

# Bedrock Geologic Map Unit Properties Table: Apostle Islands National Lakeshore

Map unit colors correspond to GRI map poster (in pocket). Bold text refers to sections in report.

Age	Map Unit (Symbol)	Geologic Description	Geologic Features and Processes	Geologic Resource Management Issues	Geologic History	
MESOPROTEROZOIC ERA	Keweenaw Supergroup Bayfield Group	Chequamegon Sandstone (PCch)	<p>Arkose is a feldspar-rich sandstone. <b>PCch</b> contains red, brown, and white arkosic sandstone. Scant beds of red shale and conglomerate occur locally. Feldspar grains are common. Sedimentary bedding is generally thick. <b>PCch</b> is about 150 m (490 ft) thick.</p> <p><b>PCch</b> dominates the bedrock within the park, and is mapped on all islands except Eagle, Sand, and Devils.</p>	<p><b>Sedimentary Rock Features—PCch</b> contains planar crossbedding, thin channel cross sections, scour-and-fill structures, mud cracks, ripple marks, convoluted bedding and other features associated with braided-stream deposition. Arkose typically forms as a result of granitic rocks breaking down. The presence of large fragments and feldspar commonly means the sediments did not travel far from their point of origin and/or were deposited rapidly because feldspars typically decompose faster than quartz.</p>	<p><b>Slope Movement Hazards and Risks—PCch</b>, as part of the bedrock that composes the cliff shorelines at the lakeshore, is prone to erosion and blockfall.</p> <p><b>Caves and Associated Landscape Management—PCch</b> contains sea caves. Climbing in sea caves is restricted at Apostle Island National Lakeshore.</p> <p><b>Abandoned Mineral Lands and Disturbed Land Restoration—Brownstones of PCch</b> were quarried on three islands at four sites and are now interpretive targets.</p>	<p><b>1.6 Billion to 1.0 Billion Years Ago (Mesoproterozoic Era)—Continental Rifting, Volcanism, and Sandstone Deposition—PCch, PCdi, PCo, and PCf</b> were deposited in one of the world’s great continental rifts. <b>PCch</b> is the youngest member of the Bayfield Group deposited atop <b>PCdi</b> in a series of braided streams after the local basin subsided again. The sediment was derived from weathering granites along the flanks of the Midcontinent rift.</p>
		Devils Island Sandstone (PCdi)	<p><b>PCdi</b> consists of white to tan quartz sandstone arenite (consolidated sedimentary rock composed of sand-sized fragments). Individual beds within <b>PCdi</b> are generally thin. <b>PCdi</b> is about 100 m (330 ft) thick.</p> <p><b>PCdi</b> crops out at Devils and Sand islands, and along the shoreline in the mainland unit of Apostle Islands National Lakeshore.</p>	<p><b>Sedimentary Rock Features—PCdi</b> contains cross-bedding and ripple marks. <b>PCdi</b> is also well sorted.</p> <p><b>Devils Island Sandstone Type Locality—the remarkable exposures of PCdi</b> at Devils Island are the geologic type locality.</p> <p><b>Paleontological Resources—PCdi</b> contains potential trace fossils as burrows. Microbial fossils are known from rocks similar in age, elsewhere in the region.</p>	<p><b>Slope Movement Hazards and Risks—PCdi</b>, as part of the bedrock that composes the cliff shorelines at Apostle Islands National Lakeshore, is prone to erosion and blockfall.</p> <p><b>Caves and Associated Landscape Management—PCdi</b> contains sea caves. Climbing in sea caves is restricted at Apostle Island National Lakeshore.</p> <p><b>Paleontological Resource Inventory, Monitoring, and Protection—If fossils are identified from PCdi</b>, they should be documented and an appropriate monitoring protocol established.</p>	<p><b>1.6 Billion to 1.0 Billion Years Ago (Mesoproterozoic Era)—Continental Rifting, Volcanism, and Sandstone Deposition—PCch, PCdi, PCo, and PCf</b> were deposited in one of the world’s great continental rifts. <b>PCdi</b> is the thin, middle member of the Bayfield Group deposited atop <b>PCo</b> as a blanket of beach sand flanking numerous shallow ponds and lakes after the basin was partially filled with sediment.</p>
		Oriente Sandstone (PCo)	<p>Arkose is a feldspar-rich sandstone. <b>PCo</b> is red, brown, and white, arkosic sandstone. Scant beds of red shale and conglomerate occur locally. Feldspar grains are common. <b>PCo</b> is approximately 1,000 m (3,300 ft) thick.</p> <p><b>PCo</b> is mapped at Eagle and Sand islands.</p>	<p><b>Sedimentary Rock Features—PCo</b> contains planar crossbedding, thin channel cross sections, scour-and-fill structures, mudcracks, ripple marks, convoluted bedding and other features associated with braided-stream deposition. <b>PCo</b> is also poorly sorted. Arkose typically forms as a result of granitic rocks breaking down. The presence of large fragments, poor sorting, and feldspar commonly means the sediments did not travel far from their point of origin and/or were deposited rapidly because feldspars typically decompose faster than resistant quartz.</p>	<p><b>Slope Movement Hazards and Risks—PCo</b>, as part of the bedrock that composes the cliff shorelines at the lakeshore, is prone to erosion and blockfall.</p> <p><b>Caves and Associated Landscape Management—PCo</b> contains sea caves. Climbing in sea caves is restricted at Apostle Island National Lakeshore.</p>	<p><b>1.6 Billion to 1.0 Billion Years Ago (Mesoproterozoic Era)—Continental Rifting, Volcanism, and Sandstone Deposition—PCch, PCdi, PCo, and PCf</b> were deposited in one of the world’s great continental rifts. <b>PCo</b> is the oldest member of the Bayfield Group deposited atop <b>PCf</b> in a series of braided streams. The sediment was derived from weathering granites along the flanks of the Midcontinent rift.</p>
	Oronto Group	Freda Sandstone (PCf)	<p><b>PCf</b> contains fine- to medium-grained, red, brown, and tan sandstone arenite (consolidated sedimentary rock composed of sand-sized fragments) with lesser shale and conglomerate layers. Feldspar and mica flakes are common. Bedding is well defined.</p> <p><b>PCf</b> is not mapped within Apostle Islands National Lakeshore.</p>	<p><b>Sedimentary Rock Features—PCf</b> contains cross-bedding.</p>	<p>None reported.</p>	<p><b>1.6 Billion to 1.0 Billion Years Ago (Mesoproterozoic Era)—Continental Rifting, Volcanism, and Sandstone Deposition—PCch, PCdi, PCo, and PCf</b> were deposited in one of the world’s great continental rifts. <b>PCf</b> is the youngest member of the Oronto Group to form from eroding volcanic rocks of the Keweenaw volcanics.</p>