



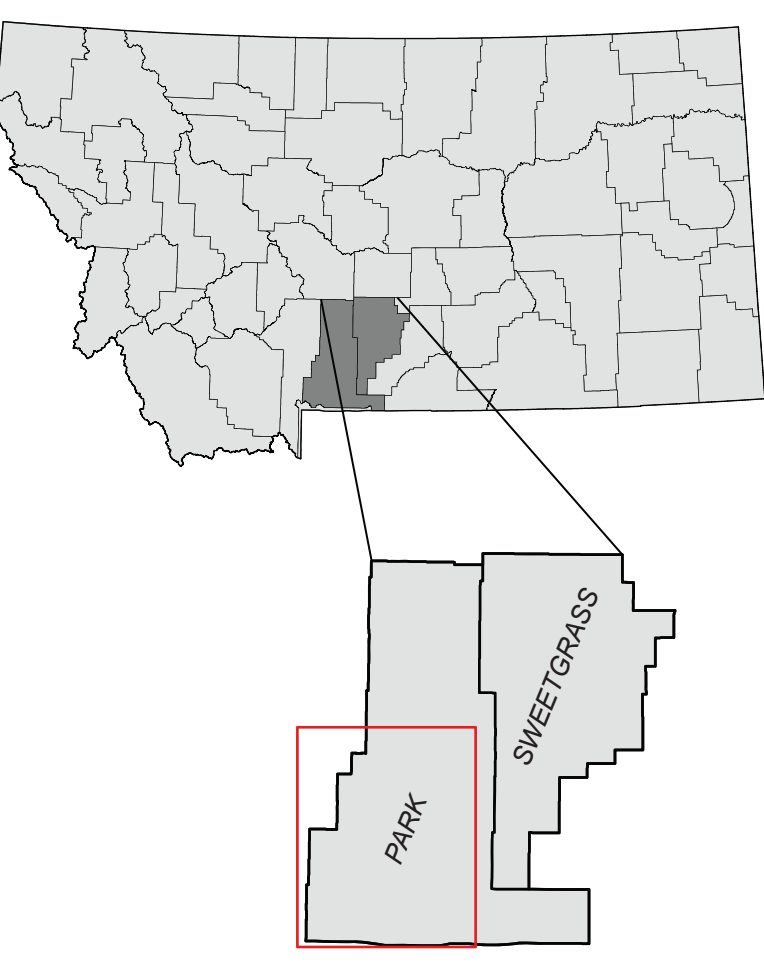
Montana Ground Water Assessment Atlas 9, Plate 1

**Hydrogeologic Framework of the
Upper Yellowstone River Valley**

Park County, Montana

Sara C. Edinberg

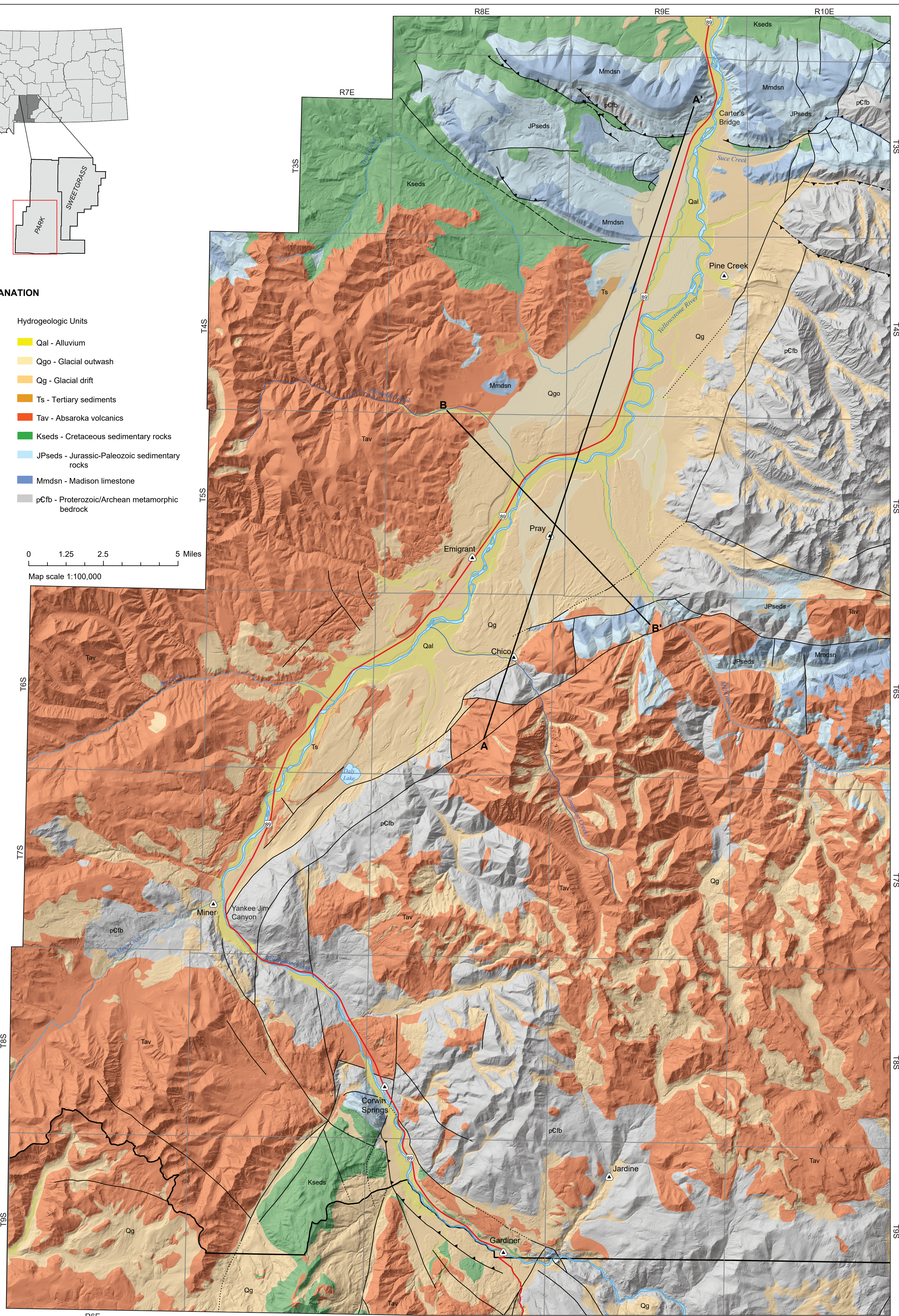
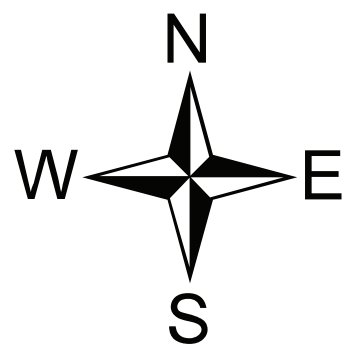
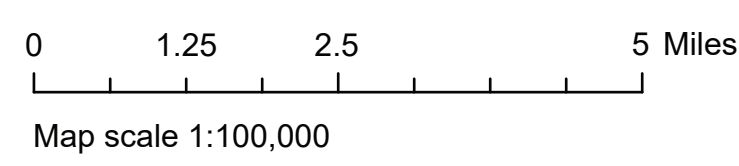
2024



MAP EXPLANATION

- △ Towns
- Roads
- Rivers
- Township/Range
- County
- Faults; dashed where approx. located; dotted where concealed.
- ▼ Thrust/reverse fault; sawteeth on upper plate.
- Cross-section lines

- Hydrogeologic Units**
- Qal - Alluvium
- Ogo - Glacial outwash
- Qg - Glacial drift
- Ts - Tertiary sediments
- Tav - Absaroka volcanics
- Kseds - Cretaceous sedimentary rocks
- JPseeds - Jurassic-Paleozoic sedimentary rocks
- Mmdsn - Madison limestone
- pCfb - Proterozoic/Archean metamorphic bedrock



	Era	Period/Age	Unit Symbol	Unit Name & Aquifer Code*	Occurrence and Description of Map Units
Basin-Fill	CENOZOIC	Quaternary	Qal	Quaternary alluvial deposits 111ALVM, 110ALVM	Sand and gravel deposits generally present within the floodplain of the Yellowstone River. Surficial, unconfined aquifer; thickness up to 150 feet. Can be difficult to differentiate from some Quaternary glacial deposits.
			Ogo Qg	Quaternary (Pleistocene) glacial outwash and drift 112OTSH, 112DRFT	Glacial deposits consisting of glacial drift (fill, fluvioglacial alluvial fans, and some Pleistocene terrace deposits) and glacial outwash. Lithology of drift is variable and non-stratified, consisting of claybound gravel and boulders with localized layers of clay, sand, and gravel. Thickness is at least 400 feet in some areas. North of the Eightmile Creek terminal moraine, an outwash plain forms a productive aquifer due to the higher proportion of sand and gravel.
		Tertiary	Ts	Tertiary sediments 120SDMS	White or light tan, poorly bedded siliceous siltstone and claystone. Total lateral extent is unknown, but may be widespread beneath the Quaternary basin-fill sediments. Exposed in the Hepburn's Mesa area, where some wells are completed in this unit. May be difficult to differentiate from other unconsolidated sediments in the subsurface.
Bedrock	MESOZOIC	65 Ma	Tav	Absaroka Volcanics Supergroup 124ABSK	Volcanic rocks consisting of dacitic or andesitic flows, dikes, sills, porphyries, and breccias. Stratigraphic groups of hydrogeologic interest include Eocene dacites, Hyalite Peak Volcanics, and Golemyer Creek Volcanics. Groundwater is present where the rocks are sufficiently fractured; widely used on the western side of the valley where no other aquifer is available.
		144 Ma	Kseds	Cretaceous sedimentary rocks 210UDFD	Includes Landslide Creek, Everts, Eagle Sandstone, Telegraph Creek, Cody Shale/Frontier, Mowry Shale through Fall River Sandstone, and the Kootenai formations. Lithology consists of alternating layers of sandstone, siltstone, mudstone, claystone, shale, and localized coal beds. Utilized as an aquifer where outcrops are present in the northwest and southeast portions of the study area.
	PALEOZOIC	543 Ma	JPseeds Jm, Je PMpa Mmdsn DOs Cs	Jurassic through Paleozoic sedimentary rocks; includes Madison Limestone 220UDFD, 330MDSN, 300UDFD	Includes Morrison and Ellis formations (Jurassic); Quadrant through Arnsden formations (Pennsylvanian and Mississippian); Madison Limestone (Mississippian); Three Forks, Jefferson, and Big Horn formations (Devonian/Ordovician); and Flathead, Wolsey, Meagher, Park, and Pilgrim formations (Cambrian). Lithology consists of sandstone, mudstone, interbedded shales, dolomite, and limestone. Utilized as an aquifer where formations outcrop at the north end of the valley and up Mill Creek.
		PRECAMBRIAN	4.6 Ga	pCfb	Proterozoic Archean 500GNSC

*Aquifer codes are assigned by MBMG staff based on the lithology description, depth, and location of the well. The code includes a three-digit number related to the age of the formation, followed by a four-character abbreviation for the geologic unit or aquifer name.

