DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

PREPARED IN COOPERATION WITH THE
DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT

OPEN FILE MAP

SHEET 1 OF 5

This map is preliminary and has not been reviewed for conformity with U.S. Geological Survey standards and nomenclature.

EXPLANATION

Qal | Qs | Qls | Qm | Qt

Surficial deposits

Qal; alluvium; sand, gravel, silt and clay
Qs; beach and dune sand; loose and fairly well sorted
Qls; landslide deposits; largely bedrock debris
Qm; marine deposits; mud, gritty mud, silt and sand in Bodega Head quadrangle
Qt; marine and stream terrace deposits; sand, silt and gravel; deemphasized along sea cliff to show bedrock

Qr

Rhyolite of Clear Lake area, Kelseyville quadrangle

Qob

Olivine basalt of Clear Lake area, Kelseyville quadrangle

ROCKS WEST OF SAN ANDREAS FAULT

Tsm

Sandstone and mudstone near Fort Ross in Skaggs and Duncans Mills quadrangles; well bedded

Tg

Strata of German Rancho

Sandstone, mudstone, and conglomerate, well bedded, abundant potassium feldspar

TKu

Undifferentiated sandstone, mudstone, and conglomerate, Stewarts Point quadrangle

Ka | Ks

Sandstone, mudstone and conglomerate

Ka; strata of Anchor Bay, well bedded, contain little or no potassium feldspar

Ks; strata of Stewarts Point, well bedded, contain abundant potassium feldspar

Ksb

Spilite (sodic basalt) near Black Point, Stewarts Point quadrangle

Closely fractured and faulted, stratigraphic relations and age uncertain

Kgr

Granitic rocks at Bodega Head, Bodega Head quadrangle

Closely fractured and faulted

Pliocene and Holocene | Miocene | Paleocene and Eocene | Late Cretaceous and Paleocene | Late Cretaceous | CRETACEOUS

ROCKS EAST OF SAN ANDREAS FAULT

QTge | QTget

Glen Ellen Formation

QTge; sand, gravel, mudstone, and minor interbedded tuffs
QTget; tuff and interbedded sand and gravel; grades westerly into QTge

Pliocene and Pleistocene | TERTIARY AND QUATERNARY

Tm

"Merced" Formation

Fine-grained sandstone and local minor coarse-grained grit and tuff breccia, poorly indurated

Tor | Tors | Torc

Ohlson Ranch Formation

Tor; sandstone, siltstone, conglomerate
Tors; sandstone
Torc; conglomerate

Tp

Petaluma(?) Formation

Sandstone, clay shale, and conglomerate, poorly indurated

Tsb | Tsr

Sonoma Volcanics

Tsb; basalt flows
Tsr; rhyolite breccia

QUATERNARY | TERTIARY

GREAT VALLEY SEQUENCE

KJgv | KJgvs | KJgvc

Sedimentary Rocks

KJgv; undifferentiated rock; mainly well bedded sandstone, shale and conglomerate
KJgvs; siltstone with minor sandstone
KJgvc; conglomerate

IGNEOUS ROCKS LOCALLY PRESENT AT BASE OF GREAT VALLEY SEQUENCE

Jv

Basaltic pillow lava and breccia

Jd

Diabase, gabbro, quartz diabase, quartz gabbro, and trondhjemite

Ju

Ultramafic rock, largely pyroxenite, includes serpentine

JURASSIC AND CRETACEOUS | JURASSIC

FRANCISCAN ASSEMBLAGE

KJfss | KJfm | KJfs

Sedimentary, igneous, and metamorphic rocks

KJfss; predominantly graywacke-type sandstone and shale with minor greenstone, conglomerate, chert, and limestone. Rock pervasively sheared and commonly veined with laumontite. Sandstone massive and well-bedded to locally thin-bedded and flysch-like, and contains about 5 to 25 percent detrital potassium feldspar.

KJfm; chiefly metagraywacke with slight to pronounced metamorphic fabric (semischist and schist of textural zone 2 and 3 of Blake, Irwin, and Coleman, 1969, p. 241), and minor metagreenstone and metachert; contains blueschist minerals, including glaucophane, lawsonite, and jadeitic pyroxene. Metagraywacke contains no detrital potassium feldspar.

KJfs; sheared shale and sandstone that contains generally resistant masses of chert, "high grade" metamorphic rock, variably shattered sandstone and greenstone, metagreenstone, and generally less resistant serpentinite (see table below for lithologies and map symbols); masses range in length from less than one foot to greater than 5 miles, and constitute a variable, generally unknown proportion of the unit.

JURASSIC AND CRETACEOUS

Rock Types That Occur as Discrete Masses, Chiefly within KJfs

Rock Type	Map Symbol
Serpentinite, including relatively fresh ultramafic masses. Occurs as lenses, sheets, and irregularly shaped masses, largely within and along boundaries of KJfs. Shown to scale where possible, some smaller masses shown by symbol.	sp , ✦
Silica-carbonate rock. Shown to scale where possible, smaller masses omitted.	sc
Chert, including metachert. Shown to scale where possible, smaller masses omitted.	ch
Greenstone, including pillow lava, tuff, minor intrusive varieties, and minor fossiliferous limestone, and metagreenstone ranging from rock containing incipient blueschist minerals to completely recrystallized blueschist (types II and III of Coleman and Lee, 1963). Masses range to longer than 5 miles. Shown to scale where possible, smaller masses not shown.	gs
Foliate metabasalt in the southern Skaggs quadrangle is shown by pattern.	
Graywacke-type sandstone, containing 0 to locally about 5 percent detrital potassium feldspar, and some metagraywacke. Probably occurs in masses ranging to at least several miles long; map distribution largely unknown.	gwy
"High grade" metamorphic rock, chiefly gneissic, including glaucophane schist, eclogite, and amphibolite, most occurring in blocks less than 100 feet long. Shown to scale where possible, smaller blocks shown by symbol.	m , ♦

MAP SYMBOLS

Contact

Dashed where approximate, queried where uncertain, and dotted where locally shown as concealed.

Fault

Dashed where approximate, queried where uncertain and dotted where concealed. Whether or not the fault is active or poses any hazard to man is generally unknown. Only crosscutting faults are shown within KJfs, although most contacts therein probably are faults.

Active fault

Trace of recently active fault: indicated by topographic features, which are inferred to be the product of fault displacement of the ground surface.

Limit of mapping at north edge of map area

inclined | horizontal | vertical | overturned

Dip and strike of bedding

Landslide deposit

Arrows show general direction of movement; landslide shown only where bedrock relationships are concealed by the deposit or where the landslide is larger than about 1 mile in maximum dimension. Many additional landslides exist; areas not mapped as landslide deposits are not necessarily stable bedrock.

PURPOSE OF MAP

This map provides geologic data primarily for use by geologists, but may also be of interest to engineers, planners, and others concerned with the application of geologic information to land-use planning and development decisions. It is one of a series of geologic maps which form the first stage in a program to gather and interpret geologic information for regional planning and development. This program is part of the San Francisco Bay Region Environment and Resources Study being carried out by the U.S. Geological Survey in cooperation with the Department of Housing and Urban Development. The map is a progress report that has been compiled and modified from a variety of sources, and changes may be required as more information is obtained. Other maps and reports interpreting the significance of the geology for land-use planning and other practical purposes will be prepared as part of the study.

The Franciscan assemblage, which underlies a large part of the map area, contains an abundance of sheared rock characterized by low permeability and an abundance of landslides. Most of this sheared rock, together with numerous masses of shattered sandstone, is assigned to one unit on the map (KJfs). The whole of the Franciscan assemblage in the map area seems separable into three major rock units (KJfss, KJfm, KJfs), which are here interpreted to represent three folded and faulted thrust plates. The Great Valley sequence and underlying igneous rocks in turn overlie the Franciscan rocks as a fourth thrust plate. Depiction of the Mesozoic rocks east of the San Andreas fault in this fashion is based on modification of the cited compilation sources, using some new field work, the abundance of potassium feldspar in sandstones, and photogeologic mapping.

The Cenozoic geology of the area is not emphasized on this map. What is shown has been compiled and slightly modified from the cited compilation sources, with the aid of very little new information.

SOURCES OF COMPILATION DATA

(See References Cited for sources with dates shown in parentheses)

1. E. H. Bailey, geologic investigations in 1957-1962
2. E. H. Bailey, and M. C. Blake, Jr., field investigations in 1959-1960; T. W. Dibblee, field investigations in 1944; and Higgins, (1960).
3. Wentworth, (1966) and (1968); recently active fault traces and adjacent landslides from Brown and Wolfe, (1970).
4. Crawford (1966); supplemented by field reconnaissance by Blake and Wright in 1970.
5. Gealey, (1951); supplemented by field reconnaissance by Blake and Wright in 1970; recently active fault from Brown, (1970); Glen Ellen Formation from Cardwell (1958) and advice of J. A. Bartow and K. F. Fox, Jr.
6. Higgins, (1950); supplemented by field reconnaissance by Blake and Wright in 1970.
7. Photogeology by Wentworth in 1970; augmented by information from Julius Schlocker, and Schlocker and Bonilla, (1963).
8. McNitt, (1968); supplemented by field reconnaissance by Blake and Wright in 1970.
9. Bailey, (1946)
10. Rudolf G. Strand, geologic investigations in 1967-1969.
11. Travis, (1952); supplemented in northwest quarter of quadrangle by field investigations by W. P. Irwin in 1966, and field reconnaissance by Blake and Wright in 1970; contact between Petaluma and "Merced" Formations from J. A. Bartow; Glen Ellen Formation from Cardwell (1958).
12. Clyde Wahrhaftig, field investigations in 1970.

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McNitt, J. R., 1968, Geological map and section of Kelseyville quadrangle, Mendocino, Lake, and Sonoma Counties, California: California Div. Mines and Geology Map Sheet 9, scale 1:62,500.

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Travis, R. B., 1952, Geology of the Sebastopol quadrangle, California: California Div. Mines and Geology Bull. 162, Scale 1:62,500.

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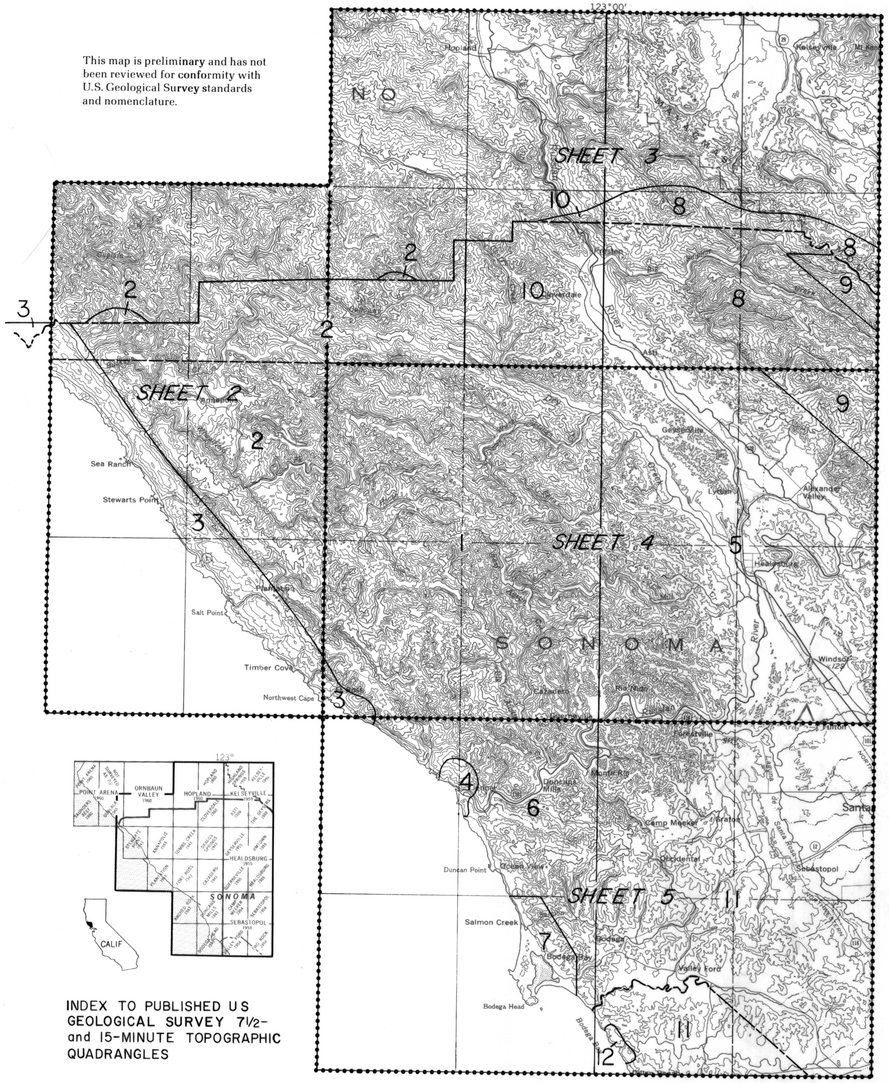

INDEX TO PUBLISHED U.S GEOLOGICAL SURVEY 7½- and 15-MINUTE TOPOGRAPHIC QUADRANGLES

INDEX TO SOURCES OF DATA AND TO MAP SHEETS

PRELIMINARY GEOLOGIC MAP OF WESTERN SONOMA COUNTY AND NORTHERNMOST MARIN COUNTY, CALIFORNIA

Compiled by

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1971