



RECYCLED PAPER
MEETS UNITED STATES GOVERNMENT REQUIREMENTS
74830 - White
74840 - Canary
5" x 8" • 50 Sheets/Pad





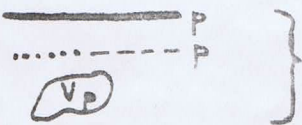
Howard Brooks

- to go with the copy
of the Buddenhagen
map

John B

SYMBOLS

GEOLOGICAL

- f ———— FAULTS: Determined; conjectural; concealed
-  FAULT occurring in axial area of fold;
- anticlinal or synclinal indicated by symbols.
-  ANTICLINE
-  SYNCLINE
-  Overturned bed; B indicating "base", used only
- when actually determined on basis geological evidence.
-  } p, lower case, appended to any structural or depositional
feature, indicates that it was determined photo-geologically
and not verified in field.

G

Fossil locality

G 103

Mesozoic fossil locality: Fossils reported on by:
R. W. IMLAY (JURASSIC); N. J. SILBERLING (TRIASSIC)
D. L. JONES (CRETACEOUS)

G B-4
B-20

Fossil locality reported on by J. A. BOSTWICK;
mostly PALEOZOIC; few TRIASSIC

↑

Fossil plant locality.

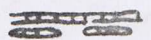

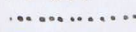


△ 117

△ 55

Localities reported to have significant fossils by
Merriam + Berthiaume (1943) G.S.A. BULL. vol. 54, pp. 148-154
GREEN: COYOTE BUTTE (FRAM.) Localities } Their numbers
PURPLE: COFFEE CREEK (MISS.) Localities }
Same colors applied to Bostwick's determinations.

18-R

Rock identification by R. G. BOWEN.

-  Limestone outcropping
-  Boulders; conglomerate
-  Sandstone
-  Siltstone
-  shale; chert

OTHER

⊙ DDU 8-138 Center of airphoto
used in mapping.

——— ROADS
(incomplete)

——— STREAMS
(incomplete)

PENCILS USED FOR COLORING

M = MONGOL

S = J. S. STAEDTLER

T = DIXON THINEX

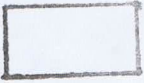


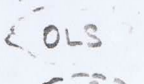

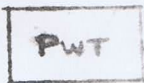







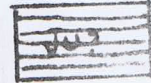

V = EAGLE "VERITHIN"

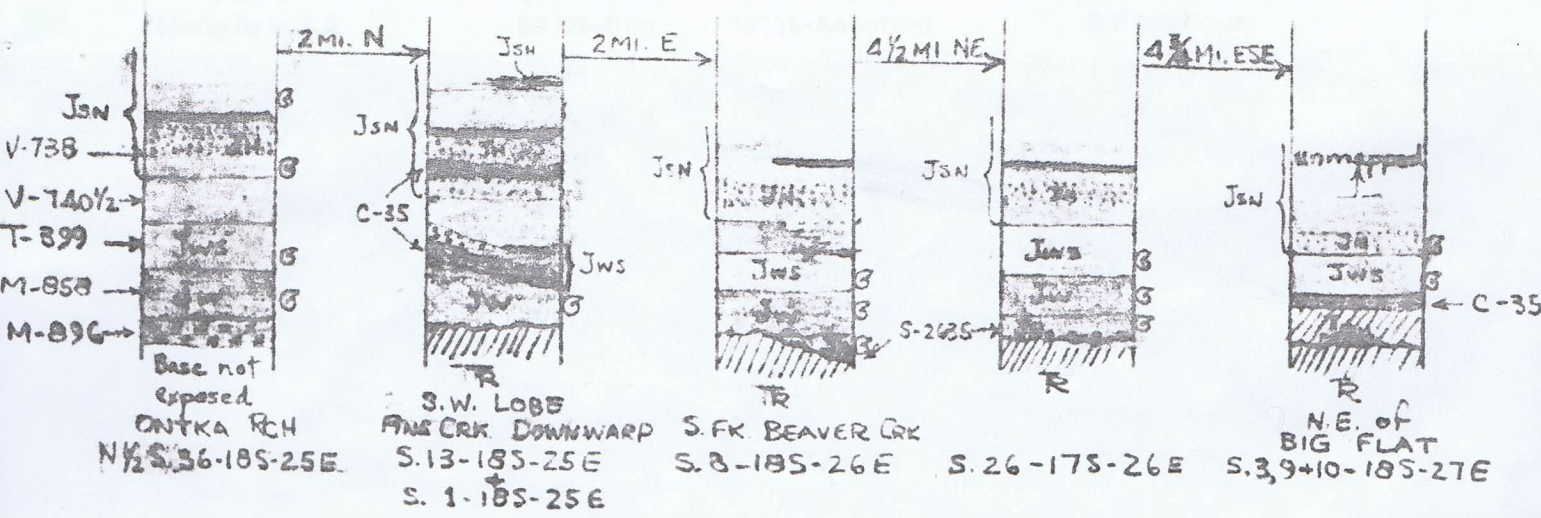
C = CASTELL "POLYCHROME"

EXPLANATION

FORMATION COLOR AND PATTERN SCHEME AND SYMBOLS

ENCIL
abbreviation
explained on
symbol sheet)

		Covered, deeply weathered and/or alluviated areas where no bedrock information is available and because of structural complexities interpretation is not justified.
M-817		Recent to Quaternary (?) valley alluvium. (Much more extensive than shown on map)
M-867		Landslide, slump, and extensive talus Quaternary to Recent. (Pink indicates slumped block lava or tuff)
M-2638		Old land surface (probably late Tertiary) with deep soil covering and mixed non-significant float.
		Scab-like ^{sedimentary} remnants, outliers, gorge fill, etc. now mostly removed by erosion; probably of various ages ranging from Jurassic to late Tertiary or Quaternary. Color, if any, indicates my interpretation.
M-946		Welded tuff, rhyolite, pumiceous tuff Believed to correlate with Rattlesnake + Danforth of nearby areas
V-745		Vesicular (Bav), dense (BAO), and columnar (BAC) basalts probably younger than Columbia River Basalts
V-755		Soft tuffs, tuffaceous sand, bentonitic clay, and conglomerate, mostly unconsolidated, composed predominantly of well rounded quartzite pebbles and boulders. <u>MASCALL</u> equivalent?
		Uncon.
M-813 (Heavy)		<u>BASALT</u> , columnar, dense, and, in isolated areas, amygdaloidal; <u>COLUMBIA RIVER BASALT</u> equivalent, except possibly the apparently older amygdaloidal type.
		Uncon.
M-848		Sandstone, conglomerate, and siltstone, interbedded; marine fossils. <u>BERNARD FORMATION</u> : Upper Cretaceous Unconformable on Triassic; apparently overlaps Jurassic beds as it is found in contact with them anywhere in map area.
		Uncon.
V-738		<u>UPPER JURASSIC</u> , (?), post <u>SNOWSHOE</u> Unfossiliferous thinly interbedded siltstone, sandstone, and dark shale. East of Snow Mtn. only.
T-599 V-738		<u>MIDDLE JURASSIC</u> (<u>WEBER</u> , <u>WARM SPRINGS</u> and <u>SNOWSHOE</u>) undifferentiated in areas of heavy cover, e.g. Egger Butte area and between Little Missouri and Snow Mtns.



Jsn - Vigraass' Shaw Member of SNOWSHOE FORMATION; black shale; ^{is very thin and} occurs much less extensively than shown on his map; I did not think it merited separate mapping.

JSN - SNOWSHOE FORMATION - Upper MIDDLE JURASSIC: Interbedded platy tuffaceous siltstone and fine-medium grained sandstones.

JH - Member near base, very massive spheroidal weathering volcaniclastic sandstone not practical to map separately over most of map area. Includes a thin flow of basalt porphyry grading to a volcanic breccia in the southwestern lobe of the Pine Crk downwarp. I am convinced this distinctive sandstone member is essentially correlative with LUDWIG's HYDE formation; contrary to Dickinson's and Inlay's conclusion.

Not far (100-200) above HYDE sandstone member, referred to below, within the thinly interbedded siltstone-sandstone section is a tuffaceous section 100' thick, characterized by thin layers green and light colored cherts and light colored platy tuffs; is widespread over area and probably could be used as a marker horizon for detailed mapping.

everywhere in the Pine Crk downwarp area the uppermost SNOWSHOE is an erosional surface; hence its total thickness is unknown. In the headwaters of Twelve Mile and Grindstone Crks, higher beds may be present. Further analysis will be required to elucidate this possibility.

Unnamed member: Blue-greenish gray clay shale, thinly laminated and interbedded with fine grained sand; observed only in southwestern and southern part of map area - useful for mapping; no fossils.

Conglomeratic volcanic wacke tongue characterized by abundant limestone pebbles and small boulders; present only in sw. lobe of Pine Crk downwarp.

Jws - WARM SPRINGS - MIDDLE JURASSIC: predominantly thin bedded, fissile, dark gray-black "organic" (?) shale; interbedded fine grained "ashy" sands, calcareous sandstone and concretionary limestone. Contains Ammonites and zones with abundant Bositra. Porphyritic lava occurs within this formation in SW Lobe of downwarp and at its base (?) in the Big Flat area. is very useful for mapping

JW - WEBER - LOWER MIDDLE JURASSIC: Thin calcareous section: very calcareous sandstone, sandy gritty limestone, and limestone, apparently grading upward into overlying shaly section - abundantly fossiliferous with a variety of pelecypods.

JR - ROBERTSON - LOWER JURASSIC: Dense gray limestone in many places characterized by abundant *Richestylus* fossils; underlain by coarse sandstone and heavily bedded conglomerate containing felsitic pebbles; lower beds are extremely

Fine textured basalt at base of ONTKA Rch section. No evidence of intrusion observed, but several scattered occurrences of similar rock in the area to the SW, both in Jurassic and Trout Crk beds, suggest that possibility.

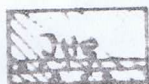
JOU

and the Triassic (Secs. 25+35-17S-26E and Secs. 7+8-17S-27E).
Basal Jurassic undifferentiated - Big Flat section: Studied insufficiently to discuss. Where exposed along road on west side of porphyry it consists of sandstone, limestone breccia and black shale, no fossils - which Dickinson mapped as NICELY and SUPLEE.

NOTE ON SUPLEE and NICELY FORMATIONS

These very thin formations, established by Kupper on the basis of faunal evidence, occur in a very limited area, mainly in Sec. 27-18S-26E. The Jurassic stratigraphy of this area is atypical of the general region and needs additional study so is not colored on map. In the area directly to the west where the Suplee may be present it is not practical to map it separately from the Robertson, so has been included with it and so colored.

S-2635



Base not exposed

LOWERMOST JURASSIC (Hettangian)
- based on Ammonite evidence. Thin bedded marly buff colored limestone, sparsely fossiliferous, underlain, apparently conformably, by 30' bed of rib-forming, massive, gray, non-fossiliferous limestone which apparently lies on poorly exposed, massive conglomerate of unknown age. Overlain unconformably by Snowshoe formation. Occurs at east end of Williams Reservoir, NE 1/4 Sec. 9-19S-25E, and possibly in thin slivers along fault zone to SW which separates older formations on west from Jurassic Snowshoe beds on east.

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M-873



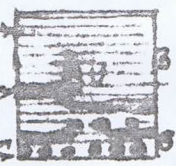
Post-Crofted RIDGE beds of unknown position; fossils noted, could be as high as Jurassic. Further investigation needed.
Medium to coarse grained wacke. Mapped only in Secs. 29+30-18S-25E.

S-2633
V-740 1/2



TRIASSIC(?) upper member - Chaotic, poorly - unconsolidated conglomerate characterized by abundant Paleozoic limestone boulders; interbedded with minor thin beds siltstone and sandstone showing near vertical dips. Present in western area, especially, upper Trout Crk and Grindstone Crk areas; Correlation conjectural; appears to lie unconformably on Trout Crk. beds and in fault contact with older formations. Possibility of confusion in some areas with deposits on late Tertiary or Quaternary "old land surfaces".

S-2653
M-864
V-740 1/2



TRIASSIC - UPPER (KARNIAN) member Predominantly a marine section, with, as here defined, heavy-bedded limestone boulder conglomerate at base, overlain by ^{thinly} interbedded black organic shales, thin limestones, sandy gritty limestones, calcareous sandstones and grits, flaggy micaceous sandstone and minor chert pebble conglomerate. In eastern part of area volcaniclastic wacke and breccia, with minor lava and associated cherts are present in lower part of this member.

Probable erosional unconformity

M-813 (Light)



TRIASSIC - middle member: Predominantly chert fragment grits and sandstone with minor conglomerate and buff colored siltstone. Limestone pebbles present but uncommon. Basal beds on N. side decompose, as here defined, is thin calcareous sandstone - grit zone with chert layers above and below. In Wade Butte and Paleozoic area to west it is uncertain whether formation so colored is correlative with this - it could be much higher stratigraphically, even above Tru.

S-2626



TRIASSIC - lower member: Interbedded buff ^{siliceous} siltstone, shale, and fine grained sandstone with ^{minor} massive chert fragment grit and conglomerate. Lowest beds exposed in atial area Bees Anticline on S. Fk. Beaver Crk. (NE 1/4 Sec. 18-175-25E) are massive wacke sandstone and conglomerate. No fossils or limestone boulders or pebbles observed.

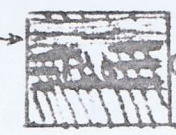
M-898 on map suggest use same term with ~~adjacent~~ or better contrast with adjacent Weberg formation
M-864
M-876



TROUT CREEK BEDS: Age uncertain; shown only in Paleozoic area where they probably include part of lower member of Triassic and beds of probable Permian age above COYOTE BUTTE (Permian) limestone. - Interbedded fine grained sandstone, siltstone mudstone + siliceous tuffaceous shale; - zones of predominantly bedded chert (a) and minor coarse chert fragment sandstone and grit; some conglomeratic; also extensive massive, buff colored, chert like, felsitic rock (andesite) with, on Δ WHITE (Sec. 14-185-25E), coarse basal conglomerate of same rocks. Section is essentially vertical, probably in part overturned, probably isoclinally folded and faulted, hence stratigraphic succession not evident and thickness uncertain. Best exposed in upper Trout Crk area, Secs. 14, 15, + 16-185-25E, hence suggested name.

Normal conformable depositional contact(?) (Not observed)

M-876
V-740 1/2



COYOTE BUTTE - UPPER PERMIAN: Essentially gray - buff massive limestone, with probable interbeds of fine grained sandstone and marly siltstone, and minor coarse wacke; in upper part green and maroon chert, both above limestone and interbedded are conspicuous. Limestone varies from dense gray containing fusulinids and other fossils to barren gray and light buff, rather soft saccheroidal with adjacent fossiliferous beds. Thickness and succession not determinable.

Conformable contact?

M-853

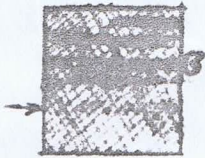


SPOTTED RIDGE - PENNSYLVANIAN(?): Clastic section, predominantly medium - coarse grained light greenish brown sandstone, but with characteristic zones of heavy-bedded conglomerate ranging from small pebbles to 18-24" well rounded boulders of fine textured red, purple, and light colored volcanic porphyries; occasional thin, irae and thin beds magnetite sandstone. ~~Scarcely fossiliferous material has been reported to indicate a Pennsylvanian A~~

Depositional contact probably unconformable - but not observed

M-854

M-896



COFFEE CREEK - MISSISSIPPIAN: Gray massive limestone and soft buff silty marly limestone, both fossiliferous, and thin bedded black, gray-weathering brittle limestone, non-fossiliferous with (probably) predominant fine to medium grained feldspathic sandstone below limby section. One distinctive zone noted characterized by small rounded pebbles of reddish volcanic porphyries and sandstone containing scattered grains of pink and white feldspar. Thickness, succession, and relationships to beds above and below are not evident.



M-855

BIRDSONG: DEVONIAN: Massive limestone with a few feet of gray shale - two outcroppings, the larger on the N. Fl. of Trout Cr. (Secs. 8+16 T8S-25E) at a distance of one mi. to the S. Both apparently are fault slivers, bounded by younger formations on both sides.

NOTE ON PALEOZOIC FORMATIONS

Due to the discontinuous spotty outcrops, wide intervening areas with no information, and the extreme complexity of the structure, which is anything but well understood, the spatial relations of the rocks provide almost no clues to the stratigraphic succession, the thickness of the component units or their mutual relationships. For the most part formation boundaries cannot be reliably determined by ordinary field methods (i.e., exclusive of extensive excavation.)

Consequently the succession outlined above depends almost entirely on paleontological evidence, which has to be taken on faith by the field geologist.

May 18, 1966

WESTERN MAP

(Preferred scale 1:31,680 - same as present map)

I. Land net and culture (Gray plate)

1. Longitude and latitude lines at 15' intervals.

2. Township and section lines and numbers.

3. Roads - as shown on my map: main roads solid line _____
secondary short dashed - - - -



4. Buildings with names of farms, cabins, etc.

⊕ 5. Centers of airphotos used for geological mapping -
omit number of picture.

6. Cemeteries, etc. Omit name Suplee (mail shed) which
no longer exists.

7. Miscellaneous: You may think of other things - if important
please discuss with me.

This map should be printed in a subdued gray so as not to
interfere with geology.

You may find that adjacent USFS planimetric maps do not fit
exactly. If so, suggest you copy as I have adjusted them on
my map.

II. Drainage map - This in lieu of topography (Bright blue)

1. Drainage - as shown on USFS planimetric maps; should include smallest tributaries and ravines; distinguish permanent and intermittent streams.
2. Springs - both from USFS and my maps.
3. Names of topographic features.
4. Elevations - lake and reservoirs.

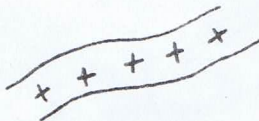
III. Geological data (Black plate)

This map for geological information which will be printed in sharp black. I believe we should confer on this before undertaking extensive drafting. However, I think it should include the following:

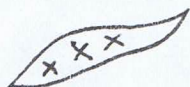
1. Formation contacts: wherever drawn solidly and unquestioned. This will include: distinct members with special patterns, e.g.



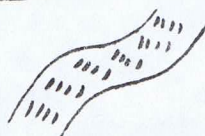
Qls - Landslides



Jurassic lavas

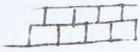


Scattered basalt intrusives(?)



Highly siliceous felsitic rock associated with Trout Creek beds

Distinctly or continuously mapped cherts



Limestone - original deposition



Conglomerate zones composed of limestone boulders

Conglomerates composed predominantly of limestone boulders occur in several places on this map which are not shown graphically as limestone - just the conglomerate symbol with notation "Ls. bldrs. Please show these graphically." Some of the principal ones are:

S.W. sec. 12, T. 17 S., R. 25 E.

W $\frac{1}{2}$ sec. 24, T. 17 S., R. 25 E.

NW $\frac{1}{4}$ sec. 2, T. 18 S., R. 25 E.

(NE sec. 17 + NW sec. 16 and SW sec. 9; also S. central sec. 9 all in T. 18 S., R. 25 E.)

W $\frac{1}{2}$ sec. 32, T. 18 S., R. 25 E.

Thin zone above (E of) "JBAPOR" (Jurassic lava) in NW sec. 13, SE sec. 11 and SW sec. 1 (just below (w) of blue clay), T. 18 S., R. 25 E.

Sec. 8, T. 17 S., R. 26 E. in basal Jurassic

Below Pli zone in basal Jurassic, secs. 26 and 35, T. 17 S., R. 26 E.

NNEly trending cg. zones in Triassic in SW $\frac{1}{4}$, T. 17 S., R. 26 E. and NW $\frac{1}{4}$, T. 18 S., R. 26 E.

2. Other lithologic data:



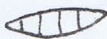
Sands and sandstone (small dots)



Shales, mudstones, siltstones (short dashes)



Conglomerate zones (except those composed of volcanic boulders which should be shown in red)



Individual, lenticular(?) outcrops of limestone


3. Structural information



a. Dips and strikes with graphic lithologic information.
Include letter B (indicating base of bed) on same side of strike line as I do.



b. Faults.

At least twice as wide as depositional contacts - do not ink where questioned or dashed; omit "f's," but where  is shown add same, as indication of photo-geological determination.

c. Axes of folding

I would like to show synclines as green lines, anticlines as red. If this is feasible they should not be drawn on Map III.

In any event they should be shown in some other color than black.



d. Crushed and broken zones.

4. Fossil localities

3
108 AM

About same size as on my work map.

Add number 108, etc., if shown on map and info on type of fossil; e.g., Am = ammonite; Pos should be changed to Bos (formerly Posidonia, now Bositra), etc.

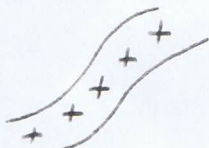
4

Fossil plant material.

- 5. Miscellaneous notes - Such as "Ind. gouge", "petrol. odor", "mag. sd.", etc.

IV. Map IV (Red plate)

Patterns for pre-Tertiary igneous rocks to be printed in red.



Jurassic lavas



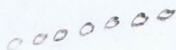
Scattered basalt intrusives(?)



Highly siliceous felsitic rock associated with Trout Creek beds



Conspicuous volcanic wacke-lava-lahar zones with associated cherts, especially in Triassic in T. 18 S., R. 26 E., and T. 18 S., R. 27 E. Colored on my work map - you may not have taken it over.



Conglomerate composed of volcanic boulders



Anticlinal axes

I think patterns under Map III, and anticlinal axes will be clear on your copy of work map. I will send you a copy with volcanic wacke and conglomerate of volcanic boulders clearly shown.

Do not ink igneous pattern in NW sec. 2, T. 18 S., R. 26 E.

V. Map V (?) (Green plate)

Print in green



Synclinal axes



Chert zones in Jurassic formation (shown thus on my work map).

Miscellaneous

Do not ink any geologic data in $W\frac{1}{2}$ sec. 5 and $E\frac{1}{2}$ sec. 6, T. 19 S., R. 25 E., as I have some new data to add.

Omit structural lines within area marked "photogeology only" in T. 18 S., R. 26 E.

E A S T E R N M A P

I. Land net, culture and topography (Gray plate)

Pre-Tertiary geology of this area was mapped largely on USGS topographic quadrangles Sawtooth Creek and West Myrtle Butte. Suggest therefore to use enlargement of these maps for Map I.

II. Drainage (Blue plate)

Main streams and principal tributaries in blue.

III. Geological Data (Black plate)

IV. Pre-Tertiary* igneous (Red plate)

V. ? (Green plate)

* Do not include elliptical outcrops in SW $\frac{1}{4}$ sec. 6, T. 19 S., R. 29 E., and SW $\frac{1}{4}$ sec. 27, T. 20 S., R. 28 E., or near C SE $\frac{1}{4}$ sec. 6, T. 20 S., R. 30 E.