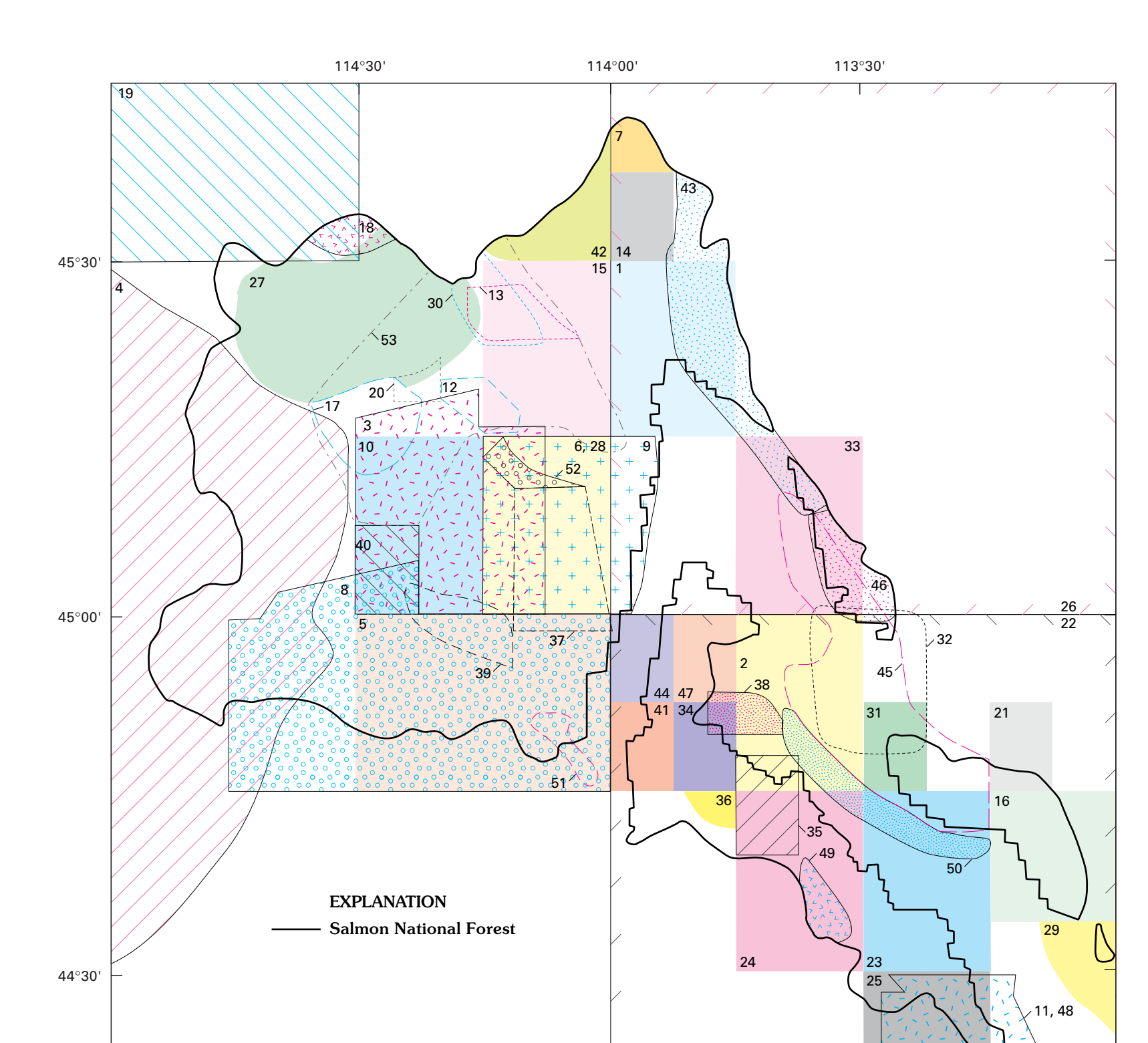
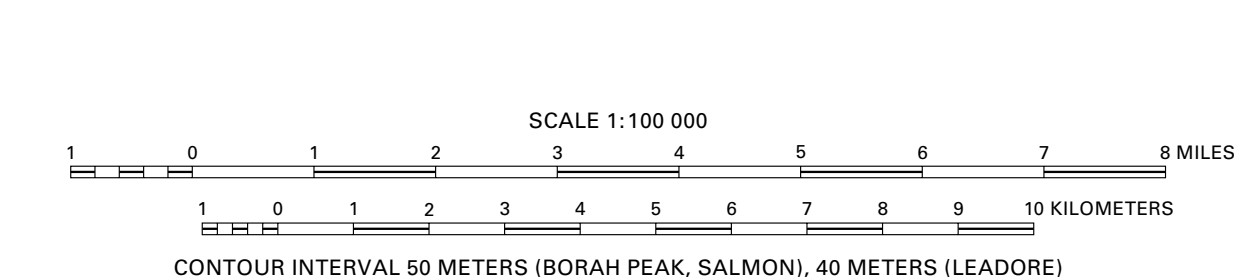


- DESCRIPTION OF MAP UNITS**  
(Boxes colored only for units shown on this sheet)
- SURFICIAL DEPOSITS**  
 Qu Alluvial, colluvial, landslide, and glacial deposits, undivided (Quaternary)
- CENOZOIC SEDIMENTARY ROCKS**  
 OT Gravel, limestone, sandstone, and volcanoclastic sediments (Eocene to Oligocene?)  
 Thu Tuff and tuffaceous conglomerate (Pliocene to Miocene)  
 Ts Sedimentary rocks—basin fill (Miocene?) to Eocene)  
 Tcc Older column of Panther Creek (Eocene)
- CENOZOIC VOLCANIC ROCKS**  
 Ch Chalko Volcanic Group, undivided  
 Tuffs and flows of Thunder Mountain cauldron complex (southernmost part of Salmon National Forest)—See Fisher and others (1992)  
 Tsa Summit tuff  
 Tsp Puffin, chertite  
 Tst Lapilli tuff  
 Ttl Lower tuffe lava  
 Ttc Tuffs of Castle Rock segment of Van Horn Peak cauldron complex (southernmost part of Salmon National Forest)—See Elton (1988)
- TERTIARY TO CRETACEOUS INTRUSIVE ROCKS**  
 Maf Mafic to felsic intrusions, undivided (Eocene)  
 Gp Gray porphyry (Eocene)  
 Gr Granite (Eocene)  
 Gg Granite, granodiorite, and quartz monodiorite (Eocene)  
 In Intrusive dykes (Eocene)  
 It Intrusions, mostly intermediate and felsic (Tertiary to Cretaceous)  
 Hb Hornblende-biotite tonalite (Cretaceous)  
 Kg Biotite-muscovite granite (Cretaceous)  
 Kgp Plagiophytic granite and granodiorite (Cretaceous)  
 Kgd Biotite granodiorite (Cretaceous)  
 Kgf Foliated biotite granodiorite (Cretaceous)
- MESOZOIC TO PROTEROZOIC SEDIMENTARY ROCKS**  
 Pd Dimorphic Formation (Lower Triassic)  
 Pp Phosphoria Formation (Lower Permian)  
 Pm Stinky Canyon (Lower Permian to Upper Mississippian) and Banded Mountain (Upper Mississippian) Formations, undivided  
 Ss Surrent Canyon?, South Creek?, and Scott Peak Formations (Upper Mississippian) and Middle Canyon (Upper and Lower Mississippian) Formation, undivided  
 Mm Surrent Canyon, South Creek, and Scott Peak Formations (Upper Mississippian) and Middle Canyon (Upper and Lower Mississippian) Formation, undivided  
 Rf Ruffalo Canyon Formation (Upper Mississippian)  
 Mf Scott Peak Formation (Upper Mississippian)  
 Mm Middle Canyon Formation (Upper and Lower Mississippian)  
 Mc McCowan Creek Formation (Lower Mississippian)  
 Tt Three Forks and Jefferson Formations, undivided (Eggon Devonian)  
 SDu Laketown Dolomite (Silurian) and Samsbury Mountains Formation (Lower Silurian to Middle Ordovician), undivided  
 Sdu Samsbury Mountains Formation (Lower Silurian to Middle Ordovician)  
 Ok Kinnikinnick Quartzite (Middle Ordovician)  
 Os Summerhouse Formation (Lower Ordovician)  
 Ok Kinnikinnick Quartzite (Middle Ordovician) and Summerhouse Formation (Lower Ordovician), undivided  
 CW Wilbert Formation (Lower Cambrian to Neoproterozoic?)
- PALEOZOIC TO PROTEROZOIC VOLCANIC ROCKS**  
 RZm Metacritic and metamorphic units (Lower Paleozoic?) to Neoproterozoic)
- PALEOZOIC INTRUSIVE ROCKS**  
 OCf Mafic to predominantly felsic alkalic intrusions (Ordovician to Cambrian)
- PALEOZOIC TO PROTEROZOIC METAMORPHIC ROCKS**  
 RZm Gray marble (Lower Paleozoic?) to Neoproterozoic)
- PROTEROZOIC SEDIMENTARY ROCKS**  
 Yc Lawson Creek Formation (Mesoproterozoic)  
 Ys Samsage Formation (Mesoproterozoic)  
 Yg Gansight Formation (Mesoproterozoic)  
 Ya Apple Creek Formation, undivided (Mesoproterozoic)  
 Yb Banded albite unit  
 Yc Coarse albite unit  
 Yd Dismette unit  
 Yf Fine albite unit  
 Yg Big Creek Formation (Mesoproterozoic)  
 Yh Lawson Creek Formation, Samsage Formation, and (e) Lemhi Group, undivided (Mesoproterozoic)  
 Yi Amphibole quartzite, unnamed (Mesoproterozoic)  
 Yj Hoodoo Quartzite (Mesoproterozoic)  
 Yk Yellowjacket Formation (Mesoproterozoic)  
 Yl Feldspathic metasediments (Mesoproterozoic)  
 Ym Missoula Group, undivided (Mesoproterozoic)  
 Yn Helena and Empire Formations, undivided (Mesoproterozoic)  
 Yo Spokane and Grosvenor Formations, undivided (Mesoproterozoic)
- PROTEROZOIC INTRUSIVE ROCKS**  
 Ym Mafic intrusive rock (Neoproterozoic?)  
 Yn Megacrystic granite and augen gneiss (Mesoproterozoic)  
 Yo Amphibolite and magnetite-hornblende gneiss (Mesoproterozoic)
- PROTEROZOIC METAMORPHIC ROCKS**  
 Yp Biotite gneiss (Mesoproterozoic)  
 Yq Quartzite (Mesoproterozoic)  
 Yr Calc-alicite quartzite (Mesoproterozoic)  
 Ys Basement gneiss (Paleoproterozoic)
- CONTACTS AND FAULTS**  
 Contact—Dashed where approximately located; quartered where uncertain. Scratch boundaries used where contact occurs along lat 44°30' N. and 45° N.  
 Strike-slip fault—Dashed where approximately located; dotted where concealed. Opposed arrows show relative movement.  
 Normal fault—Dashed where approximately located; dotted where concealed; quartered where uncertain. Bar and ball on downthrown side.  
 Thrust fault—Dashed where approximately located; dotted where concealed, quartered where uncertain. Swath on upper plate.  
 Low-angle normal fault—Dashed where approximately located; dotted where concealed. Box on upper plate.  
 Thrust fault with lateral movement—Dashed where approximately located; dotted where concealed. Swath on upper plate; bar and ball on downthrown side.  
 Thrust fault with younger-over-older relationship and multiple-stage development—Dashed where approximately located; dotted where concealed. Swath on upper plate. Younger-over-older relationship (caused by multiple phases of compressional deformation and set by decolping in lower plate during thrust juxtaposition. Superposed brittle deformation by low-angle normal movement).  
 Anticline—Dotted where concealed.  
 Overturned anticline—Dotted where concealed.  
 Syncline—Dotted where concealed.  
 Overturned syncline—Dotted where concealed.  
 Caldera margin  
 Dikes of unknown age or chemistry  
 Strike and dip of bedding  
 Overturned  
 Strike and dip of tilted breccia zone and cataclastic surface east of Baker and Lemhi, and west of Tindley, Idaho  
 Strike and dip of inclined foliation  
 Bearing and plunge of lineation—May be combined with foliation symbol  
 Drill hole  
 Area in which stratigraphic unit occurs at a higher-than-typical metamorphic grade  
 Brittle deformed and silicified breccia and cataclaste—Formed along low-angle normal faults during Tertiary regional extension (Tucker, 1983; Hancock and others, 1998). Locally preserved as an erosional remnant forming the slopes on several ridge tops on west side of northern Bessiehead Mountains, on top of Banner Mountains, and near McCowan Creek to Lemhi Range. Along Kinnickinnick Creek a highly polished, reddish, hematitic, silicified surface of ultracarbonate tips 8° NW, and increases steeply (average 30°) from Eocene to Miocene(?) sedimentary strata that intersect the surface at an angle of 60°. Below surface, brecciation is intense but gradual; decreases to subvertical (Pratt and others, 1998) through a 50-m-thick transition zone. The same fault that formed the cataclaste in Bessiehead Mountains has probably been truncated at depth by extensional dip faults at the Hamberg gap present along Ditch Creek northeast of outpost of North Fork.

Base from U.S. Geological Survey, Borah Peak, 1965, Leach, 1985, Elton, 1988, 1992  
 Projection: Universal Transverse Mercator, zone 12, 1987 North American Datum



- SOURCES OF GEOLOGIC MAPPING**
- |                                     |   |
|-------------------------------------|---|
| 1 Anderson (1959)                   | 28 Ship and others (1984)   |
| 2 Anderson (1961)                   | 30 Spore (1984)   |
| 3 Bennett (1977)                    | 31 State (1973)   |
| 4 Carr and others (1973)            | 32 State (1979)   |
| 5 Connor (1990)                     | 33 Tucker (1975)  |
| 6 Connor and Evans (1986)           | 34 Tysdal (1996a)   |
| 7 Dammann (1983)                    | 35 Tysdal (1996b)   |
| 8 Elton (1988)                      | 36 Tysdal (1996c)   |
| 9 Elton (1981)                      | 37 Tysdal (2000b, 2003)   |
| 10 Evans and Connor (1990)          | 38 Tysdal (2002)  |
| 11 Hui (1965)                       | 39 Tysdal and DeBorough (1997)  |
| 12 Hildred (1981)                   | 40 Tysdal and others (2000)   |
| 13 Kaiser (1956)                    | 41 Tysdal and Moze (1996)   |
| 14 Leper (1982a)                    | 42 Unpublished mapping, K.V. Evans, USGS, 1995-97                                     |
| 15 Leper (1982b)                    | 43 Unpublished mapping, K.V. Evans, USGS, 1995-97                                     |
| 16 Lucchitta (1966)                 | 44 Unpublished mapping, K.V. Evans, F. Moze, and R.L. Hankman, USGS, 1991-94          |
| 17 Lund, Evans, and Espinoza (1983) | 45 Unpublished mapping, K.I. Lund, USGS, 1995-2000                                    |
| 18 Lund, Rehn, and Holloway (1983)  | 46 Unpublished mapping, G.R. Winkler, USGS, 1995-97, and R.G. Tysdal, USGS, 1999-2001 |
| 19 Lund and others (1992)           | 47 Unpublished mapping, R.G. Tysdal, USGS, 1997                                       |
| 20 Maly (1974)                      | 48 Unpublished mapping, R.G. Tysdal, USGS, 1997                                       |
| 21 M Gensie (1994)                  | 49 Unpublished mapping, R.G. Tysdal, USGS, 1997-99                                    |
| 22 Rember and Bennett (1979)        | 50 Unpublished mapping, R.G. Tysdal and K. Lund, USGS, 1997-99                        |
| 23 Raspeil (1968)                   | 51 Unpublished mapping, R.G. Tysdal, USGS, 1996-98                                    |
| 24 Raspeil (1980)                   | 52 Unpublished mapping, R.G. Tysdal, USGS, 1998-2003                                  |
| 25 Raspeil and Leper (1983)         | 53 Unpublished mapping, K.I. Lund, USGS, 2000-01                                      |
| 26 Raspeil and others (1995)        |   |
| 27 Schenk and others (1994)         |   |
| 28 Shockey (1957)                   |   |



**Geologic Map of the Eastern Part of the Salmon National Forest**  
 By  
 K.I. Lund, K.V. Evans, R.G. Tysdal, and G.R. Winkler

**GEOLOGIC MAP OF THE SALMON NATIONAL FOREST AND VICINITY, EAST-CENTRAL IDAHO**  
 Compiled by  
 Karl V. Evans and Gregory N. Green  
 2003

See "Index to sources of geologic mapping"  
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