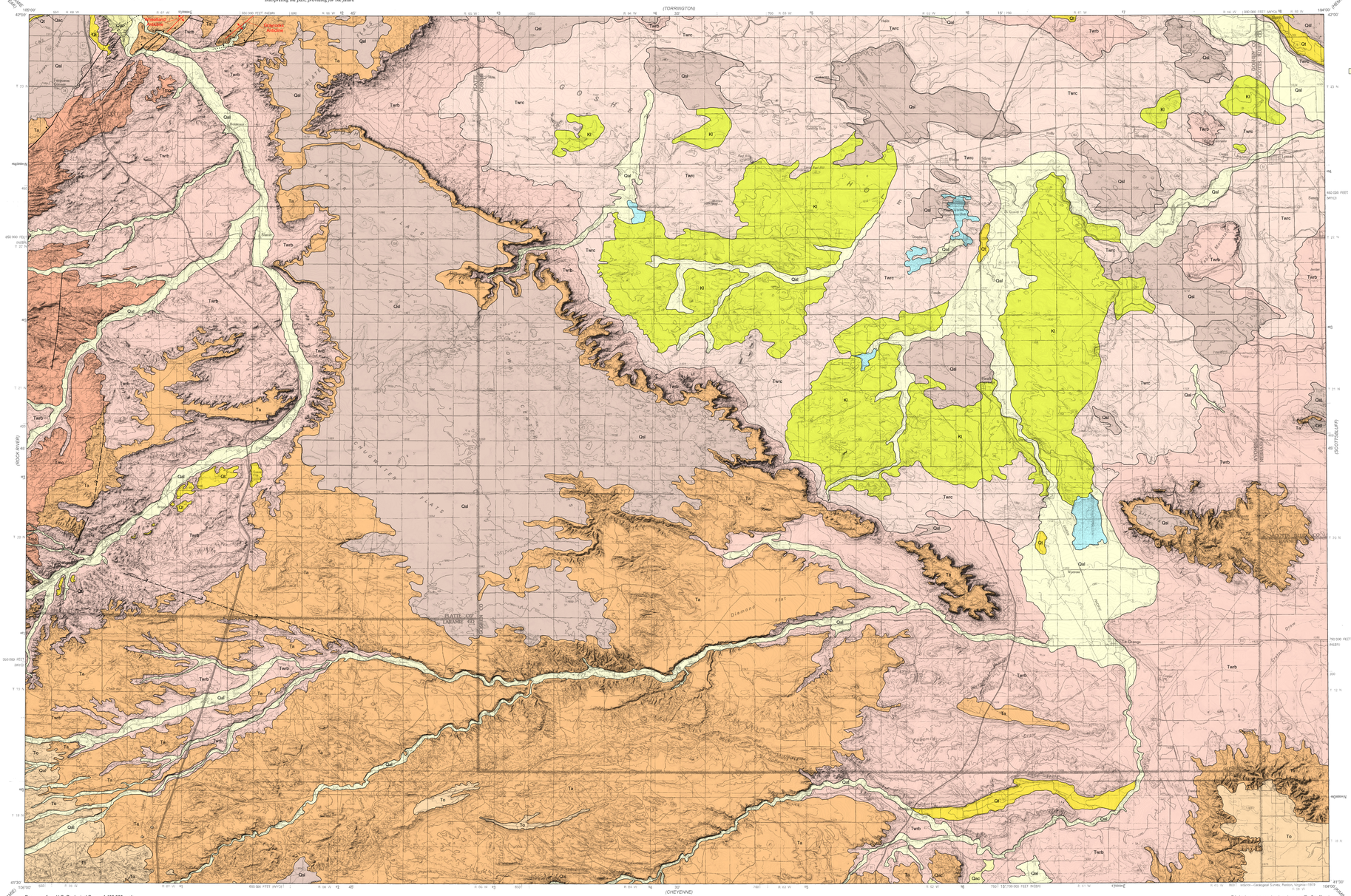
WYOMING STATE GEOLOGICAL SURVEY
Erin A. Campbell, Director and State Geologist
Laramie, Wyoming

Interpreting the past, providing for the future

OPEN FILE REPORT 2020-1
Chugwater 1:100,000-scale Bedrock Geologic Map



EXPLANATION

CORRELATION OF MAP UNITS

Qal, Qaf	Qac	Qt	Holocene, Pleistocene	QUATERNARY
Unconformity				
To			Pliocene	NEOGENE
Unconformity				
Tmo	Ta		Miocene	NEOGENE
	Unconformity			
	Twrb		Oligocene	PALEOGENE
	Twrc			PALEOGENE
Unconformity				
Kl			Upper Cretaceous	CRETACEOUS

TERTIARY — CENOZOIC
MESOZOIC

MAP SYMBOLS

Definitions: *Certain—Estimated location 100 m (328 ft)*
Approximate—Estimated location 101–500 m (328–1,640 ft)

- **Formation contact**—Continuous where certain
- **Fault**—Continuous where certain, long dash where approximate, dotted where concealed, queried where existence uncertain; bar and ball on downthrown block of normal fault
- **Anticline**—Continuous where certain
- **Lake or reservoir**

DESCRIPTION OF MAP UNITS

Cenozoic

Qal — **Alluvial deposits (Holocene)**—Silt, fine-grained sand, and some gravel as valley fill in the present flood plains, bars, lowest terraces, and islands of the principal streams: includes gravel, sand, silt, mud, and clay. Variable thickness; may exceed 61 m (200 ft) in Platte River Valley

Qaf — **Sand and loess (Holocene)**—Fine-grained, windblown sand; variable thickness

Qac — **Mixed alluvium and colluvium (Holocene and Pleistocene)**—Unconsolidated to poorly consolidated sand, silt, cobbles, gravel, and clay. Includes slope wash and smaller alluvial fan deposits that coalesce with alluvium. Thickness 0–15 m (0–50 ft)

Qt — **Terrace deposits (Holocene–Pleistocene)**—Beds of coarse sand and gravel, pebble, cobble, and boulder deposits containing some silt, fine-grained sand, lenses of bentonitic clay, and locally some ash beds. These terraces occur along present drainages; thickness 0 to greater than 64 m (0–210 ft)

To — **Ogallala Formation (lower Pliocene and upper Miocene)**—Tan to brown, unconsolidated to well-cemented sandstone, siltstone, volcanic ash, and conglomerate (gravel to boulder sized), interbedded with claystone and thin beds of limestone toward the east. The conglomerate clasts are primarily Precambrian igneous material, with limestone clasts predominating in some conglomerates near the base of the formation. Thickness 0–100 m (0–330 ft)

Ta — **Arikaree Formation (middle and lower Miocene)**—Friable, gray, tuffaceous, calcareous, fine-grained cross-bedded sandstone, interbedded with lenses of siltstone and volcanic ash. Coarse conglomerate occurs locally near the base of the formation. Thickness 0–152 m (0–500 ft)

White River Formation (Oligocene)—Upper units consist of pinkish buff siltstone and sandstone with lenses of volcanic ash. Lower units include interbedded red and green claystone and sandstone with coarse channel deposits

Twrb — **Brule Member (upper Oligocene)**—Pale-pink, moderately hard, brittle, argillaceous siltstone that contains channel deposits of sand and sandstone, localized beds of limestone, moderately thick beds of clay, and intermittent beds of volcanic ash. Thickness 0–137 m (0–450 ft)

Twrc — **Chadron Member (lower Oligocene)**—Consists of green, red, or buff bentonitic loosely to moderately cemented clay and silt that contains channel deposits of sandstone and conglomerate. Contains a lower unit that consists of variegated fluvial deposits. Thickness 0–213 m (0–700 ft)

Tmo — **Miocene and Oligocene rocks, undivided**—Light- to orange-gray, medium- to fine-grained poorly cemented tuffaceous sandstone, with intermittent calcareous sandstone concretions and siliceous root casts. Hard gray sandstone and channel conglomerate with Paleozoic and Precambrian rocks in a calcareous sandstone matrix. Red conglomerate with light-red loosely cemented conglomerate composed of pebbles, cobbles, and boulders derived from Paleozoic and Precambrian rocks in an orange-red claystone and sandstone matrix. Unit includes members of the White River Formation and may include Arikaree Formation where undifferentiated

Mesozoic

Kl — **Lance Formation (Upper Cretaceous)**—Upper unit consists of a variegated sequence of beds of sandstone and shale that contain intermittent beds of coal, intermittent beds of impure limestone, which contain oyster shells; and chert pebbles, cobbles, and boulders that are mostly brown. Lower unit consists of a thick sequence of beds of carbonaceous shale, gray siltstone, and dark- to light-gray sandstone that contains thin beds of coal that are more abundant in the lower 91 m (0–300 ft) of the unit

REFERENCES AND SOURCES TOF MAP DATA
(Numbers are noted in INDEX TO SOURCES OF GEOLOGIC MAPPING)

(1) Babcock, H.M., Rapp, J.R., and Durum, W.H., 1952, Reconnaissance of the geology and ground-water resources of the Horse Creek-Bear Creek area, Laramie and Goshen counties, Wyoming, with a section on the chemical quality of the water: U.S. Geological Survey Circular 162, 28 p., 1 pl.

(2) Borchert, W.B., 1985, The ground-water system in the LaGrange aquifer near LaGrange, southeastern Wyoming: U.S. Geological Survey Water-Resources Investigations Report 83-4024, 56 p., 4 pls.

(3) Burchett, R.R., 1986, Geologic bedrock map of Nebraska: Nebraska Geological Survey, scale 1:1,000,000.

(4) Case, J.C., and Hallberg, L.L., 2004, Preliminary surficial geologic map of the Chugwater 30' x 60' quadrangle, Wyoming: Wyoming State Geological Survey Open File Report 04-4, 10 p., 1 pl., scale 1:100,000.

(5) Crist, M.A., 1980, Effect of pumpage on ground-water levels as modeled in Laramie County, Wyoming: U.S. Geological Survey Open-File Report OF-80-1104, 26 p., 5 pls., scale 1:84,500.

(6) Dockery, W.L., 1939, Underground water resources of Horse Creek and Bear Creek valleys, southeastern Wyoming: Laramie, University of Wyoming, M.A. thesis, 53 p., 3 pls.

(7) Edwards, A.R., 1939, Underground water resources of Chugwater Creek, Laramie River and North Laramie River valleys, Wyoming: Laramie, University of Wyoming, M.A. thesis, 47 p., 3 pls.

(8) Jenkins, P.T., 1938, Geology of a portion of the east side of the Laramie Range, Albany, Laramie, and Platte counties, Wyoming: Laramie, University of Wyoming, M.A. thesis, 42 p., 1 pl.

(9) Lowry, M.E., Crist, M.A., and Tilstra, J.R., 1967, Geology and ground-water resources of Laramie County, Wyoming: U.S. Geological Survey Water Supply Paper 1834, 71 p., 2 pls., scale 1:125,000.

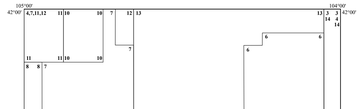
(10) McGrew, L.W., 1967a, Geologic map of the Bordeaux quadrangle, Platte County, Wyoming: U.S. Geological Survey Geologic Quadrangle GQ-620, scale 1:24,000.

(11) McGrew, L.W., 1967b, Geologic map of the Ferguson Corner quadrangle, Platte County, Wyoming: U.S. Geological Survey Geologic Quadrangle GQ-622, scale 1:24,000.

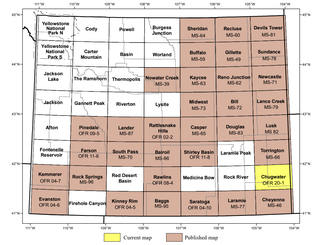
(12) Morris, D.A., and Babcock, H.M., 1960, Geology and ground-water resources of Platte County, Wyoming: U.S. Geological Survey Water Supply Paper 1490, 195 p., 4 pls.

(13) Rapp, J.R., Visher, F.N., and Littleton, R.T., 1957, Geology and ground-water resources of Goshen County, Wyoming: U.S. Geological Survey Water Supply Paper 1377, 145 p., 4 pls.

(14) Wenzel, L.K., Cady, R.C., and Waite, H.A., 1946, Geology and ground-water resources of Scotts Bluff County, Nebraska: U.S. Geological Survey Water-Supply Paper 943, 150 p., 12 pls.



INDEX TO SOURCES OF GEOLOGIC MAPPING
(Numbers are noted in REFERENCES AND SOURCES OF MAP DATA)



KEY TO ABBREVIATIONS
Wyoming State Geological Survey maps: Map Series (MS) and Open File Report (OFR)

INDEX TO 1:100,000-SCALE BEDROCK GEOLOGIC MAPS OF WYOMING

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Base map from U.S. Geological Survey 1:100,000-scale metric topographic map of the Chugwater, Wyoming and Nebraska Quadrangle, 1979

Base hillshade derived from United States Elevation Data (NED) (10 m resolution), 2017; azimuth 315°, sun angle 45°, vertical exaggeration 3

Projection: Universal Transverse Mercator (UTM), zone 13
North American Datum of 1927 (NAD 27)
10,000-meter grid ticks: UTM, zone 13
50,000-foot grid ticks: Wyoming State Plane Coordinate System, east central zone, and Nebraska Coordinate System, south zone

National Geodetic Vertical Datum of 1927

Wyoming State Geological Survey
P.O. Box 1347 - Laramie, WY 82073-1347
Phone: 307-766-2286 - Fax: 307-766-2605
Email: wsgs.sales@wyo.gov

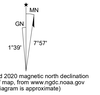
0 2 4 6 8 10 12 14 16 18 20 Kilometers
0 1 2 4 6 8 10 12 Miles

SCALE 1:100,000
Contour interval 10 meters

0 2,000 4,000 6,000 8,000 10,000 12,000 14,000 16,000 18,000 20,000 Meters
0 5,000 10,000 15,000 20,000 25,000 30,000 35,000 40,000 45,000 50,000 55,000 60,000 65,000 Feet

Digital cartography by James E. Stafford

Map edited by Suzanne C. Luhr,
Andrea M. Loveland, and Seth J. Wittke



UTM grid and 2020 magnetic north declination at center of map, from www.ngdc.noaa.gov (diagram is approximate)

PRELIMINARY GEOLOGIC MAP OF THE CHUGWATER 30' x 60' QUADRANGLE, GOSHEN, PLATTE, AND LARAMIE COUNTIES, WYOMING, AND SCOTTS BLUFF AND BANNER COUNTIES, NEBRASKA

compiled and mapped by

James E. Stafford and Andrea M. Loveland

2020