

Figure 41. Map. Electrical resistivity survey line on Bearpaw Bridge. ⁽⁶⁾



Figure 42. Photo. Bearpaw Bridge.

4.5.2 Data Analysis and Interpretation

Electrical Resistivity

The interpreted resistivity data is shown in figure 43. Three resistive anomalies are observed, labeled BP-1, BP-2 and the large resistive anomaly coincident with the cave location. The center of this anomaly is located at approximately 41.2 m (135.2 ft) along the survey line. The maximum resistivity value at the cave location, located at 40.9 m (134.2 ft) to the east and along the bottom edge of the data, is 84,400 ohm-m. More information at greater depths is needed to fully characterize this anomaly.

BP-1 is a large anomaly located along the lower western (left) portion of the geoelectric cross section. This anomaly has a large lateral extent, approximately 15 m (49.2 ft). Resistivity data at greater depths are needed to fully characterize this anomaly. BP-2 is a small anomaly located near the surface at approximately 30 m (98.4 ft) along the survey line. It has a maximum resistivity value of 64,439 ohm-m and is located less than a meter below the surface. The diameter of this anomaly is approximately 2.5 m (8.2 ft).

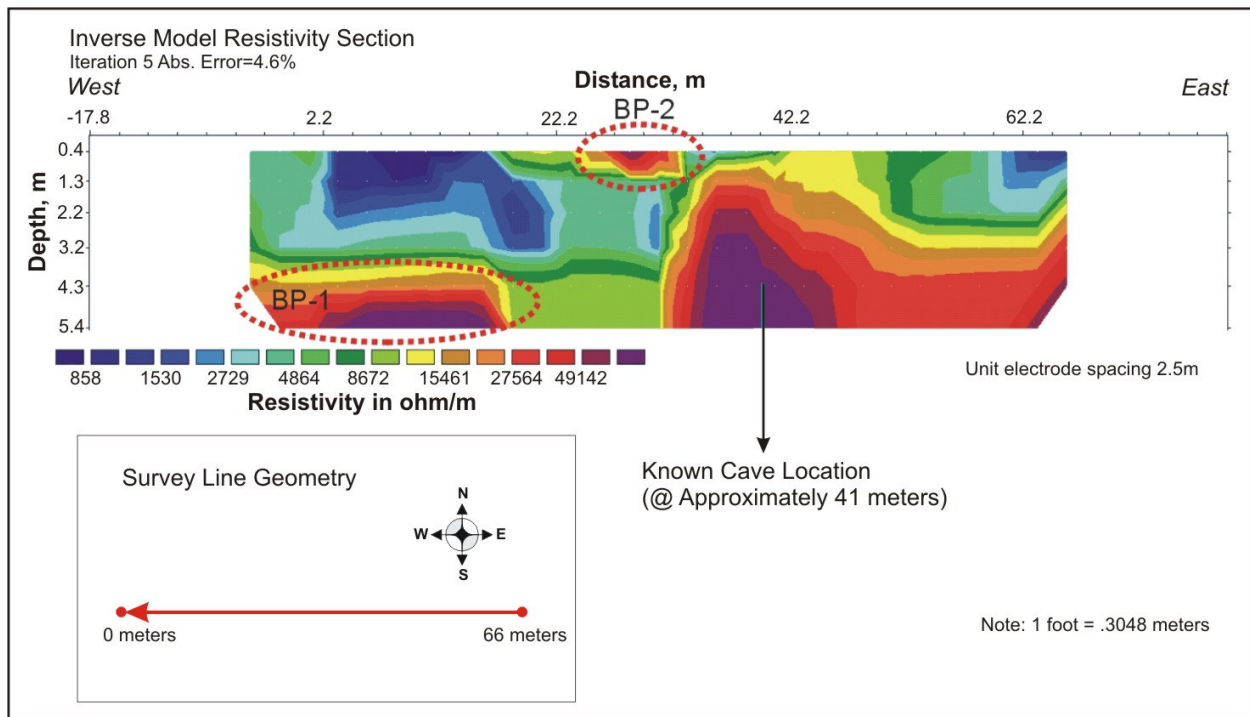


Figure 43. Cross Section. Electrical resistivity data collected on Bearpaw Bridge.

4.5.3 Comparisons

Only electrical resistivity data were collected over Bearpaw Bridge. Therefore, no comparisons are possible at this site.

4.6 HERCULES LEG CAVE – KNOWN AND UNKNOWN SECTIONS

4.6.1 Site Description

The Hercules Leg Cave, pictured in figure 44, is part of a cave system located on the southern end of Cave Loop Road and to the east of the Master Tube. Hercules Leg Cave meanders across the area and passes under the road several times. The cave contains many geological features including copulas, overburden collapse, “aa” cauliflower, lava waves, skylights, and some of the finest lava ribs in the park ⁽⁶⁾. The overburden thickness in this area varies between approximately 2.7 m to 3.4 m (8.9 ft to 11.2 ft). Figure 45 shows two plan view maps of this cave. The first part is considered a “known” area, outlined in blue, where the cave travels underneath the road at least twice. For this report, different names are given to each individual section of the Hercules Leg Cave that passes underneath the road in order to allow clearer descriptions. The “Hercules Leg Cave – North” refers to the northernmost part of Hercules Leg Cave that passes underneath the road. At this location the cave has a width of 9.8 m (32.2 ft) and a height of 0.91 m (3.0 ft) at one point underneath the road. The southern portion of the cave, named “Hercules Leg Cave – South” in this report, has a width of 22.3 m (73.2 ft) and a height of 2.4 m (7.9 ft). The second part of this survey site is considered an “unknown” area and is located just north of the known area, outlined in red.

The Hercules Leg Cave was chosen as a survey site because the cave passes underneath the road twice. This will test the capability of the geophysical methods to distinguish multiple caves close to one another. Also, it will test the capabilities of the methods to find shallow voids.



Figure 44. Photo. Entrance at Hercules Leg Cave.

4.6.2 Data Analysis and Interpretation

Ground Penetrating Radar

Figure 46 is a plan view map ⁽⁶⁾ that illustrates the approximate location of the GPR survey lines over the known and suspected locations of Hercules Leg Cave. The exact coordinates of the starting and ending points of the three GPR lines are listed in table 12.

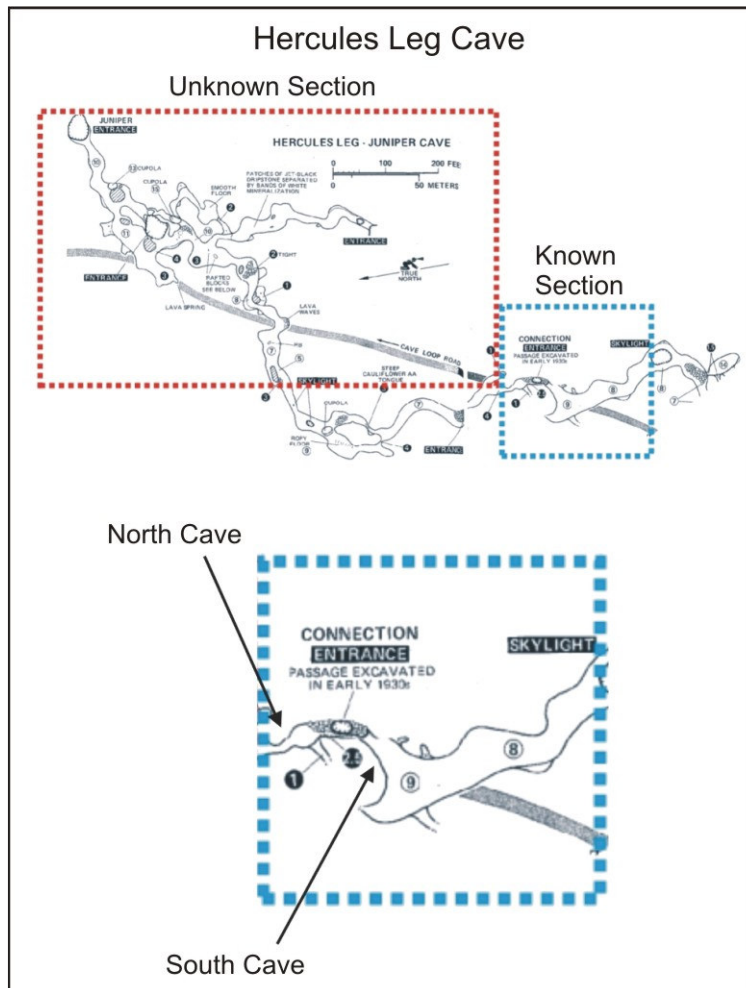


Figure 45. Map. Plan view index map of Hercules Leg Cave. ⁽⁶⁾

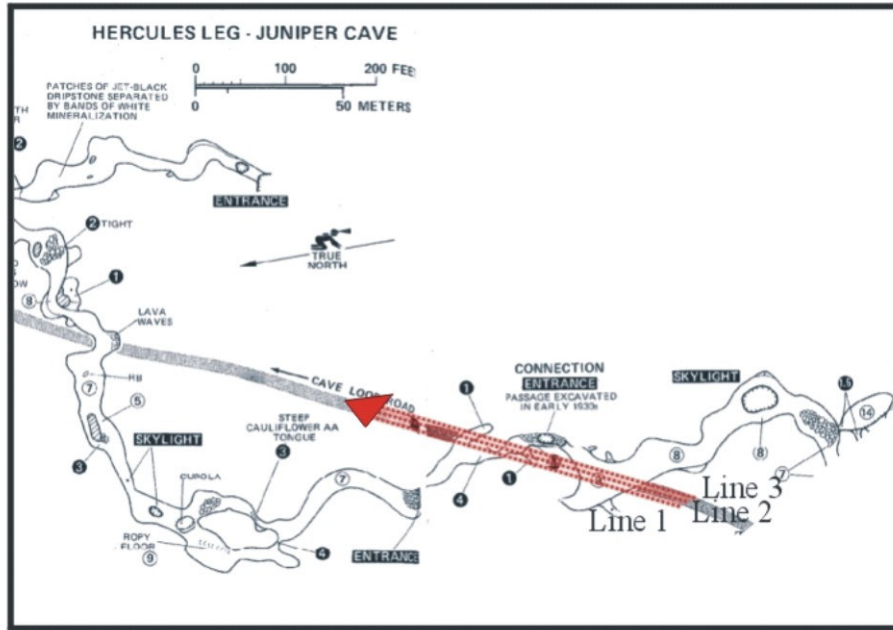


Figure 46. Map. GPR survey line over Hercules Leg Cave. ⁽⁶⁾

Table 12. GPR survey line coordinates over Hercules Leg Cave.

Line #	North End Point		Mid Point		South End Point	
	Easting (m)	Northing (m)	Easting (m)	Northing (m)	Easting (m)	Northing (m)
Line 1	623679.67	4618090.99	623659.54	4618045.37	623637.36	4617996.32
Line 2	623680.86	4618090.54	623660.73	4618044.87	623639.05	4617995.62
Line 3	623681.81	4618090.14	623661.67	4618044.53	623639.96	4617995.28

All coordinates are listed in NAD 83/UTM Zone 10

Approximately 106.7 m (350.1 ft) of data were collected along each of three profiles at Hercules Leg Cave with both the 200 and 400 MHz antennae. Two profiles were collected measuring approximately 53.3 m (174.9 ft) using the 100 MHz antenna. In general, the data from each of the profiles correlate well with each other and show many of the same characteristics. The known lava tubes at Hercules Leg Cave were the most readily identifiable lava tubes in all of the GPR cross sections collected at LBNM. Figures 47 and 48 display the 200 MHz data collected along Line 1, which crosses the region of known caves along with the area where caves are suspected to occur, respectively. Anomalies coincident with the known caves are clearly evident in the processed data. The clarity of the anomalies is probably due to the small amount of overburden present and possible lack of fracturing and blistering in the area. Tape and compass surveying estimated 2.7 m (8.9 ft) of overburden at Hercules Leg South Cave and 3.4 m (11.2 ft) of overburden at Hercules Leg North Cave, compared to 2.1 and 1.8 m (6.9 and 5.9 ft),