Tanaocrossus kalliokoskii is a fusiform palaeonisciform “subholostean” with an elongate dorsal. Known only from the holotype (AMNH 5700), an impression lacking the anterior half of the skull and the pectoral fins, from the “upper portion” of the Chinle Formation in Montrose County, Colorado. A 2005 excavation of “Walt’s Fish Quarry” in the Owl Rock Member of the Chinle Formation of San Juan County, Utah, yielded three new specimens of T. kalliokoskii, two of which have complete skulls and pectoral fins. The “Walt’s Fish Quarry” site is geographically close to the type locality of Tanaocrossus. Three more specimens from the lower part of the Bull Canyon Formation in Quay County, New Mexico are well-preserved and three-dimensional, unlike the flattened Utah specimens. The new material reveals Tanaocrossus to be a perleidiform based on the presence of an antero-dorsally expanded preopercular, a vertical suspensorium, among other characters. Tanaocrossus has sometimes been placed within the Family Scanilepidae along with Scanilepis and Fukangichthys; however, the new specimens demonstrate that this cannot be the case, and the placement of the latter taxa is in question as well. Detailed study of the three-dimensional Bull Canyon specimens will allow for a clearer understanding of this hitherto enigmatic fish.