CALIFORNIA DEPARTMENT OF CONSERVATION
DIVISION OF MINES AND GEOLOGY

DMG OPEN-FILE REPORT 95-08

GEOLOGIC AND GEOMORPHIC FEATURES RELATED TO LANDSLIDING NORTH AND SOUTH FORKS OF CASPAR CREEK, MENDOCINO COUNTY, CALIFORNIA

1995

DEPARTMENT OF CONSERVATION

Division of Mines and Geology

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OPEN-FILE REPORT RELEASE

OFR 95-08 "Geologic and geomorphic features related to landsliding, North and South Forks of Caspar Creek, Mendocino County, California" -- 1995, 2 plates, map scale 1:12,000, $6.00

SUMMARY: This set of two maps, prepared for the California Department of Forestry and Fire Protection under the Pilot Monitoring Program, is intended to provide information of geology and geomorphic features of the watersheds of North and South Caspar Creek. The mapping for these areas was done at a scale of 1:12,000. Mapping was based on aerial photograph interpretation, compilation of unpublished data, and limited field reconnaissance. The maps depict significant geologic and geomorphic features of the watersheds including transitional/rotational landslides, debris slides, debris flow/torrent tracks, disrupted, hummocky ground, landslides, and inner gorge areas. The maps also identify relative ages of landsliding.

Plate 1, which depicts geologic and geomorphic features related to landsliding, was mapped by Thomas E. Spittler. The North Fork of Caspar Creek was never logged with tractors, whereby the details of the-surface morphology are well preserved. The lack of ground disturbance allows the landslides to be subdivided into five relative age classes. None of the landslides observed in the North Fork of Caspar Creek have occurred following the clear-cut logging in the watershed that has occurred during the past 9 years.

Plate 2, which depicts geologic and geomorphic features related to landsliding, was compiled by Mary A. McKittrick. The South Fork of Caspar Creek watershed was logged using tractor yarding methods in 1971, 1972, and 1973. As a result of this style of logging, numerous skid trails as well as dense vegetation obscure subtle geomorphic features on hillslopes causing landslide mapping to be difficult. Most of the small landslides observed in the field are associated with disturbed land resulting from timber harvesting; however some small slides pre-date tractor logging as evidenced by the age estimates of tree growth within the slide features.
Of the 15 landslides in the watershed that are fresh appearing, seven are associated with the existing roads across the upper slopes and eight occurred in areas not adjacent to roads. The landslides in the clear-cut blocks appear to predate the timber harvesting based on the age of vegetation growing on the scars.

The North Fork of Caspar Creek above its weir drains a watershed of 500 ha (1225 acres), while the South Fork watershed above the weir is about 425 ha (1050 acres). These watersheds are about 11 km (7 miles) southeast of Fort Bragg, inland from the central Mendocino County coast. The Caspar Creek area is one of three areas selected for geologic mapping under the Pilot Monitoring Program. The other two areas studied include the North Fork Mokelumne River (OFR 95-06) and North Fork of the Gualala River (OFR 95-05).

AVAILABILITY: This Open-File Report is available for reference at the Division of Mines and Geology offices in Sacramento, San Francisco, and Los Angeles. A copy may be purchased for $6.00 at the San Francisco and Sacramento offices.

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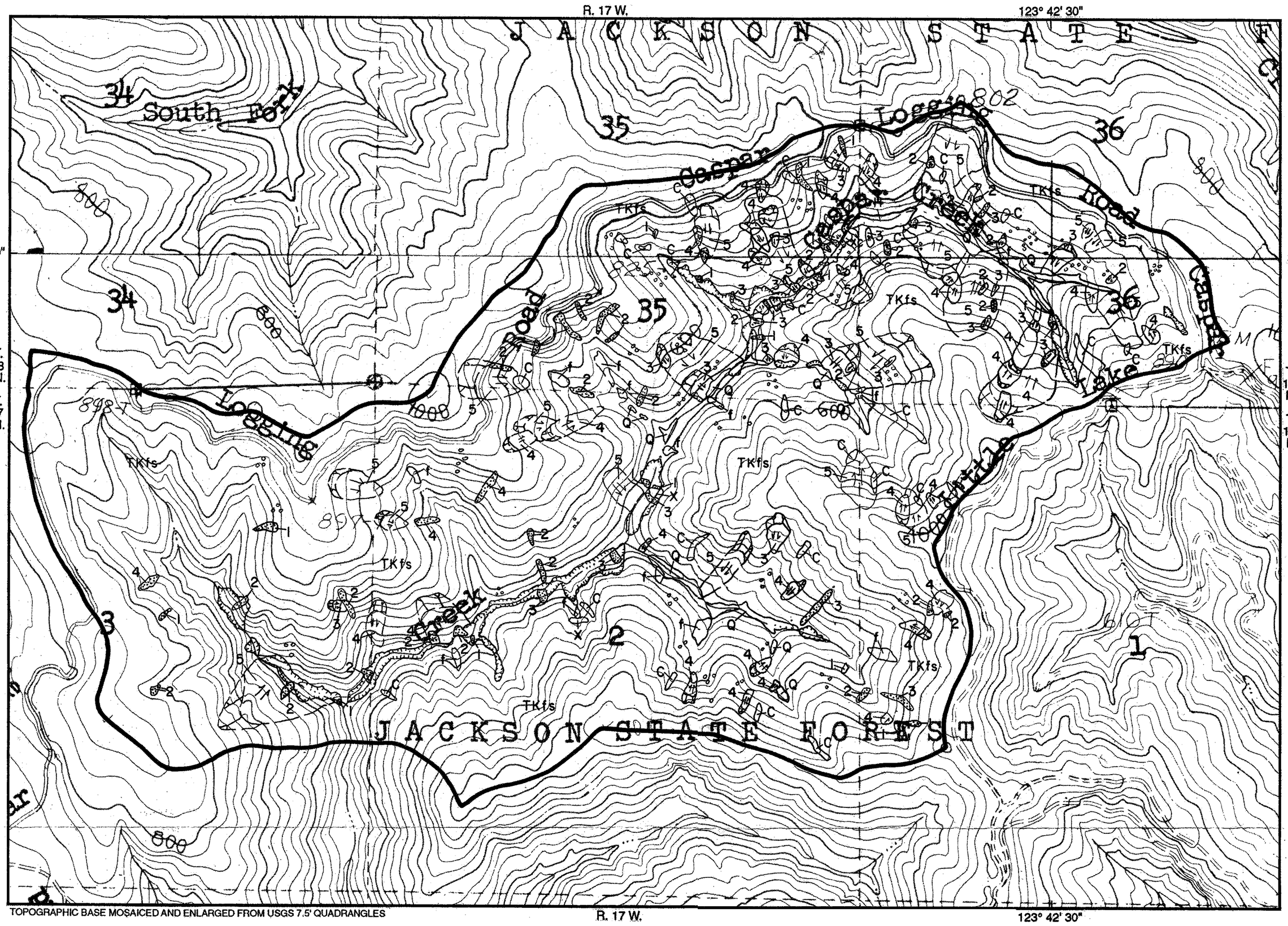

TOPOGRAPHIC BASE MOSAICED AND ENLARGED FROM USGS 7.5' QUADRANGLES

EXPLANATION

ROTATIONAL LANDSLIDE: Relatively cohesive slide mass with a failure plane that is relatively deep compared debris slides of similar areal extent. Failure plane may approach 50% of the slides greatest horizontal dimension. The sense of motion across the slide plane is arcuate. >— indicates scarp, ⇌ indicates direction of movement. Dashed where boundaries are approximate.

DEBRIS SLIDE OR DEBRIS FLOW: Unconsolidated rock, colluvium, and soil that has moved rapidly downslope along a relatively shallow failure plane. Debris slides often fail when dry and are relatively wide with respect to their length. Debris flows generally fail under saturated conditions and are very long relative to their length. These features form steep, unvegetated scars in the head regions. Their deposits, where present, are hummocky.

DISRUPTED, HUMMOCKY GROUND: Irregular ground surface caused by complex landsliding processes resulting in features that are indistinguishable or too small to delineate individually at the map scale. May include areas affected by down-slope creep, expansive soils, and/or erosion. Boundaries are indistinct.

INNER GORGE SLOPE: Geomorphic feature consisting of steep slopes, generally steeper than 65%, extending from the active stream channel to the first break in slope. Formed by coalescing scars from mass wasting and erosional processes caused by active stream erosion.

LEGEND

H	**HISTORIC ALLUVIUM:** Unconsolidated flat-lying deposits of silt and fine-grained sand that has deposited behind the old logging splash dam.
C	**COLLUVIAL ACCUMULATION:** Soil and weathered bedrock that has accumulated in inclined topographic depressions and bedrock hollows.
Q	**QUATERNARY ALLUVIUM:** Poorly consolidated sand, silt, and gravel along the flood plane. The major deposits of alluvium have formed behind ancient landslide dams.
f	**ALLUVIAL FAN DEPOSITS:** Inclined deposits of poorly sorted sand, silt, and gravels. Derived from up-slope debris flows.
X	**BEDROCK OUTCROP:** Exposures of relatively unfractured, massive Franciscan Complex sandstone.
TKfs	**COASTAL BELT FRANCISCAN COMPLEX (Tertiary-Cretaceous):** Well-consolidated marine sedimentary sandstone, with lesser amounts of siltstone, mudstone, and conglomerate.
	LITHOLOGIC CONTACT: Dashed where approximately located.
	WATERSHED BOUNDARY: Line depicts location of drainage divide.

DATA ON THIS MAP SHOULD NOT BE USED AS A SUBSITUTE FOR SITE-SPECIFIC STUDIES OR AS A BASIS FOR RULES OR REGULATIONS

0 .5 1 Mile
0 .5 1 Kilometer

SCALE 1 : 12,000

CONTOUR INTERVAL 40 FEET

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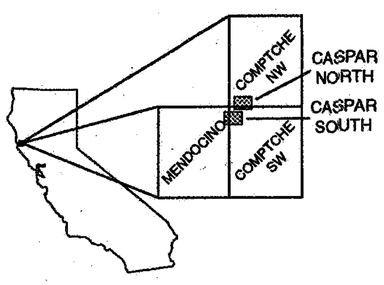


LOCATION MAP AND
7.5 QUADRANGLE INDEX TO STUDY AREA

GEOLOGY AND GEOMORPHIC FEATURES RELATED TO LANDSLIDING, NORTH FORK OF CASPAR CREEK, MENDOCINO COUNTY, CALIFORNIA

by
Thomas E. Spittler
California Department of Conservation
Division of Mines and Geology
1995

RELATIVE AGES OF LANDSLIDES

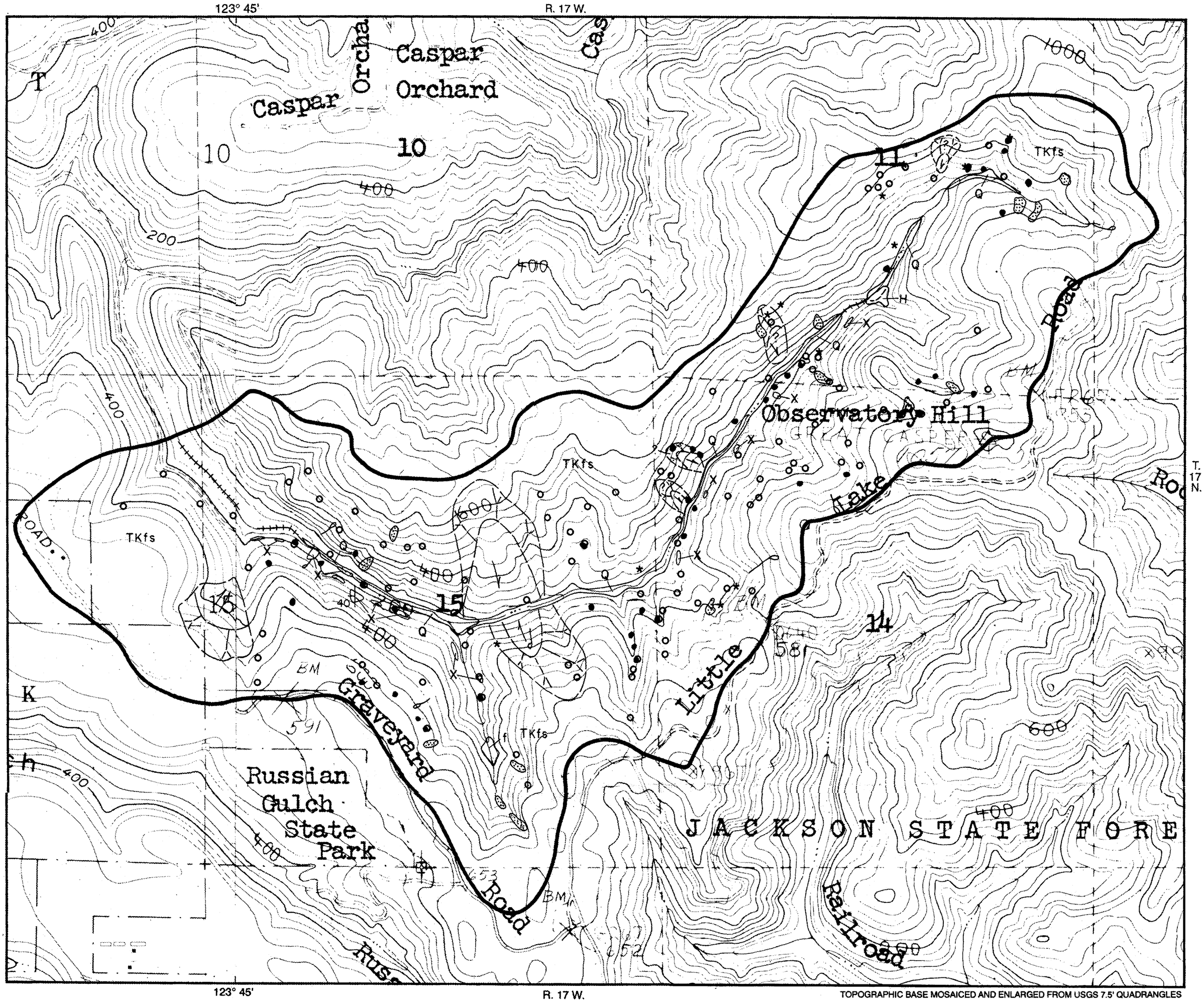
1. Fresh appearing landslide. Most recently active within the last 20 years.
2. Landslide that has affected the second-growth trees but has recovered to some degree. Estimated to be from 20 to 120 years old.
3. Landslide that has impacted toe old-growth trees or stumps but has not affected the second growth trees. Estimated to be from 100 to 1000 years old.
4. Landslide that has not affected the old-growth trees or stumps but has a well defined surficial morphology. Estimated to be from 500 to several thousands of years old.
5. Geomorphic feature with a morphology suggestive of landsliding but which is highly modified. Possibly related to differential erosion of inhomogeneous bedrock, perched ancient erosional surfaces, or ancient landsliding.

REFERENCES

California Department of Forestry and Fire Protection, 1992, Natural Color Aerial Photographs, Cal Aero Surveys Flight JDSF, Flight Line 2, Frames 20, 21 and 22, Flight Line 3, Frames 34, 35, and 36, Flight Line 4, Frames 46, 47, 48 and 49, Flight Line 5, Frames 57-60, and Flight Line 6, Frames 65 and 66, nominal scale 1:6,000.

Kilbourne, R. T., 1982, Geology and Geomorphic Features Related to Landsliding, Glenblair NW 7.5' Quadrangle (NW 1/4 Comptche 15'), Mendocino County, California: California Division of Mines and Geology Open-File Report OFR 82-25 SF, scale 1:24,000.

Kilbourne, R. T. and Mata-Sol, A.R., 1983, Geology and Geomorphic Features Related to Landsliding, Glenblair SW 7.5' Quadrangle (SW 1/4 Comptche 15'), Mendocino County, California: California Division of Mines and Geology Open-File Report OFR 83-20 SF, scale 1:24,000.



TOPOGRAPHIC BASE MOSAICED AND ENLARGED FROM USGS 7.5' QUADRANGLES

EXPLANATION

TRANSITIONAL/ROTATIONAL LANDSLIDE: Relatively cohesive slide mass with a failure plane that is deep-seated in comparison to that of a debris slide of similar areal extent; sense of motion along slide plane is arcuate or 'rotational' in a rotational slide; complex versions with rotational heads and translational movement or earthflows downslope are common; translational movement along a planar joint or bedding discontinuity may be referred to as a block glide; ⇒ indicates scarp; >— indicates direction of movement; dashed where dormant, queried where uncertain. All of the large, dormant slides in the map area were interpreted from aerial photography.

DEBRIS SLIDE: Unconsolidated rock, colluvium, and soil that has moved slowly to rapidly downslope along a shallow translational failure plane; forms steep, unvegetated scars in the head region and irregular hummocky deposits (when present) in the toe region; debris slide features revegetate and lose distinction over time, resulting in the map representing the location of features observed at the time aerial photography was flown (1975).

DEBRIS FLOW/TORRENT TRACK: Long stretches of bare ground scoured and eroded by the extremely rapid movement of water-laden debris; commonly triggered by debris sliding in the upper part of the hillslope during high intensity storms; scoured debris may be deposited downslope as a tangled mass of organic material in a matrix of rock and soil; debris may be reactivated or washed away during subsequent events; all scars indicate relatively recent activity due to the presence of their unvegetated tracks.

* **LANDSLIDE:** Too small to delineate at this scale; slides observed during field mapping which both pre-date and post-date logging conducted in the early 1970s.

● **LANDSLIDE:** Too small to delineate at this scale; slides mapped by Spittler (1995) from 1975 aerial photography; represent erosional features resulting from the tractor yarding conducted in the early 1970s.

O **LANDSLIDE:** Too small to delineate at this scale; slides from California Department of Forestry and Fire Protection (1974) landslide survey.

INNER GORGE: Geomorphic feature consisting of steepened slopes over 65 percent, and occurring below the first break in slope.

LEGEND

Q **ALLUVIUM (Quaternary):** Poorly consolidated flat-lying deposits of silt, sand, and gravel both adjacent to the elevated above active stream channels.

f **ALLUVIAL FAN DEPOSITS:** Inclined deposits of poorly sorted sand, silt, and gravels. Derived from up-slope debris flows.

H **HISTORIC ALLUVIUM:** Poorly consolidated flat-lying deposits of silt, sand, and gravel deposited during historic time.

X **BEDROCK OUTCROPS:** Exposures of relatively unfractured massive Franciscan Complex sandstone.

TKfs **COASTAL BELT FRANCISCAN COMPLEX (Tertiary-Cretacious):** Well consolidated sand-stone interbedded with smaller amounts of siltstone, mudstone, and minor conglomerate; pervasively sheared; commonly highly weathered.

40 **STRIKE AND DIP**

LITHOLOGIC CONTACT

WATERSHED BOUNDARY: Line depicts location of drainage divide.

0 .5 1 Mile
0 .5 1 Kilometer

SCALE 1 : 12,000

CONTOUR INTERVAL 40 FEET

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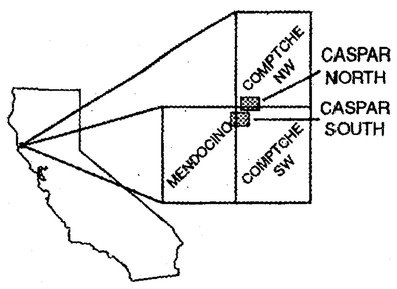

LOCATION MAP AND
7.5' QUADRANGLE INDEX TO STUDY AREA

GEOLOGIC AND GEOMORPHIC FEATURES RELATED TO LANDSLIDING, SOUTH FORK OF CASPAR CREEK, MENDOCINO COUNTY, CALIFORNIA

Compiled by
Mary A. McKittrick
California Department of Conservation
Division of Mines and Geology
1995

REFERENCES

Chickering, H.G., Jr., 1975, Consulting Photogrammetrist, Natural color aerial photography, Jackson State Forest, Flight date: 6-6-75, Flight line 10A, Frames 17 to 19; Flight line 11A, Frames 21 to 23, nominal scale 1:15,840.

California Department of Forestry and Fire Protection, 1974, Landslide Survey of the South Fork of Caspar Creek, Mendocino County, California; additional landslides added by the U.S. Department of Agriculture, Forest Service, 1994; (unpublished data) scale 1:4,000.

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Spittler, T.E., 1995, Aerial Photographic Interpretation of Landslides Triggered by Logging Conducted before the Implementation of the Forest Practice Rules: California Department of Conservation, Division of Mines and Geology, unpublished mapping, scale 1:12,000.

DISCUSSION

Mapping is based on aerial photograph interpretation, compilation of unpublished data (CDF, 1974), and limited field reconnaissance. The south fork of Caspar Creek watershed was logged using tractor yarding methods in 1971, 1972, and 1973. As a result of this style of logging, numerous skid trails as well as dense vegetation obscure subtle geomorphic features on the hillslopes causing landslide mapping to be difficult. The exception is where either large slides that have a distinctive morphology expression can be detected from aerial photographs, or where small slides which can be observed beneath dense vegetation occur. Most of the small landslides (*, ●, O) observed in the field are associated with disturbed land resulting from timber harvesting; however some small slides pre-date tractor logging as evidenced by the age estimates of tree growth within the slide features.

DATA ON THIS MAP SHOULD NOT BE USED AS A SUBSITUTE FOR SITE-SPECIFIC STUDIES OR AS A BASIS FOR RULES OR REGULATIONS