



SCALE 1:62 500
 1 2 3 4 MILES
 1 2 3 4 KILOMETERS
 CONTOUR INTERVALS 40, 50, AND 80 FEET
 DATUM IS MEAN SEA LEVEL

EXPLANATION

<p>Quaternary</p> <p>Surficial deposits Qal, alluvial deposits of silt, sand, gravel, cobbles, and boulders Qa, talus; angular fragments of waste rock fringing cliffs Qc, volcanic deposits; angular fragments of waste rock from source area of avalanche Qs, landslide deposits; angular fragments of waste rock from source area of slide, characterized by irregular hummocky topography Qrs, rock streams; angular fragments of waste rock forming lobes characterized by flow wrinkles Qe, colluvial deposits</p> <p>Glacial deposits Qe, chiefly till in cirques and glaciated valleys. Unsorted mixture of material ranging from clay to boulders; includes both young fresh undisturbed moraines and older moraines that are rounded and dissected</p> <p>Granodiorite and related rocks of Electric Peak stock In complex stock; rocks are medium gray to medium dark gray, fine to medium grained, composed of different proportions of plagioclase (anorthite to bytownite), quartz, potassium feldspar, biotite, hornblende, and augite</p> <p>Lamprophyre of Bighorn Pass sheet Dark-gray, fine-grained; consists of automorphic granular aggregate of potassium feldspar, plagioclase (An₅₀₋₆₀), quartz, biotite, diopside, magnetite, apatite, and alteration products; mafic minerals occur as phenocrysts</p> <p>Porphyry laccoliths and sills Biotite rhombic porphyry and biotite-quartz lattice porphyry, medium-light-gray to light-gray, fine to very fine grained, porphyritic; contain abundant phenocrysts of plagioclase (An₅₀₋₆₀), biotite, and hornblende in a microcrystalline groundmass that is filled or traugitic and composed of minute crystals of plagioclase and commonly microperthitic quartz surrounded by products of diatexic alteration</p> <p>Biotite quartz monzonite of Mount Holmes stock Light to very light gray, fine-grained, hypotaxomorph porphyritic. Marginal zone (shown by dotted pattern) includes both very fine grained granoblastic quartz monzonite that is a hypotaxic chilled zone and quartz-feldspar hornfels derived from the Flathead Sandstone and Wolsey Shale that form the roof of the stock</p> <p>Landslide Creek Formation Sandstone and conglomerate, greenish-gray, poorly sorted, composed mainly of fragments of andesitic volcanic rocks. Thickness not known</p> <p>Everts Formation Sandstone, light to medium-gray, fine to medium-grained, thin-bedded, tabular and calcareous; interbedded dark to olive-gray chippy shale, mudstone, and siltstone. Thickness about 1,200 feet</p> <p>Eagle Sandstone Sandstone, light to medium-gray, fine to medium-grained, thin to thick-bedded, calcareous; interbedded dark-gray carbonaceous shale, in beds a few feet thick, and thin lenticular coal. Basal 160 feet, the Virgelle Sandstone Member, is medium-light-gray fine-grained thick-bedded to massive arenaceous sandstone. Thickness about 500 feet</p> <p>Telegraph Creek Formation Sandstone, brownish to medium-light-gray, fine to very fine grained, thin-bedded, calcareous; interbedded medium-gray platy mudstone and shale. Gradational into overlying and underlying formations. Thickness about 500 feet</p> <p>Cody Shale Upper shale member: medium to dark-gray platy to chippy mudstone and shale; interbedded dark-greenish to brownish-gray very fine grained sandstone and siltstone. Thickness about 500 feet Middle sandstone member: yellowish to brownish-gray very fine grained medium-bedded glauconitic sandstone; interbedded dark-gray shale. Thickness about 10 feet Lower shale member: medium to dark-gray and yellowish-gray shale and mudstone; interbedded similarly colored siltstone and fine-grained sandstone. Thickness 250-400 feet</p> <p>Frontier Sandstone Sandstone, yellowish to light-olive-gray to medium-gray, fine-grained, partly calcareous, partly tabular, in beds 1-3 feet thick separated by thin interbeds of dark-gray shale. Thickness about 50-100 feet</p> <p>Mowry Shale Shale, medium to dark-gray, chippy to pencil; a few interbeds of olive-gray fine to medium-grained sandstone and of light-gray bentonite. Thickness about 500 feet</p>	<p>Quaternary</p> <p>Thermopsis Shale Upper sandstone member: yellowish-gray to grayish-brown fine-grained calcareous, partly glauconitic siltstone; interbedded dark-gray chippy shale and mudstone. Thickness about 100 feet Middle shale member: dark-gray very fine shale; a few thin interbeds of olive-gray fine-grained sandstone. Thickness about 100 feet Lower mudstone member: medium-light to yellowish-gray fine-grained medium to thick-bedded sandstone; interbedded medium-dark-gray shale and siltstone. Thickness 75-100 feet</p> <p>Kootenai Formation Mainly shale and mudstone, medium-dark-gray and grayish-red, a few thin interbeds of light-gray limestone and sandstone; medium to light-gray "stratoid limestone," 20-30 feet thick; near top, massive chert, pebble conglomerate and quartz-chert sandstone unit 20-50 feet thick at base. Thickness 250-300 feet</p> <p>Morrison Formation Shale, mudstone, and siltstone, grayish-red, dark-gray, and grayish-green; interbedded yellowish-brown to light-gray, fine to very fine grained sandstone in lenticular beds as much as 3 feet thick, and, in upper and basal parts, olive and medium-light-gray limestone. Thickness about 200 feet</p> <p>Ellis Group</p> <p>Swift Formation: calcareous sandstone and sandy limestone, pale-yellowish-brown to light-olive-gray, medium-grained, glauconitic, oolitic, locally concretionary. Thickness 12-60 feet Riverton Formation: shale, mudstone, and siltstone, pale-red to medium-gray, calcareous; a few beds less than 0.5 feet thick of medium to light-gray partly oolitic limestone. Base marked by 1- to 6-foot-thick bed of medium-gray fine-grained oolitic limestone. Thickness 10-60 feet Sherlock Formation: Upper red-bed member: pale to grayish-red siltstone, mudstone, and shale. Thickness 25-40 feet Middle limestone member: medium-light to medium-dark-gray very fine grained chippy fossiliferous limestone in 0.1- to 1.0-foot-thick beds; interbedded dark-gray shale. Thickness 60-75 feet Lower red-bed member: grayish-red and grayish-green siltstone, mudstone, and shale. Thickness 80-80 feet</p> <p>Thaynes(?), Woodside, and Dinwoody Formations</p> <p>Thaynes(?) Formation: light-gray fine-grained calcareous sandstone in beds 0.2-3 feet thick. Thickness 0-50 feet Woodside Formation: grayish-red to reddish-brown shale, mudstone, and siltstone, and micaceous sandstone, in beds 1-5 feet thick; lower part and some interbeds are greenish-gray shale. Thickness 75-100 feet Dinwoody Formation: light to yellowish-gray very fine grained thin-bedded limestone; weathers near pale brown. Thickness 0-50 feet</p> <p>Shedhorn Sandstone Upper sandstone and dolomite: medium to light-gray fine to very fine grained sandstone and medium-light to brownish-gray fine-grained calcareous dolomite; beds 0.1-0.5 feet thick. Thickness about 30 feet Middle chert and sandstone: brownish-gray to grayish-yellow phosphatic chert and cherty phosphatic glauconitic sandstone; beds 0.1-1.0 feet thick. Thickness about 30 feet Lower phosphatic sandstone: medium to yellowish-gray fine-grained slightly calcareous sandstone containing as much as 50 percent phosphatic nodules and pebbles; beds 0.1-2.0 feet thick; basal part includes 10 feet of yellowish-gray shale. Thickness about 60 feet</p> <p>Quadrant Sandstone Sandstone and quartzitic sandstone, yellowish-brown to very light gray, fine-grained, in beds 0.5-3 feet thick; interbeds commonly less than 1 foot thick of light-gray fine-grained dolomite in upper half and basal part. Thickness 200-225 feet</p> <p>Amnsden Formation Upper unit: grayish- and pale-red calcareous or dolomitic siltstone; a few thin interbeds of dolomite and shale. Thickness 0-30 feet, removed by erosion in some places Lower unit: pale-red to yellowish-orange mudstone, siltstone, and shale; interbedded fine to very fine grained calcareous sandstone. Thickness 0-30 feet Formation thickness typically 0-60 feet</p> <p>Mm, Madison Group undivided Mm, Madison Canyon Limestone: medium gray to pale-yellowish-brown fine to coarse-grained limestone and dolomite in beds 1-5 feet thick or massive; nodules of brownish-gray chert common; massive dolomite at top and base. Thickness about 100 feet Mi, Lodgepole Limestone: light-brownish to medium-gray fine to medium-grained limestone in beds 0.1-2.0 feet thick separated by partings and interbeds as thick as 0.5 feet of calcareous siltstone and silty limestone; contains abundant fossils; lower half locally contains abundant nodules and thin irregular beds of yellowish-brown to dark-gray chert. Thickness about 600-600 feet</p>	<p>Three Forks and Jefferson Formations Df, Three Forks Formation: Trident Member equivalent (in northeast part of park only): grayish-red and grayish-green calcareous mudstone and shale and interbedded light-gray fossiliferous limestone, grading downward into yellowish-brown to grayish-green sandstone and shale. Thickness about 50 feet Lower Galatin Member equivalent: In Gallatin Range: light-olive-gray very fine grained dolomite and silty dolomite, in beds 0.1-0.2 feet thick, in upper 15-50 feet, underlain by light-olive to yellowish-brown to dark-gray shale and mudstone in lower 20-25 feet. Thickness 80 feet In northern part of park: lenticular limestone and dolomite in upper 30 feet, underlain by light-olive to dark-gray shale and mudstone that includes interbeds less than 1 foot thick of yellowish-brown fine-grained limestone. Thickness 80 feet Df, Jefferson Formation: In Gallatin Range: yellowish-brown to brownish-gray very fine grained massive dolomite 80 feet thick (equivalent to Riverton Member), underlain by brownish- to light-gray (rarely dark-gray) very fine to fine-grained and upper, partly fossiliferous dolomite in beds 0.1-2.0 feet thick containing thin interbeds of yellowish-brown dolomitic siltstone and silty dolomite. Thickness 210 feet In northeastern part of park: pale and pale-yellowish-brown fine-grained sandy dolomite and dolomitic limestone in beds 0.2-1.0 feet thick. Thickness about 175 feet</p> <p>Bighorn Dolomite Dolomite, light-brownish-gray, very fine to fine-grained, partly laminated; partly containing light-gray to yellowish-orange chert in lenses as long as 5 feet, in beds 0.1 foot thick to massive with massive units most common in upper part. Thickness 100-200 feet</p> <p>Snowy Range Formation Gray Creek Limestone Member: brownish-gray to yellowish-orange very fine to medium-grained dolomite limestone, dolomite, and dark-blue shale. Thickness 0-10 feet Sage Limestone Member: pale-yellowish-brown to medium-gray very fine grained, partly glauconitic limestone, irregularly ribbed with grayish- or dark-yellowish-orange sandy limestone and calcareous sandstone; in beds about 1 foot thick; interbeds as thick as 2 feet of variably colored mudstone limestone; contains abundant fossils; Colletia magna beds at base only in north-central and northwestern parts of park. Thickness 15-150 feet Dry Creek Shale Member: greenish- to light-olive-gray shale; interbeds less than 1 foot thick of very fine grained calcareous sandstone and siltstone; interbeds of gray very fine grained oolitic glauconitic limestone and limestone pebble conglomerate at top, a 1-foot-thick bed of yellowish-brown platy calcareous siltstone or very fine grained sandstone at base in Gallatin Range. Thickness 40 feet Formation thickness 110-800 feet</p> <p>Pilgrim Limestone Upper unit: medium-gray, mottled yellowish-gray and pale-yellowish-brown, largely oolitic fine to medium-grained thick-bedded to massive limestone. Thickness 10-150 feet Middle unit: medium-gray medium to coarse-grained glauconitic fossiliferous limestone pebble conglomerate. Thickness about 60 feet Lower unit: medium-gray very fine grained limestone in beds 0.2-0.5 feet thick ribbed with grayish-orange silty limestone, interbedded with medium-gray oolitic glauconitic fossiliferous limestone in beds 0.2-0.5 feet thick; a few beds of limestone pebble conglomerate and grayish-green shale. Thickness 75-100 feet Formation thickness 100-250 feet</p> <p>Park Shale Shale and mudstone, grayish-green to medium-dark-gray; upper part includes interbeds as much as 0.5 feet thick of yellowish-gray to grayish-green argillaceous or glauconitic silty limestone; lower part includes a few interbeds less than 0.5 feet thick of limestone concretion, glauconitic limestone, and limestone pebble conglomerate. Thickness 100-120 feet</p> <p>Meagher Limestone Limestone, mottled medium-gray to medium-dark-gray and yellowish-gray to grayish-orange, very fine grained, in beds 0.1-2.0 feet thick, separated by partings or thin interbeds of grayish-green shale. Thickness 175-255 feet</p> <p>Wolsey Shale and Flathead Sandstone Wolsey Shale: greenish-gray micaceous and sandy shale; thin interbeds of argillaceous calcareous sandstone and siltstone and glauconitic silty limestone; upper 80 feet gradational into overlying Meagher Limestone. Thickness 100-150 feet Flathead Sandstone: yellowish-gray to grayish-orange fine to medium-grained quartzitic sandstone in beds 0.2-3.0 feet thick; partly laminated or cross-laminated; basal part includes poorly sorted sandstone and conglomerate. Thickness 100-160 feet</p>	<p>UNCONFORMITY</p> <p>CONTACT</p> <p>FAULT Dashed where approximately located or indefinite; dotted where concealed; K, indicates formation boundary locally separated within larger mapped unit</p> <p>REVERSE FAULT Dashed where approximately located or indefinite; dotted where concealed; R, upthrown side</p> <p>GLIDE FAULT Dashed where approximately located. Southeast on upper plate</p> <p>Strike and dip of beds Inclined Horizontal Overturned Strike and dip of joints Inclined Vertical Strike and dip of foliation</p> <p>Anticline Dotted where concealed</p> <p>Syncline Dotted where concealed</p> <p>Limestone sink</p>
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See west half for sections

**GEOLOGIC MAP AND SECTIONS OF PRE-TERTIARY ROCKS,
 NORTHERN PART OF YELLOWSTONE NATIONAL PARK**

