremont cottonwood has also been so widely planted and naturalized that its truly "native" range is now obscure. It is a pioneer species on dredger tailings east of Sacramento and elsewhere in the Central Valley.

Within California, Fremont cottonwood is uncommon in the Klamath Mountains and north Coast Ranges. Some stands do occur on the upper Trinity and Eel drainages. Jepson (1910) erred in listing the northern limit as near Redding. Some Fremont cottonwood grows in the Sacramento River Canyon north of Redding, and a disjunct stand grows along Moffett Creek, near Fort Jones in Siskiyou County. Fremont cottonwood was prominent in the pristine riparian forest of the Sacramento Valley (Thompson 1961), and it is still abundant in wet spots throughout much of the Central Valley. Disjunct colonies grow on Santa Cruz, Santa Catalina (Thorne 1967), and San Nicolas Islands (Foreman 1967). We probably have shown only a small part of the isolated colonies in the Mojave Desert. Fremont cottonwood is abundant along the Colorado River (Grinnell 1914).

In California, Fremont cottonwood seems to prefer relatively low-elevation habitats, but near the coast it is usually replaced by black cottonwood. At higher elevations in the Coast Ranges and Sierra Nevada, Fremont cottonwood is sometimes replaced by black cottonwood, but more commonly there is an elevational discontinuity between the two cottonwoods. In western Nevada, Fremont cottonwood again becomes locally common.

Other references: Buttery and Green 1958, Coville 1893, Howell 1970, Klyver 1931, Lloyd and Mitchell 1966, Parish 1930, Powell 1968, Thomas 1961, Twisselmann 1967, Vogl and McHargue 1966, Wetzel 1971.
Personal communication: Peter G. Sanchez, Aug. 4, 1970.

Populus tremuloides Michx.
quaking aspen, aspen *Map 62*

In North America no other tree species is as wide-ranging as quaking aspen (Fowells 1965). A major portion of this range is in Alaska, Canada, and the northeastern United States. Aspen also extends south well into Mexico.

The southern limit in California is an exceedingly isolated colony near the 7,500-foot level on Fish Creek in the San Bernardino Mountains (Grinnell 1908). The Sierra Nevada distribution starts about 150 miles to the north at Horse Meadow in southern Tulare County. In the Sierra Nevada, quaking aspen is locally abundant in moist, high-elevation habitats-often around the edges of meadows. Disjunct colonies grow east of the Sierra Nevada in the White Mountains (Lloyd and Mitchell 1966).

Our data on distribution in the Cascades and Modoc Plateau are incomplete. Quaking aspen is more scattered there, however, and often grows at lower elevations. Besides bordering creeks and meadows, it is also sprinkled over steep, barren lava talus slopes in this region. At McArthur-Burney Falls State Park aspen grows as low as 3,000 feet. Jepson (1923) doubted that aspen grew on Mount Shasta, but Cooke (1940) found it on Shastina and Pilgrim Creek. Extensive shrubby thickets of aspen appear on the upper slopes of the Warner Mountains.

Aspen is not common in the Klamath Ranges. Little (1971) shows only one locality west of the Sacramento River drainage; and Jepson (1923) knew of only one locality, Canyon Creek in Trinity County. Actually, aspen is scattered in a number of remote places in this region including the Trinity Alps, Russian Peak, and the Marble Mountains. The southern extreme in the Klamath Ranges seems to be in Cedar Basin, just south of North Yolla Bolly Mountain.

Other references: Gillett, Howell, and Leschke 1961, Grinnell and Storer 1924, Howell 1940-42, 1946-49, Lewis 1966, Little 1966a, Little and Archer 1965, Maciolek and Tunzi 1968, Raven 1950-53, Rockwell and Stocking 1969, Roof 1969a.

Populus trichocarpa Torr. & Gray
black cottonwood *Map 63*

Black cottonwood ranges from southern Alaska east to North Dakota and south into Baja California (Fowells 1965). Brayshaw (1965) considered black cottonwood to be a western subspecies of the balsam poplar, *Populus balsamifera* L.

In Washington and Oregon black cottonwood forms extensive bottomland forests along the streams and sometimes on the adjacent uplands, but in California it stays close to water courses. Black cottonwood is locally common on coastal streams, and is particularly conspicuous in the lower Eel River drainage. It may associate with red alder near tide level. In the warmer, more interior valleys and foothills black cottonwood is replaced by Fremont cottonwood. Although it is abundant on streams around Monterey Bay, black cottonwood is absent from Marin County (Howell 1970) and much of the San Francisco Bay region. Jepson (1910) reported black cottonwood in Mitchell Canyon, Mount Diablo, but Bowerman (1944) listed only Fremont cottonwood from the same area. Disjunct colonies grow on Santa Catalina (Munz 1935), Santa Cruz, and Santa Rosa Islands.

At higher elevations in the mountains throughout California black cottonwood sporadically reappears near streams, springs, and lakes–sometimes overlapping the range of quaking aspen. In the southern Sierra Nevada black cottonwood may be found up to 10,000 feet elevation.

Other references: Grinnell 1908, Hall 1902, Hall and Hall 1912, Howell 1940-42, Lloyd and Mitchell 1966, Meyer 1931, Powell 1968, Raven 1950-53, Raven and Thompson 1966, Roof 1969a, Sharsmith 1945, Smith 1952, Stebbins 1968, Thomas 1961, Twisselmann 1967, Wetzel 1971.
Personal communication: Reid Moran, Oct. 12, 1970.

Prunus cherries, plums

(Rosaceae Rose Family)

This large, variable genus of shrubs and trees includes some 150 to 175 species. About 25 species are native to the United States. Eight species grow in California, and one of these is endemic to the California islands.

Many of the shrubby California plums and cherries reach tree size in favorable spots–*Prunus emarginata* (Dougl.) Walp., *P. virginiana* var. *demissa* (Nutt.) Sarg., *P. subcordata* Benth. Individuals of *Prunus ilicifolia* (Nutt.) Walp., are sometimes very large; Twisselmann (1956) describes one at Cherry Spring in the Temblor Range as 24 feet tall with a trunk 11.5 feet in circumference. James R. Griffin measured one *P. ilicifolia* in the Carmel Valley in 1971 that was 47 feet tall. However, none of these species is consistently tree-like, and they are not mapped.

Prunus lyonii (Eastw.) Sarg. (*P. ilicifolia* ssp, *lyonii* [Eastw.] Raven)

Catalina cherry *Map 64*

Catalina cherry is closely related to *Prunus ilicifolia* and some botanists consider it an insular form of the mainland species. Catalina cherry is more consistently of tree form and size than *P. ilicifolia.*

Catalina cherry is mainly confined to Santa Catalina, Santa Cruz, Santa Rosa, San Clemente, and Anacapa Islands. Alice Eastwood reported typical *P. ilicifolia* on Santa Catalina Island, but Thorne (1967) could find only *P. lyonii* there. Reports of *P. lyonii* on the mainland in Baja California may be based on *P. ilicifolia.*

Other references: Raven 1963.

Pseudotsuga Douglas-firs

(Pinaceae Pine Family)

This genus includes about six species, all in the Northern Hemisphere. Two species grow in North America. Both of these Douglas-firs are found in California, and one is endemic to the State. A host of specific names have been proposed within the American Douglas-fir species, particularly by the French taxonomist F. Flous. But these species have never gained wide acceptance in California.

Pseudotsuga macrocarpa (Vasey) Mayr

bigcone Douglas-fir (bigcone-spruce) *Map 65*

This southern California species is probably restricted to the State. Gause (1966) lists all the old references which suggest that bigcone Douglas-fir grows in Baja California. The bases for these reports are vague, and Ira Wiggins doubts them (Bolton and Vogl 1969). Bolton and Vogl (1969) report the southern limit to be near Banner and San Felipe[2] Canyons in San Diego County, but the VTM survey found scattered trees in Chariot Canyon south of Banner.

The bulk of the bigcone Douglas-fir range was covered by the VTM survey, and our map for this species is relatively complete. Some details of the distribution have probably been altered by fire in the 30 years since completion of the VTM field work. In elevation, this species ranges from a low of 900 feet in the chaparral up to 8,000 feet in the Mixed Conifer Forest (Gause 1966).

The northernmost stands of bigcone Douglas-fir are in the Mount Pinos region of Kern County (Twisselmann 1967). The VTM survey mapped two trees as far north as Eagle Rest Peak in Kern County and slightly farther north in the Sierra Madre of Santa Barbara County at the head of Labrea Creek. The western limit is on Zaca Peak. This *P. macrocarpa* locality is about 21 miles from the closest outpost of *P. menziesii* (Griffin 1964c).

Pseudotsuga menziesii (Mirb.) Franco

Douglas-fir *Map 66*

Douglas-fir grows extensively through western North America (Fowells 1965). The interior variety extends from central British Columbia southward to central Mexico. The coastal form dominates vast portions of western Oregon and Washington between the coastal spruce zone and the fir forest of the higher Cascades.

In California extensive stands of Douglas-fir continue southward through the Klamath and Coast Ranges as far as the Santa Cruz Mountains. Douglas-fir mixes into the eastern portion of the Redwood Forest and dominates the Douglas-fir and much of the Mixed Evergreen Forests. In the Santa Lucia Mountains Douglas-fir stands are well developed only on the Little Sur River. Scattered groves appear in the Limekiln Creek, Willow Creek, and Salmon Creek drainages. Clare B. Hardham sent us a Douglas-fir specimen from San Carpoforo Creek just south of the Monterey County line. The VTM survey found one old, apparently non-planted Douglas-fir tree within the Monterey pine forest east of Monterey. Douglas-fir has recently been planted in this same vicinity.

The southern limit for Douglas-fir in the Coast Range is an extremely isolated colony in the Purisima Hills (Griffin 1964c). This grove is within a bishop pine forest on diatomaceous earth. These *P. menziesii* trees are only 21 miles away from the closest stand of *P. macrocarpa* on Zaca Peak.

In the Sierra Nevada-Cascade Range, Douglas-fir is a common part of the Mixed Conifer Forest as far south as the Yosemite region. Douglas-fir skips most of Madera County, and the southern outpost in the Sierra Nevada is near Big Creek in Fresno County.

In California, Douglas-fir is largely restricted to forests west of the Cascade- Sierra Nevada crest. Billings (1954) mentioned a Douglas-fir collection from Glenbrook on the east shore of Lake Tahoe, but the VTM survey did not find any Douglas-fir in this area. In Lassen County a few Douglas-fir groves occur on the eastern flank of the Sierra Nevada between Honey Lake and Susanville.

Other references: Howitt and Howell 1964, McKeever 1961. Personal correspondence: Clare B. Hardham, Dec. 28, 1968, Gordon R. Foster, May 7, 1971.

Quercus oaks

(Fagaceae Beech Family)

Quercus is a huge Northern Hemisphere genus with some 300 tree and shrub species. Countless hybrids and questionable species have been described in the genus. About 68 oak species grow in the United States. Fifteen different oaks are present in California. *Quercus gambelii* Nutt. comes close to California in

[2]See Geographic Location of Place Names, footnote 3, for comment on this place name.

southern Nevada (Little 1971). Nine California species are predominantly of tree size and form and are mapped. Two of these species, blue oak and valley oak, are endemic to the State. Many of the others have the bulk of their distributions in California.

Quercus agrifolia Née (including the shrubby var. *frutescens* Engelm.)

coast live oak, California live oak *Map 67*

The early Spanish and Mexican settlers in California were well acquainted with this live oak, which they called "encina." In 1602 Sebastian Vizcaino, the first European to land at Monterey, held a religious ceremony under a coast live oak on the shore of Monterey Bay. Fray Junipero Serra supposedly said mass under the same live oak in 1770. The scientific collection of this species came in 1791 when the Malaspina Expedition visited Monterey. As Jepson (1910) noted, the range of coast live oak corresponds well with the Mexican sphere of influence in California during the Mission period.

Typical *Q. agrifolia* is common in northern Sonoma County. It extends farther north into Mendocino County along the Russian River to Hopland and northwest to Anderson Valley. In Mendocino County *Q. agrifolia* seems to hybridize readily with *Q. wislizenii,* and it is difficult to tell where the coast live oak distribution ends.

Coast live oak crosses the Coast Ranges in Napa County, reaching the edge of the Sacramento Valley along several creeks in Yolo County. Some *Q. agrifolia* trees are scattered up the Sacramento River in the Delta region as far as Courtland. Coast live oak populations also extend over the Coast Ranges at Pacheco Pass. The VTM survey mapped a few trees in southwestern Fresno County. Twisselmann (1967) listed western Kern County colonies at Bill Little Spring and Drake Ridge in the Temblor Range.

Coast live oak is most abundant in the valleys and lower slopes as part of the Foothill Woodland and the southern California phase of the Mixed Evergreen Forest. In the north it seldom exceeds the 3,000-foot level, but in the south it may approach 5,000 feet. Within the range of coast live oak, *Q. wislizenii* tends to grow in a shrubby form in chaparral above the *Q. agrifolia* woodlands. The more interior *Q. agrifolia* stands in southern California have been called var. *oxydenia* (Torr.) J. T. Howell. Hoover (1970) applied this name to pubescent forms as far north as San Luis Obispo County. Coast live oak extends southward into Baja California.

Other references: Cooper 1926, Howell 1970, Thomas 1961, 1970, Twisselmann 1956.

Quercus xalvordiana Eastw. *Map 68*

In 1894, Alice Eastwood collected some scrubby oaks in San Emigdio Canyon, Kern County, which she later described as *Q. alvordiana* The variable group of semi-deciduous oaks associated with this name is not a satisfactory taxonomic unit (Tucker 1952a). In form they are not always satisfactory trees either. These problem oaks, however, should be considered if the southern distribution of *Q. douglasii* is to be fully understood.

Tucker (1952a,b) has shown that the name *Q. alvordiana* applies to small trees which are morphologically intermediate between deciduous *Q. douglasii* trees and evergreen *Q. turbinella* Greene shrubs. The origin of the "alvordiana" problem must have involved past hybridization between these two species. The problem is complicated by the merging of the interior *Q. turbinella* shrubs with the coastal *Q. dumosa* Nutt. shrubs.

The "alvordiana" hybrids are not just local novelties sprinkled around where the two parental species overlap. They are a conspicuous part of the inner Coast Range vegetation from the upper Carmel Valley in Monterey County southward into the Tehachapi Mountains. In places the dominant oak of the Foothill Woodland is not typical *Q. douglasii* but rather *Q. xalvordiana.* Since these hybrids are such a vague entity, we have mapped only the generalized region where they appear. The map is largely based on what the VTM survey called the "tree" form of *Q. dumosa.*

Other references: Benson et al. 1967, Hoover 1970, Twisselmann 1967.

Quercus chrysolepis Liebm. (including the shrubby var. *nana* Jepson).

canyon live oak *Map 69*

Canyon live oak's distribution starts in southwestern Oregon and runs southward into Baja California and eastward to central Arizona (Tucker and Haskill 1960). Most of the literature states that *Q. chrysolepis* ranges eastward to New Mexico. All New Mexico and some Arizona reports of *Q. chrysolepis* are probably based on the closely related *Q. dunnii* Kell. or the unrelated *Q. turbinella.*

Within California, canyon live oak is the most widely distributed oak. In various tree and shrub forms it covers a vast array of forest, woodland, and chaparral habitats. As the common name implies, it is conspicuous on steep, rocky canyon slopes. At higher elevations in the Sierra Nevada and Klamath Mountains *Q. chrysolepis* is replaced by the related shrubby species, *Q. vaccinifolia* Kell. Canyon live oak is scattered on the east slope of the southern and central Sierra Nevada. It does not cross the Cascades, nor does it extend into Lassen National Park (Gillett, Howell, and Leschke 1961). It is rare on the north side of Mount Shasta (Cooke 1941).

Disjunct stands occur on the Providence and New York Mountains (Tucker and Haskill 1960). A few canyon live oaks appear on the southern California islands where they hybridize with the closely related *Q. tomentella* (Muller 1967).

Other references: Howell 1940-42, 1970, Howell, Raven, and Rubtzoff 1958, McClintock and Knight 1968, McMinn 1951, Oberlander 1953, Thomas 1961.

Personal correspondence: Enid A. Larson, Feb. 7, 1971, John M. Tucker, Nov. 16, 1970.

Quercus douglasii Hook. & Arn.
blue oak *Map 70*

Blue oak is the conspicuous deciduous oak in the Foothill Woodland surrounding the Central Valley. The main distribution reaches northward to Montgomery Creek in Shasta County. Scattered blue oak trees occur above the McCloud River arm of Shasta Lake. An isolated population grows east of the Cascades near Pit River Powerhouse No. 1 (Griffin 1966). To the west, in Trinity County, another isolated population grows in the Browns Creek-Reading Creek area.

Sierra Nevada foothill stands extend onto the floor of the Sacramento Valley in many areas. Blue oaks are common on the Sutter Buttes in the valley. A large extension of the Coast Range population into the Sacramento Valley occurs in the Dunnigan-Arbuckle area (Griffin 1962).

In the south the main distribution stops in the Liebre Mountains of Los Angeles County and the Santa Ynez Valley of Santa Barbara County. A few trees above Mission Santa Barbara are less than 3 miles from the coast. Small groves of blue oak occur on Santa Cruz and Santa Catalina Islands (Muller 1967).

In various parts of its distribution *Q. douglasii* grows with many other species of the "white oak group." Blue oak appears to hybridize with at least *Q. dumosa, Q. garryana, Q. lobata,* and *Q. turbinella.* Hybridization with *Q. turbinella* is the most significant (see section on *Q.* × *alvordiana).*

Other references: Howell 1970, Lewis and Gause 1966.

Quercus engelmannii Greene
Engelmann oak (mesa oak) *Map 71*

Engelmann oak has a limited distribution in southern California and adjacent Baja California. Southward from Los Angeles County *Q. douglasii* in the Foothill Woodland is replaced by Engelmann oak in the Southern Oak Woodland. Engelmann oak is scattered along the base of the San Gabriel Mountains between Pasadena and San Dimas. The VTM survey also mapped a few isolated *Q. engelmannii* trees in Riverside County near Hemet. An 1878 specimen by John G. Lemmon in the University of California Herbarium was labeled San Bernardino County, but gave no definite locality. The main distribution lies in western San Diego County, usually below 4,000 feet in elevation. One specimen was collected on Santa Catalina Island (Thorne 1967).

Engelmann oak appears to hybridize locally with *Q. lobata* and *Q. dumosa.* Jepson's (1910) suggestion that Engelmann oak occurred in the San Carlos and Mount Hamilton Ranges has no modern confirmation, and may have been based on hybrid forms of *Q. douglasii.*

Other references: Boughey 1968, Munz 1959.

Quercus garryana Dougl. (including varieties *brewerii* [Engelm.] Jeps. and *semota* Jeps.)
Oregon white oak, Garry oak *Map 72*

This is the only oak species in California that extends far beyond the State's boundaries. Oregon white oak is scattered northward into southwestern British Columbia (Fowells 1965). In Oregon it is abundant in the Willamette Valley, and it spreads across the Klamath Mountains in dry, warm portions of the Douglas-fir and Mixed Evergreen Forests. In California it continues to be common in the Klamath Mountains and north Coast Ranges–as a dominant in the Northern Oak Woodland, as a minor part of several forest types, and as a brushfield shrub on sterile soils.

South of Marin County, Oregon white oak is rare. Thomas (1961) mentioned only two localities in the Santa Cruz Mountains. Tucker (1953) found a single tree northeast of Gilroy. Hoover (1970) reported *Q. garryana* in San Luis Obispo County, but we have identified his collections as *Q. lobata.*

Oregon white oak crosses the Cascades and reaches up the Pit River drainage to the Big Valley Mountains in Lassen County. This oak continues southward in an interrupted belt all the way to the Tehachapis (Twisselmann 1967). Tucker (1950) found one isolated tree in Bouquet Canyon in Los Angeles County.

Jepson's (1910, 1923) comments on the shrubby forms of *Q. garryana* are not too helpful. He suggests that var. *brewerii* is a high-elevation shrub in the Klamath Mountains and that var. *semota* is a shrub isolated in the southern Sierra Nevada. Actually, the shrubby *Q. garryana* in northwestern California occupies a wide range of elevations. Its isolation from the Sierra Nevada shrubs is not great, either geographically or morphologically (McMinn 1951). Large brushfields of *Q. garryana* were mapped by the SV survey in the Cascade foothills from Shasta County south into Butte County. More widely scattered foothill stands connect with the *semota* populations of the south. Twisselmann (1967) called the extensive *Q. garryana* brushfields in Kern and Los Angeles Counties the "Shin oak brush" association.

Other references: Bowerman 1944, Howell 1970.

Quercus kelloggii Newb. (including the shrubby form *cibata* Jeps.)
California black oak *Map 73*

This oak has a broad distribution in California–almost as great as that of canyon live oak. California black oak ranges northward to the vicinity of Eugene, Oregon. According to Ira L. Wiggins its southern limit is in the Laguna Mountains of San Diego County. It does not cross into Baja California (McDonald 1969).

California black oak is abundant in the lower portions of the Mixed Conifer Forest, and it is also common in parts of the Mixed Evergreen Forest. This species ranges farther east of the Cascades than the other California oaks. California black

oak is the only oak with significant populations in Modoc County, as far east as Adin Pass. In Lassen County *Q. kelloggii* is scattered along the eastern base of the Sierra Nevada. Stands on the east side of the Sierra Nevada in lnyo County were mentioned by Jepson (1910). As McDonald (1969) suggests, ponderosa pine is probably the most common associate of California black oak, but their ranges do not coincide in many regions.

Quercus kelloggii occasionally hybridizes with *Q. wislizenii* in areas where their ranges overlap. In 1863 Albert Kellogg described these semi-deciduous intermediates as *Q. morehus,* and controversy about their origin lasted for decades (Jepson 1923). At times hybrid-like individuals appear in localities now far removed from one of the parental species. For example, "morehus" hybrids may occur on Santa Cruz Island, but no *Q. kelloggii* grows there now (see interior live oak for additional comments on this hybrid). In the south Coast Ranges *Q. kelloggii* also hybridizes with *Q. agrifolia.* These hybrids were first described as *Q.* × *ganderi* C. B. Wolf.

Other references: Bowerman 1944, Grinnell 1908, Hoover 1970, Howell 1970, McClintock and Knight 1968, McMinn 1951, Raven 1950-53.
Personal correspondence: George Dobbins, Aug. 29, 1970, Enid A. Larson, Feb. 7, 1971.

Quercus lobata Née
valley oak, California white oak *Map 74*

Valley oak, called "roble" by the Spanish, was first collected by the Malaspina Expedition near Monterey in 1792. Huge valley oaks, which dotted the fertile lowlands, impressed the early settlers. As Jepson (1923) noted, valley oaks were often "the sign of the richest soil."

The northern limit of this endemic species seems to be near Lakehead above the Sacramento River arm of Shasta Lake. Valley oak stands were mapped along the lower Pit and McCloud Rivers by the VTM survey before the flooding of Shasta Lake. We could find no confirmation of Jepson's (1910) report of valley oak on the Trinity River. According to Joseph P. Tracy the northwestern limit is in Ten Mile Valley, northwest of Laytonville in Mendocino County.

Valley oak was a conspicuous part of the riparian forests in the Sacramento Valley (Thompson 1961). It also grows along part of the lower San Joaquin River. Valley oaks were common over the alluvial fans of the larger rivers coming down from the Sierra Nevada. The valley oak woodland on the Kaweah River plains around Visalia may have been the most extensive in the San Joaquin Valley. It should be emphasized that valley oaks were not generally distributed in the Central Valley. Large portions of the valley were devoid of any trees.

Valley oaks are by no means restricted to alluvial soils in the Central Valley or within the Foothill Woodland region around the valley. In the south Coast Ranges they are a minor component of several mixed-species upland communities. They often become conspicuous on the open savannas of the broader ridge tops. On Chews Ridge in Monterey County valley oaks grow at 5,000 feet. In the Tehachapi Mountains valley oaks reach the 5,600-foot level in association with Jeffrey pine (Twisselmann 1967). In southern Monterey County a few valley oaks grow within a mile or so of the coastline.

The main distribution stops near the San Fernando Valley in Los Angeles County. Abrams (1910) collected one specimen near Santa Monica. Typical valley oak occurs on Santa Cruz and Santa Catalina Islands (Muller 1967). Hybrids between *Q. lobata* and *Q. dumosa,* sometimes called *Q. macdonaldii* Greene, are present on these islands and also on Santa Rosa Island. Similar hybrids appear on the mainland as far south as Orange County (Boughey 1968). Tucker (1968) described. a hybrid between *Q. turbinella* and *Q. lobata* on the Joshua Tree National Monument.

Other references: Cooper 1926, Klyver 1931, Howell 1970, Thorne 1967, Tracy (nod), Twisselmann 1956.

Quercus tomentella Engelm.
island live oak *Map 75*

This insular oak is the rarest of the California oaks. Although fossils have been found on the mainland, *Q. tomentella* is restricted to the islands (Muller 1967). Edward Palmer discovered it on Guadalupe Island off the Baja California coast in 1875. Island oak is now known from five of the California islands: Anacapa, San Clemente, Santa Catalina, Santa Cruz, and Santa Rosa. *Quercus tomentella* is closely related to *Q. chrysolepis.* A few typical canyon live oaks occur on the islands, but most of the canyon live oak there seem to be influenced by hybridization with island oak.

Quercus wislizenii A. DC. (including the shrubby var. *frutescens* Engel m.)
interior live oak *Map 76*

Interior live oak is largely a California species, but it does range south into Baja California. As the name implies, interior live oak ranges farther inland than coast live oak. Along the lower slopes of the Sierra Nevada and Cascades it is part of the Foothill Woodland. In some places it forms dense, shrubby thickets just below the Mixed Conifer Forest.

The northern limit is in southern Siskiyou County, but hybrids between interior live oak and California black oak have been found in southern Oregon (Anonymous 1948, Matthews 1948). Such *Q.* × *morehus* hybrids also occur on Hat Creek Rim east of the Cascades (Griffin 1966) (see section on California black oak for additional comments on this hybrid).

In the north Coast Ranges, interior live oak occupies a variety of forest, woodland, and chaparral habitats. In much of the south Coast Ranges and southern California distribution it is shrubby and grows at higher elevations than coast live oak. In the Santa Cruz and Santa Lucia Mountains, however, interior live oak trees provide much of the hardwood understory in the Redwood Forest.

One locality of interior live oak lies on the east side of the Sierra Nevada, on Oak Creek in Inyo County (Haller 1962).

Other references: Buttery and Green 1958, Havlik 1970, Howell 1970, Klyver 1931, Muller 1967, Raven and Thompson 1966, Thomas 1961, Twisselmann 1967.
Personal correspondence: Enid A. Larson, Feb. 7, 1971.

Sequoia redwood

(Taxodiaceae Taxodium Family)

Fossil records show that *Sequoia* was once widespread in the Northern Hemisphere. The genus has, however, only one living species, which is endemic to coastal California and the extreme southwestern corner of Oregon.

Sequoia sempervirens (D. Don) Endl.
redwood (coast redwood) *Map 77*

The first account of redwood was written by Fray Juan Crespi when the Portola Expedition encountered the species near Pinto Lake in Santa Cruz County in 1769. Archibald Menzies of the Vancouver Expedition made botanical collections near Santa Cruz in 1794, but his specimens were not formally named until 1824.

Redwood's northern range ends in the Chetco River drainage of Oregon within 14.5 miles of the State line. In California, the Redwood Forest is usually separated from the immediate coast by some combination of grassland, North Coastal Coniferous Forest, or Closed-cone Pine Forest communities. The eastern edge of the Redwood Forest merges with the Mixed Evergreen and Douglas-fir Forests. The bulk of the distribution lies below 2,000 feet in elevation.

Several redwood maps based on "commercial" forest types emphasize a gap between the more interior Eel River populations and the coastal Mendocino County stands (Forest Survey 1953, Roy 1966a). The SV survey suggests that the range narrows at this point, but the "gap" is not great. The absence of redwood from south-coastal Humboldt County is striking.

There apparently has always been a gap in redwood distribution across the low hills in southern Sonoma and northern Marin Counties. In effect the "coastal" stands in this region have been displaced eastward into Napa County. The isolated colonies east of Napa are about 42 miles from the coast. To the north the Howell Mountain stand and the Ink Grade, Swartz Creek, and Aetna Springs colonies are not quite as far from the coast. But they face the Sacramento Valley drainage and are the most "interior" localities.

In the Santa Lucia Mountains redwood is increasingly confined to steep canyon bottoms. At the heads of some of these canyons the VTM survey found some individual redwok,- as high as 3,500 feet elevation. The extreme southern limit of redwood has aroused much interest. Havlik and Ketcham (1968) refute Sudworth's (1908) report of redwood in Salmon Creek. The southernmost redwood that James R. Griffin has observed, however, is only 1.5 miles from Salmon Creek. Redwoods that may have been planted exist just inside San Luis Obispo County (Hoover 1970).

Other references: Galloway 1959, Howell 1970, Oberlander 1953, Rubtzoff 1953.

Sequoiadendron (Sequoia) giant sequoia

(Taxodiaceae Taxodium Family)

In 1939 Buchholz segregated giant sequoia from *Sequoia*. For a long time the new genus, *Sequoiadendron*, received little acceptance, but it is now coming into more general use (Munz 1959). The genus has just one living species, which is endemic to the Sierra Nevada of California.

Sequoiadendron giganteum (Lindl.) Buchholz
giant sequoia, bigtree *Map 78*

In 1850 John M. Wooster discovered giant sequoia in the Calaveras Grove (Ellsworth 1933). Public notice was aroused 2 years later when a bear hunter, Alexander T. Dowd, stumbled onto the Calaveras Grove and returned with tales of fantastic trees. Later John Bidwell "recalled" discovering these trees in 1841, but his story is not very convincing (Ellsworth 1933).

By 1853 botanical specimens were circulating in the United States and in Europe, and a confusing array of scientific names was proposed. Despite the confusion in names, the distribution of these huge trees became reasonably well known. Soon all the major groves had received names. Jepson (1910) listed seven isolated northern groves and 24 more extensive southern groves. Since then, no major discoveries have been made, but the names of the groves have become confused. Rundel (1969, 1972) reviewed the names for all the different populations and described a total of 75 groves. Little's (1971) maps do not show the isolated McKinley Grove in Fresno County.

The bulk of the distribution lies in the southern groves–a 70-mile-long zone between the Converse Basin Grove in Fresno County and the Deer Creek Grove in southern Tulare County (Fowells 1965). The species extends eastward into the Kern River drainage near Freeman and Long Meadow Creeks. The location of many of these groves seems to be associated with abundant ground water supplies (Axelrod 1959, Rundel 1969). Elevations range from a low of 2,700 feet on the South Fork of the Kaweah River below the Garfield Grove to a high of 8,800 for an outlier above the Atwell Grove (Rundel 1969). The boundaries of the present groves have been relatively stable for many centuries (Rundel 1971).

North of the Kings River the more isolated stands occur–the McKinley, Nelder, Mariposa, Merced, Tuolumne, South Calaveras, North Calaveras, and Placer groves. The Placer Grove, with six live trees and two fallen logs, grows near the Middle Fork of the American River. This extreme northern stand, known as early as 1860 (Ellsworth 1933), now includes some planted trees.

Other references: Calif. Dep. Nat. Resources 1952, Hartesveldt 1965.

Taxus yews

(Taxaceae Yew Family)

In the Northern Hemisphere about eight tree and shrub species of yews have been described. Three tree and one shrub species grow in North America. Only one yew ranges into California.

Taxus brevifolia Nutt.
Pacific yew *Map 79*

Pacific yew ranges over a large area in the West. It reaches north to Alaska and eastward to Montana. In California it is scattered, and our map shows only a fraction of the isolated stands. The small, understory yew trees seldom appear on vegetation maps. Yet in productive forests in parts of the Klamath Mountains, Cascade Range, and northern Sierra Nevada yew abounds in almost every canyon and is sprinkled on the shady uplands.

We found no yew records for Sonoma County although it may well grow there. The southern limit in the Coast Ranges is probably in Marin County (Howell 1970). Despite persistent reports of yew in the Santa Cruz Mountains (Munz 1959, Little 1971), Thomas (1961) was unable to find any evidence of native yews in that area. Some of the reports may be based on a planted yew at Loma Mar.

The southern limit in the Sierra Nevada is in the North Grove, Calaveras Big Tree State Park (Rundel 1968). No support for more southerly reports in the Sierra Nevada can be found now.

Pacific yew does not cross the Sierra Nevada. Some Shasta County yew stands are east of the main Cascade crest but are still within the Mixed Conifer Forest. Little (1956) mentions one dubious report of yew from the California-Nevada border area near the Truckee River. A 1910 specimen by Amos Heller is labeled "Morrills Lake, above Verdi, Washoe Co." Neither the yew or Morrills Lake can now be relocated.

Other references: Cooke 1940, Jepson 1910, Powell 1969, Stebbins 1968, Towsley 1937, Tracy (n/d).
Personal correspondence: Philip W. Rundel, Dec. 1969, John H. Thomas, Oct. 14, 1970.

Thuja thujas (arborvitae)

(Cupressaceae Cypress Family)

This Northern Hemisphere genus has six species. Two widespread species grow in North America–one in the east, the other in the west. The western species ranges into California. The other four thujas grow in Asia.

Thuja plicata Donn
western redcedar *Map 80*

The range of western redcedar resembles that of western hemlock (Fowells 1965). Western redcedar has a continental distribution from southeastern British Columbia south into central Idaho. It also has a broad coastal range from the southeastern corner of Alaska down through Oregon. In western Oregon and Washington *Thuja plicata* is common in both "*Tsuga heterophylla*" and "*Abies amabilis* zones" (Franklin and Dyrness 1969).

California's *Thuja* stands are just a minor southern extension of the main distribution. This tree is common in the North Coastal Coniferous Forest only in the lower Mad River drainage and the very wet region south of Ferndale in Humboldt County. Unlike western hemlock and Sitka spruce, *Thuja plicata* does not have any disjunct stands in coastal Mendocino County. Sudworth's (1908) Mendocino report must be in error.

Although our data are incomplete, western redcedar does not seem to be common in northern Humboldt or Del Norte Counties. Some of the isolated stands in this region are in rather boggy habitats. The most inland colony we know of is at Sanger Lake.

Torreya torreyas

(Taxaceae Yew Family)

This Northern Hemisphere genus has only six species. Two species occur in North America, one confined to a small area in Florida and Georgia, and the other endemic to California.

Torreya california Torr.
California torreya (California-nutmeg) *Map 81*

No other tree in California has a distribution pattern quite like torreya. Its range has two distinct parts, one in the Coast Ranges and the other in the Cascade- Sierra Nevada foothills. What is unusual is the lack of any sort of connection between the two parts–across either the north or south.

This California endemic is not really rare. As Jepson (1923) stated, the range is fairly extensive but localities are few in number and trees few in a given locality. It was first collected in the Sierra Nevada by William Lobb in 1851.

The most northerly record we could find in the Coast Ranges is in the southwestern corner of Trinity County (at the Island Mountain railroad tunnel). The main distribution starts in central Mendocino County (Jepson 1910). We have probably shown only a small portion of the isolated localities in this area. In the coastal forests torreyas are often scattered as individual trees. In Lake County torreyas also appear as chaparral shrubs. Part of the Santa Cruz Mountain distribution is also shrubby on sterile chaparral slopes. Sharsmith (1940) and the VTM survey both found a few trees in the Mount Hamilton Range. The southern end of the Coast Range

distribution is on Fremonts Peak, Monterey County (Howitt and Howell 1964). The interior outpost in the Coast Ranges is Walker Ridge, Colusa County, on serpentine soil.

In the Cascade - Sierra Nevada foothills torreya is usually confined to shady canyon bottoms and seldom occurs in open chaparral. Mallory et al. (1965) found the extreme northern stand on the North Fork of Battle Creek in Shasta County. Torreya is common along many creeks in eastern Tehama County. The southern limit is probably on the Tule River in Tulare County (Jepson 1923). The elevational range in the southern Sierra Nevada runs from 3,000 to almost 7,000 feet.

Other references: Griffin and Powell 1971, Howell 1970, Thomas 1961, Towsley 1937.

Personal correspondence: Philip W. Rundel, Dec. 1969, Donald V. Hemphill, Oct. 15, 1970.

Tsuga hemlocks

(Pinaceae Pine Family)

The genus *Tsuga* has about 10 species in the Northern Hemisphere, four in North America and the others in Asia. Two species range into California. French taxonomists have described several hemlock species and hybrids that are not generally recognized in the United States.

Tsuga heterophylla (Raf.) Sarg.

western hemlock *Map 82*

Continental populations of western hemlock range from southwestern British Columbia south into central Idaho (Fowells 1965). The broad coastal distribution starts in the north on the Kenai Peninsula of Alaska. In western Washington and Oregon the "*Tsuga heterophylla* zone" is the most extensive vegetation type (Franklin and Dyrness 1969).

California is at the southern margin of this large distribution. Western hemlock is locally common as far south as the lower Mad River drainage in Humboldt County. It usually appears as a minor component in the North Coastal Conifer Forest and the Redwood Forest. Sudworth (1908) knew of no California stands more than 20 miles from the coast. The SV survey, however, mapped western hemlock east of Weitchpec –some 30 miles inland. Near Bear Basin Butte in eastern Del Norte County an outpost of western hemlock grows within a mile or two of mountain hemlock.

Western hemlock is absent south of the Eel River in Humboldt County but reappears in coastal Mendocino County. The southern limit is probably in the Gualala River region of Sonoma County (Jepson 1923, Powell 1968). Early reports of western hemlock in Mann County cannot be confirmed (Jepson 1910, Howell 1970).

Tsuga mertensiana (Bong.) Carr.

mountain hemlock *Map 83*

Mountain hemlock has a continental distribution in southeastern British Columbia, western Montana, and northern Idaho (Fowells 1965). Its coastal distribution extends north to the Kenai Peninsula of Alaska. South of the Canadian border in the Cascades, mountain hemlock no longer grows at lower elevations. In the western portions of Washington and Oregon the "*Tsuga mertensiana* zone" is the highest forested zone (Franklin and Dyrness 1969).

In California, mountain hemlock is an important species in the Subalpine Forest. It is locally abundant in the Klamath Mountains. In the western Siskiyous along the Del Norte-Siskiyou County line mountain hemlock drops to relatively low elevations–4,000 feet on Bear Basin Butte. The southern outpost in the Klamath region is probably a tiny colony on Black Rock Mountain near North Yolla Bolly.

Mountain hemlock is not widespread in the California Cascades. It occurs on Mount Shasta (Cooke 1940). Probably additional small stands are scattered in eastern Siskiyou County, for which we have no vegetation type data. In Shasta County mountain hemlock grows on Magee Peak. In the nearby Latour State Forest a few trees grow as low as 6,000 feet. Mountain hemlock is again common in the Lassen Peak region between 7,500 and 9,200 feet in elevation (Gillett, Howell, and Leschke 1961).

The main Sierra Nevada population starts in Sierra County and runs almost continuously in the Subalpine Forest into Fresno County. In the southern Sierra Nevada, mountain hemlock ranges in elevation up to 11,600 feet (Raven 1950-1953). The extreme southern limit seems to be near Silliman Lake in Tulare County. Probably more mountain hemlock colonies occur on the eastern slope of the Sierra Nevada than the map shows. Sudworth's (1908) report of mountain hemlock in the San Jacinto Mountains of southern California is unconfirmed.

Other references: Howell 1940-42, Klyver 1931, Maciolek and Tunzi 1968, Parsons 1968, Raven 1950-53, Rockwell and Stocking 1969, Sawyer and Thornburgh 1969.

Umbellularia California-laurel

(Lauraceae Laurel Family)

This genus is rather geographically isolated from its relatives. *Umbellularia* has only one species, and it is the only genus in the Laurel Family found in the western United States. Eight genera of this family occur in the eastern part of the country.

Umbellularia californica (Hook. & Arn.) Nutt.

California-laurel, California-bay (pepperwood, Oregon-myrtle) *Map 84*

California-laurel ranges from the Umpqua region of southwestern Oregon south to San Diego County (Fowells 1965). It was first collected by Archibald Menzies of the Vancouver

expedition of 1790-92 between Monterey and San Francisco. This species grows abundantly, in a variety of tree and shrub forms, in the western Klamath and north Coast Ranges. In the Redwood and Douglas-fir Forests, California-laurel trees are conspicuous on valley bottomlands and near foothill streams. Some of the finest groves in California used to grow in the lower Eel River Valley (Jepson 1910). South of the Santa Lucia Mountains California-laurel becomes less common and more widely scattered. Individual trees may still be large; for example, the "Laurel of San Marcos" near Santa Barbara is 6 feet in diameter (Van Rensselaer 1 948). The last outpost in southern California seems to be on the eastern slope of the Laguna Mountains, south of Jepson's (1910) Julian report.

Much of the inner Coast Range and Sierra Nevada distribution occurs in chaparral areas below the Mixed Conifer Forest. Dense thickets are common on the steep lava rims of eastern Tehama County. The Sierra Nevada populations seldom exceed 5,000 feet in elevation. They extend as far south as Breckenridge Mountain in Kern County (Twisselmann 1967).

Shrubby forms are locally abundant on serpentine soils in both Coast Range and Sierra Nevada foothills. The place name "pepperwood springs" has been applied to such serpentine colonies in several regions.

Other references: Boughey 1968, Grinnell 1908, Howell 1970, Howell, Raven, and Rubtzoff 1958, Klyver 1931, Lewis and Gause 1966, McClintock and Knight 1968, Meyer 1931, Rockwell and Stocking 1969.

SUMMARY

Griffin, James R., and William B. Critchfield

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Retrieval Terms: forest trees; natural distribution; phytogeography; plant communities; forest ecology; California.

The distribution of 86 forest and woodland trees native to California is illustrated on maps at a common scale. For species of limited range, large-scale inserts show greater detail of distribution. In areas where distribution data are incomplete, probable range boundaries are shown.

The maps are based primarily on the original field records of the Vegetation Type Map survey of the 1930's and secondarily on field records of the current State Cooperative Soil-Vegetation survey. These sources are supplemented by herbarium specimens, literature citations, Forest Survey plot records, personal observations, and interviews with local authorities.

Descriptive notes relate the distribution of each species to its ecological context, including the plant communities in which the tree commonly appears and the extremes of its elevational range. Taxonomic problems and possible hybridization influences are discussed. Historical items relating to the discovery of endemic species are noted. Nearly one-fourth of the species illustrated are endemic to California, and the distribution of many others is centered in the State. The Supplement contains corrigenda and addenda.

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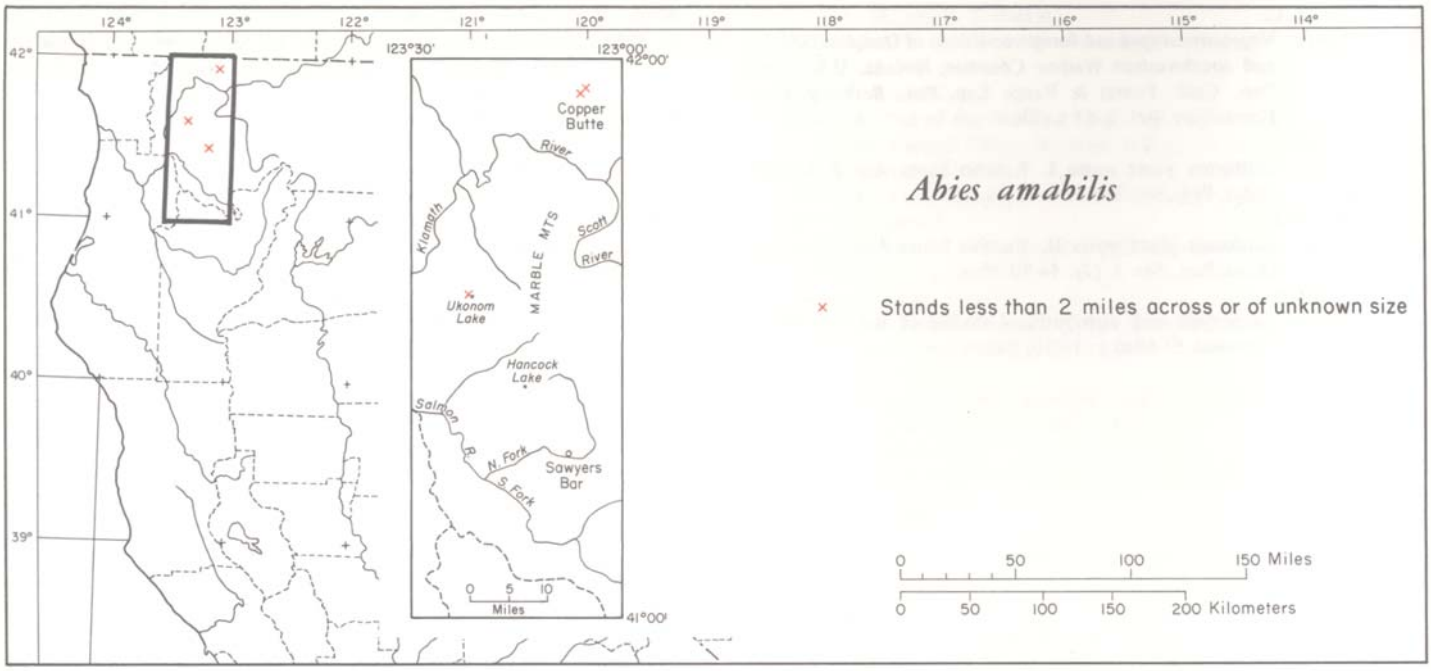
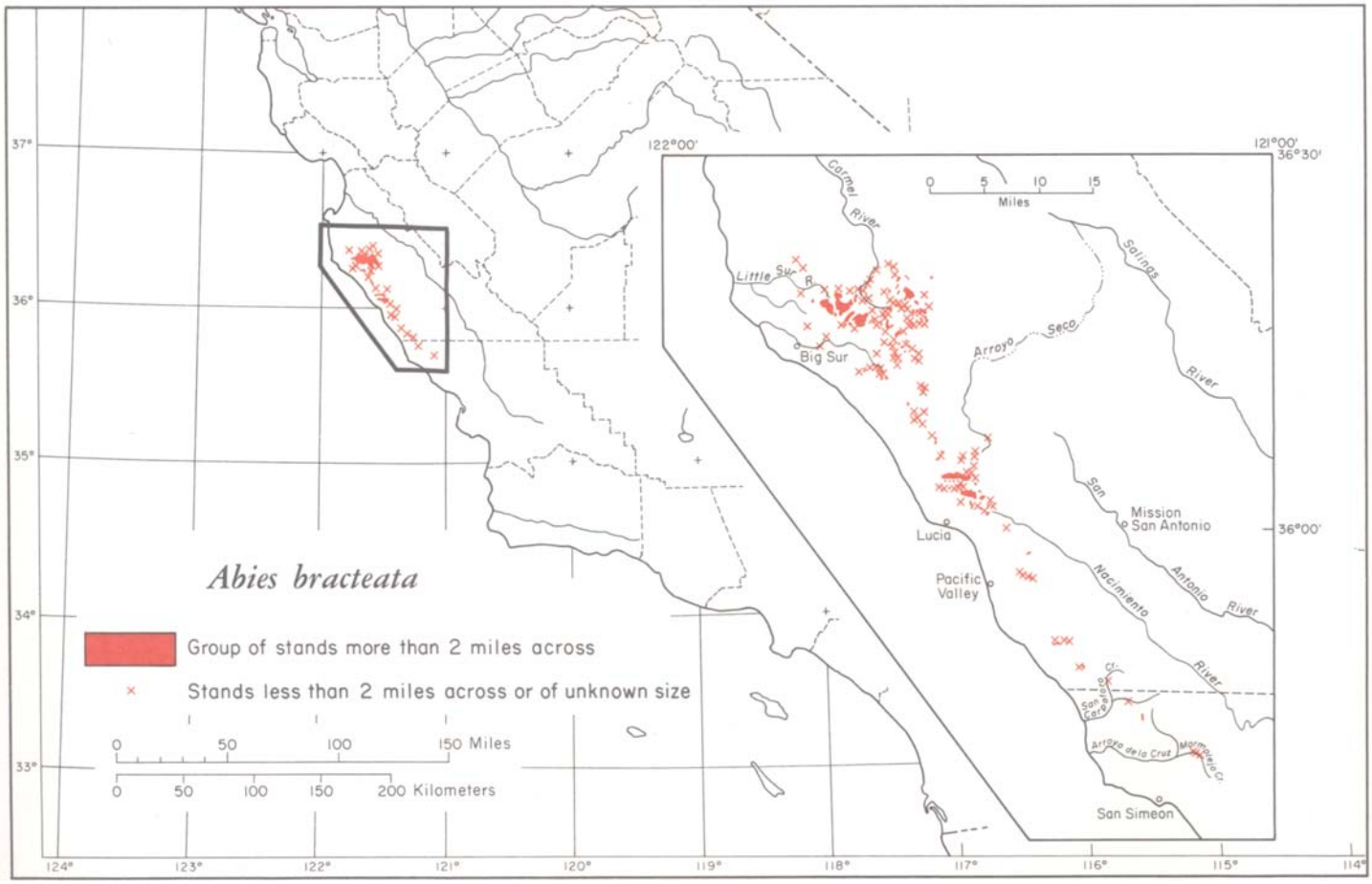
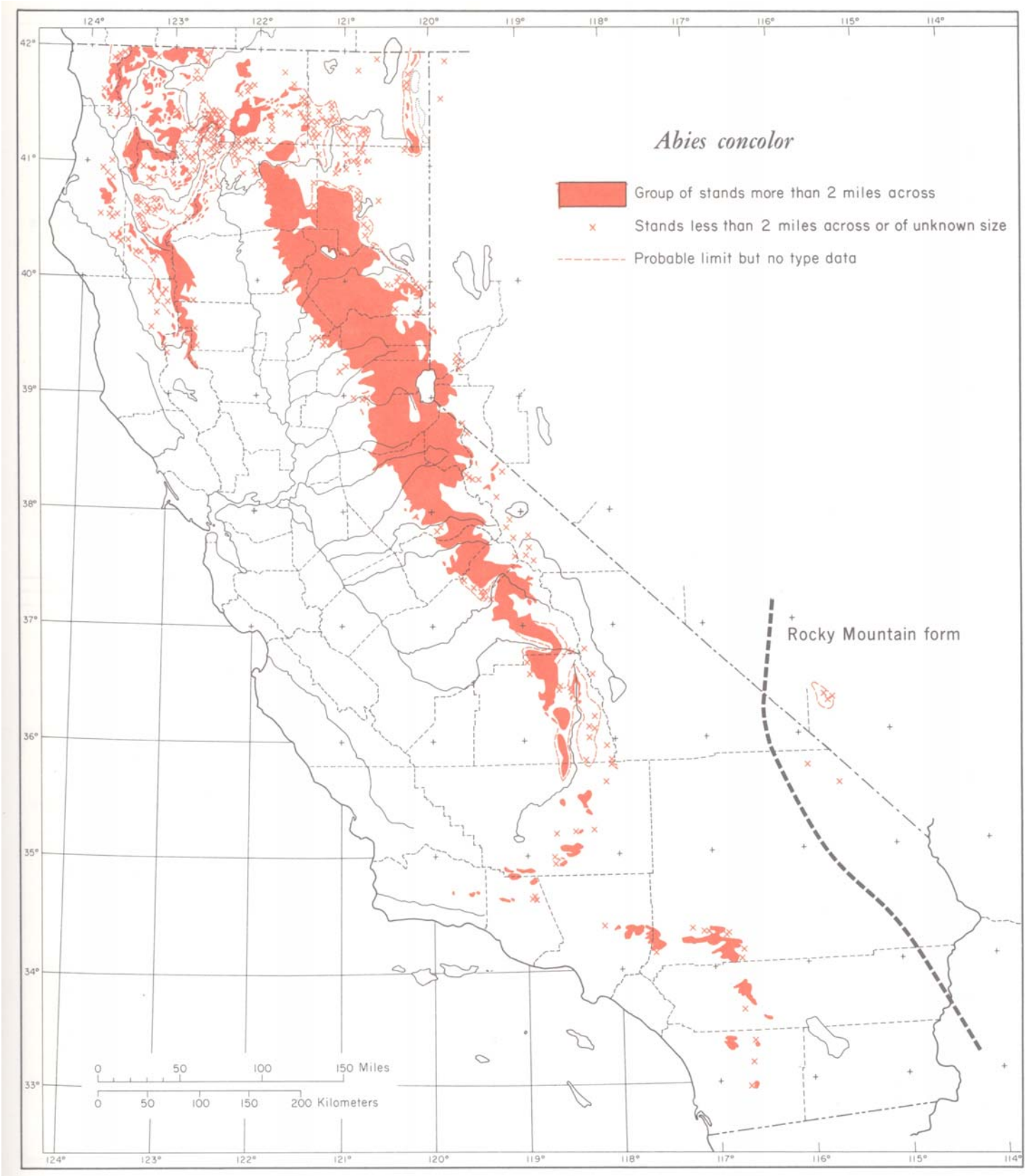
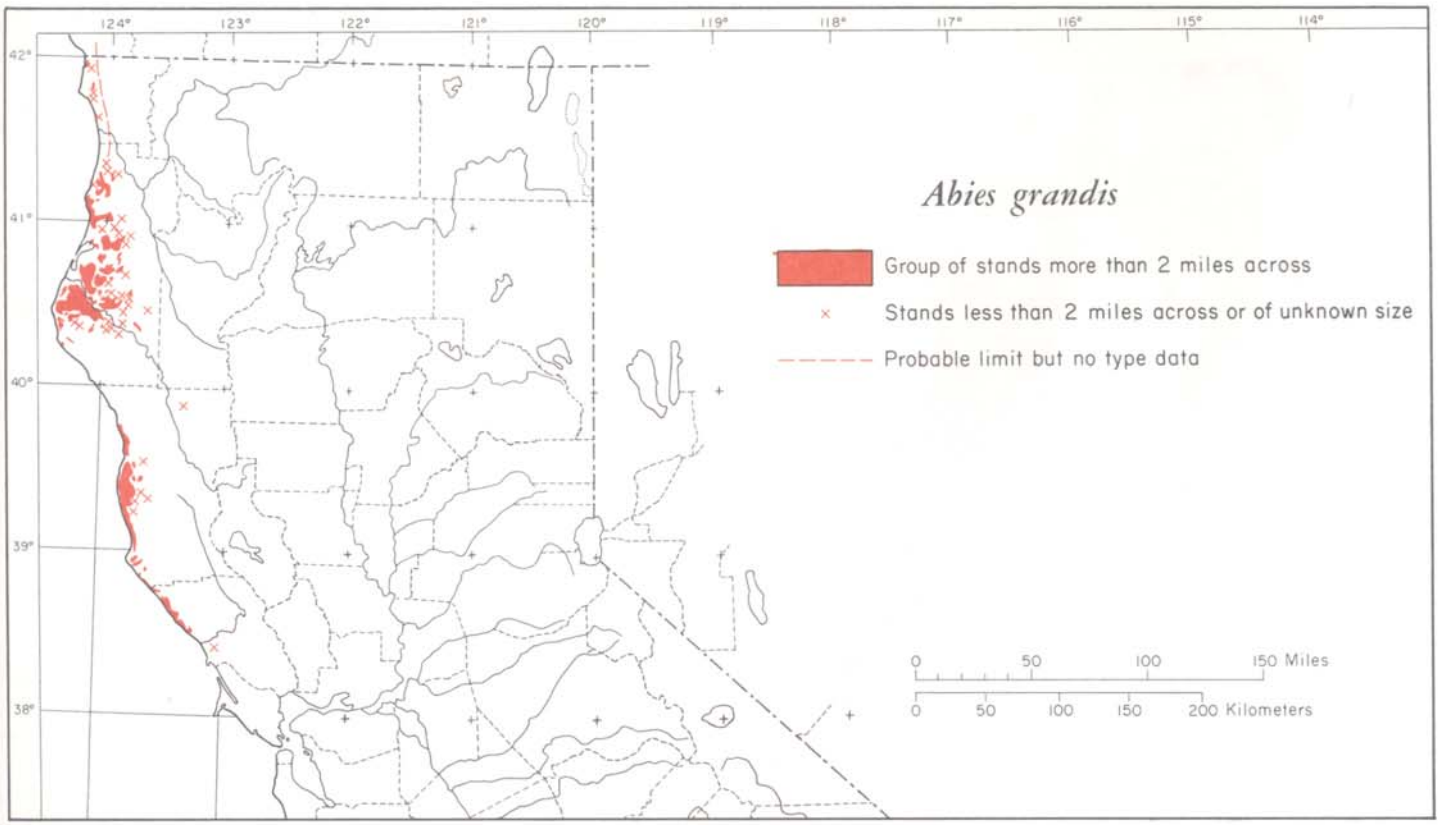


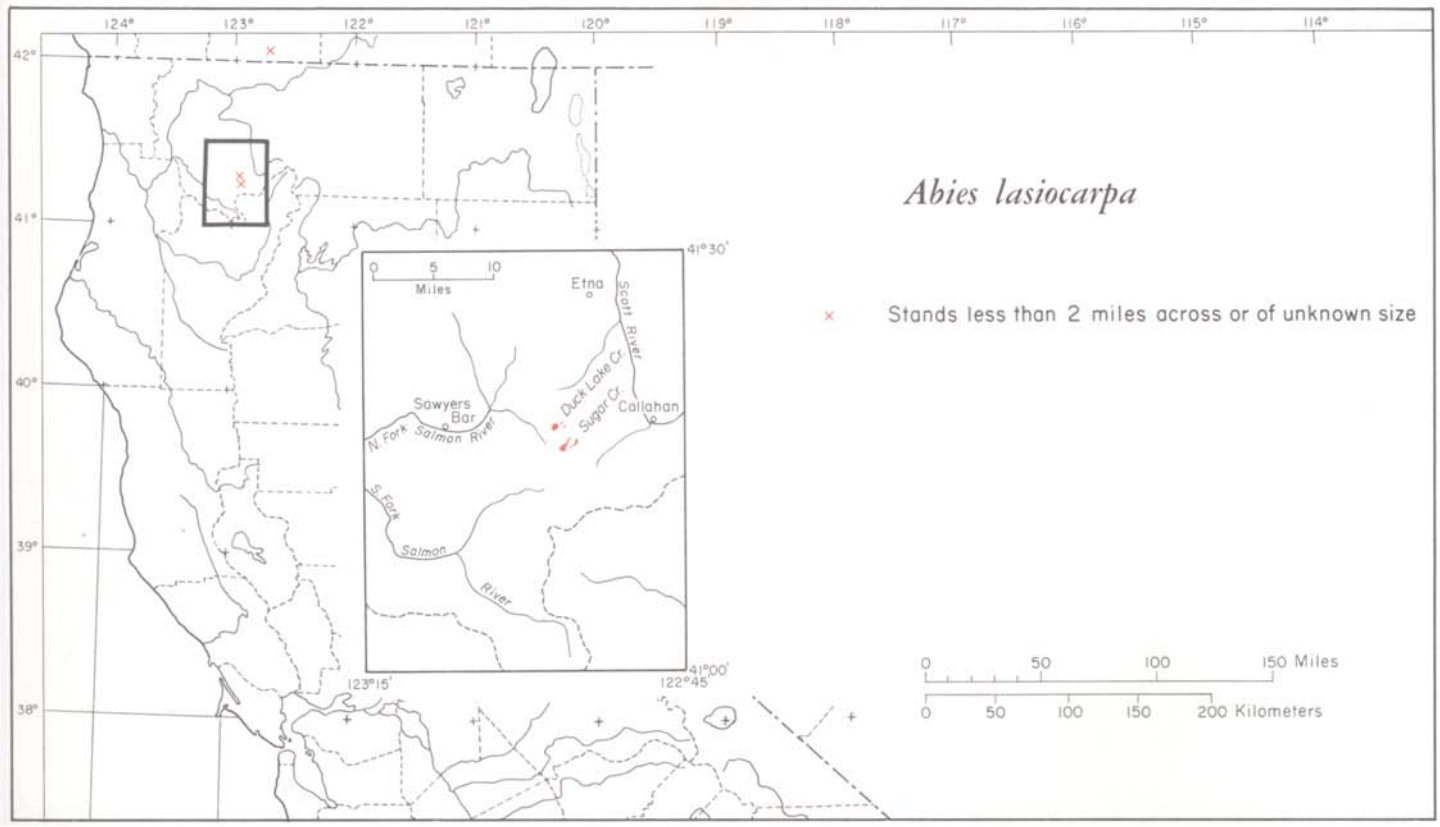


Map 1 (top) Map 2 (bottom)


Abies concolor
Group of stands more than 2 miles across
Stands less than 2 miles across or of unknown size
Probable limit but no type data
Rocky Mountain form
0 50 100 150 Miles
0 50 100 150 200 Kilometers
124° 123° 122° 121° 120° 119° 118° 117° 116° 115° 114°
42° 41° 40° 39° 38° 37° 36° 35° 34° 33°

Map 3





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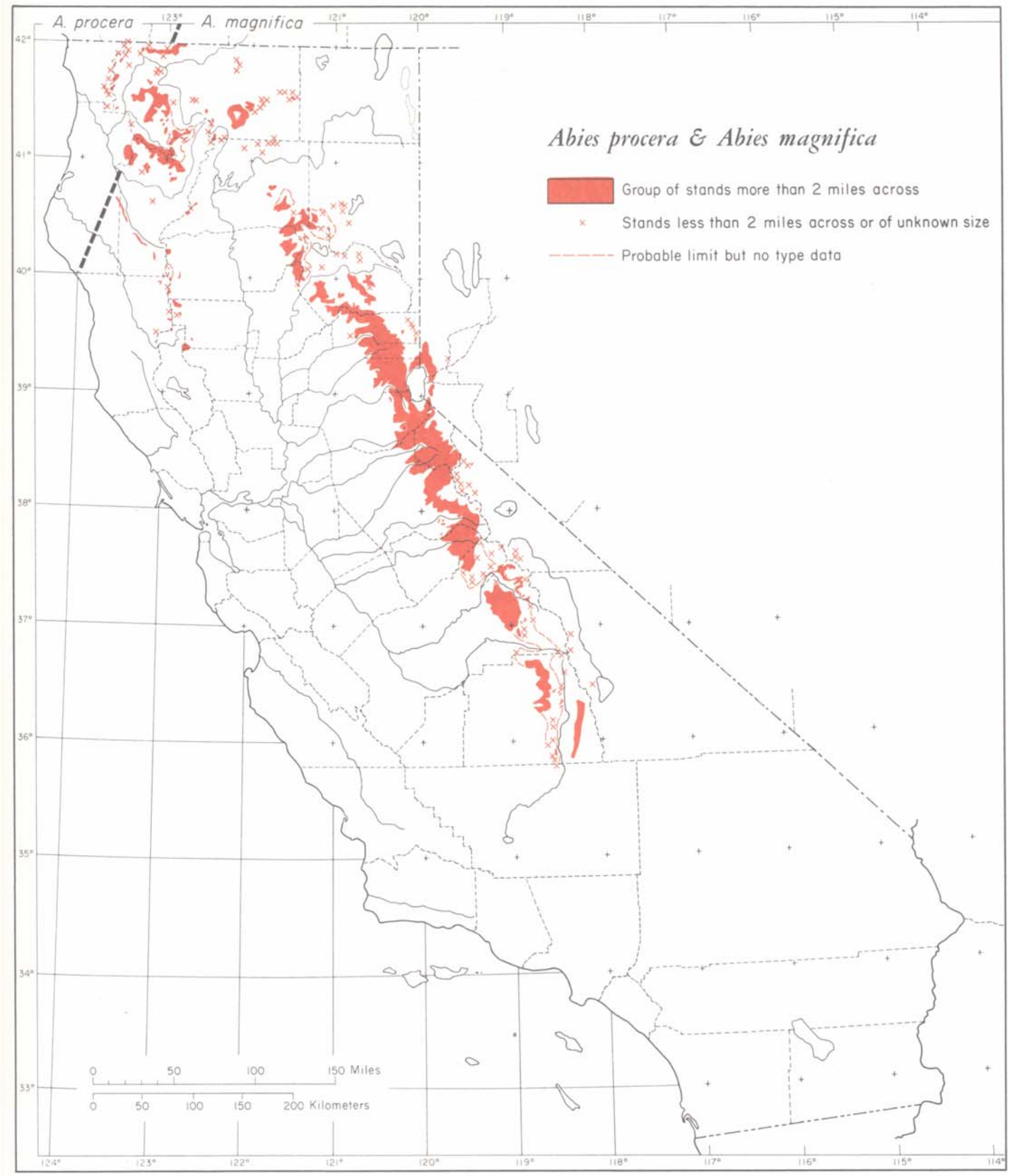
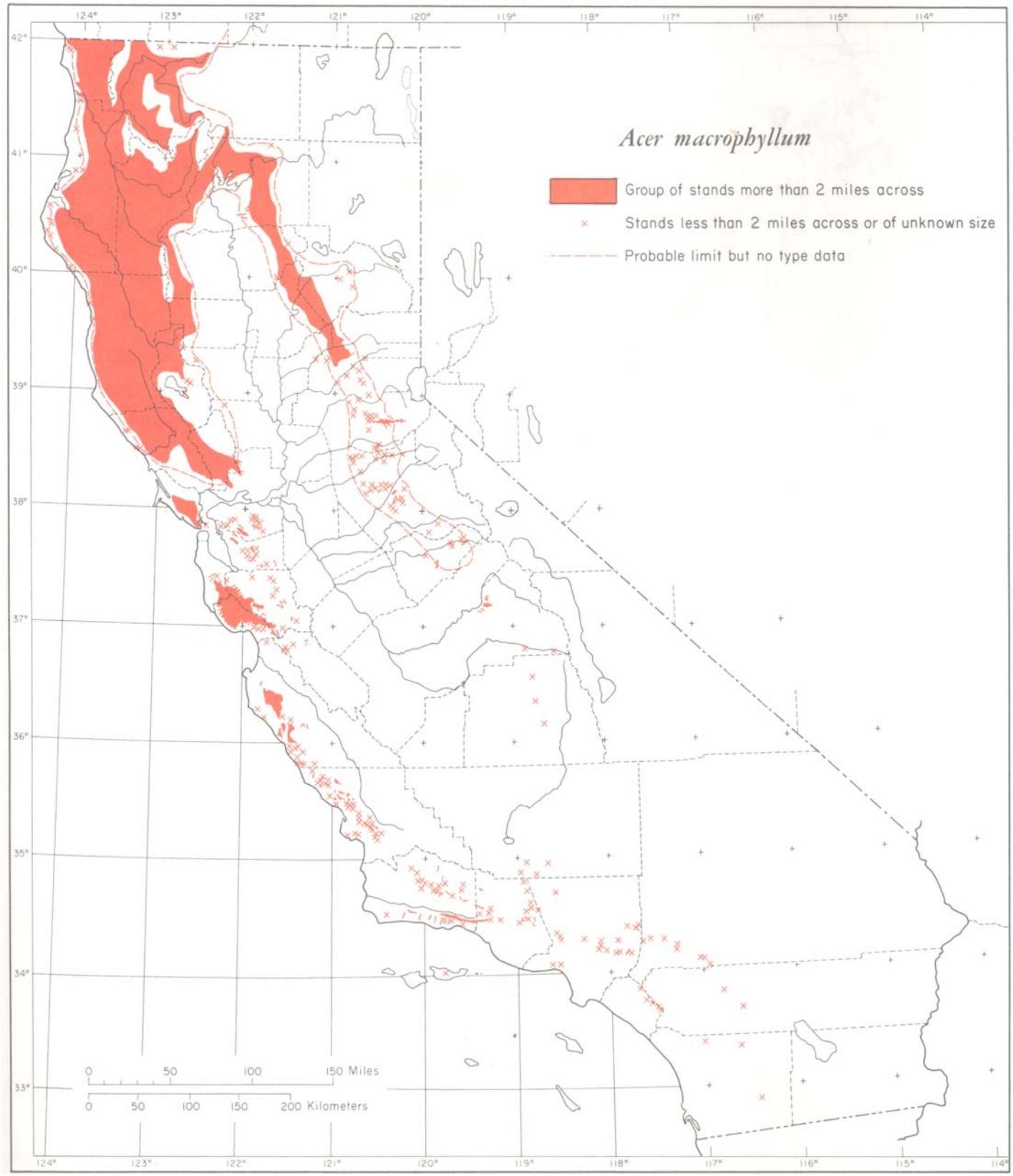
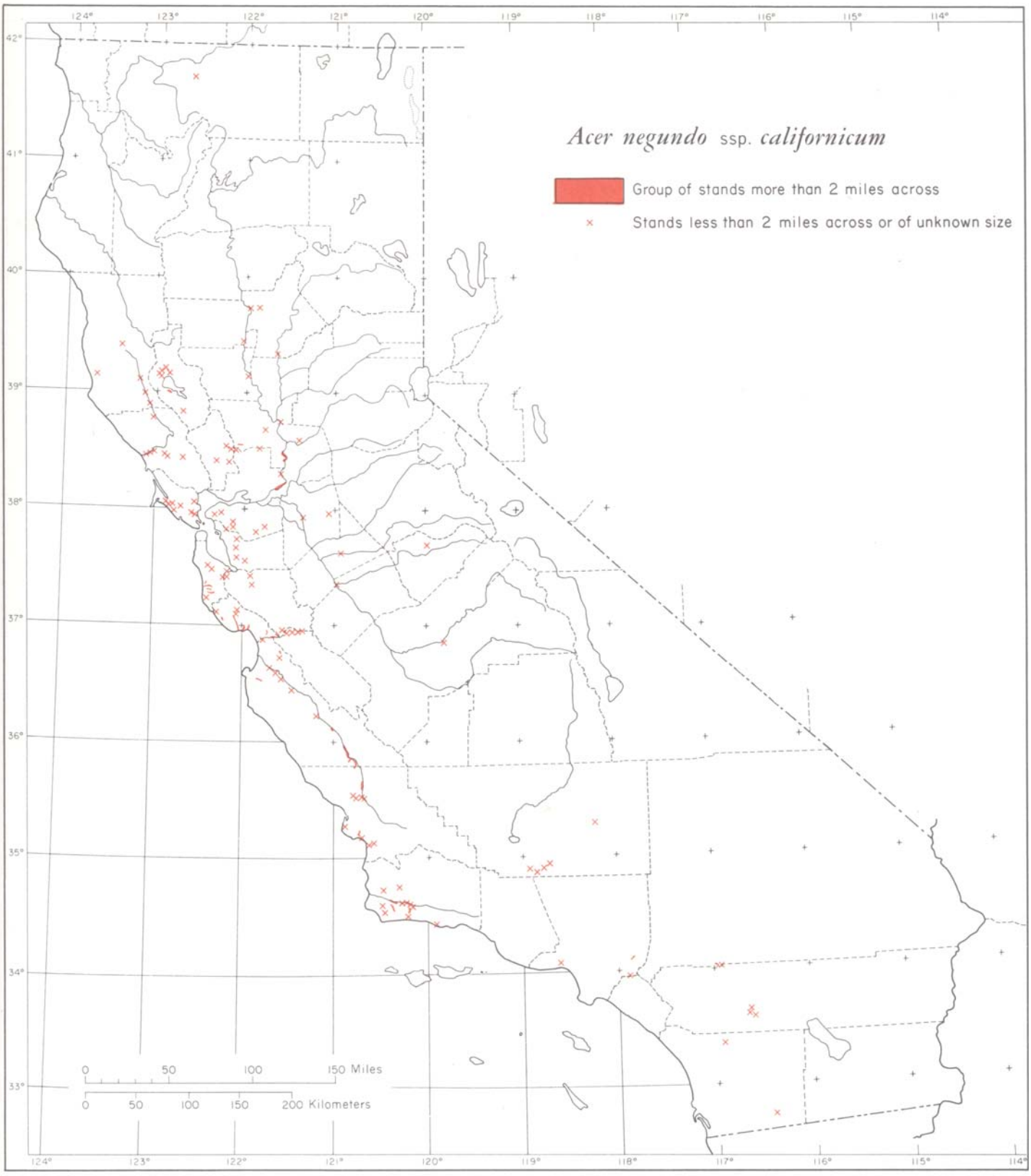

A. procera
A. magnifica
Abies procera & Abies magnifica
Group of stands more than 2 miles across
Stands less than 2 miles across or of unknown size
Probable limit but no type data
0 50 100 150 Miles
0 50 100 150 200 Kilometers

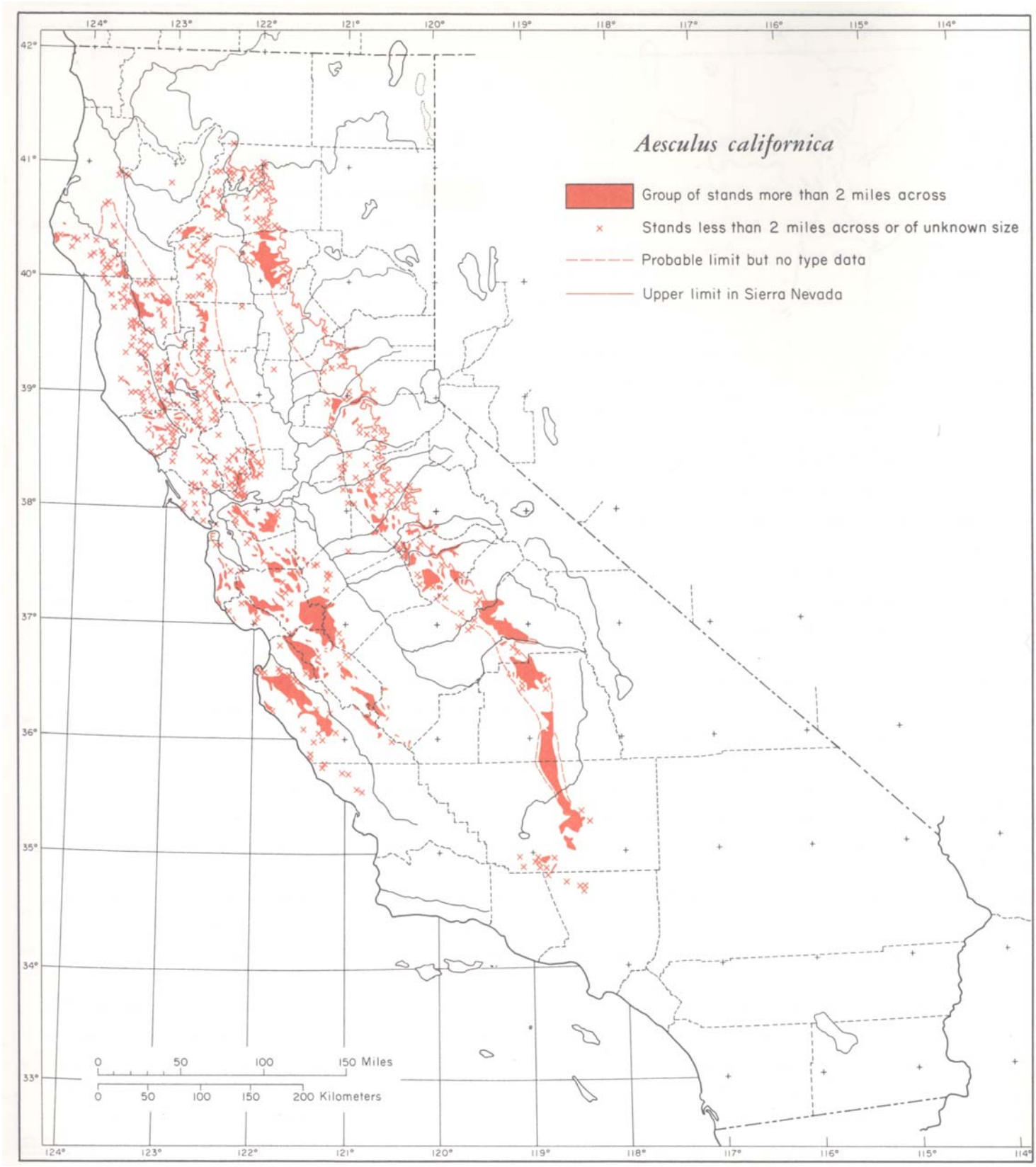
Map 6


Acer macrophyllum
Group of stands more than 2 miles across
Stands less than 2 miles across or of unknown size
Probable limit but no type data
0 50 100 150 Miles
0 50 100 150 200 Kilometers
124° 123° 122° 121° 120° 119° 118° 117° 116° 115° 114°
42° 41° 40° 39° 38° 37° 36° 35° 34° 33°

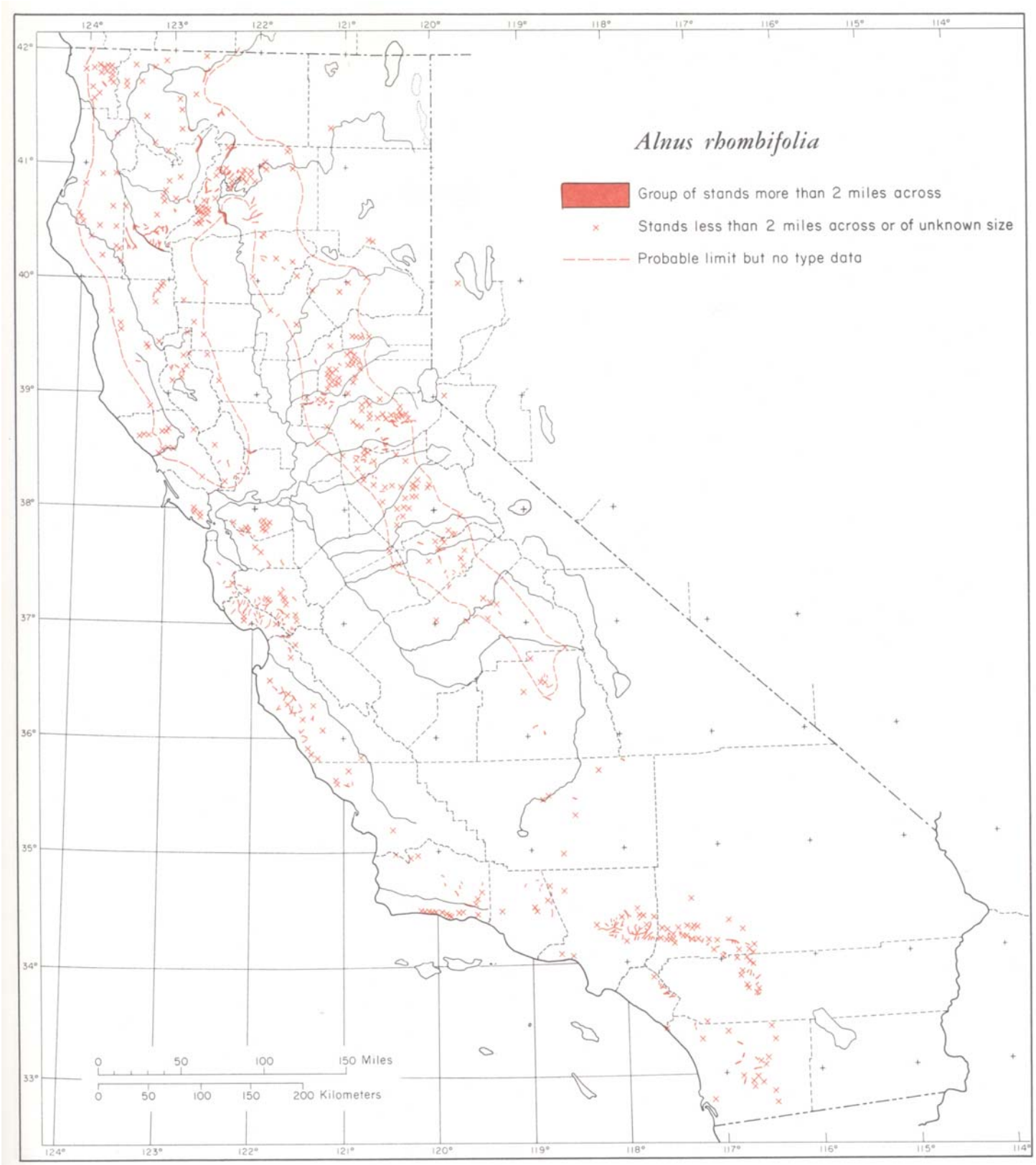
Map 7


Acer negundo ssp. californicum
Group of stands more than 2 miles across
Stands less than 2 miles across or of unknown size
0 50 100 150 Miles
0 50 100 150 200 Kilometers
124° 123° 122° 121° 120° 119° 118° 117° 116° 115° 114°
42° 41° 40° 39° 38° 37° 36° 35° 34° 33°

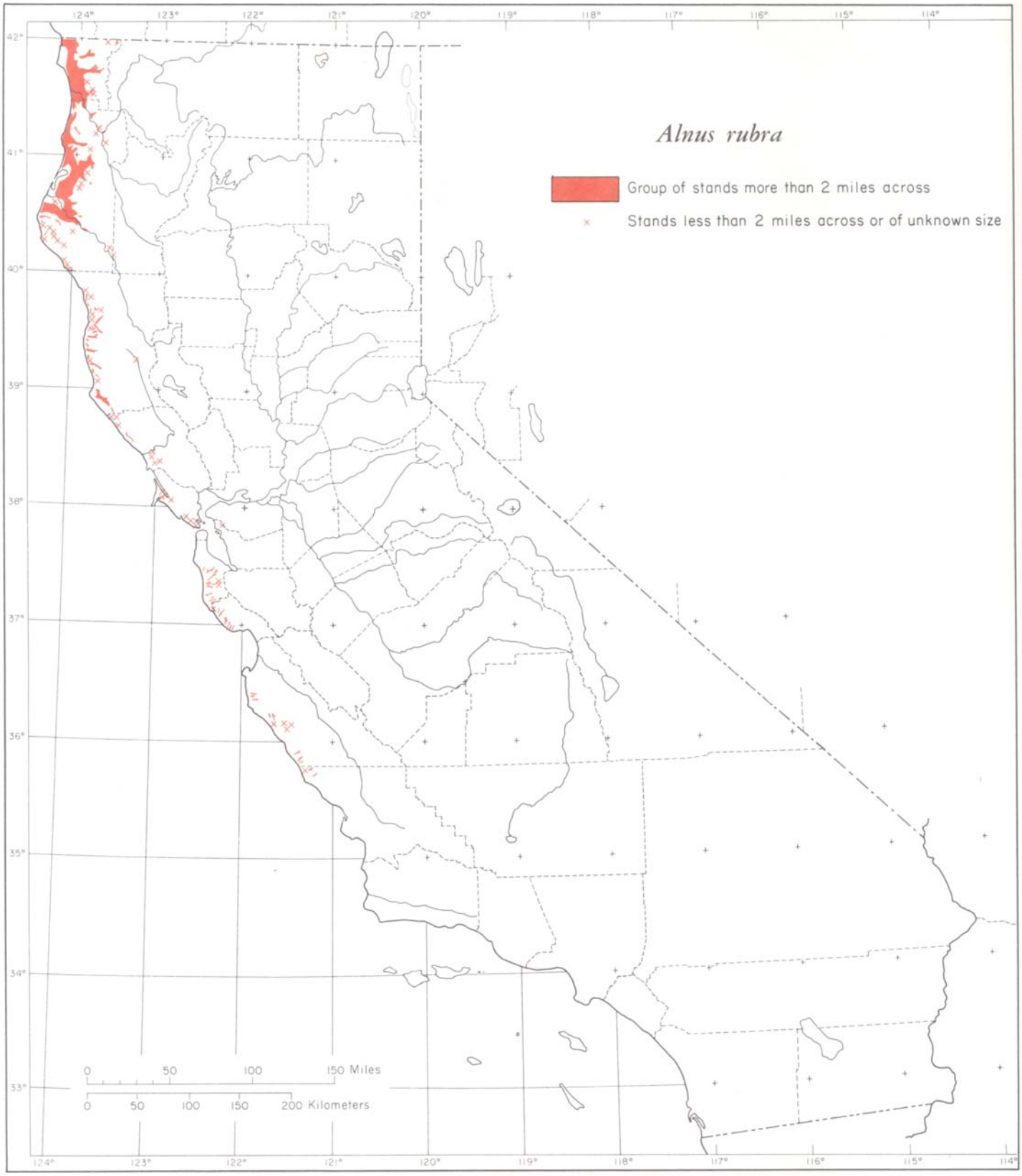
Map 8


Aesculus californica
Group of stands more than 2 miles across
Stands less than 2 miles across or of unknown size
Probable limit but no type data
Upper limit in Sierra Nevada
0 50 100 150 Miles
0 50 100 150 200 Kilometers
124° 123° 122° 121° 120° 119° 118° 117° 116° 115° 114°
42° 41° 40° 39° 38° 37° 36° 35° 34° 33°

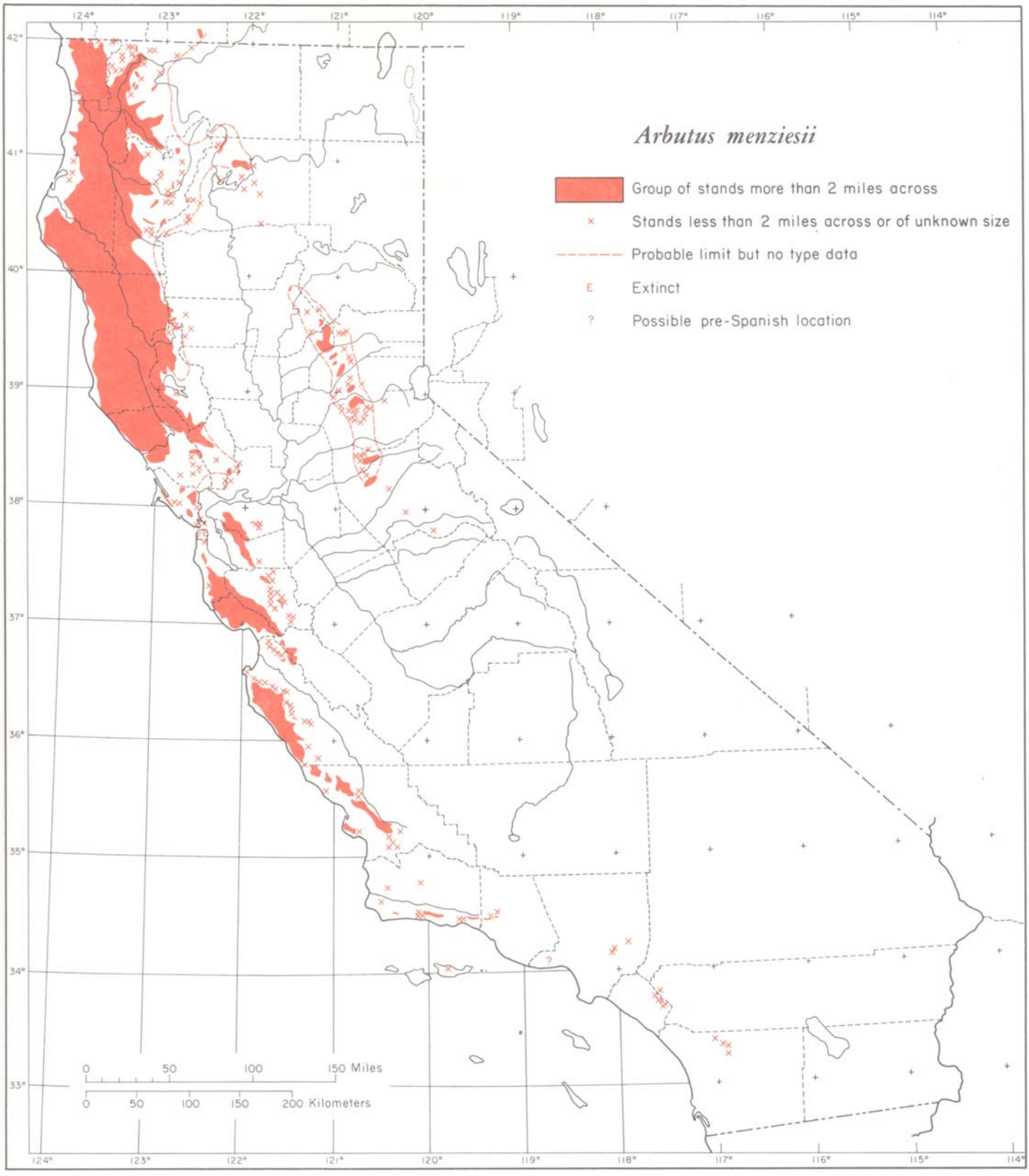
Map 9


Alnus rhombifolia
Group of stands more than 2 miles across
Stands less than 2 miles across or of unknown size
Probable limit but no type data
0 50 100 150 Miles
0 50 100 150 200 Kilometers
124° 123° 122° 121° 120° 119° 118° 117° 116° 115° 114°
42° 41° 40° 39° 38° 37° 36° 35° 34° 33°

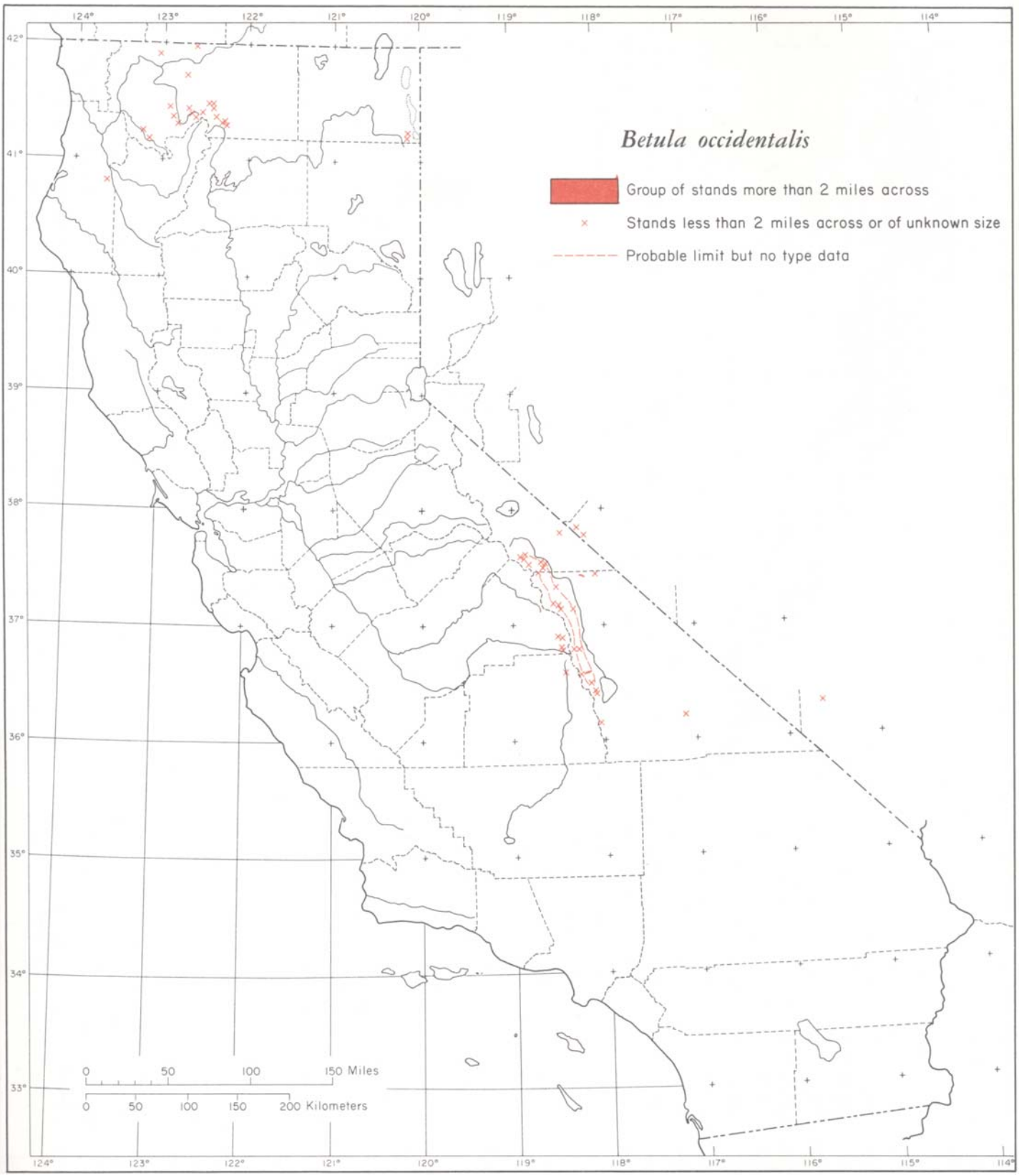
Map 10


Alnus rubra
Group of stands more than 2 miles across
Stands less than 2 miles across or of unknown size
0 50 100 150 Miles
0 50 100 150 200 Kilometers

Map 11


Arbutus menziesii
Group of stands more than 2 miles across
Stands less than 2 miles across or of unknown size
Probable limit but no type data
E Extinct
? Possible pre-Spanish location
0 50 100 150 Miles
0 50 100 150 200 Kilometers

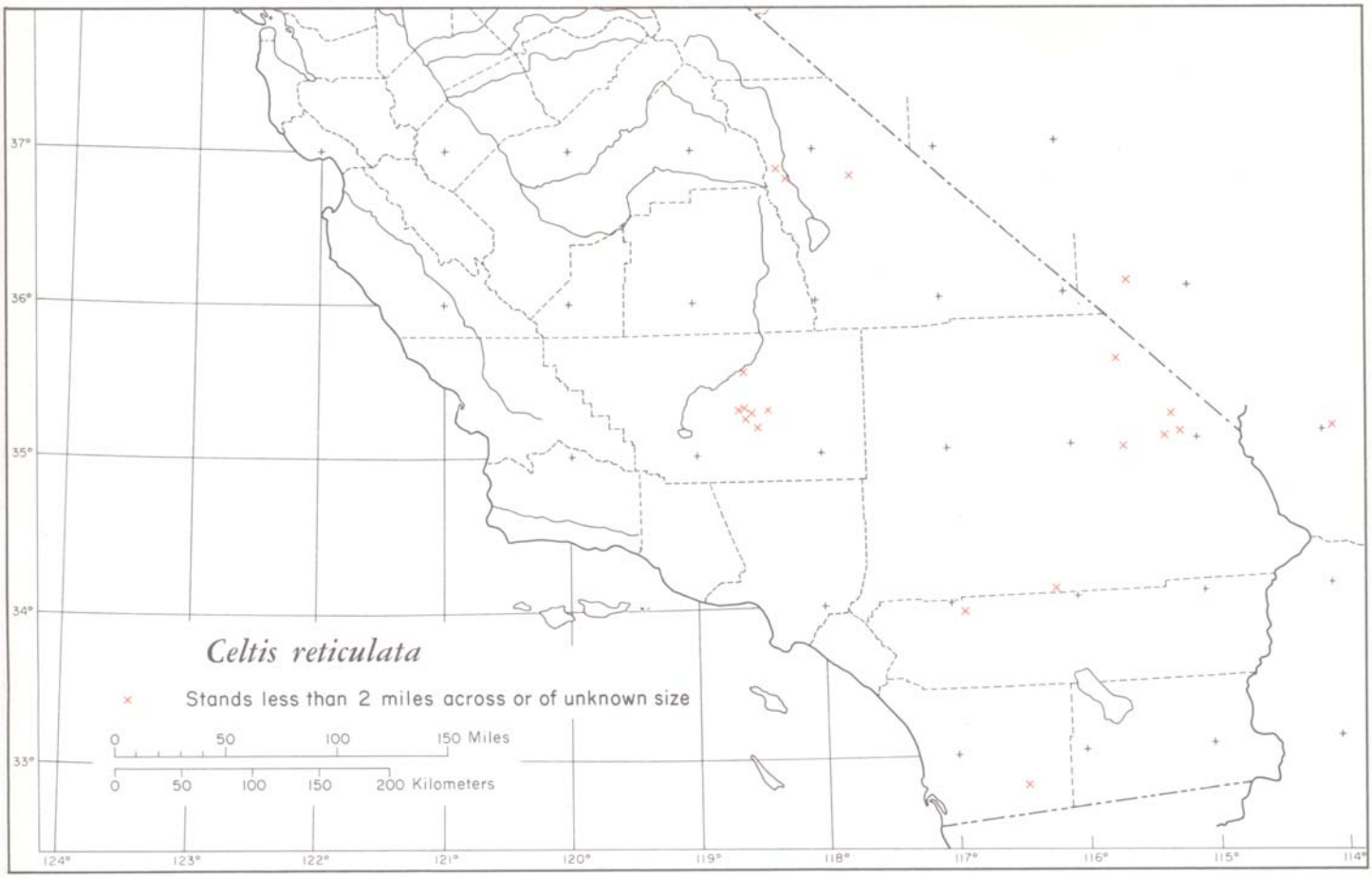
Map 12

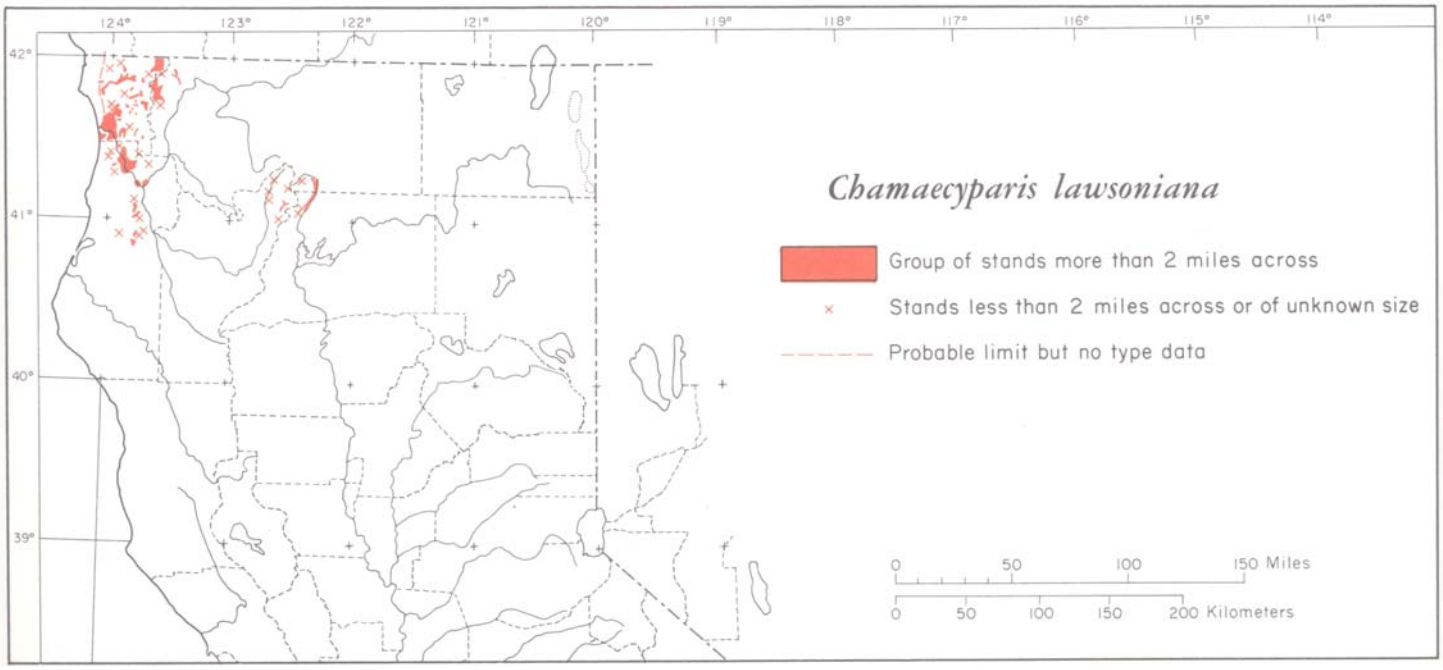

Betula occidentalis
Group of stands more than 2 miles across
Stands less than 2 miles across or of unknown size
Probable limit but no type data
0 50 100 150 Miles
0 50 100 150 200 Kilometers
124° 123° 122° 121° 120° 119° 118° 117° 116° 115° 114°
42° 41° 40° 39° 38° 37° 36° 35° 34° 33°

Map 13


Castanopsis chrysophylla
Group of stands more than 2 miles across
Stands less than 2 miles across or of unknown size
0 50 100 150 Miles
0 50 100 150 200 Kilometers
124° 123° 122° 121° 120° 119° 118° 117° 116° 115° 114°
42° 41° 40° 39° 38° 37° 36° 35° 34° 33°

Map 14





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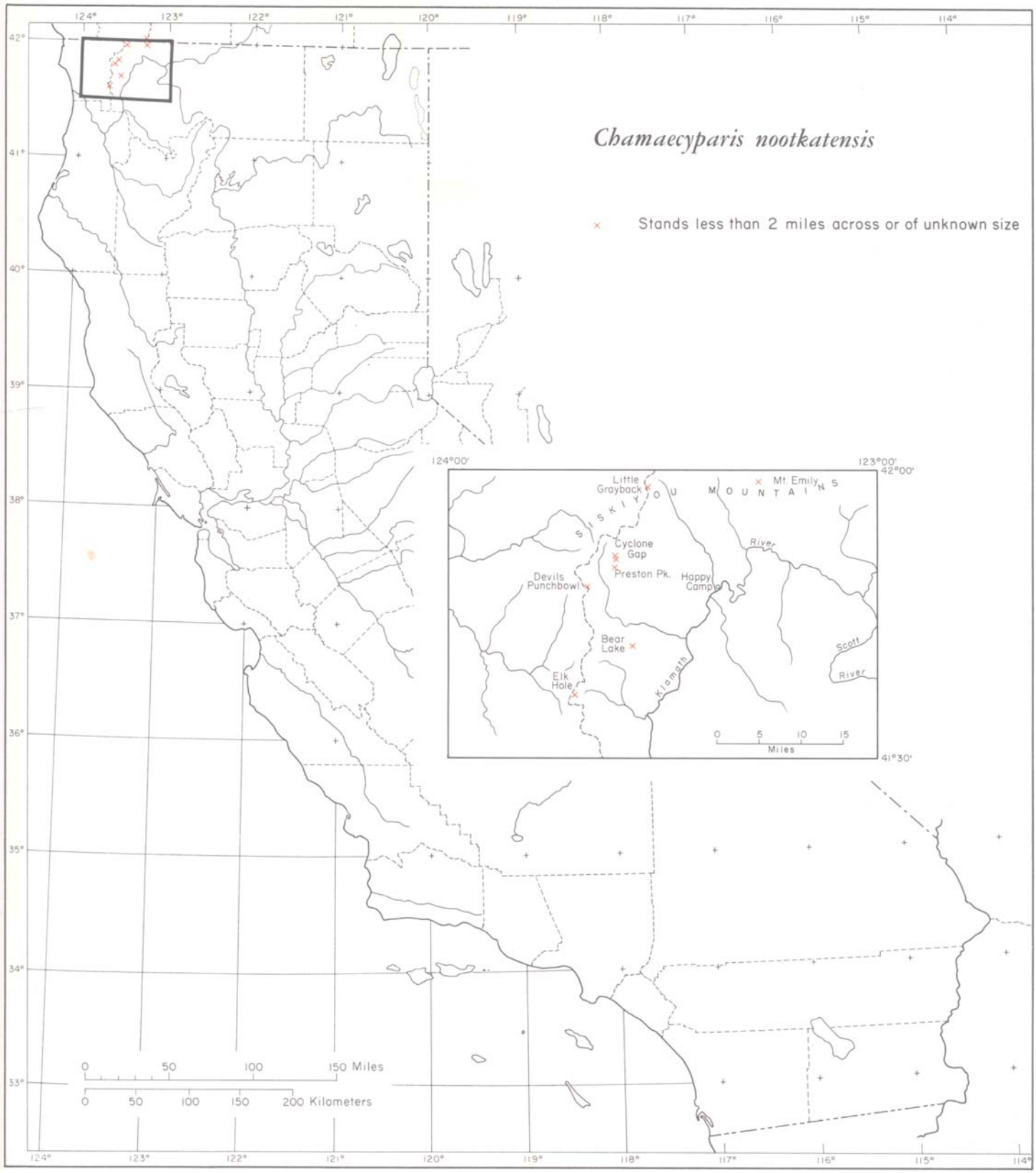
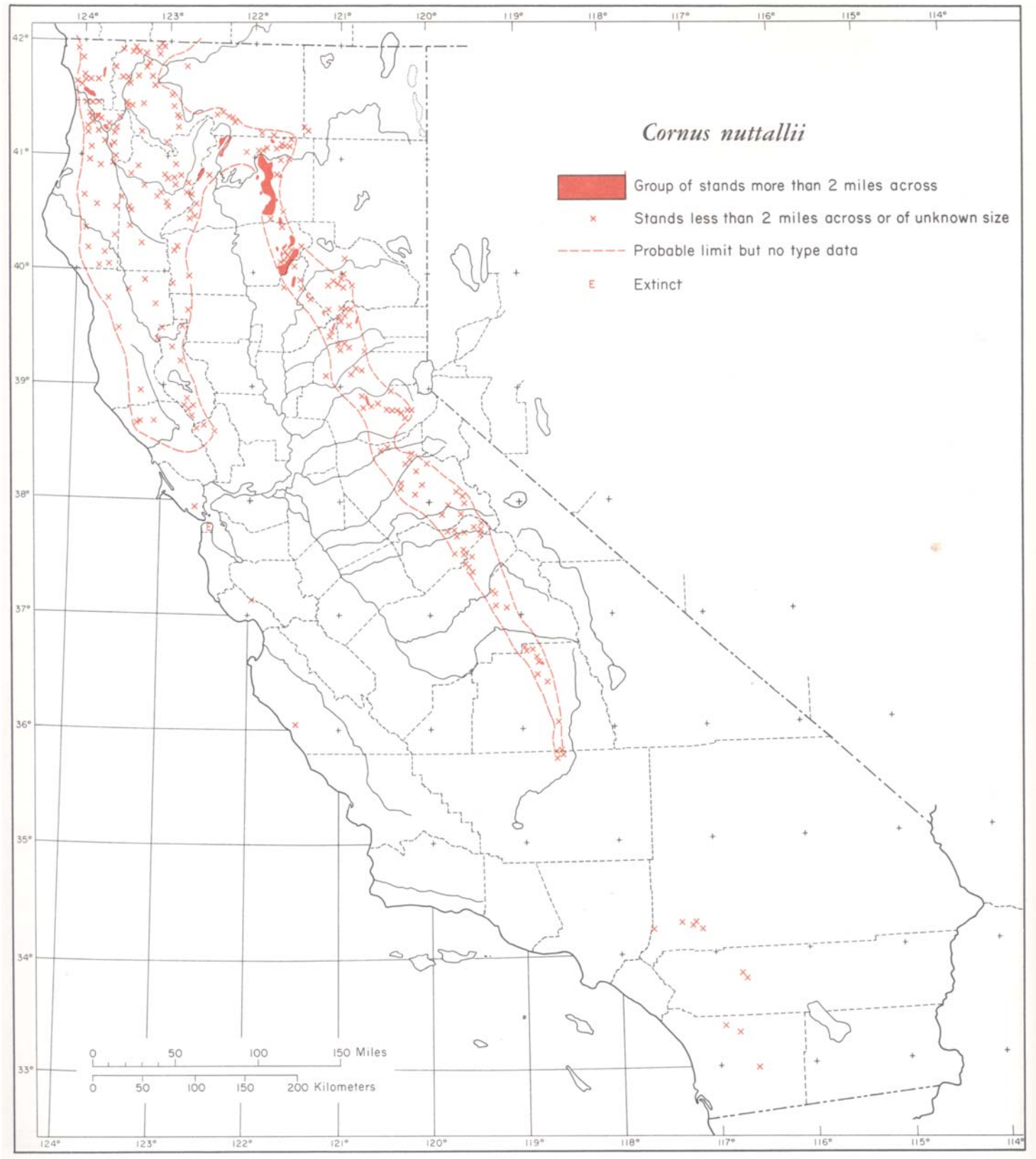
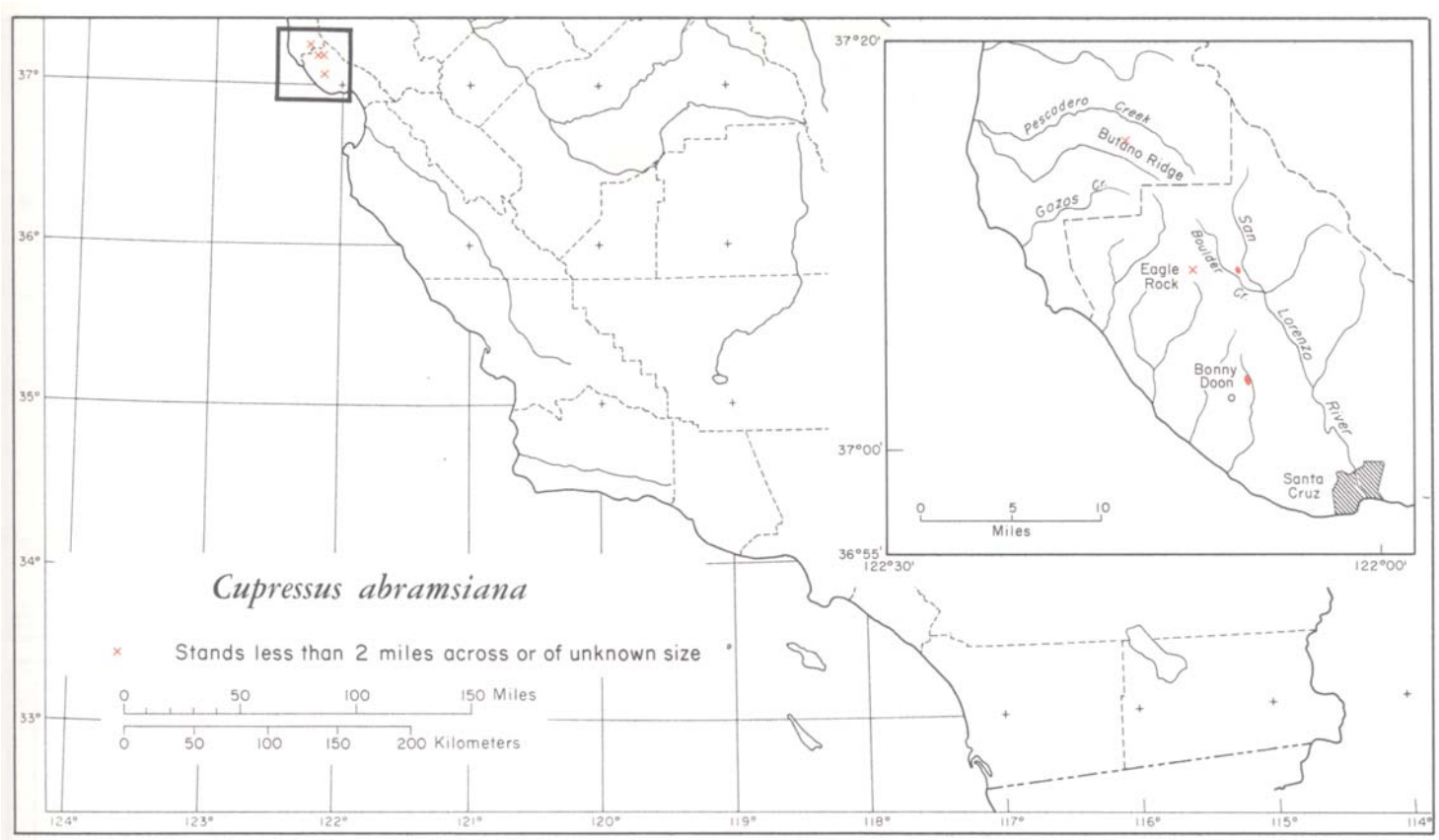
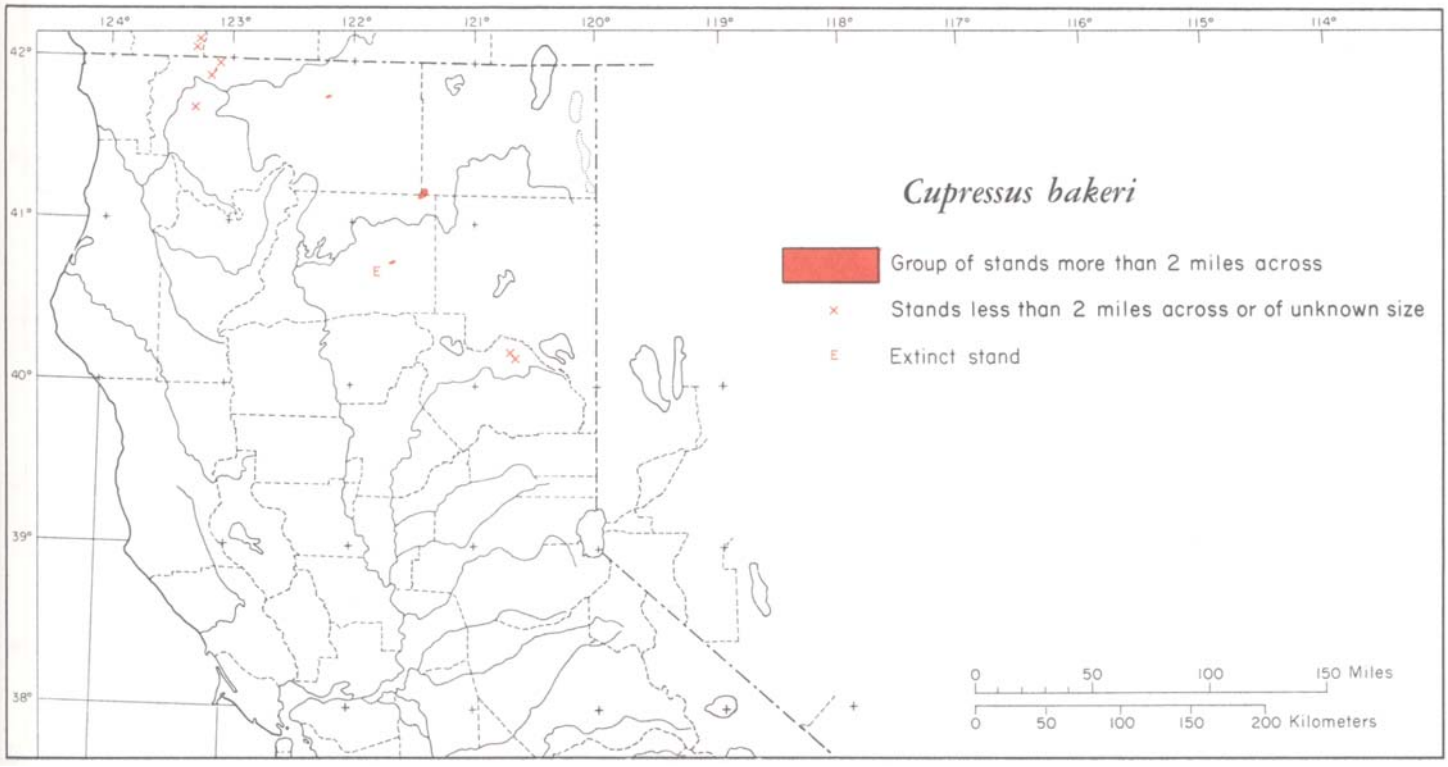

Chamaecyparis nootkatensis
Stands less than 2 miles across or of unknown size
124°00'
123°00'
42°00'
41°30'
Little Grayback
Mt. Emily
SISKIYOU MOUNTAINS
Cyclone Gap
Preston Pk.
Devils Punchbowl
Happy Camp
Bear Lake
Elk Hole
Klamath River
Scott River
0 5 10 15
Miles
0 50 100 150 Miles
0 50 100 150 200 Kilometers

Map 17

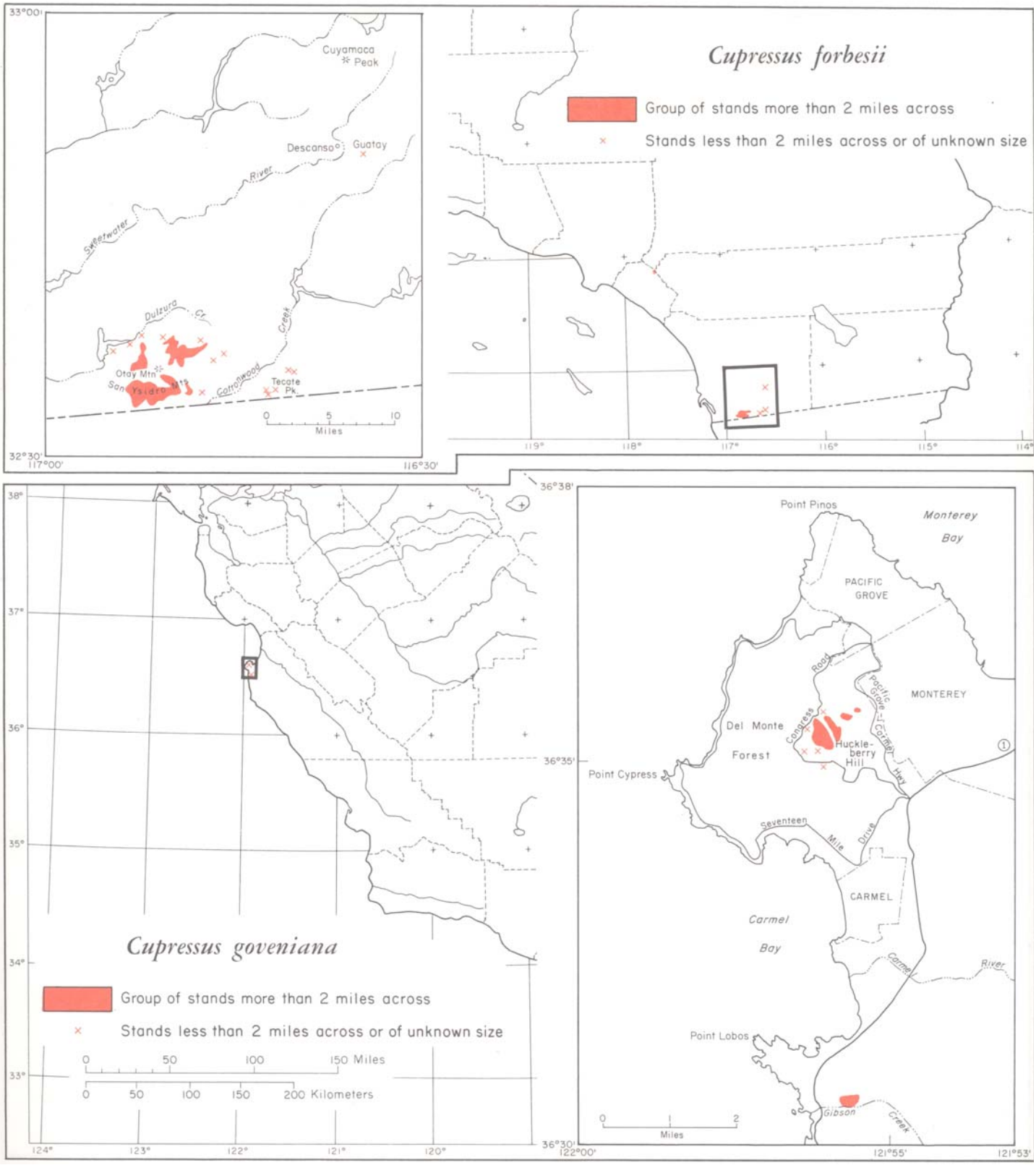

Cornus nuttallii
Group of stands more than 2 miles across
Stands less than 2 miles across or of unknown size
Probable limit but no type data
E Extinct
0 50 100 150 Miles
0 50 100 150 200 Kilometers
124° 123° 122° 121° 120° 119° 118° 117° 116° 115° 114°
42° 41° 40° 39° 38° 37° 36° 35° 34° 33°

Map 18





Map 19 (top) Map 20 (bottom)



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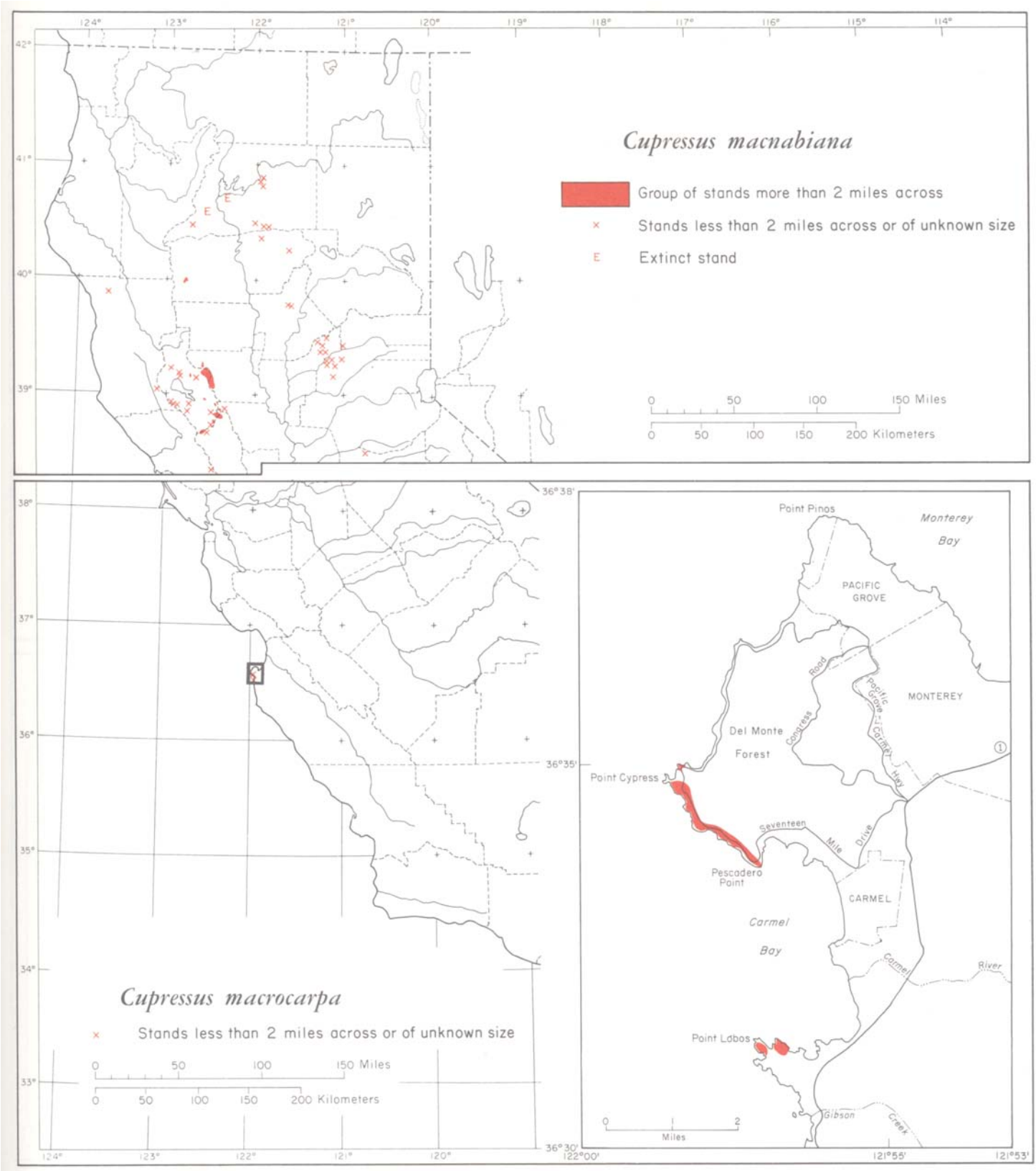

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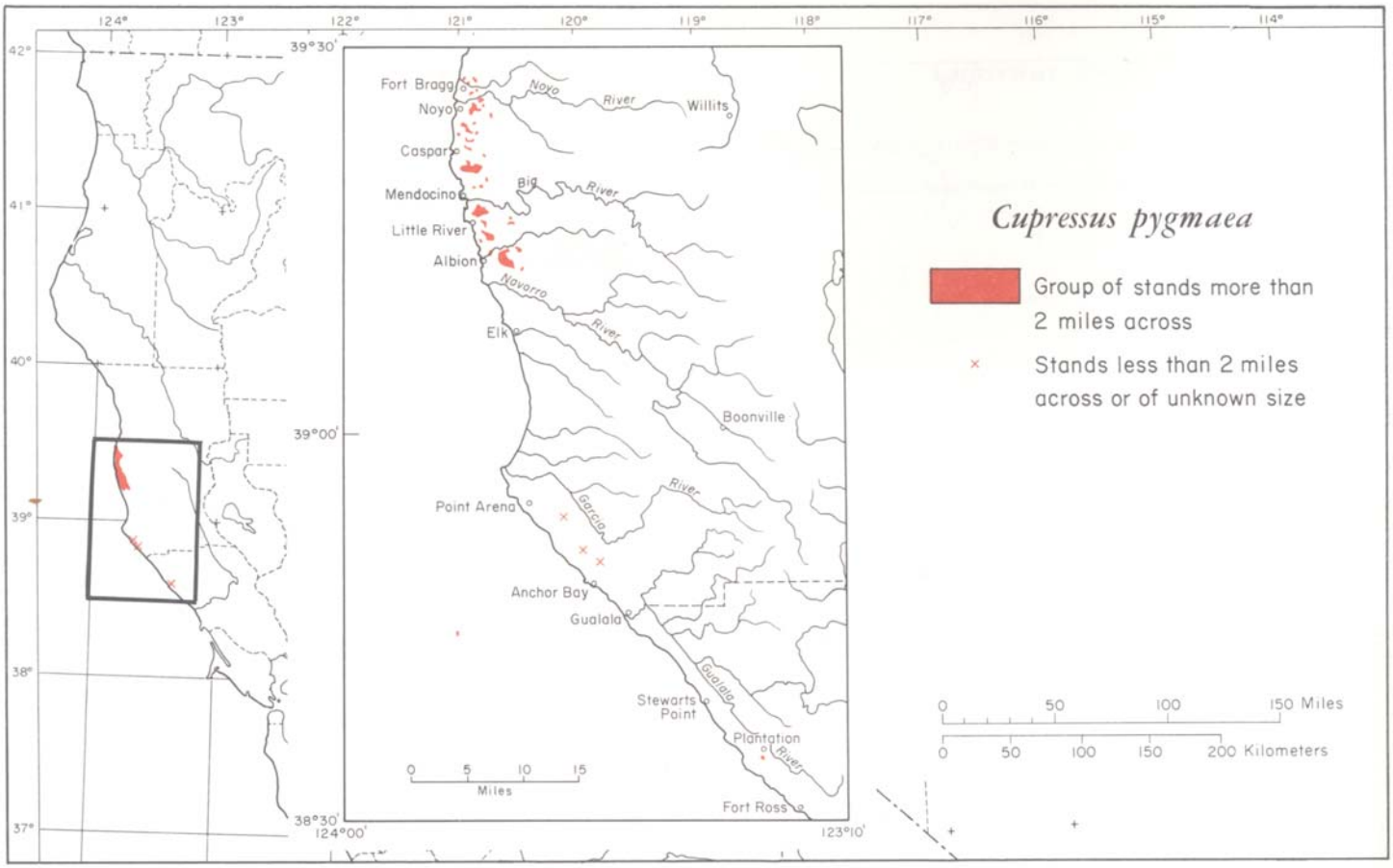

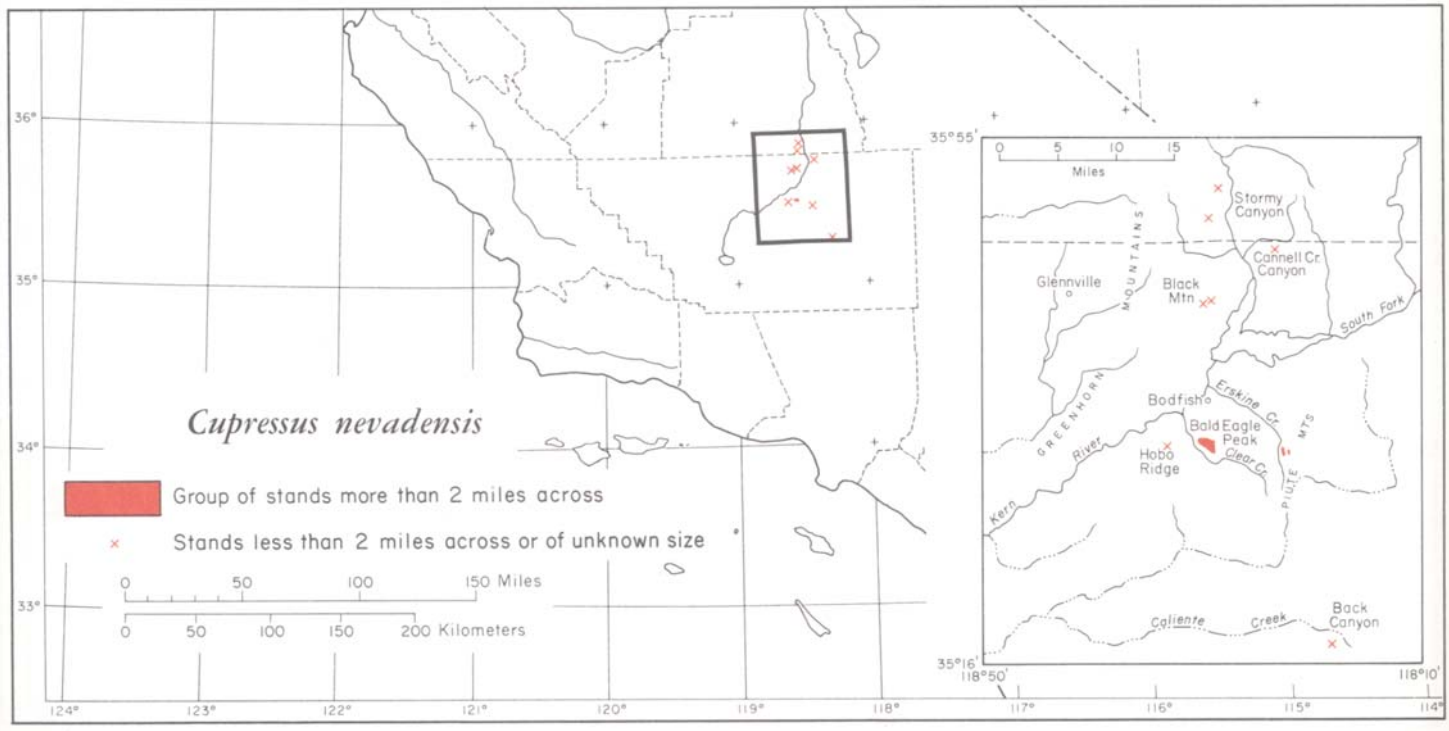

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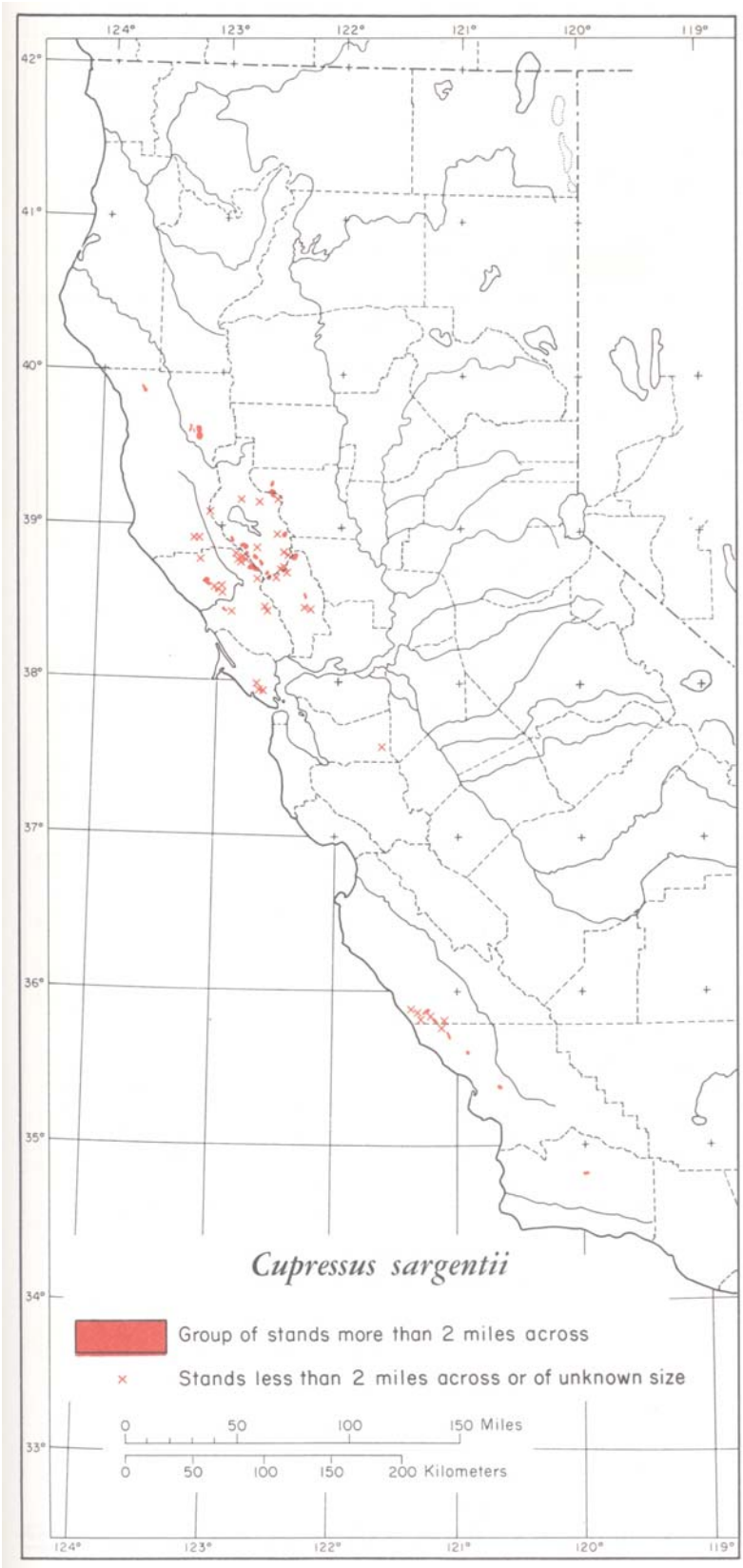
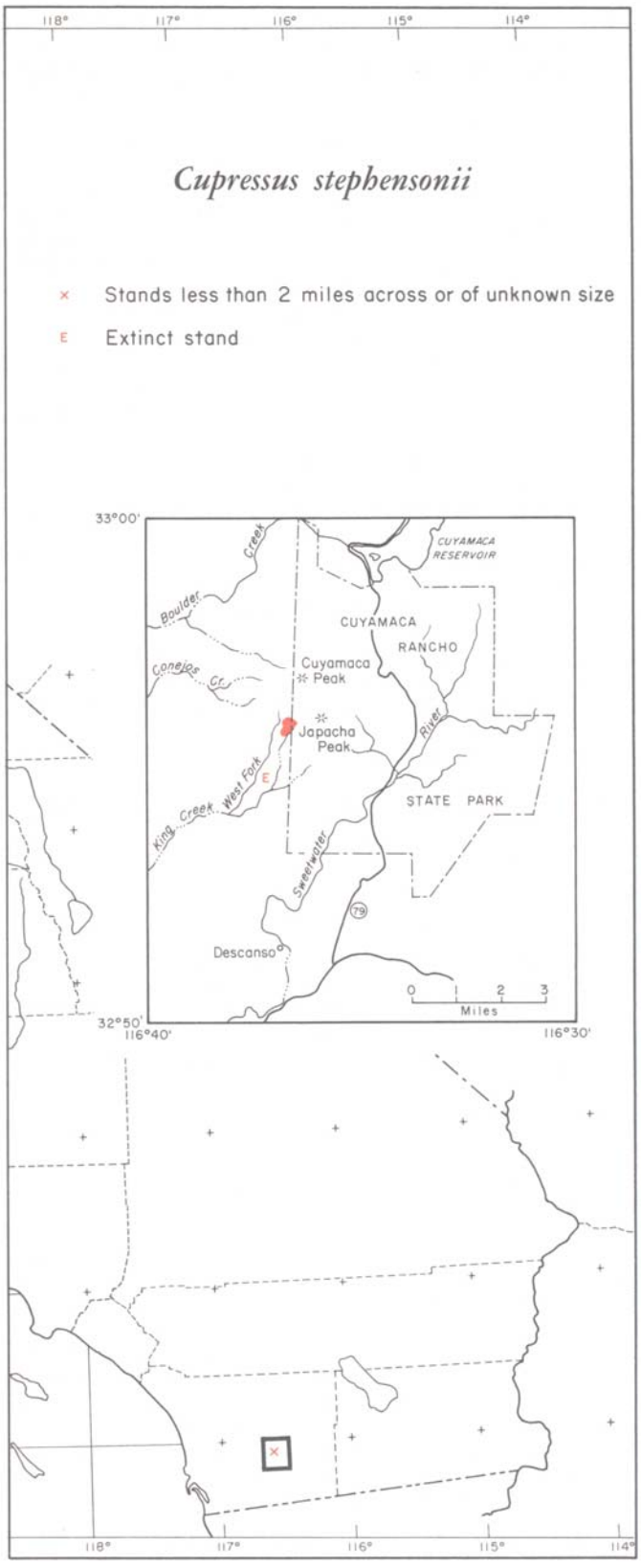
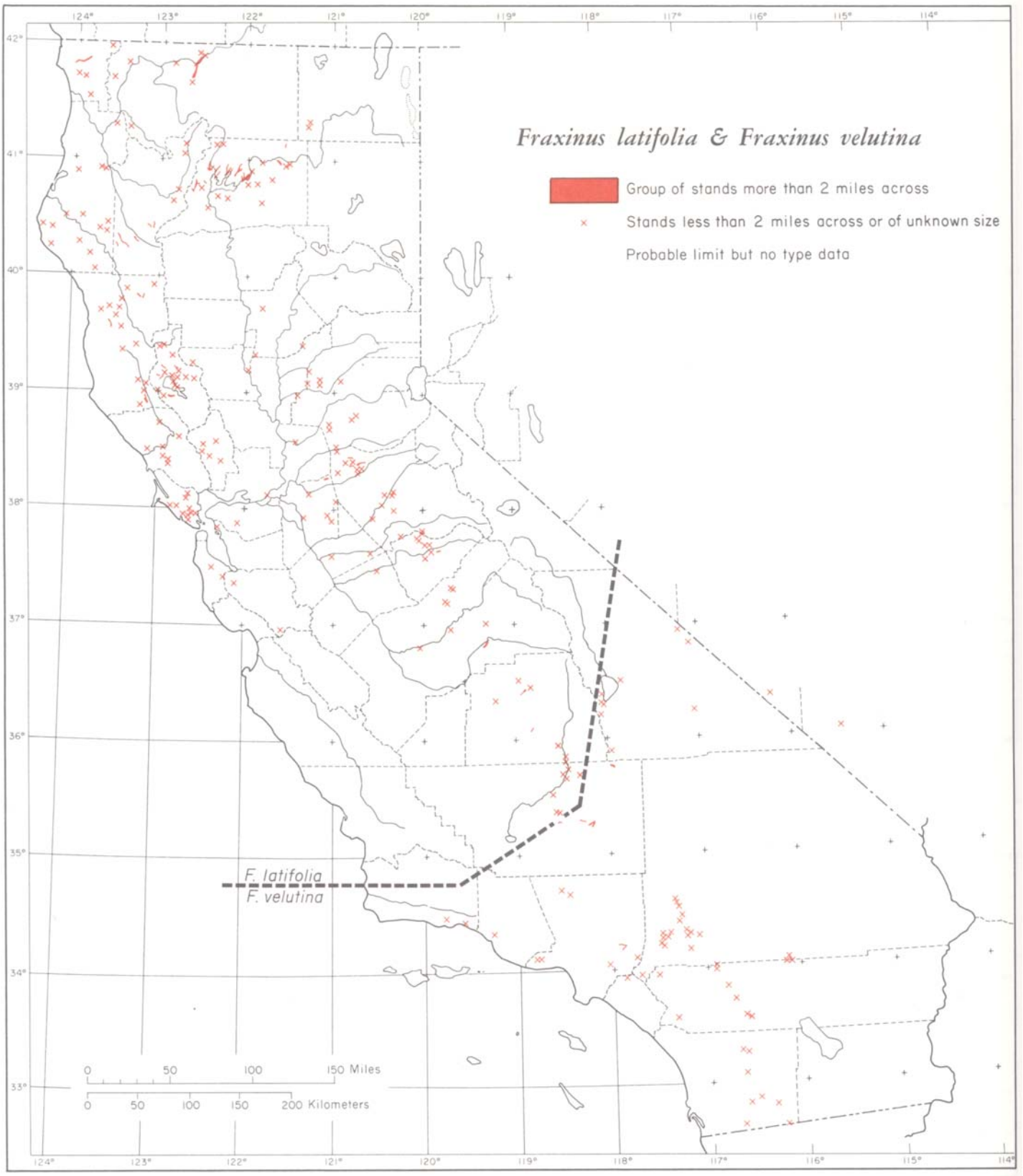

Cupressus sargentii
Group of stands more than 2 miles across
Stands less than 2 miles across or of unknown size
0 50 100 150 Miles
0 50 100 150 200 Kilometers

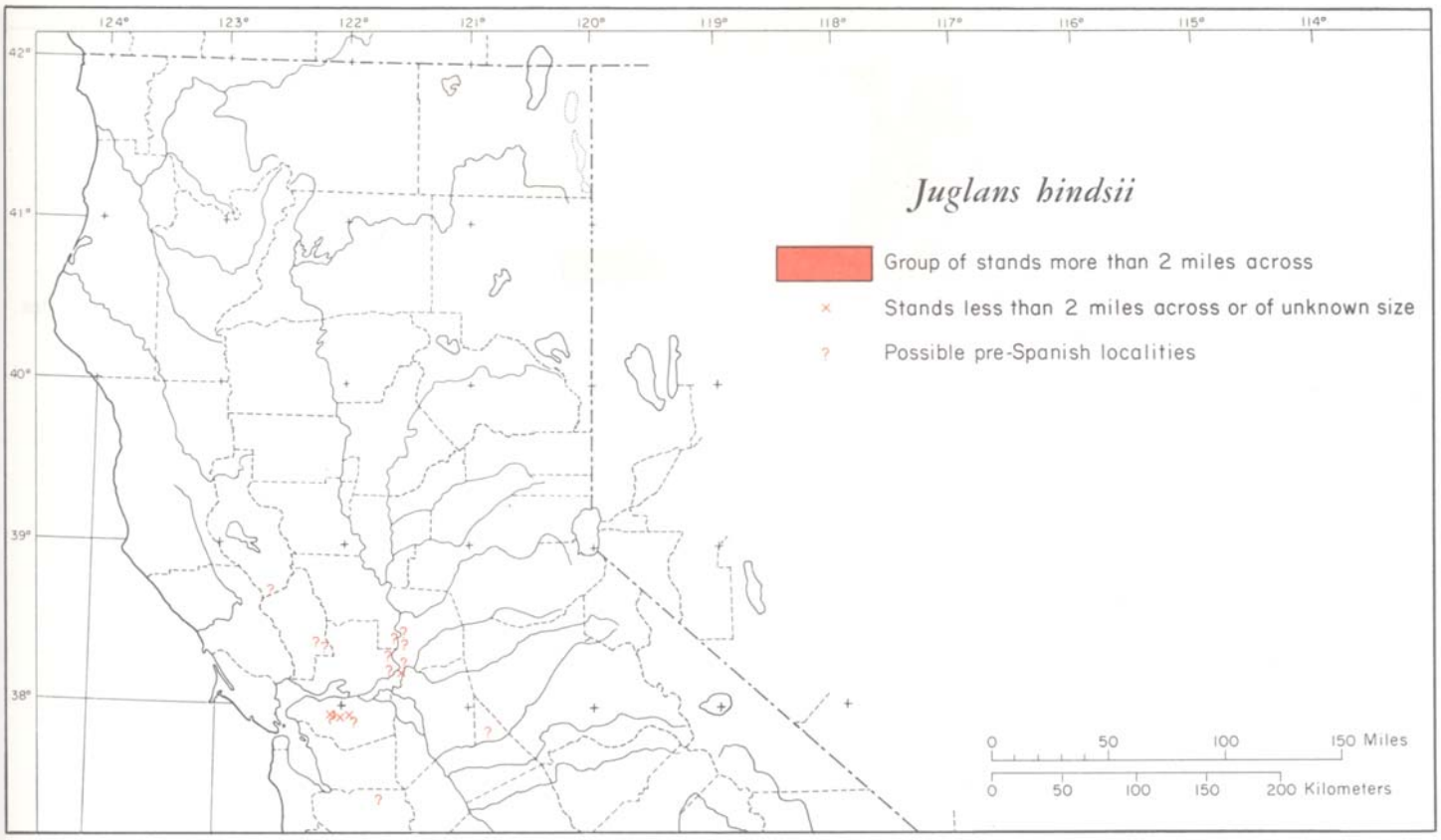
Map 27

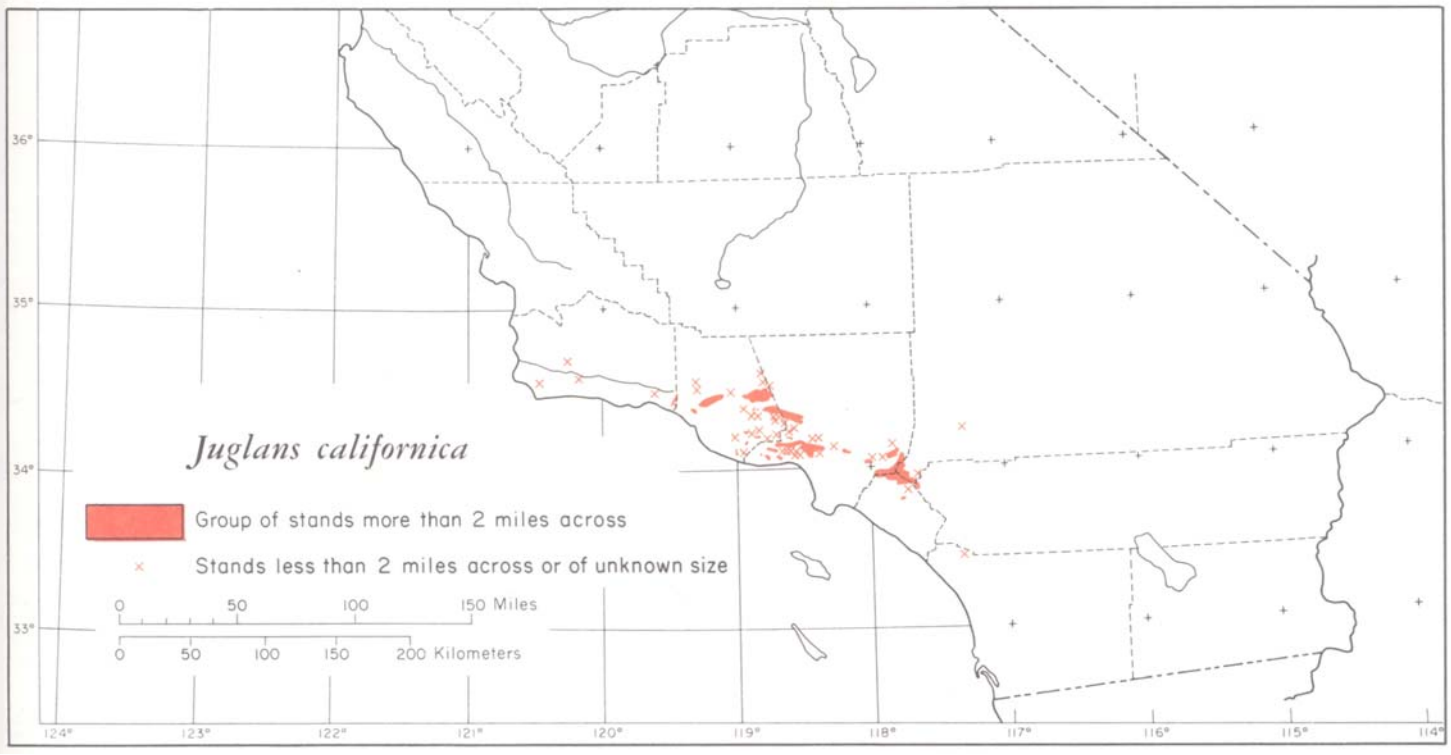

Cupressus stephensonii
Stands less than 2 miles across or of unknown size
E Extinct stand
CUYAMACA RESERVOIR
CUYAMACA RANCHO
Cuyamaca Peak
Japacha Peak
STATE PARK
Descanso
0 2 3 Miles

Map 28

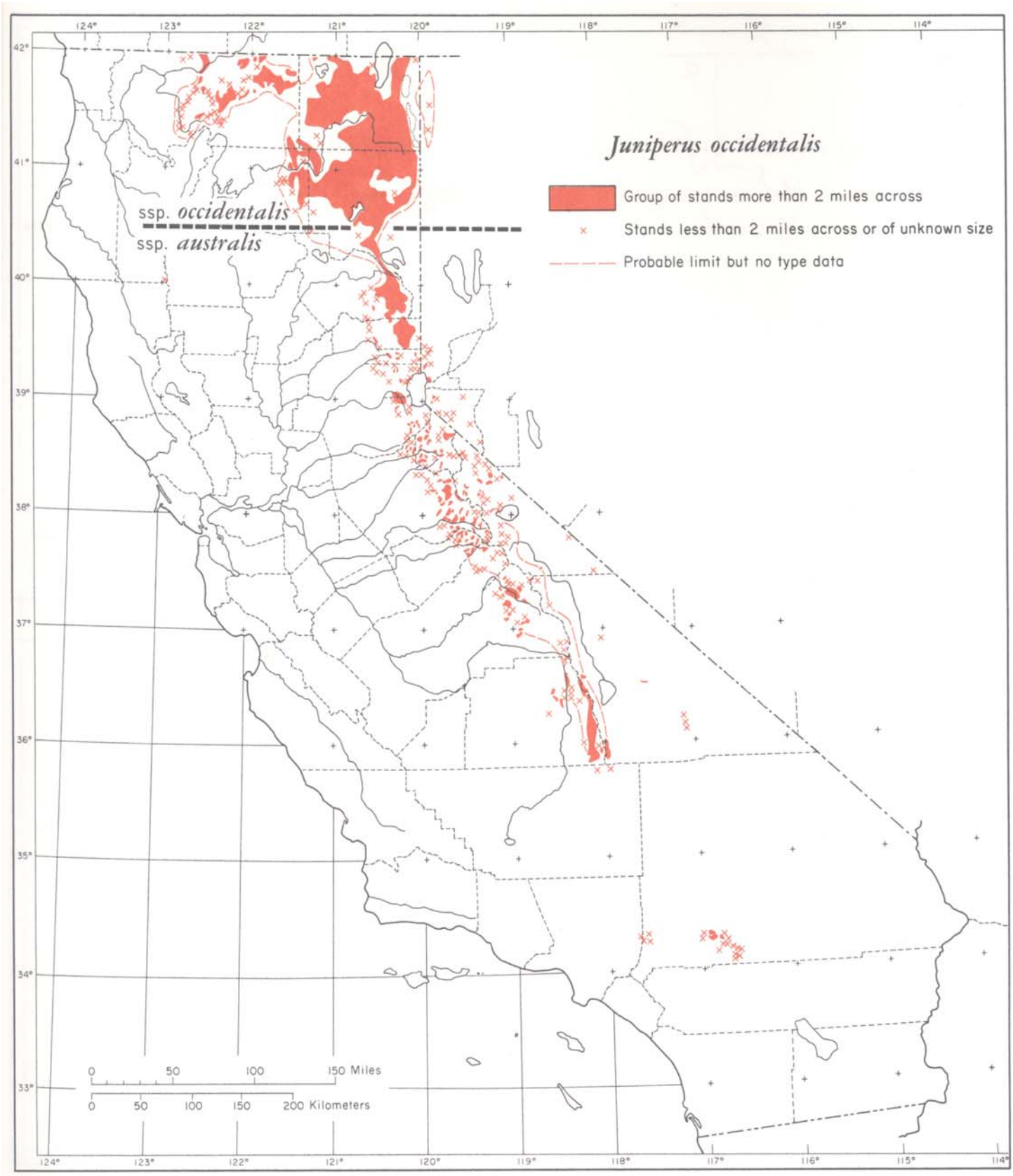

Fraxinus latifolia & Fraxinus velutina
Group of stands more than 2 miles across
Stands less than 2 miles across or of unknown size
Probable limit but no type data
F. latifolia
F. velutina
0 50 100 150 Miles
0 50 100 150 200 Kilometers

Map 29

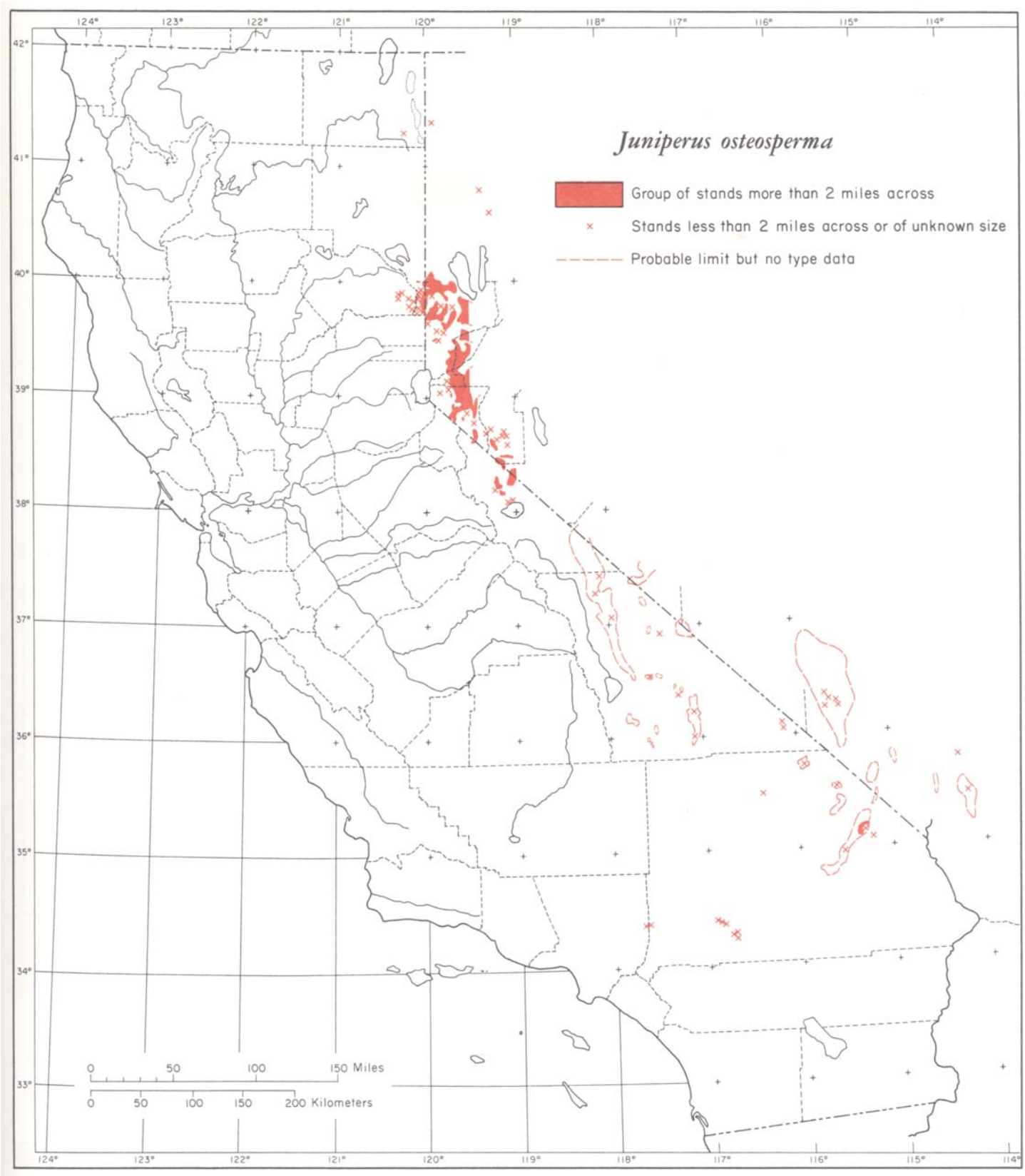




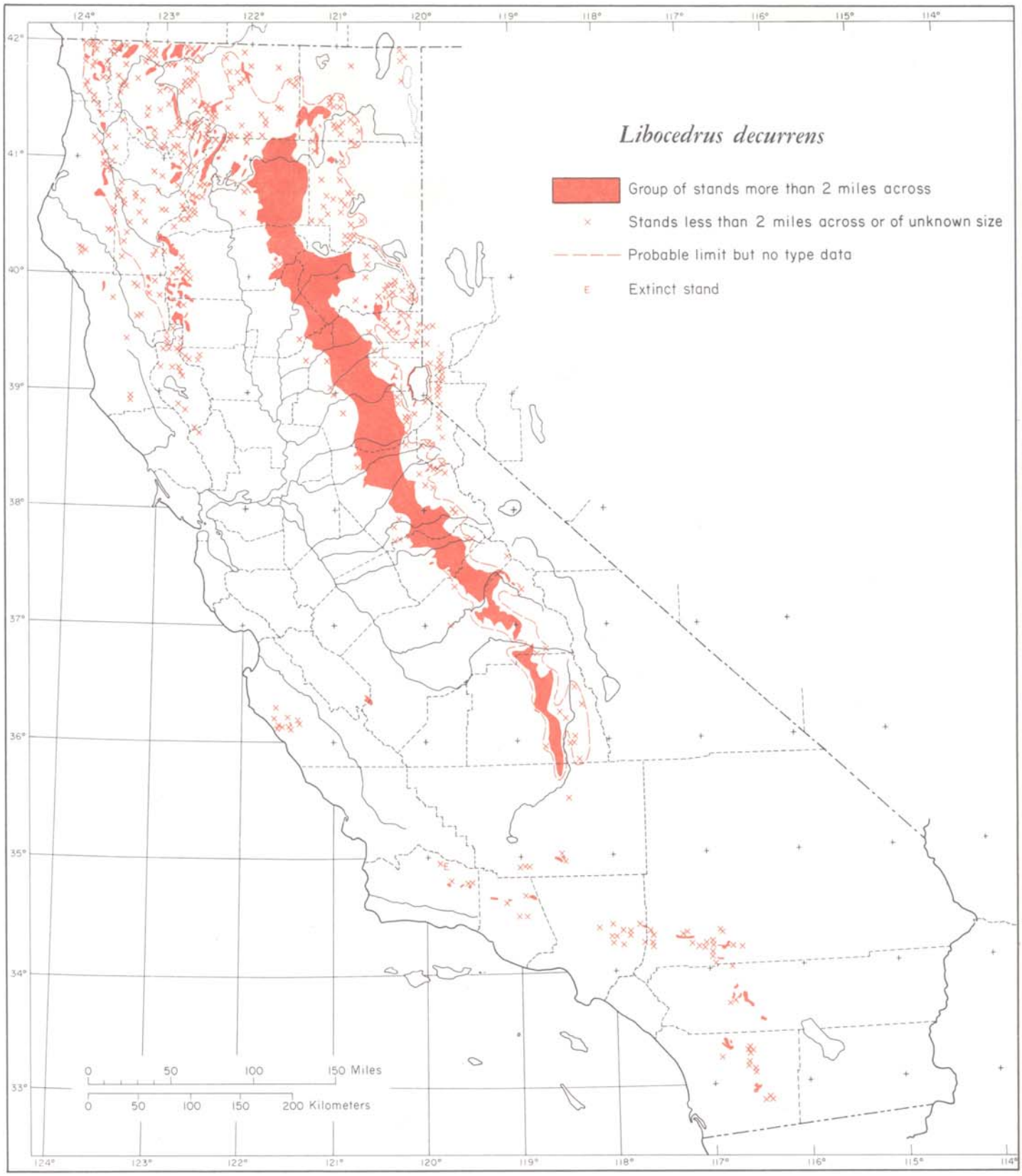
Map 30 (top) Map 31 (bottom)


Juniperus occidentalis
Group of stands more than 2 miles across
Stands less than 2 miles across or of unknown size
Probable limit but no type data
ssp. occidentalis
ssp. australis
0 50 100 150 Miles
0 50 100 150 200 Kilometers

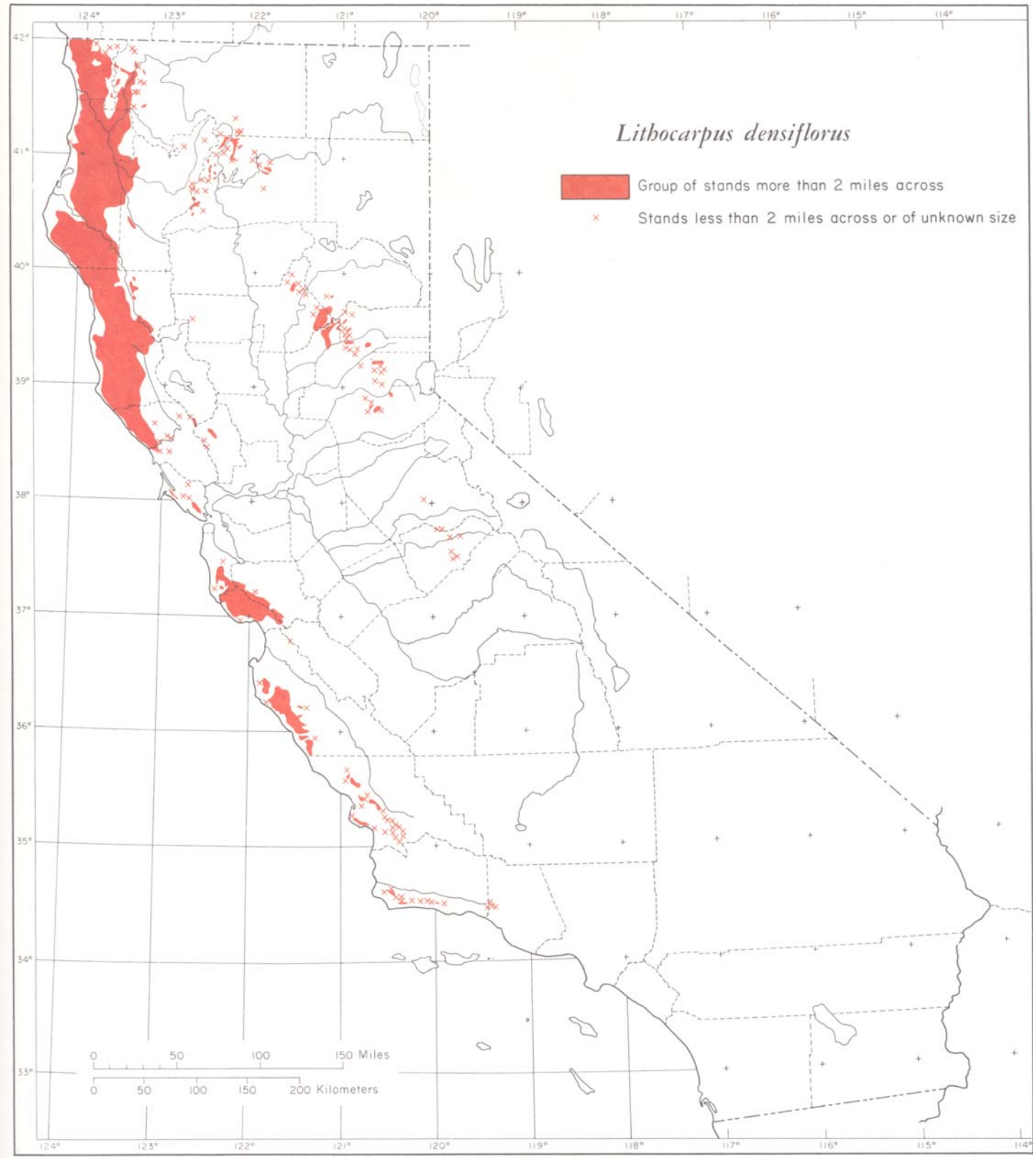
Map 32


Juniperus osteosperma
Group of stands more than 2 miles across
Stands less than 2 miles across or of unknown size
Probable limit but no type data
0 50 100 150 Miles
0 50 100 150 200 Kilometers
124° 123° 122° 121° 120° 119° 118° 117° 116° 115° 114°
42° 41° 40° 39° 38° 37° 36° 35° 34° 33°

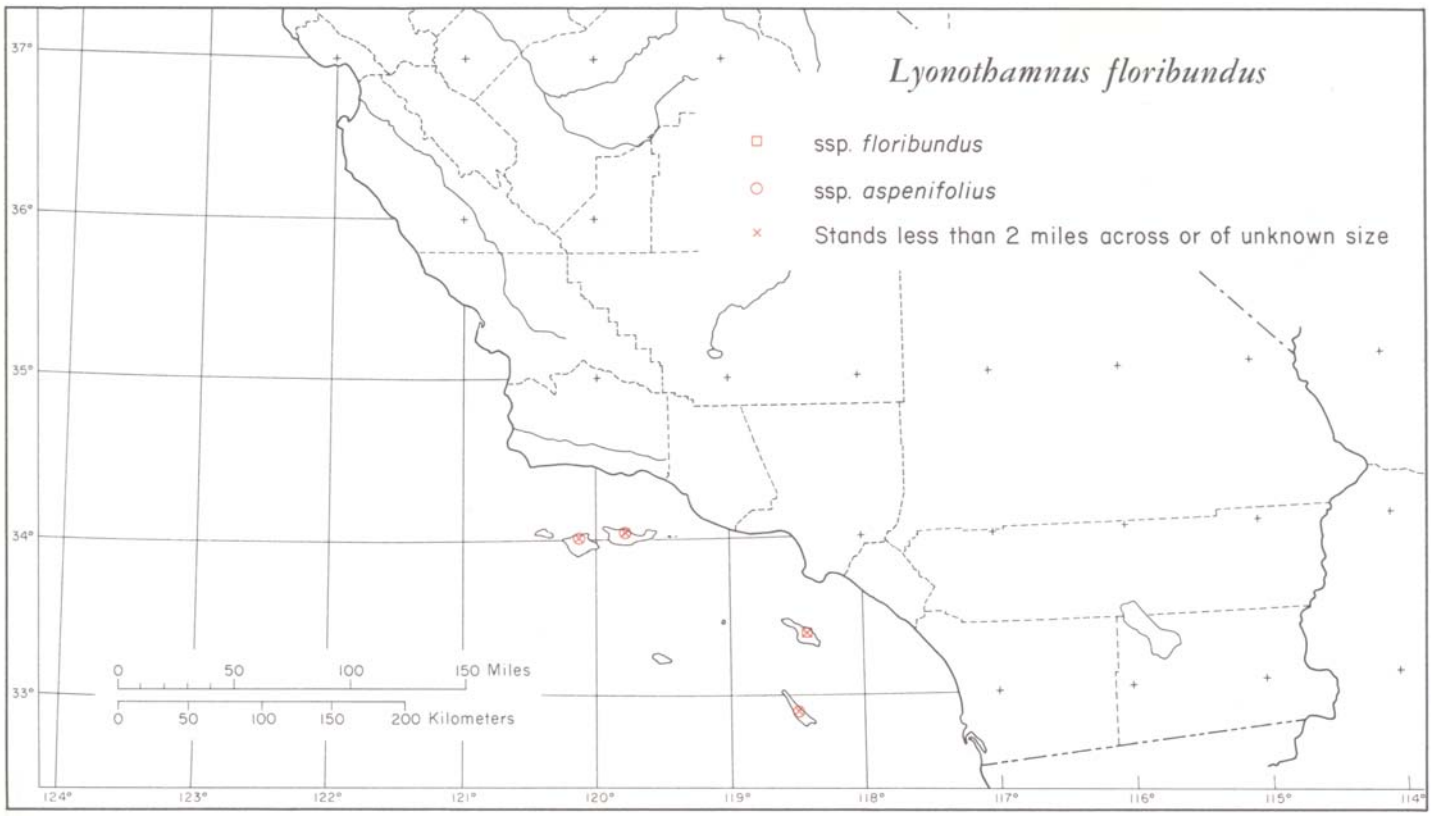
Map 33

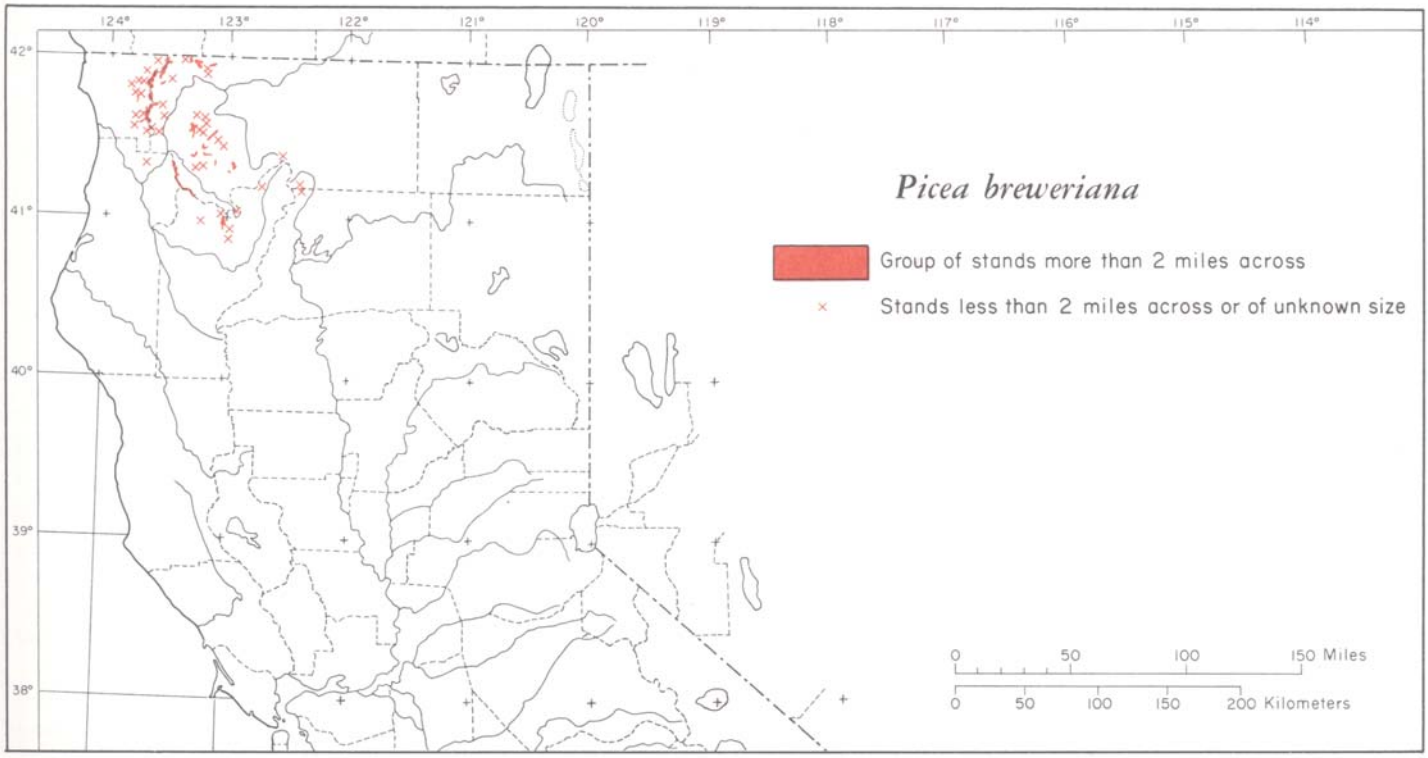

Libocedrus decurrens
Group of stands more than 2 miles across
Stands less than 2 miles across or of unknown size
Probable limit but no type data
E Extinct stand
0 50 100 150 Miles
0 50 100 150 200 Kilometers
124° 123° 122° 121° 120° 119° 118° 117° 116° 115° 114°
42° 41° 40° 39° 38° 37° 36° 35° 34° 33°

Map 34

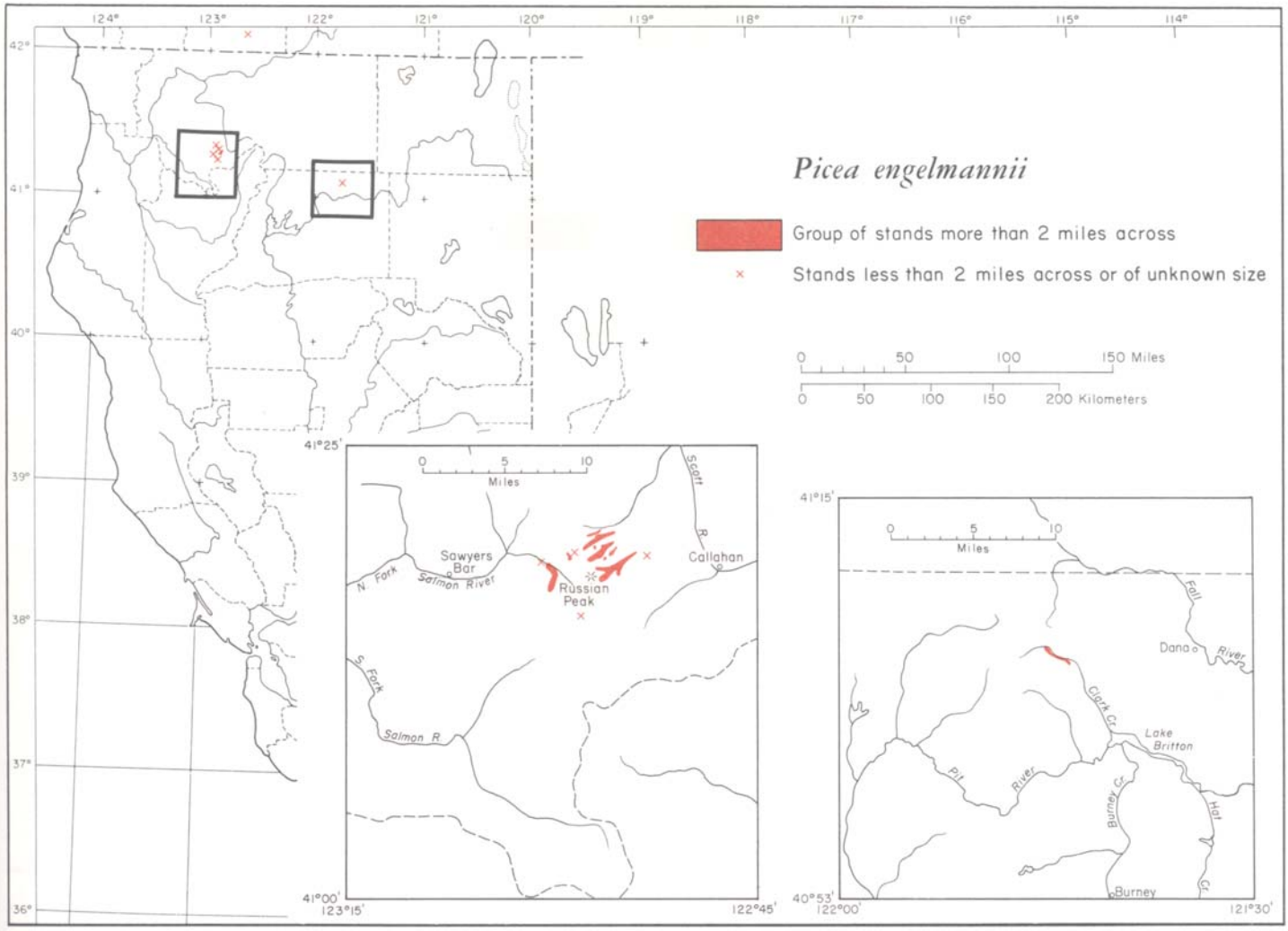

Lithocarpus densiflorus
Group of stands more than 2 miles across
Stands less than 2 miles across or of unknown size
0 50 100 150 Miles
0 50 100 150 200 Kilometers

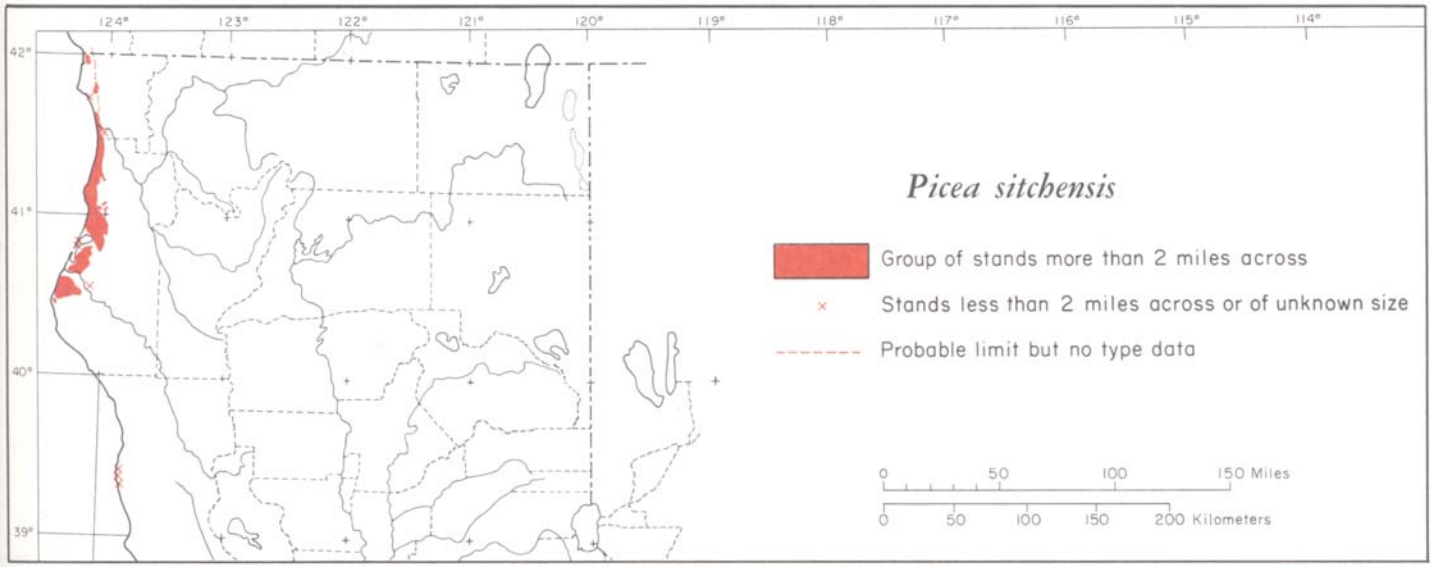
Map 35



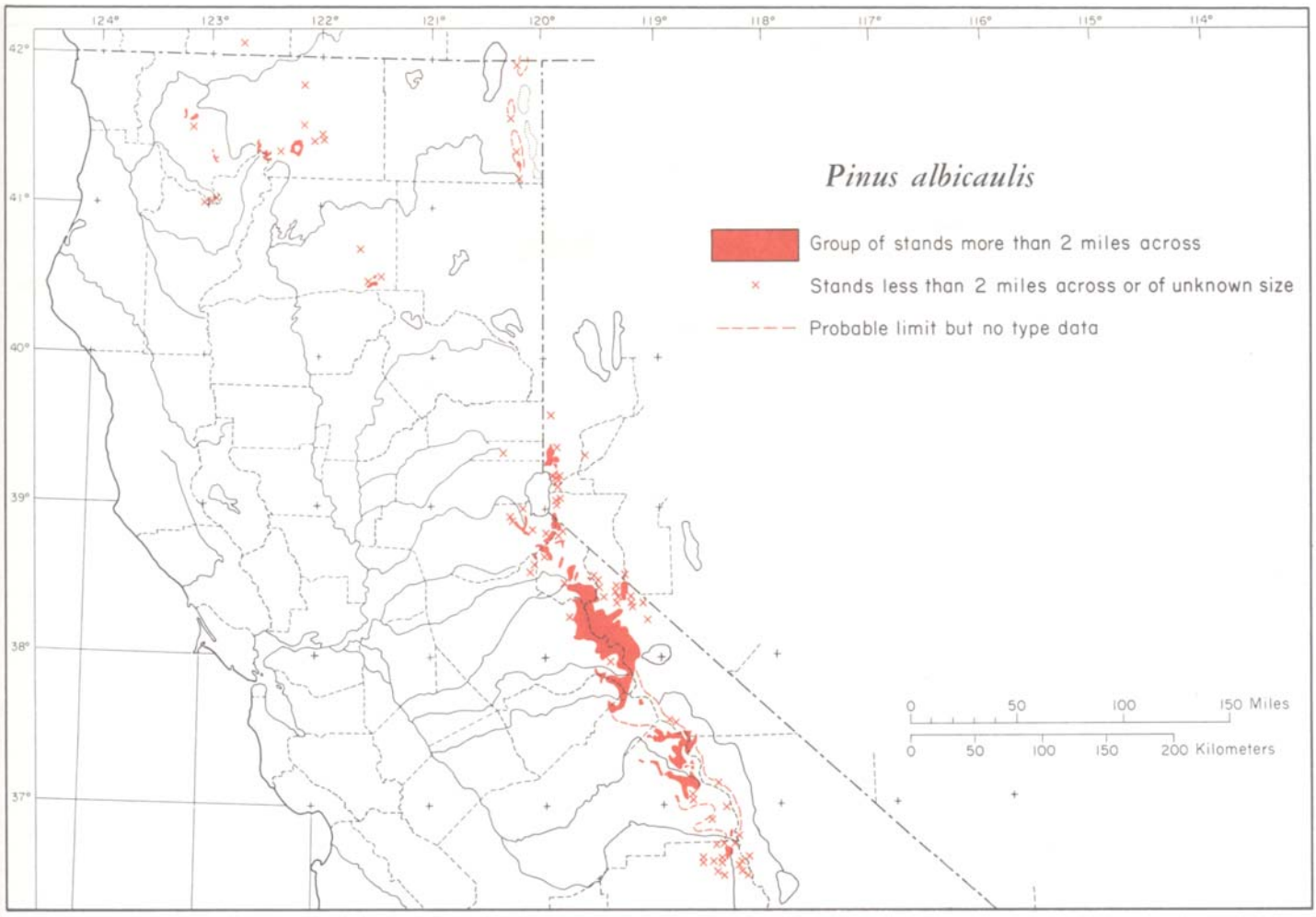


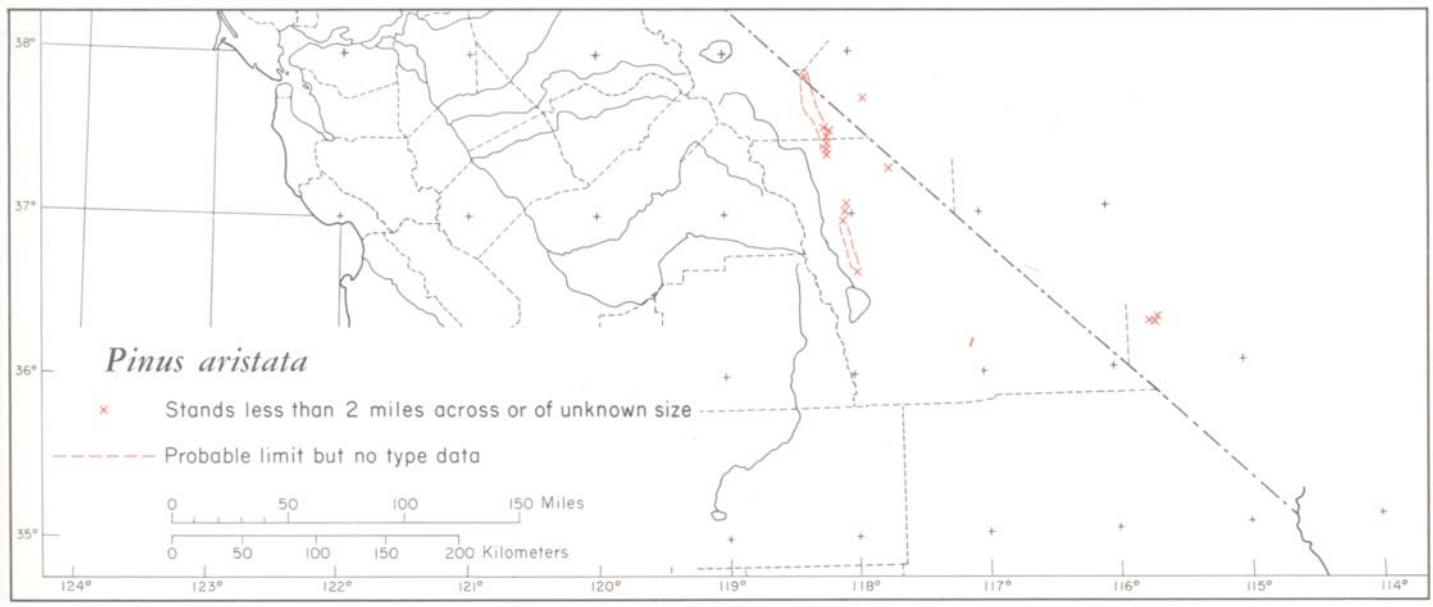
Map 36 (top) Map 37 (bottom)



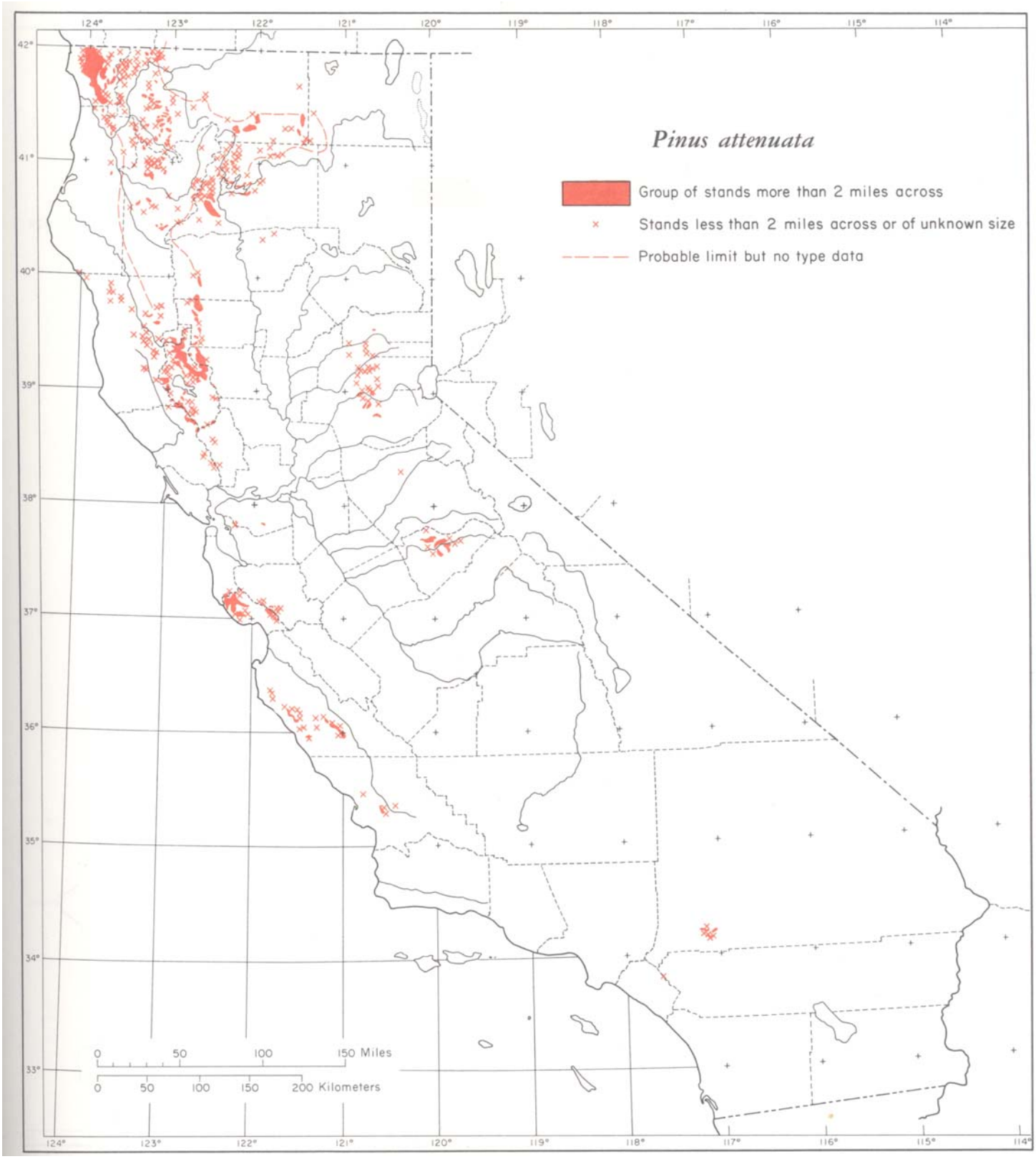


Map 38 (top) Map 39 (bottom)





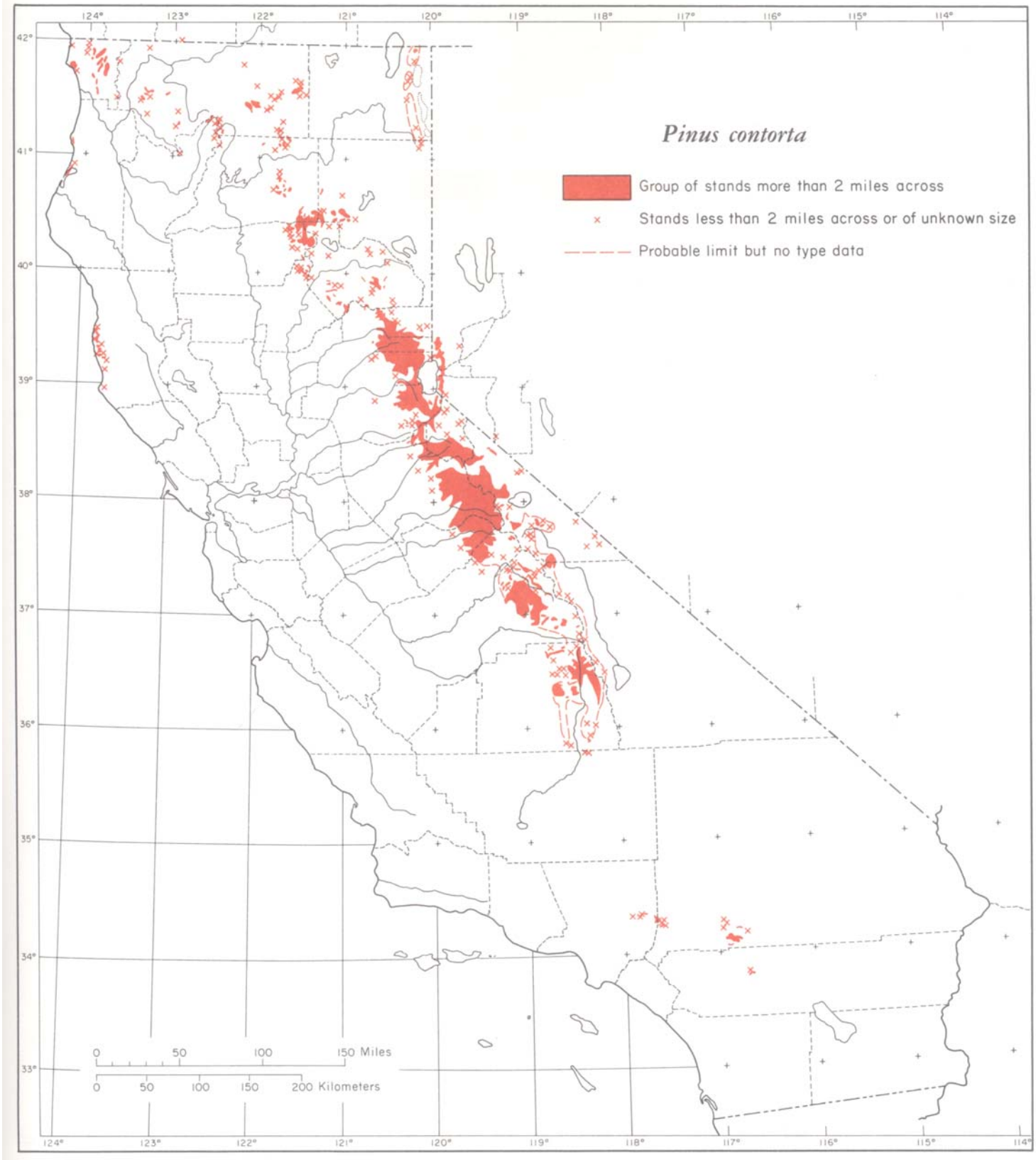
Map 40 (top) Map 41 (bottom)


Pinus attenuata
Group of stands more than 2 miles across
Stands less than 2 miles across or of unknown size
Probable limit but no type data
0 50 100 150 Miles
0 50 100 150 200 Kilometers
124° 123° 122° 121° 120° 119° 118° 117° 116° 115° 114°
42° 41° 40° 39° 38° 37° 36° 35° 34° 33°

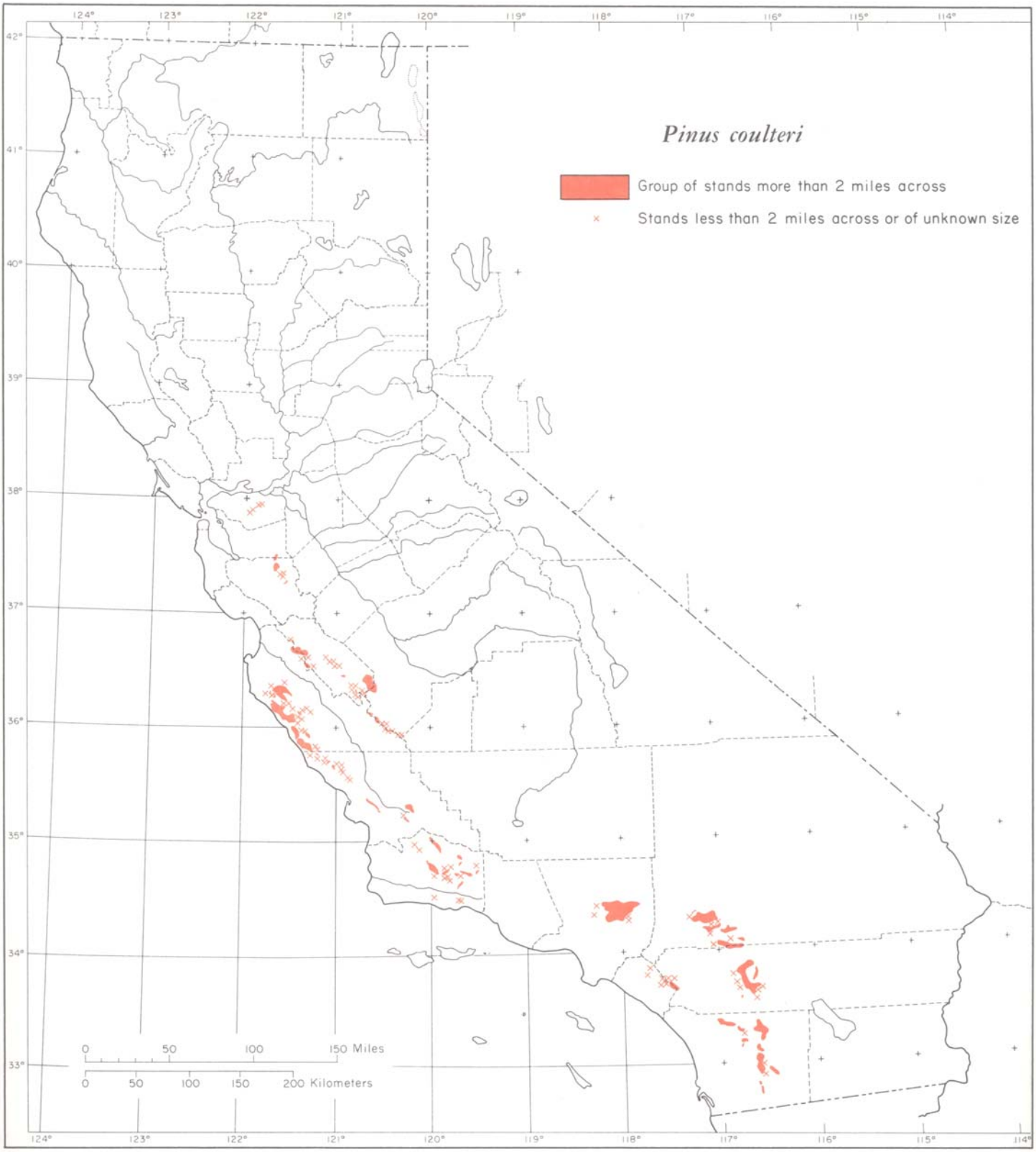
Map 42


Pinus balfouriana
Group of stands more than 2 miles across
Stands less than 2 miles across or of unknown size
Probable limit but no type data
0 50 100 150 Miles
0 50 100 150 200 Kilometers

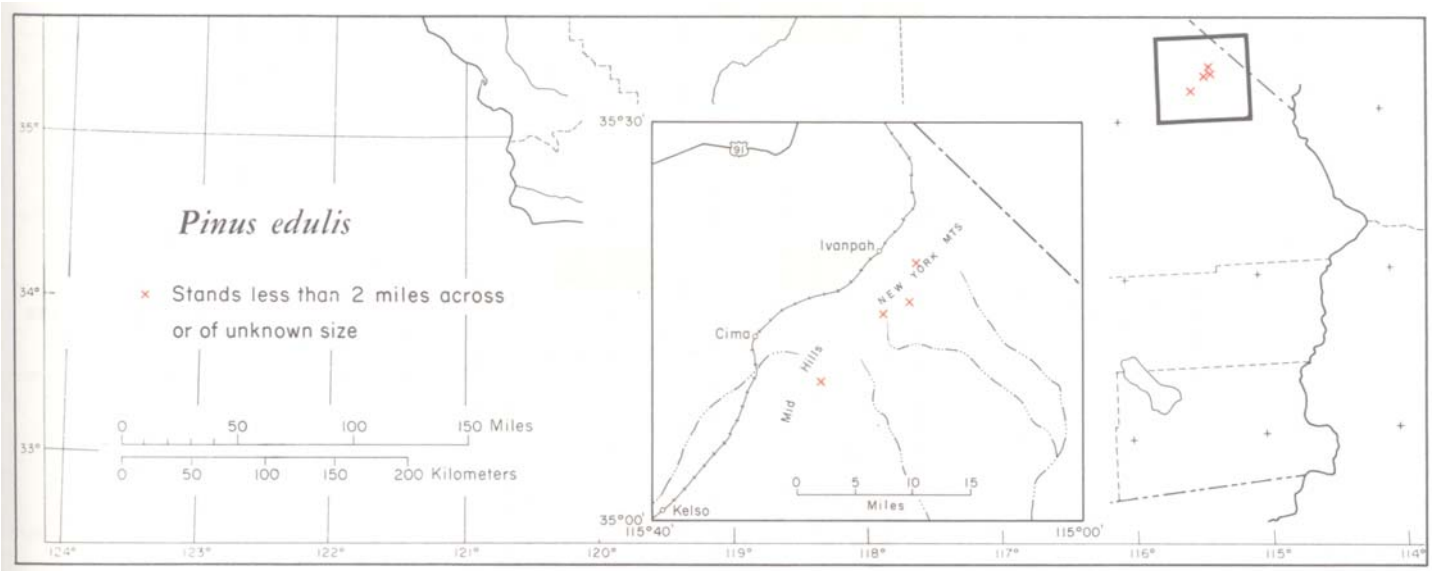
Map 43

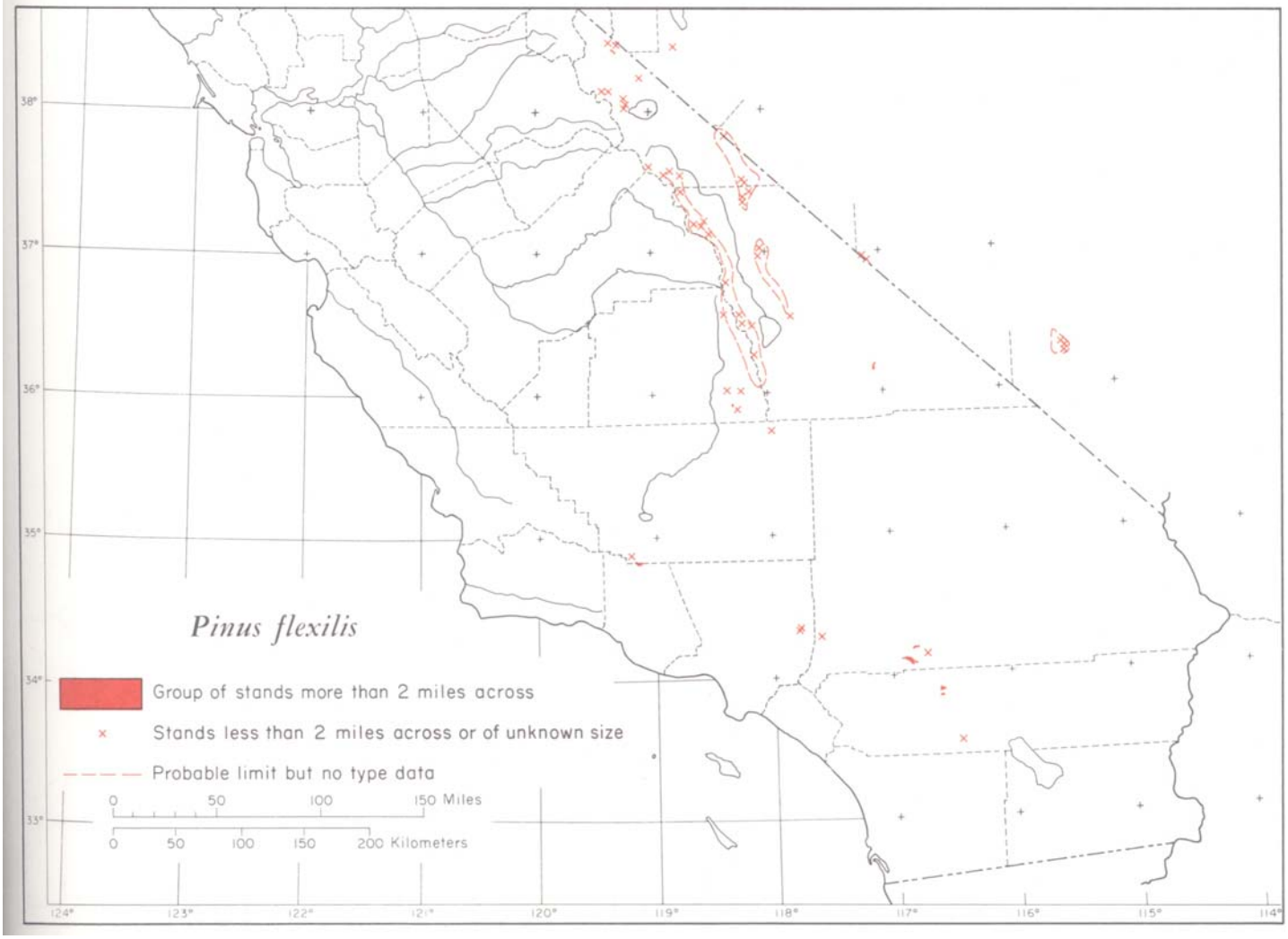

Pinus contorta
Group of stands more than 2 miles across
Stands less than 2 miles across or of unknown size
Probable limit but no type data
0 50 100 150 Miles
0 50 100 150 200 Kilometers
124° 123° 122° 121° 120° 119° 118° 117° 116° 115° 114°
42° 41° 40° 39° 38° 37° 36° 35° 34° 33°

Map 44

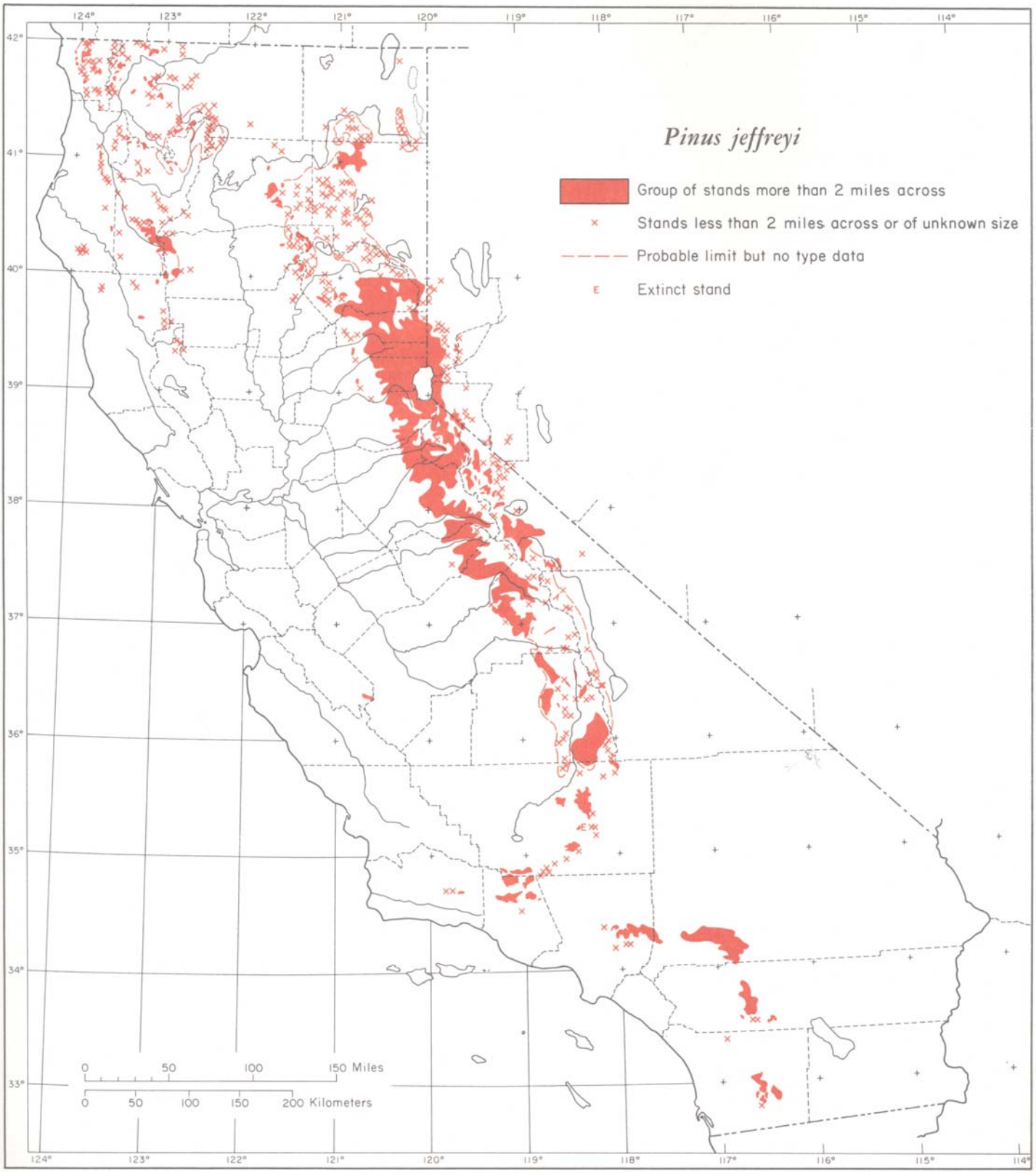

Pinus coulteri
Group of stands more than 2 miles across
Stands less than 2 miles across or of unknown size
0 50 100 150 Miles
0 50 100 150 200 Kilometers
124° 123° 122° 121° 120° 119° 118° 117° 116° 115° 114°
42° 41° 40° 39° 38° 37° 36° 35° 34° 33°

Map 45

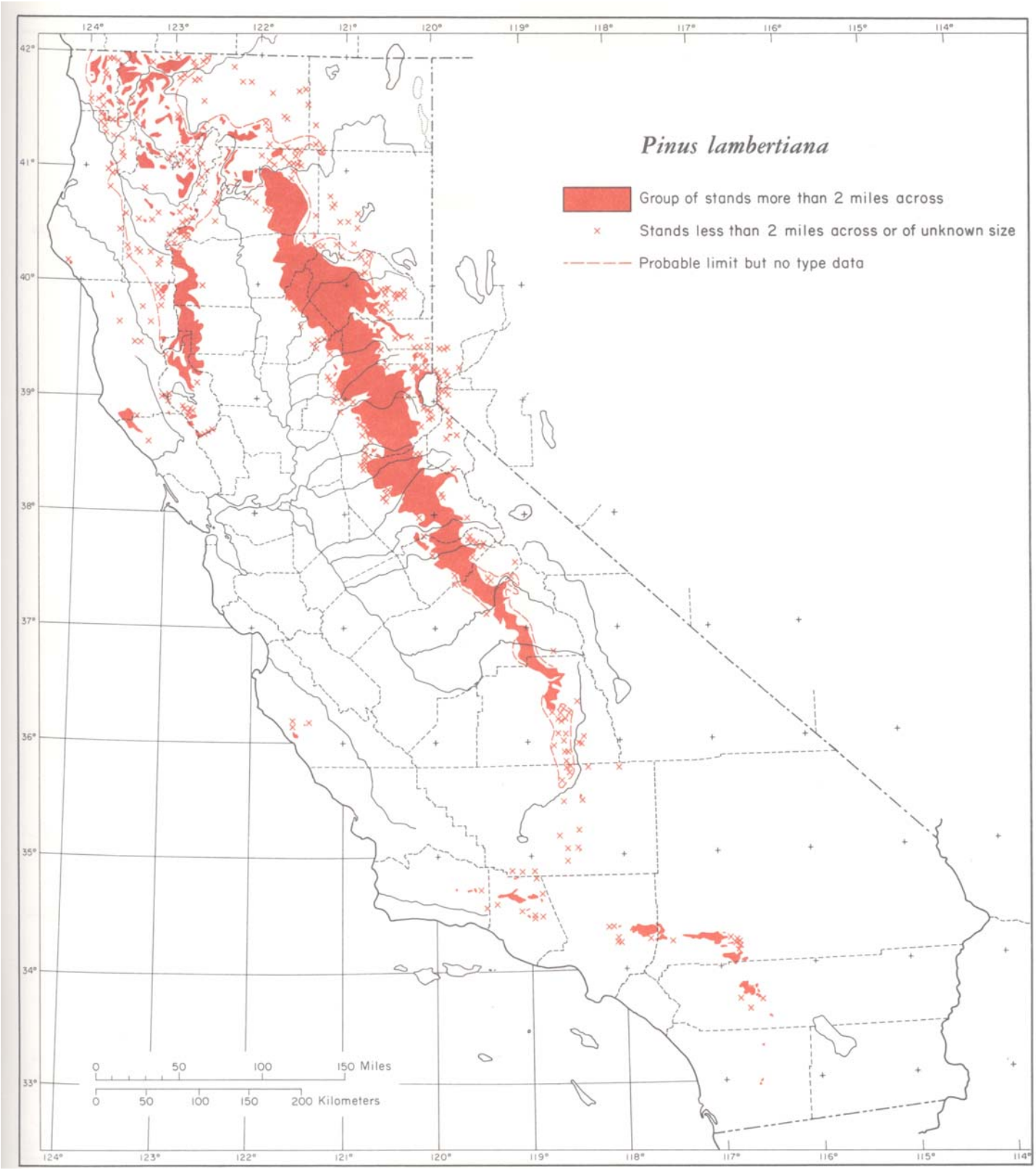




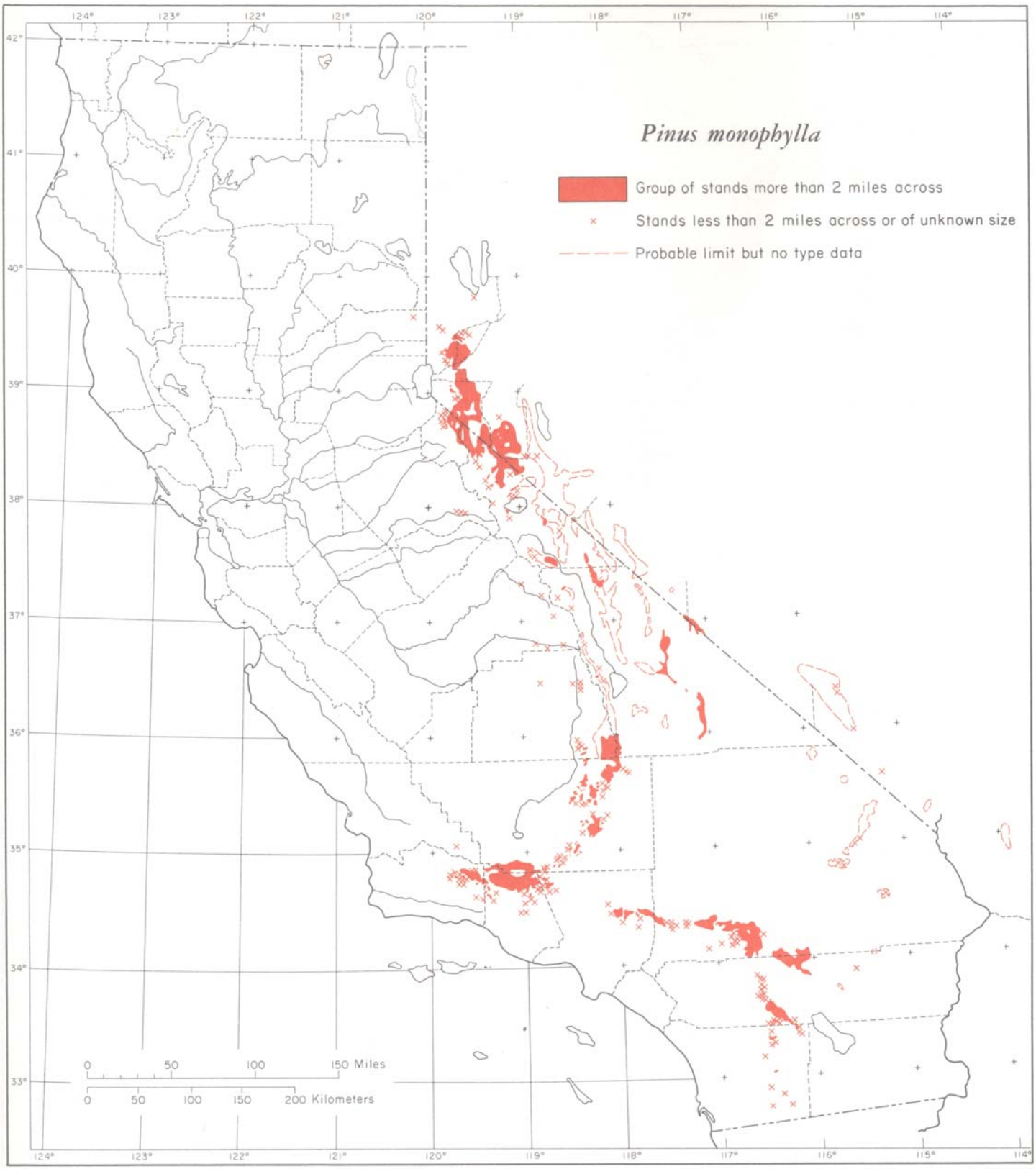
Map 46 (top) Map 47 (bottom)


Pinus jeffreyi
Group of stands more than 2 miles across
Stands less than 2 miles across or of unknown size
Probable limit but no type data
E Extinct stand
0 50 100 150 Miles
0 50 100 150 200 Kilometers
124° 123° 122° 121° 120° 119° 118° 117° 116° 115° 114°
42° 41° 40° 39° 38° 37° 36° 35° 34° 33°

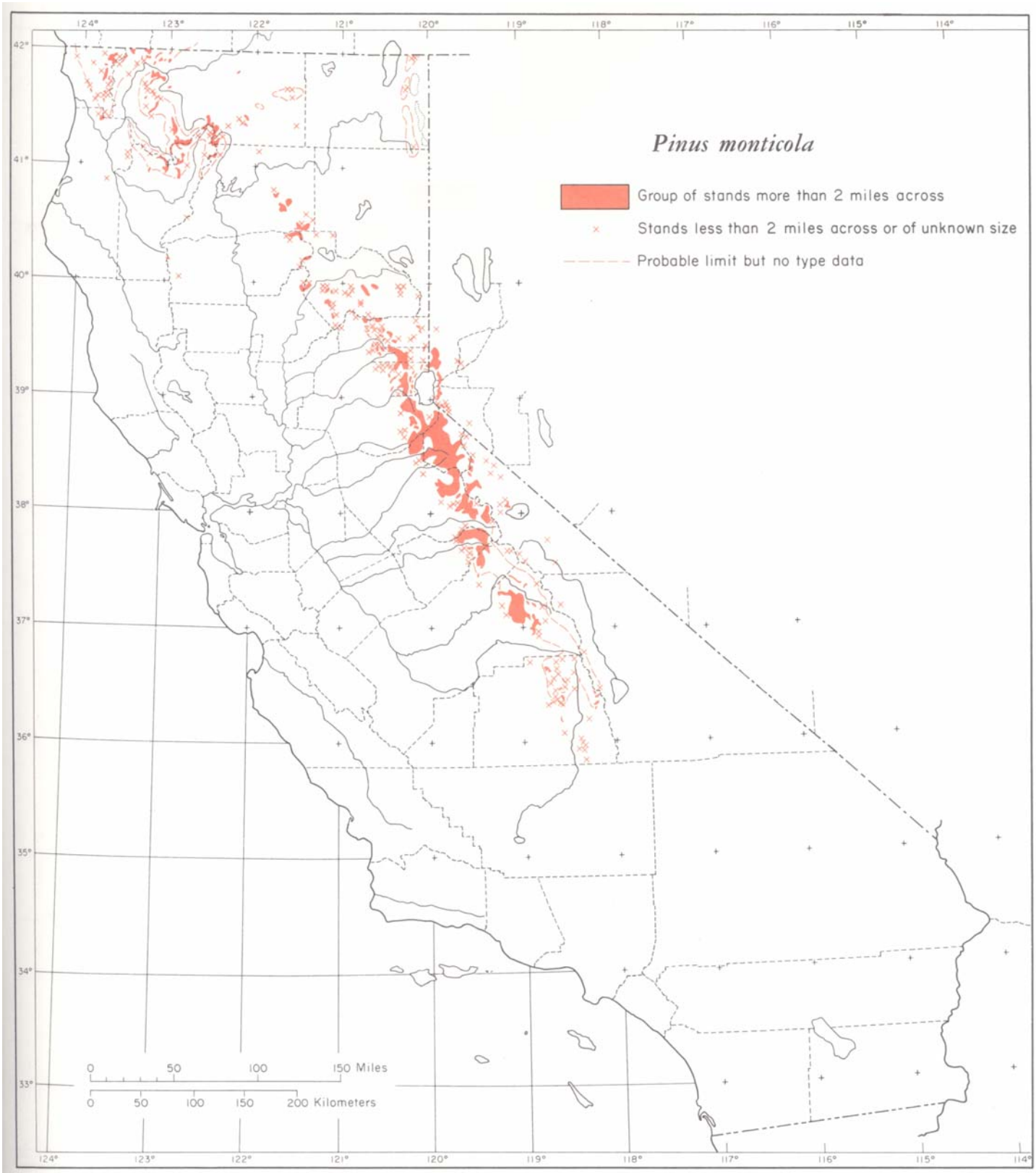
Map 48


Pinus lambertiana
Group of stands more than 2 miles across
Stands less than 2 miles across or of unknown size
Probable limit but no type data
0 50 100 150 Miles
0 50 100 150 200 Kilometers
124° 123° 122° 121° 120° 119° 118° 117° 116° 115° 114°
42° 41° 40° 39° 38° 37° 36° 35° 34° 33°

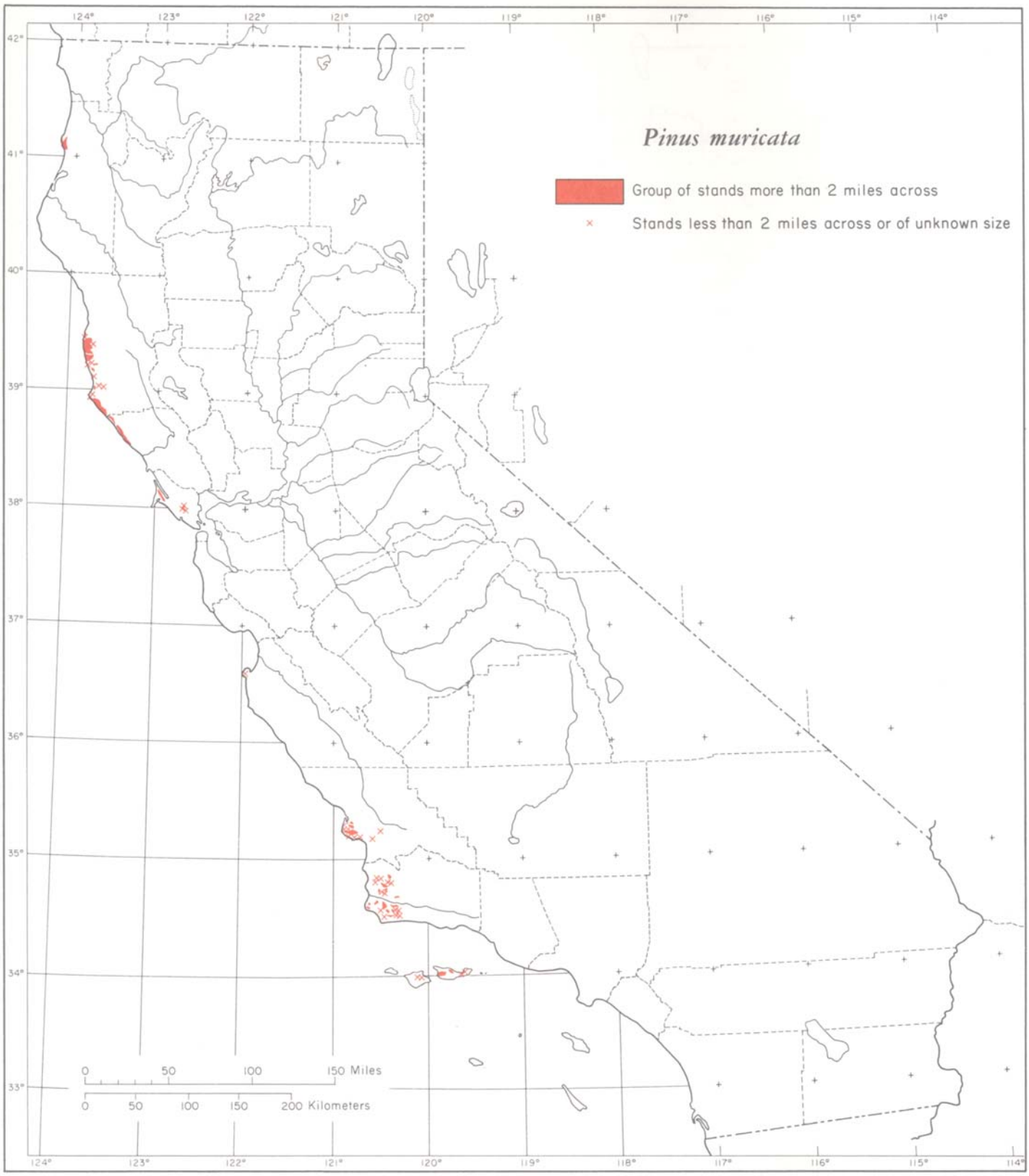
Map 49


Pinus monophylla
Group of stands more than 2 miles across
Stands less than 2 miles across or of unknown size
Probable limit but no type data
0 50 100 150 Miles
0 50 100 150 200 Kilometers

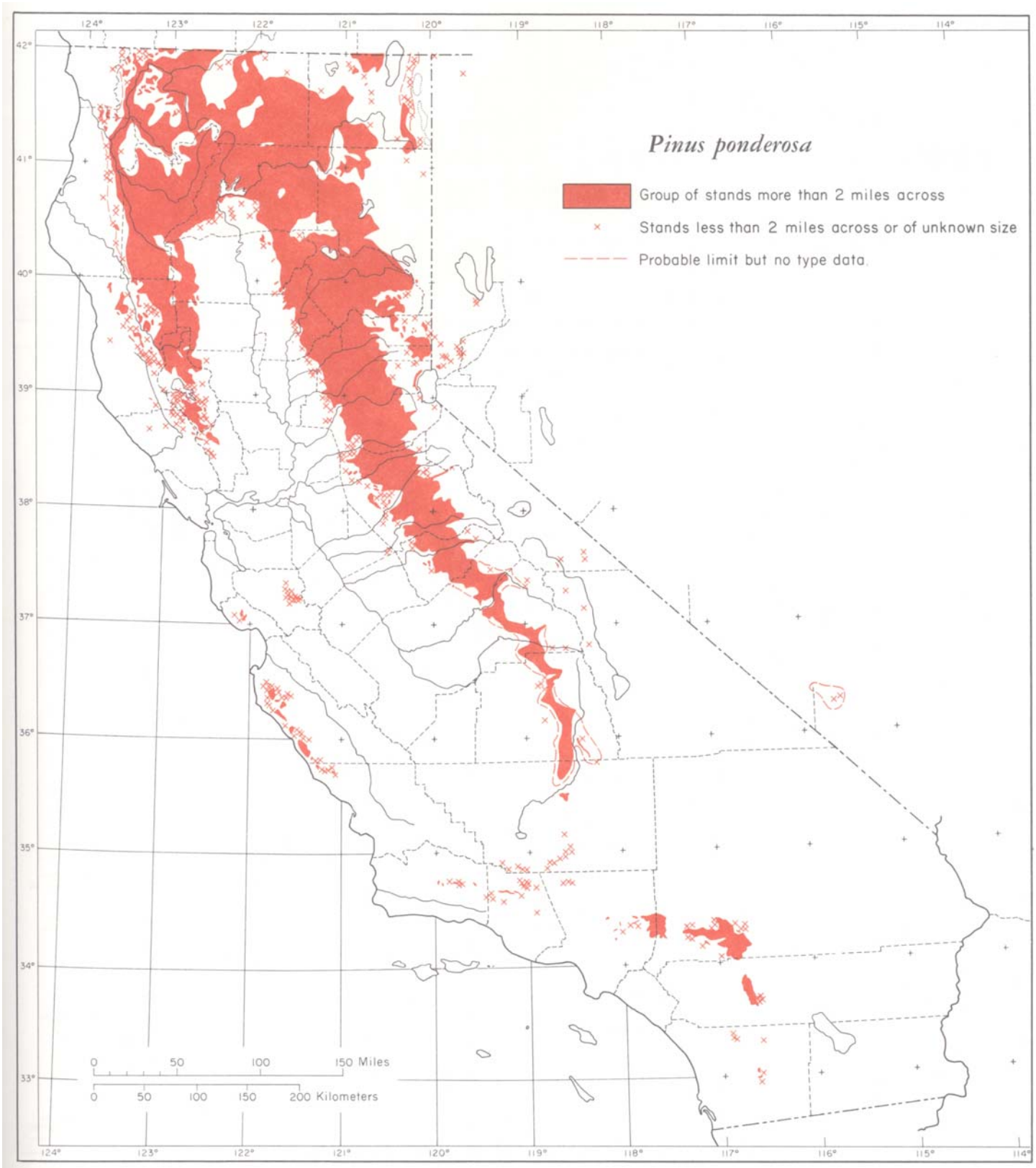
Map 50


Pinus monticola
Group of stands more than 2 miles across
Stands less than 2 miles across or of unknown size
Probable limit but no type data
0 50 100 150 Miles
0 50 100 150 200 Kilometers
124° 123° 122° 121° 120° 119° 118° 117° 116° 115° 114°
42° 41° 40° 39° 38° 37° 36° 35° 34° 33°

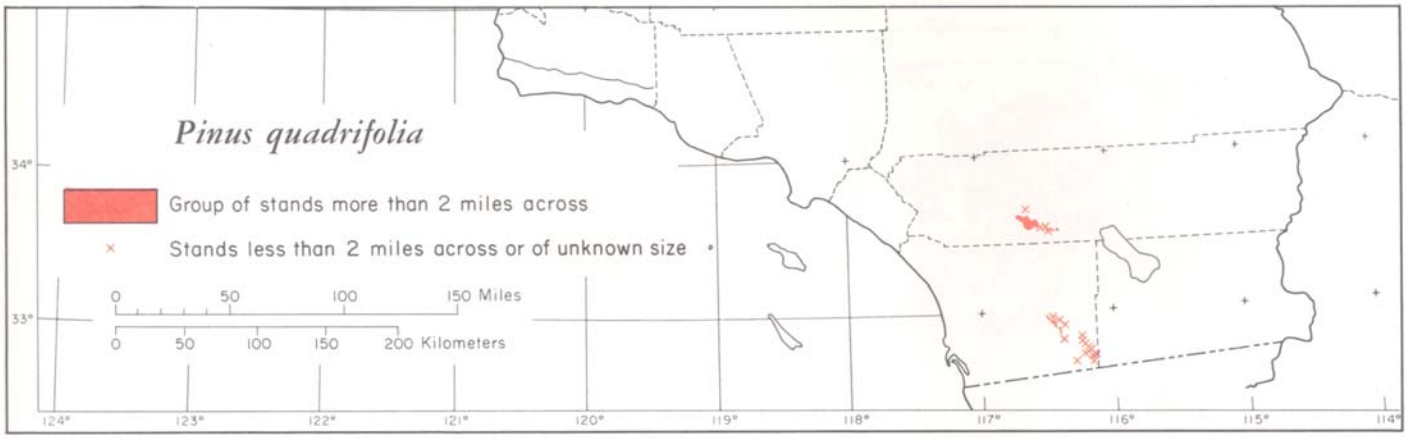
Map 51

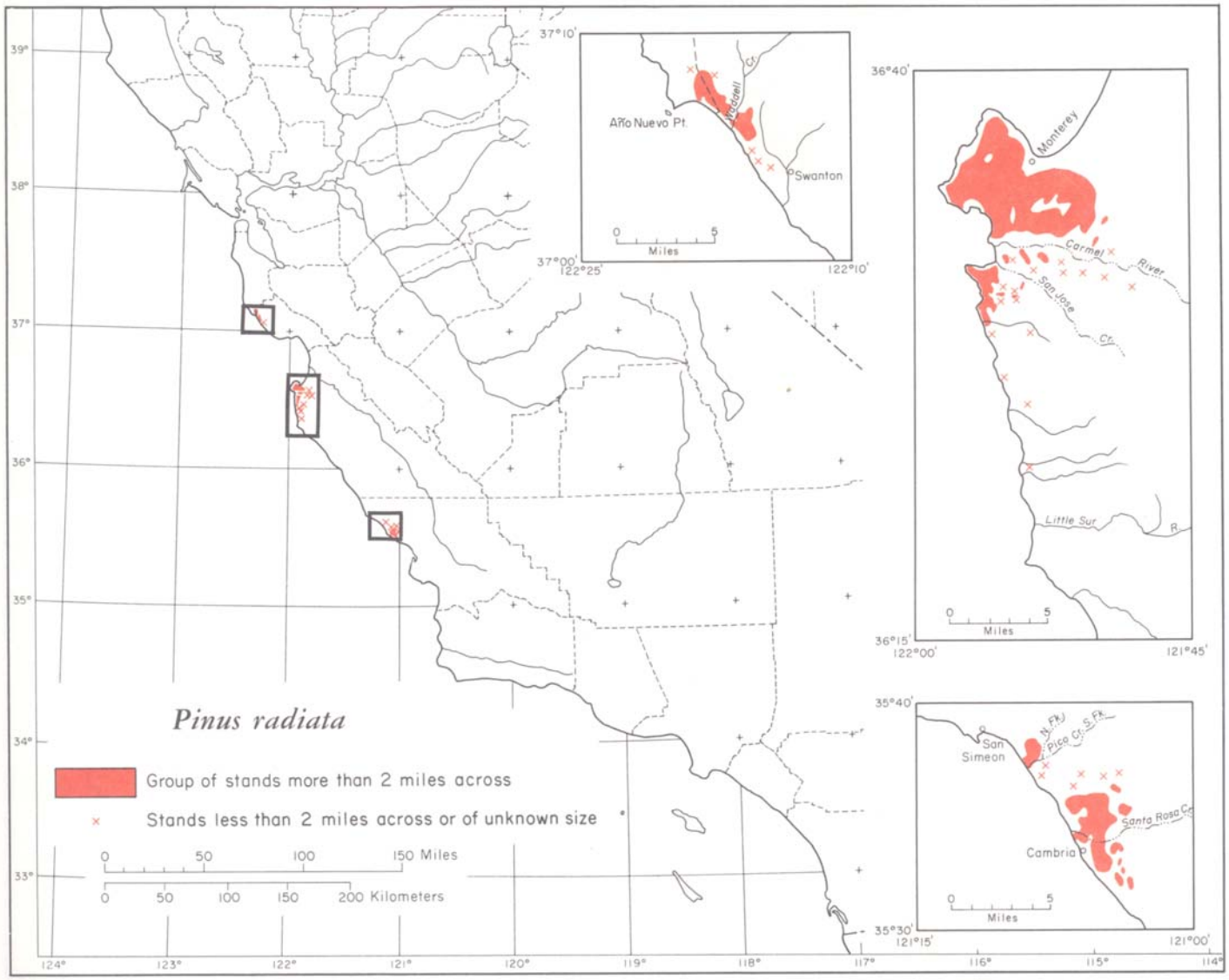

Pinus muricata
Group of stands more than 2 miles across
Stands less than 2 miles across or of unknown size
0 50 100 150 Miles
0 50 100 150 200 Kilometers

Map 52

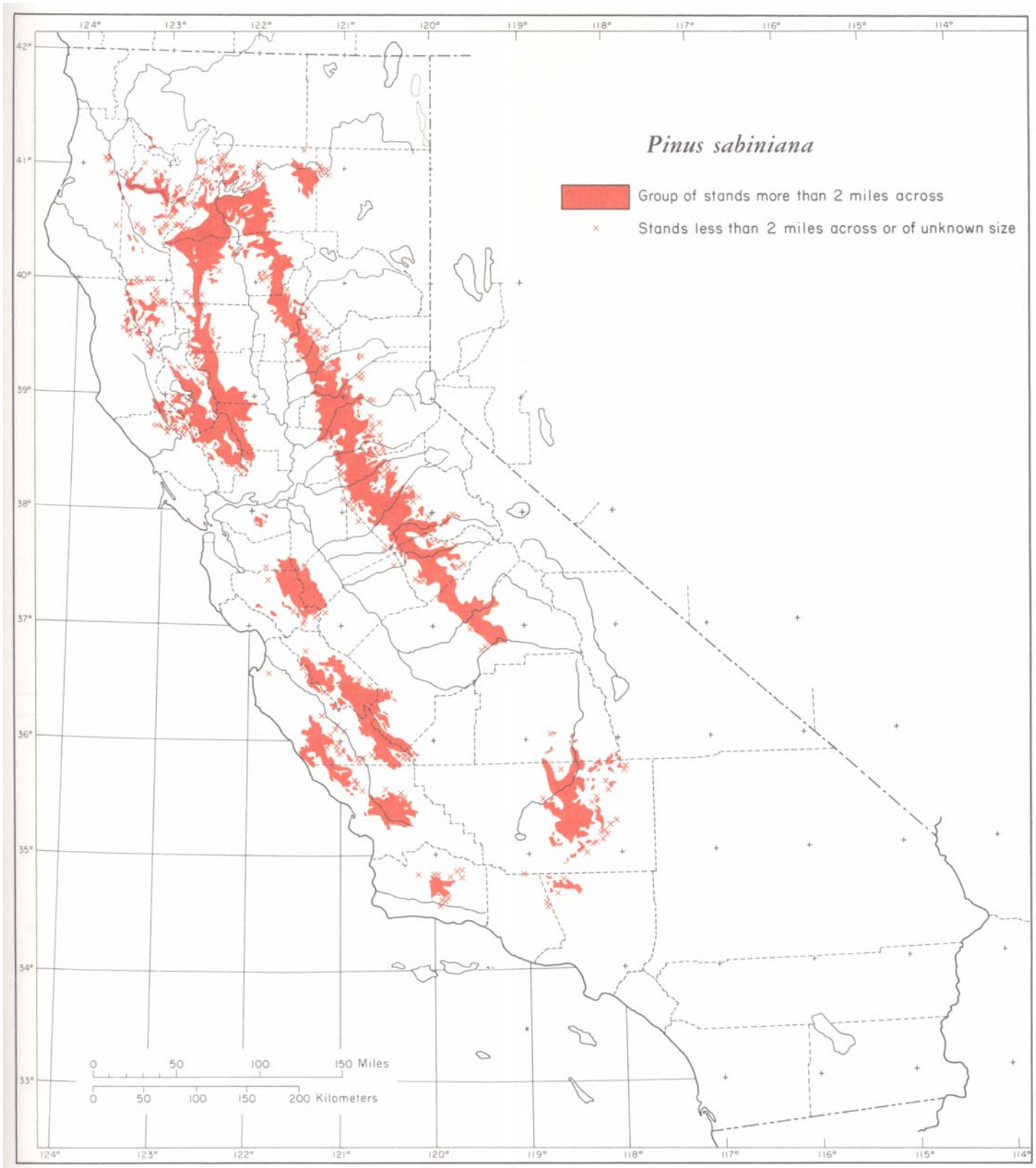

Pinus ponderosa
Group of stands more than 2 miles across
Stands less than 2 miles across or of unknown size
Probable limit but no type data.
0 50 100 150 Miles
0 50 100 150 200 Kilometers
124° 123° 122° 121° 120° 119° 118° 117° 116° 115° 114°
42° 41° 40° 39° 38° 37° 36° 35° 34° 33°

Map 53

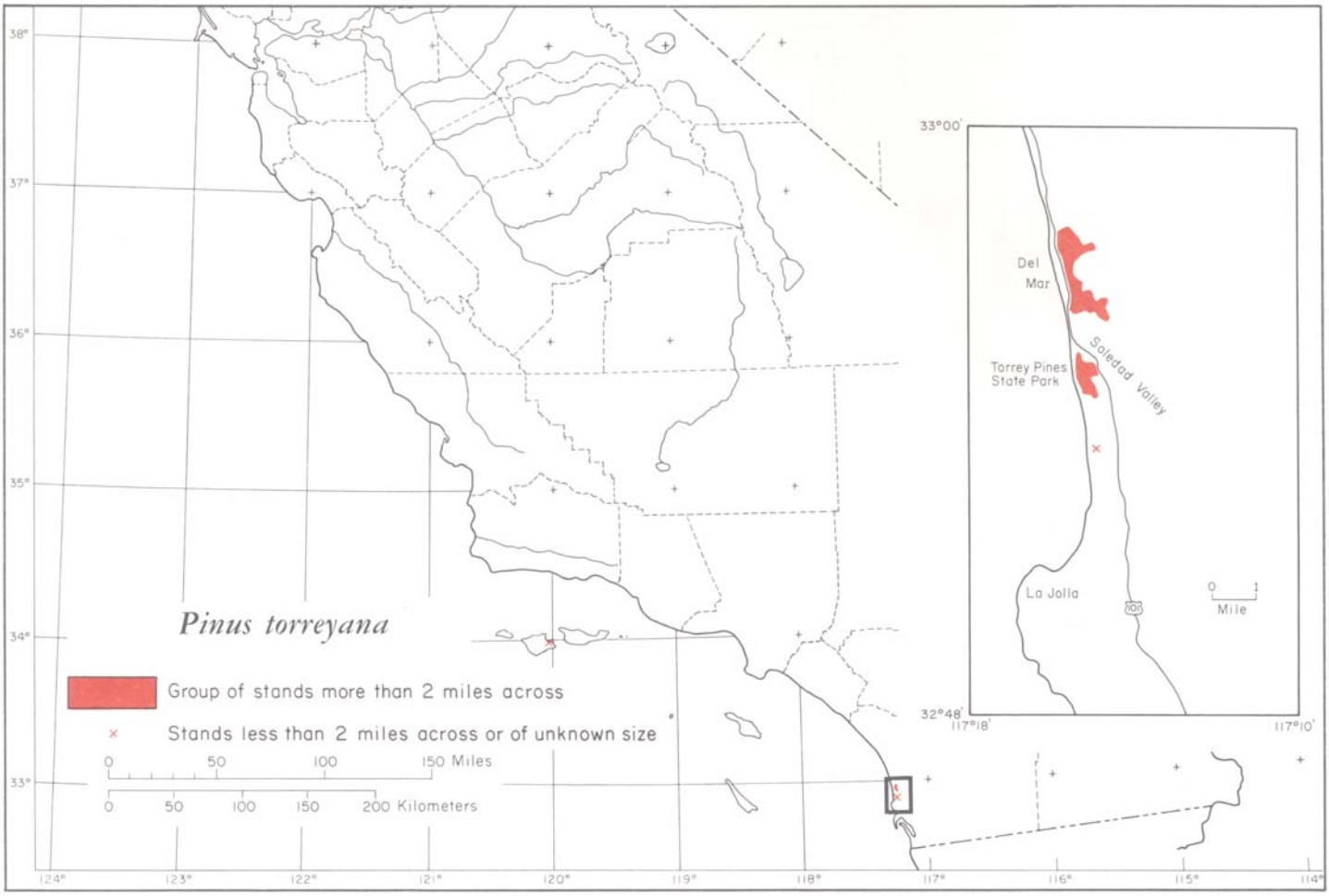


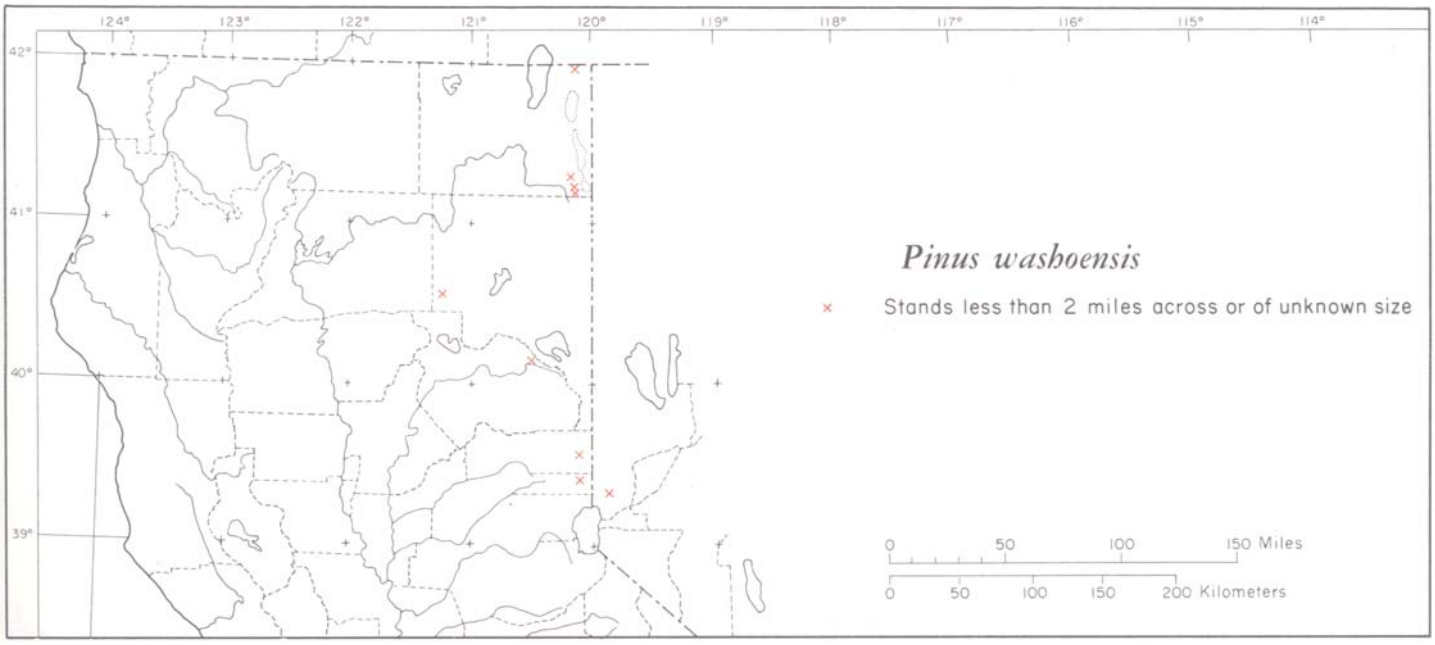


Map 54 (top) Map 55 (bottom)

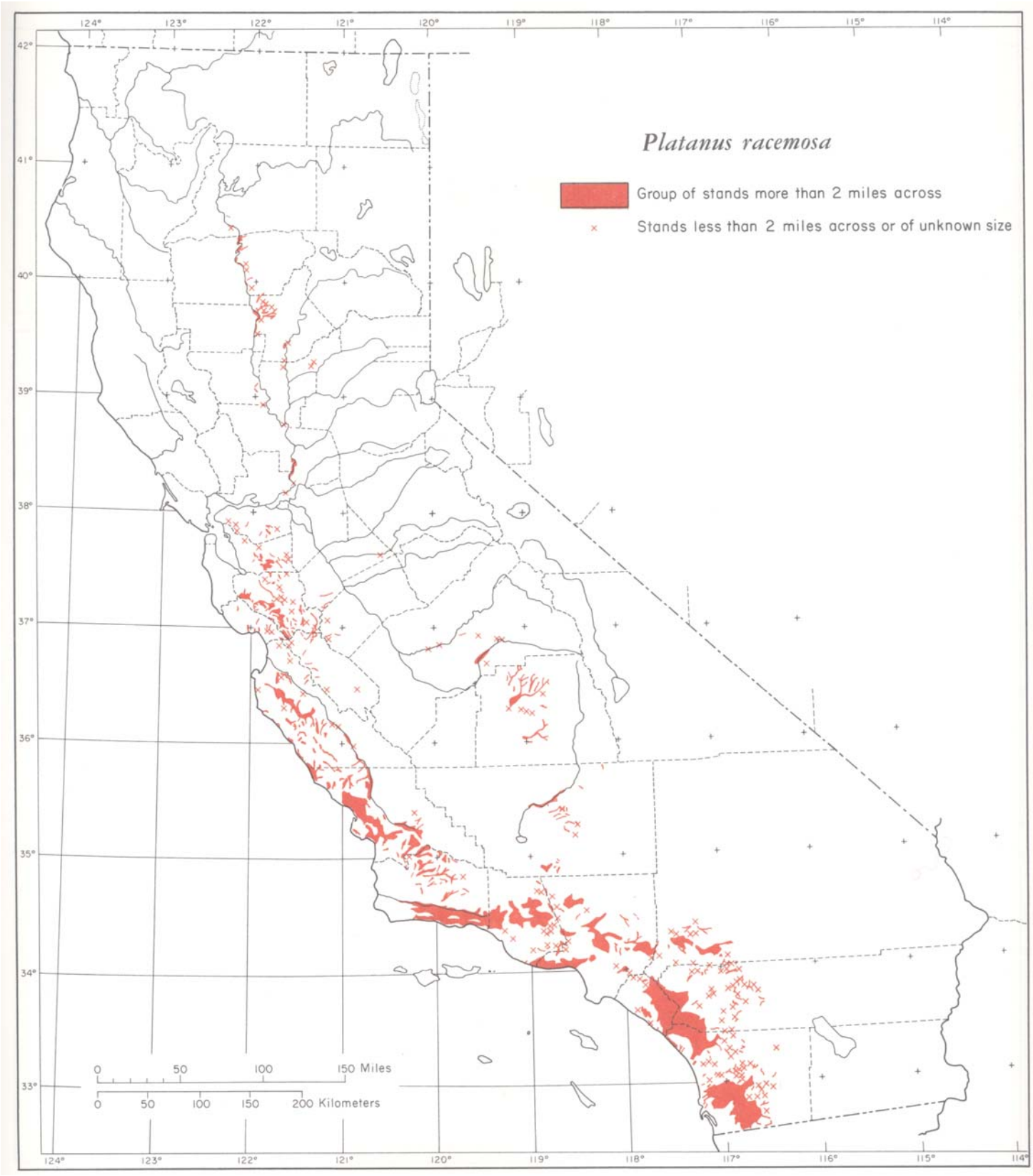

Pinus sabiniana
Group of stands more than 2 miles across
Stands less than 2 miles across or of unknown size
0 50 100 150 Miles
0 50 100 150 200 Kilometers
124° 123° 122° 121° 120° 119° 118° 117° 116° 115° 114°
42° 41° 40° 39° 38° 37° 36° 35° 34° 33°

Map 56

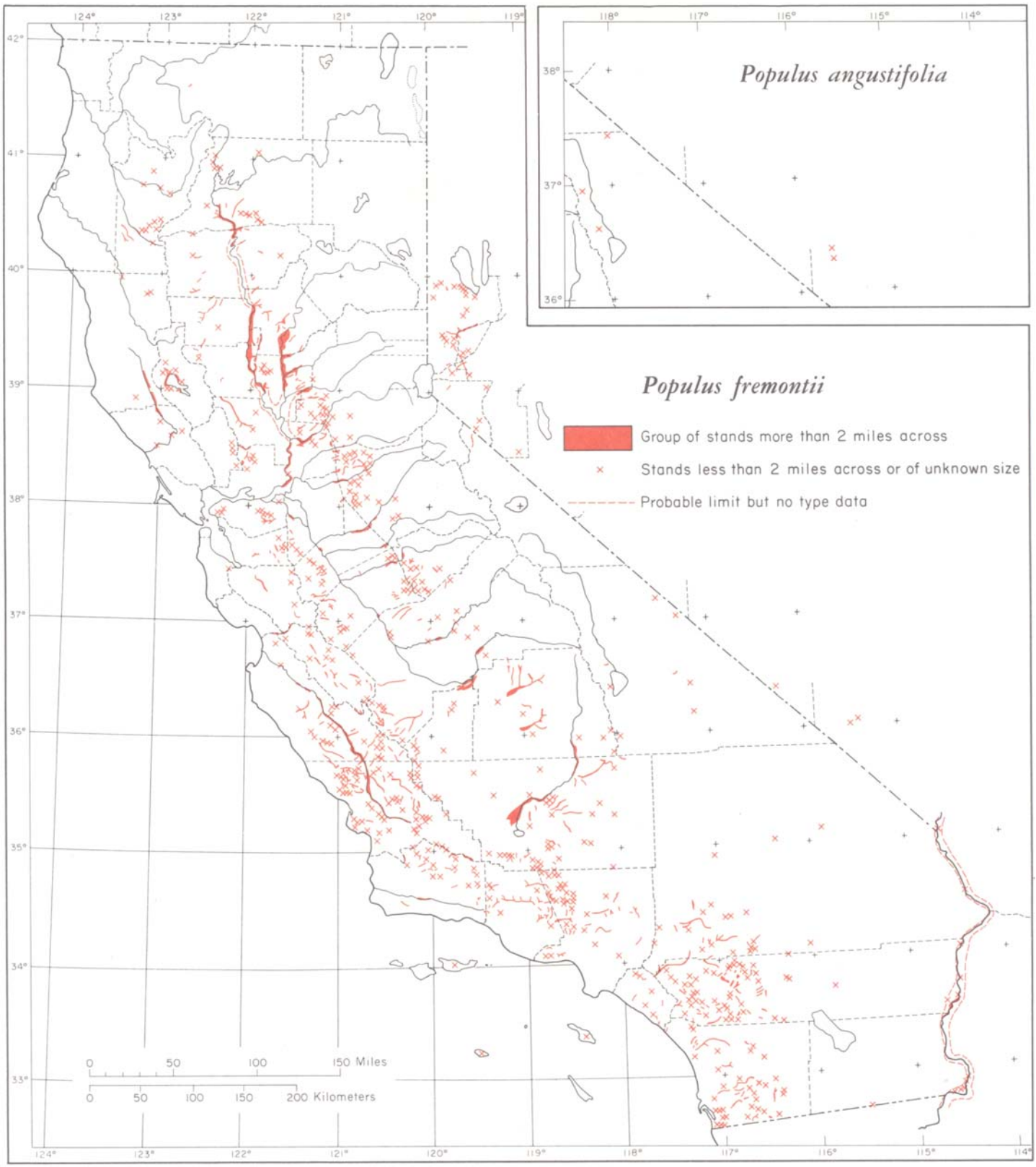




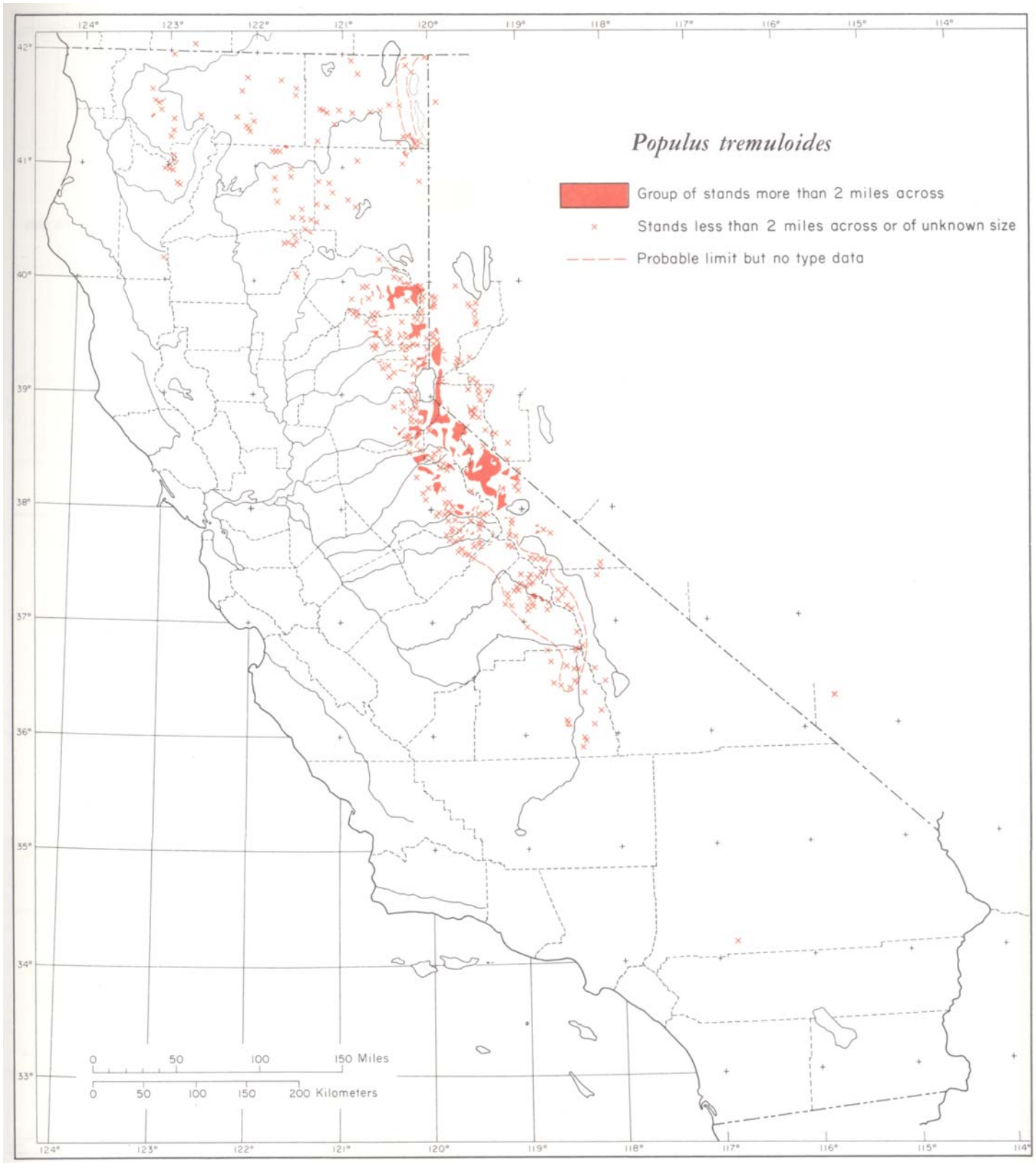
Map 57 (top) Map 58 (bottom)


Platanus racemosa
Group of stands more than 2 miles across
Stands less than 2 miles across or of unknown size
0 50 100 150 Miles
0 50 100 150 200 Kilometers
124° 123° 122° 121° 120° 119° 118° 117° 116° 115° 114°
42° 41° 40° 39° 38° 37° 36° 35° 34° 33°

Map 59



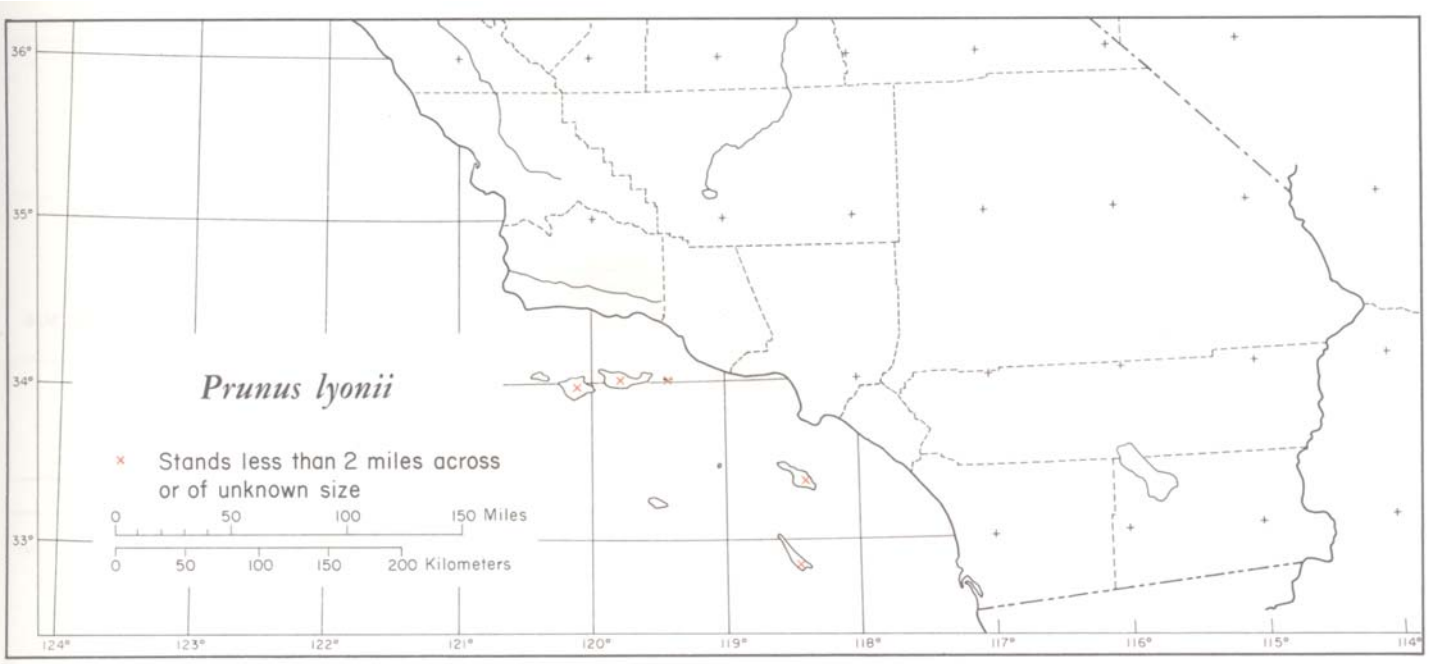
Map 60 (top) Map 61 (bottom)

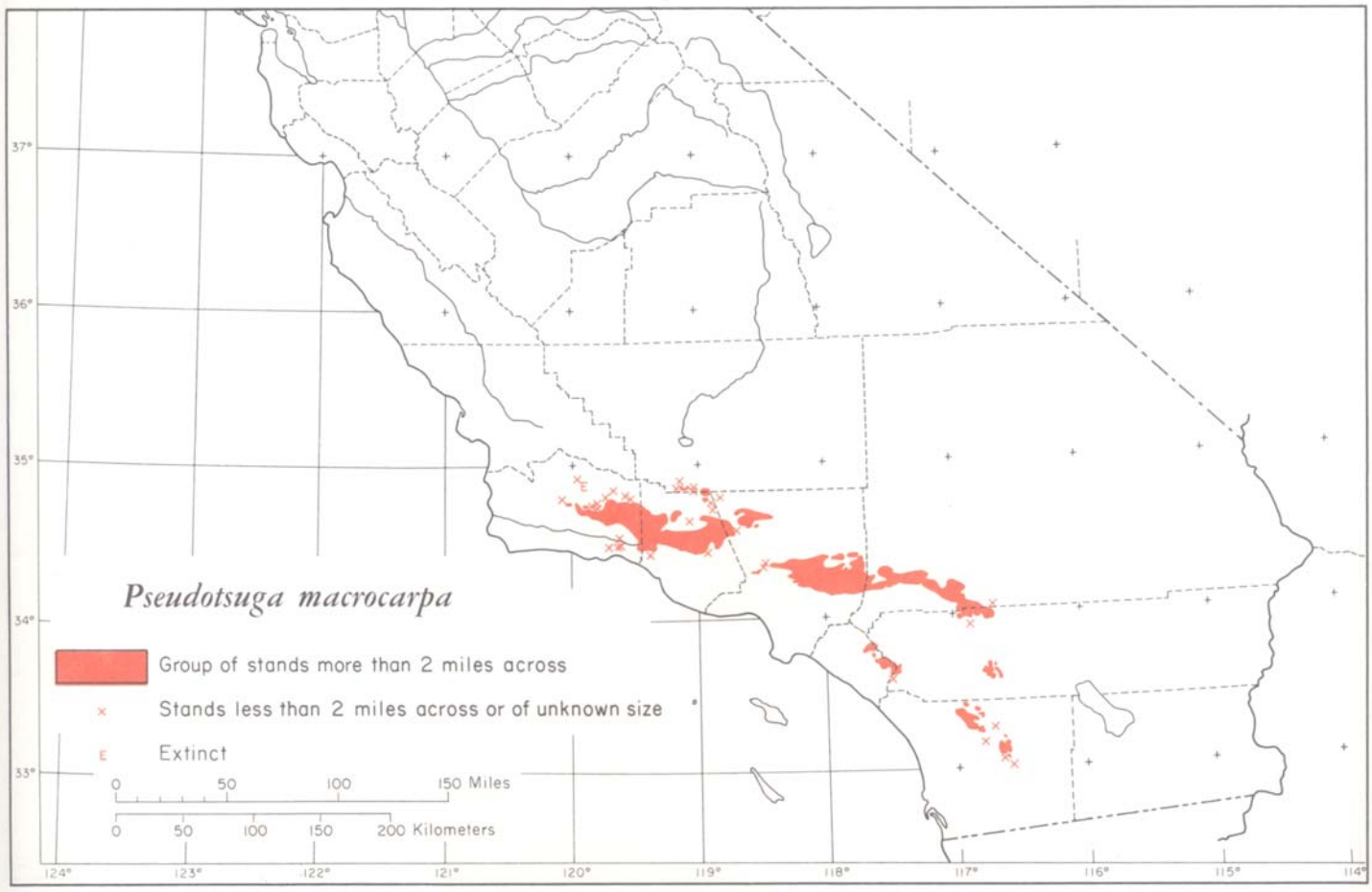

Populus tremuloides
Group of stands more than 2 miles across
Stands less than 2 miles across or of unknown size
Probable limit but no type data
0 50 100 150 Miles
0 50 100 150 200 Kilometers

Map 62

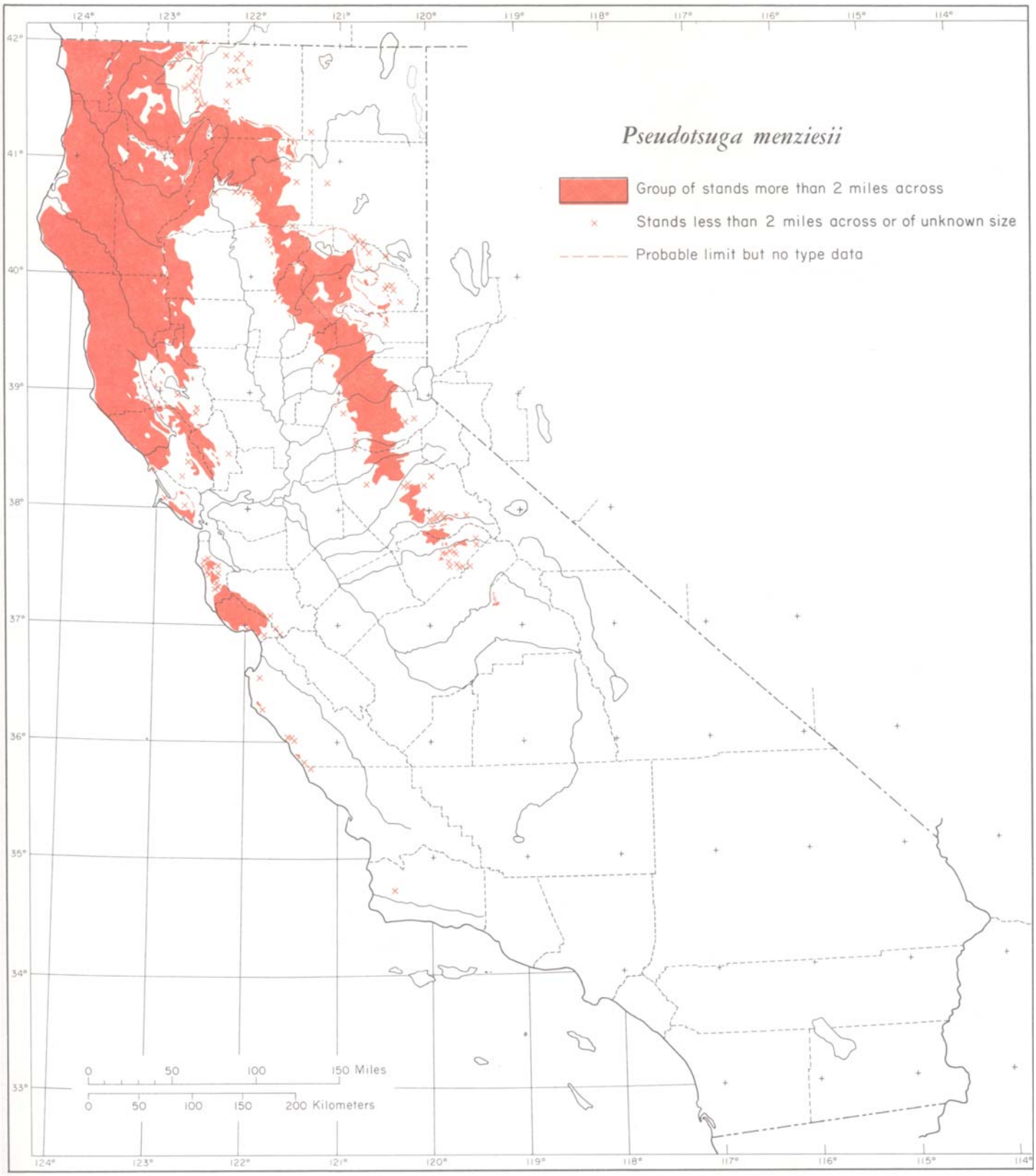

Populus trichocarpa
Group of stands more than 2 miles across
Stands less than 2 miles across or of unknown size
0 50 100 150 Miles
0 50 100 150 200 Kilometers

Map 63

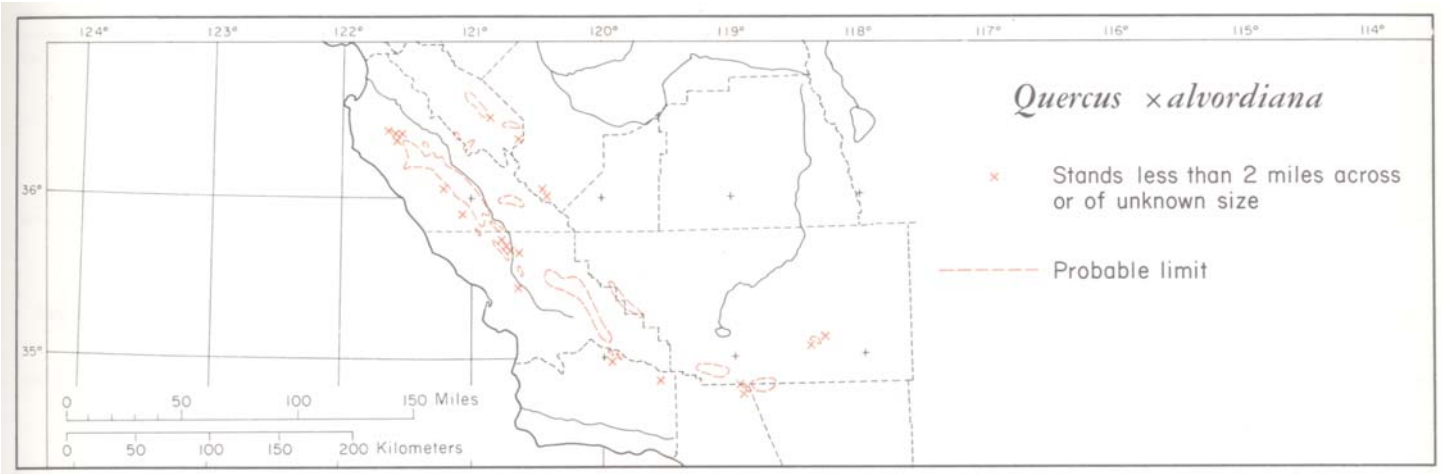


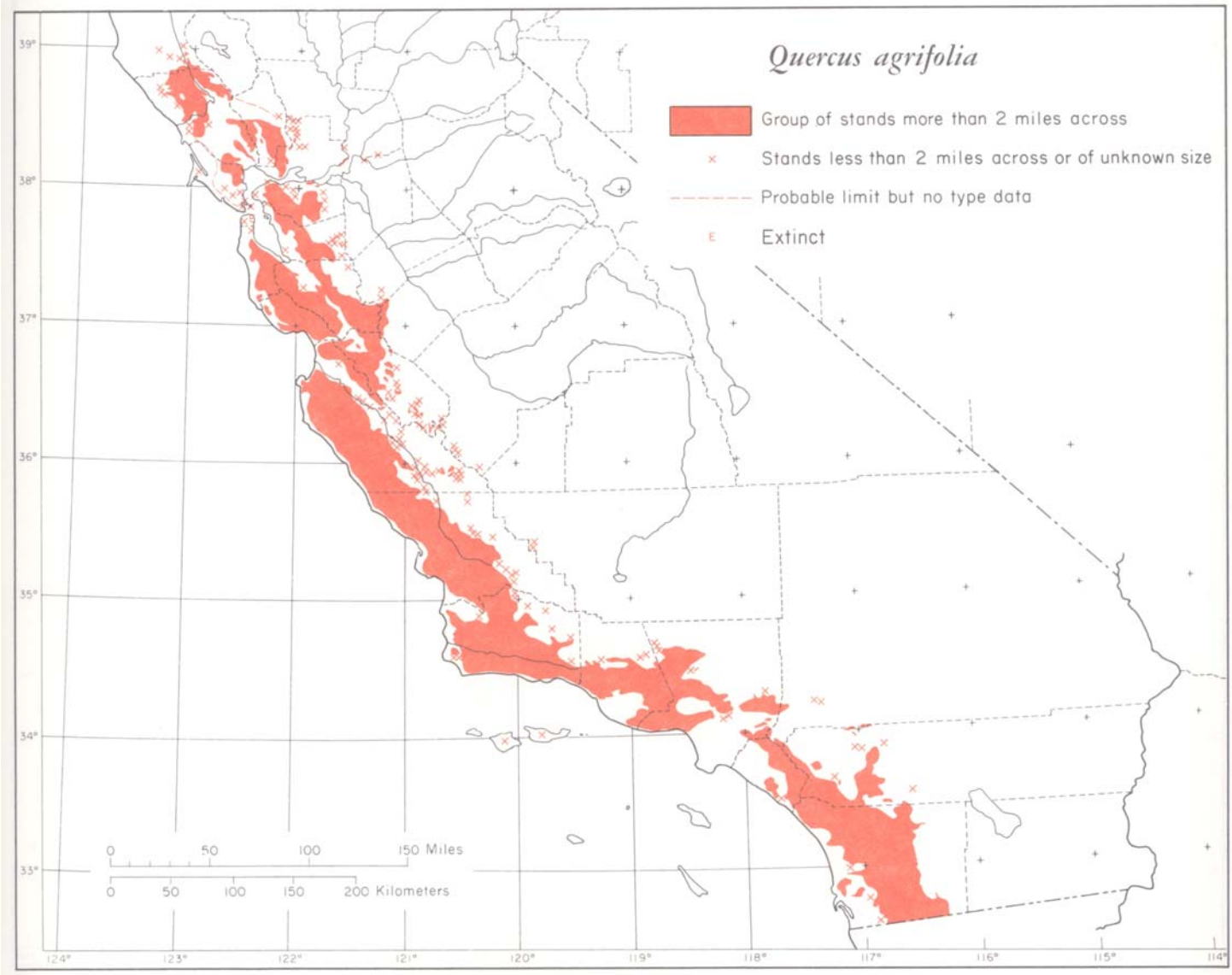


Map 64 (top) Map 65 (bottom)

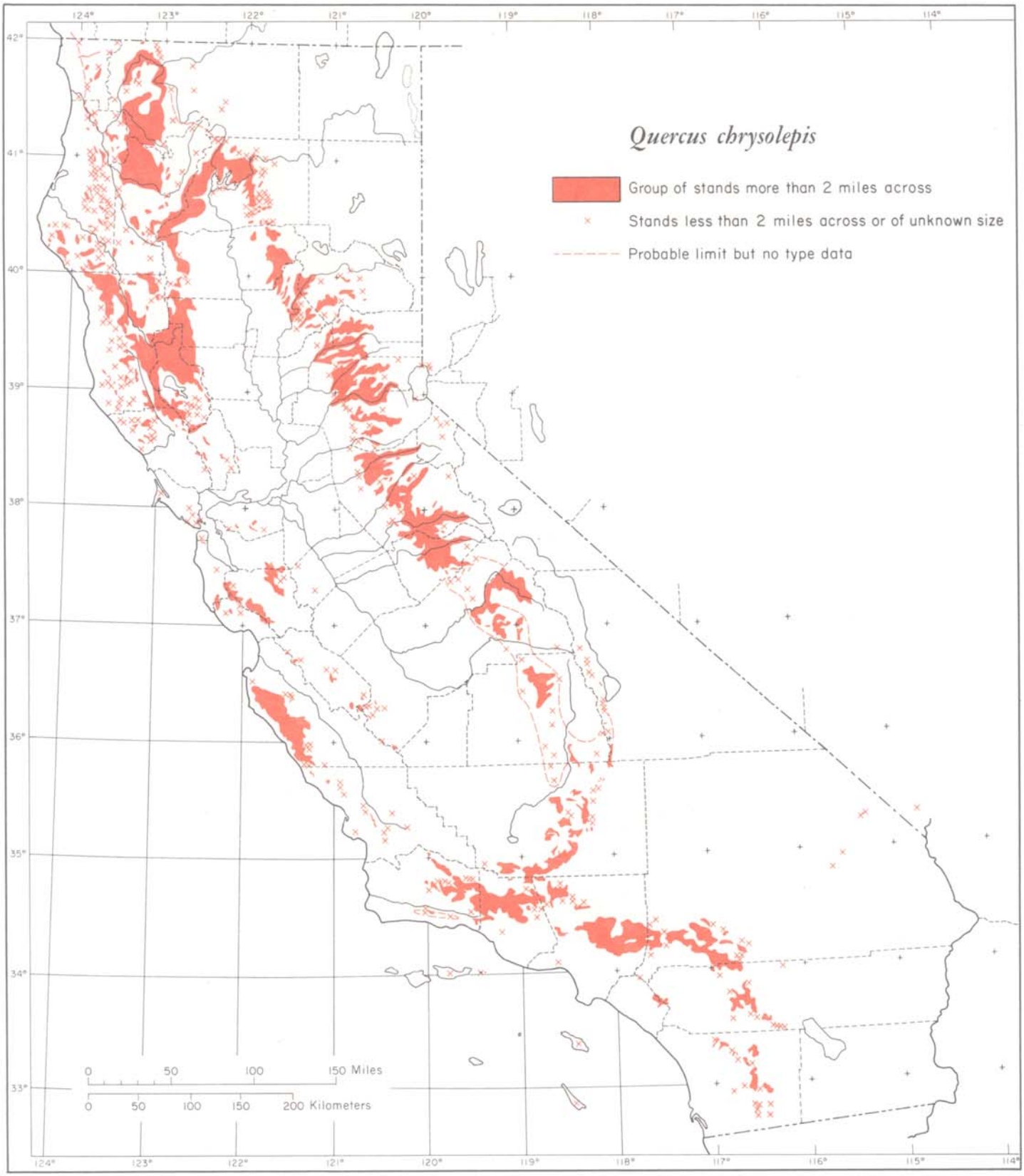

Pseudotsuga menziesii
Group of stands more than 2 miles across
Stands less than 2 miles across or of unknown size
Probable limit but no type data
0 50 100 150 Miles
0 50 100 150 200 Kilometers

Map 66

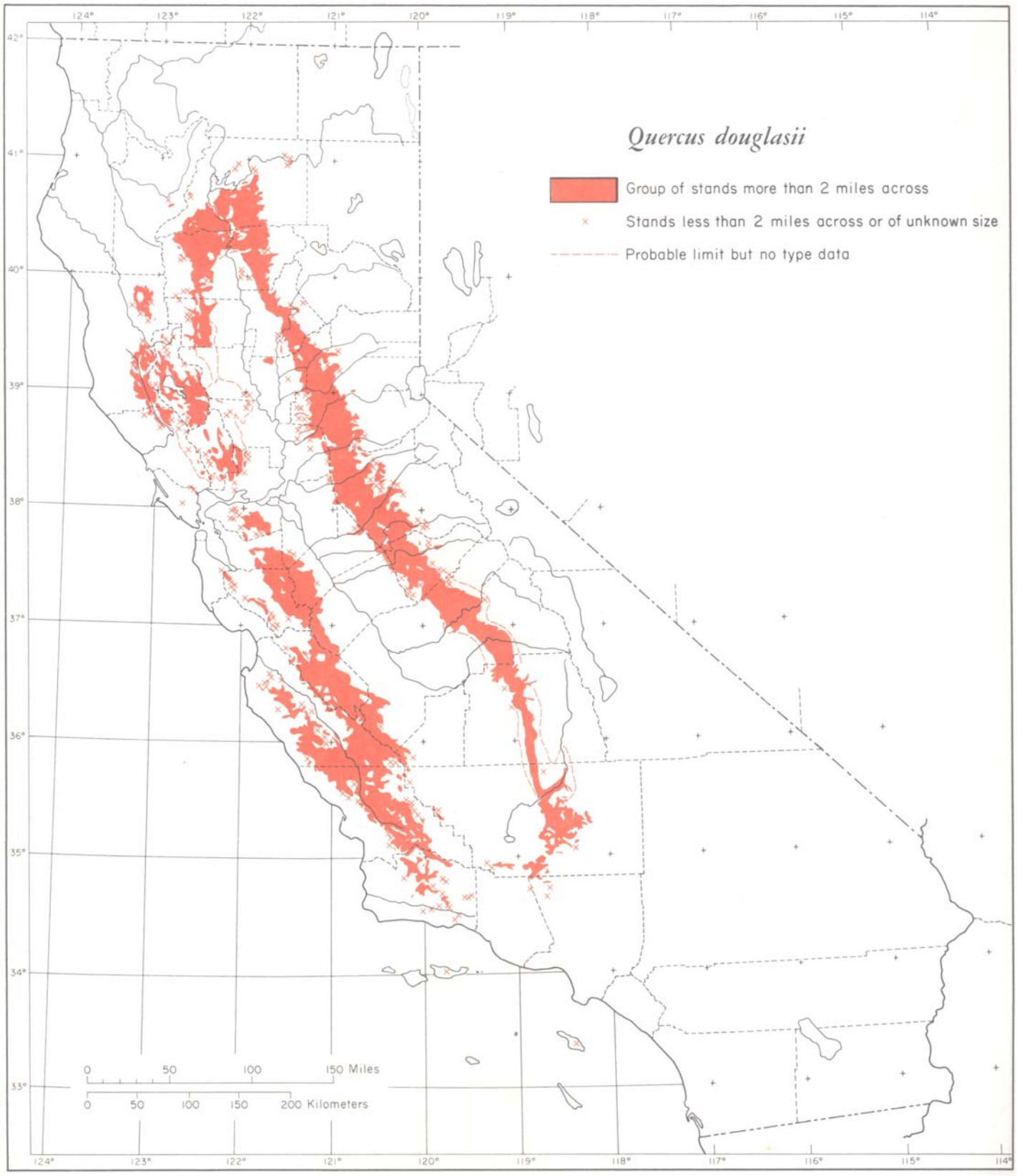




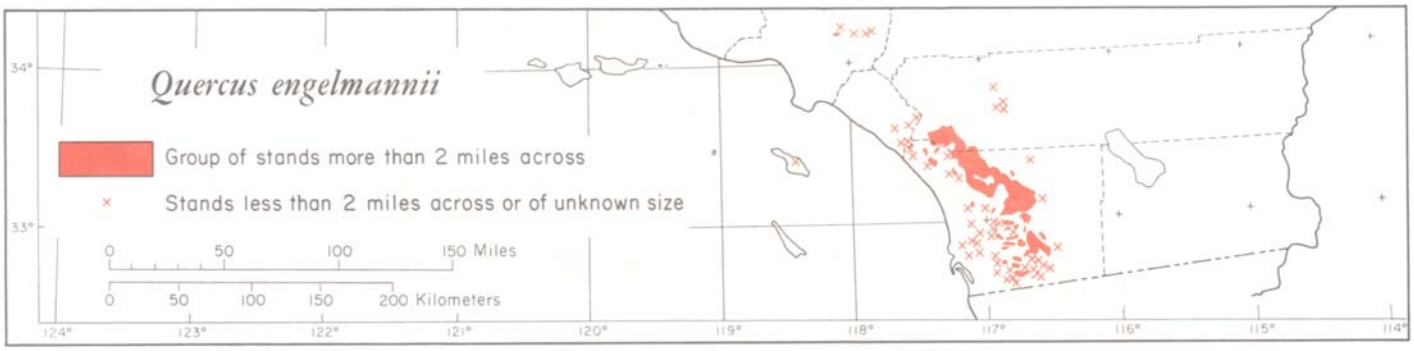
Map 67 (top) Map 68 (bottom)

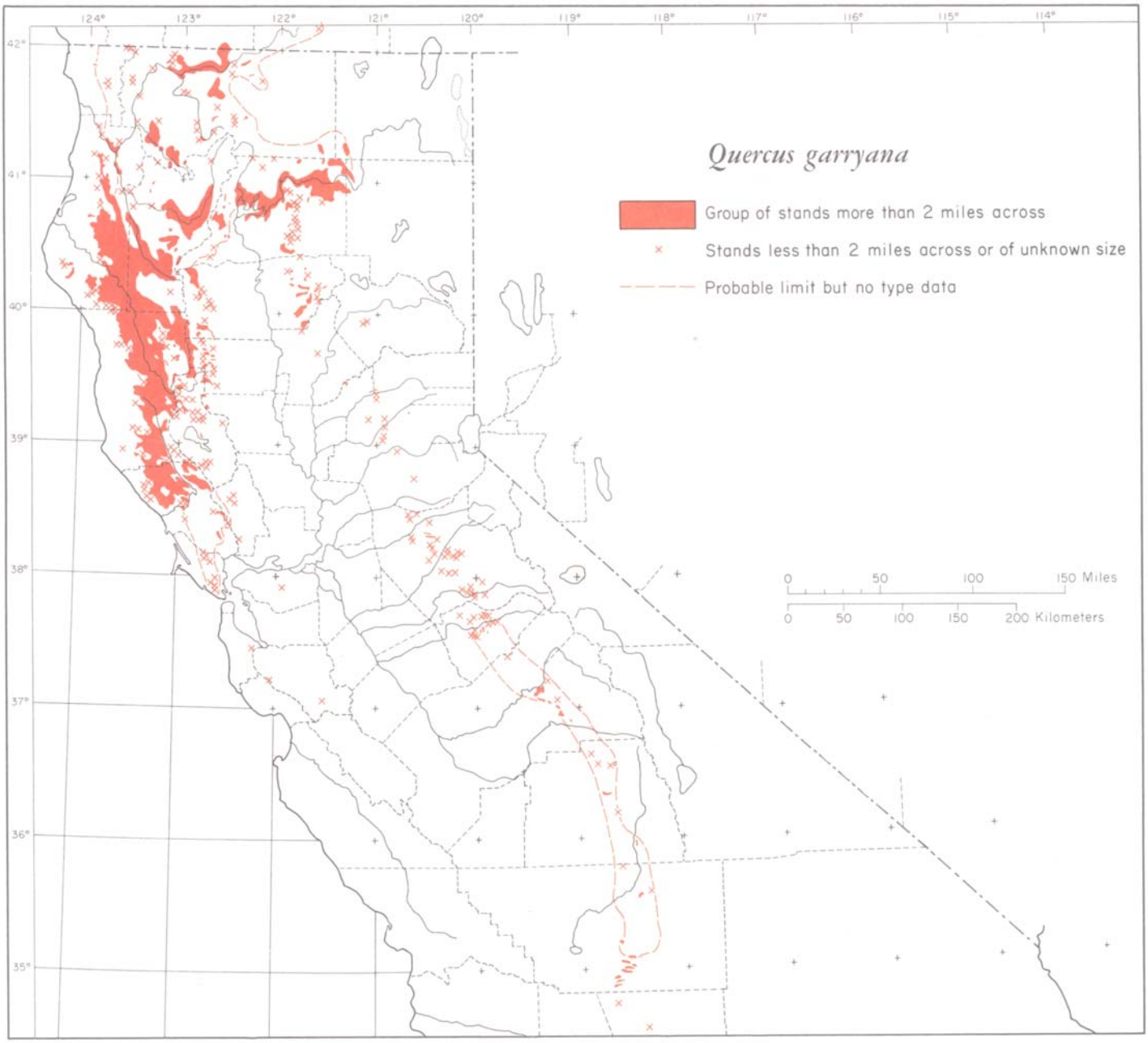

Quercus chrysolepis
Group of stands more than 2 miles across
Stands less than 2 miles across or of unknown size
Probable limit but no type data
0 50 100 150 Miles
0 50 100 150 200 Kilometers

Map 69

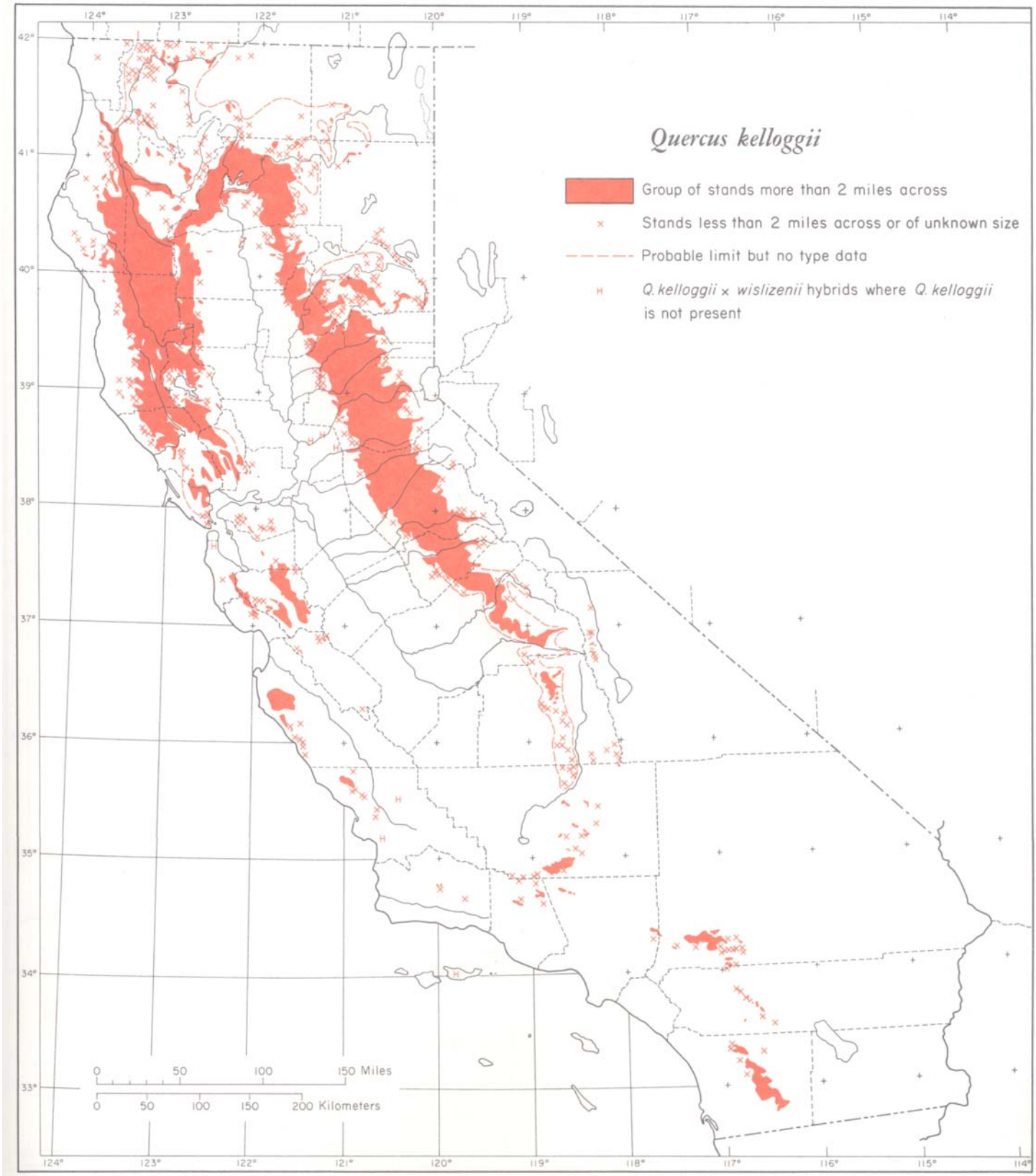

Quercus douglasii
Group of stands more than 2 miles across
Stands less than 2 miles across or of unknown size
Probable limit but no type data
0 50 100 150 Miles
0 50 100 150 200 Kilometers
124° 123° 122° 121° 120° 119° 118° 117° 116° 115° 114°
42° 41° 40° 39° 38° 37° 36° 35° 34° 33°

Map 70

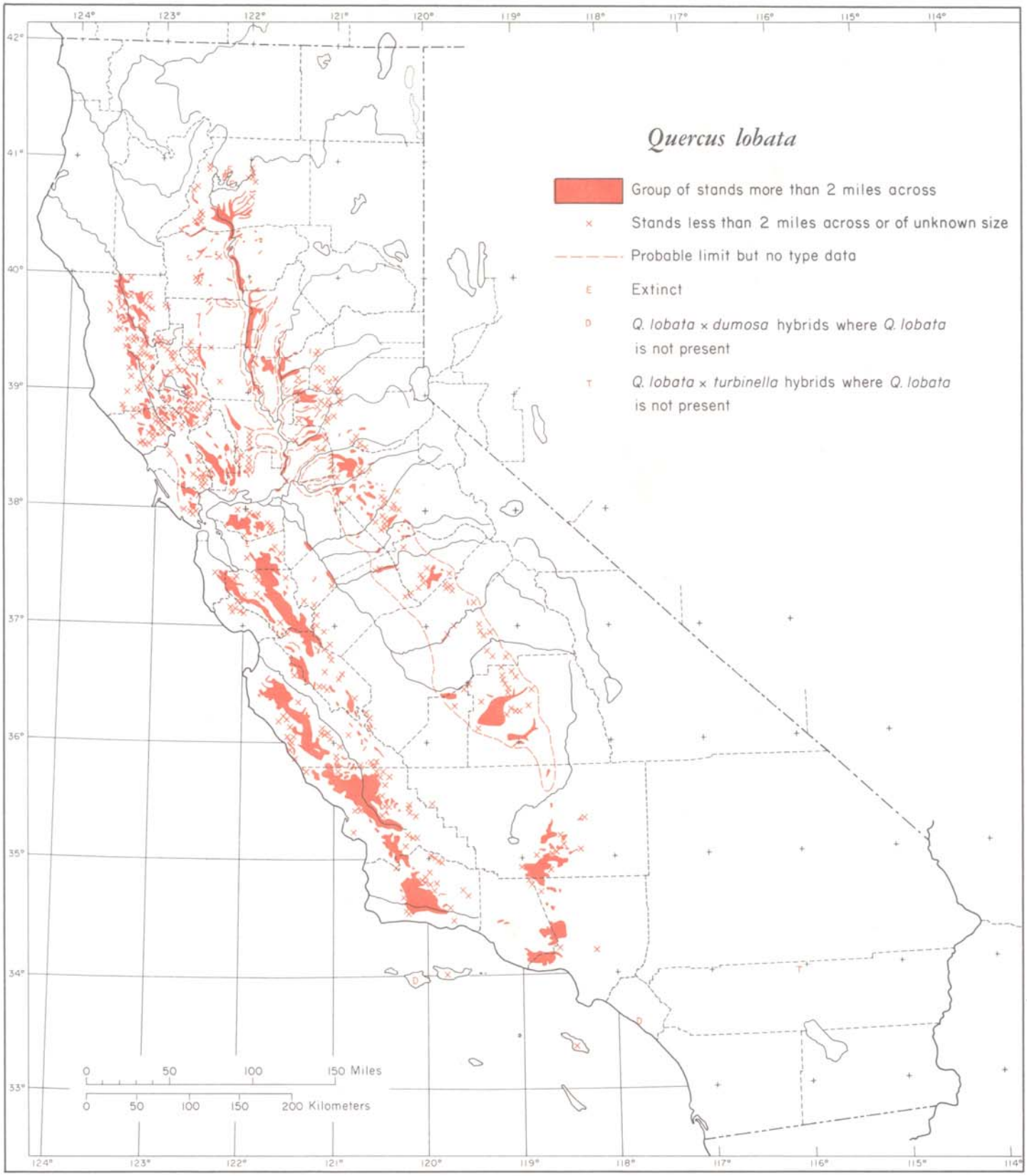




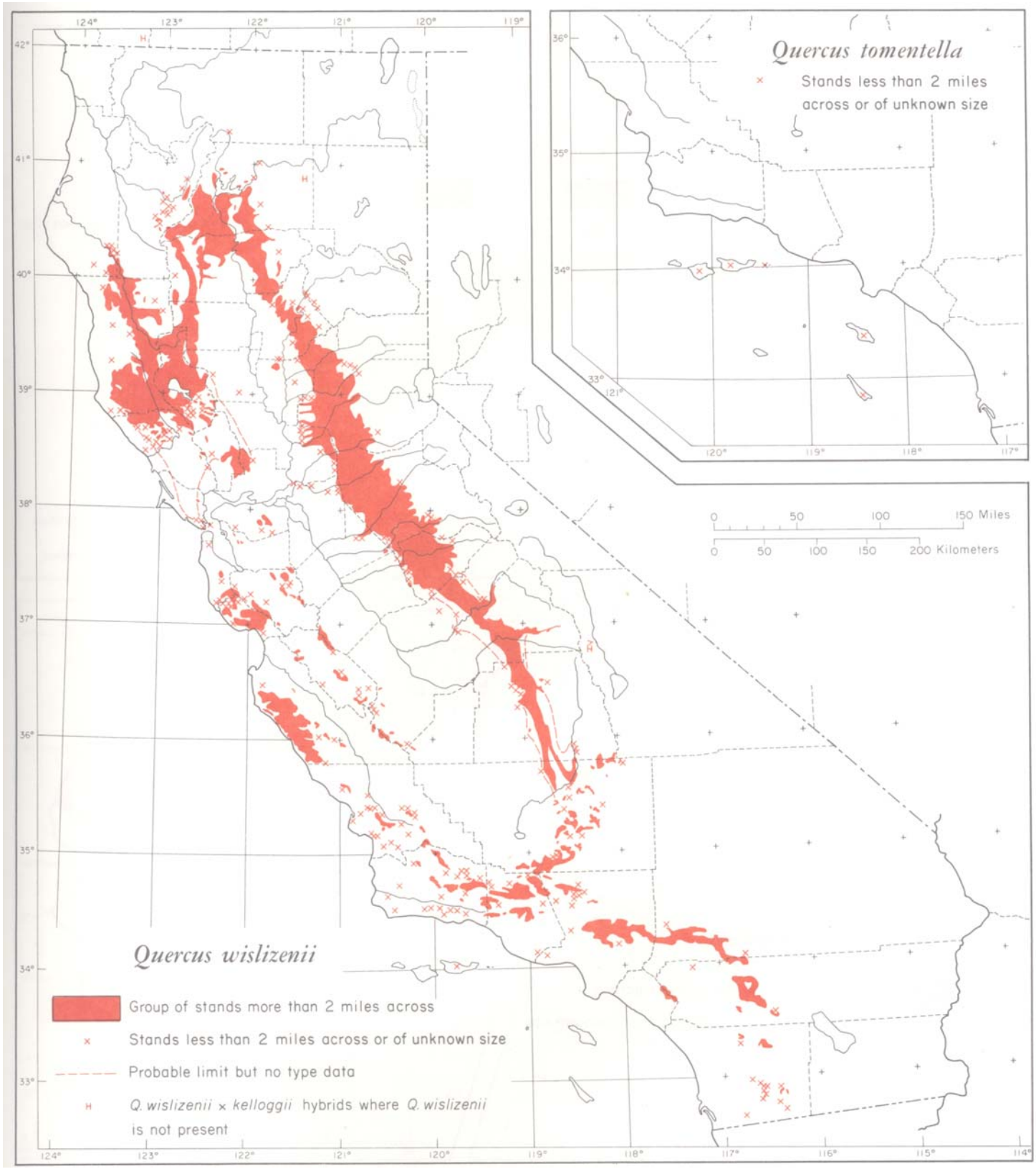
Map 71 (top) Map 72 (bottom)


Quercus kelloggii
Group of stands more than 2 miles across
Stands less than 2 miles across or of unknown size
Probable limit but no type data
Q. kelloggii x wislizenii hybrids where Q. kelloggii is not present
0 50 100 150 Miles
0 50 100 150 200 Kilometers

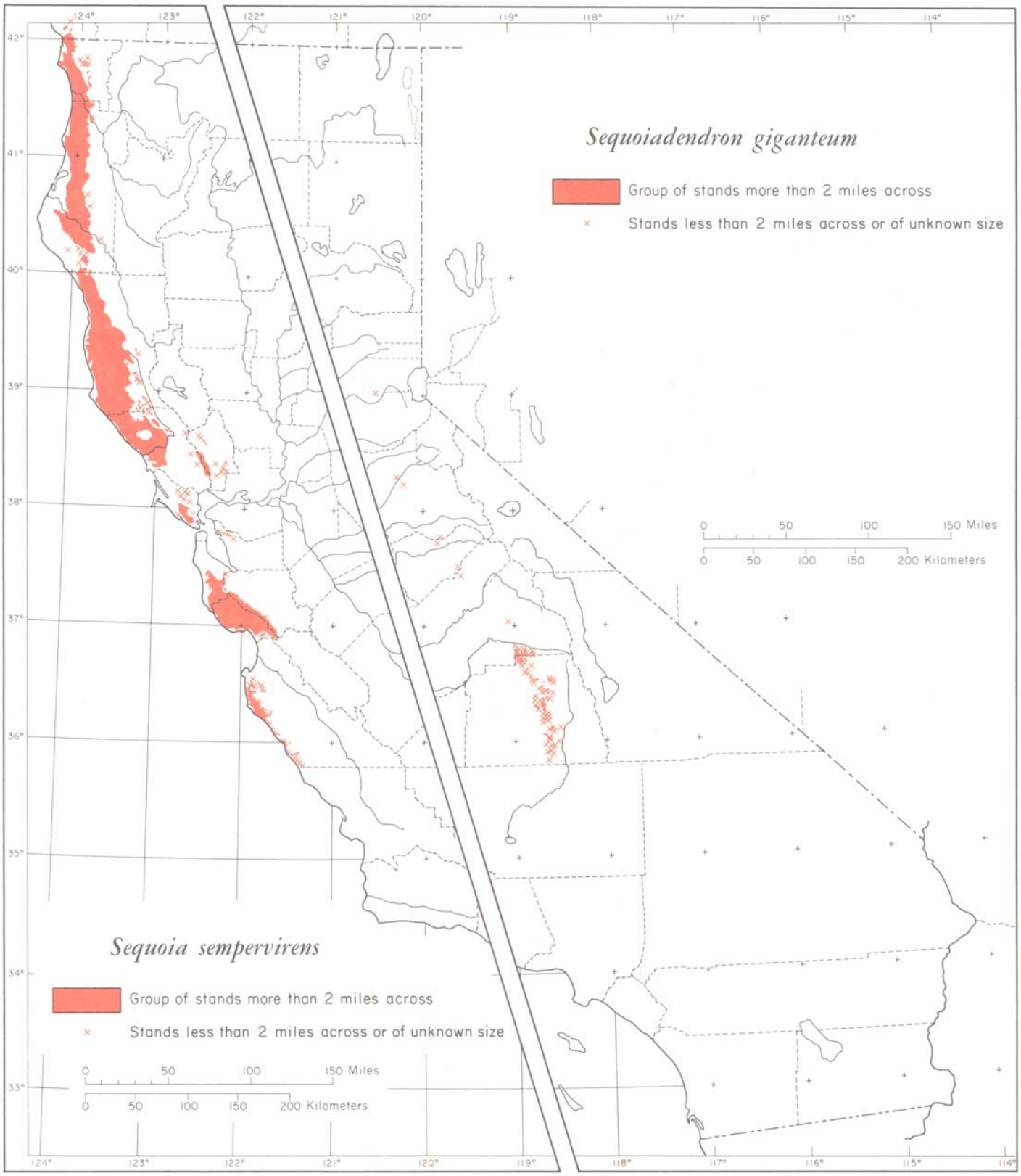
Map 73


Quercus lobata
Group of stands more than 2 miles across
Stands less than 2 miles across or of unknown size
Probable limit but no type data
E Extinct
D Q. lobata × dumosa hybrids where Q. lobata is not present
T Q. lobata × turbinella hybrids where Q. lobata is not present
0 50 100 150 Miles
0 50 100 150 200 Kilometers
124° 123° 122° 121° 120° 119° 118° 117° 116° 115° 114°
42° 41° 40° 39° 38° 37° 36° 35° 34° 33°

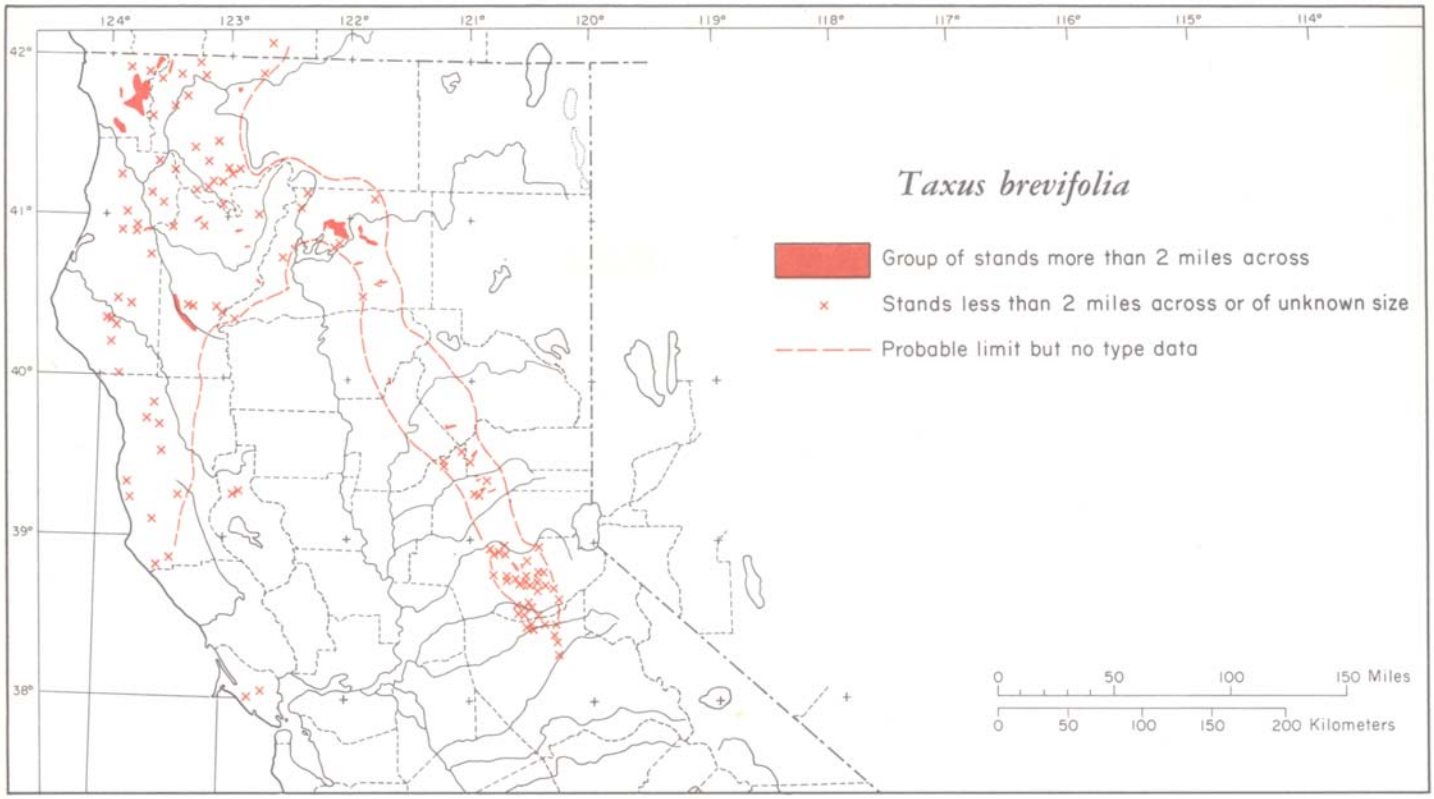
Map 74

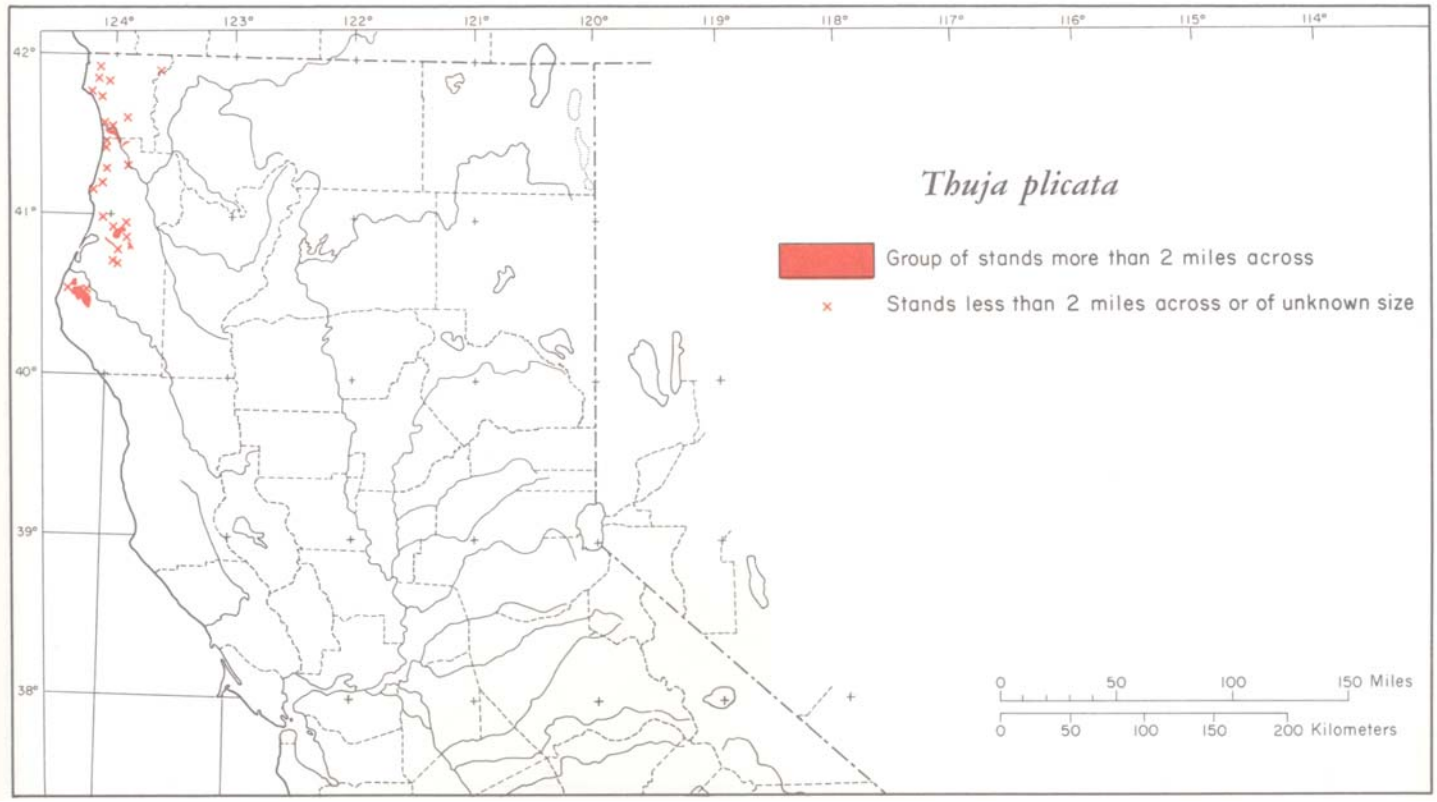


Map 75 (top) Map 76 (bottom)



Map 77 (top) Map 78 (bottom)

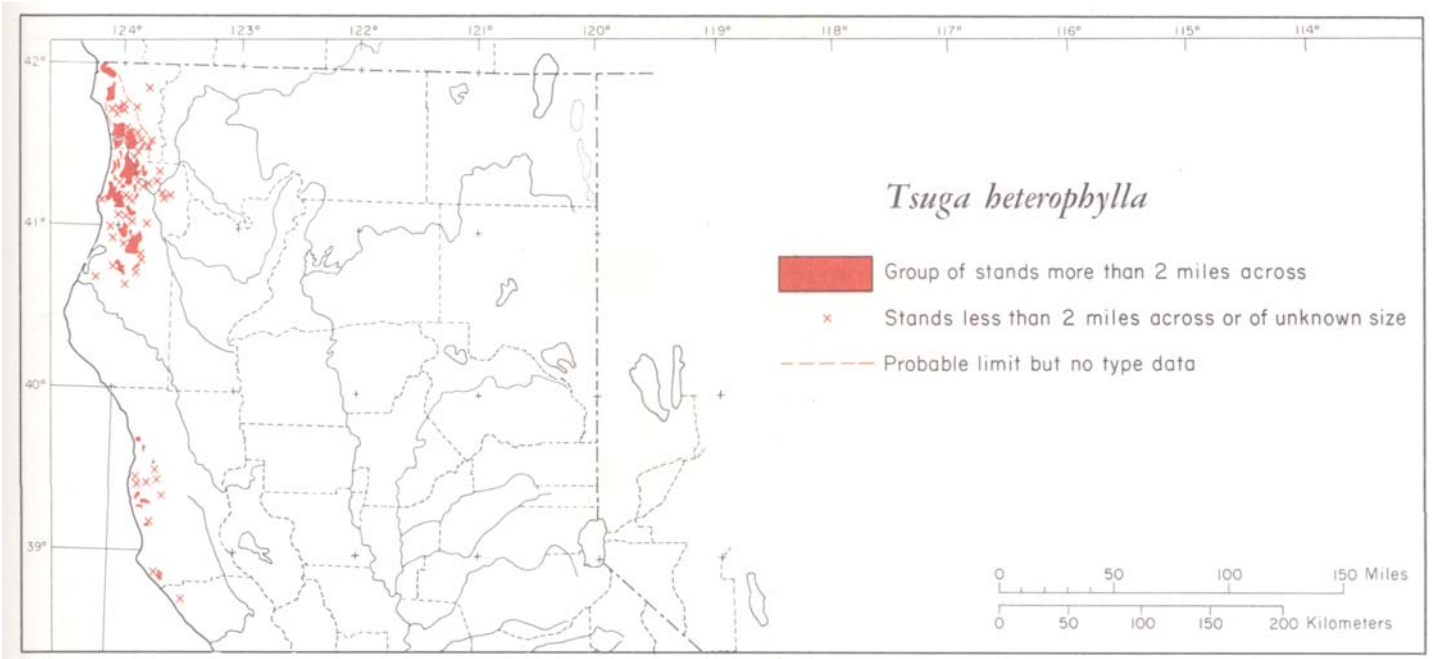


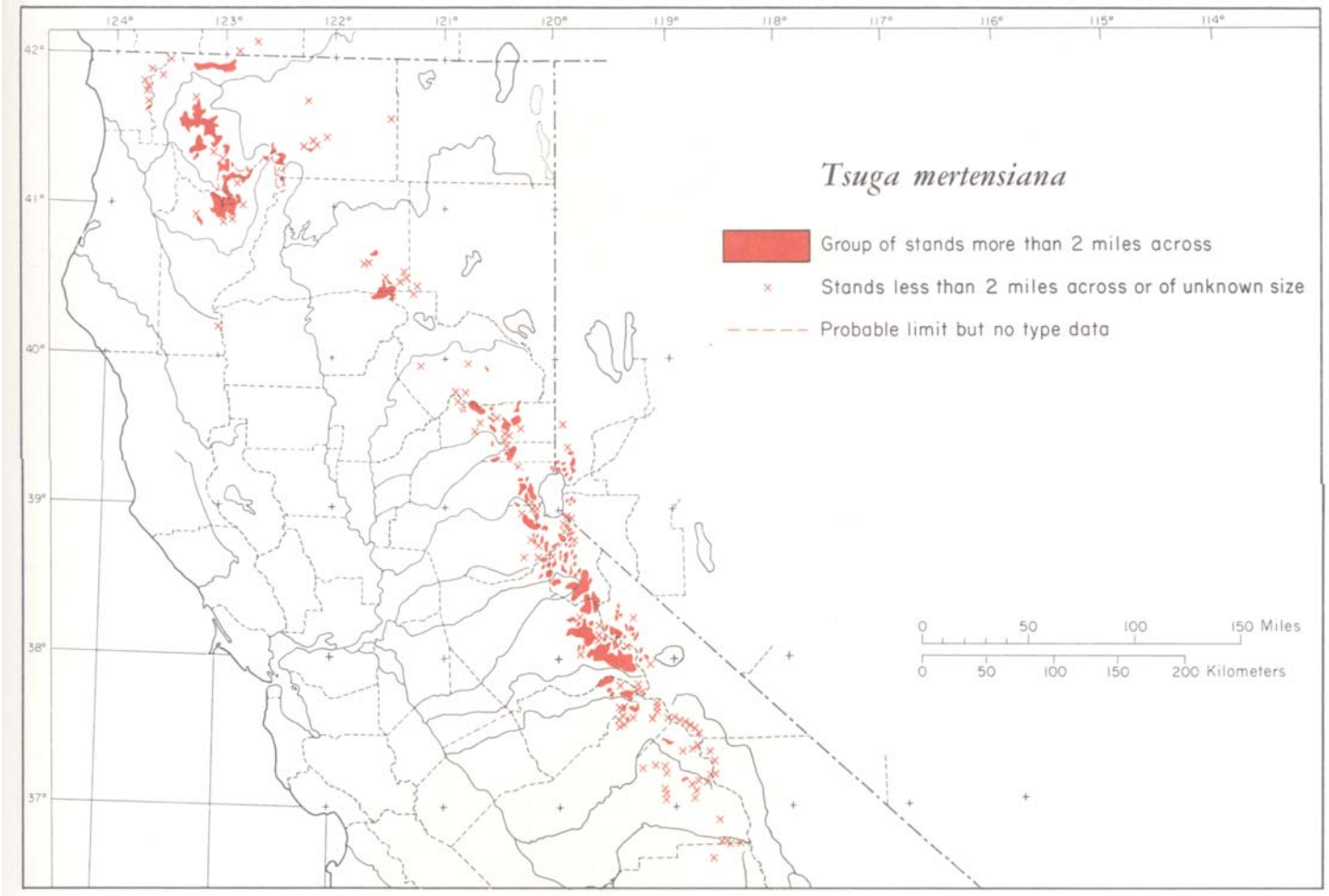


Map 79 (top) Map 80 (bottom)

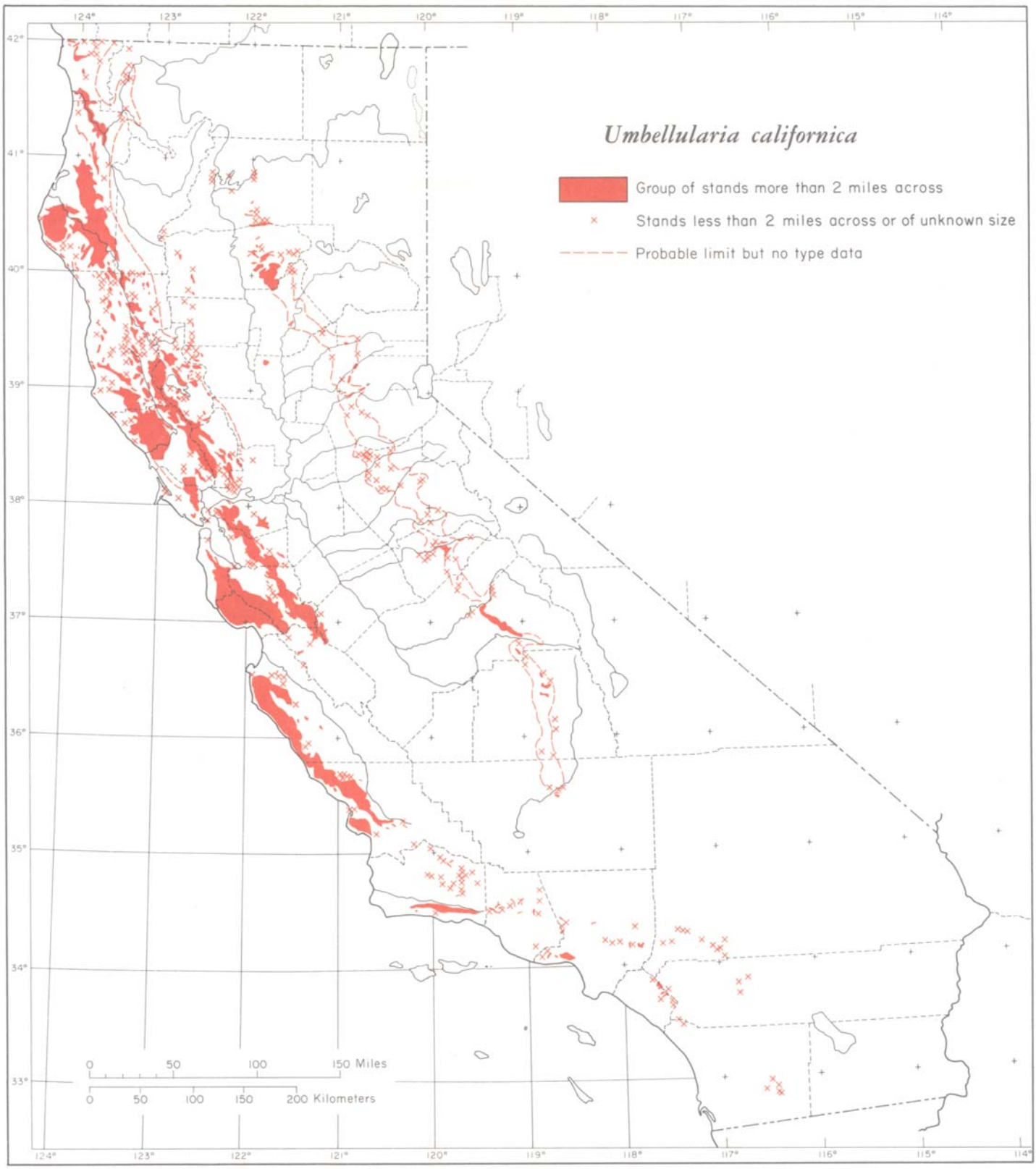

Torreya californica
Group of stands more than 2 miles across
Stands less than 2 miles across or of unknown size
0 50 100 150 Miles
0 50 100 150 200 Kilometers
124° 123° 122° 121° 120° 119° 118° 117° 116° 115° 114°
42° 41° 40° 39° 38° 37° 36° 35° 34° 33°

Map 81





Map 82 (top) Map 83 (bottom)


Umbellularia californica
Group of stands more than 2 miles across
Stands less than 2 miles across or of unknown size
Probable limit but no type data
0 50 100 150 Miles
0 50 100 150 200 Kilometers

Map 84

GEOGRAPHIC LOCATION OF PLACE NAMES

Name	*Latitude (N)*	*Longitude (W)*
Adin Pass	41°21'	120°55'
Aetna Springs	38°39'	122°29'
Alder Creek	35°52'	121°24'
Amador City	38°25'	120°49.5'
Anastasia Canyon	36°20.5'	121°34'
Anchor Bay	38°48'	123°34.5'
Anderson Valley	39°00'	123°22'
Antelope Valley	34°45'	118° 15'
Applegate	39°00'	120°59.5'
Arroyo Seco	36°16'	121°23'
Asbill Creek	39°55.5'	123°21.5'
Ash Creek	40°28'	122°00'
Atlas Peak	38°27'	122°15.5'
Atwell Grove	36°28'	118°40.5'
Avila	35°11'	120°44'
Bald Mt. (Nev.)	41°50'	119°37.5'
Bald Mt. Range	39°36'	120°06'
Banner	33°04'	116°33'
Banner Canyon	33°05'	116°34'
Basket Peak	35°39'	118°38.5'
Bautista Canyon	33°36'	116°44'
Bear Basin Butte	41°48.5'	123°44.5'
Ben Lomond Mt.	37°06.5'	122°09'
Big Creek	37°12'	119°15'
Big Meadow	35°52.5'	118°20.5'
Big River	39°18'	123°47'
Big Valley Mts.	41°10'	121°20'
Bill Little Spring	35°25.5'	119°50.5'
Black Butte (Glenn Co.)	39°43.5'	122°52.5'
Black Butte (Siskiyou Co.)	41°22'	122°21'
Black Rock Mt.	40°12'	123°00.5'
Blakes Fork, South Russian Creek	41°17.5'	122°59.5'
Blodgett Forest	38°55'	120°39.5'
Boca	39°23'	120°05.5'
Bolinas Ridge	38°57.5'	122°43'
Boonville	39°00.5'	123°22'
Bouquet Canyon	34°30'	118°27'
Box Springs Mts.	33°58'	117°17'
Breckenridge Mt.	35°27'	118°34.5'
Browns Creek	40°35'	122°55'
Brownsville	39°28.5'	121°16'
Brush Mt.	34°53'	119°13.5'
Buck Creek Ranger Station	41°52.5'	120° 17.5'
Bully Choop	40°33.5'	122°46'
Burney Springs	40°47'	121°37.5'
Burton Mesa	34°44'	120°34'
Butte Lake	40°34'	121°17.5'
Cabin Creek	37°42.5'	118°15'
Calaveras Big Trees State Park	38°17'	120°18.5'
Caliente	35°17.5'	118°37.5'
Caliente Mt.	35°02'	119°45.5'
Callahan	41°18.5'	122°48'
Canyon Creek	40°56'	123°01'
Canyon Creek Lakes	40°58.5'	123°01.5'
Carmel Valley	36°30'	121°45'
Cascade Canyon	34°12.5'	117°39'
Castle Crags	41°11'	122°21'
Castle Lake	41°13.5'	122°23'
Castle Peak	39°22'	120°21'
Cedar Basin	40°11'	122°59'
Cedar Mt.	37°33.5'	121°36.5'
Cedar Pass	41°34'	120°16'
Cedar Roughs	38°34'	122°18'
Cedros Island (Mexico)	28°10'	115°15'
Chariot Canyon	33°03'	116°33'
Cherry Spring	35°21.5'	119°47'
Chetco River (Ore.)	42°05'	124°12'
Chews Ridge	36°18.5'	121°34'
Chiminea (Chiminaes) Canyon	34°46.5'	119°58.5'
Clark Mts.	35°32'	115°35'
Clear Creek	36°23'	120°43'
Clover Creek	40°41'	122°00'
Cone Peak	36°03'	121°29.5'
Converse Basin	36°48'	118°58'
Copernicus Peak	37°21'	121°37.5'
Corral Creek Campground	35°51'	118°27'
Cottonwood Creek	41°59'	122°38'
Courtland	38°20'	121°34'
Crater Lake (Ore.)	42°55'	122°05'
Cuesta Pass	35°21'	120°38'
Cummings	39°50'	123°37.5'
Cuyama Valley	34°55'	119°35'
Cuyamaca Lake	33°00'	116°34'
Cuyamaca Peak, Cuyamaca Mountains	32°57'	116°36.5'
Cypress Camp	40°45'	121°36.5'
Danish Creek	36°22.5'	121°42'
Dark Canyon	33°48'	116°44'
Darling Ravine	40°24.5'	121°47'
Deep Lake	41°34.0'	123°06.5'
Deer Creek	35°53.5'	118°37'
Del Monte Forest	36°35'	121°56'
Democrat Hot Springs	35°31.5'	118°40'
Descanso	32°51.5'	116°37'
Devils Canyon	36°04.5'	121°35'
Devils Gulch	37°33'	119°48'
Dinsmores	40°29.5'	123°36'
Division Creek	36°56'	118°19'
Donomore Meadows	42°00'	122°54.5'

Name	*Latitude (N)*	*Longitude (W)*
Drake Ridge	35°23.5'	119°51'
Duck Lake Creek	41°19'	122°56'
Dunnigan	38°53'	121°58'
Eagle Rest Peak	34°54.5'	119°08'
East Fork, Ashland Creek (Ore.)	42°08'	122°42'
East Fork, Elk Creek	41°43'	123°18'
East Fork, Trinity River	41°05'	122°35'
East Weaver Lake	40°49'	122°59'
Eden Valley	39°37'	123°10'
Elk Hole	41°36.5'	123°42.5'
Etiwanda	34°07.5'	117°31.5'
Fish Creek	34°08.5'	116°47'
Fort Jones	41°36.5'	122°50.5'
Fort Ross	38°31'	123°14.5'
Frazier Mt.	34°46.5'	118°58'
Freeman Creek	36°08.5'	118°31'
Fremonts (Gabilan) Peak	36°45.5'	121°30'
Galena Creek (Nev.)	39°20'	119°53.5'
Galloway Creek	38°52.5'	123°39'
Garden Valley	38°51'	120°51.5'
Garfield Grove	36°20'	118°43'
Garner Valley	33°39'	116°39'
Genoa (Nev.)	39°00'	119°51'
Gibson Creek	36°30.5'	121°55'
Glenbrook (Nev.)	39°05.5'	119°56.5'
Glenwood	37°06.5'	121°59'
Gold Hill (Ore.)	42°26'	123°03'
Goosenest Mt.	41°43'	122° 13'
Gordon Valley	38°22'	122°08'
Grouse Creek	40°43'	123°38'
Guadalupe Island (Mexico)	29°05'	118°20'
Gualala River	38°46.5'	123°30'
Guatay, Guatay Campground	32°51.5'	116°34'
Hackamore	41°33'	121°07'
Haiwee Creek	36°08'	118°03'
Happy Camp	41°47.5'	123°22.5'
Hat Creek Rim	40°45'	121°24.5'
Hawkins Bar	40°52'	123°31'
Hetch Hetchy Reservoir	37°57'	119°44'
High Lake	41°18'	122°57.5'
Hippo Butte	41°43'	121°32'
Hobart Mills	39°24'	120°11'
Hooker Canyon	38°21.5'	122°28'
Hopland	38°58.5'	123°07'
Horse Meadow	35°54'	118°22.5'
Horse Range Creek	41°20'	122°56.5'
Hot Springs Mt.	33°18.5'	116°34'
Hot Springs Valley[1]		
Howell Mt.	38°34.5'	122°25.5'
Indian Creek	41°53'	123°26'
Ink Grade	38°36.5'	122° 27.5'
Inskip Butte	40° 20.5'	121°56.5'
Iron Mt. (Ore.)	42°40.5'	124°09'
Island Butte	41°41.5'	121°35.5'
Island Mt.	40°02'	123° 29.5'
Jail Canyon	36°11.5'	117°07'
Jalama Creek	34°31'	120°29'
Jeffrey Mine Canyon	37°37'	118°19'
Jess Valley	41°14'	120°19'
Joe Creek	41°59'	123°07'
Joshua Tree National Monument	34°00'	116° 15'
Julian	33°04.5'	116°36'
Junipero Serra Peak	36°08.5'	l21°25'
Kaweah River	36°26'	118°55'
Kern Plateau	36°00'	118°15'
Kinevan Canyon	34°30.5'	119°49'
Kings Range	40°09'	124°07'
Kingston Range	35°44'	115°55'
Klamath Mountains[2]		
Knopti Creek	41°56'	123°41'
Labrea Creek	34°52'	120° 10'
Laguna Mts.	32°52'	116°25'
Lakehead	40°54.5'	122°23'
Lassen Peak	40°29'	121°30'
Las Tablas Creek	35°38.5'	120°55'
Last Chance Creek	40°07'	120°25'
Last Chance Mts.	37°17'	117°42'
Latour State Forest	40°37'	121°42'
Laurel Creek	37°37'	118°55'
Lava Beds National Monument	41°45'	121°30'

[1]Hot Springs Valley, listed by Sargent (1891) and Jepson (1910) as the southern limit of *Acer macrophyllum,* has not been located on maps of San Diego County. It probably designates the valley southwest of Hot Springs Mountain in which Warner Springs is located.

[2]The term "Klamath Mountains" is used in the context of the "Klamath Mountains geologic province" of northwestern California and southwestern Oregon (Bailey 1966). This 11,800-square-mile region of metamorphic rocks lies between the geologically younger sedimentary Coast Ranges and the volcanic Cascades. A major subdivision of the Klamath Mountains is the Siskiyou Mountains of California and adjacent Oregon. Other components include the Marble, Salmon, Scott, and Scott Bar Mountains, South Fork Mountain, and the Trinity Alps. The southern tip of the Klamath Mountains is near North Yolla Bolly.

Name	*Latitude (N)*	*Longitude (W)*
Laytonville	39°41'	123°29'
Liebre Mts.	34°44'	118°40'
Limekiln Creek	36°01.5'	121°30.5'
Little Salmon Creek	39°13'	123°45'
Little San Bernardino Mts.	33°55'	116°15'
Little Stony Creek	39°17'	122°35'
Little Sur River	36°20'	121°52'
Lockwood Creek	36°49'	118°51.5'
Loma Mar	37°16.5'	122°18.5'
Lone Pine Creek	36°35.5'	118°09'
Long Meadow	35°49.5'	118°20.5'
Long Meadow Creek	35°59.5'	118°34'
Lopez Canyon	35°15'	120°30'
Loyalton	39°40.5'	120°14.5'
Luffenholz Creek	41°02.5'	124°07'
Magalia	39°48.5'	121°35'
Magee Peak	40°41.5'	121°37'
Madeline Plains	40°50'	120°20'
Manchester	38°58'	123°41'
Marble Mts.	41°35'	123°13'
Mariposa Grove	37°30.5'	119°36'
Martin Road	37°03'	122°08'
Mattole River	40°15'	124°10'
McArthur-Burney Falls State Park	41°01'	121°39'
McKinley Grove	37°01.5'	119°06'
Merced Grove	37°45'	119°50'
Middle Fork, American River	39°02'	120°33'
Miller Gulch	38°35'	123°18.5'
Miller Lake (Ore.)	42°04'	123°18'
Mineral King	36°27'	118°36'
Miranda	40°14'	123°49.5'
Mission San Antonio	36°01'	121°15'
Mission San Juan Batista	36°50.5'	121°32'
Mitchell Canyon	37°54.5'	121°57'
Moffett Creek	41°38'	122°45'
Monterey Peninsula	36°36'	121°56'
Montgomery Creek	40°50.5'	121°55'
Mountain Lakes Wilderness Area (Ore.)	42°20'	122°06'
Mt. Ashland (Ore.)	42°05'	122°43'
Mt. Carmel	36°23'	121°47'
Mt. Diablo	37°53'	121°55'
Mt. Eddy	41°19'	122°28.5'
Mt. Fillmore	39°44'	120°51'
Mt. Hamilton, Mt. Hamilton Range	37°20.5'	121°38.5'
Mt. Pinos	34°49'	119°08.5'
Mt. Pleasant	39°57.5'	121°10'
Mt. Rose (Nev.)	39°21'	119°55'
Mt. St. Helena	38°40'	122°38'
Mt. Tamalpais	37°55.5'	122°35'
Mt. Whitney	36°34.5'	118°17.5'
Mud Lake	40°10.5'	120°43'
Music Creek	41°19.5'	123°00'
Napa Valley	38°20'	122°20'
Natoma	38°39'	121°11'
Nelder Grove	37°26.5'	119°35'
New Idria	36°25'	120°40.5'
North Butte (Sutter Buttes)	39°141	121°47'
North Calaveras Grove	38°17'	120°18.5'
North Fork, Battle Creek	40°25'	121°56'
North Fork, Little Sur River	36°20'	121°48'
North Fork of South Fork, Cow Creek (now called Atkins Creek)	40°39'	121°46'
North Fork of Middle Fork, Willamette River (Ore.)	43°53'	122°15'
North Trinity Mt.	41°06.5'	123°29'
North Yolla Bolly	40°11.5'	122°58.5'
Nortonville	37°57.5'	121°53'
Oak Creek	36°50'	118°15'
Oasis Spring	32°54'	116°27.5'
Olancha Creek	36°16'	118°04'
Oregon Caves (Ore.)	42°06'	123°24'
Owens Peak (Mt. Owen)	35°44.5'	118°00'
Pacheco Pass	37°04'	121°12.5'
Palomar Mt.	33°21.5'	116°52'
Panther Flat Campground	41°50.5'	123°56'
Peavine Peak (Nev.)	39°35.5'	119°56'
Phelan	34°25.5'	117°34.5'
Pigeon Pass	33°59.5'	117°16.5'
Pilgrim Creek	41°23'	122°05'
Pilitas Creek	35°21'	120°30'
Pilot Ridge	37°46'	119°56'
Pine Meadows	33°36'	116°36.5'
Pinto Lake	36°57'	121°46'
Piru Creek	34°30'	118°45'
Pit River Power House No. 1	40°59.5'	121°30'
Piute Mts., Piute Peak	35°27'	118°23.5'
Placer Grove	39°03.5'	120°34'
Plantation	38°35.5'	123°18.5'

Name	*Latitude (N)*	*Longitude (W)*
Pleasants Peak	33°48'	117°36.5'
Point Arena	38°57'	123°44.5'
Point Pinos	36°38'	121°56'
Potrero Creek	32°36'	116°39'
Preston Peak	41°50'	123°36.5'
Prospect (Ore.)	42°45'	122°29'
Pulga	39°48'	121°27'
Purisima Hills	34°44'	120°20'
Rancheria Creek	37°57'	119°41'
Reading Creek	40°36.5'	122°55'
Red Mt.	39°57'	123°40.5'
Redwood Creek	41°05'	123°52'
River Pines	38°33'	120°44.5'
Rogue River (Ore.)	42°28'	123°30'
Roseman Creek	38°49.5'	123°36'
Round Mt.	40°48.5'	121°57.5'
Russ Gardens (6th and Harrison Sts., San Francisco)	37°46.5'	122°24'
Russian Gulch	39°20'	123°48'
Russian Peak	41°17'	122°57'
Salmon Creek	35°49'	121°21.5'
Salmon Mts.	41°10'	123°22'
Salton Sea	33°15'	115°45'
Salyer	40°53.5'	123°35'
San Antonio Canyon	36°02.5'	121°28'
San Benito Mt.	36°22'	120°38.5'
San Carlos (Diablo) Range	36°20'	120°45'
San Carpoforo Creek	35°47'	121°16.5'
San Dimas	34°06.5'	117°48.5'
San Emigdio Canyon	34°55'	119°10'
San Emigdio Range	34° 52'	119°10'
San Felipe	33°12'	116°36'
San Felipe Canyon[3]		
San Fernando Valley	34°13'	118°30'
Sanger Lake	41°54'	123°39'
San Lorenzo River	37°05'	122°05'
Santa Rosa Mts.	33°31'	116°25'
Santa Ynez Valley	34°37'	120°05'
Santiago Peak	33°42.5'	117°32'
San Vicente (Mexico)	31°20'	116°21'
San Ysidro Mts.	32°35'	116°50'
Sawtooth Peak	35°49.5'	118°00'
Scott Bar Mts.	41°42'	122°55'
Scott Camp Creek	41°15'	122°23.5'
Scott Mts.	41°17'	122°41'
Scott Valley	41°30'	122°52'
Seiad Creek	41°52.5'	123°08'
Sentenac (San Felipe) Canyon	33°06.5'	116°27'
Shastina	41°24.5'	122°13.5'
Shotgun Creek	41°03.5'	122°23'
Sierra Peak	33°51'	117°39'
Sierra Valley	39°45'	120°20'
Silliman Lake	36°38'	118°42'
Sirretta Peak	35°55.5'	118°20'
Skinner Ridge	36°22'	121°48'
Slick Rock Creek	38°50.5'	123°37'
Snow Mt.	39°22.5'	122°45.5'
Soldier Ridge	40°01.5'	122°58.5'
Somersville	37°57.5'	121°52'
South Calaveras Grove	38°15'	120°14'
South Fork, Kaweah River	36°22'	118°50'
South Fork, Kern River	36°00'	118°08'
South Fork, Kings River	36°48.5'	118°45'
South Fork Mt.	40°30'	123°30'
South Fork, Salmon River	41°08.5'	123°10'
South Fork, Tule River	36°02'	118°43'
South Yolla Bolly	40°02'	122°51'
Spanish Peak	39°56'	121°07.5'
Steve Peak (Ore.)	42°04'	123°15.5'
Strawberry Valley	41°18'	122°20'
Sugar Creek	41°18'	122°55'
Sugar Hill	41°48.5'	120°19.5'
Sugar Lake	41°18'	122°56.5'
Sunday Peak	35°47'	118°35'
Sutter Buttes	39°13'	121°49'
Swanton	37°04'	122°13.5'
Swartz Creek	38°38.5'	122°29'
Sweetwater Mts.	38°25'	119°18'
Telescope Peak	36°10'	117°05.5'
Temblor Range	35°15'	119°45'
Ten Mile Valley	39°44.5'	123°31'
The Cedars	38°38'	123°07'
Thing Valley	32°48'	116°23'

[3]San Felipe Canyon cannot be located on current maps of northeastern San Diego County, although it is still cited as one of the southernmost outliers of *Pseudotsuga macrocarpa* (Bolton and Vogl 1969). Jepson (1910) probably referred to Banner Canyon when he placed San Felipe Canyon between Banner and Julian. In the past Sentenac Canyon, 6-7 miles northeast of Banner, has sometimes been called San Felipe Canyon, but this locality is improbably low and arid for *Pseudotsuga macrocarpa.* The "San Felipe Canyon" locality of this species is most likely based on the type collection from the mountains near San Felipe, 8-9 miles north of Banner and Julian. *Pseudotsuga macrocarpa* still *grew* less than a mile from San Felipe at the time of the VTM curve)/

Name	*Latitude (N)*	*Longitude (W)*	*Name*	*Latitude (N)*	*Longitude (W)*
Thomas Mt.	33°37.5'	116°41'	Walker Ridge	39°05'	122°29'
Thompson Peak	41°00'	123°03'	Walnut Creek	37°55'	122°03'
Timbered Crater	41°10'	121°29.5'	Warner Springs	33°17'	116°38'
Topatopa Mts.	34°32'	119°02'	Weitchpec	41°11'	123°42.5'
Toro Creek	36°35'	121°43'	Wheeler Peak	40°06.5'	120°41'
Trinidad Head	41°03.5'	124°09'	Whiskey Peak (Ore.)	42°01.5'	123°15.5'
Trinity Alps	41°00'	123°00'	Whiskeytown Lake	40°38'	122°34'
Tule River	36°06'	118°50'	Willow Creek		
Tuolumne Grove	37°46'	119°48.5'	(Monterey Co.)	35°53.5'	121°27'
Umpqua River (Ore.)	43°30'	123°30'	Willow Creek		
Van Duzen River	40°32'	123°45'	(Sonoma Co.)	38°26'	123°05'
Ventana Camp	36°15.5'	121°44.5'	Wyman Creek	37°26'	118°05'
Verdi (Nev.)	39°31'	119°59.5'	Yreka Creek	41°45'	122°37.5'
Virgin Creek	39°28'	123°47'	Zaca Lake	34°46.5'	120°02.5'
Virginia Range (Nev.)	39°20'	119°40'	Zaca Peak	34°46'	120°01.5'

INDEX OF SCIENTIFIC AND COMMON NAMES

¤ GPO-792-192

SUPPLEMENT

This material is not a detailed revision; it consists of additions and corrections that we noticed and that colleagues brought to our attention. These new data are *not* shown on the maps. Citations in the supplemental Species Notes refer to the new References except for several items from the original References.

Species Notes

Abies bracteata

Additional population Monterey County on a tributary of Santa Lucia Creek, north slope Junipero Serra Peak, 36°10.5'N, 121°26'W (Griffin 1975, Talley 1974). Talley (1974) provided an excellent discussion of the ecology of this fir.

Abies concolor

Additional populations: Potosi Mountain, southern Nevada, 35° 58'N, 115° 30'W (D. K. Bailey, pers. comm. Nov. 29, 1975); San Bernardino County, New York Mountains, 35° 16'N, 115° 18.5'W (Henrickson and Prigge 1975). Henrickson and Prigge (1975) also gave details on the distribution and ecology of this fir throughout the eastern Mojave Desert. Additional literature on variation within the species and its relationship to *Abies grandis* (Hamrick and Libby 1972).

Acer negundo

Additional populations: San Diego County, Panawatt Spring, 33° 16'N, 116° 32'W (R. M. Beauchamp, pers. comm. March 11, 1976); Monterey County, Quinado Canyon, 36° 07'N, 121° 07'W, Toro Creek, 36° 35'N, 121° 43'W.

Aesculus californica

Additional populations: Monterey County, Mission Creek, 36° 05'N, 121° 16'W, Nacimiento River, 35° 58'N, 121° 20'W, Sam Jones Canyon, 35° 54'N, 121° 09'W; Santa Cruz County, Sunset Beach, 36° 53'N, 121° 50'W; Trinity County, near Del Loma, 40° 47'N, 123° 20'W (J. P. Smith, Jr., pers. comm. July 17, 1973). R. A. Minnich (pers. comm. April 1976) reported a few shrubs at Upper Oso Camp, Santa Ynez drainage, Santa Barbara County; but Smith (1976) does not consider these or other scattered buckeyes to be native to Santa Barbara County.

Alnus rubra

The four X's in Monterey County on Map 11 were based on an erroneous interpretation of VTM map symbols. Some of the other stands shown on Map 11 in the coastal canyons of the Santa Lucia Mountains are not very typical *A. rubra.*

Betula occidentalis

Additional population Alpine County, Woods Lake, 38° 41'N, 120° 0.5'W (Smith 1973, Taylor 1976).

Castanopsis chrysophylla

Additional population Monterey County, north of Lewis Road, 36° 53'N, 121° 42'W (K. Taylor, pers. comm. Oct. 15, 1975).

Cornus nuttallii

Additional population San Diego County, Volcan Mountains, 33° 09'N, 116° 37'W (R. M. Beauchamp, pers. comm. March 11, 1976).

Cupressus macrocarpa

E. L. Seeman (pers. comm. Sept. 4, 1973) reported several apparently native trees well isolated from the main Del Monte Forest population 0.8 mile east of Point Cypress above Cypress Point Golf Course, 36° 34.8'N, 121° 57.7'W.

Cupressus macnabiana

Additional population Shasta County, small grove 0.3 mile northwest of Old Shasta, some 200 yards south of Highway 299W, 40° 36'N, 122° 32'W (W. W. Oliver, pers. comm. March 3, 1976). Additional information on hybridization between *C. macnabiana* and *C. sargentii* (Lawrence and others 1975).

Cupressus pygmaea

Additional literature on the ecology of this cypress and associated trees such as *Pinus muricata* and *Pinus contorta* ssp. *bolanderi* in the Mendocino County pygmy forests (Westman 1975).

Cupressus stephensonii

Additional population in the mountains of northern Baja California, nearly 100 miles south of the only previously known stand in San Diego County. The new locality is west of Santa Catarina Mission near the village of El Rincón at an elevation of 4000 ft, 31° 42'N, 115° 46'W (R. Moran, pers. comm. May 21, 1976).

Juglans californica

Swanson (1967) gave detailed notes on old herbarium records and his own field observations on the distribution of this walnut. Hoover (1970)–see original references–did not concur with his comments on the natural presence of *J. californica* along Santa Rosa Creek east of Cambria, San Luis Obispo County.

Juniperus occidentalis

Additional population Inyo County, Sentinel Peak, Panamint Mountains, 36° 06'N, 117° 04.5'W (Johnson 1976). Additional details about the Trinity County "Soldier Ridge" locality (see page 21) were given by T. and V. Keeler-Wolf (1973); largest stand Soldier Ridge, second largest Doe Ridge; small stands Lightning Camp Ridge, Buck Ridge, Wright Ridge, Devils Hole Ridge, and Stockton Ridge. The westernmost stand in this region is probably on Big Butte, 40° 01'N, 123° 09'W (A. L. Bellon, pers. comm. Dec. 10, 1974).

Lithocarpus densiflorus

In Santa Barbara County, tanoak is not necessarily restricted to such mesic spots as suggested on page 22, but it can occur in chaparral on dry ridgetops (J. M. Tucker, pers. comm. May 24, 1976).

Picea breweriana

Additional literature on the ecology of this spruce (Waring and others 1975).

Pinus albicaulis

Additional populations in Mono County: Glass Mountain, 37° 46.5'N, 118° 42.5'W (E. A. Larson, pers. comm. July 30, 1973); unnamed mountain southeast of Sentinel Meadow, 37° 47' N, 118° 47'W (L. C. Johnson, pers. comm. June 28, 1974). G. H. True (pers. comm. Nov. 23, 1975) stated that the X in Nevada County (Map 40) represents three stands–two on Castle Peak and one on Basin Peak.

Pinus aristata (*P. longaeva*)

Additional populations: Inyo County, Sentinel Peak, Panamint Mountains, 36° 06'N, 117° 04.5'W (Johnson 1976); Potosi Peak, southern Nevada, 35° 58'N, 115° 30'W (D. K. Bailey, pers. comm. Nov. 29, 1975).

Pinus attenuata

Additional population Humboldt County, South Fork Bear Creek, 40° 04.5'N, 124° 03'W (W. Colwell, pers. comm. Feb. 28, 1974). R. A. Minnich (pers. comm. April 1976) reported that the large eastern stand shown on Map 42 on the south slope of Keller Peak in the San Bernardino Mountains is based on a VTM error.

Pinus balfouriana

Additional population Inyo County, Basin Mountain, 37° 18.5' N, 118° 38'W (Larson 1972); this stand, near the entrance to the cirque for which the mountain is named, is about 25 miles north of the previously known northern limit in the Sierra Nevada. R. J. Mastrogiuseppe (pers. comm. Oct. 30, 1973) stated that the northernmost locality (Map 43) in the Klamath Region on Lake Mountain, Siskiyou County covers only a few acres and should be indicated by an X rather than a mapped area; one foxtail pine stump in this stand has more than 850 annual rings.

Pinus coulteri

A. Lewis reported a small population on a bench west of Dry Gulch in Coldwater Canyon, San Gabriel Mountains, 34° 16'N, 117° 42'W; this report would place one stand within the strange disjunction of Coulter pine between Crystal Lake and Lake Arrowhead (R. A. Minnich, pers. comm. April 1976).

Pinus edulis

According to Lanner (1974a) the two-needled pine of the New York Mountains is a variant of *P. monophylla*.

Pinus flexilis

Additional populations: Inyo County, Sentinel Peak and Porter Peak, Panamint Mountains, 36° 06'N, 117° 04.5'W and 36° 03'N, 117° 03.5'W (Johnson 1976); Mono County, unnamed mountain southeast of Sentinel Meadow, 37° 47'N, 118° 47'W (L. C. Johnson, pers. comm. June 28, 1974).

Pinus lambertiana

Additional locality Monterey County, one tree in the Arroyo Seco River, 36° 07'N, 121° 28.5'W at 2150 feet elevation, an outlier of the Cone Peak forest. An unusually high-elevation occurrence (9500 ft) in the Sierra Nevada reported at Anne Lake, Madera County, 37° 36'N, 119° 22'W (May 1974).

Pinus monophylla

Additional population, continuous across Montgomery Pass, Nevada, 37° 58.5 N, 118° 20'W, between the White Mountains and the Benton Range (E. A. Larson, pers. comm. July 30,1973).

Pinus monticola

Additional population Mono County, unnamed mountain southeast of Sentinel Meadow, 37° 47.5'N, 118° 47'W (L. C. Johnson, pers. comm. June 28, 1974).

Pinus ponderosa

Additional population southern Nevada, Potosi Mountain, 35° 58'N, 115° 30'W (D. K. Bailey, pers. comm. Nov. 29, 1975).

Pinus quadrifolia

Lanner (1974b) considered this pinyon a derivative of natural hybridization between *P. monophylla* and an unrecognized five-needled pinyon which he named *P. juarezensis.*

Pinus torreyana

Additional comments on the Santa Rosa Island grove (Amme 1975).

Populus angustifolia

According to Eckenwalder (1975) the localities on Map 60 were probably based on misidentifications.

Populus fremontii

According to Coleman (1905)–see original references–a few trees used to grow in Monterey, but they appear to be extinct there now.

Populus tremuloides

Additional localities: Many widely scattered groves in southwest Modoc, northwest Plumas, southeast Shasta, and northeast Tehama Counties in the region between Lake Almanor, Eagle Lake, and Mount Lassen, and north and northeast of Mount Lassen; 40° 15'N to 40° 50'N and 120° 45'W to 121° 25'W (D. T. Gordon, pers. comm. April 16, 1975). A second aspen population was recorded in the San Bernardino Mountains in the late 1940's by District Ranger Leo Flattery, and it appeared on a 1965 San Bernardino National Forest map. But this large grove near Arrastre Creek, 34° 13.5'N, 116° 45'W, 7200 feet, was not picked up in the scientific literature.

Pseudotsuga macrocarpa

There should be a gap in the range across Cajon Pass, San Bernardino County, with no *P. macrocarpa* between Lytle Creek and Cleghorn Canyon (R. A. Minnich, pers. comm. April 1976). Additional literature on the ecology of this species (McDonald and Littrell 1976).

Pseudotsuga menziesii

Additional locality: single tree on east shore of Lake Tahoe south of Glenbrook, Nevada, 39° 03.7'N, 119° 56.6'W, 6235 foot elevation. Mapped by Little (1971) from an early collection, this occurrence has recently been verified by L. C. Johnson (pers. comm. August 26, 1976). The tree is more than 4 feet in diameter and 100 feet tall, and nearby are the decayed remains of another large Douglas-fir. Additional comments on geographic variability of terpenes in Douglas-fir (Zavarin and Snajberk 1975).

Quercus chrysolepis

Additional literature on distribution in southern Nevada (Leskinen 1975) and species variation and ecology (Myatt 1975).

Quercus kelloggii

Although McDonald (1969)–see original references–mapped the range of this oak on the eastside of the Sierra Nevada in Inyo County south to Tunawee Creek, E. A. Larson (pers. comm. Oct. 16, 1973) reported a new locality on the North Fork Ash Creek, 36° 23.5'N, 118° 06.5'W, as the southern limit in the Owens Valley region.

Quercus lobata

Additional literature on the ecology of valley oak (Griffin 1976).

Quercus wislizenii

Additional populations: Monterey County, Toyon Ridge, Toro Regional Park, 36° 35'N, 121° 40.3'W; San Benito County, 1 mile north of Fremont Peak 36° 46'N, 121° 30'W. Additional literature on the hybridization of *Quercus agrifolia* and *Q. wislizenii* (Brophy and Parnell 1974).

Sequoia sempervirens

Additional populations: Monterey County, small grove on Gibson Creek, 36° 30.5'N, 121° 56'W, within a *Pinus radiata* forest; all the redwood trees in the *P. radiate* forests of the Monterey Peninsula, e.g., along Sawmill Gulch, appear to have been planted. Humboldt County, Spring Creek, 41° 04.5'N, 123° 42.5'W; according to Indian legend this isolated stand originated from a redwood branch stuck in the ground by an Indian woman (S. Adams, pers. comm. May 11, 1976).

Sequoiadendron giganteum

Additional literature on the ecology of this species (Rundel 1972).

Taxus brevifolia

Additional population Trinity County, Big Flat, 41° 04'N, 122° 56'W (Ferlatte 1974). The "Morrills Lake" near Verdi, Nevada, mentioned on page 38 is now called Fuller Lake. 39° 28.5'N, 119° 59'W (I. LaRivers, pers. comm Sept. 10, 1975); although the lake's location has been verified, the presence of native yew at the lake has not been confirmed.

Torreya californica

G. H. True (pers. comm. Nov. 23, 1975) could not find this species near the X shown in Nevada County, and the basis for that locality can not be established now. Jepson (1901-36)–see original references–reported *Torreya* on the "Pitt River", but no modern confirmation of this species in that part of Shasta County is available.

Tsuga mertensiana

Additional stand of eight trees in Mono County, unnamed mountain southeast of Sentinel Meadow, 37° 47.5'N, 118°

47'W (E. C. Rockwell, pers. comm, June 1, 1976). Additional comments on the southern limits of this hemlock (Parsons 1972).

Umbellularia californica

Additional population San Diego County. Roblar Grade, 33° 25'N, 117° 21'W (R. M. Beauchamp, pers. comm. March 11, 1976). Additional literature on ecology in the Santa Cruz Mountains (Unsicker 1974).

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