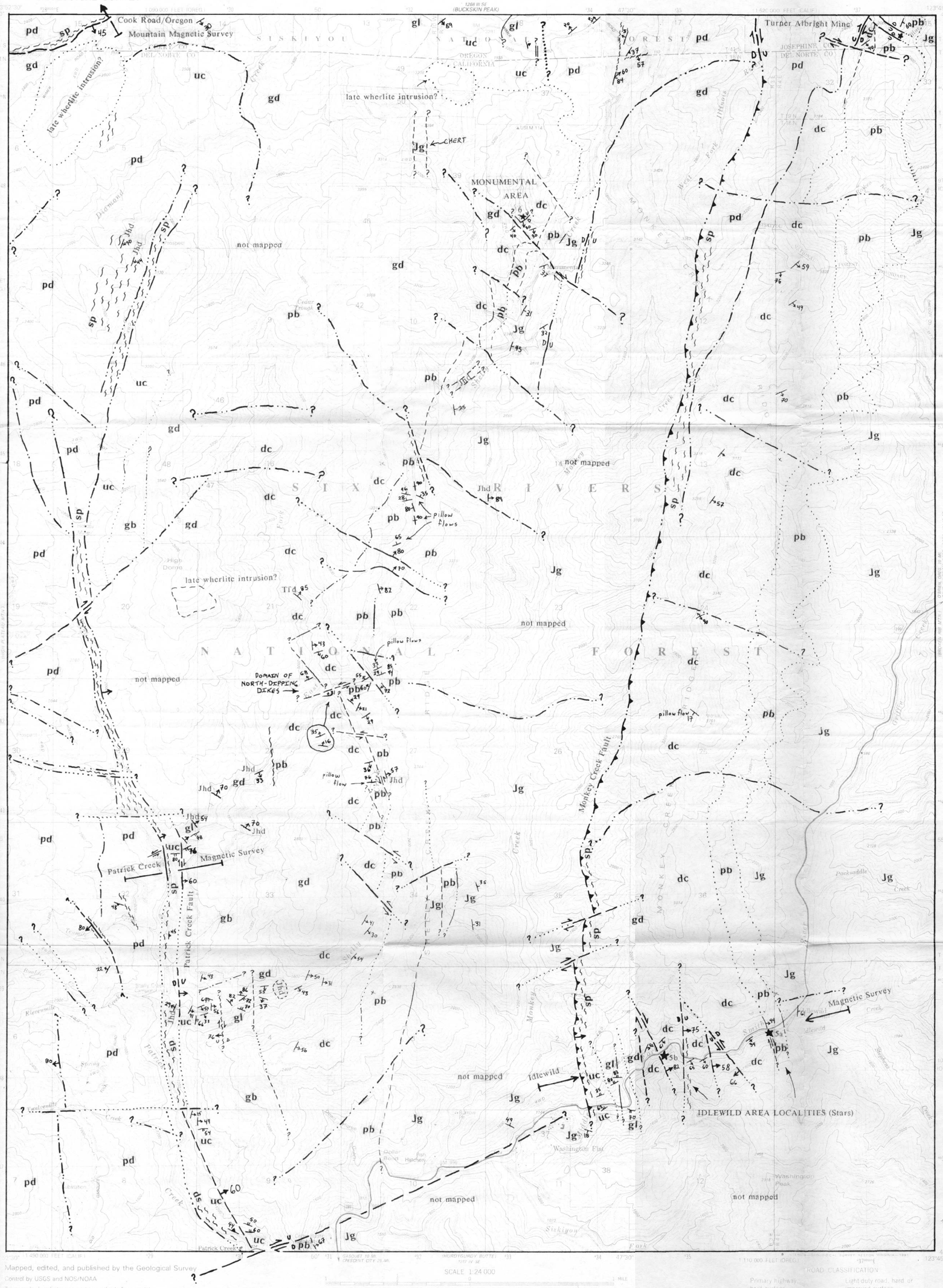
Bedrock Geologic Map of the Shelly Creek Quadrangle, CA and OR

APPENDIX I

PLATE 1 of 1

by Robert J. Alexander



KEY FOR BEDROCK GEOLOGIC MAP

Lithologic Descriptions

Tfd — FELDSPAR-BEARING DIKES. Light to dark gray to light pink, felsic (dacite) to intermediate (andesite), porphyritic dikes. Phenocrysts include alkali feldspar + hornblende ± biotite ± quartz. Dikes cross-cut all other features and are undeformed with only incipient low temperature alteration. Probable Tertiary age based on similarity to igneous rocks mapped and dated by Dick (1976, 1977), Ramp (1977) and Reich (1990) in southwest Oregon. These dikes occur most commonly in northern half of the map area.

Jhd — HORNBLENDE-BEARING DIKES. Dark green to dark gray, intermediate, porphyritic dikes with abundant groundmass hornblende, plagioclase, and sulfides, and sparse to abundant hornblende phenocrysts. Acicular hornblende phenocrysts commonly show pronounced alignment within dikes. Metamorphosed to low grade and locally deformed. Commonly occur in highly sheared serpentinite shear zones. Hornblende $^{40}Ar/^{39}Ar$ ages range from 155 to 150 Ma (Harper et al., in press).

155-150 Ma

Jg — GALICE FORMATION. Basal hemipelagic argillites, green to black cherts, calcareous nodules, Fe-Mn-rich argillites, and black slates grade upward into interbedded graywacke and shale (flysch) turbidites with rare pebble conglomerate (Harper, 1980, 1984; Harper and Pinto-Auso, 1984). Basal fine-grained rocks conformably overlie pillow lavas of the Josephine ophiolite and have yielded radiolarian fauna of early to middle Oxfordian age (Harper et al., in press). Occurence of *Buchia concentrica* in the flysch indicates a Late Oxfordian to Kimmeridgian age (Harper, 1980). These rocks have been metamorphosed to very low/low grade during the Nevadan Orogeny. Bedding is typically preserved and serves as a paleo-horizontal reference for the structural analyses.

Early Late Jurassic

pb — EXTRUSIVE SEQUENCE. Dark green to reddish (hematitic) pillow lava, and subordinate pillow breccia and massive flows, conformably overlain by hemipelagic chert of the Galice Formation. Locally interstratified with extrusive rocks are heterolithic talus(?) deposits which consist of angular to sub-rounded clasts of basalt and diabase clasts and are interpreted as talus deposits formed at the base of fault scarps. Also locally interstratified with extrusive rocks are hemipelagic rocks, tuffs (Harper, pers. comm.), and massive sulfide mounds (Kuhns and Baitis, 1987; Zierenberg et al., 1988). Subseafloor hydrothermal alteration is pervasive and locally overprinted by Nevadan regional metamorphism and deformation (Harper et al., 1988).

dc — SHEETED DIKE COMPLEX. Dark green to light green aphanitic to medium-grained, diabasic, mafic dikes. Chilled dike margins are commonly well-preserved. Dikes are predominantly sub-parallel but are locally cross-cut by younger dikes at a steeper dip. When dikes are restored to oceanic positions by rotating Galice sediments to horizontal, the orientation of dikes display a regionally consistent southward dip direction of ~30-50°. Subseafloor hydrothermal alteration is common and ranges in grade from amphibolite to prehnite-pumpellyite facies conditions (Harper et al., 1988; this study). Dike margins are commonly faulted and healed by epidote, prehnite, pumpellyite and/or quartz which indicate an oceanic origin.

gb — GABBRO AND$_{gl}$ RELATED ROCKS. **Gb**, undifferentiated medium-grained, hypidiomorphic granular gabbro, locally interlayered with ultramafic rocks, and commonly intruded by diabase dikes. **Gd**, high-level gabbro which is typically isotropic and cross-cut by numerous diabase dikes. **Gl**, layered gabbro distinguished by variations in modal mafic minerals and plagioclase, and display either a high-temperature deformation fabric or a cumulate texture. **Gu**, interlayered gabbroic and ultramafic rocks. Subseafloor hydrothermal alteration is highly variable, from incipient alteration to pervasive amphibolite facies overprints (Harper et al., 1988; Kimball, 1988; this study).

uc — LAYERED ULTRAMAFIC ROCKS. Medium- to coarse-grained, poikiolitic wherlite, clinopyroxenite, and dunite. Interstitial plagioclase is common. Serpentinization is common and occurs in a variety of textures, from static pseudomorphic replacements of olivine and orthopyroxene (i.e. meshwork fabrics) to extremely well-foliated mylonites. Kimball (1988) describes retrograde alteration ranging from ~granulite facies to greenschist facies conditions.

Upper Jurassic Josephine Ophiolite 162±1 Ma

pd — PERIDOTITE TECTONITE. Predominantly medium- to coarse-grained harzburgite tectonite with subordinate dunite, lehrzolite, and orthopyroxenite. Locally contains podiform chromite deposits associated with dunite, usually within the upper ~1 km of the upper mantle sequence (Norrell, 1990). Serpentinization is common, especially in and adjacent to fault zones. Dark green to black on fresh surface and yellow-brown or red-brown on weathered surface. Serpentinized peridotite weathers green, pale-green or white. Unusual serpentine mylonites of uncertain age commonly occur in the upper part of the peridotite (Norrell et al., 1989; Norrell and Harper, 1988; Norrell, 1990). Age of serpentinization ranges from oceanic (162 Ma) to contemporary (Kimball, 1988; Coulton, in prep.).

sp — SHEARED SERPENTINITE. Extremely well-foliated serpentinite which commonly contains porphyclasts of ultramafic rocks, gabbro, diabase, rodingite dikes, and hornblende dikes ranging in size from centimeters to ten's of meters. Foliations are typically sub-parallel to shear zone boundaries. These shear zones probably range in age from oceanic(?) (Norrell et al., 1989; Norrell, 1990; Coulton, in prep.) to Nevadan(?) (Harper, 1980; 1984; 1989), and perhaps younger. Serpentine fabrics are locally cross-cut by undeformed rodingite dikes (162 Ma), hornblende dikes (155-150 Ma), and feldspar dikes (Cretaceous/Tertiary?), suggesting a protracted history of serpentinization and deformation.

MAP SYMBOLS

Lithologic Contact: solid where exposed, dashed where approximate, and dotted where inferred.

Fault: solid where exposed, dashed where approximate, and dotted where inferred. Tick mark and number indicates dip direction and magnitude. Arrow indicates slip line azimuth and number indicates plunge. Sense of shear indicated by U (up) and D (down) or arrows.

Thrust Fault: solid where exposed, dashed where approximate, and dotted where inferred. Barbs are on upthrown block.

Bedding: strike and dip of bedding.

Cleavage: strike and dip of cleavage.

Shear Foliation: strike and dip of foliation in shear zones.

Dikes: strike and dip of ophiolite dike margins. Jhd = Jurassic hornblende-bearing dikes. KTfd = Cretaceous/Tertiary(?) feldspar-bearing dikes.

Igneous Layering: strike and dip of igneous layering related to accumulation and/or high temperature plastic deformation.

Air Photo Linement: sharp linements interpreted as a faults.

OTHER SOURCES FOR BEDROCK GEOLOGY ON MAP

1) Harper (1982, 1984)

2) Harper (unpublished mapping 1978 - 1990)

3) Vail (1977) [northern 1/3 of map]

Mapped, edited, and published by the Geological Survey

Control by USGS and NOS/NOAA

Topography by photogrammetric methods from aerial photographs taken 1975. Field checked 1977. Map edited 1982

Projection: California coordinate system, zone 1 (Lambert conformal conic)
10,000-foot grid ticks based on California coordinate system, zone 1 and Oregon coordinate system, south zone
1000-meter Universal Transverse Mercator grid, zone 10
1927 North American Datum
To place on the predicted North American Datum 1983 move the projection lines 21 meters north and 47 meters east as shown by dashed corner ticks
Certain land lines are omitted because of insufficient data
There may be private inholdings within the boundaries of the National or State reservations shown on this map

SCALE 1:24 000

CONTOUR INTERVAL 80 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

UTM GRID AND 1982 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U. S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225, OR RESTON, VIRGINIA 22092
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

ROAD CLASSIFICATION

Primary highway, hard surface — Light-duty road, hard or improved surface
Secondary highway, hard surface — Unimproved road
Interstate Route · U. S. Route · State Route

SHELLY CREEK RIDGE, CALIF.–OREG.

41123-H7-TF-024

1982

DMA 1267 IV NE—SERIES V895