# TECTONIC SETTING

This map is one of a set of two 1:250 000 scale maps and an accompanying sheet of cross-sections that describes the geological framework of some 22 975 km$^2$ of east-central Yukon (*see* inset and index maps). A more detailed map of part of the area (central 105-K) is published separately at 1:100 000 scale (Map 2150A).

Much of Sheldon Lake and Tay River areas (NTS 105-J, 105-K) northeast of Tintina Fault is underlain by uppermost Proterozoic and Lower Paleozoic basinal strata (Selwyn Basin) that formed in a re-entrant within shallow-water carbonate and clastic strata (Mackenzie Platform) along the outer margin of ancestral North America. The oldest exposed strata consist of latest Proterozoic to Cambrian turbiditic quartz sandstone (unit PY) and maroon slate (unit PЄN) (more than 2500 m thick) succeeded by local Cambrian shale (unit ЄG), (up to 700 m) capped by a widespread Cambro-Ordovician basinal limestone and siltstone (unit ЄOR) (300 m). A starved sequence of shale, chert, and siltstone (unit OSR; lowermost unit DP) (450 m) with local volcanic rocks (unit OM) was deposited during the Ordovician to Middle Devonian. Regional sub-Upper Cambrian (unit ЄOR) and other local unconformities suggest intermittent extension and syndepositional faulting. In the Silurian and Devonian the basin was flanked on the southwest by shallow-water carbonate and clastic units of McEvoy Platform (units SDc and Ssp) (300+ m). Large stratiform zinc-lead deposits are known in Early Cambrian (Faro) and Early Silurian (Howards Pass, to east of area) strata.

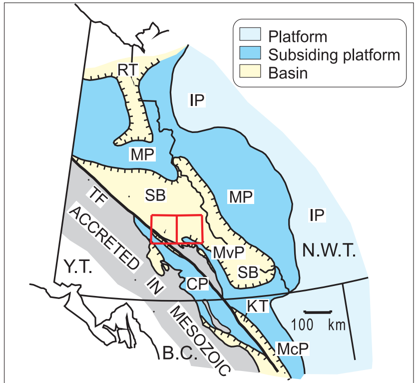


**Figure 1.** Tectonic setting of Tay River (left) and Sheldon Lake (right) areas (in red).Tectonic elements: Richardson Trough (RT), Selwyn Basin (SB), Kechika Trough (KT), Interior Platform (IP), McEvoy Platform (MvP), Cassiar Platform (CP), Mackenzie Platform (MP), Macdonald Platform (McP), and Tintina Fault (TF).

In the Late Devonian, turbiditic quartz-chert sandstone, and chert-pebble conglomerate were deposited in submarine fan complexes as shale deposition transgressed far northeastward onto the ancestral margin (units DME, MC, DMP, and DP). The coarse clastic units, perhaps 1200 m in aggregate thickness, were derived from elevated fault blocks of Selwyn Basin strata to the north and west, including latest Proterozoic gritty quartzose clastic rocks and Ordovician-Silurian chert. An extensional or transtensional event is indicated by an absence of compressional deformation, local felsic volcanism (unit Mv), and widespread stratiform barite (± lead-zinc) occurrences (e.g. Tom, Jason to east of area). A regional unconformity occurs beneath upper Upper Devonian strata (unit DMP).

Succeeding Lower Mississippian and Triassic carbonate and siliciclastic sedimentary rocks separated by Carboniferous to Permian chert and shale (units MT, CPMC, and TJ) (total 1700 m) were likely deposited on a silty to muddy, at times euxinic, shallow-marine shelf. A regional unconformity occurs beneath Middle to Upper Triassic (unit TJ), and possibly beneath Upper Mississippian strata (unit CPMC).

Rare Lower Cretaceous chert-bearing clastic rocks (unit KBT) (more than 120 m), the first signal of Jura-Cretaceous orogenic uplift to the west, disconformably overlie Upper Triassic strata.

Ancestral margin strata southwest of Tintina Fault comprise two distinct successions separated by the northwest-trending St. Cyr Fault. On the southwest, the Pelly Mountains assemblage (3500 m) consists of relatively deep-water, late Proterozoic to Silurian fine clastic and carbonate strata (units PЄp, ЄOsl, and OSl) succeeded by shallow-water, Siluro-Devonian carbonate and clastic rocks (units Sst and SDdq; Cassiar Platform), in turn overlain by Devono-Mississippian shale and chert-bearing sandstone (unit DMs). The Devono-Mississippian strata are analogous in tectonic affinity to the Earn Group (unit DME) northeast of Tintina Fault. To the south of Tay River map area the succession includes felsic volcanic rocks that host volcanogenic massive-sulphide occurrences (e.g. Wolf). Unconformities occur at the base of the Lower Silurian (unit Sst) and upper Upper Devonian (unit DMs). In the narrow belt between St. Cyr and Tintina faults, the St. Cyr assemblage (more than 1600 m) differs from the Pelly Mountains assemblage in the lack of Paleozoic shallow-water clastic or carbonate strata, as well as in the presence of a unique and enigmatic unit of Late Devonian limestone-phyllite (unit DMcsl). Cambro-Ordovician to Devonian strata consist chiefly of fine-grained pelitic (unit ODsl) and carbonate (unit ЄOc) rocks of probable deep-water origin. Scattered remnants of Carboniferous to Triassic strata include chert (unit Mt), siltstone, carbonate, and shale (units DMs, Csl, and uTsc) that resemble equivalent strata in adjacent regions southwest of St. Cyr Fault.

In the Early Cretaceous, northeast-southwest compression led to northwest-trending, regional-scale folds, and extensive, shallow-dipping thrust faults. Incompetent Ordovician to Devonian shale and chert are complexly deformed above a regional, flat-lying, buried detachment (*see* cross-sections, sheet 3). Shortening in Cambro-Ordovician to Devonian strata is at least 50%, indicating that the paleogeographic width of the Selwyn Basin was twice as much as is currently represented. Folds and faults ultimately root in a basal detachment that extends beneath the region and across the entire deformed belt. Upper Paleozoic oceanic rocks of the Slide Mountain terrane (unit CPs), and metasedimentary rocks of the Yukon-Tanana terrane (unit CTY), were emplaced as thrust sheets during this deformation. Deformation is bracketed as younger than affected Early Cretaceous strata (unit KBT), and older than intrusion of the mid-Cretaceous Selwyn Plutonic Suite (unit KS) and eruption of dacitic pyroclastic rocks of the coeval South Fork volcanics (unit KSF). The plutons are regionally associated with tungsten-copper skarn (e.g. Mactung) and base-metal vein occurrences. The volcanic rocks are notably barren.

Cretaceous-Tertiary dextral slip along Tintina fault zone, which transects the southwest part of the area, amounted to at least 430 km. Pull-apart basins along the fault zone accumulated fluvial clastic rocks (unit Ts) and bimodal volcanic rocks (unit Tv) that host epithermal precious-metal veins (e.g. Grew Creek).


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