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**Twenty-six archival stratigraphic sections
in Paleoproterozoic to Neoproterozoic strata
from the Coal Creek inlier,
southern Ogilvie Mountains, Yukon**

R.I. Thompson and C.F. Roots

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ABSTRACT

This Open File presents 26 stratigraphic sections measured by Bob Thompson during regional mapping of the northeast half of Dawson map area (NTS 116 B/C). The sections are previously unpublished, and figures are augmented by stratigraphic nomenclature from more recent work. These stratigraphic sections document representative exposures of Paleoproterozoic to Neoproterozoic strata in the Coal Creek inlier, namely the Wernecke, Fifteenmile, Mount Harper, Hay Creek and ‘Upper’ groups.

INTRODUCTION

The Ogilvie Mountains project was initiated by the Geological Survey of Canada (GSC), Vancouver subdivision in 1980 to up-date reconnaissance maps of Green (1972) in response to mineral exploration which followed the release of regional stream sediment geochemical surveys. The mapping resolved the distribution of thick Proterozoic carbonate units having numerous showings of zinc-lead strata-bound and vein-style mineralization. These are exposed in the Coal Creek erosional inlier (Fig. 1) beneath Paleozoic carbonate of the Ogilvie platform to the north and shale and volcanic rocks of Selwyn basin to the south.

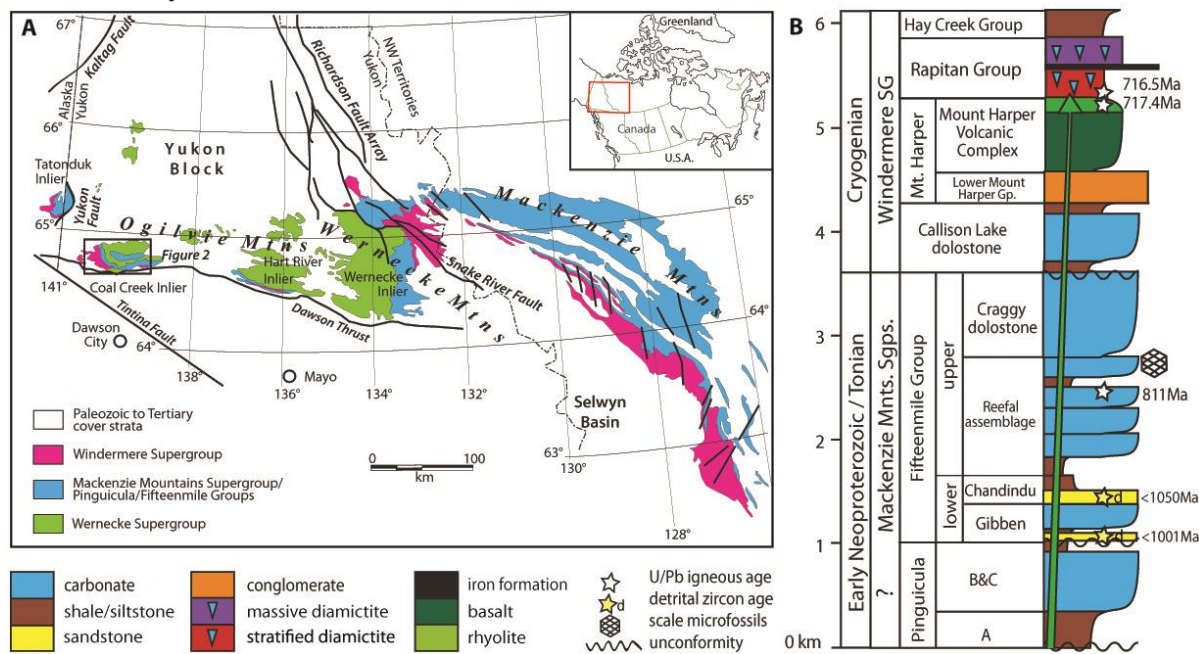


Figure 1. Coal Creek inlier is the westernmost exposure of Proterozoic rocks in the northern Canadian Cordillera. The composite stratigraphic column represents the current nomenclature from the Coal Creek inlier (adapted from Kunzmann et al., 2014).

The locations of most of the measured stratigraphic sections were originally shown on eleven 1:50 000-scale monochromatic geology maps produced by Thompson et al. (1994). Progress reports and several contributions to symposia constitute the written record of the 1980-1986 project, but the sections remained unpublished. Since 2008 sedimentological study and stratigraphic analysis by researchers from Harvard, McGill and Simon Fraser universities (see Bibliography) improved understanding of the stratigraphy and several units in the inliers have been formally defined. The measured section of this publication (sheets S-1 through S-21) are located on the resulting updated regional bedrock map of Strauss et al. (2014; 1:100,000 scale). This compilation of the earlier

stratigraphic observations complement that map and is made available to assist more complete description of the Proterozoic units of the Coal Creek inlier.

PROTEROZOIC STRATIGRAPHY OF THE COAL CREEK INLIER

The Coal Creek Inlier is the westernmost of three exposures (by uplift and erosion) of broadly equivalent Proterozoic rocks located along the southern margin of the Yukon Block (Fig. 1). The inlier contains eight Proterozoic sedimentary rock sequences, as well as the Wernecke breccias and less abundant mafic intrusions. Some of the age constraints, stratigraphic relationships and nomenclature are described below, with reference to earlier studies of correlative strata in the Hart River and Wernecke inliers.

Distribution of the stratigraphic sequences in the Coal Creek inlier is shown on Figure 2. The oldest, the Wernecke Supergroup, is exposed in the northeast, while progressively younger strata are found toward the western side of the inlier. The sequences range in age from about 1.64 billion to 600 million years (Furlanetto et al., 2013; Thorkelson et al., 2001, 2005; Macdonald et al., 2012). Metamorphism is greenschist facies or lower grade; multiple generations of block faults and late high angle reverse faults disrupt strata, but sections are well exposed and well preserved.

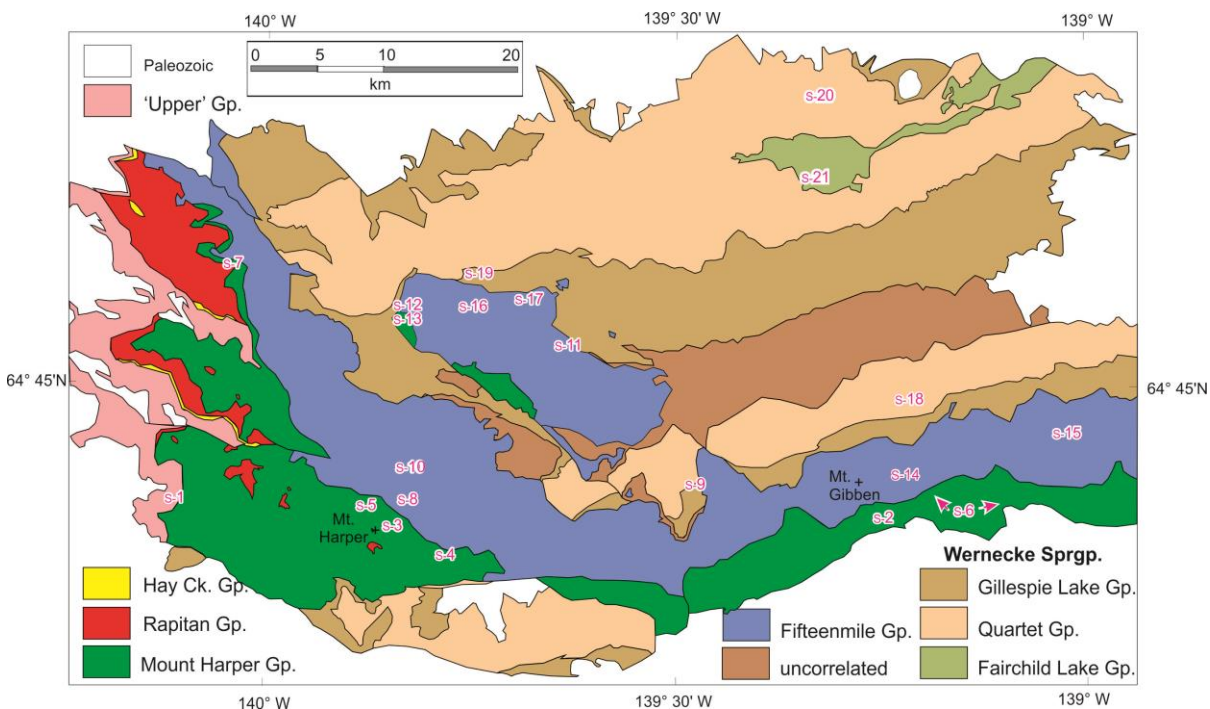


Figure 2: Distribution of stratigraphic groups in the Coal Creek inlier, showing approximate location of the measured stratigraphic sections (sheets S-1 to S-21).

The Paleoproterozoic Wernecke Supergroup is only present on the Yukon block (west of the Richardson Fault Array/Snake River Fault; see Fig. 1). It consists of over 10 km of polydeformed carbonate and siliciclastic rocks (Delaney, 1981) that were deposited in an intra-continental basin or continental margin prior to the Racklan orogeny which occurred between 1640 and 1599 Ma (Thorkelson et al 2005, Furlanetto et al., 2013) and emplacement of the mineralized Wernecke breccia at about 1.60 Ga (Thorkelson et al., 2001, 2005). Mafic intrusions cutting the Wernecke Supergroup in the Coal Creek inlier are likely correlative with the ~1380 Ma Hart River sills in the Hart River inlier (Abbott 1997) or the ~1270 Ma Bear River dykes (Thorkelson 2000; Schwab et al.

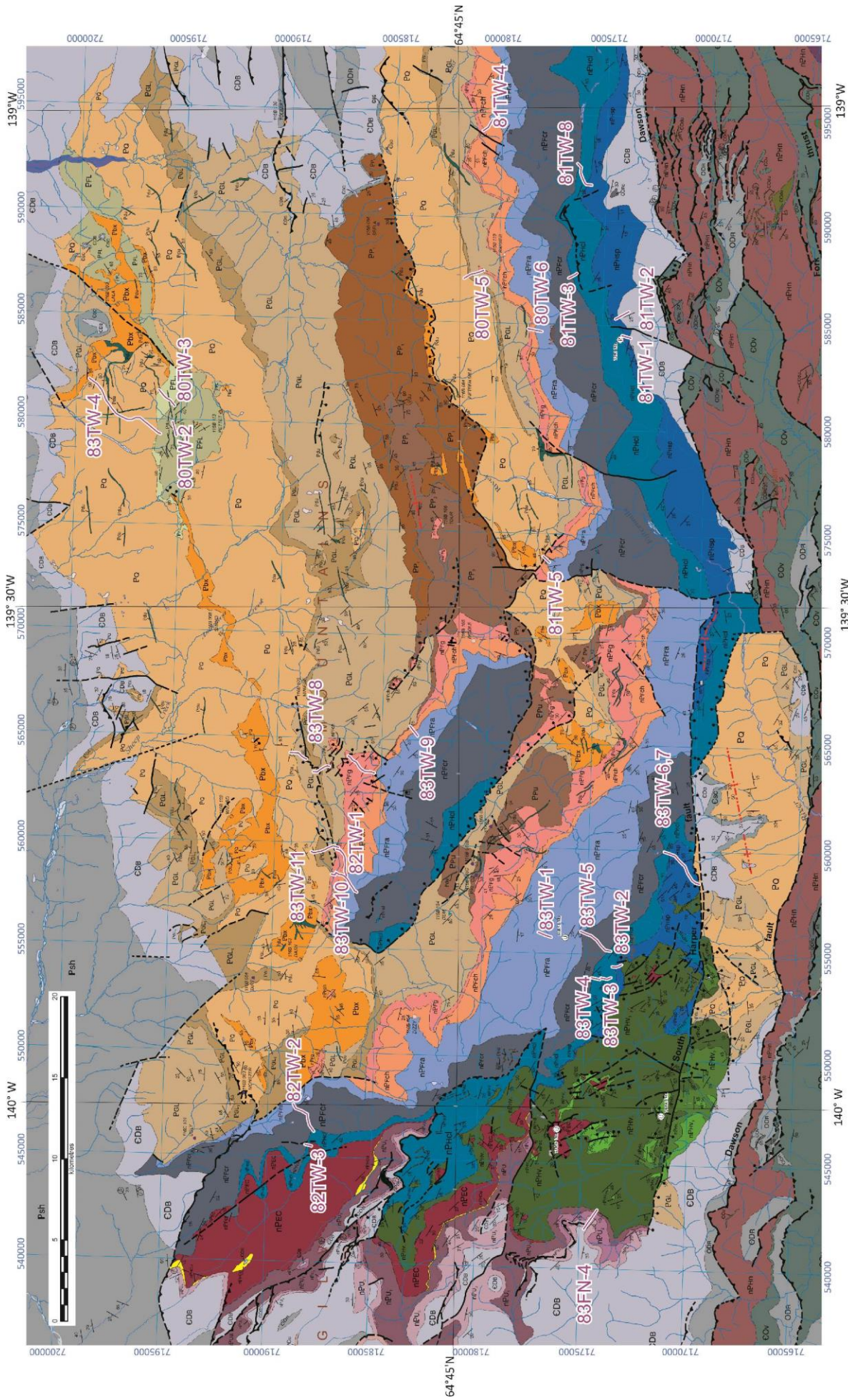


Fig. 3. Bedrock geological units of Coal Creek Inlier (from Strauss et al., 2014; legend in Fig. 4), showing the location of archive stratigraphic sections (sheet # in Fig. 2, and Table 1).

MIDDLE ORDOVICIAN TO MIDDLE DEVONIAN**ROAD RIVER GROUP**

ODR black shale, argillite and slate; interbedded chert and quartz sandstone; graptolite fauna chiefly at base of chert beds

MIDDLE CAMBRIAN TO LOWER ORDOVICIAN

COv **DEMPSTER FORMATION:** amygdaloidal basaltic flows and breccia; mostly subaqueous (Abbott, 1997)

CDB **BOUVETTE FORMATION:** light grey to white, medium to thick-bedded, sucrosic dolomitic grainstone and packstone; locally oolitic and heavily silicified; locally medium-bedded silty dolomitic wackestone and packstone at base (up to 1430 m)

CSc **SLATS CREEK FORMATION:** yellow-beige, silty dolostone with interbedded quartz sandstone and red siltstone; uncommon ripple marks, mud cracks, concretions and trace fossils

PALEOZOIC undifferentiated

Psh dark grey to black shale, siltstone and minor limestone; may include units above

EDIACARAN TO LOWER CAMBRIAN

PEu undifferentiated and poorly exposed slate, phyllite, shale, sandstone, limestone and local altered volcanic breccia

'UPPER GROUP' (WINDERMERE SUPERGROUP)

nPU_s grey brown weathering, dark brown quartz wacke and arenite; interbedded with dark brown orange dolomitic wackestone and fine-grained siltstone; locally laminated black fetid silty limestone; rare coarse-grained to granule quartz wacke and discontinuous lenses of chert pebble conglomerate and cross-bedded quartz arenite; locally trace fossils, such as *Cruziana* and *Rusophycus*; (<170 m) (correlative with Ingta, Backbone Ranges, and Vampire formations; Macdonald et al., 2013)

nPU₂ thick-bedded, discontinuous, and massive white to buff-colored recrystallized dolostone with pervasive brecciation and secondary cements; overlain by ~100 m of thinly bedded, pink dolomitic siltstone, wackestone, and grainstone with hummocky cross-stratification and ripple cross-lamination; local fine-grained dolomitic sandstone and stromatolites (correlative with parts of June beds, Gametrail, and Blueflower formations; Macdonald et al., 2013)

nPU₁ jet black shale and finely laminated siltstone (correlative with the Sheepbed Formation; Macdonald et al., 2013)

CRYOGENIAN TO EDIACARAN**HAY CREEK GROUP (WINDERMERE SUPERGROUP)**

nPHcu poorly exposed siltstone and black shale succeeded by <10 m of dolostone breccia; sharply overlain by white to buff-colored, finely laminated dolostone with abundant bed-parallel (sheet-crack) cements and "giant wave ripples" (correlative with Ravensthroat formation; James et al., 2001)

RAPITAN GROUP (WINDERMERE SUPERGROUP)

nPEc **EAGLE CREEK FORMATION:** dark green and maroon to yellow-orange massive and stratified diamictite, lithic wacke, conglomerate, and shale; locally dropstones, till pellets, and striated clasts; dominated by carbonate and volcanic clasts with minor quartzite clasts; some invasive basaltic flows (nPHv₁); tuff horizon near base is dated at 716.47 ± 0.24 Ma (U/Pb CA-ID-TIMS zircon; Macdonald et al., 2010, 2011) (correlative with Rapitan Group)

PROTEROZOIC UNDIFFERENTIATED

Pdu mafic dikes and sills (possibly associated with Wernecke Breccia occurrences, Hart River Sills, Gunbarrel sills and dikes, and/or Mount Harper Volcanics)

NEOPROTEROZOIC**MOUNT HARPER GROUP (WINDERMERE SUPERGROUP)**

nPHv₄ **MOUNT HARPER, UPPER SUITE:** orange-weathering tabular diabasic pillowed flows, breccia, tuff, and invasive flows within Eagle Creek Formation

nPHv₃ **MOUNT HARPER, UPPER SUITE:** blue-black weathering, andesitic basalt in columnar-jointed and shattered massive flows overlying angular flow shards ('hydroclastic breccia'); minor sills

nPHv₂ **MOUNT HARPER, UPPER SUITE:** light-orange weathering, rubble-forming, rhyolite flows, breccia and ignimbrite; locally quartz and plagioclase-phyric; dated at 717.43 ± 0.14 Ma (U/Pb CA-ID-TIMS zircon; Macdonald et al., 2010)

nPHv₁ **MOUNT HARPER, LOWER SUITE:** massive and pillowed andesitic flows, tuff-breccia, lapilli tuff, and block-and-ash breccia

nPHd **MOUNT HARPER, LOWER SUITE:** NNW-SSE mafic feeder dikes and sills

MOUNT HARPER GROUP (WINDERMERE SUPERGROUP), continued:

nPSP **SEELA PASS FORMATION:** heterolithic sandstone and conglomerate with pebble to boulder-sized angular and rounded clasts; clasts composed of dolostone, limestone, quartzite, and phyllite from underlying units; medium to thick-bedded, graded or massive, rare dolomitic mudstone, dusky red wackestone/mudstone; coarsening-up packages from mudstone to coarse-grained wackestone and sandstone (up to 1100 m) (correlative with Coates Lake Group; Macdonald et al., 2010, 2011; Strauss et al., 2014)

nPCL **CALLISON LAKE FORMATION:** finely laminated sandstone, siltstone, and shale interbedded with laterally discontinuous stromatolitic bioherms at base; sharply overlain by medium-bedded dolostone with abundant domal stromatolites, microbialite, evaporite pseudomorphs and sedimentary talc horizons; at top interbedded black shale and stromatolitic dolostone; locally includes abundant chert and dolomitic silicified breccia; hosts vase-shaped microfossils; upper shale dated at 739.9 ± 6.1 Ma (Re-Os Isochron; Strauss et al., 2014) (correlative with Coates Lake Group; Abbott, 1997; Macdonald et al., 2010, 2011; Strauss et al., 2014)

NEOPROTEROZOIC**FIFTEENMILE GROUP (MACKENZIE MOUNTAINS SUPERGROUP)**

nPFcr **CRAGGY DOLOSTONE:** thick-bedded and massively recrystallized, silicified sucrosic dolostone; local ooids, coated grains, brecciated tepee structures, tabular clast conglomerate, intraclast breccia, low-angle and trough cross-stratification, microbialite, and low-relief stromatolites (>500 m thick) (correlative with Little Dal Group; Macdonald et al., 2012; Turner and Long, 2012)

nPFra **REEFAL ASSEMBLAGE:** black to brown-coloured shale, siltstone, minor sandstone and conglomerate; carbonate grainstone, ribbon-bedded calcisiltite, intraclast breccia, and laminated micrite; local boundstone and stromatolite reefs flanked by reef talus and carbonate debris (up to 500 m thick); tuff horizon near top dated at 811.51 ± 0.25 Ma (U/Pb CA-ID-TIMS zircon; Macdonald et al., 2010, 2012) (correlative with Little Dal Group; Macdonald et al., 2012; Turner and Long, 2012)

nPFch **CHANDINDU FORMATION:** basal maroon shale and siltstone with abundant mud cracks; transitions upward into cyclic shale, siltstone, and dolostone intervals with grainstone, stromatolites, or microbialaminite; local stromatolitic bioherms and poorly sorted, massive coarse-grained sandstone beds; upper part contains large carbonate oololiths (possibly correlative with Katherine and Hematite Creek groups; Halverson et al., 2012; Macdonald et al., 2012; Long and Turner, 2012; Kunzmann et al., 2014)

nPFg **GIBBEN FORMATION:** grey ribbon-bedded dolostone, oolitic grainstone, stromatolitic dolostone, and microbialaminite with tepee structures; thickens northward into several hundred metres of grey to black shale that transition up-section into pink ribbon-bedded limestone (possibly correlative with Katherine and Hematite Creek groups; Halverson et al., 2012; Macdonald et al., 2012; Long and Turner, 2012)

Neo- and MESOPROTEROZOIC**Correlation unclear:**

PP₂ orange to light blue weathering dolostone grainstone, micrite, and boundstone; locally stromatolitic with morphospecies *Minjaria* and *Conophyton*; locally upper black shale and minor dolomitic with green weathering, planar-laminated siltstone and minor coarse-grained quartz arenite (equivalent to PR2 of Medig et al., 2014).

PP₁ weakly foliated, brown to grey-coloured siltstone, shale, and phyllite with irregularly dispersed large dolostone blocks and conglomerate interpreted as oololiths and debris flows (equivalent to PR1 of Medig et al., 2014).

MESOPROTEROZOIC

Pbx **BRECCIA AND REGOLITH:** dominantly WSW-trending intervals of yellow-brown weathering heteroclastic megabreccia; contains blocks of quartz sandstone, siltstone, diorite, iron formation, and silicified carbonate clasts in hematitic silicate to carbonate matrix (equivalent to Wernecke breccias)

PALEOPROTEROZOIC**GILLESPIE LAKE GROUP (WERNECKE SUPERGROUP)**

PGL orange and brown-weathering, medium to thick-bedded dolostone; common domal and columnar stromatolites with prominent argillaceous intervals; minor maroon weathering argillite

PGL₁ grey dolostone, laminated and thin-bedded, rare slump folds and breccia, locally stromatolitic

QUARTET GROUP (WERNECKE SUPERGROUP)

PQ thin to thick-bedded grey to brown sandstone, siltstone, and shale; rare slump structures, ripple and trough crossbedding common

FAIRCHILD LAKE GROUP (WERNECKE SUPERGROUP)

PFL interbedded sandstone and siltstone; pinkish-weathering near and within breccia bodies; dark grey argillaceous layers and discontinuous white-weathering dolostone in upper part, rare bedded jaspillite and siltstone; locally dolomitic

PFL₁ pale grey to greenish grey and purple dolomitic limestone and siltstone; platy and ribbed weathering, rare stromatolites

Figure 4. Legend for maps (adapted from Strauss et al., 2014).

2004). The stratigraphic sections in this publication include both clastic and carbonate components of the Fairchild Lake Group (sheet S-21), the overlying Quartet Group (S-20) and the highest unit, the Gillespie Lake Group (S-17, 18, and 19).

A complex assemblage of strata overlying the Wernecke Supergroup with angular unconformity was originally named the Fifteenmile Group by Thompson et al. (1987, 1994). It originally included three upper (PF1–PF3) and five lower (PR1–PR5) informally defined map units. The Fifteenmile Group has subsequently undergone significant reinterpretations of stratigraphic relations and regional correlations. Medig et al. (2010) demonstrated that map unit PR1 overlies a regolith formed on top of breccia correlated with the Wernecke breccia. Medig et al. (2010) and Strauss et al. (2014) assigned the two lowermost units of the Fifteenmile Group (PR1 and PR2) to the Pinguicula Group as units PP1 and PP2. The Pinguicula Group occurs in the same stratigraphic position in the Wernecke and Hart River inliers (Thorkelson et al., 2005; Abbott, 1997). The two units are separated by an unconformity and the upper unit unconformably overlies both the lower unit and the Gillespie Lake Group. Medig et al. (2014) proposed alternative correlations for the lower unit based on detrital zircon ages of 1499 Ma, but provided no comment on the upper unit. Given this uncertainty, no correlations have been assigned to either unit in this publication.

The revised Fifteenmile Group unconformably overlies the uncorrelated units and is now considered to belong to the Mackenzie Mountains Supergroup (MMSG; Halverson et al., 2012). It is subdivided into the Gibben and Chandindu formations and an overlying mixed shale and dolostone — the Reefal assemblage, overlain by the informal Craggy Dolostone (S-7 to S-16). From detrital zircons in siliciclastic rocks from unit PR5 (Gibben Formation?) Medig et al. (2014) obtained uranium-lead ages as young as 972 ± 78 Ma and two of ca. 1100 Ma. In other areas, the youngest detrital ages in the lower MMSG are ca. 1000 to 1100 Ma (Rainbird et al., 1997; Medig et al., 2012). Higher in the succession, a tuff within the Reefal assemblage was dated at 811.51 ± 0.25 Ma (U/Pb ID-TIMS; Macdonald and Roots, 2010; Macdonald et al., 2010a).

The Mount Harper Group (Mustard and Roots, 1997) unconformably overlies the Fifteenmile Group. In this publication it includes the Callison Lake Formation (Abbott, 1997; Macdonald and Roots, 2010; Strauss et al., 2014), Seela Pass formation (informal status) and the Mount Harper volcanic complex (Mustard and Roots, 1997; Macdonald et al., 2011). A minimum age constraint on the Fifteenmile Group comes from a 739.9 ± 6.1 Ma date from the upper Callison Lake Formation (Re-Os; Strauss et al., 2014). Rhyolite flows in its upper part of the volcanic complex are 717.43 ± 0.14 Ma (U/Pb ID-TIMS; Macdonald et al., 2010a). The Callison Lake Formation and overlying clastic Seela Pass formation are documented in sheets S-2 through S-7.

The Rapitan Group conformably overlies the Mount Harper volcanic complex. Lowest glacial deposits include interbedded 716.47 ± 0.24 Ma tuff (U/Pb ID-TIMS; Macdonald et al., 2010a) and mafic flows. In the Coal Creek inlier, the Rapitan Group is overlain by the Cryogenian Hay Creek Group and the Ediacaran to Early Cambrian ‘Upper’ Group (Martel et al., 2011; Macdonald et al., 2011, which are in turn unconformably overlain by the Cambrian to Devonian Bouvette Formation (Morrow, 1999). Rapitan Group strata are documented in theses by Mustard (1996) and Roots (1987); no sections of the Hay Creek Group are published, but this publication contains a single measured section from the ‘Upper’ Group is included (sheet S-1).

THE MEASURED SECTIONS

The measured stratigraphic sections (the 2nd part of this document) are generally arranged from youngest to oldest. Table 1 lists the stratigraphic units, and location of each of measured sections with

the original section indicated (most are labelled on Thompson et al., 1994); the Google Earth™ location files are appended to this document. The key to symbols on the stratigraphic logs is Figure 5. These logs are from scanned images of the original hand-drawn sections. Column width mimics weathering profile, and artistic license was used to convey bedding thickness and irregularity. Text descriptions are compiled and edited from the original notes.

Table 1. SHEETS 1-21: Stratigraphic Sections and photographs

Sheet	Measured units	Section #	total measured	map-sheet	approx. location	Lat.	Long.	location (in GoogleEarth™)
S-1	Upper Group	83FN-4	278 m	116-C/9	12 km W of Mt Harper	64° 41.2'	140° 6.75'	83FN-4.kmz
S-2	Seela Pass	81TW-1	250 m	116-B/11	3.9 km SW of Mt. Gibben	64° 40.9'	139° 14.2'	81TW-1.kmz
	Seela Pass, Bouvette	81TW-2	311 m	116-B/11		64° 40.9'	139° 14.2'	
S-3	Seela Pass	83TW-2	143 m	116-B/12	1 km N of Mt Harper	64° 41.0'	139° 51.8'	83TW-2.kmz
S-4	Seela Pass	83TW-7	>520 m	116-B/12	6.2 km ESE of Mt Harper	64° 39.4'	139° 45.0'	83TW-7.kmz
	Callison Lake	83TW-6	184 m	116-B/12		64° 39.6'	139° 47.0'	83TW-6.kmz
S-5	Callison Lake	83TW-3	272 m	116-B/12	2 km N of Mt Harper	64° 41.5'	139° 51.9'	83TW-3.kmz
	Callison Lake	83TW-4	122 m	116-B/12		64° 41.5'	139° 51.9'	83TW-4.kmz
S-6	Callison Lake	81TW-3	55 m	116-B/11	1.7 km E of Mt. Gibben	64° 42.0'	139° 10.4'	81TW-3.kmz
	Callison Lake	81TW-8	358 m	116-B/11	8 km E of Mt. Gibben	64° 41.5'	139° 1.1'	81TW-8.kmz
S-7	Callison Lake	82TW-3	112 m	116-C/16	14.5 km NNW of Mt. Harper	64° 48.9'	140° 2.5'	82TW-3.kmz
	Craggy Dolostone	82TW-2	737 m	116-C/16	18.7 km NNW of Mt. Harper	64° 49.2'	140° 0.1'	82TW-2.kmz
S-8	Craggy Dolostone	83TW-5	456 m	116-B/12	2.5 km NE of Mt Harper	61° 41.8'	139° 49.6'	83TW-5.kmz
S-9	Reefal Assemblage	81TW-5	266 m	116-B/11	12.1 km W of Mt. Gibben	64° 43'	139° 28'	81TW-5.kmz
S-10	Reefal Assemblage	83TW-1	427 m	116-B/12	4.9 km NE of Mt Harper	64° 42.9'	139° 49.9'	83TW-1.kmz
S-11	Reefal Assemblage	83TW-9	289 m	116-B/13	16 km NE of Mt Harper	64° 46.1'	139° 37.0'	83TW-9.kmz
S-12	Chandindu, Reefal Assem.	83TW-10	755 m	116-B/13	15.6 km NE of Mt Harper	64° 48.3'	139° 46.1'	83TW-10.kmz
S-13	photos of section 83-10							
S-14	Gibben, Chandindu, Reefal	80TW-6	640 m	116-B/11	2.2 km N of Mt Gibben	64° 44 '	139° 11.5'	80TW-6.kmz
S-15	Fifteenmile Gp; Chandindu	81-TW-4	139 m	116-B/11	9 km NE of Mt. Gibben	64° 44.6'	139° 0.9'	81TW-4.kmz
S-16	Gibben?-Chandindu-Reefal Assemblage	82TW-1	729 m	116-B/13	16.2 km NNE of Mt. Harper	64° 48'	139° 44.5'	82TW-1.kmz
S-17	Gillespie Lake Gp., Gibben	83TW-8	1647 m	116-B/13	22 km NNE of Mt Harper	64° 50.8'	139° 37.8'	83TW-8.kmz
S-18	Gillespie Lake	80TW-5	587 m	116-B/11	3.8 km NNE of Mt Gibben	64° 44.8'	139° 10.3'	80TW-5.kmz
S-19	Gillespie Lake	83TW-11	500 m	116-B/13	17 km NE of Mt Harper	64° 48.5'	139° 45'	83TW-11.kmz
S-20	Quartet	80TW-4	1240 m	116-B/14	20.4 km NNW of Mt. Gibben	64° 52.8'	139° 19.7'	80TW-4.kmz
S-21	Fairchild Lake (carbonate)	80TW-3	976 m	116-B/14	20 km NNW of Mt. Gibben	64° 52.2'	139° 16.8'	80TW-3.kmz
	Fairchild Lake	80TW-2	639 m	116-B/14		64 52.1'	139 18.3'	80TW-2.kmz

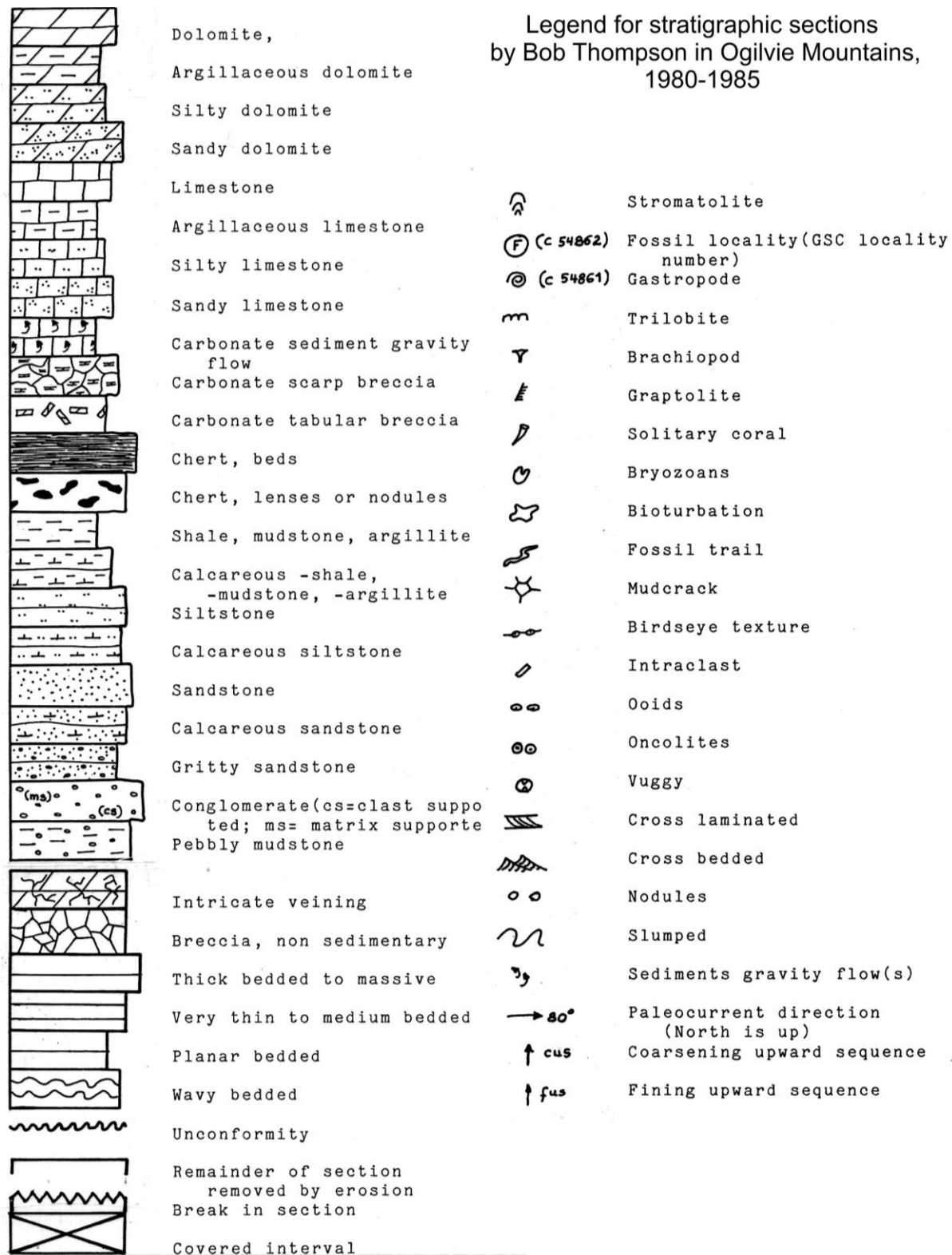


Figure 5. Key to symbols and patterns in measured sections

ACKNOWLEDGEMENTS

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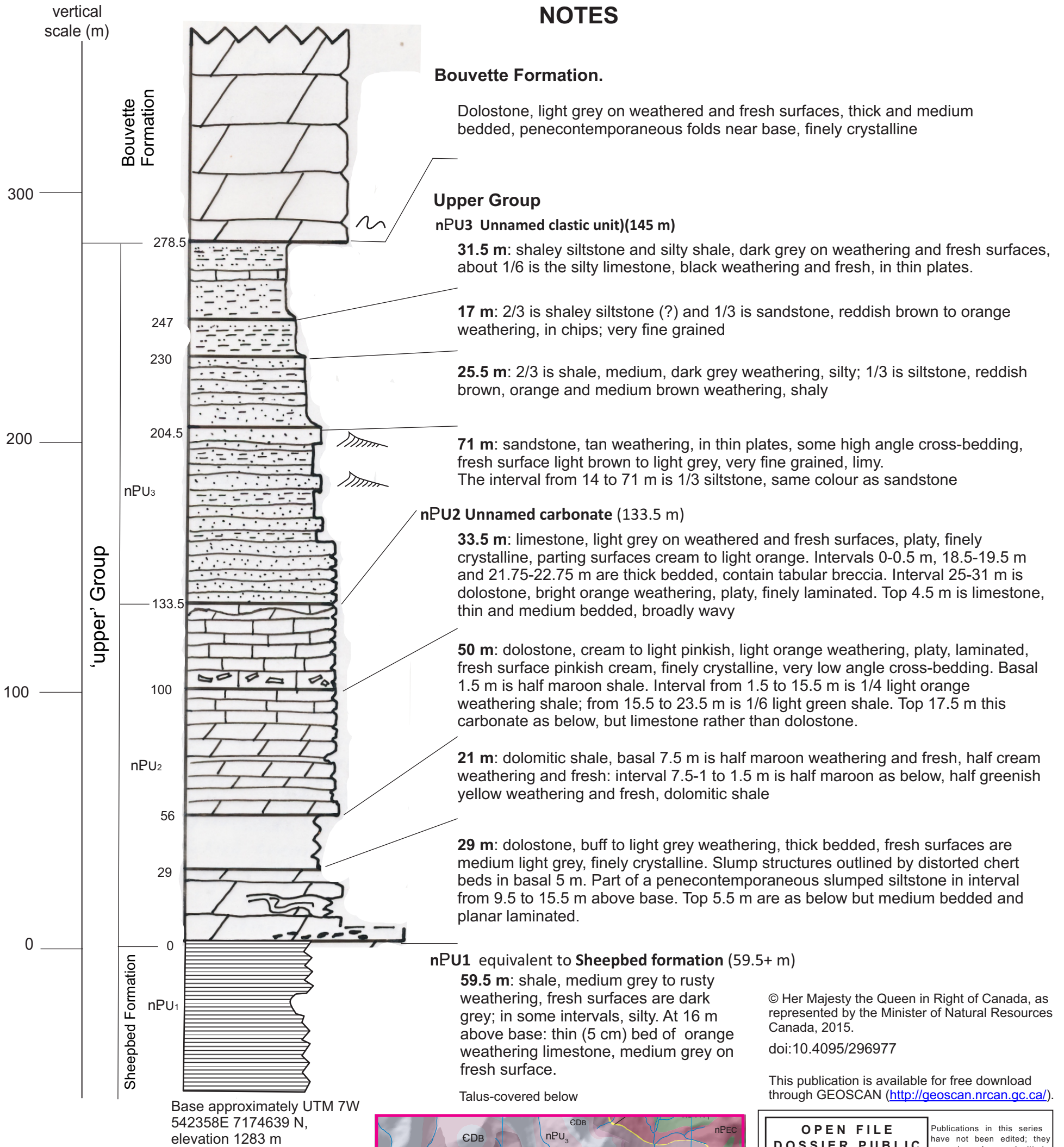
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Sheet S-1: Section 83-FN-04: 'Upper Group'

Location: East facing promontory overlooking broad valley at head of western tributary of Coal Creek, on 116 C/9).
Base is 64° 41' 15"N, 140° 06' 30"W.

Measured thickness: 278.5 m

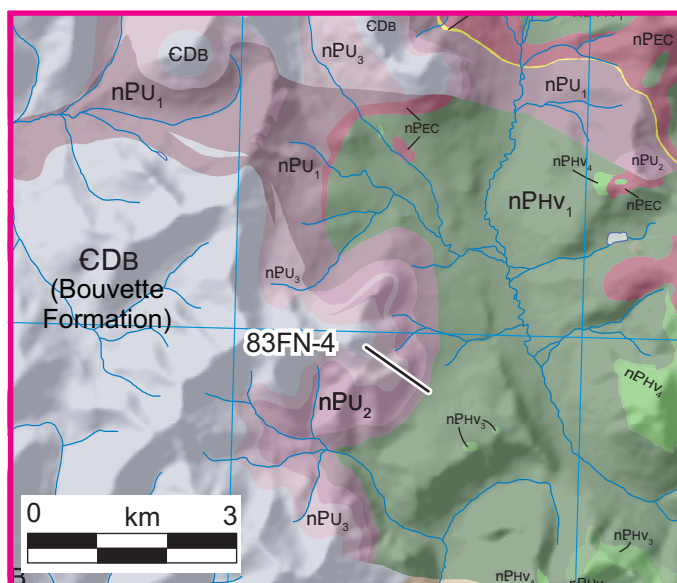
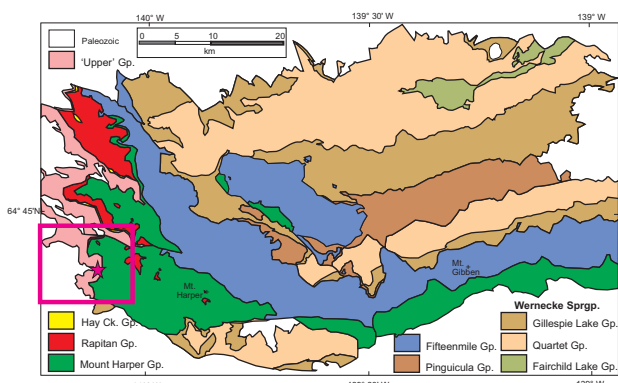
Other: Measured by Bill Fritz and Bob Thompson in 1983. Subsequently, chemostratigraphic section F842 was measured about 200 m north (along strike) and J801 in similar stratigraphy 8 km north (Macdonald et al., 2012).



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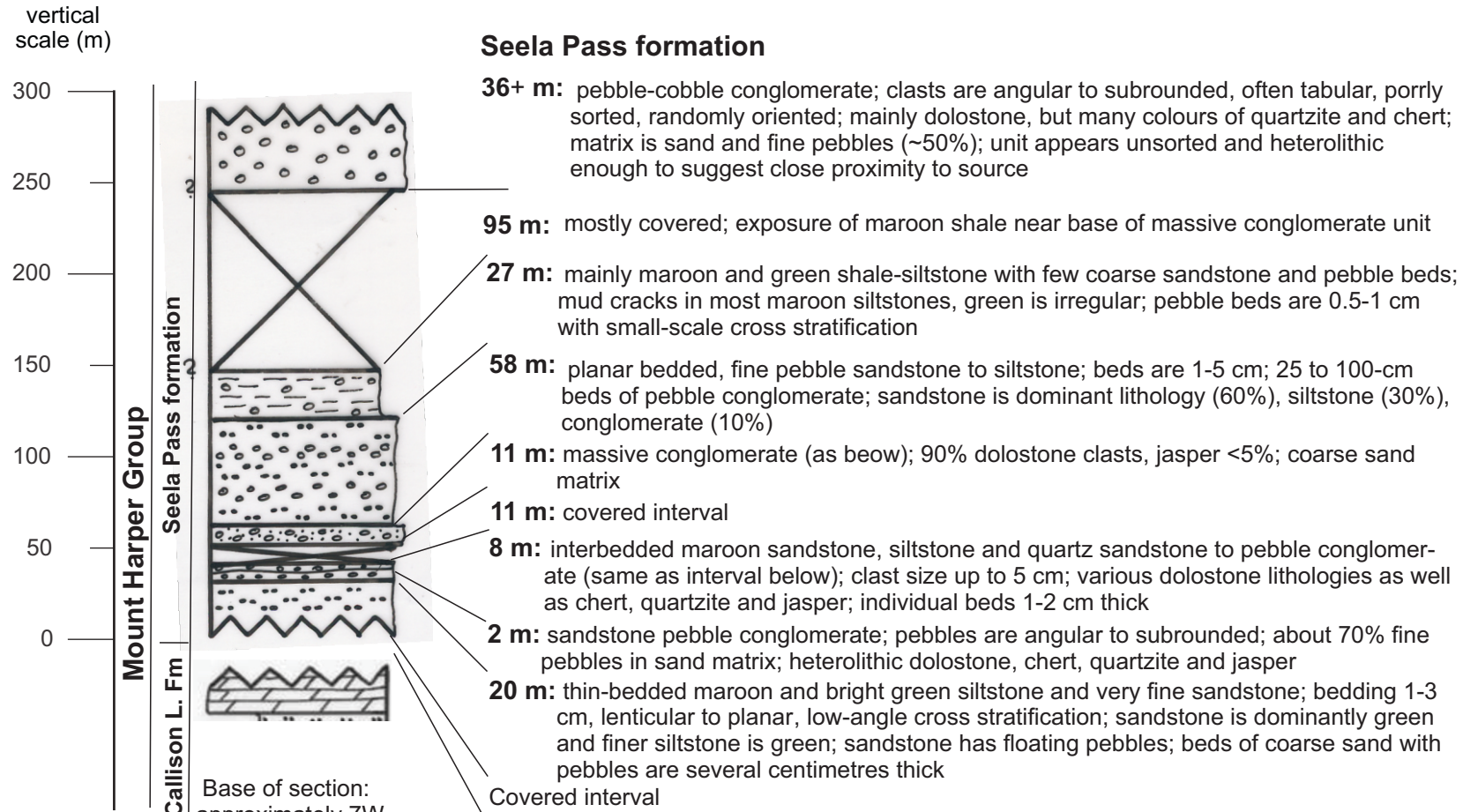
Sheet S-2. Sections 81 TW-1 and 81 TW-2: Seela Pass formation (Lower Mount Harper Group) and Bouvette Formation (partial)

81 TW-1 SECTION

Location: 3.9 km southwest of Mount Gibben; 64° 40.9'N, 139° 14.2'W.

Total thickness: 268 m.

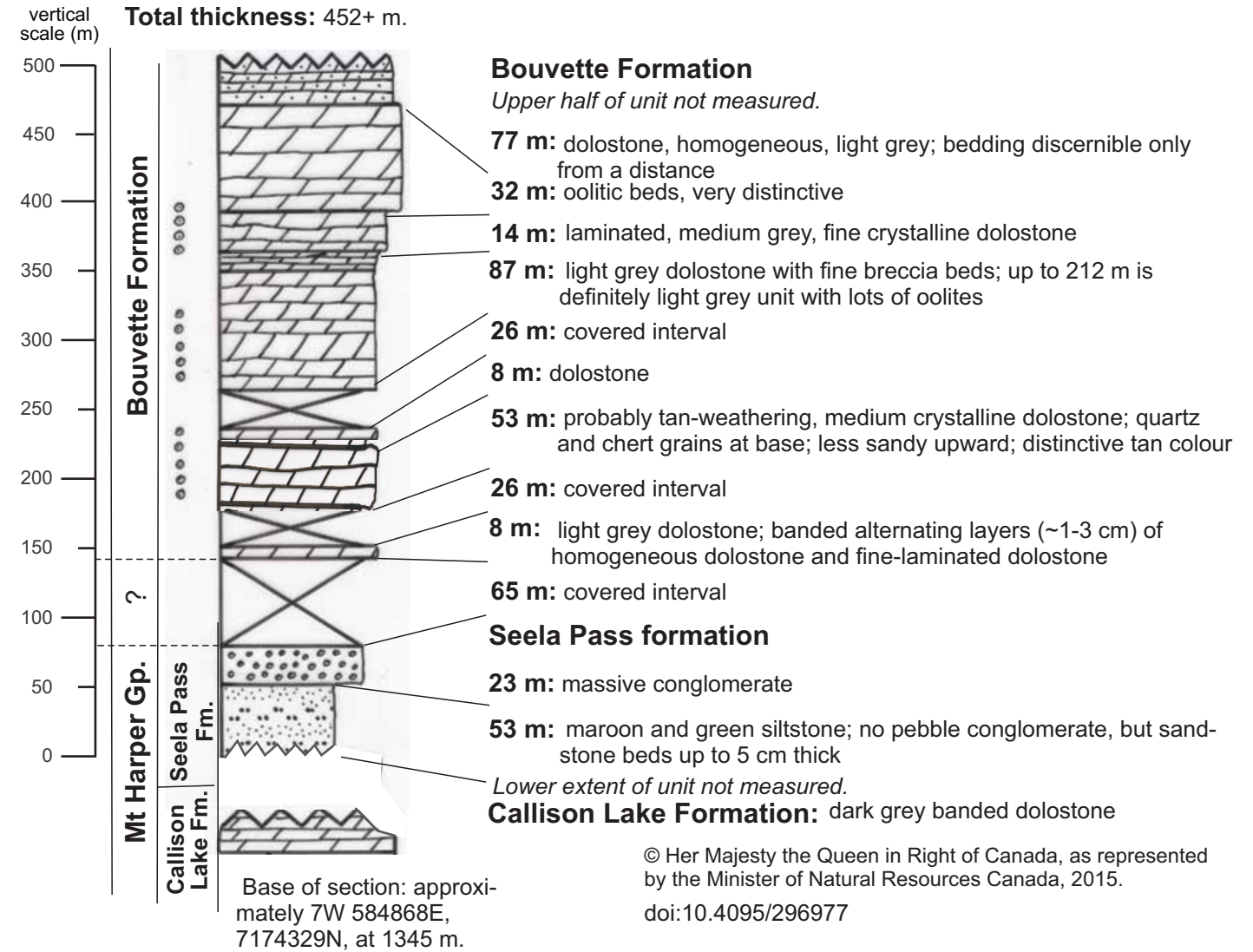
Other: Callison Lake dolostone directly beneath this section was measured and sampled to determine its age (~740 Ma, Re-Os) and contains vase-shaped microfossils (Strauss et al., 2014, section J1204; Macdonald et al., 2012, section F930).



81 TW-2 SECTION

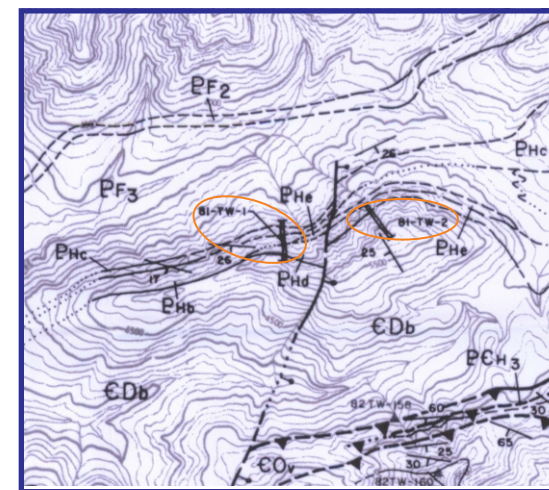
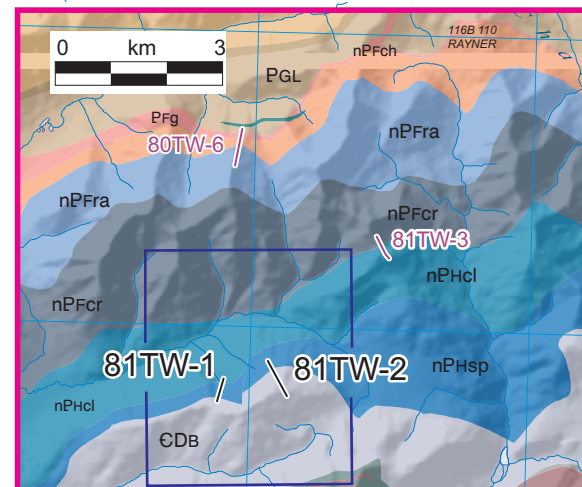
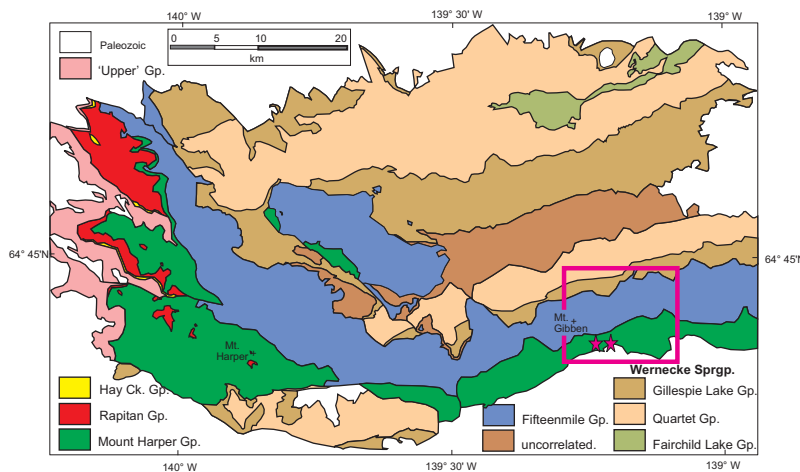
Location: 3.9 km southwest of Mount Gibben. 64° 40.9'N, 139° 14'W. Section 81 TW-2 is approximately 150 m east of Section 81 TW-1.

Total thickness: 452+ m.



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Sheet S-03. Section 83 TW-2: Seela Pass Formation (conglomerate facies)

Location: Location is not precisely known (not plotted on Thompson et al., 1994) however, from Thompson's notebook entries deduced to be the ridge east of Coal Creek, 1 km NE of Mount Harper, near the west edge of NTS 116 B/12. Approximate location: 64°41.0' N, 139°51.8' W. Section measured southward along narrow ridge saddle, from a light grey carbonate, through conglomerate, to base of the Mount Harper volcanic rocks.

Measured thickness: 143.5 m

Other: Section measured by Thompson on June 30, 1983 (notebook p. 13-14). Previously known as the Lower Mount Harper Group, this exposure was described in these by Roots (1987) and Mustard (1990) and is documented as **Reference Section 4** (Fig. A1-6 in GSC Bulletin 492, Mustard and Roots, 1997). This section was also measured by Macdonald et al. (2012).



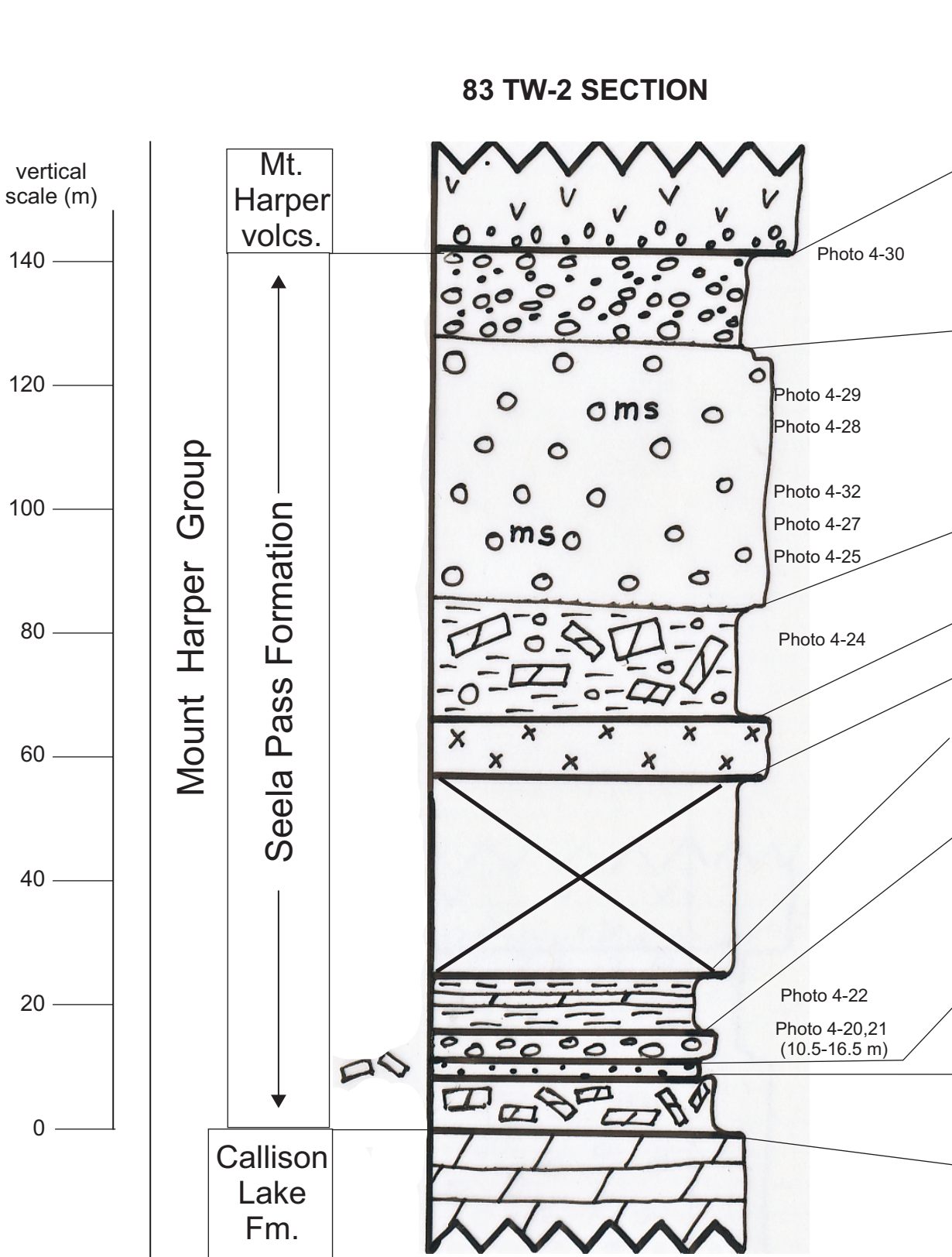
4-30: slump folded sandstone at contact with the volcanics



4-29: parallel stratified sand with pebble lags



4-28: upper conglomerate displaying parallel stratification



If the location deduction is correct, the approximate base of the section is 7W, 554199E, 7173802N; elevation 1594 m.

NOTES

Mt. Harper volcanics

Andesitic agglomerate and massive andesite.
generally conformable contact; locally erosive

Seela Pass Formation

77 m: debris flow breccia grading to conglomerate; fining upward
upper - conglomerate interbedded with red-weathering sandstone and fine granule conglomerate; irregular basal contact with underlying, middle conglomerate unit; large carbonate boulders; inverse to normal stratification in basal 0.1 m
middle - very coarse conglomerate; organized, clast-supported; imbricated clasts; stratified; pebble size 1-10 cm, largest is 50 cm; matrix is brown-weathering, sandy dolostone; thickness of individual units hard to assess (>1 m and maybe tens of metres); planar contacts; inverse to normal grading; no cross stratification; suggestion of imbrication; inverse stratification with clasts of Callison Lake Formation at base, and Craggy Dolostone midway with chert and jasper
lower - orange-weathering, grey debris flow breccia typical of underlying carbonate units; contains clasts that are likely Callison Lake dolostone; disorganized, chaotic carbonate breccia unit

9.5 m: cross-cut by mafic dyke
31.5 m: covered interval
9 m: black shale containing orange-weathering, fine crystalline dolostone beds 5-50 cm thick; dolostone contains silicified intraclasts suggestive of mass gravity flow

6 m: chaotic, disorganized, framework and matrix-supported breccia; clasts are angular with no preferred orientation; clasts composed entirely of Callison Lake dolostone; maximum clast size ~1.5 m by 0.5 m, average is ~5-10 cm; matrix is brown-weathering, sandy to silty dolostone

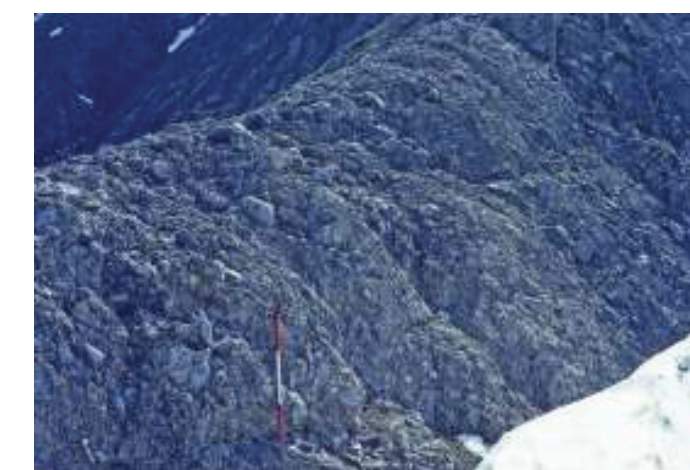
1.5 m: transition to Seela Pass formation with 80% silicification; some brown-weathering sand appearing
9 m: coarse debris flow breccia at top of Callison Lake dolostone; no clastics present

contact brecciated with silica crusts
(subsequent workers interpreted the base to be a karst and carbonate breccia - much less defined than indicated in this section)

Callison Lake Formation
interbedded black shale and stromatolitic dolostone; locally includes abundant chert and dolomitic silicified breccia.



4-27: pebble imbrication in basal bed; flow direction is 350°



4-32: coarse boulder conglomerate



4-25: basal contact of the middle debris flow



4-24: basal fault scarp breccia



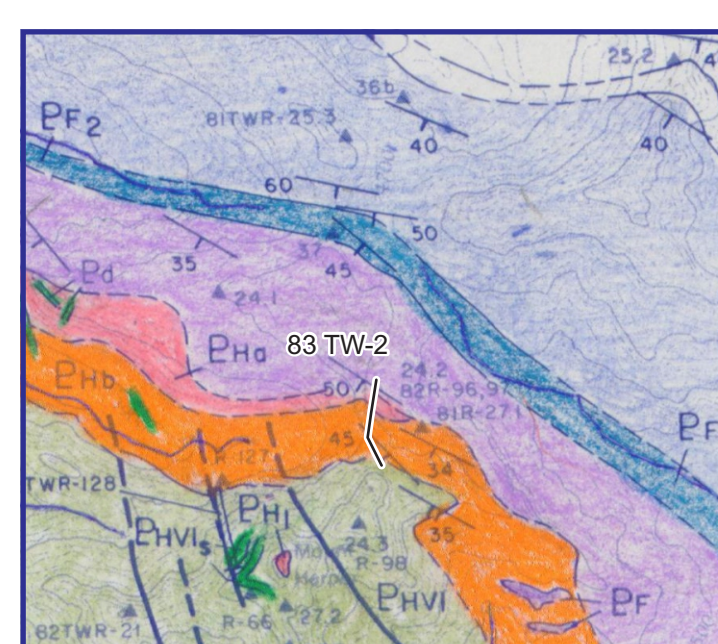
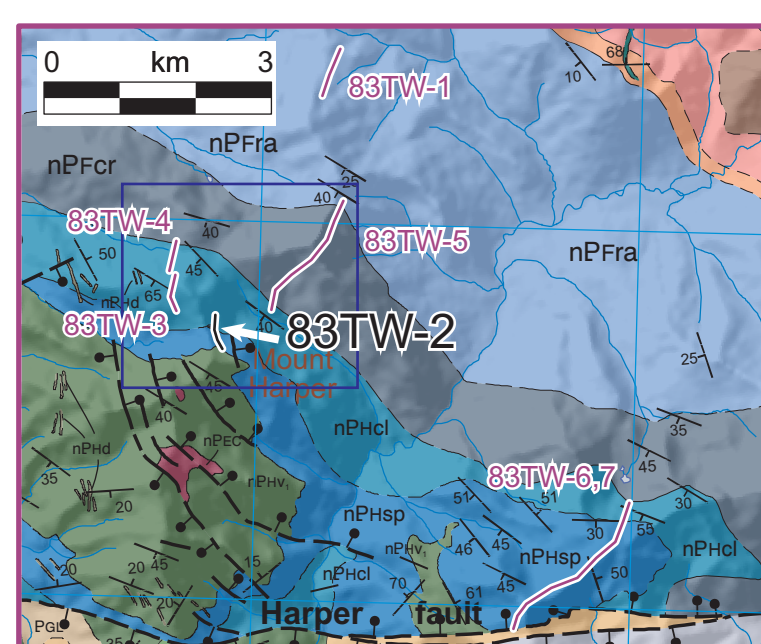
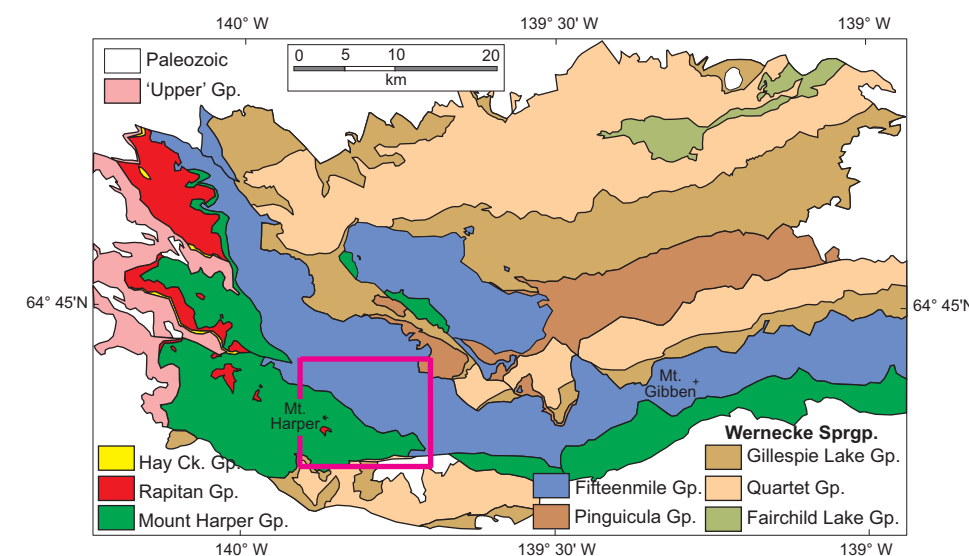
4-20: typical breccia transition below shale



4-21: carbonate bed within disorganized unit



4-22: chaotic carbonate debris flow



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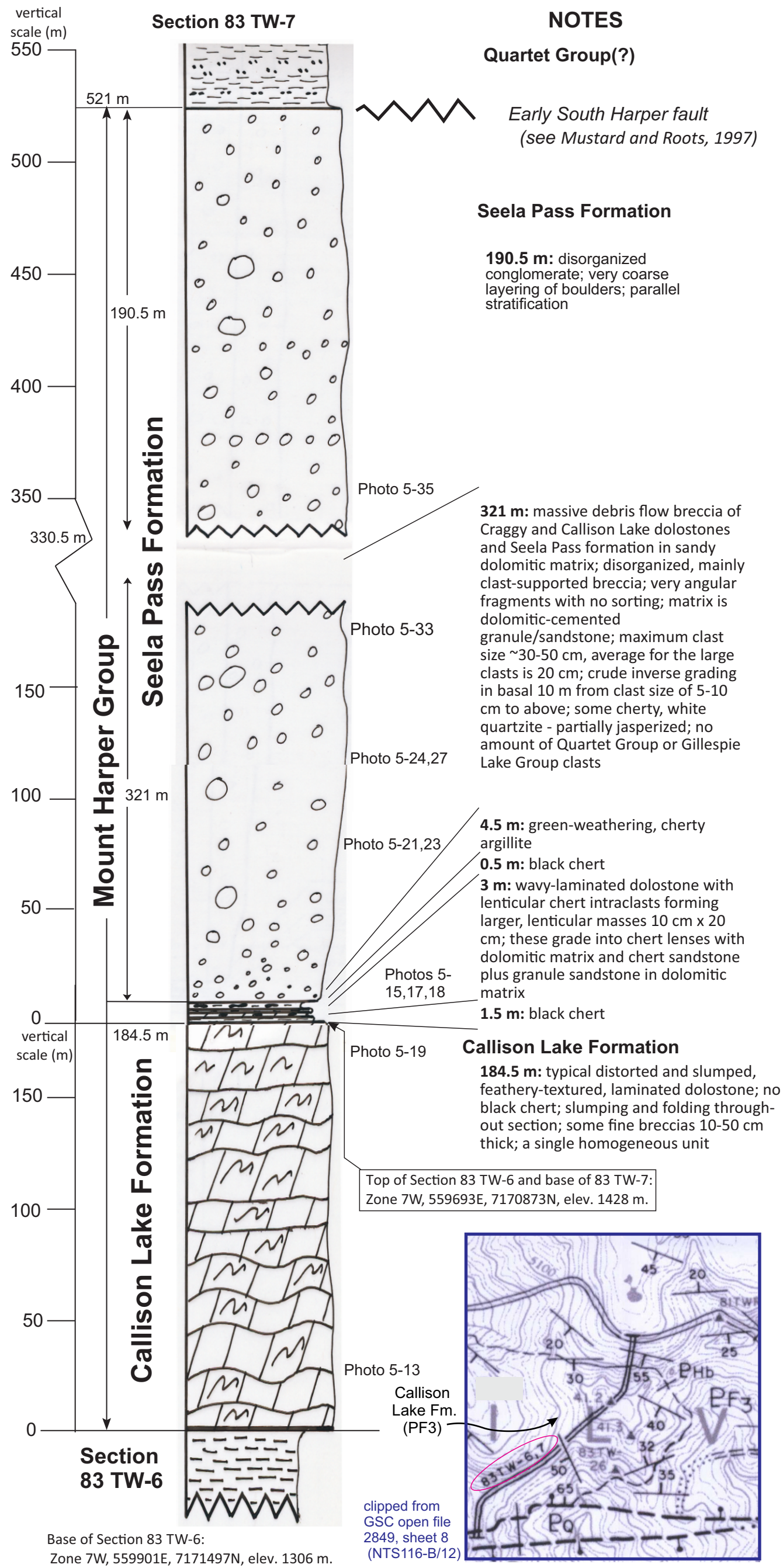
Sheet S-04. Sections 83 TW-6: Callison Lake Formation, and 83 TW-7: Seela Pass Formation (Mount Harper Group)

Location: about 6.2 km east-southeast of Mount Harper. The top of Callison Lake dolostone/base of Seela Pass formation (conglomerate) is at 64°39.4' N, 139°45' W. Measurement is up the back of north-facing cirque with lakes (83-6), and southwestward along ridge crest (83-7).

Total thickness: Section 83 TW-6 is 184.5 m; Section 83 TW-7 is 521 m to fault truncated top.

Other: Sections measured by Thompson on July 2, 1983 (book 1, p. 17-19).

Conglomerate units in this area were studied as part of a thesis by Mustard (1990) and are also documented as Reference section 2 in GSC Bulletin 492, Fig. A1-4 (Mustard and Roots, 1997). The exposure was also studied by Macdonald et al. (2012; F1016 and G018).



5-35: cliff face of coarse breccia



5-27: Seela Pass formation (at 249.5m)



5-33: coarse breccia dipping at 30°



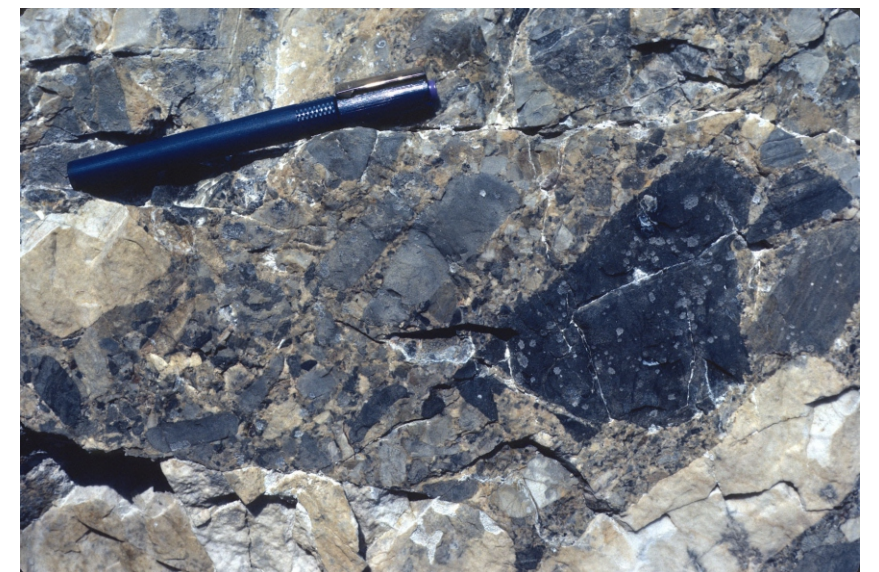
5-21: debris flow breccia at 209 m.



5-24: coarse debris flow breccia at 249.5 m.



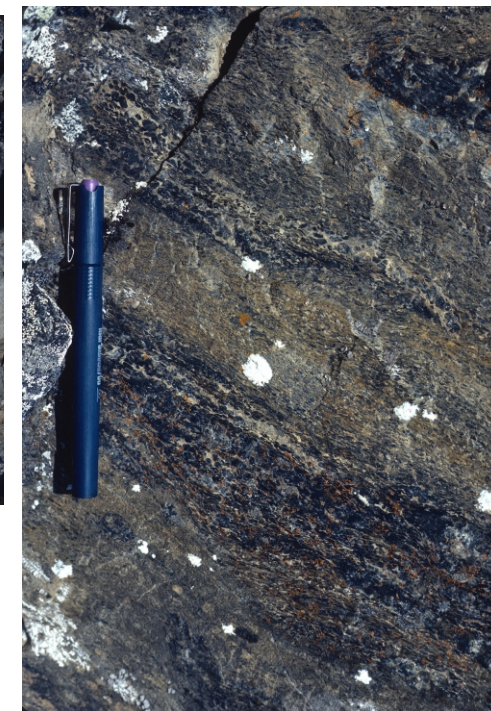
5-19: large conglomerate clasts up to 1.5 m; abundant jasper (at 126.5 m)



5-18: dolomitic-cemented, granule-sand matrix (9.5-330 m)



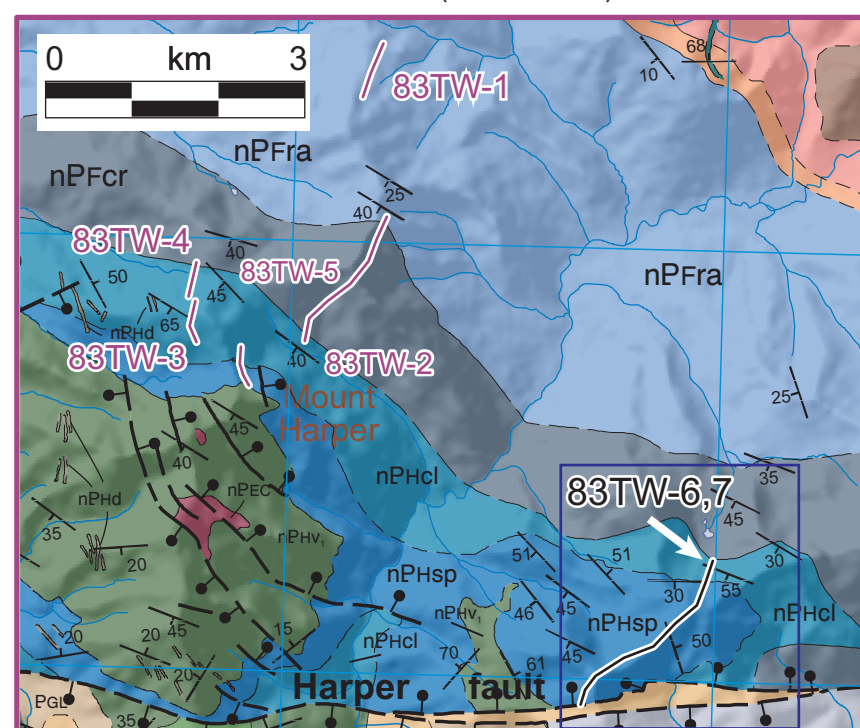
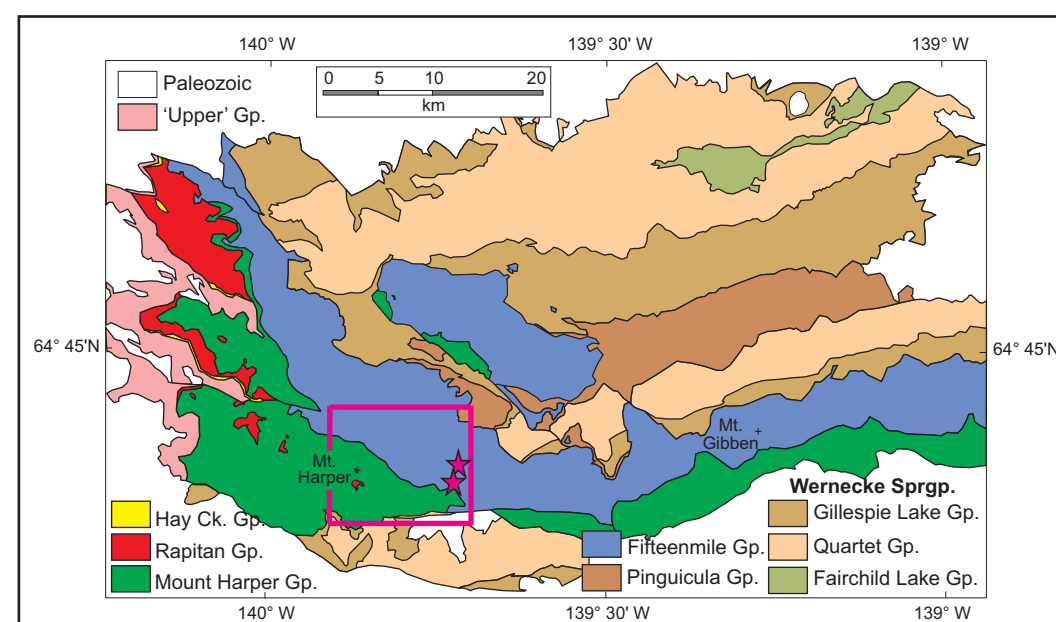
5-17: clast-supported conglomerate with laminated dolostone (9.5-330.5 m)



5-13: laminated dolostone grading to chert in dolomitic matrix (1.5-4.5 m)



5-15: dolostone-cobble conglomerate (9.5-330.5 m)



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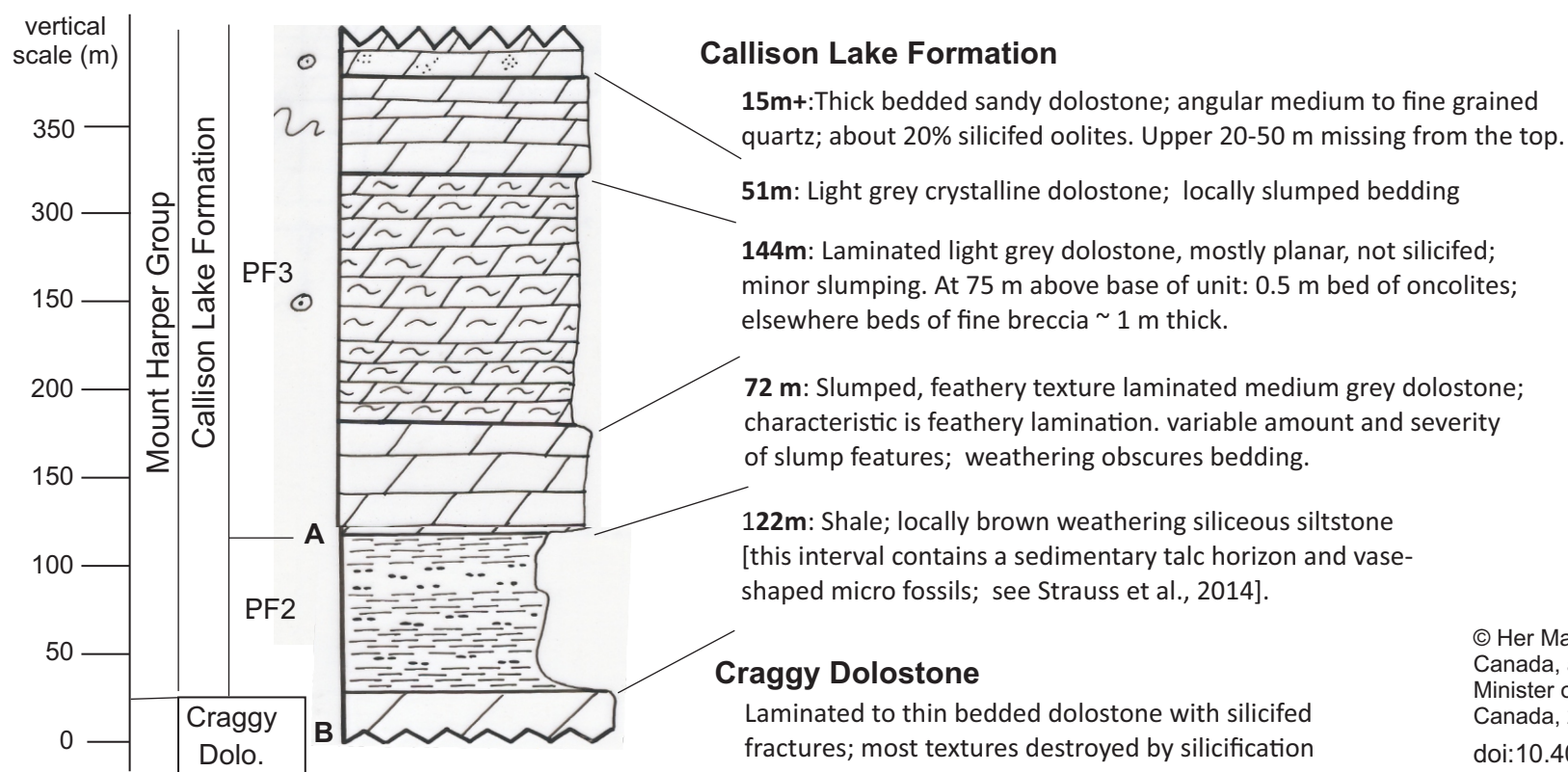
Sheet S-05. Sections 83 TW-3 and 83 TW-4: Callison Lake Formation

Location: Location is not precisely known (not plotted on Thompson et al., 1994) however, from Thompson's notebook entries deduced to be the ridge east of Coal Creek, 2 km northeast of Mt. Harper, approximately 64°41.5'N, 139°51.9'W.

A prominent north-facing carbonate cliff exposure was probably measured along its eastern edge, as section 83 TW-3. The black shale exposed at the head of the west-flowing drainage was likely measured as section 83 TW-4. The contact with the overlying carbonate was the marker horizon. The two measurements are linked in the graphic log shown here.

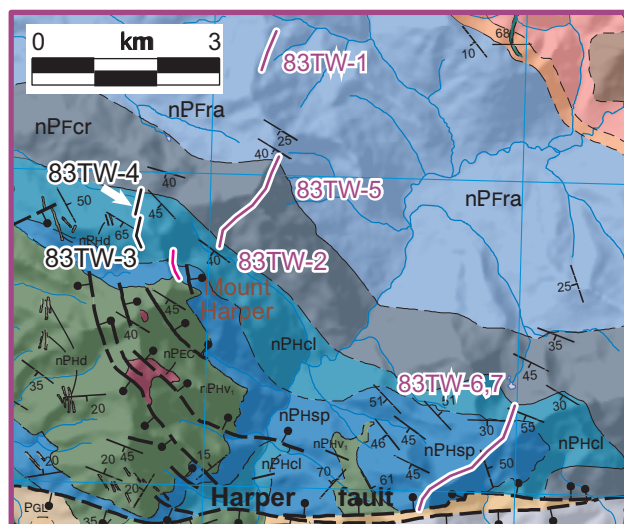
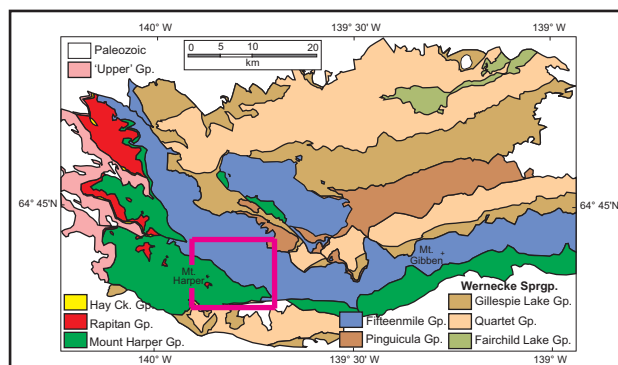
Measured thickness: Section 83 TW-3: 282 m; Section 83 TW-4: 122 m.

Other: From Thompson's notebook p. 14-15, and later designated units PF3 and PF3 (Thompson et al., 1994). The exposure was also measured by Macdonald and Roots (2010) as F836 (see also Macdonald et al., 2012). These were later correlated with Callison Lake Formation (e.g. Strauss et al., 2014).



"A": Base of section 83 TW-3 approximately 7W, 554062E, 7174581N, elevation 1462 m.

"B": Base of section 83 TW-4 possibly at 7W, 553901E, 7174597N, elevation 1366 m.



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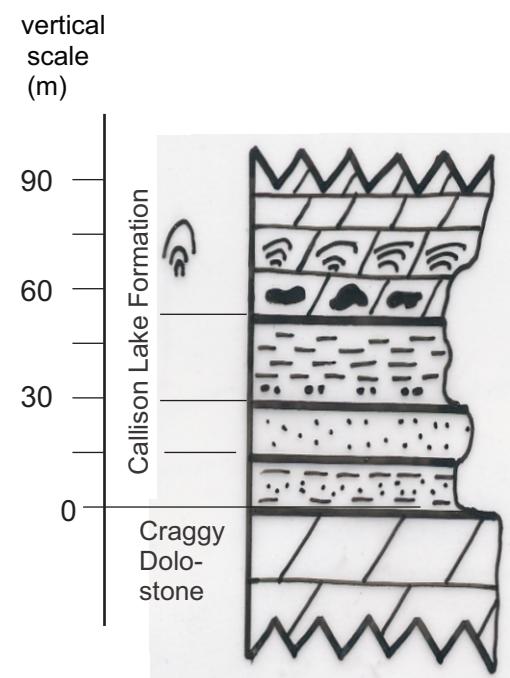
Sheet S-06. Sections 81 TW-3 and 81 TW-8: Callison Lake Formation

81 TW-3 SECTION

Location: 1.7 km southeast of Mt. Gibben. Base at 64°42.5'N, 139°10.5'W.

Total thickness: 56 m

Other: Chemostratigraphic sections F930 and J1019 (Macdonald et al., 2012) at this exposure.



Base approximate: zone 7W, 587484 E, 7176502 N, elev. 1690 m.

Callison Lake Formation

- 39 m:** dark brown-grey mudstone with orange-tan weathering, laminated, silty dolostone interbeds; no outcrop in upper part; mudstone has pencil cleavage; uppermost beds consist of brown-weathering, grey, fine crystalline dolostone
- 16 m:** brown-weathering, fine, black quartzite
- 15 m:** black, friable shale with thin (5 cm) interbeds of red and black fine quartzite

Craggy Dolostone

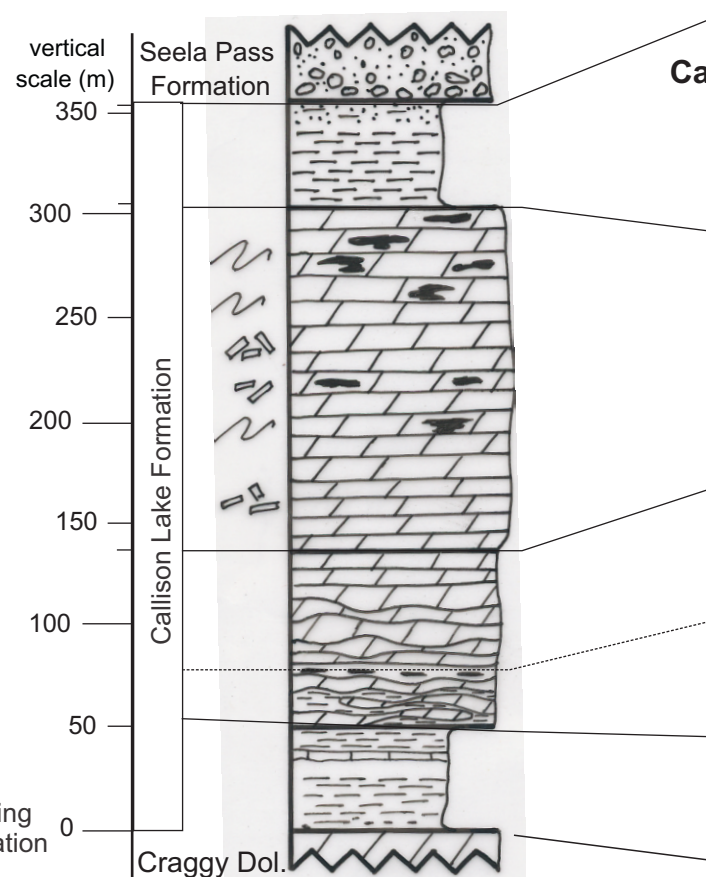
Light grey to orange-tan weathering silty dolostone; abundant silicification

81 TW-8 SECTION

Location: 6.7 km east of Mount Gibben. Base at 64°41'N, 139°03'W.

Total thickness: 358 m

Other: Stratigraphic section 81-3 along strike 5 km to the west.



Base approximate: zone 7W, 592742 E, 7176247 N; elevation 1281 m.

Seela Pass Formation

conglomerate succession; coarse sandstone to quartz-pebble conglomerate; polymictic black and grey chert, quartzite, and grey dolostone fragments; angular to subrounded; crudely bedded, poorly sorted within coarse sandstone beds

Callison Lake Formation

- 53 m:** Upper 11 m: tan-weathering sandstone and chert-granule sandstone; some maroon sandstone
Middle 30 m: maroon shale with 1-cm beds of tan-weathering sandstone
Lower 12 m: maroon, shaly siltstone interbedded with pale tan-weathering quartz-chert granule sandstone; beds are 2-50 cm thick and discontinuous along strike; maroon siltstone 60%; sandstone 40%
- Sharp contact with green maroon phyllitic shale.*
- 167 m:** light grey-weathering, medium grey dolostone with mottled medium to dark grey internal texture; irregular surface patches of knobby black chert silicification
From 145 to 168 m: beds are darker grey because laminated texture is defined by carbonaceous silt content of alternate laminae that are often folded but planar
From 97.5 m upwards: chert silicification more common
At 49 m: unit weathers chalky white, often mottled as if completely bioturbated; beds of very disoriented, often bent, 'feathery' fragments are also common (30%?); uncertain if these are intra-formational conglomerate or not; a very intensely fractured unit with massive bedding; black chert occurs as irregular patches and discontinuous beds up to 5 cm thick, but not abundant (<5%); no well-developed algal laminations; laminations are often disrupted.
- 86 m:** dark grey basal unit consists of dark grey, fine crystalline dolostone; darkest beds contain black shale partings on a fine scale that envelop small lenticular beds of light grey dolostone; some lenticular texture may be the result from later shearing; light-coloured units are massive, dark grey dolostone with some chert nodules and lenses;
At 85 m: colour change from dark to light grey over 1.5-m interval with no lithologic change (due to reduction in carbonaceous content)
At 67.5 m: black beds contain more carbonaceous material, are knobby, and thin-lenticular bedded
From 41-45 m: dark grey-weathering, fine crystalline, medium grey dolostone, chertification irregular
From 30-41 m: covered
- 51 m:** recessive interval between Craggy dolostone and banded grey dolostone unit; dark, olive green shale with 30-cm beds of buff-weathering limestone at 43.5 m; first 39 m covered.

Contact is sharp but sheared.

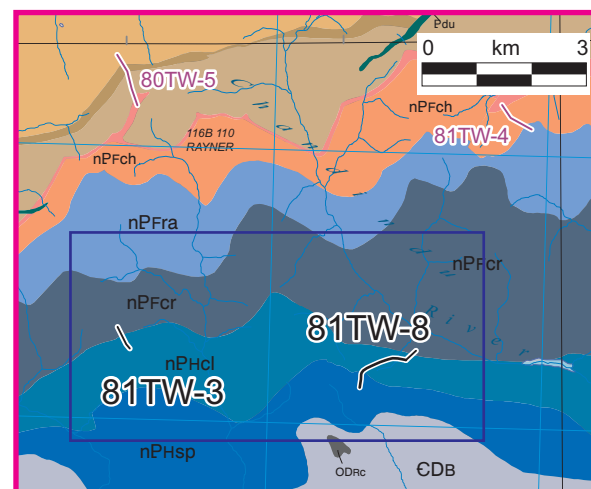
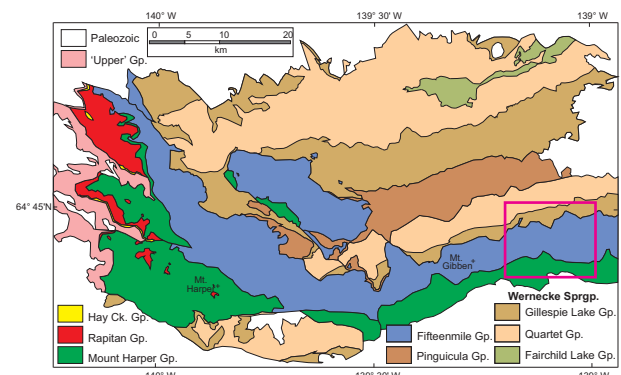
Craggy Dolostone

Thick-bedded, massively recrystallized, silicified sucrosic dolostone

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Clip of hand-coloured GSC Open File 2849, sheet 7 (NTS 116-B/11).

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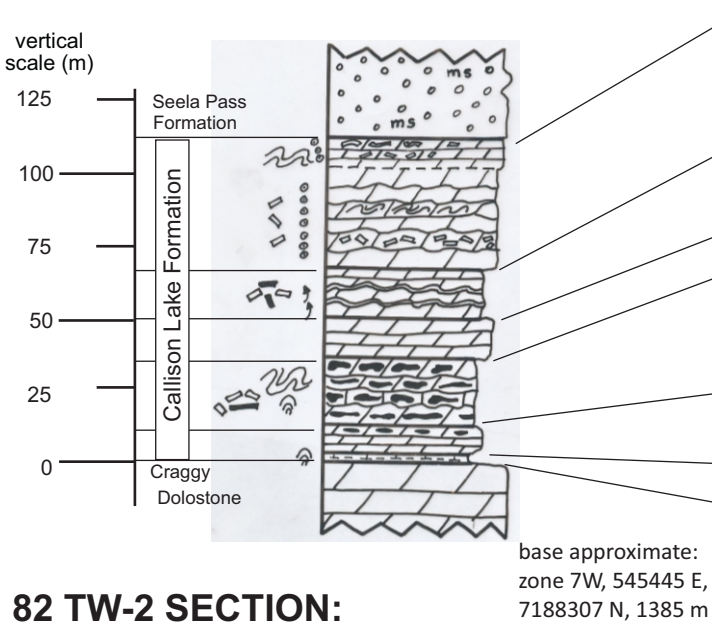
Sheet S-07. Section 82 TW-3: Callison Lake Formation; Section 82 TW-2: Craggy Dolostone

Location: 23 km northwest of Mount Harper; measured up spur to ridge top, thence northwest to saddle.
Base of section 82 TW-2: 64°48'55" N, 140°02'35" W.
Base of section 82 TW-3: 64°49'10"N, 140°00'W.

82 TW-3 SECTION:

Measured thickness: 112 m

Other: Chemo stratigraphic section F1010 (Macdonald et al., 2012) is likely the same exposure.



Seela Pass Formation

Conglomerate: clasts:matrix = 60:40; pebble to boulder, angular, unstratified, unsorted with outsized clasts up to 3 m; matrix is sandy, dolomitic; base of courses layers appears in verse graded; but no imbrication. no drop stone or cross laminations. Clast sources: Fifteenmile assemblage (>50%), Harper Volcanics (10%), quartzite-Quartet Gp.? (~20%).
Contact is sharp.

Callison Lake Formation

- 45 m:** light grey to tan-weathering flakestone grading to disarticulated slumped beds; slumped beds separated by beds of ooid packstone and wackestone with indefinite intraclasts; bedding thin to medium (this bed forms a resistant upper rib).
- 16.5 m:** grey-weathering, dolomitic wackestone with 30-40% black diagenetic chert as discontinuous wavy beds; intraclasts consist of faint irregular masses and oncoids; may represent slope breccia. Top 2 m is an ooid carbonate
- 14 m:** light grey, fine crystalline, dolomite packstone
- 23 m:** Distinctive grey, laminated dolomite packstone and mudstone; abundant carbonaceous partings and lenses; 2-20 cm bedding wavy, slumped; stromatolite-like forms. Black chert replaces approximately 50% of dolomite; forms discontinuous, wavy beds, irregular lenses, partings; chert oolite-oncolite grainstone (5%). Argillite at base; upper contact is very sharp.
- 12 m:** light grey, fine crystalline dolomite mudstone; black chert nodules and lenses in top 1 m; possible sedimentary breccia
- 1.5 m:** greenish-grey, black argillite; siliceous; thin-laminated
Contact is sharp and irregular.

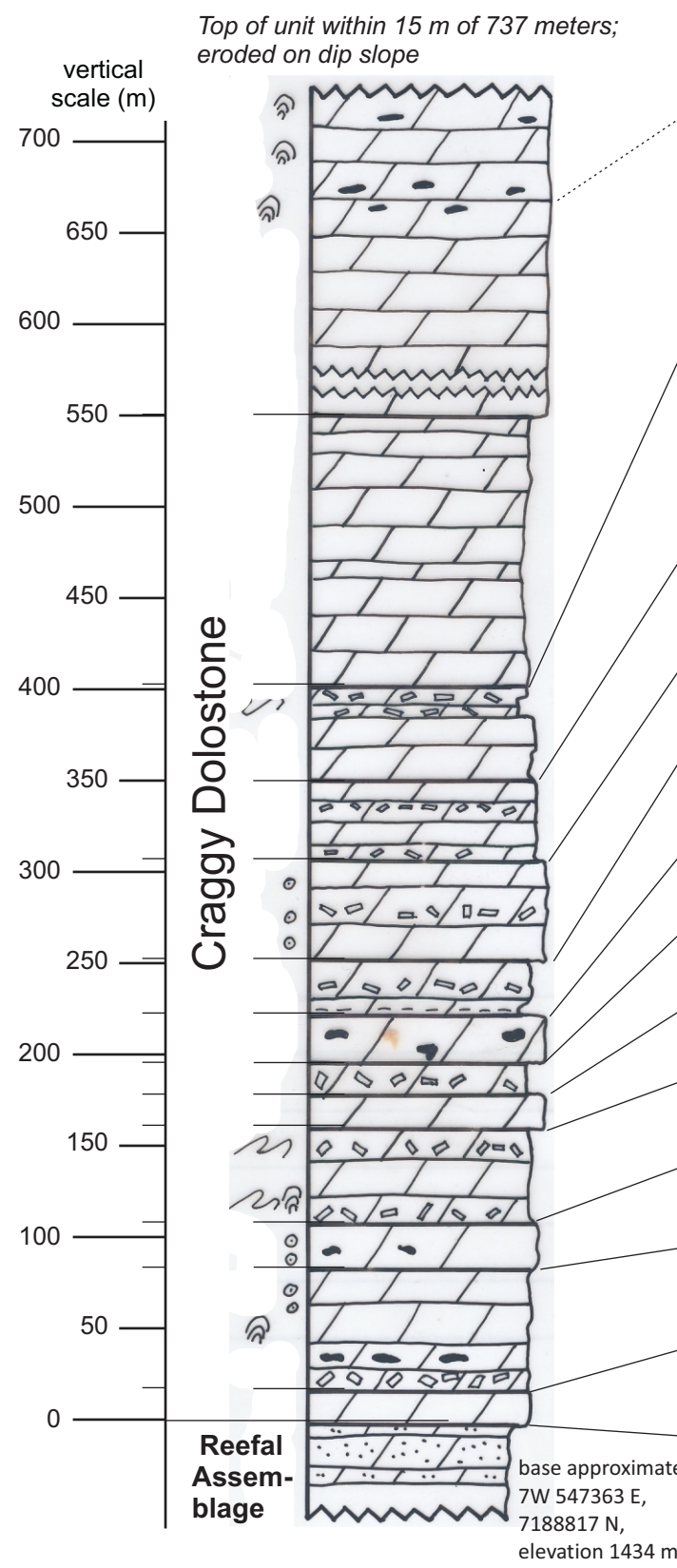
Craggy Dolostone

Buff to grey-weathering, medium crystalline dolomite; silicified stromatolite-like forms; bedding massive. Upper 50 cm is stromatolitic with chert nodules to 10 cm diameter.

82 TW-2 SECTION:

Measured thickness: 737 m

Other: Section measured by R. I. Thompson; also by G. Halverson (G0-5 and G0-6) are in this vicinity (Macdonald et al., 2012; Halverson et al., 2013).



Craggy Dolostone

Dolostone, light grey-weathering, fine crystalline, faintly laminated; thick bedded to massive; patchy silicification; stromatolitic forms throughout.

- Above 661 m:** >30% silicification, some blue-weathering chert nodules.
 - Below 661 m:** <10% silicification; light grey weathering, fine crystalline dolostone; laminated and thin bedded. Stromatolites outlined by silicification. Section broken down dip-slope at 169.5 m.
 - 150 m:** dolostone, light grey, fine crystalline; medium to thick bedded; <30% silicification, patchy, with darker parts greater than 40% silicification; evidence of slumping below 530.5 m
 - 53 m:** at 406 m: this part shows dark Gray cliffs from a distance:orange-buff weathering sugary dolostone with recessive five meter interval. Basalt read/write unit is slightly brecciaupper 15 minutes alternates between slump laminations; laminations increase upwards. Lower part: breccia, dark grey-weathering, grey, sugary dolostone; patchy diagenetic chert – pebble to cobble, unsorted; clast shape varies from angular equidimensional to slabs and flakes. Slumped and contorted beds often interlayered with breccia.
 - 43 m:** breccia persists to 337 m ;interlayered with thick to medium-bedded dolostone; 30% silicification; breccia – unsorted, pebble to cobble, clasts vary from angular equidimensional to slabs and flakes; clasts coated by secondary silica
 - 58 m:** dolostone (ooid grainstone?), sugary, pale buff-grey-weathering, white; faint laminations; thick bedded to massive, <30% silicification; breccia – very indistinct, slabby?
 - 30 m:** dolostone (and dolomitic breccia (silicified fragments)?, orange-weathering, fine crystalline;patchy silicification, could be dolomitic arenite or rudite; basal 5 m is green-weathering argillite
 - 23 m:** dolostone, medium grey, contains chert nodules, patchy silicification; massive to thick-bedded and laminated; some diagenetic chert nodules and faint molar tooth structure. At base
 - 19 m:** breccia, partly silicified (40%), granule to cobble, clasts angular equidimensional to slabs and flakes; upper 7.5 m is medium-bedded, fine-crystalline dolostone
 - 18.5 m:** dolostone, grey weathering, fine crystalline, patchy silicification (40%), laminated; medium bedded; chert lenses; contains some breccia
 - 51 m:** dolostone, medium grey-weathering; laminated, patchy silicification (<5%); medium bedded; chert lenses; stromatolitic forms; slumped beds; breccia – pebble to cobble as flakes and slabs
 - 25.5 m:** dolostone, tan weathering, medium grey, fine crystalline, laminated; thick bedded; ooids, chert nodules
 - 66 m:** dolostone (ooid packstone?), light grey-weathering, white, medium crystalline, laminated, patchy silicification; thick bedded; stromatolitic forms; breccia (?) with chert lenses at base
 - 19 m:** dolostone, light grey-weathering, white, medium crystalline, faint parallel laminations; medium to thick bedded; basal contact not exposed, probably sharp
- Base not exposed; believed conformable.*

Reefal Assemblage

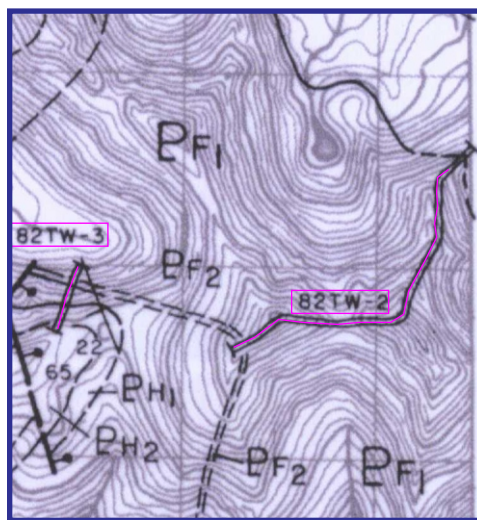
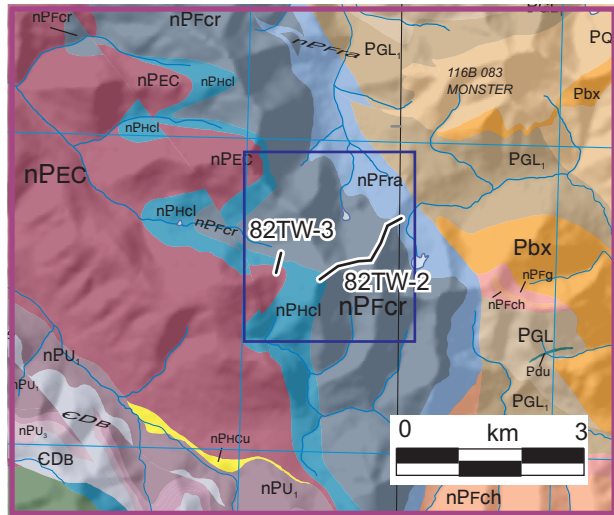
Silty and sandy dolostone, orange weathering; parallel thin to thick bedded. Argillaceous siltstone, grey, black and greenish grey-weathering; mud chips common. Dolomitic sandstone and dolomitic, gritty sandstone.

Parallel thin bedded, tan, thin, laminated, silty and sandy dolostone and argillaceous siltstone, sandstones and grits; dolomitic laminations and beds weather orange, while the remainder is grey/black and greenish grey. Flakes of mud are common in silty and sandy beds.

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clip from east edge of map sheet NTS 116-C/16 (GSC open file 2849, sheet 10):
PF3-Callison Lake Fm.
PF2-shale (included in Callison Lake Fm);
PF1-Craggy Dolostone.

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doi:10.4095/296977

Sheet S-8. Section 83 TW-5: Craggy Dolostone unit (upper Fifteenmile Group)

Location (deduced from notes): 2 km northeast of Mount Harper. Approximate location at 64°41.8' N, 139°49.6' W, along prominent ridge crest.

Measured thickness: 465.5 m

Other: from Thompson notebook 1, p. 16-17. The exposure was re-measured and sampled (F835: Macdonald and Roots, 2010; Macdonald et al., 2012). In these publications the thickness of Craggy Dolostone is 611 m; this may reflect that the north end of this exposure is a dip slope, and the full extent is estimated by offset northwest. The cited publications employ carbonate morphology terms to describe the textures.



5-3: laminated dolostone separates breccia and facies B sandstone; note lack of silicification (at 140 m)



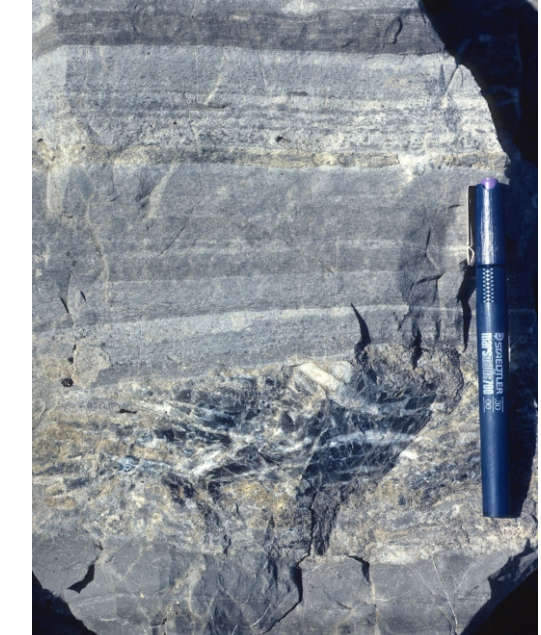
5-2: close-up of carbonate (at 59 m)



5-6: layered and banded dolostone of facies A and B (at 396.5 m)



4-37: carbonate; note silicification around blocks (at 59 m).



5-5: fine crystalline dolostone (320-330.5 m)



4-36: transition to crystalline dolostone (at 52 m)



5-4: typical facies A breccia (182-320 m)



4-35: silicified, laminated muddy and silty dolostone (9-23 m)



4-33: laminated calcareous mudstone (0-3 m)



4-34: silicified, laminated muddy and silty dolostone (0-9 m)

NOTES

Callison Lake Formation
Basal shale unit.

Craggy Dolostone

13.5 m: typical silicified, light grey debris flow breccia; estimate down dip slope to contact

121.5 m: light grey facies A and B dolostones as per below; layered with banded, medium grey dolostone of lower unit; the latter predominated by mudstone and/or wackestone; bands of laminae folded, maybe slumping

10.5 m: medium grey, thin-bedded, fine crystalline dolostone; alternating light and dark beds of 5 cm-thick silicified breccia; much finer than below

138 m: Facies B sandstones are orange-brown weathering as opposed to dark grey; silicified Facies A and B throughout

130.5 m: first evidence of gravity mass flow bed; silicified carbonate sandstone (packstone); silicification much more abundant; lithologies unchanged, artificial break at 140 m; many of Facies B sandstones contain ooids; typically Facies A and B are more silicified than intervening laminated dolostone

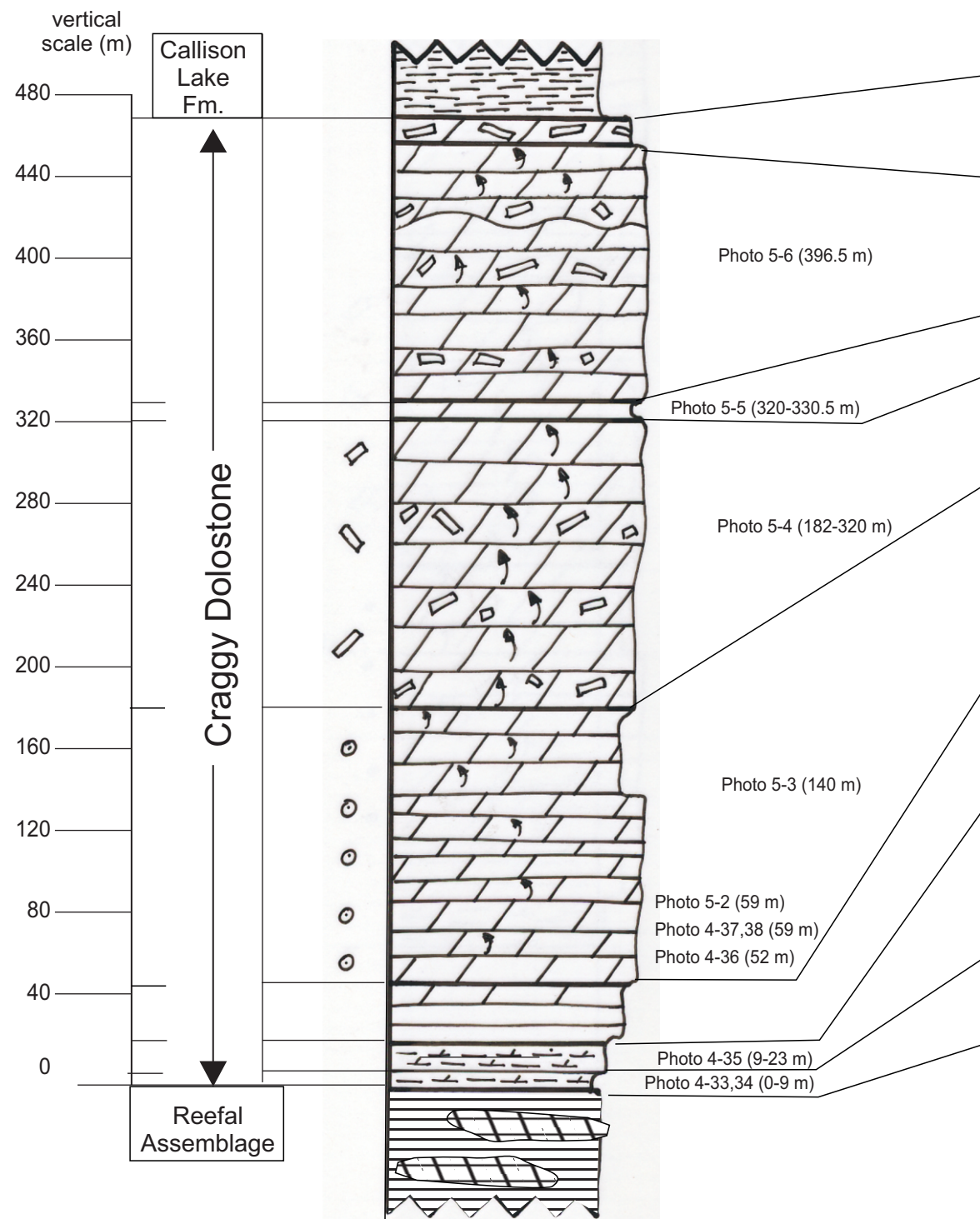
28.5 m: change over 1 m to homogeneous, grey, fine crystalline dolostone; minor silicification upward parallel to laminations; weathers light grey without lichen, so typical of more silicified part of succession

14 m: mixed gradation of parallel-laminated, yellow-weathering, muddy dolostone and grey, parallel-laminated, dolostone/mudstone beds; 0.1-0.3 m thick; upward, mudstone disappears, only orange-yellow weathering, thin-laminated dolostone

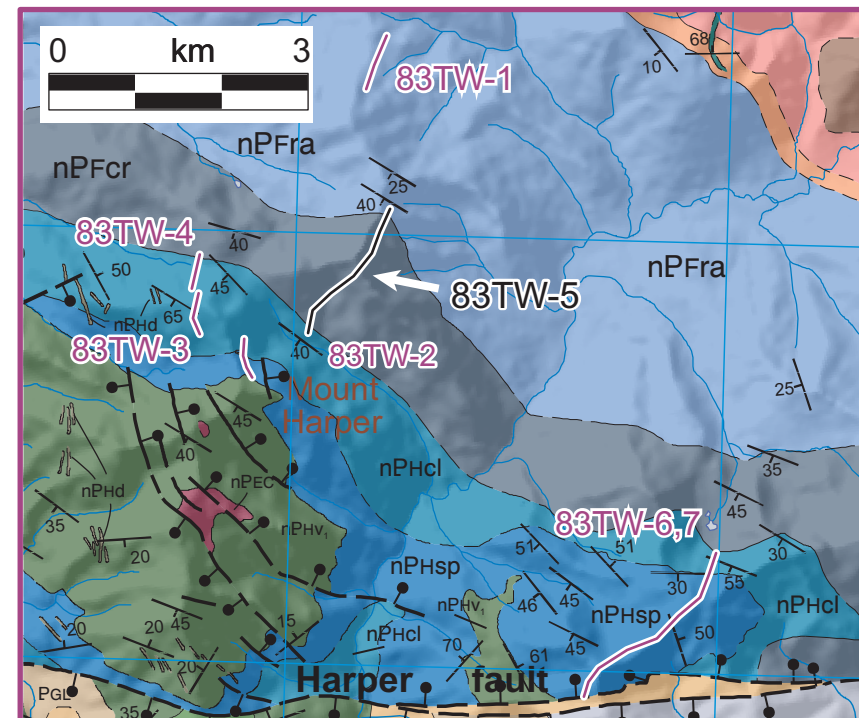
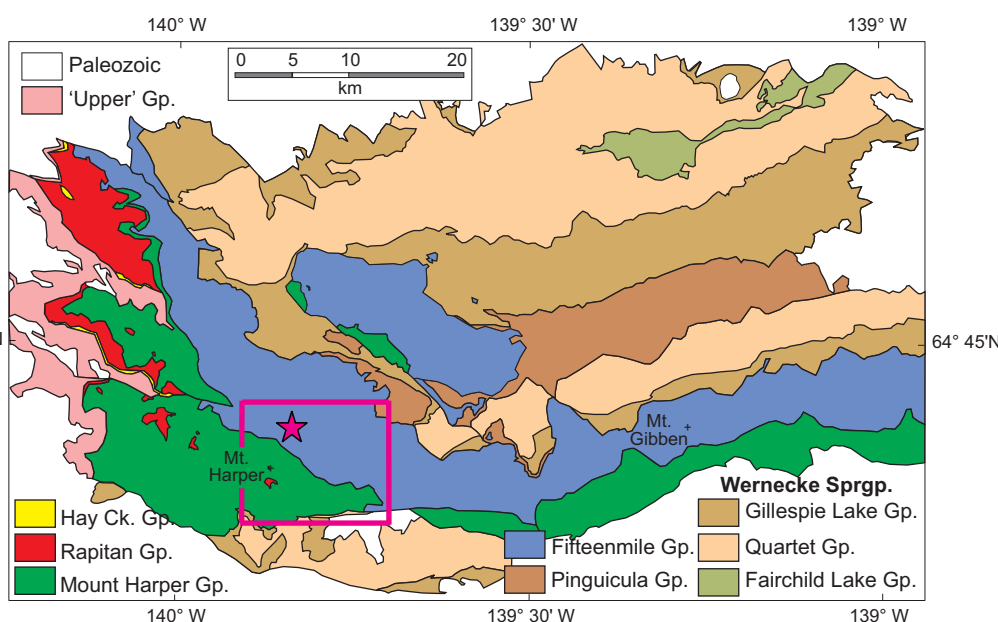
9 m: parallel-laminated mudstone at base; slightly calcareous with 0.1 m bed of yellow-weathering, silty dolostone

Reefal Assemblage (top)

65 m of black shale with beige-weathering lenses of dolostone with fenestral texture; uppermost is draped by green-brown dolostone 25 cm thick (Macdonald and Roots, 2010)



Approximate base is 7W, 555927 E, 7175298 N; elevation 1400 m, at south end of black shale saddle.



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Sheet S-9. Section 81 TW-5: lower Fifteenmile Group

Location: Deduced from Thompson's notes. It is south of station 81-205 (marked on GSC Open File 2849, sheet 7, northwest corner): a north-trending ridge 12 km west Mt. Gibben, at 64°43'N, 139°28'W.

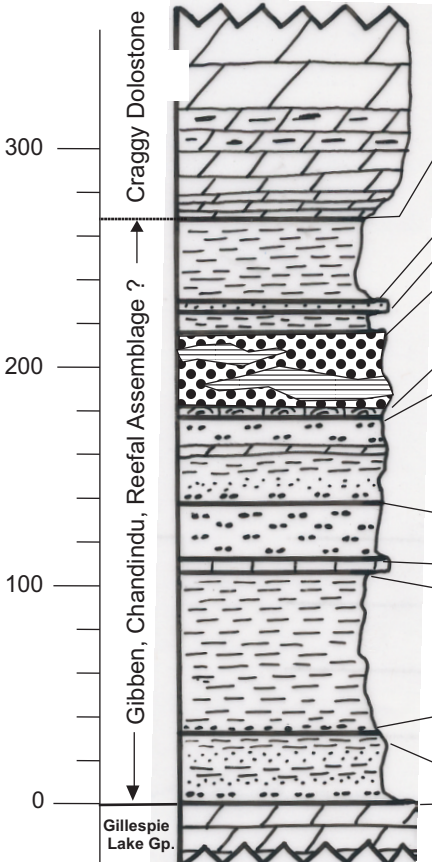
Total thickness: 266 m

Other: From Thompson's notebook 81#2, p. 26-28. The lower half of the section, originally identified as units PR₄ and PR₅, may be Chandindu and Gibben formations.

Craggy Dolostone

Laminated shale becomes laminated shaly dolostone (greenish-grey) to thin-laminated dolostone with large mounds (10 cm across, 5 cm high). Dolostone becomes progressively more massive upward.

vertical scale (m)



(If on ridge:) Base about: zone 7W, 5738i3 E, 7177698 N, elev. 1650 m.

1.5 m gradational contact

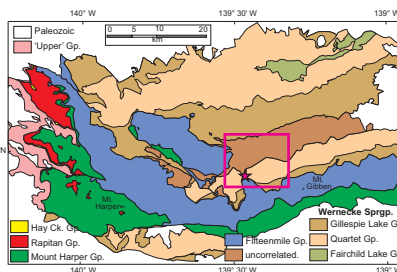
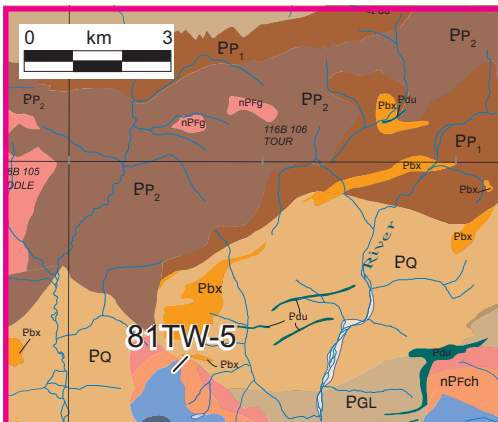
Reefal Assemblage (+/- Chandindu/Gibben formations)

- 39 m: very recessive black shale; loose scree with little outcrop
- 6 m: orange-weathering sandstone
- 13 m: black shale
- 23 m: orange-weathering, fine-grained sandstone beds 10-30 cm thick (60%); black siltstone and shale beds 0.5-5 m thick (40%); below is 10 m of shale-siltstone
- 6 m: orange-weathering limestone with small, narrow, high-relief algal mounds (stromatolites; ~0.5 cm across and ~2-5 cm high)
- 32.5 m: 3 m: grey-weathering, laminated siltstone and shale
1 m: orange-weathering, quartz-granule sandstone
7.5 m: shale and siltstone
1 m: light grey-tan weathering quartzite
15 m: black, shaly, siltstone-mudstone
5 m: orange-weathering, silty laminated dolostone
- 27 m: laminated, wavy, grey to rusty-brown siltstone and shaly siltstone
- 5 m: orange-weathering, pale, light creamy-grey limestone
- 76 m: dark grey to black, often orange to tan-brown weathering, mudstone and shale; spheroidal weathering (spalling) habit in some beds; bedding 0.5-3 cm thick, average 1 cm
- 4 m: medium to thin-bedded, fine-grained quartz sandstone with 2 cm shale interbeds in lower 1 m; most of "resistant orange-weathering" units below are silty shale with yellow-orange rind
- 33 m: 85% black shale forms fine talus, bedding thin to laminated, more resistant silty beds; 15% orange-tan and red-weathering siltstone, quartzite and silty dolostone; low-profile cross laminae in silty dolostone also, thin-bedded to laminated beds 2 cm - 2 m thick, average thickness is 10-50 cm.

sharp contact (shown as a north-side down fault on GSC Open File 2849)

Gillespie Lake Group:

pale grey to tan-weathering massive dolostone



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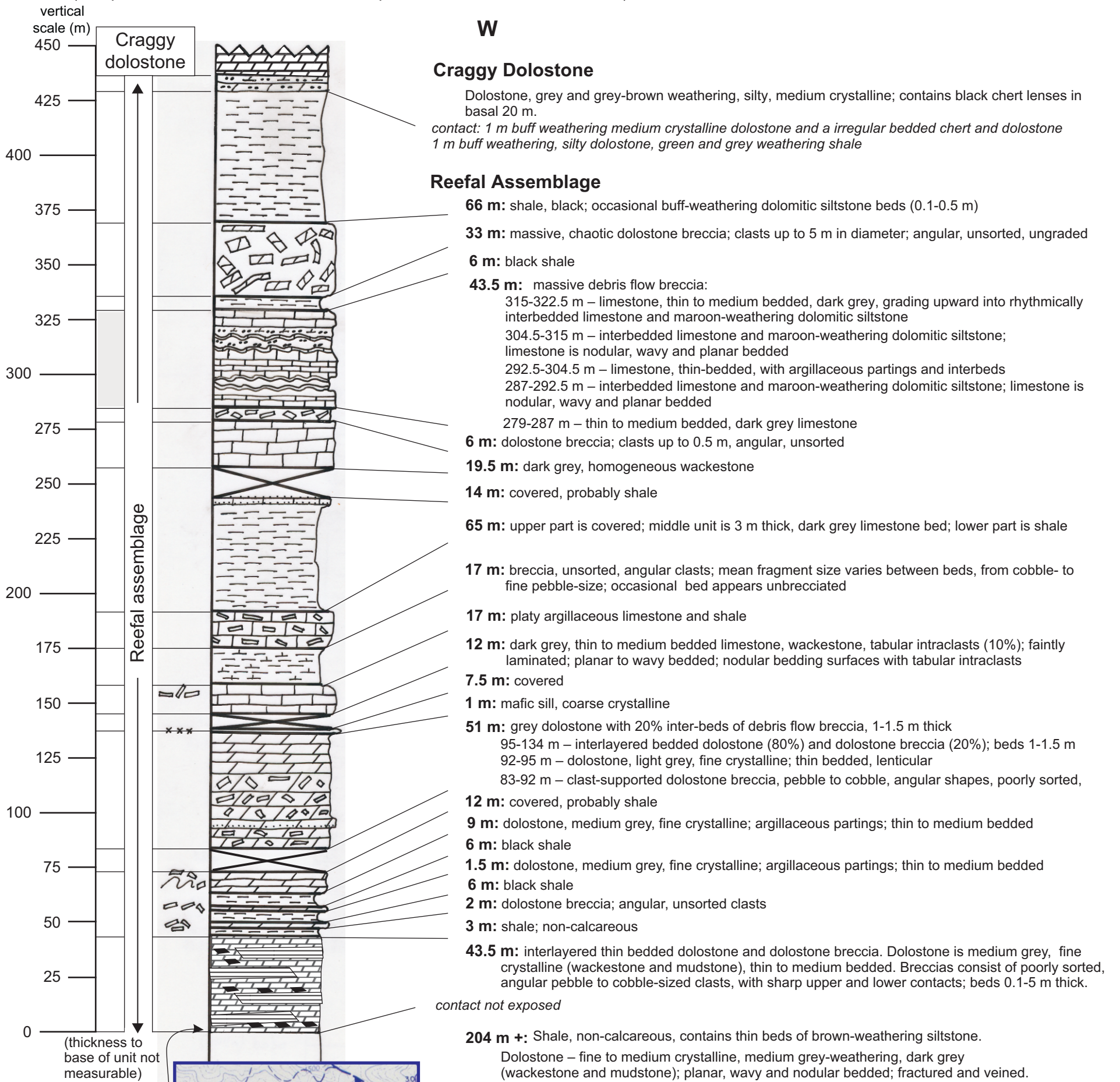
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Sheet S-10. Section 83 TW-1: Reefal Assemblage of the Fifteenmile Group

Location: Approximately 4 km northeast of Mt. Harper. Base at 64°43'N, 139°35' W

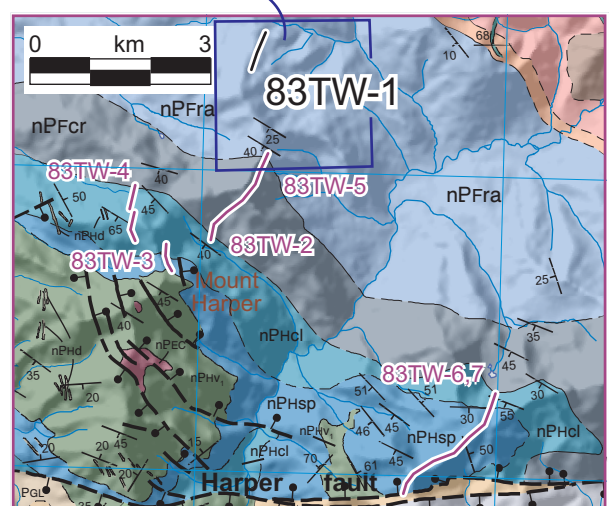
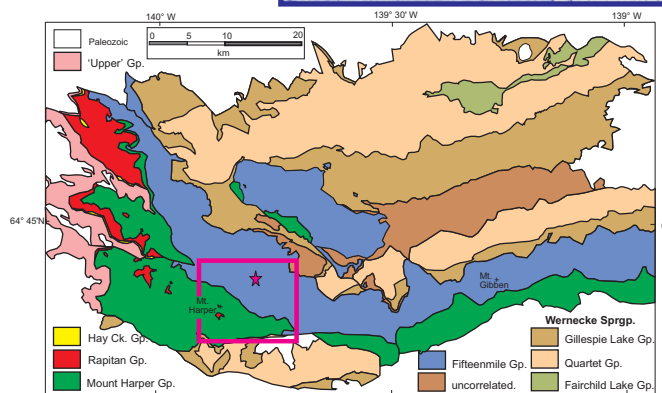
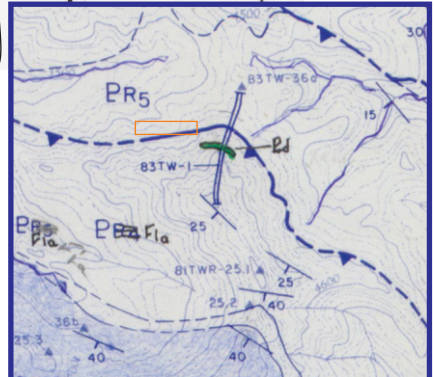
Measured thickness: 427.5 m; base of unit not observed

Other: Chemostratigraphic sections G0132 and F834 (Macdonald and Roots, 2010; Macdonald et al., 2012) follow the same ridge exposure (interpreted as Shale Basin and Fore-slope facies; Halverson et al., 2012).



measurement begins at: UTM zone 7W, 555668 E, 7177174 N, elevation 1291 m

Clipped from: GSC Open File 2849, sheet 10 (NTS 116-B/12); some unit annotations updated



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Sheet S-11. Section 83TW-9: Lower Fifteenmile Group (Gibben and Chandindu formations, Reefal Assemblage - shale basin)

Location: 16 km NE of Mt Harper:
64° 46.1'N. 139° 37'W.

Measured thickness: 299 m **Other:** From Thompson's notes 1983, book 1, p. 27-28. He observed that these units were much thinner to west, suggested it was a down-dropped block.

This exposure was studied (chemo-stratigraphic sections F1018 and G023; Macdonald et al., 2012; Halverson et al., 2012). However section 83 TW-9 contains a 125 m thick shale, possibly the "shale basin," depicted by G022 and G025 about 5 km west.

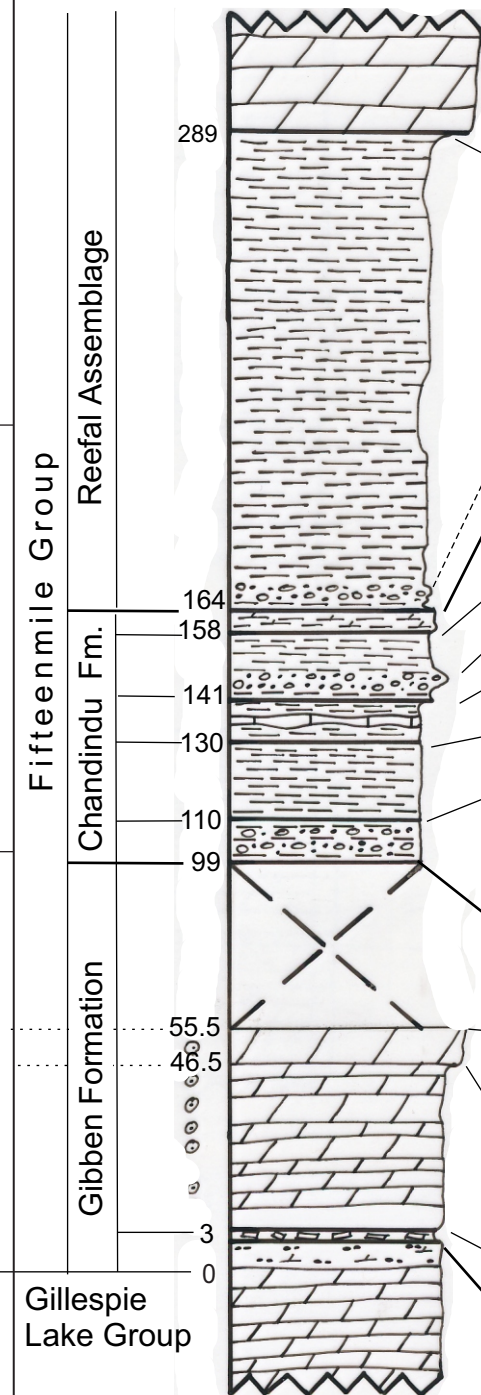
vertical scale (m)

300

200

100

0



Reefal Assemblage

28+ m: massive light grey dolostone; very homogenous

125 m: siliceous black shale up to the base

base is siliceous shale with 10 cm bed of pebbly mudstone

Chandindu Formation (70.5 m)

6 m of siliceous shale, mudstone with 1-10 cm limestone beds

17 m: black siliceous shale

1.5 m of pebbly conglomerate. Pebbles well stratified in this bed. A single disorganized bed but typical of thinner ones.

11 m: black and maroon shale and mudstone with 1-5 cm beds. Limestone are crinkly laminated, with interbedded mudstone.

20 m: black siliceous shale

11 m: maroon weathering mudstone with floating sand, granules and cobbles; about 70% clasts. Course sandstone and pebble conglomerate are disorganized: no grading; some internal stratification. Resembles the top of tan weathering silty dolostone in section 83-8. Beds are 1 cm-30 cm thick. Some parallel laminations and low angle cross bedding; minor creamy great dolostone; silty.

43.5 m: mostly covered interval

Gibben Formation (55.5 + m)

9 m: homogeneous fine-grained dolostone without solidification. Upper 5 m dolostone is light but weathering with streaks of maroon. Parallel to the irregular laminations with the beds of fine breccia in very homogeneous dolostone.

43.5 m: interbedded dolostone and ooid grain stone.

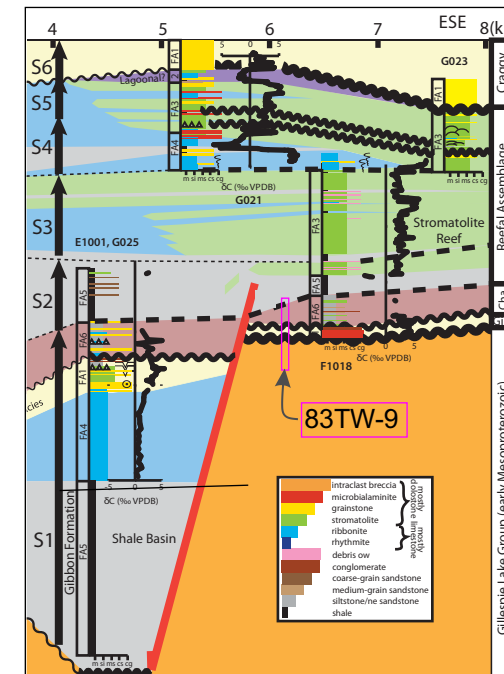
3 m: debris flow breccia: matrix-supported, very poorly sorted, containing abundant flat pebbles

unconformity

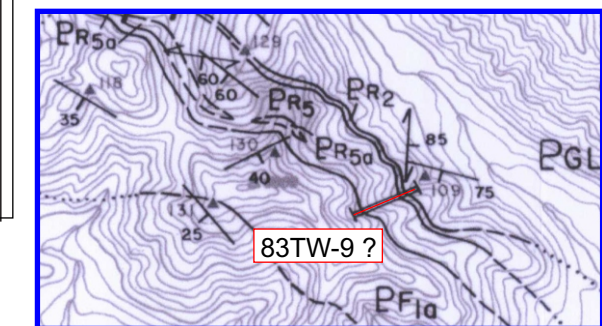
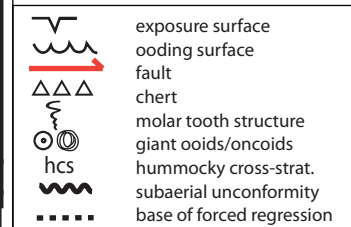
Gillespie Lake Group

orange-tan weathering, laminated to thin parallel bedded dolostone and dolomitic siltstone. Upper 15 m is parallel laminated to platy siltstone with slight dolomitic cement. Also 0.1 m disorganized matrix supported conglomerate with granules of small edgewise pebbles.

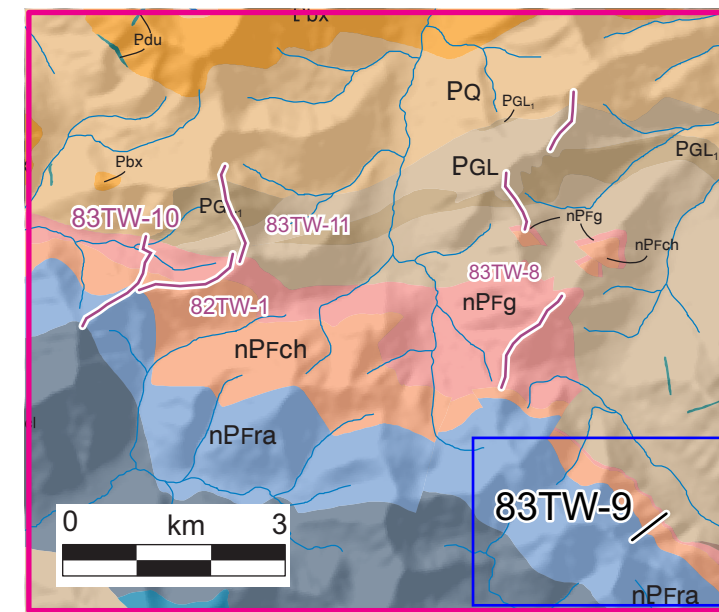
base is UTM 7W, 567798 E, 7183455 N, elevation 1260 m



clip from: Macdonald et al, 2012 (*Geoscience Canada*, vol. 39, Fig. 6 on p. 86).



Location not labeled on Open File map 2849, but stations and description correspond to the area shown above (from sheet 11). It is a northeast facing exposure in SE corner of NTS 116-B/13.



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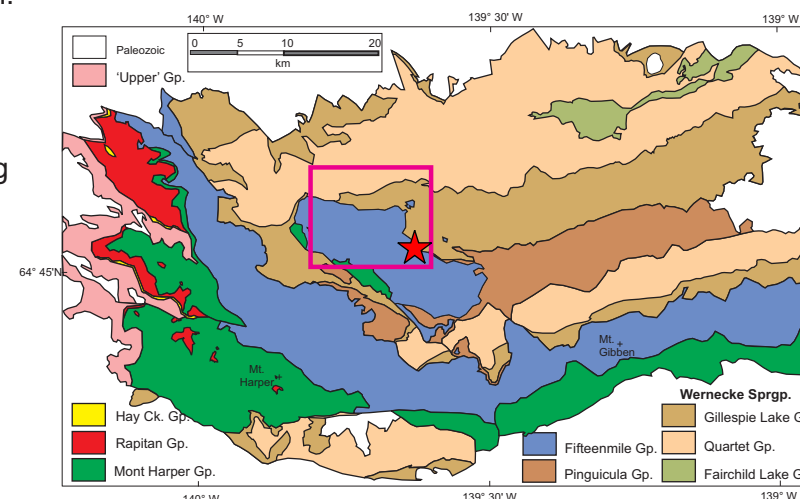
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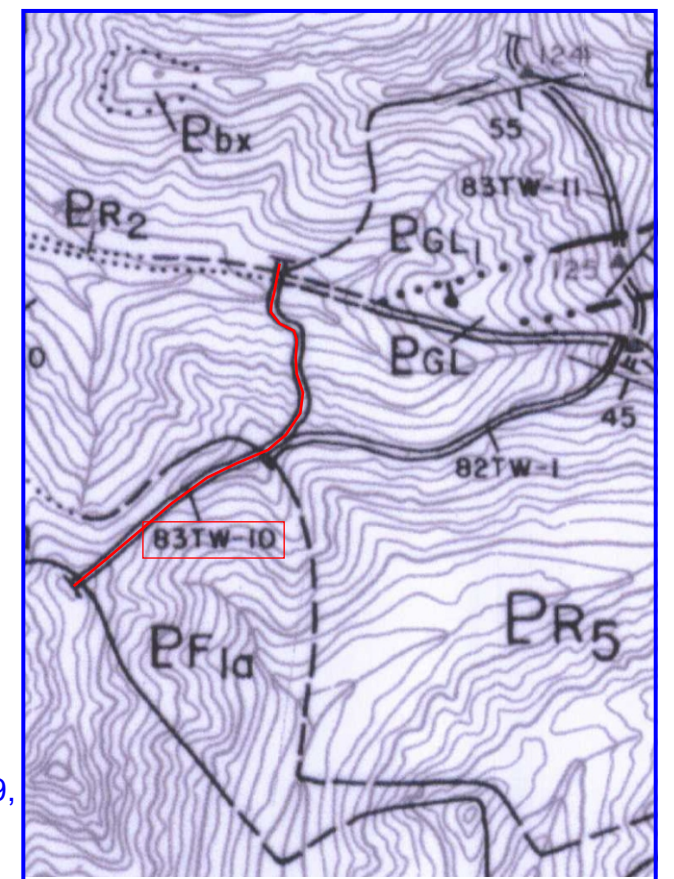
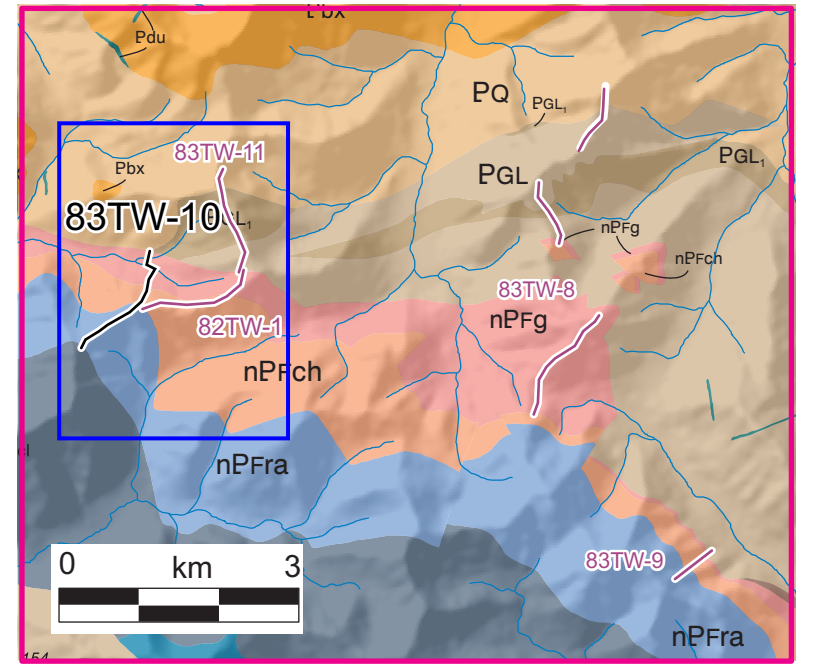
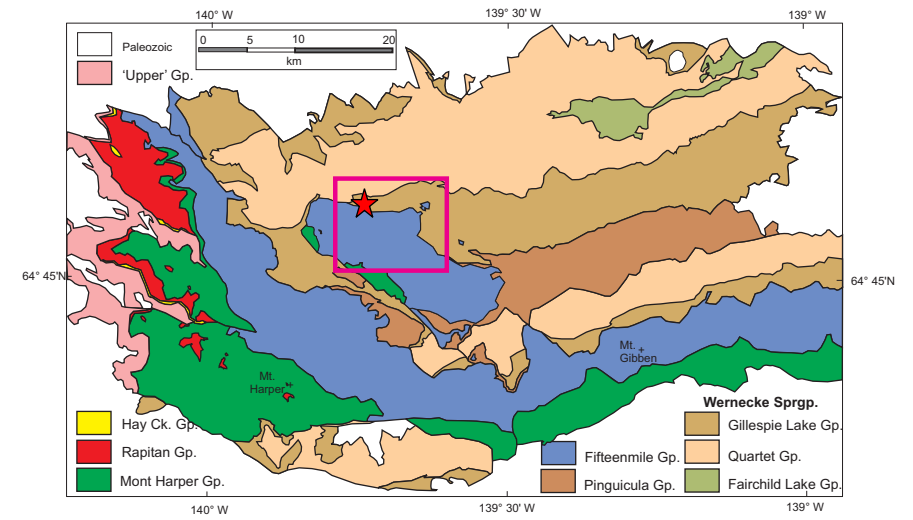


Sheet 12. Section 83TW-10, p. 1: Reefal Assemblage (Fifteenmile Group). Accompanying Sheet S-13 (83TW-10, p. 2) contains photographs.

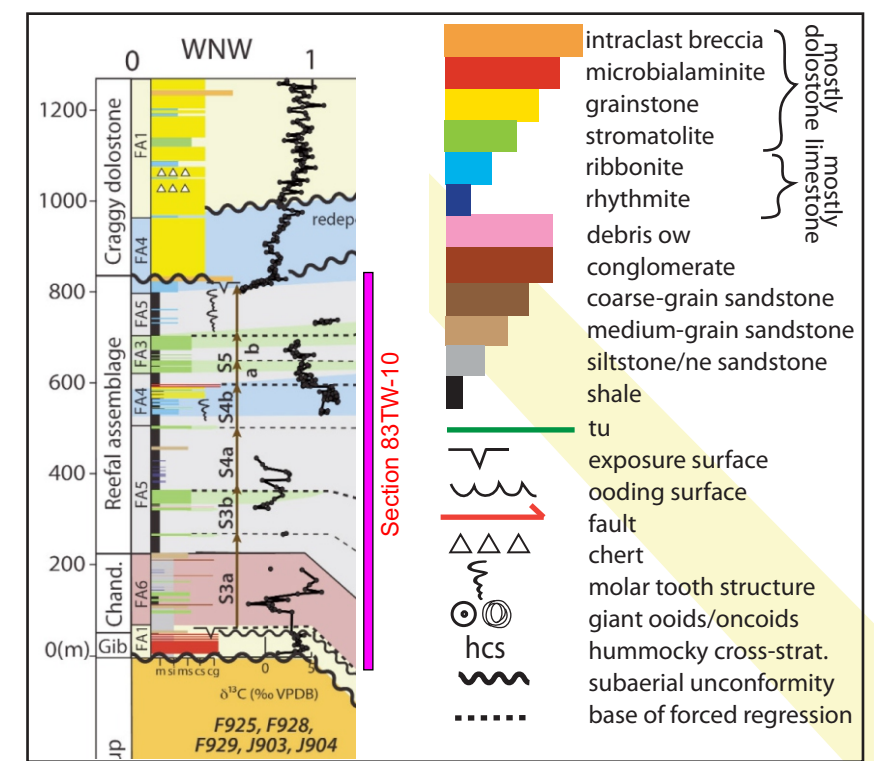
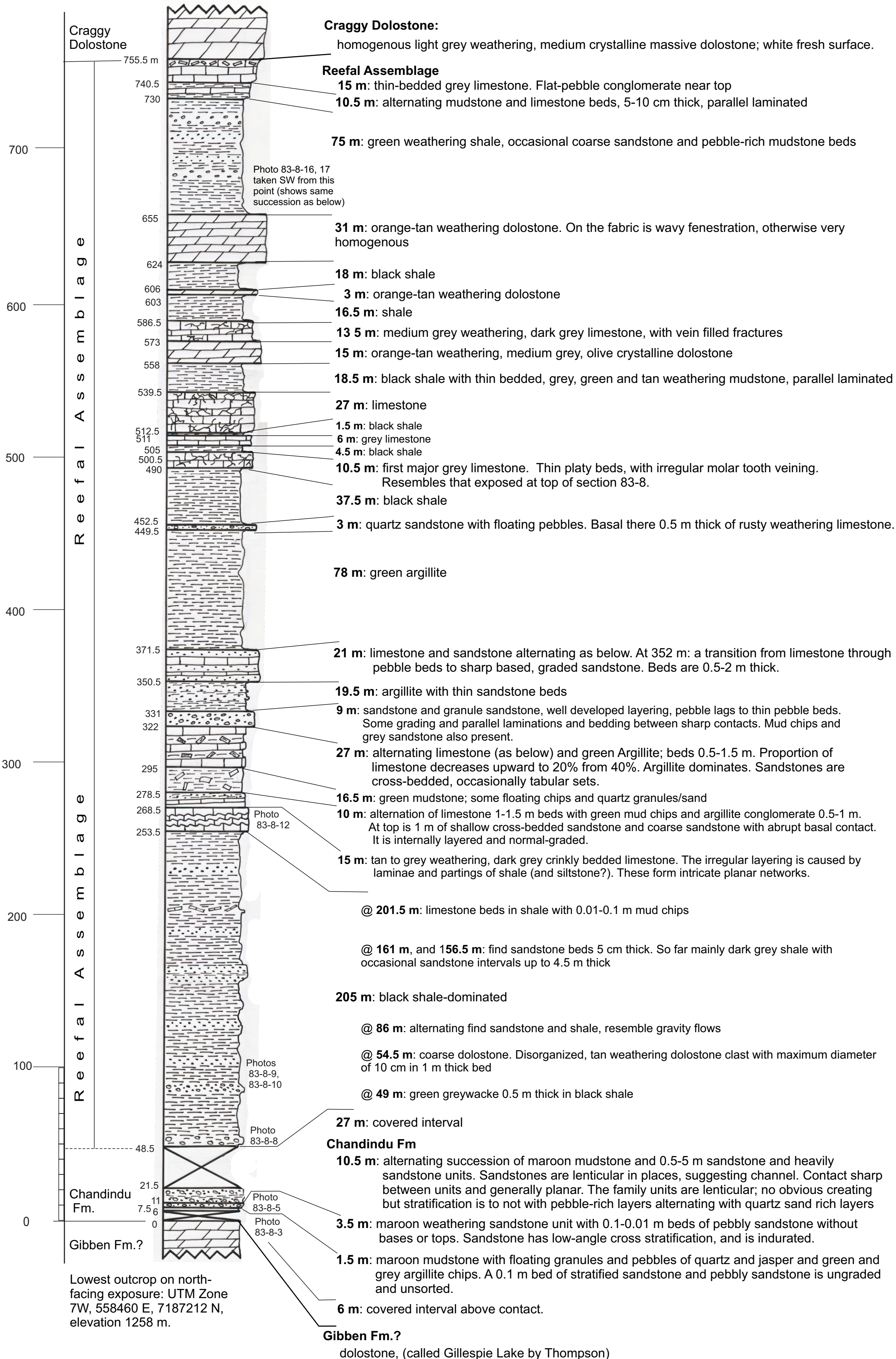
Location: Northern Coal Creek inlier: 64°48.3'N 139°46.1'W. Measured southward to ridge-crest, then SW along the crest 0.7 km.

Total thickness: 755 m

Other: Thompson's notebook 83-1, p. 29-3. As shown on GSC Open File map 2849, this section begins in PR5 and ends in PF1a. it is reinterpreted as Reefal Assemblage, overlying a thin Chandindu Formation and possible Gibben Formation. The upper part was measured and sampled nearby (sections F925 / F929, J903; Macdonald et al., 2012).



clip from GSC Open File 2849, sheet 11 (NTS 116-B/13).



clip from: Figure 6 of Macdonald et al.(2012). Magenta bar indicates approximate stratigraphic interval of this section.

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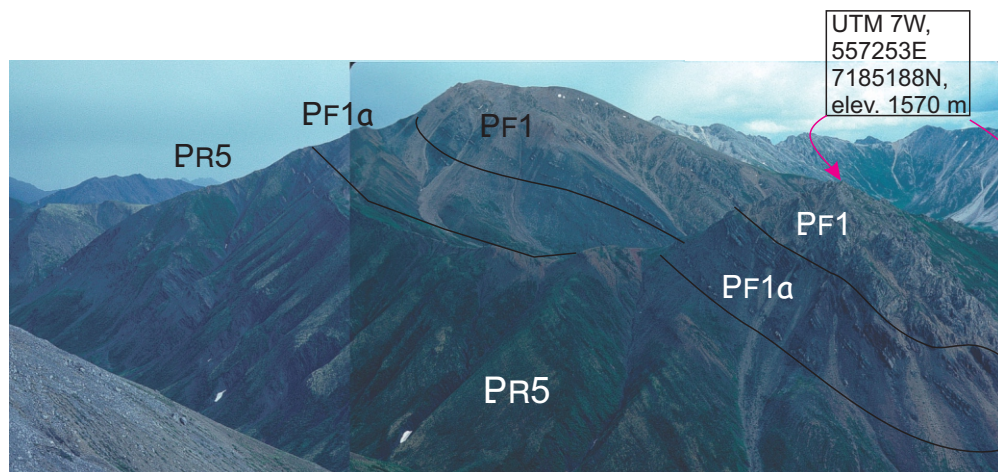
Recommended citation

Thompson, R.I. and Roots, C.F., 2015. Twenty-six archival stratigraphic sections in Paleoproterozoic to Neoproterozoic strata from the Coal Creek inlier, southern Ogilvie Mountains, Yukon; Geological Survey of Canada, Open File 7925, 1 .zip file. doi:10.4095/296977



Sheet S-13. Photos from section 83 TW-10 (see sheet S-12)

Location: Northern Coal Creek inlier: 64°48.3'N 139°46.1'W. Photographed by R.I. Thompson, July 11, 1983.



UTM 7W,
557253E
7185188N,
elev. 1570 m

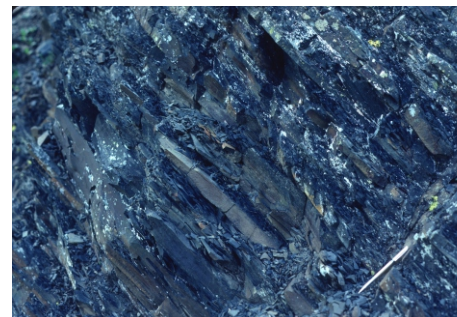
83-8-16 and 17_from ridge-crest (about 500 m in measured section) view SE to adjacent spur: Reefal Assemblage beneath Craggy Dolostone.



83-8-10_at 86 m: laminated fine mud-chip limestone



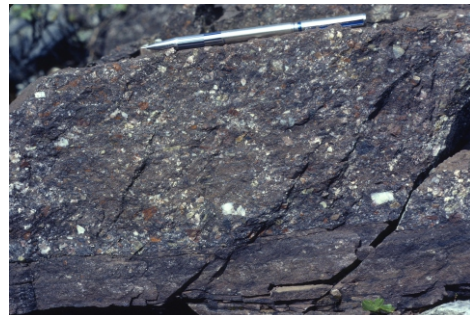
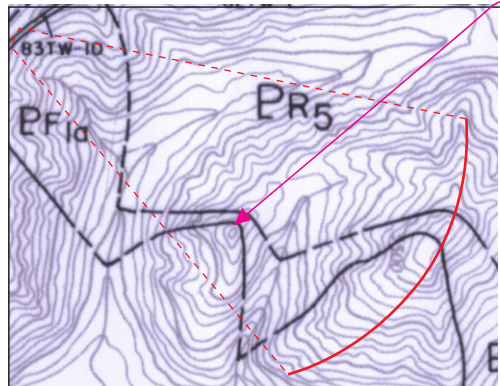
83-8-12_at 268.5 m: thin sandy mudstone layer with sharp contact



83-8-8 at 45.8 m: Normally graded pebble-sandstone bed at base



83-8-9_at 86 m: facies D



83-8-5_at 6 m: laminated maroon and black silicified sandstone, pebble lags

[Right;] Photo 83-8-3_maroon beds at base of section (Chandindu Formation)

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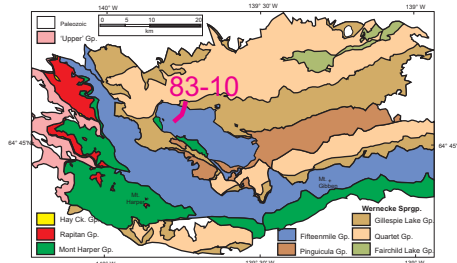


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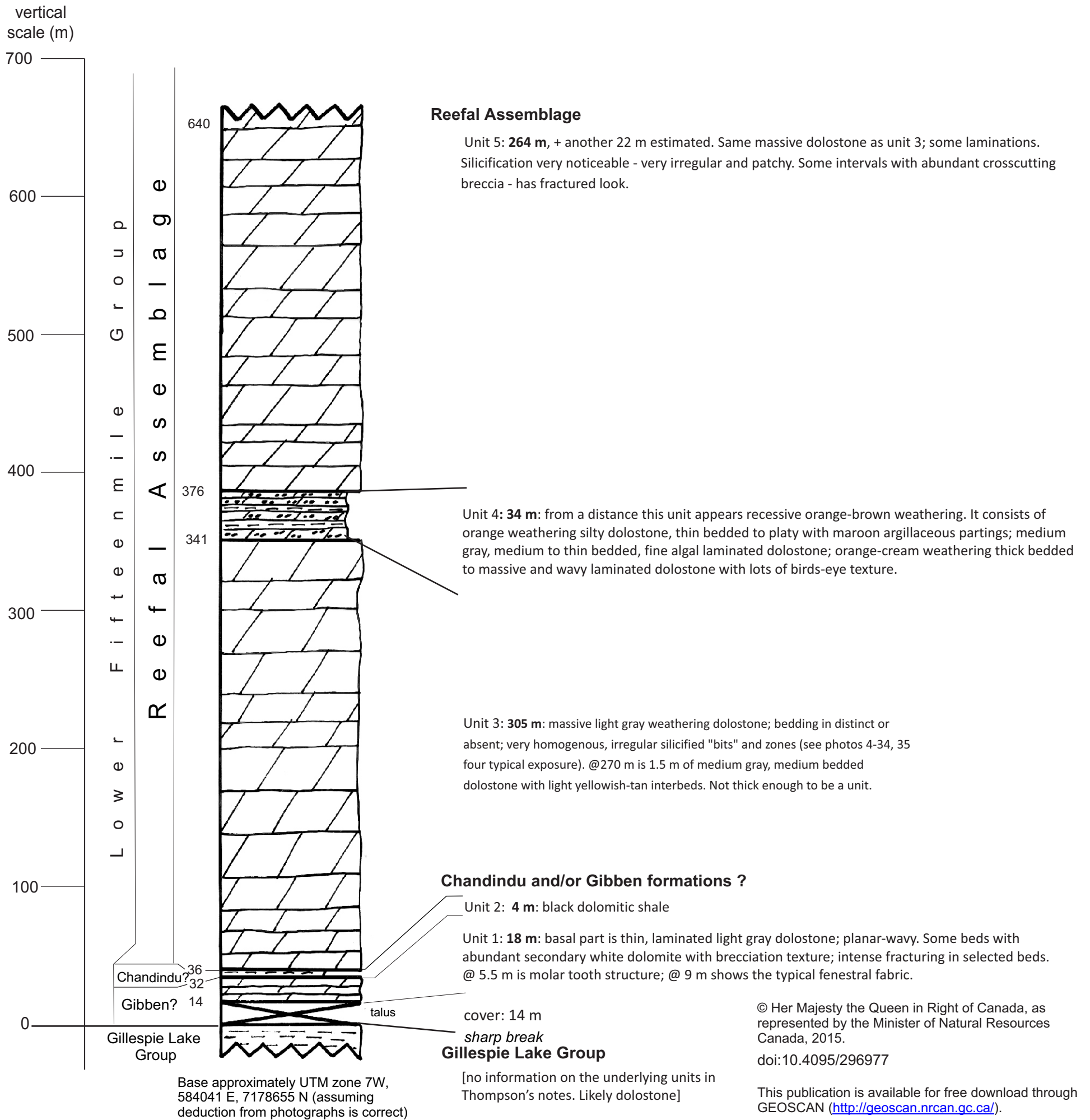


Sheet S-14. Section 80 TW-06: Reefal Assemblage (carbonate facies)

Location: 1.2 km N of Mt Gibben (deduced by comparison of mountainside photographs by Thompson and subsequent workers).
Base at 64° 44.03' N, 139° 11.56' W, ascending southwest along ridge.

Total thickness: 640+ m

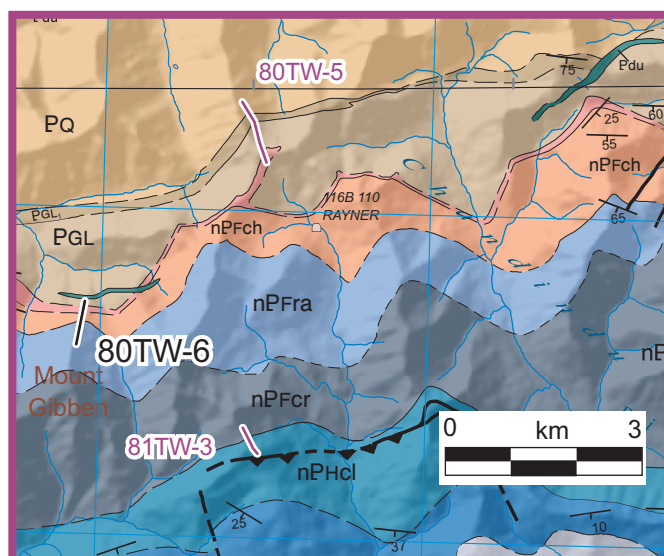
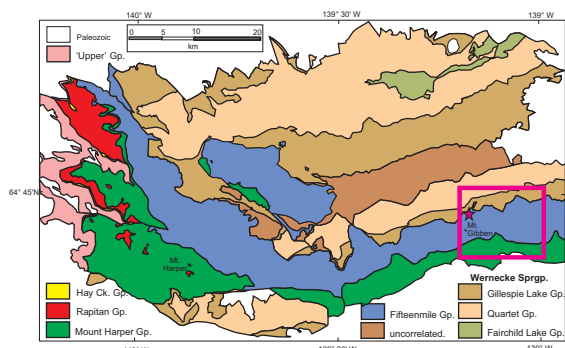
Other: From Thompson field notes for August 12, 1980; labeled as section 80 TW-5 (TW-4 was repeated) . Previously mapped as PR5 and PF1 (lower). This exposure was re-measured and sampled (sections F931, 932; Macdonald et al., 2012).



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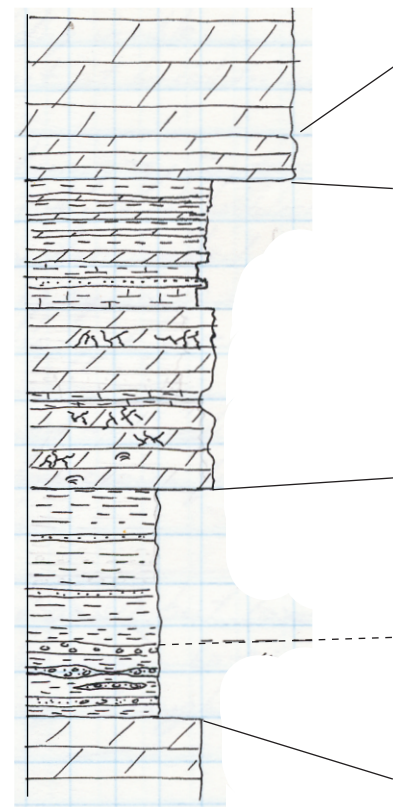
Sheet S-15. Representative strata of Fifteenmile Group and Section 81 TW-4: Chandindu Formation

The graphic log below is representative southeastern Coal Creek inlier.

Location: Generally applies to the area shown in the uncoloured map fragment below; from stations 81 TW-169 through 174 (on sheet 7 of GSC Open File 2849).

Thickness: unspecified (see applicable units in nearby measured sections)

Other: sketch scanned from Thompson's notebook 81#2 page 14 (unit names updated)



Craggy Dolostone: light grey, thick bedded or massive, homogenous dolostone; algal laminated in part; some silicified beds.

Lower member: orange planar bedded dolostone 3-5 cm, interbedded with shale and siltstone (some green polymict conglomerate)

Reefal Assemblage: carbonaceous limestone; quartz sandstone; calcareous shale and green shale

grey, upward to orange-tan, weathering massive to thick bedded dolostone; algal laminated; intricately veined with molar tooth-like appearance.

Chandindu Formation(?): maroon shale conglomerate: maroon shale, mudstone; some thin sandstone beds; some green shale

Gibben Formation: dark grey, green-grey and black shale with quartz sandstone and probably make conglomerate beds and lenses.

Gillespie Lake Group: grey, laminated, thick bedded dolostone

81 TW-4 SECTION

Location: 9 km northeast of Mt. Gibben. Plotted on GSC open file 2849 (sheet 7). Base at 64°44'N, 139°01'W.

Measured) thickness: 139 m

Other: from Thompson's notebook 81#2 pages 15-16.

NOTES [no graphic log available]

Sharp contact with overlying Reefal Assemblage (thick-bedded carbonate)

Chandindu Formation

32 m:

Upper 18 m - tan-weathering, laminated to thinly bedded dolostone with 1 to 7 cm-thick, medium grey limestone interbeds; occasional green and maroon shale beds ~5 cm thick; forms very distinctive grey and tan-brown banded unit; no quartzite or conglomerate noted; amount of maroon shale varies along strike

Lower 13 m - composed of green and dark grey shale and mudstone with 1 to 3 cm-thick, tan weathering, silty dolostone interbeds, 70% shale; number of siltstone beds increases upwards (Note: occasional maroon shale with green, but not dominant)

3 m: tan-orange weathering massive dolostone bed

13 m: covered interval; dark grey, thin-bedded, carbonaceous dolostone

70 m: light tan to orange-tan weathering, very light grey to creamy white, fine crystalline dolostone; massive (not laminated); veined by white and orange secondary dolostone

17 m: same as unit one, but laminations not visible from 9 to 17 m (more massive); veins throughout

17 m: covered interval with talus of black carbonaceous, fine crystalline dolostone

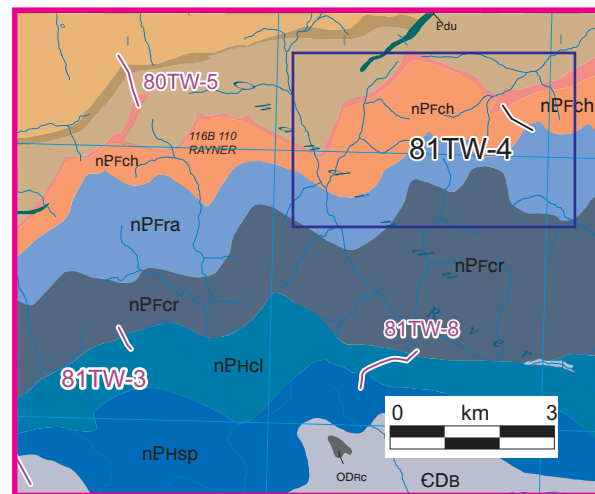
7.5 m: medium grey-weathering, medium grey, fine crystalline dolostone; thick bedded, fine planar to wavy laminated; intricate and delicate veining by orange-weathering secondary dolostone to crackle-type breccias

6 m: covered interval

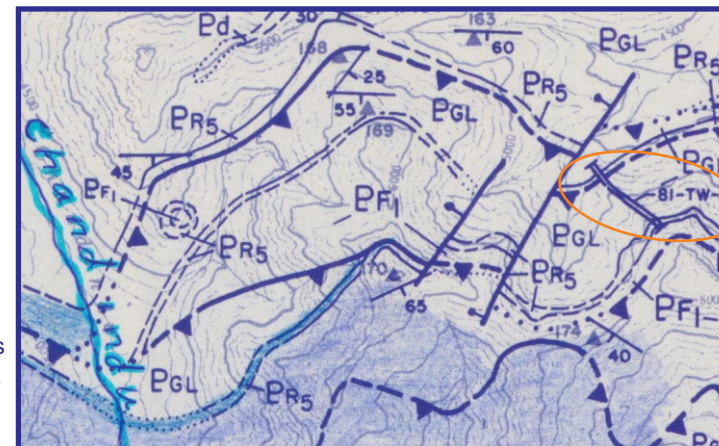
interpreted thrust fault at break in slope (shown on GSC Open File 2849)

deep maroon mudstone, cleaved with no visible bedding.

Base at: UTM zone 7W,
594516 E, 7181303 N,
elevation 1350 m



Clip from: GSC Open File 2849, sheet 7 (NTS 116-B/11), northeast corner. It crossed units "PR5" and Gillespie Lake Group. Now these are attributed to the Chandindu Formation.



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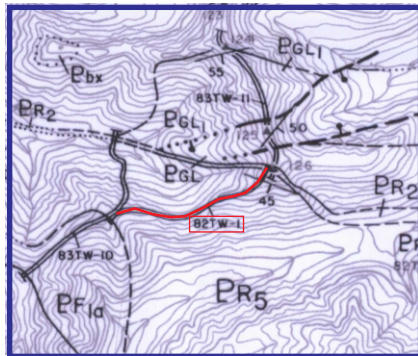
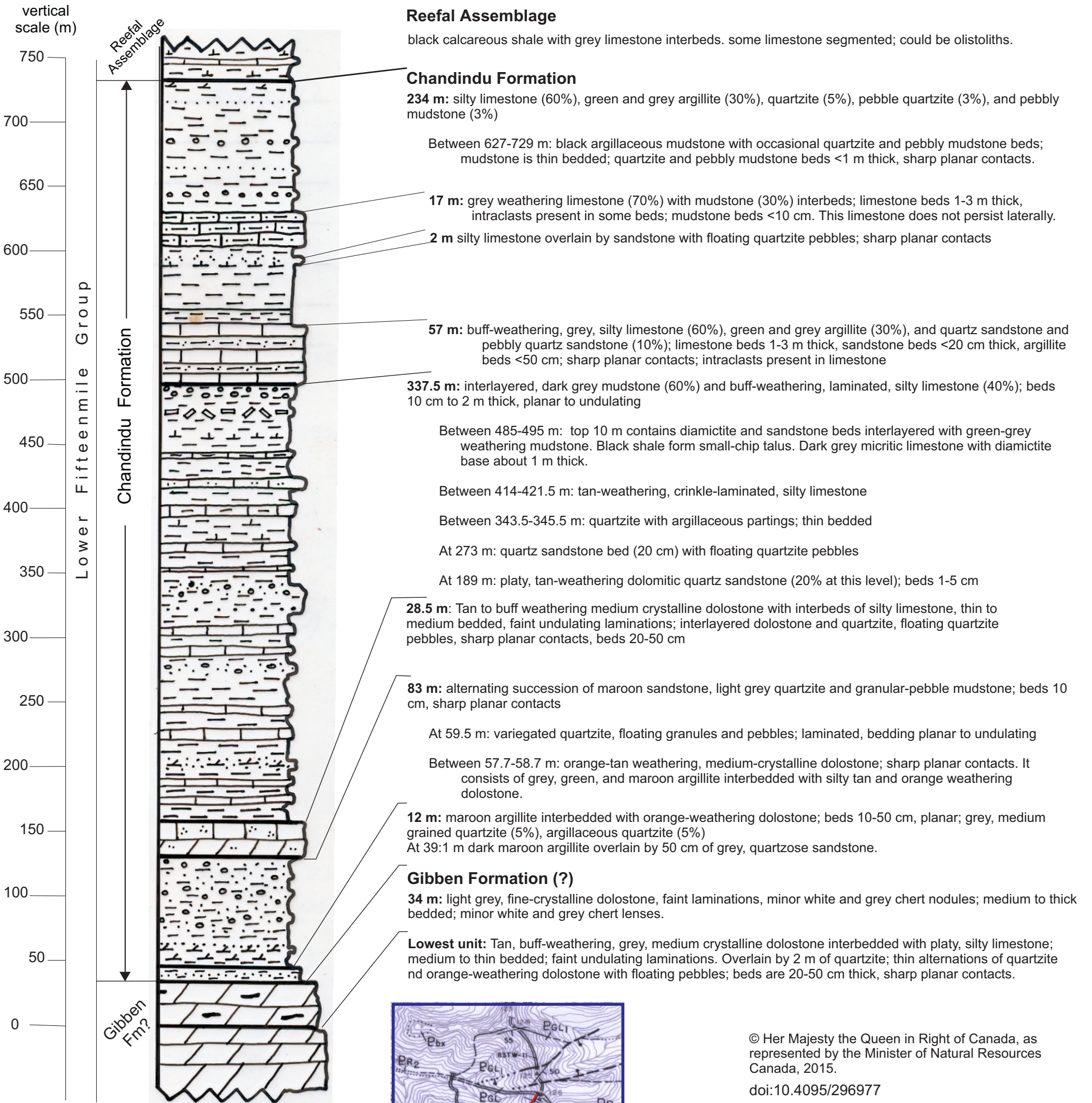


Sheet S-16. Section 82 TW-1: Gibben(?) and Chandindu formations, Reefal assemblage

Location: Ridge crest 16.4 km north-northeast of Mount Harper. Base of section is 64°48'N, 139°45'W.

Total thickness: 729 m

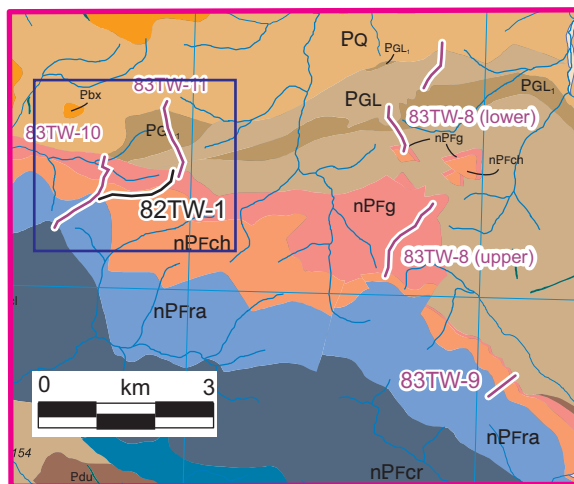
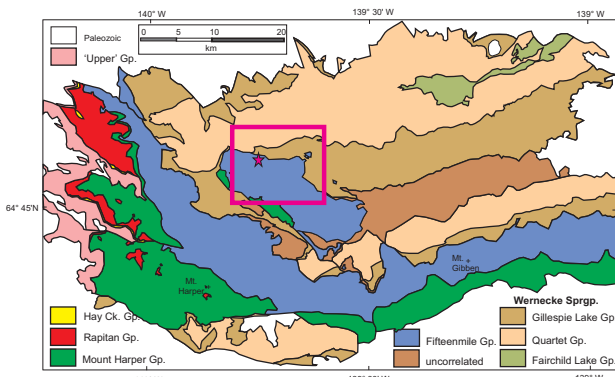
Other: Thompson's notebook 82-TW-2, p. 8-10. Re-measured by Macdonald (F925/F929) and by Halverson (G022) to the east (summarized in Macdonald et al., 2012). Chandindu Formation was formally defined by Kunzmann et al. (2014); boundaries shown here may be incorrect..



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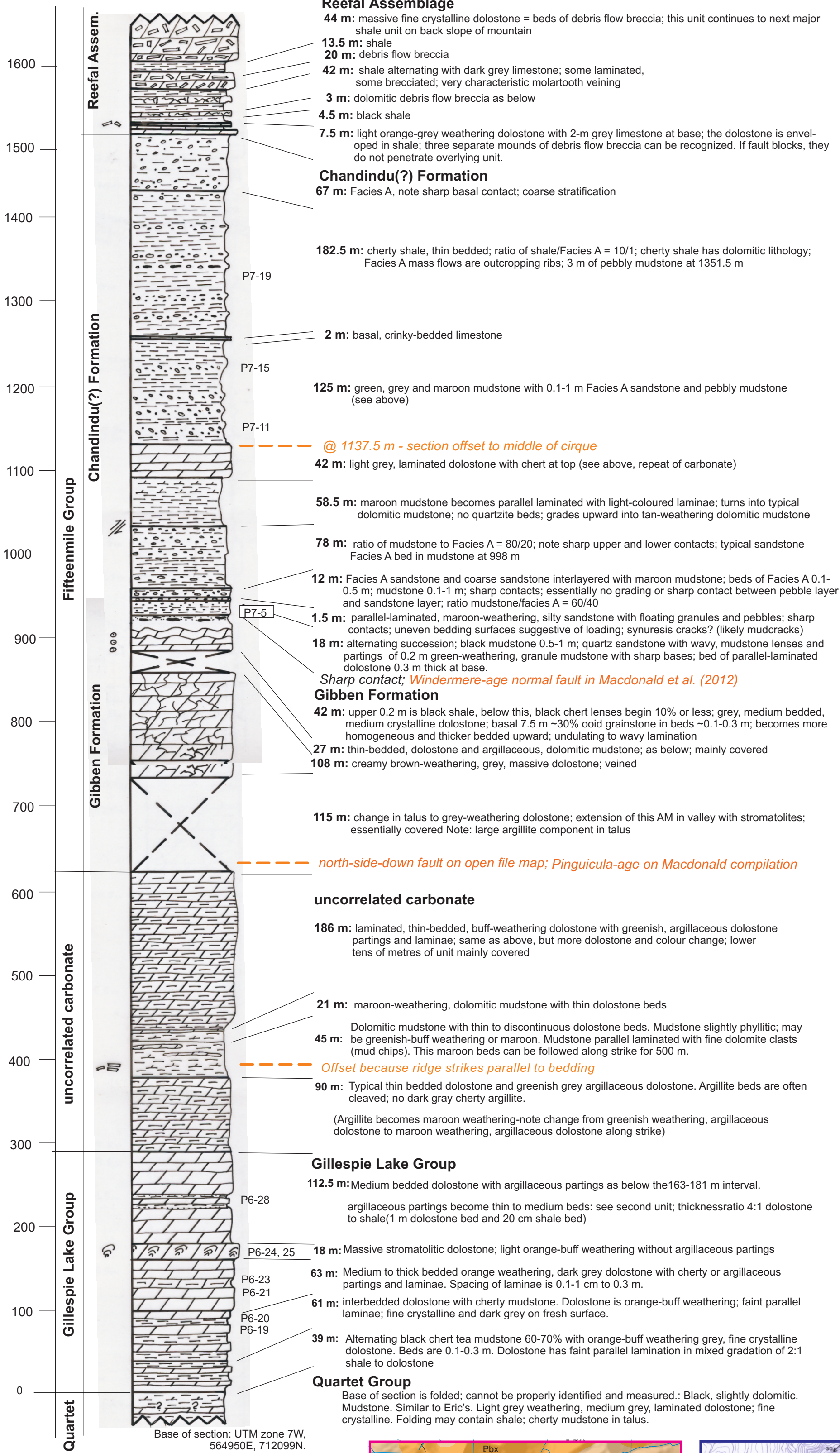
Thompson, R.I. and Roots, C.F., 2015. Twenty-six archival stratigraphic sections in Paleoproterozoic to Neoproterozoic strata from the Coal Creek inlier, southern Ogilvie Mountains, Yukon; Geological Survey of Canada, Open File 7925, 1 .zip file. doi:10.4095/296977

Sheet S-17. Section 83 TW-8: Gillespie Lake Group, Gibben and Chandindu formations

Location: 22 km NNE of Mt Harper: a series of high ridges measured southward from 64°50.8' N, 139°37.8' W, in the three intervals.

Thickness: 1647 m measured. This section has structural complications and may not show representative thicknesses.

Other: Section measured by Thompson on July 6-7-8, 1983 (book 1, p. 21-26) and consists of four intervals with stratigraphic offsets. Upper part of section measured (F1018; G028) by Macdonald et al. (2012).



7-15_ pebbly mudstone facies_ White and grey quartz with 10% jasper in the finer flows



7-19_ pebbly mudstone facies



7-11_ typical parallel bedded and laminated dolomitic siltstone.



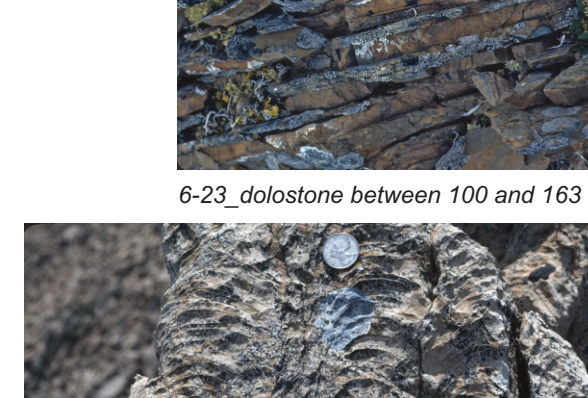
7-5_ thick bedded dolostone at 921.5 m



6-23_ dolostone between 100 and 163 m



6-28_ silty dolostone interval 385.5-428 m



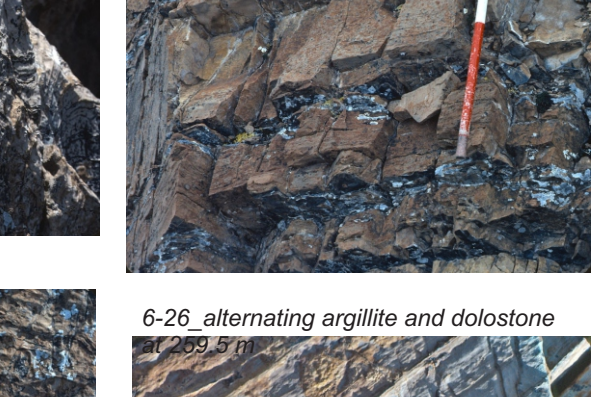
6-25_ strained stromatolites at 172 m



6-26_ alternating argillite and dolostone at 169.5 m



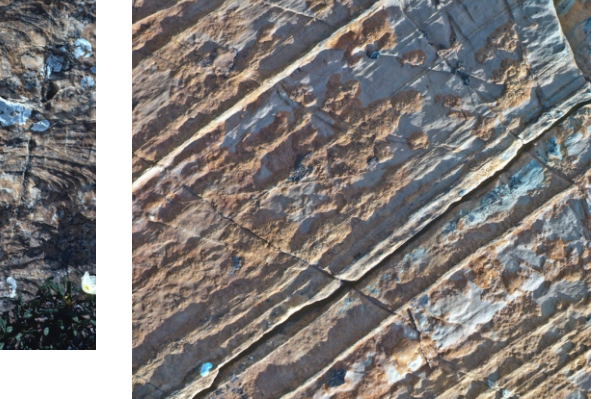
6-24_ strained stromatolites at 172 m



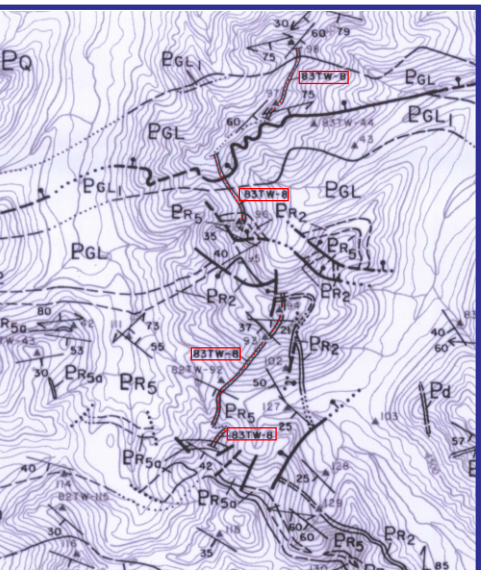
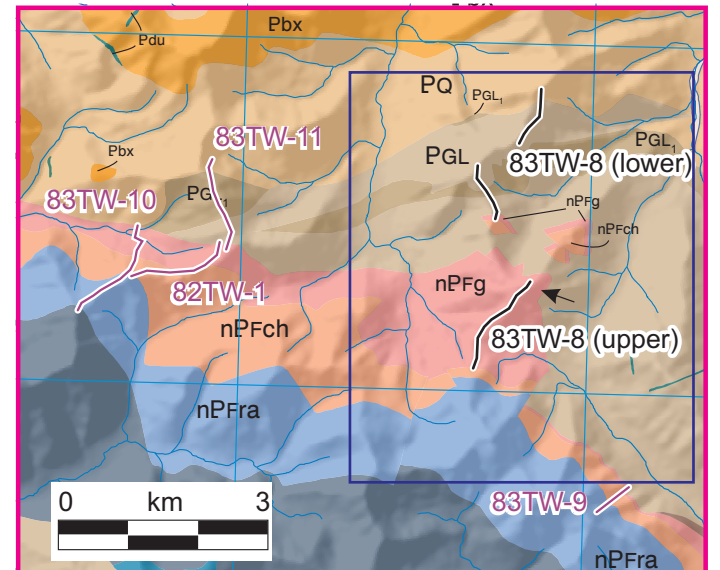
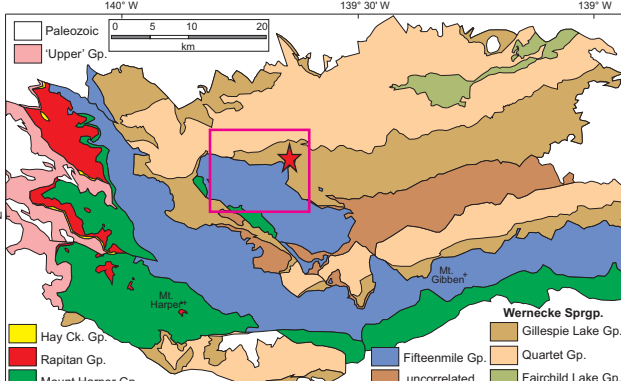
6-21_ dolostone between 100 and 163 m



6-20_ alternating 0.5 m beds of dolostone with 0.2 m beds of chert mudstone at 63 m



6-19_ alternating 0.5 m beds of dolostone with 0.2 m beds of chert mudstone at 63 m



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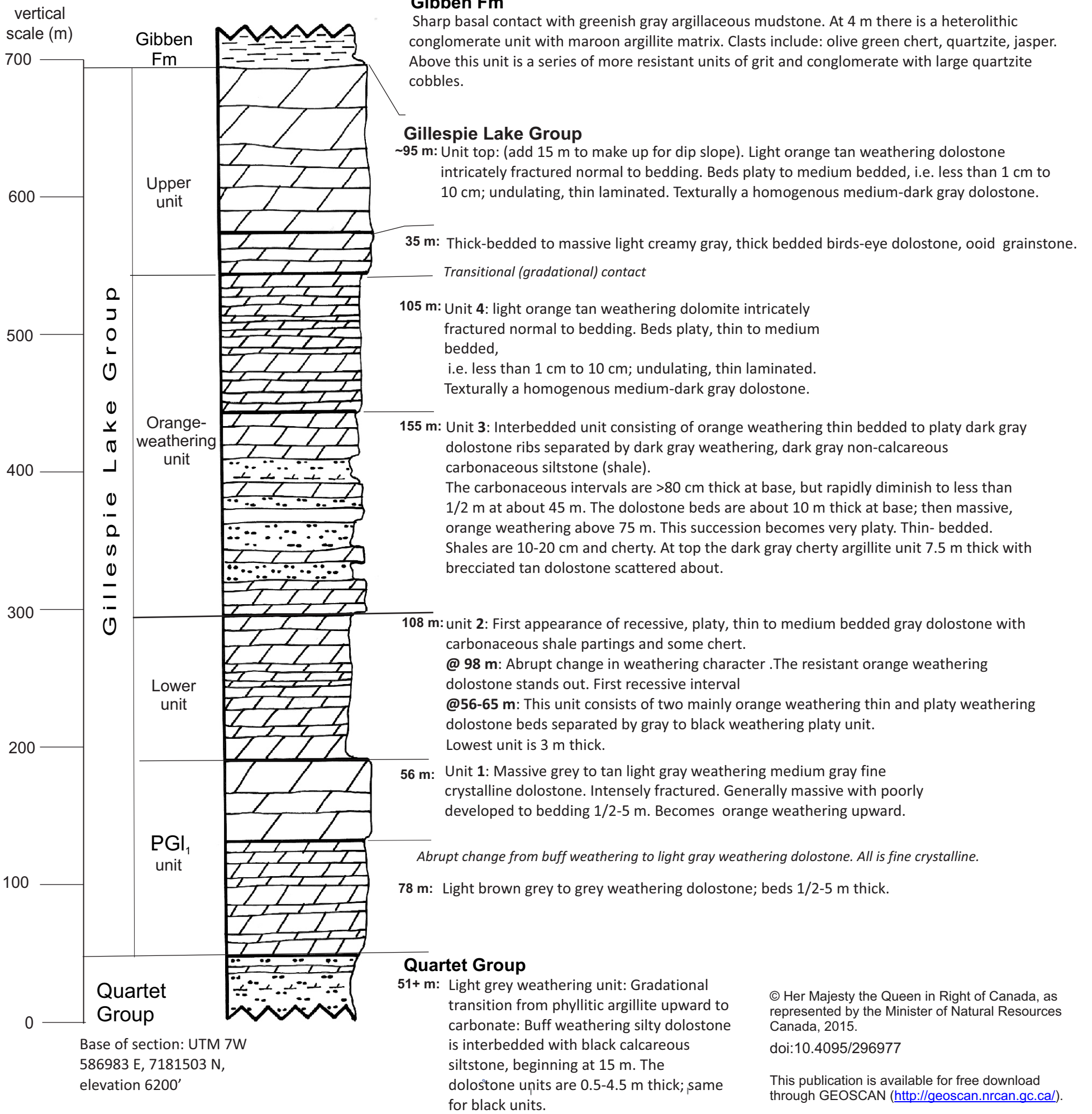
Sheet S-18. Section 80 TW-05: Gillespie Lake Group

Location: 3.8 km NNE of Mt Gibben (deduced from comparison of mountainside photographs by Thompson and subsequent workers).
Base at 64° 44.82'N, 139° 10.36'W.

Measured thickness: 697 m

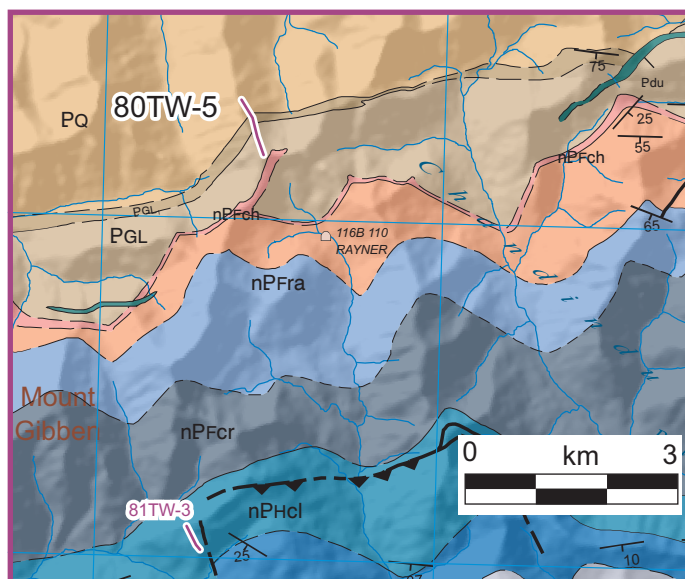
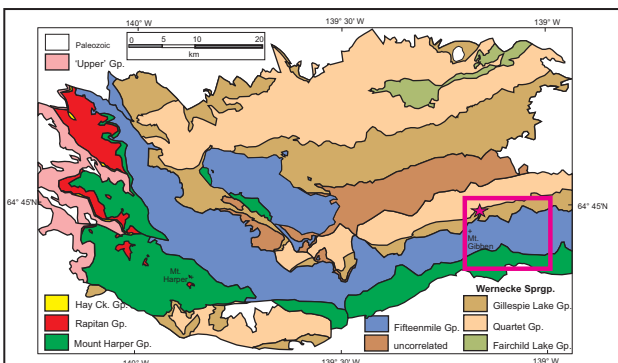
Other: From Thompson's notebook 80-1, but recorded as section 80 TW-4 (number repeated).

The bulk of the overlying unit consists of deep maroon argillite with green patches and layers. At top is a thin (2 m) clean sandstone overlain by black weathering mudstone. The white carbonate "reef" lens sits in sharp contact on black mudstone.



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2015
SHEET 18 OF 21 / FEUILLET 18 DE 21

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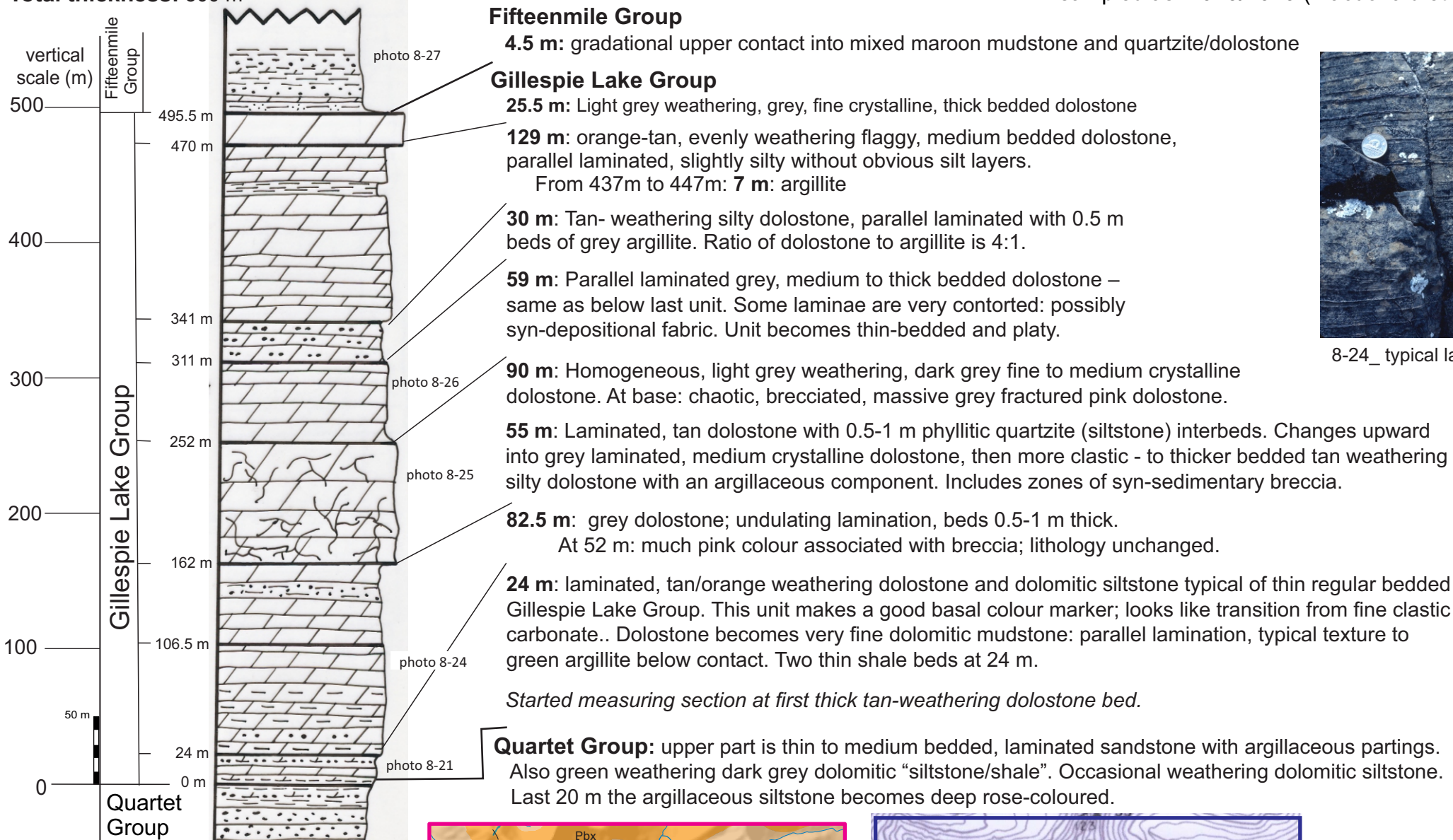
Sheet S-19. Section 83 TW-11: Gillespie Lake Group

Location: 17 km NE of Mt Harper, northern Coal Creek inlier: 64° 48.5'N; 139° 45.0'W. Measured section follows ridge-crest 1.5 km southward to prominent color change.

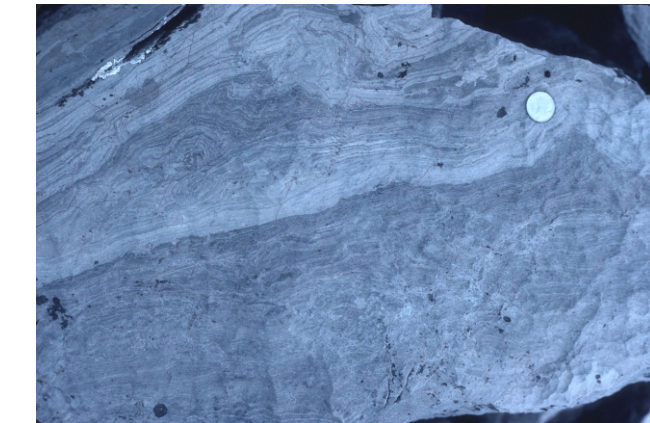
Other:
From Thompson's notebook 83-1, p. 32-33.
Top of section may have been measured and sampled as: **F925/F929** (Macdonald et al., 2012).

8-27_ Chandindu Formation unconformably overlies Gillespie Lake Group dolostone (at top of section).

Total thickness: 500 m



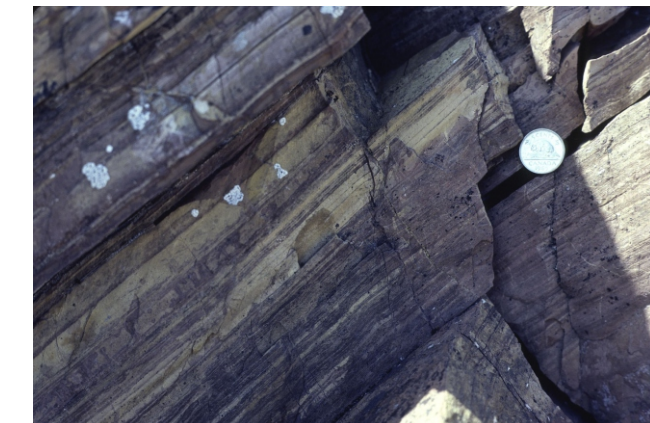
8-24_ typical laminated dolostone (@ 85.5 m)



8-26_ contorted laminae (@ 259.5 m)

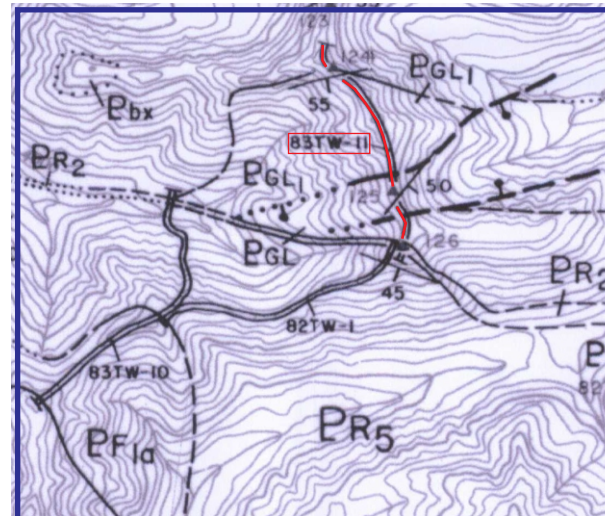
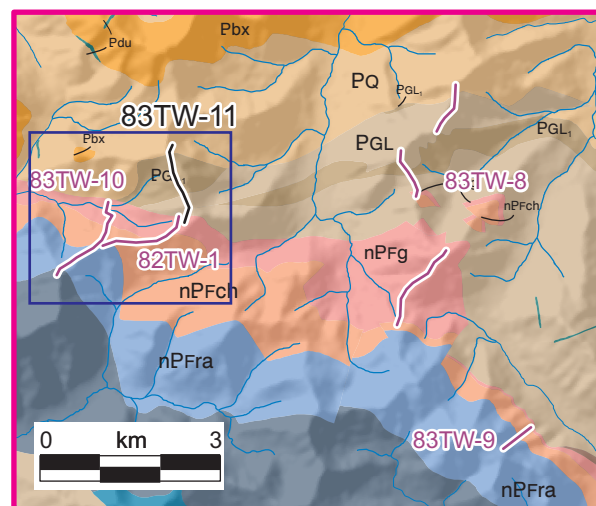
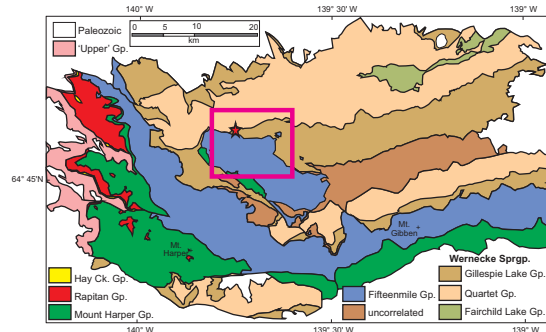


8-25_ Syn-sedimentary breccia (@ 214.5 m)



8-21_ parallel laminated maroon dolostone with thin conglomerate (0-24 m).

Base: zone 7W, 559319 E, 7188312 N, elev. 1360 m.



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clip from: GSC Open File 2849, sheet 11 (NTS 116-B/13).

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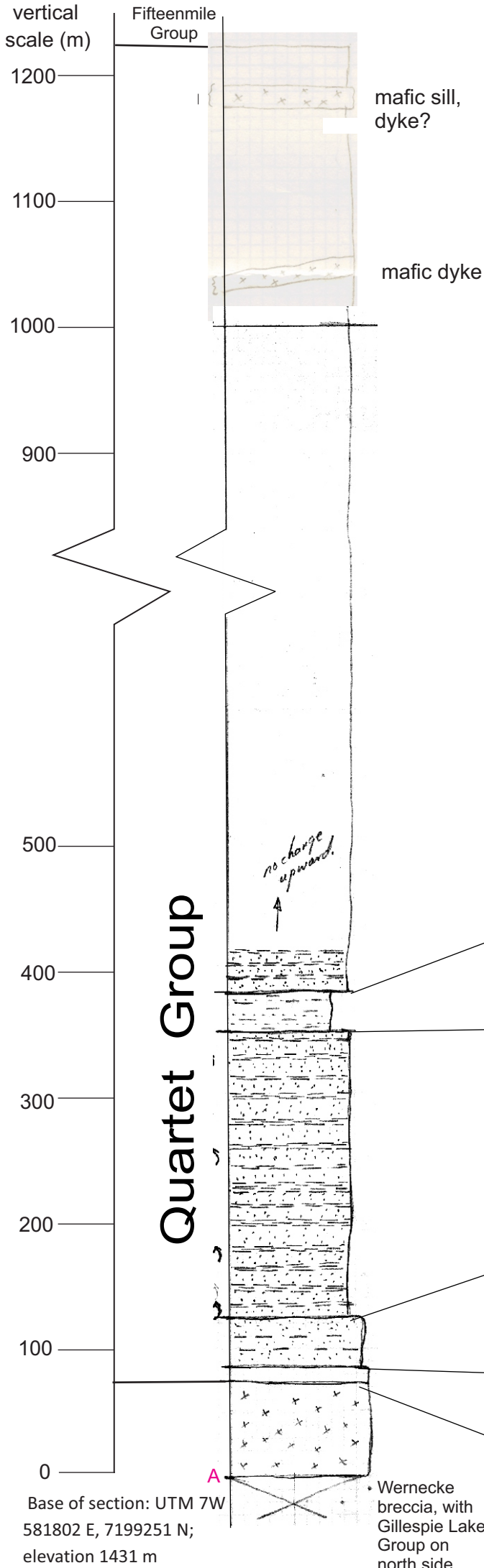


Sheet S-20. Section 80 TW-4 (partial measurement)

Location: 20.4 km NNW of Mt. Gibben; measured southward along ridgecrest. North end (A) at 64° 52.2'N, 139° 19.7'W

Total thickness: 1240m (measured) + ~500m (estimated)

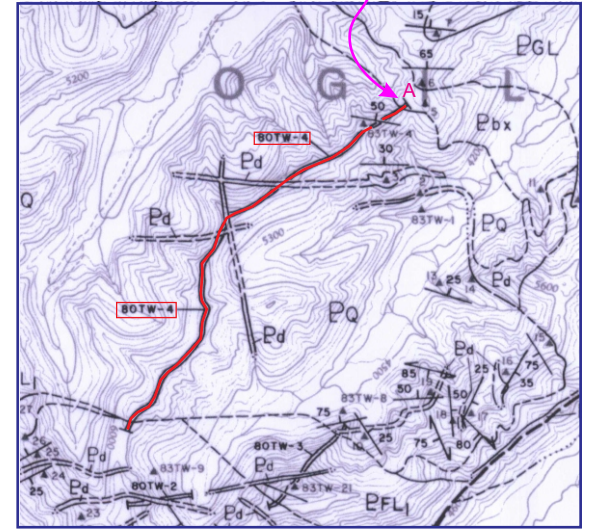
Other: Section was measured north-to-south along the ridgecrest, as is here are portrayed from bottom-to-top. however, this measurement is probably upside down, as the map pattern shows Fairchild Lake Group (sheet S-21) to southwest and Gillespie Lake Group to north east.



Quartet Group

fine-grained quartz sandstone with argillite interbeds; thin- to medium-bedded, platy weathering

Note that this measured section begins in a mafic sill, but on map begins at contact with Wernecke breccia (Pbx).



section measurement incomplete — estimate another 400-500 m to top

Clipped from Thompson et al., 1994 (GSC Open File 2849, sheet 12); near the center of NTS 116-B/14.

Unit 6, . 837 m: same as unit 4 but beds are less thick (~1 m). This unit is 70% thin to medium bedded quartzite with 30% argillite.

at 789-805 m: hornfels
at 789m: 45 m thick dyke forms the peak;
at 770-789m: hornfels.
at 650 m: 30 m thick dyke; can be traced across the ridge.

Unit 5, 33m: black to dark gray recessive argillaceous interval with less than 10% quartz sandstone interbeds. Non-calcareous, breaks into thin sheets.

Unit 4, 224 m: homogenous unit of fine quartz sandstone interbedded with argillite and argillaceous quartzite, quartzite that is platy. Sandstone beds 5-10 cm, rarely; occasionally about 1 m thick. Bedding is undulating, not planar.

Unit 3, 38 m: fine quartz sandstone, beds 5 cm to 1 m thick; green argillite bedding plane partings; 1 cm-50 cm beds of platy argillaceous quartzite. 80% quartzite, 20% argillite. From 13 - 18 m is siliceous argillite unit. Upper contact transitional with platy character becoming more pronounced and quartzite beds more typically 10 cm or less.

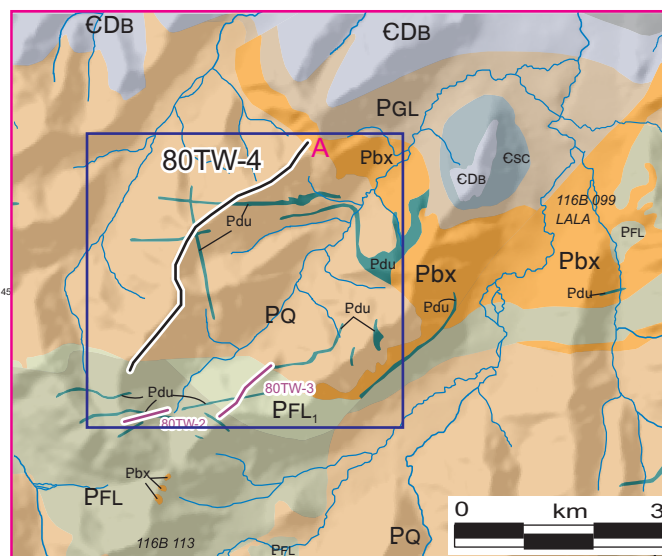
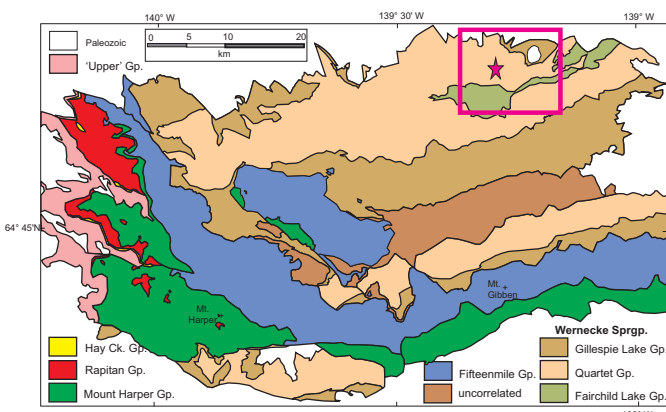
Unit 2, 11 m: dark gray-green hornfels rock. Very siliceous.

Unit 1, 76 m: mafic sill (dyke?); typical of those seen elsewhere in sections.

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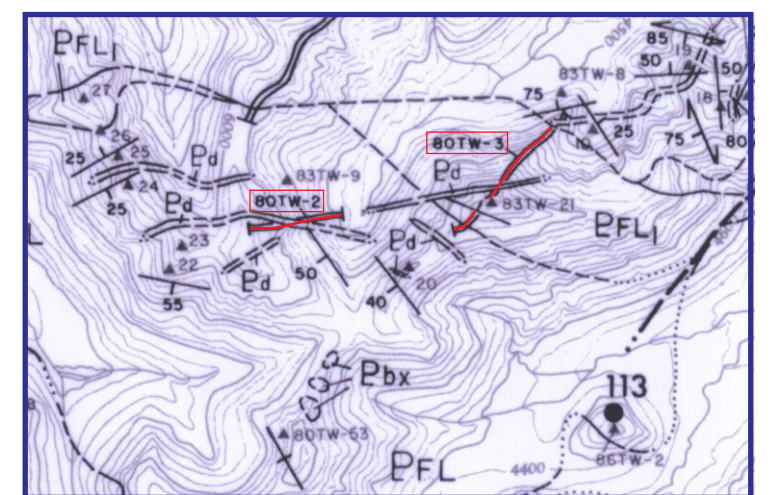
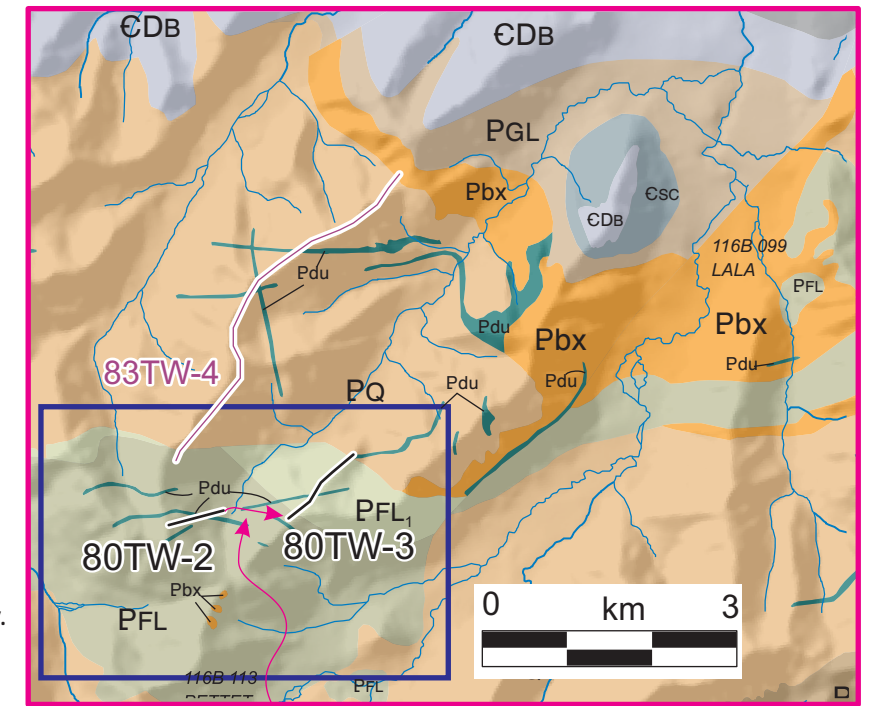
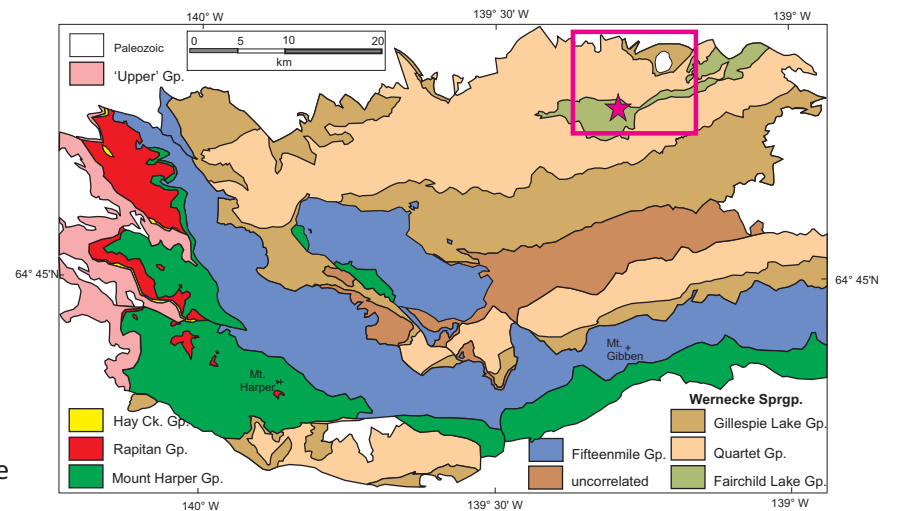
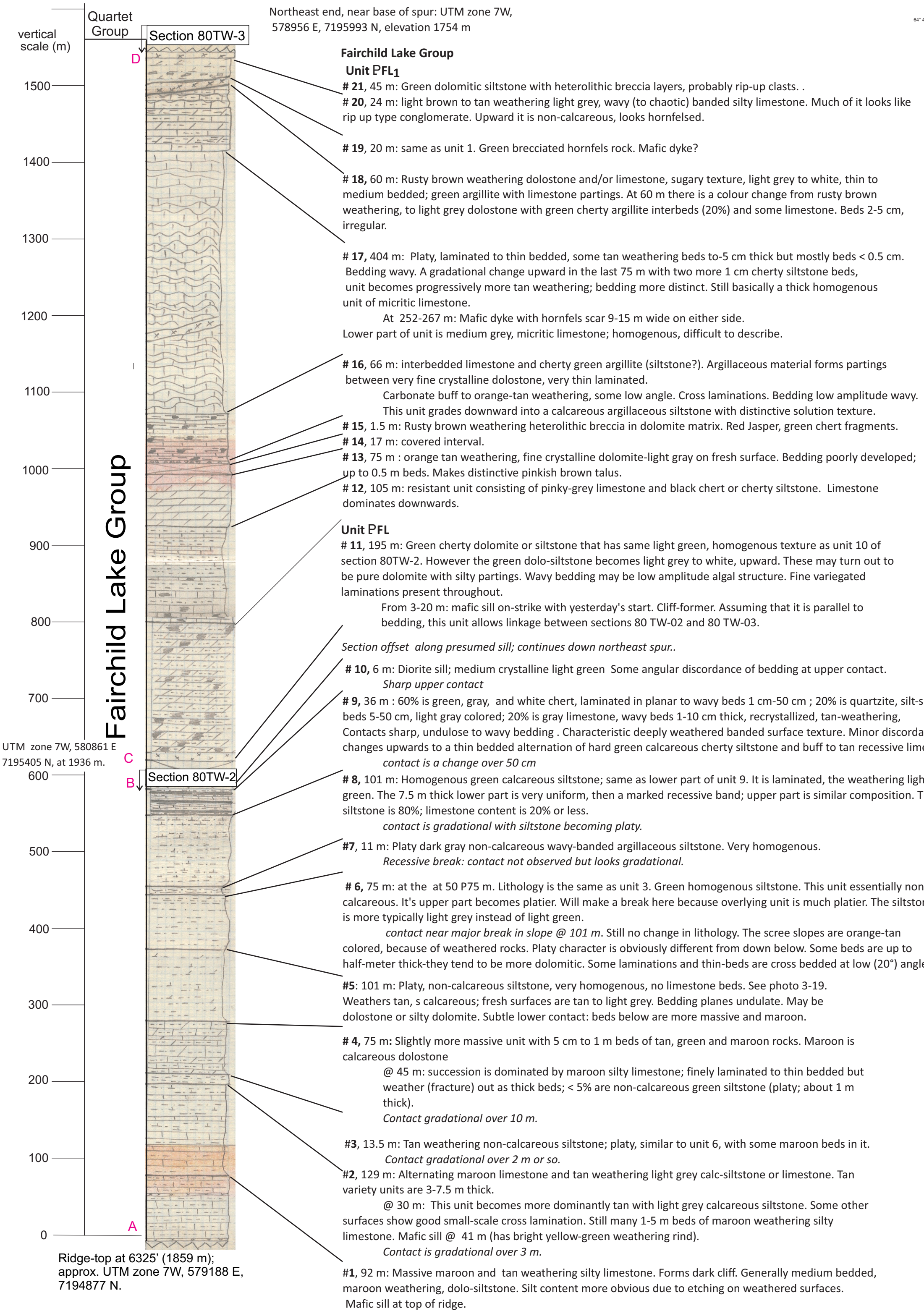
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Sheet S-21. Section 80 TW-2 and 80 TW-3: Fairchild Lake Group

Location: 50 km SW of Distincta Pk. Base of Section 80TW-2 is 64° 52.1'N, 139° 18.3'W.
Base of Section 80TW-3 is 64° 52.2'N, 139° 16.8'W

Total thickness: ~1600 m measured (no lower contact and uncertain top)

Other: From Thompson notebook 80-1, pages 30-33. This exposure is flanked to north and south by Quartet Group. These two measured sections are portrayed with stratigraphic-up to north, although beds are near-vertical and way-up indicators were not observed. Intervals are re-numbered to reflect this interpretation.



clip from: GSC Open File 2849, sheet 12; south-center of NTS 116-B/14:

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