PR120 NARRATIVE Updated 17 May 2014

Cross section PR120 was first monumented and surveyed in 1975. It was resurveyed annually during the 4 consecutive years 1977-1980, resurveyed in 1982, resurveyed annually during the 18 consecutive years 1984-2001, and, after a 10-year hiatus, resurveyed in 2012 and 2013. Additional surveys were made during 1993, 1994, and 1998, and a complete cross valley cross section (1600 m long) was surveyed in 2006 and is included in the data file for PR120.

Section PR120 crosses a gently curving reach of Powder River, about 0.3 km down river of the mouth of Thompson Creek. The left bank of Powder River is developed on a Moorcroft-level terrace that covers most of the area locally known as "Reynolds Battlefield" (Moody and Meade, 2008; Vaughn, 1961). The right bank of the low-water channel is formed by a flood plain developed after the 1978 flood (Moody et al., 1999), which grades laterally onto the Lightning Terrace.

In section PR120, the principal effect of the flood of May 1978 was an increase in the area of the channel cross section. The enlargement was accomplished mainly by 11 meters of lateral erosion of the 3½-meter-high left bank on the Moorcroft-level terrace. This channel enlargement was not compensated during the flood by the deposition of new sediment on the right-bank flood plain, although the flood did leave some new sediment (averaging half a meter's thickness between stations 80 and 100) on the right-side Lightning terrace.

New flood plain was constructed in section PR120 during the two decades following the 1978 flood -- mostly during the years 1982, 1987, 1993, and 1995 (Moody and others, 1999). By 1995, new sediment had accumulated to thicknesses mostly between 1.0 and 1.5 m from station 56 to about station 80. A 23-meter-long trench dug through these deposits in 1998 revealed their stratigraphic relations and their correspondence (or lack of it) with the annual survey data (Pizzuto and others, 2008).

During the last decade (judging from the most recent surveys conducted in 2001, 2012, and 2013), the flood plain has expanded leftward by another 6 meters, further decreasing the width of the low-water channel at section PR120. The low-water channel width here is now less, by some 10-15 meters, than it was in 1977, the year before the large flood.

Meade, R.H., and Moody, J.A., 2013, Erosional and depositional changes wrought by the flood of 1978 in the channels of Powder River, southeastern Montana: *U.S. Geological Survey Scientific Investigations Report* 2013-5035.

Moody, J.A., and Meade, R.H., 2008, Terrace aggradation during the 1978 flood on Powder River, Montana, USA: *Geomorphology*, v. 99, p. 387-403.

Moody, J.A., Pizzuto, J.E., and Meade, R.H., 1999, Ontogeny of a flood plain: *Geological Society of America Bulletin*, v. 111, p. 291-303.

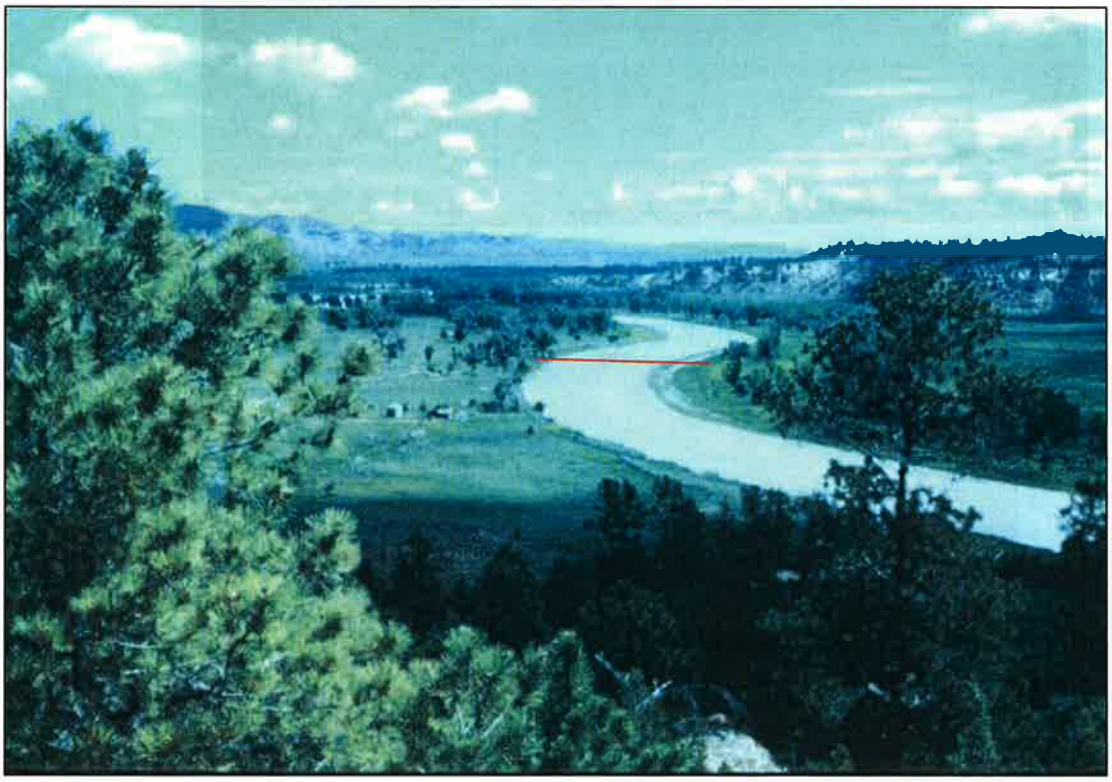
Pizzuto, J.E., 1994, Channel adjustments to changing discharges, Powder River between Moorhead and Broadus, Montana: *Geological Society of America Bulletin*, v. 106, p. 1494-1501.

Pizzuto, J.E., Moody, J.A., and Meade, R.H., 2008, Anatomy and dynamics of a floodplain, Powder River, Montana, U.S.A.: *Journal of Sedimentary Research*, v. 78, p. 16-28.

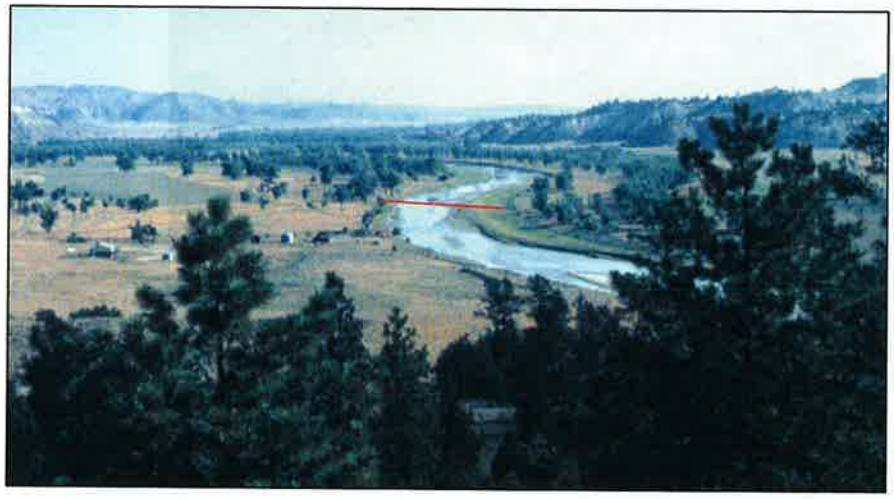
Vaughn, J.W., 1961, The Reynolds Campaign on Powder River: Norman, Okla., University of Oklahoma Press, 239 p.

PR120. **Top**. 21 July 1977. View downriver. Person (1.6 m tall) in red circle is standing on the section. **Bottom**. 16 September 1989. View is downriver from station 53.

PR120. **Top**. 25 May 1978. Aerial view downriver during the waning stage of the flood. New sediment (mud and sand) is deposited on right bank starting just upriver of the section. **Bottom**. 19 September 1988. Zoom lens view downriver from bluff shown in the bottom left of the top photo. Red line indicates the approximate line of section.



PR120. **Top**. 13 May 1993. View downriver. Discharge 34 $m^3 s^{-1}$. **Bottom**. 9 June 1993. View downriver. Discharge 170 $m^3 s^{-1}$. Note water in trough between new inset floodplain and old bank along right bank above and below section. Red lines indicate the approximate line of section.

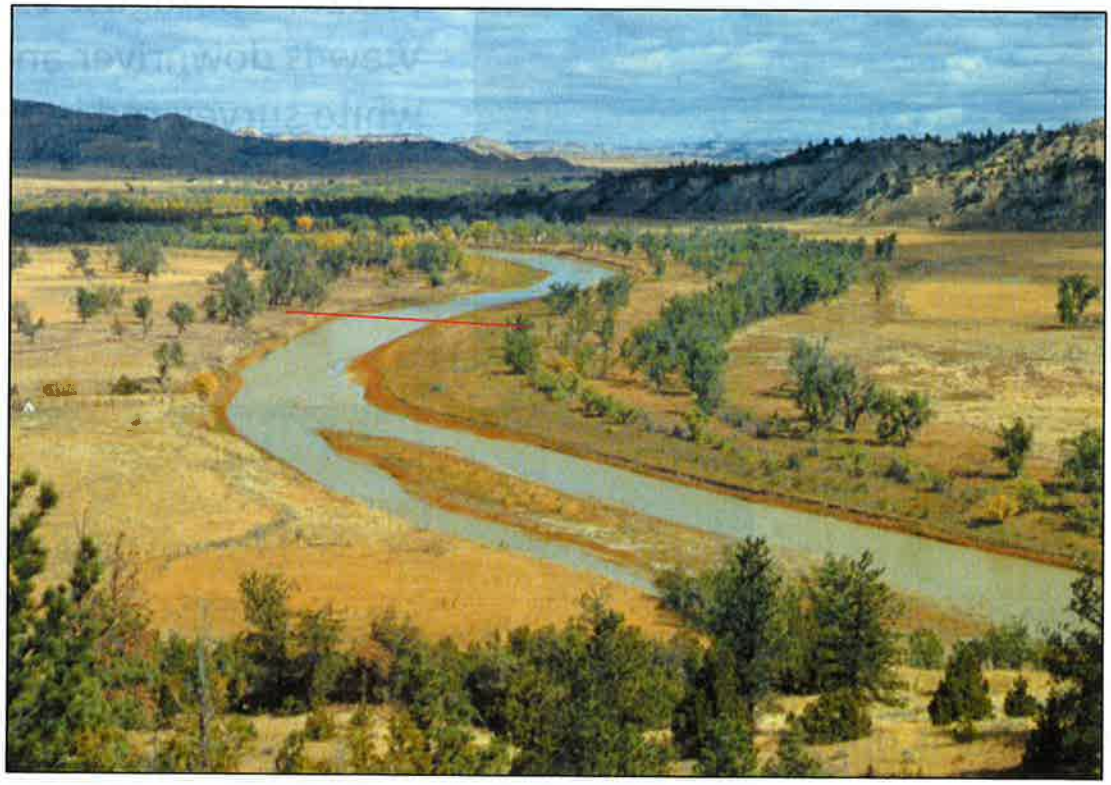


PR120. **Top**. 9 May 1994. View downriver, discharge 17 $m^3 s^{-1}$.
Middle. 23 August 1994. View downriver, discharge 0.23 $m^3 s^{-1}$.
Bottom. 24 September 1994. View downriver, discharge ~1.5 $m^3 s^{-1}$.
Red lines indicate the approximate line of section.

PR120. 14 September 1990. View downriver through station 60.

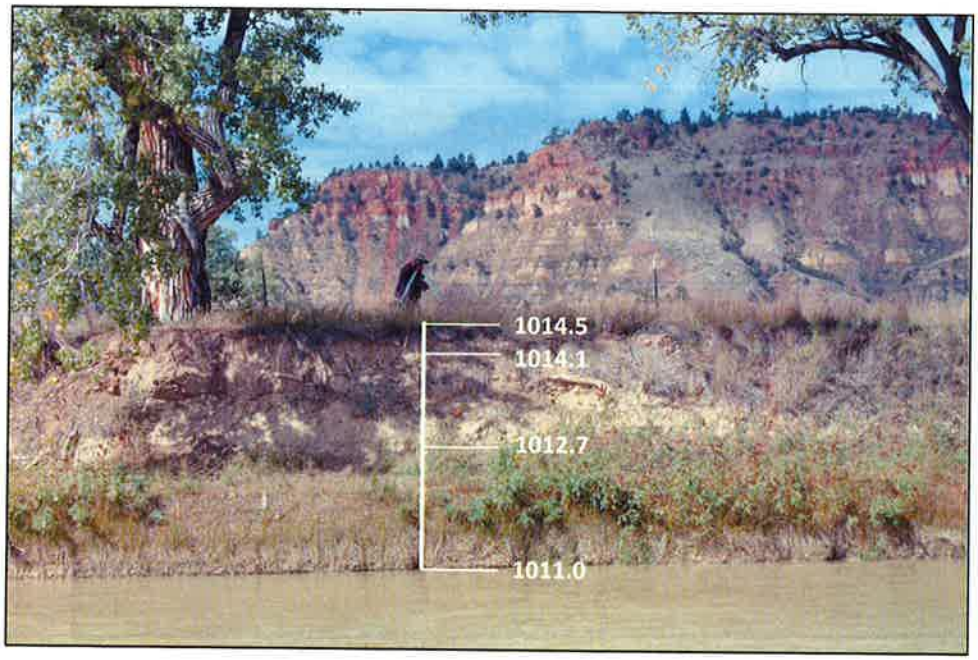
PR120. 25 August 1993. View is downriver and white survey rod is on the section.

PR120. 10 March 1995. View downriver and white survey rod is on the section.



PR120. **Top**. 10 March 1995. View downriver, discharge 3.1 $m^3 s^{-1}$
Bottom. 27 September 2006. View downriver. Red lines indicate the approximate line of section.

PR120. **Top**. 28 September 2013. View downriver below section. **Bottom**. 28 September 2013. View upriver. Tripod and D. Martin are 15 m upriver of station -7. Fence along left bank crosses the section at station -4.7. Rodman (J. Moody) is standing at station +10, which was the approximate location of the top of the left bank in 1977 before the Flood of 1978, which eroded the left bank back 11 m. (See Meade and Moody, 2013, Fig. 6).



PR120. **Top**. 28 September 2013. Cross-river view of left bank (tripod and D. Martin are 15 m upriver of station -7). River flows from left to right in photo. Elevation of the top of the left bank at the tripod is about 1014.5 m, and two cores of bank sediment were collected for OSL dating below the tripod. One core at 1014.12 m above sea level was taken in sediment presumed to have been deposited during the Flood of 1923, and one core at 1012.68 m is presumed to represent sediment from the Lightning Terrace. **Bottom**. 28 September 2013. View downriver. Red line indicates the line of section.