Creation Research Society Quarterly 2017. 53:206–216.

The Bighorn Basin, Wyoming—Monument to the Flood

Part I: The Flooding Stage

Michael J. Oard*

Abstract

The relatively small Bighorn Basin and its surrounding mountains are a striking display of every phase of the Flood, as well as pre-Flood rocks and post-Flood glaciation. The Great Unconformity is seen at several locations; the granite and gneiss beneath it are Creation Week rocks. Many thousands of feet of sedimentary rocks were laid above it during the ascending phase. This event can be called the *Great Deposition*. Many of these strata can be traced for up to thousands of miles and show little or no internal erosion. Both features support Flood deposition but contradict uniformitarianism. Dinosaur bones and tracks, commonly found along the edge of the Bighorn Basin, can be explained as having formed between Day 40 and Day 120 of the Flood.

Introduction

The Bighorn Basin is a semiarid area in north-central Wyoming surrounded by the Absaroka Mountains on the west, the Owl Creek Mountains on the south, and the Bighorn Mountains on the east (Figure 1). The basin is 120 miles (193 km) north to south and 70 miles (112 km) east to west. It probably demonstrates more of the Flood than any similarly sized area of the world. The Great Unconformity marks the divide between Creation Week rocks and early Flood rocks. The Bighorn Basin also displays the effects of a post-Flood ice age along with a possible dam-breach feature. The Clarks Fork Basin, northwest of the Bighorn Basin and northeast of Clarks Fork Canyon (Figure 1), is separated from the Bighorn Basin by a very low divide. For all practical purposes, the entire area can be considered the Bighorn Basin.

Cenozoic rocks of the two basins are classic type areas for mammal fossils, especially for the Wasatchian Land-Mammal Age (Bown et al., 1994; Clyde et al., 1994, 2007; Wei, 1995), but there are several problems with uniformitarians' proposed mammal sequence. Most of the fossils are jaw and teeth fragments from a wide variety of mammals. Some of the deposits are claimed to have been "reworked" to make them fit a preconceived fossil order. Sediment accumulation was asymmetric, so it is difficult to correlate the fossils between distant parts of the basin. And, lastly, there are differing biostratigraphic zonations.

The Biblical Geological Model

To describe the geology and geomorphology of the basin, I will apply Walker's biblical geological model (1994) with its two stages and five phases and

* Michael J. Oard, M.S. Atmospheric Science, Bozeman, Montana
Accepted for publication February 7, 2017

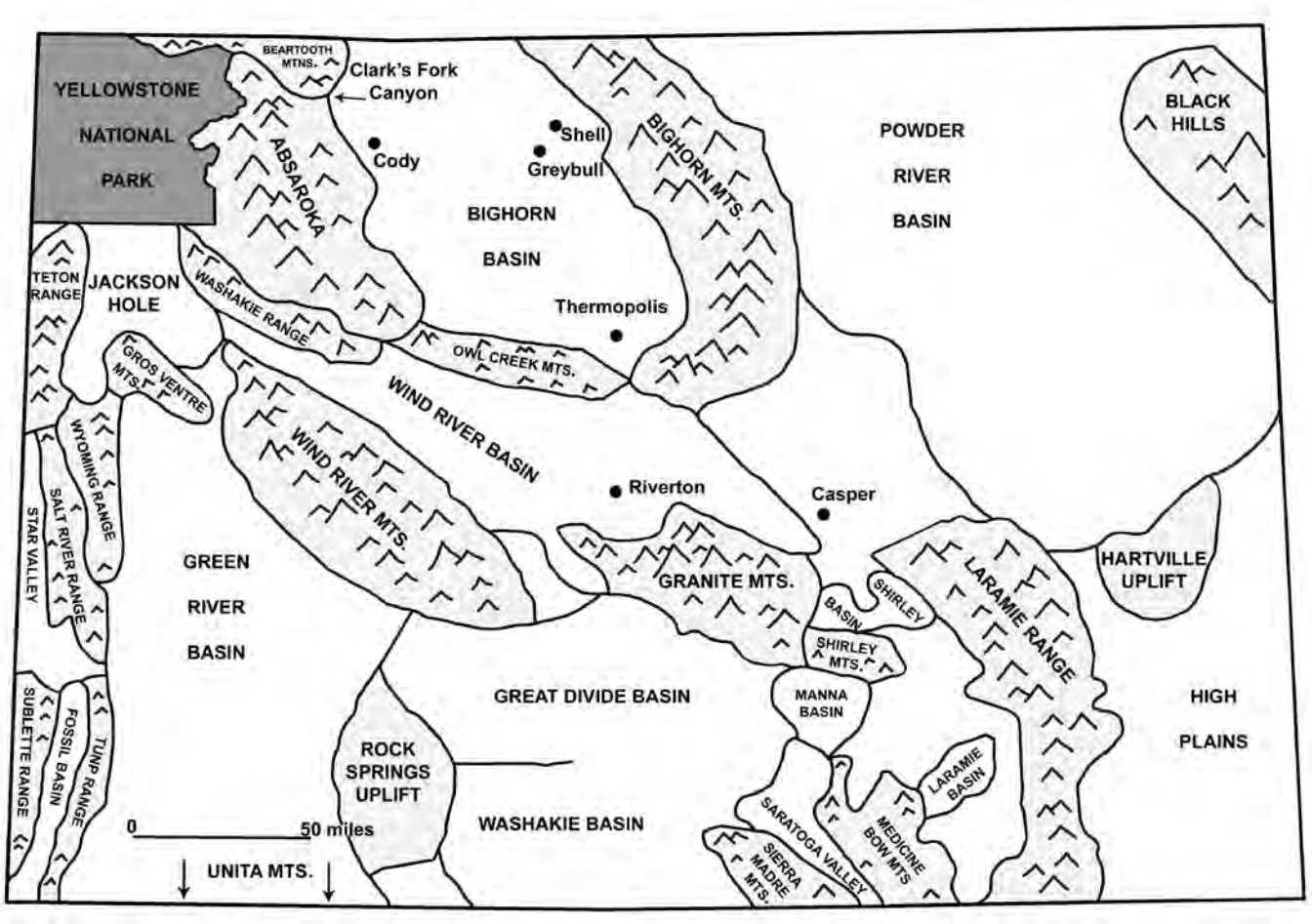

Figure 1. Map of major basins and mountain uplifts in Wyoming (drawn by Mrs. Melanie Richard).

defining criteria (Figure 2). Dinosaur tracks, eggs, and scavenged bonebeds, which were made by live dinosaurs in Flood sediments, are a defining criterion of sediments deposited in the first half of the Flood, during the *inundatory* or *flooding stage*, based on the biblical narrative, which states that all air-breathing land animals were dead before the Flood covered the land on Day 150 (Oard, 2002, 2011).

I use Walker's model because it classifies rocks in the field according to the *mechanism* that deposited the layers of sediment. Genesis 6–9 describes a global flood that lasted about one year. A flood is an event in which water rises above its normal levels and then retreats back to those levels. The same would be true on

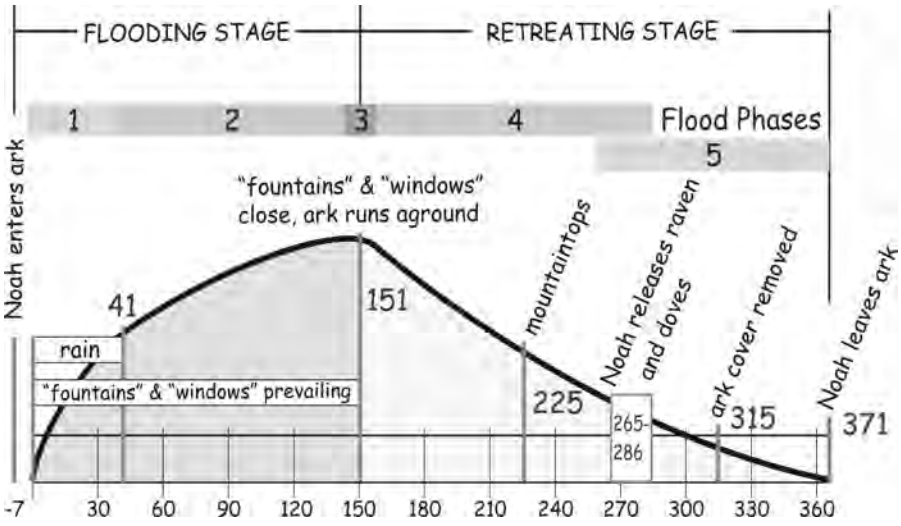

Figure 2. Graph of relative sea level for the two stages and five phases in Walker's model (drawn by John Reed). This graph assumes a 360-day year and that the Flood peaked at Day 150, both assumptions controversial.

any scale with any flood. Therefore, in the biblical Flood, we would also expect a *flooding stage*, which corresponds to Walker's *inundatory stage* or the 21 weeks of *prevailing* in the Whitcomb-Morris model (Whitcomb and Morris, 1961). This stage is logically followed by the retreating stage, or the *recessive stage* in Walker's model, which corresponds with the 31 weeks of *assuaging* in the Whitcomb-Morris model. The first part of this article will cover the effects of the flooding stage of the Genesis Flood on the Big Horn Basin. Part II will describe how the retreating stage changed the geology of the area.

Similarities to Flash Floods

Floods of all sizes exhibit many of the same characteristics, but the rapid rise unique to flash floods likely occurred during the Genesis Flood. That rapid rise is the main difference between a river flood and a flash flood. Walker (1994) concluded that after an initial rapid rise, the Genesis Flood continued to rise at a slower rate before it peaked and began to abate. At first, because of its depth, the abating water flowed freely, with few if any obstacles to impede its rush to sinking ocean basins. As the water continued to subside, land features were exposed, gradually forcing the flow into channels. As with the flash flood, the final stage ended with rivers and streams flowing down their newly excavated paths.

As the biblical Flood began, God unleashed a powerful mechanism that triggered a rapid rise in the water level. According to Genesis 7:11, "on the same day all the fountains of the great deep burst open, and the floodgates of the sky were opened" (NASB). The violence of these two mechanisms was so great that together they resulted in 40 days and nights of global rain. Walker calls this the *eruptive phase* of the Flood. This global rain abated at the end of the eruptive phase, although the biblical mechanisms continued another 110 days, implying a continued, slower rise of the Floodwater until Day 150. The time between Day 40 and Day 150 would have been similar to the rise of a flash flood after the initial rush. Walker (1994) called it the *ascending phase*. As with flash floods, the great biblical Flood reached a peak and began to subside, slowly at first with sheet flow that gradually became channelized.

Figure 3. The Great Unconformity (upper arrow) with a second unconformity (lower arrow) below Precambrian sedimentary rocks in the eastern Grand Canyon (view north).

Creation Week Rocks and the Great Unconformity

The Great Unconformity is an erosion surface with residual erosional remnants. It can be called a *planation* surface, since on the broad scale it is quite flat. It represents a considerable amount of erosion. The Great Unconformity is seen near the bottom of the Grand Canyon (Figure 3). It is also in Wyoming, separating upper crustal igneous and metamorphic rocks from overlying sedimentary rocks. At the Grand Canyon, the Great Unconformity cuts across dipping Precambrian sedimentary rocks in some places. Flood geologists disagree as to whether they represent pre-Flood or early Flood deposits. It is unlikely that large amounts of widespread sediment were laid very early in the Flood due to powerful, turbulent currents. But in deep basins within the continental crust, quieter waters would have allowed such deposition (Froede and Oard, 2007; Oard and Froede, 2008; Oard and Reed, 2017).

The Great Unconformity represents violent erosion very early in the Flood from these currents. The Unconformity is observed or inferred by seismic methods over much of the continents. A planation surface of this magnitude is difficult to explain by uniformitarian geology, since observed erosion today tends to furrow, not plane, rock over

Figure 4. The top of the granitic Beartooth Mountains, which represent a large faulted planation surface, showing two levels of planation surfaces. The higher level in the background is at about 12,000–13,500 feet (3,660–4,115 m), while roughened lower level (foreground) is at 10,000–11,000 feet (3,050–3,350 m).

Figure 5. Planation surface on top of the granite and gneiss of the northern Bighorn Mountains. Hills in the background are Paleozoic erosional remnants.

a considerable distance (Crickmay, 1974).

The Great Unconformity generally is underlain by granite of the upper continental crust, which likely represents the Creation Week. It is observed at a number of places in northwest and north-central Wyoming. Granite tops the Beartooth Mountains (Figure 4), the Bighorn Mountains (Figure 5), the Wind River Mountains (Figure 6), and even the northern Teton Mountains on Mount Moran (Figure 7) (Oard, 2014). You can drive across Creation Week rocks in the Beartooth Mountains, on the Red Lodge-Cook City Highway. It is one of the most beautiful routes in North America. The Great Unconformity has been faulted upward to different levels with some roughening of the lowest surface at about 10,000–11,000 feet (3,048–3,353 m). West of Cody, Wyoming, in the Rattlesnake Mountains, you can see the Great Unconformity with Creation Week rocks below (Figure 8).

As in Grand Canyon, the Great Unconformity in this area of Wyoming shows thick sedimentary rocks overlying granite (Figure 9). These rocks were originally deposited in horizontal layers in great thicknesses, but many were subsequently eroded during the retreating stage of the Flood, leaving erosional remnants. Therefore, the exposed planation surface is an *exhumed* planation surface. In the Beartooth Mountains, Beartooth Butte is a 1,400-foot (427-m) erosional remnant, apparently protected by a low spot on the Great Unconformity (Figure 10). Erosional remnants are more extensive in the Bighorn Mountains. A 50-foot (15 m) thickness of the lower Flathead Sandstone tops Mount Moran (Figure 7). Sedimentary rocks eroded during the later stage of the Flood make up part of the 10,000–20,000 feet (3,049–6,096 m) of fill in the Bighorn Basin. Other basins exhibit similar thicknesses of sedimentary rocks.

About mid-Flood, the Great Unconformity was uplifted. Psalm 104:8 refers to this when it states that the mountains rose and the valleys sank down. The Great Unconformity surface sank in the valleys and basins between mountain ranges. The difference between the lowest elevation of the Great Unconformity in Wyoming, the bottom of the Hanna Basin (31,000 ft; 9,449 m below sea level), and its peak high in the Wind River Mountains (14,000 ft; 4,267 m) shows a vertical difference of 45,000 feet (13,716 m)! If the unconformity was once level, this difference represents the vertical movement mentioned in Psalm 104:8.

This tectonic combination of uplift and downwarping invalidates the objection of old-earth creationists and theistic evolutionists that the Flood's waters

Figure 6. The Wind River Mountains showing the flat-topped mountains (view west from northern Green River Basin).

Figure 7. Flat-topped Mount Moran, northern Teton Mountains, Wyoming showing 50 feet (15 m) of Flathead Sandstone on top (from Hergenrather et al., 2012).

could not have covered Mount Everest (Walton, 2001). Mount Everest was once covered by marine waters, since geologists have found marine fossils encased in limestone at the peak (Gansser, 1964). The Floodwater did not have to rise over Mount Everest; Mount Everest was pushed up over 30,000 feet (9,144 m) out of the Floodwater (Oard, 2009).

Early Flood Rocks

Scripture states the heavy rain abated after 40 days, which suggests a lessening of the Flood mechanisms. Large volumes of

Figure 8. The Great Unconformity (arrow) with the Flathead Sandstone above, just west of Cody, Wyoming.

Figure 9. The Precambrian granite and sedimentary rocks below Paleozoic and Mesozoic sedimentary rocks in Wyoming were generally horizontal at the end of the Mesozoic (drawn by Mrs. Melanie Richard).

Figure 10. Beartooth Butte with marine fossils in a low spot on top of the Beartooth Mountains, 1,600 feet (490 m) above the adjacent Beartooth Lake, south-central Montana and north-central Wyoming. The channel within the middle of the butte is outlined.

Figure 11. The Grand Staircase indicating thousands of feet of erosion over the Grand Canyon area (view from the northern Kaibab Plateau north of Grand Canyon)

Figure 12. Thick sedimentary rocks in the Wind River water gap through the Owl Creek Mountains.

sediment were then deposited atop the Great Unconformity. This event can be called the *Great Deposition* and resulted in extensive layering of thousands of feet of sediments deposited on every continent. These deposits have been labeled Paleozoic, Mesozoic, and early Cenozoic in the western United States. The Great Deposition corresponds with Walker's (1994) ascending phase. The lack of strong, turbulent currents during deposition is inferred from the lack of deformation observed in those sediments. At Grand Canyon, 4,000–5,000 ft (1,219–1,524 m) of horizontal sedimentary layers overlie the Great Unconformity. Another 10,000 feet were later eroded, as seen in the Grand Staircase to the north (Figure 11). Rocks preserved in the Grand Staircase were eroded from the Grand Canyon area during the retreating stage of the Flood. This erosion is called the *Great Denudation* by secular scientists (Ranney, 2005), who place it in the mid- to late-Cenozoic.

The Great Deposition also emplaced thick sediments atop the Great Unconformity in Wyoming. Remnants of these rocks are seen along the edges of the Bighorn Basin, including those in Wind River Canyon, a 3,000-ft (914 m) water gap that cuts through the sedimentary rocks of the Owl Creek Mountains (Figure 12). Figure 13 is a schematic summarizing the events during the flooding stage.

Sedimentary Layers Similar for Long Distances

These thick early Flood sediments were deposited over extensive areas. If we use the bottom two-thirds of the Grand Canyon

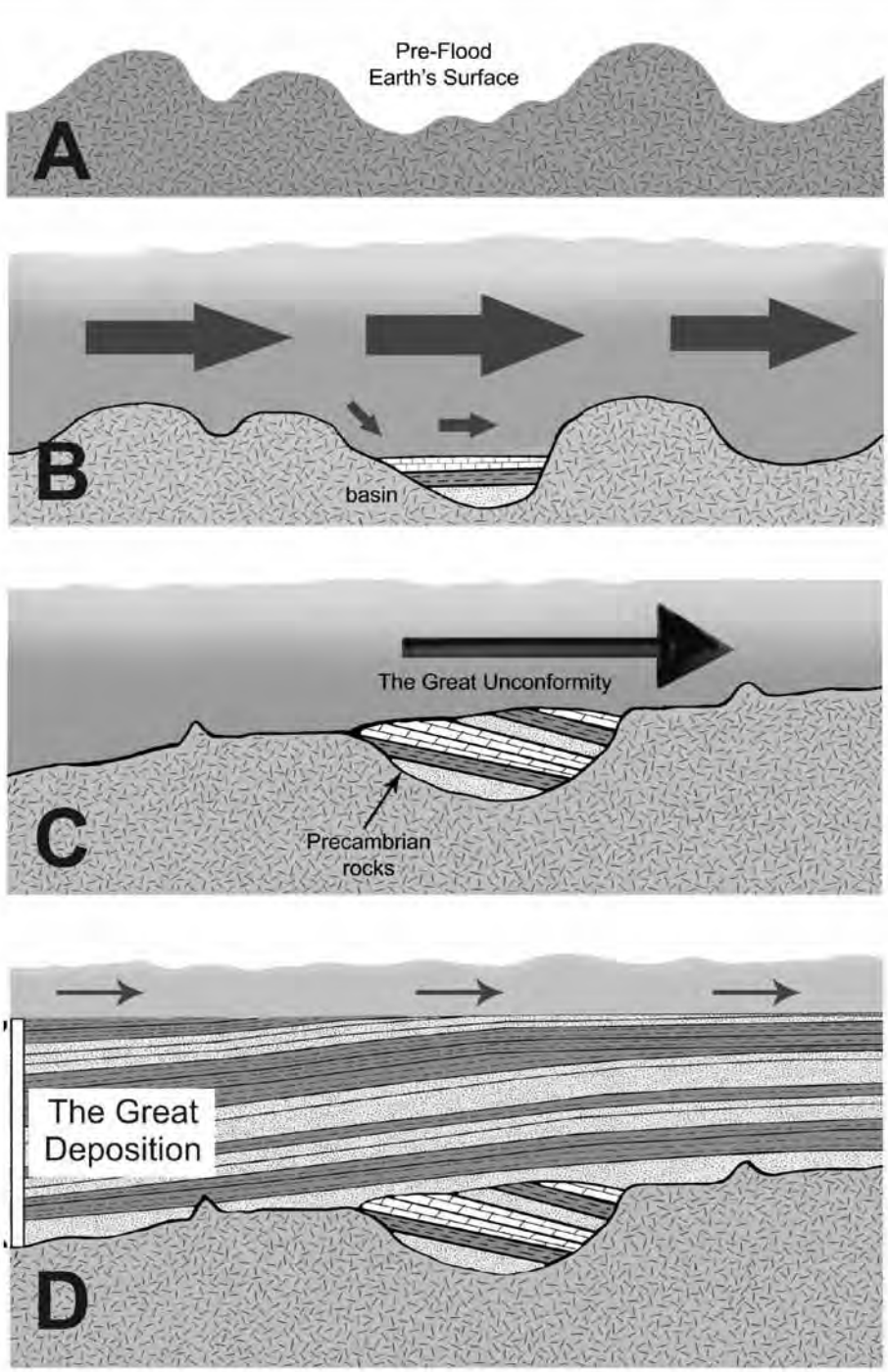

Figure 13. Schematic of events in the flooding stage (drawn by Mrs. Melanie Richard). A pre-Flood land (a) is flooded with deep basins being filled with sediments (b). Early Flood planing creates the Great Unconformity with deformation causing titled basin sedimentary rocks (c). Hundreds to thousands of meters of sediments are deposited on the Great Unconformity during the Great Deposition (d).

Paleozoic as a "type section," we observe a similar sequence in Wyoming. The lowest such layer in Grand Canyon is called the Tapeats Sandstone and can be traced over half of North America (Snelling, 2009). In Wyoming and Montana, it is called the Flathead Sandstone and is visible atop the Great Unconformity west of Cody, Wyoming (Figure 8). The different formation names resulted from geologists in different states not knowing they were seeing the same unit. Above the Flathead Sandstone in the Bighorn Basin is a layer of green shale, similar to the Bright Angel Shale in Grand Canyon. Above the shale in Wyoming are carbonates similar to the Muav and Redwall Limestones in Grand Canyon. The Redwall equivalent in Montana, Wyoming, and the Black Hills of South Dakota is called the Madison Limestone. In Wyoming there are a few additional strata in the lower Paleozoic.

Flat Gaps Between and Within Layers

Field observations indicate continuous sedimentation, but uniformitarian scientists must find large gaps to accommodate their timescale. These breaks are largely flat and thought to account for millions of years. Such breaks are found in sedimentary rocks of Grand Canyon, in Wyoming, and worldwide (Roth, 1998). The most significant is at Grand Canyon, where 160 million years of Cambrian, Ordovician, Silurian, and Lower Devonian rocks are "missing" between the Muav and Redwall Limestones (Figure 14).

A similar gap exists in Montana and Wyoming, with the exception of the Ordovician Bighorn dolomite and the thin Jefferson Formation around the Bighorn Basin (Blackstone, 1986). As in Grand Canyon, the layers are generally conformable, showing little time during deposition. Although this absence of erosion suggested to several geologists that the approximately 2,000 ft (610 m) of sedimentary rocks of the southern Teton Mountains (Figure 15) was deposited in a single, uninterrupted sequence, their uniformitarianism overcame their observations:

> The regularity and parallelism of the layers in well-exposed sections

Figure 14. The flat gap between the Muav Limestone below and Redwall Limestones above line in the Grand Canyon along the North Kaibab Trail.

Figure 15. Sedimentary rocks in southern Teton Mountains from Rendezvous Mountain with Grand Teton in the distance (view north).

> suggest that all these rocks were deposited in a single uninterrupted sequence. However, the fossils and regional distribution of the rock units show that this is not really the case. (Love et al., 2007, p. 42)

Uniformitarian geologists posit millions of years of missing time between the layers (Hill and Davidson, 2016). They point to rare parabolic scours on top of several of the layers in the Grand Canyon as proof of channels that indicate some justification for the missing time, but similar parabolic scours with fish fossils are located on Beartooth Butte (Figure 10). However, the scours lack the V-shaped morphology of channeling. Those scours likely represent current fluctuations during the Flood.

Thick, numerous, widespread sedimentary layers are exactly what we would expect during early Flood deposition. The sediment volume is a function of energy, not time. The flat "gaps" defy uniformitarian explanation, since modern settings show that erosion dissects, rather than planes, surfaces, and sediments are deposited in restricted lens, rather than widespread layers. Sedimentation today often changes its content over short distances, from conglomerate to mud to sand to silt (Figure 16).

Dinosaur Bones and Tracks

Dinosaur bones and tracks are common in sedimentary rocks at the edge of the Bighorn Basin (mammal fossils are found in the central basin). Several local museums have large displays of dinosaurs such as the one at Thermopolis. A megatracksite is found in the northeast part of the basin (Figures 17 and 18). A megatracksite is a concentration of dinosaur tracks in one area. Tracks are found at widely scattered locations in an area measuring 60 miles (96.6 km) north to south and 15 miles (24 km) east to west.

In one 2.9 mi^2 (7.5 km^2) area near Shell, researchers estimated 384,000 tracks per mi^2 (148,480 tracks per km^2) (Kvale et al., 2001). This site has several unusual features difficult to explain by any uniformitarian model (Oard, 2002). First, the tracks are found in two formations supposedly separated by three million years, but all the tracks

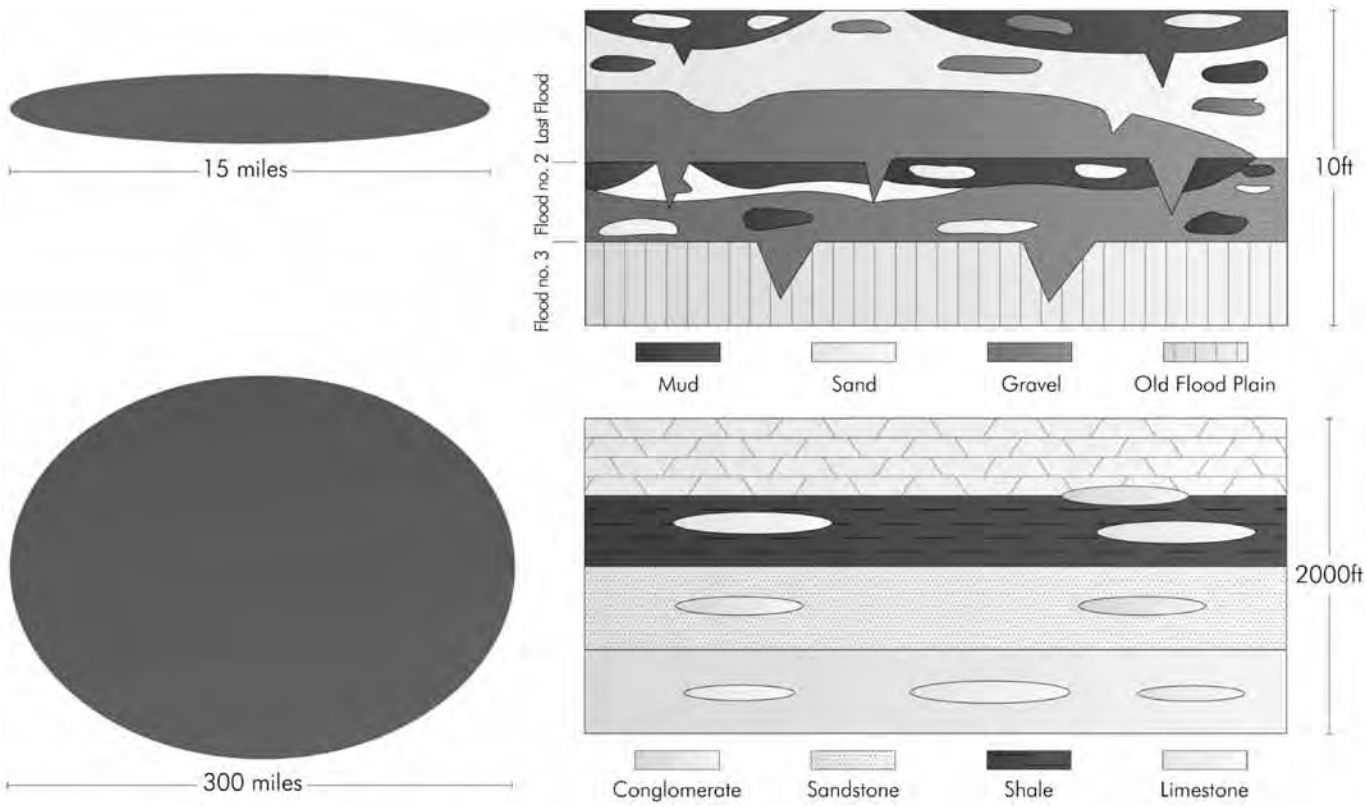

Figure 16. Contrast between present-day multiple flood sedimentation (top) and sedimentary rock layers (bottom). The left is a plan view while the right is a vertical cross section. Notice much larger scale for sedimentary rock layers than typical flood layers

were made by small bipedal, three-toed dinosaurs. Second, the two formations that contain the tracks were thought to be marine deposits until the dinosaur tracks were discovered. Suddenly, a "beach" was added. Third, the trackways are generally straight or gently curved, unusual in a natural environment. It appears the dinosaurs may have been fleeing. These features are more easily explained by the Flood. Drops in the elevation of the Flood's water could have allowed tracks to be made in soft sediments. Rapid rises could have covered them with more sediment, preserving the ephemeral tracks. Another drop in water level would have exposed those sediments to capture more tracks. This mechanism is called the BEDS (Briefly Exposed Diluvial Sediments) hypothesis and explains how tracks could have formed between days 40 and 120 of the Flood (Oard, 2011).

Conclusion

The Bighorn Basin probably exhibits more evidence for Earth's history than any other location. Creation Week igneous and metamorphic rocks were cut by the Great Unconformity early in the Flood. As the energy level of the water dropped, thousands of feet of widespread sedimentary layers were deposited. This period is called the Great Deposition, and corresponds to Walker's ascending phase. In Part II, I will describe the features seen in the Bighorn Basin that correspond to the retreating stage of the Flood and the Ice Age that followed.

References

Blackstone, D.L. Jr. 1986. Foreland compressional tectonics: southern Bighorn Basin and adjacent areas, Wyoming. *The Geological Survey of Wyoming Report of Investigations No. 34*, Geological Survey of Wyoming, Laramie, WY.

Bown, T.M., K.D. Rose, E.L. Simons, and S.L. Wing. 1994. Distribution and stratigraphic correlation of Upper Paleocene and Lower Eocene fossil mammal and plant localities of the Fort Union, Will-

Figure 17 *(left)*. Straight trackway on limestone about 8 miles (13 km) southwest of Shell, Wyoming.

Figure 18 *(above)*. Map of the straight to gently curved dinosaur tracks exposed at site about 8 miles (13 km) southwest of Shell, Wyoming.

wood, and Tatman Formations, southern Bighorn Basin, Wyoming. *USGS Professional Paper 1540*, U.S. Government Printing Office, Washington, D.C.

Clyde, W.C., W. Hamzi, J.A. Finarelli, S.L. Wing, D. Schankler, and A. Chew. 2007. Basin-wide magnetostratigraphic framework for the Bighorn Basin, Wyoming. *GSA Bulletin* 119(7/8): 848–859.

Clyde, W.C., J. Stamatakos, and P.D. Gingerich. 1994. Chronology of the Wasatchian land-mammal age (Early Eocene): magnetostratigraphic results from the McCullough Peaks section, northern Bighorn Basin, Wyoming. *The Journal of Geology* 102:367–377.

Crickmay, C.H. 1974. *The Work of the River: A Critical Study of the Central Aspects of Geomorphology*. American Elsevier Publishing Co., New York, NY.

Froede, C.R. Jr., and M.J. Oard. 2007. Defining the pre-Flood/Flood boundary within the Grand Canyon: were all the pre-Flood sediments scoured down to basement during the Flood? *Creation Matters* 12(4): 3–4, 6.

Gansser, A. 1964. *Geology of the Himalayas*. Interscience Publishers, New York, NY.

Hergenrather, J., T. Vail, M. Oard, and D. Bokovoy. 2012. *Your Guide to Yellowstone and Grand Teton National Parks: A Different Perspective*. Master Books, Green Forest, AR.

Hill, C., and G. Davidson (editors). 2016. *The Grand Canyon: Monument to an Ancient Earth—Can Noah's Flood Explain the Grand Canyon?* Kregel, Grand Rapids, MI.

Kvale, E.P., G.D. Johnson, D.L. Mickelson, K. Kelle, L.C. Furer, and A.W. Archer. 2001. Middle Jurassic (Bajocian and Bathonian) dinosaur megatracksites, Bighorn Basin, Wyoming, USA. *Palaios* 16:233–254.

Love, J.D., J.C. Reed Jr., and K.L. Pierce. 2007. *Creation of the Teton Landscape: A Geological Chronicle of Jackson Hole & the Teton Range*. Grand Teton Association, Moose, WY.

Oard, M.J. 2002. Newly discovered dinosaur megatracksites support Flood model. *Journal of Creation* 16(3): 5–7.

Oard, M.J. 2009. Mt. Everest and the Flood. In Oard, M., and J.K. Reed (editors), *Rock Solid Answers: The Biblical Truth Behind 14 Geological Questions*, pp. 19–27. Master Books, Green Forest, AR.

Oard, M.J. 2011. *Dinosaur Challenges and Mysteries: How the Genesis Flood Makes Sense of Dinosaur Evidence Including Tracks, Nests, Eggs, and Scavenged Bones*. Creation Book Publishers, Powder Springs, GA.

Oard, M.J. 2014. The meaning of the Great Unconformity and Sauk Megasequence. *Journal of Creation* 28(1): 12–15.

Oard, M.J., and C.R. Froede Jr. 2008. Where is the pre-Flood/Flood boundary? *Creation Research Society Quarterly* 45:24–39.

Oard, M.J., and J.K. Reed. 2017. *Understanding Noah's Flood*. Creation Book Publishers, Powder Springs, GA.

Ranney, W. 2005. *Carving Grand Canyon: Evidence, Theories, and Mystery*. Grand Canyon Association, Grand Canyon, AZ.

Roth, A.A. 1998. *Origins: Linking Science and Scripture*. Review and Herald Publishing Association, Hagerstown, MD.

Snelling, A.A. 2009. *Earth's Catastrophic Past: Geology, Creation & the Flood*. Institute for Creation Research, Dallas, TX.

Walker, T. 1994. A biblical geological model. In Walsh, R.E. (editor), *Proceedings of the Third International Conference on Creationism* (technical symposium sessions), pp. 581–592. Creation Science Fellowship, Pittsburgh, PA.

Walton, J.H. 2001. *The NIV Application Commentary: Genesis*. Zondervan, Grand Rapids, MI.

Wei, W. 1995. Chronology of the Wasatchian land-mammal age (Early Eocene): magnetostratigraphic results from the McCullough Peaks section, northern Bighorn Basin, Wyoming: a discussion. *The Journal of Geology* 103:461–463.

Whitcomb, J.C. Jr., and H.M. Morris. 1961. *The Genesis Flood: The Biblical Record and Its Scientific Implications*. Baker Book House, Grand Rapids, MI.