UNITED STATES DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

GEOLOGIC MAP OF THE WELLINGTON QUADRANGLE, NEVADA

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DESCRIPTION OF MAP UNITS

Qf_3 YOUNG ALLUVIAL FAN DEPOSITS--Poorly sorted deposits of boulders, cobbles, gravel, sand, and silt. Clast size generally decreases and sorting generally improves downfan toward distal margins. Includes some fine-grained basin-fill deposits where distal fan limits are gradational and poorly defined. Fan surfaces are undissected to slightly dissected with few, if any, well-defined drainage channels. Constructional surfaces are generally unweathered with very weak, if any, soil development. Drainage is distributary, radiating from the fan apex. The most extensively exposed alluvial fan unit in the quadrangle. A major component of all pediments flanking Smith Valley

Qf_{3-2} YOUNG AND INTERMEDIATE ALLUVIAL FAN DEPOSITS, UNDIFFERENTIATED--Lithologically and texturally similar to young alluvial fan deposits. Morphologically intermediate and gradational between young and intermediate alluvial fan deposits. Includes areas where young and intermediate age fan surfaces are too complexly interrelated to be mapped separately or where age relations are uncertain

Qfp FLOOD-PLAIN ALLUVIUM--Moderately to poorly sorted sandy gravel, gravelly sand, sand, and sandy silt. Channel and overbank deposits along low-gradient streams. Limited to flood plain of West Walker River

Qes EOLIAN SAND--Well to moderately well sorted sand and silt. Extensively veneers surficial deposits and bedrock in the eastern half of the quadrangle, leeward of the lacustrine plain of central Smith Valley. Symbols for units veneered by eolian sand sheets are shown in parentheses

Qsd SAND DUNE DEPOSITS--Well-sorted medium to fine sand. Forms barchanoid ridge dunes and longitudinal dunes, 1 to 15 m high. At least partly stabilized by sparse to moderately dense stands of sagebrush and bitterbush. Occurs as barchanoid ridge and longitudianl dunes veneering the lacustrine plain and piedmont east and northeast of Artesia Lake. Sand dune orientations and dune field distribution indicate dominant southwest to westsouthwest wind directions in this region. Symbols for units covered by sand dune deposits are shown in parentheses

Qls LANDSLIDE DEPOSITS--Chaotic masses of unsorted angular boulder- to clay-size debris. Includes some talus and coluvium where these materials overlap or are intermixed with landslide debris. Typically forms hummocky lobate masses in moderately to steeply sloping upland terrain

Qpa PLAYA DEPOSITS--Brownish- to grayish-white clay, silt, and fine sand with associated evaporite salt. Interbedded lenses of sand and gravel near playa margins. Deposited in ephemeral lakes and ponds

Qf_2 INTERMEDIATE ALLUVIAL FAN DEPOSITS--Similar lithologically and sedimentologically to young alluvial fan deposits. Contacts between intermediate and young alluvial fan deposits are commonly gradational and poorly defined. Intermediate alluvial fan surfaces are slightly to moderately dissected with numerous well-defined drainage channels that head on fan surfaces. Relief due to dissection is generally less than 5 m. Constructional surfaces are slightly to moderately weathered with weak to moderate soil profile development and distinct desert pavement

Qf_{2-1} INTERMEDIATE AND OLD ALLUVIAL FAN DEPOSITS, UNDIFFERENTIATED--Lithologically and texturally similar to young alluvial fan deposits. Morphologically intermediate and gradational between intermediate and old alluvial fan deposits. Also mapped in areas where intermediate and old alluvial fan deposits are complexly interrelated and difficult to map separately or where age relations are uncertain. Underlies extensive areas of the piedmont along the west flank of the Singatse Range, but along the tectonically active east flank of the Pine Nut Mountains is only exposed where protected from burial in up-faulted segments

Qp_{2-1} YOUNGER AND OLDER PENDIMENT DEPOSITS, UNDIFFERENTIATED--Lithologically, texturally, and morphologically similar to intermediate and old alluvial fan deposits, except that the pediment deposits occur as veneers on erosion surfaces cut into bedrock and older alluvium. Probably includes some intermediate and old alluvial fan deposits in areas of slight dissection. A major component of all pediment areas in the quadrangle. May occur in any area of the piedmont from mountain front to alluvial flat. Occurs extensively along the west flank of the Singatse Range. Not present along tectonically active mountain fronts

Qly YOUNGER PLUVIAL LAKE DEPOSITS--Littoral and lake bottom deposits of Artesia Lake. Also includes younger pluvial lake deposits that occur below the high shareline of Pleistocene Lake Wellington shoreline (approximately 1,465 m (4,805 ft) elevation). This high shoreline is defined along the north shore of the lake by a series of narrow wave-cut bedrock benches, truncated intermediate and old alluvial fans, and a prominent beach ridge in the exteme northeast corner of the quadrangle. Elsewhere, however, indicators of the former high shoreline are obscure and poorly preserved. The lacustrine deposits consist of distinctly bedded fine sand, silt and clay with interbedded layers and channels of alluvial sand and gravel

Qlb BEACH RIDGE DEPOSITS--Littoral deposits associated with shorelines of Pleistocene Lake Wellington. Limited to the prominent 5 to 8 m high and 2 to 3 km long beach ridges north and northeast of Arteria Lake. These depositss are primarily moderately well sorted medium to coarse sand and fine gravel

Qf_1 OLD ALLUVIAL FAN DEPOSITS--Lithologically and texturally similar to intermediate and young alluvial fan deposits. Fan surfaces are deeply dissected by well-developed subparallel drainage that heads on the fan surface. Relief due to dissection is commonly 10 to 30 m. Commonly separated from younger depositional surfaces by abrupt erosional scarps. Remnant constructional fan surfaces are strongly weathered with moderately well to very well developed soil and well-developed desert pavement

Qp_1 OLDER PEDIMENT DEPOSITS--Lithologically, texturally, and morphologically similar to older alluvial fan deposits except that older pediment deposits occur as veneers on pedimented bedrock and Tertiary and (or) Quaternary alluvium. Probably includes some fan deposits in areas of slight to moderate dissection. Older Pleistocene pediment deposits are difficult to distinguish from old alluvial fan deposits in areas of pedimented alluvium. Underlies extensive areas along the west flank of the Singatse Range but does not occur along the more tectonically active east flank of the Pine Nut Mountains

Qlo OLDER PLUVIAL LAKE DEPOSITS--Distinctly bedded, lacustrine sand, silt and silty clay with occassional interbedded layers and channels of coarse sand and fine gravel. These sediments underlie a broad lacustrine plain ranging from 1,460 m (4,800 ft) to approximately 1,510 m (4,960 ft) elevation across central Smith Valley. Sand sheets and younger pluvial lake deposits veneer large areas of this plain; and exposures of older pluvial lake deposits are restricted to deflation hollows southeast of Artesia Lake and to bluffs, gullies and small canyons along the flood-plain of the West Walker River, entrenched 5 to 40 m below the plain's surface

QTg OLD ALLUVIAL GRAVEL AND SAND--Boulder to pebble gravel, sandy gravel, gravelly sand and sand. Mostly granitic clasts. Loosely to moderately indurated matrix, predominantly sand and silt. Locally cemented by caliche. Occurs locally where the West Walker River cuts between the Pine Nut Mountains and the Wellington Hills and in uplifted blocks near or immediately adjacent to the young fault zone bounding the east front of the Pine Nut Mountains

Tg GRAVEL--Sand to boulders as large as 1 m of granitic rocks and of andesitic rocks in lesser amounts

Twc SEDIMENTARY DEPOSITS OF WILSON CANYON--Unconsolidated or poorly consolidated sand and gravel

Tsg SAND AND GRAVEL

Ts_2 SEDIMENTARY ROCKS--Mudstone, sandstone, and conglomerate. Conglomerate with clasts of andesitic, granitic, and metavolcanic rocks as large as 20 cm. Mudstone is commonly tuffaceous and locally carbonaceous

Tabx ANDESITE BRECCIA

Trd RHYODACITE--Plugs and shallow intrusive rocks. Potassium-argon age of 7.8±0.3 m.y. (McKee, E. H., written communication, 1981) in Hoye Canyon 1 mile south of Wellington quadrangle in northwesternmost part of section 15, T. 10 N., R. 22 E

Ts_1 SEDIMENTARY ROCK--Sandstone and conglomerate, poorly indurated. Clasts in conglomerate are andesitic rock and, in lesser amounts, metavolcanic rock. Maximum clast size in most places less than 30 cm, although conglomerate near base has clasts of andesitic rock as large as 80 cm

Ts SEDIMENTARY ROCK--Shale, siltstone, and fine-grained sandstone. Commonly tuffaceous. Consists of lake sediments of Hudson and Oriel (1979) and small outcrop in northeasternmost part of quadrangle

Ta ANDESITE FLOWS OR FLOWS OF INTERMIEDIATE COMPOSITION

Tsa SUGARLOAF ANDESITE OF NOBLE (1962)--Generally coarse-grained rock composed of andesine, hypersthene, augite, hornblende and minor biotite and apatite in a hyalopilitic groundmass of andesine, pryoxene, silicic glass, and opaque minerals. Includes flows and volcanic breccia (Noble, 1962)

Tmi MINNEHAHA ANDESITE OF NOBLE (1962)--Clinopyroxene andesite; lesser amounts of hornblende andesite and dacite. Andesitic sandstone and conglomerate present locally. Commonly propylitically altered (Noble, 1962)

Tal ANDESITE OF LINCOLN FLAT--Consists of 1) andesite with phenocrysts of hornblende and plagioclase, 2) andesite with only hornblende phenocrysts, and 3) dacite with phenocrysts of quartz as well as plagioclase, biotite, and hornblende. Flows, volcaniclastic breccia (lahar), and associated tuff-breccia and sedimentary rocks. Potassium-argon ages from 14 to 19 m.y. (Proffett and Proffett, 1976)

Tai ANDESITE INTRUSIVE ROCKS OF PROFFETT AND PROFFETT (1976)--In Singatse Range. Related to andesite of Lincoln Flat

Tbdp BIOTITE HORNBLENDE SANIDINE DACITE PORPHYRY--Plugs of dacite porphyry containing about 60 percent phenocrysts (Hudson and Oriel, 1979). In Buckskin Range

Tpd PORPHYRITIC HORNBLENDE DACITE DIKES--Ten to twenty-five percent phenocrysts as much as 6 mm in size of oligoclase, hornblende, and rarely biotite in aphanitic groundmass (Hudson and Oriel, 1979). In Buckskin Range

Tlp BIOTITE QUARTZ LATITE PORPHYRY DIKES--Thirty to forty percent phenocrysts in a very fine grained aphanitic groundmass of plagioclase, orthoclase, and quartz. Phenocrysts of biotite, quartz, calcic, oligoclase, and hornblende (Hudson and Oriel, 1979). In Buckskin Range

Tbp BIOTITE HORNBLENDE PORPHYRY DIKES--Twenty-five to thirty percent phenocrysts of biotite, hornblende, plagioclase, and quartz in an extremely fine grained aphanitic groundmass (Hudson and Oriel, 1979). Related rocks have a K-Ar age of about 16 m.y. (Hudson and Oriel, 1979). In Buckskin Range

Tlb BLUESTONE MINE TUFF--White to pale-colored crystal-poor unwelded tuff, tuff breccia, and sediments interbedded with crystal-poor pale-brown to reddish poorly welded tuffs (Proffett and Proffett, 1976)

Tsi SINGATSE TUFF--Brown to red-brown strongly to moderately welded crystal-rich ash-flow tuff with plagioclase, quartz, sanidine, biotite, and hornblende phenocrysts and sparse pumice fragments. Abundant foreign rock fragments near base. Potassium-argon ages of 26-25 m.y. (Proffett and Proffett, 1976, Bingler, 1978)

Tm MICKEY PASS TUFF--Consists of two cooling units, the lower one named the Guild Mine Member and the upper one the Weed Heights Member, separated by rhyolitic sediments and poorly welded tuff. The Guild Mine Member consists of brown strongly welded crystal-rich ash-flow tuff. Plagioclase, biotite, and pyroxene phenocrysts become less abundant upward; upper part contains phenocrysts of sanidine, quartz, plagioclase, and minor biotite and is less welded than lower part. Weed Heights Member consists of buff, lavender, reddish-brown moderately welded, moderately crystal rich ash-flow tuff with plagioclase, sanidine, quartz, and biotite phenocrysts and abundant white pumice fragments. Potassium-argon ages of 28 to 26 m.y. (Proffett and Proffett, 1976, Bingler 1978)

Klp LATITE PORPHYRY--Porphyry dikes containing 25-35 percent phenocrysts in an aphanitic groundmass of plagioclase, orthoclase, and quartz. Contains 5 to 10 percent subhedral orthoclase 5 to 10 mm in size, 2 to 3 percent hornblende, 3 to 4 percent biotite, and 10 to 15 percent plagioclase (and accessory quartz, sphene, and apatite) as phenocrysts as large as 2 mm across. In Buckskin Range (Hudson and Oriel, 1979)

Ka ALASKITE OF NOBLE (1962)--White, fine-grained, euhedral to subhedral grains of microcline-perthite and sodic albite lying in an irregular, seriate groundmass of potassium feldspar, albite and quartz. Granophyric in dikes and marginal apotheses (Noble, 1962)

Kr RICKY GRANITE OF NOBLE (1962)--Light buff, coarse grained, leucogranite. Equidimentional quartz grains as large as 7-8 mm are very distinctive. Of the total feldspar in the rock, 25 to 35 is albite, 60-70 percent is perthite, and 5 percent is interstitial albite. Except for relatively narrow border facies, the unit is remarkably homogeneous throughout. No discernable oriented fabric (Noble, 1962)

Ksc SOUTH CAMP QUARTZ MONZONITE OF NOBLE (1962)--Similar to Longfellow quartz monzonite of Noble (1962). Medium grained, porphyritic with potassium feldspar phenocrysts. Modal analysis on 6 samples gives following average composition: quartz, 21 percent; plagioclase, 41 percent; potassium feldspar, 27 percent; biotite, 5 percent; hornblende, 4 percent; accessory minerals, 2 percent (Noble, 1962)

Kgqm GRANOPHYRIC QUARTZ MONZONITE OF NOBLE (1962)--A complex of granophyric and micrographic rocks. Texturally and compositionally variable. Typical rock types are 1) calcic oligoclase in a very fine grained micrographic groundmass of quartz and potassium feldspar, 2) granophyric intergrowths of quartz and potassium feldspar in interstices between small andesine and hornblende phenocrysts, and 3) granophyric intergrowths of quartz and alkali feldspar surrounding a few plagioclase phenocrysts (Noble, 1962)

Kl LONGFELLOW QUARTZ MONZONITE OF NOBLE (1962)--Medium-grained, porphyritic with potassium feldspar phenocrysts. Modal analysis on 8 samples gives following average composition: quartz, 21 percent; plagioclase, 42 percent; potassium feldspar, 26 percent; biotite, 6 percent; hornblende, 4 percent; accessory minerals, 1 percent (Noble, 1962)

Kb BULLIONVILLE GRANODIORITE OF NOBLE (1962)--Ranges from diorite to granodiorite, medium to coarse grained, composed of euhedral or subhedral tablets of plagioclase zoned from calcic andesine to oligoclase, ragged grains of brown biotite that are partly altered to chlorite, and medium to pale green hornblende. Interstitial quartz and potassium-feldspar, and accessory opaque minerals, sphene, and apatite. Modal analysis on 7 samples gives following average composition: quartz, 9 percent; plagioclase, 58 percent; potassium feldspar, 7 percent; biotite, 11 percent, hornblende, 14 percent; accessory minerals, 1 percent (Noble, 1962). Potassium-argon date of 106 m.y. on hornblende and 81 m.y. on biotite (Noble and others, 1973)

KJd DIORITE AND GABBRO OF NOBLE (1962)--Compositionally and texturally variable. Includes diabasic-textured diorite and gabbro with poikilitic hornblende (after pyroxene) grains as much as 2 cm in diameter, as well as coarse-grained appinitic diorite with hornblende needles from 0.5 to 2 cm in length. Very coarse grained pods and veins of appinitic-textured diorite pegmatite developed locally. Hypidiomorphic-granular quartz diorite and granodiorite, and porphyritic quartz monzonite also occur. Completely recrystallized lepidoblastic and nematoblastic hornblende biotite amphibolite are common. Migmatite occurs locally

KJws GRANITIC ROCKS OF WEDERTZ SPRING--Granite to granodiorite, medium grained, locally small potassium feldspar phenocrysts, one modal count shows 16 percent quartz, 43 percent plagioclase, 34 percent potassium feldspar, and 7 percent mafic minerals (John, 1983)

KJf FELSOPHYRE INTRUSIVE ROCKS--Red Canyon area, Pine Nut Range (mapped by Hudson, D. E., written communication, 1982)

Jy GRANITIC ROCKS OF YERINGTON--(Knopf, 1918, Heatwole, 1978, Proffett, 1979, John, 1983, Dilles and others, 1983). Consists of four phases intruded in the following order: 1) equigranular granodiorite (granodiorite to quartz diorite in classification of Streckeisen, 1973). Included in Black Mountain pluton of Bingler (1978) which has been dated by K-Ar methods as 146 and 148 m.y. on hornblende (Bingler, 1972). Zircon uranium-lead age of 169 m.y. (Dilles and others, 1983). 2) equigranular quartz monzonoite (granodiorite in classification of Streckeisen, 1973), biotite and hornblende-bearing, medium- to coarse-grained. K-Ar age of 161 m.y. (Heatwole, 1978, p. 60). Included in Black Mountain pluton of Bingler (1978). 3) porphyritic quartz monzonite (granodiorite in classification of Streckeisen, 1973), potassium feldspar phenocrysts, medium grained. 4) quartz monzonite porphyry dikes (granodiorite in classification of Streckeisen, 1973), biotite-and hornblende-bearing. K-Ar age of 141 m.y. (Heatwole, 1978). Zircon uranium-lead date of 168 m.y. (Dilles and others, 1983)

Jms QUARTZ MONZONITE OF MOUNT SIEGEL--(Granite to quartz diorite in classification of Streckeisen, 1973). Fine to medium-grained, hornblende-biotite bearing, color index 15 to 20, local strong albitic alteration. Lithologically similar, and perhaps related, to quartz monzonite of Gray Hills. K-Ar ages of 158 m.y. on hornblende, and 103 m.y. on biotite (Bingler and others, 1980, p. 15). Stippled pattern indicates approximate area containing abundant felsitic, and locally intermediate to mafic, finely crystalline dikes and irregular intrusive masses within quartz monzonite of Mount Siegel

PINE NUT MOUNTAINS

VETA GRANDE FORMATION OF NOBLE (1962)--Divided into four members:

Jv — Volcanic conglomerate and breccia--Massively bedded. Minor interbedded medium- to coarse-grained poorly sorted feldspathic wacke

Jva — Andesite member--Medium- to fine-grained somewhat potassium-rich pyroxene andesite

Jvs — Volcanic sandstone member--Medium- to coarse-grained feldspar-rich volcanic sandstone with intercalated volcanic conglomerate

Jvt — Lapilli tuff member--Rhyolite to rhyodacite vitro-crystal lapilli tuff

Jp — PREACHERS FORMATION OF NOBLE (1962)--Well-sorted fine- to coarse-grained lithic arenite and wacke; generally flaggy with steep crossbedding present locally

Jm — METAMORPHIC ROCKS--Metaconglomerate with volcanic(?) clasts. Includes possible welded tuff, and others volcanic rocks. May be correlative to the Veta Grande Formation of Noble (1962)

JTRgs — GARDNERVILLE FORMATION OF NOBLE (1962)--Thin-bedded carbonaceous and pyritic siltstones with intercalated volcanic tuff and flow material (10-15 percent) and carbonate rock (5-10 percent)

OREANA PEAK FORMATION OF NOBLE (1962)--Divided into two members:

TRoc — Carbonate member--Massive- to thin-bedded white, bluish-gray to black marine limestone, dolomitic limestone, and dolomite

TRolv — Lower volcanic member--Acid to intermediate marine and continental tuff breccia, lapilli tuff, tuff, greenstone, welded tuff, and tuffaceous sandstone with interbedded marine carbonate. Referred to as lower volcanic member to maintain consistent nomenclature with adjacent Mt. Siegel quadrangle (Stewart and Noble, 1979) where both a lower and upper volcanic member occur

BUCKSKIN RANGE

KJc — VOLCANIC ROCKS OF CHURCHILL CANYON SEQUENCE OF HUDSON AND ORIEL (1979)--Dacitic to latitic metavolcanic flows and crystal-rich tuffs

Ja — ARTESIA SEQUENCE OF HUDSON AND ORIEL (1979)--Andesitic to dacitic metavolcanic flows; minor amounts of white to buff felsic breccia and volcanic sandstone and conglomerate

TR v — METAVOLCANIC ROCKS OF HUDSON AND ORIEL (1979)--Fine-grained porphyritic andesite; in some flows, glomeroporphyritic plagioclase laths form clusters of 3 to 5 crystals resembling chicken tracks; unit strongly resembles metavolcanic rocks (unit T u) in the Singatse Range

SINGATSE RANGE

Jq — QUARTZITE--Quartz arenite, probably correlative to Preachers Formation (unit Jp) of Noble (1962) in Pine Nut Range

Jg — GYPSUM--White and massive

JTR la — LIMESTONE AND ARGILLITE--Black silty limestone, limy argillite, sparse flow-banded rhyolite; 50- to 100-m-thick limestone (so-called "Ludwig Limestone") at top

TR l — LIMESTONE--Medium-gray medium- to thick-bedded limestone; thinly laminated in top quarter

TR la — LIMESTONE, ARGILLITE, AND FELSITE--Medium-gray limestone, argillitic limestone, limy argillite, siltstone, sandstone. Minor felsite

TR v — METAVOLCANIC ROCKS--Fine rocks porphyritic andesite, in some flows, glomeroporphyritic plagioclase laths form clusters of crystals that resemble chicken tracks. Minor rhyolite flows, breccias, and sedimentary rocks. Dated by Rb-Sr methods as 215 m.y. old (Einaudi, 1977) in Yerington quadrangle.

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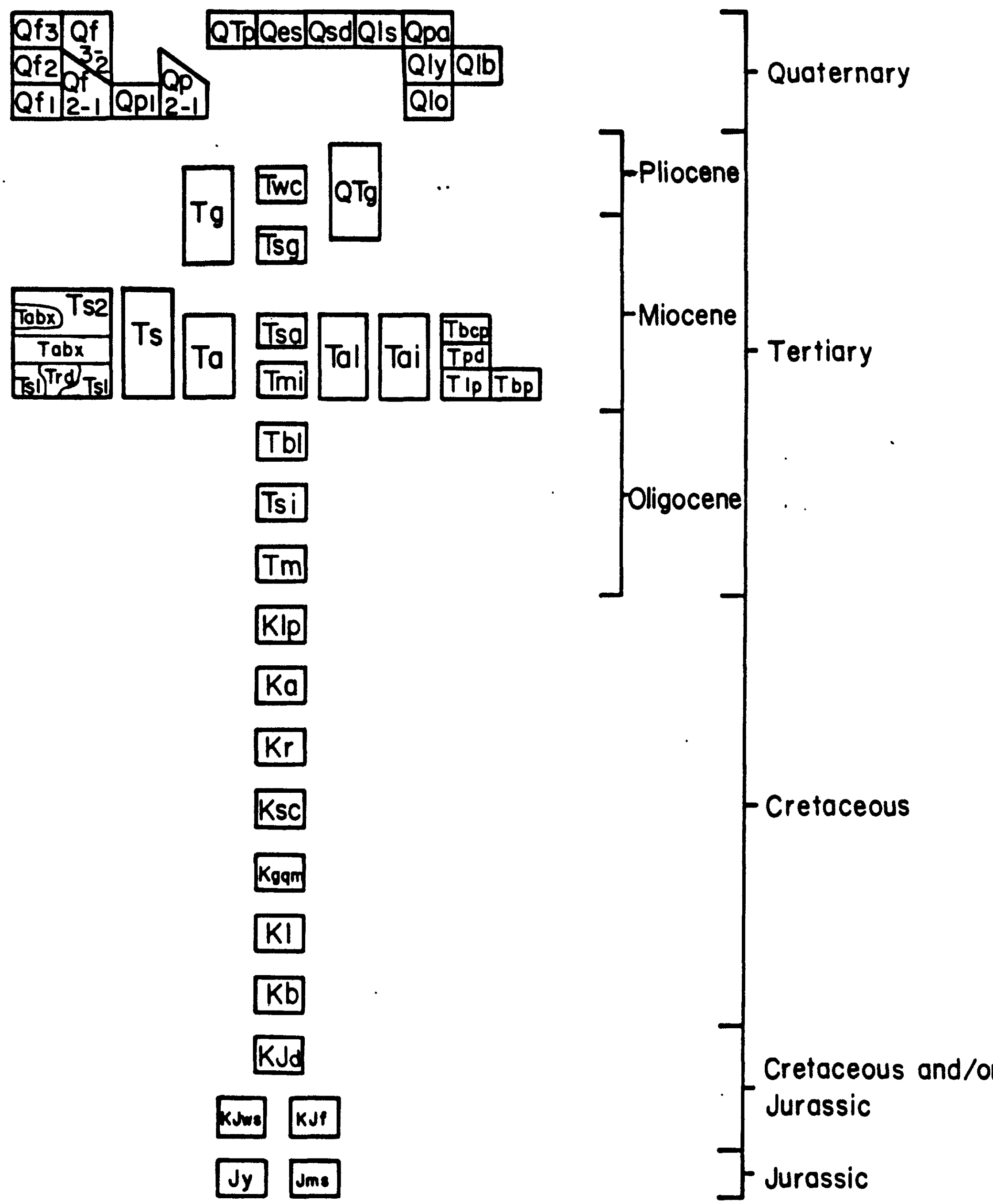
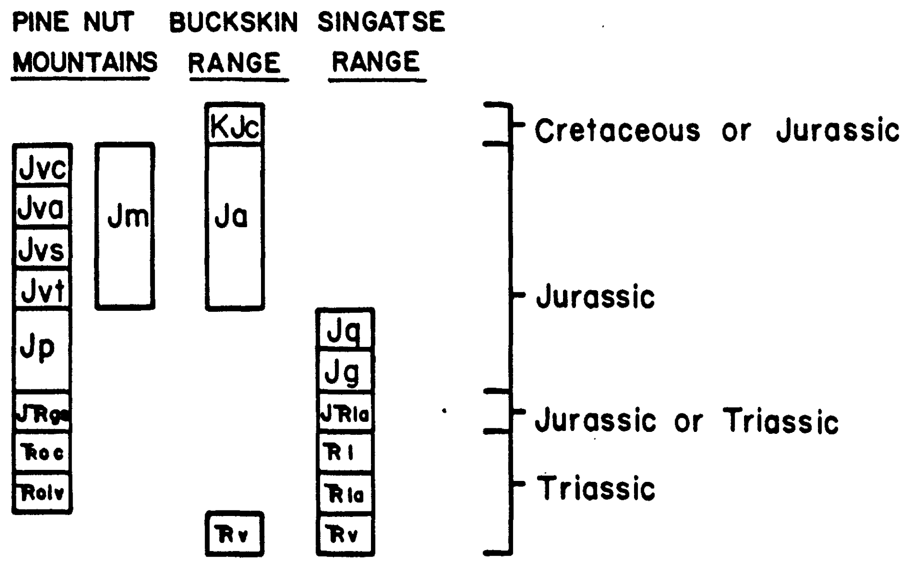
CORRELATION OF MAP UNITS





——?– – Contact. Dashed where inferred. Queried where approximately located or uncertain.

Fault. Dashed where inferred or approximately located, dotted where concealed. Bar and ball on down thrust side.

Anticline.

Shorelines.

Strike and dip of beds or compaction foliation in ash flow tuffs.

25 Inclined.

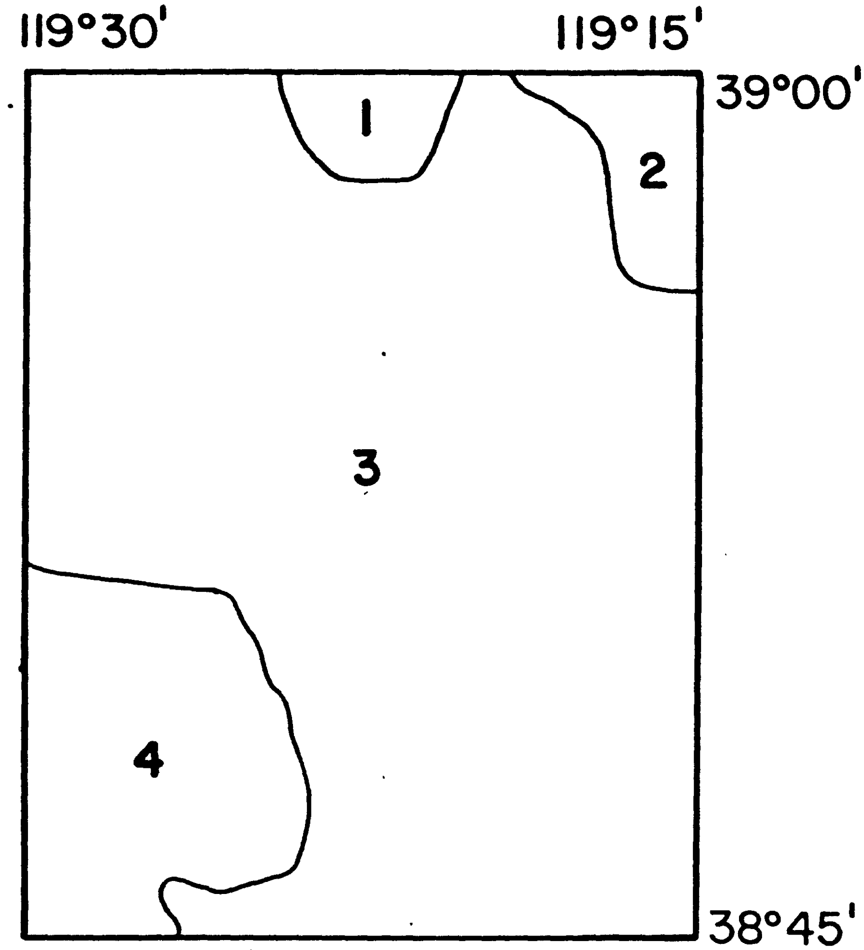
Vertical.

70 Overturned.

Strike and dip of foliation in granitic rocks.

20 Inclined.

Vertical.



SOURCES OF MAPPING

1. Hudson and Oriel, 1979
2. Proffett and Proffett, 1976, Knopt, 1918
3. J.H. Stewart assissted by Jerry Infeld, D.C. Johannesen, 1971-1981. Quaternary geology by J.C. Dohrenwend, 1980-81
4. Noble, 1962 with additions by D.H. Hudson written communication, 1979