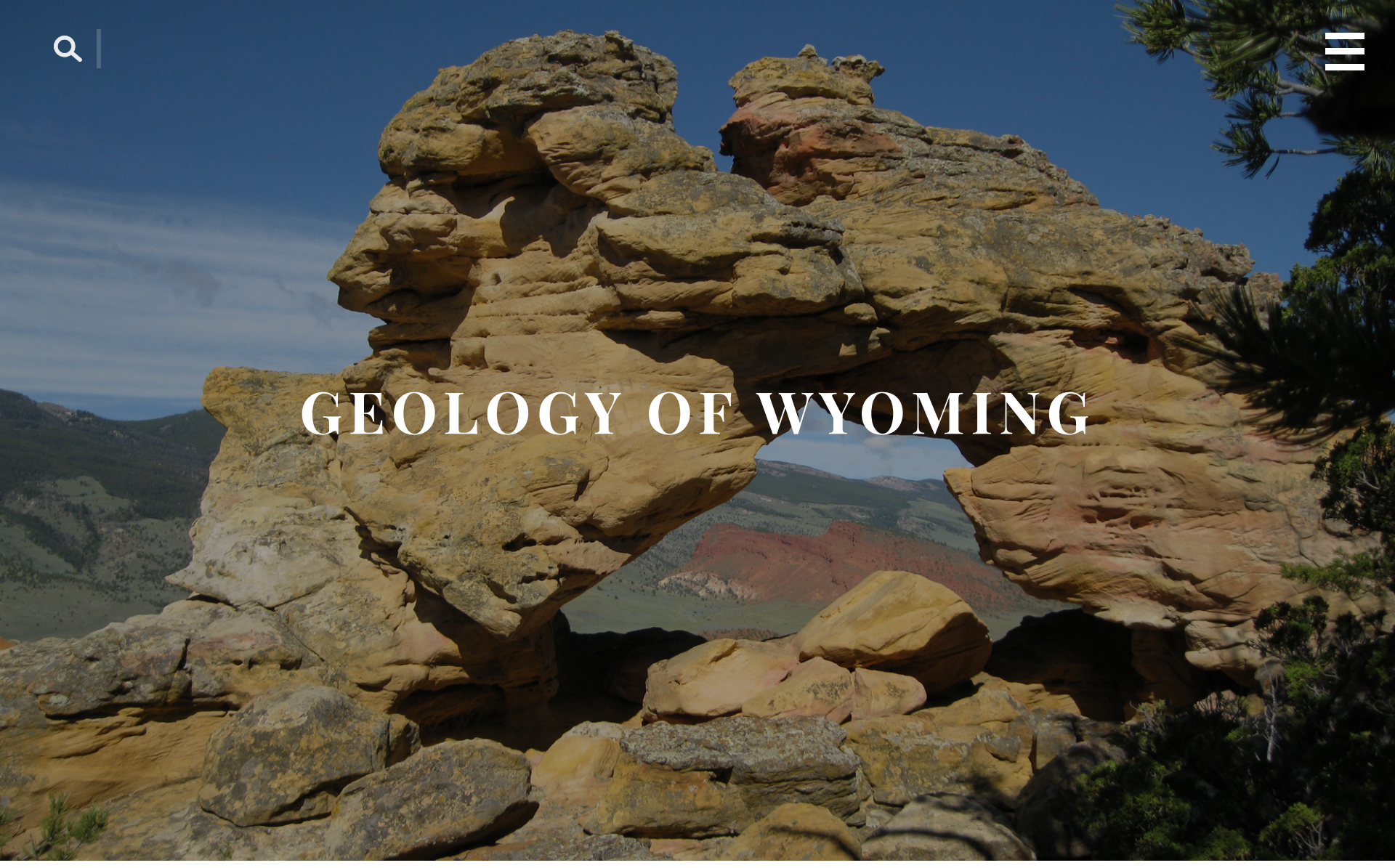


RED CANYON

Wow Factor *(3 out of 5 stars):*

★★★

Geologist Factor *(3 out of 5 stars):*

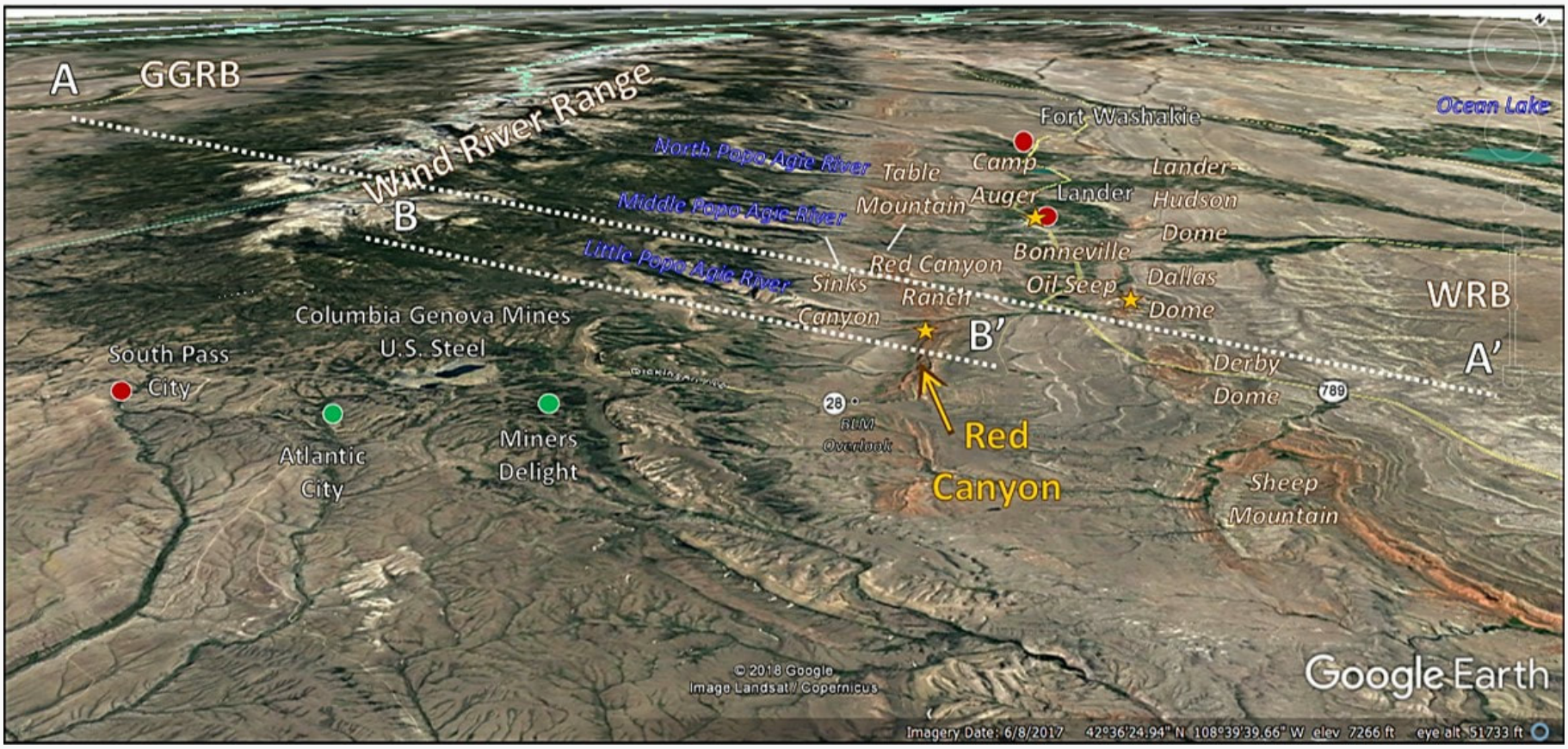
★★★

RED CANYON (18.6 MB)

Attraction

National Natural Landscape of cuesta landform terrane displaying differential erosion in a beautiful red and green valley.

At the northeast foot of the towering Wind River range lies a strike valley carved down through the Chugwater and into the Dinwoody Formation that is the location of one of Wyoming's most spectacular landscapes. It is in an historic area that played an important role in the development of the Lander Valley and Red Canyon. Red Canyon is visible to motorists who travel on Wyoming Highway 28 between South Pass and Lander. The Nature Conservancy operates a working ranch in the heart of the valley and the Wyoming Game and Fish maintains a Wildlife Management Area.



Northwest aerial view of the Red Canyon area. Abbreviations: GGRB, Greater Green River Basin; WRB, Wind River Basin. Location of cross sections AA' and BB' shown on image.
Image: Google Earth

Red Canyon in Spring from BLM overlook, Highway 28. View is to the northwest. Paleozoic Phosphoria Formation forms the treeless dip slope on the left. Red Canyon Creek flows northward along strike of the Dinwoody and Lower Red Peak Member of the Chugwater Group in the green valley. The east side of the canyon is called Red Canyon Rim and consists of red Chugwater sandstone with overlying salmon pink Nugget Sandstone on the top of the canyon (right side of the image). Table Mountain rises in the distance in the center of the image at the head of Red Canyon at the junction with the Middle Popo Agie River. It is a remnant stream terrace of dipping Mesozoic rocks with Eocene conglomerate top. Abbreviations: Jn, Jurassic Nugget Formation; Trc, Triassic Chugwater Group; Trd, Triassic Dinwoody Formation; Pp, Permian Phosphoria Formation.
Image: Bureau Land Management Website, Red Canyon Overlook; https://www.blm.gov/visit/red-canyon-overlook.

History of Red Canyon Area

There is archeologic evidence that Native Americans migrated through the Lander Valley over the last 10,000 years. The Eastern Shoshone lived in western Wyoming and the Wind River area for at least the last 3,000 years and possibly as far back as 8,000 years ago. They camped in the Pinedale area and along the eastern slopes of the Wind River Mountains. Shoshone presence in Red Canyon is recorded by spear and arrow points, tepee rings and petroglyphs.

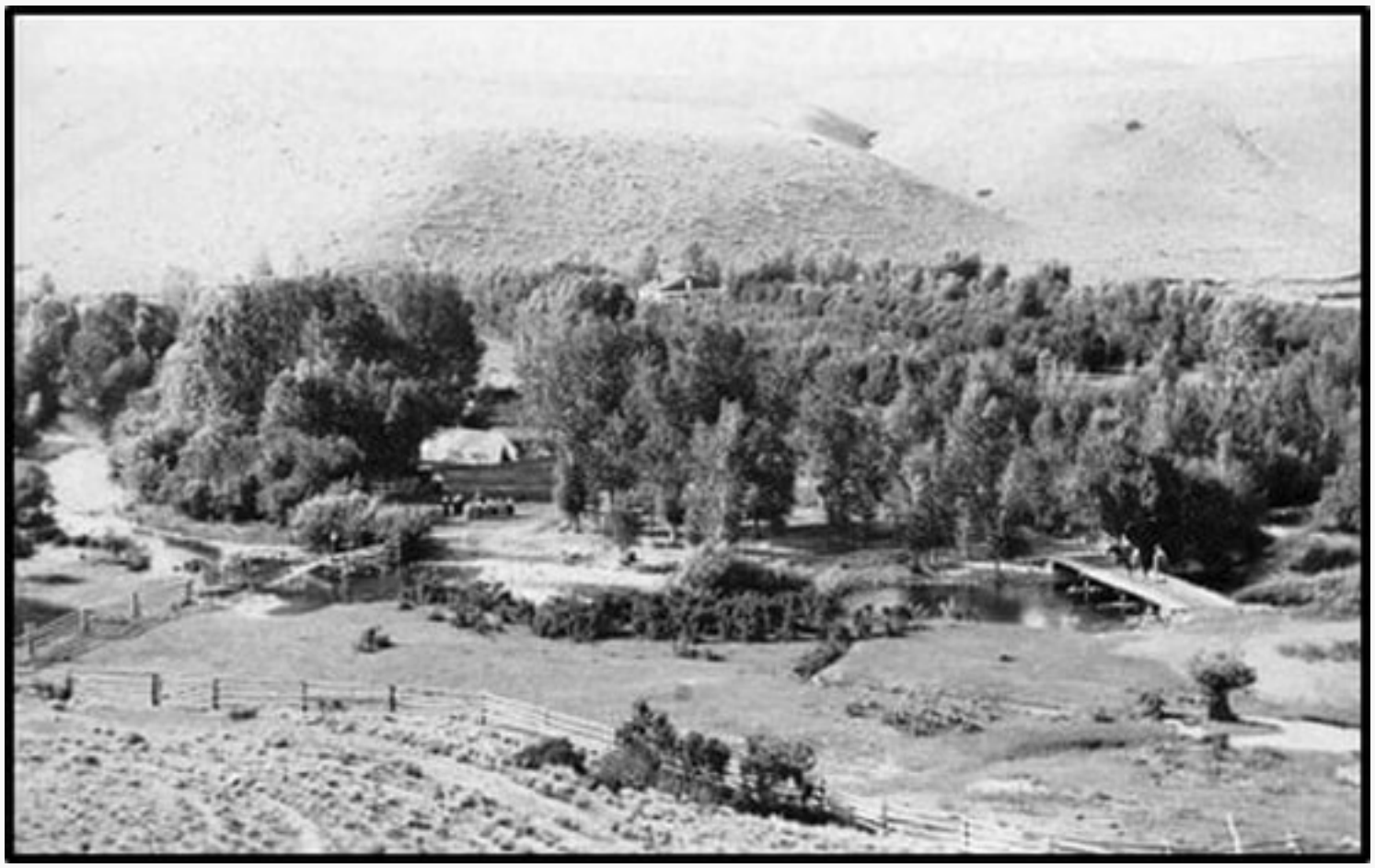
Summer encampment, Lander Valley.
Image: Theisse, C., Foutz, T, and Sproggs, J., 2010, Lander: Images of America, Location 106, Kindle Edition.

The Shoshone people were familiar with Europeans since the time of the Lewis and Clark expedition in 1805. The first mountain men entered the area in 1811. The Shoshone participated in the fur trade from 1825 to 1840. All the mountain rendezvous of that period were held within their territory. Captain Bonneville passed through the area in 1827 and reported a giant tar spring on Dallas Dome that became the site of Wyoming's first oil discovery well, the Murphy #1 in 1884. The Murphy # 1 discovery was the beginning of the state's modern oil business.

Mike Murphy at the Murphy # 1 well site, adjacent to “Giant Tar Spring” in the Little Popo Agie River. The Oil spring was first reported in Washington Irving’s “The Adventures of Captain Bonneville, U. S. A., in the Rocky Mountains and the Far West Captain Bonneville” about five miles northwest of Red Canyon.
Image: Mohrbacher, D., 2013, EOR and IOR in Wyoming: SPE/WGA Meeting, Casper, Wyoming; http://www.co2conference.net/wp-content/uploads/2014/01/David-Mohrbachers-Residual-Oil-Zone-Interview-EOR-and-IOR-in-Wyoming.pdf.

The first migrant train of white Europeans passed through in 1836 on the way to Oregon Territory. John C. Fremont and Kit Carson made their first expedition exploring the American west through the area in 1842. The Mormon migration, of people seeking religious freedom, began in 1847, and they settled in the Salt Lake Valley (on Shoshone territory). The California gold discovery in 1849 brought another, new breed of immigrants through their land (wealth seekers). Although placer gold was found along one or more of the creeks in the South Pass area in 1842, it was not until the discovery of the Carissa Load in 1867 that a rush of miners flooded into the region. Their presence on the mountain disrupted the native’s food chain by changing wildlife migrations and contaminated their streams serving as native drinking water with waste. Arapahoe, Cheyenne and Sioux bands, who were recent interlopers to Shoshone territory, became aggressive and raided the mining communities stealing horses and mules and killing miners. It was during this period that settlement began in the Lander Valley and Red Canyon. The area quickly became the “bread basket” for the mining communities in the mountain camps of South Pass City, Atlantic City and Miners Delight. Previously their supplies

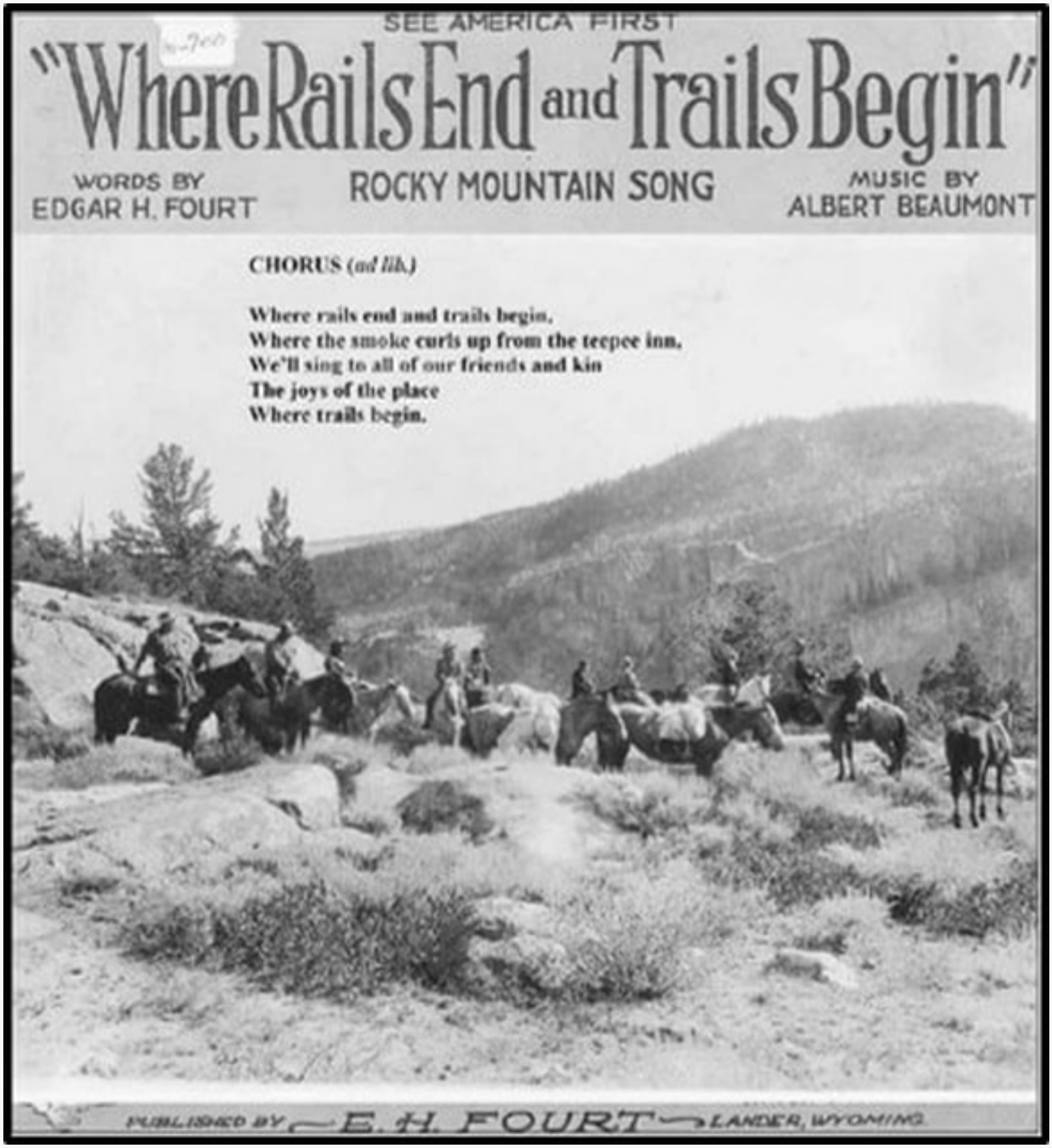
had to come from Salt Lake City, about 250 miles away.



Ed Young's orchard at the foot of Little Popo Agie Canyon and the mouth of Red Canyon, harvested fruit for the South Pass miners and residents of the Lander area.
Image: Theisse, C., Foutz, T, and Sproggs, J., 2010, Lander: Images of America, Location 350, Kindle Edition.

The Wind River Reservation to the north was created by treaty in 1868. Camp Auger was established in 1869 as a sub-fort of Fort Bridger with the dual mission of protecting the Shoshone and the miners from the Arapahoe and their allies. The Fort became a separate outpost in 1870 and renamed Fort Brown. Lander was established on the site of Fort Brown after the fort was moved to a new location (17 miles northwest of Lander) in 1871 and renamed Fort Washakie in 1878 where it remained a military outpost until 1909. Lander, incorporated in 1890,was originally called Pushroot Valley by the miners, was eventually named after General Frederick Lander who supervised the building of the "Lander Cutoff" in 1875.

A wagon road from Lander to Atlantic City was called the "Red Grade" due to the 2,000-foot elevation climb past the colorful Mesozoic rocks of the valley. A stage coach stop was established in the valley at the Red Canyon Ranch House in 1897 on the route connecting Lander and Thermopolis. The stage service ended in 1906 when the Chicago & Northwestern Railroad reached Lander. The track terminated here and was never extended, and the town became known for, "Where Rails end and Trails Begin"

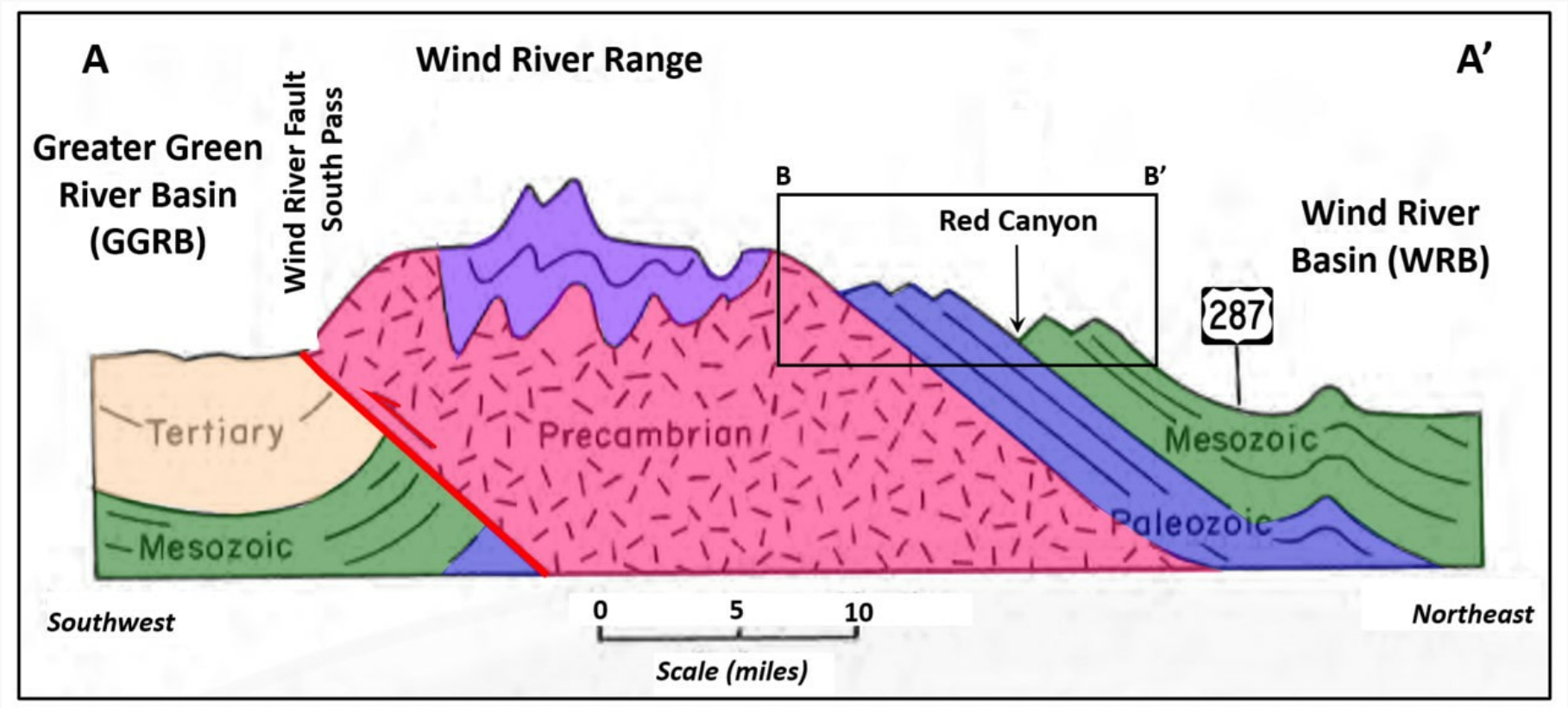


Judge Fourst's 1924 song written to celebrate the town's slogan.
Image:Theisse, C., et. al., 2010, Kindle Location 845.

Geology of Red Canyon

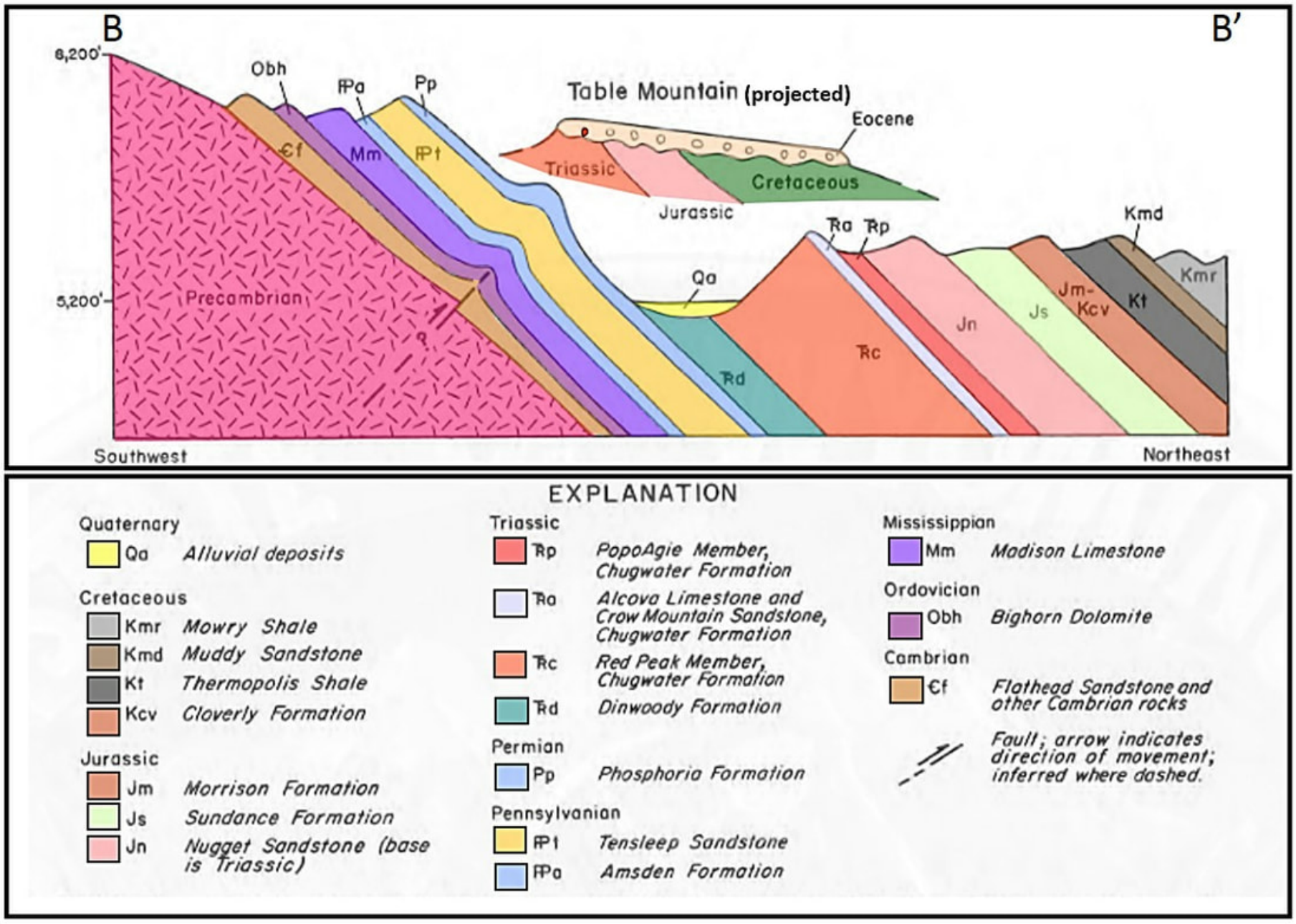
The Wind River Range was uplifted by a southward directed thrust fault during the Laramide Orogeny (70-55 million years ago). The sedimentary rocks above the basement folded and faulted in response. The northeast flank of the range dips into the Wind River Basin where streams have eroded dip canyons and strike valleys along the mountain front. Red Canyon Creek flows northwestward into the Little Popo Agie River generally separating the Paleozoic

dip slope from the Mesozoic cuestas. Table Mountain is a remnant stream terrace preserved beneath Eocene gravels. Parts of Wyoming 28 is built on a similar terrace deposit.



Schematic cross section AA' of the Wind River Range showing the tectonic tilt of the mountain and the location of Red Canyon (cross Section BB') on the northeastern flank of the mountains.

Image: After Mears, Brainerd, Jr., Eckerle, W.P., Gilmer, D.R., Gubbels, T.L., Huckleberry, G.A., Marriott, H.J., Schmidt, K.J., and Yose, L.A., 1986, Geologic tour of Wyoming from Laramie to Lander, Jackson and Rock Springs: Geological Survey of Wyoming [Wyoming State Geological Survey] Public Information Circular 27, Fig. 20, p. 33; http://www.wsgs.wyo.gov/products/wsgs-1986-pic-27.pdf.

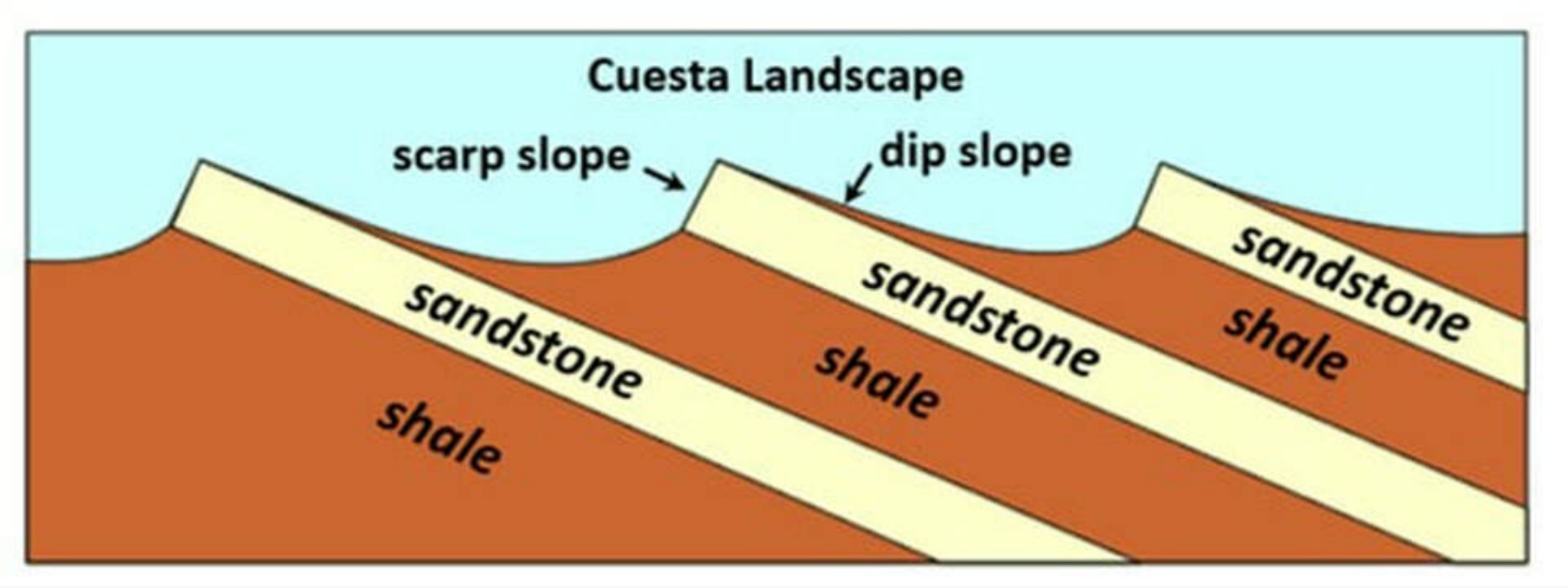


Schematic cross section of the Wind River dip slope and the Red Canyon cuesta landscape. Beds are dipping uniformly 12-15 degrees northeastward (basinward).
Image: After Mears, Brainerd, Jr., Eckerle, W.P., Gilmer, D.R., Gubbels, T.L., Huckleberry, G.A., Marriott, H.J., Schmidt, K.J., and Yose, L.A., 1986, Geologic tour of Wyoming from Laramie to Lander, Jackson and Rock Springs: Geological Survey of Wyoming [Wyoming State Geological Survey] Public Information Circular 27, Fig. 21, p. 34; http://www.wsgs.wyo.gov/products/wsgs-1986-pic-27.pdf.

A cuesta is a linear ridge or hill with a steep fore slope and a gentle backslope created by differential erosion of the tilted sedimentary rock. In this area, the geologic process of formation include: 1) deposition of flat layered Paleozoic and Mesozoic sedimentary rocks, 2) tectonic uplift and tilting of the sedimentary layers during the Laramide Orogeny, 3) differential erosion of dip slope rock layers during the Tertiary, 4) development of dendritic steam drainage that erodes dip canyons (direction of tilt) and strike valleys (structural trend of mountains).

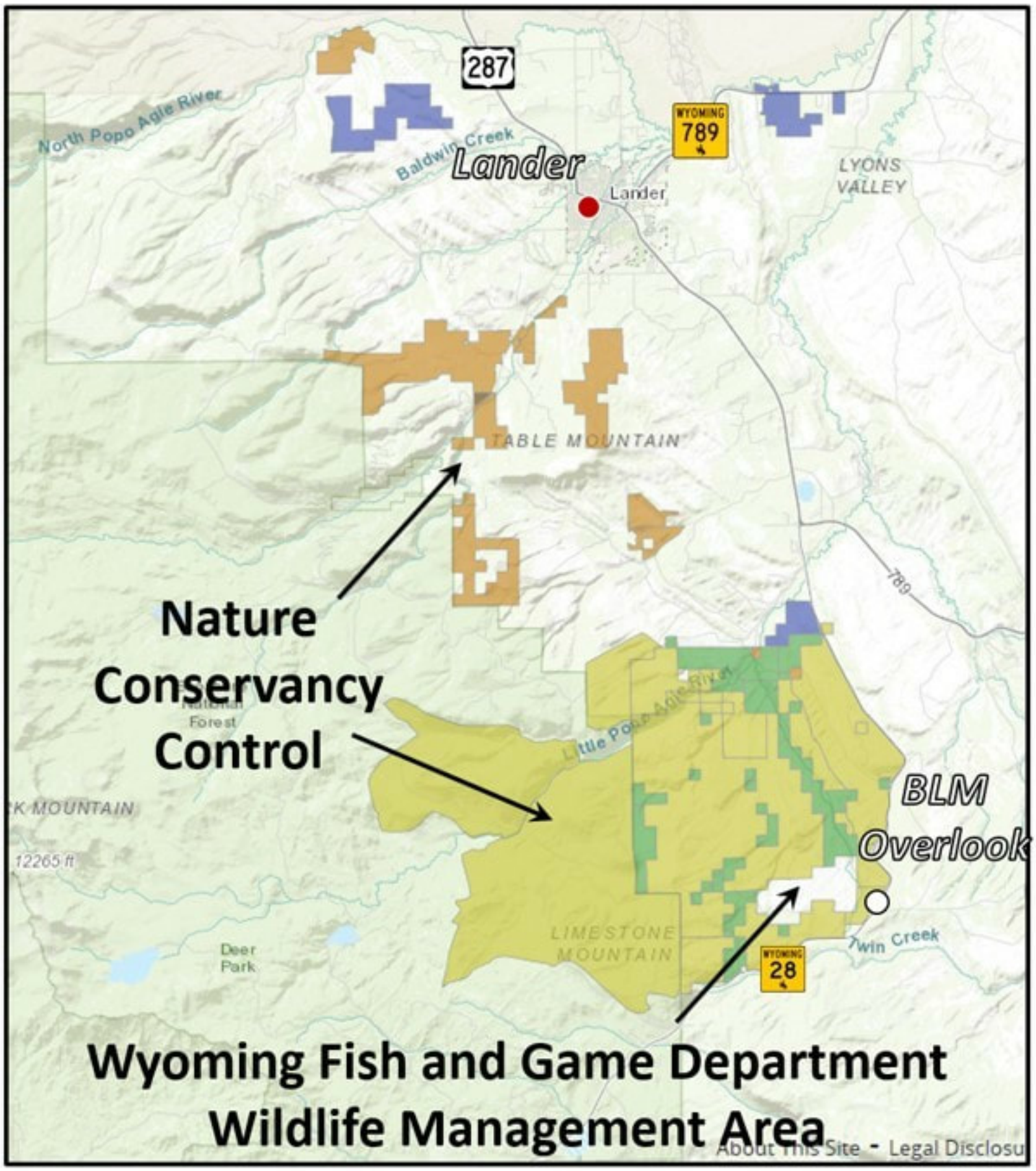
At Red Canyon, resistant Paleozoic marine carbonates and sandstones form canyons on the

backlimb of the Wind River uplift. Red Canyon Creek flows along strike exploiting the soft rocks of the lower Triassic. The cuesta are the dipping linear ridges developed in the red Mesozoic rocks on the northeast side of the stream. Resistant beds form scarp ridges and nonresistant beds form slopes and swales.



Cuesta development by differential erosion of tilted sedimentary layers of varying lithification.
Image: After http://www.columbia.edu/~vjd1/structure_landforms_basic.htm.

Today, the average person sees the Red Canyon National Natural Landmark as a flash of brilliant red and green in a valley hundreds of feet below and to the northwest of Wyoming 28 (South Pass Highway) while traveling at 55 to 65 mile per hour. Some stop at the BLM turnout to gaze across the striking landscape that geology has produced. The area lies about 12 miles north of the 19th century emigrant trails, so most of those early migrators never saw it. But it is the kind of surprise vista they would pass on their road west. Very few visitors know that it was a place of summer encampment for migratory peoples for thousands of years, or that it was an agricultural area that helped feed the citizens of Lander, soldiers at western army posts, miners' families on South Pass and other nearby communities. The ranchers, farmers and homesteaders who lived here were hardworking stewards who preserved their lands and a portion of our national heritage. Today it is a protected site to shelter wildlife and preserve the ecosystem. The Nature Conservancy purchased the 5,000-acre Red Canyon Ranch in 1993 to prevent habitat fragmentation and continue protection of the area's unique biodiversity. The ranch leases about 30,000 acres of state and federal grazing land. The property operates as a working ranch that is open to the public. The open area near the BLM Overlook is the Wyoming Fish and Game Wildlife Management Area. These 1,785 acres were purchased in 1958 for elk winter habitat. Other wildlife including mule deer, pronghorn antelope, moose, ruffed grouse, blue grouse, song birds and small mammalsmake use of the land also. As many as 650 elk have been counted using the habitat during the winter closure period (December 1 – April 30). This is a place that deserves a contemplative visit.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North Popo Agie River
Baldwin Creek
Lander
Lander
LYONS
VALLEY
TABLE MOUNTAIN
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Deer
Park
LIMESTONE
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Wyoming Fish and Game Department
Wildlife Management Area
About This Site - Legal Disclosu


287
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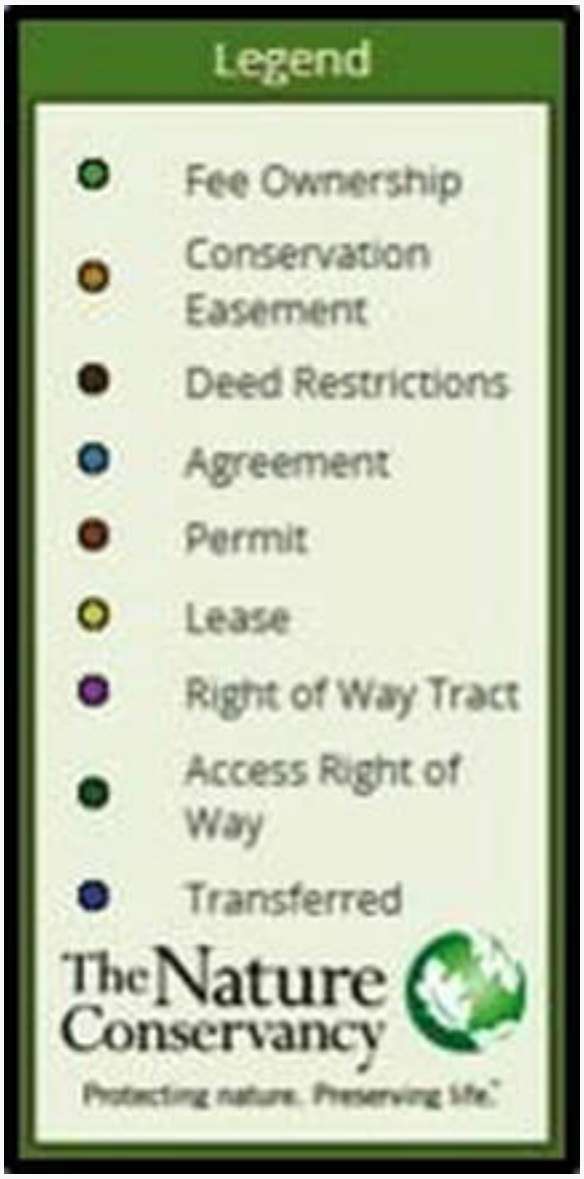
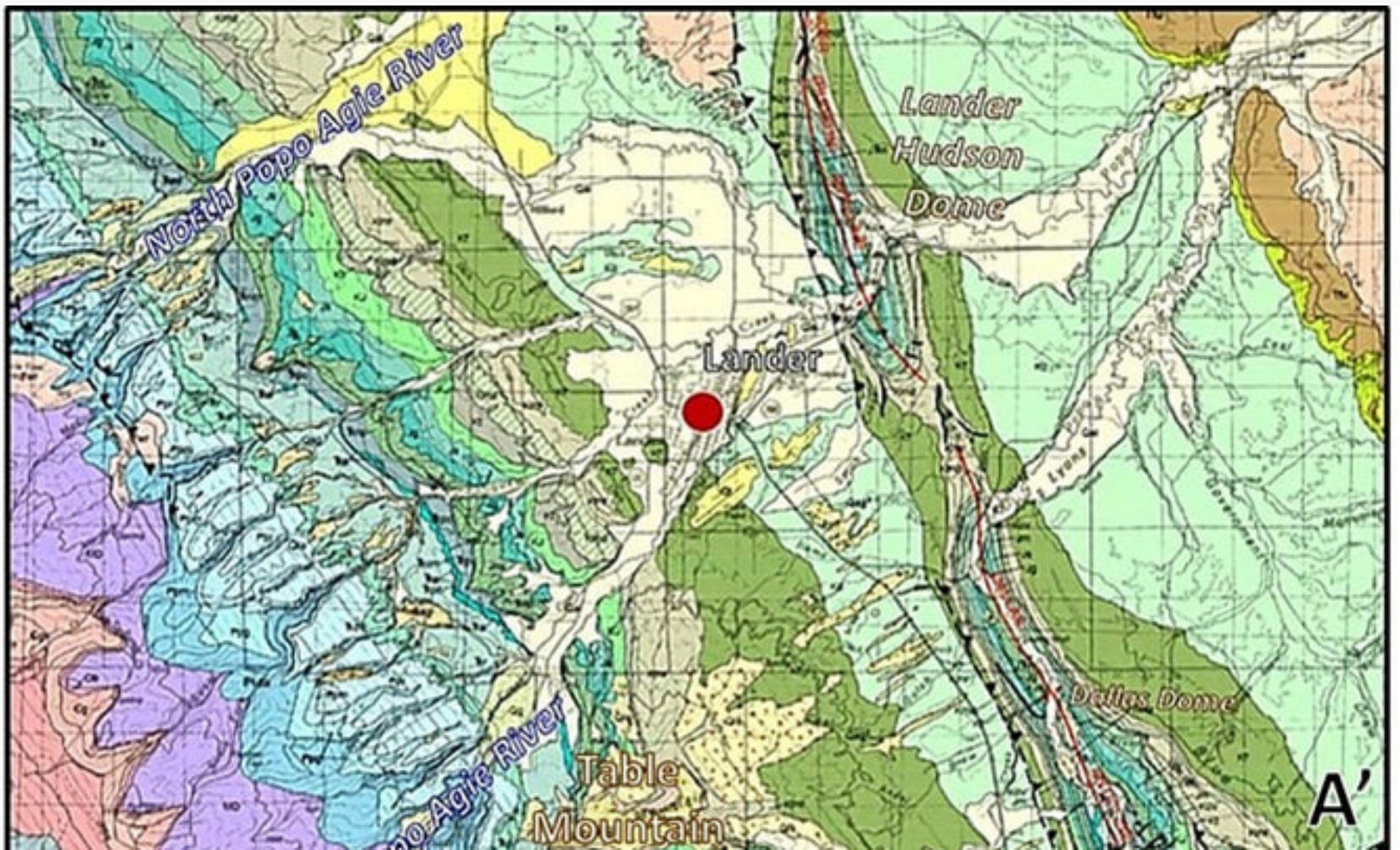
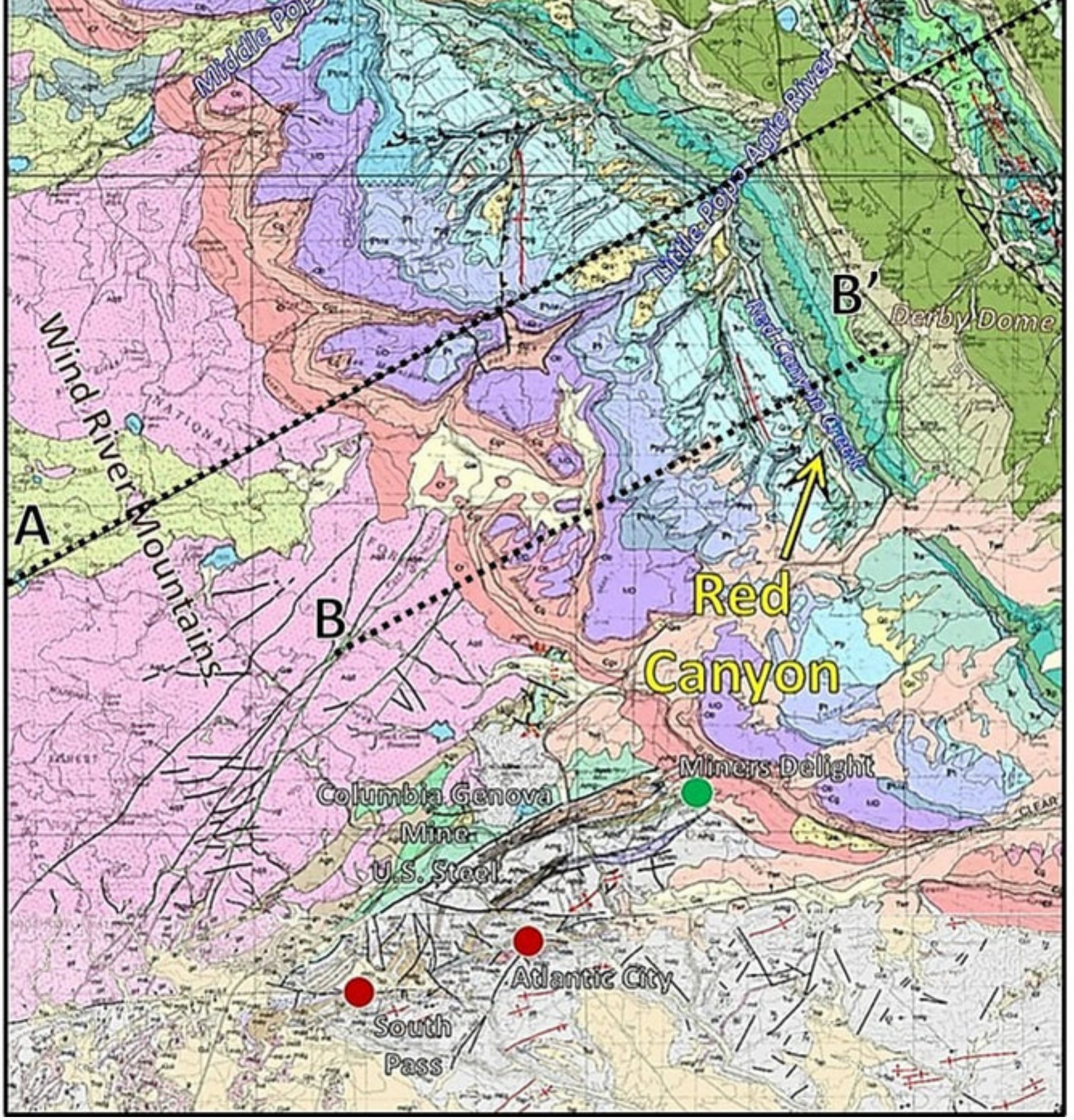


Nature Conservancy Red Canyon land map (top), aerial image (bottom) and legend. Blank area in Nature Conservancy land is the Wyoming Game and Fish Red Canyon Wildlife Management Area.

Image: After http://www.tnclands.tnc.org/ and Google Earth.

Screenshot of wintering elk on the Red Canyon Wildlife Managent Habitat Area, winter 2015.
Image: After https://www.youtube.com/watch?v=DByj3gmA29Y.




Middle Pop
Little Popo Agie River
Red Canyon Creek
B'
Derby Dome
Wind River Mountains
A
B
Red
Canyon
Miners Delight
Columbia Genova
Mine
U.S. Steel
Atlantic City
South
Pass

DESCRIPTION OF MAP UNITS

Quaternary surficial deposits

Alluvial deposits (Holocene and Pleistocene)—Unconsolidated and poorly consolidated clay, silt, sand, and gravel; includes deposits underlying current flood plains and bordering alluvial terraces

Colluvium (Holocene and Pleistocene)—Unconsolidated detritus derived from steep slopes or cliffs; includes slope wash, talus, and scree

Landslide debris (Holocene and Pleistocene)—Locally derived landslide debris from unstable, generally steep slopes

Terrace deposits (Holocene and Pleistocene)—Unconsolidated and poorly consolidated gravel, sand, and silt

Residual gravel (Holocene and Pleistocene)—Gravels known to be derived from Wind River Formation (Thompson, 1950); occurs near downdropped block of Wind River on north end of Lander anticline

Alluvial gravel (Pleistocene)—High level alluvium on pediment surfaces; commonly contains abundant angular pebbles and cobbles of Paleozoic rock; lower few feet locally cemented by calcium carbonate; thickness from 0 to 20 feet (0 to 6 m) (description and thickness from Rohrer, 1973)

Alluvial gravel (Pleistocene)—Locally derived fragments of sedimentary, igneous and metamorphic rocks; contains significant amounts of soil and alluvial material; coarsens toward Wind River Range (modified from Thompson, 1950)

Glacial debris (Pleistocene)—Unconsolidated silt, sand, gravel, cobbles, and boulders derived from Precambrian and some Paleozoic rocks; occurs as lateral and terminal moraines and outwash below moraines in glacial valleys; thickness 0 to 200+ feet (0 to 61+ m) (from Rohrer, 1973)

Tertiary sedimentary rocks

Tertiary rocks undifferentiated—Includes Miocene, Oligocene, and Eocene sedimentary deposits in south-central part of quadrangle (from Abercrombie, 1989)

South Pass Formation (Pliocene/Miocene)—Calcareous conglomerate, white volcanic ash, and light-gray to white tuffaceous sandstone; 0 to 350 feet (110 m) thick in the adjacent South Pass 1:100,000-scale quadrangle (Sutherland and Hausel, 2003)

Split Rock Formation (Miocene) [or Miocene/late Oligocene (?)]—Yellowish-gray to pale-orange conglomerate and well sorted volcanic sandstone, few beds of vitric tuff, resistant and cliff-forming; thickness approximately 150 feet (46 m)

Miocene (?) rocks undifferentiated—Conglomerate on terraces associated with the Little Popo Agie River; age uncertain

White River Formation (Oligocene and upper Eocene)—Lithologically variable, gray to orangish/yellowish-gray, bentonitic and tuffaceous mudstone, arkose and conglomerate; Thickness from 0 to 650 feet (0 to 200 m)

Wagon Bed Formation (upper and middle Eocene)—Greenish-yellow to yellowish-gray sandstone, siltstone, and mudstone containing volcanic debris and bentonite; thickness from 130 to 700 feet (40 to 210 m)

Wind River Formation (lower Eocene)—Yellowish-gray to variegated mudstone, sandstone, and conglomerate in lenticular beds; sandstones are commonly poorly sorted and feldspathic to arkosic; thickness from 0 to greater than 2,400 feet (0 to 730 m)

Fort Union Formation (Paleocene)— Basal conglomerate overlain by a series of interbedded, white, gray, tan, buff and brown sandstones, lenticular conglomerates, carbonaceous shales, siltstones and coal; thickness from 0 to greater than 1,000 feet (0 to 300 m)

Cuesta Units

Mesozoic sedimentary rocks

Lance Formation (Upper Cretaceous)—Interbedded white, gray, and buff, fine- to coarse-grained, in part conglomeratic, lenticular sandstones; gray to black shale and claystone; brown to black carbonaceous shale; and coal; thickness 0 to 900 feet (0 to 270 m)

Mesaverde Formation (Upper Cretaceous)—Massive white basal sandstone overlain by variable, lenticular, interbedded white to yellowish-gray and brown sandstones, gray carbonaceous shales, and coal beds; forms conspicuous light-colored escarpments; thickness from 50 to 300 feet (15 to 91 m) in outcrops, up to 1,500 feet (460 m) in the subsurface. An upper tongue of Cody Shale is mapped with the Mesaverde on Alkali Butte Anticline but is shown separately in subsurface on east flank of that anticline

Upper Mesozoic rocks, undifferentiated—Sedimentary units exposed south of Sweetwater Crossing Anticline. Includes units from Jurassic Sundance to Cretaceous Cody Shale mapped by Bell (1955)

Cody Shale (Upper Cretaceous)—Gray, interbedded sandstone and shale; variably grades from lower silty and sandy shales to siltstone and shaly sandstones above; generally slope-forming, although upper sandstones may form cliffs; thickness from 4,000 to 5,000 feet (1,200 to 1,500 m)

Frontier Formation (Upper Cretaceous)—Gray, tan, and brown, fine- to medium-grained, thin-bedded to massive, sometimes cross-bedded and lenticular sandstones interbedded with gray to black, fissile, silty and sandy shales; forms hogbacks and narrow strike valleys; thickness from 600 to 1,000 feet (180 to 300 m)

Mowry Shale, Muddy Sandstone, and Thermopolis Shale undivided (Upper and Lower Cretaceous)—On cross section only

Mowry Shale (Upper Cretaceous)—Black to dark-gray, hard siliceous shale, containing thin, gray to brown sandstone beds; weathers to distinctive bare, silver-gray ridges with bands of vegetation along interspersed bentonite beds; thickness from 430 to 580 feet (130 to 180 m)

Muddy Sandstone and Thermopolis Shale undivided (Lower Cretaceous)

Muddy Sandstone—Prominent gray, fine- to coarse-grained, cliff-forming sandstone, containing sporadically distributed chert pebbles, dark minerals, and chalky grains, overlain by softer sandstones and dark-gray to black shales; thickness from 10 to 150 feet (3 to 46 m). In areas where unit is very thin, the outcrop is shown as a line

Thermopolis Shale—Soft, black, fissile shale; thin bentonite layers often found in upper and lower part with few non-persistent, thin, silty sandstones sometimes found in middle of unit; thickness from 95 to 135 feet (29 to 41.1 m)

Cloverly and Morrison formations undivided (Lower Cretaceous and Upper Jurassic)—Total thickness for both units is approximately 350 feet (110 m)

Cloverly Formation (Lower Cretaceous)—Basal unit is a distinctive pebble conglomerate overlain by buff to gray to brown, fine-grained, cross-bedded, slabby sandstone with interbedded variegated shales and siltstones; weathers to a distinctive rusty-tan or brown; thickness from 100 to 150 feet (30 to 46 m)

Morrison Formation (Upper Jurassic)—Poorly sorted, silty sandstone containing interbeds or channels of coarse-grained cross-bedded sandstone overlain by finer-grained red, maroon, green, and brown claystone, mudstone, and siltstone, with interspersed lenses of coarser channel sandstones; thickness of about 200 feet (60 m)

Sundance and Gypsum Spring formations and Nugget Sandstone undivided (Jurassic and Triassic)—On cross section only

Sundance Formation (Upper Jurassic)—Sequence of greenish-gray, brown, and buff, glauconitic and non-glauconitic sandstones, limestones, and shales; belemnite fossils are common; thickness from 210 to 265 feet (64 to 80.8 m)

Gypsum Spring Formation (Middle Jurassic)—White, thick-bedded to massive, ledge-forming gypsum with red siltstone interbeds. Upper part consists of an alternating sequence of thin-bedded gypsum, reddish-brown shale, and light-gray to gray limestones; thickness from 120 to 200 feet (37 to 60 m)

Nugget Sandstone [Lower Jurassic and Upper Triassic(?)]—Includes both upper part and lower Bell Springs Member combined

Upper part (Lower Jurassic)—Red, hematite-stained siltstone and slabby sandstone, overlain by salmon-pink and light-gray fine- to medium-grained, cliff-forming sandstone, exhibits massive bedding to large scale cross-beds; thickness from 0 to 285 feet (0 to 86.9 m)

Bell Spring Member [Upper Triassic (?)]—Orange-brown and gray, fine-grained, thin to thick-bedded sandstone interbedded with reddish-brown, pale-green and purplish-maroon siltstone and shale; thickness of approximately 80 feet (20 m)

Chugwater Group and Dinwoody Formation undivided

Chugwater Group undivided (Upper and Lower Triassic)—Includes (from top to base) the Popo Agie Formation, Crow Mountain Sandstone, Alcova Limestone, and Red Peak Formation

Popo Agie Formation and Crow Mountain Sandstone undivided (Triassic)

Popo Agie Formation—Purple and red shale, red siltstone and red silty sandstone; distinctive layers of bright ocher-colored and red dolomitic claystones bearing analcime are common in upper sections; thickness of approximately 100 feet (30.5 m)

Crow Mountain Sandstone—Reddish-brown, very fine to fine-grained limey argillaceous, thin to thick-bedded and massive sandstone, interbedded with reddish-brown fissile shale and sandy siltstone; thickness of approximately 189 feet (57.6 m)

Alcova Limestone (Lower Triassic)—Pinkish to grayish-white, finely crystalline, thinly laminated resistant limestone; thickness from 3.5 to 10 feet (1.1 to 3 m). In areas where unit is very thin, the outcrop is shown as a line

Red Peak Formation (Lower Triassic)—Reddish-brown, commonly calcareous, thin- to thick-bedded siltstone, sandstone, and shale; thickness from 800 to 1,000 feet (200 to 300 m)

Dinwoody Formation (Lower Triassic)—Gray to drab greenish gray, thin-bedded, ripple-marked, sandy siltstone and silty sandstone, in part dolomitic to limy; readily weathers to a yellowish-gray or yellowish-brown; thickness from 40 to 60 feet (10 to 20 m)

Red Peak and Dinwoody Formations undivided

Dip Slope Units

Paleozoic sedimentary rocks

Phosphoria and Park City formations undivided (Permian)

Ervay Member of the Park City Formation and Tosi Chert and Retort Phosphatic Shale members of the Phosphoria Formation (Permian)—Brownish-gray to black oolitic to pelletal phosphorite, phosphatic dolomite, and brownish gray dolomitic shale overlain by gray to greenish-gray nodular massive chert and light gray weathering resistant dolomite with scattered chert lenses; thickness approximately 100 feet (30 m)

Franson Member of the Park City Formation and Meade Peak Phosphatic Shale Member of the Phosphoria Formation (Permian)—Light-gray to grayish-black interbedded series of granular phosphorite, dolomite, limestone, sandstone, shale, claystone, and nodular chert; often fossiliferous, phosphatic to limy to dolomitic, resistant to slope-forming; thickness approximately 156 feet (47.5 m)

Grandeur Member of the Park City Formation (Permian)—Sandy, argillaceous, fossiliferous, dolomitic limestone and limy dolomite, weathers light-gray to brownish-gray, interbedded with sandstone, minor shale, and claystone; carbonate rocks generally contain small irregular lenses or nodules of chert; 30 to 50 feet thick (9 to 20 m)

Tensleep Sandstone and Amsden Formation undivided (Middle and Lower Pennsylvanian and Upper Mississippian)

Tensleep Sandstone (Upper and Middle Pennsylvanian)—Gray to buff to brown, fine- to medium-grained, calcareous, cliff-forming sandstone, exhibits massive bedding to large-scale cross-beds; thin beds of quartzite and chert are common; thickness 300 to 400 feet (90 to 100 m)

Amsden Formation—[Middle and Lower Pennsylvanian and Upper Mississippian (?)]—Red, gray, and white, fine- to medium-grained, cross-bedded to massive, cliff-forming sandstone overlain by red and green shales and white, light-gray, red, and purple cherty and sandy dolomites; thickness is highly variable from 100 to 400 feet (30 to 100 m)

Madison Limestone, Darby Formation, and Bighorn Dolomite undivided (Mississippian, Devonian, and Ordovician)—On cross section only

Madison Limestone and Darby Formation undivided

Madison Limestone (Lower and Upper Mississippian)—Bluish-gray, massive to thin-bedded, crystalline limestone and dolomitic limestone with abundant cherty layers and nodules, red staining on many outcrops; thickness from 235 to 600 feet (71.6 to 200 m)

Darby Formation (Upper Devonian)—Tan crystalline dolomite, imbedded with large fragments of white, medium- to course-grained quartzitic sandstone; occurs along the eastern flank of the Wind River Range, thins and pinches out to the south and east; thickness from 0 to 20 feet (0 to 6 m)

Ordovician and Cambrian rocks undifferentiated

Bighorn Dolomite (Ordovician)—Composed of buff to gray, hard, cliff-forming, uniform granular dolomite; typically weathers to a pitted or "fretwork" pattern; thickness from 0 to approximately 200 feet (0 to 60 m)

Cambrian rocks undifferentiated (Upper and Middle Cambrian)—Includes the Gallatin and Gros Ventre formations and the Flathead Sandstone

Gallatin and Gros Ventre Formations undivided

Gallatin Formation (Upper Cambrian)—Gray, resistant, cliff-forming, thinly bedded to massive, glauconitic and oolitic limestone with flat-pebble limestone conglomerates and soft, greenish-gray shale; upper part is often mottled in appearance; outcrops may be red stained; thickness from 209 to 365 feet (63.7 to 111 m)

Gros Ventre Formation (Middle and Upper Cambrian)—Lithologically variable green, sometimes red, sandy or silty glauconitic shales with some sandstone and significant limestone; flat-pebble limestone conglomerates are common; forms slopes with little exposures; thickness from 300 to 700 feet (90 to 200 m).

Flathead Sandstone (Middle Cambrian)—Brownish to reddish-maroon, coarse- to medium-grained, cross-stratified sandstone; contains minor amounts of arkose and shale; upper section composed of reddish-gray to reddish-brown, fine- to coarse-grained, hard, ledge-forming orthoquartzite; thickness from 200 to 350 feet (60 to 110 m)

Precambrian rocks

Proterozoic rocks

Diabase dike—Dark-gray to black, fine- to medium-grained mafic dikes; laterally continuous and generally strike in a northeasterly direction. Dikes in the southwest corner of the map area have been dated at ~2,060 Ma (mega-annum or millions of years before present); thickness from 10 to 200 feet (3 to 60 m) (description and thickness from Hausel, 1991)

Archean rocks

Fine-grained quartz monzonite (Archean?)—Gray, fine-grained, equigranular quartz monzonite, consists principally of biotite, quartz, microcline, and oligoclase

Biotite quartz monzonite of the Bears Ear Pluton—Irregular bodies of leucocratic rock; texturally heterogeneous, ranging from pegmatite to alaskite to fine- and medium-grained biotite quartz monzonite; forms anastamosing dikes and veins; dated at 2,545±30 Ma (Stuckless and others, 1985)

Porphyritic quartz monzonite of the Bears Ear Pluton—Consists principally of phenocrysts of microcline set in a ground mass of oligoclase, quartz, biotite, and locally, hornblende; dated at 2,545±30 Ma (Stuckless and others, 1985).

Quartz diorite of the Louis Lake Batholith—Gray, even-grained, weakly porphyritic biotite-hornblende quartz diorite; locally includes granodiorite; may contains small, widely-spaced disk-shaped clots of amphibolite; dated at 2,630± Ma (Frost and others, 1998)

Miners Delight Formation—Group of diversified lithologies dominated by metagreywacke; hosts many epigenic shear zones and vein gold deposits; approximate age of 2.8 Ga (giga-annum or billions of years before present), but relative ages of the subunits are unknown [Note: the Correlation of map units (above) is not intended to show age relationships]. Total thickness not determinable but greater than 5,000 feet (2,000 m) and possibly up to 20,000 feet (6,000 m) (Hausel, 1991). Sub-divided into several mappable units based on dominant lithology (ies)

Metagreywacke—Feldspathic and biotitic metagraywacke interbedded with mica schist; greywacke is fine-grained, bedded, proximal and distal turbidite with bedding-parallel foliation; rocks are only slightly metamorphosed

Graphitic schist—Black, iron-stained schist; commonly sheared; locally contains quartz stringers, veins, and gold mineralization

Mafic amphibolite—Black hornblendic amphibolite with fine- and medium-grained texture; includes metamorphosed gabbro dikes and sills and basalt flows; locally hosts auriferous shear zones

Mixed member—Mixed unit of fine-grained mafic metavolcanics, metagraywacke, tremolite-actinolite schist, and chlorite schist, with local interbeds of metaconglomerate

Metachert—Interlayered cherty metagraywacke, ultramylonite, and metagraywacke

Metadacite—Black metadacite porphyry flows and sills (?) with plagioclase phenocrysts (porphyroblasts) aligned in trachytic texture

Meta-andesite—Ellipsoidal and non-ellipsoidal meta-andesite flows

Round Top Mountain Greenstone—Dominantly greenstone, greenschist, and mafic-amphibolite; includes mica schist, hornblende-mica schist, and metabasalt with lesser metagreywacke, metatuff, chlorite schist, and actinolite schist

Goldman Meadows Formation—Consists of two members mapped as one. Iron formation member consists of black to dark-gray, hard, dense and laminated alternating layers of magnetite and metachert with varying amounts of amphibole. Schist member consists of principally porphyroblastic pelitic schist, thin quartzites, and massive to schistose amphibolites

Diamond Springs Formation—Contains metabasalt, metagabro and serpentinite; formation is dominated by serpentinite, tremolite-talc-chlorite schist, and mafic amphibolite

Precambrian rocks undifferentiated—On cross section only

Gneissic granite and orthogneiss—Fine- to coarse-grained, sometimes veined and banded, granodiorite, granite, and tonalite gneiss, orthogneiss and red granite

Archean gneisses undifferentiated—Dominantly pink, varying to tan and gray, coarse-grained and coarsely foliated granitic gneiss with minor amounts of amphibolite gneiss, biotite schist, chlorite schist, and sillmanite schist. Crosscut by aplite, pegmatite, mafic dikes, and small ultramfic intrusion

Unnamed metasedimentary group—Crops out only in small area in extreme south-central part of the quadrangle

Gneiss—Felsic gneiss and granitic migmatite interlayered with supracrustal rocks and intruded by granodiorite. Encloses concordant amphibolite, tonalite gneiss and ultramafic enclaves. Exhibits common augen and migmatitic textures

Geologic Map of Red Canyon region and Formation Index.

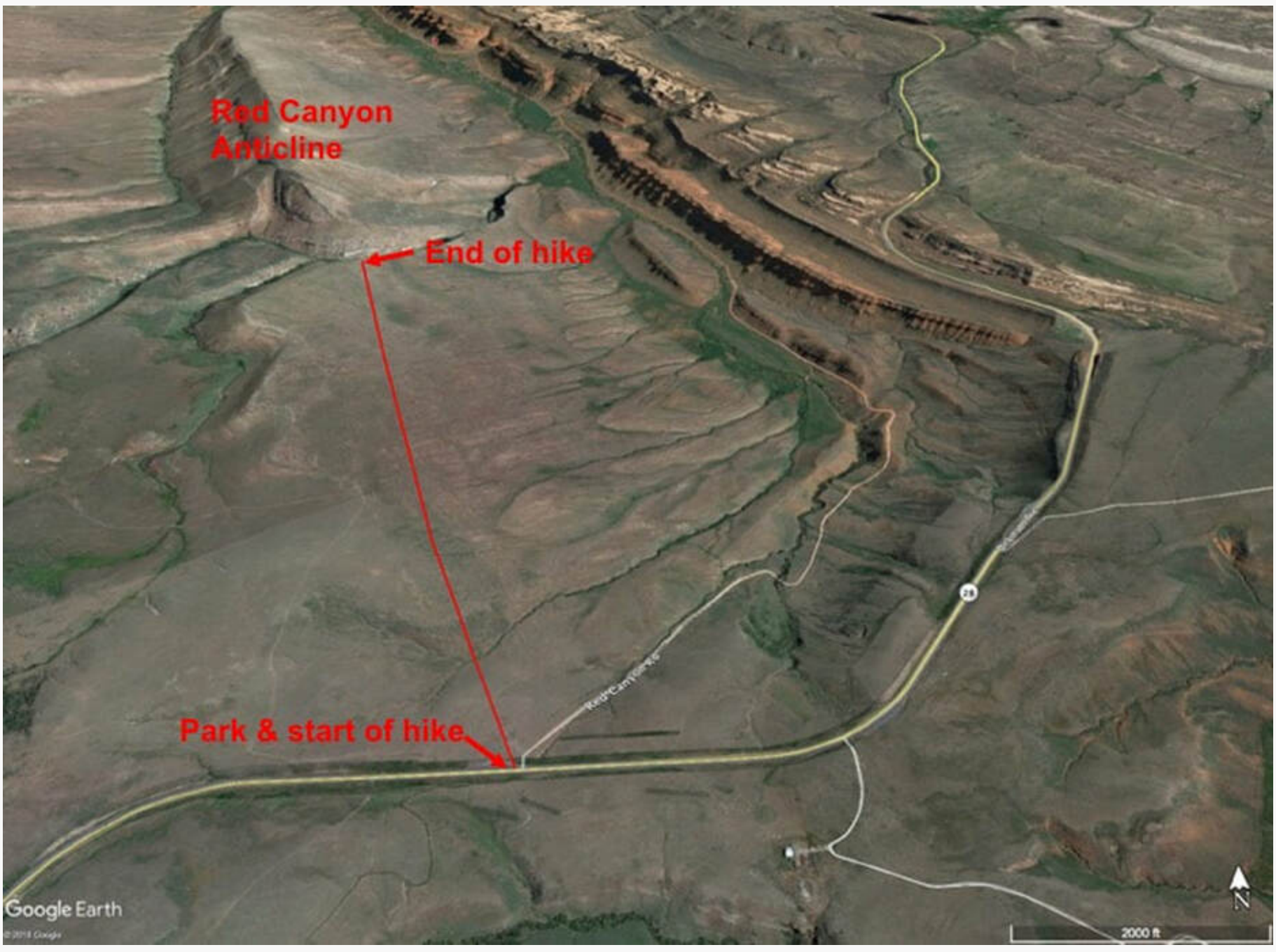
Image: After Johnson, J.F., and Sutherland, W.M., 2009, Geologic map of the Lander 30' x 60' quadrangle, Fremont County, Wyoming: Wyoming State Geological Survey Map Series 87, version

1.0, scale 1:100,000., 2009, Geologic map of the Lander 30' x 60' quadrangle, Fremont County, Wyoming: Wyoming State Geological Survey Map Series 87, version 1.0, scale 1:100,000; http://sales.wsgs.wyo.gov/geologic-map-of-the-lander-30-x-60-quadrangle-fremont-county-wyoming-2009/.

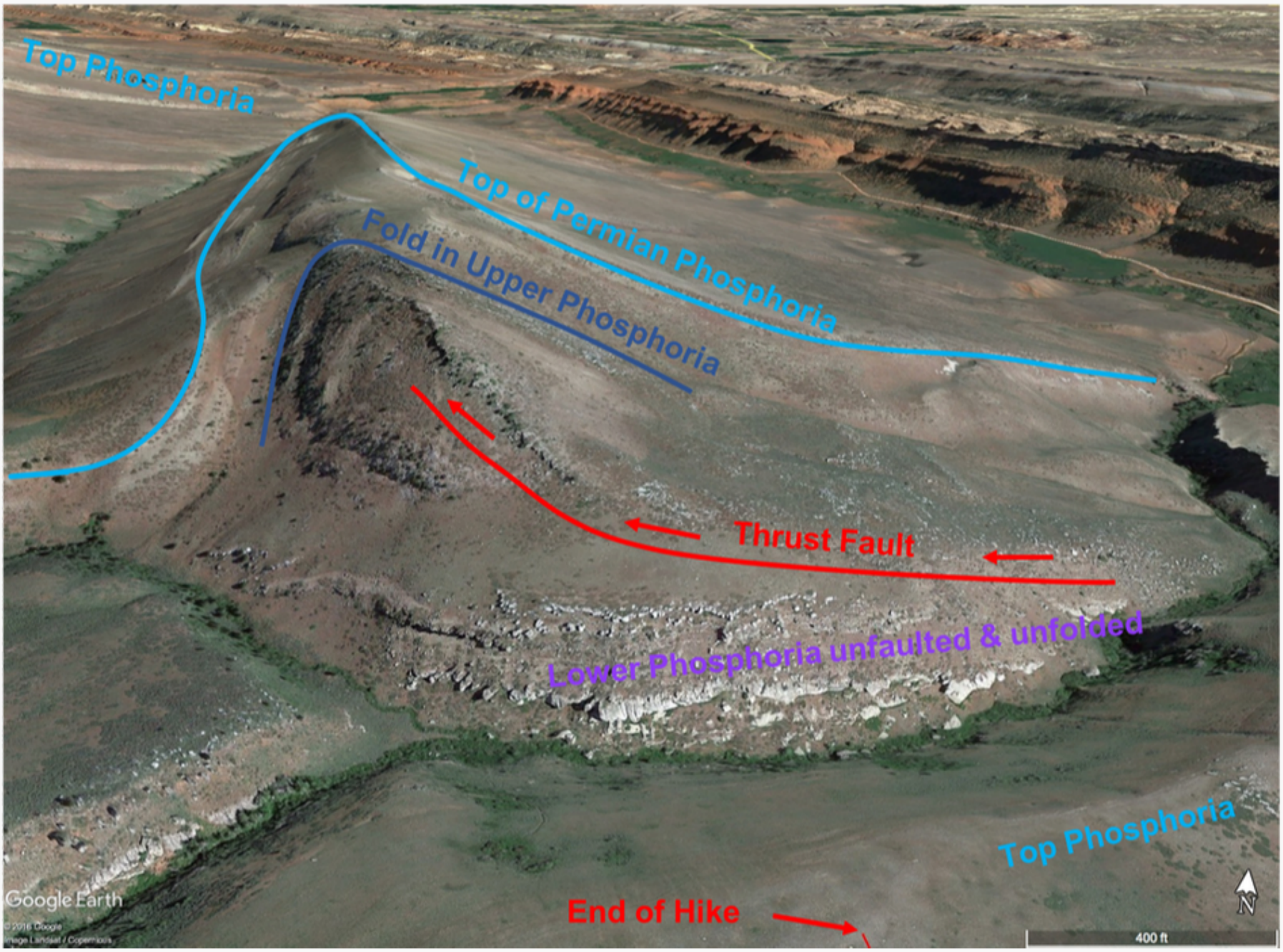
Things to Do in Red Canyon Area

The southeast end of the Wind River Mountains has a number of interesting places to visit. Our Geology of Wyoming Sinks Canyon and South Pass websites have details on what to see and how to get there. The Nature Conservancy Red Canyon Ranch website indicates it is open to the public, but gives no contact information.

If you are a geologist or geology inclined, we recommend taking a hike to see the Red Canyon Anticline that has a thrust fault in the core of the fold. It is great structural geology outcrop. Total round trip distance is just under four miles. The map below shows where to park and hike. Good public access with BLM land and the Wyoming Game & Fish Red Canyon Wildlife Habitat Management Area (closed from December 1 to April 30).



Aerial view of hike from Wyoming 28 to Red Canyon Anticline.
Image by Google Eart



Aerial view of Red Canyon Anticline with thrust fault in the core of the folded Permian Phosphoria Formation. Note that the Lower Phosphoria below the thrust fault is not folded. Also note that the Phosphoria in the foreground located at the end of the hike is not faulted or folded.
Image by Google Earth