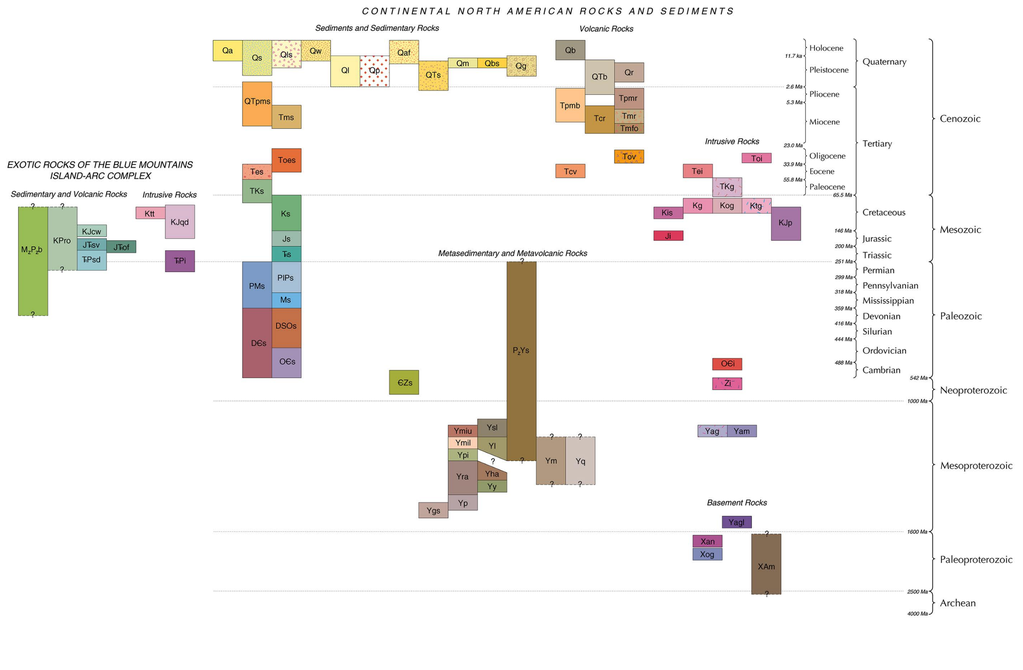
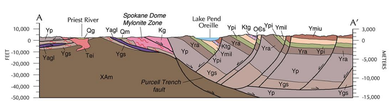
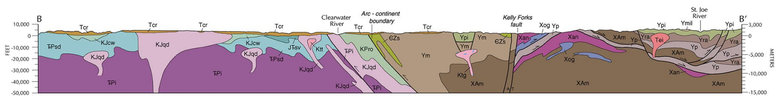
SYMBOLS

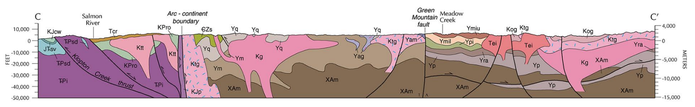
- Recent fault: active within last 15,000 years; ball and bar on downthrown side.
- Fault: dotted where concealed.
- Normal fault: ball and bar on downthrown side; dotted where concealed.
- Detachment fault: hatchures on downthrown side dotted where concealed.
- Thrust fault: teeth on upper plate; dotted where concealed.
- Reactivated thrust fault: teeth on upper plate; bar and ball on downthrown side on reactivated fault segments; dotted where concealed.
- Strike-slip fault: arrows indicate motion; dotted where concealed.
- Composite garnet isograd: garnets present on side with "G"; both Proterozoic and Cretaceous in age; garnet restricted to Cretaceous and older metasedimentary rocks.

CORRELATION OF MAP UNITS









GEOLOGIC MAP OF
IDAHO

Compiled by Reed S. Lewis, Paul K. Link,
Loudon R. Stanford, and Sean P. Long

2012

Miles
Kilometers

Scale 1:750,000

Map layout and design by Collette Gantenbein, Loudon R. Stanford, and Jane S. Freed.
Digitizing and GIS by Jesse S. Bird, Loudon R. Stanford, and Collette Gantenbein.
Base map by Collette Gantenbein and Dean L. Garwood.
Shaded relief by Collette Gantenbein.

INTRODUCTION

The *Geologic Map of Idaho* brings together the extensive mapping and associated research since the previous statewide compilation published in 1978. Over ninety geologic sources were used to compile the map (see accompanying booklet). The northern and western parts of the state were compiled by R.S. Lewis; the eastern and southeastern parts were compiled by P.K. Link and S.P. Long. The geology was initially drafted at 1:500,000 scale, scanned, and then digitized. The shaded relief on the map was created from 10 m National Elevation Data and resampled to 30 m. All surficial unit contacts were modified by L.R. Stanford to reflect the detail of the shaded-relief base map.

DESCRIPTION OF MAP UNITS

Ages listed below and in the correlation of map units conform to the 2010 U.S. Geological Survey Geologic Time Scale (U.S.G.S. Fact Sheet 2010-3059). Abbreviations are Ma (mega-annum, million years before present) and ka (kilo-annum, thousand years before present). The term "calibrated ka" refers to radiocarbon ages that have been corrected so that they correspond to calendar years. References for the age information provided below are listed in the booklet that accompanies this map.

QUATERNARY SEDIMENTS

Qa **Alluvial deposits (Quaternary)**—Deposits in valleys consisting of gravel, sand, and silt. Includes younger terrace deposits. May contain some glacial deposits and colluvium in uplands.

Qaf **Alluvial-fan deposits (Quaternary)**—Gravel and subordinate sand and silt deposited at mouths of canyons; largest fans are in Basin and Range Province in east-central and southeastern Idaho.

Qls **Landslide deposits (Quaternary)**—Unsorted gravel, sand, and clay of landslide origin; includes rotational and translational blocks and earth flows.

Qw **Windblown sand deposits (Quaternary)**—Fine- and medium-grained sand dunes in southern Idaho; includes Bruneau and St. Anthony dune fields.

Ql **Loess deposits (Pleistocene)**—Wind-deposited quartzose and calcareous silt in southeastern Idaho. Only shown where thick enough to mask older units; commonly 7-15 m (23-50 ft) thick.

Qlp **Loess of the Palouse Formation (Pleistocene)**—(stipple pattern only)–Wind-deposited silt and clayey silt of the Palouse hills near Moscow.

Qm **Missoula Flood deposits (Pleistocene)**—Gravel, sand, and silt near Coeur d'Alene and Sandpoint that were carried by outburst floods from Glacial Lake Missoula (20-15 ka). Floods also flowed back up the Snake and Clearwater rivers to Kamiah. Missoula Flood slack-water deposits cover Lake Bonneville deposits in the Lewiston area.

Qbs **Lake Bonneville deposits (Pleistocene)**—Silt, clay, sand, and gravel deposited in and at margins of former Lake Bonneville (33-11 calibrated ka) and sand and gravel deposited in giant flood bars by outburst floods from the lake (17.4 calibrated ka). The 1,575-m (5,170 ft) Lake Bonneville shoreline was used to determine the maximum extent of the lake deposits. Flood deposits follow Bonneville flood path from near Downey and the Portneuf River westward along the Snake River to Lewiston. They include sand and silt deposited in slack-water areas to 740 m (2,430 ft) elevation in the Boise, Weiser, Payette, and Snake river drainages.

Qg **Glacial deposits (Pleistocene)**—Till and outwash consisting of gravel, sand, silt, and clay. Formed by valley glaciers at higher elevations and by the Cordilleran ice sheet in northern Idaho. Includes deposits of several glacial episodes. Includes rock glacier deposits and some modern alluvium derived from reworked till and outwash.

Qs **Fluvial and lake sediment (Quaternary)**—Largely fine-grained sediment, in part playa deposits of evaporative lakes; includes Snake River Group and Bruneau Formation in central Snake River Plain and glacial lake deposits in Bonners Ferry area of northern Idaho. Also includes travertine and tufa northeast of Bancroft and Lake Thatcher sediments in the Gem Valley south of Grace.

QUATERNARY TO EOCENE CONTINENTAL VOLCANIC AND INTRUSIVE ROCKS

Qb **Basalt (Quaternary)**—Flows and cinder cones of olivine tholeiite basalt and minor latite and alkaline basalt less than 15 ka; includes Shoshone, Craters of the Moon, Wapi, Cerro Grande, and Hells Half Acre lava fields. Little or no loess cover.

Qr **Rhyolite (Pleistocene)**—Rhyolite tuffs, flows, and domes; includes Yellowstone Group (2.0-0.6 Ma) and isolated domes on Snake River Plain and north of Soda Springs (less than 2.0 Ma).

QTb **Basalt (Pleistocene and Pliocene)**—Flows and cinder cones of olivine tholeiite basalt in and near Snake River Plain. Largely Pleistocene (<2.6 Ma) but includes flows as old as 3 Ma. Covered with 1-3 m (3-10 ft) of loess.

Tpmr **Rhyolite (Pliocene and Miocene)**—Rhyolite tuffs and flows of Heise volcanic field (6.6-4.5 Ma; includes Blacktail Creek, Walcott, Conant Creek, and Kilgore tuffs), and rhyolite domes and flows of Magic Reservoir area (6.6-3 Ma).

Tpmb **Basalt (Pliocene and Miocene)**—Flows and cinder cones of olivine tholeiite basalt, and shallow basalt intrusives (~15-3 Ma); includes basalt in Owyhee County and southwest of Twin Falls, basalt of Weiser (basalt to andesite), basalt of Cuddy Mountain (alkali basalt and picro-basalt) north of Cambridge, basalt in Mount Bennett Hills north of Gooding, andesite at Square Mountain near Magic Reservoir, and Cub River diabase sill east of Preston. Includes gabbro at depth in cross section D-D'-D".

Tmr **Rhyolite (Miocene)**—Rhyolite tuffs and flows (14-8 Ma); includes Juniper Mountain volcanic center, tuff of Little Jacks Creek, Cougar Point Tuff, tuffs in the Mt. Bennett Hills, and Arbon Valley Tuff Member of Starlight Formation. Volcanic sources include Owyhee-Humboldt (13.8-12.0 Ma), Bruneau-Jarbidge (12.5-11.3 Ma), Twin Falls (10.0-8.6 Ma), and Picabo (10.2 Ma) volcanic centers.

Tmfo **Older rhyolite, latite, and andesite (Miocene)**—Rhyolitic domes and tuffs, and subordinate latite flows (17-14 Ma); includes rhyolites of Silver City and tuff of Flint Creek in the Owyhee Mountains and rhyolite of Timber Butte northeast of Emmett.

Tcr **Columbia River Basalt Group (Miocene)**—Large-volume lava flows of tholeiitic basalt, basaltic andesite, and subordinate andesite in western Idaho; consists of Imnaha Basalt (17.5-16.5 Ma), Grande Ronde Basalt (16.5-15.6 Ma), Wanapum Basalt (15.6-14.5 Ma), and Saddle Mountains Basalt (14.5-6 Ma). Includes porphyritic basalt and basaltic andesite in western Owyhee County.

Tov **Volcanic rocks (Oligocene)**—Alkali olivine basalt and trachyte of the ~26 Ma Potlatch volcanics; basalt, andesite, and rhyolite of the ~32 Ma Kamiah volcanics; and olivine basalt and andesite of the 26-31 Ma Salmon Creek volcanics southwest of Nampa.

Toi **Granite (Oligocene)**—Biotite, muscovite-biotite, and muscovite granite of the Almo pluton (29 Ma) at City of Rocks National Reserve and Castle Rocks State Park southeast of Oakley.

QUATERNARY TO EOCENE CONTINENTAL SEDIMENTS AND SEDIMENTARY ROCKS

QTs **Sediments and sedimentary rocks (Pleistocene and Pliocene)**—Older gravel, sand, and silt deposited in fans, streams, and lakes. Includes older terrace gravels and Tuana Gravel northwest of Twin Falls.

QTpms **Sedimentary rocks associated with Basin and Range extension (Quaternary, Pliocene, and Miocene)**—Fluvial, fan, and lacustrine deposits and intercalated volcanic rocks of the Basin and Range Province (~16-2 Ma); consolidated to weakly consolidated sandstone, siltstone, arkose, conglomerate, mudstone, tuffaceous sediment, basalt, basaltic tephra, and rhyolite tuff. Includes deposits of Lake Idaho (Idaho Group) in western Snake River Plain and Salt Lake Formation deposited in Basin and Range Province of east-central Idaho.

Tms **Sedimentary rocks associated with flood basalts (Miocene)**—Fluvial and lacustrine deposits associated with Columbia River Basalt Group and equivalent basalts (17-8 Ma); consolidated to weakly consolidated sandstone, siltstone, arkose, conglomerate, claystone, and tuffaceous sediment; subordinate intercalated basalt and rhyolitic tuff. Includes Payette and Sucker Creek formations in southwestern Idaho, sediments associated with basalt of Weiser in western Idaho, and Latah Formation in northern Idaho. Includes sedimentary rocks of uncertain origin in southwest corner of Idaho.

Toes **Sedimentary rocks and sediments (Oligocene and Eocene)**—Fluvial and lacustrine deposits; includes conglomerate, sandstone, and shale near Salmon; Pass Creek Gravel, Wet Creek Gravel, and Donkey Fanglomerate north of Muckay; Medicine Lodge beds of southern Beaverhead Mountains; and isolated deposits in northern Idaho.

EOCENE CHALLIS MAGMATIC COMPLEX AND RELATED SEDIMENTARY ROCKS

Tes **Sedimentary rocks (Eocene)**—Fluvial, lacustrine, and air-fall deposits of conglomerate, volcanic sandstone, mudstone, and tuff near Challis; conglomerate north of Sandpoint, and conglomerate and sandstone of the Wasatch Formation in extreme southeastern Idaho.

Tcv **Challis Volcanic Group (Eocene)**—Dacite, andesite, and rhyolite tuffs and flows and subordinate basalt and latite flows; covers large area in south-central Idaho. Includes Absaroka Volcanic Group near Henrys Lake and scattered volcanic rocks in eastern and northern Idaho.

Tei **Challis intrusive rocks (Eocene)**—Shallow roots of Challis volcanic field. Older suite of granodiorite and quartz monzodiorite and subordinate diorite, granite, and subvolcanic dacite; includes Jackson Peak, Beaver Creek, Marsh Creek, and Summit Creek stocks (49-45 Ma). Younger suite of granite and minor syenite and subvolcanic rhyolite; includes Sawtooth, Casto, Bungalow, and Lolo Hot Springs plutons (47-43 Ma).

PALEOCENE AND CRETACEOUS IDAHO BATHOLITH AND OLDER CRETACEOUS AND JURASSIC INTRUSIVE ROCKS

Kg **Granodiorite and granite (Paleocene and Cretaceous)**—Granodiorite and granite containing biotite and local muscovite (66-54 Ma); composes northern (Bitterroot) lobe of batholith and is ~20 Ma younger than southern (Atlanta) lobe.

Kgg **Granodiorite and two-mica granite (Cretaceous)**—Granodiorite and granite containing biotite, commonly with muscovite; includes bulk of Atlanta lobe (85-67 Ma) and isolated plutons in northern Idaho (107-67 Ma).

Ktg **Tonalitic orthogneiss and foliated granodiorite (Cretaceous)**—Orthogneiss (primarily tonalite) and foliated granodiorite (~90 to ~80 Ma). Includes early phases of the Idaho batholith, migmatite, intrusions along major structures, and plutonic rocks of uncertain age along the Salmon River northwest of Salmon.

Ktg **Tonalite, granodiorite, and quartz diorite (Cretaceous)**—Tonalite, granodiorite, and quartz diorite, typically hornblende-bearing; includes the Payette River tonalite (~90 Ma) along western border zone of the Atlanta lobe, and the ~99 Ma Croesus pyroxene-biotite quartz diorite south of Hailey. Also includes granodiorite with potassium feldspar megacrysts that is typically hornblende-bearing and foliated (~90 Ma in central Idaho and ~100 Ma in northernmost Idaho) and early mafic phases of the Bitterroot lobe (~70 Ma).

KJp **Plutonic rocks along the western Idaho shear zone (Cretaceous and Jurassic)**—Deformed granodiorite, tonalite, and quartz diorite; includes Little Goose Creek complex northwest of McCall dominated by porphyritic granodiorite (~105 Ma) and subordinate 160-87 Ma tonalite and quartz diorite.

Kis **Syenite and related rocks (Cretaceous)**—Syenite, monzonite, quartz monzonite, and subordinate pyroxenite (115-110 Ma); includes Gem stocks north of Wallace, Gold Hill stock northeast of Potlatch, Benning Mountain stock along the Montana-Idaho border east of Sandpoint, syenite of Wall Mountain north of Bonners Ferry, monzonite of Long Canyon (~88 Ma) northwest of Bonners Ferry, and no Business Mountain pluton (uncertain age) west of Donnelly.

KJgb **Tonalite, hornblendite, and gabbro (Jurassic)**—Tonalite in upper part of House Mountain metamorphic complex southeast of Boise (~157 Ma), hornblendite and gabbro at South Mountain southwest of Boise (~160 Ma), and tonalite of Continental Mountain at the Canadian border (~168 Ma).

MESOZOIC-PALEOZOIC ROCKS OF THE BLUE MOUNTAINS ISLAND-ARC COMPLEX

KJkt **Tonalite and trondhjemite (Cretaceous)**—Biotite- and hornblende-biotite tonalite and biotite-muscovite trondhjemite (120-110 Ma); rocks contain conspicuous magmatic epidote in plutons along eastern edge of arc complex. Includes tonalitic part of Hazard Creek complex northwest of McCall, Blacktail pluton southeast of Grangeville, and Sixmile Creek pluton southeast of Orofino.

KJqd **Quartz diorite (Cretaceous and Jurassic)**—Primarily quartz diorite, with subordinate diorite, gabbro, granite, and amphibolite; largely undeformed except near eastern part of Blue Mountains island-arc complex; wide age range (160-90 Ma).

KPrp **Riggins Group, Orofino series, and related rocks (Cretaceous to Permian)**—Metasedimentary and metavolcanic schist, gneiss, amphibolite, and marble, all of uncertain age, along eastern margin of island-arc complex; typically hornblende-rich. Includes Pollock Mountain amphibolite southeast of Riggins and gneiss of Swiftwater Creek near Lowell.

KJcw **Coon Hollow and Weatherby formations (Cretaceous and Jurassic)**—Marine mudstone and subordinate conglomerate and sandstone of the Coon Hollow Formation south of Lewiston and turbiditic sandstone, mudstone, volcanic conglomerate, and andesite and rhyolite tuff of the Weatherby Formation north of Weiser.

JTsv **Sedimentary and volcanic rocks (Jurassic and Triassic)**—Marine limestone and marble of the Martin Bridge Formation and calcareous mudstone and phyllite of the Hurwal Formation exposed west of Riggins and south of Lewiston; basaltic andesite, rhyolite tuff (~202 Ma), and conglomerate along Salmon River southwest of Grangeville; and rhyolite tuff at Pittsburg Landing (~198 Ma).

JTof **Olds Ferry terrane (Jurassic and Triassic)**—Basaltic to rhyolitic (largely intermediate) arc-derived volcanic and volcaniclastic rocks of the Huntington Formation; includes minor chert and limestone.

TrPi **Intrusive rocks (Triassic and Permian)**—Diorite, tonalite, granodiorite, gabbro, norite, quartz diorite, and trondhjemite; basement of, and feeders to, volcanic rocks in Seven Devils Group (Wallowa terrane) and Olds Ferry terrane.

TrPsd **Seven Devils Group (Triassic and Permian)**—Basaltic to rhyolitic (largely mafic) arc-derived volcanic and volcaniclastic rocks of the Wallowa terrane; includes minor limestone. Composed of Windy Ridge, Hunsaker Creek, Wild Sheep Creek, and Doyle Creek formations.

MPzBT **Baker Terrane (Mesozoic and Paleozoic)**—Massive and ribbon chert, phyllite, argillite, cherty limestone, and limestone deposited in relatively deep water, possibly in a forearc basin setting.

PALEOCENE TO NEOPROTEROZOIC SEDIMENTARY AND IGNEOUS ROCKS OF THE CORDILLERAN SYSTEM

PKs **Sedimentary rocks (Paleocene and Cretaceous)**—Fluvial conglomerate and sandstone of the Beaverhead Formation northwest of Dubois.

Ks **Sedimentary rocks (Cretaceous)**—Marine and deltaic sandstone and shale of Cordilleran foreland basin (includes Cannett Group, Frontier, Mowry, Kootenay, and Thermopolis formations) in eastern Idaho thrust belt.

Js **Sedimentary rocks (Jurassic)**—Marginal marine and marine sandstone and limestone; includes Nugget, Twin Creek, Preuss, Morrison, and Stump formations in eastern Idaho thrust belt.

TRs **Sedimentary rocks (Triassic)**—Red mudrock and fine-grained sandstone and marine limestone; includes Dinwoody, Woodside, Thaynes, and Ankareh formations in eastern Idaho thrust belt.

PMs **Sedimentary rocks (Permian to Mississippian)**—Only shown in Henrys Lake area and in cross section. Consists of *Ms* and *PPs*.

PPs **Sedimentary rocks (Permian and Pennsylvanian)**—Marine phosphorite, shale, and chert of Phosphoria Formation, fine-grained sandstone and mudrock of Wells, Quadrant, Amsden, and Shedhorn formations, and fine-grained sandstone, carbonaceous mudstone, and limestone of the Snaky Canyon Formation and Sun Valley and Oquirrh groups. Located in south-central and eastern Idaho.

Ms **Sedimentary rocks (Mississippian)**—Marine limestone of Mississippian carbonate banks and turbiditic sandstone, mudstone, and conglomerate of Antler flysch trough; includes Madison and Lodgepole formations and Chesterfield Range Group of southeastern Idaho; McGowan Creek Formation, White Knob Limestone, and overlying carbonate bank of Lost River Range; and Copper Basin Group of Pioneer Mountains. Includes poorly dated Salmon River assemblage east of Stanley, consisting of argillite, siltstone, calcareous sandstone, and limestone.

DCs **Sedimentary rocks (Devonian to Cambrian)**—Only shown in Henrys Lake area and in cross section. Consists of *OCs* and *DSOs*.

DSOs **Sedimentary rocks (Devonian to Ordovician)**—Marine dolostone and limestone and sandstone in east-central and southeastern Idaho (Summerhouse, Kinnikinic, and Swan Peak sandstones, Fish Haven, Laketown, Jefferson, Three Forks, and Darby formations) and deep-water carbonaceous mudrocks of Phi Kappa, Trail Creek, and Milligen formations east of Ketchum.

OCi **Syenitic intrusive rocks (Ordovician and Cambrian)**—Syenite, quartz syenite, alkali-feldspar granite, and subordinate gabbro (500-485 Ma). Includes Beaverhead, Arnett Creek, Deep Creek, and Yellowjacket plutons southeast and west of Salmon.

OCs **Sedimentary rocks (Ordovician and Cambrian)**—Marine limestone, dolomite, and subordinate shale and sandstone of Cambrian carbonate bank of southeast Idaho stratigraphically up to St. Charles Formation and Ordovician Garden City Limestone. Includes Bayhorse succession (Cash Creek Quartzite, Garden Creek Phyllite, Bayhorse Dolomite, Ramshorn Slate, and Clayton Mine Quartzite) of Clayton area and Pioneer Mountains; quartzite of Kamiak Butte north of Moscow; and Cambrian Gold Creek quartzite, Rennie Shale, and Lakeview Limestone east of Bayview.

€Zs **Windermere Supergroup (Cambrian and Neoproterozoic)**—Upper part consists of shallow marine and fluvial quartzose sandstone, and minor siltite, shale, and limestone of the Brigham Group of southeast Idaho, Wilbert Formation of east-central Idaho, and quartzites of unknown affinity west of Borah Peak. More highly metamorphosed equivalents are quartzite, metaconglomerate, metasiltite, calc-silicate marble, and schist of Gospel Peaks successions C and D in central Idaho; mature quartzite, biotite schist, and minor calc-silicate rocks of Syringa metamorphic sequence east of Moscow; and schist and quartzite in the Albion Range (Elba Quartzite, schist of Upper Narrows, quartzite of Yost, schist of Stevens Spring, quartzite of Clarks Basin, schist of Mahogany Peaks, and Harrison Summit Quartzite). Lower part consists of diamictite, immature sandstone, and bimodal volcanic rocks related to continental rifting. Includes Pocatello Formation (700-665 Ma), formation of Leaton Gulch near Challis, Shedroof Conglomerate in extreme northwest Idaho, and metamorphic equivalents (schist, marble, calc-silicate rocks, metaconglomerate, and ~686 Ma metavolcanic rocks) of Gospel Peaks successions A and B in central Idaho.

Zif **Intrusive rocks (Neoproterozoic)**—Syenite and diorite of the Acorn Butte, Ramey Ridge, and Rush Creek stocks along Big Creek northeast of McCall (665-650 Ma), and ~726 Ma granitic gneiss in lower part of House Mountain metamorphic complex southeast of Boise. A 695 Ma orthogenesis in the Pioneer Mountains is too small to show at map scale and is included in *XAm*.

METASEDIMENTARY ROCKS OF UNCERTAIN AGE (NEOPROTEROZOIC TO PALEOPROTEROZOIC)

PzYs **Metasedimentary rocks (Paleozoic to Mesoproterozoic)**—Quartzite, feldspathic quartzite, calc-silicate gneiss, biotite gneiss, schist, and amphibolite north and east of McCall and as pendants in the southern part of the Idaho batholith; schist, quartzite, and marble in southwestern Idaho; argillite, siltite, quartzite, carbonate-bearing quartzite, dolomite, phyllite, and conglomerate of the Deer Trail Group in northwest corner of state; and quartzite, Hayden Creek diamictite, and siltite stratigraphically above(?) the Swauger Formation south of Salmon.

MESOPROTEROZOIC INTRUSIVE ROCKS

Yag **Augen gneiss (Mesoproterozoic)**—Biotite granite and granitic augen gneiss near Elk City and northwest of Salmon (~1380 Ma). Abundant alkali feldspar and high iron content indicate A-type granite composition.

Yam **Amphibolite (Mesoproterozoic)**—Amphibolite formed from metamorphism of mafic sills; includes rocks northwest of Salmon (~1380 Ma) and east of Elk City.

MESOPROTEROZOIC BELT SUPERGROUP

Ymu **Upper Missoula Group (Mesoproterozoic)**—Feldspathic quartzite and subordinate siltite and argillite. Includes Mount Shields, Bonner, Striped Peak, and Libby formations in northern Idaho and possibly correlative quartzite north of Salmon and in the Meadow Creek metamorphic sequence east of Elk City.

Yml **Lower Missoula Group (Mesoproterozoic)**—Siltite, argillite, and dolomitic siltite in northern Idaho; includes Snowslip and Shepard formations, rocks previously mapped as upper member of Wallace Formation, and correlative garnet-grade phyllite and schist south of St. Joe River. Also includes schist, micaceous quartzite, and calc-silicate rocks in lower part of Meadow Creek metamorphic sequence east of Elk City, and argillite, siltite, phyllite, and calc-silicate rocks south of Lost Trail Pass.

Yp **Piegan Group (Mesoproterozoic)**—Calcareous and dolomitic siltite, quartzite, and subordinate argillite of the Helena and Wallace formations in northern Idaho; south of St. Joe River, correlative rocks include garnet-grade feldspathic quartzite and calc-silicate gneiss.

Yra **Ravalli Group (Mesoproterozoic)**—Feldspathic quartzite and subordinate siltite and argillite of the Burke, Revett, and St. Regis formations in northern Idaho; south of St. Joe River, includes correlative garnet-grade quartzite and schist.

Yp **Prichard Formation (Mesoproterozoic)**—Siltite, quartzite, and argillite in northern Idaho; deposited in deep water and contains voluminous ~1470 Ma mafic sills. Includes siltite, quartzite, fine-grained schist, and carbonate rocks structurally above anorthosite near Boehls Butte, northeast of Elk River.

Ygs **Gneiss, schist, and quartzite (Mesoproterozoic)**—Kyanite and sillimanite gneiss, schist, quartzite, and amphibolite that is metamorphosed lower part of Prichard Formation (Hauser Lake Gneiss) and underlying quartzite of Gold Cup Mountain in the Priest River metamorphic complex.

MESOPROTEROZOIC METASEDIMENTARY ROCKS OF LEMHI SUBBASIN OF BELT BASIN

Ysl **Swauger and Lawson Creek formations (Mesoproterozoic)**—Quartzose medium- to coarse-grained quartzite of Swauger Formation and siltite and quartzite of overlying Lawson Creek Formation in east-central Idaho.

Yl **Lemhi Group (Mesoproterozoic)**—Feldspathic fine-grained quartzite, siltite, and subordinate argillite and carbonate-bearing rocks in east-central Idaho; includes Apple Creek, West Fork, Inyo Creek, Big Creek, and Gunsight formations.

Yha **Hoodoo Quartzite and argillaceous quartzite (Mesoproterozoic)**—Feldspathic fine-grained quartzite in central Idaho that is stratigraphically above the Yellowjacket Formation. Also includes argillaceous quartzite above the Hoodoo Quartzite.

Yy **Yellowjacket Formation (Mesoproterozoic)**—Siltite, calc-silicate rocks, argillite, and rare marble in central Idaho; stratigraphically below the Hoodoo Quartzite.

Yq **Quartzitic metamorphic rocks (Mesoproterozoic)**—Feldspathic quartzite and subordinate schist and calc-silicate rocks of central Idaho. Includes the Golden metamorphic sequence east of Grangeville that is probably metamorphosed western facies of Lemhi subbasin.

Ym **Gneissic and schistose metasedimentary rocks (Mesoproterozoic)**—Biotite-rich paragneiss and schist, and subordinate feldspathic quartzite and calc-silicate rocks. Probably metamorphosed western facies of Lemhi subbasin. Characterized by igneous suite of *Yam* and *Yag*. Includes Elk City metamorphic sequence and metamorphic rocks east of Moscow, along Salmon River northwest of Salmon, and in Pioneer Mountains.

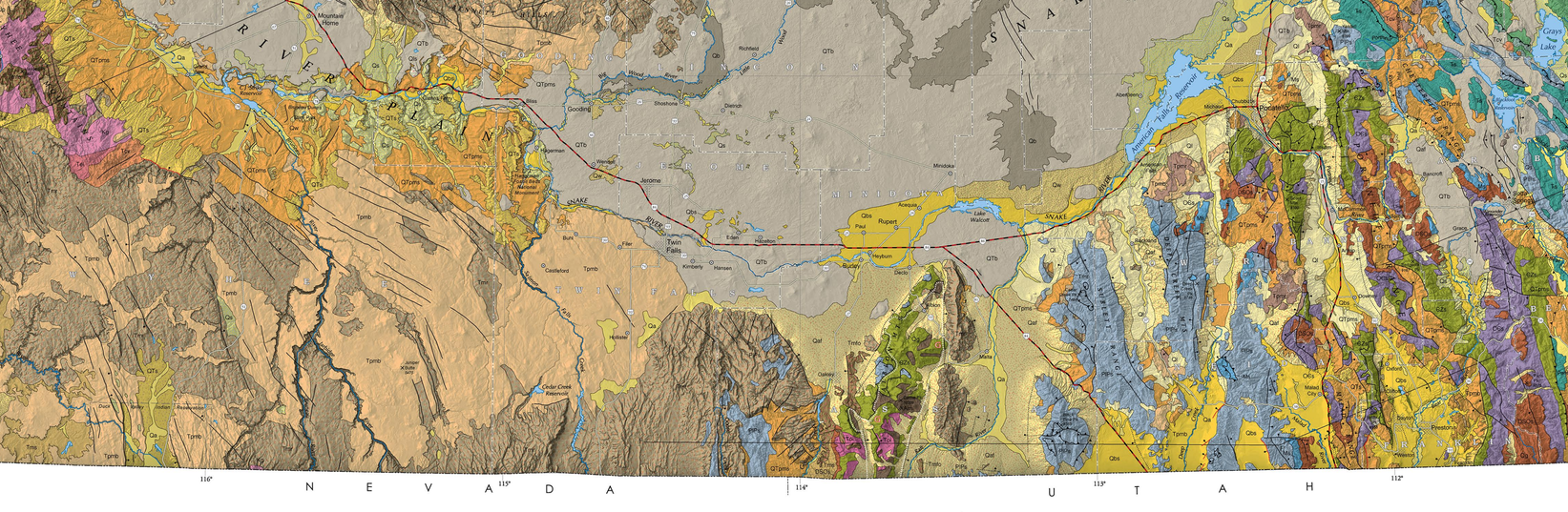
MESOPROTEROZOIC TO ARCHEAN BASEMENT ROCKS

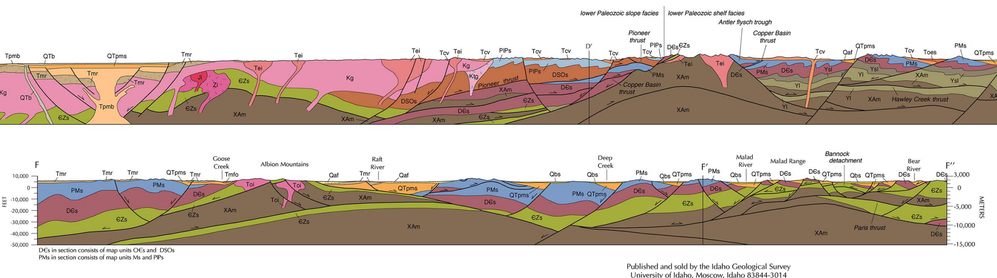
Yagl **Laclede augen gneiss (Mesoproterozoic)**—Biotite granite augen gneiss southeast of Priest River (~1575 Ma). Unit is in structural contact with surrounding rocks. Abundant alkali feldspar and high iron content indicate A-type granite composition.

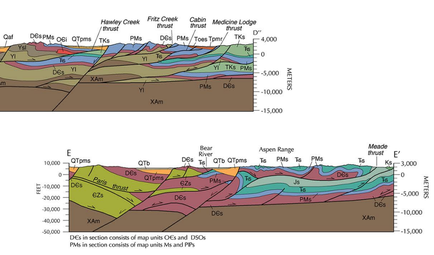
Xan **Anorthosite (Paleoproterozoic)**—Metamorphosed anorthosite at Boehls Butte northeast of Elk River (~1787 Ma). Unit is in structural contact with overlying rocks of the Prichard Formation.

Xog **Orthogneiss (Paleoproterozoic)**—Biotite tonalite gneiss and hornblende-biotite tonalite gneiss (~1870 Ma) north of North Fork of Clearwater River, and south of Coeur d'Alene.

XAm **Metamorphic rocks (Paleoproterozoic and Archean)**—Pend Oreille granodiorite gneiss near Priest River (~2650 Ma); schist, gneiss, and subordinate quartzite along North Fork Clearwater River; Kelly Creek granite gneiss northeast of Pierce (~2670 Ma); orthogneiss in Pioneer Mountains (~2600 Ma and 695 Ma); granite gneiss, granite, schist, and amphibolite of Green Creek complex in Albion Mountains (~2600 Ma); granite gneiss in Beaverhead Mountains east of Leadore (~2450 Ma); and marble, quartzite, schist, and amphibolite of uncertain age near Henrys Lake.







DCs in section consists of map units OCs and DSOs
PMs in section consists of map units Ms and PPs

DCs below Pioneer thrust in section consists of map units OCs and DSOs
PMs below Pioneer thrust in section consists of map units Ms and PPs

BASE MAP:

Projection: Idaho Transverse Mercator, 1927 North American Datum.

Shaded relief compiled from three light illuminations of 10 m National Elevation data.

Water bodies and streams from Idaho Department of Water Resource data. The Snake River course in western Idaho was digitized from NAIP 2006 imagery.

Towns and cities from 2000 Census Tiger data.

Roads from Idaho state highway data, Idaho Transportation Department. Some additional roads were digitized from NAIP 2006 imagery.

Peaks were added from the GNIS database.

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